QST

march, 1943
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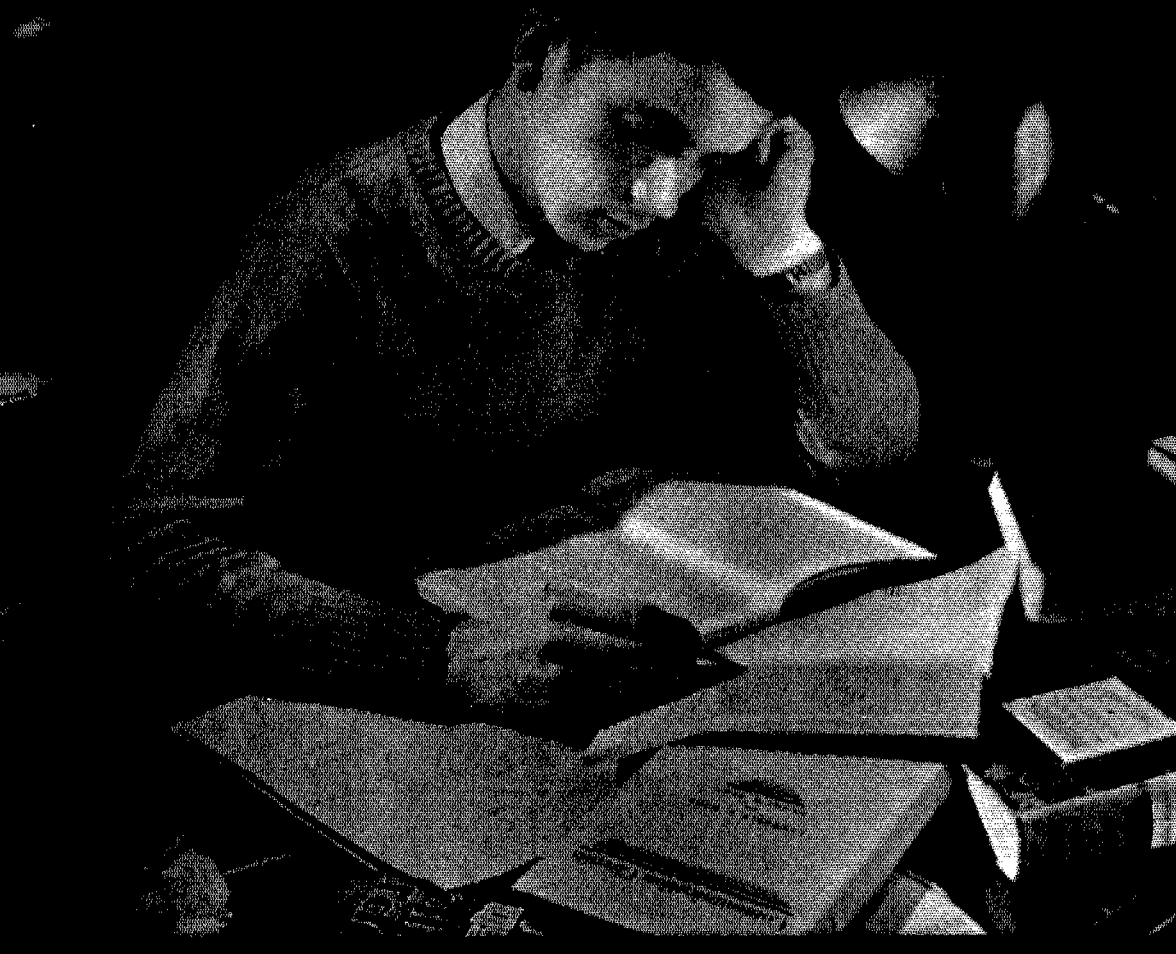
amateur radio



In This Issue—Understanding Speech Transmission

A heavy responsibility rests on all men in war industries . . . especially upon executives and engineers.

Their knowledge of confidential operations should not be the subject of discussions beyond the confines of the plant . . . nor should their natural pride in accomplishments cause them to speak unthinkingly. Discretion is an essential part of war production.

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ARMY NAVY

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MARCH 1943

VOLUME XXVII

NUMBER 3

★

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QST *devoted entirely to*

AMATEUR RADIO

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

CONTENTS

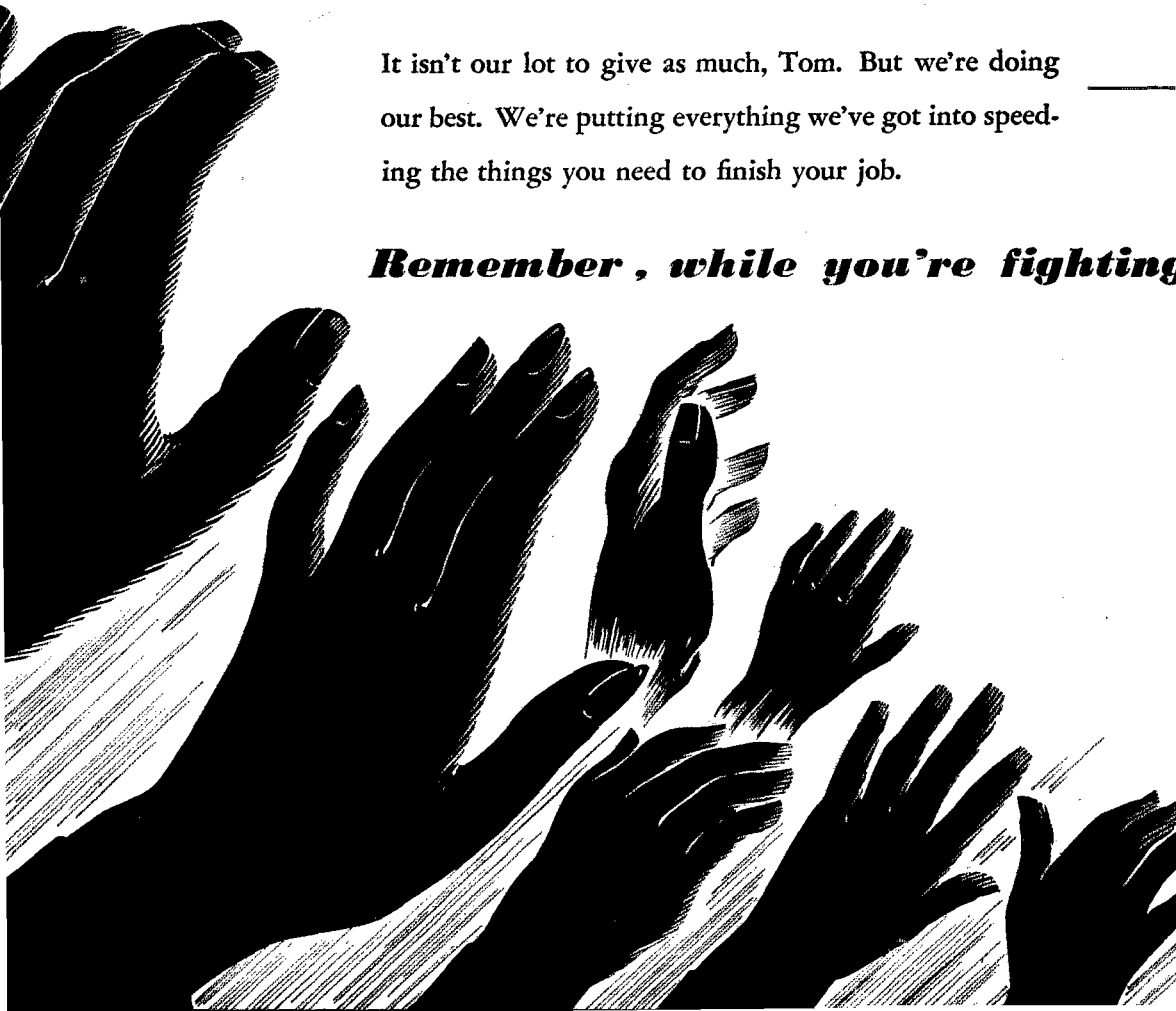
See You Soon, Tom!

We don't know where you're going, Tom. We don't know when you'll be back. But it's got to be soon!

We know what you're giving up. Your swell job at the plant, your picnics with Jane, the workshop in your basement, your quiet dreams of the future. Your life, maybe. That's everything you've got.

It isn't our lot to give as much, Tom. But we're doing our best. We're putting everything we've got into speeding the things you need to finish your job.

Remember, while you're fighting



we're fighting, too!

Thinking about Tom—the hundreds of Toms who waved goodbye at American Lava and went to war—makes our seconds precious. So we work around the clock, create startling improvements in AlSiMag steatite ceramic insulation, devote ourselves exclusively to winning the War. In the process, we continually find ourselves saying "no" to the urgent needs of old friends who have bought our products for four decades or more. We regret that. Today, we answer the greater need.

ARMY E NAVY

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

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

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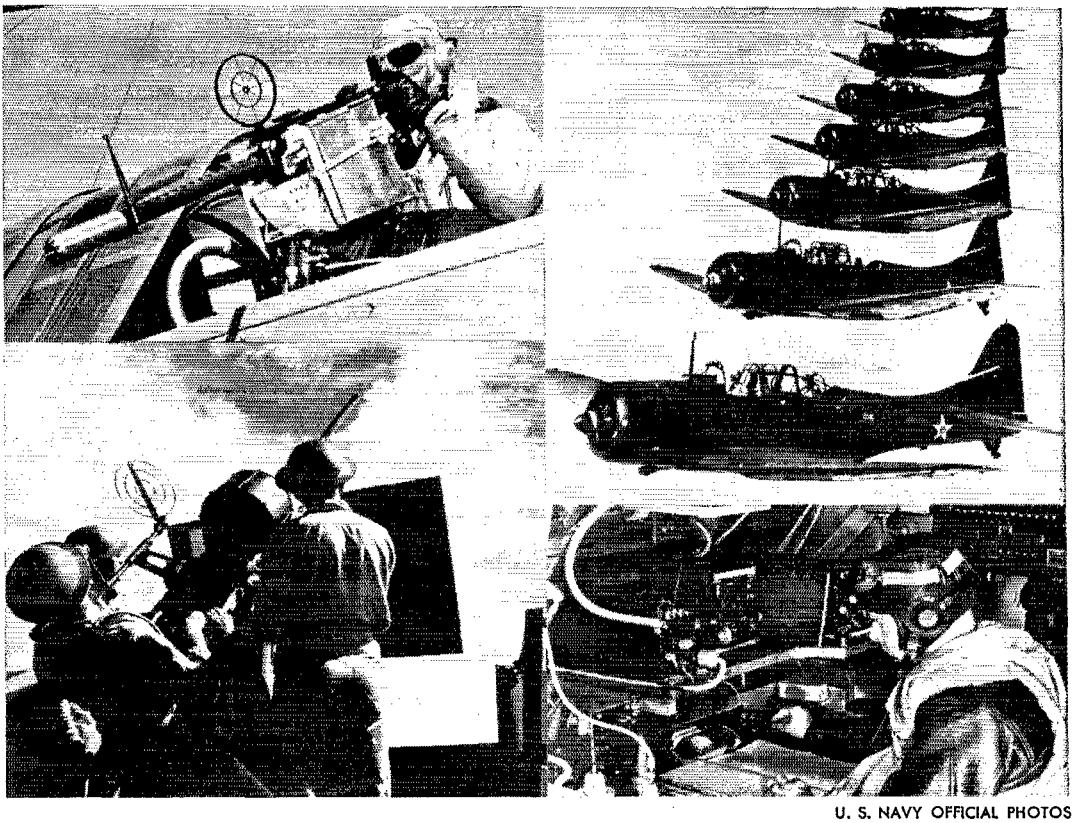
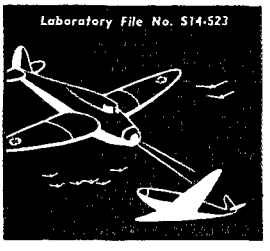


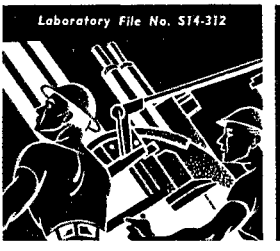
U. S. NAVY OFFICIAL PHOTOS

UTC CASE HISTORIES



Laboratory File No. S14-523

This unit helps "keep them flying." A UTC redesign combined two units in one . . . reduced quantity of critical materials 50% . . . reduced weight and size 40% . . . reduced installation time 60% . . . reduced possible trouble points 50%.

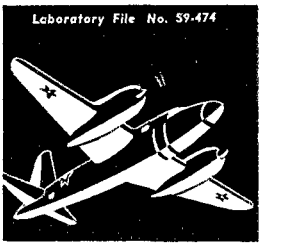


Laboratory File No. S14-312

This unit maintains ground communications at a more efficient level. Now plastic housed. Critical materials reduced 50%. UTC design reduced possible trouble points 50% . . . reduced difficulty of operation 50%.

Laboratory File No. T16-399

This unit is used at a number of points in aircraft communication. A UTC design reduced quantity of critical materials used 20% . . . reduced weight and size 20% . . . reduced possible trouble points 50%.



Laboratory File No. S9-474

This unit is a component in a piece of aircraft equipment. A UTC design reduced quantity of critical materials 60% . . . reduced weight and size 60% . . . made possible a similar reduction of size and weight in the complete equipment of which it is a component.

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THE AMERICAN RADIO RELAY LEAGUE, INC., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite.

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

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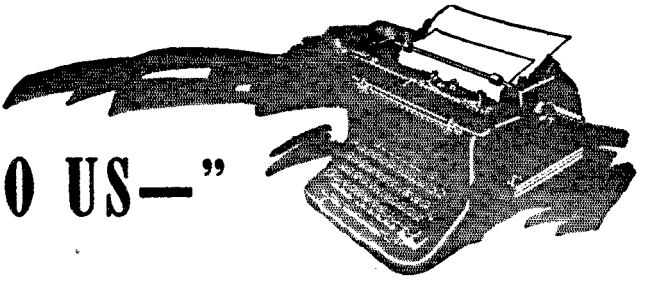


"IT SEEMS TO US—"

THE MARK OF THE EXPERT

HIRAM PERCY MAXIM, father of the League, had a wealth of engineering stories. One of them dealt with a situation wherein the largest Diesel engine in the world had come to an inexplicable stop, tying up a large plant. Experts were called in, with much paraphernalia, but they all failed to get the great engine going again. Finally the frantic management heard of an obscure expert, living in retirement on the opposite side of the continent. They called him up, offered him anything he wanted if he would come and start their engine, sent an airplane for him. When he arrived, an inconspicuous little man in overalls, he was effusively greeted by the officials of the company out in the huge shed. The plant engineers told him the engine's symptoms, to which he listened attentively. Reflecting a moment, he asked, "Has anybody got a ball-peen hammer?" The hammer was produced and the little man scampered up the ladders and galleries of the Mammoth engine, disappearing somewhere in its topmost intricacies. In a moment he was heard to strike half a dozen sharp blows with his hammer. Soon he returned, and said, "Now try her." To everyone's great relief and delight the engine started instantly, ran perfectly. The grateful management again wrung the little man's hand, told him to send in his bill.

When the bill came in a couple of weeks later, it was for a thousand dollars, perhaps modest enough in the circumstances. But the company's hard-boiled comptroller, engine troubles forgotten, exploded wrathfully. He called up the little man, called him a robber, said that company policy required itemization of each charge on bills above a hundred dollars, defied him to itemize this one. "Why," he said, "all you did was go up there and hammer, and that wasn't worth more than a dollar. If you can itemize that bill to amount to a thousand dollars, I'll pay it; otherwise I won't."

So the expert itemized his bill, and this is the way it read:

For hammering.....	$ 1
" knowing where to hammer	999
	$1000

Probably you've heard this story before; it has received wide circulation since HPM first began to tell it. If so, you know of course that the little man then got paid. But to us the real meat of this story has always been the fact that what made him an expert was that he knew precisely where to hammer. That took knowing. That's what set him apart from the pseudo-experts who tried and failed. He didn't flounder nor did he try things blindly. He *understood* engines; he saw clearly that the trouble could be only one thing and he went right there and fixed it quickly. That ability was the hallmark of the expert: knowing where to hammer.

It's the same way in radio. Most of us amateurs don't know how to locate troubles speedily, nor how to design our apparatus properly in the first place — because we haven't acquired a really sound understanding of radio. We're too casual, too shallow about it. Although we get results they're rarely what they could be, because we haven't made the effort to become truly expert in our understanding. We've been too busy operating or rebuilding. We've always promised ourselves that some day we'd take time off to start again at the beginning and really digest that basic theory and math, make it a permanent part of our knowledge.

We have that opportunity now, during our enforced stay off the air. We can't operate, we can't get the parts for new equipment. We *can* study. Tens of thousands of newcomers are doing it, learning radio soundly. If we old-timers aren't to be left behind, we must do it too. *QST* and the other League publications are doing their part to help you, by presenting the kind of material that is in demand these days, understandable theory and practical mathematics. We urge you to employ this operating lull to acquire a sound knowledge of your chosen art. It will put you out in front when we return to the air, because you'll know exactly "where to hammer."

TIME AND TIDE . . .

FOR wartime reasons the news didn't get out at the time but it is now disclosed that the Ohio Valley flood in December was one of

the worst in history. Amateurs who have been close to previous floods through supplying emergency communication know just what that means — the isolated cities in distress, the mass evacuations, the tens of thousands of homeless to care for, the attendant communication emergency that could be relieved only by us. This time it wasn't — at what additional cost in lives and misery we'll never know.

What really roils us up is that Civilian Defense was able to boast that it mobilized a hundred thousand trained relief workers to help in the huge job and, although our WERS is a part of Civilian Defense, we weren't able to take any part. And why not? Because the confounded paperwork of making out a WERS application takes two men and a nipper several weeks of spare time to accomplish, and then it bounces back a couple of times before it is in acceptable form, with the result that in this whole vast country there's so far only a handful of WERS licensees. Consequently, although the organized civilian-defense workers went on the job, they went without communication. And the Ohio Valley flood isn't the only occasion on which the ARP workers have been out on a civilian emergency; they're doing it often these days.

Of course it's to be regretted that the authorities feel that they can not permit the occasional temporary resumption of amateur operation in a restricted area exclusively for the relief of such a disaster, since the amateur's worth in such circumstances has been demonstrated beyond argument. But even u.h.f. WERS can do a lot of good, and the lack of it during the recent flood emphasizes what a shame it is that it requires such a discouraging amount of effort to get a WERS license. However, we know nothing that can be done about it, things being what they are; and, after all, we suppose that we've done plenty of more difficult tasks in our amateur careers. So we urge you radio aides and emergency coördinators not to let the paperwork get you down. You can lick that, too, the same as you're winning out over many other new problems.

But we could wish for a more realistic viewpoint at Washington — one that, with every necessary precaution for security, still perceived that the public interest requires that emergency-communication facilities be put speedily at the disposal of our communities.

K. B. W.

★ SPLATTER ★

OUR COVER

THERE must be no less than half a million people in uniform and out studying radio these days; perhaps the number is closer to a million. This month's cover therefore exemplifies a scene common to American war-time life. That our earnest young student is using George Grammer's *Course in Radio Fundamentals* in conjunction with the Defense Edition of the *Handbook* only makes it the more typical.

•••—

PAPER

IN COMMON with all U. S. periodicals, under WPB Limitation Order L-244 *QST* is currently required to reduce its total consumption of printing paper for 1943 to 90 per cent of that used in 1942. Since the average size of our recent issues has been about 25 per cent larger than a year ago and circulation is also up, this restriction necessitates drastic reductions all around. We mention the point because we believe you should know the reason for these changes when you see them.

The effect of the order is perhaps initially visible in the apparent quality of the paper, because our first step has been to adopt a lighter-weight printing stock. Appearance may suffer somewhat, particularly in halftone reproduction, but that's just something we'll have to accept. Another effect will be to reduce the average size of the issues. All we can say about that is that we'll try to crowd as much meat into the smaller number of pages as we did when we had more room. Yet another effect will be curtailed newsstand distribution. If you're accustomed to getting your copy at the stand around the corner,

(*Continued on page 90*)

IF YOUR COPY OF *QST* IS LATE—

Bear with us and the nation's transportation systems. We are both doing our best — *QST* is being printed one to three days earlier each month to help keep deliveries on schedule — but unavoidable wartime delays do occur.

Above all, remember:

1. Slowness of delivery is beyond our control; your copy is mailed at the same time as all others for your vicinity.

2. *Don't write us* about non-delivery until at least the 10th of the following month; 99 times out of 100 your copy is on the way and will reach you safely.

3. Please allow plenty of time for acknowledgment of new and renewed membership-subscription entries.

The Signal Corps and the Blue Grass State

Pre-Service and Replacement-Center Training in the Lexington, Ky., Area

BY CLINTON B. DESOTO,* WICBD

This article describes a program that, in part, soon may exist only in the past tense. The recent restriction placed on enlistments in the Enlisted Reserve Corps, necessarily will cause substantial modification in the future application of the civilian pre-service training which forms a major part of this story.

Until the classes now in training complete their courses the work goes on. After that — well, the answer is not now apparent. We feel confident, however, that some way will be found to utilize a system which has so vitally demonstrated its worth.

Yet even in the past tense, the civilian vocational training program here described fully merits a record of its accomplishments. In presenting that record *QST* pays tribute to a successful achievement.

If you have been reading *QST* — or, for that matter, the daily press — with your usual diligence recently, you won't need to be told that the nation, and in particular the Signal Corps, needs trained radio men.

For every thousand soldiers inducted the Army needs a minimum of 15 radio operators and mechanics. In certain branches the ratio is even higher. That means a potential quarter of a million radio men for the Army now being built.

Where are these men coming from? Nowhere near that many experienced radio technicians and operators are available; practically every eligible ham is now in uniform or deferred for indispensable work, and the b.c.l. servicemen's ranks are already well-thinned. The ratio of men with radio experience received at the Army's induction centers has been less than one in every thousand, or hardly more than 5 per cent of

*Executive Editor, *QST*.

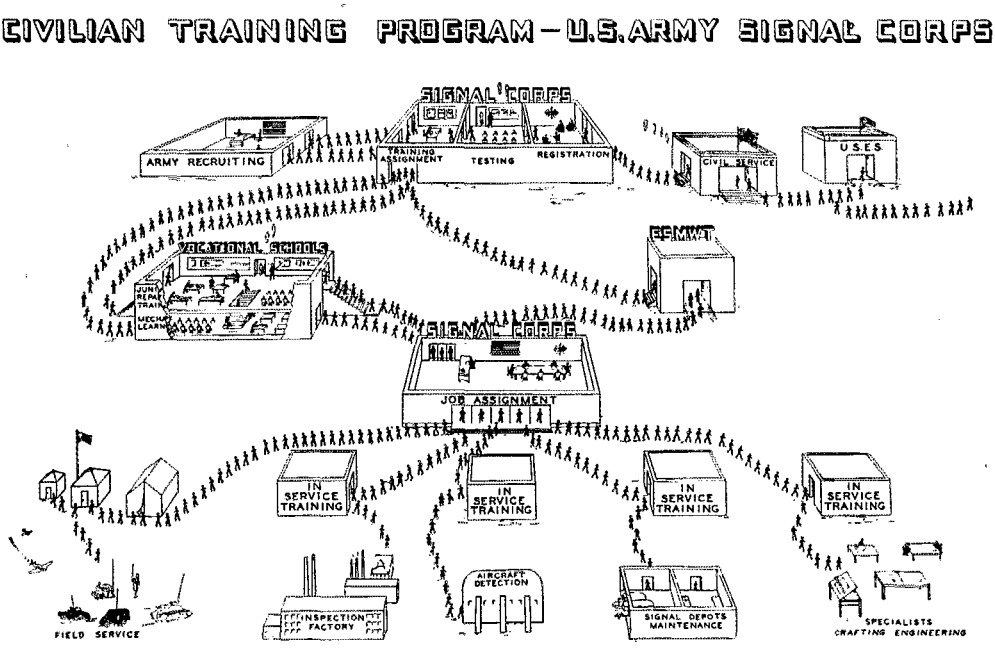


Fig. 1 — Chart showing the flow of manpower through the U. S. Army Signal Corps' civilian-training system.

Advanced training at the Lafayette Trade School. *Top* — Harold F. Gardner completes a repair job at one of the well-equipped work benches. *Center* — An instructor explains circuit-tracing technique to a student. *Bottom* — The student, Charles William Shepherd, puts the knowledge just acquired into practice with the aid of a standard multimeter.

requirements. The remaining 95 per cent must be made from men without radio experience.

That is the herculean job the Signal Corps, in concert with the other military units, has undertaken — to transform tens of thousands of ordinary citizens almost overnight into qualified radio specialists.

To secure the material for that training job every source of eligible manpower is being plumbed. In the great Signal Corps schools, such as Fort Monmouth and Camp Crowder, thousands of inductees travel the road from raw recruit to radio ratings. Augmenting the flow of men already in uniform, the Signal Corps initiated a gigantic civilian training program, in which instruction is given special classes in vocational and public schools throughout the country.

The program is administered by the Civilian Training and Military Training Branches of the Office of the Chief Signal Officer, with the coöperation of the U. S. Office of Education and the U. S. Civil Service. Its end-product is not only uniformed Signal Corps technicians but civilian maintenance men, draftsmen, engineers and factory inspectors.

The scope of the program as a whole is illustrated in Fig. 1. Of primary interest is the part to the left of the drawing — the flow of men through the vocational schools into field service and the specialized branches of in-service training.

The size of the program can be shown by a few statistics. The latest figures released show some 27,000 trainees in the civilian Mechanic Learner — Radio and Junior Repairman Trainee — Radio Classifications. These men are receiving training in 151 schools in 38 states. They are being trained by 1700 instructors and the monthly bill for training is an even million dollars — in addition to an initial million dollars invested in equipment, half of it purchased with federal funds and the other half supplied by state and local agencies. Incidentally, these figures represent a 400 per cent increase over July, 1942.

So extensive is this training program that even to summarize it in terms of its national scope would require a book as large as a set of OPA regulations. The story can only be told by taking a typical school and examining the work performed. In our search to find such a school we went to various training units and talked with the men at work there. We invaded Washington and conferred with Signal Corps officials and with Dr. J. C. Swanson, in charge of the program for the Office of Education.

Finally we ended up in Lexington, Ky. There, in the heart of the Blue Grass country — in a sedate community dedicated to the ripe traditions of thoroughbreds and southern hospitality — we found an answer. For within the Lexington area each of the major phases of this branch of the Signal Corps training program is carried on. Under two roofs (metaphorically speaking) — the Fayette Vocational School, where beginning students progress through mechanic learner and junior repairman trainee classes, and the Lexington Signal Depot, where advanced in-service training is given — we learned the whole story.

Vocational Training Begun in 1917

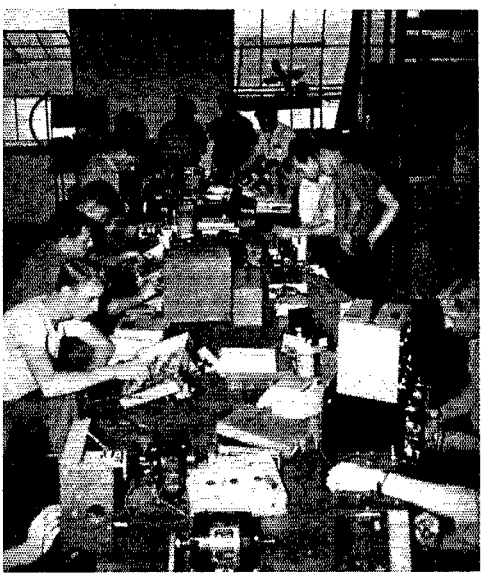
To understand the structure of this vocational training program, a little background is required. The story begins in the Halls of Congress. In the month of February, 1917, the Congress enacted the Smith-Hughes Act, under which every state was urged to establish vocational classes in its secondary schools. Federal funds were made available to assist in such classes.

This was a foresighted move, especially in the light of the needs for skilled man- and woman-power the nation was to face for World War I. It proved a worthy foundation for training for the present war, too.

In the next two decades several forward steps were taken. The most important came in July, 1940, when Congress appropriated funds for a comprehensive national-defense training program within the structure of the Smith-Hughes Act. With this incentive the vocational schools began to get down to the business of training on a national scale.

But there was still something wrong. The same backward-looking perspective that originally had stressed home economics above manual trades now placed the schooling of woodworkers and similar craftsmen above the training of technicians for such fields as radio. In fact, the radio field was scarcely considered at all in those early months. Creatures of habitual thought patterns, like most of us, educators as a class had little concept either of the incredible applications of radio and allied fields in this war or of the tremendous volume of manpower required.

It was to be another year and more before this need became so manifest that it could no longer be ignored. Even then, only a few of the more farsighted realized that the radio and electronic training field was destined to overshadow all others in volume and importance. In the intervening months one state after another has realized this need and instituted training programs.



JRT class at work on a transmitter project at the Lafayette Trade School. One group builds r.f. unit while another constructs the modulator.

Kentucky First in Radio Training

History's pages will record another bright star opposite Kentucky's name for being one of the first states to recognize the need — and the first to act on it. There's no need here to dwell on the throes of planning and preparation that preceded the birth of the program; the important fact to be recorded is that on January 24, 1942 — the coldest day of the season, as it happened — Kentucky's pre-service radio training began.

Thus began the most important single training program ever undertaken in the State of Kentucky. It was the first state to have a complete radio training program covering both pre-service

Girl Mechanic Learner students learn both theory and practice at the Lafayette Trade School. *Left* — Laboratory class relates text descriptions with actual apparatus. *Right* — Theory study group.

JRT student checks an oscilloscope used in laboratory work in one of the brightly-lighted, well-equipped new buildings at the Lafayette Trade School.

and in-service classifications. It was the first — and for a long time the only — state to have a vocational system national in scope, with students from all sections of the country.

That is why Kentucky — and in particular Lexington, which incorporates all elements of the program — was a logical scene for our survey. Not only because of the completeness of its program, but because that program, having served as a proving-ground for the setting up of a national system, is typical of that in other states.

The lowest level of training, that for Mechanic Learner — Radio, is given in thirteen vocational high schools in eleven cities throughout the state — Lexington (2 schools), Louisville, Ashland, Harlan, Covington, Madisonville, Paintsville, Owensboro, Somerset, Paducah (2 schools) and Lincoln Ridge.

These schools teach what is called the primary course. The secondary course — Junior Repairman Trainee — Radio — is given at Fayette County's Lafayette Trade School, near Lexington. The Fayette school is the largest JRT school in the country; in fact, up to last fall it had more students enrolled than all the other JRT schools combined. Students in these schools are civilians, employed under Civil Service and paid $85 a month as Mechanic Learners and $120 as Junior Repairmen Trainees. They constitute the pre-service part of the training program.

The third or in-service level of training is carried on in the Post Radio Schools of the Lexington Signal Depot. These are both civilian and enlisted schools, operated by the Signal Corps and administered by uniformed personnel.

The state-operated schools are under the general direction of Dr. R. H. Woods, state director of vocational education. The work is supervised by Harold G. Wilson, supervisor of trade and industrial education.

The spark-plug of the program is Prof. Thomas L. Hankins, W9CHN, of the University of Kentucky's Department of Industrial Education. It was W9CHN who organized the details of the original course. He worked up lists of needed equipment and supplies — and saw to it that this matériel was obtained despite all difficulties, tracking down elusive items in forgotten surplus stocks on dealers' dust-covered shelves all over the country. Now he serves as liaison man between the state supervisor, the Signal Corps and the Office of Education in Washington.

A Student Begins

A student who wants to get in on this training starts by making application to his local Civil

Advanced transmitter class at Lafayette: *Left* — General view of a corner of one of the large laboratory classrooms, showing conveniently-arranged tables and shelves for storing apparatus. *Right* — Close-up of group at work on a transmitter project, combining separately-built r.f. and modulator units into complete assembly.

Service office and taking a Civil Service examination. The test establishes that he has sufficient academic background and native intelligence to justify giving him a chance.

At one time he was required to join the Enlisted Reserve Corps. This was to ensure that he remained available to the Signal Corps at the end of his training, if they wanted him — instead of simply walking out (as a few have done). Now he is required to sign a statement that he will work for the Signal Corps for at least 12 months after he completes the training.

When the student is accepted he is given a Civil Service rating as Mechanic Learner — Radio, and assigned to one of the schools giving the primary ML course. As a Civil Service employee he not only receives the schooling free but is paid at the rate of $1020 a year while learning.

The best way to visualize the training is to take

Student aligning a simple superheterodyne in basic receiver class. Units under construction are stored in box shelves shown at right.

a typical trainee and follow him through the system at Lexington. This average student is probably a Kentuckian, since natives naturally predominate on the rolls; but he may have been assigned from any state in the country. If he is an out-of-stater, he will be made at home with traditional Kentucky hospitality. For that matter, he'll probably find an instructor or two from his home state; half the states of the Union are represented by instructors at the Lafayette school.

We'll assume that he is assigned to an ML class at Lafayette. His first view of the school is calculated to inspire confidence in the outcome of his training there. Located on spacious acreage in the rolling countryside, the modern red-brick buildings of the original county vocational school have been augmented by four large new structures, erected for this program in record time as FWA projects.

He finds himself assigned to one of three daily shifts, beginning at 6:40 A.M., 2:40 P.M. and 10:40

Student team checking the wiring of a completed chassis in receiver class, prior to connecting power supply for listening test.

P.M. Each shift is 8 hours long, with 4 hours of general theory and 4 of shop or lab work. These are not continuous sessions, of course; they are broken by occasional "smoke periods" in which the students take time out to relax.

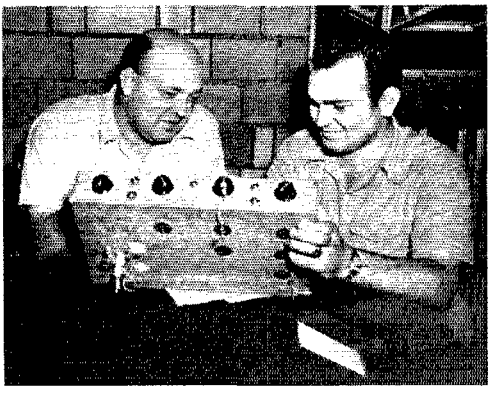
Once he is assigned to a class unit, the student stays in it throughout the course. He has the same instructors from beginning to end — one for theory and one for shop. There is one such pair of instructors for every 30 men.

Course Follows Standard Outline

The course of training he receives follows a standard outline prepared by a joint committee of the Office of Education and the Signal Corps. It is essentially a practical course, designed to give the student the nearest equivalent to the knowledge of a qualified amateur.

Three textbooks are used in the two preservice courses. Ghirardi's "Radio Physics Course" is the formal theory text in the ML

(Continued on page 92)



James W. Kelly, Sr., instructor at the Lafayette Trade School, examines transmitter r.f. unit built by his son, a student at the school.

Unscrambling Secret Speech Transmissions

An Interesting Field for Experiment

BY McMURDO SILVER

IN THESE war-time days, when the amateur too young or too old to be in the armed forces or war effort may find insufficient outlet for his inborn desire to tinker, there is still one field familiar in general to all — but familiar in detail to few — which is open to interesting investigation. Remembering Charlie Apgar's Ediphone recordings during World War I of transmissions from German-controlled United States stations and the part they played in closing such abused channels of communication when handed to our government, it is not impossible that widespread eavesdropping on scrambled speech transmissions from transoceanic radiotelephone stations may uncover present-day espionage efforts so far missed.

If one decided to telephone London, Berlin, Paris or Rome during those envied pre-war years, one could choose "open" non-private speech, understandable to any listener tuned to the transmission, or one might elect, at somewhat greater cost, to employ "private" transmission. In the latter method, normal human speech was "inverted" so that low notes came out high and high notes came out low, with the result that, except in a very few cases of unusual human ears, the message was nothing but a hodge-podge of gibberish little resembling human speech — even as practised by Donald Duck. Yet sometimes if a superheterodyne receiver was used, the beat-oscillator for c.w. reception turned on, and the set retuned slightly to one side of the carrier, fairly intelligible speech could be had for brief intervals. The length of these intervals was a function of frequency stability, in terms of cycles, of the probably 455,000-cycle receiver beat oscillator, as well as the sharpness of cut-off of the receiver's audio system.

* 140 East 28th St., New York City.

While some of us have occasionally managed to unscramble a word or two of inverted-speech telephone transmissions, it's an unsatisfactory job at best with makeshift methods. The unscrambler described here, while not hard to make, should satisfy that urge to put the soldering iron to work.

This article discloses no secrets since the principles upon which speech inversion is based, while not so familiar to amateurs, are well known in the communications field and are found in most engineering textbooks. As the author points out, the device is useful for translating only the simplest kind of inverted speech.

While the above method will actually work after a fashion, the average junk-box will readily yield odd parts sufficient to build an effective demodulator for inverted or scrambled speech. Before contemplating the construction of a suitable unit, a brief review of the processes involved may not be amiss.

Let us presume a telephone transmission circuit capable of conveying intelligible speech, and for simplicity let us imagine such a circuit as covering the range of 300 to 2700 cycles; that is, a range adequate for good speech intelligibility. If we employ speech frequencies in this range to modulate a local 3000-cycle audio "carrier," upper and lower sidebands will result. The upper sideband will be 3000 cycles plus 300 to 2700 cycles, the speech frequency range, and so will occupy the band of 3300 to 5700 cycles. This sideband will be "right-side-up" in that each element of the speech frequency range will be "lifted up" by 3000 cycles.

