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january, 1944
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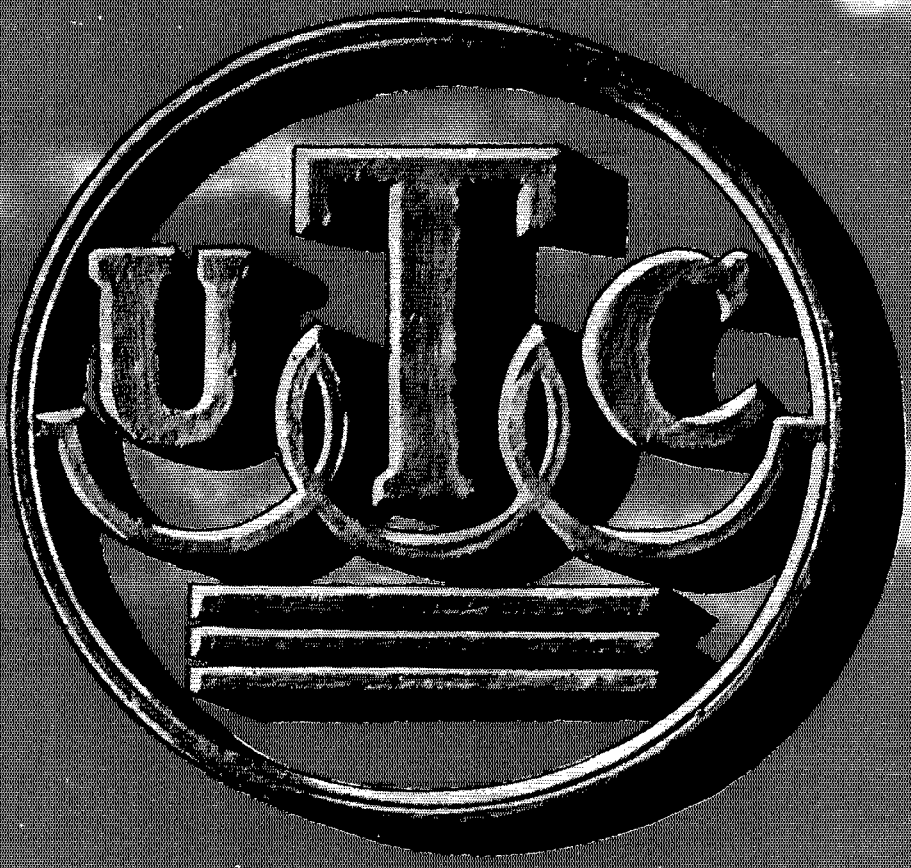

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JANUARY 1944

VOLUME XXVIII

NUMBER 1

★

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QST *devoted entirely to*

AMATEUR RADIO

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CONTENTS

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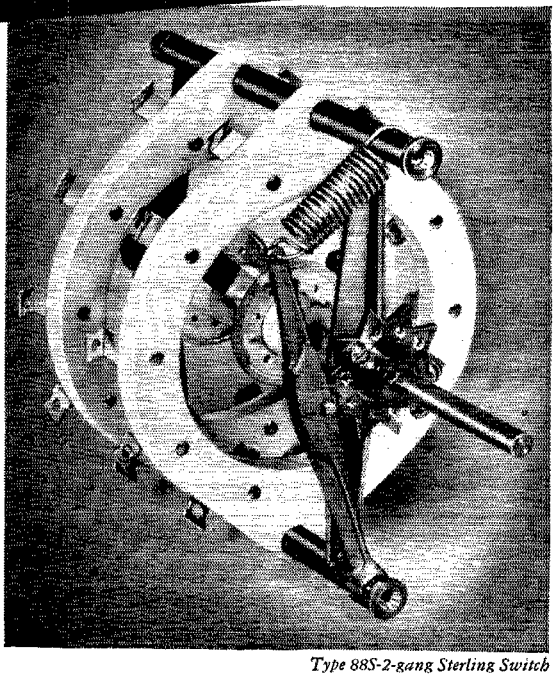

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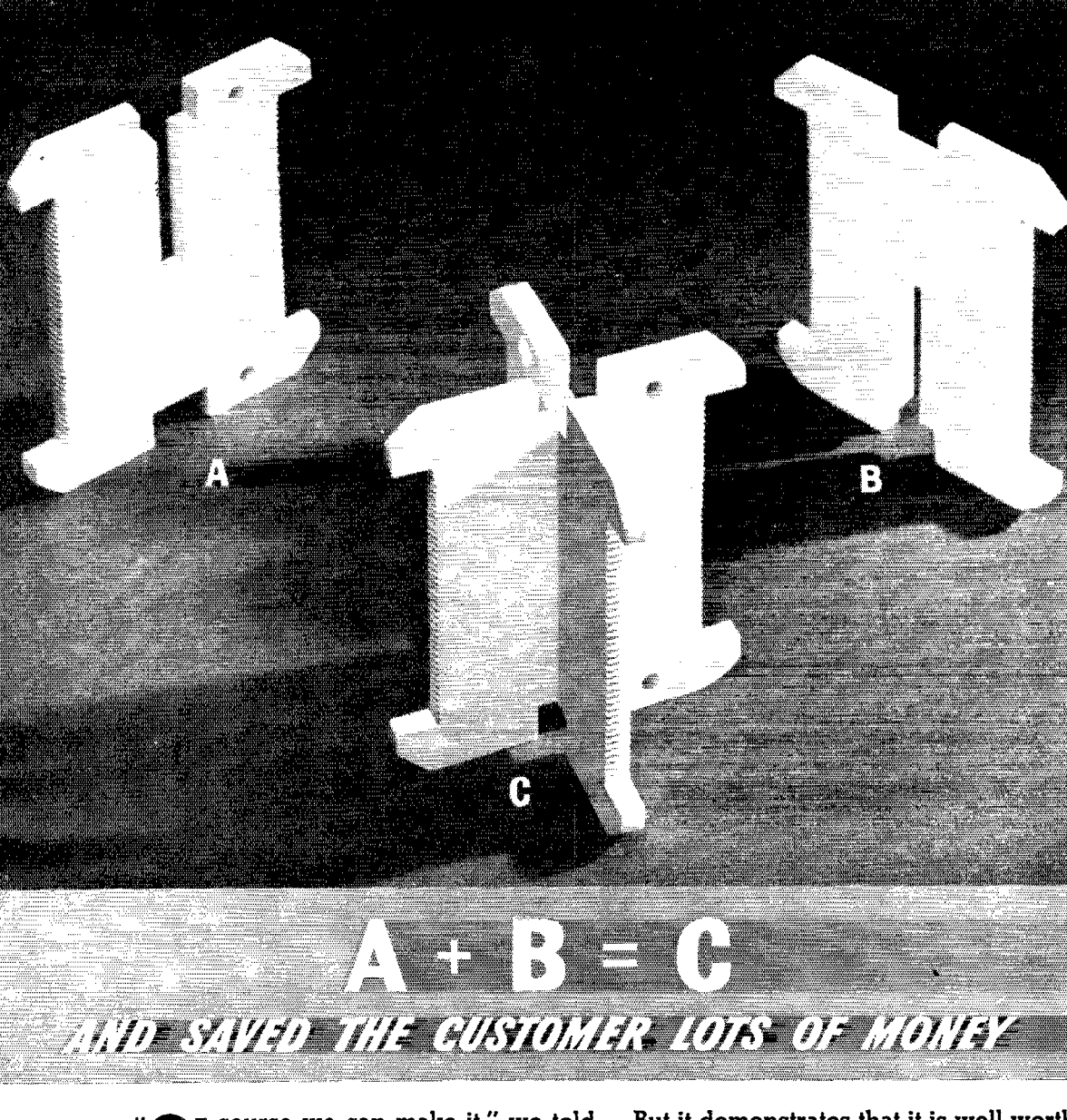

A + B = C

AND SAVED THE CUSTOMER LOTS OF MONEY

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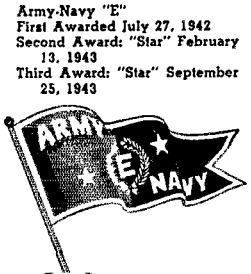

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is 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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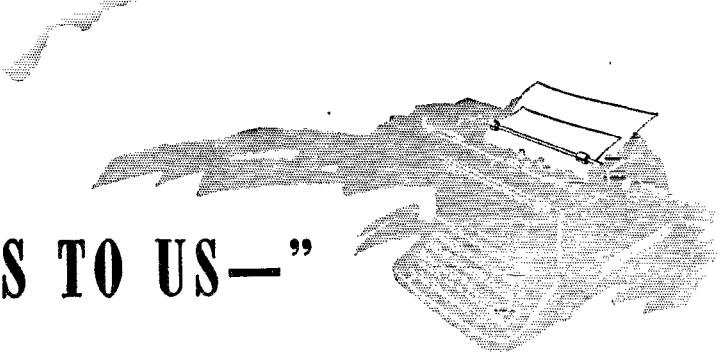


"IT SEEMS TO US—"

WATT POWER?

A FEW months back, on this page, we stated it as our belief that the time had come for us amateurs to start talking among ourselves about various problems of our postwar rehabilitation. We announced that our correspondence columns were open for such purposes, and we started the ice moving by opening up discussion of a general philosophy for the amateur radio of the future. Our correspondence department in this issue is devoted to further discussion of that topic by members of the League, which we think you will read with interest. It is our thought that we can profitably continue such explorations through the mediumship of *QST*, making haste slowly and avoiding final decisions because so many of our fellows are overseas on matters of pressing importance but nonetheless establishing at least the general outlines of what we do think about our problems.

This month we want to propose another subject: What do you think the power limitation ought to be on amateur stations after the war?

We can almost hear an agonized outcry from some of the high-power boys at the very mention of the subject, to the effect that we unpoliticly weaken our hold on an amateur right by mere public mention of the subject. That isn't true; the power of amateur stations will be what it ought to be. And there seems to be a considerable segment of amateur radio (not confined to the QRP crowd, either) of the opinion that we would better ourselves by seeking a reduction in our authorized limit. Back in 1912, in spark days, our power was set at one kilowatt input to the transformer, which was modest enough for spark rigs. When the transition came to tube transmission the figure was kept at a kilowatt input to the final stage, which is a very comfortable figure for c.w. Although there have been recurrent surges of QRP opinion, both in our ranks and in administrative circles, the figure has stood at 1000 watts throughout licensed amateur history. Prewar surveys indicate the average power used by amateur stations at the time of Pearl Harbor to have been about a quarter kilowatt to the final.

We at Hq. have no convictions in this matter and are not taking sides. In offering our facilities as a medium for finding out what the gang itself now thinks, however, we shall try to set forth the pros and cons as we understand them.

First, the arguments for power reduction:

A great many amateurs from time to time have advanced the thought that amateur radio would be much more fun if the power limit were lowered to 250 watts or even 100 watts. In the first place, that would eliminate the advantage of a fat purse — where one station is able to mow its way through countless of its fellows simply because its owner happens to have plenty of dough. We would all be on the same democratic basis, at a power level that every one of us easily could afford. The premium then would be on doing the job well — which is our meat. Small, and neat, and clean. Silver plating, maybe. Superb insulation. Everything possible to reduce losses and to improve efficiency so as to get the maximum possible percentage of that input power into radiation, at proportions with which we can all deal easily. No more overloading of tubes and blowing of condensers in the struggle to keep up with the other fellow; no more careless acceptance of sloppy practices, leaks and the haywire we once used merely because we had so many watts to spare that we couldn't be bothered to try to save the last hundred. And we'd have more pleasure and pride and satisfaction for our dollars.

There would be no great difference in performance on the high frequencies under average conditions. A few decibels, yes; but what's that to a good receiver, especially when we're all down similarly? In fact, the QRP adherents contend, we'd almost never notice the difference.

There would be two great advantages in the reduction of interference. It is seldom the high power of a distant interferer that gives you receiving trouble: it's the local blanketing you get from the high-power station in your own neighborhood, the excessive interference you get from a strong ground wave. Well, it is argued, dropping the power limit will eliminate most of that blanketing and thereby lick one of our most unnecessary forms of QRM. That's going to be particularly important in view of the greater number of amateurs we are to expect after the war, with the blanketing possibility increasingly serious in the larger cities, particularly on 'phone. The second advantage is that interference to broad-

cast listeners by similarly plugging up large sections of the dials on their receivers also would be greatly reduced.

So much for the QRP argument. Now let's look at the other side of it for a moment.

It is pointed out that, in the world-wide picture, American hams traditionally are the ones with the dollars and therefore the ones with the kilowatts and the superhets. When it comes to foreign DX, our elaborate multi-tube receivers manage to pull in signals from the 10-watt puddle-jumpers over yonder, while our powerful kilowatt transmitters lay down something that they can hear with only a three-tube homemade receiver. If we were on reduced power too, it is argued, there would be many occasions when that decrease of a few decibels would make contact impossible. And even on 3500, relaying traffic, when conditions are unfavorable because of static or imminent skip-out, that extra power might make all the difference. Then why not have it, this group contends. Provided it makes no difference in QRM to other radio services, the power we use is strictly an interior amateur matter, and there's no reason why we shouldn't use a kilowatt if it is occasionally helpful to have it.

It is also to be said, in a rather quiet whisper, that it is high-power gear that costs the money, and that if we cut our power drastically we will reduce the volume of amateur business and consequently the prosperity of our manufacturers and suppliers and their ability to create new stuff for us. Against this is the fact that, whenever a ham has any spare jack available for the station, he'll find something to spend it on.

There it is, in major outlines. But so far we've talked only of the high frequencies. You may think of the v.h.f. and u.h.f. as quite a different story — one where we shall need all the power we can get, because of the different propagation conditions. It has even been suggested to us that the League ought to seek an understanding at Washington that the present power limit on amateur stations means average power, so that if we take up pulse technique on super frequencies we'll really be able to get some peak power out of those bottles. We admit that our dope on this field is insufficient to warrant an opinion, but at the moment we definitely do not enthuse to the idea of pulse transmission in our crowded bands; nor do we see vast extensions of range resulting from it unless we want to change completely our receiving methods as well. Some of you readers are much more entitled to an opinion on this subject than we are at this stage. But even without the new techniques our bands above 28 Mc. may require different treatment than the lower frequencies, so you may wish to think of them separately.

Most of us don't realize it, but there is one complete answer to this power question in the regulations. Both the international and the domestic regs say that every radio station shall use the minimum power necessary to maintain the communication. To make an ideal compliance with the wording of these regulations, every amateur station would have a smoothly variable power control to vary the input between zero and maximum and, in every QSO, would so adjust the power level that it just satisfactorily supported the contact. On that basis we could each possess a kilowatt without possibility of harm, a kilowatt that we would almost never use, while we would find, we believe, that we did a great deal of our work with only 50 watts and some of it with only about 3. Unfortunately there has never been any practicable way of varying the input power of a complicated multi-stage transmitter over extremely wide limits, especially on 'phone. Perhaps the new tubes and circuits that will come to us at the end of this war will offer a feasible way of accomplishing this ideal. If they do, that power control is what we should hitch to that brass handwheel we talk so much about, and the question of the power limit will cease to exist.

But in the meantime, OMs, it is opened to discussion. As a practical amateur, what do you think the legal limit ought to be, and why do you believe that your figure would make the best possible kind of an amateur world? *QST* will publish as many of your responses, for our common information, as space permits.

MRI XMAS

SOMETIMES Pearl Harbor seems but yesterday. Sometimes it seems a day out of a dim previous life. In the two packed years since that fateful day several tens of thousands of American radio amateurs have put aside their ordinary pursuits, have donned uniform or coveralls and have carried their amateur-born skill in communications to the aid of the cause of decency.

It has long been the custom of the Headquarters Staff of ARRL to send Christmas greetings to the members of the League by means of this issue of *QST*, which normally reaches members during Christmas week. This Christmas finds our amateur body dispersed all over the world, many in places that previously existed for us only as prefixes on the DX map. A goodly number of our own staff members are included. Those of us who are still here — whose duty it has been to stay to do what we could on the home front — again take this traditional opportunity to say Merry Christmas to you men and women overseas; to say how proud we are of you; to assure you that we work constantly not only to support your efforts but to insure the restoration of your rights as amateurs when you return.

Though we must rely now only on the printed page, there is the old warmth in the old words: Merry Christmas, OMs and YLs — and may you have the next one at home, on the air!

K. B. W.

A Simple WERS Transceiver with Transformerless Power Supply

An Easily Constructed A.C.-D.C. Unit

BY LOUIS H. ROTH,* W2DKH

Following his success with the separate transmitting and receiving units previously described in *QST*, W2DKH went to work on a transceiver designed to operate from 115-volt a.c. or d.c. lines. The result is a compact unit which can be built in an evening or two — and it performs!

AFTER constructing the 112-Mc. a.c.-d.c. transmitter described in "Hints & Kinks,"[1] the thought occurred that it should be a simple matter to design and construct a transceiver using the same tube line-up. Although there was some question as to the possibility of obtaining satisfactory receiving performance, an attempt to see what could be done with a minimum of components and controls seemed definitely worth while.

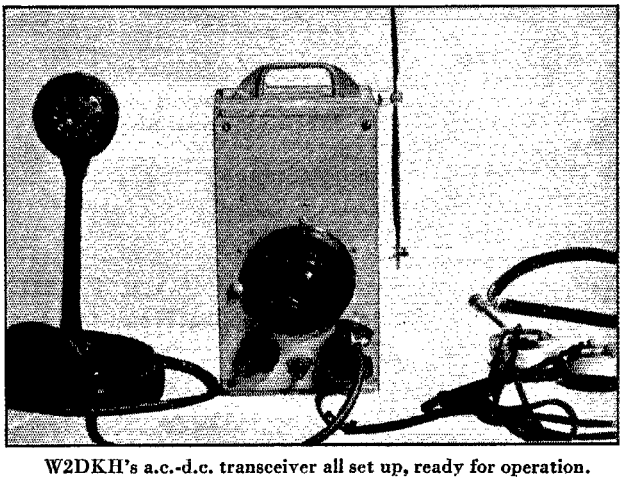
This contention has been borne out by the results obtained in actual operation of the simple unit shown in the photographs. On the second floor of my home, WERS stations in the counties of Nassau, Kings, Bronx, New York and Queens come through with loudspeaker volume. The key WERS New York City station, 15 miles away, roars in exactly like a high-power b.c. station. When the rig is operating as a transmitter, FB sparks can be drawn from the tank coil and a ½-watt neon bulb lights up rather nicely. The modulation is adequate and of good quality with a single-button mike.

There is nothing complicated about the circuit, shown in Fig. 1, especially when it is considered that the diagram includes the circuit of the power-supply section. A 12J5 is used in the combined detector-oscillator. The change-over switch, S_2, takes care of the usual change in grid-leak resistance. The pentode section of the 70L7 serves both as the output audio amplifier when receiving and as the modulator when transmitting, while the rectifier section supplies plate voltage through the filter consisting of C_7, C_8 and L_3. A tiny two-cell flashlight battery provides ample power for the mike. Various values were tried throughout the circuit before arriving at the optimum ones shown below the diagram.

Construction

The entire rig, with the exception of the antenna, is mounted as a compact unit on a plywood baseboard 4¼ × 4½ inches, attached by sturdy L-shaped brass angles to a plywood panel 4¾ inches wide and 8½ inches long. The baseboard is attached to the panel at a point about 4½ inches from the bottom. The 12J5 and C_7C_8 are mounted at the rear of the baseboard. The 70L7 is mounted in the right front corner, as close as possible to the panel. There is ample room for T_1 and L_2 between the tubes. All of the remaining components, with the exception of the S_1, S_2, R_2, and the 'phone jacks, are mounted underneath. The other parts are mounted on the lower portion of the panel. The tiny microphone battery is attached to the rear top portion of the panel, to the left of the 70L7. A 3-inch dial from an old Atwater Kent, attached to a short length of bakelite rod, is connected to the shaft of C_1 by means of an insulated coupling.

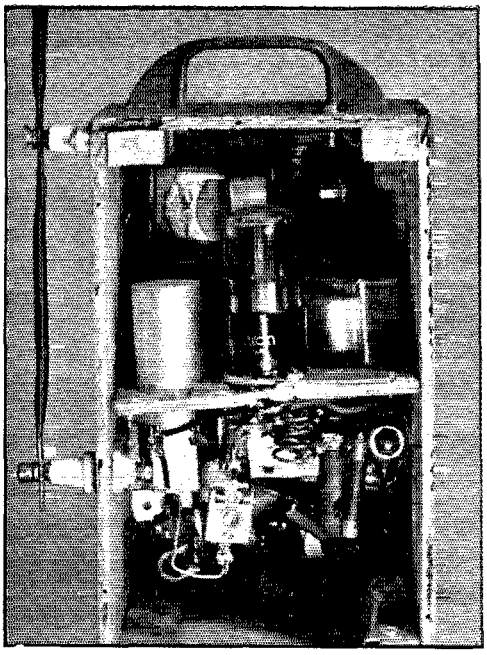
Ordinary wafer sockets are used in this rig. Practical experience has shown that ceramic sockets are okay if you have them but that their use on anything lower than 118 Mc. is just a waste of money. Of greater importance is the length of the r.f. leads; they must always be "shorter than short," if possible.



W2DKH's a.c.-d.c. transceiver all set up, ready for operation.

* 114-67 23rd St., St. Albans, N. Y.

[1] Roth, "A.C.-D.C. Gear for 112 Mc., *QST*, August, 1943.



Rear view showing the unit mounted in the plywood case and the antenna attached at the side.

To dissipate the heat generated by the 70L7 and R_2, several small holes were drilled at appropriate places through the wooden cabinet used to house the rig. This cabinet was put together from ¼-inch Presdwood (the plywood gave out). It measures 4¾ inches deep, 4¾ inches wide and 8¾ inches high and is reinforced at each corner by ½-inch-square strips 4½ inches long. Nails or glue may be used for fastening, depending on how one feels about it. The entire unit fits snugly in the cabinet and the panel is attached to the cabinet by screws at each corner.

The antenna is attached to the right rear side of the cabinet by means of a small feed-through insulator placed at a point 3½ inches from the bottom of the cabinet. C_3 is fastened with No. 12 wire to the *plate* side of L_1. The remaining terminal of C_3 is attached to the connecting screw of the feed-through insulator, providing a rigid mounting for the condenser. A small "beehive" insulator is mounted on the side of the cabinet parallel to and above the feed-through insulator to provide additional support for the antenna. Appropriate holes are drilled in the antenna rod to fit the insulator spacing.

Attached to the top of the cabinet is a 10-cent plastic handle (Woolworth's best). The panel and the cabinet were given two coats of French gray enamel for purely esthetic reasons.

The antenna is a half-wave end-fed affair, consisting of a length of copper tubing (discarded gasoline line) with a long piece of No. 12 bare copper wire inserted through the small opening at the top. If the wire is bent slightly, it fits snugly against the inside of the tubing and makes good contact as it slides up and down. The net result is a highly adjustable antenna, as good as any auto antenna.

Adjustment

Once C_3 is adjusted for maximum loading, there are only two controls to operate after S_1 has been turned on. These are the receive-transmit switch, S_2, and the tuning dial. In the "receive" position, the 12J5 plate voltage is about 100 volts.[2] With

[2] Because of the possibility of causing interference by receiver radiation in populated areas, it might be advisable to lower the detector plate voltage to the minimum which

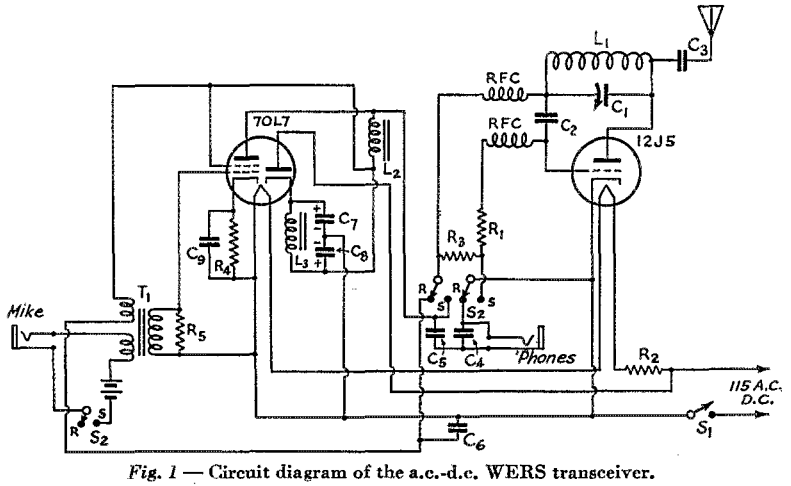


Fig. 1 — Circuit diagram of the a.c.-d.c. WERS transceiver.

C_1 — Midget variable cut down to 2 plates.
C_2 — 100-$\mu\mu$fd. mica.
C_3 — 3–35-$\mu\mu$fd. trimmer.
C_4 — 0.01-μfd. paper.
C_5 — 0.25-μfd. paper.
C_6 — 0.006-μfd. mica.
C_7, C_8 — 20-μfd. 150-volt electrolytic.
C_9 — 5-μfd. 25-volt electrolytic.
R_1 — 3000 ohms, 2 watts.
R_2 — 250 ohms, 10 watts.
R_3 — 1.5 megohms, ½ watt.
R_4 — 150 ohms, 2 watts.
R_5 — 250,000 ohms, ½ watt.
L_1 — 4 turns No. 12 wire, ½-inch diameter.
L_2, L_3 — 30-henry midget filter choke.
RFC — V.h.f. choke (Ohmite Z-0).
S_1 — S.p.s.t. toggle switch.
S_2 — Rotary switch, wafer type.
T_1 — Transceiver transformer.

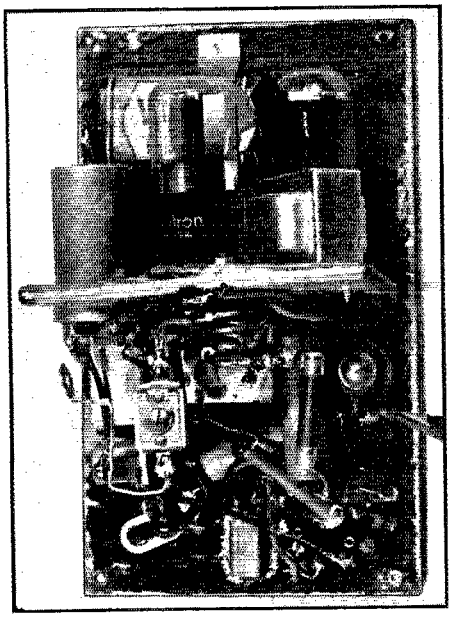
about 20 volts less on the 70L7 tetrode plate, most signals give enough volume to rattle the "cans." A 3-inch magnetic speaker is used most of the time in self defense! In the "transmit" position the voltages on the tubes are somewhat less.

After constructing the rig, it was found that a very decided hum went along with it. All sorts of schemes to eliminate this trouble were tried, but to no avail. Finally, it was discovered that R_2 was entirely too close to the r.f. portion of the rig. Mounting this component as far away as possible from L_1 and the 12J5 resulted in the complete removal of the trouble.

This rig shortly will be used as a regular portable affair in the Queens County Division of New York City WERS, and it is hoped that its performance will measure up to the necessary requirements. It is suggested that simple transceivers using the regular power lines can be used with profit by other WERS groups. The construction of this type of transceiver entails no great skill and negligible cost. The components can be purchased readily, or, if need be, they can be improvised at no great loss in efficiency. Even T_1, which is supposed to be rare, can still be obtained; if not, it can be readily made. *QST* recently described the construction of a suitable transceiver transformer from an ordinary audio transformer with the addition of a single layer of small magnet wire as the mike winding.[3]

will permit satisfactory operation. This can be done quite readily by placing a resistance between the lower end of L_2 and the primary winding of T_1, by-passing the resistance to ground. — EDITOR.

[3] Grammer, "A Transceiver for WERS," *QST*, October, 1942.



The tubes are mounted on the shelf with the socket prongs protruding below so that the tank-circuit components may be soldered directly to them.

★ SPLATTER ★

PAPER—AGAIN

MIND if we say a few words about paper again this month? It's really an important topic, you know. The paper shortage affects a lot of the nation's current doings — apart from such indispensables as your daily newspaper, the *Reader's Digest* and, of course, *QST*. Actually, printing and publishing now represent only 25 per cent of all paper usage; half our paper production goes into containers (mostly for war goods), and the remaining 25 per cent for such miscellaneous needs as writing paper, wrapping paper, towels, etc. We learned the other day that not less than 35 important articles of war matériel are made from waste paper. The thing is, there just isn't enough to go around. We've got to *conserve* paper to meet all these various needs. Furthermore, we've got to *salvage* waste paper to ease the load on new pulp production.

FOOTNOTES

QST's new year starts off with a full house, consisting of a trio of newcomers to its pages and a pair of welcome old-timers.

Charles M. Dean, ex-W1AMN, while new to *QST*'s pages, is no stranger around ARRL Hq. Back in the early '30s he was an active volunteer second-shift op at W1MK, making WAC in the wee hours and working some notable DX for these parts. Before that he'd started with a loose-coupler, a crystal, and a ¼-kw. rotary at 1HO in 1921. By 1923 he was in the b.c. game, building 123 bloopers that year. Two summers of commercial operating on the tanker fleet out of Providence followed, as well as the custom-building of several hundred "kit" sets. Then came a tour in the army (WYBA and WUC), a job at Westinghouse, first in the transmitter division and later doing installation, and then field work for Temple. A flurry of advertising brought a temporary hiatus in professional radio but brought Dean back on the amateur air as W1AMN. Interest in radio noise and v.h.f. propagation, plus dabbling in high-voltage dielectric phenomena, carried him into the aircraft ignition-interference field, with a sideline in radio interference, in 1939. As much of the result as may now be told is summarized beginning on p. 44. . . . **Willard R. Moody** (p. 27) is not actually a newcomer to *QST*, having contributed several smaller items in the past — and certainly he is no stranger to many a radio beginner who has benefited by his prolific writings and generous assistance. Now an instructor at National Radio Institute in Washington, D. C., his past record includes a B.S. in E.E. from McKinley Roosevelt Graduate College at Chicago, seven years as a b.c. serviceman, two years as a commercial operator (1st class 'phon , and a year as radio engineer with

(*Continued on page 94*)

HAMS IN COMBAT

The plane burned all that night. Madison stayed under the protective shelter of the crumpled wing-tip despite the searing heat.

IN THE August, 1943, issue of *QST* there appeared a call for stories of hams in active service on the world's battlefronts — stories of "hams in combat."

The immediate response to that plea was — well, frankly, it was disappointing. For two or three months practically nothing at all happened (with a certain exception, about which more later). Then a letter or two began to trickle in, mostly from hams reporting that some other ham had a worth-while story to tell if only he could be induced to tell it, and suggesting that we try to track down the yarn — which, of course, we did.

Now and then an intriguing newspaper clipping would arrive, and again we'd hop on the trail. Meanwhile, one or two helpful hams in this country succeeded in digging up information on their own. Fragmentary reports concerning certain newsworthy incidents arrived from a variety of sources; by piecing these together, a fairly comprehensive picture could be reconstructed.

And so, gradually we have accumulated a sufficient library of "hams in combat" yarns to justify inaugurating publication of a series as originally contemplated.

It *has* taken time — more time than was initially anticipated. Two factors seems to have been involved in this. The first and most obvious is time lag in the mails. Hams in combat areas necessarily are hams stationed overseas, and it takes a matter of weeks for *QST* to reach them and still more weeks for their letters and reports to get back to West Hartford — and longer *still* when they can tell their tales only after having returned to this country, as has happened in more than one instance.

The second reason is somewhat more obscure. It lies in a combination of modesty and the congenital inability of the average individual — be he ham, soldier, or a combination of both — to sense the dramatic in his own experiences. Or, sensing it, to put that drama down on paper. Take, as examples, the three stories which follow. Each is the result of following up an indirect lead, assembling data, dragging out the reluctant details. Not one came in as a voluntary offering on the part of the principals concerned. Finally, coupled with the native reluctance common to both soldiers and hams to engage in what they fear may seem to their fellows like boasting about their own performances, is the plain lack

of time and facilities on the part of those who are still out there where the exciting events we'd like to know about are actually happening.

Thus it seems we must rely in large part on stay-at-home ham friends, relatives and associates to dig out and piece together the yarns for this series. Considering the value such a record as this can have, we hope it isn't asking too much. Will you help?

Now about that "immediate response" referred to above. You'll recall that, in recounting what we had been told of Sgt. Johnny Adel in the August issue, we expressed the hope that someone would write in and tell us more about him.

Well, they did. And the consensus was that our information must have been pretty much all wet! The first shot was fired when Lt. Col. Wilmer Allison, W5VV, informed us that he and all the rest of the Army Air Forces Communications System were not a little irked that we had Johnny assigned to the Signal Corps instead of in the Air Corps — where he actually is. Seems that Wilmer ran into Johnny during the course of a 28,000-mile inspection tour through the South Pacific earlier this year, and that he's now in charge of one of the larger AACS stations in that area. "Incidentally, Johnny has done a swell job," concluded W5VV — who should know.

That same general dope also arrived via a couple of other routes. Then, a few weeks later, there came a letter from Capt. Fred C. Beardsley, W4DEN, via a San Francisco APO address, who in addition to claiming Sgt. Adel as a fellow AACS man and a member of his communications squadron, called us on the locale of Johnny's Jap-fighting experiences. "About the Fijis," he writes, "there never were any Japs on the Islands; also, they never had any bombing raids. So it looks like somebody is slightly island happy, and they had better push the mountains back before they get too close. . . ."

To which we can only add: "!" — and qualify our plea for further contributions with the precautionary note that, if you do send in stories on hams in combat (and we hope you do!), please verify the facts, check their authenticity, and supply substantiating data wherever possible.

Italian Invasion

THIS is a story of the Allied invasion of Italy. More specifically, it is the story of the radio operator aboard the first American airplane to land on an Italian airfield on invasion day.

He is the only man alive and free to-day to tell that story — and that only because of indomitable courage that made him brave death in the flames of his burning plane rather than submit to capture by the Nazis.

That man is Staff Sgt. Laurence E. Madison, ex-W8AHG. This is his story — pieced together from letters, from AP dispatches, from prosaic military records.

It is a story that begins quite a long time back — back at the time of the first World War, in fact. Larry Madison is 38 now. When World War I began he was only a kid of 11 but, boyishly, he had two burning ambitions. One was to be a radio operator and the other was to be a soldier. Putting the two together meant that he yearned to join the Signal Corps.

On a table in the Madison home on Center Street in Conneaut, Ohio, the small spark coil that was to have put him on the air was silenced by war. Worse still, he was too young to enlist — the Signal Corps would have none of a budding radio operator of 11. Larry's mother and father still recount the tale of his boyish heartbreak.

In time the war ended, however, and amateur radio was restored. Then Larry achieved at least the first of his ambitions. He went on the air as 8AHG. A few years later — a very few — he went to work with a transportation firm. Radio remained his dominant interest, however.

There was a period, along about the time he met "Bunny" — whose right name is Irene, and who soon became Mrs. L. E. Madison — when ham radio had to take second place. But soon the new home on Commodore Road in Lyndhurst, Ohio, began to fill with radio gear. The three children — Marilyn, now 15, Irene, 14, and Joanna, 10 — grew up with radio as a background.

Weird noises from the radio shack were the only sounds to mar the placid flow of life in the little village in the hills of northeastern Ohio —

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, 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 some amateur you know? Then sit right down and 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.

For the kind of material required, read the article "Hams in Combat," in the August, 1943, issue of *QST*, p. 16. Please indicate clearly on the report if it is available for publication in its entirety, if names, dates or places should be deleted before publication, or if all information must be held confidential.

That's all there is to it — write us a letter relating your own war-service experience or the record of someone you know. If it is published, you'll receive your $25 War Bond in return.

and they were not discordant. A decade or more passed, filled with the satisfactions of simple, settled living.

Then — not without ominous forewarning like a cloud of dust rising from an explosion, visible for an interminable instant before its sound reaches the observer — the world was at war again.

Larry had been too young for the first World War. Was he too old for this one? He didn't wait to hear himself give the answer — he wasn't going to miss out again. Of course, Irene and the three girls had something to say in the matter, but their answer was unhesitating. This time he *was* going to be a radio operator and a soldier.

The first step was enrollment in an ESMDT radio course just opening up at Fenn School in Cleveland. Larry figured he needed a little brushing up — his math might be weak, and he wasn't too sure about some of his basic theory.

But his ham background quickly made itself known, however, and his work at Fenn was well above average. He was urged to become a full-time trainee at the then new Lexington Signal Depot at Avon, Ky. Here, too, his work was outstanding, and he was selected for radar.

After four months at Avon, Larry began to get restless. There was a war going on out there. It had been going on for nearly a year now — and here he was, still in civvies.

Finally, in November of '42, Larry Madison enlisted in the Army Air Corps. Now, he thought as he put on his uniform, he'd see some action. Now he was a soldier and a radio operator.

Disregarding his radar training, at least temporarily, the Air Forces first assigned him to duty as a control-tower operator at Patterson Field. Christmas of that year found him at Connellsville (Pa.) Airport — a plain, ordinary radio operator. At first, that is; he'd been there only a few days when they made him a trick chief.

Yes, he was a soldier and a radio operator — but he was no longer a kid of 11. He and radio both had matured a lot since then, and he had bigger ideas. Sometimes he looked down at his uniform and wondered. Was he going to be left out of this war, too? The *real* war, that is?

The answer came one day in early May. An undersized War Department envelope arrived in the official mail — urgent orders, transferring him to immediate duty overseas.

"Overseas" turned out to be North Africa. Larry Madison found himself in the war at last — all the way in. North Africa was a busy place about then. Rommel was on the run — but the desert fox had not yet been run to ground. While the chase was on the Air Force was the hound-pack on the scent, guiding the ground-force hunters charging along behind.

In the next few weeks Larry was attached first to the Air Corps and then transferred to the Signal Corps. Those were hectic days. One day he'd be doing radar work and the next he'd be pounding a key. If yesterday's mission was in the radioman's seat of a Jerry-strafing attack bomber, tomorrow's would be a ferrying job involving a complicated installation at a strategic point.

After Tunisia it seemed that the tension might relax. Letters from "Bunny" became pleading: now that the North African campaign was over, wouldn't he be home on furlough?

But there was no furlough. There was too much to be done.

Sicily was next on the Allied timetable. Madison had established a reputation as a crack troubleshooter and installation man, as well as a crack operator — and a versatile, skillful operator-technician was too valuable to be spared.

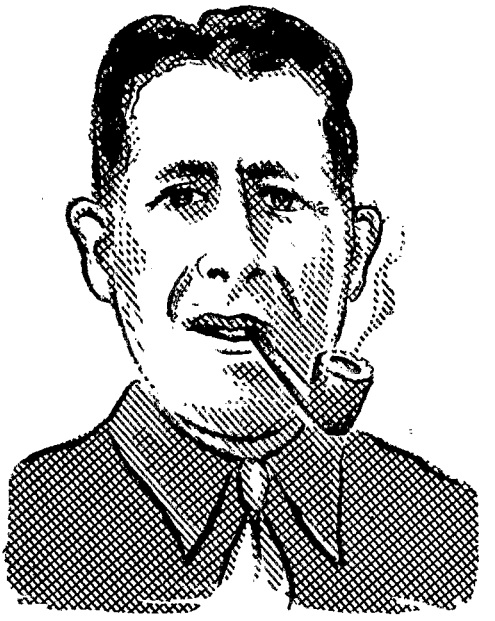
When the day for the Sicilian invasion actually arrived, Larry found himself in a jeep. It was his own personal jeep — one of the amphibious type. He called it "Bunny," after the XYL — "because," he said, "while it was unpredictable, it never let me down."

Larry and his jeep drove ashore from the landing boat with an advance echelon of the Signal Corps. Their mission was successfully completed in the early period of the fighting.

During the interlude while the infantry and artillery were mopping up in Sicily, Larry had an opportunity to move around a bit — meet the radio men in the various other outfits, maybe sit down for a while and chew the fat over a glass of *vino*. He ran into a number of other hams, and every time ham met ham it seemed the old fraternal spirit surged alive again. There never was a fraternity like amateur radio — he realized that now more than ever. . . .

Then — like a step, halted briefly in mid-stride, being resumed — the pressure was on again. This time the goal was Italy. Madison was assigned to a signal unit of the Northwest Africa air service command.

Again the urgent, hectic, interminable period



Staff Sgt. Laurence E. Madison, ex-W8AHG.

of planning and preparation. Larry's was the radio-gunner's seat in a certain B-25. It was a very special B-25. That is sufficiently evidenced by the fact that the pilot was a full colonel.

The colonel, a casual, hard-bitten veteran of World War I, was convinced that as a radio man Larry had no equal. Ingenious, versatile, resourceful — you know, ham style. If everything was going smoothly they wouldn't see each other for days. But when trouble was brewing the colonel would yell for Larry so loud they could hear him from Cairo to Algiers.

Through the August heat they sweated. Then came invasion day. The assignment for the B-25 bomber crew to which ex-W8AHG was attached was that of ferrying vital communications equipment to a specified airfield in Italy from their North African base and setting it up immediately in the rear of the British ground forces designated to occupy the sector.

The colonel's watch ticked around to the zero hour. The take-off and the brief flight across the iridescent Mediterranean were uneventful. There was not an enemy plane in sight. The navigator laid his course straight for their objective, that Italian airfield — which by now, according to the invasion schedule, was an Allied airfield.

The course ran true, and they saw the field dead ahead soon after the colonel started his glide. Still there were no signs of enemy fighters or ack-ack to warn them of danger ahead.

As they approached at 1600 feet they saw rows of German planes aligned neatly along the field. There was no other sign of occupancy. "It looked as peaceful as an airport in New York stretched out for a parade," Madison later told an AP correspondent.

"The field's in our hands, all right," the colonel decided. The B-25 circled and then came in, landing gear stretching down slowly and akwardly as though stiff from the long journey. Still there was not a sign of life on the field. The wheels of the B-25 touched the ground.

Exactly at that moment all hell broke loose. A German 88-mm. gun on the ground opened fire. The first shell was a miss. The second smashed through the ship below Madison's feet, knocking him to the floor. As the bomber, fully braked, rolled to a stop near the edge of the field, Larry felt more shells go through the front of the fuselage.

Obviously, the field was not yet in Allied hands — not quite. The Germans and British were still contesting the precise status of its title. They had come down during only a momentary lull in the fighting.

The American airmen didn't stop to think about that just then. One of the crew crawled out the fuselage door amidships and yelled, "Grab your tin hats and get the hell out of there!"

Larry ripped the cans from his head. Shorty, the gunner, grabbed up two tin hats. He shoved one at Madison and dived head-first through the emergency door.

"I followed as if my head was glued to his seat," Madison related.

Before he was all the way through the door, one of the auxiliary gas tanks caught fire and exploded. The driving concussion hurled him out and dropped him, a crumpled heap, on the runway. Suddenly the entire ship burst into flames.

Madison, dazed but not injured, slowly drew himself to his knees. None of the rest of the crew were in sight. There was only Shorty and himself.

At first they could hear only the sound of crackling flames. Then they identified the more ominous crackle of German machine-gun fire.

They dashed behind the blazing plane for cover. Still not sure in which direction lay friend or foe, they started crawling toward the hangars. Shorty was in the lead, about 25 feet ahead. Suddenly two Jerries ran up, shouting: "Hands up! Hands up!" They began counting: "Vun, two, three. . . ."

At "three" Shorty rose to his feet, arms raised. Madison started to get up, too. He pulled himself to his knees. Mingled images of Lyndhurst, Ohio, and slavery in a German prison camp tumbled haphazardly through his brain.

At that instant the main fuel tank in the burning B-25 ignited, and a huge sheet of flame blew toward them. For the moment the Nazis' attention was diverted. Still in a crouching position, Larry turned and ran back toward the blazing plane.

As he reached the flaming curtain, rifle fire spatted in the rear. But Madison dashed safely through the billowing wall of flame.

Inside the blazing area he saw that one wing-tip panel had been blown off by the force of the explosion. Engulfed in the acrid choking smoke, Larry threw himself under the wing tip. A few feet away the fuselage burned radiantly, bathing him with blast-furnace heat. Tongues of flame licked out but did not quite reach him.

"It was pretty hot, but I stayed there," Madison said. It *was* hot — so hot that the Germans did not dare approach. He knew that they were searching for him. He could hear them talking — one voice brusque and guttural, the other a nervous Teutonic whine. Other voices came. He could hear them searching the surrounding area. They stayed warily on guard. After a time food was brought, and he could hear them eating only a few feet away from where he lay.

Still they did not venture near the burning ship. What was the use? Nothing could live in that inferno. . . .

Eventually, hours later, the Nazis decided Madison was certainly dead. Shorty had been led away, a prisoner — captured but not cowed.

The plane burned all that night, and Madison stayed under the protective shelter of the crumpled wing tip. The searing heat was just short of being unbearable — but still it was better than the machine gun fire outside. In the distance he could hear the British, on the outskirts of the field, continuing the attack. There were several counterattacks back and forth, but when dawn came the Germans still held the field.

The next morning, soon after it was light, a

(Continued on page 82)

Atlantic Convoy

BY ALVAR J. KUJAMPAA, * WIKJO

BEING 22, an amateur operator for all of seven years, and unsuited for military service, I joined the merchant marine to see a little action. And action I did see — the first ship I ever boarded being lost as the result of enemy action.

I joined the crew of this ship as "sparks" at a southern port. After a hectic trip up the coast, in which we were on the scene when a tanker was torpedoed and a Navy blimp was shot down, we reached the port of New York. Even our entrance into New York harbor was not uneventful, for during it we nearly collided with another ship carrying the same kind of cargo as we were. Without going into details, had that collision actually occurred the citizens of New York would have been rudely interrupted in their good night's sleep!

We started the really serious business of getting across the Atlantic as part of an Allied convoy after stops at two more North American ports. Our destination — which, for reasons of security, I'll simply designate as "X" — was reached without any sign of trouble.

However, we did have some genuinely rough weather. In fact, it got so rough that at times I had to lash the chair to the desk in the radio room to keep from sliding all over the deck. At least half the crew made regular visits to the ship's side, to leave their stomachs' dislikes for the sea. Fortunately enough, I never experienced the slightest discomfort and enjoyed my trip across immensely.

After reaching "X," our port of destination, we had two weeks in which to rest — that being the time required to unload the ship. While there at "X" I met up with the sweetest girl I've ever known. In fact, it is she whom I hold responsible for my continued interest in the merchant marine. I might even go so far as to say that this interest revolves around the fond hope of getting back to "X" for the continuance of a beautiful friendship which some day might even result in marriage, I hope!

However, life is cruel, and after a few days of bliss we had to leave "X" and return home. I'd been told that our ship was destined to come back to that same port, so I left my honey with the promise that I'd be back in a short while.

When we started back the convoy was accompanied by so many escort vessels, including even a baby aircraft carrier, that the entire crew knew all could not be well where we were headed. Our apprehensiveness was soon confirmed. The first bit of danger came when a floating mine rolled gently along the side of our hull. There was not sufficient concussion for the mine to perform the function it was designed to accomplish, however, and we had to leave the pleasure of setting it off to one of the escort vessels. This they did in short order with the aid of their deck guns.

The convoy followed an evasive course, first heading west, then southwest, and lastly north — all of which added to our belief that action lay ahead.

And action there was. On the very day that Prime Minister Churchill made the statement that no merchant ships had been sunk in North Atlantic waters for more than four months, our convoy was attacked by a German submarine pack.

Being the only radio operator on board our ship, I had to keep a continuous watch during enemy action. After the first warning was flashed, my ears were literally glued to the speaker for the count of ships going down. On the night that a German torpedo found our ship, therefore, I was on duty in the radio room. The two Navy signalmen aboard joined me there, and we discussed the night's events. The reports I had received from other ships indicated that all of the merchantmen torpedoed that night had held positions in the starboard column of the convoy. Since we were exactly 180° out of phase with the scene of action and held the first position in the port column, we sensed no immediate danger.

About two hours elapsed with no further reports of ships being sunk. This sudden lull after the furious attack made us uneasy. One of the Navy boys remarked that those wise Jerrys might be coming over to the port side of the convoy now that they had most of the escorts looking for them on the starboard side. Leaving me with this cheerful thought, the signalmen went outside.

I'll swear that it seemed a year, but actually not more than half an hour elapsed before the sub pack struck. I felt the ship heave, and an instant later I heard a terrific explosion deep in the hull. The force of the explosion threw the chair in which I was sitting hard up against the bulkhead.

On opening the radio-room door I could hear mad shouts of "Abandon ship." No one seemed to know how badly we were hit. I didn't see any water coming into the radio room, so I proceeded about my business of reporting to the commodore that we had been torpedoed. Then, throwing the code book and other confidential papers overboard, I donned my life jacket and

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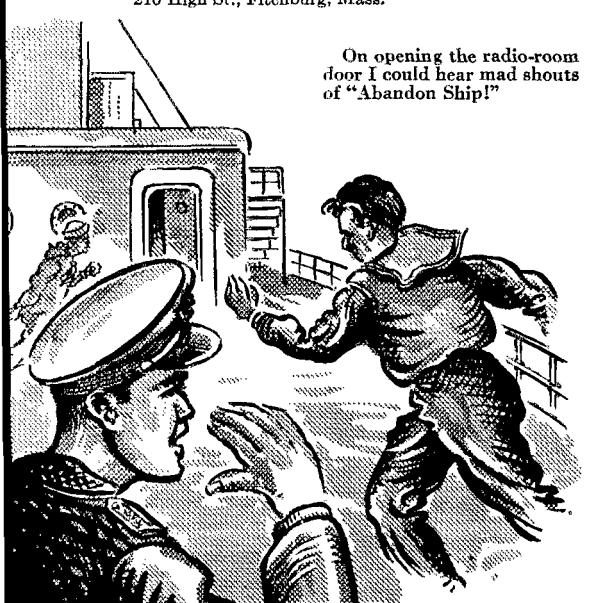


On opening the radio-room door I could hear mad shouts of "Abandon Ship!"

began to run for the life boat stations carrying the life-boat transmitter. The decks of the ship had just been swabbed with fish-oil — a very slippery substance, indeed — and I fell down three times before I reached the boat deck with my valuable cargo. Three life boats already had been lowered, and the captain was frantically holding the fourth for the remaining members of the crew.