The lower sideband, however, will be "upside-down." Applying the speech range of 300 to 2700 cycles as modulation to a 3000-cycle carrier will give a lower sideband ranging from 2700 (3000 minus 300) down to 300 (3000 minus 2700) cycles. This sideband is not intelligible, since what was originally a 300-cycle speech tone has been shifted up to 2700 cycles, while what was originally a 2700-cycle speech tone has been translated into a 300-cycle tone. All intermediate frequencies between 300 and 2700 cycles in the original speech are similarly inverted, with only the mid-band frequency (the pivot-point in inversion) remaining unshifted.

It becomes apparent that if, during or after the process described above, it is possible to erase the local carrier and the upper sideband, there will remain only the lower sideband — a substantially exact replica of the original speech frequency range but "upside-down" in that it is inverted so that low frequencies are now high frequencies and vice versa.

Fig. 1 shows a basic circuit capable of effecting speech inversion, or conversely, de-inversion or demodulation, for the device which will invert speech will, if fed with inverted speech, re-invert it back to its original form. Transformer T_1 may

be a simple Class-A input transformer designed to operate out of the available receiver or source of inverted speech to be demodulated, and capable of feeding the control grids of V_1, V_2, in push-pull. Since the plates are connected in parallel, this circuit becomes a version of the familiar "push-push" frequency multiplier found in transmitters. Because the input sees the grids in push-pull while the plates are in parallel, such output as may be obtained is almost solely due to unbalance between the two tubes connected to function as a balanced modulator, and this unbalance may be eliminated as will be shown. The local audio oscillator is coupled to what are preferably the injector grids of two 6L7s, employed as V_1, V_2, through transformer T_2, likewise in push-pull.

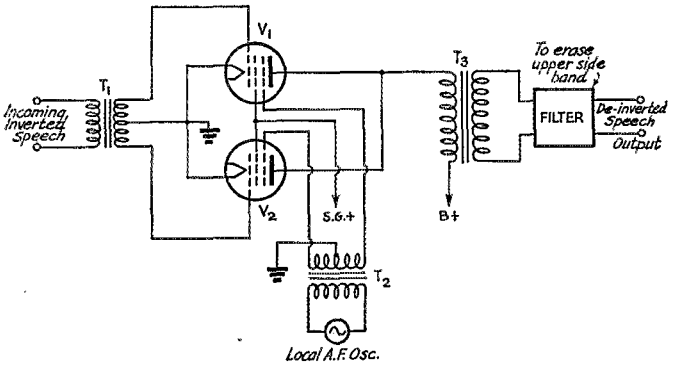


Fig. 1 — Basic diagram of balanced-modulator speech inverter or de-inverter.

This same push-pull input/parallel-plate output circuit which erases the original inverted speech frequency likewise erases the locally-generated audio tone. The balanced modulator, while erasing from its output the original input and local oscillator frequencies applied to it, functions to combine the two and deliver at its output only the upper and lower sidebands produced in the modulation process. Only the lower sideband is desired, it being in reception the de-inverted replica of the signal received inverted, and hence intelligible speech once again. Therefore a suitable filter is connected between the output transformer, T_3, and the load to erase the undesired upper sideband resulting from modulation.

Since it will not be known by the experimenter beforehand what the carrier frequency used by the transmitting station to effect inversion before transmission may be, except that it will probably lie between 3000 and 10,000 cycles, it is necessary that the local oscillator be variable in frequency so that it may be adjusted in reception to provide exactly the same carrier frequency for demodulation as was used at the transmitter for inversion. The local audio oscillator may be any available variable-frequency audio test oscillator, or it may be a simple Wien bridge *RC* tuned oscillator built specially for the purpose — and useful for audio circuit testing as well, once built.[1]

The only non-junk-box item required to build a practical inverted-speech demodulator is the filter to cut off the upper sideband. This can be dispensed with without serious derogation of the performance if 6L7s are used as V_1, V_2. These tubes will require a quite high impedance load at T_3 such as may be obtained by using a microphone, an ordinary 3:1 audio, or a grid-to-line transformer connected backwards to give high-impedance input and low-impedance output operation. Then simple shunt capacitors across the "primary" (original grid winding) of T_3 will provide sufficient high-frequency attenuation to erase the undesired upper sideband to a point where, while it may be still audible, it will be weak enough so that it will not seriously interfere with intelligibility. Some value between 0.0005 and 0.01 μfd. will suffice, with the higher value used for low oscillator frequencies and vice versa, as determined in actual operation.

T_1 may be any available single-plate to push-pull grid, or line to push-pull grid, audio transformer having primary suitable for operation out of the receiver circuit used to feed the demodulator. T_2 may be practically the same thing — any small audio transformer to the primary of which the local audio oscillator may be connected without too much loss, and having a push-pull Class-A secondary to feed the injector grids of 6L7 tubes V_1, V_2.

Fig. 2 illustrates a practicable working circuit for use in building the inverted speech demodulator, with all resistor, capacitor, etc., values appended. Construction is so simple it should take only a few hours to put together on a breadboard or old chassis. Power supply may be most anything available. Even the receiver power supply should suffice for the demodulator proper, though it is doubtful if the average communication or broadcast receiver will have enough reserve plate and heater power for the two-tube Wien bridge oscillator. In any case the power supply problem is so simple and straightforward, with even filtration and hum problems somewhat less rigorous than for good receivers, that it should be capable of simple solution.

Once built the demodulator may be tested for proper operation separately from the receiver to which it will be connected in actual use. The audio oscillator may be checked with headphones or loudspeaker for proper operation, setting trim-

[1] See *FM* Magazine, November, 1942, for detailed audio-oscillator description.

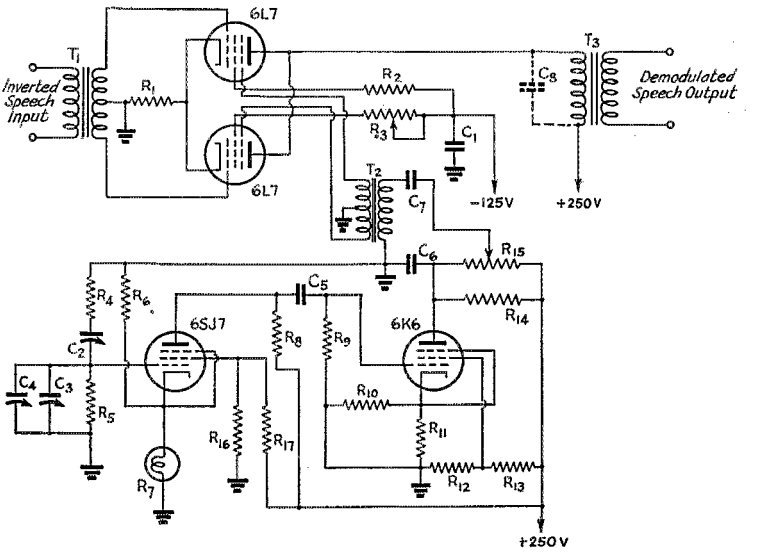


Fig. 2 — A practical de-inversion circuit, including Wien bridge type oscillator.

C_1 — 0.25 μfd., 400 volts.
C_2, C_3 — Approximately 800 μμfd. each; each may be two paralleled sections of b.c. receiver type 4-gang, 400-μμfd.-per-section condenser. (Frame must be insulated from ground.)
C_4 — 5-50-μμfd. trimmer.
C_5, C_6 — 0.5 μfd., 400 volts.
C_7 — 0.25 μfd., 400 volts.
C_8 — See text.
R_1 — 250 ohms, 1 watt.
R_2 — 2000 ohms, 1 watt.
R_3 — 10,000-ohm volume control.
R_4, R_5 — 0.15 megohm, 1 watt (must not differ from each other more than 0.5 per cent).
R_6 — 2500 ohms, 1 watt.
R_7 — 3-watt, 115-volt S3 lamp.
R_8, R_9 — 0.5 megohm, 1 watt.
R_{10}, R_{11} — 1500 ohms, 2 watts (a single 750-ohm 5-watt unit may be substituted).
R_{12} — 50,000 ohms, 1 watt.
R_{13} — 10,000 ohms, 1 watt.
R_{14} — 20,000 ohms, 2 watts.
R_{15} — 20,000-ohm volume control.
R_{16}, R_{17} — 50,000 ohms, 1 watt.
T_1, T_2, T_3 — See text.

mer C_4 for clean, pure wave form as heard in the output — or better yet, as viewed on an oscilloscope. This done, the 'phones may be transferred to the secondary of T_3, with the oscillator set up to produce about a 3000-cycle tone, and R_3 adjusted to balance V_1, V_2, so that minimum oscillator tone is heard in the output when R_{15} is set at about mid-scale position. It will probably be necessary to interchange V_1 and V_2 to accomplish this result. Establishment of suitable values of C_8 used to shunt the "primary" of T_3 to erase the upper sideband can be effected quite well by unbalancing the demodulator balance control, R_3, so some audio oscillator tone is heard in the output, and then determining what value of C_8 *just* serves to cut it down noticeably for 3000, 4000, 5000, 6500 and 8000-cycle oscillator frequencies. If desired, a tap-switch can be used to connect the required values of C_8 across the "primary" of T_3 for the different carrier frequencies which will be used in actual demodulation.

To put the demodulator described into operation, it will probably be easiest to connect it between the output of a receiver which has previously been tuned to a scrambled speech signal, with headphones or loudspeakers then connected to the ouput of the demodulator. Assuming that the demodulator has been balanced, operation will then require only that the audio oscillator be carefully tuned over its range in order to locate that point at which its frequency corresponds to the inverted carrier oscillator employed in the transmitter. This point will be that at which the scrambled speech becomes intelligible. This condition obtained, speech may be rendered still more intelligible by readjustment of R_{15} for clear tone, and by partial erasure of the upper sideband through connection of the most appropriate value of shunt capacitor across the "primary" of T_3.

Lest, as a result of contemplation or experiment, the reader become too imbued with the "secret" possibilities inherent in scrambled speech transmission to the United Nations war effort, it seems well to state that what appears herein is far from new to the military and commercial fields. The system described is so embryonic as to class as a "low-privacy" system, while interlaced inversion wherein different segments of the required frequency range are inverted in different manners is almost equally embryonic. An effectively secret system for military purposes will be so far in advance of the simple "low-privacy" transoceanic commercial telephone circuits which the device herein described will "break" as to bear almost no recognizable similarity.

The Russian Telegraphic Alphabet

How to Transcribe Radio Code in the Language of the USSR

BY LOUISA B. DRESSER*

RECENT issues of *QST* have contained the Japanese and Arabic telegraphic codes.[1] It seems appropriate that the radiotelegraphic code for one of our most powerful allies, Russia, should also appear in these pages. Long one of the central theatres of this war and the scene of much of the bitterest fighting, the increasing coöperation between our armed forces makes it most desirable that U. S. radio operators learn how to transcribe Russian code.

Contrary to popular belief, the language is not fundamentally a difficult one. Because of its alphabet and composition, Russian, like Arabic, is more readily transcribed by English-speaking operators than ideographic languages such as Japanese. Since it is largely phonetic, it becomes easy to substitute the proper English values for the respective Russian letters.

The adapted Cyrillic alphabet, a sub-division of the basic Slavic, is common to Russia, Bulgaria and Serbia. The Russian language proper includes three branches, all based on this alphabet: Great Russian, which furnishes the standard literary language, based on the dialect of Moscow; Little Russian, which is spoken in South Russia and parts of Poland, Czechoslovakia and Roumania; and White Russian, used by four or five million people of White Russia and parts of Poland, Lithuania and Latvia.

The Russian alphabet is one of the three dominant alphabets of the world, the other two being the Arabic and the Latin. It is basically a combination of the Greek and Latin alphabets. Six of the Russian letters appear in the same form as the Latin letters: A, E, K, M, O and T. Another six letters appear in the Latin alphabet, but have different values. B in Russian when transliterated in English becomes W, H becomes N, P becomes R, C becomes S, Y becomes U and X becomes H.

The accompanying chart, which is based on official sources, gives the Russian alphabet, the equivalent English letters, the Russian sounds and the telegraphic code symbols. A study of the chart reveals that, by changing the Russian letter into the equivalent English one, the telegraphic code then becomes identical in formation with our own telegraphic code.

Five additional letters appear in the Russian alphabet, employing sounds for which there are no single characters in the Latin alphabet, namely, Ч (MN), Ш (MM), Ю (IM), Я (AA) and Э (UI), which are expressed in code by the usual characters for the English letters given in the parentheses, but with dots and dashes formed without any dividing letter spaces.

In pronunciation all vowels are open, except in especially-favored positions, and the consonants are not harsh. The letters Б and Ь are mute and indicate only that the consonant preceding such a letter is respectively hard or soft. Й (EE) (Kratkaya) always stands after a vowel.

(Continued on page 88)

RUSSIAN RADIOTELEGRAPHIC CODE

ENGLISH LETTER	RUSSIAN LETTER	RUSSIAN SOUND	FORMED AS
A	А	AH	•—
B	Б	BEH	—•••
W	В	VEH	•——
G	Г	GEH	——•
D	Д	DEH	—••
E	Е	YEH	•
V	Ж	ZHUH	•••—
Z	З	ZEH	——••
I	И	EE	••
J	Й	EE	•———(KRATKAYA)
K	К	KAH	—•—
L	Л	LLL	•—••
M	М	MMM	——
N	Н	NNN	—•
O	О	O	———
P	П	PEH	•——•
R	Р	ER	•—•
S	С	S	•••
T	Т	TEH	—
U	У	OO	••—
F	Ф	EFF	••—•
H	Х	HAH	••••
C	Ц	TS	—•—•
MN	Ч	CHEH	———•
MM	Ш	SHEH	————
Q	Щ	STCH	——•—
Y	Ы	OUI	—•——
IM	Ю	U(YOU)	••——
AA	Я	YAH	•—•—
X	Ь		—••—
UI	Э	EH	••—••

*Editorial Assistant, *QST*.

[1] Millikin, "The Japanese Morse Telegraph Code," *QST*, September, 1942, p. 23. Worrell, "The Arabic Telegraphic Alphabet," *QST*, January, 1943, p. 34.

Something from Nothing

A Junk-Box Bridge for Measuring R, C and L

BY W. J. MERTZ,* VE4UN

It's not much trouble to make, costs little or nothing, and can be a useful gadget to have in the shack. Just the thing for checking resistance, capacity and inductance over most of the ranges ordinarily required.

With meters going to war, a bridge of the type described here can be useful to nearly every ham. Most of us have nothing with which to measure condensers, resistors and coils, and plenty of others may find, as I did, that that odd condenser really has no capacity at all. At a time when most parts have to come from the junk box or old sets, we need more than ever to know that values are up to the ratings.

The circuit is such a simple one that it needs no special explanation. It is given, together with the values used, in Fig. 1. Various ranges can be obtained with different settings of the switches: with R_2, readings from 250 to 100,000 ohms can be obtained; with R_3, 10,000 to 750,000 ohms; with L_1, 0.5 to 5 millihenrys; with C_1, 25 $\mu\mu$fd. to 0.003 μfd.; with C_2, 100 $\mu\mu$fd. to 0.02 μfd.; and with C_3, 0.01 to 3 μfd. All these ranges have proved to be useful, and, although the accuracy probably leaves something to be desired, it is amply good for most of the work to which the bridge will be put.

If other values are used for the fixed standards the ranges will vary accordingly; in addition, the useful range with a given standard resistance, inductance or capacity also will depend to some extent upon the taper of the variable resistor, R_1. With some tapers the readings may be so congested at one end that the accuracy will be considerably reduced, in which case the usable range will be less than that theoretically available.

* Weyburn, Sask., Canada.

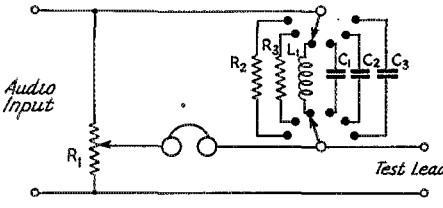


Fig. 1 — Circuit diagram of the bridge.

R_1 — 5000-ohm wire-wound potentiometer (preferably linear taper).
R_2 — 2500 ohms.
R_3 — 25,000 ohms.
L_1 — 2.5 millihenrys (r.f. choke).
C_1 — 500-$\mu\mu$fd. mica.
C_2 — 0.005-μfd. mica.
C_3 — 0.5-μfd. paper.

The construction of the unit is shown by the drawing of Fig. 2. The first thing to do is to make the dial scale and the box. For the scale a 6½-inch circle may be drawn with India ink on good quality light cardboard. The outside circle will be the first scale, and concentric circles ⅜ inch apart are drawn inside it until there are six scales. This leaves space in the center for a 1⅝- or 1¾-inch knob.

Having drawn the circles, the next thing is to look up an old dial which is divided as all dials are. This dial can be matched to one of the circles drawn and the divisions may be copied onto the scale. Then, from the center point of the circle, straight lines can be drawn through each of the points over all the six scales until finally all the scales are properly divided. The outside scale may then be numbered.

The box is made of ¼-inch wood according to the dimensions given. When the scale is cut away to leave 270° (which was the rotation of the variable resistor used) it can be glued firmly to the sloping front of the box, which may well be of Masonite.

The next thing to do is to mount firmly the variable wire-wound resistor through the center point of the dial scale. This resistor should preferably be linear (mine wasn't, and while it made little difference to me no doubt it would be helpful if it was). The panel can be countersunk so that the mounting nut is flush with the surface and the control should be put in to stay. A close-fitting hole in the panel and some glue, as well as tightening the nut firmly, will be of value.

Any knob to which a celluloid or other transparent pointer may be tightly fixed will serve to tune the gadget. I had no celluloid, but I had an old toothbrush handle made of transparent material. This was filed and sanded down until it was of a suitable thickness, and then it was polished up and a thin line was scratched down the center. This was filled with India ink to make a hair line which lies close to the scale. The pointer was cemented permanently to the knob after the knob was recessed to hold it, and when the knob is finally attached it should be tightly and permanently fixed. It is too hard to reset once the calibrations are made.

The other material used can then be mounted. Incidentally, I had no contact points on hand any more, so I used ordinary paper fasteners instead. These can be forced through a small hole and the projecting ends bent back to hold them firmly. They also provide excellent material to which the various resistors and other parts can be soldered.

Values of the resistors and condensers should not make a great deal of difference — those given in the circuit diagram were convenient to use, in my case. The better their quality and accuracy the better for the whole thing, but I just used ordinary ones of good quality. Once everything is assembled and the wiring done with heavy bus wire so that the wiring stays put, the gadget can be calibrated.

For an audio tone, I simply use anything handy, which does *not* include a regular audio oscillator. But almost any receiver will do, inasmuch as there is some way to make any receiver emit a strong squeal — or a strong steady carrier, with the b.f.o. on, will give a usable signal. No doubt this is not strictly according to Hoyle, but I have found that the quality or tone of the signal source doesn't make enough difference to be noticed, if it makes any difference at all. In practice, I do use the same audio squeal from a battery-powered regenerative receiver each time I use the bridge. We must bear in mind that we are making something out of nothing.

A few precision resistors and condensers are necessary for calibrating the bridge. I used 2500- and 50,000-ohm 1 per cent precision resistors and 0.0001-, 0.00025- and 0.005-μfd. silver-capped condensers. These may not be at hand, but probably everyone can find a way to get a few accurate standards from which to work. If nothing better is possible, perhaps a number of resistors and condensers of supposedly the same value can be tested, and if a substantial percentage show the same reading, they could be used as standards. However, it would be far more satisfactory to beg, borrow or steal some standards to start with, or at least ascertain the exact values of some that are on hand.

On the outer scale, with the switch points set to include the 2500-ohm resistor, the standard 2500-ohm (or other) resistor can be connected to the short test leads, and with the audio input plug in the 'phone jack of a screaming receiver the knob can be rotated for the null point where the signal disappears. This point can be inked on the scale, putting the figure at the point in small numerals. We now have 2500 ohms established and we can now take a junk-box resistor, variable or otherwise, which we can pair accurately with the standard by reading it on the scale. When we have the second 2500 ohms adjusted, we can connect the two of them together in series, with clips, and we can establish a 5000-ohm point on our scale; then in parallel and we have 1250 ohms to ink in. With 5000 ohms established we can set two junk-box resistors to that value and connect them in parallel and take a reading. If we get 2500, our starting point, we are doing fine and we can connect them in series and establish 10,000

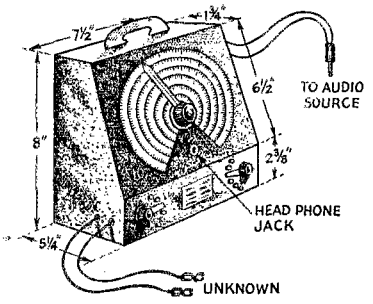


Fig. 2 — A sketch of the case for the bridge, showing outside dimensions.

ohms. This system of back checking is useful and provides much interesting and instructive work. As an example: We now have 5000 and 1250 ohms established. By connecting these two values in parallel we get a result of 1000 ohms. Two 1000-ohm resistors in parallel give us 500 ohms, and all three in series should give us our original standard 2500. If it does, we now have 1000 and 500 ohms established and the possibilities are unlimited from there on.

Of course, similar methods may be used with whatever standards are used, and similar methods are used with the condensers to calibrate their scales. It will be noted that while resistances increase in value on the scales, with clockwise rotation of the knob, condenser capacities decrease in the same direction. I found it valuable to ink all points found right on the scales for direct reading. For intermediate readings a graph can be easily drawn from readings established, if desired.

For inductances, I used the average of several r.f. chokes as a starting point, and this is good enough to tell a 1.5-mh. choke from a 2.5 one at least. This scale is useful when arriving at inductances for long-wave bands or for 100-kc. oscillators. I used the smallest scale for the by-pass condensers and readings from 0.01 to 3 μfd. are possible. Any condenser that will not show a null point anywhere is better off in the scrap heap.

Values of old unmarked variable condensers and resistors can be determined with this bridge, and 10,000 uses can be found for it. I thought calibrations might change with temperature and age, but over a period of two or more years the standards still show up at their original points, and they are right on the beam in winter as well as in summer. It is probably not too accurate, but it is mighty handy. The ham who has nothing better, or nothing at all, should have one.

HAPPENINGS OF THE MONTH

W.E.R.S. RULES AMENDED

FCC on January 19th modified certain of its rules governing the War Emergency Radio Service. We report the changes for the government of all concerned, and urge the WERS gang to make notation of these changes on their copies of the WERS regs.

Sec. 15.27 originally authorized licensees to "make any changes in the equipment" that are deemed necessary or desirable. The quoted words are now changed to "make any alterations in components of the licensed equipment."

A new sentence has been added to Sec. 15.42, on the transmission of call letters: "When communications are carried on with any other station licensee, stations in the war emergency radio service shall identify themselves as herein required, and in addition, shall announce the call letters, unit numbers, and the class of the station with which they are communicating."

Sec. 15.51 is clarified by now reading "station licensee" instead of simply "licensee."

A new section has been adopted, numbered 15.55: "*General limitations.* — Stations in the war emergency radio service shall not be operated on board any vessel unless such operation has been approved by appropriate naval authority."

A one-word amendment occurs in the sixth item under Sec. 15.62, dealing with the supplementary statements that must be filed for civilian-defense stations (and in the identical provision in Sec. 15.82, dealing with state-guard stations): the requirement of information on provisions for "periodic" inspection of the equipment is changed to refer to provisions for "frequent" inspection.

On the service which may be rendered by civilian-defense stations, treated in Sec. 15.63, two new sentences have been added, dealing with a matter which is treated later in this article: "In addition, civilian-defense station licensees, when requested in specific instances by any Civil Air Patrol Wing Commander, may use their licensed civilian-defense stations for essential communication with civil air patrol stations for which the particular Wing Commander is licensee, during emergencies endangering life, public safety, or important property. Civilian-defense stations shall not be operated on board any aircraft unless specific authority for such operation has been granted by the Commission upon proper application and showing of need therefor."

In Sec. 15.64, the word "other" has been deleted, without altering the sense. The last sentence of this section (and an identic provision for state guard stations in Sec. 15.83) has prohibited transmissions not directed to "a specific authorized station." The quoted wording is now altered to read "authorized stations."

Since WERS stations are authorized to communicate, in emergencies, with police, forestry, marine-fire, and special emergency stations, which FCC brackets under the title of Emergency Service, the Commission adopted a new rule in Part 10 of its regulations authorizing said stations to communicate with WERS stations, the new section being number 10.113, and replacing Sec. 10.122.

The most important change, however, is the expansion of WERS to embrace not only civilian-defense stations and state-guard stations but a new class known as "Civil Air Patrol stations." That is to say, there are now three categories of WERS stations.

The Civil Air Patrol is a branch of OCD, a voluntary organization through which citizens may apply their knowledge of aviation to furthering the war effort. Under a Wing Commander in each state, CAP provides forest patrol, courier service, disaster relief, rescue missions and, according to the press, certain patrols of considerably greater importance, and trains aircraft and ground personnel. A preview of the introduction of CAP into WERS was afforded by the article in our last issue on OCD's "Tri-Part Plan," in which it was recommended that the CAP employ four channels between 115.2 and 116 Mc. in the WERS band.

FCC adopted a complete set of rules for CAP stations, closely paralleling those for other types of WERS stations. They are defined as stations used exclusively for essential communications relating directly to CAP activities, except when such stations are under military control. They may be used only during emergencies when life, public safety, or important property are in danger; or for essential communication directly relating to CAP activities, when other communication facilities do not exist or are inadequate. All CAP stations within a state will be provided for under one license in the name of the Wing Commander, with the requirement that there be a formally designated communications officer to supervise the actual operation. WERS operator permits are required for all operation. The usual provisions for a showing, supplementary statements, supervision, tests, etc., are duplicated for the CAP stations.

CAP licenses, like any other WERS license, will actually authorize operation on all WERS frequencies. But, as a matter of practical operation, it has been agreed between the several agencies concerned that CAP activity will be confined, in the interests of reducing interference, to the top four OCD channels of the band lying between 115.2 and 116 Mc. Compliance with this understanding is facilitated by an arrangement whereby all CAP applications are forwarded to FCC via the CAP national commander at Washington.

TRANSMITTING TUBES WANTED

ON BEHALF of the broadcasting stations of the country, we renew the appeal of the National Association of Broadcasters to amateurs who are willing to sell tubes suitable for use in broadcast transmitters. (We do not register tubes in the ARRL ApBu.) Tubes for civilian uses, of course, are difficult to obtain and every time a ham tube goes to work in a b.c. station a new bottle is spared for military use. It is particularly hoped that amateurs entering the armed services will make their tubes available before their departure. Hams willing to sell their power tubes are asked to address the National Association of Broadcasters, attention Howard S. Frazier, Director of Engineering, 1760 N St., N. W., Washington, D. C., listing the type, age, and price desired, and giving all pertinent information as to condition. NAB relays the data to the b.c. stations and you are extremely likely to hear soon from one that wants to buy your bottles.

The Aluminum Company of Canada, Ltd., is badly in need of some Eimac 250TL (or equivalent) tubes for the maintenance of an important transmitter at one of its remote plants where the only communication is by radio. There is involved not only the wartime production of aluminum but the maintenance of a weather-reporting service for the Canadian Government and an observation post, so it is worthy of our help. Amateurs willing to sell their 250TLs are requested to address J. B. Wood at the company, 1700 Sunlight Building, Montreal, Quebec, stating age of tubes and price desired, and describing condition.

A.R.R.L. METER PROGRAM ENDS

WE RENEW the notice that, a sufficient number of meters having been received for the program we operated for some months on behalf of the Signal Corps, no more can be accepted at the present. Please do not send any more meters to ARRL unless the appeal is renewed. If you encounter an amateur about to send in his meters to ARRL, please ask him to QRT.

Although this particular program has ended, there are plenty of urgent calls for your meters!

ARE YOU LICENSED?

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

ALTERNATE ELECTIONS

TWO of our divisions had to be resolicited for nominations before eligible candidates were named for alternate director.

In the Rocky Mountain Division, Willard C. Wright, W9BQO, was the only eligible nominee and therefore was declared elected for the 1943–44 term without balloting by the membership. Mr. Wright is a repairman for the Mountain States Tel. & Tel. at Denver.

In the Northwestern Division, balloting is occurring to choose between R. Rex Roberts, W7CPV, the incumbent, and Orpheus U. Tatro, W7FWD. A petition for A. Robert Cunningham, W7HAL, was also received but was invalid because of insufficient signers.

SERVICE RECORDS WANTED

AT ARRL Hq. we continue the endeavor to compile a roster of amateurs serving in the armed forces, not only for mention in "In the Services" but more particularly with a view to being able to demonstrate later the amateur's contribution to this national effort. We also record all known amateurs in war radio work in the Civil Service. We ask you to drop us a line of data on yourself, your buddies, your associates. We wish no information of military consequence: simply your name, old home town call, rank or rating, branch of service.

MISSING IN ACTION

THOMAS CHURCHILL NELSON, JR., RM1c, W6QGN, of Mill Valley, Calif., has been officially reported missing in action in the Solomons. He was radio operator for the Commanding Officer, Torpedo Bombing Squadron.

P.O.W.

GEORGE MERRIMAN, VS6AH, is reported to have been taken prisoner by the Japanese during the seizure of Hong Kong.

Strays

I have just enlisted in the Navy, December 13, 1942. Thirteen years ago, December 13, 1929, I received my first ham ticket. — *W1BEW*

Elementary A.C. Mathematics

Part II — Vectors*

BY GEORGE GRAMMER,** WIDF

THE graphical representation of the instantaneous values of a sine function, or "sine wave," by means of the projection of a rotating radius can be explored further with some profit. Let us take the case of two sine waves having the same angular velocity — that is, the same frequency — but differing in phase. There are innumerable examples of such cases in practice, and, when two waves exist in a single part of one circuit, a question arises as to the nature of the result of the combination.

As a general principle, it can be stated that the current in a single circuit element can have only one value at a given instant of time. While several forces may be tending to move the electrons one way or the other, there is only one *resultant* force, and the resultant is the one the electrons obey. This is comparable, for example, to a tug-of-war; the contesting teams exert forces in opposite directions, but the rope moves only one way, if it moves at all. The effect, then, of applying several electromotive forces in a single circuit is to produce a single resultant e.m.f. at any instant, with the current proportional to the e.m.f. at that instant. At a subsequent instant the resultant e.m.f. may be entirely different, both as to intensity and direction; in fact, both intensity and direction may change with extreme rapidity. But there is always a *single* value of current associated with each value of e.m.f.

Nevertheless, just as the resultant e.m.f. is constructed from its several components, it is frequently convenient to consider the current as being similarly constructed from several components, each the result of a separate e.m.f. Suppose we have two such components flowing in the same circuit element. Calling the maximum value of the first I_1 and of the second I_2, the expressions for the instantaneous values would be

$$i_1 = I_1 \sin (\omega t + a)$$
$$i_2 = I_2 \sin (\omega t + b)$$

where ωt is the same in both cases, but the phase angles a and b may be different. For purposes of illustration, let us assume that I_1 is 3 amperes and I_2 is 2 amperes; also, that the frequency is 60 cycles, a is 30 degrees and b is 60 degrees. We can select any value for ωt we wish, depending upon the particular part of the cycle we want to consider. The value of ω is of course determined by the frequency ($\omega = 2\pi f = 376.8$ radians per second) so that what we actually select is an instant of time — or rather, a time *interval* measured from the reference instant t_0 to the desired instant t_1. With a little forethought, let us select a time interval t of 0.000695 second; this will give us an angle ωt of 0.000695×376.8 or 0.262 radians, which is approximately 15 degrees.

We can now draw the two currents to scale on a radius diagram, as shown in Fig. 7. For simplicity we take t_0 as the X axis to the right of the origin. The radii are rotating in the counterclockwise direction, and in the time interval t both will have moved through the angle ωt. This angle, 15 degrees, is given by the X axis and the dashed line; the arrow indicates rotation through this angle in the time interval from t_0 to t_1. However, I_1 has a head start of 30 degrees (the angle a in the expression describing the instantaneous current i_1) and consequently is drawn in a position 30 degrees in advance of the dashed line. I_2 has a start of 60 degrees, so that it is 60 degrees in advance of ωt, or 30 degrees ahead of I_1. The projections on the Y axis give the instantaneous values of the two components. One component represents so many electrons moving past a point in the circuit while the second component

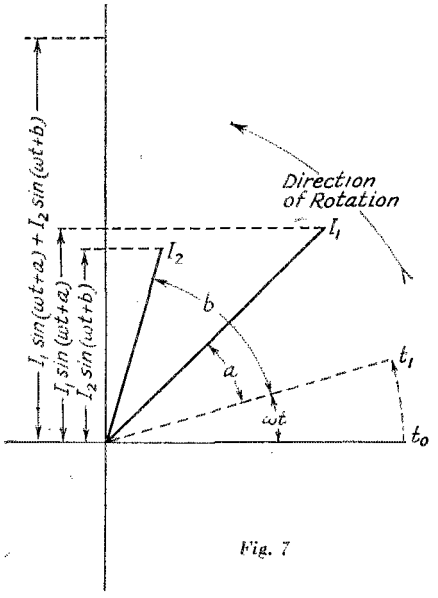


Fig. 7

*Part I appeared in *QST* for February, 1943.

**Technical Editor, *QST*.

represents another number; the two added together give the total number of electrons or the total current. Hence we simply add the instantaneous currents to find the total current at the same instant. This is indicated on the graph by the simple linear addition of the two projections.

In Fig. 7 all the action takes place in the first quadrant, so the others are not shown. The same principles would of course apply in any quadrant or combination of them. For example, suppose that t is chosen so that ωt becomes 130 degrees. Then, using the same current components as before, the graph takes on the appearance of Fig. 8. The current radii keep their same respective positions with reference to the dashed line representing the angle ωt. In this instance I_1 lies in the second quadrant and I_2 in the third quadrant. By the laws of signs previously described, i_1, the instantaneous value of the current I_1, is positive, while i_2, the instantaneous value of I_2, is negative. Thus i_1 represents a component flowing in one direction and i_2 a component flowing in the reverse direction. As before, there can actually be only one current; the opposing components simply represent the independent effects of two opposing e.m.f.s. which, if acting alone, would cause currents of that value to flow. The resultant e.m.f. is the difference between the two, since they are acting in opposite directions; consequently the current which actually flows is the difference between the two components. In the graph the value of the actual current is represented by the distance A along the Y axis, the symbol A being used because room is lacking to write in the expression for the algebraic sum of the two components.

The Equivalent Radius

No matter what the value we assume for ωt, the radii I_1 and I_2 always will be in the same angular positions with respect to each other and ωt, since the phase angles, a and b, are constant. (This will be true, of course, only so long as both currents have the same angular velocity. If the velocity of one should change, the angular distance between the two radii would no longer be constant but would vary with the instant of time considered. In that case, however, the currents would not be of the same frequency, since a change in velocity is identical with a change in frequency.) The two components may therefore be considered to rotate as a *unit*. Under such circumstances it is natural to look for some single radius which will be exactly equivalent, at all times, to the two individual radii whose relationships as to amplitude and phase are fixed. Such an equivalent radius, from its amplitude and angular position, would give directly the value of the resultant or actual current in the circuit at any instant, in the same way that the amplitude and position of each of the component radii

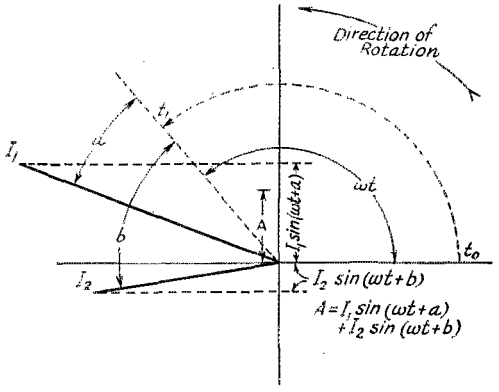


Fig. 8

give the instantaneous values of the respective components.

It seems clear that if such an equivalent radius exists its projection on the Y axis must generate a sine wave, as the radius rotates, of the same angular velocity as that of the two components from which it is constructed. This because its length and position would be fixed with respect to the two component radii, hence it too would rotate uniformly with them, and at the same speed. And as we have seen before, the uniform rotation of any radius results in the generation of a sine wave by the projection on the Y axis. The practicability of substituting an equivalent radius therefore hinges on the question of whether the addition of two sine waves of the same frequency results in the production of still another sine wave of the same frequency. The addition does in fact give that result; the new wave will have a new amplitude, and perhaps a new phase, but it will still be a *sine* wave, and its frequency will be exactly that of the two components from which it is derived. This is the reason why it is impossible to separate two currents — signals, if we like — of exactly the same frequency once they get into the same circuit. The component currents lose their identity completely, merging into a new resultant current of the same form and leaving behind no clues as to their original amplitudes and phases.

There is one further conclusion to be reached. Since the projection of our equivalent radius must be a sine wave, then that projection must fit into the same sort of formula that describes the components separately. That is,

$$i = I \sin(\omega t + c)$$

where i is the instantaneous value of the total current (sum of the component projections), I is the amplitude of the equivalent radius, and c is its phase angle; ω and t are of course the same as before.

Let us look now at Fig. 9, where I_1 and I_2 are

drawn in the same positions they occupied in Fig. 7. To simplify the angular notation we substitute p for $\omega t + a$, and q for $\omega t + b$. Then $i_1 = I_1 \sin p$ and $i_2 = I_2 \sin q$. In the case of the resultant current we substitute r for $\omega t + c$, so that $i = I \sin r = i_1 + i_2$. This is same process we followed previously, except for the change in notation.

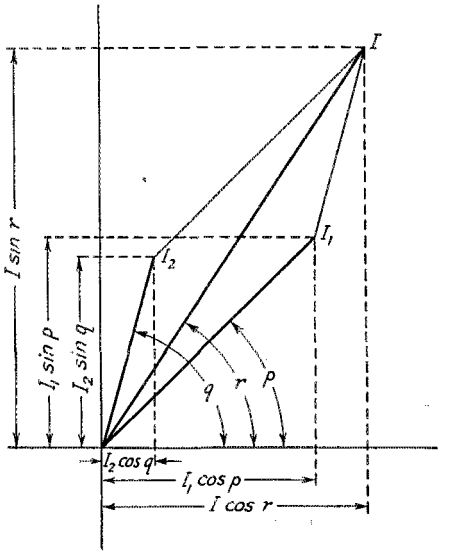


Fig. 9

The key to the combination of the two currents is to be found in the cosines of the angles associated with them. It will be recalled that the ratio of the length of the projection of the radius on the Y axis to the length of the radius itself is the sine of the angle; similarly, the ratio of the length of the projection of the radius on the X axis to the length of the radius is the cosine of the angle. By rotating the figure a quarter turn to the left, the X axis becomes vertical, and it will be recognized that, except for the fact that the axes were previously labelled, there is no essential difference so far as the vertical projections are concerned. In other words, when the radii rotate a quarter circle or 90 degrees from the positions shown in Fig. 9, what were formerly X projections now become Y projections, and must add to give the projection of the resultant. Since this will be true no matter what the starting positions of the two radii, the X projection of the resultant always must be the sum of the X projections of the two components. With both Y and X projections of the equivalent radius determined, the radius itself is uniquely determined, both as to length and position.

The X projection of I_1 is $I_1 \cos p$ (in Fig. 9), and the X projection of I_2 is $I_2 \cos q$. Adding these linearly gives the X projection of the equivalent radius, or $I \cos r$. By this means we locate the end point of the equivalent radius I; instead of starting with a radius in a specified position and constructing the projections, we simply reverse the process and start with the projections. The end point of the equivalent radius I is found at the intersection of a vertical line through the X axis at the point representing the X projection, and a horizontal line through the Y axis at the point representing the length of the Y projection. A line drawn from this point of intersection back to the origin of the graph is the equivalent radius. Its length is the amplitude of the resultant current, on whatever scale has been chosen for the drawing, and its position with respect to the line representing ωt determines its phase angle. Both the length and the angle can be measured from the graph; the angle r was made equal to $\omega t + c$, c being the phase angle, so that to find c we must subtract ωt from r.

It is not necessary to arrive at a solution by graphical means, although the drawing is an extremely useful aid to an understanding of the principles. Greater accuracy, if it is needed, can be had by using the trigonometric functions. We observe that

$$I \sin r = I_1 \sin p + I_2 \sin q$$
$$I \cos r = I_1 \cos p + I_2 \cos q$$

and that

$$p = \omega t + a = 15° + 30° = 45°$$
$$q = \omega t + b = 15° + 60° = 75°$$

these being the values previously assigned. From a table of trigonometric functions, $\sin 45° = 0.707$, $\cos 45° = 0.707$, $\sin 75° = 0.966$, $\cos 75° = 0.259$. Then since $I_1 = 3$ amperes and $I_2 = 2$ amperes,

$$I \sin r = (3 \times 0.707) + (2 \times 0.966) = 4.053$$
$$I \cos r = (3 \times 0.707) + (2 \times 0.259) = 2.639$$

Going back for a moment to the trigonometric functions, it will be remembered that the sine of an angle is equal to y/r, and that the cosine is equal to x/r (in this case, r means "radius," as in Fig. 6, and is not to be confused with the angle r discussed above). The tangent of the angle is equal to y/x. Then if we divide the sine by the cosine, we have

$$\frac{\frac{y}{r}}{\frac{x}{r}} = \frac{y}{x}$$

which is the tangent. In other words, the tangent of an angle is equal to the sine of the angle divided by the cosine. Therefore, in Fig. 9,

$$\tan r = \frac{I \sin r}{I \cos r} = \frac{4.053}{2.639} = 1.536$$

Since I in the left-hand expression occurs in both numerator and denominator, it does not affect the *ratio* of the sine to the cosine, and hence does

not affect the value of the tangent. From a table of trigonometric functions it is found that 1.536 is the tangent of 56° 56′. Subtracting ωt, which is 15°, gives 41° 56′ for the value of c, the phase angle.

We are now in a position to find the amplitude of the equivalent radius. Since $I \sin r = 4.053$, and r has been found to be 56° 56′, then

$$I = \frac{4.053}{\sin 56° 56'} = \frac{4.053}{0.838} = 4.84 \text{ amp.}$$

The resultant current therefore has a maximum value of 4.84 amperes, and has a phase angle of 41° 56′, placing it between I_1 and I_2.

The same method may be used in the case illustrated in Fig. 8 and will lead to an identical result, since the amplitude and phase angle of the resultant current do not change with ωt.

Vectors

The length and angular position of the equivalent radius can be arrived at by an even simpler graphical means, although the method really amounts to the same thing as the one already used. Inspection of Fig. 9 will show that the line joining the ends of I_2 and I is parallel to I_1 and has the same length, while the line joining the ends of I_1 and I is parallel to I_2 and has the same length as I_2. In other words, these lines together with I_1 and I_2 form a parallelogram, with I its longer diagonal. Quite simply, then, the length and position of I can be found by drawing one line parallel to I_1 through the end of I_2 and a second through the end of I_1 parallel to I_2. The point where the two lines intersect is the end point of I, the resultant amplitude.

It is easy to see why this gives the same result as adding the projections. In Fig. 9 the projections partly coincide, but if we make an equivalent drawing in which they do not (or rather, look at the drawing from a slightly different viewpoint), the addition perhaps becomes plainer and the identity of the parallelogram method with the trigonometric method becomes clear. This is done in Fig. 10, where the addition is shown in two ways. If we begin with I_2 drawn from the origin of the graph, its X and Y projections will be $I_2 \cos q$ and $I_2 \sin q$, respectively. Now instead of starting I_1 from the origin, we start it from the end of I_2, so that its projections begin where those of I_2 end. I_1 is drawn at the same angle (with respect to the axes) as before. Its projections are $I_1 \sin p$ and $I_1 \cos p$, and once they have been drawn we automatically have the total projections; i.e., the projections of the equivalent radius.

Alternatively, we can start out with I_1 drawn from the origin, marking off the projections, and then draw I_2 from the end of I_1, still maintaining the proper angles. This leads to exactly the same result, as the graph shows. The four lines necessarily form a parallelogram, since both I_1's are drawn at the same angle with respect to the axes, and so are both I_2's. They meet at the end point of I, which is not shown in Fig. 10, but would be constructed in the same way as in Fig. 9.

This type of construction is frequently used in mechanics, where it is called the *parallelogram of forces*. If the lines I_1 and I_2 represent mechanical forces having values proportional to their lengths, and exerted in directions indicated by the directions of the lines, the amplitude and direction of the resultant force is found by completing the parallelogram as just described. Lines which represent, by their length and direction, the magnitude and direction of a force are called *vectors*. In our case, of course, the relative directions of the radius lines indicate phase rather than direction in which an e.m.f. is applied; the only direction which has meaning so far as the circuit is concerned is the direction of current flow. This is given by the sign of the Y projection; a positive projection indicates flow of current in one direction through the circuit while a negative projection indicates flow in the opposite direction. Nevertheless the vector method leads to correct results, and since it is an easily visualized method of analysis, as well as simple to apply, we call our rotating radii *radius vectors*.

The process of combining a number of vectors to find a resultant (which is also a vector, since it possesses both magnitude and direction — that

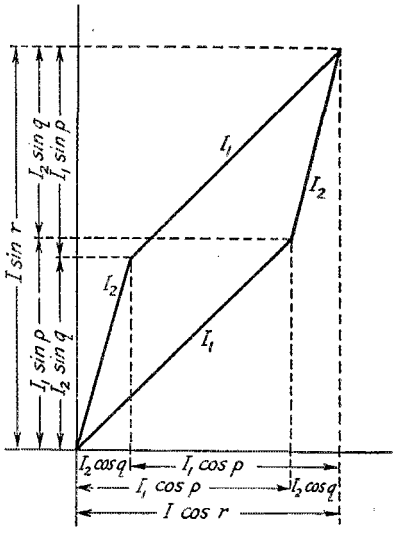


Fig. 10

is, phase) is called *vector addition*. Addition takes account both of length and direction of the vector and there is no limit to the number of vectors which may be added. Direction is usually indicated by providing an arrowhead on the vector, since there are two possible directions associated

with a line unless one is specifically excluded. The process of addition is simply one of placing the vectors end to end, as shown in Fig. 11, the "tail" of one being placed at the "head" of the preceding one. The dashed line is the *vector sum* of the four vectors A, B, C, and D.

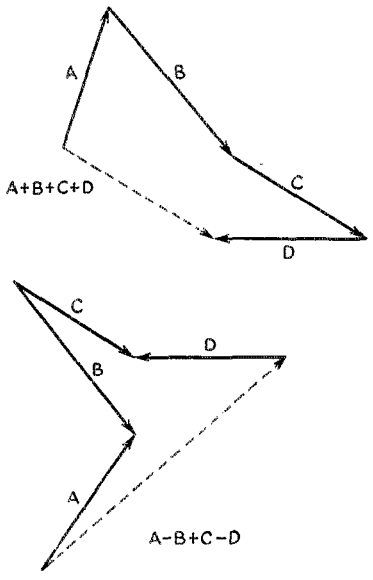


Fig. 11

When a vector is to be subtracted, its direction is simply reversed. The second drawing in Fig. 11 represents the case when B and D are subtracted from the sum of A and B, the vectors otherwise being the same as in the upper drawing. Most of the cases we will encounter call for addition, but occasionally subtraction is necessary. (For example, if the total or resultant current and one of its components are known, the other component can be found by subtraction.) In any case, the direction of the resultant always will be away from the starting point. The order in which the vectors are added or subtracted makes no more difference than the order in which a series of numbers is added or subtracted; the same resultant would be obtained if we started with D and added (or subtracted, as required) C, then B, and finally A, or used any other order we might choose.

Radius Vectors

The vectors can all originate at one point, in which case they may be added by the parallelogram method rather than by the direct addition just illustrated. This is usually the situation when radius vectors are used. The four vectors shown in Fig. 11 are redrawn from the same origin in Fig. 12, so that they could represent various components of an alternating current. In this case we add them by pairs, first taking one pair and finding the sum, then adding a third to the sum already found, and continuing in this fashion until the whole set has been added. In Fig. 12, A and C are added together by completing the parallelogram, giving the resultant $A + C$. Using this resultant together with B, another parallelogram is formed to find the resultant $A + B + C$. This resultant in turn is combined with D by the parallelogram method to find the total sum, $A + B + C + D$. It happens that the final resultant practically coincides in direction with C and is just slightly greater in amplitude. This result is identical with that obtained in Fig. 11, as will be obvious from inspection of the drawings.

In the case of radius vectors the direction is always taken as outward from the origin of the graph. As we mentioned before, this "direction" has no significance so far as the direction of current flow is concerned, except as the latter is positive when the vector lies above the X axis and negative when the vector lies below. It does, however, serve its purpose in the construction of the resultant.

Practical Applications

In the solution of electrical circuits the instantaneous values are not usually of primary interest; if the function is of the simple harmonic type — that is, a sine wave — it is known how the current varies with time. The *amplitude* and *phase angle* are the quantities of particular concern in a given circuit. As the preceding discussion has shown, both amplitude and phase angle of a resultant current are affected by the amplitudes and phase angles of the various components from which it is constructed. Once the resultant is found, the phase angle which is of chief interest is that which exists between the current and the applied e.m.f. (the voltage also is a sine function which may or may not reach its maximum point in the cycle at the same instant that the current does).

When this is the case we can dispense with the time factor and simply consider *relative* phases since, in the absence of any circuit

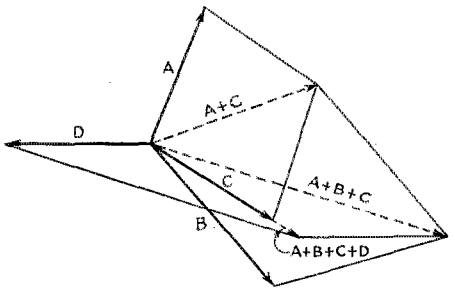
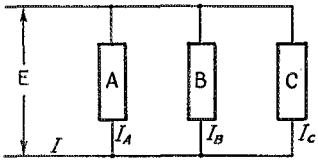


Fig. 12

changes, the phase angle between any two components will be constant. The angle ωt therefore can be neglected, since it does not affect the relative phase angle. Consequently, we can place our radius vectors in any position in the circle we please, just so long as the *difference* in phase between them is correctly represented, because the vector construction leads to the same amplitude and relative phase of the resultant at every part of the cycle.

Fig. 13



I_A = 2 amp ∠ 35°
I_B = 1.5 amp ∠ −20°
I_C = 2.5 amp ∠ −70°

To simplify matters, it is usual practice to select one component or quantity as a reference, arbitrarily calling its phase zero. The reference quantity is then drawn along the X axis to the right of the origin (in the "t_0" position in Figs. 7 and 8), and the other components are then drawn in the proper positions according to their relative phases with respect to the reference component. Selection of the reference is a matter which depends upon the circumstances. For example, if the circuit under consideration contains a number of parallel branches across which the same e.m.f. is applied, the common voltage would logically be chosen; the phases of the individual currents in the branches then would be referred to the voltage in constructing the vector diagram. On the other hand, if the circuit is one containing a number of series elements the same current flows through all elements, but the voltage across each may have a different amplitude and phase with respect to the current. In such a case the current would be chosen as the reference.

The phase of a component may be such that its cycle begins before (in time) that of the reference. If this is the case, then since the direction of rotation is counterclockwise we draw the component vector above the reference vector and call its phase angle with respect to the reference "positive." On the other hand, if the phase of a component is such that its cycle begins at a later instant than that of the reference, it is drawn below the reference and its phase angle is called "negative." A positive phase angle indicates that the component is "ahead of" or "leading" the reference; a negative phase angle indicates that the component is "behind" or "lagging" the reference by that angle. A positive angle also may be considered to be one generated by movement in the normal (i.e., counterclockwise) direction, while a negative angle is one generated by movement in the clockwise direction, opposite to normal. An angle of − 50 degrees therefore is one generated by a radius moving clockwise 50° from the reference position. It should be plain that in moving 50° in the clockwise direction the radius reaches the same position it would have had it moved in the normal direction over the remainder of the circle. Thus a negative angle of 50° is equivalent to a positive angle of 360° − 50° or 310°. If a negative angle is less than 90° it lies in the fourth quadrant, since its positive equivalent is between 270° and 360°; if more than 90° but less than 180° it lies in the third quadrant, since its positive equivalent is between 180° and 270°, and so on.

A representative parallel-circuit case is shown in Fig. 13. Three circuit elements, A, B, and C, are in parallel; the same voltage, E, is applied to all of them. The current I_A through element A is assumed to be 2 amperes and to have a phase angle of 35° (positive, since there is no indication to the contrary). Current I_B through element B is 1.5 amperes at a phase angle of − 20°, while current I_C through element C is 2.5 amperes at a phase angle of − 70°. These phase angles are relative to the voltage, which is taken as the reference. The *vector* sum of the three currents will be the amplitude of the total current, I, while the angle which the resultant vector makes with the voltage vector will be the phase angle of the total current with respect to the voltage. The voltage, E, does not enter into the sum. It has no function in the diagram except to establish the relative phases, so we need not draw it to the proper amplitude scale; in fact, its amplitude is not even given.

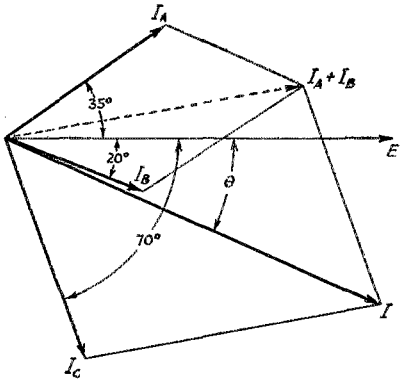


Fig. 14

The vector diagram is shown in Fig. 14. With E in the "zero time" position, I_A is drawn 35° ahead, I_B 20° behind, and I_C 70° behind. Vector addition of I_A and I_B gives $I_A + I_B$, shown by a dashed line. This sum is then added to I_C by the parallelogram method, giving the total current,

(*Continued on page 68*)

IN THE SERVICES

COAST GUARD amateurs are writing us now. Thanks for information! Keep it up — and send along some pictures.

We have heard that many hams in the Services are boning up on radio and getting commercial tickets — something they have always wanted. More power to you and if we can be of any help, let us know.

In line with "Ham Hospitality" here in the States we have a good suggestion from Jim Howden, W6SSG. He thinks amateurs in camps should register with the local USO and home hams should leave their addresses and phone numbers with the USO — thus providing means by which a get-together could be arranged from either end. Seems to us like a good idea. (For whole letter see "Correspondence from Members.")

We're already looking forward to the wonderful mess that we'll hear on 40 meters when this is all over!

NAVY—SPECIAL DUTY

ON THE QT, there's a ham on active service in the Navy with a beautiful full set of false teeth!

1EQQ, Hartley, Corpus Christi, Texas.
1KQF, Taylor, RT1c, Norfolk, Va.
1LTR, Nelson, Corpus Christi, Texas.
1MWP, Welch, Corpus Christi, Texas.
2HET, Hults, RM2c, Algiers, La.
2IMS, Kilian, Corpus Christi, Texas.
2ISY, Ross, Corpus Christi, Texas.
2LCE, Smith, Corpus Christi, Texas.
2MRK, Genaille, Corpus Christi, Texas.
2NLZ, Gull, RT2c, New London, Conn.
3FPA, Tong, CRM, Algiers, La.
3GDW, Pavlovich, RT2c, Norfolk, Va.
3HMH, Trout, Corpus Christi, Texas.
3HPE, Latham, Grove City, Pa.
4CRP, Boyd, CRM, Algiers, La.
4EOX, Andress, RE, Algiers, La.
4HWU, Post, RT2c, Norfolk, Va.
4ZU, Hawley, Lt. (jg), Algiers, La.
5ELR, Dausman, Lt., Algiers, La.
5EWP, Atkinson, Corpus Christi, Texas.
5FGM, Duthie, Corpus Christi, Texas.
5GFM, Nicolades, RM2c, Algiers, La.
5HBB, Brooks, Corpus Christi, Texas.
5HPH, Seaman, CRM, Algiers, La.
5IKS, Bergin, Corpus Christi, Texas.
5IVM, King, Corpus Christi, Texas.
5JUL, McClain, Corpus Christi, Texas.

COAST GUARD

1CBR, Maddock, RM3c, Truro, Mass.
1DJB, Luce, Petty Officer, address unknown.
1EVZ, King, RM1c, address unknown.
1HTI, Mikishka, RM3c, Truro, Mass.
1KOO, Hope, RM2c, Truro, Mass.
1LQ, Black, RM3c, Truro, Mass.
1LQL, Bolderson, RM3c, Truro, Mass.
1LZJ, Bartlett, RM3c, Truro, Mass.
1NTJ, Vardakis, RT1c, New York, N. Y.
1MQF, Faria, RM3c, Truro, Mass.
1RR, Cavallini, RM3c, foreign duty.
2CVO, Bloechle, RT2c, New York, N. Y.
2FIJ, Wheatley, RT1c, New York, N. Y.
2JJX, Berkery, RT1c, New York, N. Y.
2JWI, Landfear, RT2c, New York, N. Y.
2MEL, Bry, RT2c, New York, N. Y.
2NFU, Tritsch, RT2c, New York, N. Y.
2NJL, Lodi, RT2c, New York, N. Y.
20AV, Hill, RT3c, Miami, Fla.
3GVV, Stott, RT2c, New York, N. Y.
3JAO, Bartoo, Cadet, New London, Conn.
4DTV, Watson, CRM, South Portland, Me.
6SGN, Williams, RM2c, Montara, Calif.
6UKH, Altschuler, address unknown.
8SCR, Quick, CRM, New York, N. Y.
8UMY, Brown, RM2c, Ft. Story, Va.

All we can say is — either the bomb or the sign was moved! These Navy hams "somewhere in England" look too happy. *L to r.*: Lt. (jg) Cameron, W8RNH, Lt. Hoselton, W4ADP, and Lt. (jg) Tippey, W4DBG.

This is Sgt. Bill Eppley, W3BNK. After a course at Ft. Monmouth, he is now an instructor at Camp Murphy, Fla. You hams down there have him to thank for the publicity in this issue! Keep the information coming.

8VKJ, Witte, EM1c, New London, Conn.
9BPZ, Nolkemper, RM3c, St. Louis, Mo.
9COY, Leaf, Sea2c, Truro, Mass.
9MPW, Deziel, RM1c, St. Louis, Mo.
9NCS, Martin, RM2c, foreign duty.
9TBT, Luecke, RM3c, St. Louis, Mo.
9TEF, Gulseth, Fireman 3c, Memphis, Tenn.
9VZG, Thompson, RT2c, St. Louis, Mo.
9ZVM, Cortinovis, RM1c, St. Louis, Mo.
Operator's license only:
Jayson, CRM, Cedarhurst, N. Y.
McGinnis, RM3c, St. Louis, Mo.

ARMY—GENERAL

HERE'S a New Year's Resolution — Al Faries, W7IXX, a Corporal in the Army, hopes 1943 will see Hitler, Tojo, and Mussolini across secondary of his final plate power supply transformer (4500 volts each side at 750 mills!).

1CSC, Ballard, Pvt., Ft. Ruckman, Mass.
1DYM, Gordon, Pvt., Camp Edwards, Mass.
1ICU, Taylor, Sgt., Miami, Fla.
1IPQ, Waterman, Lt., Ft. Belvoir, Va.
1KCX, White, Pvt., Atlanta, Ga.
1KWX, Padykula, T/4th, Camp Chaffee, Ark.
1MUK, Dinsmore, Cpl., Camp Edwards, Mass.
1MXO, Tetu, Pvt., Camp Forrest, Tenn.
1NIB, Brennan, Pvt., Charleston, S. C.
1NNT, Schmaelzle, Sgt., Palm Beach, Fla.
1NTI, Terrien, Cpl., foreign duty.
1PX, Stewart, Lt., Camp Lee, Va.
2DVM, Cannata, Pvt., Camp Edwards, Mass.
2FDR, Margolis, Lt., address unknown.
2HCC, Socolick, Pfc., Ft. Geo. G. Meade, Md.
2JAP, Brody, Pvt., Camp Upton, N. Y.
2JCL, Ford, Pvt., Ft. Dix, N. J.
2JOB, Soderstrom, T/Sgt., Los Angeles, Calif.
2JYR, Ray, Sgt., Ft. Dix, N. J.
2KES, Zauner, 2nd Lt., Ft. Monmouth, N. J.
2KVL, Horizny, 2nd Lt., New York, N. Y.
2KXL, Fischer, Pvt., Albany, N. Y.
2MED, Turchin, Pvt., Ft. Jackson, S. C.
3CKA, Jones, address unknown.
3DLT, Roth, Tech. Sgt., Ft. Knox, Ky.
3EVH, Cameron, Pvt., address unknown.
3GOU, Serfling, Pvt., Camp Edwards, Mass.
3GYQ, Bulger, Lt., Cambridge, Mass.
3IBI, Bardfeld, Lt., Ft. McClellan, Ala.
3IHO, Deemer, Chicago, Ill.
3JDA, Borden, Pvt., Ft. Warren, Mass.
3JDZ, Thompson, Capt., address unknown.
3JOR, Galloway, Lt., Boca Raton Field, Fla.
3JPX, Burk, Cpl., foreign duty.
3JXT, NeCamp, Sgt., Ft. Eustis, Va.
4ANN, Medler, Pvt., Camp Robinson, Ark.
ex-5AVD, Furlow, T/5th, Camp Barkeley, Texas.
5CQF, Bornemann, Boston, Mass.
5FRP, Sampson, Lt. Col., Ft. Sill, Okla.
5HEF, Crutchfield, Sgt., Ft. Sill, Okla.
6IPG, Fernstrom, address unknown.
6QOA, Sheehy, address unknown.
7BCU, Short, Pvt., Camp Roberts, Calif.
7ETX, Velikanje, Capt., Camp McQuaide, Cal.
7FDD, Early, Pvt., Camp McCoy, Wis.
7FEJ, Hebbard, Pvt., Camp Claiborne, La.
7FPQ, Reisinger, Pvt., Scott Field, Ill.
K7GUK, Buck, Sgt., foreign duty.
7IYU, Cowan, Cpl., foreign duty.
8BOM, Mastrianni, Lt., Ft. Bragg, N. C.
8HRH, Chmielewski, Cpl., Selfridge Field, Mich.
ex-8ISH, Hirsimaki, Staff Sgt., Ft. Monroe, Va.
8PQC, Knoll, Sgt., address unknown.
8RJL, Kerstetter, Pfc., Camp Edwards, Mass.
8SLW, Rempinski, Pvt., Indiantown Gap, Pa.
8SWL, Lee, Camp Chaffee, Ark.
8USZ, Lehner, Kansas City, Mo.
8UVG, Cooper, Tech. Sgt., New York, N. Y.
8VD, Felsburg, Pvt., Maxwell Field, Ala.
8VJD, Mandelstamm, Pvt., Camp Adair, Ore.
8WKK, Flood, Pvt., Ft. Benning, Ga.
9ALU, Christ, 2nd Lt., Camp Davis, N. C.
9AVT, Swanson, Sgt., Camp Barkeley, Texas.
9BDI, Huckins, Staff Sgt., Camp Claiborne, La.
9BQF, Higgins, address unknown.
9DRC, Rassinier, Pvt., Ft. Taylor, Fla.
9EBX, Dezonia, Pvt., Bangor, Me.
9GEN, Coen, Pvt., Camp Adair, Ore.
9GEW, Johnson, address unknown.
9GWD, Fye, Pvt., Ft. Francis E. Warren, Wyo.
9IXC, Uther, Tech. Sgt., foreign duty.
9JZU, Hoefle, Cpl., Ft. Knox, Ky.
9KMK, Swift, Major, Ft. Bragg, N. C.
9LGQ, Schook, Sgt., Seattle, Wash.
9LTM, Bruch, Pvt., Ft. Myer, Va.
9NJD, Richter, Sgt., foreign duty.
9NLS, Boyce, Pvt., Kansas City, Mo.
9QKN, Christianson, Pvt., Paterson, N. J.
9UAZ, Hamm, Capt., address unknown.
9UFD, Leeder, Pvt., foreign duty.
9VKN, Howe, Pvt., Buffalo, N. Y.
9WOD, Dreher, Lt., foreign duty.

CANADA

HERE begins what we hope will become a complete listing of "VE" hams "In the Services." The information, gleaned from back issues of *QST* and other sources, is very sketchy and is probably very much "ancient history" by now. Many of the calls did not appear in the last issue of the call book listing Canadian Amateurs so we couldn't get the names. We shall welcome up-to-the-minute word on all of you. Please report in as the "W" hams do — on a postal giving call, name, rank, outfit, and P. O. address. (This last is only for our files, not for publication.)

RCA

ex-1EF, Foster, Halifax, N. S.
1EK, Street, Halifax, N. S.
2BM, Sugars, Capt., foreign duty.
2BU, Huetsis, Lt. Col., address unknown.
2CJ, Pelly, address unknown.
2DD, Bordeleau, Sgt., address unknown.
2DM, Biggs, address unknown.
2DR, Skarstedt, address unknown.
2GE, Yull, Lt., Brockville, Ont.
2GM, Altherr, Lt., address unknown.
2GO, Rowan, foreign duty.
2HI, Ethel Pick, address unknown.
2HO, Wilson, foreign duty.
2JO, Smardon, 2nd Lt., address unknown.
2LE, Eon, Major, address unknown.
2OP, Hilt, foreign duty.
3AD, Michael, address unknown.
3AIB, Weir, address unknown.
3ALU, Barker, Cpl., address unknown.
3APG, Gladstone, foreign duty.
3AXZ, Bottomley, address unknown.
3GW, Cutsey, address unknown.
4AAW, Morley, address unknown.
4ABD, Hoyer, Sgt., Yorkton, Sask.
4AEL, Black, address unknown.
4AMG, Marsden, address unknown.
4ANI, Brockie, address unknown.
4BG, Simpson, Lt., address unknown.
4BP, Doughty, Edmonton, Alta.
4BW, Sacker, address unknown.
4DH, Long, address unknown.
4HT, Sterling, address unknown.
4QL, Bean, address unknown.
4VO, Dorothy Fitts, Calgary, Alta.
4KF, Sullivan, address unknown.
5ADU, Schubert, POW.

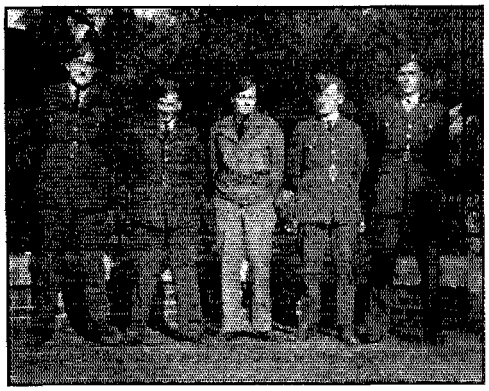
RCN

1KU, Van Blarcom, foreign duty.
1ME, Gauvreau, Newfoundland.
1ML, Forestall, address unknown.
1OI, Baxendale, foreign duty.
2BB, Webster, St. Hyacinthe, Que.
2DE, Kelly, Lt., address unknown.
2DU, Wright, Lt., Ottawa, Que.
2EQ, Beecher, address unknown.
2KX, Beveridge, address unknown.
2NR, Parkin, address unknown.
3KC, MacKnight, Lt., foreign duty.
4ABE, Geary, address unknown.
4AEN, Marion, Halifax, N. S.
4AFG, Underwood, address unknown.
4AJC, Blacker, Lt., address unknown.
4ALT, Botte, address unknown.
4ANF, Veres, address unknown.
4BH, Neilson, address unknown.
4FK, Sutherland, address unknown.
4GC, Strong, address unknown.
4NF, Wilinson, address unknown.
4TJ, Jebb, address unknown.
4UB, Prior, address unknown.
4XG, Keatinge, address unknown.
4YM, Woodward, address unknown.

RCAF

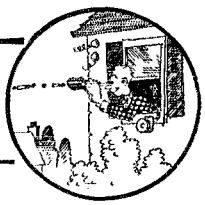
1DY, Ditmars, Montreal, Que.
1EE, Doull, address unknown.
1FL, White, address unknown.
1HB, Howell, LAC, Moncton, N. B.
1HV, Murphy, address unknown.
1IC, Priddle, address unknown.
1IE, Richardson, Cpl., foreign duty.
1JL, Oulton, P/O, Moncton, N. B.
1JM, Morton, Chatham, N. B.
1JN, McWilliam, address unknown.
1KB, Scott, address unknown.
1KJ, Harris, address unknown.
1KQ, Loosen, LAC, foreign duty.
2BC, Davison, address unknown.
2CD, Hanna, F/O, foreign duty.
2FG, Bannister, F/O, address unknown.
2IP, Girard, WO1, address unknown.
2JR, Brown, Cpl., Lachine, Que.
2KM, Boyle, address unknown.
2KS, Elliott, address unknown.

(Continued on page 84)



A good showing of hemispheric solidarity! W9TCP sent us this picture of Antipodean hams at an RAF field in England. Not bad DX! *L. to r.:* LAC White, ZL2GX; Sgt. McAllister, G2ZK; Lt. Fowler, W3GJZ; LAC Shaw, VE1OH; and Lt. Dale, W9TCP.

EXPERIMENTER'S SECTION



Address correspondence and reports to ARRL, West Hartford, Conn.

PROJECT A

Carrier Current

SINCE our last letter to *QST* several months ago, we have had quite some improvement in the small group of wired-wireless stations in this vicinity. To the original gang of six we have added six more active stations, although some of the originals have dropped out for reasons they could not control. WW2DC has dropped out because of his college education, and WW2DCW and 2CA because of lack of some equipment, but for our losses we have had some gains. Though not within the range of most of our transmitters, WW2SRA has completed one two-way contact with a station in River Edge and one in New Milford. At times we have heard them, and they have heard us but could not get through. River Edge and New Milford are about six to seven miles airline from WW2SRA's location. 2SRA is now running approximately 40 to 50 watts, and the stations in the River Edge and New Milford sections are running around 30, so far as I know.

A great many changes in our rigs have been made; in fact, so many that I will not try to list them. We have tried many circuits and coupling ideas and have found out how and possibly why some work and others do not. We have been bothered some by heavy line noise which has hampered our operations at times. Noises from furnaces have been the most troublesome this winter, even in spite of the fuel shortage! Most of the work has been on voice thus far.

On January 13th the entire group of active stations in the Maywood and Rochelle Park area had a two-hour round-table, the first real group to contact at one time in this limit of operation. We believe that this group, numbering seven stations, is the largest group active at one time, all on in the same contact. I think that this contact demonstrates that carrier-current communication is not just a passing fancy for amateurs and experimenters, but that it shows the effectiveness of wired wireless as something better than an idle amateur rig.

Those who took part in the round-table are WW2SRA, WW2MLH, WW2JVH, WW2SRP/W2ITL and WW2GEJ/W2CBL of Rochelle Park and WW2GCA and WW2HMK of Maywood, N. J. Telephone lines and a.c. lines were both used by all the stations for sending and receiving, the telephone lines doing the better job in most cases.[1] With the exception that WW2GOA and myself did not hear WW2GEJ, all of the stations were able to hear each other. WW2GEJ is about 2½ miles airline from our locations which accounts for our not hearing him, although he was hearing both 2GCA and myself at S7. Line noise was very slight all during the contact, which accounted for the signals holding up as they did.

Since no previous sked had been made, it surprised us to find all the seven stations on at once. The most we have had on at other times was three stations. We believe this seven-way round-table was quite an accomplishment, and hope others will have the same success we have had.

Even though there are hundreds of hams in northern New Jersey, I have had very few reports of activity or requests for information from our own state, so I would like to make another appeal for more fellows interested in carrier current. How about writing me? There will be plenty of opportunities to work fellows if more of us could get together. We even might get chances to handle messages or start WERS nets, if we could get the stations spread out over a large area. You can also get valuable information and experience for getting your license. I know I'll be getting mine soon, and I can say that there's no better experience than experience. How about it? — *H. M. Kuhles, WW2HMK, 33 East Pleasant Ave., Maywood, N. J.*

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We, the members of the West Philadelphia Radio Association, have been reading with great interest the articles presented in *QST*, and finally decided to see if a suitable c.c. network could be established in the Philadelphia area. At this writing, I want to report that we have built three converters, with a fourth under construction, and all have worked with fine results. Two were exact copies of the one presented in March, 1942, *QST*, while the other, my own, is a more or less standard circuit used in most superhets. The

[1] In using telephone lines for carrier-current work, utmost caution must be used to make certain that the carrier-current operation does not interfere with normal functioning of the telephone circuits. We have been informed that most states have laws which forbid making attachments to public telephone lines. — EDITOR.

transmitters are also of the same general design as those in March *QST*, with a few minor variations. W3EVH has built his transmitter and receiver in one steel cabinet, and it seems to work very nicely. He uses a variable condenser in addition to the fixed mica condensers across the transmitter tank coil so that he can vary the frequency of the oscillator from 150 to 200 kc.

In the diagram of my converter, shown in Fig. 1, all of the coils used in the grid circuit of the mixer section are universal-wound r.f. chokes, of which the local radio store seems to have a few in stock. It will be noticed that the tuning range has been extended on either side of the c.c. band in use. This is so that I can listen to the aircraft-control stations at 278 kc. and 282 kc. and also keep up with my c.w. practice by listening to the other c.w. stations which seem to be prevalent throughout the tuning range of the converter. I might add that I have noticed quite a few commercial stations operating within the band we are now using. Some form of accurate receiver, together with a constantly-variable oscillator, seems to be the safest bet when dodging the frequencies of these stations.

If any of the fellows in the Philadelphia area wish to construct a c.c. station, we would advise the construction of a converter first, so as to avoid a recurrence of the plight of W6MEP. Listen before you send, even when QSO, as these commercials pop up on most of the c.c. frequencies.

I have heard W3EVH at my receiving station, which is about one mile airline from his place. W3EVH has successfully maintained two-way contact between his home and the West Branch YMCA, where we have our radio room in a sort of penthouse on the roof. Signals were over S9 in strength. Some of the fellows have been going around to the homes of members who do not have c.c. outfits, operating portable transmitters from there to determine definitely whether or not they could be heard. So far, the results look exceedingly good. Harmon De Witt, our secretary, was also heard from his home by W3EVH.

My transmitter will be completed in the very near future, and I will report any successes with it as soon as possible. — *Bob Freeburger, W3IBB.*

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Our carrier-current project for WERS in Prince George's County, Md., is expected to cover most of the county shortly, or an area of at least 100 square miles. We expect to have carrier-current transmitters and receivers in all of the report centers, which in many cases are fire department stations. At present we have two transmitters set up, one at Hyattsville and the other at Mount Rainier, about three miles away at the District of Columbia line. One of these transmitters was originally built for the 160-meter 'phone band, but has now been converted for low frequencies. It has a 6C5 e.c.o. into an 807 into a pair of 812s in push-pull, and has about 50 watts output. This transmitter can be heard at Beltsville, 7 miles distant airline, and also in Washington, about 10 miles away.