I told the captain that I had sent a message to the commodore but had received no acknowledgment of receipt. I guessed that perhaps our transmitter or receiver had gone bad — either that, or the commodore's ship was in an even worse predicament than our own and couldn't answer.

The captain ordered me to run back up to the radio room and make one more effort to contact the convoy leader. This I did. I could get no reply to my calls, however, so I left the radio room again. On the way I noticed a signal lamp. It seemed like something we might need, so I grabbed it up as I ran.

Then came the task of leaving our "home, sweet home" of the deep. Some task it was, too, with the sea rough enough to keep a whale submerged. We managed, however, and soon we were afloat in our lifeboat, preparing to watch a ghost-ship go down to meet the destiny of the sea. When daylight came our ship was still afloat, but the after portion was high up out of the water and the bow was pretty well submerged.

I could see now why I had received no answer from the commodore's radiomen. Both of my antennas were down, one lying against the smoke-stack and the other dangling away down against the hull of the ship.

At dawn two escort vessels came to our assistance. They circled the ship and told us that it looked as though she might be saved. Our captain issued orders for all hands to go back aboard. This we did. The badly maimed ship was a pitiful sight. Everyone set to work immediately to restore order. I began to make emergency repairs on the one salvageable antenna.

While we were at work on deck, a Nazi submarine began to surface near our bow. Seeing the deck cannon and anti-aircraft guns aboard her, we thought she was going to become active as a surface raider and hold battle with our two escorts. By this time the convoy had moved on and there were no other ships in sight.

When our escorts immediately took the offensive, however, the sub, like a scared fox, crept back into its roomy ocean. There it was safe enough, for the escorts couldn't drop depth charges without endangering our ship. All of this action was so close to the ship that I could easily have thrown an apple into its midst.

After the raider submerged we were told by the captain of one of the escort vessels that the sub had been lying right alongside us all along. Furthermore, they probably were still there, looking for an opportunity to shell us. Thereupon a violent controversy took place between our captain and the escort captain. In the end our captain ordered us to abandon ship again. It seemed she had been so badly damaged that she would go down in a very few hours, anyway.

While at "X" I met the sweetest girl I've ever known.

So we took to the life boats again. This time we were picked up by the escort vessels, one of which was a Canadian and the other a Free Frenchman. I was taken aboard the Canadian. That corvette unquestionably was the pitching-est, rollingest mechanism man has ever sent to sea. Life aboard her wasn't without its brighter moments, however, since now we were hunting for subs instead of shunning them as before.

It soon became apparent that the corvette's sounding equipment for detecting subs wasn't functioning properly, however. Something had happened to it during the battle the night before. The escort captain therefore informed us that the ship would head for the nearest port where we could be put off and the damage repaired.

While aboard the corvette I visited the wireless room to find out whether or not my distress signals had been received. The radio operators there informed me that, although they themselves hadn't been guarding 500 kc., the commodore had received my message and relayed it along to the escort ships.

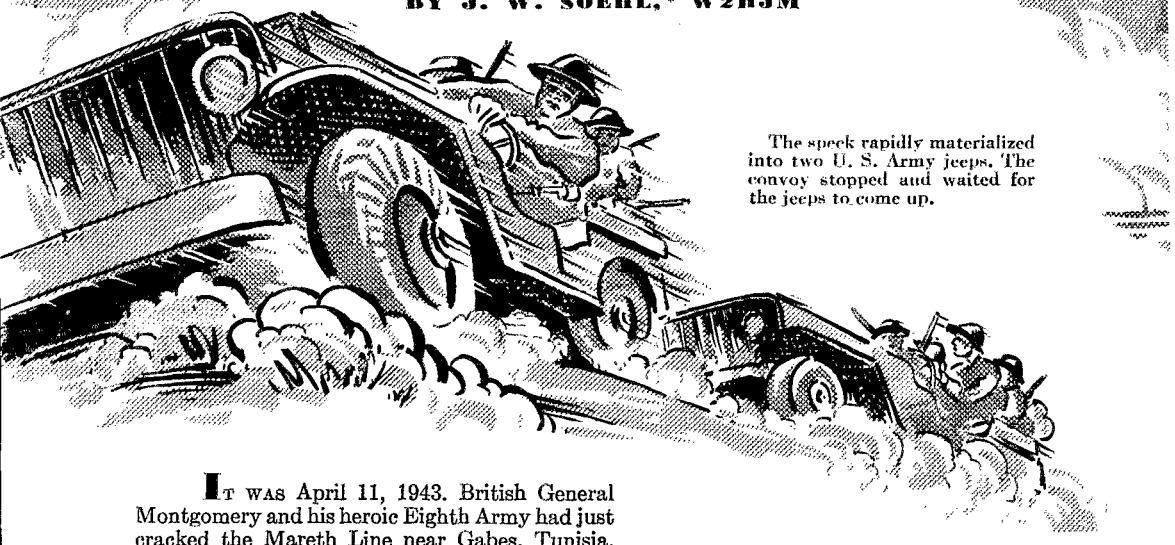
About five days later we arrived at a British Crown Colony. There, under the care of the American Red Cross, we lived the life of soldiers at a U. S. Army camp which was on the island. Right here I'd like to take my hat off to the American Red Cross. They're really a swell bunch, and too often not fully appreciated until a predicament similar to ours is experienced. They fed us and gave us emergency seaman's kits, containing clothing, shoes, a toothbrush, a comb, and a shaving kit. We were also given carton upon carton of cigarettes, all of which went well with my shipless colleagues.

After two weeks of "goldbricking" at the Army camp we were sent by boat to another port on the North American mainland, and thence by train to New York City. And that was the end of my first voyage on "Atlantic convoy."

I don't mind having a ship sunk under me, but I hope that my next voyage will fare better. You see, I just got myself a brand-new alarm clock and I'd sure hate to lose it.

La Fauconnerie by 1600

BY J. W. SOEHL,* W2HJM



The speck rapidly materialized into two U. S. Army jeeps. The convoy stopped and waited for the jeeps to come up.

It was April 11, 1943. British General Montgomery and his heroic Eighth Army had just cracked the Mareth Line near Gabes, Tunisia. The Jerries under Rommel had started scurrying up the coast to take up new positions near Sousse. With the RAF, giving air support to the hard-driving Tommys, were two now-famous U. S. fighter units — the 57th Fighter Group and the 79th Fighter Group.

Both fighter units had been driving up the coast and through the Western Desert from Egypt, giving what has been described by Churchill as "the finest air support ever given any army." They had been considered sister units. Both were flying the famous Warhawks. Both had been through all the hell a campaign on the blistering desert can offer and were still banging away at the enemy daily from dawn to dusk.

With the 79th in important posts were two radio hams. One was Lt. Col. Charles "Chuck" Grogan, W8RZA, operations officer of the group and formerly commander of the 87th Fighter Squadron, one of the 79th's four fighter squadrons. The other ham was Major Guy A. Stewart, W2JRG, group communications officer.

When the first light of dawn came on April 11th, the advance party of the 79th was on a landing ground at Cekhira. During the night orders had come to move on to la Fauconnerie at dawn in an effort to keep up with the fleeing Rommel and his horde.

Prior to this particular day Major Stewart, as the ranking ground officer, had led the advance party convoy, making moves of hundreds of miles each day. Lt. Col. Grogan usually flew his P-40 along with the other pilots, as they moved their planes forward after the advance party had set up the new bases.

On this particular day, however, W8RZA was assigned to the ground convoy by Col. Earl E. Bates, the group commander. A new pilot was assigned to fly Lt. Col. Grogan's plane. The latter conferred with W2JRG at dawn, as the seventy jeeps, trucks, radio cars and other vehicles lined up for the dash across the desert.

"I'll go ahead of the convoy, Stew," said the colonel. "I'll only be a short distance ahead of you. We're not more than a few hours behind Jerry and you've got no protection whatsoever from attack if any of their rear patrols should linger behind a bit."

Soon the colonel was out of sight, and only distant dust could be seen far ahead on "Y" track. The convoy was scheduled to move only about sixty miles, but it was tortuous going and eleven hours had been allowed for the move. After going about ten miles — passing hundreds of wrecked German and Italian tanks, trucks and other vehicles, and tons of abandoned equipment — the convoy reached a certain "crossroads" marked on the map.

Major Stewart found a situation not unusual in African operations. Instead of two roads crossing, as shown on the map, there were five "roads." Nearby was a native sheepherder tending his flock, which had apparently been hidden from the enemy as he passed. At first they couldn't get much out of the frightened native. The major conferred with other officers who came up in cars and jeeps behind him. Finally, by sign language and pointing to the big blue star on the major's jeep, the native pointed out the road over which Col. Grogan presumably had gone. By the compass this seemed to be the right direction.

The convoy started again. It continued on its way mile after mile, passing wrecked and abandoned enemy equipment strewn as far as the eye could see. The terrain soon became hilly, and

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after an hour it seemed as though the road was bearing too far to the southwest. The major stopped again to look at his compass and map and to confer with the officers behind him. It began to appear that they were on the wrong road.

Rather than lose time in turning the convoy around and retracing to the intersection the major decided to go on further, looking for a crossroad or desert track that would lead northeast. He had moved only a few hundred yards beyond a bend when he came to a small valley. There in front of him was a narrow-gauge railroad that showed plainly on the map. Furthermore, there was what was left of a railroad station. The sign on it, "Mezzuna," was plainly visible.

The major stopped the convoy. Where had he heard that name? Oh, yes — the 79th had plastered hell out of it the day before on a bombing and strafing mission. The map showed the station to be about 12 miles too far to the west of where "Y" track should cross.

Up rolled the other vehicles. Again the officers conferred. There should be a way to cross that track. If the road they were on crossed within a mile, as the map indicated, they would be all right. The convoy started again, bearing to the left along the railroad.

In the distance the major saw something on the road. At first it was only a speck. The major trained his field glasses on it. The speck rapidly materialized into two U. S. Army jeeps.

The convoy halted and waited for the jeeps to come up. They stopped. In the first jeep was an American captain and two lieutenants, while in the second were two sergeants and three privates. All were armed to the teeth with tommy guns and rifles. All wore steel helmets. They were from the First Army.

"Say," called Major Stewart, "how in hell do I get over to 'Y' track leading to la Fauconnerie?"

"My God," gasped the captain, "do you know where you are, major?"

"Yeh, I'm lost," acknowledged the major.

"The Germans were right here where you are not over an hour ago. We are out on patrol looking for rear-guard action," said the captain. "You'd better turn back and get the hell out of here."

"Nothing doing," laughed W2JRG. "I'm supposed to get this convoy into la Fauconnerie by sixteen hundred and I'm going to do it. To hell with Jerry. He's running like hell and isn't waiting around for me and my men."

"But, major," protested the captain, "you don't even have any protection that I can see."

"Nope," the major said, "there isn't a damn machine gun in this convoy. I've come all across Africa and had no protection, and I guess I can chance it the rest of the route. Now, how the devil do I get out of here and back on the right road?"

The captain protested, but the major cut him short. "We're going, brother. I've got a hundred fighter planes back there waiting for word that we've arrived and are ready for them to fly in."

The captain pointed out a way to cross the railroad tracks and another road that would, by following the tracks to the east, get them back to "Y" track. Slowly the convoy turned around and reassembled, and then started out again.

The indicated twelve miles was slow traveling. Much of the trip was taken in first and second speed. The road continually twisted and turned. After a time the major noticed great clouds of dust to their right. He wondered what that might be. He kept his convoy moving slowly ahead.

Finally he saw some men far ahead as he came around a knoll. As he drew near, they held up their hands.

"An' where are you going, major?" asked a British colonel.

"This is the 79th Fighter Group, USA, and I'm heading for la Fauconnerie," W2JRG replied.

The three British officers laughed.

"Don't you think you're a bit premature, major?" asked the colonel.

"And just why am I premature?"

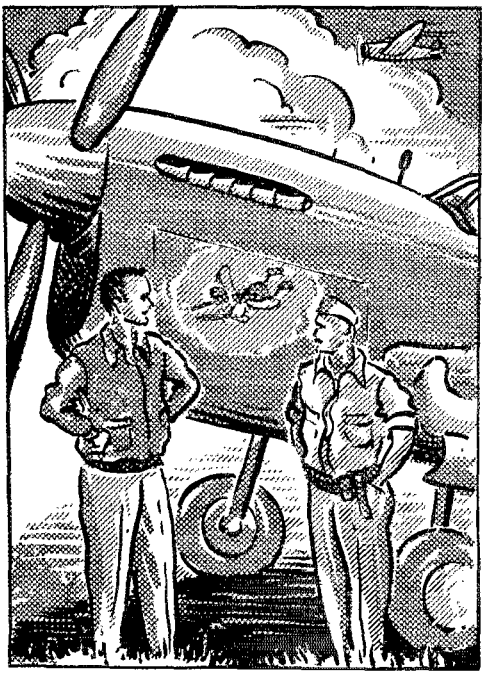
For an answer the colonel pointed to his right, and said: "Well, sir, you're ahead of the tanks and hi think General Monty would like to 'ave them up front ahead of the fighter groups."

There they were. Dozens and dozens of British heavy and medium tanks rumbling and roaring and snorting up the grade, heading north in pursuit of Rommel.

Who said that a communications officer can't possibly see any front-line action?

The 79th Fighter Group had actually gotten ahead of the tanks of the British Eighth Army.

The group arrived at la Fauconnerie at 1555. The embers from the camp fires of the fleeing Germans were still warm, and here and there slight wisps of smoke arose toward the sky.



Lt. Col. Grogan conferred with W2JRG at dawn.

Cameras in Light-Beam Communication

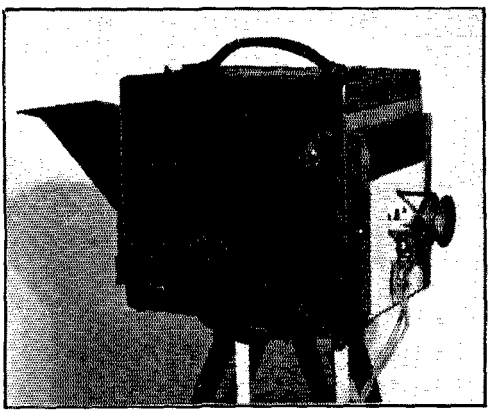
Suggestions for Adapting Available Types to Transmission and Reception

BY JAMES PERKINS SAUNDERS,* WIBDV

CENTURIES ago a Greek soldier observed that the brightly polished surface of an enemy's shield, blazing with the glare of the reflected sun, could be seen for many miles. An obvious result was the adoption of a shield covering. A second thought suggested a form of communication by means of intermittent flashing of the reflected beam of light. Since the invention of that first crude heliograph, refinements have brought the use of the light beam to a status in which it is regarded as a very useful aid to military communication. It is particularly indispensable when radio silence and secrecy are of prime importance. The use of an artificial light source and the control of the beam by a shutter or by keying the power supply for the lamp, together with the application of filters and polarizing screens, are features of the modern application of the method. Although the light beam is not radio, the amateur may find the present a convenient time in which to renew his acquaintance with this ancient and interesting method of communication.

If the average amateur is to experiment with light-beam transmissions, the equipment should be simple. The limited range and usefulness to him seldom warrant complicated or costly apparatus. If a camera is available, the most expensive part of the required installation is already provided. Although the faster lenses which are furnished on high-grade cameras will assure better results, even the lowly Brownie may be adapted to the purpose.

* Assistant Principal, Northbridge Senior High School, Whitinsville, Mass.



A Presdwood backpiece is cut to fit the slots used to retain the film- or plate-holder at the back of a Graflex camera. Ideally, it should be long enough to close the entire back of the camera, cutting off from the lens all direct light except that from the transmitting lamp.

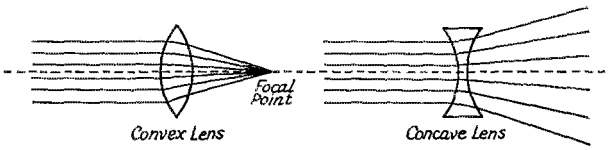


Fig. 1 — Diagram showing rays of light parallel to the principal axis entering a lens. The rays are bent as they pass through the lens and converge at the principal focus of the lens. See text for details.

Optical Principles

Before discussing the equipment, let us recall a few principles of optics.[1] Light rays, which normally travel in straight lines, can be bent by passing them through a lens. The lens is generally a disc of glass, formed so that it is either thicker in the center than at the circumference, or vice versa. These two fundamental types are identified by the respective terms, *convex* and *concave*. The lens used as the objective in a camera is convex, and only the convex type is to be considered for application to light-beam transmission. As shown in Fig. 1, the convex lens will bend *parallel* light rays so as to converge at a center called the *focal point*. This effect is caused by the fact that the speed of light is less in glass than it is in air. The concave lens, on the other hand, causes the parallel rays to spread apart instead of coming to a focus. A more specific term for the particular focal point, indicated in Fig. 1, is the *principal focus* of the lens. It is defined as the point where rays *parallel to the principal axis* of the lens are brought to a focus. The *principal axis* is the line passing through the optical center of the lens and perpendicular to its faces. The distance along the principal axis from the center of the lens to the principal focus is the *focal length* (*f*) of the lens.

The formation of an image of any object, such as the tree in Fig. 2, by means of a convex lens may be explained essentially as follows.

The light rays reflected from the object do not follow paths closely parallel to the principal axis, except in the special case where the distance between the lens and the object is infinite. Therefore, the rays do not normally converge at the principal focus. Rays from each point in the object form a cone of light subtending all of the exposed portion of the lens. As the cone passes through the lens its rays become bent so as to

[1] Bourne, "Optical Fundamentals for Amateurs," *QST*, June, 1942.

focus at a spot in a plane behind the principal focus of the lens. This plane is called the *focal plane* and is perpendicular to the principal axis. One of the factors which determines the spot in the focal plane at which the rays of the cone will focus is the position of the point at which the cone originates in respect to the principal axis. The total combination of spots formed by the various cones of light arriving from all points in the object forms the complete image. Because the cone of rays from the top of the object, for instance, is centered approximately about a ray which passes through the center of the lens and therefore is not bent, it follows that the image must be inverted in respect to the object, as shown in Fig. 2.

The focal length of the lens is combined with the distance between the object and the lens in a formula which determines the distance of the image from the lens: $1/I = 1/f - 1/O$, where O represents the distance of the object (in this case, the tree) and I is the distance of the image, both referred to the center of the lens. The dimensions of the image are proportional to the dimensions of the object as the distance of the image from the lens is to the distance of the object from the lens.

We have been discussing the *real image*. If a magnifying convex eyepiece is placed behind the focal plane at a distance equal to the focal length of the eyepiece, as shown in Fig. 3, the human eye, which is in itself a lens, will see a magnified view of the real image. The image is still inverted, with respect to the original object, since we are merely magnifying the real image as we would magnify a printed word on this page by means of the same lens. The magnified image seen by the eye cannot be focused upon a screen or film, since its rays are parallel and do not proceed from an actual source of light. It is, therefore, not a real image, and is called the *virtual image*.

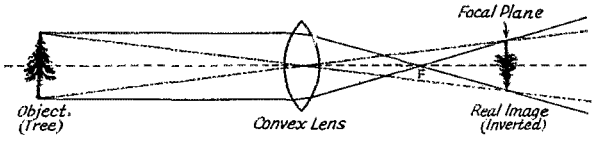


Fig. 2 — Diagram showing the ray method of constructing an image.

If a camera is focused upon a distant house, a real inverted image of the house is formed in the focal plane where the photographic plate or film normally is placed. If the camera has a ground-glass focusing screen, the eye can see the real image upon it. If a substitute for the regular camera back is provided with a mounting for a magnifying lens, centered on the principal axis of the camera lens and behind the focal plane of the camera by the distance of its own focal length, the eye will be able to see the enlarged inverted view of the house. This image is a virtual image, as described in the preceding paragraph. Careful focusing of the magnifying lens is necessary.

The suggestions here offered for the use of cameras in light-beam transmission supplement earlier *QST* articles which described the application of telescopes to this purpose. Although the longer focal length of the telescope lens offers an advantage in producing a narrow beam relatively free from the effects of spherical aberration, the average amateur is more apt to have a camera than a telescope. Too, the camera set-up is considerably more compact and convenient than any arrangement employing a lens of very long focal length. The author has adapted his accessory equipment to work with almost any type of camera.

The Camera as a Transmitter

Now a lens is a two-way medium for the passage of light. If light can come from the house and be focused upon a screen, it is equally possible for a point of light originating at the focal plane of the camera to be converted by the lens to parallel rays which will fall upon the house. The size of the light source will affect the dimensions of the light beam. For instance, the image of a window in the house will occupy a certain small area in the camera image. If the dimensions of the light source are comparable to those of the image of the window, the image of the light source observed at the house will cover only the approximate area of the window itself. For distances up to two miles the filament of an ordinary dial-light lamp bulb makes a practical light source.

It is important that no direct light, other than that emanating from the filament, be permitted to pass through the lens. The camera body and bellows shield the lens from the sides, while a backpiece, closing the back of the camera, is constructed to support the lamp and an eyepiece as shown in the photographs. It may be made of Presdwood or similar material and should be painted black on the side toward the camera lens to prevent stray reflections. A hole, just large enough to permit a view of the filament, is drilled through the backpiece in line with the principal axis of the camera lens. Unless some accurate means for properly locating the hole is at hand, it may be best to cut a larger hole in the backpiece and cover it with an adjustable shield in which the smaller hole is drilled.

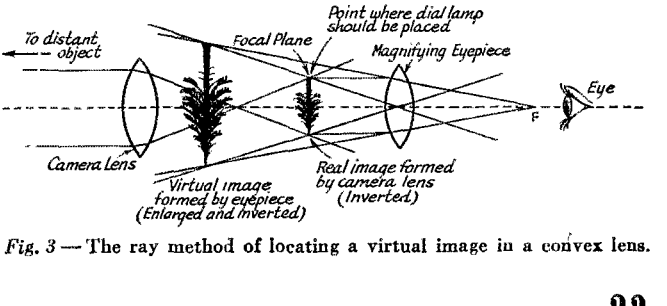
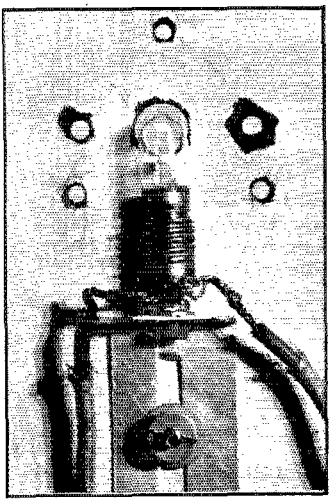


Fig. 3 — The ray method of locating a virtual image in a convex lens.



The dial lamp with adjustable mounting is placed so that the filament is in line with a viewing aperture, both being adjusted for alignment with the principal axis of the camera lens.

The lamp mounting should provide for sliding adjustments to allow the filament to be positioned in the focal plane and on the principal axis of the camera lens. The forward-and-backward adjustment may not be necessary if the camera in use has a focusing front, but will be required if a fixed-focus camera, such as the Brownie, is to be used. The lateral and vertical adjustments will be required in fitting the back to any camera. An L-shaped metal bracket, slotted on both arms to pass a mounting screw on the backpiece for the vertical adjustment, and another screw on the lamp socket for the forward-and-backward adjustment, will serve. Only a very small lateral adjustment should be required if the mounting first is properly centered on the backpiece, and this may be made by turning the vertical arm about its supporting bolt as an axis. The lamp should be rotated until the plane of the filament is parallel to the backpiece.

Eyepiece

While an eyepiece is not an absolute necessity, it is difficult without it to determine when the light beam is accurately focused upon the distant receiving point. Although the photographs show a magnifying lens mounted directly behind the lamp and on the same side of the backpiece, it may be preferable in some installations to mount the lamp on the inside of the backpiece. This will make it possible to bring the filament within the focal plane of a camera lens which has no focusing adjustment.

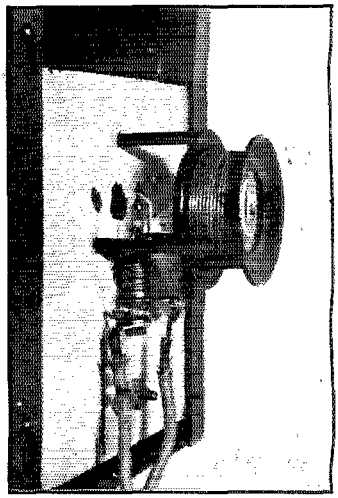
The type of mounting for the eyepiece will depend entirely upon the specifications of the lens available. The one illustrated in the photographs is a tripod magnifier of the sort used in biological laboratories. This required the drilling of three holes in the backpiece, or in the adjustable shield, on a circumference concentric with the "peephole." Then the tripod legs were pressed into these holes, and the center of the eyepiece was found to be in line with the center of the peephole, as it should be. The lens of this particular magnifier may be focused upon the filament and the object image by rotating it in its threaded mounting.

Any convex lens with a focal length of between ½ inch and 1½ inches may be used as the eyepiece. One source of supply is the finder objective lens in a discarded camera. "Linen testers" and other small magnifiers also are suitable. If unmounted, the lens may be cemented in a cell made from an empty spool which will slide in a short section of mailing tube for focusing.

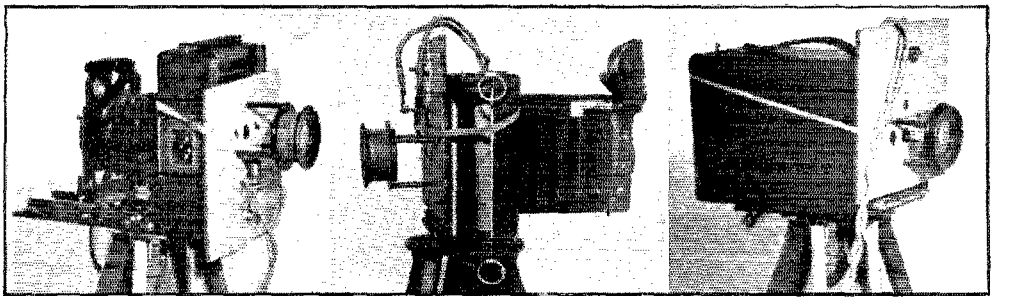
Thus, the light-beam apparatus is seen to be made up of a camera, a special backpiece, a lamp and its adjustable bracket support, and a magnifying eyepiece. A steady support for the camera, such as a rigid tripod, also is required.

The adjustments for use are very simple. With the camera pointed at the target, the shutter is set at "Time" and left open, with the diaphragm at its maximum opening. The eyepiece then is adjusted so that the filament, as viewed through it, is in sharp focus. Because of the danger of serious injury to the eye, the filament should never be lighted when the operator is looking through the eyepiece. Next, the camera lens is focused so that the house window or other target is sharply defined as seen through the eyepiece. If the camera is not one of the focusing type, pains should be taken to bring the filament into the focal plane of the fixed lens by means of a "backward-and-forward" adjustment of the lamp. When the adjustment is made correctly it should be possible to view both the image and the filament simultaneously in sharp focus, allowing for distortion caused by the glass envelope of the lamp. Finally, adjustments of the orientation of the camera, the height of the camera front and the position of the filament are made until the magnified image of the lamp filament appears to be centered directly upon the image of the target when viewed through the eyepiece.[2]

[2] Bourne and Huntoon, Experimenter's Section, *QST*, May, 1942.



One type of magnifying eyepiece is shown here. It is mounted by inserting the legs of its tripod support into holes drilled in the backpiece of the camera.



Left — A small plate camera set up for light-beam transmission. This type has a rising and falling front which aids in centering the beam. It is also provided with rack-and-pinion focusing adjustment, a convenience in bringing the image of the target into the plane of the lamp filament. *Center*—An old-time Kodak No. 3 adapted for light-beam work. The lens is probably as slow as any to be found on a folding type of camera, yet it proved capable of transmitting a satisfactory beam. *Right* — Since the Brownie No. 2 camera has a fixed-focus lens with no means of adjustment, the lamp must be mounted on the inside of the backpiece to bring it more nearly into the focal plane of the lens, and the eyepiece mounted correspondingly closer to the back in order to focus the lamp filament sharply.

Operation

When a key and a suitable source of power for the filament are connected in series with the lamp socket, the transmitting equipment is ready for action. Keying speed must be greatly reduced from that used by a good radio operator. The factors which make this necessary are the time lag in the cooling of the filament and the optical phenomenon known as "persistence of vision"; that is, the tendency of the retina of the human eye to retain the impression of a bright image for an appreciable time. It has been found necessary to emphasize the difference in duration for dots and dashes as well as to maintain slow speed and careful spacing of characters.

The unaided eye, or a field glass or telescope, may be used in copying the signal at the receiving end. The eyepiece of the transmitter also may be employed, though an annoying distortion results from the curvature of the lamp's glass envelope. Provision might be made for dropping the lamp out of the way when receiving, if it can be accomplished without disturbing the focusing adjustments made for transmitting.

It is possible, of course, to construct an electronic receiver with a photoelectric cell or phototube and associated amplifying equipment. For the limited range for which the transmitter is suited, such a receiver may seem hardly worth the time and expense involved. This additional equipment will be required, however, if the light beam is to be modulated for the transmission of sound, or if higher-speed telegraphy is contemplated. Those who are interested in such an application may refer to an earlier article by W6PCB and W6TOY in *QST*.[3] The object here has been to keep the equipment as simple as possible and to encourage code transmission.

My best results have been obtained when using a 4 × 5 Graflex camera with an *f* 4.5 lens. The beam is very narrow, visible only in the one window which is my target in a friend's house at a distance of between 1½ and 2 miles. This camera has a slot at the back, which is normally used as a seat for the filmpack holder. It makes a neat and convenient holder for the Presdwood light-beam backpiece.

At first I tried to focus the beam on the target by means of a ground glass with cross-hairs for centering. Although entirely satisfactory for the original purposes of pictorial composition, the use of the cross-hairs as a guide for aiming the light beam introduced entirely too much error. The addition of the magnifying eyepiece resulted in extremely accurate aiming and focusing. The one disadvantage in the use of the Graflex lies in the necessity for careful juggling of the tripod legs when aiming the camera.

Other cameras with less efficient lenses provide fairly satisfactory beams over short distances. I used the same Presdwood backpiece with these other cameras, substituting it for the regular back in each case. Since it was convenient to attach the backpiece by means of elastic bands, it was readily possible to line up the lamp filament and the target by shifting the position of the backpiece itself. The adjustable rising and sliding front with which some cameras are fitted helps materially in solving the problem of alignment. In general, any camera having a removable back may be adapted to light-beam work. The better the lens, however, the sharper the beam.

In these days of radio silence and of meagre supplies of photographic materials, here is one way to keep both hobbies alive. Why not dig out that camera, hook up a dial lamp, and flash away?

[3] Stevens and Stevens, "A Simple Light-Beam Communication System," *QST*, May, 1942.

Strays

Lt. Comdr. Carl Evans, W1BFT, former SCM of New Hampshire, recently was testing a v.h.f. voice circuit in a foreign port. Midway through the test he was astounded to hear someone come on the channel and say, "Hello, W1BFT." After recovering from the shock he tried to contact the answering ham, but without luck. Apparently the other fellow got "cold feet." W1BFT still would like to know who it was, so how about the unknown identifying himself?

U.S.A. CALLING!

CIVIL SERVICE POSITIONS

MOST of the needs of the government services for wartime civilian technical personnel are handled by appointment in the Civil Service. The government agencies remain in need of many more technical people, particularly radio operators, technicians and laboratory mechanics. Complete particulars on each position are published in numbered bulletins called Civil Service Announcements. For most jobs there are several grades of appointments, with successively higher pay for greater training and experience. From time to time we publish in this department brief outlines of some of these positions, but the full particulars appear in the announcements. These are to be found displayed at any first- or second-class post office, in charge of a person designated as secretary of the local board of U. S. Civil Service Examiners — except in certain major cities, listed on page 42 of December *QST*, where the Civil Service maintains regional offices of its own. Every radio amateur interested in a government position should make it a habit to drop by the post office occasionally and see the new announcements. Either the regional office or the secretary of the local board will gladly show you details, answer questions and supply application forms.

RESEARCH AND DEVELOPMENT

IN OUR FIELD, the great personnel need in this war is for physicists and graduate engineers, particularly those whose experience qualifies them to take over the direction of difficult projects. The need is so great that plenty of opportunity still exists for men and women of the right caliber to obtain connections with work of the highest interest and national importance. The best avenue of approach to this field is via George W. Bailey, the president of ARRL, who is technical aide to the director of the Office of Scientific Research & Development, 1530 P Street, N. W., Washington 25, D. C. He may be addressed personally and in confidence, for a mutual exchange of information.

Technicians and laboratory mechanics are also needed in this field of work. An opportunity for the maximum contribution to the war effort can probably be arranged for any qualified person by contact with Mr. Bailey at the above address.

WOMEN'S ARMY CORPS

THE Women's Army Corps is seeking 58,000 women recruits. While untrained women are eligible, there is a particular need for those with knowledge of radio, drafting, engineering, telephone operation, teletype — in fact, WACs do 155 important Army jobs at nearly 300 Army posts in this country and overseas. Lately WAC has been recruiting state training units, which are sworn in as a group at a public ceremony and moved to basic training as a state group. Basic training centers are at Ft. Des Moines, Iowa; Ft. Oglethorpe, Ga., and Daytona Beach, Fla. — after which there comes active duty with a field unit or further schooling at a specialist school or an Officer Candidate School. Every WAC has a chance for OCS, an eight weeks' course which, if successfully completed, results in commission as a second lieutenant. Full information on enrolling in a state WAC training unit can be had by a visit to your nearest Army Recruiting Station.

O.W.I. OVERSEAS JOBS

THE Office of War Information is looking for radiotelegraph operators, technicians and engineers, for assignments overseas. Although the standards are high, this service seems to pay higher than many other agencies, and the color and adventure of foreign duty will appeal to many. We understand that these positions pay from $2,600 to $4,400 a year, plus subsistence allowances while serving overseas. Those interested may write directly to the Office of War Information, Outpost Service Bureau, 224 West 57th St., New York, for further information.

C.A.A. RADIO ELECTRICIANS

THE Civil Aeronautics Administration needs men who are U. S. citizens between the ages of 17 and 45, to serve as Principal Radio Electricians. Essential duties are maintenance of all types of radio, teletype and emergency power-supply equipment used in radio aids to air navigation along the federal airways. The work includes antenna impedence matching, aligning radio range courses, tuning u.h.f. antenna systems and adjusting teletype equipment. Past experience must be such that, after brief familiarization on the job, CAA radio and communication facilities can be adjusted, repaired and maintained.

The entrance salary is $2300 a year, with opportunity for advancement to $2900. For service in Alaska, Hawaii or elsewhere beyond continental U. S., the salary range is $2875 to $3625. In addition to salary, a per-diem allowance is paid while in travel status away from assigned headquarters.

The applicant should be a high-school graduate or should have completed a comprehensive course in radio engineering of either the home-study or resident type. If the high-school courses did not include shop and mechanical drawing, ex-

(Continued on page 92)

Logarithms

Their Use in Radio Circuit Calculations

BY WILLARD R. MOODY*

Logarithms form a part of many radio formulas, while their use is required in solving many others. Their application to any problem involving the handling of unwieldy quantities facilitates its solution. It will pay anyone not already familiar with the potentialities of logarithms to make a study of them, especially in these days of slide-rule priorities.

THE Briggs or *common* system of logarithms is based upon the principle that many calculations may be simplified if the terms are expressed as powers of 10 during the calculation and then reconverted after the calculation is complete. This is especially true when roots, powers, or the multiplication or addition of large numbers is involved. It is understood, of course, that any number can be expressed as a power of 10 in the following form:

$$n = 10^l,$$

where n is the number and l is the exponent of the power to which 10 must be raised to equal the number. The exponents of the powers of 10 approximately equivalent to any positive number between 1 and 10 may be determined from the graph of Fig. 1. Thus,

$$2 = 10^{0.3}; 5 = 10^{0.7}, \text{ etc.}$$

In logarithms, the exponent, l, denoting the power to which 10 must be raised, is called the *logarithm* of the number n. Therefore, in the examples given above, we might write

$$0.3 = \log 2; 0.7 = \log 5, \text{ etc.}$$

These expressions are read, 0.3 equals the log of 2; 0.7 equals the log of 5, etc.

Thus either the number or the logarithm may be determined from Fig. 1, when one or the other is known, provided that it is always understood that the logarithms are exponents of powers of *10*. So that there may be no question on this point, the logarithmic expression is sometimes written to include the subscript 10.

$$l = \log_{10} n; 0.3 = \log_{10} 2, \text{ etc.}$$

The number indicated by the subscript is called the *base*. Whenever the base is not indicated by subscript, the base 10 is implied.[1] The number, n, is often referred to as the *antilogarithm* of the logarithm.

Thus, 2 = antilog 0.3; 5 = antilog 0.7, etc.

Tables of Logarithms

The values given in the preceding examples are approximate, being correct only to the accuracy with which the graph may be read, which is not high. Tables of numbers with their corresponding logarithms calculated to a high degree of accuracy are given in most mathematical text books and are found also in books of mathematical tables obtainable at any store handling school books.

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Negative Numbers

Negative numbers have no logarithms, but computations involving negative numbers may be made by treating each number as a positive number and applying the correct sign to the result, for

$$-n = (-1)(n)$$

Multiplication

Let us consider the product of two numbers, n_1 and n_2. Converting each of the numbers to a power of 10, we may write

$n_1 = 10^x$; $n_2 = 10^y$
$\log n_1 = \log 10^x = x$ (by definition of a logarithm)
$\log n_2 = \log 10^y = y$
$n_1 n_2 = (10^x)(10^y) = 10^{x+y}$
$\log n_1 n_2 = \log 10^{x+y} = x + y.$
Since $x = \log n_1$ and $y = \log n_2$,
$\log n_1 n_2 = \log n_1 + \log n_2.$

The product of two or more numbers may be determined by finding the sum of their logarithms and taking the antilogarithm of that sum.

Example:
What is the product of 2 and 4?
From Fig. 1,

$\log 2 = 0.3$
$\log 4 = 0.6$
Adding, $\log [(2)(4)] = 0.9$

Again referring to Fig. 1,
antilog 0.9 = 8, which is the product of 2 and 4.[2]

[1] Another system of logarithms sometimes encountered in scientific work is the Naperian or *hyperbolic* system which employs 2.718 (denoted by the subscript e) as the base. In this system, all numbers are converted to powers of 2.718. Expressions in the hyperbolic and common systems may be interchanged by means of the following equivalents:

$\log n = 0.4343 \log_e n$ $\log_e n = 2.3026 \log n$

[2] Exponential solution: $2 = 10^{0.3}$; $4 = 10^{0.6}$; $(10^{0.3})(10^{0.6}) = 10^{0.9} = 8$

Division

By a similar process, the quotient of two numbers may be found.

$n_1 = 10^x$; $n_2 = 10^y$

$\log n_1 = \log 10^x = x$; $\log n_2 = \log 10^y = y$

$$\frac{n_1}{n_2} = \frac{10^x}{10^y} = 10^{x-y}$$

$$\log\left(\frac{n_1}{n_2}\right) = \log 10^{x-y} = x - y$$

Since $x = \log n_1$ and $y = \log n_2$,

$$\log\left(\frac{n_1}{n_2}\right) = \log n_1 - \log n_2$$

The quotient of two numbers may be found by subtracting the logarithm of the divisor from the logarithm of the dividend and taking the antilogarithm of the difference.

Example:

$$\frac{5}{2} = ?$$

From Fig. 1,

$$\log 5 = 0.7$$
$$\log 2 = 0.3$$

Subtracting, $\log \frac{5}{2} = 0.4$ antilog $0.4 = 2.5$.[3]

Logarithms of Numbers Greater than 10

Thus far we have considered only the logarithms of numbers between 1 and 10. We shall now find that the logarithms of all other numbers can be determined from the graph of Fig. 1, or from tables showing the logarithms of numbers between 1 and 10.

For example,

$50 = (5)(10)$

$\log 50 = \log 5 + \log 10 = 0.6990 + 1 = 1.6990$

$500 = (5)(10^2)$

$\log 500 = \log 5 + \log 10^2 = 0.6990 + 2 = 2.6990$

$\log 5000 = \log 5 + \log 10^3 = 3.6990$

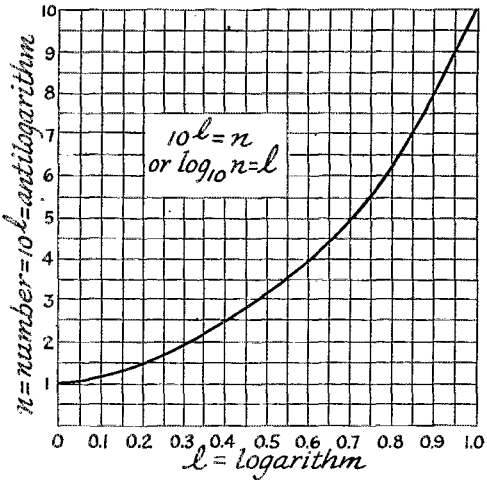


Fig. 1 — Graph showing the logarithms of numbers between 1 and 10. Use of the curve for determining the logarithms of other numbers is discussed in the text.

Thus we see that, when a number is multiplied by any multiple of 10, the decimal part of the logarithm remains the same, while the whole number preceding the decimal increases by one each time the number is multiplied by 10.

The whole number appearing before the decimal point in a logarithm is called the *characteristic*, while the decimal part is called the *mantissa*. The mantissa alone determines the significant figures of the number, while the characteristic indicates where the decimal is to be placed.

To determine the logarithm of a number greater than 10, move the decimal point to the left until it appears immediately after the first digit.

Find the logarithm of the resulting number from the tables and give it a characteristic number equal to the number of places the decimal point has been moved.

Example:

$\log 568.273 = ?$

Move the decimal point so that it appears after the first digit.

$\log 5.68273 = 0.75456$

Since the decimal point was moved two places to the left,

$\log 568.273 = 2.75456$

The antilogarithm of a logarithm with a positive characteristic is found by taking the antilogarithm of the mantissa from the tables and then moving the decimal point a number of places to the right equal to the number of the characteristic, adding zeros at the right if necessary.

Example:

antilog $4.8597 = ?$

antilog $0.8597 = 7.239$

Since the characteristic is 4, the decimal point is moved 4 places to the right.

antilog $4.8597 = 72{,}390$

Example:

antilog $1.2430 = ?$

antilog $0.2430 = 1.75$

Since the characteristic is 1, the decimal point is moved one place to the right.

antilog $1.2430 = 17.5$

Logarithms of Numbers Less Than 1

Logarithms of numbers less than 1 appear in a somewhat different form than those for numbers greater than 1, although the same principles are involved. For example,

$0.5 = (5)(10^{-1})$

$\log 0.5 = \log 5 + \log 10^{-1} = 0.6990 - 1$ [4]

$0.05 = (5)(10^{-2})$

$\log 0.05 = \log 5 + \log 10^{-2} = 0.6990 - 2$

$0.005 = (5)(10^{-3})$

$\log 0.005 = \log 5 + \log 10^{-3} = 0.6990 - 3$

[3] Exponential solution: $5 = 10^{0.7}$; $2 = 10^{0.3}$; $\frac{10^{0.7}}{10^{0.3}} = 10^{0.4} = 2.5$

[4] While the subtraction indicated might be performed to give $\log 0.5 = 0.3010$; $\log 0.05 = -1.3010$; etc., a different set of logarithmic tables would be required. By changing to the forms which follow, the standard tables may be used for numbers both above 10 and below 1.

It is quite apparent from the above examples that the mantissa is positive, the characteristic alone being negative. Therefore, it is obvious that it would be incorrect to write

$\log 0.5 = -1.6990$; $\log 0.05 = -2.6990$; etc.,

since this would indicate a negative mantissa. When it is desirable to write the characteristic and mantissa together as a single term, the negative characteristic is indicated by placing the minus sign *above* the characteristic.

$\log 0.5 = \bar{1}.6990$; $\log 0.05 = \bar{2}.6990$; etc.

However, in many cases where the manipulation of logarithms is involved, operations are more easily performed if logarithms with negative characteristics are written in a form which divides the characteristic into two parts, the part combined with the mantissa being positive. To arrive at an expression for this form, 10 (or any multiple of 10) is added algebraically to the negative characteristic appearing before the mantissa, while the subtraction of an equal quantity is indicated after the mantissa.

$\log 0.5 = \bar{1}.6990 = 9.6990 - 10$
$\log 0.05 = \bar{2}.6990 = 8.6990 - 10$

When circumstances make it desirable, it is also permissible to write

$\log 0.5 = 19.6990 - 20$
$\log 0.05 = 48.6990 - 50$,

where the quantities added and subtracted are 20 and 50 respectively, instead of 10.

The logarithm of a number less than 1 is obtained by moving the decimal point to the right of the first significant number, finding the logarithm of the resulting number from the tables, and giving the characteristic a negative number equal to the number of places the decimal point has been moved.

To make the characteristic appearing before the mantissa positive, add 10 (or any multiple of 10) algebraically to the negative characteristic, and indicate the subtraction of an equal quantity to the right of the mantissa.

Examples:

$\log 0.0027 = ?$

Move the decimal point so that it appears following the first significant number.

$\log 2.7 = 0.4314$

The decimal point has been moved three places, so the characteristic is -3.

$\log 0.0027 = 0.4314 - 3 = \bar{3}.4314 = 7.4314 - 10$
$\log 0.576 = ?$
$\log 5.76 = 0.7604$
$\log 0.576 = 0.7604 - 1 = \bar{1}.7604 = 9.7604 - 10$

To find the antilogarithm of a logarithm with a negative characteristic, find the antilogarithm of the mantissa from the tables; if the logarithm is in two-term form, find the characteristic by adding algebraically the positive number found before the mantissa to the negative number found after the mantissa. Move the decimal point to the left the number of places indicated by the resulting characteristic, adding zeros if necessary.

Examples:

antilog $8.9355 - 10 = ?$
antilog $0.9355 = 8.62$
$-10 + 8 = -2$ = characteristic

Moving the decimal point 2 places to the left,

antilog $8.9355 - 10 = 0.0862$
antilog $16.6656 - 20 = ?$
antilog $0.6656 = 4.631$
$-20 + 16 = -4$
antilog $16.6656 - 20 = 0.0004631$

Powers and Roots

The computation of any positive power, p, of a number, n, is reduced to an operation of multiplication by the use of logarithms. Converting the number to a power of 10,

$n = 10^x$
$\log n = \log 10^x = x$
$n^p = (10^x)^p = 10^{xp}$
$\log n^p = \log 10^{xp} = xp$

Substituting for x its equivalent, $\log n$,

$$\log n^p = p \log n$$

The value of any positive power of a number is obtained by finding the product of the exponent of the power and the logarithm of the number, and taking the antilogarithm of that product.

Example:

$2.3^2 = ?$
$\log 2.3 = 0.3617$
$\log 2.3^2 = (2)(0.3617) = 0.7234$
antilog $0.7234 = 5.289$ [5]

Example:

$5.7^{\frac{3}{4}} = ?$
$\log 5.7 = 0.7559$

$$\log 5.7^{\frac{3}{4}} = \left(\frac{3}{4}\right)(0.7559) = 0.5669$$

antilog $0.5669 = 3.689$

Since $\sqrt[x]{n} = n^{\frac{1}{x}}$, the logarithm of the positive root of a number is obtained by writing the number with a fractional exponent and using the preceding rule for determining the logarithm of the power of a number.

Example:

$\sqrt[3]{8} = ?$
$\sqrt[3]{8} = 8^{\frac{1}{3}}$

$$\log 8^{\frac{1}{3}} = \frac{1}{3}\log 8 = \frac{0.9031}{3} = 0.3010$$

antilog $0.3010 = 2$ = cube root of 8. [6]

[5] Exponential solution: $2.3 = 10^{0.36}$; $2.3^2 = (10^{0.36})^2 = 10^{0.72} = 5.289$

[6] Exponential solution: $8 = 10^{0.9}$; $\sqrt[3]{8} = 10^{\frac{0.9}{3}} = 10^{0.3} = 2$

Example:

$\sqrt[5]{0.1862^4} = ?$

$\sqrt[5]{0.1862^4} = 0.1862^{\frac{4}{5}}$

$\log 0.1862^{\frac{4}{5}} = \frac{4}{5} \log 0.1862 = \left(\frac{4}{5}\right)(\bar{1}.26998)$

$= \left(\frac{4}{5}\right)(9.26998 - 10) = \frac{37.07992 - 40}{5}$

Adding and subtracting 10 in the numerator,

$\frac{37.07992 - 40}{5} = \frac{47.07992 - 50}{5} = 9.41598 - 10$

$= \bar{1}.41598$

antilog $\bar{1}.41598 = 0.2606$

Negative Powers and Roots

Since $n^{-x} = \frac{1}{n^x}$, $\log n^{-x} = \log 1 - \log n^x$

$= 0 - \log n^x = -\log n^x$.

In this form, it is apparent that both characteristic and mantissa are negative. To convert to the form in which the mantissa is positive, the indicated subtraction is performed by substituting for 0 its equivalent 10 − 10.

Example:

$5^{-3} = ?$

$5^{-3} = \frac{1}{5^3}$

$\log \frac{1}{5^3} = \log 1 - 3 \log 5 = 0 - (3 \times 0.6990)$

$= 0 - 2.097.$

$$\begin{array}{r} 10.000 - 10 \\ 2.097 \\ \hline \end{array}$$

Subtracting, $\log 5^{-3} = 7.903 - 10$

antilog = 0.008

The same process is used in obtaining the logarithm of a negative root. The root is first converted to a fractional power as before.

Example:

$\sqrt[3]{5} = 5^{-\frac{1}{3}} = \frac{1}{5^{\frac{1}{3}}}$

$\log \sqrt[3]{5} = (10.0000 - 10) - \frac{1}{3} \log 5$, etc.

Cologarithms

The cologarithm of a number is the logarithm of its reciprocal.

$\text{colog } n = \log \frac{1}{n} = \log 1 - \log n = -\log n$

The use of cologarithms is sometimes convenient when performing series of multiplications and divisions, since it permits the addition of all logarithmic terms. Thus, in a problem such as

$$\frac{(52)(75)(6.3)(0.027)}{(8753)(50.7)(1.7)}$$

the solution may be obtained by addition alone by writing

log result = log 52 + log 75 + log 6.3 + log 0.027 + colog 8753 + colog 50.7 + colog 1.7

Addition and Subtraction of Logarithms

Examples of addition:

Add:

$$\begin{array}{r} 1.5273 \\ 4.4063 \\ 2.7581 \\ \hline 8.6917 \end{array}$$ antilog = 491,700,000

Add:

$$\begin{array}{r} 8.7536 \\ 4.4721 - 10 \\ \hline 13.2257 - 10 = 3.2257 \end{array}$$ antilog = 1681.5

Add:

$$\begin{array}{r} 1.5628 \\ 5.2743 - 10 \\ \hline 6.8371 - 10 = \bar{4}.8371 \end{array}$$ antilog = 0.0006872

Add:

$$\begin{array}{r} 8.0756 - 10 \\ 4.8452 \\ 7.6223 - 10 \\ \hline 20.5431 - 20 = 0.5431 \end{array}$$ antilog = 3.492

Examples of subtraction:

Subtract:

$$\begin{array}{r} 7.2543 \\ 2.8679 \\ \hline 4.3864 \end{array}$$ antilog = 24,345

Subtract:

$$\begin{array}{r} 1.7651 \\ 3.6423 \\ \hline \end{array}$$

Since the minuend is smaller than the subtrahend, 10 is added to and subtracted from the minuend.

$$\begin{array}{r} 11.7561 - 10 \\ 3.6423 \\ \hline 8.1138 - 10 = \bar{2}.1138 \end{array}$$ antilog = 0.012995

Subtract:

$$\begin{array}{r} 12.3472 - 10 \\ 5.1063 - 10 \\ \hline 7.2409 \end{array}$$ antilog = 17,415,000

Subtract:

$$\begin{array}{r} 23.1063 - 20 \\ 8.7544 - 10 \\ \hline 14.3519 - 10 = 4.3519 \end{array}$$ antilog = 22,485

Subtract:

$$\begin{array}{r} 12.1164 \\ 8.5321 - 10 \\ \hline \end{array}$$

Add 10 and subtract 10 from the minuend.

$$\begin{array}{r} 22.1164 - 10 \\ 8.5321 - 10 \\ \hline 13.5843 \end{array}$$ antilog = 38,400,000,000,000

Subtract:

$$\begin{array}{r} 4.1076 - 10 \\ 22.4681 - 30 \\ \hline \end{array}$$

Add 20 to and subtract 20 from the minuend.

$$\begin{array}{rl} 24.1076 - 30 & \\ 22.4681 - 30 & \\ \hline 1.6395 & \text{antilog} = 42.07 \end{array}$$

Multiplication and Division Involving Logarithms

Finding the value of a power of a number involves the multiplication of the logarithm of the number by the exponent of the power.

Examples:

$\log x = 0.5732$
$3 \log x = (3)(0.5732) = 1.7196$

$\log x = 2.7541$
$2 \log x = 5.5082$

In cases involving logarithms with negative characteristics, both parts are multiplied separately.

$\log x = 7.2075 - 10$
$3 \log x = 21.6225 - 30 = 1.6225 - 10 = \bar{9}.6225$

Finding the root of a number involves the division of the logarithm of the number by the index of the root.

Examples:

$\log x = 0.8724$

$\log \sqrt{x} = \dfrac{0.8724}{2} = 0.4362$

$\log x = 3.6872$

$\log \sqrt[3]{x} = \dfrac{3.6872}{3} = 1.2291$

In cases involving negative characteristics, both parts are divided separately.

$\log x = 5.2230 - 10$

$\log \sqrt{x} = \dfrac{5.2230}{2} - \dfrac{10}{2} = 2.6115 - 5$

$= 7.6115 - 10 = \bar{3}.6115$

Practical Examples

Logarithms are involved in many radio formulas. In still others which involve long series of multiplications and divisions, or roots and powers, logarithms may simplify the computations. Several practical examples illustrating the use of logarithms follow.

Db. Gain:

The decibel is a logarithmic unit based approximately on the least difference in sound intensity that the average normal human ear can detect. Radio servicemen do not have much use for the decibel, but sound men doing public-address work often deal with db. measurements. If a signal is fed into an amplifier and the power output measured is P_1 and the power output P_2, the power gain may be expressed as so many db.

$$\text{Db. gain} = 10 \log \frac{P_1}{P_2}$$

As a typical case, let us assume that we have a 10-volt, 400-cycle signal across a 5-ohm voice coil. The power output, P_1, is given by

$$\frac{E^2}{R} = \frac{100}{5} = 20 \text{ watts}$$

If the input resistance of the first amplifier is 100,000 ohms and the signal voltage across this resistance is 1 volt, the power input is

$$\frac{1^2}{100{,}000} = 0.00001 \text{ watt}$$

$$\text{Db. gain} = 10 \log \frac{20}{0.00001} = 10 \log 2{,}000{,}000$$

$$= (10)\ (6.3010) = 63.01 \text{ db.}$$

Reactance:

As another example, suppose that we want to find the reactance of a 16-μfd. condenser at 60 cycles.

The reactance is given by

$$X_C = \frac{159{,}200}{f\,C},$$

where f is the frequency in cycles, C the capacitance in microfarads and X_C the capacitive reactance in ohms.

$$X_C = \frac{159{,}200}{(60)\ (16)}$$

$\log 60 = 1.7782$
$\log 16 = 1.2041$
Adding, $\log [(60)\ (16)] = 2.9823$
$\log 159{,}200 = 5.2019$
$\log [(60)\ (16)] = 2.9823$
Subtracting, $\log \left[\dfrac{159{,}200}{(60)\ (16)}\right] = 2.2196$

The antilog of 0.2196 is approximately 1.658 and, since the characteristic is 2, the answer is 165.8 ohms.

Resonance:

A tank coil has an inductance of 80 μh. What capacitance is required to resonate the circuit at 1750 kc.?

At resonance, the inductive reactance, X_L, and the capacitive reactance, X_C, are equal.

$$X_L = 2\pi f L,$$

where f is the frequency in cycles, L the inductance in henrys and X_L the inductive reactance in ohms.

$X_L = (6.28)\ (1{,}750{,}000)\ (0.00008)$
$\log 6.28 = 0.7980$
$\log 1{,}750{,}000 = 6.2430$
$\log 0.00008 = 5.9031 - 10$
Adding, $\log X_L = 12.9441 - 10 = 2.9441$
antilog $2.9441 = 879$ (ohms) $= X_L$.

$$X_C = \frac{1}{2\pi f C},$$

where C is the capacitance in farads.

$$X_C = \frac{1}{(6.28)\ (1{,}750{,}000)\ (C)} = 879$$

$$C = \frac{1}{(6.28)\ (1{,}750{,}000)\ (879)}$$

log 6.28 = 0.7980
log 1,750,000 = 6.2430
log 879 = 2.9440
Adding, log denominator = 9.9850

Since the log of the numerator 1 is zero, it is smaller than the log of the denominator, and 10 must be added to and subtracted from the log of the numerator. Thus,

log 1 = 10.0000 − 10
log denominator = 9.9850
Subtracting, log C = 0.0150 − 10
= $\overline{10}$.0150 antilog 0.0150 = 1.035.

Since the characteristic is − 10, the decimal point must be moved 10 places to the left, so the answer is 0.0000000001035 farads, which may be changed to micromicrofarads by pointing off 12 decimal places. This gives a capacitance of 103.5 $\mu\mu$fd.

Load Impedance:

An output transformer has a 20-to-1 turns ratio. What will be the impedance reflected back into the plate circuit of the output tube when a 5-ohm voice coil is connected across the secondary of the transformer?

$$Z_p = N^2 Z_s,$$

where N is the turns ratio, Z_s the secondary load and Z_p is the reflected impedance.

$Z_p = (20^2)\ (5)$
log 20^2 = 2 log 20 = 2.6020 [(2) (1.3010)]
log 5 = 0.6990
Adding, log Z_p = 3.3010
antilog 3.3010 = 2000 (ohms)

Transformer Turns Ratio:

The rated plate load of a tube is 7000 ohms, and the load is a 5-ohm voice coil. What transformer turns ratio is required for the output transformer to match impedances?

$$N = \sqrt{\frac{Z_p}{Z_s}} = \sqrt{\frac{7000}{5}},$$

log 7000 = 3.8451
log 5 = 0.6990
Subtracting, log $\frac{7000}{5}$ = 3.1461

$$\log \sqrt{\frac{7000}{5}} = \frac{3.1461}{2} = 1.573$$

antilog 1.573 = 37.41 = N

Coil Dimensions:

A single-layer coil with an inductance of 87 μh. and a diameter of 2¾ inches is required. What should the number of turns be if the coil length is 3¼ inches?

$$N = \sqrt{\frac{3d + 9l}{0.2d^2} L},$$

where d is the diameter and l the length, both in inches, L is the inductance in microhenrys and N the number of turns.

$$N = \sqrt{\frac{(3)\ (2.75) + 9\ (3.25)}{(0.2)\ (2.75)^2} \times 87}$$

$$= \sqrt{\frac{8.25 + 29.25}{(0.2)\ (2.75)^2} \times 87}$$

$$= \sqrt{\frac{(37.5)\ (87)}{(0.2)\ (2.75)^2}}$$

log 37.5 = 1.57403
log 87 = 1.93952
Adding, log numerator = 3.51355
log 2.75 = 0.43933
log 2.75^2 = (2) (0.43933)
= 0.87866
log 0.2 = 9.30103 − 10
Adding, log denominator
= 10.17969 − 10 = 0.17969
log numerator = 3.51355
log denominator = 0.17969
Subtracting, log N_2 = 3.33386

$$\log N = \frac{3.33386}{2} = 1.66693$$

antilog 1.66693 = 46.44 turns

Matching Section:

A quarter-wave r.f. line is to be used to match two different impedances. The input impedance is 70 ohms, the output impedance 180 ohms. What should be the surge impedance of the matching section?

$$Z_s = \sqrt{Z_1 Z_2},$$

where Z_s is the surge impedance of the matching section, and Z_1 and Z_2 the input and output impedances, respectively.

$$Z_s = \sqrt{(70)\ (180)}$$

log 70 = 1.8451
log 180 = 2.2553
Adding, log (70) (180) = 4.1004

$$\log Z_s = \frac{4.1004}{2} = 2.0502$$

antilog 2.0502 = 122.5 ohms

Characteristic Impedance:

What is the surge impedance of an r.f. transmission line made up of two No. 14 wires spaced 6 inches?

$$Z_s = 276 \log \frac{b}{a},$$

where Z_s is the surge impedance of the line in ohms, b the spacing, center to center, of the wires and a the radius of the conductor.

Wire tables show that the diameter of No. 14 wire is 0.64 inch, making the radius 0.32 inch.

$$Z_s = 276 \log \frac{6}{0.032}$$

log 6 = 0.7782 = 10.7782 − 10
log 0.032 = 8.5051 − 10
Subtracting, log quotient = 2.2731

$$Z_s = (276)\ (2.2731)$$

$$\log 276 = 2.4409$$
$$\log 2.2731 = 0.3566$$
$$\text{Adding, } \log Z_s = 2.7975$$
$$\text{antilog } 2.7975 = 627.5 \text{ ohms}$$

Tank Current:

A current of 10 amperes flows in a series circuit of 22 ohms inductive reactance, 43 ohms capacitive reactance and 27 ohms resistance. What is the voltage across the terminals of the circuit?

$$E = IZ,$$

where

$$Z = \sqrt{R^2 + (X_C - X_L)^2}$$
$$= \sqrt{27^2 + 16^2}$$
$$\log 27 = 1.43136$$
$$\log 27^2 = (2)(1.43136) = 2.86272$$
$$\text{antilog } 2.86272 = 729$$
$$\log 16 = 1.20412$$
$$\log 16^2 = (2)(1.20412) = 2.40824$$
$$\text{antilog } 2.40824 = 256$$
$$256 + 729 = 985$$
$$\log 985 = 2.99344$$
$$\log Z = \frac{2.99344}{2} = 1.49672$$
$$\text{antilog } 1.49672 = 31.38 \text{ ohms}$$
$$E = IZ = (10)(31.38) = 313.8 \text{ volts}$$

Current in Inductive and Capacitive Circuits:

The current, i, at any elapsed time, t, after the voltage has been applied to a capacitive or inductive circuit may be found from one of the following formulas.

$$i = \left(\frac{E}{R}\right)\left(e^{\frac{-t}{RC}}\right)$$

$$i = \left(\frac{E}{R}\right)\left(1 - e^{\frac{-Rt}{L}}\right),$$

where E is the d.c. voltage applied, R is the resistance in the circuit, t is the elapsed time in seconds, C the capacity in farads, L the inductance in henrys, i the current in amperes and $e = 2.718$. The values of

$$e^{\frac{-t}{RC}} \text{ or } e^{\frac{-Rt}{L}}$$

may be obtained quite easily by the use of logarithms.

Let us assign the following values for the capacitive circuit.

$t = 0.04$ second
$R = 300$ ohms
$C = 15$ μfd.

$$\frac{t}{RC} = \frac{0.04}{(300)(15)(10^{-6})} = \frac{(4)(10^{-2})}{(4500)(10^{-6})}$$
$$= \frac{(4)(10^{-2})}{(0.45)(10^{-2})} = 8.88$$
$$e^{\frac{-t}{RC}} = 2.718^{-8.88} = \frac{1}{2.718^{8.88}}$$
$$\log \frac{1}{2.718^{8.88}} = \log 1 - \log 2.718^{8.88}$$
$$= \log 1 - 8.88 \log 2.718 = 0 - (8.88)(0.4343)$$
$$= 0 - 3.8565$$
$$= 10.0000 - 10$$
$$\underline{3.8565}$$
$$6.1435 - 10 = \bar{4}.1435$$
$$\text{antilog } 4.1435 = 0.0001391 = e^{\frac{-t}{RC}}$$

In the equation for the inductive circuit, let us assign these values:

$R = 12$ ohms
$t = 0.08$ second
$L = 0.6$ henry

$$\frac{Rt}{L} = \frac{(12)(0.08)}{0.6} = \frac{0.96}{0.6} = 1.6$$

$e = 2.718$

$$\log 2.718^{-1.6} = \log \frac{1}{2.718^{1.6}} = \log 1 - 1.6 \log 2.718$$
$$= 0 - (1.6)(0.4343)$$
$$= 10.0000 - 10$$
$$\underline{0.6949}$$
$$9.3051 - 10 = \bar{1}.3051$$
$$\text{antilog } \bar{1}.3051 = 0.2019 = e^{\frac{-Rt}{L}}$$

Inductance and Capacity of Two-Wire Line:

The inductance of a two-wire r.f. transmission line may be determined from

$$L = 0.28 \log \frac{d}{r} \text{ μhy. per ft.},$$

where d is the spacing of the wires in inches and r the radius of the conductor.

Find the inductance per foot of a transmission line made of two No. 14 wires spaced 6 inches.

$$\frac{d}{r} = \frac{6}{0.032} = 187.5$$

$$\log \frac{d}{r} = \log 187.5 = 2.73$$
$$L = (0.28)(2.73) = 0.764 \text{ μhy. per ft.}$$

The capacity of a two-wire r.f. line is given by

$$C = \frac{1}{0.236 \log \frac{d}{r}} \text{ μμfd. per ft.}$$

Find the capacity if the line described in the preceding problem.

$$\log \frac{d}{r} = 2.73$$

$$C = \frac{1}{(0.236)(2.73)} = \frac{1}{0.6443} = 1.55 \text{ μμfd.}$$

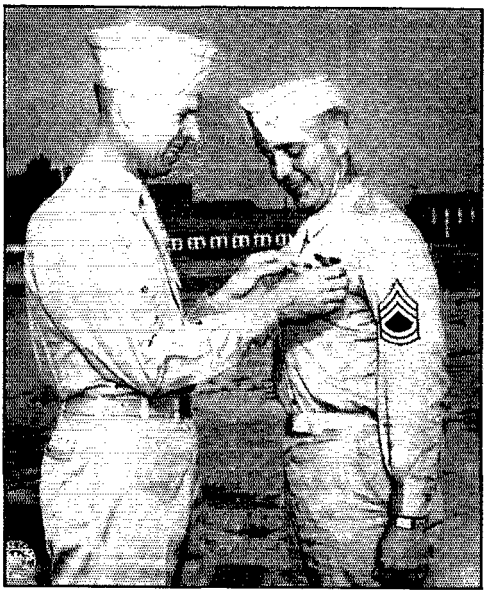
per foot.

★ HAMDOM ★

Hamdom this month presents one ham who joined the Signal Corps and is doing an outstanding job, a lifetime Signal Corps man who turned ham — and had the time of his life, and a b.c.l. serviceman-ham whose ingenuity resulted in an outstanding commercial contribution. The point of which seems to be that, whichever end of the game he may start from, the really good radioman is a ham at heart — and vice versa.

♦

Already one of Hamdom's most-decorated heroes, Lt. George R. Holbert, K6TQS, recently was presented with a third Oak Leaf cluster for his coveted Air Medal. The decoration was awarded for the part he played as aerial gunner aboard a bomber in the sinking of a Jap carrier which was protected by seven Nipponese fighter planes. On this mission, the sergeant's high-altitude



Official U. S. Signal Corps Photograph

bomber had to fly at the comparatively low level of 5,000 feet to "lay its eggs" aboard the carrier.

In all, K6TQS has been on sixty combat missions for a total of 550 hours of combat flying in the South Pacific war theater. During his period of service he has earned the Purple Heart, the Air Medal, the Good Conduct Ribbon, the American Defense Service Ribbon and his air crew Wings, in addition to the three Oak Leaf clusters. He was awarded the Purple Heart for participation in a bombing mission over Tulagi last summer. The Air Medal was awarded for action over Guadalcanal, and the first Oak Leaf cluster was added for downing a four-engined flying boat north of that location. His second Oak Leaf cluster was for having participated in more than 25 combat missions.

Originally from Lamar, Colo., Lt. Holbert was for a time an announcer at b.c. station KOKO. Before Pearl Harbor he sent out his "CQ de K6TQS" on 20 meters from the John Rodgers Airport, near Honolulu. He entered the Army in 1939.

The photograph above shows K6TQS being decorated by Brig. Gen. William O. Reeder, commandant of the Eastern Signal Corps Schools. A technical sergeant at the time the picture was taken, K6TQS is now wearing gold bars, having graduated from the Officer Candidate School at Ft. Monmouth.

When Master Sergeant Austin L. Foster, W2OCX–ex-K7BAQ, retired from the U. S. Army in October, he had chalked up a grand total of thirty years in the Signal Corps. Twenty-seven of those years were spent in Alaska with a signal service detachment, during which time a routine assignment for his outfit was setting up communications in weather 50° below zero, using dog teams for transportation. Sgt. Foster, who has been stationed at Ft. Monmouth since shortly before Pearl Harbor, said he would "head for Alaska after a short vacation." His comment was: "I may be giving up my uniform, but I'll still be doing communications work up there, at least until the war is over. Some people say it's too cold in Alaska and the Aleutians, but it got too hot for the Japs. They left!"

During the time Sgt. Foster was stationed at Ft. Monmouth, he was a radio instructor. Later he was made the non-commissioned officer in charge of the signal center at post headquarters. Before Pearl Harbor, he spent his spare time in setting up amateur station W2-OEC at Ft. Monmouth for the benefit of the soldier hams there.

A brasspounder for forty years, W2OCX started out as a Morse telegrapher. On joining the Signal Corps he did Morse, cable and radio operating. He became interested in ham radio in 1915, but it wasn't until 1931 that, at the suggestion of W7JZ, he finally took it up as a hobby. He received the call K7BAQ and went on the air with a pair of p.p. 45s. Several other rigs followed. After four decades of pounding brass, c.w. is still "music to his ears" and he impatiently awaits the day when he can open up again.

♦

Lawrence Handler, ex-W2BMP, maintenance foreman at Westinghouse Lamp Division, is shown below with the machine-tool fixture which won him a WPB merit award, a check for $541.50, and a $50 war bond.

The fixture he designed is a collar-like device which fits over the end of a vacuum-tube element assembly to hold it in place while the glass bulb is sealed around it. With the method formerly used, to release this collar after each sealing operation it was necessary to hammer it back to its original position. This sometimes damaged the fixture and cracked the glass. Ex-W2BMP suggested installing three metal jaws on the fixture which would pull the collar back to its original position and eliminate the need for hammering. He also proposed installing ball bearings on the fixture to eliminate the motion caused by friction when the collar was released, another frequent cause of injury. These ideas resulted in an average daily saving of nine production hours and the conservation of critical materials by preventing tube breakage.

Before joining Westinghouse, ex-W2BMP was a radio electrician and serviceman and devoted his spare time to hamming.

HAPPENINGS OF THE MONTH

CHANGE IN W.E.R.S. HOURS

EFFECTIVE November 12th, FCC amended Section 15.75 of its WERS regulations to change the testing hours on Monday and Wednesday in the Eastern and Central time zones to read one hour earlier. That is, in the Eastern time zone the testing hours on these days are now 9 to 11 P.M.; in the Central time zone they are now 8 to 10 P.M., the same as in the Mountain time zone. Mountain and Pacific time-zone hours are unchanged and there is no alteration in the Sunday testing hours.

R.T.P.B. NOTES

THE Radio Technical Planning Board, the formation of which was reported in our November issue, has practically completed its organization and, by the time these lines are in print, its panels will have plunged into hard work. The members of the Board met in Washington with FCC on November 17th, with the members of IRAC also present, to discuss general policy and the scope of the work. Army, Navy and FCC have appointed observers as point of contact.

The objectives of the RTPB are to formulate recommendations for the technical future of the radio industry and radio services, in accordance with the public interest and the technical facts, and to publish those recommendations for the information of government, industry and the public. Its work is restricted to engineering considerations. It is a nonprofit agency sponsored and financed by a group of nonprofit associations interested in the radio field. Its contributing sponsors are the American Institute of Electrical Engineers, the American Radio Relay League, FM Broadcasters, Inc., the International Association of Chiefs of Police, the Institute of Radio Engineers, the National Electrical Manufacturers Assn. and the Radio Manufacturers Association. Representatives of these contributing sponsors (President Bailey in the case of ARRL, with Secretary Warner as alternate) constitute an Administrative Committee, with management functions. There are also some noncontributing sponsors, among whom probably will be Aeronautical Radio, Inc., the International Municipal Signal Assn., and the National Independent Broadcasters. RTPB itself is made up of representatives of all of the sponsors plus the chairmen of all of the panels, at present numbering thirteen.

Dr. W. R. G. Baker, a vice-president of General Electric Co., is chairman both of the Board and of the Administrative Committee. The vice-chairman is Dr. A. N. Goldsmith, consultant, while W. B. Cowilich, assistant secretary of IRE, serves as secretary, with Bond Geddes, executive vice-president of RMA, as treasurer. L. C. F. Horle, manager of the RMA Data Bureau, has been engaged as Coördinator, with a major task involving the collating and publishing of the RTPB work.

This work initially gets accomplished of course in the panel or study committees. Panel No. 1 is on Spectrum Utilization, its scope an analytical study of the factors pertinent to the most effective use of the transmission medium. Its study can be almost academic, since it concerns itself with what would be an ideal distribution of frequencies to services, assuming that there was no present occupancy of the ether. Its chairman is Dr. Goldsmith, its vice-chairman Dr. R. H. Manson (Stromberg-Carlson). Panel No. 2 is the all-important one on Frequency Allocation, its chairman Dr. C. B. Jolliffe (RCA-Victor), its vice-chairman F. M. Ryan (AT&T). This committee has the duty of recommending the allocation of frequency bands to all services "on the basis of propagation and equipment characteristics, with due regard to military requirements, public interests, and past practices."

Panel No. 3, on High-Frequency Generation, will supply data on probable progress in the development of tubes for increasing frequencies, under the chairmanship of Roger Wise (Sylvania), with H. F. Argento (Raytheon) as vice-chairman. The review and further development of standards for Standard Broadcasting constitutes the field of Panel 4, under H. S. Frazier (NAB) and Burgess Dempster (Crosley). Panel No. 5 deals similarly with V. H. F. Broadcasting, 30–300 Mc., with Dr. G. E. Gustafson (Zenith) as chairman, Dr. C. M. Jansky, jr. (Jansky & Bailey), vice-chairman. RTPB attaches particular importance to the future of Television Broadcasting, which is the field of Panel No. 6 under D. B. Smith (Philco) as chairman, I. J. Kaar (GE) vice-chairman. This television panel probably will be broken down into at least seven committees, reviewing the work of the recent National Television Systems Committee.

Panel No. 7 deals with Facsimile Broadcasting under the chairmanship of J. V. L. Hogan (consultant), with C. J. Young (RCA Labs) as vice-chairman. The radio communication services (as contrasted to broadcasting) are the work of Panel No. 8 under the chairmanship of Dr. Haraden Pratt (Mackay), with Dr. H. H. Beverage (RCAC) as vice-chairman. Relay Systems are the field of Panel No. 9, under E. W. Engstrom (RCA Labs), with Dr. Ralph Bown (Bell Labs) as vice-chairman. Panel No. 10 is to develop standards for Radio Range, Direction & Recognition; its chairman is W. P. Hilliard (Bendix), its vice-chairman C. G. Fick (GE). Aviation matters are handled by Panel 11 on Aeronautical Radio, chairmanned by D. W. Rentzel (American Airlines), his assistant not yet named. Panel No.

12 under C. V. Aggers (Westinghouse), with H. B. Marvin (GE) as vice-chairman, is to study Industrial, Scientific & Medical Equipment with a view to eliminating radio interference. The Police & Emergency Services are the subject of Panel No. 13, led by Prof. D. E. Noble (Galvin), with Frank Walker, W8EBN (Michigan State Police), vice-chairman.

Any radio agency with a legitimate interest can obtain membership on any of the panels. ARRL of course is to be represented on several. We shall make further reports from time to time.

WAR SERVICE RECORD

IF YOU are a radio amateur of the United States or Canada, and are devoting your talent during this war to any aspect of radio work, ARRL Headquarters requests that you register the pertinent data with us by means of the form at the bottom of this page (or a post card reproduction of the essential part). This applies whether you are serving in the armed forces or in the essential auxiliary services, or in industry which is wholly devoted to war work. Our purpose, of course, is to compile the records and the statistics that will show how great the amateur's contribution has been to victory, and that will prove that our countries are smart to foster amateur radio.

We have been asked why we don't accept the registrations of radio amateurs who are serving in other essential fields such as shipbuilding, aviation, etc.; aren't they just as patriotic? We hope that no one ever attempts to detract from the record of any American who is doing his best to win this war by working where he is needed most or in the field in which he is most skillful. But the ARRL's field is amateur radio and the record we are compiling has for its purpose the demonstration of what radio amateurs do in wartime for telecommunications, radiolocation and related activities.

You'll help the whole gang along if you'll register with ARRL and give us similar dope on any of your ham buddies.

ELECTION NOTICE

To All Full Members of the Midwest Division:

You are hereby advised that no candidates for Midwest Division director and alternate director were nominated under the recent call. By-Law 21 provides that if no eligible nominees be named, the procedure of soliciting and nominating is to be repeated. Pursuant to that by-law, you are again solicited to name Full Members of your division as candidates for director and alternate director. See the original solicitation published at page 39 of October *QST*, which remains in full effect except as to date mentioned therein: Nominating petitions must now be filed at the Headquarters office of the League in West Hartford, Conn., by noon EWT of the 20th day of January, 1944. Voting will take place between February 1 and March 20, 1944, on ballots to be mailed from the Headquarters office the first week of February. The new director and alternate will take office as quickly as the result of the election can be determined after February 20, 1944, and will serve for the remainder of the 1944-1945 term.

You are urged to take the initiative and file nominating petitions.

For the Board of Directors:

K. B. WARNER,
Secretary

November 1, 1943.

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 24 of July *QST*. 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.

AMATEUR WAR SERVICE RECORD

Name

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

Present mailing address

SERVICE

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

Rank or rating

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

A Rotary Audio-Frequency Generator

Tone Wheels for Code-Practice and Testing Purposes

BY PAUL J. PALMER,* W8UGR

"Hi, there, fellers," said Tuffy 6L6G, "Humph! Dis dope 8UGR tinks he kin do widout us guys fer makin' de racket fer code practice. Oh, yeah? I'm frum Mizzoory, buddy. Betcha a buck he'll hafta cut us in t'git enny pushover. Jist in case, fellers, I'll be standin' by so's ya kin use me in de amplifier er sumpin'. S'long, guys, looks lik' it ain't gonna be long now. Tsk, tsk, poor feller, ain't it t'bad? 30 fer now'n' 73."

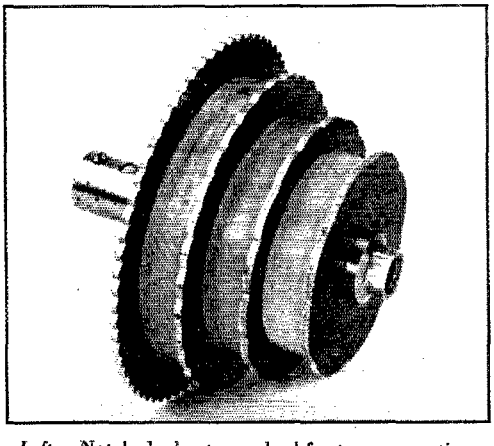
In this article W8UGR describes a simple tone-wheel system for generating audio-frequency signals for code-practice and other purposes. By keying several tones simultaneously, interference may be simulated. The arrangement also may be used as a siren-alarm generator.

DURING the past few years the writer has been engaged in the construction of a so-called electronic organ. The tones are created by means of a series of serrated wheels of soft iron passing through or rotating in the field of magnetic pick-up coils. It is, perhaps, the most perfect way of obtaining true pitch or mathematically related tones and their harmonics, especially when using a synchronous alternating-current motor as the driving source. The Hammond electronic organ uses such a method, and recently the thought occurred that perhaps something of this nature could be adapted to the generation of fixed audio frequencies for either code practice or audio-frequency testing equipment.

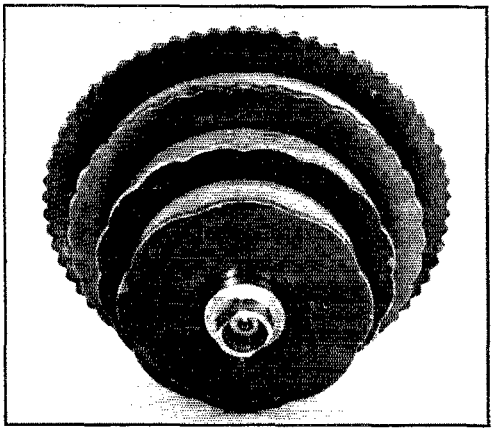
From the physics of sound it is well known that audio frequencies can be produced by holding a card or metal reed against a toothed wheel, the frequency depending upon the product of number of teeth in the wheel and the number of revolutions per second. For example, if a wheel with sixteen teeth is connected directly to the shaft of an 1800 r.p.m. synchronous or induction motor, the speed will be 30 revolutions per second. Since the product of 30 and 16 is 480, a card held against the edge of the wheel will produce a 480-cycle tone. By using a shaft gearing of the ratio of 11 to 12, and the same 16-tooth wheel, it is possible to generate a 440-cycle tone, which is the International "A" pitch of the musicians. Further, by using wheels with 8 teeth, 32 teeth, 64 teeth, etc., harmonic tones precisely one octave apart will be produced. If it is desired to produce tones in the 1000-cycle series, using a ratio of 5 to 6 in the drive and wheels with 10, 20, 40 and 80 teeth, the tones will be 250, 500, 1000 and 2000 cycles respectively.

To produce the tones electrically, small pick-up coils wound on permanent-magnet cores are placed in line with the edges of the tone wheels, as shown in the sketch of Fig. 1. As the wheel rotates, current whose frequency depends upon the speed and number of teeth is induced in each of the coil windings. This current is of sufficient strength to produce a tone in headphones connected across the winding. This signal may, of course, be amplified through a regular sound-system amplifier, using the leads from the pick-up coil in lieu of the microphone and its battery. A broadcast receiver with a phonograph pick-up

*868 Whittier Blvd., Grosse Pointe Park, Detroit 30, Mich.



Left—Notched-edge type wheel for tone generation.



Right—Front view of the tone-wheel assembly.

connection will serve ideally, in the event it is desired to have greater volume.

By using three or four of these wheels with different numbers of teeth, one can build up a code-practice apparatus which will simulate the

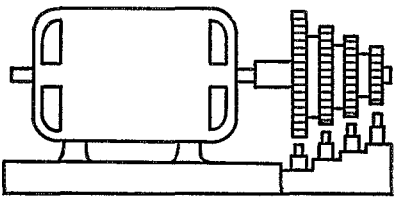


Fig. 1 — Sketch showing arrangement of the notched wheels and pick-up coils for the tone generator.

interference caused by several stations. This is made possible by providing a separate key and resistor of the variable type in each pick-up coil circuit, as shown in the diagram of Fig. 3. By having different operators key simultaneously, and by varying the strength of the signal from each individual pick-up coil by means of the resistors, QRM can be duplicated. Thus, operators can be taught to read through the heaviest sort of interference. The smaller the difference in frequencies the greater the interference, of course.

The wheels illustrated in the photographs are some of those made for the electronic organ and are shown only as examples. They are made of soft sheet iron from $\frac{3}{32}$ to $\frac{1}{8}$ inch in thickness. The edges are serrated in sine-wave shape for the generation of accurate musical tones. However, this refinement is not necessary for a code-practice or testing unit. For this purpose all of the wheels may be of the same diameter, varying only in the number of teeth.

Instead of serrating the edges of several discs, it may be easier to make a plate such as the one shown in Fig. 2. Holes are drilled at equal spacings along the circumference of each circle to give the desired frequencies. With this arrangement the pick-up coils should be mounted at right angles to the surface, instead of "on edge" as in the model using toothed wheels. The principle of the drilled-hole type is similar to that of the Alexanderson high-frequency alternator. Other methods may readily suggest themselves to the experimenter. Where only one tone is desired a very simple set-up can be arranged, and any kind of steel or cast iron gear may be used.

The pick-up coils are simple to make. The cores should be of $\frac{1}{4}$-inch diameter steel drill rod about $2\frac{1}{2}$ inches long, which can be magnetized easily. If soft-iron cores are used, it will be necessary to provide them with separate excitation coils, operated from a battery or other source of d.c., to keep them magnetized. However, the permanent-magnet type is the simplest, of course.

Since the frequency of the current is different for each of the coils, each should be wound with a different number of turns so that the impedances will be the same. With the perforated wheel shown in Fig. 2, the windings are as follows:

64-tooth wheel, 150 turns
32-tooth wheel, 225 turns
16-tooth wheel, 325 turns
8-tooth wheel, 420 turns

No. 30 or smaller wire may be used since the current generated is very small. Small fiber pieces may be used for the coil ends. The cores may be cut off square except for the one used with the 64-tooth wheel. The end of this one should be wedge-shaped, as shown in the detail sketch of Fig. 2, since the teeth are so small that the square end would cause an overlapping

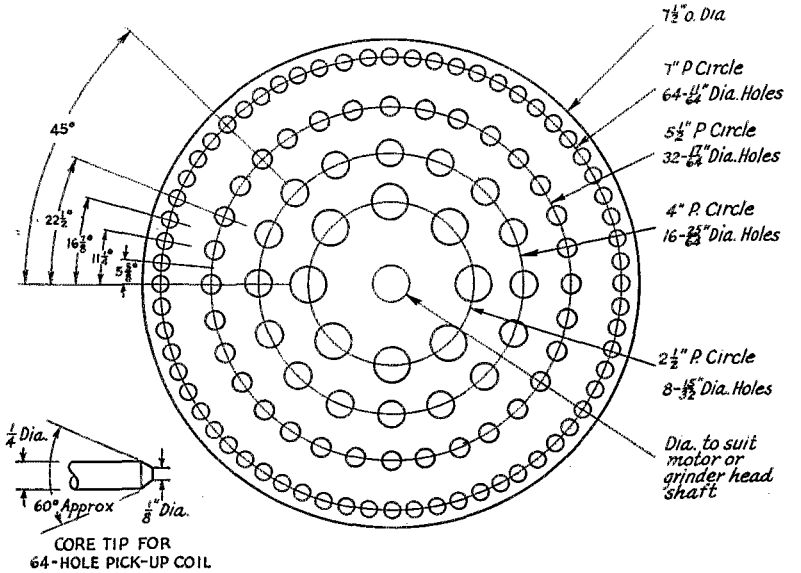


Fig. 2 — Plan for perforated-type wheel for four frequencies. Detail at left shows tapered core for 64-hole pick-up.

of fields and produce "double talk." The position of each coil should be adjusted so that only a small air gap exists between the end of the core and the edge or surface of the wheel as the case may be.

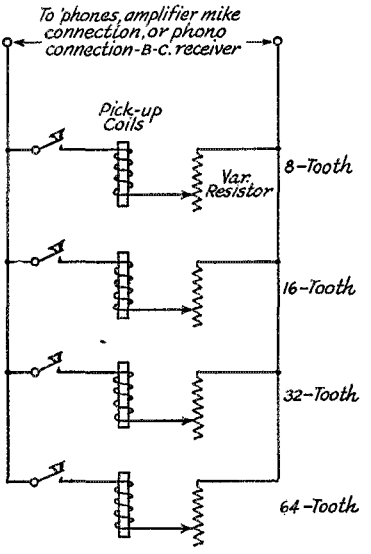


Fig. 3 — **Circuit for keying several tones individually. The variable resistors are used to control signal strength.**

In case it is desired to build up an air-raid or fire-station siren, a motor of the universal type, whose speed can be controlled by a variable resistance, may be used. Such motors are often found in vacuum-cleaners, oil-burners, etc. Since the weight of the tone wheel is sufficient to produce considerable fly-wheel effect, some sort of braking device may be required to obtain the desired variation in speed. Tremendous volume can be produced by using high-power amplifying equipment. Such a device could be used in sound systems in factories and in other places for sounding general alarms.

Where the experimenter is not interested in obtaining some particular selected pitch the tone wheels can be mounted on a grinder head and driven by vee belt, or a grinder attachment for a drill press may be used.

Here at W8UGR we have found the field of synthetic musical tone generation very fascinating, and it is hoped that this article may suggest to the experimenter many uses for this method of audio tone generation.

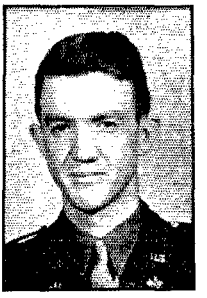
Strays

The face of the new Canadian 5-cent piece carries the following slogan in International code: "We win when we work willingly." So far as I know, Canada is the first country to honor its hams in this fashion. — *W6KTY.*

★ ★ ★ ★ ★ ★ ★ ★

Gold Stars

LT. PETER D. BARNHART, W4EUN, was killed January 15, 1943, when the Army transport aboard which he was a passenger crashed in the jungles of Dutch Guiana. At the time he was on a special emergency assignment to site and install needed communications and other equipment somewhere in North Africa.



A roving missionary's son, W4EUN was born in Persia and built his first crystal set in Chile at the age of five. At 13 he built his first vacuum-tube receiver, the first message he copied being from Byrd at the South Pole. During his high-school days he bought transmitting gear with the proceeds of a paper route and joined AARS. An honor student at Stetson University, upon graduation he taught radio at a government school.

Commissioned a lieutenant in the Signal Corps in August, 1941, W4EUN was first assigned to duties at Ft. Monmouth. That October he was sent to England with the Electronics Training Group, being recalled in March, 1942, to teach radio and radar at the AAF school at Orlando, with the further duties of installing and inspecting equipment throughout Florida. After his overseas assignment he was to have returned to Orlando.

SGT. JAMES W. WRIGHT, W6SAP, was one of the eight American airmen who lost their lives during the first U. S. Army Air Forces raid on Nazi objectives, July 4, 1942. The bomber in which he was radio operator-gunner was returning to its base in England from a bombing mission over German airdromes in Holland when it was shot down by antiaircraft fire and crashed. Sgt. Wright was posthumously awarded the Order of the Purple Heart.

W6SAP had been interested in radio "from the time he could read," and spent much of his spare time devising ways of improving his transmitter. He preferred to keep radio as a hobby, however, his choice of a vocation being chemistry or aviation. He was in his second year at Stockton Junior College in California when he enlisted in the Army Air Forces. He received training as a radio operator and later attended gunnery school before going overseas.

★ ★ ★ ★ ★ ★ ★ ★

IN THE SERVICES

BY THE TIME this issue of *QST* comes off the presses the holiday season will be well upon us and we'll all be going about the performance of the customary Yuletide tasks. But our hearts will be going out to the boys and girls in the services — our relatives, loved ones, and friends. We're wishing that each and every one of them could be at home with us instead of being scattered to the four corners of the earth, and we're thinking of all the things we're going to do in 1944 to hasten that day of victory. There is so very little we can do on these pages to convey our gratitude for the fine job being done, but the two things we do want to express are: Hearty Christmas Greetings and earnest Good Wishes for a Victorious New Year! Let's all do our utmost to make next Christmas a peaceful one.

ARMY—AIR FORCES

"I HAVE enjoyed reading the roster each month. It is about our only means of knowing where the old ether-busters are located." Those are the sentiments of Lt. J. H. Baldrige, W8JSP. We know all of you OMs use this "directory" as a means of keeping track of your former contacts. With that in mind, check yourself up and be sure we have *your* name and up-to-date information in our file.

We're happy to have a "Leatherneck" to grace our roster this month. S/Sgt. N. W. Fincher, W4FIJ, was in training at the Radio Matériel School of NRL at Bellevue, D. C., when we last heard of him via his father.

1FOO, Pope, 2nd Lt., foreign duty.
1KDN, Murray, Pfc., Truax Field, Wis.
1MWD, Gilmore, Pfc., Truax Field, Wis.
2AOE, Shafter, Pfc., Truax Field, Wis.
2CWT, Frans, Pfc., Mitchel Field, N. Y.
2EKS, Bartoss, Pfc., Truax Field, Wis.
2GUK, Musko, Pfc., Truax Field, Wis.
2HHC, Beckmeyer, Pfc., Truax Field, Wis.
2IDW, Rodman, A/C, Independence, Kans.
2IKE, Buelow, Pfc., Truax Field, Wis.
2INF, Sullivan, A/C, New Haven, Conn.
2JGD, Lutweik, Pfc., Truax Field, Wis.
2LUN, Stimmel, Pfc., Kelly Field, Texas.
2LVC, Anderson, Pfc., Truax Field, Wis.
2MBA, Schwartz, Capt., Maxton, N. C.
ex-2MXI, McCormick, Pfc., Truax Field, Wis.
2NCZ, Wilkes, Sgt., foreign duty.
2VL, Gutman, Capt., foreign duty.
3DVQ, Kent, S/Sgt., Selfridge Field, Mich.
3IMW, Kulp, Pvt., Sioux Falls, S. D.
3IPA, Sprouse, Pfc., Truax Field, Wis.
3JRE, Laker, Major, foreign duty.
4CVM, Key, Pfc., Truax Field, Wis.
4CWE, Stoffregen, Sgt., address unknown.
4GFC, Dixon, S/Sgt., Pope Field, N. C.
4GYN, Nelms, Seymour, Ind.
4HOD, Dalzell, M/Sgt., address unknown.
4HUK, Sandefur, A/C, Gettysburg, Pa.
4WI, Hood, 2nd Lt., address unknown.
5BKE, Lawson, 2nd Lt., San Antonio, Texas.
5BVH, Tomlin, W/O, Ellington Field, Texas.
5FAR, Cadena, Lt., Lubbock, Texas.
5HQH, Bradley, Cpl., address unknown.
5IDO, Caltagirone, Sgt., foreign duty.
5JAH, Laurents, foreign duty.
5JXO, Watkins, A/C, Seymour Johnson Field, N. C.
6BCM, Everman, Lt., Pecos, Texas.
6GY, McGlashan, Major, Los Angeles, Calif.
6LTY, Deak, Pfc., Hobbs, N. M.
6POC, Ulrick, M/Sgt., Esler Field, La.
K6ROV, Paquette, M/Sgt., address unknown.
8AGN, Solokowski, Pfc., Truax Field, Wis.
8ANZ, Miller, Pfc., Truax Field, Wis.
8CEB, Tate, Pfc., Truax Field, Wis.
8HQY, Hamilton, Cpl., Venice, Fla.
8IAV, Ehlman, Tech., Gardenia, Calif.
8KMS, Calvin, Pfc., Truax Field, Wis.
8LIS, Shugert, S/Sgt., address unknown.
8MRT, Chamberlin, Pfc., Truax Field, Wis.
8MXH, Tupper, S/Sgt., address unknown.
8NIO, Barkley, W/O, Keesler Field, Miss.
8NKA, Pirrung, F/O, Baer Field, Ind.
8NUF, Vogle, Cpl., Presque Isle, Maine.
ex-8OOS, Legg, 1st Sgt., Selman Field, La.
8PZV, Luhrman, A/C, St. Louis, Mo.
8QCS, Batchelor, Pfc., Truax Field, Wis.
8QPA, Procter, Cpl., address unknown.
8RXQ, Koch, T/Sgt., foreign duty.
8RYC, Amend, Pfc., Truax Field, Wis.
8SIJ, Cover, Opl., foreign duty.
8TIS, Adkins, Capt., Long Beach, Calif.
8UAT, Kessler, Pfc., Truax Field, Wis.
8VNM, Gatzke, Cpl., address unknown.
8VUH, Morgan, 2nd Lt., Cambridge, Mass.
8VWI, Waterman, Cpl., foreign duty.
9ADG, Caird, Capt., Washington, D. C.
9CJY, Smith, Pfc., Truax Field, Wis.
9CQK, Dirrieck, address unknown.
9ELI, Stevenson, T/Sgt., address unknown.
9IMT, Canterbury, Col., Washington, D. C.
9LYC, Baxter, Lt., foreign duty.
9PGI, Novak, T/Sgt., Camp Stewart, Ga.
9PNE, Anderson, 2nd Lt., Truax Field, Wis.
9VIC, Cattlett, A/C, San Antonio, Texas.

Operator's license only:
Bartlett, Pfc., Scott Field, Ill.
Biblen, Pfc., Truax Field, Wis.
Cook, Cpl., Long Beach, Calif.
DePippo, Pfc., McChord Field, Wash.
Duell, Cpl., Valparaiso, Ind.
Easton, Lt., Boca Raton Field, Fla.
Elder, Cpl., Delray Beach, Fla.
Gaffey, Lt., foreign duty.
Gaines, Pfc., McClellan Field, Calif.
Gottlieb, Cpl., Scott Field, Ill.
Grant, Pfc., Truax Field, Wis.
Hogan, Cpl., Alamogardo, N. M.
Reinstadler, A/C, Pittsburgh, Pa.
Seidel, Sgt., Greenville, S. C.
Wants, 2nd Lt., Boca Raton Field, Fla.
Waters, S/Sgt., Valparaiso, Ind.
Willson, Pfc., Truax Field, Wis.
Winquist, Pfc., Scott Field, Ill.

MARINE CORPS

1LAS, Hoisington, Capt., Rye, N. Y.
1LHD, Richards, T/Sgt., foreign duty.
1LJG, Johnson, Cpl., Santa Ana, Calif.
2ISQ, Troster, 2nd Lt., Cambridge, Mass.
2JHQ, Boudreau, T/Sgt., foreign duty.
2JIL, Huberman, Parris Island, S. C.
2KYI, Yorio, Cpl., foreign duty.
3FSF, Smith, T/Sgt., Cherry Pt., N. C.
3JLH, Greenwood, T/Sgt., Parris Island, S. C.
4FDH, Harrell, Pvt., address unknown.
4GGX, Newman, Lt., foreign duty.
4GVJ, Jenkins, T/Sgt., foreign duty.
5IZA, Holland, M/Sgt., foreign duty.
5KRS, Young, T/Sgt., Washington, D. C.
6BCX, Smith, Lt., Washington, D. C.
6NBE, Lowe, S/Sgt., Camp Lejeune, N. C.
6PUU, Page, T/Sgt., Chicago, Ill.
6UNJ, Klimek, Gunner, San Diego, Calif.
9EPB, Cappels, address unknown.
9FSY, DeHaan, Lt., Camp Murphy, Fla.

Operator's license only:
Alexander, Lt., San Diego, Calif.
Gillespie, Pvt., San Diego, Calif.
Maloney, Major, Washington, D. C.
Szabo, Pfc., foreign duty.

ARMY — GENERAL

ANOTHER Doolittle breaks into print! This time, however, it's a lieutenant and not a general, and the locale is Australia rather than Africa. 2nd Lt. J. B. Doolittle, W1CTC, of Woodmont, Conn., who recently swapped his zebra stripes for a little gold bar via OCS, is now seeing service in the radio section of a signal company where his ham experience is "plenty handy."

1EYY, DeWitt, Pvt., Camp Shelby, Miss.
1ICI, Wyer, Lt. Col., address unknown
1JFB, Drury, Pfc., Asheville, N. C.
1LDG, Burke, Cadet, Gainesville, Fla.
1MHT, Robinson, Pvt., Camp Barkeley, Texas.
1MPY, Ballard, S/Sgt., Ft. Benning, Ga.
2GCC, Chenoweth, Lt., Edgewood Arsenal, Md.
2MCO, Jones, Pvt., Bronx, N. Y.
2NBT, Yuter, Pfc., Cambridge, Mass.
3AVL, Hanger, Lt., Washington, D. C.
4EYV, Kizzire, Lt., foreign duty.
4FYZ, Moore, Pfc., Camp Murphy, Fla.
5JVR, Duller, Pvt., Bronx, N. Y.
6AMY, Ferguson, Pvt., Ft. Riley, Kans.
6UCF, Anderson, Pfc., College Station, Texas.
6OZC, Douglass, Lt., Sausalito, Calif.
7HVC, Pease, Sgt., foreign duty.
7IDY, MacKinnon, Pvt., Ft. Bragg, N. C.
7IGV, Darham, Pvt., address unknown.
8JOF, Degolyer, Cpl., Ft. Lewis, Wash.