Our receivers are mostly new Emerson battery a.c.-d.c. portables, which were converted to the lower frequency without much trouble. — *Karl H. Stello, W3IVZ.*

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About six months ago, W2LJB, W2EXV and I got together and started this c.c. business, mainly so I could learn the code and also to keep up the code speed of the others. We have tried to keep a daily schedule at 7 P.M. and have worked it more times than we have missed. W2EXV has been very busy and cannot spend too much time away from his work, and has some work left to do

(Continued on page 68)

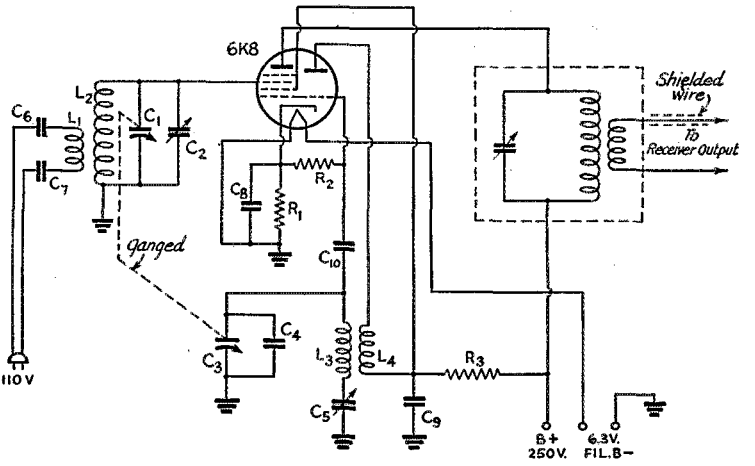


Fig. 1 — Circuit diagram of W3IBB's carrier-current converter. Oscillator frequency range is 1710 to 1950 kc. for a 1600-kc. i.f.

C_1 — 250-$\mu\mu$fd. variable.
C_2 — 3-30-$\mu\mu$fd. mica trimmer.
C_3 — 250-$\mu\mu$fd. variable with 9 rotor plates removed.
C_4 — 3-30-$\mu\mu$fd. mica trimmer.
C_5 — 3-130-$\mu\mu$fd. mica trimmer.
C_6, C_7, C_8, C_9 — 0.1 μfd.
C_{10} — 100 $\mu\mu$fd.
R_1 — 300 ohms, ½-watt.
R_2 — 50,000 ohms, ½-watt.
R_3 — 50,000 ohms.
L_1 — 1 mh.
L_2 — 5 mh.
L_3 — 200 turns of No. 28 enameled, ¾-inch diameter, close-wound.
L_4 — Oscillator tickler (approximately 20 turns).
T — 465-kc. i.f. transformer remodeled to tune to 1600 kc.

U.S.A. CALLING!

RADIO ENGINEERS AND PHYSICISTS

WHILE tens of thousands of enlisted men are being trained in the armed forces in the employment of radio, so complex is the nature of the special radio equipment being used in this war that highly skilled engineers and physicists are necessary at the top of the picture to deal with the problems of design and application. Engineers are needed in civilian capacities, and are very badly needed. Any engineer qualified for such work unquestionably is already employed in industry or research, but the national need is now so great that such engineers should consider whether they are absolutely essential to their present programs and how essential those programs are to the victorious conclusion of the war.

There must be many engineers and physicists to-day who, although happily connected, are wondering whether they are doing their full duty, whether their talents couldn't be more usefully employed in more important work. This is probably particularly true of those who believe that they ought to be in an activity of immediate assistance to the armed forces, but who, for various personal reasons, do not wish to serve in a military capacity, or who, for one reason or another, are unable to qualify for commissions. It is true that they can be exactly as useful in a civilian capacity as in uniform. What men in such circumstances most want, we believe, is an opportunity to investigate quietly these opportunities for more important employment of their capabilities, while not disturbing their present connections. The president of the League is in position to enter into confidential correspondence with such men, with a view to exchanging particularized information, and pledges himself to keep such inquiries confidential and personal, without revealing an inquirer's name to anyone until he is ready to have him do so. Address letters to the personal attention of George W. Bailey, c/o Office of Scientific Research & Development, 2101 Constitution Ave., N. W., Washington, D. C.

NAVY COMMISSIONS

THE Navy still accepts applications for commission in any one of three classes of the Naval Reserve. One of these is Aviation Volunteer (Specialist), described on page 36 of our December issue, the work dealing with radio detection. Another is Class EV(S), concerned with both detection and communication work; and finally there is CV(S), the well-known group engaged in direct communication work. Further information may be had by direct correspondence with The Commandant of your Naval District; or, if uncertain of your qualifications, ask for the advice of G. W. Bailey, 2101 Constitution Ave., Washington.

ENLISTMENTS BY WOMEN

THE women auxiliaries of the Navy and Coast Guard are proving highly successful, and are being expanded. The educational requirements have been reduced to two years of high school or business schooling. Enlisted WAVES and SPARS destined for radio training are sent to the University of Wisconsin at Madison, in classes of 450 or more at a time, the course lasting several months. WAVES and SPARS attend classes together and are taught the sending and receiving of code and something of the mechanical and technical side of radio. In the service, they replace enlisted men as operators at Navy or Coast Guard shore stations within the continental limits of the country. They have the opportunity of applying later, through military channels, for officer candidate training.

At the Officer Candidate School at Smith College, some especially selected WAVES and SPARS are being trained in cryptography and decoding, to replace officers now at shore stations.

Incidentally, we notice that the WIRES (informal organization of Women In Radio & Electrical Service) are being taken into the WAACS. The WIRES number about 8000 civilian women trained by the Signal Corps as radio operators, technicians and repairmen, and as telephone switchboard and instrument repairmen.

For details about enlistment in any of these women auxiliaries, see page 28 of February *QST*.

F.C.C. RADIO INSPECTORS

FCC HAS developed an urgent need for additional radio inspectors, the Civil Service Commission announces. The positions are in two pay grades, at $2000 and $2600 a year, and are located throughout the country. An inspector's duties include such work as the inspection of equipment on ships and aircraft, or at land stations, the making of frequency runs and harmonic analyses, and the examination of operators.

The requirements for these positions have now been modified materially. For radio inspector, $2600, applicants may qualify through *one* of the

following: (1) a full 4-year course at a college or university of recognized standing in electrical or communications engineering, (2) a full 4-year college course with major study consisting of at least 24 semester-hours in physics, (3) 4 years of technical experience in radio work, or (4) any time-equivalent combination of (1), (2), and (3). For assistant radio inspector, $2000, only 3 years of such education or experience are required. In some cases applications will be accepted from junior and senior students. Amateur experience under a Class A license may be substituted for 2 years or less of the experience requirement, for either position. In addition, applicants must hold a valid second-class radiotelegraph operator's license, or must demonstrate during the first 6 months of service their ability to transmit and receive 16 code groups per minute in International Morse Code. They must also be able to drive an automobile, as they may be required to do considerable traveling and to drive inspection cars and mobile laboratories.

Applications will be accepted until further notice at the Commission's Washington, D. C., office, but qualified persons are urged to apply immediately. No written test will be given, and applicants will be rated on the basis of their statements in the applications, subject to verification by the Commission. Full information and application forms may be obtained at first- and second-class post offices (except in regional headquarters' cities where they are available only at the Civil Service regional offices) or from the Commission itself at Washington. Ask to see Announcement No. 280.

Persons doing war work are not encouraged to apply unless they may use higher skills in the positions sought. War Manpower restrictions on Federal appointments are given in Form 3989, posted in post offices.

MARINE CORPS COMMISSIONS

THE Marine Corps is still accepting applications for commission in its Aircraft Warning Service. Officers selected for this work, after the usual indoctrination, attend a special service school for from three to six months and receive valuable instruction on detection apparatus. They are then assigned to Marine Corps units to supervise the operation and maintenance of this kind of equipment, organizing and training AWS personnel for both ground and air forces.

Candidates should hold degrees in EE or radio engineering, but college graduates with special training in physics and math are also eligible; and occasionally those with only two years of such schooling but with considerable practical experience in these fields are accepted. Physical defects are sometimes waived and the possession of dependents is no bar. The age limits are 20 to 45. The usual initial appointment is as second lieutenant, but higher ranks may be awarded applicants with exceptional qualifications.

Prospects should write to The Commandant, Headquarters, U. S. Marine Corps, Washington, D. C. If uncertain about your qualifications, ask advice from G. W. Bailey, 2101 Constitution Ave., Washington.

BROADCASTING NEEDS HELP

BROADCASTING has been classified as one of the industries essential to the war effort: it is the nation's only means of instantaneous mass communication. The demands of the armed forces for station technicians and for receiver repairmen have been so great that this civilian service is now experiencing an acute shortage of personnel. Amateurs who are still fighting on the home front because of age, sex, dependents or physical handicaps can make a real contribution to the national effort by accepting technical positions in broadcast stations, or by servicing home receivers during the emergency.

NAB is registering amateurs who are available for either type of work. Please write to Howard S. Frazier, director of engineering, National Association of Broadcasters, 1760 N Street, N. W., Washington, D. C., stating which type of work is preferred, whether you are willing to work in another locality if necessary, whether you are available for full-time or part-time work, your operator licenses if any, age, radio experience, educational background, and salary desired. Many opportunities in these fields are open to women — particularly the wives of radio men in the armed services.

SIOUX FALLS INSTRUCTORS

THERE is an urgent need for men and women to serve as civilian instructors in radio at the Army Air Forces Technical School, Sioux Falls, S. D. Starting salaries range from $1620 to $2600 per annum, depending upon the education and experience of the applicant. Minimum requirements include high-school education (which may be waived in some cases), plus *one* of the following:

1) Holds, or has recently held, an amateur or commercial radio operator license.

2) One year's experience as an operator, radio engineer or repairman.

3) Successful completion of a six months' resident course or an ESMWT course in radio.

4) One year of college work in a recognized institution.

Applicants who have had at least six months' experience in advanced and difficult radio work, who have taught radio or allied subjects for at least six months or who have a degree in electrical or radio engineering or the equivalent, will qualify for a starting salary of $2000. Those with certain additional experience may qualify at $2600.

For full particulars write to AAF Employment Officer, Army Air Forces Technical School, Sioux Falls, South Dakota.

SCOTT FIELD INSTRUCTORS

ALTHOUGH the effort to obtain instructors for the Navy aviation service schools and the Army AAF Technical Service schools is still centralized at Chanute Field, Rantoul, Illinois (where one may address The Secretary, Board of Civil Service Examiners), some of the schools are still making direct appeals for help.

Closely paralleling the Sioux Falls call above is one from the AAFTTC school at Scott Field, Illinois, near St. Louis. The commanding general there reports that soldier instructors are being called into combat duty and that they are in desperate need of civilian instructors to teach the soldiers who man the radio sets in American bombers. Those selected for instructor positions will go to school for three months at government expense, meanwhile drawing salary at $1620 per year. When schooling is finished and teaching begins, salaries are increased to $2000, may go as high as $3000. Prerequisites are relatively few. For instance, ham operators with willingness to learn more radio are very acceptable. Many women have responded to Scott Field's plea, but hundreds are still needed. Men physically disqualified from the draft, or over 38, are also eligible. Those wishing to apply should write to the Director of Training, Scott Field, Illinois.

COMMERCIAL OPPORTUNITIES

REQUESTS continue to come to the Personnel Bureau for qualified radio men. Construction programs in radio industries engaged in defense production are being expanded and radio personnel is needed to fill the gaps created by this expansion or left vacant by amateurs and engineers going in the armed forces. Aircraft companies, broadcast stations, radio manufacturing and engineering concerns need radio service men and draftsmen, inspectors and engineers. Trade and vocational schools engaged in Signal Corps teaching need instructors. Plants making electronic-controlled mechanical gadgets for the Army and Navy want men with ham or commercial background.

Sometimes a couple of men are needed, sometimes a dozen. One of these plants may be located in your vicinity and if you are enrolled in our Personnel Bureau your name and qualifications are furnished the inquiring agency, which contacts, investigates and hires you direct. If you have not enrolled, we think you are overlooking a good thing. There is no cost or obligation on your part. You don't even have to be a member of the League. Simply fill out and return the Registration of Personnel Availability on page 38 of the October 1942 *QST*, or typewrite a copy, and we shall do our best to place you promptly and advantageously.

CIVILIAN MECHANIC-TECHNICIAN

THE Civil Service continues its search for radio mechanic-technicians for varied duties in connection with the construction, maintenance and operation of all types of modern radio equipment. Particulars are to be found in their Announcement No. 134 at your post office. There are five grades of the position, with salaries running from $1440 for Juniors to $2300 for Principals. No written tests; applicants are rated on their education and experience as stated in applications, and upon corroborative evidence. Basic requirement is the possession of at least a year of full-time paid experience in some branch of technical radio work, *or* the successful completion of an ESMWT radio course, or a six months' technical course in residence at a radio school, or a year of resident study in engineering which included radio. Here is the chance to learn the ins and outs of the new communications equipment which is helping to win the war.

CIVIL SERVICE ENGINEERS

THERE are many more Civil Service calls for trained communications people than we are able to mention individually in *QST*. We briefly review below some of the recent announcements. Fuller information and application blanks may be obtained from local Civil Service secretaries at any first- or second-class post office, or from the regional offices or the main office of the Civil Service Commission at Washington. Candidates are rated on their training and experience, without written tests.

An interesting point is that Civil Service annual salaries do not include the added compensation for overtime. The present 48-hour federal week includes eight hours of overtime and the present rate of compensation therefor increases the basic salary by about 21 per cent of the first $2900, provided that doesn't run the total compensation above $5000.

Heading the list of new calls is the need for engineers with education or experience in almost any branch of engineering, salaries running from $2600 to $8000. In your post office you may see particulars in the Commission's Announcement No. 282 (1943). Junior engineers, at $2000, are covered by Announcement No. 281. College women are especially desired. Those without engineering courses may qualify by taking the tuition-free government-sponsored ten-week ESMWT courses in many colleges. Men and women with drafting experience are desired as Engineering Draftsmen, with salaries of $1440 to $2600, per Announcement No. 283. Positions as Technical Assistants, at $1440 to $1800, are open to college students, especially women, with appropriate study in mathematics, physics, engineering or metallurgy. Women with one to four years of technical or scientific experience or education in radio are wanted as Technical and Scientific Aids, at $1440 to $2000. We note also Physicists, $2600 to $5600; Junior Physicists, $2000; teletype operators, $1440 to $1620.

Who Killed the Signal?

A Radio Mystery Serial

BY CLINTON B. DESOTO,* WICBD

Chapter 2 — "Beauty and the Beast"

Synopsis:

The characters in this story — which is designed to entertain but may also instruct — are Radio Parts, living in a receiver that stood silent and dark when the current failed. In the first installment the Signal was reported missing — apparently murdered by an unknown hand. The Great Sleuth, an amateur detective and therefore a good one, was called in. With him he brought three trusted assistants — Ohm Meter, Volt Meter and Milly Am Meter. After studying the chassis, scene of the crime, he interviewed Power Cord, one of the numerous Parts who lived there. From that lanky, brown-complexioned character he learned how the set lived on current and that the current had failed. At first Power Cord himself seemed a logical suspect because it was his job to carry current to the set. Then Volt discovered Cord's helper, Power Plug, asleep on the floor beside the wall socket — a derelict from duty. But when Plug plugged himself in and the lights gleamed again inside the cabinet the set still refused to work, and the Sleuth knew the mystery was not yet solved.

The story continues. . . .

POWER CORD looked on curiously. "What are you going to do now?" he asked.

The Sleuth pondered. He said, "We've got to find out what happens to that current. It *does* go somewhere after it leaves you, doesn't it?"

"Well, yes and no," Power Cord answered.

"What do you mean, 'yes and no'? What kind of an answer is that? Come on, man — be specific."

"Well, it never actually leaves me. Like I said, the kind of current I've been carrying on this job is alternating current. The electrons run back and forth inside me, reversing themselves sixty times a second."

"But I thought you said it was the electrons in the current that kept the set alive. How can that be if it never leaves you?"

"Well, yes, they do — in a way. But they don't feed the set directly. It's the energy from them that the set uses. The electrons themselves stay right inside me all the time."

The Sleuth was frankly puzzled. "How does the set get this energy, then?"

Power Cord scratched his head. "That's quite a story. I'm not sure I can tell you how it works. It's sort of like digestion, maybe. And then again it isn't. . . ." His voice trailed off.

"If you can't tell me, who can?" the Sleuth demanded impatiently.

"Let's see. You might go to Switch — but he only passes along the current from me. When he's closed, that is; otherwise it just doesn't flow. And from Switch the current goes to Power Transformer. Tell you what you do. Go up there and talk with old P.T. He knows all the answers — if you can get him to talk. Kind of a close-mouthed customer, though. All sealed up in that shell of his."

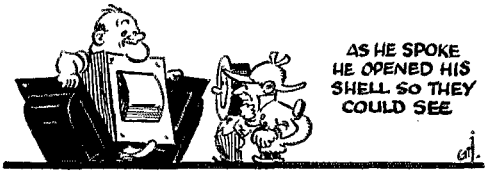
The Sleuth grunted and stalked off along the apron of the chassis, the three Meters straggling along behind. Upstairs they found Power Transformer, the biggest of the Parts, standing stolidly apart inside his dull black shell.

Even the wily Sleuth found it difficult to locate the right lead to Power Transformer's confidence, but after a few moments' conversation the rugged old individualist's reluctance was overcome. When their mission was explained P.T. declared his willingness to help. Himself a great believer in regulation, he was eager to track down the culprit.

"Sure, I'll tell you what you want to know," he said. "The current? I get it right in my primary. That's this heavy winding around my middle, here." As he spoke he opened his shell so they could see.

"The one wound with wire about the size of my pointer?" Milly asked coquettishly.

Old P.T. smiled on her with a lack of his usual reserve. "That's the one," he told her kindly. "Those billions of little electrons run back and forth through my primary so fast it sometimes



* Executive Editor, *QST*.

makes my shell buzz. In fact, they travel so fast that they kick up a big cloud all around my core."

"A dust cloud?"

"Something like that — only you can't see it. It's not really a cloud, you understand. Actually, it's what is called a magnetic field. The field is made up of lines of force, which start out as little circles around the wire and extend out in bigger and bigger circles until they completely occupy my core."

"This core you speak of — that's the vertical stack of soft iron laminations that holds you up?" the Sleuth asked.

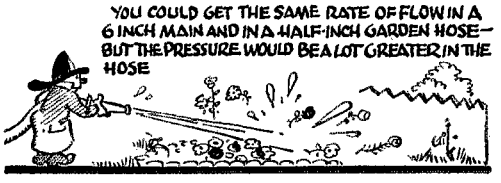
"That's right. As you can see, my windings go around the middle, through these big square holes. They call 'em windows — why, I'll never know. And when that magnetic field from the primary builds up around my core it just saturates me with energy."

"I see." The Sleuth thought for a moment. "And what do you do with the field?"

"Why, I induce it into my other windings, of course," Power Transformer answered.

"What do you mean, you *induce* it?"

"I'll explain it this way. You understand that it's the alternating current in my primary winding that sets up the magnetic field — right? Well, when the field builds up and collapses as the current reverses, it in turn sets up a current in any other winding that happens to be around."



"How does it do that?"

"Oh, it's those confounded little electrons and their atoms again. They have polarity, you know. The electrons are negative and the nucleus of the atom is positive. The magnetic field also has a kind of polarity, although we call it the North and South poles. Anyway, when that field moves through a wire, as it builds up and collapses it gives the electrons the urge to travel, and they leave their home atoms and start to roam."

"And when the electrons move that makes an electric current, eh?" Volt interrupted eagerly.

"Right you are, son. When those commercial-minded electrons start circulating through my primary and set up a field, the electrons in my other windings start a current of their own. It's called induced current."

"I see," the Sleuth replied slowly. "And *those* are the electrons that are used to feed the set?"

"Well, yes and no."

"Oh, Lord — more of that 'yes and no' business," the Sleuth complained fretfully. "What *do* you mean?"

"Only that it's a little more complicated than that. You see, I have to use alternating current to induce energy from the primary into my other windings, as I've explained. But the tubes in the set need direct current — except for their heaters, of course."

"Their heaters?"

"Yes, their heaters. And don't ask me why; get one of the Tubes to tell you. All I know is that it doesn't matter much what kind of current the heaters get. They'll get hot on anything."

"Where do they get whatever current they use, then?"

"Oh, they get it from me, all right. Everything in the set does, if it comes to that. My winding here takes care of the heaters — the one with only a few turns of big, heavy wire."

"But why don't they get it direct from Power Cord, if they use a.c. anyway?"

Power Transformer groaned. "Oh, my sacred aunt. Do I have to tell you about volts and such, too?"

At the mention of his name Volt Meter pricked up his ears. "You don't have to tell me anything about volts," he boasted. "I measure 'em all the time!"

The Sleuth motioned Volt to silence. "Don't interrupt. Maybe these are a different kind of volts. Let him tell the story in his own way."

"Well, if I must, I must," Power Transformer said resignedly. "If you just say 'current' it's like talking about water in a pipe. There's more to it than that. You have to say how much water there is. And since the water is flowing in a pipe you have to say what the pressure is, and the rate of flow. In the same way electric current — that is, how many electrons travel past a certain point in a given time — is measured in amperes."

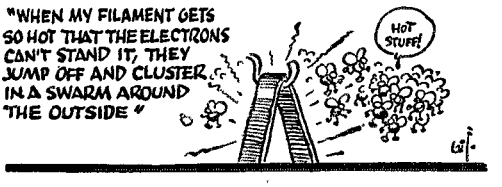
At the word "amperes" Milly's pointer began to wiggle excitedly. The Sleuth's stern look caused her to subside, however.

"You could get the same rate of flow in a 6-inch main and in a half-inch garden hose — but the pressure would be a lot greater in the hose. In electric current the pressure is measured in volts. For the same total water flow — excuse me, electron flow — the voltage goes up as the current or amperage comes down, and vice versa."

"Then the size of the wire affects the pressure?"

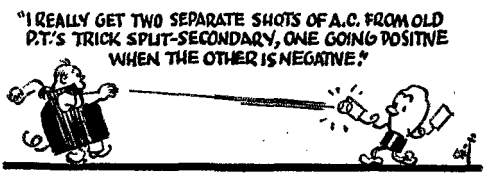
"Yes, along with the material it's made of, and the length — even the temperature."

"That's all very interesting; I'd like to learn more about it a little later on. But you still



haven't told me why the Tubes don't use current direct from Power Cord for their heaters."

"Simply because they can't stand the pressure. You wouldn't try to water a flower bed with a high-pressure fire hose, would you? The heaters need a lot of current, but they need it at low pressure. And that's how I give it to them — at



about 6 volts, instead of the 115 volts Power Cord carries."

"What your job amounts to, then, is taking the a.c. from Power Cord and changing it into other voltages for the rest of the set by inducing it into other windings with different numbers of turns?"

"Precisely."

"I see. Now tell me how they get that direct current you mentioned before, if you will."

"That's where I turn the job over to Rectifier Tube. You'll have to ask him about that," Power Transformer said, withdrawing into his shell again. "And now, if you'll excuse me, I've got to see a man about a little leakage."

Clearly the interview was over. Shrugging, the Sleuth looked around for Rectifier Tube. Ohm had located him first, however, and was already leading the way. In fact, when the Sleuth and the other arrived the two were already in conversation.

"We're here looking into the death of the Signal," Ohm was saying importantly. "What have you got to say for yourself?"

Normally an exceptionally well-balanced fellow, Rectifier Tube seemed to resent Ohm's officiousness. The Sleuth had some difficulty restoring his ruffled phase. In the end, however, he talked freely.

"Sure, that's my job," he acknowledged. "I take the a.c. from Power Transformer — and boy, he puts out plenty of pressure, too. Then I make d.c. out of it for the rest of the lads and lassies. That is, I make pulsating d.c. Filter Choke and Filter Condenser over there finish the job," he added.

"Tell us how you do it," the Sleuth urged.

"Well, to start with, I'm a vacuum tube — a high-vacuum tube, too, and don't forget it. All the air has been exhausted from this glass envelope of mine and there's nothing in it but my filament and plates."

"*All* the air?" Ohm asked skeptically.

"Well, almost all of it," Rectifier conceded grudgingly. "As much as they could pump out with the best evacuators they had, anyway. There's not enough gas in me to give you a day's driving with an 'A' book," he asserted pugnaciously.

"We believe you," the Sleuth soothed. "Go on."

"Sure. Well, first of all my filament has to be hot. That's these little fine wires you see up here in my middle. Some Tubes have a heater and a cathode, but I stick to a plain old directly-heated filament. More efficient, you know. Old Power Transformer uses a separate low-voltage winding just to give me power to heat my filament."

"And then?"

"When my filament gets so hot that the electrons can't stand it, they jump off and cluster in a swarm around the outside. That's called emission."

"Does it hurt?" Milly asked sympathetically.

"Oh, it's not too bad," Rectifier replied with an air of martyrdom. "I can take it. After all, it's for the good of the set!"

"What happens to this cloud of electrons?"

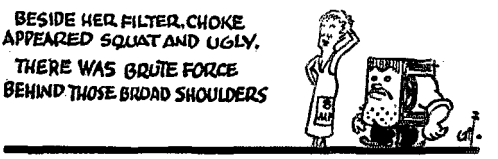
"That's where that big high-voltage winding of Power Transformer's, with all those turns of fine wire, comes in. From it he shoots the current to my plate at terrific pressure — 400 volts or more, sometimes. It's alternating current, of course, and every time the positive half of a cycle comes along, my plate pulls those electrons away from my filament by the buckets-full. Of course, when the plate is negative it repels the electrons and none travel then. But, boy — do they light out when it goes positive. That's called electronic conduction," he added.

"And because the electrons flow only on the positive half of the cycle and only in one direction, this electronic current becomes pulsating d.c. instead of a.c.?" the Sleuth asked.

"You hit it right on the nose, pal. That's why they call me Rectifier; I rectify the a.c. and make it d.c. simply by playing like I'm a one-way street for electrons."

"What do you have that other plate there for?" Volt asked curiously.

"Oh, that's for the other half of the cycle. I really get two separate shots of a.c. from old P.T.'s trick split-secondary winding, one going positive when the other is negative. One plate takes the positive at any one time and the other the negative. That way one plate is always putting out, which means that I can turn out the d.c.



pulses twice as fast. You see, I'm a 'full-wave' Rectifier — not one of those common 'half-waves.' I give 'em both barrels!"

(Continued on page 54)

ON THE ULTRAHIGHS

CONDUCTED BY E. P. TILTON,* W1HDQ

ANOTHER deadline finds us with just about time enough to dash off a few new service addresses. Apparently our listing of these has brought results in a number of cases, and from what the boys write those letters from the gang have been mighty welcome.

W4GJO writes, via V-Mail, that he got quite a bit of "fan-mail" as the result of his listing, but he fears that more may have been written which may never get to him as his address has been changed (you will have to guess as to the actual location) since the last one was published. Grid has had the good fortune to run into a number of hams over there. His flying control officer is Capt. Hall, W1DW, while Lt. Rich, W1HCB, is f.c.o. for another group. Write to Grid as follows: Lt. Ansel E. Gridley, Hq., 2nd Bombardment Wing, A.P.O. 634, c/o Postmaster, New York City.

W1CGY, in the midst of basic training for the Ski-Troops, says that it's rather hard for a ham to concentrate on "left flank" and "right face" when the Signal Corps boys are batting out code right alongside. The Signal Corps gang out at Camp Hale is composed of southern boys, who must find those sub-zero temperatures rather tough; there appears to be not a ham in the crowd. The address, Pvt. Clarke Paige, Co. K, 3rd Bn., 87th Mountain Infantry, Camp Hale, Colorado, will get mail to W1CGY.

W4FKN, who used to work 5, 2½, and 1¼ in Atlanta, Ga., is now in his third army hospital, having spent all but two weeks of his army career in them as the result of a leg injury sustained early in his basic training at Fort Monmouth (Camp Edison). He is convalescing at Ashford General Hospital, Ward 207, White Sulphur Springs, W. Va., and expects to be there for some time as the injury is expected to take a considerable time to mend. He'd be mighty glad to hear from the boys and, unlike most of the gang, he'll probably have time to answer correspondence.

W1MEP writes from Ft. Monmouth that he has been meeting up with some of the gang he worked from Glastenbury Mountain, Vermont, on 5 and 2½. One of his last contacts on 2½ before the close-down was with W2OEN, Middletown, N. J. — the first N. J. — Vermont QSO on 2½. Chet has visited Mid during his time off, and they had a fine time re-living that DX, we'll bet. Another record Chet made for himself with his flea-power rig atop the Mountain was his contact with W5HTZ, Cromwell, Okla., on Five. And now these two had a chance to meet personally in the Signal Corps, but unfortunately they met up with one another on the last day of Merlin's stay at Ft. Monmouth. His outfit was leaving for parts unknown in about ten minutes, so their personal QSO was just about as brief as their record-breaking one on Five.

One of the 2½-meter gang in Hartford, Dom Duva, W1NEA, reports that he passed his Aviation Cadet exam on December 15th, and is awaiting assignment.

Some time back we passed along the suggestion of W6QLZ that we get out some gear for WERS work along the lines of the Army's portables — which cause each other no receiver QRM. That one brought plenty of response, the boys rushing up with the information that many of the rigs the Army labels "transceiver" actually have superhet receivers. Some of them are even f.m. jobs! They work on various frequencies, none really high.

And now, just as these lines are being pounded out, comes a call from our local Radio Aide, Al King, W1LUV. Springfield and its Warning Area at last have a WERS license. We're WKHF now — and here's where that copper from the W1HDQ antennas gets back into circulation!

*329 Central St., Springfield, Mass.

Silent Keys

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

John C. Elms, W5ERU, Littlefield, Texas
Frederick L. Fieger, W6NVL, San Diego, Calif.
Sgt. John Godich, W8SZL, Trafford, Pa.
David Jayson, W2HAP, Woodmere, N. Y.
Lt. Stanley J. Kuaklis, USSC, W2KMR, Kearney, N. J.
Clarence H. Mitchell, W6OMD, Phoenix, Ariz.
Leonard E. Moline, W9HNH, E. Chicago, Ill.
P/O Ronald Norman, RAFVR, ex-G6DP, England
Murvel A. Peacock, RT2c, W8DSK, St. Louis, Mich.
Owen H. Relly, G2AO, Eastbourne, Sussex
Dr. G. A. E. Roberts, G2IU, Twyford, Hamps.
Paul G. Shudrick, W9PDV, E. Gary, Ind.
Frank Warehime, W5DWP, Carlsbad, N. Mex.
Willis L. Watson, W9UWS, Galatia, Ill.

SUBSTITUTE CIRCUIT FOR TRANSCEIVER TRANSFORMER

FIG. 1 shows an arrangement we have been using in our 2½-meter WERS transceivers. Since transceiver transformers are no longer obtainable in this town, I found the substitute circuit to work very well, although the voltage step-up provided by the transformer is sacrificed. In this arrangement, the detector is simply capacity-coupled to the first speech amplifier stage following the microphone. The connection does not interfere with proper operation of the microphone circuit. I thought I would send this in so you can pass it along to the boys through *QST*.

I have also used a door-bell transformer as a substitute for a microphone transformer, with very good results. — *Glenn V. Lichtenfels, W8AQT.*

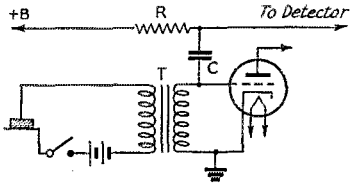


Fig. 1 — If a transceiver transformer cannot be obtained for your WERS unit, W8AQT suggests an alternative way of coupling the detector output by capacity to the speech amplifier.
R is a 25,000-ohm, ½-watt resistance and *C* a 0.01-μfd. condenser. *T* is the mike transformer.

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SIMPLIFYING THE WHEATSTONE PERFORATED-TAPE CODE-PRACTICE MACHINE

WILL you please allow me to offer some constructive criticism in regard to the code-practice machine described on page 29 of *QST* for November?

The entire function of relay Ry_2 is to open the circuit which holds Ry_1 closed after an instantaneous contact of the "make" points. The necessity for the second relay may be traced back to the fact that, in the original circuit, the "break" contact itself is actually arranged to *close* at a time when it should be open. To obtain the necessary reversal, the back-contact relay Ry_2 is required. If the action of the "break" contacts is reversed so that contact is broken when the feeler drops into the hole in the tape, we can cut

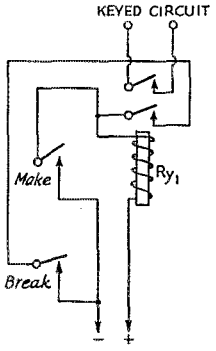

Fig. 2 — Revised circuit diagram for the Wheatstone-tape code reproducer in which one of the two original relays is eliminated. The power-supply portion of the original circuit shown in *QST* for November remains unchanged.

the locking circuit directly in series with the "break" contacts and thereby eliminate the necessity for the second relay. The revised circuit is shown in Fig. 2, while Fig. 3 shows a sketch of the relative positions of the contacts and "feelers" of the "make" and "break" contact arms. In constructing the machine, these arms are mounted one above the other, of course, and not side by side as shown in the sketch.

I have built the set this way and find the action more positive than with the second relay. It also eliminates a third pair of contacts which must be kept clean and which may develop into a source of trouble. — *R. H. Klingel, Union, N. J.*

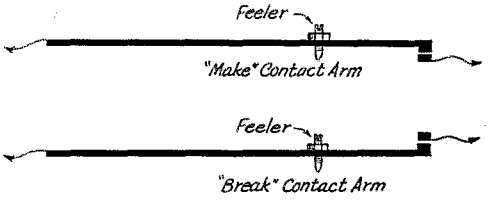

Fig. 3 — Sketch of the contact arms used in the perforated-tape code machine, showing the reverse-contact arrangement of the "break" arm operated by the tape.

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REPAIRING ELECTROLYTICS

I HAVE been experimenting with both wet and dry types of electrolytic condensers, and have found that about half of the time the dry electrolytics are in good condition after failure, except for corroded terminal strips or a small burned spot on the positive plate. This strip of already-

(Continued on page 88)

CORRESPONDENCE FROM MEMBERS

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

HOME FRONT HOSPITALITY

Route 1, Box 37B, Redlands, Calif.

Editor, *QST:*

Have been watching to see among the numerous letters to the editor one from the hams of the home front variety, offering the hospitality of the old shack to hams in the service who happen to be stationed in camps in the vicinity.

Gas rationing, etc., has restricted to some extent the ease with which soldiers can get about. So perhaps now more than ever the remains of the old shack would be a welcome spot to light, and I feel sure would result in many a pleasant personal QSO. Also, it would help prevent the shack from degenerating into a sewing room. Of necessity a room must have a reason for being or give up the ghost.

The boys in service would, I know, accept the hospitality and find the potluck and friendly spirit of the low- and high-powered rigs equal insofar as sincerity is concerned. So what say, soldier, how about a last ditch stand to protect the shack of a fellow ham? You have the protection of Uncle Sam's uniform, which puts you in solid with the XYL and makes you doubly welcome.

Perhaps you lads in camp could register with the local USO headquarters in the nearest town. Then the home guards could, by leaving their address and 'phone number with the USO, provide the means by which a sked could be arranged from either end.

Here's hoping this suggestion finds some measure of favor with Ye Editor and all concerned.

— *Jim Howden, W6SSG*

CONVOY TO RUSSIA

EDITOR'S NOTE. — The following letter was written by Don Leahy, W8TKY, to his fellow-members of the Rochester Amateur Radio Association. We reproduce it here through the coöperation of Charles I. Otero, W8UPH, secretary of the RARA. It is a thrilling drama of action under fire, and W8TKY has since been cited and promoted for his part in it.

Brooklyn, N. Y.

Hi, Fellows:

. . . I just got back from a very exciting trip to Russia. I can't tell you the name of the port, but . . . I made the trip as part of an armed guard on a merchant ship. There are a lot of people who don't seem to know just what is expected of us fellows. Well, here it is in brief. There are usually as many gunners aboard as necessary and a combination signalman and radio operator. Of course, the gunners have their jobs to maintain the guns, but the radiomen in time of emergency have their own gun to operate. I know, because I spent nearly three days on a .30-cal. machine gun under actual fire. You probably heard of the July 4th convoy to Russia, but you didn't hear all of it.

We left a place that I will call X and ran into a heavy fog just outside the harbor. There we formed convoy and headed for Russia. We were picked up by a reconnaissance plane two days out of X and shadowed for two days. On the third of July we had a small-scale torpedo plane attack, and three of them were shot down. . . .

On the next day, the 4th of July, we had plenty of fireworks. We were attacked by at least 50 to 60 torpedo planes, some of which got into the convoy but never did get out again in one piece. They got caught in the most deadly crossfire I have ever seen or heard about. . . .

It was only a few hours after this attack that the convoy was broken up and told to proceed on their own to their destination. Well, you can just picture the havoc that was wrought in so doing. There were subs and dive bombers on our tails every minute. The ship I was on was lucky (or was it?); we were in a fog and stayed in it for nearly three days. I was in the radio shack at that time and received many SOS calls from ships being torpedoed and dive-bombed. You can imagine my feelings, knowing the positions of the ships and our own ship's position in comparison with it. We were in the middle of the melee. We reached an island outside the White Sea and met two other merchant ships that had got there, together with a few escort vessels.

The next day we took off again and, just happening to be lucky, ran into another fog. . . . We proceeded toward our destination but ran into a lot of ice, which made our course more dangerous because it was taking us around nearer to the coast of Norway. During this ordeal of the ice we came across a lifeboat from one of the torpedoed ships and proceeded to rescue the survivors. This, of course, made our own boats overloaded later on.

Things went well till the morning of the 9th, when a submarine picked us up. It was a short time later that we had our first dive-bomber attack. You can imagine my feelings as I saw those planes diving on us and releasing their deadly 500-lb. bombs. I can still hear those damn things screaming down this very moment. The way the pilots tried to drop the bombs so that they would get a direct hit was to come down on the stern of a ship, just within machine-gun range, and drop three of them, figuring that they would spread — one on the stern, one amidships and one up forward near the bridge.

Well, we were lucky, but only because our captain knew what he was doing. Every time they dropped a load of bombs the captain would be watching them from the bridge through a pair of binoculars, then change his course accordingly. There were no direct hits on our ship, although they were close enough to do plenty of damage. About the middle of the seven-hour battle, the ship behind us was hit on the bridge with a 500-lb. bomb and disabled. All the crew got off safely with the exception of two men.