8KXS, Hunter, Pfc., Minneapolis, Minn.
8LSF, Kolb, Sgt., foreign duty.
8SHS, Stevenson, T/Sgt., foreign duty.
8TTL, Baisley, M/Sgt., Camp Davis, N. C.
8WTB, Tilbury, Cpl., Nashville, Tenn.
9BBE, Runnels, T/4, address unknown.
9EPG, Krueger, Lt., address unknown.
9ERU, Hubbell, 2nd Lt., address unknown.
9HPS, Leonard, T/R, foreign duty.
9JQA, Allison, Pvt., Camp Callan, Calif.
9KGU, *Blaskovich, S/Sgt., Camp Wallace,* Texas.
9NBB, Phelps, Pvt., Camp Roberts, Calif.
9NIC, Lowall, Pvt., Ft. Knox, Ky.
9QKL, Mastalio, Sgt., San Francisco, Calif.
ex-9QKY, Cohen, Lt., foreign duty.
9QUA, Gerber, Sgt., foreign duty.
9SYP, Van Brunt, Cpl., foreign duty.
9TDQ, Shalett, Pvt., Ft. Pierce, Fla.
9UUQ, Singer, T/Sgt., foreign duty.
9ZDW, *Haney, Capt., foreign duty.*

Operator's license only:

Atkeisson, T/4, foreign duty.
Castle, foreign duty.
Digre, Sgt., Seattle, Wash.
Geer, Pvt., University, Miss.
Kordik, Pvt., Camp Barkeley, Texas.
Ormston, Pvt., Camp Gruber, Okla.
Seilhamer, 2nd Lt., Ft. Belvoir, Va.
Vandegrift, Pvt., Stanford University, Calif.

NAVY—SPECIAL DUTY

A W4 LSPH, ART1c R. J. Dickson, sent in a letter with his AWSR "just to let all of you fellas back there in the States know that us hams up here in the Aleutians are still able to send along our 73." We're glad to hear it, OM. Keep up the good work!

KA1AC, Winston, RE, Washington, D. C.
1RK, Drozek, Lt. Comdr., Washington, D. C.
2MJM, Kehlenbeck, ARM1c, Cherry Point, N. C.
4ETI, Rogers, RT1c, Washington, D. C.
4FFV, Love, Key West, Fla.
4GVX, Tinney, RM2c, Norfolk, Va.
4HLS, Ikner, ART3c, Corpus Christi, Texas.
5HZD, *Stephens, CSP, Memphis, Tenn.*
6CPY, Thomas, RT1c, Treasure Island, Calif.
ex-6GLX, Anderson, RT1c, Treasure Island, Calif.
6KO, Callahan, Lt. Comdr., foreign duty.
6LRJ, Davison, RT1c, foreign duty.
6MRF, Wedel, ART1c, Corpus Christi, Texas.
6PAM, McKeown, S1c, College Station, Texas.
6RYU, Wells, RT2c, Pt. Hueneme, Calif.
6SSP, Mills, ART2c, Quonset Point, R. I.
7DTP, Hoover, RT2c, Treasure Island, Calif.

Thanks to RT1c H. H. Murphy of Haines City, Fla., this month we can personalize our listing of amateurs in the oldest branch of service afloat. W4AXY is stationed at the Coast Guard district radio repair shop in Miami, Fla., and is currently working on the intricacies of one of the war's newest developments.

7GEV, Johnston, ART1c, Corpus Christi, Texas.
7IFS, Ballieu, RT3c, Treasure Island, Calif.
7IIG, Alexander, ART2c, Clinton, Okla.
7JAA, Douglas, ART2c, Washington, D. C.
7JBD, White, RT1c, address unknown.
8CRM, Gassett, Lt. (jg), St. Simon Island, Ga.
8NPG, Frye, RT1c, Norfolk, Va.
8NQU, Goff, Lt. (jg), Key West, Fla.
8WJX, Werner, RT3c, Treasure Island, Calif.
9DYH, *Whittaker, RT2c, Corpus Christi,* Texas.
9ECX, Bauer, Lt. (jg), Philadelphia, Pa.
9HDD, Valker, RT3c, Washington, D. C.
9HZY, Brandenburg, ACRT, Wildwood, N. J.
9IKY, Smith, RT1c, San Diego, Calif.
9IZQ, Pfister, Ens., Corpus Christi, Texas.
9KKA, Clarke, RT2c, New London, Conn.
9KNC, Inman, RT2c, Washington, D. C.
9OPT, Hurst, RM3c, Miami, Fla.
9RZF, Shirer, A/S, Topeka, Kans.

COAST GUARD

1LVY, Ryder, RM3c, foreign duty.
2DIA, Weiler, Lt. (jg), Brooklyn, N. Y.
2DQC, *Wasiewicz, RT2c, Atlantic City, N. J.*
2HOM, Garretson, S1c, Brooklyn, N. Y.
2LUC, Weingart, A/S, address unknown.
2NVP, Quarles, CRM, address unknown.
ex-3DUI, Probst, RM2c, Bethany Beach, Del.
5BZT, Minis, CRT, New Orleans, La.
5GRE, Schrieffer, RT2c, address unknown.
ex-6CVY, Forsman, CPO, Hartford, Conn.
6LTE, Myers, CRM, Camp Bradford, Va.
7EJC, Bailey, RM2c, Tatoosh Island, Wash.
9NUQ, Kitterman, Silver Spring, Md.
9OZL, Albee, S2c, Atlantic City, N. J.
9OZO, Albee, RM2c, Southampton, N. Y.
9PDE, Lassard, Lt. (jg), address unknown.
9QBO, Gereau, St. Louis, Mo.
9SUI, Besanson, address unknown.
9ZHH, Sacks, RM1c, St. Petersburg, Fla.
9ZNG, Willes, RM1c, Selbyville, Del.

Operator's license only:

Armstrong, RM2c, foreign duty.
Carroll, RM2c, foreign duty.
Killian, A/S, St. Augustine, Fla.
Walther, Mus.1c, Brooklyn, N. Y.

ARMY—SIGNAL CORPS

"POUNDING brass has not much place in the chaplain's work," writes Chaplain O. C. Zaebst, W4HWX, "but as an entree and for finding out where we eat, etc., the ability to take it at 20 w.p.m. is invaluable." We've heard of fellows being hours late for meals in peacetime because of their interest in some particular contact. Looks like the situation had reversed itself since Pearl Harbor!

ex-1CCS, Dwyer, S/Sgt., foreign duty.
1IBM, Andrews, Capt., Camp Hood, Texas.
ex-1JK, Ferretti, Capt., Ft. Monmouth, N. J.
1LHB, Rudolph, address unknown.
1LLW, Porrazzo, Pvt., Camp Crowder, Mo.
1NIA, Secondari, Pvt., Camp Crowder, Mo.
1NJR, Cronin, Cpl., Tampa, Fla.
2FMD, *Arsics, M/Sgt., Camp Campbell, Ky.*
2HTH, Magee, Lt., New Orleans, La.
2IUW, Maglione, 2nd Lt., Ft. Monmouth, N. J.
2IUW, Maglione, 2nd Lt., address unknown.
ex-2JQK, Lenwell, Capt., Ft. Washington, Md.
2KCV, *Robertson, Lt., address unknown.*
2NKK, Breines, Cpl., Ft. Monmouth, N. J.
2NUZ, Ruzicka, Pfc., Camp Murphy, Fla.
2OGR, Strothman, Lt., Milwaukee, Wis.
3EQL, Rohleder, Pfc., Ft. Monmouth, N. J.
3FCO, Zacharevich, Pfc., Ft. Monmouth, N. J.
3HIY, DeBellis, T/4, Ft. Leonard Wood, Mo.
3IAP, Williams, Pvt., Ft. Clark, Texas.
3JNJ, Burkhead, Lt. Col., Ft. Bragg, N. C.
3PG, Trindle, Pvt., Camp Adair, Ore.

Hitler and Tojo may be credited (or blamed) for the coincidence which brought "The Christies" together. Lt. Hal Christenson, W2KJR, left, and Lt. Hal Christensen, W6RIM, right, worked each other on 20 c.w. during peacetime. Came the war; they met at Ft. Monmouth OCS; they studied and graduated together; and now, as radio officers, they're roommates where their present training would be any ham's delight.

4AJ, Castleberry, 2nd Lt., Springfield, Ohio.
4BOC, Alford, 2nd Lt., address unknown.
4CP, Worsley, 2nd Lt., Ft. Monmouth, N. J.
4EXF, Blackerby, Lt., foreign duty.
4FOT, Mitchum, Pvt., Camp Crowder, Mo.
4FXR, Graham, Pfc., foreign duty.
4GMW, Council, Sgt., foreign duty.
ex-4GUP, Snellgrove, T/4, foreign duty.
4IFY, Onffroy, Lt., Ft. Monmouth, N. J.
K4JA, Marin, M/Sgt., foreign duty.
4ZZ, Brown, Pvt., Camp Crowder, Mo.
ex-5BSK, Frisco, Lt., Presque Isle, Maine.
5DXK, Bowman, Capt., Camp Crowder, Mo.
5GYG, Baird, T/5, Boston, Mass.
5KDX, Gardner, Cpl., foreign duty.
5KEI, Huckabee, Pfc., Camp Murphy, Fla.
7AFX, Pile, Capt., San Francisco, Calif.
K7DIS, Davis, T/3, foreign duty.
7FAF, James, Lt., Oklahoma City, Okla.
7GNE, Werthmann, Capt., Seattle, Wash.
7HBH, Lestarjette, T/3, foreign duty.
7IJY, Mackie, S/Sgt., foreign duty.
7JS, Walker, Seattle, Wash.
8BEX, McKenas, Cpl., foreign duty.
8IXZ, Kolonick, Lt., foreign duty.
8LVA, Laditka, T/4, foreign duty.
8MBT, Pfaff, 2nd Lt., address unknown.
8QCC, Besesparis, Cpl., Camp Murphy, Fla.
8RMG, Kozub, Pfc., Ft. Monmouth, N. J.
8STA, Keith, Pvt., Colorado Springs, Colo.
8USC, Goldsboro, Pvt., Ft. Jackson, S. C.
8VPS, *Virgin, Sgt., Augusta, Ga.*
8WTC, Stevenson, T/5, Camp Crowder, Mo.
8WVN, Payne, Pfc., State College, Pa.
9BFN, Koplin, Pvt., Camp Kohler, Calif.
9BPX, Freyman, Pfc., Gainesville, Fla.
ex-9CFH, Distelhorst, Capt., Ft. Monmouth, N. J.
9CPX, Weimer, T/4, Charleston, S. C.
9EBZ, Mitchell, address unknown.
9FNN, Lemons, Cpl., Camp Crowder, Mo.
ex-9HSM, Larson, S/Sgt., foreign duty.
9MZW, Welsh, Camp Crowder, Mo.
9QGS, Sullivan, T/Sgt., foreign duty.
9RHS, Blanc, Sgt., Fresno, Calif.
9SBY, Kilsdonk, T/5, Camp Murphy, Fla.
9SDM, Haas, Pfc., Camp Crowder, Mo.
9TRK, Grenseman, T/4, foreign duty.
9ZVF, West, Lt., foreign duty.

Operator's license only:

Harris, T/5, Camp Crowder, Mo.
Heath, Sgt., foreign duty.
Hoole, S/Sgt., Drew Field, Fla.
Pierce, Cpl., foreign duty.
Plummer, S/Sgt., foreign duty.
Scheff, T/Sgt., Fort Jay, N. Y.
Stillwagon, Pfc., foreign duty.
Van Dusen, Cpl., Alexandria, Va.

NAVY—GENERAL

ARM2c Fred McReaken, W6USO, says all he has to do to meet another ham and start the proverbial ragchew is to stick a copy of *QST* in his hip pocket and walk through one of the hangers at a Naval Air Station in Florida. Those call letters of his have become the symbol of a lot of fun and hospitality all over the country, too!

1GG, Sproul, Lt., Washington, D. C.
2HGU, Asmus, 3F2c, Pt. Hueneme, Calif.
2JVN, Hands, F3c, Lafayette, Ind.
2MHG, Grissler, Lt. (jg), address unknown.
2MR, Muller, Comdr., address unknown.
2MZB, Rosenbaum, A/S, Newport, R. I.
ex-3AFH, Stretch, Lt. Comdr., address unknown.
3BFQ, Watkins, Lt., Patuxent River, Md.
3CDL, Epstein, Ens., Pasadena, Calif.
3FXY, Lambrecht, A/S, Sampson, N. Y.
3IME, Weatherbie, Lt. (jg), Norfolk, Va.
3JNB, Corey, Sea., Ithaca, N. Y.
4CFP, Coe, CSK, Camp Peary, Va.
4ERS, Driggers, AMM1c, Yukon, Fla.
4HKQ, Payne, A/S, Jefferson City, Tenn.
4HSQ, Burke, S1c, Stillwater, Okla.
5CEE, Davis, CRM, Madison, Wis.
6HBR, Archambeau, RM2c, College Sta., Texas.
6ONK, Smith, address unknown.
6OSU, Nielsen, A/S, Berkeley, Calif.
6TCK, Porter, address unknown.
6TZY, Hixson, A/S, Austin, Texas.
6UUQ, Falwell, Ens., Washington, D. C.
7FNU, Downs, RM3c, San Ysidro, Calif.
7ICI, Hansen, A/S, Camp Peary, Va.
7IIU, Stoll, RM1c, Pt. Blakely, Wash.
8APN, Heston, Lt., Washington, D. C.
8BAH, Tummonds, Lt. Comdr., Cambridge, Mass.
8EWP, Lee, Ens., Washington, D. C.
ex-8JAW, Puel, ACRM, Philadelphia, Pa.
8OHV, Gast, ARM3c, address unknown.
8OSI, Donelson, Ens., address unknown.
9PWX, Tommelleo, CRM, Amagansett, N. Y.
8VUK, Liechti, S2c, address unknown.
9BSP, Ensor, Lt., Seattle, Wash.
9DQU, Spies, Lt., Arlington, Va.
9MBD, Knoebel, S1c, Washington, D. C.
9VBT, Weinrich, S2c, Madison, Wis.
9YXC, Taylor, S2c, St. Louis, Mo.
ex-9ZT, Waldron, Pharm., Moffett Field, Calif.

Operator's license only:

Flach, A/S, Ithaca, N. Y.
Harvey, RM2c, Norfolk, Va.
Jacobs, S2c, Jacksonville, Fla.
Klane, A/S, address unknown.
Pehrson, RM2c, Ocean Side, Calif.
Rowland, A/S, Ames, Iowa.

Lt. H. E. Hively, W8QFQ, who has "hammed" in Pittsburgh, Pa., and Canton, Ohio, has been on active service since September, 1941. After attending several schools along the Atlantic Coast, Lt. Hively assumed the duties of technical officer at one of the U.S. bases located in a warmer clime. We understand that the CO of his company is a ham, too!

MERCHANT MARINE AND MARITIME SERVICE

As you know, censorship regulations do not allow us to associate men on sea duty with their ships — consequently this different style of listing for those in the merchant service. We're mighty pleased with the growing proportions of this section of our roster. Let's keep it up!

1BZO, Bodner; 1CBT, Benson; 1MHU, Jankowski; 1KJO, Kajampaa; 2BSJ, Rowe; 2CWW, O'Reilly; 2GEI, McDonough; 2GIY, Muller; 2JZC, Segelken; 2LIW, Hyder; 2NNL, Sharp; ex-2OBY, Anselmo, 3GER, Ingraham; 3HDH, Smith; 3HPX, Kingsbury; 5BD, Downing; 5CCS, Greenwalt; 5CJG, Frantz; 5KGC, Meador; 5KGF, Abeyta; 6LUR, McKinney; 6NQK, Soltesz; 6RHE, Lindgren; 6RHJ, Wanzer; 6RNH, Millhollin; 6RZA, Smith; 6SAE, Moran; 6SJT, Coleman; 6TSU, Marino; 6TZD, Dvorak; 7IDF, Cole; 8ERX, Reisdorf; 8NUD, Johnson; 8SQI, Darata; ex-8SYK, Mitchell; 8UCM, Johnson; 9ACY, Hitt; 9AIP, Wulff; 9IEU, Roberts; ex-9LMX, Dressen; 9RFT, Strang; 9YFE, Hendricks; 9YWO, Weisser; and Fetzer, Knox, Lachelle, Plank and Wilson with operator's license only.

CIVIL SERVICE

1EAX, Miner, Signal Corps, address unknown.
1IMC, Byer, Navy Dept., Washington.
1JYA, Gibbs, Signal Corps, Boston, Mass.
1KYI, Croteau, Signal Corps, Philadelphia.
1LZZ, Butman, Navy Dept., Washington.
1MIM, Gooding, Rouses Pt., N. Y.
1MTP, Keefe, FCC, radio operator.
1MVF, Faatz, Signal Corps, foreign duty.
1NOV, Mahoney, Navy Dept., instructor, Boston, Mass.
1SX, Purington, Navy Dept., Washington.
2CXP, Tiedeman, engineer and instructor, Ft. Monmouth.
2FDA, Appel, FCC, monitoring officer.
2FXW, Duoba, tech., Signal Depot, Dayton.
2HOR, Muzzio, AAF & ASC, Fort Newark, N. J.
2JFP, Tuthill, NRL, Bellevue, D. C.
2MMR, Vandivert, Navy Dept., Washington.
2NPC, Sloughter, Fort Belvoir, Va.
3AKB, Rice, Navy Dept., Washington.
3AKN, Walker, engineer, Langley Field, Va.
ex-3AWZ, Allison, Navy Dept., mechanic, foreign duty.
3AYS, Smack, engineer, Patterson Field, Ohio.
3CDQ, Zandonini, Washington.
ex-3CXJ, deBettencourt, Navy Dept., Washington.
3EYX, Walter, Navy Dept., Washington.
3FPL, Bly, Navy Dept., Washington.
3FUE, Klopfer, Navy Dept., Washington.
3FZ, Young, Navy Dept., Washington.
3GHB, Meisinger, engineer, Washington.
3GKP, Smith, Navy Dept., Washington.
3HGG, Eaton, Navy Dept., Washington.
3II, Parker, FCC, Washington.
3INU, Reese, inspector, San Jacinto, Texas.
3JGZ, Prince, Navy Dept., Newport News.
3ZE, Perine, Navy Dept., Washington.
4AQU, Langbehn, engineer, Maxwell Field.
4BXL, Canfield, Miami Air Depot, Fla.
ex-4CUB, Stratton, FCC, monitoring officer.
4DBV, Robertson, Godman Field, Ft. Knox.
4DGS, Thompson, Navy Dept., Washington.
4EHO, Sharp, Navy Dept., Washington.
ex-4EVI, Thomas, Navy Dept., Washington.
4FII, Johnston, SC, radio mechanic, Courtland, Ala.
4HEW, Isley, Navy Dept., Washington.
4IIC, Wilhelm, CAA, Hunter Field, Savannah, Ga.
5AYC, Hutcherson, radio technician, Ft. Worth, Texas.
5CTX, Churchwell, SC, radio engineer, Camp Hulen.
5DPE, Fiolle, CAA, radio engr., Ft. Worth, Tex.
5EAU, Sutton, SC, radio repairman, Palacios, Texas.
5FBR, Twiss, Navy Dept., Washington.
5FXV, Bilsborough, Love Field, Dallas.

W. V. Landa, W5HNH, is a "sparks" in the merchant marine. Although he received his ham ticket in 1938, the fun of QSOing was all too brief because he went to sea at about the same time. Right now he's anxiously awaiting the day when he can get "a pile of junk with about 20 watts steam pressure back on those bands again."

5GFY, Elzey, FCC, monitoring officer.
5JBD, Thoman, CAA, Love Field, Dallas.
5JHX, Newton, CAA, Love Field, Dallas
5JXH, Daubendick, CAA, Love Field, Dallas.
5KAJ, Gregory, FCC, monitoring officer.
6AHZ, Kelliher, Sacramento Air Depot.
6ATJ, Ross, Sacramento Air Depot.
6AYJ, Simmons, Sacramento Air Depot.
6BVK, Falck, Sacramento Air Depot.
6BZB, McCauley, SC, Los Angeles.
6CBR, Johnson, Sacramento Air Depot.
6CHV, Culbertson, Naval Air Station, San Diego, Calif.
6DQA, Bell, Sacramento Air Depot.
6EEF, Hansen, Sacramento Air Depot.
6ER, Reimers, Sacramento Air Depot.
ex-6EVE, Gates, Navy Dept., Washington.
6FOC, Nash, Sacramento Air Depot.
6GFX, Hilleary, Sacramento Air Depot.
6GMU, Ryan, Sacramento Air Depot.
6GSP, Anderson, Sacramento Air Depot.
6GSX, Ware, FCC, monitoring officer.
6HUB, Groen, Sacramento Air Depot.
ex-6ITJ, Mason, Sacramento Air Depot.
6JCZ, Berlin, Sacramento Air Depot.
6JTC, Pelz, Sacramento Air Depot.
6KJK, Korsmeier, Sacramento Air Depot.
6KSO, Haddock, Navy Dept., Washington.
6KYP, Shuper, Sacramento Air Depot.
6LCJ, Townsend, Sacramento Air Depot.
6LNN, Gardner, Sacramento Air Depot.
6LPY, Beebe, Sacramento Air Depot.
6LUN, Woodward, Sacramento Air Depot.
6MAG, Goetz, engineer, Moffett Field, Calif.
6OAB, Miller, Sacramento Air Depot.
6OBP, Bradford, Sacramento Air Depot.
6PVB, Johnson, FCC, monitoring officer.
6QAM, Nielson, radio engineer, foreign duty.
6QMO, Brill, CAA, Ashley, N. D.
6QNA, Hyatt, CAA, San Francisco, Calif.
6RKJ, Wiebe, Sacramento Air Depot.
6RWO, Davidson, Signal Corps, address unknown.
6SBV, Vieira, FCC, monitoring officer.
6STB, Hunter, FCC, foreign duty.
6TJW, Feagans, Sacramento Air Depot.
6TON, Chilson, FCC, monitoring officer.
6TXL, Bennett, Sacramento Air Depot.
6TYW, Edwards, Sacramento Air Depot.
6URX, Jensen, CAA, address unknown.
ex-7ABV, Sands, Sacramento Air Depot.
7AN, Williams, radio engineer, Seattle.
7BHN, Dunkle, FCC, monitoring officer.
7EE, Truman, Sacramento Air Depot.
K7EYI, Anderson, CAA, inspector.
7FDH, Clayton, CAA, Mullan, Idaho.
7FND, Dowers, Navy Dept., Washington.
7GJI, Anderson, CAA, foreign duty.
7GOI, Leisy, CAA, Boeing Field, Seattle.
7IYW, Horton, Dayton Signal Depot, Ohio.
7JAG, Fultz, NRL, Washington.
7SO, Truax, Sacramento Air Depot.
8BWK, Dimmack, Navy Dept., Norfolk, Va.
8CGW, Pratt, Wright Field, Dayton, Ohio.
ex-8CSO, Butler, SC, inspector, Bluffton, Ohio.
8CVQ, Marburger, Naval Lab, Washington.

8DPR, Schuster, address unknown.
8EHB, Lustig, Navy Dept., Norfolk, Va.
8EQV, Strete, CAA, inspector.
8EWT, Hope, comms. officer, Buffalo, N. Y.
8FLA, Polityka, FCC, monitoring officer.
8FYH, Sikorski, comms. officer, Buffalo, N. Y.
8GHQ, Hosier, inspector, Sandusky, Ohio.
8GWL, Trenaman, Navy Dept., Arlington.
ex-8GXE, Hill, SC, inspector, Detroit.
8HAR, Peake, inspector, Wright Field.
8HHR, Dean, radio engineer, Wright Field.
8HIG, Wilkins, foreign duty.
8HMJ, Gillin, SC, inspector, Providence, R. I.
8IHR, Anderson, SC, radio operator, Ft. Wayne.
8JHN, Whitnum, radio engineer, Wright Field.
8JRY, Bramley, SC, inspector, W. Collingswood, N. J.
8JUC, Saboe, Philadelphia Signal Depot.
8KHK, Maxwell, FCC, monitoring officer.
8KXP, Lesser, Navy Dept., inspector.
8LAB, Ray, AAF, engineer.
8LPK, Bochenko, address unknown.
8LSF, Kolb, AAF, instructor, Scott Field.
8MOW, Henderson, Navy Dept., Washington.
8MPH, Sturgeon, Navy Dept., Newport, R. I.
8NIY, Utz, Navy Dept., mechanic, Herndon, Va.
8NTE, Jex, FCC, monitoring officer.
8OHO, Vargovic, FCC, monitoring officer
8ONF, Merrill, address unknown.
8PJG, Logan, SC, engineer, Wright Field.
8PXP, Branche, FCC, monitoring officer.
8QKB, Johnson, SC, mechanic, Bowman Field, Ky.
8RQA, Georgia, NTS, instr., Evanston, Ill.
8SDU, Watts, Navy Dept., inspector. Kokomo, Ind.
8SFH, Radcliffe, radio operator, Charleroi, Pa.
8TH, Wiegert, SC, engineer, East Orange.
8TMC, Bretelson, AAF, Dayton, Ohio.
8TTD, Lauffer, SC, instr., Camp Crowder.
8TUT, Reina, CG, installation & repairs.
8UDB, Koch, Navy Dept., electrician, Norfolk, Va.
8UIP, Gravel, SC, inspector, Canadensis, Pa.
8UQM, Rataski, FCC, radio inspector.
8UUP, Lane, radio operator, West Brownsville, Pa.
8UWR, Weber, CAA, Pellston, Mich.
8VWC, Carpantier, Wright Field, Ohio.
8UWN, Miller, Navy Dept., instructor, Lock Haven, Pa.
8VQT, Herman, SC, radio mechanic, foreign duty.
8WBS, Nichols, AAF, instructor, Chanute Field, Ill.
8WFY, Moxley, mechanic-technician, Dayton Signal Depot.
8WLY, Lacagnina, SC Lab, Ft. Monmouth.
8WNS, Lambert, SC, operator.
8WSI, Wadden, radio operator & mechanic, Philadelphia, Pa.
8WUG, Rohrich, NRL, Washington.
8WVP, Meyer, foreign duty.
8WXB, DeFord, CAA, foreign duty.
9AC, Brennan, supervisor, St. Louis.
9ATA, Cook, AAF, instructor, Chicago.
9AUK, Kugel, Navy Dept., engineering aide, Washington.
9AWJ, Nichols, Navy Dept., Washington.
9BKG, Lewis, SC, engineer, Boca Raton Field.
9BLU, Morrison, FCC, monitoring officer.
9BPA, Pilant, SC, inspector.
9BVK, Harrington, CAA, Omaha, Nebr.
9BWB, Oliver, Navy Dept., inspector, Newport, Ky.
9CDC, Capelle, AAF, instr., Truax Field, Wis.
ex-9CDF, King, SC, instr., Camp Crowder.
9CEB, Van de Kamp, AAF, instructor, Scott Field.
9CGF, Hane, FCC, monitoring officer.
ex-9CHB, Reinhardt, electrician, Hill Field Utah.
9CTG, Nowak, SC, instr., Camp Crowder.
9CYX, Port, Navy Dept., inspector.
9CZA, Unthank, AAF, instr., Sioux Falls.
9DJN, Coffey, CAA, Indianapolis, Ind.
9DKK, Brewer, SC, instr., Craig, Colo.
9DLC, Black, radio mech., Corpus Christi.
9DLK, Tucker, SC, mechanic-technician, Wichita, Kans.
9DNY, Joern, SC, inspector, Towson, Md.
9DWR, Manship, FCC, monitoring officer.
9EFB, Manuel, Navy Dept., inspector, Evanston, Ill.
9EFO, Earsom, AAF, instructor, Ft. Lauderdale, Fla.
ex-9ET, Scherer, Silver Spring, Md.
9EWC, Greve, AAF, instructor, Truax Field.
9FFO, Green, FCC, monitoring officer.
9FZC, LaBlonde, Navy Dept., instructor.
9GBM, Fox, Navy Dept., Washington.
9GBN, Monkkonen, CAA, Watertown, S. D.
9GEU, Welch, CAA, Omaha, Nebr.
9GJU, Riddle, inspector, Independence, Kans.
9GKF, Lambert, CAA, Moline, Ill.
9GLS, Thomas, FCC, San Antonio, Texas.
9GTT, Hume, AAF, instr., Truax Field.
9GWH, Hill, AAF, instr., Sioux Falls.
9GXN, Dodge, AAF, instr., Truax Field.
9GZK, Wickstrom, SC, inspector, Chicago.
9HBT, Hallaway, SC, engr., Wright Field.
9HHW, Begley, CAA, Sioux Falls, S. D.
9HJF, Algeo, SC, operator, Ft. McPherson, Ga.
9HQH, Mills, Cambridge, Mass.
9HRN, Davis, Lexington Signal Depot.
9HSI, Sieverin, SC, inspector, Schenectady, N. Y.
9HWS, Coder, AAF, instr., Sioux Falls.
9IDM, Brazelton, SC, engineer, Lexington, Ky.
9IGC, Hardell, Philadelphia Signal Depot.
9IHN, Pendl, FCC, monitoring officer.
9ILR, Ostergaard, mechanic-technician, Dayton Signal Depot.
9IYZ, Austin, AAF, instr., Madison, Wis.
9JGH, Burdett, AAF, instr., Chicago, Ill.
9JKJ, Austin, Navy Dept., Washington.
9JVD, Gorn, SC, instructor, Joplin, Mo.
9KCX, Evans, Navy Dept., inspector, Philadelphia, Pa.
9KDA, Jenkins, Navy Dept., inspector, Vallejo, Calif.
9KFQ, Stogsdill, CAA, Knoxville, Ky.
9KHV, Fay, CAA, Neosho, Mo.
9KLN, Mayer, AAF, instr., Truax Field, Wis.
9KNQ, Tracy, AAF, inspr., Wichita, Kans.
9KOB, Sample, AAF instr., Madison, Wis.
9KOY Hoffman, radio operator, Ft. Lincoln, N. D.
9KRL, Frashier, Navy Dept., Philadelphia, Pa.
9KXG, Winger, AAF, George Field, Ill.
9KXK, Niles, AAF, instr., Truax Field, Wis.
9KZL, Rova, CAA, foreign duty.
9LUO, Tschannen, Navy Dept., Washington.
9LWB, Lipson, radio operator, New Orleans, La.
9LWM, Howard, radio mechanic-technician, foreign duty.
9MAJ, Dee, Navy Dept., Washington.
9MEN, Sharp, FCC, monitoring officer.
9MG, Rosenkrans, SC, Tallahassee, Fla.
9MLU, Jordanek, FCC radio operator.

CANADA

WHILE we realize full well that amateurs all over the world are meeting other amateurs in the strangest places and under varied circumstances, we'd like to relate this one coincidence which occurred several months ago because it concerns our Canadian friends. Just imagine W8HMH's astonishment when he found out that the four RCAF men who stopped him one day in Washington, D. C., were amateurs. How that came to light so rapidly, and whether they ever did get to see the Washington monument they were inquiring about, has never been told. Of course, the hamfest which followed was all too brief because of the exigencies of war, but personally we doubt if much time was spent sightseeing that day.

That the majority of the VE hams are, like the above, away from home and probably not seeing their *QST*s is a known fact. For that reason, we're asking the wives and mothers and fathers of Canadian amateurs if they won't send us information on those in service. We're not trying to find out any military secrets — all we're interested in is the name, call, rank, branch of service and mailing address. Won't you help us out, so that our listing two months from now will be the best ever?

RCAF

1HK, Dowden, Lt., address unknown.
1KH, Leonard, Squadron Lead r, Halifax, N. S.
1KJ, Harris, F/O, Halifax, N. S.
1MF, Mills, Ontario.
2RF, Gouin, St. Johns, Quebec.
3APZ, Jobb, Pilot, address unknown.
3HR, Wilkes, Toronto.
3PR, Brandon, Squadron Leader, Ottawa, Ont.
3VU, Kehoe, P/O, Clinton, Ont.
4ADP, Wilson, Sgt., Scoudouc, N. B.
4AFY, Shopka, Winnipeg, Man.
4AGZ, Stewart, F/O, foreign duty.
4IN, Lawrie, Sgt., Vancouver Island, B. C.
5AEZ, Wise, Cpl., Vancouver, B. C.

RCCS

ex-1EF, Foster, Lt., Halifax, N. S.
2XM, Crowe, Lance Cpl., West Edmonton Alta.
3AOG, Chinnick, address unknown.
4SB, Clements, Lt., Ottawa, Ont.
4XE, Bannard, WO1, Edmonton, Alta.
5EP, Vaughn-Smith, WO2, Vancouver, B. C.
5FT, Wright, Signalman, Victoria, B. C.
5JZ, Riddle, Signalman, Vancouver, B. C.

RCN

1FB, Roue, Lt., Newfoundland.
2LU, MacKimmie, Sub. Lt., Hyacinthe, Que.
4ABR, Loucks, Sub. Lt., Hyacinthe, Que.
4ALV, Clark, Sub. Lt., Hyacinthe, Que.

Operator's license only:

Foerster, RA5c, Ottawa, Ont.

RC CIVIL SERVICE

1GY, Wickwire, radio opr., Halifax, N. S.
3JZ, Garvin, tech., ass't., Montreal, Quebec.

Operator's license only:

Wells, radio opr., Dept. of Transport.

The RCAF is in the spotlight again, this time in the person of F/Lt. J. H. Brownell, VE4BU, of Pointe du Bois, Man. Lt. Brownell joined the RCAF in November, 1940, and starts his fourth year of overseas service this month. At present he is serving with the RAF Headquarters Staff in England.

Ignition Noise on the V.H.F. and U.H.F.

An Investigation of the Problem of Electrical Disturbances in Mobile Reception

BY CHARLES M. DEAN,* EX-WIAMN

With development in the mobile-communications field progressing ever higher into the radio-frequency spectrum, the problem of combating certain types of electrical noise increases to the proportions of a bogey. Of course, there has been noise as long as there has been radio. Most everyone appreciates that noise is inherently a properly executed radio function; otherwise it wouldn't be heard in the receiver. By definition, therefore, noise is not noise in the sense that the term is used in radio, although that is probably the mildest of the many words privately used to express the clatter and bang which often accompanies a choice signal. At its inception it is a very definite form of electrical disturbance. In general, these disturbances have been classed in two groups: man-made and atmospheric. Each of these groups has several forms resulting in noise in the receiver. One of the most troublesome in the first group is that produced by gasoline-engine ignition systems. Amateurs operating mobile units have had to deal with this problem.

The current trend, particularly in the marine and aviation fields, toward utilizing the ultra-high-frequency bands above 100 Mc., together with increased receiver sensitivity, has produced new noise-interference problems. During 1926–1930, when mobile units first moved up to the "short waves" around 3 and 7 Mc., there were no suppression methods in effect and the pioneers meeting this type of noise had to start from scratch. After considerable work on the part of many investigators, including the famous Bureau of Standards staff, the shielded-ignition system in current use was evolved. Naturally, with the practical experience gained over ten years, many improvements over the original have been effected. These improvements have been only in details of a purely electrical or mechanical nature, however, and have not resulted in any particular changes in the matter of radio shielding.

Up to the time when various mobile services started the movement to the ultrahigh frequencies, this system was generally adequate. Now it has been found to be definitely inadequate in cases which concern the installation and operation of modern high-sensitivity receivers. An enormous amount of valuable experience and data will come from the war efforts of the many commercial enterprises working with the military.

Meanwhile, many reserve groups operating at home are puzzled by the problem of minimizing this noise phenomenon. A wider appreciation of limiting conditions and a general understanding of the causes underlying the problem should assure greater success in the field of u.h.f. communication.

* 16 Oak Grove St., Manchester, Conn.

The use of much higher frequencies in mobile communication has increased the problem of electrical-noise elimination. The author reviews the causes of increased ignition interference and indicates some of the factors which must be taken into consideration if satisfactory noise reduction is to be obtained.

The Spark Impulse

The primary source of electrical noise is the ignition spark which is necessary for engine operation. There are many theories regarding the fundamental effect of the spark upon the gaseous mixture in the cylinder. The one best substantiated by experimental data stresses "thermal effect." According to this theory the heat of the spark causes combustion. Therefore, the practical engineer insists on a "hot" spark. This is an important point from the viewpoint both of the ignition engineer, who wants to attain maximum combustion efficiency, and of the radio man, who wants to know why such a noise-producing spark should be necessary.

It may be interesting to note that the most popular source of energy for the ignition spark in aircraft and marine installations is the magneto. However, the nature of the source is not too important, since ignition-noise impulses are relatively characteristic whether generated by an ignition coil or a magneto.

In analyzing the spark impulse it is customary to consider an individual discharge as a unidirectional voltage containing an a.c. component. In magneto-type ignition systems these individual impulses alternate positively and negatively as the magnetic field is reversed, while induction-coil systems with conventional distributor-breaker assemblies fire consistently in one direction. Normally an ignition spark of either type contains two components, one capacitive and the other inductive. This is illustrated graphically in the oscillogram of Fig. 1. The first part of the wave train results from the capacitive component, while the "tail" is caused by the inductive factor. It is the latter which causes the greatest proportion of radio interference. The practical question as to whether or not the inductive component is necessary for proper engine ignition is not readily

answered, since almost equally convincing arguments may be advanced to support either contention. If a condition is assumed wherein the magneto insulation, wire losses, spark-plug design and gas mixtures are assumed to be ideal, it is certain that the capacitive component is all that is required to ignite the gaseous mixture. Indeed it is often said that *any* spark will ignite a charged cylinder, regardless of whether the spark is "fat" or "thin." This may be true in a sense, but it is also a fact that a certain minimum amount of energy must be expended in the spark to accomplish complete ignition of a given gas charge. Thus, there are definite limitations as to what can be done toward the suppression of the spark itself.

Unfortunately, there are few instances where ideal electromechanical characteristics can be maintained under practical operating conditions. Radio men know how wafer switches, coil forms, tube sockets and other insulated parts fail because of leakage caused by the penetration of moisture, overheating, etc. That wires carrying the voltage to the spark plugs are subjected to tremendous electrical and thermal stresses is evident when it is considered that voltages as high as 20,000 must be handled at frequencies ranging up into the megacycles, and that the whole system may be required to run at a "slow-oven" temperature of 250 degrees. Spark plugs have an unfortunate habit of fouling, as any car owner knows, and the gas mixture may be anything but ideal, particularly during "cold starts" when heavy priming is necessary. Under these actual conditions it is doubtful whether satisfactory ignition could be accomplished with the capacitive discharge alone. Although without doubt there is an excess of energy in the normal spark, this is necessary in practice to ensure proper ignition under all conditions.

In marine and automotive installations it has been the practice to lop off the tails of the spark discharges by inserting resistors in series with the spark plugs or the high-tension lead to the distributor. While this course represents a sound theoretical approach to the suppression of extraneous oscillations, it is satisfactory in application only because the suppressors can be removed easily in the event they interfere with the ignition of the engine. While there are acknowledged merits in the suppression of the inductive component by this means, its proper application is not yet sufficiently well understood to permit it to be used promiscuously. This is particularly true in aircraft installations, where an ignition failure often carries disastrous consequences.

Suppression Requirements

In examining the problem from the viewpoint of radio reception, the first point to be established is the signal-to-noise ratio necessary for satisfactory communication. The best signal-to-noise ratio obtainable with present-day frequency-modulation receivers is about 80 db. A ratio of 40 db. will give fairly satisfactory noise-free images in visual reception, while any number of communication receivers operate satisfactorily for the services in which they are used at ratios around 25 db. If a signal is modulated 100 per cent and the carrier has a fairly narrow bandwidth, a ratio even as low as 5 db. may be acceptable.

Whatever else the requirements may be, the relative signal-to-noise energy at the receiver output is a consideration of greatest importance. Modern radio-receiver design includes many features aimed at noise suppression, such as squelch circuits or "codans," expanding selectors and total shielding, including that of portions of the antenna. These improvements are by no means complete. Many developments will come from the intense work now being done in connection with the war.

In spite of the intense effort which has been directed toward suppression, certain types of noise continue to disrupt communications. While the migration to the ultrahigh frequencies has resulted in an almost complete elimination of atmospheric interference, particularly above 100 Mc., the problem of man-made noise grows even more acute. Electrical impulses, such as ignition disturbances, contain interference voltages resulting from a high-frequency fundamental and an infinite array of harmonics. These voltages are characteristic of the dimensions and impedances of the circuits within which they are generated and of any other circuits which may be included within their electrical fields. As might be expected the noise literally blankets almost the entire radio-frequency spectrum, but it becomes proportionately more annoying with increasing frequency.

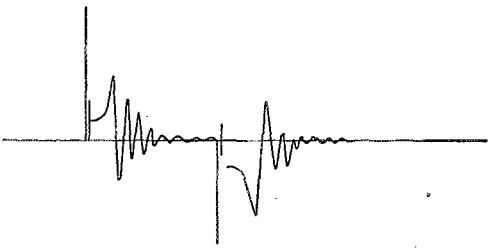


Fig. 1 — Oscillogram of a typical simple ignition spark discharge. The "tail," resulting from the inductive component is responsible for most radio interference.

Character of Impulse Noise

Impulse noises of the type generated by ignition systems are of a complex nature. A fairly simple classification would be to set them equivalent to Heaviside functions which are repeated at regular intervals. By setting up a Fourier series, an explanation of this type of noise can be found. The resultant takes the form of a square-wave recurrent impulse and consists of a fundamental and an infinite number of harmonics. Because of their common basis in the fundamental, all of the harmonics would be in phase at the start and finish of the impulse. These

harmonics decrease in amplitude with increasing frequency, presenting a proportionately smaller energy factor to the receiver. Thus, if the fundamental of the impulse is a low frequency of the order of 100 kc., the harmonics at 100 Mc. will be quite weak.

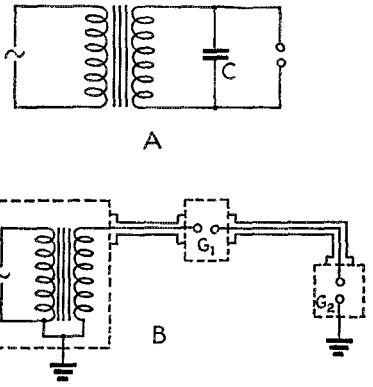


Fig. 2 — Basic ignition circuits as discussed in the text. In the simplified circuit at A, *C* is the distributed capacity of the circuit. In B, G_1 is the distributor gap, while G_2 is the gap at the spark plug.

However, the receiver has a definite pass band; i.e., any setting of the tuning control may represent a "spread" of several kilocycles. This results in the reception of all harmonics falling within the pass band and, since this band is small in comparison to the over-all span of the harmonic spectrum, the amplitudes of harmonics accepted are essentially equal. Furthermore, because of their in-phase relationship, their amplitudes add up arithmetically at the initiation and conclusion of the impulse. This results in a receiver input peak voltage proportional to the number of harmonics accepted by the pass band. In other words, the wider the pass band the greater the impulse peak voltage impressed on the receiver input. Thus the resultant peak value could easily exceed that of the signal, even though the energy of an individual harmonic impulse might be far less than that of the desired signal.

A further consideration of the effect of noise impulses on a receiver is the fluctuation effect caused by the noise voltage combining with the signal carrier. The carrier is modulated to some degree by the noise. The phase relationships between the frequencies of the noise harmonics and the carrier frequency produce resultant frequencies which vary with the shifting phase combinations. It is apparent that holes will be punched in the carrier under certain conditions when noise voltages, 180 degrees out of phase, cancel a proportionate amount of the carrier voltage. A noise impulse whose amplitude exceeds that of the signal carrier may completely block out the signal at times. This may not always be as bad as it sounds since the individual peaks of impulse noise are of short duration and occur at relatively infrequent intervals, allowing the signal to ride through. The value of the modulation factor of the voltage applied at the detector input is equal to the reciprocal of the carrier-to-noise ratio for the entire noise spectrum. In other words, the response of the receiver will be constant for all frequencies in the spectrum. In conventional amplitude-modulated reception the audio spectrum of the noise will be the same at the receiver output as that fed into the detector. In the case of a superheterodyne this will include all frequencies up to the upper cut-off frequency of the audio amplifier, which usually equals one-half the intermediate-frequency band-width.

Only those impulses which occur at regular and separated intervals have been given consideration here. If the disturbance is of a disorderly nature, resulting in overlapping trains of decay, the peak values are entirely different since the modulation effect, already noted as affecting the carrier, is expanded to include the various overlapping wave trains of noise. It can be seen readily that, with proper phase relationships, the peak values will exceed the peaks of single spaced impulses by a factor proportional to the number of trains acting to make up the resultant.

Noise Propagation

Noise impulses acting on the receiving antenna are the result of high-frequency currents flowing in the conductors connecting the noise-source circuits. When the noise generator is grounded, or when it has a substantial capacitance to ground, the currents also will be propagated by way of the ground path. Therefore, there can be two means of propagation; viz., by direct radiation, and by induction from the ground paths surrounding the receiver.

It has been pointed out that noise impulses vary widely in shape and duration. This is explainable by considering the fact that the incidental circuits contributing to the generation of noise are acting to apply a degree of frequency discrimination to the original impulse. It would be extremely difficult to set up a series of conditions including the entire array of wave trains generated in an ignition system. However, there are several typical cases which can be at least partially analyzed. Consider the simple circuit of Fig. 2-A. This is a simplified diagram of one branch of an ignition system, including the generator. Old-timers in radio will recognize in it the simplest form of spark-transmitter circuit. In the early days of long-wave radio the oscillating discharge of a spark gap was universally used as a source of r.f. excitation for driving an oscillatory circuit. An ignition system lacks only the limited control of the old-time "rock crushers." A brief consideration of the circuit will show that there will be two resonant circuits acting in coupled relationship, if the primary circuit is momentarily excited and then left free to oscillate. The two resulting frequencies will appear simultaneously, producing beat frequencies and a wave train similar to that shown in Fig. 1.

Since the primary circuit acts in the same manner for all branches in its contribution to the generation of beat frequencies equal to the sums

and differences of the original frequencies, it may be neglected in further considerations of circuit behavior. Furthermore, the secondary also maintains a fairly uniform discharge characteristic and thus, for the purpose of analyzing u.h.f. signal generation, it also may be neglected. This is apparent when the oscillogram of Fig. 3-A is examined. This shows a typical spark-discharge wave train of a frequency equal to $\omega/2\pi$. With short, unshielded conducting lines, this form holds fairly constant for any given generator. The multiple break-down of the gap, indicated by the short vertical rises, is caused by turbulence introduced at the point of break-down. This condition more closely resembles the most erratic engine effect. While it is not directly relevant to a study of radio interference, it is illustrative of a condition existing in practice which could result in severe radio interference.

If the secondary circuit is shielded as indicated in Fig. 2-B, the connecting line between the generator and the spark gap becomes a coaxial transmission line. It is well known that a coaxial line which is not terminated in its characteristic impedance will resonate because of reflections and the oscillatory character of the voltage and current distribution. The degree to which this affects the characteristic is illustrated graphically in Fig. 3-B. This oscillogram was taken at the same point in the line as that shown in Fig. 3-A, and with the same generator. The system was enclosed in a complete shield from which there was essentially zero radiation. The addition of the shielding caused reflections to be set up in the line, resulting in high-frequency modulation envelopes on the fundamental discharge wave.

If a second line is included in the same coaxial shield and a separate source is furnished to drive it through a second spark gap, the high-frequency component of the discharge in the first circuit will increase in a manner similar to that shown in the oscillogram of Fig. 3-C. In the case of an unshielded line the second generator would have a characteristic discharge closely equivalent to that of the first. Slight phase discrepancies are evident in the change of fundamental frequency. This condition was simulated experimentally by timing one generator to discharge slightly off-time from the other. The point of timing in this instance gave the most pronounced envelope. It is particularly interesting to note the positive progression of the high-frequency oscillations, indicating that the negative resistance of the gap nullified the positive resistance of the circuit at the start of this phase of the discharge. If it were possible physically to maintain a constant negative resistance, the amplitude of the oscillations would increase indefinitely. Further variations of line length, the ratio of diameters of the coaxial shield and conductor, the length of the gap, the rate of recurrence of the initial discharge, and other factors all influence the ultimate wave form in varying degree. The illustrations are typical of one particular set of conditions.

An additional complication is immediately apparent when a complete branch of a typical shielded system is inspected. As shown in Fig. 2-B, the distributor acts as an additional series spark gap which is far more prolific of radio-frequency oscillations than the spark plug. In the case of a magneto with an integral distributor system the break-down is less complicated, since the distribution takes place directly from the coil and connecting leads thereby are eliminated. Ignition-coil systems, in which the high-tension voltage from the generator is fed through a length of shielded lead to the distributor, produce an extremely complicated and bothersome condition. This type of installation ties in series two oscillatory circuits of the type under discussion, as shown in Fig. 2-B. The voltage at the first gap has essentially the same phase relationship for the start of the impulse as in the simple single-ended circuit. However, once the first gap breaks down the current will oscillate in the first circuit, as previously noted. It will also present an oscillating source of energy for excitation of the second circuit, which sets up almost immediately its own train of oscillations when the second gap breaks down.

Voltage Peaks

Such complex circuit behavior often gives rise to surprisingly high peaks along the lines. Since the amplitude of noise at the point of reception is proportional to the power in the circuit of origin, these peaks are of interest. Frequently the wire size and insulating material vary in different portions of a circuit. The high-tension lead to the distributor, if one is used, may be either 9 or 12 mm. in diameter, while the individual leads to the plugs may be made of 5- or 7-mm. wire. Combinations such as these introduce additional propagation effects. Lines with air dielectric and good conductivity may transmit r.f. energy at a

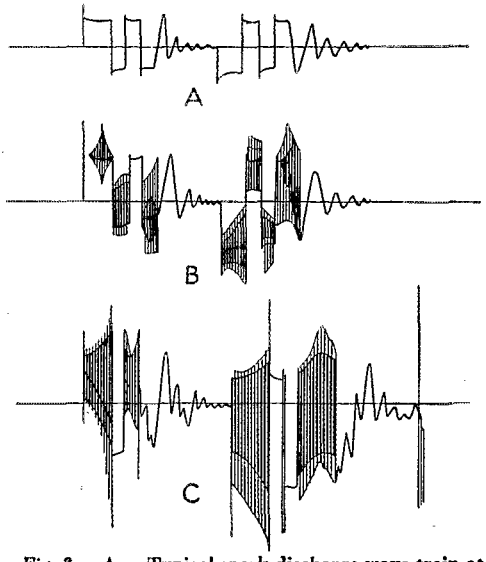


Fig. 3 — A — Typical spark-discharge wave train at a frequency of $\omega/2\pi$. B — The effects of resonances in the lines comprising the ignition circuit. C — Effects of two spark gaps in the same system.

speed approximating that of light, but if the dielectric is rubber, neoprene, or other solid material the velocity may be reduced to one-half this value. This introduces a time-constant effect which acts to build up enormous power peaks at resonant maxima in the line of slower time constant. Contributing to this condition are the reflections which result from the combination of a fast time constant with the coupled-modulation effect previously mentioned. An oscillogram illustrating severe condition of this type is shown in Fig. 4.