There were about 60 dive-bombers that attacked us, and they never would have got us at all if our guns had not stopped working. You see, we had been pouring out a steady stream of lead at those damn Nazis and the guns were red hot. We got two of the dive-bombers. I was credited with one and one of my shipmates on a .50-cal. gun with the other. The last plane that attacked us came right down and dropped three 500-lb. bombs on our starboard side, so close to the ship that I could have reached out and touched them from the machine-gun nest that I was in. The ship all but did a flip in the air when they hit the water.

That was the finish. We took to the lifeboats and were picked up about an hour later by one of the escort vessels. I spent seven weeks in Russia. . . .

Well, I guess that is all there is to tell about my disastrous trip. I sure hope that I will be able to see some of you guys again before long. . . .

— *J. D. Leahy, RM1c, W8TKY*

MORE THINGS TO THINK ABOUT

217 51st St., Newport News, Va.

Editor, *QST:*

The letter from W9KNZ, "Things to Think About," in January, 1943, *QST*, prompts me to add to the thoughts brought out in his letter.

We fully expect that the former amateur bands will be restored to us after the present conflict is ended. In an exchange of thoughts with various fellow hams, several of whom are in the military services dealing with secret radio work and devices, it appears that not only should we do everything possible to have our old frequencies restored intact but also we should seek to have bands in the microwave field opened for our uses. The region from 300 to 3000 Mc. appears to hold great possibilities for our future amateur work. . . .

Undoubtedly great changes will result after the war is over. It is logical to expect that the radio field will be overhauled as a result of international conferences. Those of us who remember the attempts by foreign governments in the past, particularly the Japanese, to abolish the amateur or, failing in that, to limit his activities as much as possible, will agree that ARRL and all amateurs should be planning now for advancing our needs in all respects. Careful consideration should be given to expanded amateur facilities in the lower-frequency spectrum. The international powers having met to determine communications control will probably be more receptive of suggestions for an increased amateur status than at any time in the past. Our own Congress should be made thoroughly aware of the fact that amateurs are invaluable both in war and in peace.

We almost had a 40-meter 'phone band shortly before the explosion on December 7, 1941. In fact, a few amateurs did experience a limited occupancy of the 7250–7300 kc. band for 'phone work during the early part of September, 1941. When amateur operations are again allowed there should certainly be 'phone territory allocated on 40 meters. I personally think 7300–7500 kc. would be ideal.

There are innumerable other matters that can be brought to light. However, if the general amateur status is definitely defined and settled by government rules and regulations first, then the detailed results we obtain from enjoying the privileges granted under these rules can be ironed out to suit our tastes at our leisure.

— *Walter G. Walker, W8AKN*

1517 Fargo Ave., Chicago, Ill.

Editor, *QST:*

. . . I hope you guys can get us back on after the war, but it's going to be tough going. I doubt if our bands will be any wider and they will probably be narrower than ever. And the ham population will take a big jump after the war with all the free radio education and radio training being dispensed to the multitude.

It's too early for definite post-war planning, but it's easy to see that operation in the post-war bands is going to be a mess in general under the pre-war frequency allocations. And if the bands are any narrower, the congestion will multiply. The practical peak in receiver selectivity having been reached, I see the only possible solution in restricting 'phone operation to frequencies of 28 Mc. and higher and limiting all amateur plate inputs to 100 watts. I believe this the only way that the majority of amateurs will derive the maximum enjoyment from the pursuit. In addition, the new amateur should, for his first year of

(*Continued on page 92*)

OPERATING NEWS

GEORGE HART, WINJM
Acting Communications Manager

CAROL A. KEATING, W9WWP
Assistant Communications Manager

More Rules Changes. More amendments have been made in Part 15 of FCC's Rules & Regulations. The actual textual changes are given in "Happenings of the Month," elsewhere in this issue. ECs, SCMs and WERS radio aides should annotate their copies of the WERS Rules accordingly, to keep their information up to date. This does *not* mean only those Emergency Coördinators in areas where WERS is active. It means *all* ECs, in *all* sections. Anyone who requests information from Headquarters regarding WERS in his locality will be referred to you; therefore you should have all the information available.

A few interpretations are in order: (1) Sec. 15.27 may now be interpreted to mean that the components of any unit transmitter may be changed at the discretion of the radio aide without necessitating submission of a modification application; it supersedes any previous interpretations that complete transmitters may be changed around without such modification of the station license. (2) When communicating with units of another station licensee, WERS units are now required to identify themselves as usual, and in addition must announce the call letters, unit number and class of station with which they are communicating; e.g., "WQRR-1 calling police radio WXXX-1, etc." (3) When mention is made of the "licensee" it usually refers to the *station* licensee; however, in order to eliminate possible confusion, Sec. 15.51 has been changed accordingly. (4) The one-word amendment to Sec. 15.62 is for the purpose of requiring that inspections of the equipment be made more often than might be interpreted from the word "periodic," while at the same time relieving the necessity of inspection at regularly scheduled intervals. (5) The significance of the change in Sec. 15.64 (and Sec. 15.83 for state guard stations) is that it is no longer possible to interpret this section as meaning that the control station may not address information or instructions to all stations in the net. There has been some question about this in the past; the new wording clears it up.

The other changes, as recorded in "Happenings," are self-explanatory. It is possible that experience will dictate still other modifications in WERS rules. Watch for future changes in *QST*, and keep up to date on them.

CAP. WERS has taken under its wing a third category, the Civil Air Patrol. The factual data on the introduction of CAP into WERS is also given in "Happenings" in this issue. While at first glance it would appear that much interference will result between civilian defense and

Honor Roll

The American Radio Relay League War Training Program

Listing in this column depends on an initial report of the scope of training plans plus submission of reports each mid-month stating progress of the group and the continuance of code and/or theory classes. All Radio Clubs engaged in a program of war radio training are eligible for the Honor Roll. Those groups listed with an asterisk teach both code and theory. Others conduct only code classes.

*Burlington (Vt.) Amateur Radio Club
*Central Oregon Radio Klub, Bend, Oregon
*Detroit Amateur Radio Assn., Detroit, Mich.
*Eastern Amateur Radio Club, Brooklyn, N. Y.
*Edison Radio Amateurs' Assn., Detroit, Mich.
*Hampden-Sydney College Radio Club, Hampden-Sydney, Va.
*Hillsborough Township Radio School, Southbranch, N. J.
*Iowa-Illinois Amateur Radio Club, Burlington, Iowa
Knoxville Communications Club, Knoxville, Tenn.
*M.I.T. Radio Society, Cambridge, Mass.
*New Haven (Conn.) Amateur Radio Assn.
Tucson Short Wave Assn., Tucson, Arizona
*Withrow High School Radio Club, Cincinnati, Ohio

CAP stations, such will not be the case if OCD's recommendations for frequency allocations be observed. The important thing is observation of the agreement that CAP stations will operate only on the 115.2–116 Mc. portion of the band, and the fact that *during test blackouts or actual air raids all CAP stations will be silenced and planes grounded.* It is suggested that in areas, where Civil Air Patrol stations are active, civilian defense stations should if possible avoid use of the 115.2–116 Mc. segment of the band. Amateurs not already engaged in civilian defense communication organization, or even those who are so engaged but can spare the time from their other duties, are urged to offer their services to the local Civil Air Patrol commanders to help establish and organize this new branch of WERS.

WERS Inquiries. The National Office of OCD has informed us that they are receiving numerous requests for information on the War Emergency Radio Service. Such information should be obtained from your Regional OCD headquarters, not from Washington. Correspondence should be directed to Washington only at their request. For those who were active in AARS it might be helpful to remember that the various civilian defense regions include the same states as do Army Corps Areas, with headquarters in Boston, New York, Baltimore, Atlanta, Cleveland, Chicago, Omaha, Dallas and San Francisco, respectively.

Even better, write to ARRL. In many cases we can give you not only information on your local setup but also the name and address of the Emergency Coördinator nearest you, who can probably give you more specific and detailed information than anyone else. If we are unable to supply the information requested, we will refer you to the proper person at your regional office.

—*G. H.*

BRIEFS

Since the Federal Communications Commission prohibits broadcasting over the air without a license, the Old Line Network at the University of Maryland will transmit its programs through the wires of the campus lighting system. The work of erecting the technical equipment was performed by students who will also assume the tasks of producing the programs. Work was held up on the project because of priority difficulties and it was only through the donations of student hams that the work was completed.

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W4DAO of Pensacola, Fla., taught his daughter to spell out her name in code, as part of her tap-dancing routine. She did it so well while performing on a USO program there recently that she received many compliments from the Navy radiomen in the audience.

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Store your gear in as dry a place as possible. Moisture is radio apparatus' worst enemy. Lighting the filaments for a few hours from time to time will usually do the trick. For basement installations, burning a small light bulb inside the cabinet or below the chassis until the gear is thoroughly warmed will keep out mildew and dampness.

— *From QCEN's* The Listening Post, *Jan. '43.*

When eleven Signal Corps Lab engineers happened to be in Temple, Tex., at one time recently, a regular ham round-up resulted. Sponsored by local amateurs, a hamfest and dinner was staged in their honor at the Moss Rose cafe. Those present (pictured above) represented every call-letter area except the 6th. *Left to right, top row (standing)* —John Renick, Zenith Radio engineer; Fred Taylor, W1HCU; Howard Miller, Signal Corps Labs.; William Schwartz, W2AEL; Marvin Bernstein, W8DLU; Dave Middelton, W9AOB/W2OEN; Frank Orio, Signal Corps Labs.; F. L. Box, W5DCH; Charles Sutphin, Signal Corps Labs.; Jess Coleman, W5LM; Mills Hieronymus, W5GGQ. *Bottom row (sitting)* — Lt. Oliver D. Perkins, W7MH, Officer-in-Charge; Jim Pearce, W8BPD; Joseph Durrer, Signal Corps Labs.; John Bloomer, W5BEQ; Victor Colaguori, W2GUM; Ed. G. Raser, W3ZI; Merrill Eidson, W5AMK; Capt. Bennett R. Adams, jr., W4APU/W4EV, ex-director Southeastern Division, ARRL; Chester Lytel, Zenith Radio; J. E. Brown, W2AGG/W8ZM, former radio inspector, FCC.

THE WAR is teaching nearly every manufacturer new things about his product. We are learning how to improve performance and how to build better and more easily. We are discovering new materials and improving techniques. When peace comes, it is likely that "prewar" will be another name for "obsolete."

One thing about the product will remain very much the same, and that is the hand that operates it. The same old touch, the same skilled fingers will be hanging up the new records. Only the tool will be new, and we want the tool to fit the hand.

Ease of operation — and this includes speed, convenience and freedom from fatigue — has always been an important goal in communications receivers, but we think there is still room for improvement. When we design for the post-war amateur, we want our receivers to excel in this respect as in others. We have some ideas of our own on how a receiver should "handle," but we should like the opinions of the experts. They really know.

The amateurs we have talked to have pretty clear ideas on how their "ideal receiver" should be arranged. They know what kind of a dial they want, and where it should be located. They want certain controls within easy reach, and they want these controls to do specific things. You who read this page probably have ideas just as definite. We should like to hear them. You are experts at operating, just as we are at building, so let's put our heads together.

When you write, tell the whole story. If you think that the audio end of the receiver should be arranged so that it can be used as part of the transmitter speech amplifier system, we want to hear about it. If you think there should be a lot of audio power, this is the time to speak up. If you expect to do a lot of work in certain bands, let us know which ones they are.

This is going to be your receiver, tailor made. This is your chance to draw the specifications. How about it?

DANA BACON

The Month in Canada

ONTARIO—VE3

From Len Mitchell, 3AZ:

A VERY interesting letter was received this month from 3AER, who is on active service with the RCN. The letter was written at sea last November and AER states it is the first time he has written to the SCM since 1934, although he has read every issue that has been published since then. The letter is so interesting that we are taking the liberty to quote excerpts from it:

"We've been banging along from the crest of one wave to the crest of another for several days now, and I've been rather busy, but it just happened that to-night I picked up last month's *QST* (believe it or not, wherever we go I seem to be able to get latest copies, even yet!) and the VE3 section is sort of small, so I thought I'd stick in my oar. I'm well into my third year in the Canadian Navy now, and have rank of leading telegraphist."

AER goes on to state this gives him charge of the wireless staff, and continues:

"The OW is a sergeant in the CWACs and is stationed at Petawawa Military Hospital as a bit of an eye-specialist. Incidentally, I've never seen her in her uniform — it's about time I had a little leave. It will seem like heaven to be modulating my old p.p. 809s again after the war. I intend to go in for a lot more c.w. hamming then, too; after sixteen years in amateur radio I've finally learned the code (really learned it, I mean), and expect much more enjoyment from a c.w. contact than just RST reports and PSE QSL! About a year and a half ago, in Halifax, I met VK6MW, Bill Weston from Freemantle, Western Australia. I've chewed the rag over thoroughly for months, on 20-meter 'phone before the war with Bill, and he sent his best to the lads in VE3. By the way, there are a great many VE3s in the Navy; the desk and benches at Signal School are covered with call signs."

We wish to thank AER for this very newsy letter, and we hope it will inspire others on active service to follow his good example.

2DR and 2EE have been promoted to the rank of Lt. Comdr. 210 is now a Squadron-Leader. Lt. Bob Prissick, ex-2CX, is the proud father of a 9-pound son.

MANITOBA—VE4

From Art Morley, 4AAW:

4AG writes a nice letter from Halifax, where he is with the Navy. 4AJJ is a civilian instructor out at Virden. 4ARY was recently promoted to sgt. He is with the RCAF. 4VG, after spending some time on operational stations, has landed up at Macdonald; 4ME can get his address from me if he wishes.

2BS would like to know the whereabouts of 3BZ. 4ABD has gone to Montreal. 4LV was recently transferred to Brandon. 4AAV is somewhere over there. 4IF has been promoted to the rank of Flight Lt., and is doing a swell job somewhere in India.

Those of you who miss getting mentioned here, please don't blame me. I can't help it. If you don't let me know where you are, I'm stuck. So *please* write. To those who do write and don't hear from me for some time, please be patient, as I'm very busy working with the RCAF. Sooner or later you'll get your answer. 73.

ALBERTA—VE4

From W. W. Butchart, 4LQ:

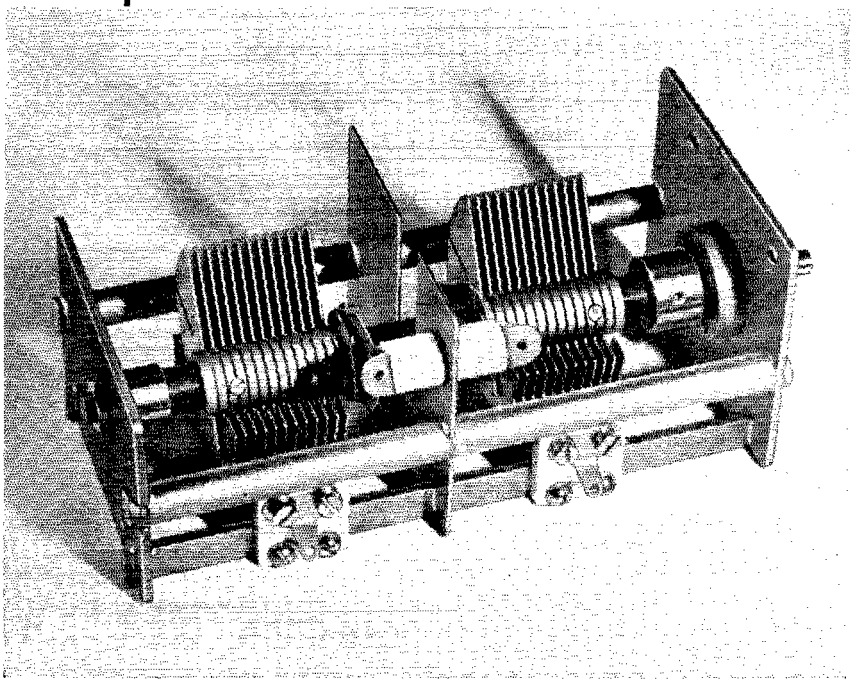
4BJ is in the RCAF as an LAC, Radio Mechanic. 4XE is playing around with an "Undulator" (a machine for copying code). He intends to use it in his instructional work with RCCS. 4BW's business is flourishing, and keeps him plenty busy.

5FG, formerly of Prince George and now with the Canadian Army Dental Corps, was a guest at 4HM's shack early in January. Doc looks fine in uniform. While here he had a great old rag-chew with 4EA and 4LQ. 4FG kept a regular sked each afternoon at 1:00 P.M. with 4HM, and they formed quite a friendship.

5CE has taken up residence in Alberta, about 60 miles west of Edmonton. 4XF is giving lectures in map-reading to members of "E" Troop Cavalry Signals. 4BV is cameraman

(*Continued on page 50*)

TOUGH



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OUR soldiers are proving they are "tough" and can take it. Hammarlund variable condensers are right in there, fighting alongside our boys and proving that they too can take it.

THE HAMMARLUND MANUFACTURING CO., INC.
460 West 34th Street, New York, N. Y.

(Continued from page 48)

on one of the Edmonton Ciné Clubs "Groups" which is busy filming a competition film. 4EA is Scenario writer with the same group.

4ZI of Barons came across with another batch of news which goes as follows:

"4PZ is going to the RCAF as a Telegraph Engineer, and has taken his Commercial Op's exam from 4HQ (Bill Stunden) in Calgary. 4WZ is basking in the shadow of a temporary deferment from military service until such time as his presence on the farm is no longer essential to Agriculture. 4ADY and his XYL, last reported holidaying in Barons from the Coast, returned home to find their home had been occupied by others during their absence, and they are consequently living in a trailer camp. 4ARC is kind of eyeing 4PZ's success in the matrimonial effort before taking the plunge. (So help me, that's just what ZI said! — *LQ.*) 4AQP does a spot of curling in his spare time."

The real news from ZI lies in the fact that he became a proud "Pappy" on New Year's Day. (*P.S.* This makes ZI's score an even two "YL Ops.") Nice going, Elwood, and thanks a lot for your letters. They are most certainly appreciated.

ZI also sent along a clipping from the Lethbridge Herald covering the marriage of ADP (Alberta's Dried Prune) in Nova Scotia. Doug is with the RCAF, and has been stationed in Labrador prior to being posted in Shelburne, N. S., where he now is. ZI is going to try to get Bill Savage, 4EQ to shoot along some news on the Lethbridge gang. If Bill does *kick through something interesting should be forthcoming.*

4AF is chief engineer in the new CJOC, which is sporting 1000 red-hot watts on 1060 kc. 4WH's kid brother, last reported in this column several months ago as being in Singapore at the time of the Jap conquest, has since turned up safe and sound in Ceylon, news which is really great stuff.

That winds up proceedings for this month gang, so 73.

★ BOOK REVIEWS ★

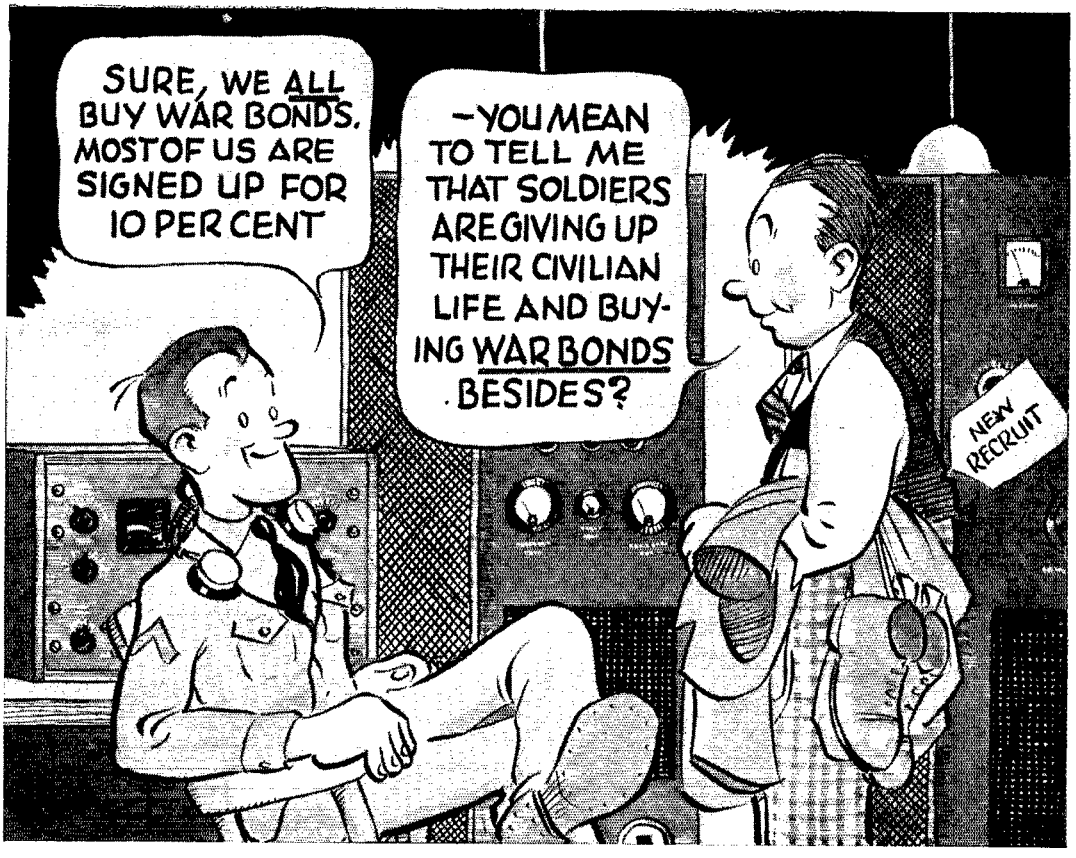
Microwave Transmission, by J. C. Slater. Published by McGraw-Hill Book Co., New York. 309 pages, 6 × 9; illustrated. Price, $3.50.

Microwaves, as defined in the preface to this volume, are electromagnetic waves having lengths between one centimeter and one meter. While a considerable literature has accumulated in the various engineering and scientific periodicals dealing with waves of this order of length, there has been no one text in which the large amount of published material has been classified, digested and correlated. In view of the current importance of the subject, *Microwave Transmission* will unquestionably be welcomed by workers in the u.h.f. field.

The author is professor of physics at the Massachusetts Institute of Technology, where one of the prominent groups carrying on investigations in the microwave region is located. His treatment is primarily of the behavior of the waves themselves and the devices used for propagating them, rather than the methods of generation and reception. It is emphasized at the start that the shortness of wavelength forces a re-examination of some of the ideas which lead to useful results at low frequencies, but which become more or less incorrect approximations at extremely high frequencies. After an opening chapter on the theory of transmission lines from the ordinary electrical circuit standpoint, the book therefore treats the more fundamental ideas of electric and magnetic fields, based on Maxwell's equations, with the purpose of showing where and why the ordinary transmission-line ideas must be modified to fit the microwave picture. In the course of the book, rectangular wave guides, parallel-wire transmission lines, coaxial lines, and circular wave guides are treated. There are also chapters on radiation from antennas and on directive devices for antennas.

Not a book for casual reading, *Microwave Transmission*

(Continued on page 52)



CAN we on the home front do less than Elmer? He and his buddies are giving up everything, even their lives, and buying bonds, too. Invest 10% every payday in WAR BONDS—it's your duty!

PRECISION PRODUCTS FOR BETTER RADIO

HAMMARLUND

THE HAMMARLUND MFG. CO., INC., 460 WEST 34TH ST., NEW YORK, N. Y.

(*Continued from page 50*)

is written for the more advanced student or engineer. While the treatment is necessarily mathematical, Prof. Slater has an easy and fluent style which unfortunately seems to be rare in technical works but which we believe is a distinct asset to elucidation. Certainly it is unusual to find, in a text dealing with a difficult subject, such an aside as the story of the old lady and the mince pies! But perhaps the answer is that only those whose authority in the field is beyond question dare unbend in their published writings.

Frequency Modulation, by August Hund. Published by McGraw-Hill Book Co., New York. 375 pages, 6 × 9, illustrated. Price, $4.00.

So far as we know, this is the first engineering text on frequency modulation. It is a complete treatment of both the theoretical and practical aspects of f.m. transmission and reception, intended to be useful both for the classroom and for the engineer engaged in the design and operation of f.m. equipment.

Nearly half of the book is devoted to an analysis and comparison of amplitude, phase and frequency modulation, singly and in combination, including a discussion of the effects of various types of interference on the three modulation systems. The characteristics of wave propagation in the frequency region used for f.m. broadcasting and communication also are described. The remainder of the volume concerns circuits used in f.m. transmitters and receivers, and antenna systems for both transmission and reception.

While the use of higher mathematics cannot be avoided in a text of this type, a distinct effort has been made to simplify its applications so that specific design problems can be solved with a minimum of difficulty. The circuit information, representing the latest engineering practice, has been drawn from an extensive list of sources. The book is a definitely worth-while addition to the library of anyone engaged in radio engineering work, and an essential for those specializing in f.m.

A Guide to Cathode Ray Patterns, by Merwyn Bly. Published by John Wiley & Sons, Inc., New York. 39 pages, 8 × 11; paper covers with spiral binding. Price, $1.50.

This is a handy little book for the man who has occasion to use an oscilloscope for different types of testing. Drawings of scores of patterns, of types frequently encountered in practice, are associated with brief explanations of the conditions which give rise to them. When a particular pattern appears on the screen, it should not be difficult to find a prototype in this volume which, even if not exactly identical, will indicate the probable explanation.

Separate sections of the book are devoted to phase determination, frequency determination, modulation patterns, sine-wave testing, square-wave testing, resonance curves and vacuum-tube characteristics. Several graphs showing how oscilloscope patterns are constructed are included, as well as a series of "perfect" half-sine waves that can be used for comparison with actual patterns.

Principles of Aeronautical Radio Engineering, by P. C. Sandretto. Published by McGraw-Hill Book Co., New York. 414 pages, 6 × 9; illustrated. Price, $3.50.

This is a practical engineering treatment of radio in its commercial airline applications, by the superintendent of the United Air Lines Communications Laboratory. As such, it is the first book of its kind, although there have of course been other books dealing with aircraft radio equipment either in a more popular manner or as part of the broader subject of radio engineering. Dealing primarily with the principles and design of systems and equipment for air navigation (*avigation*) and communication, it presupposes familiarity with ordinary radio and electrical principles.

After an introductory chapter outlining the functions of radio in aircraft, in which the general questions of constructional requirements, testing and servicing methods are discussed, the subject matter is divided into the three broad classifications of avigation, communication, and accessories.

(*Continued on page 54*)

International small talk . . .

It doesn't actually win the battle, but hobnobbing with a foreign buddy is a form of wartime communication that builds international morale. In the picture two Americans and a French soldier tell it with gestures to an English Tommy.

via Electronics . . . International communication is doing more than any other single thing to win this war. Here the talk between soldiers ceases to be "small talk," for global strategy depends upon instantaneous communication of big ideas. Thus the radio transmitting tube becomes the greatest fighting tool ever placed at the disposal of armies.

The same inherent characteristics . . . *high performance, stamina, dependability* . . . that made Eimac Tubes first choice during peacetime have set them apart as the pre-eminent leader during this global war. Just how important and how many jobs they are doing today is a story that will be told once victory is ours. In the meantime rest assured that Eimac still remains a step ahead . . . is still first choice among the leading engineers throughout the world.

Follow the leaders to

Eimac TUBES

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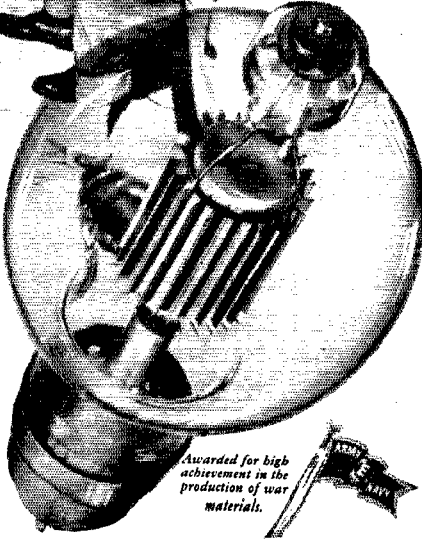


Awarded for high achievement in the production of war materials.

(Continued from page 52)

The first category includes chapters on radio ranges, both low-frequency and u.h.f. types, direction-finding from the airplane and from the ground, markers, instrument landing and absolute altimeters. The section on communication covers plane-to-ground working on both medium and ultra-high frequencies, including propagation, antennas and equipment. Under accessories there is a discussion of power supply equipment, noise suppression, control systems, interphones, etc. Mechanical requirements for aircraft radio systems are set out in an Appendix.

While free use of ordinary mathematics is made in the development of the circuit relations, advanced knowledge is not necessary to an understanding of the text. To the lay observer, it appears that Mr. Sandretto has done an excellent job of assembling and presenting his material, and he has been especially successful in focussing attention on the necessity for tailoring radio equipment to the aircraft rather than — a natural tendency for the non-aeronautical radio designer — the other way 'round.

Television Standards and Practice, edited by Donald G. Fink. Published by McGraw-Hill Book Co., New York. 405 pages, 6 × 9; illustrated. Price, $5.00.

The record of television standardization shows that, while it was early set forth as a principle that standardization was essential before commercial television could become a reality, the path to an acceptable set of standards has been a difficult one, frequently marked by stormy interludes. At one time commercial television apparently was all set to go, only to be called off practically at the last minute because of disagreements within the industry as to the technical standards to be used. This situation led to the formation of the National Television System Committee, composed of representatives of the various organizations working on television problems, which began work in the latter part of 1940 and in the remarkably short time of six months evolved a set of standards meeting with the acceptance of practically everyone concerned. In 1941 the recommended standards were adopted by the FCC for commercial television broadcasting, and now are part of the FCC regulations.

Television Standards and Practice is a compilation of reports of various committees or panels of the NTSC dealing with the standards actually adopted. Particular attention has been devoted to selecting those papers which indicate the reasons behind the standards, and in this respect the volume is an outstanding symposium on the engineering problems of television.

— *G. G.*

Who Killed the Signal?

(Continued from page 40)

"Very interesting," the Sleuth commented. "Er — you've been able to keep 'putting out' without any trouble lately, I take it?"

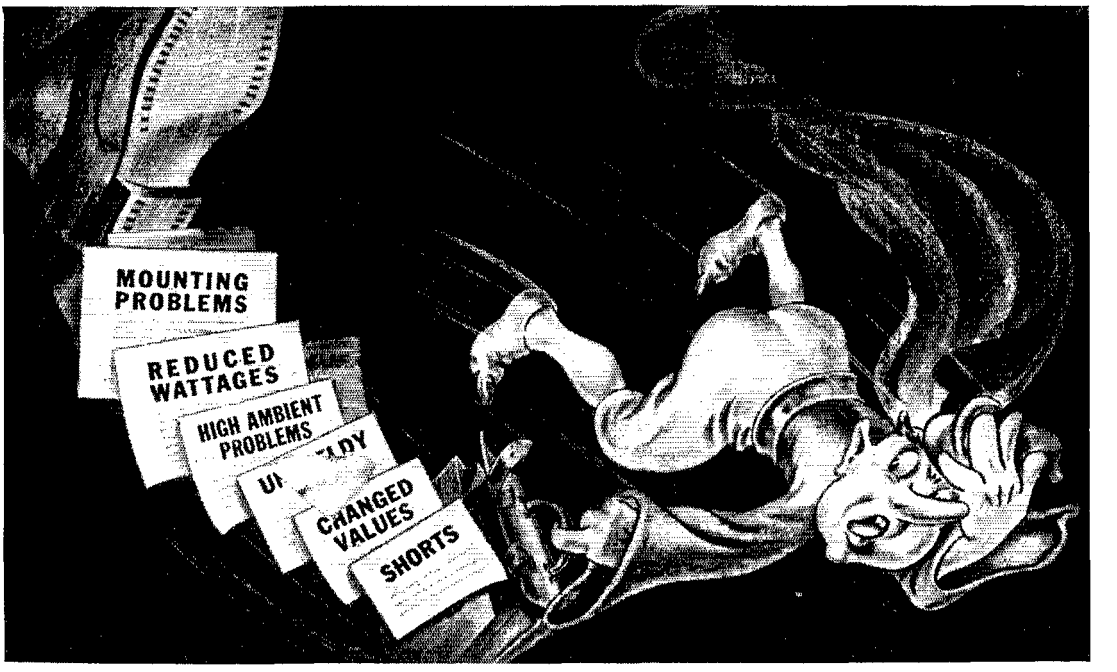
"Sure thing. Ask any of these Parts — I'm always in there pitching."

At that point the Sleuth felt a tug on his sleeve. It was Volt, and at his insistence the pair went off a little way and held a whispered conference.

"I guess that's all we need from you," the Sleuth said absently when they returned. "How about introducing us to your associates — Filter Condenser and Filter Choke?"

"Sure — glad to. Hey, you F.C.s, c'mon over!"

Rectifier performed the introductions in his best thermionic manner. Filter Condenser was a tall, svelte, perfectly-formed creature in a sleekly-fitted bright metal dress. She acknowledged the introduction with cool hauteur. Beside her Filter Choke appeared squat and ugly; there was brute force behind those broad shoulders. He looked somewhat like a smaller edition of Power Transformer, with the same type of laminated core but only one winding.



the resistors that said "GOODBYE" ... to all of that!

Goodbye to the many shortcomings common to conventional resistors space wound with bare wire and protected by brittle outer coatings! And good riddance!

For years now, and on almost all types of jobs, Koolohm Resistors have proved the superiority of their ceramic insulated wire construction beyond all question. For Koolohms are much smaller than other resistors of equal rating. They weigh less. They deliver full wattage ratings, regardless of resistance values. They utilize larger, safer wire sizes. They have ceramic insulated windings which avoid danger of shorts and changed values, at the same time permitting layer-windings, or high-density, progressively-wound interleaved patterns. They may easily be mounted anywhere, even direct to a chassis—because, with their wire already ceramic insulated before it is wound, Koolohms are doubly protected by a chip-proof outer ceramic tube.

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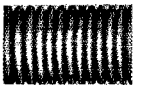
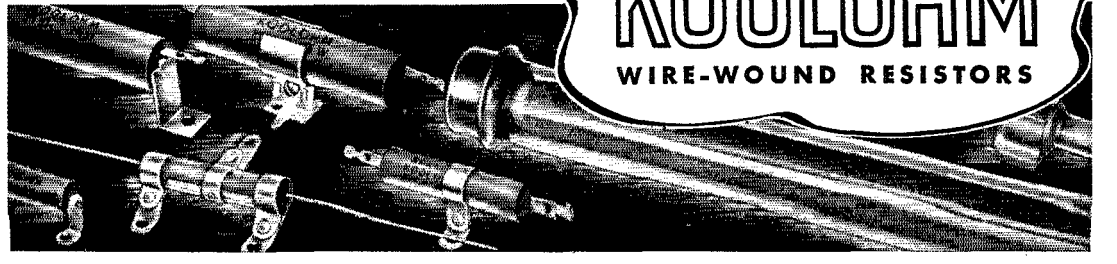


KOOLOHM layer winding Turns cannot "swim" or short. Insulation has a dielectric strength of 350 volts per mil. at 400° C.!

KOOLOHM interleaved winding—the perfect Ayrton-Perry type. Resistors are available having negligible inductance, even at 50 to 100 Mc.!

Section of KOOLOHM wire with ceramic insulation removed to show contrast between bare and insulated wire. This flexible, heat-proof insulation is actually applied to the wire at a temperature of 1000° C.



SPRAGUE
KOOLOHM
WIRE-WOUND RESISTORS

(*Continued from page 54*)

Filter Choke greeted them affably.

"A smooth fellow," Volt whispered behind his hand.

"Now if you'll just answer a few questions," Sleuth began, ignoring the comment. "What were you doing when Signal died?"

"Working away, as usual," Filter Choke replied. "That is, we worked until the current stopped coming. After that, of course, there was nothing for us to do."

"And just what is it you do with the current?"

"Oh, we smooth out its pulsations — make it as nice and level as this chassis."

"What did I tell you?" Volt nudged the Sleuth.

The great detective ignored him. "I take it you're talking about the pulsating current that Rectifier delivers to you. Just how do you smooth it out?"

"It's sort of like taking it from here and piling it over there," Filter Choke replied. "Filter Condenser and I work together as a team. Incidentally, we're actually quite different personalities, but it happens that each of us has qualities that complement the other's and so it works out swell.

"But that's by the way," he added hastily, noting the Sleuth's look of impatience. "Here is how we work. When a pulse of current comes along, Electrolytic (that's my pet name for Miss Condenser) takes it in one of her sections. She lets it pile up until that section is charged to the limit of its capacity. I help by holding the flow back so that none spills over."

"But that current is awful strong," Ohm objected. "Don't tell me you can hold it all by yourself."

"Oh, I have a system. It's sort of like jujitsu," Choke winked confidentially. "I let it build up an induced current in my winding until it stops itself by its own strength."

"Oh," said Ohm.

"Then what?" the Sleuth probed.

"Well, of course, when Electrolytic has all she can hold in her first section I have to let some of it through. Otherwise it would spill over, because there are other pulses coming along all the time."

"Or it would just push you out of the way regardless," Ohm muttered.

"OK — have it that way if you want. Anyway, I straighten that current out plenty, I can tell you. It's nowhere near as bumptious when I get through with it, believe me. I hold the big peaks back, and in between times Electrolytic supplies me with enough from her storage capacity to keep the flow pretty constant."

"Then what do you do with it?"