Complex high-frequency envelopes of this type have been known to develop voltage peaks of over 100,000 volts in a resonant line. Other variables tending to introduce a time deviation into the combined circuits also bring about similar conditions. For instance, if the distributor rotor is mounted slightly off-center, as often is the case, a gap relationship may be struck at some point along the circumference of the distributor stator which will result in an intensification of radio-frequency noise. This is often noticeable as a pulsation of the general noise level at a rate corresponding to the speed of rotation of the rotor.

There are numerous other ways by which ultrahigh-frequency energy is generated in an ignition system. Discontinuities in the shielding, such as sudden changes in dimensions, result in reflections being sent back along the line. When such reflections exist, standing waves varying widely in frequency may be set up. These waves may serve to excite other circuits at their resonant frequencies, and thus the generation of noise voltages becomes almost a certainty.

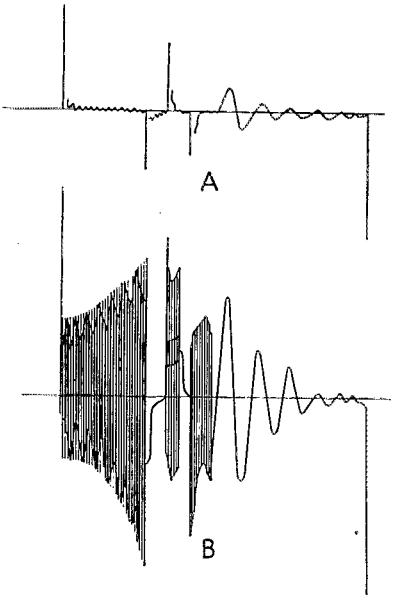


Fig. 4 — Oscillograms illustrating the high-voltage peaks developed as a result of the "time-constant" and coupled-modulation effects described in the text.

Elimination

Earlier in the discussion it was stated that propagation of noise impulses is by means of the radiation and induction fields surrounding the circuits. While, actually, other factors are present, they can usually be dismissed as negligible in mobile installations. In general, three factors must be considered in devising means of eliminating noise interference. The magnitude of the interfering fields will be a function of the dimensions and manner of assembly of the circuits, together with the voltages and currents flowing in them. This degree of interference may be termed the influence. If the radio receiver were ideally shielded and if its design included the ultimate in squelch circuits, its susceptibility to noise would be essentially zero and the noise factor would then be a function of the susceptibility of the receiving unit. When physical requirements permit the operation of the receiver at a position remote from the noise source, the coupling is zero, and thus the noise, or lack of it, may also be considered a function of the coupling.

Obviously, the last factor can be neglected in the case of mobile units, since the limited space necessitates the operation of the receiver in close proximity to the noise source. The susceptibility of the receiver is, of course, dependent upon its design and upon the type of service in which it must operate. The factor of influence remains the only one within the scope of this discussion. An appreciation of the fields acting at the source to influence the noise at the receiver will aid materially in combating this interference through proper installation.

It has been shown that several factors contribute to the generation of high-frequency energy. Radiation of the energy thus developed forms a picture equally complex.

Shielding

In the past the maintenance of completely dependable ignition was considered to be the major problem to be solved in designing a satisfactory ignition shield. This continued to be true so long as communications channels were confined to the lower portion of the high-frequency spectrum, where interference elimination is less difficult. While trouble-free ignition is, of course, still of prime importance, the migration to higher frequencies for communications has made noise elimination the part of the design most difficult to satisfy, especially in the light of improvements in electrical and mechanical practices which guard against interruption of ignition. The change to higher frequencies has introduced new conditions under which the shielding must perform. New constructional techniques will have to be developed. Thus it is found, for instance, that slight discontinuities in the shielding material may render a system nearly useless at ultrahigh frequencies, although they might be of no consequence at some comparatively lower frequency.

In addition to contributing greatly to the generation of the high-frequency energy, these

discontinuities form the basis of the largest percentage of noise radiation. If the components of the simplified circuit shown in Fig. 2-B were carefully assembled with loss-free connections equivalent to the lapped couplings used in hydraulic lines, the noise pattern would be practically zero at any point surrounding the unit. The effectiveness of any shielding system depends upon the application of a few simple rules. Good conductivity in the material forming the shield is a necessity, since its primary function is that of restricting flux penetration. The penetration of flux is proportional to the thickness of the material, and, since this factor is dependent upon the depth of penetration of the currents set up in the surface, it is proportional also to the square root of the frequency and inversely proportional to the perimeter of the shield.

In considering the effectiveness of a shield for ultrahigh frequencies, hydraulic laws offer the best analogies. Most everyone has encountered automobile radiator leaks of some nature. The case of a radiator which runs all summer with clear water but which springs leaks profusely in the fall when anti-freeze is added may be likened to an r.f. shield which is effective enough at lower frequencies but which "leaks" sadly at higher frequencies. The high frequencies have greater penetrating powers where discontinuities are concerned, just as anti-freeze ferrets out the discontinuities in an automobile cooling system.

If there is any degree of penetration through the shield, either through the use of poor or inadequate material or because of discontinuities, there will be a charge escaping which will vary in amplitude with the amplitude of the source voltage. Since there are currents of high frequency present in varying degrees throughout the conducting circuits, it is apparent that these charges will represent magnetic and electric fields outside of the shielding if allowed to escape. If there is any slight separation between the charges the fields will not cancel, and the result will be an electric doublet or dipole.

The strength of the dipole field will be the product of the distances separating the charges and the strength of either charge. Near the source of the wave there are two fields. The first of these, the induction field, is predominant up to distances approximating one-sixth of a wavelength from the source. Beyond that point the second component comes into prominence. This is the radiation component, which differs from the induction component in that it has no close relationship with charge and current as has the induction field. This second component is cast free of its point of origin and is left to dispel itself in any and all directions. Therefore any phenomena taking place at distances greater than one-sixth wavelength may be considered to be caused by radiation from the source. All ground circuits, particularly those surrounding the point of reception, must have low resistance. If a section of the ground path is partially isolated by a high-resistance connection, the voltage developed across the isolated section will be proportional to the resistance. This, in turn, may lead to extraneous fields which will cause noise by direct induction, if they fall within the necessary boundaries.

The radiated energy may travel any distance and propagate itself for an unlimited time. That is, it can be absorbed and reflected at any point which offers it the dimensions of a dipole. This may be any conductor across which the wave falls. The energy thus scattered will be partially absorbed and partially re-radiated, depending upon the natural ohmic resistance of the conductor and its radiation resistance. Therefore, good conductors reflect a greater amount of energy because of their low resistance and correspondingly low absorption of power through heating.

In defining the strength of the dipole, one of the factors is the distance separating the charges. This is an axiom familiar to hams. Experiments with reflector antennas involve the computation of dipole strength; for maximum current, the length must equal some odd quarter wavelength. The current in a quarter-wave radiator will be at a maximum on one end and at a minimum on the other. If the length is less than $\frac{1}{4}\lambda$, the current will not reach a maximum and consequently there will be less energy transferred. Thus it can be seen that, although the dimensions of the various lines and reflection surfaces are not of primary importance at lower frequencies, they become increasingly active as the frequency of the exciting charge becomes equal to their natural frequency. This point is clearly illustrated by the example of a vibrating string excited by a frequency equal to its natural period of vibration. All other frequencies have no effect, excepting harmonics which will excite the string with inverse proportionality to their number.

It is further evident that, if any of the energy escapes to the outside of the shielding, any group of conductors, whether integral with the noise source or not, will be potential radiators. This is noticeable when noise measurements are made starting at a low frequency around the broadcast band. In most instances, at these lower frequencies the noise seems to be vertically polarized. As the frequency of measurement is increased this effect is no longer apparent, since the noise is reflected from many surfaces in many planes and at many angles.

Noise Measurement

In measuring the noise and checking improvements in the installation, it has become universally popular to use the actual receiver being installed as a noise meter. For comparative purposes where real values are of no consequence, this method is simple and satisfactory. An a.c. voltmeter of the rectifier type, inserted in place of the headphones or speaker, is used to indicate the degree of change an improvement makes. A fairly good impedance match between the receiver output and the meter is about the only requisite. Furthermore this method does not require any special knowledge of measurements,

(Continued on page 90)

"E" for Excellence

Prewar Manufacturers of Amateur Equipment Receive Army-Navy "E" Awards for Outstanding War Production

A SIGNAL CORPS colonel, making the presentation speech at a recent Army-Navy "E" award, asserted that "soldiers of production" are "as damaging and terrifying to our enemies as are our troops. Your work is just as vital and just as essential as the services of those in the combat areas."

In no field of war production is that importance more tangible than in the radio industry. Communications represent the lifeline of modern warfare, and the success of communications is inescapably dependent on the quality and reliability of the apparatus in use.

The communications equipment used by the U. S. Army and Navy has been hailed as the finest in the world. That fact is a tribute to the men and women who are producing it. It is an even greater tribute to those who are responsible for its outstanding development and design. Going a step further, it is a tribute to those who created the original techniques that led the way.

In each of these categories radio amateurs have an important place. The amateur body nurtured many of the manufacturers who are now producing this outstanding radio materiel; it supplied skilled personnel in the form of executives, engineers, technicians and production men; and, of course, it has been the great proving ground and mass experimental laboratory for the art.

The effectiveness of this contribution is evidenced by the number of firms, once manufacturing amateur gear wholly or in large part, who have received Army-Navy "E" Awards for outstanding production merit. These awards are the highest mark of recognition civilian "soldiers of production" collectively can receive.

It is a fact of major importance that the institution of amateur radio has been an important ingredient in the successful performance which has led to the recognition of these firms.

Bliley

By both alphabetical and general precedence, the Bliley Electric Co. is an excellent example of a supplier of a critical wartime need whose prewar market was chiefly the amateur field. Founded as an experimental venture by F. Dawson Bliley, W8FU, in 1928, Bliley began manufacturing quartz crystals solely for amateur use as a one-man organization located in the basement of W8FU's residence.

As the reputation of Bliley products achieved increasing stature among amateurs, commercial companies naturally became interested. Despite the depression the company expanded rapidly, and soon became a leader in its field. Up to the outbreak of war, however, crystals for amateur applications represented the bulk of its production.

When war came production requirements expanded greatly. Plant facilities and employees multiplied overnight. Manufacturing processes were altered to enable the replacement of skilled male technicians with unskilled female workers, who now comprise approximately 88 per cent of Bliley employees. With crystals a critical military bottleneck, the government initiated a program for the construction of a new plant devoted solely to the manufacture of military crystals. This new plant, known as the Bliley Mfg. Corp., is now completed and in full operation.

For all this the experience gained in manufacturing amateur crystals was the nucleus and the background. F. A. Lennberg, W8CQQ, director of industrial relations for Bliley, says: "Basically there is little difference between military and amateur production. Naturally, higher-speed methods had to be developed and many techniques altered, but the fact remains that the experience and equipment which we had used in connection with amateur products was converted directly to wartime usage."

Writing in the "Correspondence from Members" section of the December, 1943, issue of *QST*, Staff Sgt. John L. Hill, W9ZWW, made this significant point:

"Up until the day the Signal Corps 'got on the ball' and started placing orders for non-obsolete radio gear, the purchasing power and the rigorous technical demands of the amateur maintained dozens of radio manufacturers tooled up and in business ready for the military expansion. Not that makers of broadcast receivers and their components have not contributed all the resources of their facilities, but the amateur suppliers did have products almost entirely suitable for military utilization, and they were ready to go from the day the contract was mentioned. Possibly heretofore this has seemed too insignificant a contribution to call up as evidence of the hams' desirability, but to me, now that I am in the service, it appears to be an exceedingly important argument in our behalf. . . ."

Every practising amateur is well aware of the truth of this comment. Only one exception might be made — instead of regarding it as "insignificant," we have perhaps been prone to consider this contribution so obvious as not to require mention. If proof is required, however, it is provided in ample measure in the accompanying article.

Bliley Electric Co. receives its Army-Navy "E." *Right* — Col. J. D. O'Connell; F. Dawson Bliley, W8GU; Comdr. Ralph G. Walling, USN (Ret.); Charles Collman, vice-president of Bliley. *Left* — Col. O'Connell observes a final crystal testing operation, described by Bliley's chief engineer, John Wolfskill, W8QKT (left).

Eimac

When two San Francisco hams — Bill Eitel, W6UF, and Jack McCullough, W6CHE — borrowed $5000 in 1934 and rented a vacant butcher shop to build ham transmitting tubes that could really take it, the result had an effect on a war production need that then could not even have been visualized. Now two large Eitel-McCullough plants, one at San Bruno and one at Salt Lake City, are turning out transmitting tubes for military use seven days a week, 24 hours a day.

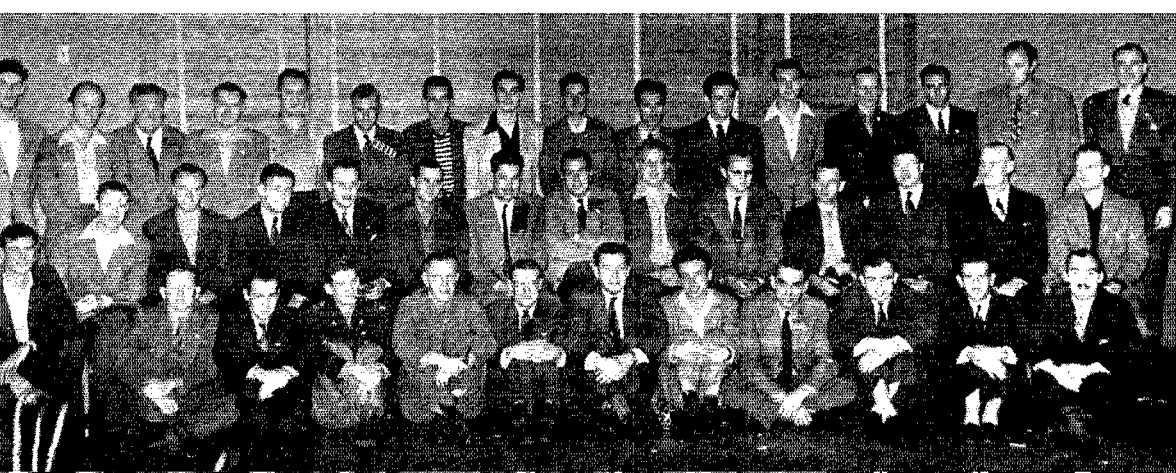
The Eimac duo began their respective radio careers as hams, first met each other through ham contacts over the air, and the tubes they made during the beginning years were designed for ham transmitters. Moreover, Eimac was — and is — a ham-staffed outfit throughout. An amateur call follows the name of practically every department head, shift foreman, etc., in both plants. At one time most of the workers were hams. Now, with the introduction of mass-production techniques, girls outnumber the male workers by five to one — but the nucleus still is a long roster of names and calls notable in amateur lore.

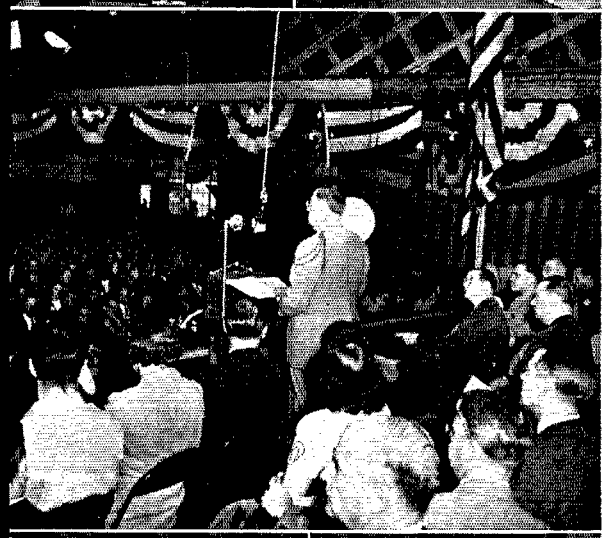
Herb Becker, W6QD, now liaison engineer at Eimac, says of these hams: "We feel that the Eimac hams are the most enthusiastic in the country as far as backing the future of ham radio is concerned. You no doubt have observed our advertising campaign which runs in about fifteen to twenty magazines, including *QST*. We feel that the spirit of the hams at Eimac will carry a lot of weight when the war is over in restoring enthusiasm on the Pacific Coast — and we don't have to tell you that the West Coast enthusiasm has always been the best in the country!"

General Radio

General Radio might not ordinarily be thought of as coming within the amateur-nurtured classification. However, according to C. E. Worthen of G-R: "I think that amateur radio has had an important though indirect influence on our war production program. Certainly the activity of amateurs in opening up new fields and carrying on much of the experimentation that has led eventually to commercial developments has helped us to be prepared for the demands of the war program upon our engineering and production facili-

Amateurs all — and all Eitel-McCullough employees at the Eimac San Bruno plant. *Front row (sitting)*: Bert Eaves; Leigh Norton, W6CEM; Lt. Hiewinkle, W7HTX; Brower McMurphy, W6OU; George Wunderlich, W6DUW; Bill Eitel, W6UF; Eddie Hoetzel, W6DZZ; Dave Snyder, W6ZS; Bill Stancil, W6CGB; Don Drieschman; Elliot Sigourney, W6OS. *Second row:* Dave Atkins, W6VX; Earle Sanderson, W6IUZ; Ronnie Gordon, W6AAZ; Bill Tallmon, W6DVB; Royal Higgins, W9AIO; Gordon Howes, W6CEO; Jack McCullough, W6CHE; Art Arrigoni, W6WN; Orrin Brown, W6HB; Byron Ballou, W6BET; Rad Leonard, W6RRR; Clay Murdock, W6OMC; Jack Perry, W6USR; Tom Hall, W6SC. *Third row:* John Woerner, W6ONQ; Jim Cathey; Jim Brown, W6AY; John Koski, W6DBO; Mahlon Kehler, W6LOK; O. P. Taylor, W6BAX; Harry Smith, W6RNG; Jack Meniktos, W6TFO; Harry Mandoli, W6HAM; George Becker; Rich Lawton, W6MVQ; Cleve Amendt, W6TGH; George Bird, W5HGC; Jack Rothman, W6KFQ; Bill Baker, W6LV; Herb Becker, W6QD.





Left — G-R takes on an "E." Melville Eastham, president of General Radio, is second from the right, with Massachusetts' Governor Saltonstall in center. *Below, right* — Mr. Eastham and Henry S. Shaw, W1JK, chairman of the board of G-R. *Below, left* — James K. Clapp, ex-W1BYX, and Hammond S. Hollis, W1WG, well-known both as amateurs and as engineers.

ties in the same way that it has helped all radio activities. In addition, some of our ultrahigh-frequency developments have had their practical tests under amateur auspices."

In its pre-World War I origins, General Radio's predecessor firm owed much to amateur support. In recent years, of course, its products have been in a field somewhat removed from all but advanced amateurs. Yet the G-R engineering staff — as erudite and professional a group of engineers as ever existed — still boasts many a ham association. Board Chairman Henry S. Shaw, W1JK, President Melville Eastham, Treasurer Harold B. Richmond, *QST*'s own erstwhile assistant technical editor, John M. Clayton (now on leave to the Navy) and dozens of others.

Hallicrafters

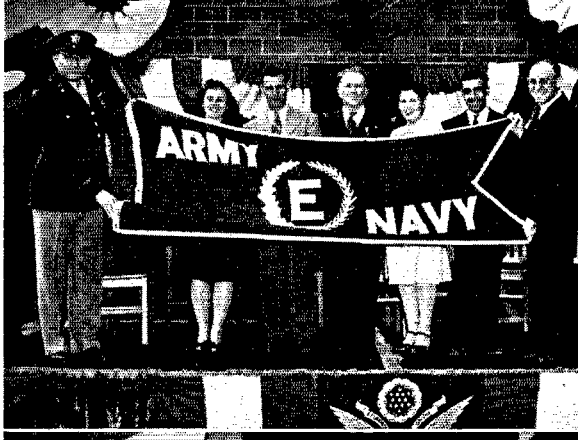
Before Pearl Harbor The Hallicrafters Co. was engaged in the manufacture of communications equipment designed primarily to meet the demand for commercially styled equipment embodying refinements that the amateur could not himself employ in his homemade sets. Its policy was to supply equipment at reasonable cost so that the average amateur could purchase transmitters and receivers for little more than the cost of a homemade unit.

The Hallicrafters engineering staff then included (and still does) many prominent hams. By employing men with an amateur background on the production line, many short cuts were found which resulted in better products. Final testing of all units has always been done by experienced amateur personnel. They have found that the hams take great pride in their work, realizing the need of careful scrutiny for any deficiencies which would impair performance.

When the present crisis arose, the engineering, production, testing and administrative personnel was augmented by many more men and women holding amateur licenses. In this way it was possible quickly to expand the facilities to meet the heavy demands of the Army and Navy for communications equipment that would perform satisfactorily on the fighting fronts.

Perhaps the most outstanding Hallicrafters contribution has been the development of the SCR 299 mobile unit for the Signal Corps. This unit, using a transmitter originally designed for amateur use, has been described as being as important to the success of our military efforts as the well-known jeep, the Flying Fortress, or the Bofors gun.

Above — Col. Thomas L. Clark, U. S. Signal Corps, presents the "E" award — which subsequently has collected two stars — to the Hallicrafters, Chicago. On the stand are several of the 37 hams in key positions in the company. *Left* — W. J. Halligan, W9WZE, chief of the Hallicrafters, accepts the award on behalf of his firm.



Right — After presentation to Heintz and Kaufman, Ltd., the Army-Navy "E" flag is displayed by Col. S. W. Stanley, Margaret Collins, Nelson Klingler, John Hulme, Dorothy Tampos, John Fernandez and Jack Kaufman, ex-W6AJB, president of Heintz and Kaufman. *Below* — Comdr. Frank E. Vensel, jr., presents Jack Kaufman, president of H & K, with his "E" pin.

Heintz & Kaufman

The H & K letterhead carries this foot-line: "Gammatrons of course!" Intended to express the attitude prevailing in a considerable section of the amateur fraternity, that same slogan these days might well be attributed to the military.

The importance of the amateur background for Heintz & Kaufman's "E"-meriting tube contributions is emphasized by W. Noel Eldred, assistant to the president, who says:

"The original 354 Gammatron was developed with tantalum elements for amateur use. Subsequent developments of this and other tantalum types, have led to the tremendous radio detection program, which is almost entirely based on the use of u.h.f. tubes patterned very much after the design of the early 354. We believe it may be said that the amateur has contributed in large measure to the present radio program, and that Heintz and Kaufman has been only a connecting link between the amateur and the practical application as we know it to-day."

H & K entered the transmitting tube field in 1927 to provide rugged tubes with low interelectrode capacities and which could withstand plate overloads without gassing, for the custom-made transmitters they were manufacturing.

Both principals in the original partnership came into radio as amateurs. Ralph Heintz emerged from the Signal Corps after World War I to become one of the first Pacific Coast radio manufacturers, building the U. S. Army's first short-wave transmitter, San Francisco's first b.c. station, the first commercial marine and aircraft short-wave transmitters, and other "firsts." In 1926 Heintz joined Jack Kaufman, ex-W6AJB, with whom he had shared a mutual interest in radio since college days, to form H & K.

Mallory

P. R. Mallory & Co. is another firm which, although prominently engaged in every field of radio, gives substantial credit to amateur radio both for trade support and for contributions in the design and development of the products which last August won a third star for its "E" flag.

Mallory has found that the experience and broad vision gained by its past coöperation with amateurs has proved invaluable in providing the "know-how" on many products required for the war effort. Even further, many existing amateur products have filled definite war needs. For example, vibrapacks originally developed to power amateur mobile and portable gear are now powering this type of equipment for the armed forces.

Because it believes that the radio industry owes a profound debt of gratitude to the amateurs for their many contributions to the radio art, and because it believes that the patriotic services of the amateurs in our armed forces warrant special recognition, Mallory has announced that it plans in the postwar period to give even more enthusiastic support to amateur activities.

In this "all-out" war, Mallory believes that the "all-out" efforts of the amateurs cannot be praised too highly.

At that, it isn't suprising that Mallory should have a sympathetic attitude toward amateur radio — for, like most radio manufacturing establishments, it has a large number of hams in

Right — Hams and ex-hams at Mallory proudly display the Army-Navy "E" flag and the three stars they helped win. *L. to r.*: Gordon V. Peck; C. H. Woodward, ex-W7BC; M. E. Nulsen; J. W. Lee, who received the SOS from the ill-fated *Titanic*: T. N. Rosser, ex-W9BOP; Howard N. Louden, W9BMF; B. V. K. French, ex-W8WV; Ralph Caudell, W9HSD; Howard Rhodes; R. M. Ellis, W9YSA.

Left — At the McElroy "E" ceremonies T. R. McElroy greets ex-ham Sgt. Robert Armstrong, who used McElroy code equipment in peacetime at his amateur station, in the course of his AAF training at Sioux Falls, and in the field on the European battle front, where he was wounded in action. *Below, left* — Senator David I. Walsh, chairman of the Senate Naval Affairs committee, was a speaker at the presentation of the Army-Navy "E" award to the McElroy Mfg. Corp. *Below, right* — Governor Leverett Saltonstall of Massachusetts also spoke at the McElroy "E" award ceremonies.

administrative positions. "This company fairly seethes with hams!" reported Walter T. Craigle, of the public relations section, in connection with the accompanying photograph. "I merely started for the front door, announcing, 'All hams follow me to have their picture taken,' and they came pouring from practically every desk!"

McElroy

There is scarcely a ham who has not seen and heard T. R. McElroy at some ham gathering or other, and certainly there must be no ham who has not heard of him. The converse is also true. No one knows amateur radio and the importance of its rôle better than Ted McElroy.

Despite the fact that for most of his life he has been a commercial operator — the world's champion radiotelegraph operator, in fact, having first won that title a full twenty years ago — he is equally proud of his amateur status and wholeheartedly associates himself with the amateur fraternity.

In fact, Ted McElroy is the first important radio manufacturer to proclaim publicly the wartime debt owed by the radio industry to the radio amateur. When he accepted the "E" award on behalf of his firm, he made this statement in a speech broadcast over a national network:

"Particularly I want to say that the production accomplishments of this company and of the whole radio industry would have been *impossible* had it not been for the radio amateurs bonded together in the American Radio Relay League. This company and many another were established primarily to supply the amateur field, and they gained their prewar experience supplying that critical market. These were the manufacturers whose quick conversion to total war production and whose experience in *communications* equipment took the first vitally important steps in the production of military radio equipment and made possible the later great strides of the whole radio industry. Had it not been for the existence of a large body of radio amateurs, those essential companies would not have been here ready for the emergency of war."

Above — Capt. Henderson, USN, who presented the "E" award to Meissner observes operation of the Meissner "Ultra-Hi-Frequency Transceiver," designed for 2½-meter amateur operation and now, unchanged, extensively used in military service. Also in the group are James T. Watson, president of Meissner; Lt. Crabtree, USN; G. V. Rockey, vice-president of Meissner, and Lt. Comdr. Karl Miles, USN. *Left* — Among these hams in the Meissner Engineering Department, photographed in front of a screen room in the engineering building, are W9AMZ, W9ANG, W9KMI, W9TJ, W9VMR, W9VMS, W9WBW and W9YPM.

Right — A dozen of the nearly 50 hams at National Co., and their boss. Front row, l. to r.: Robert Murrey, W1FSN; Richard Gentry, W1LEN; Ralph Dennis, W1CJ; O. E. Sims, W1DXD; D. H. Bacon, W1BZR, chief electrical engineer; Jack Ivers, W1HSV; W. A. Ready, president of National Co. Back row: Dudley Campbell; Herman Bradley, W1BZQ; W. J. Larkin, chief mechanical engineer; S. W. Bateman, W1RX; Calvin Hadlock, W1CTW; C. L. Gagnebin, W1ATD. *Below* — On a tour of inspection of the National plant following presentation of the "E" award are: Brig. Gen. Lewis; Rear Admiral Cluvasius; Ralph Dennis, W1CJ; F. C. Beekley, W1GS; Arthur H. Lynch, W2DKL, and Walter H. Balcke, treasurer of National Co.

Meissner

Prior to Pearl Harbor, the manufacture of parts and equipment for the amateur market was one of four divisions of the Meissner Mfg. Co. With active amateurs holding key positions, the amateur division naturally was the "pet."

"When the Japs struck at Pearl Harbor," Bill Atkins, W9TJ, recalled, "we realized that an immediate 'on-the-spot' contribution would do more good than a dozen future production programs.

"A quick analysis of the complete Meissner line indicated the obvious: Meissner phono-recorders would be useful as war implements only if they could be dropped accurately from planes on the heads of the enemy. Meissner b.c.l. receivers would not work so well in two-way military communications service. Even the static eliminated by Meissner f.m. broadcast receivers would not kill Japs. Thus, by simple elimination, it was possible to relegate worthless items to the morgue. What remained? The entire Meissner line of amateur equipment — ready for immediate use!

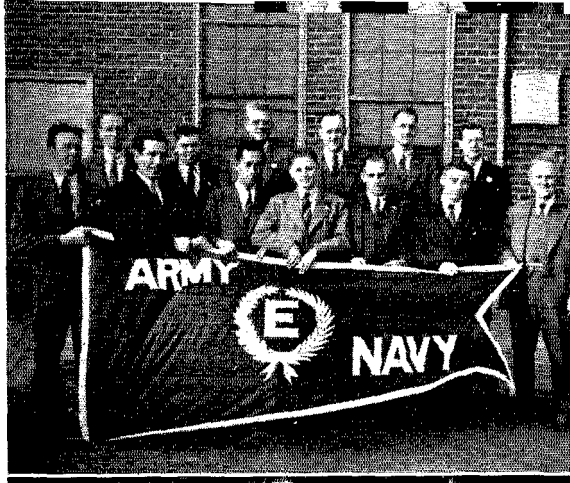
"Yes, we were proud of the fact that we had a complete line of communications equipment ready and waiting for military use — equipment designed by amateurs for amateur service! 'Do not change a thing,' they told us. 'We want it as is. That this Meissner amateur equipment went far beyond the 'stop-gap' category is indicated by the orders we receive *now* for identical equipment. True, the nomenclature is different, but it is a comfortable feeling to realize that 'CL 168931-X-7' is the ham's old standby, the Signal Shifter, all dressed up with a military designation!

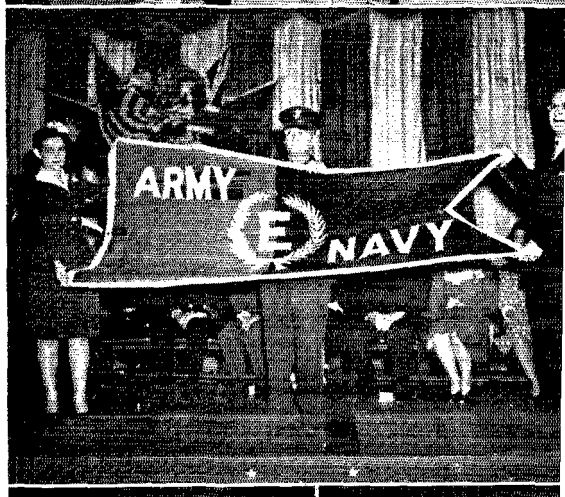
"Of course, we now produce special equipment with features restricted exclusively to military use. We can't say much about it — except mention that a Signal Shifter supplies r.f. excitation."

National

There is probably no manufacturing concern more intimately associated with the evolutionary

(*Continued on page 86*)





Above — When Shure Brothers received their "E," Marion DeBlock (left), representing the employees, and S. N. Shure (right) for the company accepted the pennant from Lt. Col. N. Boruszak of the Dayton Signal Corps Procurement District.

Right — Comdr. Eugene F. McDonald accepts the "E" award for his company while top-flight Zenith executives, all of whom began as hams, listen — G. E. Gustafson, W9AQS, vice-president in charge of engineering (second from left); Ed Passou, executive engineer (third from left); Karl Hassel, Zenith vice-president and director (fifth from left) and J. E. Brown, assistant vice-president and chief engineer (sixth from left).

ON THE VERY HIGHS

CONDUCTED BY E. P. TILTON,* W1HDQ

IT WAS inevitable, when we started reporting the war activities of members of the v.h.f. fraternity, that eventually we would be called upon to report war casualties as well. Though there undoubtedly have been others, the first to come to our attention cost us Capt. H. G. Harbin, W6PGO, who lost his life in a plane crash in India early this fall. Hal was one of the small but persevering group of v.h.f. enthusiasts who, in the face of the natural obstacles afforded by Arizona's mountainous terrain, developed and maintained activity on 56 Mc. under conditions which would have disheartened a less hardy individual. Stationed at Tucson before the outbreak of war, Captain Harbin rose from the ranks as the result of his knowledge of radio and skill as an operator.

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As this is being written your conductor is shivering in the cold weather of Boston, after six weeks in various Navy Yards in Florida. Our experience in each yard is the same: a good percentage of the men responsible for the operation and maintenance of the Navy's radio, radar, and sound gear are hams. In the Radio Matériel Office at Key West, for instance, we found nine hams engaged in installation and servicing of gear at the Naval Operating Base there. These included Lt. E. A. Briggs, ex-W9OP, officer in charge; Lt.(jg) R. L. Goff, W8NQV; Lt.(jg) J. L. Tucker, W5DHG; Ensign C. L. Dieter, W3EBB (ex-W1EMZ, W8RIP); Ensign Edgar Engles, W5GOU; Civilian Radio Engineer F. E. Bassett, jr., W4AKI; and civilian technicians J. P. Bonner, W4EFH; E. C. Hunter, W4FLH, and H. W. Harrison, W5DFZ. Ed Hunter, W4FLH, needs no introduction to 56-Mc. men, and Carl Dieter will be remembered by old-timers in Connecticut as W1EMZ, one of the gang who really got things started on Five back in '31 and '32.

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War certainly shuffles us around! Almost everywhere one goes familiar names and calls can be found wherever radio work is being done, and those who stay at home are almost certain to find that men they've known from radio contacts only are stationed somewhere nearby. Some of the most pleasant hours we've spent since Pearl Harbor have been the result of meeting up with some of our v.h.f. friends from other sections of the country. It has been our purpose to publish just as much information as possible about the work and addresses of v.h.f. men who are now away from home, either in the service or engaged in the war effort in civilian capacities. If you're away from home and would like to get in touch with some of the gang, drop us a line giving your address.

Right in our old backyard at Westover Field, is W4DDF, formerly of Nashville, Tenn., who, with W4BAF, used to work on the gang around Nashville to get going on the very highs. His address: Cpl. John M. Dortch, Hq. 1st A/B Eng. Avn. U. T. C., Westover Field, Mass.

W1LLL writes that Brother Horsetrader W1KJT was with the 7th Army in Sicily when last heard from. Johnny was one of the group making the first American landings in North Africa more than a year ago. Another Horsetrader, W1KFA, would like us to act as a committee of one to extend the season's greetings to all the gang from "somewhere in the Southwest Pacific." Address: Lt. M. Kasanof, 0923303, APO 929, San Francisco.

Thus we reach another anniversary in the life of this department. That this column still exists after two years of wartime censorship, which prevents our reporting the many interesting things we're witnessing daily, is due to the fact that many of you have taken the trouble to provide us the material with which to keep the column going in the spirit in which it was started four years ago. To you who have kept us informed, our heartfelt thanks; and to everyone, Season's Greetings and best wishes for 1944!

Our Cover

THE familiar a.m. Army walkie-talkie, which in recent years has become a symbol of the modern Signal Corps so far as the public is concerned, is now being replaced by the new frequency-modulated SCR-300 pictured on the cover of this issue.

Where the old walkie-talkie was in essentials no more than a ham-style battery-operated v.h.f. pack transceiver in military garb, the new unit is a distinct development in its own right. In the first place, the use of f.m. instead of a.m. results in improved tone and the reduction of noise interference. Secondly, the new model has a non-radiating superheterodyne receiver which greatly facilitates one-frequency net operation. Third, miniature tubes are used, resulting in more compact construction and better efficiency. The result is a tripled useful range for the new unit over the old with the same battery life.

In addition to these basic modifications, the SCR-300 has several interesting mechanical features. One of these, the gooseneck connection which enables the antenna to be kept vertical whether the operator is erect or prone, is illustrated by the "phantom" portion of the cover view.

Complete with battery supply and a moisture-proof case which makes it impervious to weather and immersion, the new walkie-talkie weighs the same as its predecessor — 35 lbs.

Official U. S. Signal Corps Photographs

* 329 Central St., Springfield, Mass.

Signal Corps Troops in Italy

A Report on Communications During the Invasion of the Salerno Sector

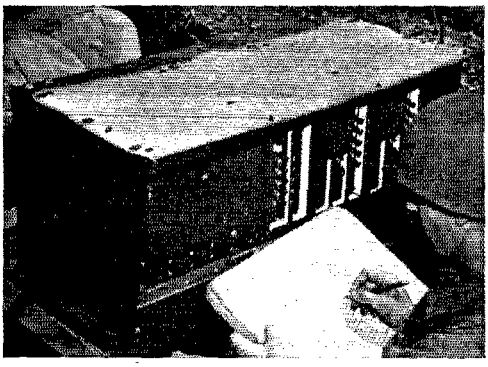
Praised as perhaps the most valuable single item of Signal Corps equipment, the "handie-talkie," a compact five-tube transmitter-receiver complete with self-contained dry-battery supply, weighs only five pounds. Extending the telescopic antenna automatically turns on the set. The push-to-talk button for switching from reception to transmission is operated by the thumb. When not in use the set is slung over the soldier's left shoulder by a strap and the telescopic antenna collapses into the case.

Official U. S. Signal Corps Photographs

THE following report, released by the War Department, was received at the Office of the Chief Signal Officer from a war observer attached to the American Fifth Army now battling in Italy:

"Communications, like rations, are one thing the artillery, engineers and doughboys depend on at all times, particularly in a landing operation.

"And communications those troops had when they invaded the Salerno sector on 'D' day, September 9, 1943, when virtually every type of troops in the Fifth Army hit the sand.



Regimental communications officers were high in their praise of the SCR 608, an f.m. set used for voice communication in mobile artillery and field artillery operations. It consists of two receivers and one transmitter mounted on a single base, powered by the storage battery in the vehicle in which the unit is installed. Individual channels are selected by push-button tuning.

"This wasn't all happenstance. It came about through careful planning by the Signal Corps.

"Communications with ships in the harbor — command ships, rather than the conventional well-grounded Army command posts — were established at almost the precise moment the first troops set foot ashore and, although maintenance of these lines was rugged at times, there were few instances when the troops ashore were out of instant contact either with their sister platoons, companies, battalion or regimental headquarters, or the higher echelons of command.

"The work of the Signal Corps was inspiring and, in order to furnish the high command with the necessary verbal picture, these men frequently got out ahead of the combat troops.

"In Italy one signal company actually got ahead of the infantry, with the result that the information it 'phoned back to the heavy guns of the destroyers, cruisers and other craft in the harbor offshore brought about the destruction of German Mark VI tanks which threatened the whole landing party.

"Though virtually every type of equipment the signal companies had at their disposal that day and for days to come was in use, there was little opportunity to determine which piece of equipment was the most valuable. Like the artilleryman or engineer, it all depended on whom you talked with — each had his favorite. The consensus was, however, that the handie-talkie — that small compact radio set which gives the platoon an opportunity to communicate with its company commander or battalion leader instantly — won universal approval. It provided the much needed communication with isolated groups and parties sent forward to reconnoiter.

"Regimental communications officers were generally high in their praise of the 600 series, which gained considerable use during this invasion.

"During the early operations most of the equipment had to be brought ashore in 'ducks' which frequently shipped water in the high seas.

"During the height of the operations the di-

(*Continued on page 86*)

The SCR 610, also favored, is a low-powered f.m. transmitter-receiver. The telescopic antenna is fitted into the top case when not in use. A mobile set, it is powered from the storage battery of the vehicle in which it is mounted. The SCR 609 is similar to the SCR 610 but is dry-battery operated.

STRAYS

A recent issue of *Air Force* (official service journal of the AAF) tells how T/Sgt. Sachnoff, a radio operator-gunner, used his wits and his radio training. In the course of a bombing mission he picked up an S9 signal in the proper code of the day, giving instructions to change course and attack a different objective. Although the message seemed proper, T/Sgt. Sachnoff became suspicious. At that particular spot over Africa he had never before been able to receive strong signals from the base. By using his radio compass he determined that the message was coming from a position in front of the ship and he radioed a warning back to his base.

On the return trip the sergeant's flight encountered 150 Allied fighters at 30,000 feet, heading for the false target. When the fighters reached the area they found 45 Messerschmitts circling at 20,000 feet and promptly dove on them, destroying thirty.

T/Sgt. Sachnoff was presented with the DFC for being the kind of a fellow who doesn't believe everything he hears.

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Melted toothpaste tubes were used in place of solder by Signal Corps technicians in Iceland when the supply of solder ran low. The men salvaged the tubes from their buddies in order not to delay the construction of vital communication facilities.

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The Monitor, published by the Mountain States Telephone and Telegraph Company, recently carried this item: "Did you know that high-frequency radio waves have been used experimentally in cooking a ham, and that in twenty minutes a ham was perfectly cooked which by steam would have required four or more hours?"

Bet you could do it in *fifteen* minutes with a California kilowatt! — *W6NZE.*

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Miss A. Mabel Gadsden is the assistant to John C. Clarricoats, Secretary of the Radio Society of Great Britain, with headquarters at New Ruskin House, Little Russell St., London, W.C. 1. Miss Gadsden's wartime job is much bigger than in peacetime, with membership in RSGB increasing at the rate of between 150 and 200 new members a month. Her spare time is spent as a quartermaster in the Girls' Training Corps (Southgate Coy).

Radio and electronics equipment will make up 92 per cent of the total communications requirements for the armed forces in 1944, with telephone and telegraph materials comprising only 8 per cent. In 1942 the volume of production was approximately 13 per cent telephone and telegraph equipment, 70 per cent radio and 17 per cent other electronics equipment. In 1943 the figures were 9, 61 and 30 per cent, respectively, while next year radio apparatus will be 50 per cent and military electronics equipment 42 per cent.

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The following item recently appeared in the "How to Keep Well" column of the Chicago *Daily Tribune:*

"Mrs. J. M. writes: My husband, who is in service, is working with radar. I have heard that any man working with light beams and rays cannot beget children. Do you think it can affect the body like this?"

The reply: "No danger from radar." — *W9VZP.*

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Paint your call letters on your lunch box and meet other hams! W8FU did that, and as a result reports meeting several amateurs from W4 and W6. — *J. C. Nelson.*

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A discussion of "Electrocardiograph Nomenclature" in a recent issue of the *American Medical Association Journal* contained the following: "The term RS-T junction should be used to indicate the point or shoulder which marks the end of the QRS complex, the point where the steep slopes of the QRS deflections are more or less abruptly replaced by the more gradual slopes which precede or comprise the first limb of the T wave. . . ." — *W1LIG.*

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The speed with which Pfc. Frank J. Elliott, W9CNW, transcribed code amazed instructors at the Army Air Forces technical school at Truax Field, Madison, Wis. When he did not participate in his first code class (20 w.p.m.) because his ability was "slightly above" that speed, the officers gave him a test. The code machine was pushed to 30, 40, 60, 65 and finally 72 w.p.m., its top speed, and all the while W9CNW typed the messages calmly and accurately.

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A member of RSGB, in a letter to GM6ZV, enclosed a QSL card. Nothing remarkable in that, you say; but behind this lies a story of coincidence. He found the card — that of FT4AF — in the ruins of a bombed house at Sfax. FT4AF was a YL and we hope she is safe and well, despite the destruction of her home. — *RSGB Bulletin.*

A new wartime parts catalog may be obtained upon request from Centralab, 900 E. Keefe Ave., Milwaukee 1, Wis. Divided into four sections — covering controls, capacitors, trimmers and switches — it includes all standard items available to the jobber trade at the present time.

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A wall chart for visual aid in the study of vacuum tubes has been announced by National Union Radio Corp., Newark, N. J. The chart measures 30 × 45 inches and shows in detail all parts of a typical radio tube. Element classifications and symbols for different types of tubes are given, as well as sketches of base pin arrangements and numbering systems for vacuum tubes. It is available free of charge to universities, colleges and Signal Corps instruction centers, or for $1 to individuals conducting accredited radio courses.

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Schools and colleges conducting basic or preinduction radio training courses can obtain modern receiver kits from Allied Radio Corp., 833 W. Jackson Blvd., Chicago, Ill. The kits, especially developed for illustrating radio theory and practice, contain all necessary parts for the construction of 5-tube a.c.-d.c. superheterodyne receivers. The circuit includes such features as oscillator-biased r.f. and i.f. stages, a contact-potential biased audio stage, inverse feed-back, a.v.c., high-capacity filtering and a self-contained antenna system.

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Development of a new radio-frequency capacitometer for the precision measurement of small values of capacitance and inductance has been announced by the Electronics Department of General Electric Co. The instrument weighs 55 pounds and is a completely self-contained portable unit in a steel case. The panel and base can be withdrawn for standard-rack mounting of the unit. The instrument measures directly at radio frequencies instead of audio, using an oscilloscope as an indicator. The ranges are 0-1000 $\mu\mu$fd. and 0-1000 μh.

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High-altitude oil capacitors for aircraft equipment are now being offered by Aerovox Corp., New Bedford, Mass. The impregnant and filler of the Aircraft Type 12 capacitor is a special oil which maintains effective capacitance even at sub-zero temperatures. The arrangement of terminals, corona shield and ceramic cap minimizes surface leakage, corona losses and probability of voltage breakdowns, even at extreme altitudes.

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An individual named William Wheeler, who has been manufacturing and selling mechanical devices designed as attachments for radio receivers, recently was ordered by the Federal Trade Commission to cease and desist from misrepresentations of the devices called "Miracle Radio Control" and "Miracle Aerial Loop." Tests disclosed the control to be without value in improving radio reception and the loop to be no more effective than a length of ordinary copper wire.

Prisoners of War

W4GXG, Pfc. Earl Teague, is being held as a prisoner of war at Stalgag V B, Germany.

W5GUZ, Albert C. Senter, is reported to be held a prisoner of war by the Japanese.

W9DTA, Edwin A. Noordewier, is being held as a prisoner of war in Germany. He was a radio operator on a bomber shot down over Europe.

W9JKN, Frank Goldstein, missing in action for more than a year, has been reported via the American Red Cross as a prisoner of war.

Missing in Action

The following amateurs have been reported to be missing in action:

W5KFV, John N. Stewart, jr., Pass Christian, Miss.

W7BDB, Iley D. Winn, ART1c, USNR, Dayton, Wash.

GM8FR, Tel. R. Frew, Glasgow, Scotland.

W7BDB was on a patrol flight somewhere in the Pacific when the engagement occurred from which he was not reported back at his base.

Silent Keys

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

W1CTP, Roscoe H. McKinney, Rockland, Maine

Ex-W1FU, Lloyd L. Rounds, USCG, Cranston, R. I.

W1GBK, Norman Unsworth, Greystone, R. I.

W2BPD, George W. Walaitis, Brooklyn, N. Y.

W2LWA, Walter E. Lindstrom, So. Ozone Park, L. I., N. Y.

W4CWJ, Arthur R. Weaver, Morristown, Tenn.

W5AEA, Homer Norwood Darst, Richmond, Texas

W6PGO, Capt. H. G. Harbin, Tucson, Ariz.

W8RGV, Howard Hatzenbuhler, Mt. Clemens, Mich.

W9DLD, Paul Millmaker, Centralia, Ill.

W9HRP, Charles Knipfer, Erlanger, Ky.

W9KYV, G. Edwin Parcell, Wichita, Kans.

Ex-W9OSL, Frank A. Ryker, Miami, Fla.

W9PXJ, Herschel C. West, Greenview, Ill.

W9UXT, Jean David Sumner, jr., East St. Louis, Ill.

W9WQY, Edward D. Fierce, St. Louis, Mo.

HINTS AND KINKS FOR THE EXPERIMENTER

OOPS!

REFERENCE "S-Meter with Left to Right Scale," page 63, December issue, suggest you move this one to the "short-circuit section" before any of our scarce and valuable meters become casualties. What in hell does a meter spring know about magnet polarity? — *L. M. Belleville, W7CFX.*

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FILAMENT SWITCH FOR PROLONGING TUBE LIFE

THORIATED-TUNGSTEN filament-type tubes, such as the 35-T, constitute an exception to the rule that it is cheaper to let filaments run than it is to let them cool and reheat frequently in the course of stand-by operation. The life of such tubes is greatly shortened through long periods of heating without the application of plate voltage because the grid may become coated, resulting in secondary emission.

At W6PGB a progressive-contact d.p.d.t. knife switch was used, one pole of which applied filament voltage when required while the second contact was arranged to provide a momentary delay before the plate voltage was applied. A relay system would be preferable, of course, but the switch is cheaper and serves the purpose. If properly guarded, it may be rendered as safe as any other switching device.

A glance at Fig. 1 will enable old-timers to recognize the switch as of the type once used first to start the rotary spark gap and then to turn on the primary voltage. The hinge contacts of a d.p.d.t. knife switch are moved from the center to one end of the base, while one pair of stationary contacts is shifted to the center. New blades are made which are long enough to reach both sets of contacts. A well-insulated handle should be provided. A shield or cover may be constructed of any good insulating material, such as Presdwood. The incoming lines should be run inside the shield from beneath the mounting. It should not be possible for the operator to come into contact with any live portion of the device, since it could easily become a death-trap if not properly protected.