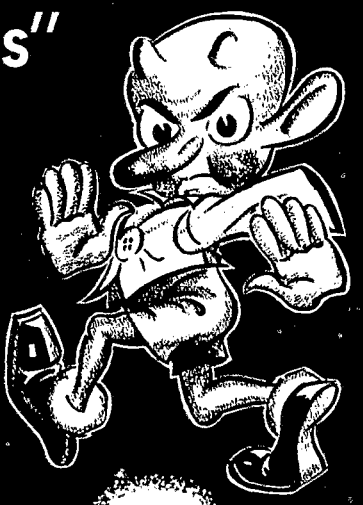
"I dump it into Miss Condenser's other section, and the set takes it from there."

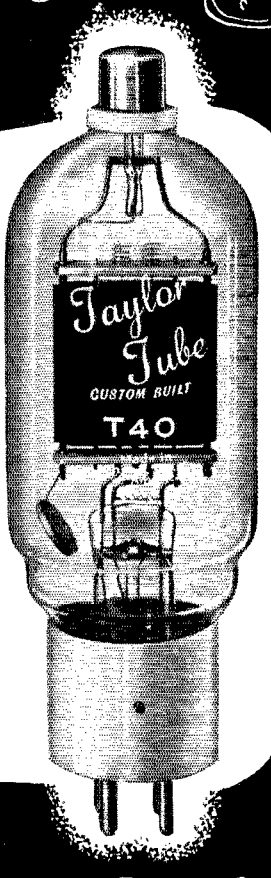
"Just like the storage tank in a water supply system, isn't she?" Milly gurgled sweetly.

Eyeing her coldly, Filter Condenser spoke for the first time. "I'm no tank, dearie, and I'll thank you to remember it," she said cuttingly.

Ask the "Gremlins" about...

TAYLOR TUBES





At first glance a radio tube looks like "Duck Soup" when the destructive little "Gremlins" start poking around in high frequency circuits. After a couple of unsuccessful encounters with Taylor Tubes however, the "Keep Clear" signal has been spreading along the entire "Gremlin Grape-Vine Network" with uncontrolled speed.

It's no secret in any field of operations that Taylor Tubes have the "stuff" to help keep vital communications going at "par-plus" efficiency. Every Taylor Tube is engineered to "deliver the goods" whenever and wherever needed.

"MORE WATTS PER DOLLAR"

Taylor HEAVY CUSTOM BUILT DUTY Tubes

TAYLOR TUBES, INC., 2341 WABANSIA AVE., CHICAGO, ILLINOIS

(*Continued from page 56*)

"I know just how much I can hold, and I take that much and not a drop more."

"Of course, of course," agreed the Sleuth hastily. But the irritated Miss Condenser was not to be conciliated.

"And every electron they get from me is pure direct current, too — the best stuff in town," she swept on. "I'm no common hash-slinger, I'll have you know, and I don't stand for any rough stuff, either. You don't hear a ripple, when I'm around."

"Not even the 3½ per cent kind they have at the Army posts?" Milly asked wickedly.

"Listen, sister. When I say there isn't a ripple in the stuff I serve 'em, that's exactly what I mean!" Electrolytic's film, always a little thin, was beginning to break down.

Ohm, who had wandered off and could be seen apparently engaged in idle gossip with some of the other parts, returned while Filter Condenser was speaking. He looked at her with an analytical gleam in his eye.

"Are you quite sure of that?" he asked meaningly. "From some of the talk I've picked up you've dished out some pretty rough stuff at times. It couldn't be that Signal died because you fed him the wrong kind of current, could it?"

At this charge Filter Condenser stiffened as though the potential were more than she could stand. "Why, you insignificant little snoop, if it weren't for me Signal would have —" She stopped short. Sleuth eyed her keenly. This was the most promising lead yet. Then, amazingly, Filter Condenser burst into tears. "Oh, you men are all alike," she sobbed. "Give a girl a bad name and —"

Filter Choke could stand it no longer. "Look here," he said angrily, his rugged face suffused with sympathy. "You've got this all wrong. Electrolytic couldn't have done anything like that. Why, she's the kindest, the finest —" He broke off, choked by his own fervor.

"Go on." The Sleuth's tone was neutral.

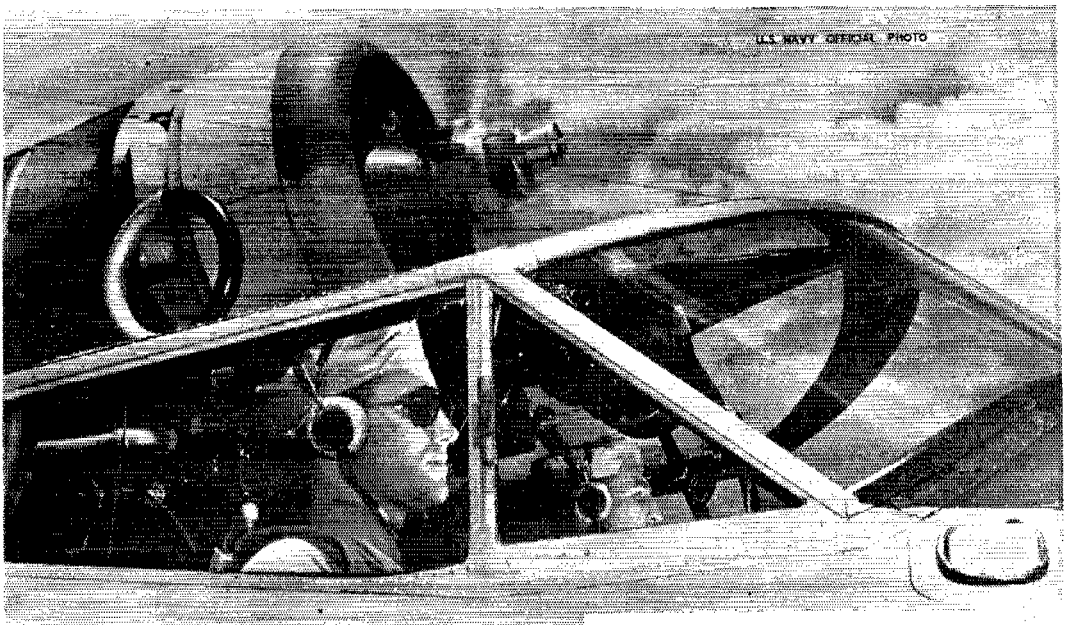
"All right. I'll tell you." Choke spoke in tones too low for her to hear. "Come over here where we can talk." Leading them a little to one side, he began earnestly.

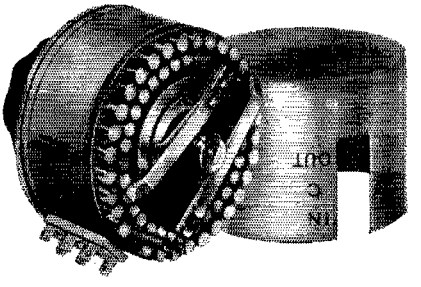
"There's always a lot of gossip going around about a girl in her position — having to serve every customer who comes along, you know. Actually, she has a pretty hard time of it," Filter Choke explained. "You see, those pulses of current are pretty rough, and all the protection she has is that thin film made by her electrolyte."

"What's this 'electrolyte'?"

"It's a solution — the salt of a weak acid and a strong base. She wears it impregnated in a sheet of gauze. It's really her cathode, and the aluminum sheets inside her are her anode. The film formed by the action of the electrolyte on the aluminum is her dielectric — insulator, I suppose you'd call it. And it gives her plenty of resistance, too.

"Electrolytic's a funny kind of a gal," Choke went on reflectively. "One side of her always





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Our fighting men have undertaken to complete a job. We, in turn, are determined that they shall have the necessary tools to do so. Commercial requirements must be subordinated.

When normal conditions return, we will be proud to offer not only our most complete line of precision attenuators in the world, but many advanced types of laboratory test equipment for use in electrical, broadcast, sound picture, industrial and television fields.

THE DAVEN COMPANY

158 SUMMIT STREET NEWARK, NEW JERSEY

(Continued from page 58)

wants to give in but the other resists, which makes her what you might call a unidirectional conductor. If you approach her with just the wrong polarity, she's a pushover. But good old Rectifier Tube always makes sure that the current comes at her with the right polarity, and that way she'll take the strongest charge and still stand up."

Milly sniffed superciliously, but stayed silent.

"But it's true that we never serve anything but pure d.c. — honest it is," Filter Choke argued. "If you've heard anything else, it's a lot of idle gossip. Don't pay any attention to it."

The Sleuth seemed unconvinced. There was silence for a moment. Then Volt spoke up. "It shouldn't be too hard to find out if he's telling the truth or not," he said. "Suppose Milly and I tried some of their output. We could tell, couldn't we?"

"Sure you could," Filter Choke agreed eagerly. "Just stand over here and let us hold your terminals. We'll prove that we're innocent."

"But what if the current is bad?" the Sleuth objected. "Wouldn't it harm you?"

Volt shrugged. "So what? I'm willing to take the chance. How about you, Milly?"

"We-ell." Milly seemed doubtful. "Oh, all right. After all," she added brightly, with a jaunty flip of her pointer, "we can only die once."

There was a momentary bustle while Volt and Milly joined their positive terminals and took hold of the Filters' output. When Volt touched his negative to the chassis he seemed to shiver, and his pointer slammed up almost to the little pin on the right of his scale.

The Sleuth stepped forward anxiously. Then he saw the smile on Milly's face. "It's all right," she said. "The current's just as pure as they said it was!"

"Steady as a rock," Volt confirmed, when he had regained his balance. Disconnecting his terminals, he pronounced, "They're innocent, all right."

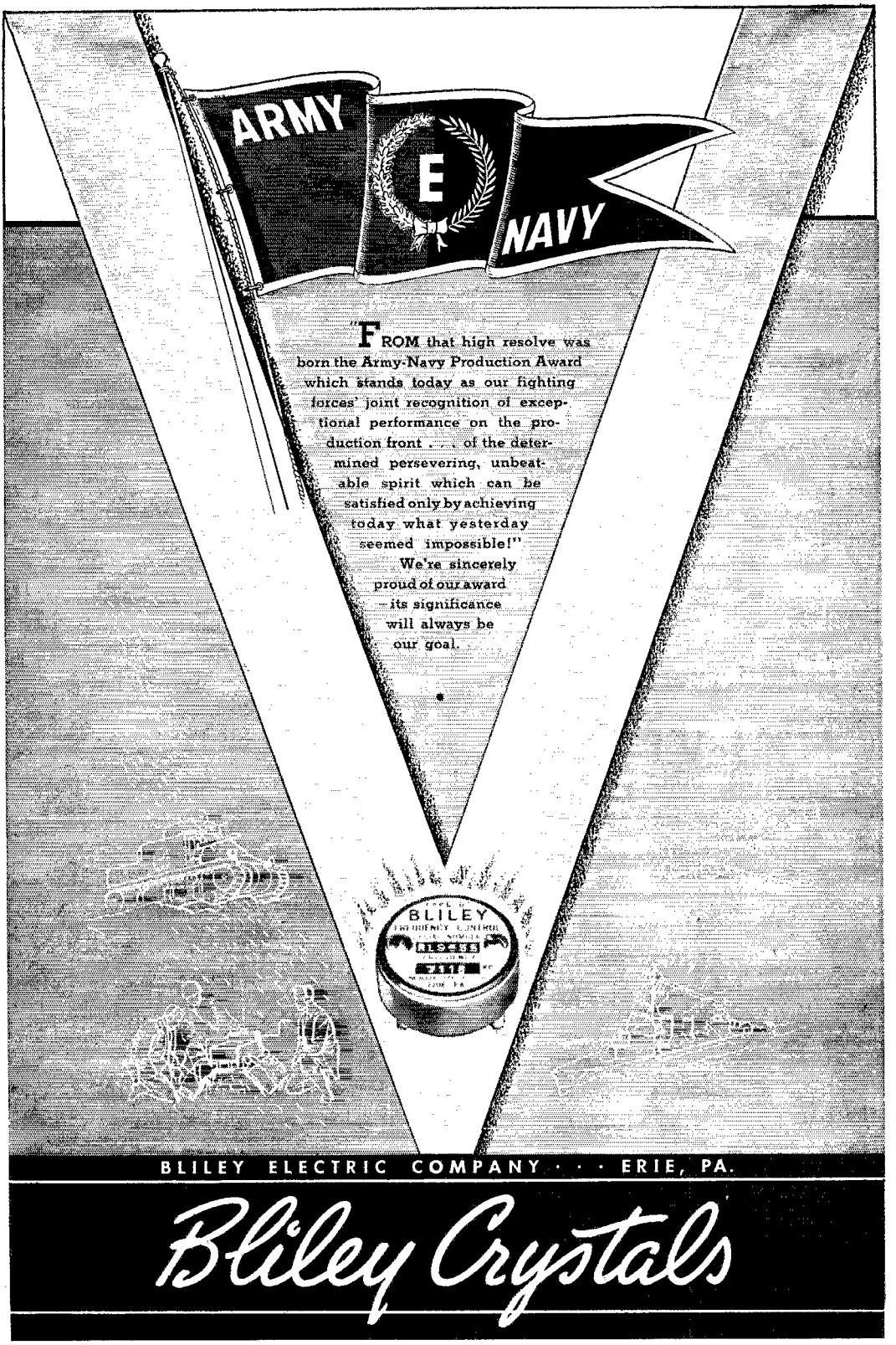
The Sleuth's shoulders sagged in disappointment. "Well, I guess that's that. Another suspect eliminated. I thought we really had a solution, that time."

"We did, too, but it was in the condenser instead of in the bag," Milly tittered.

When she saw that the Sleuth was genuinely downcast, however, her native sensitivity responded. "Please don't be discouraged. Perhaps we've been working on the wrong theory all along. After all, we don't *know* that the Signal was starved to death or was poisoned. Couldn't he have been killed in some other way? Like — like strangling, or — or something?"

The Sleuth looked at her for a long moment, his analytical brain seizing on the new idea. "Of course!" he exclaimed, snapping his fingers. "That's it! Come along." Pulling Ohm erect by his test leads, he led the trio underneath the chassis at a rapid pace. Head bent, he eyed the maze of wiring closely as he strode along — a hound keen on a fresh scent.

(To be continued)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"FROM that high resolve was born the Army-Navy Production Award which stands today as our fighting forces' joint recognition of exceptional performance on the production front . . . of the determined persevering, unbeatable spirit which can be satisfied only by achieving today what yesterday seemed impossible!"
We're sincerely proud of our award – its significance will always be our goal.
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Elementary A.C. Mathematics

(*Continued from page 29*)

I. The lengths of the vectors are made to conform to a convenient scale of current, and measurement of I shows its value to be slightly over 4.2 amperes, while its phase angle, θ, with respect to the voltage is approximately $-25°$.

In the trigonometric solution, the sine and cosine components of the vectors are added separately, just as in the previous example. I_A lies in the first quadrant, hence both sine and cosine are positive. I_B and I_C are in the fourth quadrant, consequently their sines are negative and their cosines are positive. Then, using the proper signs,

$$I \sin \theta = I_A \sin 35° - I_B \sin 20° - I_C \sin 70°$$
$$I \cos \theta = I_A \cos 35° + I_B \cos 20° + I_C \cos 70°$$

The values of the sines and cosines can be taken from tables of trigonometric functions. Substitution of these values, together with the assigned amplitudes of the currents, gives

$$I \sin \theta = (2.0 \times 0.574) - (1.5 \times 0.342) - (2.5 \times 0.940) = -1.715$$
$$I \cos \theta = (2.0 \times 0.819) + (1.5 \times 0.940) + (2.5 \times 0.342) = 3.903$$

The phase angle is found from

$$\tan \theta = \frac{I \sin \theta}{I \cos \theta} = \frac{-1.715}{3.903} = -0.439$$

From the tables, it is found that this is the tangent of 23° 43′, hence θ is 23° 43′, lagging. We then proceed to find the amplitude of I from $I \sin \theta = -1.715$, as before:

$$I = \frac{-1.715}{\sin \theta} = \frac{-1.715}{0.402} = -4.26 \text{ amp.}$$

The minus sign has no special significance here; it simply indicates that when the voltage is beginning to rise in the positive direction the current is still flowing in the negative direction. The amplitude of the current also can be found from the relation $I \cos \theta = 3.903$:

$$I = \frac{3.903}{\cos \theta} = \frac{3.903}{0.916} = 4.26 \text{ amp.}$$

In evaluating the phase angle we made use of the prior knowledge gained from the construction of the vector diagram, which indicated a lagging phase angle of approximately 25°. Our previous definition of an angle called for measurement in the counterclockwise direction from the reference axis. By this definition, the phase angle of I_A would still be 35°, but that of I_B would be 340° (360° − 20°) and that of I_C 290° (360° − 70°). However, the numerical values of the trigonometric functions of these angles are exactly the same as those of the angles actually used, since the equivalent of an angle in the fourth quadrant is 360° minus the value of the angle. In the example, tan θ was found to be negative, hence θ must lie in either the second or fourth quadrant. We can eliminate the second quadrant in this way: In the second quadrant y is positive and x is negative, hence the tangent is $y/-x$; while in

MALLORY TECHNICAL DATA SHEET

R. F. By-Pass Condensers

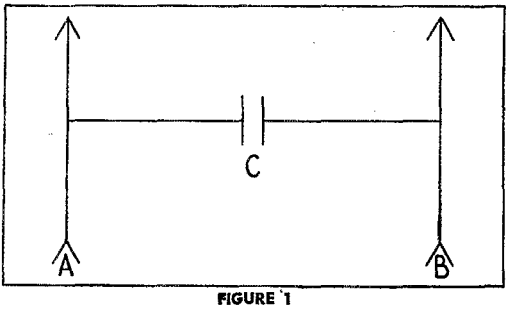


FIGURE 1

Does condenser "C" by-pass lines "A" and "B"? That depends on the frequency! On low frequencies the by-passing may be perfect for the circuit requirements. But at high frequencies, the lead inductance of condenser "C" becomes appreciable, and the actual circuit becomes as shown in figure 2.

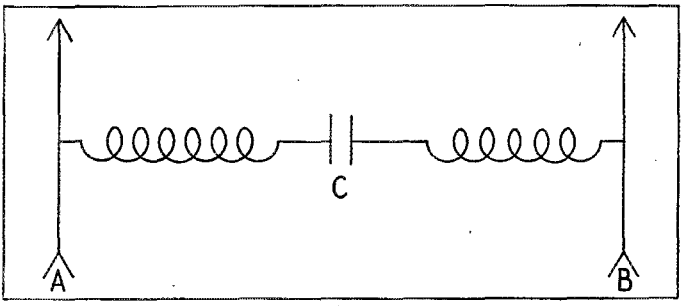


FIGURE 2

The coils represent the inductance of the condenser leads

The method of eliminating lead inductance is shown in figure 3. Note that there are no common leads, and consequently no common impedance.

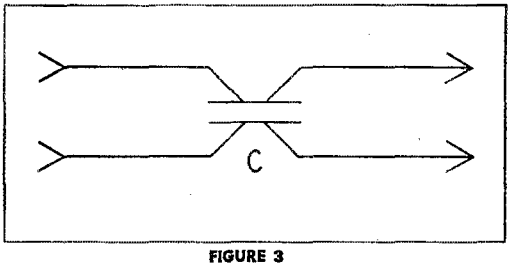


FIGURE 3

These diagrams explain why Mallory primary vibrator hash suppression condensers, types RF481 and RF482 have four terminals. Intended to be used in the input circuits of vibrator power supplies, these condensers provide efficient hash suppression at even relatively high frequencies.

This advertisement is No. 3 of a series to acquaint you with the practical application of radio products.

(Continued from page 62)

the fourth quadrant y is negative and x is positive, so the tangent is $-y/x$. In the present example, $I \sin \theta$, which corresponds to y, is negative, and $I \cos \theta$, which corresponds to x, is positive; consequently $\tan \theta = -y/x$, and therefore lies in the fourth quadrant.

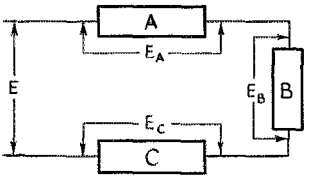


Fig. 15

$E_A = 50$ volts $\angle 60°$
$E_B = 75$ volts $\angle -80°$
$E_C = 25$ volts $\angle 25°$

The series circuit is treated in essentially the same way. Fig. 15 shows a circuit containing three series elements, A, B and C, all carrying the same current, I. The voltage drop across A is 50 volts at a phase angle of 60 degrees with respect to the current; across B there is a drop of 75 volts at a phase angle of -80 degrees and across C 25 volts at a phase angle of 25 degrees, both phase angles being with respect to the current. The total voltage, E, is the vector sum of the voltage drops across the three series elements. The current, being the same in all elements, is used as the reference.

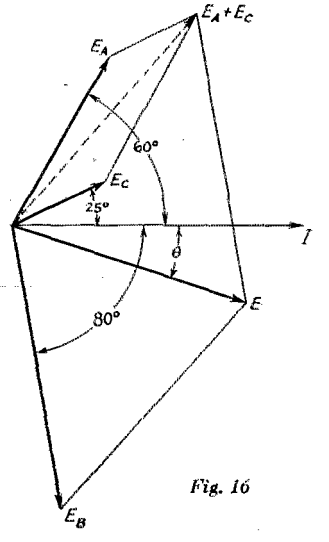
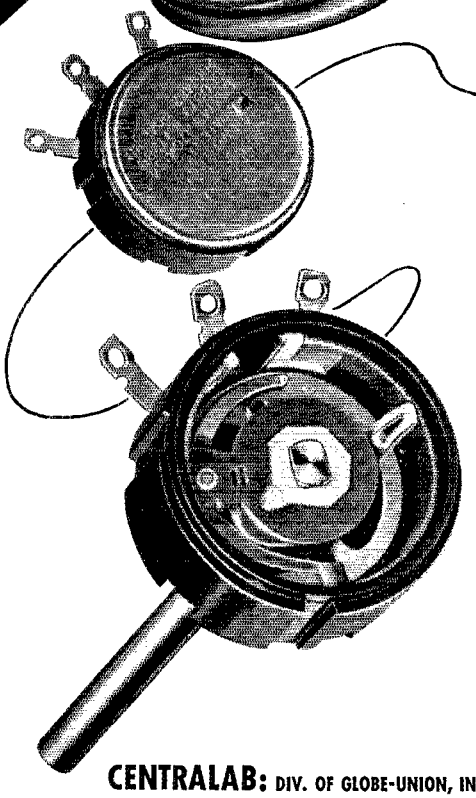


Fig. 16

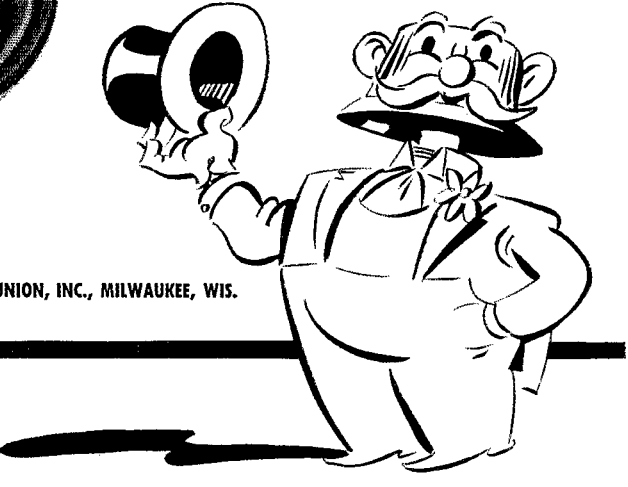
The vector diagram is shown in Fig. 16. The three voltages are drawn to scale in amplitude and at the proper phase angle with respect to the current. Using the parallelogram method, E_A and E_C are first added to get $E_A + E_C$. (It is simply convenient to pick this pair first; any pair of vectors could be chosen, of course.) The sum is then added to E_B to find the resultant or total voltage, E. The amplitude of E as scaled off

Wire Wound Radiohms by Centralab



Our Army, Navy and Air Force is using electronic equipment in which Centralab Wire Wound Radiohms play an important part.

Available in single or tandem type . . . with or without switch . . . for use as potentiometer or rheostat . . . in resistance values up to 10,000 ohms. Total rotation 300°. Switch type requires 40° for switch throw. Linear taper only . . . rated conservatively at 3 watts . . . temperature rise of 100 ohm unit is 28°C. at 3 watts, 40°C. at 4 watts . . . with load carried over total resistor.



CENTRALAB: DIV. OF GLOBE-UNION, INC., MILWAUKEE, WIS.

(*Continued from page 64*)

on the graph is approximately 64 volts, and the phase angle, θ, is about 18 degrees, lagging the current.

The trigonometric solution is likewise carried out as in the preceding example. E_A and E_C lie in the first quadrant (since the phase angles are positive and are less than 90 degrees), so their sines and cosines are both positive. E_B lies in the fourth quadrant since its phase angle is negative and is less than 90 degrees, hence its sine is negative and its cosine is positive. Consequently,

$$E \sin \theta = E_A \sin 60° - E_B \sin 80° + E_C \sin 25°$$
$$E \cos \theta = E_A \cos 60° + E_B \cos 80° + E_C \cos 25°$$

Substituting the proper values gives

$$E \sin \theta = (50 \times 0.866) - (75 \times 0.985) + (25 \times 0.423) = -20.0$$
$$E \cos \theta = (50 \times 0.500) + (75 \times 0.174) + (25 \times 0.906) = 60.7$$

The phase angle is found from

$$\tan \theta = \frac{-20.0}{60.7} = -0.329$$

and, from trigonometric tables, $\theta = 18° 13'$. The amplitude of the voltage, E, is (ignoring the negative sign)

$$E = \frac{20.0}{\sin 18° 13'} = \frac{20.0}{0.313} = 63.9 \text{ volts}$$

The tangent of the phase angle is negative, and since $E \sin \theta$ (y) is negative and $E \cos \theta$ (x) is positive, the angle lies in the fourth quadrant. Hence the voltage lags the current by 18° 13'.

Both these examples illustrate the fact that the amplitude of the total current (or voltage) can be less than the arithmetical sum of the amplitudes of the individual components from which it is constructed. In the last example, the applied voltage, E, is actually less than one of the voltage drops, E_B. This condition arises because of the relative phases of the components. The amplitudes of the components add arithmetically *only* when the components have the same phase; that is, when there is no phase difference between them. When this is the case the resultant or sum has its largest possible value; in no case can it ever exceed the arithmetical sum of the amplitudes of its components.

(*This is Part II of the article. Part III will appear in an early issue of* QST.—*Editor.*)

Strays

Giant flywheels in some stabilizing gyroscopes in large ocean liners require nearly three hours to reach their maximum speed of 15 revolutions per second, while the water wheels in some turbines in hydroelectric plants will run on momentum, unless brakes are applied, for more than 12 hours. — *Collier's.*

TRIPLETT

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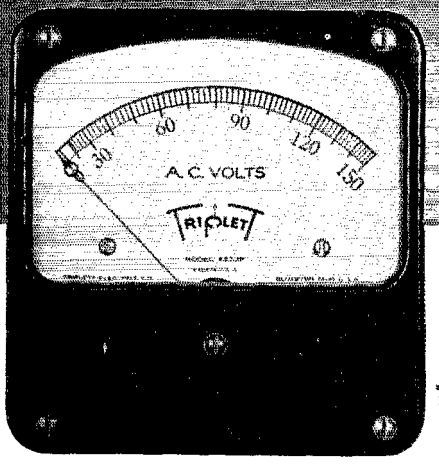
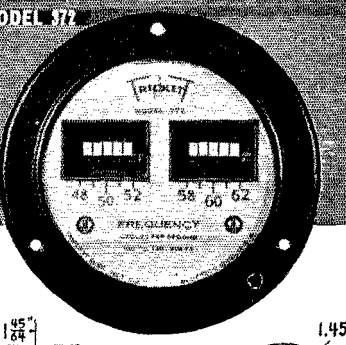
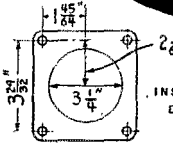


MODEL 437-JP





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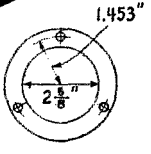

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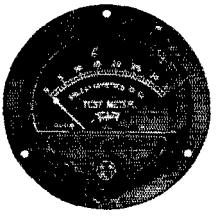
Maximum Service in Minimum Space

TRIPLETT *Thin Line* INSTRUMENTS



Precision performance by new *thin* instrument with *standard* Triplett movement housed in either metal or molded case. No projecting base; wider shroud to strengthen face; simplified zero adjustment; balanced bridge support; metal bridges at both ends; doubly supported core. For "Precision in limited space" write for Triplett Thin Line Bulletin.

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Model 437 J P—A rectangular line of meters to meet dimensions shown (see diagram). Wide-open scale for maximum readability. Complete coverage AC-DC Voltmeters, Ammeters and Wattmeters. Magnetic or static shielding provided on order. Molded Plastic Case for maximum protection in high voltage circuits. Pivots, Jewels and other component parts designed to meet severe vibration requirements.

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A WORD ABOUT DELIVERIES

Naturally deliveries are subject to necessary priority regulations. We urge prompt filing of orders for delivery as may be consistent with America's War effort.

TRIPLETT

THE TRIPLETT ELECTRICAL INSTRUMENT CO., BLUFFTON, O.

Experimenter's Section

(Continued from page 54)

on his rig. While W2LJB is also doing vital war work, he has found time to iron out his difficulties.

It appears that there is much to be done before this system of communication is entirely satisfactory. However, if all of us who have anything to do with it report to you at headquarters, we may be able to glean something useful and pass it on.

Two of us are actually working two-way nightly over an airline distance of about 1½ miles, with about 5 watts. W2LJB and W2EXV are using superhet receivers and have the simple two-tube regenerative receiver described in *How to Become a Radio Amateur*, using a low-frequency coil which I wound for it. At the beginning I had some doubts as to whether my receiver would be good enough, but I haven't once failed to receive either of the others while they have been unsuccessful in hearing me many times, reporting heavy line noise. I had the noise, too, but the 6C5 and 6J7 got them through 100 per cent.

The two converters and the transmitters are breadboard *QST* rigs from the March 1942 issue. The frequency used is about 170 kc., although I have no sure means of checking except by tracking the harmonics on a broadcast receiver. There have been no complaints in the neighborhood.

I am a member of the local auxiliary fire department, and have suggested carrier current communication for the department. The chief of the town department is taking the matter up with the wire chief of the alarm system before he will give me permission to try it. It may be worth the try. The two stations farthest apart are, I think, six miles from each other, and if we can make that I'll really have something to report.

Almost forgot to mention that W2LJB has a few practice tapes which he transmits from time to time, and if any persons in our section are interested he is willing to run them more often. — *William Printz, 148 Chestnut St., Kearny, N. J.*

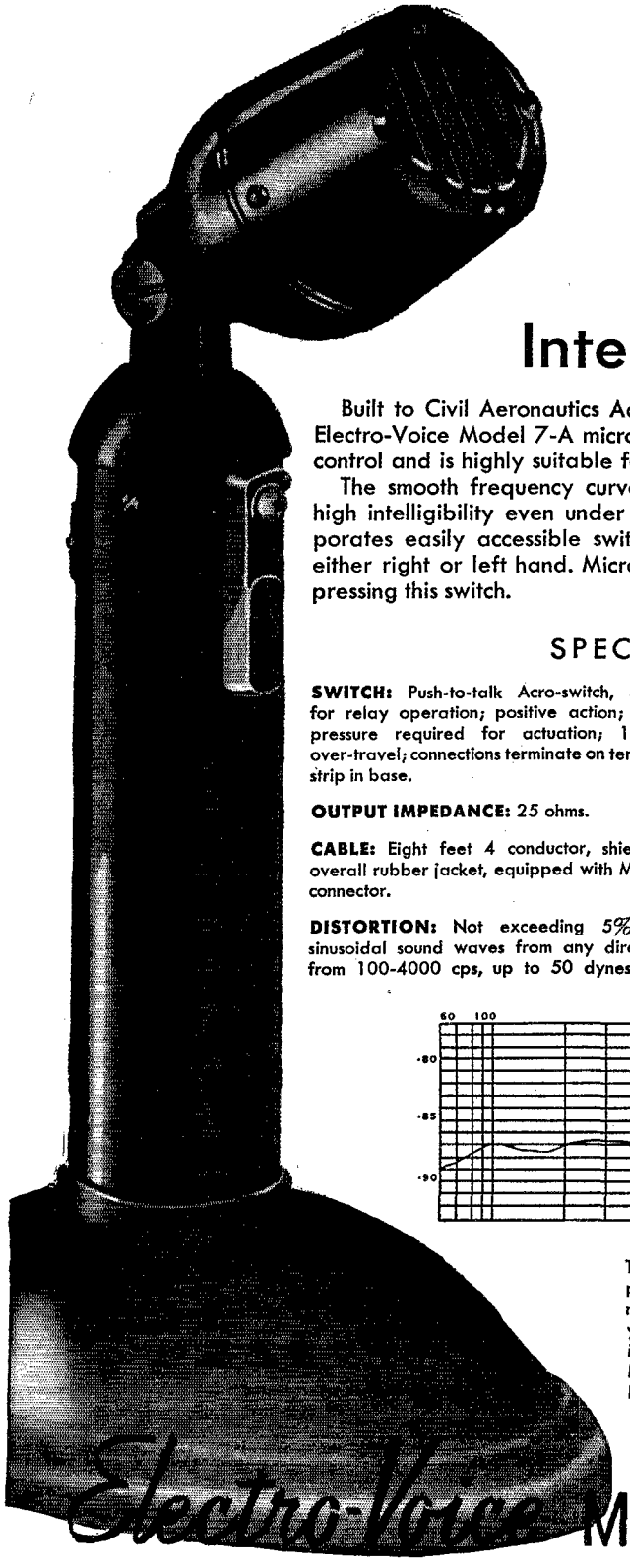
— • • • —

W5KHH and Derwin King (LSPH) of Monroe, La., have succeeded in working two-way over a distance of two miles airline and five miles via power line. Both rigs were built after those in *QST* for March, 1942. The signal from one, running an input of 225 volts at 17 ma., was reported R_2, while that from the other, running 275 volts at 25 ma., was R_7. Difficulty was experienced with QRM from long-wave stations and line noise. The receiver at W5KHH is a Sky Buddy with a *QST* converter, the other receiver an EC-1, also fitted with a *QST* converter.

W5KHH would like to exchange ideas with anyone interested in c.c., particularly those who have had some experience working in areas served by two power companies and those who have succeeded in obtaining good results with 'phone.

— • • • —

George Boles, W2NBU, 315 51st St., Brooklyn, N. Y., and Biagio Trimboli, 282 22nd St., Brooklyn, would like to contact anyone in their vicinity interested in carrier-current experimental work.



Intelligibility

Built to Civil Aeronautics Administration specifications, CAA-515, the Electro-Voice Model 7-A microphone is widely used for airport landing control and is highly suitable for many other sound pick-up applications.

The smooth frequency curve, rising with frequency, gives extremely high intelligibility even under adverse conditions. Desk mounting incorporates easily accessible switch which can be operated by thumb of either right or left hand. Microphone may be moved without danger of pressing this switch.

SPECIFICATIONS

SWITCH: Push-to-talk Acro-switch, SPDT, for relay operation; positive action; slight pressure required for actuation; 1/16" over-travel; connections terminate on terminal strip in base.

OUTPUT IMPEDANCE: 25 ohms.

CABLE: Eight feet 4 conductor, shielded, overall rubber jacket, equipped with MC4M connector.

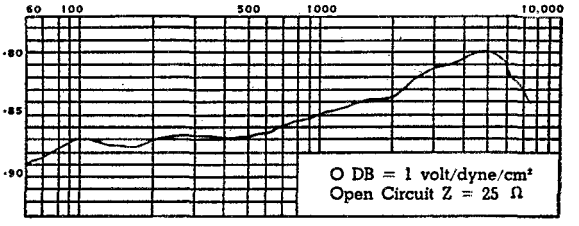
DISTORTION: Not exceeding 5% for sinusoidal sound waves from any direction from 100-4000 cps, up to 50 dynes/cm².

INSULATION: Leads from the moving coil are insulated from the microphone housing and stand, and are capable of withstanding 500 volts RMS, 60 cps.

STAND TUBE: Wear resistant, ⅛" XXM bakelite.

CORROSION RESISTANCE: The entire microphone is completely inhibited against corrosion and will successfully withstand a 20% salt spray atmosphere for 100 hours at 95° F.

NET WEIGHT: 3½ lbs.; Shipping wt.: 5 lbs.



This Model 7-A Desk Mounting Communication Microphone supersedes our previous Model S-7. Our Engineering Department may be able to assist you with your microphone problem. *Electro-Voice Manufacturing Co., Inc., 1239 South Bend Avenue, South Bend, Indiana. Export Division: 100 Varick Street, New York, N. Y., U. S. A.—Cable Address: "Arlab"*

Electro-Voice MICROPHONES

AMATEUR ACTIVITIES

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — 3IGS called up from Brooklyn to say that he is working for the Signal Corps. 8EU has organized a code class which meets twice a month, and he sent his complete *QST* file to Noroton for the use of the boys there. 3KT, school teacher in civil life, is going to school at Asbury Park, where you can't be late. 3GYV is still in North Carolina undergoing his fourth training period. The boys of Lower Merion are building some very slick WERS rigs and test equipment, and using few critical materials. 6KBR is teaching at Penn for the Navy. He has a pair of HY75s on 650 Mc. to play with. 3HYT got shifted from Phila. to Anacostia. The Frankford Radio Club still meets. There is quite a lot of operating on 160 kc. If all the boys on WW will write me I will compile a list and put same in this column. State what time you consider most suitable and your location. For a start, suppose we select 11:00 P.M., Sunday, till 1:00 A.M., Monday, the two week-ends following the day you receive this *QST*. Use 160 kc. c.w., toss a coin. If it is heads, listen for the first five minutes, if tails, call CQ WW for that period. Send in reports of calls heard, or even if you were listening and heard nothing. 3JD, 3GGC and 3ITZ all have exceptionally good rigs. The lads in West Phila. have an excellent opportunity to make two way contact. So much for wired wireless; may your harmonics stay where they belong. 73, Jerry, W3BES.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Hermann E. Hobbs, W3CIZ — The WERS in Prince Georges Co. are active and have both wired wireless and u.h.f. radio stations working. Perry Wightman, the radio aide, has been appointed procurement officer for WERS by Col. Henry S. Barrett, director of air raid precautions. The FCC has approved two-way radio for Fairfax County police. PV reports some activity on the u.h.f. waves in the district and has done some construction along those lines, even on one meter. How about reporting WERS activities to the SCM? 73.

SOUTHERN NEW JERSEY — Acting SCM, Ray Tomlinson, W3GCU — Asst. SCM, ZI; regional EC in charge of emergency coördination, BAQ; Emergency Coördinators: Atlantic City, EFM; Camden, KW; North Plainfield, CGU; Vineland, GMY; Somerville, EBC. CCO, former SNJ SCM, Lt. Lester H. Allen, U. S. Air Corps, has been assigned the post of base communications officer, and officer in charge of photography. Les may be addressed by mail at Tuckerman Army Air Base, Newport, Ark. ARN has just received RT3c, U.S.N. ITU is now corporal, and new address is Co. A, 800th SSR, Camp Crowder, Mo. CCO was home over the Christmas holidays on leave, and while home purchased the small Stancor transmitter from ACC for service at the base in Arkansas, where the 3AQ receiver has also been lent for service in the pilot training program. The antenna coupler from GCU's rig is also lent for service in conjunction with this equipment. GEV is enlisted in Navy as electrical engineering instructor at a school in Virginia. UT is instructor at Rutgers. JKI is in Army and is radio op at Fort Jackson, N. C. JKH is student at Rutgers. AFA is on night shift at defense plant. FBT is with Pratt and Whitney Aeronautical Corp. CCC has been assigned to the Radio Matériel Division of the Navy and is now in charge of new radio station at Amagansette, L. I., N. Y. Ed is RM1c, USN. GRW is radio op in Merchant Marine. HWT received his wings at Naval school in Pensacola, Fla. BMM, Naval Ensign, has been transferred to Traverse, Mich., where he has taken up residence. JJX is in Signal Corps Labs., and is op at WVT, U. S. Sig. Corps Labs., Chicago, Ill., and can be reached by mail at 433 West Van Buren St., Chicago, Ill. GER is with Wright Aeronautical Corp. GSR is with Eastern Aircraft. CYI is technical sgt., address him Signal Service Regiment, Fort Monmouth, N. J. Major Kale, VE, may be addressed 71st Armored Field Artillery, Camp Cook, Calif. AID is now chief-in-charge of aircraft radio maintenance for Eastern Aircraft at the West Trenton Airport. HVO held the annual Christmas party of the Ladies' Auxiliary of the DVRA at her home. ABS's radio school now has 33 students; one of the boys received third-class 'phone ticket during week of Jan. 16th. Stan has submitted Hillsborough Twp.'s WERS plan to the defense council for approval, after which application for WERS license will be made to FCC. Hamilton Twp.'s WERS license is awaiting FCC action. ABS, ACC, and four others in that vicinity are working regular skeds on wired wireless with very excellent S9 sigs over two mile span. JNO is now in charge of repair department at American Radio Co., where GCU is also doing repair duties in his spare time. EQF is RM1c at Floyd Bennett Field, radio central. LT is with DeLaval Steam Turbine Co. BAQ is again in the field on duty with Sig. Corps Labs, as radio engineer. So long 'till next month. 73.

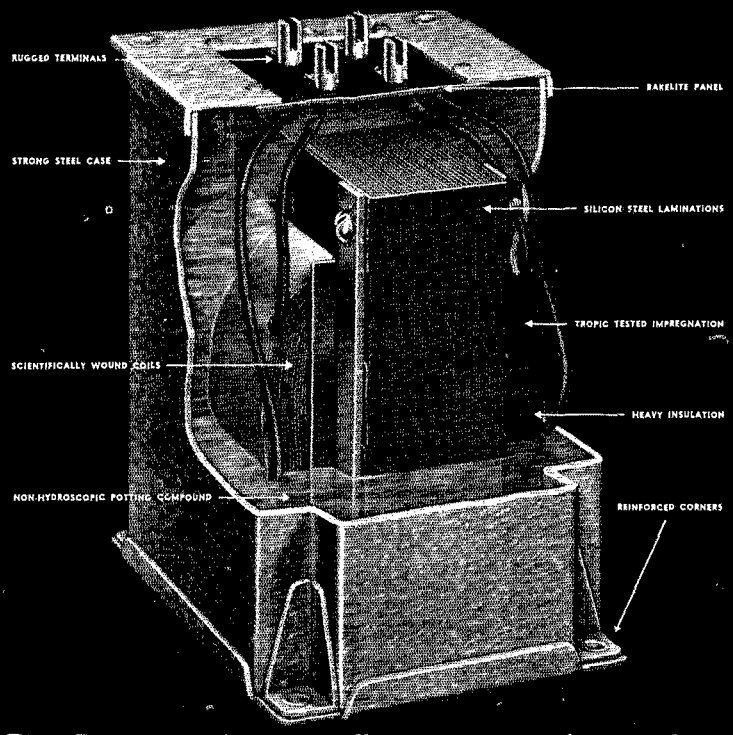
WESTERN NEW YORK — SCM, Fred Chichester, W8PLA — 8SWL, an 18-year-old, is now with the Armed Forces at Camp Chaffee, Ark. According to the Adirondack Amateur Radio Association there are twelve girls taking radio training in classes being held at Gloversville. It is expected that they will take part in the WERS work as soon as they get their licenses. The AARA school at that place has furnished the Signal Corps with some ten men and has seventeen more about ready to turn loose. A 32-week ESMWT radio course is being given at Dansville. There are 25 members in the class, a number of whom have enlisted in the U. S. Army Reserve. TSC and PLA are taking the course. One member, after finishing the first half of the course, enlisted in the WAACs. PWU is now radio electrician with the Armed Forces at Corpus Christi, Texas. Joseph Paterchok, LSPH, passed his 2nd class telegraph commercial exam 7 months after getting his ham ticket. He is a Signal Corps inspector, at present.

WESTERN PENNSYLVANIA — SCM, E. A. Krall, W8CKO — Asst. SCM in charge of EC, VYU. HKU is a communications officer for Warren County and has a fine organization with him. BOZ is his radio aide and built most of the equipment being used. The WERS call for Warren County is WKLY. At present there are five units in the set-up. TOJ is adjutant of group 315, CAP. KYW is in auxiliary police but finds time for WERS work. PHC and JSV are both employed in a defense plant. Doc, VMW, has instructed a group so that they could participate in CDC work. AOE has been burning midnight oil preparing for commercial. The rumor committee says RIT is stationed at Middletown Airport. IYI is at Langley Field. We advise all amateurs who are not in the service, or over age, to organize code and theory classes in order to follow their love for radio. The ARRL has prepared such courses and a word to Headquarters will bring results.

CENTRAL DIVISION

ILLINOIS — SCM, Mrs. Carrie Jones, W9ILH — YZE, s/sgt. in the Signal Corps, spent Christmas at home AKG, cpl. in the Army Air Corps, is an instructor at Scott Field. Ex-QJR, Capt. in the Army Air Corps, has been in 36 states in the past 6 months; 40 states and Hawaii the past year. AIO, not AOI as was mentioned a few weeks ago, is in Kansas City. When visiting the Signal Corps station at Scott Field, the familiar fists of ZCH and FJN were heard operating from Chicago, and it brought back memories of ILN! NBX is an instructor at the AAFTS in Chicago. WWP has accepted the post of Asst. Communications Mgr. at ARRL. MIN expects to leave for Kansas City soon, to become an instructor in radio. RT is attending school in New York. NFL has returned from Africa and after a short vacation, reported to the Florida office for another assignment. "Jeem" was assigned the call of EL2B while in Africa. ICN enlisted in the Marines and has left for basic training. Ex-WSR (now 3JPK) is working in electrical design in the Navy dept. in Washington, D. C. NLW, YL op, is assisting at the controls of WILL at the U. of Ill. Ex-UPG (now 8VKJ) is studying for commission in Coast Guard at New London, Conn., after some lively active duty in the South Pacific. IAW and his jr. op are studying cryptography since they can't ham.

INDIANA — SCM, LeRoy T. Waggoner, W9YMV — The Indianapolis Radio Club is now holding meetings in the Cropsey Auditorium, Central Library. Visitors are welcome at any of the gatherings held every Friday night. ENJ is on the dark continent, and says it is a wonderful sight. WQA, radio aide and EC of Bloomington, has seven WERS units ready to go. Activities will follow issuance of the license, already applied for. NIS is enrolled in a radio



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mechanic course at the Army school at Kansas City, Mo. Congrats to 8NAF/9, who took unto himself a Hoosier bride on Dec. 20th. Ev says 4HYL is one of several hams working with him at Columbus. Ev has been building WERS receivers. FDS was home for a week-end recently. MFM made radiotelephone first at the last FCC exam in Indianapolis. GHZ is proud father of a YL. YXT and LVH passed class A and class B, respectively. EHT is helping to build standardized WERS units for Terre Haute. MEY is taking a course in metallurgy offered in East Chicago by Purdue University. MDJ/EZ hopes to teach some War Dept. pre-induction courses in radio. WDV has been transferred from Kentucky to Michigan. VW, ex-EC for LaPorte, is now Lieut. Harold Brooks, USA. Now you know why new ECs are constantly being needed. OOG is studying at Philco in Philadelphia! IIL is a 2nd lieutenant in the Signal Corps at Fort Monmouth. OUQ has left a Florida Signal Corps for an unknown destination. Lieut. Houchin was in Honolulu on that ill-fated Sunday morning of Dec. 7th. LPQ reports that Sullivan has applied for its WERS license. CZD is radio aide. TIY visited K6OQM and K6ROJ recently. Bob is with the FCC at Honokaa and sends 73 to the gang.

Indiana Hamdom is mourning the death of Leonard Moline, HNH, of East Chicago, who died in an Army hospital from the effects of a head injury received several years ago. He was one of the most conscientious amateurs among the ORS and AARS.

Another sad loss to Indiana and 160 Meters occurred with the resultant death of Paul G. Shudrick, PDV, of East Gary, when two Army planes crashed at Waco, Texas. He saved a man from drowning last spring, but was so modest that the incident would never have been reported if it hadn't been for an alert bystander.

Emergency Coördinators are still needed in some Indiana communities. If your city or town isn't thus properly represented, please drop a line to the SCM, applying for the job, or recommending some qualified ham for the job. The services are constantly making inroads on the EC personnel. Thanks and 73, Roy.

KENTUCKY — SCM, Darrell A. Downard, W9ARU — The absence of news in the Kentucky space on this page previously seems to indicate that you fellows think that amateur radio stopped December 7, 1941. Give us the dope on those code and theory classes, fire warden activities, WERS set-ups, etc. BEW has finished his courses in engineering, mathematics and electricity and is now studying physics, teaching Signal Corps trainees and teaching a code class in CAP. He built 5 complete sets for operating WERS in Ashland and holding WERS drills. VHU, Middlesboro, has a code class of 20 in CPT. The ARTS meets every other month on the second Saturday of the month, the next meeting being in March. Drop in to see us at 319 W. Jefferson at 7:30 P.M.

MICHIGAN — SCM, Harold C. Bird, W8DPE — 8BIU reports that Centerline WERS is nearly all set to go on the air, and everything is coming along fine. 8DYH is running two radio schools in the city and progressing nicely. However, he needs more instructors. How about it, gang? 8IHR reports code classes doing swell. 8MCB enjoyed the last DARA meeting, and regrets that he has to be so busy at other times. 8DZ reports an antenna blown down by the wind up his way. 8NXT had a few messages and wished he could be on the air. 8GP sold all his meters and is now busy with service work. 8FX is learning to check frequencies around 100 and 500 kc. 8EGT says that he and 8JO are assigned to radio personnel in a lab. He says the QTH is Roscommon, Mich., P. O. Box 112. 8RJC reports that 8JUQ lost his daughter. 8JUQ is now with the FCC. 8SPJ is active in Detroit WERS activities. 8AHV reports that WERS license for Lansing has not yet arrived, but that they had favorable reports at an OCD meeting lately. 8UGR is trying to interest the gang out his way in WERS. It is noted that 135 cities have applied for WERS licenses and are being licensed very fast. Indiana seems to be doing very nicely — are we going to get licked here in Michigan? Let's have some dope on WERS for next report. What say? 73 — Hal.

OHIO — SCM, D. C. McCoy, W8CBI — Imagine your SCM's embarrassment when he has recommended an EC to a local defense council, only to find that the EC has been gone to parts unknown for three months! Please fellows, if you find that you cannot carry on as EC, let me know and recommend a successor if possible. Cincinnati: No report from MFP. A copy of "The Listening Post," monthly bulletin of the old reliable Queen City Emergency Net, indicates progress with WERS operations. Equipment and personnel are major problems. Some of the members of the old QCEN have failed to apply for WERS operators' permits. VAH would like to get in on the WERS activities. Middletown: DGU has been appointed EC to replace FVW, who has left town. Bob has also been appointed radio aide for the Middletown WERS area. IBN, QIE, TOR, VNK, PNP, MGA and VTB will help. Papers are being prepared for license, and for WERS operators' permits for the gang. Classes for training 3rd class radio telephone operators are under consideration. OPJ was last heard from as being with the Air Force somewhere in Africa. Hamilton: SUK has been appointed radio aide for local defense council. They are applying for license. The following WERS areas in the Cincinnati Region are without ECs. The SCM would like to have candidates suggested or have some volunteers: Wilmington, Winchester and Hillsboro. Defiance: ZY has been reported as being radio aide for Defiance. Bowling Green, Napoleon and Bryan are without ECs. Any suggestions for good ECs, or any volunteers? Chillicothe: ECs are needed at the following points in the Chillicothe region. Washington Court House, Jackson, Pomeroy and Gallipolis. Do I hear any volunteers or nominations? Zanesville: TGU is really making an earnest effort to get some WERS activity going down that way, but needs coöperation from the rest of the gang. Hal's last letter is really to the point, and I quote: "When I see the pictures of the graves of American soldiers in Africa who have died to protect the very things that we won't lift a hand here to protect, I cannot accept any excuse offered me . . . one of the excuses I received, 'Well, I'm not going to put another cent into it, . . .' This, when others are paying with their lives! But I am not giving up hope." Athens: LKU reports that WERS license for Athens has been issued, call WJZQ, and that some equipment is all ready to go, awaiting operator permits for his gang. Wilson Norris is radio aide. LKU is now comptroller for the County Civilian Defense Council, and communications officer for the Civil Air Patrol. Reports Rev. Purrington preparing for amateur license. Emergency Coördinators are needed for Cambridge and Barnesville in the Zanesville region. How about some of you fellows in these towns stepping up and giving Hal a lift? A letter from NAF (formerly of Mt. Vernon, Ohio) now at Columbus, Indiana, tells us he is inspecting Signal Corps equipment at Noblitt-Sparks, and that he is trying to stir up some WERS activity there (Indiana SCM please copy). He got married Dec. 20th and the XYL is a bear cat with the soldering iron. Columbus: The license for Columbus has been issued, call WJXC. First tests were run December 20th and were very successful with loud signals over 4 miles. 40 non-hams are in training for 3rd class 'phone permits leading to WERS operator permits. More hams are needed. Equipment is also needed. HAM and Robert Swepston (not an amateur) are deputy radio aides. 17 units are in service and more under construction. ANJ has been appointed radio aide for Granville, and will operate under the Columbus set-up. ECs are needed for Marion and Lancaster to complete the personnel of the Columbus region. Nominations or volunteers are in order. Dayton Region: The Dayton gang is getting set for some serious WERS operation. TOZ has done a swell job as personnel officer and has succeeded in getting 22 men licensed, with more on the way. DMN and his gang are bearing down on the students to get them ready for 3rd class 'phone permits, and reports good progress. Many of the gang are burning what "midnight oil" they can spare getting their portable-mobile units ready. SPL returned home from Fort Monmouth recently with shiny gold bars on his shoulders as 2nd lt. of Signal Corps. The grapevine brings us word from "Duck" (MFV's brother) that the Army has ruined his feet with so much marching. Eaton: SID, VYE and PRS are busy getting set for WERS operations in Preble County, working under the Dayton set-up. Piqua: The SCM, accompanied by LJ, were guests of the Piqua gang for their drill January 9th. WKN and his gang have done a fine job of getting on the air in spite of the loss of experienced men to the armed services. JEI, now in the Army, is making rapid progress. Last report was 25 w.p.m. Springfield: EQN reports PGO has been promoted to sergeant, and doing well with radio work

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in the Army. Says all those left behind are still busy with war work, teaching, or Civilian Defense activities. Greenville and Bellefontaine: A swell letter from Dent, NAB, now at the Great Lakes Training Station learning to be a "gob" with a rating of RT3c, says UQF and GMB are in his company, and that they are all enjoying their work and have many good times together. An EC is needed at Xenia, the only uncovered WERS area in the Dayton Region. Canton: An encouraging report from Gene, MWL, indicates new life and interest in the WERS program. They have some good equipment ready for service, but are short on manpower. However, the gang is behind him. New Philadelphia and Steubenville; No EC in either of these towns. Volunteers or nominations are in order! Alliance: The grapevine brings us rumors of WERS activity in this vicinity, but no details available. Cleveland: John, AVH, reports the Cleveland license received, call WJJH. John requests that the gang come through with their services and equipment now that the license to operate is available. Greater Cleveland hams should contact him, or LVS or DS, the deputy radio aides, as soon as possible. George Sackl (5KQH and ex-8PMS) sends us a letter from somewhere overseas, but the censor removed considerable of it. He reports MRU, 5KNU (ex-80ZE), SRD, and R. Edwards (operator's license) as being with him. Youngstown: TAD reports difficulties between the city and county as to who will apply for WERS license, but expects to have this ironed out shortly. QJA, SJP and RPC are actively assisting in WERS program. The boys are ready for real action. Akron: Rex, LUT, reports that an expansion program is under way for the Akron area and request for modification of their license has gone to FCC. Lorain and Ashtabula: ECs are needed for these WERS areas. How about some volunteers or nominations? Sandusky: A regional EC is needed for Sandusky and an area EC for Tiffin. Mansfield: JJM is in the midst of getting acquainted with the WERS regulations. Once these are absorbed, we are expecting some real WERS activity to come out of Mansfield. Miscellaneous: We have had several interesting letters from 9FXM telling of his experiences with WERS operations in Richmond, Ind. 73 and "V." — Dan.

WISCONSIN — SCM, Emil R. Felber, Jr., W9RH — Last month your SCM received only one letter for this Section. Fellows, here's a good reason why I would like to hear from more of you that are on the home front. "OM: Your Dec. notice in *QST* asked us to write in. I am enjoying my work as an operator, and am overseas, and lucky in receiving *QST* regularly. It's the only way that I have of knowing what's doing at home. Will be watching your column. 73, T4/c E. S. Strelczyk." At the Janesville Vocational School the Signal Corps (enlisted reserve) has as instructors TT, 5EBO, CSG, KBT, WWF; and AXX is in the stock room. MIJ left the music world and is now teaching code at Madison. The Shorewood Opportunity School, using material received from ARRL, has finished two classes of 69 on Jan. 5th, after having had instruction of two periods of two hours each since September 14th. The new classes started Jan. 11th and are being sponsored by the Milwaukee Radio Amateurs' Club. The school purchased 50 keys and high frequency buzzer sets, and will lend them to the new students. CCD will again assist GPI in this work. UFX, EC of Madison area, writes he is teaching the WAVES radio, and announces that a few more code instructors are wanted, male or female with a good fist. FLARC has suspended regular meetings, but is planning a ham get-together soon. JEK in Navy as 3/c specialist. MRY, RM1c, home on furlough after being with fleet 2½ years. NAK's XYL is teaching code at Navy school. WXD and WCW at Treasure Island, ready to graduate. Both are RT2c. PCN home during Xmas from Annapolis, where he is a cadet. QKN has been in the communications branch of the Coast Artillery (antiaircraft) since August, and has had a serious abdominal operation. H. A. Mask, RT2/c, writes that Ruth, WCW, formerly of Madison, is now working as an engineering aide with the Army Signal Corps in Frisco. Her husband, who has been licensed since Pearl Harbor, is attending school at Treasure Island. The MRAC received a greeting card from YEG, who is in Africa. DTK has been raised to comdr., at Corpus Christi. Ex-HWY, RM1c, is at M.I.T. in Boston, and met up with GQO, who is at Raytheon. Also met VDY, and then ran into Capt. EFX of the Army. Lt. JWT of the Marines took himself a wife, Nov. 28th, and at present is at Cambridge, Mass. DYO is at the USNTS at Great Lakes. AXR has been promoted to corporal and transferred to radio operator with the help of ARRL. He is in San Antonio, Texas, and looking for mail. VKC, after attending school at Scott Field, received a commission as second lieutenant and is a communications officer of a squadron at Austin, Texas. UHZ is back from Ireland and now stationed in N. J. 73. — Emil.

DAKOTA DIVISION

NORTH DAKOTA — SCM, John W. McBride, W9YVF — I want to thank the many North Dakota amateurs for Christmas cards and letters received. I appreciate your help. DAK, now Lt. Eisele of Jamestown, is located at Ft. Monmouth, N. J. Where is the rest of the Jamestown gang, also Bismarck and Grand Forks hams? Your SCM is now junior instructor in Uncle Sam's Army Air Force Technical School. QGM is now in lab in Signal Corps at Ogden, Utah. YTX reports from Honolulu. Lt. Jerome Riley, UGM, is located at Del Valle Field, Tex. His brother Dannie is located about 60 miles away. UGC is hi-speed op. at Omaha. PQW is in Canada, and RPJ, YOY, and RPD have been transferred to East Coast. IZA is teaching at Carrington High. GZD is technician with Signal Corps in Solomons region. OCI has Class A and is op. for Border Patrol at Ft. Lincoln. GNA is back at CAA as op. at Minot Airport. BZZ is in the Navy. HDD and RHV are ops. at KLPM. KIL is now located in Minot. EOU has been in the Army for some time. ZPL, AFM, and PUP have moved from Minot. DXC moved to Bismarck. DNI is now radioman completing his training at Memphis. SSW is EC, and would appreciate it very much if all hams would list their 2½-meter equipment with him and get information regarding WERS operation. — John, YVF.

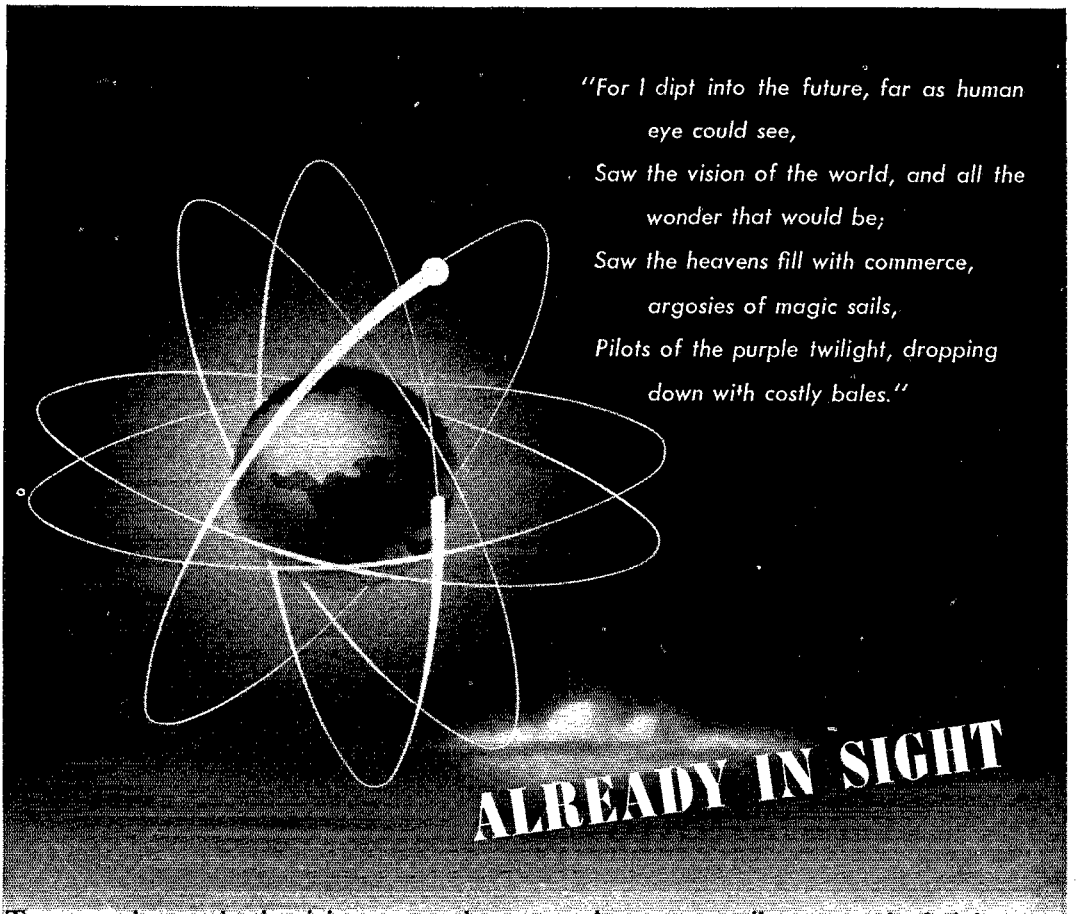
SOUTH DAKOTA — SCM, P. H. Schultz, W9QVY — VOD reports for duty in Chicago on the first of Feb. as a lt. (sg). INT is lt. in the Signal Corps at New Orleans. QAK is a staff sgt. at the observation airdrome at Salinas, Calif. Your SCM has addresses for all three of these fellows, and they would enjoy hearing from you. Some of the old gang might be interested to know that the temperature in these parts has been around 30° below lately. 73.

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — KQA writes that his brother AZJ is instructor in Signal Corps school at U. of N. D. YKD has transferred from Ft. Meade to Air Corps at Wayne, Pa. RVU is chief radioman at Balboa. Cards from KET indicate he was home on leave, after having enjoyed some months of salt brasspounding. UVA, now a lt. in the Signal Corps, is enjoying the climate at Tampa, Fla. Word just received that ZWW has left NWA for armed service. Permit me to suggest that your EC certificates will be immediately endorsed and returned to you. It is a good idea to keep them renewed. Let me remind those wishing to correspond with me that considerable time is saved by writing me here at Glenwood instead of at Bemidji. 73. — Army.

DELTA DIVISION

ARKANSAS — SCM, Ed Beck, W5GED — Another regular examination was just concluded a few days ago in Little Rock which was rather well attended. Approximately 75 of the various examinations were given, and the outlook is quite favorable for some new talent entering the field. GWD now holds lieutenant's commission and is in foreign service. GNV has had a few off days at home recently and anticipates service in the Air Force in the near future. EQP has succeeded in effecting a transfer and is now an ensign. Ex-GTN, now 9ADB, is located in Alabama and is doing a nice job as tech. sgt. ASG, formerly of Widener, is located in communications at Maxwell Field. INO anticipates a brief visit home before entering the armed services in the near future. ARH plans returning to Little Rock to his previous position on the north side. JHL has our most sincere sympathy at the recent loss of his brother-in-law. AY is getting very nice results from the new recorder he recently put in service. PX is sporting a new winter weight CAP uniform. GED received very nice souvenir from GWD. Just a brief reminder to those appointees who have been negligent in submitting reports. Keep those reports coming in, gang. 73 and the best to all.

LOUISIANA — SCM, W. J. Wilkinson, Jr., W5DWW — JET is somewhere overseas as pharmacist mate, 2nd class. HEJ and HEK are back in Monroe. FYS sends 73 from San Diego, where he is in the Army. INL sends dope of some of the boys. J. C. is in Canal Zone. DRX, JCC and many others are in some branch of the armed services. IYL is at Ft. Barrancas, Fla. BSR and JFR still in Lake Charles, trying to get WERS set up. HHV and IYG send greetings from the armed



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services. BPL remains somewhere overseas. CSD is located at Mobile, Ala. GEF is RM3c, and is located at Los Angeles, at present. IBL is RM2c, located on West Coast. GBC is at Perrin Field, Texas. ZV drops a line from up Boston way. CQF, her OM, is attending classes at M.I.T. GOC and DAQ are both lts. in the Navy. HR hoping to get into some government radio job. Until next month, 73, and "V."

TENNESSEE — SCM, James B. Witt, W4SP — Some of the hams in the Tenn. State Guard at Knoxville have 2½-meter gear ready to go and have sent in applications for WERS station licenses. The Knoxville Communications Club is planning on starting another code class in the near future.

MIDWEST DIVISION

IOWA — SCM, Arthur E. Rydberg, W9AED — QVA reports that the Iowa-Illinois Amateur Radio Club classes in code and theory are continuing every Friday. CTQ, Iowa's SCM before he entered the Navy, was promoted to warrant electrician, and has been assigned to Key West, Fla. To celebrate the big event, Ray was married on Christmas day. NLA joined the Army and is in Signal Corps at Fort Lewis, Wash. SHY is a tech. sgt. in the Signal Corps, Fort Monmouth, N. J. ROD is in North Ireland, working as a civilian with the Army Air Force. CCE tells of his work with OCD chief regarding WERS. LTS, formerly of Moline, Ill., now working for United Airlines in Des Moines. Des Moines Radio Amateur Association WERS work continues. Junior repairman trainees, West High School, are building some of their equipment. LDM is patiently awaiting a call from the Navy. BBB was home for Christmas on furlough. TGL, recently married, paid a visit to Des Moines while on furlough. OCG writes from North Africa. UAD, who attended school at Gallups Island, is now a radio operator in the Merchant Marine. He recently returned to Des Moines after a trip to North Africa. PJV now working for FCC at Grand Island, Nebr. NMZ now living in Des Moines. AHP is the possessor of a new first class radiotelephone license and has been promoted to the WOC transmitter. TWX has been transferred to Iowa City.

KANSAS — SCM, A. B. Unruh, W9AWP — Ecs have a tendency not to stay put. JZU is now a student in radio at armored force school, Ft. Knox, with rating of corporal. Another EC, YOS, has moved to Wichita to join the radio force at one of the plane factories. YGG is now with Braniff at Love Field, Texas, as radio mechanic. WGW sold SX-28 to the Army. WGW has been teaching code for CPT and is teaching two ESMWT classes in "Fundamentals of Radio" five nights a week. TYV is still in Texas, instructing and operating in air traffic control. KCS, RM3c, USNR, reports that not only did he rejoin ARRL, but that he was instrumental in getting a number of ex-hams who work the same traffic circuit to do likewise. NQX is teaching a class in "Fundamentals of Radio" in which the students are fellow members of the Wichita Police Department. Brothers Ex-EAQ and Ex-CCM are with Boeing, Wichita. The former is also aiding with ESMWT class. ESL is teaching math, electronics lab, and radio lab at K. U. in the six-month course for Wright Field, Dayton, Ohio, aircraft radio research laboratory. 73. — Abie.

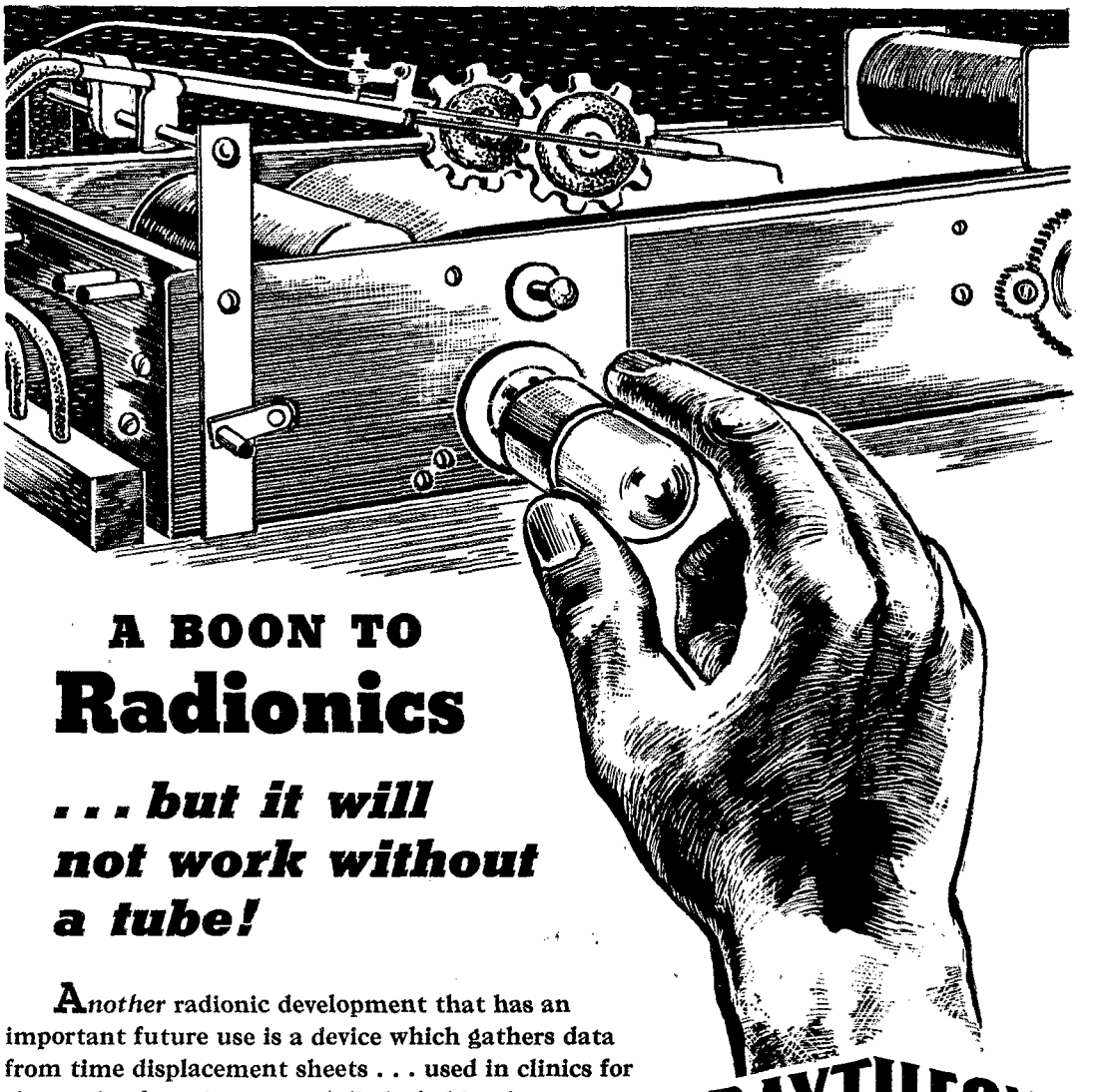
MISSOURI — Acting SCM, Letha Allendorf, W9OUD — BVW is still at Grand Island doing things with meters and dials for the FCC. WOC, who had to leave there when his ears went back on him, recovered his hearing and returned to the job, but is now in Washington, working for the same company. TAF has moved to Creve Coeur from Nebraska, and is working at the St. Louis ordnance plant. VPR, Chamois, Mo., is somewhere overseas with the Navy and his YXL is living in Jefferson City. TAF and VPR studied together in Nebraska for their tickets. ZKD is RM2c in the Navy and ZJN is in the Army. YZO is an electrician at the Navy Yard in Maryland. During the trial blackout in the Middlewest, a plane flying over the Sikeston area reported by radio to VDG about lights which were showing. The wardens of the districts were notified by telephone to see that the lights were extinguished. VDG was using a receiver only, no transmitter of course. TGN has operated over one hundred and fifty thousand miles since he joined the Navy. He is chief radioman on his ship. The only other ham on board is 6RKH, RM1c. 9APC, ex-6TOD, is now foreman in the radio division of a bomber plant. ASA is radio instructor in the Signal Corps. 73, and good luck to every one of you!