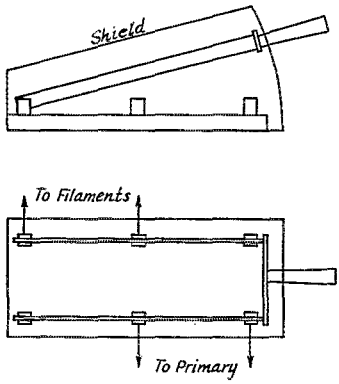

Fig. 1 — D.p.d.t. knife switch adapted for use as a time-delay switch for plate and filament lines.

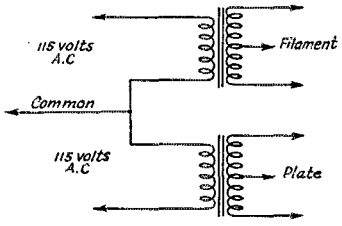

Fig. 2 — Circuit connections for using filament and plate transformers rated at 115 volts on a 230-volt line.

If a 230-volt power line is available, there is added advantage to be gained by using both sides of the line, as shown in Fig. 2. This protects the filaments from a voltage drop when the key is closed. In fact, the filament voltage actually will rise slightly as the key is pressed. This is important because more tubes are ruined by improper filament voltage than is generally realized, and thoriated-tungsten filaments are particularly cranky in this respect. — *Rex A. Reinhart, W6PGB.*

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PILOT LAMP AS BALLAST RESISTOR

SEEKING a means to avoid the "flash" and "dimout" effects provided by an a.c.-d.c. midget receiver when the power is first turned on, an added ballast resistor was tried across the filament of the 25Z5 tube. A Mazda type 313 28-volt pilot lamp did the trick in this case, and it is believed that it would work out in other sets using the series of tube types prefixed "25." — *F. E. Herman, W9AXZ.*

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SUBSTITUTIONS FOR 12SA7 TUBE

THE following simple method of substituting a 12K7GT or a 12J7GT for the hard-to-get 12SA7 mixer has proved satisfactory in practically all cases. The connections at socket terminal No. 5 are removed and extended to the grid cap for the new tube. The lead to socket terminal No. 8 is changed to terminal No. 5, and a jumper is run from terminal No. 8 to terminal No. 6.

Should the oscillator circuit fail to operate,

the oscillator grid resistor should be increased to approximately 50,000 ohms. The best value may have to be determined by experiment. When oscillation is obtained, the oscillator tuned circuit may have to be checked for tracking. — *Dean C. Logan, W6GKZ.*

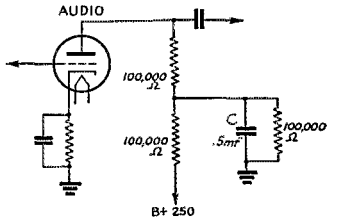

Fig. 3 — Diagram to show method of relieving peak-voltage surges on by-pass condensers.

SHUNT RESISTOR ECONOMIZES USE OF PAPER CONDENSERS

THE heavier paper condensers with higher voltage ratings are more difficult to obtain than low-voltage condensers under conditions of wartime material shortage. A method of substituting 200-volt condensers for 400-volt units in a resistance-coupled amplifier is shown in Fig. 3. In this instance the shunt resistor placed across the condenser cuts the peak voltage from 375 to 190 as the set warms up. By avoiding the surge peaks, the condenser of lower voltage rating will stand up well. The gain of the stage was not noticeably affected by the reduced plate voltage and the frequency response was good with the value of resistance shown in the diagram. — *Willard Moody.*

SOLDERING IRON REST TO DISSIPATE HIGHER TEMPERATURES

HIGHER temperatures are required to melt wartime solder, because of the reduced proportion of tin. This means the use of a hotter iron. If the soldering iron is not protected by a thermostat, some means should be provided to dissipate the additional heat when the iron is at rest. A solid block of steel or cast iron may be used to good advantage as a rest for the soldering iron under these conditions. The block should be sufficiently large to dissipate enough heat to prevent burning of the tip when the iron is not in actual use.

AN INEXPENSIVE MOUNTING FOR A 112-MC. ARRAY

IT IS NOT necessary to do without the advantages of a rotary beam for 112-Mc. work, if one is willing to forego one or two dispensable refinements. The four-element vertical array shown in Fig. 4 was easy to construct and cost only $2.90, including the price of a 20-foot length of ⅝-inch o.d. copper tubing. Four feet of the copper tubing remained for use in the tank circuit of the transmitter, so that the actual investment in the beam was $2.66.

The mast is a sixteen-foot 2 × 3. Two feet of the same stock is arranged to swing about the top two feet of the mast by means of very heavy strap hinges, about six inches in length. The cross-bar supporting the elements is of 1¾ × 1-inch stock, four feet in length. The elements of ⅝-inch copper tubing are each rigidly supported by two stand-off insulators, mounted on 2 × 12 × 1-inch strips which are fastened to the cross-bar at the proper intervals. The lengths of the elements will depend upon the desired operating frequency. In this case the radiator was 48¾ inches, the reflector 50⅞ inches, and the directors 44⅝ inches. The spacing should follow the suggestions in the *ARRL Antenna Handbook.*

This scheme of rotating the array does not allow complete 360-degree rotation, but there is an advantage even in this handicap, since the feeders do not have a chance to wrap themselves about the mast. The beam is rotated through a range of about 200 degrees by means of two ropes, one attached to each end of the cross-bar, passed through pulleys to the nearest window in the shack. Heavy grease should be applied to the hinges and the pulleys.

A 400-ohm line was used, with a delta match measuring 12½ inches on the sides and spanning 10 inches across the center of the radiator. — *Herman Lukoff, W3HTF.*

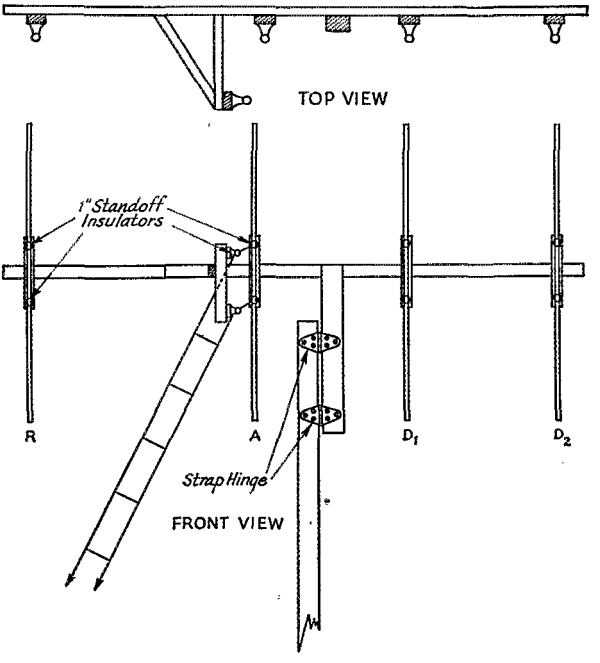

Fig. 4 — Hinged mounting for a 112-Mc. array. The arm which supports the feed line at right angles to the cross-bar should be two feet or more in length, since its purpose is to prevent, so far as possible, interference with the field pattern of the antenna.

CORRESPONDENCE FROM MEMBERS

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

QRD?

Response to the November editorial has been hearty, diversified — and voluminous. So voluminous, in fact, that to print all of the letters received would require a dozen or more *QST* pages.

This correspondence divides into two categories — that which concerns the topic of the editorial itself, and the somewhat larger portion in which general postwar problems and the future of amateur radio as a whole are discussed.

To present as many of these diversified viewpoints as possible within space limitations, this correspondence is being published in two installments. Letters relating more or less directly to the editorial topic of technical proficiency will be found below. Representative letters from the more general second category will be published next month.—EDITOR

150 E. Main St., Ephrata, Pa.

Editor, *QST:*

Two articles in the November issue of *QST* seemed to me to be very pertinent. One was the editorial regarding the possible necessity for the amateur to prove his need of frequencies. The other was the article on astronomy.

Up to the present time amateur radio has been concerned primarily with communication. In fact, radio development in the past twenty-five years has been in that field. It is true that other uses for electronics have been developed in the laboratory and have been used in industry, but the transmission of intelligence has been the chief duty of the electron. It seems to me that it would be well if *QST*, and amateurs as a whole, turned some of their interest and knowledge into other fields where the science of electronics could be used. In fact, I have noted that your magazine for the past year or so has recognized that need. Witness the articles on recording, on the electron microscope, and several others not truly radio in nature. While I do not believe that our magazine is the place for detailed articles on other sciences, where those sciences can be readily coördinated with radio I believe that *QST* may well include them, especially now that communication is nil. . . .

In line with the editorial thought, any endeavor in allied sciences which can make radio and our knowledge of the electron useful would justify our occupation of any portion of the spectrum. Ragchewing certainly cannot in the future justify our use of frequencies. There are many of us who do not possess the knowledge or the equipment for extensive experimentation, but our particular skills may fit us for methods of justifying our radio licenses by wedding our art with some other science. If we become message handlers, members of emergency networks, and real investigators, radio and otherwise, we shall justify our ham bands.

I do not mean that our magazine should become an amateur scientific journal, but certainly there are hams who are interested in allied sciences and I believe *QST* can still dip into those fields without losing its character. *QST* must always be a radio magazine but, as your own editorials have often pointed out, radio has now grown into the larger field of electronics. Amateurs by their very numbers and diverse abilities can partake in many fields of electronic research, and I am sure that *QST* will stay ahead of the obvious trend that is even now here. It always has.

— *Theodore R. Sprecher, W3DXC*

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10 Park Terrace East, New York, N. Y.

Editor, *QST:*

. . . You asked the question: "How should we state our aims, our policy?" Every amateur's aim should be to provide an unfailing means of communication at any time to any point, under any conditions for the restoration of life or property. His aim should be to improve operating proficiency and technical knowledge by experimenting and by exchanging ideas so as to improve and advance the art of radio communication. Every amateur's policy should be to promote good will and understanding between all nations: an ambassador of democracy. Amateurs following these aims and policies will be serving the people and their country in peace and in war.

Here are a few thoughts for your postwar planning. You know as well as I that, the more amateurs there are in this country, the more recognition they can demand and probably get. When this war is over you will have more amateur material than ever before in amateur history. In the armed services you have not only thousands of radio operators but thousands of radio technicians. Here at home thousands of third-class radiotelephone licenses have been issued. Many of these people would become amateurs if you would but open the door to them. They will not study for six months to learn how many amperes go into the antenna, however, nor will they master thirteen words per minute in code. Why? Because they have been operating by radiotelephone in the armed forces or in WERS without ever needing to know amperes or code. . . .

Your postwar planning should, therefore, consider a change in the necessary requirements for obtaining an amateur license. Provide three classes of licenses, namely:

1st-Class Amateur:

Requirements — Technical examination and code speed of 13 w.p.m. (same as present amateur license). *Allotted frequencies* — All amateur bands.

2nd-Class Amateur:

Requirements — Technical examination; no code test. *Allotted frequencies* — All amateur 'phone bands.

3rd-Class Amateur:

Requirements — Non-technical examination, same as now required for third-class restricted 'phone permit. No code test. *Allotted frequencies* — All amateur 'phone bands above 112 Mc.

By making three classes of amateurs, you open the door to all. You encourage study and offer as a reward better frequencies with which to contact more distant stations. The beginner (third class) is allotted frequencies which will not get him very many miles from home. Therefore he cannot cause too much trouble while he is learning.

It is also proposed that you consider granting a third-class amateur license to all those in our armed forces who now hold any type of FCC license and to those WERS operators who have faithfully served in civilian defense. . . .

The above will lead the way to more amateurs, and more amateurs means more recognition.

— *Frank Heubner, WERS*

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42 Ferguson Place, Ramsey, N. J.

Editor, *QST:*

. . . I would like to know why the trend toward the decrease in amateur operator requirements in this country. I was greatly surprised to read that you find it hard to decide whether this is a weakness or a source of great strength. . . . Most of my friends and myself feel that it's a source of great weakness, since it gives society the very basis on which to bring its attack against the amateur.

You admit in the editorial that we want a store of operators, if this can be done in addition to *advancing* ourselves in technical proficiency. Now let's stop here a moment and study this advance in technical proficiency. Do you feel that a fellow who purchases his transmitter already built, with a receiver also ready to plug in and operate, is going to be interested in advancing himself technically? We don't think so. On the contrary, while a few may, the greater majority will want to QSO and never think of looking behind the panel to find out what makes it work. These things are evident in many an afternoon conversation that we have heard, before the QRT, in which one fellow actually was telling the other one how to tune up his rig. Of course, you will say that such things will happen and can't be prevented. But don't you feel that relaxing the operator requirements is the first way of saying to society that our fellows can't make the grade of the 13 w.p.m. code test and technical quiz as it stands? Also, I have heard talk of completely doing away with the c.w. exam for 'phone tickets. This is disgraceful, and I do hope the League is not sponsoring any such program and that it will do everything to fight it and leave the exam as is.

Why don't you run an article in *QST* asking . . . the fellows if they would be more interested in the actual design more than just the circuit? We're sure you will find the results surprising. By reading articles such as this no one will have to worry about passing the FCC amateur exam as it stands, and society will have to take a back seat in its attack against amateurs on the grounds that they are merely conversing to amuse themselves, contributing nothing and learning nothing, and that therefore their frequencies could be put to better use.

— *William T. Tague*

Naval Air Technical Training Center,
Ward Island, Corpus Christi, Tex.

Editor, *QST:*

. . . Most of us are quite confident that the reason Uncle favored us the way he did before December 7th was for the purpose to which we are now being put. As has been said many times, you can't beat an amateur in his ability to get the "mostest out of the leastest," to copy an "unreadable" signal, and to become a proficient traffic man when given a standard procedure.

However, one thing the majority of us hams didn't have was technical skill. In other words, we knew the how, but the why was missing.

After the last shot is fired and legislation gets under way to put up new signposts on the airways, there is no doubt in my mind that the amateur will be given his share — provided we're there to get it. Apparently . . . that is being taken care of. It's quite probable, however, that the amateur of tomorrow will be quite different from the ham of yesteryear. As an outgrowth of the war, many who were hams but knew little of radio theory have been trained in the field to such an extent that, to Uncle, they rate the name of technician. Also, no small number of other persons who knew nothing of radio before the war have been so trained that their knowledge will surpass that of the majority of prewar amateurs.

Probably the majority of these men will be the hams of tomorrow. They will be able, because of their technical skill, to keep their bands clean and stay out of other people's hair, and they'll know what corrective measures to apply or where to find the root of a trouble. How will they feel when men who can't work a simple Ohm's Law problem splatter up an adjacent channel?

I'm quite confident that, if you get the bands for us, there'll be men to occupy those bands, regardless of the requirements. Therefore, I vouch for a postwar amateur fraternity whose members don't have to make excuses for the privileges they are granted. . . .

— *James L. Whittaker, RT2c, W9OYH*

603 35th St., West Palm Beach, Fla.

Editor, *QST:*

". . . Partly to have something to hold up before the world that will commend itself to the minds of legislators and administrators. . . ."

This excerpt . . . calls to mind a conversation I had some eighteen months ago with a very young but (technically) highly educated Signal Corps major. He pointedly informed two other members of his staff, both of whom were hams, and myself that he "would rather train a raw recruit who had never seen the inside of a radio than be pestered with these silly amateurs." . . .

That very hour I realized that hams would never receive their due credit from Signal Corps officials, and I knew then that someone was going to have to fight for every ounce of credit due us if credit was to be had. . . .

In my eighteen months of teaching Signal Corps officers — college men with various backgrounds, many E.E.s, physicists, and a sprinkling of other types that someone had desperately hoped would fit — I have drawn a few conclusions. Here they are:

There is *no* substitute for genuine interest and a little experience. You *cannot* take a man who has had no previous interest in radio or similar equipment and make a radio man out of him in a year. On the other hand the students who have been hams, or have worked with sound, seismograph or similar equipment, have been the life blood and backbone of the Signal Corps, as far as radar is concerned. From my experience in our department here, I can truthfully say that students with a little amateur experience have made up the bulk of the small percentage of really *good* men we have turned out. . . .

It might interest you to know that my only qualification for this job is fourteen years of interest and participation in amateur radio as a hobby — I'm not a college man.

— *George A. Caldwell, W9UNK*

2052 College Ave., Indianapolis, Ind.

Editor, *QST:*

. . . I hear occasional doubts expressed as to how much of the amateur frequencies we shall get back after the war. Myself, I thought we were fighting this war . . . for such things as amateur radio — the chance for individual expression. I think amateur radio is a . . . function of democracy and a brother to free speech.

I know the thought is that in the future radio operators can be trained by schools. . . . But the trouble with schools is that the students learn only what is taught them. It is only when a person is undisciplined (a bad word to those who think regimentation and restriction are the keys to national success) that he learns things and finds the unbeaten paths that forward technical and operating art. The greatest advances in science have been made in a free-lancing, voluntary atmosphere. . . .

Amateur bands are an investment of the people of the United States. Investments don't pay off right away, sometimes. But there comes a day when an investment is . . . a very vital thing. I have heard it said that the Signal Corps would have been a year behind had it not been for amateurs. If something happens to the amateur bands we shall be in the position of a man who freezes his capital and proceeds to live off it. I know that the spectrum can be put to use by commercial people and made to serve well. But, if something is not plowed back in, we shall face the war in 1965 with no reserve. We shall have only men who are in the commercial end, and it may be that they cannot be spared to go to the battlefront or for wartime industrial duty. . . .

I do not believe that the position of the amateur as a reserve corps, available for duty just where he might be needed in wartime, has been emphasized. . . . The thousands of amateurs who took up space in the radio spectrum and chewed the rag and fooled around in peacetime were the excess manpower capital so badly needed when war came. . . .

To think of putting the amateur wholly or partly out of business is another form of isolationism — a short-sightedness which would prove costly in another generation.

— *Albert Freeland, W9YDA*

THE C.A.A. OPERATOR IS GOOD

Seaplane Base, Navy 152

Editor, *QST:*

. . . I was disappointed in your choice of articles relative to the CAA, as I imagine others were, judging from the two letters printed in the correspondence section (*QST*, Sept., 1943, p. 68; Oct., 1943, p. 58 — EDITOR). . . .

When CAA snatched me from behind the sales manager's desk of one of the L.A. radio supply houses, I was quite shaky for fear I couldn't "cut the buck." When CAA put me on in '40 I had eighteen years of radiotelegraph and teletype operating experience, with AP, for brokerage and steamship firms, and in the Navy.

The peacetime CAA operator is a good man — he has to be! He has the duties of a broadcast engineer plus those of a telegraph-teletype technician, plus his duties for the Weather Bureau. Roger Wilco may be getting by, but doubtless the regulations have been relaxed to accommodate his type. His story inspired "a number of inquiries" — but why wouldn't it? It sounded like an advertisement guaranteeing anyone an admiral's stripes in five easy lessons.

The CAA spent several million dollars instituting schools to "make" communicators. They had to give up the idea in most regions, due to the lack of suitable personnel. The CAA man has worked along in silence, handling millions of lives a year, guiding planes through weather that would make the birds walk. He has a responsibility larger than that of any shipboard radio operator.

However, you'd better wait until we win the war and a couple of years to boot, and then you'll

really see how the CAA man works. His job will be world-girdling and heaven-high. He'll be a big part of ARRL, also, for many of our fraternity have stayed with ARRL throughout it all. . . .

— *Leonard Collett, RM1c, W9DEA*

THE JAPANESE CODE: A REBUTTAL

63 Wendell St., Cambridge, Mass.

Editor, *QST:*

Having been a consistent reader of *QST* for quite some time, I find it somewhat disillusioning to see such a worthless bit of sarcasm as was that letter in "Correspondence from Members" in November *QST* regarding the article on the Japanese Morse code.

Obviously, the above-mentioned article was not intended by its author to give a letter-perfect historical background of the Japanese language. It seems that his aim was to present a brief sketch of the fundamentals of present-day Japanese, which, I believe, he accomplished quite well considering the limited scope of any magazine article. The individual who so severely criticized this article must indeed have felt somewhat ashamed of his harsh language, since he prefers to hide his identity behind an anonymous signature. Really, in all seriousness, was such a letter worthy of a page and a half of precious wartime magazine space?

— *Ensign John F. Siau, USNR*

1850 North 13th St., Philadelphia 22, Pa.

Editor, *QST:*

Your recent article, "The Japanese Morse Radiotelegraph Code," and the letter entitled "About the Japanese Language" in the Correspondence section of *QST* for November, 1943, were of very much interest to me.

I am a native-born American citizen of Japanese ancestry. Because of the lack of information and understanding regarding us "Nisei" (second generation), people and employers at large identify us with the militarists of Japan with whom we are at war. The majority of us are just as loyal as any other American of direct foreign ancestry; we have been brought up in this country, we have an American education, we have American characteristics and mannerisms and we have American ideals. And I have had the privilege of having the red-blooded American hobby of amateur radio for the past twelve years. Most of us have never seen the country of Japan; many of us cannot even carry on an ordinary conversation in the Japanese language, and our general knowledge of Japan is very slight.

Mr. Joseph Grew, formerly U. S. Ambassador to Japan, in his book, "Message from Tokyo," maintains that we must differentiate between the Japanese militarists and the Japanese subjects. I make the plea to readers of this letter that they will differentiate us Japanese-American "Niseis" from the Japanese militarists and subjects.

I do not have the ability to read or write the Japanese language and cannot even speak passable Japanese. In view of this, the article and the letter which appeared in *QST* were not only interesting but informative to me.

— *Benji Hara, W6FJK*

73 FROM NORWAY

Toronto, Ont., Canada

Editor, *QST:*

I am a Norwegian friend of yours, who in peacetime was a wireless operator on a passenger ship between Norway and the U.S.A. Since then I have been educated as an engineer (B.S.). I came from Norway about a year ago, and I was directed to give you best regards from the hams in Norway. The hams at home complained that it was extremely difficult to obtain *QST*, but whenever copies arrived in strange ways they went from ham to ham, causing even more interest, of course, than in peacetime. . . .

I met some of your members in England when I was working with them on radiolocation. . . .

*

LINES FROM A SEABEE

Editor, *QST:*

Just a few lines from one of the boys in the Seabees. We are not so lucky in this outfit as those in the regular Navy or Army, in that we have no radio communications unit here — all our communications being handled by the Navy or Marine Corps. I have met several hams walking around here with fingers itchy for the key. Most of these fellows, like me, joined this outfit because we are construction men, radio being our hobby.

I have *QST* forwarded every month and we pass it around when it comes. I'm always looking for something concerning the Seabees or their camps. So far I have found quite a few radio men in this area. . . . Chiefs get eight weeks primary training and a month or so of advanced training. Other ratings get four weeks boot and four advanced. I expect to be assigned to a battalion shortly and start real work. Then to "Island X"! . . .

Please keep *QST* coming to us. We'll build and fight; you edit and print.

— *James Hanson, W1NQP*

THE OLD "GEN"

RCAF (attached RAF), India Command

Editor, *QST:*

. . . *QST* is doing a swell job in holding the amateur cause together. . . . How about more articles on antennas, math and theory as you have published of late? They are a great help in keeping the old "gen" (as we say in the British forces) in the old "noodle."

There are lots of Canadians here in this same job. Most aren't hams but will be after the war. I've been spreading the idea of joining the ARRL among them. . . .

Keep *QST* coming, and long live ham radio!

— *Sgt. R. M. Watson, VE3AVZ*

* Name withheld by request.

OPERATING NEWS

GEORGE HART, W1NJM
Acting Communications Manager

CAROL A. KEATING, W9WWP
Assistant Communications Manager

New Testing Hours for WERS. One of the sore spots in WERS organization has been the late testing hours on Monday and Wednesday in the Eastern and Midwestern sections of the country. Licensees complained that the hours were too late, that many of their operators worked in war factories and had to arise early the next morning, and that women operators did not wish to be abroad on dimmed-out streets at that late hour. Many boys and girls of high school age found it impossible to take part in drills scheduled so late at night. Consequently FCC, on November 2nd (effective November 12), amended its Section 15.75 to provide for earlier testing periods on Monday and Wednesday in the Eastern and Central time zones. These changes are recorded in "Happenings of the Month" in this issue. It is hoped that the new hours will encourage additional testing and make for more CD-WERS activity in the sections which found the former testing hours undesirable.

Keep Going with WERS. In view of the number of new licenses for CD-WERS which have been granted by the Commission in recent weeks, this advice hardly seems to be necessary. However, many radio aides, new and old, have reported that WERS is slowing down in their communities along with other civilian defense activities. This, they say, is due to a gradual falling off of interest on the part of volunteer operators who adopt the attitude that the emergency is practically over and their services, which were offered in the first place purely as a patriotic gesture, are no longer needed.

This attitude is perhaps understandable on their part; but you amateurs who are participating should know better. You should know that radio apparatus that sits around idle gets out of whack and necessitates some trouble-shooting before being put back on the air. Dampness gets into transformers, corrosion sets in, electrolytic condensers go haywire, dust collects and in general throws the gear out of kilter. In short, the equipment must have attention or it gets out of operating condition. The radio service cannot enter a state of suspended animation as other parts of civilian defense can. It must be kept fully alive or it will die completely. You can depend on it, as soon as your local WERS service has become lax and disorganized it will be called upon to perform some community service. Then transmitters will not work, or if they do they will probably be off-frequency, operators will not report to their posts, or if they do they will have forgotten their procedure, and general bedlam will ensue. Local officials will then ask: "Is this what you fellows have been drilling for months for?" It will make no difference that you have merely done what the rest of the local civilian defense organization has done, or that half of the operators who reported had to find the janitor and argue with him for half an hour before being allowed to enter the report center; all those things should have been arranged before. The only thing that will matter, regardless of the reason, will be that when called upon to render an emergency service your organization was found to be lacking, despite the long hours of construction, testing and drilling.

Keep Going! Weed out of your organization those operators who no longer wish to participate; replace them if possible with new recruits or, failing that, reassign the remaining operators to the most important posts and reduce the number of station units in service. Explain to your local officials the necessity for maintaining the radio service and secure access to those places in which fixed units are located. Hold a drill at least once a week, with simulated incidents having more emphasis on natural disaster emergencies than on enemy action. Let your community know that you are still on the job and ready to serve immediately if called upon, and that you will *stay* ready to serve until amateur radio once again is able to take over the task of emergency communication — and that then, too, you are at their service whenever they need you.

Postwar Planning. Many amateurs have written to us to ask what we have been thinking in regard to the future, and particularly what we are doing about it. That is a topic too broad in scope to be discussed fully in this column, and this is not the proper place to do so, but we want you to know that we have been thinking about the post-war future especially in regard to amateur operating activities, and preparing for it with an eye exclusively to the welfare of the licensed radio amateur, as always.

Briefly, it is planned to renew all former Communications Department operating activities on an even grander scale than before. The availability of appointments as ORS, OPS, OBS, OO, RM, PAM and TLS will be reinstated. Contests will be sponsored regularly among all operating groups. Trunk lines will be reorganized both for the purpose of handling traffic and tying in with emergency networks. A rehabilitated W1AW will carry on the work of communication with the gang on all amateur bands, 'phone and c.w., send out regular Official Broadcasts of latest news and announcements of interest to amateurs, and continue the code proficiency

program which was so popular before the war. A new W1AW program proposed is marker-frequency transmissions on band and sub-band edges to facilitate receiver and frequency-meter calibrations and reduce the possibility of off-frequency operation.

Emergency coördination should emerge from this war stronger than it was in pre-war days, with more emphasis on v.h.f. than heretofore, this as a result of WERS experience and Army and Navy combat experience. Local emergency networks on the very highs tied in with long-distance networks operating on lower frequencies should provide a vast and complete coverage of the United States to within "spitting distance" of any particular destination. The emergency networks to be will not consist of a group of amateurs who are willing to utilize their gear for emergency communication purposes; they will consist of organized groups who are not only willing but able to render such service on a moment's notice, and their ability will come as a result of periodic practice and drill sessions under a standard recognized operating procedure, possibly tying in with the regular traffic nets on these occasions.

The always-popular Field Day will be resumed also and will give the gang a chance to "rough it" as they might have to under emergency conditions, and try out v.h.f. rigs from mountain tops to establish new DX records. The Century Club and DX Contests will be resumed, of course. There is a trophy at Headquarters to be presented to the first amateur to establish two-way communication with Mars.

Postwar planning is getting to be a major topic of discussion at Headquarters. No doubt many of you are having thoughts along the same line, and some of you have written to us with your ideas. We like this, and want it to continue, and we wish that more of you, especially those who think they have some good ideas for future operating activities, would write to us and let us in on them. The postwar planning of the Headquarters gang should be based on suggestions from the membership and from the amateur at large; so drop a line to your director, or direct to Headquarters, and give us your ideas. At some time in the near (we hope) future we may find such suggestions invaluable.

The anticipation of the resumption of all these former activities, plus a few new ones, makes us feel mighty good, and we don't think it is a pipe dream. One thing is certain, however, and that is that none of this can become real unless we get our frequencies back after the war, and just as certain is the fact that we will not get our frequencies back if we do nothing to deserve them. We feel that so far we have more than fulfilled what was expected of us, that the nation would indeed have been in a dilemma shortly after Pearl Harbor if thousands of radio amateurs had not stepped into the Army and Navy bottleneck of operator procurement and relieved the immediate shortage of operators. Likewise, civilian defense radio would have been non-existent if amateurs had not been available to organize and supervise it.

Now, however, is the critical time. Now that the products of Army and Navy radio schools have increased to an extent almost equal to the great demands of the armed services, and now that civilian defense is beginning to taper off, it is the time when we amateurs, especially we amateurs at home, must keep ourselves in evidence, and the only way we can do that is by continued activity in WERS, war or no war, civilian defense or no civilian defense. If the rest of civilian defense peters out, WERS will keep going; so much more to the credit of amateur radio.

The postwar amateur should not be one who engages in the hobby of amateur radio "just for fun." An amateur who does not contribute something to radio, whether it be a technical or operating contribution, does not deserve to possess a license. A person who buys a ready-built transmitter and receiver to equip his station, pays to have them installed, memorizes the license manual and gets his code speed up to 13 w.p.m. by hook or by crook, then spends his entire amateur career entirely for his own amusement and that of his family, is not deserving of the name "amateur" as we have come to know it, and he is not the kind of person this League proudly represents. A person who is motivated to operate an amateur station primarily by a desire for pleasure must pay for that pleasure by contributing something to the art of radio communication. Reciprocally, a person who operates primarily to contribute something to the art is rewarded for that contribution by the pleasure he inevitably derives from the process. The primary aim of amateur radio heretofore has been and henceforth shall be service to the nation. The painless process of carrying out that service is, for the true amateur, pure, solid enjoyment.

— *G. H.*

AFFILIATED CLUB HONOR ROLL

The following clubs are additions to the "ARRL Affiliated Club Honor Roll" which appeared in the August, 1943, issue of *QST*, on page 72:

Inter-City Radio Club, Mansfield, Ohio.
Mid-Hudson Amateur Radio Club, Poughkeepsie, N. Y.
Richmond Amateur Radio Association, Richmond, Ind.
Short Wave Amateur Club of America, Laplace, La.

Because she was unable to appear for the picture of the WERS officials of New York City (see page 14, October, 1943, *QST*), we are including this picture of Mrs. Jeannette W. Grabscheid, LSPH, who has been the executive secretary to the radio aide of WNYJ since March, 1943. Prior to this time Mrs. Grabscheid was director of all code classes for the greater New York area. She is a member of YLRL, ARRL and WERS.

WERS of the Month

Syracuse, N. Y.

ON SEPTEMBER 9, 1942, a group of amateurs met to make plans for what was destined to become one of the most successful WERS systems in the country. This group chose as its leader and as its nominee for radio aide Jerome Blaisdell, W8STD, who was then appointed radio aide by the city. The nucleus thus created was supplemented as the result of two larger meetings held the same month at which the organization of WERS in Syracuse got under way in earnest.

Immediately upon approval of the project by the city, equipment needs were surveyed, newspaper publicity was sought and obtained to enlist volunteers, and a class of better than 50 civilians was organized for training in questions and answers leading to acquisition of the third class radiotelephone permit, rules and regulations for WERS, and simulated practice and instruction in the operating procedure to be used in the Syracuse system.

Meanwhile the amateurs who formed the nucleus of the organization campaigned for and collected about 350 used broadcast receivers, all donated by citizens of Syracuse. In space donated by the NYA, they set up a workshop and secured workbenches, tables, shelving and cabinets through donations of local merchants. The shop was open four evenings per week and was manned by a staff of 30 civilian volunteers whose work was planned and supervised by the amateurs. The first task of this group was the tearing down of the 350 donated radios and sorting and testing the parts therefrom. The parts which were not usable were sold for junk, providing a small source of revenue for the maintenance of the shop. In addition, a small sum was appropriated by the city and county for WERS, and the funds so obtained were used to purchase scarce parts and items not otherwise procurable.

Once the initial task of procuring parts was accomplished, the next step was to make actual plans for construction of the equipment to be used in the service. This, like all aspects of Syracuse WERS, was done according to standards acceptable to all. Satisfactory circuits were selected for a transmitter-receiver and for a transceiver, and the workshop staff started production in a business-like way. A few of the amateurs built their own equipment.

While this was going on the radio aide and his associates were busy arranging for the location and installation of the units. Permission was obtained to install the control station on the top of the highest building in the city (23 floors), but since this was not the location of the civilian defense control room, the operation of this control station was directed from the CD control center by means of a low-powered rig located there. Thus the control station controls its networks from the most favorable location in the city despite the fact that the center of other civilian defense activities is not located there.

The license was received on January 20, 1943, under call letters of WKBS. It was the 99th CD-WERS station license to be issued by FCC, the 8th in the State of New York. Operation commenced immediately to test the transmitters and break in the civilian operators. Since that time 30 station units have been put into operation and 3 more are under construction. The operating staff numbers 70, an average of 2.33 operators per station unit. Of the 70 operators, 15 are amateurs and 55 are civilian volunteers, and 12 more operators are at present receiving training. The Syracuse license covers a population of over 200,000, ranking fourth in New York State in this respect, and plans are being made to cover the whole of Onondaga County, which covers some thirty towns surrounding Syracuse and includes a total population of almost 300,000.

The keynote of the success of Syracuse WERS has been the various forms of publicity which were readily given by both newspapers and broadcasting stations. Initially, such publicity was largely responsible for procurement of the large group of operating personnel and donations of old broadcast receivers from which many of the parts for construction of the equipment were obtained. Continuance of the publicity has resulted in respect and pride on the part of the citizenry and local government for their civilian defense radio system. The "WKBS Bulletin," edited by Ken Thomas, keeps all participants informed of latest development and is a kind of internal publicity which goes a long way toward keeping up interest and morale.

Radio Aide Blaisdell gives especial credit to his civilian operators who, he says, are particularly conscientious in attending drills, classes and meetings in all kinds of weather, and to his immediate associates in supervising the system, men such as Ken Thomas, secretary and editor of the "WKBS Bulletin"; J. Clark White, W8BAL, chief net operator, and Arthur Laurien, W8CYJ, shop supervisor.

Each month under the above heading we intend to 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 amateur or WERS permittee. Descriptions of organizations which have already been featured in *QST* articles will not be considered. The story can describe the organization in general, how it came into being, how it was set up and how it operates; or it can describe some particular phase of the organization which makes it unusual or unique. Contributions should be brief (three typewritten pages, double-spaced, is a good standard) 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."

Hamfesters' Radio Club, "Chicago's Largest and Livest," sends greetings to its members in the services with a picture taken at one of the meetings. The club's Service Roll, listing 76 men and women in uniform, represents more than a third of the active membership.

Press Schedules

Through the courtesy of the Office of War Information, Transradio Press Service, Radio News Association, United Press, and Press Wireless, this list of schedules of code transmissions has been compiled for practice purposes. The schedules below are subject to change without our knowledge. They are listed with the stipulation that none of the material copied may be divulged except to the addressee. *Do not use these transmissions for anything but code practice.*

Time (EWT)	*Call*	*Frequency (kc.)*	*Origin*	*Speed*	*Days Scheduled*
12:30 A.M.	WKRX	6,100	New York	30	Daily
1:15–2:30 A.M.	DLA	5,800		18–25	Varies
2:30 A.M.–2:00 P.M.	DLN	17,670		18–25	Varies
8:00 A.M.	WJS	15,700	New York	30	Daily
8:00 A.M.	WCX	7,850	New York	35	Weekdays
8:00 A.M.	WBC	15,825	New York	30	Daily
9:00 A.M. (in Spanish)	WCW	1,580	New York	40	Weekdays
9:10 A.M.	WHL4	17,910	New York	30	Except Sun.
9:30 A.M.	WPK2	13,185	New York	30	Daily
10:00 A.M.	WKRX/WHL4	15,190/17,910	New York	30	Daily
10:00 A.M.	WCX	7,850	New York	35	Sundays
10:20 A.M.	WPU	14,635	New York	30	Except Sun.
10:30 A.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
10:30 A.M. (in Spanish)	WCW	1,580	New York	40	Weekdays
11:15 A.M.	WKRX	15,190	New York	30	Except Sun.
12:00 N.	WCX/WJS	7,850/15,700	New York	35	Sundays
12:15 P.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
1:45 P.M.	WRK	15,910	New York	30	Daily
2:00 P.M.	WHL3/WBC	18,510/15,825	New York	30	Daily
2:00 P.M.	WCA	15,730	New York	50	Except Sun.
2:00 P.M. (in Spanish)	WPU	14,635	New York	40	Varies
3:00 P.M.	KHF4	15,700	Los Angeles	35	Weekdays
3:00 P.M.–10:00 P.M.	DLD/DLB	7,757/6,887		18–25	Varies
4:00 P.M.	WBC	15,825	New York	30	Except Mon.
5:00 P.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
5:00 P.M.	WCX/WJS	7,850/15,700	New York	35	Sundays
5:15 P.M.	WJP	8,810	New York	30	Except Sun.
5:30 P.M.	WBC	15,825	New York	40	Sunday only
6:00 P.M.	WCL	9,390	New York	30	Daily
6:00 P.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
6:00 P.M.	WCX/WJS	7,850/15,700	New York	35	Sundays
7:30 P.M.	WCX/WJS	7,850/15,700	New York	35	Sundays
7:30 P.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
8:30 P.M.	WCX/WJS	7,850/15,700	New York	35	Sundays
8:30 P.M.	WCX/WJS	7,850/15,700	New York	35	Weekdays
10:00 P.M.	WBG7/WKRX	7,620/5,985	New York	30	Daily
10:00 P.M.	WBS/WHL2	7,355/11,460	New York	30	Daily
11:00 P.M.–1:15 A.M.	DLC	7,332.5		18–25	Varies
11:15 A.M.	KHF4	15,700	Los Angeles	35	Weekdays

I'm Still QSOing on C.W.!

BY G. CARROLL UTERMAHLEN,* W3HVD

DEAR OM:

It is now almost two years since we pulled switches for the last time. Do you miss the old QSOs as much I do?

The purpose of this letter is to let you know about the substitute I found for ham radio. It isn't stamp collecting, either — it's a c.w. landline!

Harvey Bramble (an s.w.l.), another ham and myself — all of whom have been left behind to keep 'em flyin' — put our heads together and really got to work on this idea of carrying on with a code-practice oscillator.

A quick inventory of our radio parts revealed that we had the needed equipment for a two-position send-receive set-up. We decided to use the line as we would a real ham rig.

Our equipment consisted of a code practice oscillator, some old transformer wire, two sets of cans and keys and some haywire connections. We set up one position in Harvey's shack, and located the second one in the cellar — about twenty-five feet away. Since we couldn't see each other (the floor separated us), we had to rely solely on the code for communication purposes. The set-up works like a charm, and we have but four wires connecting the two "stations."

It may sound funny to get a kick out of working someone only twenty-five feet away, but just you try it the next time you get that old urge to get on c.w.! Another good thing about it is that it helps to keep your fist in shape and your receiving speed up to par. It is an invaluable aid in helping SWLs acquire proficiency in sending and accuracy in receiving at advanced speeds.

There are only three things to remember in installing a c.w. landline. First, you must keep your lines as short as

*7 McCormick Ave., Baltimore, Md.

ARTICLE CONTEST

The article by G. Carroll Utermahlen, W3HVD, wins the CD article contest prize this month.

We invite entries for this contest. Regarding subject matter, we suggest that you pick a topic of current interest. Amateur radio is a broad field and our ways of contributing to the war effort need discussion and emphasis. Perhaps you would like to write on Radio Training programs, club methods boosting code proficiency, Emergency Corps registering for CDC selections and WERS activity, organizing or running a radio club, getting local groups QSO by light beam or wired wireless or ground currents now that radio is out!

Space permitting, each month we will print the most interesting and valuable article received. Please mark your contribution "For the CD contest." Prize winners may select a bound *Handbook* (Radio Training Course or regular edition), *QST* Binder and League Emblem, or any other combination of ARRL supplies of equivalent value. Try your luck!

possible; second, you must make the installation 100 per cent indoors, and third, you have to check the entire outfit for radiation. These precautions must be taken, if you are to avoid difficulties with the FBI. Hi!

Unlike the ham bands of prewar days, our little channel is open at any time, and not subject to sporadic DX conditions. We can ragchew without fear of censorship, DX is

Right — The author, W3HVD, "transmits" from the cellar position.

Left — Harvey Bramble, s.w.l., does a bit of serious copying at the other "station."

limited only to the imaginations of the operators, and QRM and QRN are unknown! Truly, it's about as close to a ham's Utopian dream as one can come.

Of course, this plan completely neglects the needs of the 'phone man. Guess he'll just have to use a nickel for every QSO he wants to have with a ham friend. But after all, doesn't that prove that in the long run there are more advantages to c.w. operation than 'phone?

73 from your ham friend,

Carroll

The Month in Canada

QUEBEC — VE2

From Lt. L. G. Morris, 2CO:

J. P. Gouin, 2RF, writes that he is employed at No. 9 Air Observer School, St. Johns, P. Q., and says he expects to see a ham radio boom in that town when peace comes. 2BE, Alex Reid, was in Ottawa on a business trip and took time out to see 2DR, Bill Skarstedt, and 2EE, Stan Comach. 2DU, Noel Wright, lunched with 2AX, Gordie Southam, while in Montreal recently. 3AGM, formerly of Kirkland Lake and Virginiatown, Ont., is now located at Perron, P.Q. In brasspounding days he was active on 20- and 40-meter c.w., running 900 watts to a pair of 100THs. He is now chief electrician at Perron Gold Mines. 2CO is a lieutenant, RCNVR (special branch). 2CX-5TD has been promoted to the rank of captain, RCCS (CAA).

ONTARIO — VE3

From L. W. Mitchell, 3AZ:

Recently 9AL has been overseas and is now back in Ottawa. He was in charge of No. 4 W.T.S. for the RCAF at Guelph after its opening and was transferred from there to Ottawa before going overseas. 3IX, who has been stationed at Winnipeg after returning from overseas, also is in Ottawa. 3IM is back in Canada after successfully earning a number of promotions and a decoration while overseas with the RCAF.

ALBERTA — VE4

From W. W. Butchart, 4LQ:

Reid Elliott, 4JP, of Alliance, and family were Edmonton visitors in October.

Included in the "In the Services" column of the November issue of *QST*, we noted the calls 4AA, Frank Duval, of Lethbridge, and 4GE, Stu Jamieson of Drumheller. Frank apparently joined the Railway Corps of the Canadian Army, and Stu went to the RCN as an electrical artificer.

4EO, Bill Savage, of Lethbridge, paid a short visit to Edmonton accompanied by his wife and two friends. He managed to QSO 4HM, 4EA and 4LQ via telephone, and the following morning 4HM took Bill in tow for a couple of hours. Bill and his YF are very much interested in rifle work, both being very good shots. Bill has left the employ of the Lethbridge Fire Department and is now electrical inspector for the City of Lethbridge. Bill also informed us that he has moved his QTH again, but that it is still on the "north side."

4EY, Bill Careless, of Edmonton, entered the field of politics in Edmonton recently (civic elections), but failed to be elected. Better luck next time, Bill!

4HM, Chas. Harris, of Edmonton is proud of the progress being recorded by his son, Roger, who is in the RCAF. He soloed after seven hours and five minutes of dual instruction.

4EA, Roy Usher, of Edmonton, recently was elected president of the Edmonton Ciné Club and is kept pretty busy with club activities. Roy and 4BV, Reg Mainwood, of Edmonton, found themselves once again in the same group production committee for production of a short film. (Reg starred in last year's production!)

Heard a rumor the other day to the effect that 4AEV, Norm Lockhart, of Vulcan, had gone overseas with the RCAF, but we lack verification of this news.

A very "newsy" letter arrived from 4IN, Bill Lawrie, of High River, who is with the RCAF on the West Coast. Last news we had of Bill was that he was flying in coastal patrol planes, but he tells us that he hasn't been doing that work for a considerable time. He works on the Pacific Communications Programme of the RCAF on the coast and in carrying out his duties of W.E.M. he manages to see quite a bit of the country. His home is in Vancouver, but he gets periodic postings to points along the coast. He says that there is some pretty nice equipment being used and some pretty nifty directive antennas. In his work Bill sees quite a few hams, and has promised to send along a list of the boys he has met. Bill's daughter Doris is a code and cypher clerk in the W.D. of the RCAF, with a rank of sergeant. Young Bill is attending U.B.C.

4AKG, Bobby Saunders, of Kirkcaldy, one of 1N's protegés, stayed with 1N while working in the Vancouver shipyards, but has since returned to the prairies.

4NN, Larry Nelson, of Vulcan, is operating a Dept. of Transport Station at Whitehorse, Yukon. His brother 4PB, Elmer Nelson, of Vulcan, is also up there operating.

4LM, Bill Marsh, of Drumheller, is signals officer with the RCAF at Tofino, B.C.

That just about wraps it up for this time fellows. How about sending along the odd bit of news? Watsa?

BRITISH COLUMBIA — VE5

From Jack Sibson, 5BQ:

It seemed like old times again on Nov. 12th when we held a hamfest. Yes, there are still a few hams around. The BCARA is still trying to keep the old ham spirit alive. The New Westminister, Point Grey, Totem and West End Clubs were represented as follows: Fred Taylor, 5HA; Martin Thoreau, 5OT; Tom Holtby, 4IG; Charlie Longley, 5AN; Roly Tufnail, 5FM; Dennis Reaville, 5AV; Ted Goode, 5ND; Roy Sharp, 5ES; Phil Henstridge, 5GR; Jack Sibson, 5BQ; and George Goode, 5EO, who is in the western chief dispatcher for T.C.A.

We had a nice letter from Chuck Palmer, 5AAE, who is with T.C.A. at North Bay, Ont. He is married and has a little girl. My, my — it doesn't seem very long ago when he was getting in my hair around the shack! Let's have more letters, fellows.

Fred Grant, 5NT, was home on leave from Manitoba. He surely looked good.

AMATEUR ACTIVITIES

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — Last month's report contained two errors: 3JJN informs us that his new offspring is a jr. operator and not a YL, and 3KD avers that the Philadelphia police radio car batteries did not run down at the Broad Street Station fire. 3HFD is building a 2½-meter f.m. transmitter with a pair of HK24s in the final and an 815 driver. 3IXN is still rebuilding his rig and new shack but finds little time to work on them. 3DMQ has a new QTH, as has 3JJN. 3GHM tested out his super oscilloscope and it perks FB. 3JKC visited the Frankford Radio Club and contracted the rebuilding bug. 3IMV went down for his Class A ticket. 3IJN has a stripe and a half in the USMM. Lower Merion WERS has a 100 per cent QSO range of at least twenty miles. From reports of nearby WERS in Penna. and New Jersey, WKIB-4 puts out the best signal in Philadelphia. 3EEW took himself a YF recently. 3ENX reports the arrival of a new baby YL at their house. 3DUK, of SS fame in Delaware, paid us a visit recently. He painted a glowing picture of his new QTH with plenty of antenna space. Not many reports this month; how about it, boys? 73 — *Jerry*

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Hermann E. Hobbs, W3CIZ — Pfc. IMM, located in Temple, Tex., writes that his amateur radio experience was of great assistance to him as radio operator in the field artillery, and that he wishes to join the ARRL. An interesting letter was received from IVT, lt. (jg) USN. His family, now located in Lomita, Calif., was in Pearl Harbor on Dec. 7th, and his son was shot in the leg. He has a second son, born last Jan. IVT's address is Navy No. 128, c/o FPO, San Francisco, Calif. Hats off to three of our youngest members. They are: Allan Bringle, 13 yrs.; Don Weinrath, 12 yrs.; and Tom Pendleton, 12 yrs. Allen and Don have their WERS tickets and are operating regularly. Tom is still waiting on FCC. All three are doing a fine job. Eight WMDD members have been recommended for service ribbons. They are: Bill Blair, radio aide; Micky Mock, asst. radio aide; Paul Thomsen, commander of operations; "Mac" Williams, asst. commander of operations; Bob Caviness, chief operator WMDD-1; Commander Phippeny, chief of construction; Nick Smith, senior operator and antenna construction; Harry Lowe, technician and special shop work. We are all glad to hear that T. M. Amos is recovering from an injury received several months ago. Mr. Alfred Christie is doing a fine job on his operator training program. His wife, Mrs. Helen Christie, is also quite active in WERS work. Seems as though every time you drop in at WMDD-1 you find Bob Caviness on duty. Bob Cline is heading up WERS activities in the Kensington area. We have the following family teams in the WMDD net: Mr. & Mrs. Alfred Christie, Mr. & Mrs. Ed Roccati, Mr. & Mrs. Ralph Stewart and daughter, Blaine and Leroy Platt, Commander Phippeny and son, Reid. Asst. Radio Aide Mock will "take over" for a couple of months while Radio Aide Blair takes leave, on orders from the ol' medicine man. 73.

WESTERN NEW YORK — SCM, William Bellor, W8MC — We have had several inquiries about WERS activity in the Batavia area. If this area is not being covered, we hope someone will undertake to start it. Dick Briemer, LSPH, at Sampson Naval Base, has been appointed code instructor. QLI is making progress with Corning WERS. Ward Kinkle is communications officer for the Amsterdam CAP unit and hopes when it gets going it will be able to tie in with the Albany and Troy units in a net. FU and GAZ have been carrying on successful QSOs on carrier current for a distance of about four miles. JJQ is home for eighteen days after undergoing an operation for double hernia at Truax Field, Madison, Wis. VJB is attending Union College in Schenectady as a Naval Reservist. Your SCM enjoyed a nice chat with 1GS while attending the recent fall meeting of the I.R.E.; he also met plenty of hams, now engineers for Uncle Sam. We are getting much better response from the boys on far away assignments, and as one man's report is another's "news," we will keep this space filled yet. 73 — *Bill*

SOUTHERN NEW JERSEY — SCM, Ray Tomlinson, W3GCU — Asst. SCM, Ed. G. Raser, ZI; Regional EC for So. N. J., N. J. state radio aide for WERS and radio aide for Hamilton Township WERS, H. Dallas Fogg, ASQ; EC for Somerville and vicinity including Southbranch and radio aide for Hillsboro/Branchburg Township WERS, P. S. Case, ABS. ASQ reports only six more units are now to be built to complete the total of twenty-five units for Hamilton Township WERS. ABS reports progress with Hillsboro/Branchburg Township program; five of their nine units are ready for action. Stan's QTH is now: P. S. Case, Radio Aide, RFD No. 1, Neshanic Station, N. J., telephone Neshanic Station 6118. State radio aide. ASQ, tells us there are other communities also readying for WERS and preparing applications. ASQ, GCU, HTJ and ITS were accorded a swell time on a visit to the meeting of the SJRA on Thursday, Oct. 21st. ASQ rendered a very enlightening talk on WERS, together with several constructional suggestions from HTJ, ITS and GCU; and GCU spoke upon the importance of everyone submitting monthly reports regarding men in the services as well as other phases of what activity may be indulged in under present conditions. ASQ was also called upon by the state defense council recently to visit Fort Monmouth and give a talk on the aspects of WERS. ABS reports that his signal originating in Southbranch could not be heard in New Brunswick, an airline distance of approximately eleven miles, and by the use of the antenna figure 1711, page 382 of the 1943 ARRL *Handbook*, and following the instructions given, the signal was then heard in New Brunswick R-7. This antenna was also tried in Hamilton Township in some weak locations with the same results. AID built receiver and antenna for use on airplane for CAP service. Alban Hatzell, LSPH, is a new member of So. N. J. section. He is at present connected with RCA in Camden, and has requested information regarding participation in any phase of amateur activity, especially WERS. He desires to help in any way he can, and may be addressed: Mr. Alban Hatzell, c/o Mrs. See, 726 Linden St., Camden, N. J. EED is studying hard with a view to signing up as radio operator with the merchant marine. ZI is radio technician, now stationed temporarily at Hamonton Barracks, N. J., State Police. Lt. Commander Bill "Doc" Smith, USN, ex-AN, ex-K4ENY, the popular Virgin Island 20-meter 'phone, ex-9AQE, Great Lakes 20–75 'phone, has been ashore since Oct. EUH won a $50 war bond for suggestion submitted at Eastern Aircraft. JOL, also at Eastern Aircraft, got a day off recently — and paid for it. Hi! GYM is still on the air, as transmitter operator at 500 watts b.c. WCAM, Camden. John holds 1st-class 'phone and 2nd-class telegraph, as well as Class A tickets. BGP is now managing director of WCAM. Dave Toy, studio operator at WCAM, is preparing himself with an eye to procuring that much-desired ham ticket. He now holds 1st-class 'phone license. JJX is now the proud papa of a second jr. operator, born Nov. 4th. JOL has just about completed construction of another receiver for Hamilton Township WERS. Pfc. Jack Sherman, formerly with Nidisco, Trenton, is now at Camp Murphy, Fla. HTP is somewhere in Unk Sam's service. GNM is with Medical Corps somewhere in England. GRW is with the merchant marine as radio operator. We are sorry to hear of the accident which occurred to Sam, IU, who was painfully burned at work when a compound vat exploded. HAZ and XYL have taken up residence near his post, Ft. Monmouth. Bill's address is now S/Sgt. Wm. F. Petty, 12034635, Co. F, 803 Sig. Tng. Regt., Ft. Monmouth, Red Bank, N. J. Capt. Edmund Burroughs, ex-AIU, was called to duty with the U. S. Army Medical Corps, Oct. 22nd. Ed will be missed by many 'till his return. Major Kale, VE, has been in post hospital, Pine Camp, with infected hand. CCO has been reported playing nursemaid to "Goldy," a pet goldfish belonging to one of his superior officers at Wright Field Radio Labs. Arthur G. Hassal is a radio operator aboard a B-17 bomber. Address Jimmie: Cpl. Arthur G. Hassal, APO 760, c/o Postmaster, N. Y. C., N. Y. Drop him a line, guys; he is asking for mail from home. JTL was called to active duty on June 22nd and is now studying electrical engineering under the ASTP at the University of New Hampshire. We wish to thank those who have reported these items, and would be very grateful for information regarding the following: JQQ, IZT, GNO, FHV, ISZ, GTM, IZV, IEQ, GAF, IIN, AXL, GYZ, JL, IET, AWL, HNO, AWH, FMR, IAZ, FNH, BPJ, IIC, IFV and IHZ. Also AIR, AMP, HPE, ARN, GMY, BYR,

AVJ, AEJ. Anyone who has information regarding any of these boys will be doing them a great favor if they will report the whereabouts and activities (if possible or permissible) of any of them. Please pass along any news you may have to your SCM; we need all we can get. 73 to all.

CENTRAL DIVISION

ILLINOIS — Acting SCM, George Keith, jr., W9QLZ — JZA, an ex-Morse operator, is taking his basic training at Camp Callan, Calif., and hopes to get into radio or American Morse work. JTX has been working at the Naval Air Station at Norfolk, Va., and reports the OM, FIN, has been an instructor in aviation radio and is now getting additional training in the Art. JVC is having easy going in Italy and hopes to try for a commercial ticket as soon as he returns to the U.S.A. OZU entered the Marines Nov. 9th. The Joliet Club, with eighteen members, installed the following officers: ODT, pres.; KPC, vice-pres.; Al Van (operator license) secy-treas. ODT is still corresponding with the FCC regarding WERS. Lt. (jg) ex-OOF is stationed at Brunswick, Me. MGI, John W. Watson, 16018189, APO 528, c/o Postmaster, New York City, would like to hear from any of the Illinois gang. 1st Lt. ZZD is doing dental work in the Army at Jefferson Barracks, Mo. CWV had to quit school because of ill health but expects to be fully recovered soon. 1NQR, ex-9LGK, is research engineer for G.E. at Schenectady. Ensign CVM is doing special work in the Navy and is stationed at Brunswick, Me. Staff Sgt. JAU is up to his ears in radio in Australia. Sgt. GVP married ALU's sister. QKL would like to know what has happened to MNR! Also, where is GFW, LPR and QWM? QKL is radio electrician and chief radio operator in his searchlight battery in Calif. T/Sgt. UGU writes that JKN, who was captured on Bataan but reported as missing for over a year, was finally heard from via Red Cross. A ham in Italy writes to tell of the thrill he got from reading the section news in *QST*, so send in enough news to keep the column going. Season's Greetings. 73 — *Geo*

INDIANA — SCM, Herbert S. Brier, W9EGQ — The Indiana wing (52) of the CAP is now licensed for WERS under the call WKVY. The license is for fifty-nine units, all portable-mobile, ranging in power from ½ watt to 25 watts. AB has been experimenting with f.m. reception on super-regenerative receivers for WERS. The transmissions were heard satisfactorily in South Bend. YMV is now S1c; he would like to get letters from you. His address is: L. T. Waggoner, S1c, USMSTS, R-48, Gallups Island, Boston, Mass. PUB was to get four months of training and then go on active duty. Now fourteen months later, he is still going to school. His address is Dave Gilea, ARM3c, T.L.U., F.A.W.-14, c/o Fleet P. O., San Francisco, and he would welcome letters. SNF is now Pvt. Barry, USA. OOG, home on furlough, bawled me out for saying he taught radio when he actually teaches radar. BPX is studying advanced engineering for the Army at the University of Fla. MKM, somewhere in Alaska, enjoys reading about the fellows in *QST* and the *Bison*. VLI is with the AAF in South Pacific. NZZ tried to change to a job as radio engineer, but the railroad said "you stay where you are." KHB is teaching a group of scouts how to build crystal sets. MTL has built one v.h.f. superhet and is working on another. FXM, radio aide and EC for Richmond, reports WERS working smoothly with all units having good coverage. He says that nobody ever sees NVA. WIB, at present stationed on the West Coast, has seen much action in the Pacific. DLC and BHC are among those working with Indianapolis WERS. The control antenna there is ninety feet high. EHT is going to radio school for the Navy in Chicago. CTK has finished his radar training and is now on active duty. YDA pounds brass for the Indiana State Police, and even works DX at times. NGB was home on his first leave since before Pearl Harbor; he has been on active duty in the Pacific. ABB has been sent to the West Coast from Tenn. HZY is located at a Navy air base on the Atlantic Coast working with radar. YCU recently received 2nd-class commercial license. RTH is doing r.f. alignment in Columbus plant of Noblitt Sparks. Who can supply me with the present addresses of ILU and SVZ? I have a few copies of the November issue of the *Bison* on hand and will send one on request until the supply is exhausted. Please send more reports. 73 — *Herb*

MICHIGAN — SCM, Harold C. Bird, W8DPE — 1st Lt. James Gundry writes that he has joined the benedicts. Congratulations. He is now located in Texas with a tank destroyer outfit. Sgt. A. F. Gasta, formerly of Bay City, writes from Australia that he had been reading *QST* for months; DSF finally sent him a membership for Christmas. His call was 8QZV and he used to haunt the 7-Mc. band around Bay City, occasionally getting up on QMN to move some traffic. 8PLC writes he is back in Cadillac now; he has joined the CAP unit there and is teaching the cadets code. They are also planning a WERS set-up in their unit. A very fine letter was received from 8HU whose address is now APO 980, Seattle, Wash. He writes, "For months I have been intending to write you as a means of greeting all the rest of the Michigan gang. To-day I ran across the Oct. issue of *QST* and I resolved to write you this very day. The article which I always look for is the news of the boys in Mich. The news of WERS always makes me a little sad to think I must remain on the outside. It has been my pleasure to be associated with two more hams from Mich. I cannot recall their calls; they are Lt. Thomas G. Mitchell of Benton Harbor and Lt. Levi D. Huffman of Albion. It is my sincere hope that the boys of the DARA and the larger family of the ARRL will keep the spark alive until the day comes." 8OCC writes that he bought a Sky Champion receiver that is just like new from former 8SMI. Maurice is working in a defense plant in Marshall. Vic Crawford sends his *QST* renewal and says he is working for the American Air Lines in Niles. He would like to hear from you. His address is Vic Crawford, 1631 Ferry St., Niles, Mich. The Pontiac City WERS station, WKYM, now has two units completed, installed and tested. The main unit is a crystal-controlled rig. 8TNO spent considerable time on it and finally got it working to his satisfaction. Crystal control seems to be quite a problem on v.h.f. The boys run tests on the rigs on the Monday night periods. Thanks to you fellows in the services for your contributions to this column. Remember we are all back of you and hoping for your speedy return, so until then, so long and 73 — *Hal*

WISCONSIN — SCM, Emil Felber, jr., W9RH — EC reports he is in the middle of an organizing bee for WERS. He is trying to have a system worked out whereby the city-county police system will have charge. The WAVES, Marines and Coast Guard Women's school is being discontinued at Madison. Wired wireless is being dropped here because all fellows are in the armed services. UFX would like to hear from all the hams and former Navy students whom he has had contact with and promises to answer all letters. The Great Lakes Amateur Radio Club hereby sends Seasons Greetings to all members and friends. FRO has joined Squadron 624-2 CAP; he has been active for the last four months as radio aide. He has been promoted to technical sergeant and is a candidate for second lieutenant as communications officer; he has charge of a code class every Wed. night and hopes to be able to get CAP-WERS started soon. Ray P. Charney, F3c, writes that about all he can say is that he is eating good food and doing well with a submarine repair unit in the Pacific. The Milwaukee Radio Amateurs Club has appointed GVL as editor of a club bulletin which is being sent monthly to all members out of town to keep them informed on the activities of the club and the whereabouts of the local hams. A fifty per cent reply was received and so the bulletin will continue until interest lags. SYT, GVL, GIL, CDY and NY are busy installing the WERS antennas at twenty locations in Milwaukee County. Once more — let's hear about Appleton WERS. Happy New Year to all. — *Emil*

DAKOTA DIVISION

SOUTH DAKOTA — SCM, P. H. Schultz, W9QVY — PRZ is now in civil service and located in the branch radio laboratory of the Naval station at Astoria, Ore. Al's QTH is still Rapid City; however, he operated at Colman. KQO was in radar school the last time he wrote, but was discharged because of physical handicap when called up for active duty. He is now in Aberdeen working at the Gamble store as radio repairman and has seen a lot of the gang there. LLG was there and QAK also dropped in when at home on leave. IK is working for Minneapolis-Honeywell Regulator now. MNI is back working for the merchant marine after a leave at home. TXK is in Italy. ZBU called on him the other day. 7HEY (ex-9EXJ) and his XYL, 7GHF, are instructors at the Air Forces Technical School at Sioux Falls. He has commercial 2nd-class telephone and telegraph licenses now and intends to try for 1st-class telephone license soon. 7GHF has her Class A. We have not heard from any of the WERS gang as to how they are getting along. Please read last ARRL bulletin and pass on any dope you might have.

Why not make plans for postwar net now? Please write me a card, so that I can contact you in the near future either personally or by letter. 73 — *Phil*

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — Some very welcome V-mail from GFO, a lieutenant in a signal service company overseas, states the fellows read *QST* there, especially the "activities" column; which fires my old hulk to plead for more reports and that they be sent in not later than the 10th of each month. GFO wishes to contact the T.C. and Iron Range boys who are out globe trotting his direction. You can contact the SCM for dope. Other NW hams in the same vicinity are UKW, HYX, YCV. A report was received from KET, who has just returned from another long cruise in merchant marine service. His address is c/o American Communication Assn., Room 56, Franklin Bldg., Baltimore. KFF has been an inspector in an aircraft factory, but rejoins merchant marine this month. Milden "Mike" Boreen, POK, died the latter part of Sept. from a heart attack, but word of this did not reach me until I heard from ex-EPD, now of Mount Vernon, Ill. If you know of any happenings of interest to NW Minn. hams, please drop the SCM a line. JKR is now a lieutenant, and recently married Florence Lee of Bemidji. Cecil was injured in some Army vehicle; he is located with Co. G, SOTR, at Fort Belvoir, Va. The SCM will leave next month for the West Coast, to be gone until next June. If anyone is willing to serve as SCM I shall be glad to have you write me, otherwise mail addressed to me at Bemidji will be forwarded to my new address and the reports will go in from there. 73 — *Army*

DELTA DIVISION

ARKANSAS — SCM, Ed Beck, W5GED — IGM visited GED while in Little Rock recently on a brief vacation and family reunion. BMI got a new auto license plate, 7388, just by accident. SI was unanimously reelected as Delta's choice for director and expresses his gratitude to the gang. DZE is at present working as a radio inspector out of New Orleans. CFQ and IZK are doing their bit in the war effort by working for the same manufacturer down Dallas way; this corrects the previous erroneous report. PX is doing service work at one of the local emporiums in his spare time. JHL is rebuilding completely for the not too distant future. GWN is keeping the brasspounding in order for the Missouri Pacific. GNV is planning a visit home in the near future. We need more reports and plenty of them. Your SCM wishes each one of you the most sincere Season's Greetings; so 73 and all the best, gang, until next month. — *Ed*

LOUISIANA — SCM, W. J. Wilkinson, jr., W5DWW — BYY was in town for a few days on leave from Signal Corps school. HSH is RT1c. HUZ is now working at a shell plant somewhere in La. WERS has been going strong and is all set for any emergency in or near Shreveport. Why not make it a point to sit down and drop a line to your SCM right now while you're thinking of it? Every item received up to the present time has been used. We have heard from several of the boys in the services who read *QST*, so we are sending 73 to all of them from all of us. Until next month, when I'm hoping more news will be available, 73 — *Dub*

MISSISSIPPI — SCM, P. W. Clement, W5HAV — Capt. IBO was home on leave recently before embarking for overseas duty. HEH has been promoted to RT1c, and after a furlough at home has returned to sea duty. JGP's mother received a cablegram from him saying that he had arrived overseas safely. The Gulf Coast Radio Club's youngest member, Hoyt, is now in the Navy and is in the aviation radio school at Jacksonville. We regret to hear that KFV is reported missing in action. Coast amateurs are doing considerable experimenting with carrier-current communication. Recently JHS was in QSO across town with 8TKM, a lieutenant at Gulfport Field, when an interruption occurred in the form of shipping orders — and Lt. Compton finished the QSO by mail from Miami several days later. 73.

MIDWEST DIVISION

IOWA — SCM, Arthur E. Rydberg, W9AED — The executive committee of the Linn County Radio Club meets every Tuesday night. The club has its WERS blanks about ready to send in, and if it is successful will become the first licensed WERS in Iowa. The club has several women interested in WERS. EC JIH lives at the same address as a former Cedar Rapids EC, KCL. ROW was married to Mary Meyer, Navy inspector. 6UBT is bragging about his first jr. operator, a ten-pound boy. UCM is also a proud father, a pretty six-pound baby girl. GJY is wagering his hill-top location will make the best WERS station. Robert Hutchison is communications officer of the Davenport CAP Radio Section, with Wayne O'Neil, ex-SLZ, as alternate. They have a mobile truck to house the ground transmitter, first aid station and photo laboratory. They will use two transceivers for the planes. RFT, of Waterloo, writes from Calif. He is now radio officer in the merchant marine, and recently visited VKs on a 41,000-mile trip. AEP and IFI were in Denver recently; Bill had a telephone QSO with FKQ, former Iowa ham, who now works at KOA transmitter. SCJ, BAL and DIB are busy hunting pheasants and ducks. AEP and DIB lament the passing of the graveyard shift. CK, a pool shark, reports hearing rumors that AS is now working. OLY reports that LDM, in going from Boston to Bremerton, Wash., stopped for a visit in Des Moines. BBB paid a recent visit before going to Fla. Kenny Keyte was home on furlough. PJV is working at KGHO, state police station. GBP is trying to get in the Air Corps. JBY finished training as aerial gunner and radio operator and is overseas. UAD, in the merchant marine, is on another world trip. Scotty Miller was in Des Moines on furlough lately. URK reports the Des Moines gang is busy with receivers for OCD warning system. PNK, PNT, JYW, BAL and AED are attending ESMWT electronics class at West High in Des Moines. Des Moines hams, please send news to AUL. 73 — *Art*

KANSAS — SCM, A. B. Unruh, W9AWP — IGJ, who is an instructor in radar, visited the home gang while on furlough. A meeting of Wichita hams was held at the Hotel Allis on November 21st, to get the remainder of the gang together. The group was augmented by a number of new hams brought to Wichita by war industries. It was decided to hold further meetings, elect new officers, and renew ARRL memberships. Visitors were KFT and MOR of Augusta. NHB and QEF, both former WARC presidents, returned home on furlough. They are now stationed at Naval base in Farragut, Idaho. QEF has appointment to radio school. Ham ranks in Wichita and Kans. were saddened by news of the death of G. Edwin Parcell, KYV. At the time of his death he was a radio technician for the Midwest Procurement District, and stationed at Boeing-Wichita. Sympathy is extended to his family, relatives and friends. YVW was transferred from Wichita to Bartlesville, Okla. for same employer. GTG is with CAA; he was in Wichita to check the range station. Formerly he was located in Grand Island and at Rapid City. LTJ had furlough from Army to visit dad, QQT. SKC is due for a trip to the Ft. Leavenworth induction center. YYW, affiliated with the Navy at Farragut, visited YF, ZUY. UWN and YF returned from Minn. and would like to locate ex-members of the MINK 5th district network. He says only "oldsters" JCG and DQP are left. JZU, EQD and GFN are working as final testmen for Raytheon at Waltham, Mass. QQU is now at Fort Belvoir, Va. ICV, chief operator at KGZC, spent vacation in Kans. this year. RQF is taking Army specialized training in engineering at Regis College, Denver. He reports that while home on furlough, he had an old-fashioned bull session with PLN, also home from an air base in Calif. RBX is in radar. With NQX in the Navy as lieutenant (jg), LFB has assumed job of chief operator at KGPZ, in addition to his other work. Greetings to all, with sincere wishes for the new year — a year that will bring nearer the day when again the bells will toll "peace on earth, good will toward men." — *Abie*

MISSOURI — Acting SCM, Mrs. Letha A. Dangerfield, W9OUD — The QTH here is now Butler, home of the famous Bob Henry Radio Shop. BMS is working in Bob's new project here — a crystal grinding plant. A flock of YLs, divided into two shifts, are dong most of the actual grinding on rocks for the Army. BMS and a couple of other OMs keep the equipment in working order. KIK got in a little brass pounding last April when he went to St. Paul on one of the U.S. engineer boats. He worked St. Louis on 750-meters c.w. all the way up and back. RBJ fixes the transmitters for the boats and works on home tele-talkie sets on the side. BAF is operating on one of the boats on the Mississippi. KIK and RNK reported the unexpected death of WQY, Police Lt. Fierce. AXB, RT1c, has been in the Navy over a year. Bob wrote from Treasure Island where he graduated from radio materiel school and was awaiting assignment. AES, S1c, was with him at Treasure Island. RTP reports that North Kansas City has just received CD-WERS license, with call KGPH. Operators are YPV, FSS, BBP, JEB, LSW, RTP and Bate, with operator license only. HVW sent in some news about the gang at Pleasant Hill. MRB is installing radio equipment in B-24-J bombers

at San Diego. QXT was given a medical discharge from the Air Forces. ACY is instructor in artillery at Ft. Meade, N.D. INI did not pass his physical. HVW is still carrying mail for Uncle Sam. Ex-LBO was pilot of a flying fortress shot down over Germany in May and is a prisoner of war. OWQ wrote that she was busy. TYW sent a very interesting account of his radio activities, starting in 1911 when he held the call 9EW in Chicago. He had 1st grade commercial and operated on the Great Lakes out of Chicago in '13–'14–'15 and was instructor with 106th Field Eng. Bn., 31 Div. '18–'19. He has been a ham 29 years and is the oldest timer in St. Louis; he has just become active in WERS and worked across the county on 2.5 with 3 watts using an HY75 and Johnson-Q 10-meter radiator. SPY says he sees CZI occasionally in Sikestown and that MFN is no longer with the FCC but is pounding brass on the high seas, and that he himself may get back into service. It is certainly grand to hear from you. 73 to all of you from all the rest. To the boys in the service — all the best.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — At a recent district radio aide meeting held at WJLH-1, the following were present: State radio aide EAO; NJM, ARRL; district radio aides KDK, Hartford; EEM, Waterbury; NEK, New London; DBM, Middletown and KQY, New Haven; radio aides IGT, IWY and Tuttle as well as WERS operators Galor, Hewitt and communications officer of New London. Plans regarding message handling procedure and smoothing out relaying messages between warning districts were discussed. Radio aide IGT of New Haven ran off several movie reels of the WJLH units in operation. Test messages have been sent between warning districts in very good time, Monday nights being set aside for this purpose with coverage of nearly all the state. Districts participating are WMHC, WKNQ, WKAO, WKOB, WJLH, WJQA, WJTR and WKWG. A route to the regional headquarters in Boston is being planned and will be extended to Washington if the need arises. CTI, radio aide Norwalk, has seven new WERS operators licensed and now is teaching class of ten more. AKG, radio aide Shelton, has WJLH-65 in operation and working satisfactorily. HBL and MIY have opened up radio service store. LTB is building receiver for his car. TD is polishing up WERS net procedure for WJLH. MVE has returned from Philadelphia and is now active as an operator for WJLH-20. JQD has proven again that blindness is no handicap for a WERS operator — Bill has yet to miss a test at WJLH-8. IJ is active in the State Guard. Matthews, WKAO-48, continues as a key relay point between WJQA, WKAO and WJLH districts. IND has completed a crystal-controlled unit for WJLH-39, Hamden, which is operating very satisfactorily. For all neighboring warning districts desiring frequency markers, WJLH-1 on 112.1 and WJLH-39 on 115.0 Mc. are both crystal controlled. CTC, now a second lieutenant in the Signal Corps, writes an interesting letter from the Pacific area from which we quote a few excerpts: "Twenty months since seen home . . . faithful reader of station activities . . . ham experience has helped in devising many weird gadgets . . . hope for a chance of seeing WERS units in operation." NRV, a sergeant in the Signal Corps, writes from N. Y., where he is a radio operator, teletype operator and trick chief. We appreciate hearing from the boys and would welcome letters from more of them. Best of luck and 73.

MAINE — Acting SCM, G. C. Brown, W1AQL — KEZ sent his EC certificate for endorsement and has been reappointed EC for Millinocket. He says that the WERS unit, WKMI, is working FB with five licensed amateur operators. HSD has been appointed communication officer of the Maine State Guard with the rank of major. Mr. and Mrs. FNL are receiving congratulations on the birth of a new YL. BGG is in the Navy with the rank of CPO. DEO is spending his spare time lining up a portable 'phone set for the telephone company, to be used in the case of a bad break in wire communication. BXE is a civilian radioman with the Signal Corps in Harrisburg, Pa. CRU is at WGAN in Portland. CBU is working with the FCC at Stockton. Your SCM received a nice Christmas card from FQ, somewhere in England. AUC expects to go to Rome, N. Y., for the CAP. Not many of the gang sent in reports this month. What say, fellows? Also, there still must be more of those EC certificates which are due for endorsement.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., W1ALP — HUV reports that the Town of Winchester has received its WERS license under the call of WKYD, with two station units and eight operators being trained. BXC and GWK are in the Army. KDF has taken over as radio aide for the City of Boston. 8QKC is in the Army and is located at Fort Banks. NOX has joined up with an airline company. DBD was put into 1-A and expects to go back into the Army. GHT is working as a civilian in the Signal Corps in Boston. DFS is now a lieutenant commander in the Navy in Boston. ALP is now working at radiation laboratory at M.I.T. CKW, BWJ and ex-UG/8DMW are also working at the same place. MZE is communications officer at La Guardia Field, N. Y. SL is civilian procurement administrator, Signal Branch 1st Service Command, in Boston. AXA says WERS is still working fine and has twelve new operators to help out. MPP is teaching blinker to Coast Guard Reserves and code class at night to Cambridge Adult Education Center. IID sends a V-mail letter from the African war theater and says he is now a communications officer. MPT was home again for a short stay. LLW writes from Camp Crowder again, and is almost through his basic training. The only ham there, 2EIN, was transferred. To any of you hams who would like to write to any of these fellows, just drop me a card and I will be glad to send you their QTHs. LID was home again for a short stay. LBY writes again from Colton, Calif. The many ham friends of Col. Van Horn will be sorry to hear of his retirement from the 1st Service Command, Signal Corps in Boston. CIC writes from New Orleans, La., where he is working, and says that he has met a lot of hams from all over the country. QW, in a letter written at sea, says he has his hands full as CRM. 2NOC writes that he is radio aide for his county. LDV writes from the South Pacific, and says that when he gets home he will be living in New Bedford. The gang with him is composed of 8MKA, 6UOJ, ex-PIP, 8UBV, 2LMR and other ex-hams. He also met LXZ. His XYL, MIM, is still doing some operating at Ogdensburg, N. Y. KCF is in New Orleans and is RC1 and working for a chief's rating. KXU has been at Camp Crowder and also got married. EJU has been discharged from the Army. KNZ is in No. Ireland and has a YL in Glasgow. HLW is working at M.I.T. EKT reports that the CD test in the Greenwood section of Wakefield pleased the town officials. Myron Gerrish and Donald Green were in charge of two-way radio communication with LVV and HIL manning the mobile units. MJE reports that her OM, KON, is now a lieutenant (jg) and at present located at Fort Schuyler, N. Y. KER is also a lieutenant (jg) and is at Princeton. LTI, ARM3c, is back at Quonset, R. I. NBL, somewhere in the Pacific, is now the proud father of a baby boy, which makes MNH a new and very young grandpop. GID, a first lieutenant in the Army, was married a few months ago. MJE visited KER's XYL in Longmeadow. NKW has been very busy at home due to a serious illness in his family. MCR says that when they get WERS for Boston, his section will have six operators, two portable-mobile units, two walkie-talkies, as well as the station at the report center. IYU is a master sergeant, MON a technical sergeant and ZK a major in the State Guard; they are rebuilding state police equipment for the State Guard units. LWI and MQH resigned because of defense work. MAR is with the 5th Army in Italy.

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — Thanks to a long newsy letter from LDV "somewhere in the South Pacific," we have some news about hams of Western Mass. and elsewhere. LDV, JJY, LXZ are together in the South Pacific. IOT is in Alaska at wx station. LXE is taking an engineering course at New Mexico A. & M. College. FJK is an Army switchboard operator in N. Y. MIM (Mrs. LDV) is a border patrol operator at Ogdensburg, N. Y. JYA is doing teletype and meteorology work in New England. MVF is in the Seabees. MND is an FCC monitor. ALR is working for G.E. after discharge from the Navy. Ex-JXN, now 4HMS, is operator on an oil tanker. 8NCS is attending radio materiel school in Washington, D. C. 8MKA is an operator in the South Pacific. AUN is a radio inspector with G.E. 6UOT and 6UOJ are operators at a South Pacific island base. 7DXL has completed a course at a Navy radio school and is back aboard ship in the Pacific. MQL is RM1c on a "tincan" in the South Pacific. 6PIP is radio supervisor at a South Pacific island base. 8UBV is materiel man for wx station in the South Pacific. Thanks a million for all the

(*Continued on page 76*)

(Number one hundred eighteen of a series)

★

Merry Christmas

and

Happy New Year

from

National Company

which includes

C. L. Gagnebin	W1ATD	Vic Rossi	W1JHI
T. P. Leonard	W1AUJ	Alfred Zerega	W1JMK
Herman Bradley	W1BAQ	Robert Williams	W1JOX
James Ciarlone	W1BHW	Clyde Tillotson	W5JVI
Dana Bacon	W1BZR	F. Lopez	W1KPB
Ralph Dennis	W1CJ	Harold Gould	W1KWV
Calvin Hadlock	W1CTW	Richard Gentry	W1LEN
B. Hagood	W1DCU	John Stanley	W1LFF
Harvey Poore	W1DKM	Francis Waden	W1LNV
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Robert Murray	W1FSN	S. W. Bateman	W1RX
B. Mitchener	W1GNV	Wm. S. Doyle	W1TV
D. Smith	W1HOH	Harry Harris	W8WVM
John Baxter	W1HRK	Arthur H. Lynch	W2DKJ
Vincent Messina	W1HRW	Myrl B. Patterson	W5CI
Jack Ivers	W1HSV	Herb Becker	W6QD

John Prusak *(Amateur operator license but no call)*

★ For seven years it has been our custom each year to buy National Tuberculosis Society Christmas Seals and have *QST* stick one on this page in each copy of the January issue. But it takes a lot of girlpower to do this tremendous job of stamp-licking and this year we must use girlpower for only the most essential jobs — so we are simply making our contribution in the same amount as if we had bought the necessary 60,000 Christmas Seals and the printed reproduction above is a symbol of the stamp we wish were there.

NC

ADVERTISEMENT

Amateur Activities

(Continued from page 74)

dope, Bob. KJO is spending 30-day "survivor's leave" after his ship was torpedoed. Al is a radio officer in the USMM. LDI/2OIQ is now an aviation cadet. All the news this month comes from overseas. How about a line from some of the gang at home? 73.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — JCA is now a chief radioman. LVG, although, in the services, has found time to work on a 1¼-meter rig using a couple of RK34s. DUK, we understand, is now a chief radio electrician. KKQ has signed up with the WACs and has left for training. We're all mighty proud of Leora. We understand that LIN is now back in the States. JCA was home on leave recently. 3JTL is now at the University of New Hampshire, where he is studying electrical engineering under the ASTP.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — GBK, who was previously reported missing in action, has been definitely reported as killed. Lloyd Rounds, ex-1FU, was reported as having died of a streptococcus germ while in service on board ship with the U. S. Coast Guard. Lloyd was proprietor of the Park Radio Service on Park Avenue, Cranston, and also one time operator of WLSI. NDC, of Augusta, Me., and Robert Neville, Class B operator's license, of Charleston, Mass., now both stationed at Fort Adams, paid HRC a visit on Oct. 31st and talked over ham matters, inspected the shack, etc., and then visited JEZ. We enjoy this sort of thing a great deal, and wish more of the boys could find time to drop around and get acquainted when stationed around here. NDC says his transmitter is getting an overhauling when he gets home on leave, preparing to return to the air after the war. Ernie Grant has left Elliot-Underwood-Fisher and is now with Raytheon as a field engineer and likes the work.

VERMONT — SCM, Burtis W. Dean, W1NLO — CGV and EKU have been busy with 2½-meter equipment construction for the State Guard unit at Barre and have had other hams in that area participating. The Flight Radio Operator's School at Northeast Airlines in Burlington has folded up. The Burlington gang is sorry to see the instructors leave and have enjoyed their company and presence in the Queen City. GKA, KXP and LMO are going back on the line for Northeast. BIJ and IEL have returned to Boston. "Mel" will teach for Mass. Radio. IQG and LWN have been to Boston looking for positions. IQG has his 2nd-class radiotelegraph. AEA writes from 90th S.E. Tr. Sqdn., Craig Army Air Field, Selma, Ala., and tells of traffic control and dispatching work on 80-meter frequencies with some u.h.f. "Chas" also does a little flying. GAZ is also at Craig Army Air Field and has contacted AEA. JVS and family have moved to Christiana, Del. KJG and XYL recently paid a visit to MCQ who fondly looks over his rig — and hopes. The BARC started their code, math. and theory classes Oct. 25th at Burlington High School with thirty-four students. Classes are held Mon. and Wed. nights from 7 to 9 P.M. BD, LML, LWN and NLO are instructors. GAN is busy doing radio service work. The Vt. Blood Plasma Bank needs blood donations badly, so get in touch with your local Red Cross and do your bit. Season's Greetings. 73 and CUL — *Burt*

NORTHWESTERN DIVISION

MONTANA — SCM, Rex Roberts, W7CPY — CAL, ART1c U. S. Navy, is at Lakehurst, N. J. Lt. Col. CT made a short visit in Billings while on furlough; Les is headed for Florida. Give us your new QTH, Les. Ex-KD4HZS has just returned from the Arctic Bay country, where he was in wx bureau work. Reports are few, fellows. 73 — *Rex*

OREGON — SCM, Carl Austin, W7GNJ — JN, radio aide for Portland WERS, reports that the area will be sectionalized, with an assistant for each section. HLF writes that WERS activity is progressing, with FMQ, GUP, DBZ, HWH and GLK's OM (FRO) taking part. DBZ is radio aide, and has a mobile rig in his car. HVD was made an ART1c the latter part of August. At that time IDJ was in Providence and HKO was a radio instructor in Chicago. GOC was home for a few days; he is now RT1c and headed for M.I.T. FU is building receivers for Forest Service. Olga Sandine, a member of CORK, is now S2c, studying radio at Oxford, Ohio. Charles Webb, a member of CORK, passed 20-w.p.m. code test and was issued a certificate. Sorry so few reports this month, fellows. 73.

WASHINGTON — SCM, O. U. Tatro, W7FWD —

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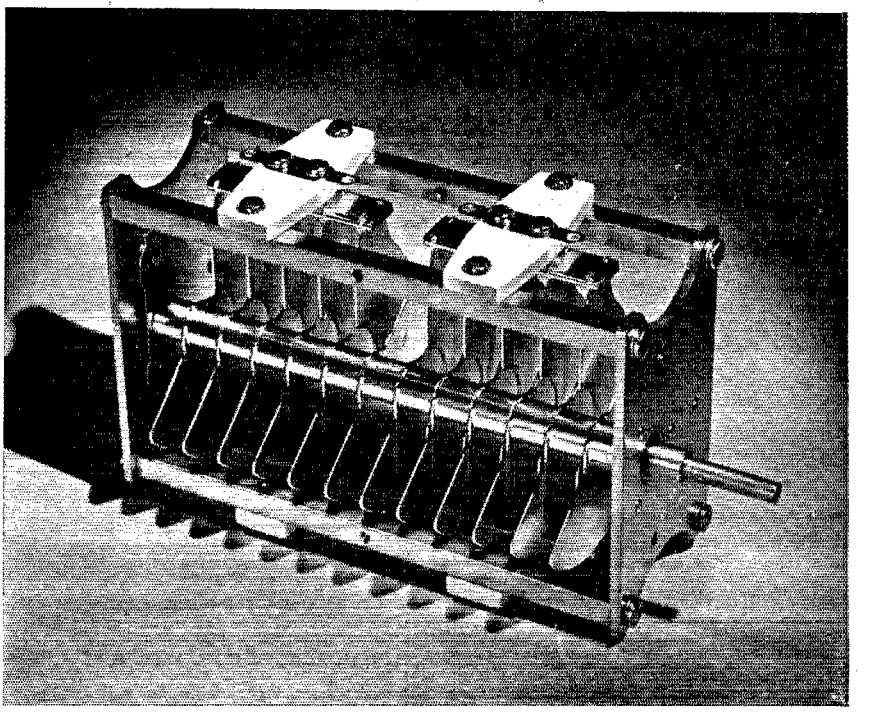

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(*Continued from page 76*)

Seattle is setting up WERS and has broadcast an SOS to all radio hams to volunteer for the new program. No direct word has been received about whether it has its license or not and your SCM will appreciate hearing from the boys in Seattle. He would also like word from Bremerton. G2DF, a very active ham who has kept schedules with many of this district, writes that he is now in the north of Scotland, reads *QST* regularly and thinks that American hams have an opportunity to master v.h.f. through WERS that other hams of the world do not have and that the WERS idea is a good thing. HMJ has returned to Treasure Island after a short furlough and says that the Navy schooling in radio is the best in the land. GNU is working in San Francisco building tubes for Eimac. HML has graduated from A. and M. and is now at Treasure Island. BCS is in ARC at Seattle. AYO is a CAA operator at Everett and is reported by CMX to be doing better than 60 w.p.m. IBM, besides ranching, is building a speech amplifier and cutting records to keep his hand in. GRO is a radar technician in the Marines at San Diego. EKW, now a full lieutenant, has taken on more duties and has moved out to Dutch Harbor. FMR is a Navy radio inspector. FME is in the Navy. GDW is working in a Navy laboratory. HJN is now a captain and personnel officer at Camp Wheeler, Ga. Please send in your letters, fellows. Now is the time when we should keep up ham interest. 73—*Tate*

PACIFIC DIVISION

EAST BAY — SCM, Horace R. Greer, W6TI — EC, QDE; EC v.h.f., FKQ; Asst. EC v.h.f., OJU; OO v.h.f., ZM. EE reports another successful WERS meeting held Nov. 18th at the Oakland City Hall. TI wishes to extend to everyone Season's Greetings and may the New Year find much happiness for everyone, everywhere, and no matter if the war might or might not be over in 1944, we of the amateur fraternity have done and will always do a bang-up job for any cause that might arise. During the past year many of our brother hams have passed on to the great beyond, and during the months to come many more will leave our ranks. But when the peace has been won and the world is a safe place to live in, the amateurs under the guidance of the ARRL will carry on and make amateur radio a bigger and better organization than ever before. 73 — *TI*

SAN FRANCISCO — Assistant SCM, William A. Ladley, W6RBQ — ECs: DOT, GPB, RBQ. Warrant Officer Ken Hughes, CIS, can be addressed as follows: 1142 Hayward Ave., Bremerton, Wash. WERS in San Francisco, KGCW, is very active with regular drills, in which all zones participate, held every Wednesday night. The WERS system in San Francisco is perhaps one of the most intricate in operation in the U.S.A. due to civilian defense warning methods, hilly terrain, etc., but a really commendable communications system is the result of coöperation and hard work on the part of all members and Radio Aide Gene Pera, DOT. Present membership to date is as follows: WN, EQA, KZP, NQJ, LV, BIP, NJW, UKO, DAD, LFZ, IUH, ATY, RFF, HJ, JKN, JQC, BUJ, CIS, MZ, LES, CY, RBQ, IDP, EVI, NPT, DOT, MXV, JP, ZS, KNH, CVP, RAH, 3OX, 3JWK; also, Ralph Lawrence Abry, John Benson, Paul Bickel, Kenneth W. Child, Grace Charles, Barbara Mary Fleischer, James Boyer Hicks, Alma Hardy, Jean W. Maxfield, Murrel Montague, George Meulendyk, Fred D. Rowe, Howard O. Snyder, Carrol J. Stafford, Russell Sorensen, Carl Schwartz, Darrell H. Teachout. Please, everybody, send in news on a one-cent postal. 73 — *Bill*

ROCKY MOUNTAIN DIVISION

COLORADO — Acting SCM, H. F. Hekel, W9VGC — Oct. and Nov. saw big events for the Radio Widows Club. Jackie Hawley put on a Halloween party. The OMs were invited to this blow-out, and a good time was had by all. Min DeGroat's husband was home on a two-weeks' leave from the Navy and a good time was had by all. Min also celebrated her birthday on Nov. 1st. Jackie Hawley and Margaret Swanlund each had a wedding anniversary. Mabel Hekel was hostess for the Club's third anniversary meeting and the following officers were elected for 1944: pres., Martha Stedman; vice-pres., Mabel Hekel; secy., Margaret Swanlund; treas., Pearl Stockman. Here is the line-up of hams on the Denver Police Department: APR, IJU, FXQ, JB, VEU, WYX. They claim to have the only water-cooled antenna in the world, an all metal stand pipe 145 ft. high and 10 ft. in diameter. BQO appointed WERS radio aide and is getting things going around Denver. He has twelve operators lined up and anyone interested in WERS should get in

(Continued from page 78)

and help him put it over. CND has been discharged from the Army and is back home again. PDA is teaching radio at the Vocational Training School at Englewood, Colo. DTA is reported by his mother to be a prisoner of war in Germany. He is a former student of WYX. After getting his ticket, he enlisted and was stationed at Lowrey Field near Denver where he took advanced training in radio. He made good and from there was sent to England. He took part in many raids over occupied territory and had the misfortune to be shot down over Europe during the summer. BTO reports that EMU is still in Denver and with RCA as sound engineer. CNL sent his new address as Box 1001, Indio, Calif. EHC, first lieutenant in the Signal Corps, is stationed at Orlando, Fla., attending the AAF School of Applied Tactics. He expects to leave very soon. Good luck, Carl. WYX reports the AAROD has six war bonds and will have another soon. Bob is president of that club. Send in your news regardless of how trivial it seems to you. 73 — by *Heck*

UTAH-WYOMING — SCM, John S. Duffy, W7DIE — Wyoming: 7GDI has been appointed EC for Cheyenne and vicinity, upon nomination of the Shy-Wy Radio Club. 7HDJ is an artillery major, stationed in England, doing research in cancer, having been assigned to the Medical Corps. Utah: 6BAE is radio aide for Salt Lake City, and 6EYS is assistant. The Utah gang has applied for WERS licenses but has not received them yet. The Utah Amateur Radio Club has folded for the duration, as all the officers, and many of the members, are in the armed services. Please, fellows, drop us a line and tell us what you are doing in WERS, in your local club, what substitute hobbies you have taken up (temporarily, of course), and all about yourself and your fellow hams, so we can run it in *QST*, and keep more or less in touch with each other. — *JS*

SOUTHEASTERN DIVISION

ALABAMA — SCM, Lawrence J. Smyth, W4GBV — DXI is a second lieutenant in the Signal Corps and is now on foreign duty. FDX, of Augusta, Ga., said that he had a letter recently from ECF, who is out in the Pacific somewhere. Let us hear from you again, Bill. GDO is taking a course in radio operations in Ft. Monmouth. EBZ is a lieutenant in the Signal Corps, stationed at Ft. Monmouth. EW, a master sergeant at Maxwell Field, was a visitor of GBV at the transmitter of WRBU. BEB is now with WJRD at Tuscaloosa. 73 — *Larry*

EASTERN FLORIDA — Acting SCM, Frank C. Fassett, W4BYR — Please note change in mail address here to: P.O. Box 1335, Tampa 1, Fla. CPF joined Seabees and is now chief storekeeper, USNR, at Williamsburg, Va. Ole reliable Spence in St. Pete says that hams are hard to find there. DHD is in Canal Zone and likes it FB; he is enrolled in night math classes in college there and making progress with Spanish, too. GVC states no news of moment around Orlando. EBP is back in Tampa and the gang is glad to see him around again. Word was finally received from EPI. He has moved from Clermont back home to Sanford and says that Bill Hoffman, ex-ASQ, is teaching radio in High School there. Looks like reinforcements for HGO and Boyle, LSPH. Merf down in Miami was heard from again. His boy is running regularly now to Rio. He says that out of twenty-six operators at WKDL, twenty are hams or ex-hams. CNZ has returned from vacation and has taken up lawn cutting as a temporary profession. NB is working nails back to elbow as assistant to Pan Am communications superintendent. Fishel at Fort Myers reports that FSG-WERS is in full operation with six TR4s. We hear that TZ is now with Raytheon. HAD is still in Seattle and has finally dug up some hams there. DES was back in Winter Haven for a few days and visited your scribe in Tampa. AII passed through Tampa (in the air) recently. Capt. Hazleton, communications officer FSG, reports that the organization is still on the march. He recently gave two exams at Titusville, two at Fort Pierce and Fort Myers and one at Punta Gorda. Fort Pierce has just received two additional pieces of equipment. WPB and Fort Lauderdale will both recruit to ten men. New posts have been established at Plant City, Lakeland, Winter Haven, Bartow and Arcadia. All will operate WERS under FSG. Those who have not seen and operated the Holliston-ER4 being built by the Jax gang for FSG-WERS have missed something. Nice letters were received from FDA, BRB-KBUW and EEZ. FDA has been through radio materiel school at Frisco and is now at sea. He says he went to school with FYI, but has since lost track of him and wants his QTH; he also writes that a heavy percentage of the

Don -
The '44 Handbook goes on sale after Xmas. What shall I say about this new bigger edition?
RTB

Ralph-

Well, first of all, I'm sure the gang will be glad to hear that the new HANDBOOK is bigger and better than ever. We say that every year, it seems, but it's particularly true this year. I'd say this-

George Grammer considerably enlarged the theory and design chapters which constitute the first section of the book, especially the treatment of basic electrical and vacuum-tube fundamentals. The chapter on WERS has been expanded and revised to cover current trends. There's an entire new chapter on carrier-current communication, the field the gang at large seem to have found most interesting during the wartime suspension. The classified vacuum-tube tables, long one of the HANDBOOK's most valuable features, have been brought up to date, of course--and a new cross-index by type numbers has been included to make it easier to locate any given type.

It's bigger -- but basically it's still the same tried-and-true HANDBOOK. All the constructional and general information has been retained and brought up to date and re-organized for maximum convenience in reading and reference. The addition of miscellaneous data and tables of practical use to the operating ham and technician, rounds out the new edition and makes the 1944 HANDBOOK more than ever the "all purpose volume on radio" -- data book, training text, operating manual.

DM

(Continued from page 80)

radio technicians he has met are hams. BRB closed down his crystal grinding foundry and is lieutenant and chief radio operator. He has MS bar and Atlantic and European ribbons. He reports that BYS is chief radio operator and that Bill Meloney is lieutenant (jg) USMS. Neil Carrington, RM1c, is at Jupiter with EIA, CRM, USNR, after a year in Greenland. Via ex-DT: Gene heard that Don Layman, RM1c, ex-AGP, was married recently. Ab Adams, RM3c, USCG, is at radio school in Conn. EEZ is at Jax Naval Base and says there are hams there from all over, including F8AM. He has also seen HUB from Nashville who wants the gang to know that he likes Florida sunshine. Jack is ART2c and is working in radar laboratory. CGG is working in radio laboratory at Jax Base and puts in a boost for *QST*. EEZ says that if any of the gang at the Jax Base have news for this column to contact him at the Base Radio Shop and he will see that it gets into print. AQ has finally been heard from — and in person. Phil has been released from Philco and is back in Tampa with Bailey, OZ, for Tampa police.

WESTERN FLORIDA — SCM, Oscar Cederstrom, W4AXP — MS, now lieutenant (jg), went to Corpus Christi, Tex., where he will be stationed for a time. Ex-ABB, from Wadley, Ala., is in aircraft radio here at N.A.S. Roger Mangold, one of our new hams, is now an ACRM. He sends greetings to the gang. Roger acquired a wife and became a chief at almost the same time. FVJ is back at WTAL. 3IPD is looking forward to being in uniform. M. J. Brundage passed radiotelephone first in Jax, recently. He and BCZ are in service business in Tally and keeping the radio gear in order for the state highway patrol and fixed stations in the northwestern district. They say f.m. is the stuff and DX good on v.h.f. BJF keeps sheriff's outfit going in Panama City. FM, CWR and CRT, who are in the Coast Guard, recently visited BCZ, ECT-FJR and the Old Maestro had a nice ragchew on Palafox the other day. A "hi hi" and the AXP call via auto horn brought AXP's ears up in a hurry, the signal was soon located and personal QSO followed in short order. ECT works at A and R Radio Shop at A.S. AXP, jr., is a radio helper at A and R. The Old Maestro wishes all health and good wishes in the coming year. 73.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, H. F. Wood, W6QVV — Those KGLV units that have been energised are working out very well on regular drills; however, we are still waiting for that modified license to come through to put about thirty more rigs into service; we have about that many more applications ready to file with the FCC. The Los Angeles area will be very well covered when they are all in order, and as the county groups which have been working out very well under the leadership of GVT also expect to augment their roster, along with several communities that have their own system, we should be able to handle any communications crisis that might develop. Don Wallace reports that the Long Beach gang are finally on the air and progressing very well under RO, and that he (Don) reported in seven stations from his own location on a recent test. George Riddle, ex-FMZ, now 31VT, writes that for the duration he has been commissioned lieutenant (jg) and that his work has mostly been in installations of radio and kindred duties. He sends his 73 to "the gang around San Pedro," especially the URAC and he hopes to contact you all when it's all over. David Martin, now in North Africa, says he ran across a couple of hams recently and they had a "fest" away over there. SML gives a correction on his new QTH; it is Cherry Road, RD No. 1, Ithaca, N. Y. 4HYB has now moved to 12031 Wagner, Culver City, and wants to get in WERS work there before joining the services. Give him a call you Culver City-ites. Another correction: PFF calls attention to the fact that FFN is heading the WERS group in San Dimas district and that he, PFF, has charge of the San Gabriel gang, made up of seventeen units at present. Their area covers about seventy-two square miles and tests have shown that this is very effectively covered by SCQ, TYV, LZV, MXF, GOX, FSN, LFF, PFF and others, including a few with 3rd-class 'phone. He also reports that intercity tests with the San Dimas area have turned out very well. We have not heard from Inglewood, Culver City nor any of the other groups this month. I ran into PPW the other day and he looks swell after his long illness, and is working hard. The XYL of SSU dropped in for a minute with YL jg and reports that Dick still is hopping from hither to yon. There is still no word from UQL and MFJ. ESX is busy making up antenna tuners. He has hooked up to his land line so he can

Centradite

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Centradite is particularly recommended for coil forms where thermal expansion must be low to prevent undue change in inductance At 20-600°C thermal coefficient of expansion is 3.1×10^{-6} as compared to 8.3×10^{-6} at 20-800 °C for Steatite.

Centradite can be supplied in various shapes by extrusion or pressing.

Centradite due to its resistance to heat shock, lends itself to a new process of soldering metal to ceramic, whereby the ceramic surface is metallized to permit soldering.

We invite inquiries regarding the future uses which may fit your applications.

★ LOW THERMAL EXPANSION ★ HIGH RESISTANCE TO HEAT SHOCK ★ LOW POROSITY ★ LOW LOSS FACTOR

BODY NO. 400	DESCRIPTION OF MATERIAL
20-100 °C 1.9×10^{-6} 20-600 °C 3.1×10^{-6}	Thermal coefficient of expansion per degree Centigrade
13,000 lbs.	Modulus of rupture in lbs. per sq. in.
5.4	Dielectric constant
3.00 or less.	Dielectric loss factor
Class "L3" or better	Grade per American Stand. C75.1-1943
Zero to .007 %	Porosity or moisture absorption
White	Color of material

Centralab

Division of GLOBE-UNION INC., Milwaukee

PRODUCERS OF VARIABLE RESISTORS . . . SELECTOR SWITCHES — CERAMIC CAPACITORS, FIXED AND VARIABLE . . . STEATITE INSULATORS

(Continued from page 82)

put his son's voice out over a loud speaker when he calls home from his institution of higher learning (he's in the Air Forces). AEL has started again after a long layoff on his own. QVV's daughter is now married and will live on a cattle ranch, so here I sit surrounded by *QST's*, the *Handbook* and some junk. SMC would like to hear from any of the old Wilmington, Calif. Radio Club members. His address is: Lt. J. T. Gaffey, 0-739764, APO 520, c/o Postmaster, New York, N. Y. Keep up the WERS work, keep up your equipment and your morale and we'll be aseein' of yah — soon I hope. Season's Greetings. 73 — *Ted*

ARIZONA — SCM, Douglas Aitken, W6RWW — MLL reports that they've organized a radio club in Nogales with Ed Marston as president and NRP as vice president, and have a nice nucleus of a membership and fifteen or more potential hams who are on their way to ham tickets. Meetings will be held twice a month. IYZ was in Nogales visiting the gang and collecting a little Christmas stock of cheer. The Tucson Short Wave Assn. is keeping up its good work and at the present time has a code class of twenty-five flying cadets. TBJ has been home on furlough. TVU is now overseas. OZM made a visit to the coast and took in a hamfest. A card from HBR, RM2c, states he is now an instructor in the Navy operators' school at College Station, Tex., but is hoping for active duty soon. 9VWY is now located at Avondale and would like to meet any of the gang or participate in any way in which he might help. TSZ, RT2c, is now going to Navy school on Treasure Island. QLZ has returned to Phoenix. RPS is now a civilian employee at Falcon Field, besides teaching code and theory three nights a week to CAA students. MAE and NEL are constructing WERS equipment and hope OAS, radio aide, will pass it! TBR says the OM, OAS, has the family bus looking like a Christmas tree with various antennas sprouting here and there and red and green lights on the dash and the car radio so it will get anything provided it is the police! NGJ has installed a speaker system in the county supervisor of the new junior police patrol so he can park outside of schools and handle traffic via loud speaker. ILA has been called into active service and is now in the Midwest. RXQ was home on furlough and had a fine visit with him; he is now RT3c and on his way to Treasure Island for further schooling. I want to wish the best of everything to the whole Arizona gang, wherever you are and whatever you are doing. — *Doug*

SAN DIEGO — SCM, Richard Shanks, W6BZE — Lack of news makes reports brief and far between. FTT, now with Raytheon, is stationed in San Diego. ANU is an ensign in the Navy, and is stationed in Okla. EPW, also with Raytheon, is stationed in San Francisco. The Helix Amateur Club had a swell meeting several weeks ago at MMV's with motion pictures furnished by MMV. GWY, a commander in the Navy, is now at sea. CNB is now stationed at Corpus Christi, Tex., as an instructor. Ex-ADD, in U. S. Army, is now stationed in Italy. BHF has resigned as captain in the State Guard in order to devote his full time to his radio business. KW has crossed the Equator and it has been reported he had quite an experience. Please send news of any value to me for next report. 73.

WEST GULF DIVISION

NEW MEXICO — SCM, J. G. Hancock, W5HJF — Capt. ENI is in Walter Reed Hospital, Washington, D. C., suffering from his old back trouble. CXP has an essential discharge and is back in Clovis after twenty months in the Southwest Pacific war zones. To "Doc" and Sid, and to Lt. ZM/ZU in Washington, D. C.; RM3c JWA on the high seas; Lt. (USN) HWG on the high seas; AAV with Western Electric in N. H.; CJP, Santa Fe; DER, Clovis; DLG, Tularosa; CNM, the ole RI, San Antonio; DYV, radar inspector; FAG, Albuquerque Air Depot; FPC, chaplain in armed forces; FSP, 8th Service Command, San Antonio; GGX, Albuquerque; GSD (QTH wanted); GUZ, who is presumed a prisoner of war of the Japs; HAG, Albuquerque; ICD, Fort Bayard Veterans Hospital; ISN, Clovis; JGV, Douglas, Ariz.; JLJ, Albuquerque; JXL, Cottonwood, Ariz.; JZQ, Douglas, Ariz.; KCW, Clovis; KKS, Los Angeles; RTlc David Erwin, Francis Gormley, Pvt. Harold Wheeler (all LSPH); ND, Orange, Tex.; 3IRM (ND's jr. operator), air cadet in Ga.; ZA, Roswell; and all you other guys and gals that I am overlooking, and to you who will soon have that operator's license: The merriest Christmas possible and a victorious New Year in which we may again be united, even with those Ds and Js who were once one of us. 73 — *Jake*

EVERYONE IS TALKING ABOUT THE NEW *Electro-Voice* ACHIEVEMENT

NICKNAMED THE "LIP-MIKE"

Officially known as the T-45, the

Electro-Voice
DIFFERENTIAL MICROPHONE

is also affectionately termed the "Schickelgruber"

Developed by Electro-Voice engineers in close collaboration with the Fort Monmouth Signal Laboratory, the T-45 marks the beginning of a new era in which voice transmission is unaffected by ambient noise or reverberation. It accomplishes such complete suppression of background that speech from a battlefield or from the deafening interior of a moving tank is accompanied by hardly a trace of noise.

The "Lip-Mike" is a Differential Microphone designed to fit under a gas mask without breaking the seal — small enough to allow an Armored Force respirator to slide over it — and has been standardized for all Army Ground Forces.

- *Frequency response substantially flat from 200-4000 cps.*
- *Low harmonic distortion*
- *Cancellation of ambient noise, but normal response to user's voice*
- *Self-supporting, to free both hands of the operator*
- *Uniform response in all positions*
- *Usable when gas mask, dust respirator or oxygen mask is required*
- *Unaffected by temperature cycles from —40° F. to +185° F.*
- *Ability to withstand complete immersion in water*
- *Physical strength to withstand 10,000 drops*
- *Weight, including harness, cord and plug, less than 2 ounces.*

WHEN PEACE COMES, THERE WILL BE DIFFERENTIAL MICROPHONES OF MANY TYPES FOR CIVILIAN USES IN WHICH THESE ADVANTAGES WILL BE OF REVOLUTIONARY IMPORTANCE. THUS, ANOTHER WARTIME DEVELOPMENT WILL FIND ITS GREATEST VALUE IN THE COMING OF PEACE.

Electro-Voice MICROPHONES

ELECTRO-VOICE MANUFACTURING CO., INC. • 1239 SOUTH BEND AVENUE • SOUTH BEND, INDIANA

Export Division: 13 East 40th Street, New York 16, N. Y. — U. S. A. Cables: ARLAB

Signal Corps in Italy

(Continued from page 57)

visional signal company lost one jeep when it came into contact with a mine. The battery of another went dead, thus cutting down the mobility of the signalmen, but nevertheless they went ahead, sometimes on their bellies, stringing wire and getting switchboards and other apparatus into operation.

"When darkness settled on 'D' day and the division was fairly well established on shore, an inspection disclosed that contact had not only been maintained with the front line units, but also with those on each side of the division. When the first day ashore came to an end, the company found that it had established four switchboards over which was operated a net of telephones. In addition, it had installed six telegraph sets, laid one-half mile of field wire and three miles of assault wire.

"On the assault phase of the operation, some 200 tons of signal equipment were brought ashore by the Fifth Army and its respective units. However, where they had hoped to salvage some of the wire that was left behind by the Germans they were disappointed, for the enemy had not only cut the wire but had carried away whole sections so as to make any salvaging operations extremely difficult. Not only did Jerry carry away the wire, but to make things even more difficult, he cut down poles, while at the base of others he planted booby traps and land mines to catch the careless soldier."

"E" for Excellence

(Continued from page 55)

process whereby equipment, originally created to fill amateur needs, ultimately is applied to commercial and military use than is the National Co.

Concerning its history in this respect, W. A. Ready, president of National has this to say:

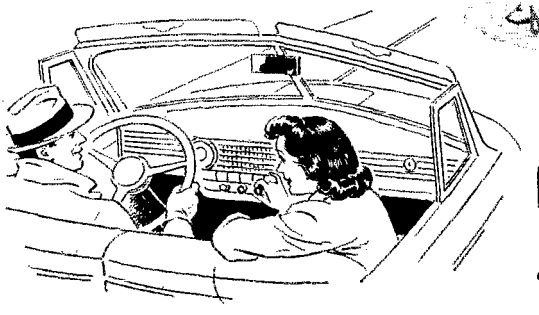
"About 75 per cent of our work is with the Navy and the specifications are extremely close. Most of the work is restricted or confidential and so we cannot say too much about it, but from reports from the battlefields it would seem to be functioning properly. This is testified to by the fact that we have received the Army-Navy 'E.'

"National entered the amateur field in 1923 with the introduction of the Velvet Vernier Dial and a line of transmitting and receiving condensers. The first amateur transatlantic contact and the first short-wave tests for the Navy were made by Capt. Fred H. Schnell using National condensers and dials.

"Many parts items were added to the line, most of which were suggested by amateurs and were made to fill their exacting requirements.

"In 1928 National brought out its first short-wave receiver, followed in 1930 by the SW-3. In 1934 the 'HRO' was introduced, and in 1935 the NC-100. These all were built to the exacting requirements of the amateur field.

(Continued on page 88)



From "*Music on the Road*" ... a Clearer Voice for War

Few entertainment mediums operate under such unfavorable conditions as the automobile radio. It sings its arias on a "stage" that bounces and jolts. It cracks its jokes while trolley-wire "lightning" snipes at its sensitive nervous system. It reads its news reports under the savage attack of high-tension current from the automobile ignition system. Even temperature and humidity get in their licks. Talk about a "dog's life"! Rover, move over.

For years, Delco Radio technicians have applied themselves to overcoming the many problems of vehicular radio. One by one, vibration — electrical interference—humidity and temperature — and other trouble-makers fell before their relentless quest. Automobile radio lost its stutters and gained a calm, clear voice.

But more than better entertainment came with this conquest. In their eternal search for "a better way," Delco technicians were finding the answers—*years in advance*—to similar problems of war-vehicle radio communication. When war struck, they already had a sound working knowledge of the chief deterrents to practical radio communication in bombers, tanks, tank destroyers and other mobile units. The quest for better entertainment had yielded an invaluable by-product — a clearer voice for war.

Delco Radio
DIVISION OF
GENERAL MOTORS

★ ★ ★ ★ **BACK OUR BOYS . . . BY BUYING BONDS** ★ ★ ★ ★

(*Continued from page 86*)

"In 1938 the nations of Europe began to use these receivers in quantity, and in 1941 our own government considered them for Army and Navy use. The circuits and general construction of these receivers are practically the same to-day as those used by the amateur.

"The suggestions of the amateurs definitely laid the groundwork for the receivers that have stood up so well in battle practice to-day, and it would be most unfortunate for this country if their place in the sun of peace was not recognized at the conference table. Amateurs have expedited our electronics war program by many months."

Shure

Among the several manufacturers of microphones whose products are found in amateur stations, Shure Brothers is the only firm so far to have received the "E" award. In connection with this award, J. A. Berman, sales manager of Shure, made the following statement:

"In the prewar era, Shure Brothers manufactured microphones for all applications: public-address, recording, broadcasting, communications, etc. During that time, Shure Brothers did considerable research work in the field of special communications microphones designed for amateur and professional use. The main developments in this field were special 'speech' curves and cardioid directional characteristics to eliminate the pick-up of background noise.

"In our present war work, we have found that our research on speech microphones and directional characteristics has given us a valuable background for the design and manufacture of microphones for communications in war."

Zenith

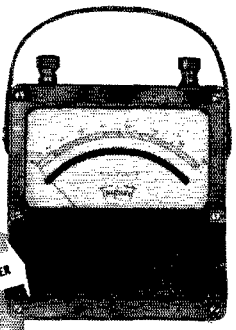
In 1915, ten years before there was a Zenith Radio Corporation, two young hams, Ralph Mathews and Karl Hassel, joint operators of the world-famous 9ZN, formed a partnership known as the Chicago Radio Laboratories. In 1921 they were joined by Comdr. E. F. McDonald, jr., who became general manager of the company. At that time they were producing radio sets on a kitchen table at the prodigious rate of one per day. By 1923 their business had grown tremendously and they adopted the trade name Z-Nith from their call letters. This soon became Zenith, and the Zenith Radio Corporation was formed.

At that time the short waves were still considered worthless by commercial interests, and suitable only for a toy for hams. Zenith, however, took the hams seriously and coöperated with them in research. In 1923 with Zenith's aid continuous contact was maintained between Chicago and the MacMillan Arctic Expedition where it was frozen in for the winter, 9 degrees from the North Pole. MacMillan had with him *QST*'s present acting technical editor, Donald H. Mix, W1TS, with a ham station, and all communications were carried on through the amateurs of the United States. Sometimes the messages were relayed through Bismarck, N. D., Washington, Milwaukee or Chi-

(*Continued on page 90*)

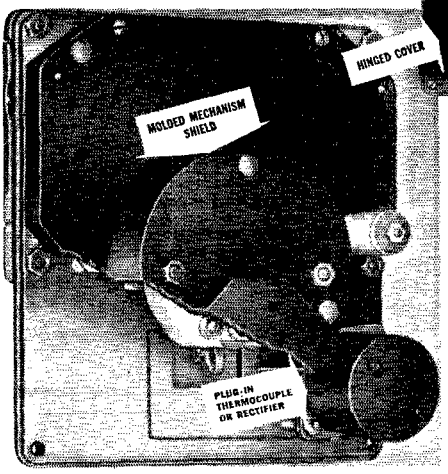
TRIPLETT Practi-Quality

PRECISION—DURABILITY—FAIR PRICES



TRIPLETT MODEL 645 PORTABLE

Hinged cover protection. Opens flush. Smooth case open or closed. Molded shield protects mechanism, excludes dust, permits plug-in thermocouple or rectifier replacements without exposing sensitive mechanism. Pre-calibration of thermocouples or rectifiers made possible by interchangeable plug-in units. No re-calibration required. In burnout of thermocouple or rectifier new replacement can be effected "on the job".



THE TRIPLETT ELECTRICAL INSTRUMENT COMPANY
BLUFFTON, OHIO

For additional engineering information on Model 645 and other instruments of the same case style write for 645 data sheet.

★

BUY WAR BONDS AND STAMPS

CAN YOU FILL ONE OF THESE MOST IMPORTANT WAR JOBS?

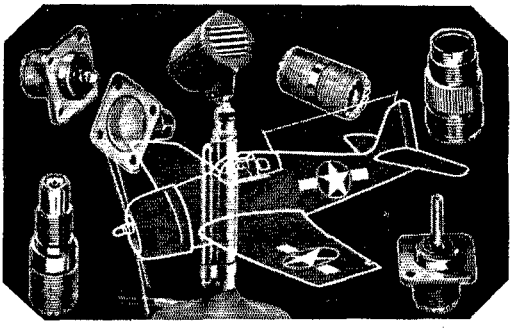
If you know theory and practice, you are urgently needed by a non-profit, non-commercial organization assigned to vital war research.

- **Electronic Engineers**
- **Radio Engineers**
- **Electrical Engineers**
- **Physicists**
- **Electrical Designers**
- **Electronic Designers**
- **Communication Engineers**
- **Electronic Technicians**
- **Mechanical Engineers**

If you are in one of the above categories and your highest skill is not being utilized to help save lives and materials, to help shorten the war, please write! ACT NOW!

Salaries based on experience, ability, education and past earnings. In addition, we will pay all expenses of transportation, moving, etc., for you and your family. Living quarters will be made available. If granted an interview, we will compensate you for all expenses incurred in coming to New London. Don't wait! Write, stating background and experience to . . .

PERSONNEL DEPT.
P. O. Box 271, New London, Conn.



Producing and Planning

Like so many other important industries, Astatic is building for the present and planning for the future. While producing important parts for wartime radio equipment and microphones for many branches of the service, Astatic is creating and re-designing radio and phonograph parts for the postwar market.

ASTATIC

The ASTATIC CORP.
Youngstown, Ohio
In Canada: Canadian Astatic, Ltd., Toronto, Ont.

(Continued from page 88)

cago, and no two nights were alike. But the messages got through, and *it was the hams who did it.*

Zenith, born in a ham station, has been ham-minded through the years and has never lost touch with the hams of America. In his book, "Youth Must Fly," published in 1942, Comdr. McDonald repeated what he has said on many other occasions: "Everything we have in this country in radio to-day is due to the youths of the United States. Youthful amateurs nicknamed 'hams,' who did not know that there were rules about how things should be done, tried unorthodox stunts and made nearly every basic discovery in the development that has given America the finest radio in the world. All that the industry's engineers and extensive laboratories have done is refine the discoveries of amateurs. Moreover, most of our engineers are graduates from amateur ranks; and some of them still come down red-eyed in the morning after nights spent in their ham shacks."

Zenith's laboratory is filled with hams. G. E. Gustafson, vice-president in charge of engineering, has been active as W9AQS for many years. Karl Hassel, one of the first kitchen-table partners of 9ZN, is now a director of Zenith Radio Corporation. J. E. Brown, assistant vice-president and chief engineer, came from the ranks of the hams. There is not an engineer in the Zenith laboratory to-day who is more than forty years old, for the simple reason that the radio hams of yesterday who formed the nucleus of Zenith engineering laboratory were youngsters when they started in the business.

College degrees and insignia of honorary fraternities are commonplace to-day in Zenith's great research laboratory. Nevertheless, Comdr. McDonald still announced publicly in 1942 that Zenith had a research staff of 54,000 engineers. He figured that this was true because the company regularly advertised to America's 54,000 licensed hams for ideas. When peace returns Zenith expects to continue its contact with and encouragement of the hams of America.

— C. B. D.

Ignition Noise

(Continued from page 49)

since the indications are directly comparable. In cases where high-sensitivity receivers are used, a simple attenuator at the input to the first intermediate stage may be necessary to get below the hiss noise of the receiver itself and any fluctuation noise from the area wherein the tests are conducted.

Any noise picked up when the engine is not running must not be subtracted arithmetically from the readings taken on impulse noise, since the noise from different sources does not add up arithmetically because of the wide differences in crest factors of the various noise forms. Fluctuation noise, for instance, varies as the square root of the bandwidth and has a crest factor of

(Continued on page 98)

(Continued from page 90)

about 4. Impulse noise varies directly as the bandwidth and has a crest factor which varies with the phase relationship of the individual impulses and the bandwidth of the receiver. A convenient and commonly used method of stating the improvement in a single term is by taking the reading of the interference before and after improvements have been attempted and expressing the ratio in terms of decibels.

From the foregoing it may be concluded that shielding is the best method now available for the control of noise impulses at the source. If the shielding is made adequate for the service in which it is to work and is properly installed, there will be practically no interference. The effectiveness is dependent on little more than good workmanship and a little "radio sense." When the rules are slighted or are not thoroughly understood, however, the result will be intensification of interference at the ultrahigh frequencies.

U.S.A. Calling!

(Continued from page 86)

perience as a licensed amateur will offset the lack. Application form and further information are to be obtained by addressing the Regional Manager of CAA at the closest of the following addresses: P. O. Box 636, New York Airport Sta., LaGuardia Field, New York; Municipal Airport, Atlanta; 608 So. Dearborn, Chicago; Box 1689, Ft. Worth; City Hall Bldg., Kansas City; 1500 Fourth St., Santa Monica; King County Airport, Seattle; Box 440, Anchorage, Alaska.

Italian Invasion

(Continued from page 17)

Spitfire circled the field and attempted to land. "I thought the pilot might see me in the wreckage," Madison related. "I waved as hard as I could, trying to warn him away, but he didn't see me. He landed. As he taxied toward the hangar, a German gun put a shell through the plane."

Throughout the day the British continued the attack, but the German defenders were well protected. Artillery was brought into action, dropping high explosives around the field and exposing Madison to danger equally from his friends and enemies. One thing, at least, the British fire accomplished. It kept inquisitive Jerries away from the landing strip separating the hangars and the smoldering wreckage of the B-25.

The flames had died down, leaving the fuselage a charred skeleton. Madison, still concealed under his wing tip remained undiscovered.

It wasn't any fun. The sun, beating down on the aluminum skin covering the wing, was almost as hot as the burning plane the night before. The burns on his arm and shoulder became more painful by the hour. Blisters rose, and the rivulets of sweat chafed more than did the burns.

(Continued on page 94)

(*Continued from page 92*)

At that, Madison considered himself lucky. He was alive, wasn't he? And, close enough so he could reach it, there was a crumpled five-gallon water container blown from the B-25 by the explosion. It was broken and dented, but in the bottom enough brackish water remained so he could wet his lips through the day. "It tasted like ink, but it was good," he said.

The day wore through, and darkness fell. Larry had been on that field nearly 30 hours. With the darkness the British attacked again. During the skirmish Madison left the shelter of the wing. He crawled to the edge of the field. There he paused, trying to decide what to do next.

Suddenly he realized that the firing had practically ceased. There were scattered bursts from the British side, but from the Germans — only silence. Carefully, quietly, he began to walk in the blackness toward the nearest hangar.

It was empty — at least for anything living — but through the roof he could see gaping holes left by the British shells. He stepped outside and surveyed the field, illuminated now and then by bursting shells. There was not a plane in sight.

Madison started down the road leading off to the sea. After going a way he met three British sergeants, cautiously reconnoitering. They listened to his tale, took him back to their camp, gave him medical care and put him up for the night.

"Well," Madison observed, "the recruiting sergeant promised me action if I joined the Air Corps. I guess I got it!"

— *C. B. D.*

Splatter

(*Continued from page 13*)

Ansley Corp. That, and the fact that he has been a *QST* reader since he was 13; viz., since 1929. Nonetheless, he still goes so far as to say that he thinks "*QST* is great." . . . **Louis H. Roth, W2DKH,** when put on the witness stand, refused to talk on the grounds of possible self-incrimination. If we gave him too much of a build-up in this department, he said, the local hams around Jamaica, N. Y., would never allow him to live it down. Being a counselor-at-law by trade, it was hard to trap him into inadvertent admissions. With our accustomed perseverance in tracking down the lowdown, however, we discovered that he is (a) 39, (b) married, and (c) the father of a 5-year-old son (name of Paul). These were about the only facts he'd admit to unequivocally. Charged with being a ham, he confessed to having held the calls W2BPU, W2BQV and, of course, W2DKH — but contended that actually he is more putterer than ham. Concerning statements from official records showing him to be secretary of the Amateur UHF Club as well as the Federation of Long Island Radio Clubs, he alibied that he was given these jobs because no one else wanted them. On one thing, though, we've got

(*Continued on page 96*)

(Continued from page 94)

him cold. He *did* build the neat little a.c.-d.c. WERS rig described on p. 11.

Paul J. Palmer, W8UGR, first "Splattered" on p. 16 of the January, 1943, issue, is now practically a *QST* institution. **James Perkins Saunders, W1BDV** ("Splatter", p. 8, June, 1943), returns on page 22.

•••—

It is a distinct pleasure to report that one crisp new $25 U. S. War Bond has been issued for each of the three stories published under the "Hams in Combat" heading in this issue (p. 14). There's a bit of a story within a story connected with each one, too. In the case of the yarn on W2JRG's North African experience, W2HJM instructed that the bond for his story be sent to the wife of its principal character — Mrs. Guy M. Stewart, at the old W2JRG QRA at Tuckahoe, N. Y. W1KJO, having turned down several offerings of shore jobs while on the beach, is now back on the convoy run again, and presumably will find good use for his bond when he lands across (for a reason you will guess when you read his yarn!). As for the ex-W8AHG story, while several individuals contributed data on his experiences, it seemed most fitting to send the third bond to his wife who is gamely carrying on alone on the home front back in Lyndhurst, Ohio.

Incidentally, you might be interested in these excerpts from a letter from Mrs. Madison: " . . . Larry has been overseas since early May and has never had the pleasure of a furlough. (Privately, I think he deserves one.) . . . However, they have a job to do, and all feel that the sooner it is over the sooner they'll come home. . . . To read of men who've always had all the comforts of life living in foxholes does something to one, and when it comes to my own husband, it is inconceivable. These little sorties, such as they were on last September, are now a specialty of his outfit and they're becoming expert at it. . . . Larry wrote later that he watched the Jerries eat and listened to their talk during that grueling wait, and could have touched them. 'They tried their damnedest to do away with your OM. First shelled the plane, machine-gunned us, and tried to take me prisoner — but they failed.' . . . By the way, I have enjoyed ham mail from all over the U.S.A. as a result of this story. . . . Now I must stop, because working on a precision lathe in a war plant requires rest at night — for the operator, I mean — and I must not let down, unpredictable though I may be!"

•••—

FEEDBACK

AT THE time December *QST* was "put to bed" we were under the impression that J. P. Eichinger, W9NBE, was loath to have it bruited around that the photograph of blackboard notes on "waves" published in Strays on p. 61 came from him. However, it seems that this wasn't the case at all, and so we hereby proclaim that the engineering sidelight in question was supplied by W9NBE, who hails from St. Louis and is now working on interesting stuff at Raytheon.

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 pieso-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 15, Okla.

USED equipment wanted. Highest cash prices paid for receivers, transmitters, meters, parts, etc. I promise you the best deal. Let me know what you have. Bob Henry, W9ARA, Butler, Mo.

IN STOCK: Mac No. 200 keys, $2.25; condensers, resistors, panels, chassis, transformers, Vibroplexes, radio supplies of all sorts. Your inquiries and orders invited. Henry Radio Shop, Butler, Mo.

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

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

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.

METERS: Quantity of Radio City Product appliance testers, Model No. 417P, price $13.25; Triplett 673 AC voltmeter, 670 AC ammeter in stock. Each in portable leather case. All new. Price $14.99 prepaid net each. 673,400 microampere. Don't delay. First-rate, like-new panel meters accepted in trade, also up-to-date tube checkers, etc. Hatry & Young, 203 Ann St., Hartford 3, Conn.

WANTED — Hallicrafters receiver SX24, SX25. Meissner FM converter. Meador, W4GLP, Box 205, Nashville, Tenn.

SELL — Electric Specialty motor generator. Input 110 volts A.C., output 400 volts D.C. Colin Kennedy long wave receiver plus amplifier. Best offer. Arthur Lukach, 35 East 84th St., New York City.

WANTED — RCA receiver BP–10 camera size portable, new condition. W9BQZ, 1382 Park Ave., Plainfield, N. J.

WANTED — Pre-selector, D B 20 or equivalent. Gene Hitchon, VE3AJS, Belleville, Ont., Canada.

WANTED — Meissner signal shifter, FB–7; Thordarson 15P18, DB20, DM 36. Haynes, 2413 Mallery, Flint 4, Mich.

FOR SALE — 500 watt telephone and telegraph transmitter, $325. 250 TH PP final. All parts but final wired and ready to go. Compression speech amplifier and Xtal mike. Will answer all queries. W3AJO, 4203 Rosemont Ave., Drexel Hill, Pa.

WANTED — 25 Dual-speed phono tables. Any make. Van Sickle Radio, Indianapolis 6, Ind.

SELL — Ten kits for 40-watt fluorescent lamp, 220 volts, 60 cycles (each includes G. E. 58G675 ballast, two lamp sockets, starter and socket). $2.50 each express c.o.d. W4DRB.

WANTED — Set of coils for National SW-5 to cover 2000 to 3000 meter band. William A. Riaski, Guthrie Center, Iowa.

SALE — Precision tube tester, Model 912 counter case; Webster 0122 automatic phono for 10"–12" records. Both in excellent condition. Make offer. Dettman, 9527 Glenwood Road, Brooklyn 12, N. Y.

RCA-ACR-III communication receiver for sale. In excellent condition. Priced for quick sale-$100.00. T. I. Burwell, 565 Quinnipiac Ave., New Haven 13, Conn.

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 — BOOKS to help you master technical radio. Practical Radio Communications, 1943 Edition, $6.00; Radio Operating Questions and Answers, $3.00; Radio Code Manual, $3.00. Postpaid. Money back if not satisfied. Write for circulars 5Q. NILSON RADIO SCHOOL 51 East 42nd St., New York City 17, N. Y.

WANTED — Super Het. communications receiver. W9TOF, P.O. Box 8, Eagle Lake, Minn.

SELL — Immediate delivery on those time-proven Eidson commercial crystal units for Police, Aircraft, Marine, Government, etc. Available in the 125–10,000 kilocycle range with temperature coefficients to meet all requirements. Regrinding service also available. "Eidson's", Temple, Texas.

SUPER SKYRIDER, 11-tube crystal receiver, including matched 12" Jensen PM speaker, matched Hallicrafters walnut cabinets; See January, March, May 1937 *QST* advs. Condition recently checked perfect; undersigned only owner. F.o.b. $45.00. T. M. Ferrill, Lucedale, Miss.

TWO complete Abbott TR4, 2½ meter units with complete set of tubes and Radiart 4200 DF power supplies. These units have never been used. Inquire of K. E. Fuller, W9PLS, Lincoln, Ill.

SELL — National SW-3 receiver with tubes, coils, supply. Stancor 10-P transmitter with tubes, crystal, coils. Excellent condition. Make offer. Harold C. Horwitz, 6651 Clemens, University City 5, Missouri.

AMATEUR television equipment complete with tubes and all necessary parts required for receiver and the transmitter. Such receiver will be purchased separately (must have tubes) for 110 volt A.C. operation. Such transmitter will be purchased separately (must have tubes) with 2" iconoscope. For 110 volt A.C. operation. Baptiste, Box 114, Howard, R. I.

WILL buy any or all issues of Amateur Call Books from 1924 through 1939. Wanted for WERS operation HY75 tubes. Harry Johnson, Ex 1SF-ALJ. Box 48, Branford, Conn.

FIRST satisfactory offer takes one each: Par-Metal 72" relay rack; 17½" Par-Metal deluxe relay cabinet; kw UTC autotransformer, RK60, TZ20, Stancor 3893 modulation transformer; Thordarson T19F91, and three Thordarson T76S74. Irvine, Box 652, Abilene, Texas.

RECORDERS wanted. Any make or model. Good condition, 12" and 16". Speak-O-Phone, 23 West 60th St., New York City.

WANTED — Hallicrafters or Sargent radio compass. State condition and price. New York YMCA School, 5 West 63rd St., New York City.

WANTED — Condition, prices on HRO, Super Pro, NC200X, HQ120X, NC81X, NC101X, RME Pre-selector. Lt. C. Manitsas, Signal Section, MASC, Harrisburg, Pa.

WANTED — Amrad quenched gap, "S" Tube, DeForest and other "antique" tubes, sets and equipment. Also 1914 Edition "A.R.R.L. List of Stations"; Maps of Member Stations; and "Story of A.R.R.L." Franklin Wingard, Rock Island, Illinois.

WANTED-SWS Coils, Nos. 14A, 10, 18, 19, 20. W1BB.

WANTED — *QST*'s January, March, May, July, 1925. Also earlier issues. W4MR, 1711 West Lee, Greensboro, No. Carolina.

ATTENTION WERS! 20 RCA 6 volt, 250 volt, 50 MA. D.C. Dynamotors $5.00 each. 25 RCA Mobile 5-inch Magnetic Speakers, 50¢ each. 12 new RCA type 811 tubes, $2.00 each. F.O.B. Radio Division, City of Fort Worth, Texas.

"THEN I'LL PUT IT THIS WAY—THE JEEP AND YOUR **ECHOPHONE EC-1** ARE BOTH REMARKABLE!"

Echophone Model EC-1

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

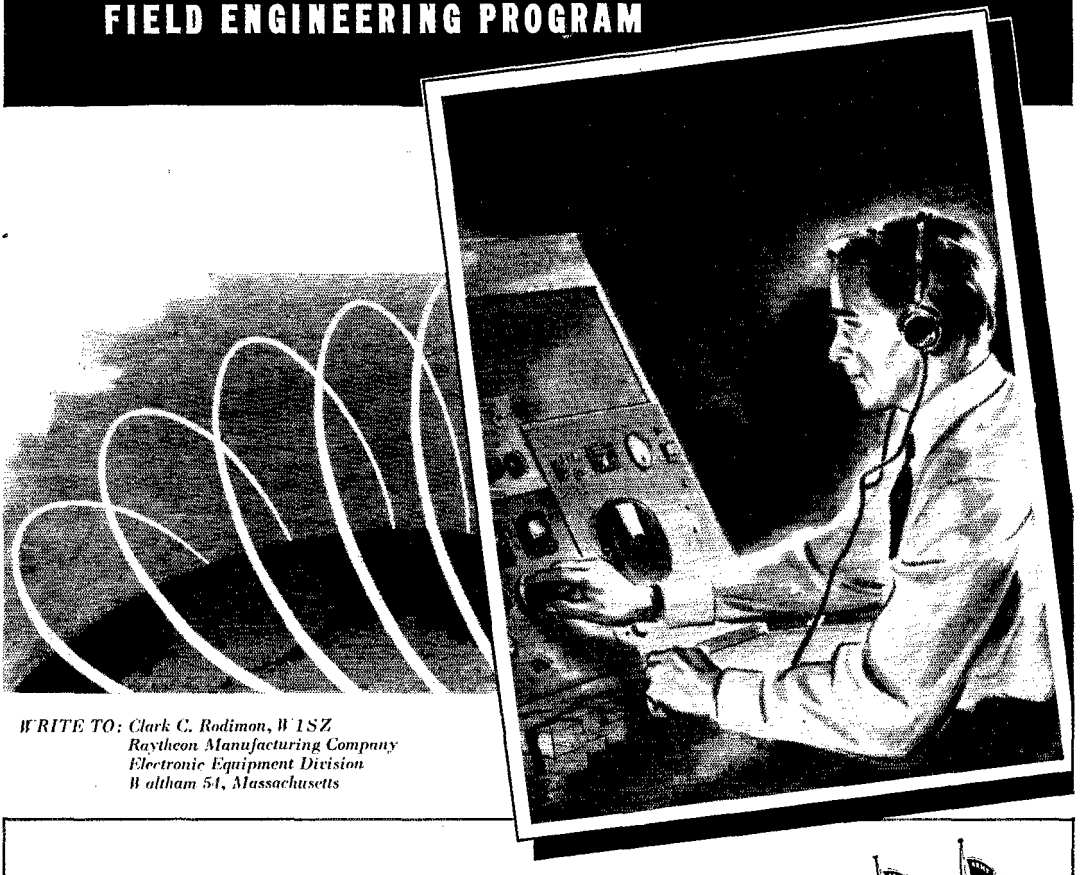
Echophone Radio Co., 540 N. Michigan Ave., Chicago 11, Illinois

Index to Advertisers

All of the above advertisers are coöperating with the A.R.R.L. to permit publication of an editorially adequate *OST* during this period of war-rationing of paper. Using less advertising space but at higher rates, they continue their customary support of *OST*. 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.

OPPORTUNITIES OPEN!

FOR QUALIFIED MEN TO HELP U. S. NAVY THROUGH RAYTHEON'S FIELD ENGINEERING PROGRAM



WRITE TO: Clark C. Rodimon, W1SZ
Raytheon Manufacturing Company
Electronic Equipment Division
Waltham 54, Massachusetts

Raytheon's Field Engineering program for the Navy is expanding.

Raytheon now offers an opportunity for a few more qualified men to help the Navy in this important program.

Practical experience gained as a radio amateur is an invaluable background for this work.

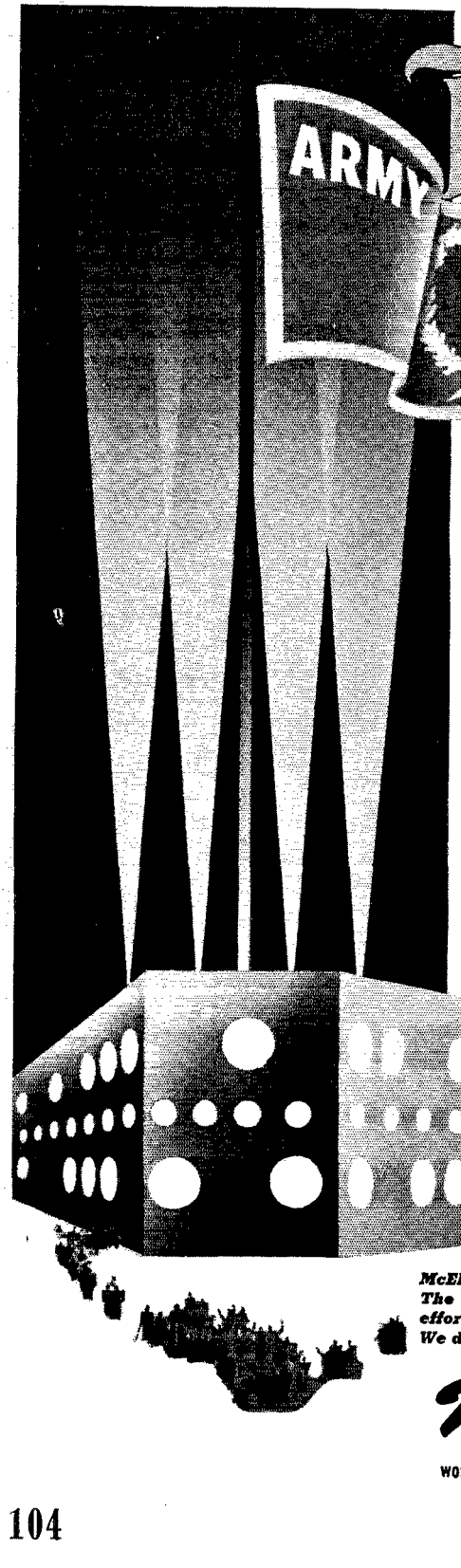
Activity in this Field Engineering program is excellent preparation for other important Raytheon work in the future.

ARMY-NAVY "E" WITH STAR
Awarded All Four Divisions of Raytheon
for continued excellence in production

RAYTHEON

Raytheon Manufacturing Company
Waltham Massachusetts

DEVOTED TO RESEARCH AND THE MANUFACTURE OF TUBES AND EQUIPMENT FOR THE NEW ERA OF ELECTRONICS



Proudest moment

The pride that we take in our products has been overshadowed by an even greater emotion. On November 8, 1943, we of the McElroy Manufacturing Corporation were awarded the Army-Navy "E". It isn't easy for us to express in words just how much a flag and a tiny "E" pin mean. We're thrilled. We're grateful to the Army and Navy. And we shall try, above all, to live up to this high honor.

Here, in Boston, we have a happy factory group. There are several hundred of us... fine men and women... putting our utmost into each job. On the basis of thirty years' experience, I have ideas as to what constitutes good telegraph apparatus. Our engineers, under Tom Whiteford, work out the original models which are later translated into actual equipment by our skilled personnel.

As for our selling policy... we have no salesmen. We do have a few resident representatives at points where they may be helpful. To these men, and to the men and women of the McElroy plant, I'd like to say — thanks . . . keep building for Victory.

McElroy engineers are constantly alert to the needs of our industry. The equipment we produce stands as eloquent testimony to their efforts. We never imitate. We never copy. We design. We build. We deliver. Perhaps a McElroy engineer can be of service to you.

McElroy MANUFACTURING CORP.
82 BROOKLINE AVE. BOSTON, MASS.

WORLD'S LARGEST MANUFACTURER OF AUTOMATIC RADIO TELEGRAPH APPARATUS

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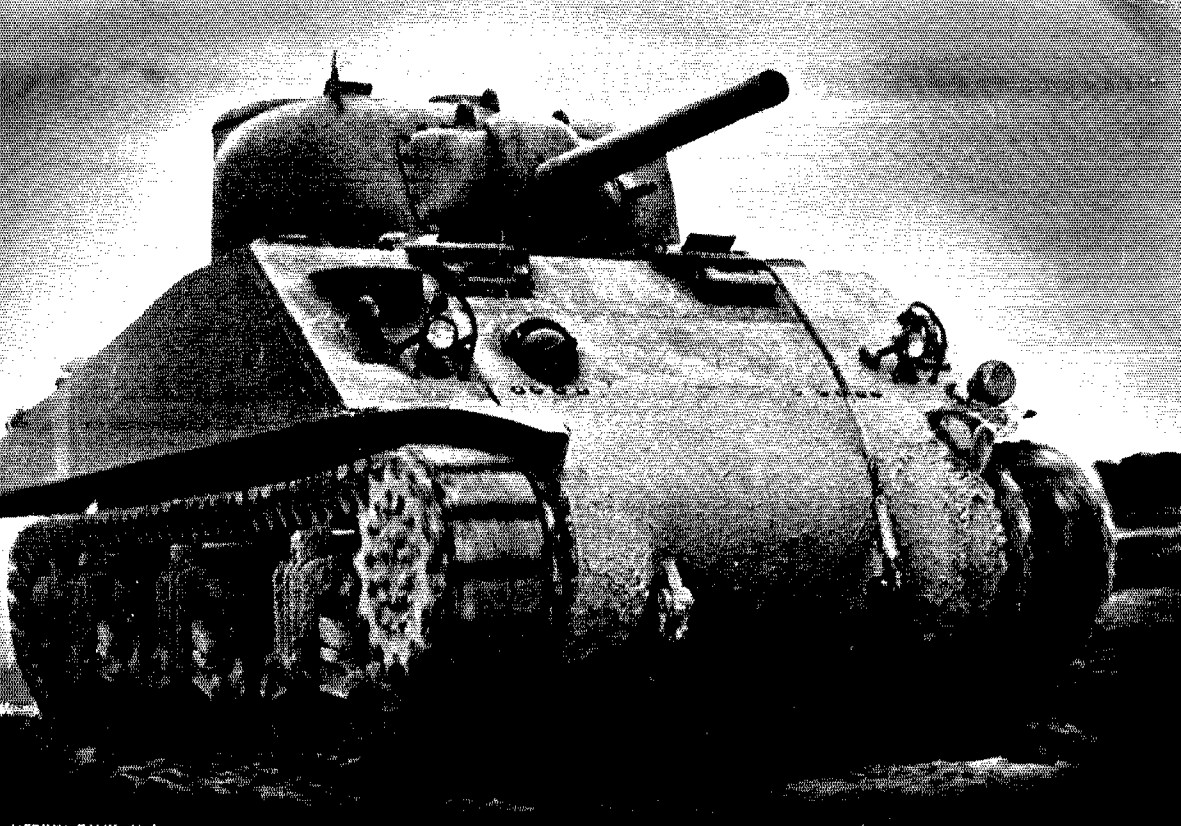
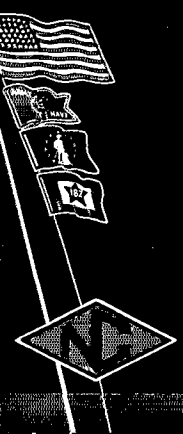
CONCORD, N. H.

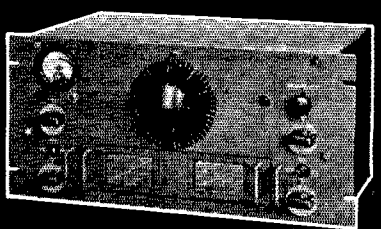


MEDIUM TANK, M-4
PHOTO BY
S ARMY SIGNAL CORPS

BUTTONED DOWN *and ROLLING*

Rolling all over the world. Hitting the enemy where it hurts him the most, covering infantry, scouting, fighting. Fighting and talking. Talking by radio to coordinate all in a pattern of Victory.





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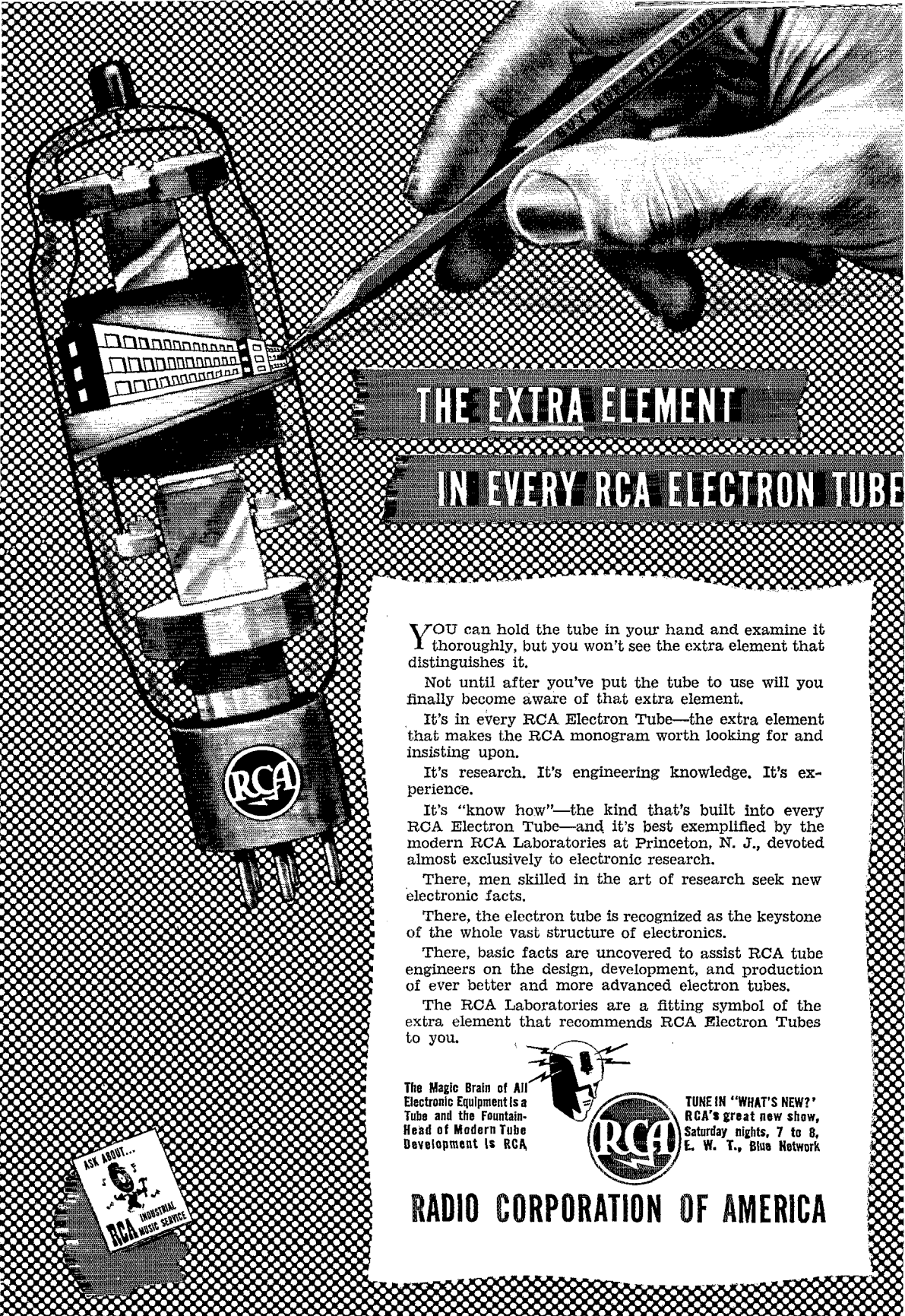

THE EXTRA ELEMENT

IN EVERY RCA ELECTRON TUBE

YOU can hold the tube in your hand and examine it thoroughly, but you won't see the extra element that distinguishes it.

Not until after you've put the tube to use will you finally become aware of that extra element.

It's in every RCA Electron Tube—the extra element that makes the RCA monogram worth looking for and insisting upon.

It's research. It's engineering knowledge. It's experience.

It's "know how"—the kind that's built into every RCA Electron Tube—and it's best exemplified by the modern RCA Laboratories at Princeton, N. J., devoted almost exclusively to electronic research.

There, men skilled in the art of research seek new electronic facts.

There, the electron tube is recognized as the keystone of the whole vast structure of electronics.

There, basic facts are uncovered to assist RCA tube engineers on the design, development, and production of ever better and more advanced electron tubes.

The RCA Laboratories are a fitting symbol of the extra element that recommends RCA Electron Tubes to you.

The Magic Brain of All Electronic Equipment is a Tube and the Fountain-Head of Modern Tube Development is RCA

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RADIO CORPORATION OF AMERICA