NEBRASKA — SCM, Roy E. Olmsted, W9POB — A nice report from EAT, EC for East Central district, states that his active AECs are OED at Fremont, LEF at Brainard, and VAS at Columbus; and that he is setting up WERS at Ashland. MLB, EC for West Central district, with EKP, has WERS in working shape at Gothenburg and would like to have applications from amateurs in that territory for AEC appointment. North Platte, McCook, Ogallala and Kearney are focal points which should be licensed if possible. KQX is still trying to organize the West End district. EWO is now at the richest spot on the Pacific Coast. Four members of SENRC are dispersed as follows: TAF is working at a Missouri ordnance plant, VPR is in the Navy and serving overseas, DLK is senior radio mechanic technician at Wright Field, WKP is teaching radio at Lexington, Ky., and is now operating the cinema at Grant. FBQ sends a swell note from Omaha saying that, between chasing fires in the Fire Department, he teaches code and procedure at Electronic Institute. UEW, OYB, and RQW are also teaching radio, and HTE is an officer with the Air Transport Command. JBK writes that he is very busy with college work but would like to finish the crypto course which was interrupted by Pearl Harbor. He also reports that BZR recently graduated from Signal Corps School and that HQS is with the Merchant Marine, both being home on furlough at Christmas. JRZ is making test equipment. VQO is teaching radio at Milford while GE is a student at the same institution. FWW writes to say "Aloha" to all, besides signing himself RM2c. KPA finally got his call and is located at Seattle for a few weeks, assembling a camping outfit for service with Pan American in Alaska. In the future, send mail to me at Milford, Nebr., Box 354. 73, Pop.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — Congratulations to DDX on his advancement to RT1c and also for the birth of a jr. op. 6LRN, cousin of FMV, now RM1c in USCG, writes an interesting letter from the West Coast, praising station activities. GB was honored with the membership of 9FFL, who is now at Yale. The club has started another theory class under the direction of FJE. Your SCM was recently paid a visit by YL 9ONW, 9AND, and Mary Bryant, instructors of the Army Air Corps cadets recently transferred from Scott Field to Yale University. All expect to take active part in New Haven WERS activities. Visitors at WERS tests in New Haven were EAO, State Radio Aide, 9WWP and NJM from ARRL, as well as a surprise visit by Mr. Kearny of FCC Washington, D. C., and Martin Cattaneo, State Communications Officer. Ex-9WSK-5JLZ, instructor at Yale University, has been a tremendous help to the WERS in New Haven. APA expects to be commissioned 1st lt. in the Army. MQM now RM2c in USN, ACV with CBS in New York. APA, GRU and Bert Dow have all sold their rigs to the Signal Corps. The former says he is hearing New Haven WERS stations very consistently on 112 Mc. Asst. SCM CTI reports WERS activities perking very smoothly in Norwalk. NGD is proud papa of jr. op. KTF overhauled his mobile WERS installation with very gratifying results. LUZ and MIQ have been busy installing rigs in cars for mobile WERS units. NE and AXB have just completed a 46-foot mast for Norwalk's control station. New Haven Warning District control station WJLH-1 has the honor of being issued the first FCC temporary WERS license. Station is on the air with crystal-controlled transmitter operating on a frequency of 112,064 kc. From Dot Evans' New Hampshire Section report we learn that our JMY and New Hampshire's MUW have united in matrimony. Congratulations to BDI, whose promotion to lt. colonel was announced recently.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, Jr., W1ALP — MME is now at Camp Crowder, Mo. NJV and NEX got back from Phila. where they had training in the Signal Corps. NJV is now in the Navy and NEX expects to go in Feb. The last word from ERH was that he was in London. MQO is now RT2c, U. S. Coast Guard, located at Portsmouth, N. H. BNO is RM1c at U. S. Naval Air Station at Quonsett, R. I. The Norfolk County Radio Assoc. held its annual meeting at the home of AGR on Jan. 11th. HSB, the Norwood EC, is a sergeant in the communications section of the State Headquarters Co. HKY is a tech. sgt. and now somewhere in Africa. We hear from JXU's XYL that Bernie is all OK somewhere out in the Pacific. JJY is also out there. NAM and 3GYQ are located in Boston and are looking for a receiver to keep up in their code. MPP is teaching code at the Cambridge Adult Center. MSY, now at home, is a survivor from the *Wasp*. IZT home again on a short leave. KON is going to school again at Harvard. MJE had a siege



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of sickness in her family. LQQ and XYL had a new baby YL. We wish to welcome 5ZV and her husband in these parts. Her OM is going to school at Harvard. MZE is now working up in Presque Isle, Maine. EKT and DID are working at M.I.T. GAG bought a house across the street from EHT. EHT had a couple of letters from IIQ. NLT is in the Signal Corps. GNE expects a QSL from his draft board. KID is busy on war work. IQY is doing some special work now. His jr. op is in the Army, doing radio work. IQW working at M.I.T. FKS still working for Boston Edison and building u.h.f. receivers out of b.c. junk. Our energetic Cambridge EC, KTG, finally got the WERS license for her city under the call WJQZ. They used the 14 stations during the last two alerts. Hams from Harvard and M.I.T. altered the sets so that c.w. could be used. AKA, who is with the Signal Corps from Boston, is stationed at "parts unknown." Ex-FBS is located at Macon, Ga. HQR located at Quonsett, R. I. HX is still at Patterson Field, Ohio. BB is doing some work as a radio op for the Coast Guard, one night a week or so.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — MXO is now connected with an M.P. escort guard outfit in the Army. Had nice letter from CME, who tells us to keep the key in operating condition for a good QSO sometime soon. We are sorry to learn that MWI is in poor health, but we hope that 1943 will bring with it all things good for her. KKQ has taken the tests for joining the WAACs. We hate to lose you, Leora! BFT was home on leave at Christmas time.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — Christmas brought a nice card from ECG, whose address now is Warrant Radio Electrician B. A. McGinn, USNR, U. S. Naval Air Station, Tillamook, Oregon. Also we are informed that Pvt. A. W. Nelson, LWB, who was formerly with WEAN, is now at 369th training school squadron, Scott Field, Illinois, training for radio operating amd mechanics. New arrivals at WEAN include DJO (formerly of Worcester) and BIL, who is also all wrapped up in Pawtucket WERS and is trying to recruit some gals for WERS out there. East Providence WERS also would like to recruit some YLs for its service. Cranston is expanding their WERS by two more stations. MSD has taken up hiking on Sundays. Since my last report I have received word that you folks in New England chose to re-elect me for another term as your Alternate Director. May I take this opportunity to thank all of you for your votes and to say that I do appreciate the honor of continuing in the office. Please remember me next month.

VERMONT — SCM, Clifton G. Parker, W1KJG — BD has been engaged as instructor in the Signal Corps, and has recently been home on leave. Roy has been stationed at Fort Monmouth and Baltimore. HLH and XYL are the proud parents of a son, born December 7th. IQG and XYL have announced the arrival of a YL in their family, Susan Alice, born December 26th. 8CEX is now working at WCAX and is living at 1595 North Ave., Burlington. 9IGI is engaged as flying instructor for Northeast Airlines, Inc., at the Burlington airport. LWN and NLO have tried out carrier current units, rebuilt from inter-phone equipment, with output of about 2 watts. AEA has recently been home on leave from his duties with the Signal Corps and called on KJG. Your SCM is spending most of his time at the Capitol during the winter months, and recently had a fine trip to Boston in connection with state communications work. The Burlington Amateur Radio Club has arranged for use of a room at Burlington High School to conduct code and theory classes based on the pre-induction course outlined by the War Dept. In return the club is building a suitable code table, doing the wiring, and is furnishing instructors. NJP has been promoted to captain, and is at New London, Conn., for the present. MEP is now in Signal Corps, and LJZ has gone to Rhode Island. The Burlington Club has also completed one plane detector unit and is engaged in building a second one.

NORTHWESTERN DIVISION

IDAHO — SCM, Don D. Oberbillig, W7AVP — AQK, KJ and AVP have been active in Idaho State Guard signal platoon. Ex-ALC teaching radio at signal school, Boise. NH and AVZ still at Twin Falls. BZJ operating radio repair shop at Jerome. DAW servicing radios at Boise. GU working as instrument repairman. ABK is radio instructor at Signal School in Boise. The SCM would appreciate a card from all licensed hams still in Idaho, giving a little information on their activities, since many of the Idaho hams in the service have written for information about the gang and remarked that they watched *QST* for the news from Idaho.

MONTANA — SCM, R. Rex Roberts, W7CPY — AST and FL are both located in Seattle. GPS is now with the CAA in Great Falls. HCV is now located in San Francisco. Have some inquiries as to location of AQK. Can some of you inform the SCM? CBY is in Butte. BHB built a well-calibrated frequency generator from the junk box.

OREGON — SCM, Carl Austin, W7GNJ — EC, 7JN. Blizzard at Bend, no trains for two days, so reports scarce or delayed. BGM still at Ft. Wayne, teaching as well as being assistant. GUP received a long message from GNJ, punched on teleplex tape. Interesting report from ISP says he joined Army in May, was put in Signal Corps, had two months' training at Camp Crowder, then went to radio school at Kansas City for three months, then to radio school in Florida, where he likes the work, and learns plenty. QP was refused transfer to radio school, so will continue as EM1c. HU now police radio technician at Idaho Falls. IIK completed radio training and made higher rating with Navy. HAL still itching to try out the 112-Mc. job. FHX teaching the radio teacher at Lakeview. Roy Mickel, LSPH, made WERS rig. It works. KFNX, City of Bend, had official test last Wednesday. HHH operating a portable, ARZ control, HVX, GSI, GNJ and Roy Mickel as mobiles. Seems Bend was about first WERS in West. How about Portland? HVX, secy. CORK, reports Leo and Roy Mickel received 20 w.p.m. certificates, 5 more members ready for Class B exam, 2 more members signed up with navy radio, and says CORK will start another new class in Feb. More notes and letters from Oregon hams, please! Mail them on or before the 16th. 73.

WASHINGTON — SCM, Carl F. Hofmann, W7EPB — Olympia Radio Club reports new officers as follows: HWB, pres.; EGV, vice-pres.; FWR, secy.-treas.; FWD, trustee. They hold meetings on the third Tuesday of each month. HMJ is RM2c, HNS is 2nd lt., HJN now 1st lt. somewhere in Alabama. HML is in Alaska. IHJ and IHK are somewhere near the East Coast. GP is still inspector in Army plane manufacture. JCS studied at Harvard and M.I.T., graduated, and then went on to Stuart, Fla. These boys sure get around these days. IOQ reports that Everett is now set up with WERS communication. EKW's new home is IGM and GXU's old home. Has 65-ft. steel tower and beam to admire. SA is newcomer to highway dept. transmitter since HIF left to go to United Air Lines to work between here and Alaska. Tacoma also has its WERS system organized with the call KNFH. The last we heard from GRQ was Corpus Christi, (Tex.?). The Marines do travel! FET is also somewhere in Texas. FPV is doing nice job keeping ham paper "Amateur WaWa" going. 73, Carl.

PACIFIC DIVISION

EAST BAY — SCM, Horace R. Greer, W6TI — EC, QDE; EC u.h.f., FKQ; Asst. EC u.h.f., OJU; OO u.h.f., ZM. Due to war conditions, the regular East Bay Section meeting for January was called off. It is getting hard to find a speaker. Everything seems to be a military secret. However, periodical meetings will continue and cards will be sent out as in the past whenever a meeting can be held on the third Wednesday of a month. BIJ, former chief op. at WPDA, Tulare, later with the FCC at Fresno, and BIL are now assigned to the San Francisco-Oakland Bay Bridge. They are trying to install KRUB, 2500 watt 'phone on 1682 kc. SAN is a radio op on a Merchant Marine tanker. EE, the radio aide for Oakland WERS, reports that everything is under control with KFMY-1, main control station, working fb. The other two control stations, besides the one mentioned at the City Hall, are located at Eastern Police Station and Northern Police Station. This gives a complete coverage for the region. At this time there are 34 sets licensed and applications are on file for 28 more sets. 74 licensed operators to date fill out the personnel. EE asks you to please offer any equipment to WERS that you might have that is not being used. It may be either sold or lent for the good of the cause. By calling TE. 3600, and offering your services or equipment, you are doing your part in national defense. Believe it or not, 2½ meters will do the job that is being asked of us and all tests to date have proved it. Just another day closer to victory. "TI."

ROANOKE DIVISION

VIRGINIA — SCM, Walter G. Walker, W3AKN — HAE, now at Hampden-Sydney College, reports the following news about our fellow hams: HRC is now in Australia as a 1st lieut. in the Signal Corps. Sgt. "Shorty" Dunning, HBF, is in the Coast Artillery, stationed at Seattle, Wash. HAE and IEM are roommates at H-S Col-

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lege; both are teaching code classes several times per week. HAE is Naval ROTC, V-7 (S), inactive until graduation. HPH has been advanced to lt. col., and is still building army airports up and down the Eastern seaboard for the AAF. HWJ is now located in the new War Dept. building, the Pentagon, at Arlington, Va. AJA is devoting most of his spare time to coöperation with the Hampton Police in an effort to get something lined up for WERS participation. Carl is about the only amateur now left in the immediate neighborhood of Hampton, since Ray, HJW, has moved to his new home in Wythe district. HJW and IIF are now in good wired wireless range of each other; about two blocks. Your SCM would surely appreciate hearing some news from other sections of the state. How about some of those radio clubs that used to be in existence in Lynchburg, Richmond, Hopewell, Petersburg, Roanoke, or up around the Valley of Virginia? Drop me a postcard around the 15th, even if it only has 73 and your call! Like this: 73, Walt, W3AKN.

WEST VIRGINIA — SCM, Kenneth M. Zinn, W8JRL — We are still losing a lot of hams from our territory. The latest to go is WSD, Carl Seese. His address is now 770 Crouse St., Akron, Ohio. LGB is in the armored division. WAT is in the Navy. TZT is teaching theory at West Virginia Tech. at Montgomery. PNE has been transferred to Huntington, so that leaves KXB, LSX, VQV and ELJ still around Stollings, W. Va. ELJ taught an ESMWT class last summer and fall, and is now casting around for a place in the service. Several of the boys have asked for ex-SCM KKG's address, so here it is: Major W. H. Riheldaffer, Medical Corps, Fort Hancock, New Jersey. LCN, who has been in the Navy about three months, arrived home in time to see the flood, and had to enter the house out of a boat, through the second floor window. They live on the island, so he spent his leave scrubbing up the mud at home. He is stationed at Norfolk, and says AZD, CAL and BWK are all stationed in the same building there with the Navy. ELO and PTJ are both with the Navy in North Carolina. 73, Ken.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Stephen L. Fitzpatrick, W9CNL — CAA, TRR, YXU and BQO open new classes in radio theory and code under the auspices of the CU extension at the C. A. Johnson Building in Denver, Colo., with classes Monday through Friday, 7:30 to 9:30 P.M. PGX reports for NDM, and CNL also receives a card from NDM. Lt. Shell, flight instructor, is stationed at Corpus Christi, Texas. EHC has been promoted to 1st lieutenant. He says that there are still a few amateurs in the incoming ranks. BQO reports QYU is trying to get a commission in the Navy. PDA has moved to Cosgriff Hotel at Craig, Colo. W5BHY and BQO had a chat on the opening night of the code class. The AAROD is still holding regular meetings the second and fourth Friday nights. New officers are CNL, pres., BJN, vice-pres., and WYX, secy-treas. 73.

SOUTHEASTERN DIVISION

EASTERN FLORIDA — Acting SCM, Frank C. Fassett, W4BYR — OZ is bragging about a new junior op. OZ is expecting a Navy call any minute. HAD is still going to military school in Atlanta. HAD, senior, has just returned from Alaska for short vacation and is due to return under year's contract. AQ is working in Philadelphia as government inspector. DES is still with Philco, and was home on a short visit recently. EUF is teaching radio at Camp Stewart. DUO, TZ and GLZ have sold their receivers to Uncle Sam. Applications for Hillsborough County WERS operators permits are still coming in. Spence from St. Pete reports: EWS is now RM1c with Coast Guard at Tampa. APY is engaged in coöperative training in St. Pete; DBG is now a full lt. as special naval observer at American Embassy, London; FJG is civilian instructor for Army fliers; HUY has just adopted a new jr. op. Fort Meyers reports that they have filed with FCC for WERS with CAZ as Radio Aide. CAZ has lt. commission, with CAP as communications officer. He has eighteen people studying for restricted 'phone licenses. Card received from Tip Curran indicates that he is making fb progress from illness. FWZ, JAX, states that old auto receivers are needed for conversion to 2½ meters by project to be carried on at University of Florida. These rebuilt units will be used by Civilian Defense councils in their WERS nets. First signal company FDF needs some 2½-meter transceivers rebuilt from old BC sets. Send any information to General Blanding of State Defense Council. Donations of any sort of equipment will be welcome. First signal co. is progressing in its drive for members in many localities. CLW is receiving applications for this class of station. FWZ is CO and office boy and invites inquiries. At least four ops are required for an individual detachment at any one location. Hdqtrs. advises that enrollment in the AEC is still important, their main job now being to assist in the administration of WERS and the reporting of WERS activities to the SCM. Let's have some more reports, fellows!

WESTERN FLORIDA — SCM, Oscar Cederstrom, W4AXP — Ex-6BRG, A. P. Ludwig, would like to hear from the gang he used to work on forty meter c.w. while he was at San Diego, Calif. He is now a chief radio electrician at Naval Air Station, here in Pensacola. PE is now executive officer of service school at N.A.S. His picture in the Jan. *QST* was recognized by SI, Eubanks, whom he had not seen in ten years. CRU is a radioman at the A & R, and lives at 138 N. M Street, here in Pensacola. He is from Marianna, where he worked both fone and c.w. Ex-PN has renewed his ham ticket. ENR is at Corry Field teaching code. MS has a new acorn tube and is planning building a 2½-meter osc. Eddie says QU passed through Pensacola during the week. He is with the Navy Bureau at Washington, and he is now a lieutenant, U.S.N. ALJ is now a major in the Army in North Africa. MX is back at WCOA as announcer. 5BKH, former Director of West Gulf Division, now assistant communications officer at NAS Pensacola, visited Abilene, Texas, which is his home town. BQK, a model airplane fan and ham, is studying to be a pilot. Additional news. GVH, one of our blind ops, lost his mother Jan. 15th. His loss is a double one because his mother helped him keep his log. The Section extends its heartfelt sympathy to GVH, who lives in Panama City. John and Margaret Blackman are the proud parents of an 8½-pound YL, born Jan. 8th. John is one of the radio instructors at the Naval Air Station, Pensacola, and is an old-time Navy and commercial op. GTJ and BJF keep plugging away at the F.D.F. "The Old Maestro" AXP.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, H. F. Wood, W6QVV — It begins to look as though we were going to get something done about WERS in this area after all. Just had the pleasure of attending a meeting at the OCD Headquarters and there met Mr. Birch, late of the Signal Corps, who has been assigned to OCD work here by Washington. He is giving practically all of his time to the WERS setup in the effort to get all points licensed and in operation. Some applications from the gang have been received, but they are comparatively few. We need a lot of operators and equipment, so get busy, if you haven't already done so! File your application for operator's permit, your high frequency equipment forms, and your fingerprint cards and photos. If you haven't these forms, drop me a card and I'll see that you are supplied. Send your applications to me *now*! MDQ writes that he has finished basic training at Camp Kohler and has been shipped to radio school in Florida. He is now with the 2nd signal radio service section at Camp Ritchie, Maryland. BUK says thanks for the card to Graham, and AM says he has checked over the 2½-meter rig in his car. What a swell setup they have ready for WERS! Hope to have some details on this for you later, as it is a setup that any of the areas to be served might well be proud of. PPG, the lug, got himself all married recently. He reports that REG and RDI were around recently. MFJ is RT1c now on a big boat, and managed to get home for the Xmas holiday. We called upon PPW. Brownie was once again in good health, looking fine, but missing the 160-meter gang. 73 es gud luck. — Ted, W6QVV.

ARIZONA — SCM, Douglas Aitken, W6RWW — It is my sad duty this month to report the sudden passing of OMD on Jan. 2nd. He leaves a wife and four children, and the whole gang wish to express our sympathy to them in their bereavement. Phoenix is still badly snarled up trying to get WERS going there. OAS has sold his transmitter to an airways company. RPS has been ill. SCK says he got his Class A last year. MLL is progressing, and is up and around a bit again. We wish to apologize to your former SCM, KOL, for rating him as a lt. (jg) — he is a full lt. in the Navy, now instructing at one of the Navy schools on the East Coast. RJN is now a flight op for PAA and has reported some wonderful trips. UKB has been advanced to RT3c and is attending an advanced Navy school. Tucson reports the club meetings well attended, also that they are graduating and taking on new pupils in their code classes regularly. Say, gang, don't let that ARRL membership lapse. We are going to need plenty of backing when the shooting is over, and they are our No. 1 line of attack! 73, Doug.

SAN DIEGO — SCM, Richard Shanks, W6BZE — CNB

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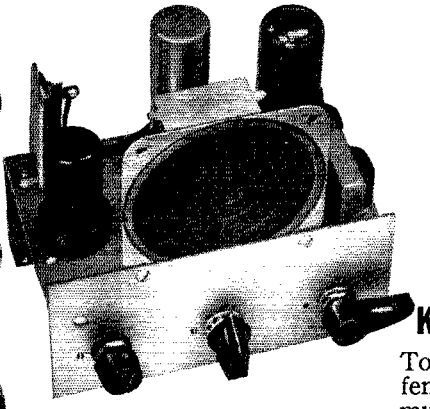

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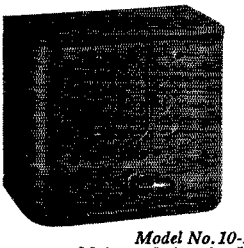

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Amateur Activities

(*Continued from page 80*)

teaching radio in Corpus Christi in the Navy, was home on leave for a few days. Ex-EOH, USN, is in New York City and is still going to radio school. K6BZD is back in San Diego and is working at Consolidated in the radio department. KW was in town for a couple of days, but his work keeps him moving. Let us know where you are, if possible, Johnny! DNS and FQU working in the radio lab at Ryan Aircraft. FEX of L.A. here in San Diego at Naval Training Station. BHF is a captain in the State Guard. EDJ broke his ankle while repairing a P.A. system. NVL passed away while attending Officers' Training School in the East. He had a heart attack. GG is thinking of going into some type of defense work in L.A. QUS and HWJ are working on carrier current. DAN, former R.I. in San Diego, is a lieutenant in the Army Signal Corps. Good luck and 73.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, N. R. Collins, Jr., W5IAU — ALA sent in his resignation as EC for the Dallas area. CDU will take over where Jack left off. JJF is in El Paso in the Signal Corps Reserves. BNQ is teaching at SMU. HQN left Lockheed for the Merchant Marine. LY has moved to Gladwater, Texas. ISD, EC for the Big Springs district, is now st. sgt. Haynes, Camp Adair, Oregon. CVW is now stationed in India. GTL is in Officer's Training School at Ft. Mammouth, Ky. EVI is in Washington, D. C. Dallas Defense Guard needs some radio men. ECA is now a captain at Camp Murphy, Fla. EDC and EDB are in Lexington, Ky. with the Signal Corps. HKK has a commercial. JQY and GZH are still in Dallas keeping up the morale of the widows. The boys here in Texas are remarking what a swell job headquarters is doing in putting out such a swell magazine despite war conditions. 73, N. R.

SOUTHERN TEXAS — SCM, Horace Biddy, W5MN — As no other valid nominating petition was received, yours truly is here for another two years and hopes to do some good for amateur radio. Many thanks, fellows, and let's have those reports. We note with interest that many of our brother hams are in the services battling the Axis, and many more are preparing to go, so it is up to us on the home front to keep alive that ham spirit for their victorious return. You men in the services, if you get a chance we shall be glad to hear from you. You men in Southern Texas, drop a line to the SCM or Hq. KNH is new EC for Gonzales. DWN/WLJX reports from Ft Monmouth, where he is instructor in O.C.S. of the Signal Corps. He sends 73 to the good ole West Gulf Division. Good luck to FNA in the Merchant Marine, who reports as follows: "I am operator on a nice ship with nice radio equipment. Don't know where I am going. 73." His card was mailed more than 2250 miles from here. BUV is back in S. A. instructing code at Kelly. Bill Curtis of Alice, Texas, who will soon be 18 years of age, is looking for a radio school prior to entry in the service. HCH, ALS, QA, EUL, EJ, EN, JEC, ex-BIJ, EXO, 3IXO and many others whose calls are unknown are teaching radio for the Signal Corps in San Antonio. S. A. WERS net being reborn after muffing FCC forms first time. EDX has recently entered the armed services. DUP is now in S. A., working for the Signal Corps. JC is back in S. A., after many moons absence. AQN has returned to S. A. from Galveston, and is now in the Marines as reported. Alex Fabris, James Fischer, Calvin Graf, Leslie Germer, King Hudson, Leonard Parsons, all Class B hams with op licenses only, along with JVF and JKU, are planning to enter the armed services soon. DBN, who punches tape at WVB, visited the SCM. Congrats to DJA, bug tapper of old, now a sgt. in the Signal Corps, who finally braved the sea of matrimony.

NEW MEXICO — SCM, J. G. Hancock, W5HJF — David Erwin is now collecting ideas while instructing radio in the Navy. JWA is now probably on the high seas as RM2c. CXP is installing and servicing radios on the warbirds in Australia; says he hopes they let him stay "Down Under" long enough after the war to work us up here. ENI is raising cain to get a double duty assignment as medical officer and radio operator in some isolated spot. HJF has been having lots of trouble shooting bugs in his communications receiver, but finally came out on top. KCW was here in person. He says he is having trouble getting all of his collected junk in the basement. Remember ND? He is in Orange, Texas. ND's jr. op (now 3IRM) is busy with WERS in Washington, D. C. FSP is still shooting bugs for Major Halliday. Thanks a meg for all the swell letters, fellows.

EVEN war can bring out much that is good.

The gauging of thin mica sheets threatened to be a production bottleneck. Fingers, highly trained by the Braille system, were called upon to replace mechanical gauges and slower vision. The fingers responded.

Today a group of blind employees at SOLAR are gauging mica quicker and more accurately than ever achieved before. They and their "seeing-eye" dogs bring unusual talents to the production front.

"HANDS THAT SEE"

SOLAR is proud to be a pioneer in drawing upon the untapped reservoir of such able employees. SOLAR "Quality Above All" is well protected by these "hands that see."

Solar

SOLAR

SOLAR MANUFACTURING CORP., BAYONNE, N. J.
Makers of Capacitors (Mica, Paper and Electrolytic)

CAPACITORS

In the Services

(Continued from page 32)

3AAO, Williams, Brantford, Ont.
3ACS, Morgan, Rivers, Man.
3AED, Marnie, Winnipeg, Man.
3AHU, Newstead, Rivers, Man.
3AKY, Wilson, foreign duty.
3ALK, Young, Sgt., Montreal, Que.
3AQK, Rooke, foreign duty.
3AQN, Mann, Rivers, Man.
3AUI, Burgin, Rivers, Man.
3AWE, Scott, foreign duty.
3AXD, Lorch, Montreal, Que.
3AXU, Martin, Montreal, Que.
3GZ, Camden, foreign duty.
3IM, Broughner, foreign duty.
3KG, Calder, Lt., address unknown.
3LS, Wilson, Ottawa, Que.
3MZ, Wright, address unknown.
3SN, Jones, foreign duty.
3VZ, Smith, Montreal, Que.
3WP, Bishop, foreign duty.
4AAH, Thornber, address unknown.
4ABV, Johnson, address unknown.
4ABW, Shepherd, foreign duty.
4ADD, Craig, Saskatoon, Sask.
4ADH, McIntyre, foreign duty.
4AEE, Lemieux, Rivers, Man.
4AEV, Lockhart, Edmonton, Alta.
4AGZ, Stewart, address unknown.
4AHH, Forman, foreign duty.
4AHQ, McMullen, foreign duty.
4AIY, Lewis, address unknown.
4AIZ, Douglas, foreign duty.
4AJV, Milne, AC2, address unknown.
4ANH, Reidford, Trenton, Ont.
4ANM, Musselman, Cpl., address unknown.
4APL, Scott, address unknown.
4APM, Pitt, foreign duty.
4BM, MacDonald, address unknown.
4BU, Brownell, F/O, foreign duty.
4CZ, Hone, Rivers, Man.
4DZ, Wright, address unknown.
4EI, Coats, Winnipeg, Man.
4FN, Hanneson, address unknown.
4FS, Leitch, Winnipeg, Man.
4HI, Shepherd, Coal Harbor, B. C.
4JN, Lee, Winnipeg, Man.
4LV, MacDonald, Paulson, B. C.
4ME, McCauley, foreign duty.
4MM, Watts, Ottawa, Que.
4QG, Graham, address unknown.
4SS, Sheffield, Winnipeg, Man.
4TK, Rothwell, Rivers, Man.
4WJ, McNair, Ottawa, Que.
4YC, Lumb, Fort St. John, B. C.
5ACZ, Anderson, Point Gray, B. C.
5ADJ, Butler, Rivers, Man.
5ADL, Pike, Dead Tree Point, B. C.
5AEB, Matthews, address unknown.
5AFU, Gauld, address unknown.
5ID, Norman, F/L, Montreal, Que.
5KO, Draper, Cpl., address unknown.
5RV, Meakin, Vancouver I., B. C.
5TN, Howard, address unknown.

(Continued on page 86)

Your local RCA TUBE and EQUIPMENT DISTRIBUTOR

'ROUND-THE-CORNER SERVICE!

Following are but a few of the electronic items regularly handled by your local RCA Tube and Equipment Distributor:

RCA, CUNNINGHAM, and RCA VICTOR RADIO TUBES

RCA SPECIAL PURPOSE TUBES

RCA POWER TUBES, PHOTOTUBES, CATHODE RAY TUBES, etc.

RCA ELECTRONIC TEST EQUIPMENT

. . . also condensers, resistors, rheostats, controls, potentiometers, coils, transformers, wire, and numerous other radio and electronic components produced by many manufacturers.

Making war equipment that necessitates frequent calls for tubes and other electronic components?

Then get acquainted with your *local* RCA Tube and Equipment Distributor today!

He may have just what you need in stock for immediate delivery upon receipt of a suitable priority. If he doesn't, he is well equipped to get it for you as fast as circumstances permit—and to render an intelligent, personalized expediting service all along the line.

Equally important is his technical knowledge. He has been dealing with things electronic since the "knee pants" days of radio. He knows what to use and how to use it. You'll find his technical advice and recommendations a big help.

There are over 300 RCA Tube and Equipment Distributors throughout the country. Write or wire for a list of those nearest you.

RADIO CORPORATION OF AMERICA
RCA Victor Division, Camden, N.J.

AN ADVERTISEMENT OF THE RCA TUBE AND EQUIPMENT DIVISION IN THE INTEREST OF GREATER SERVICE AND EFFICIENCY IN PRIORITY-COVERED WAR MATERIALS BUYING

SEE PAGE 88

(*Continued from page 84*)

5TO, Thompson, F/O, address unknown.
5TR, Hodgkinson, foreign duty.

RCCS

1AQ, Clairmonte, Camp Debert, N. S.
1EJ, Mills, Capt., foreign duty.
1EU, Croft, foreign duty.
1FC, Smith, foreign duty.
1LB, Crossley, Lt., foreign duty.
2BK, Dumbrille, Capt., foreign duty.
3AMB, Wilson, foreign duty.
3AQJ, Clifford, CSM, Montreal, Que.
3HZ, Cahill, foreign duty.
3IW, Chown, address unknown.
3KV, Hamilton, Montreal, Que.
3PL, Russell, Capt., Camp Debert, N. S.
3WM, Morgan, O/C, Montreal, Que.
3YY, Vivian, address unknown.
4AAD, Freeman, Calgary, Alta.
4AC, Meadows, Kingston, Ont.
4ADM, Knowles, Sgt., address unknown.
4AHY, Runnals, Sgt., Ottawa, Que.
4AIE, Koshnysh, address unknown.
4DV, Mowbray, Staff Sgt., foreign duty.
4LQ, Butchart, Edmonton, Alta.
4NN, Parrett, Sgt., Kingston, Ont.
4TM, Ward, Ottawa, Que.
4AJ, Heavens, Ottawa, Que.
4XA, Gillett, Kingston, Ont.
4XE, Barrard, WO1, Montreal, Que.
4ZZ, Morris, Ottawa, Que.
5FB, Savage, address unknown.

RAF

1OH, Shaw, LAC, foreign duty.
ex-2AG, Charpentier, address unknown.
2BP, McGrail, address unknown.
2DO, Campbell, address unknown.
2FD, Wurtele, address unknown.
2ID, Evans, address unknown.
3AKB, Elston, address unknown.
3SZ, Doreen, address unknown.
3VA, Dawley, Montreal, Que.
4AMN, Findlay, LAC, address unknown.
4PH, McVicar, Capt., foreign duty.

Russian Telegraphic Alphabet

(*Continued from page 19*)

Apart from the business of transcribing code messages, the Russian language is one of remarkable fidelity. It is a language that is simple and direct. The order of the words is immaterial, the emphasis being the essential part. A small number of words furnishes an inexhaustible variety of deviations and every imaginable shade of meaning. Lomonosov said of his native tongue: "One may find in it the magnificence of the Spanish, the vivacity of the French, the force of the German, the tenderness of the Italian and, besides, the wealth and the expressive brevity of the Greek and the Latin."

Much is rumored of the wonders of military radio and electronic devices presently in use on land and sea. Brief bits of description of the accomplishments of these secret weapons and the possibilities of their further application stimulate the imagination and inspire confidence in early victory in technician and layman alike.

JOHNSON "Viking" parts are finding preference in everything from the government trainee's transmitter kit to the most secret electronic weapon. Whether it be *a socket, insulator, plug, jack, inductor, condenser or similar item* it is chosen by men who know radio and men who know radio know JOHNSON parts. The "VIKING" trademark is becoming synonymous with quality and advance design to thousands of newcomers as it has been for some time to the veterans. The engineer and newcomer alike will look to JOHNSON for release of wartime developments and for leadership in new products in a new world of peace and freedom. They won't be disappointed.

Many parts can now be delivered more quickly than before. If it will help win the war please forward your inquiry. Catalog 967J available on request.

JOHNSON

a famous name in Radio

E. F. JOHNSON COMPANY
WASECA, MINNESOTA

Hints and Kinks

(Continued from page 42)

formed aluminum may be placed in a glass test tube of appropriate size, along with a cathode and a suitable solution; this might save the day for somebody who couldn't get a replacement.

Several of the wet electrolytics that I have opened were found to be empty, while others were full of a white substance. Careful washing and filling with a less-than-saturated borax solution restored the usefulness of these units. The use of a film of oil on the top of the solution would seem to be desirable to cut down evaporation, but I have not tried it as yet. From some experiments it seems that there is a tendency for the leads entering the solution to fail right at the point where the air and solution meet. Some sort of solution-proof paint on the lead ought to stop such failures.—*J. S. Farmer, Box 614, Gatun, C. Z.*

—···—

NEON-BULB CODE-PRACTICE OSCILLATOR

I HAVE had better luck with the code-practice oscillator circuit shown in Fig. 4 than with any other I have tried. It is extremely simple and really works well. Only a few parts are required and the circuit may be wired up in a few minutes. Almost any receiving triode will serve as the rectifier, *V;* I use old 01As, 71As and other obsolete types for which I have no other use. The 25-watt lamp, which is used as a series dropping resistor for the tube filament, has enough ballast action so that it should be suitable for either 5-volt or 6.3-volt filaments. The remainder of the circuit diagram is self-explanatory.

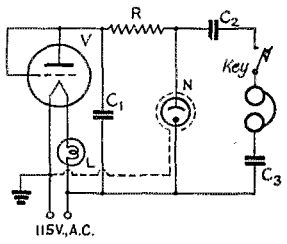
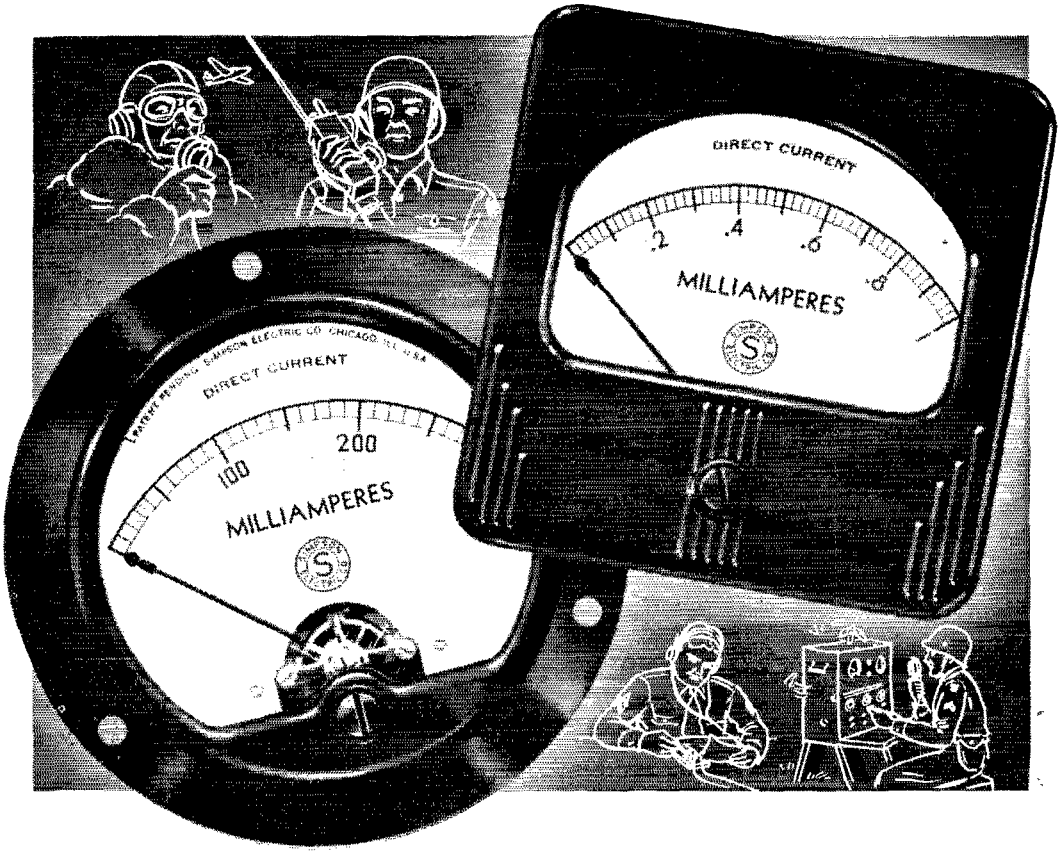


Fig. 4 — Circuit of neon-bulb code-practice oscillator.

C_1 — 1 μfd.
C_2, C_3 — 0.002 μfd.
R — 3 megohms.
L — 25-watt lamp.
N — Neon bulb.
V — Receiving triode as rectifier.

If the tone is fuzzy or has a slight ripple, the note can usually be cleaned up by winding a single turn of insulated wire around the top of the neon bulb and connecting it as shown by the dotted line. Since I mounted the parts for this outfit on a piece of plywood, I assume that the slight ripple in the tone without the "neutralizing" connection was caused by the close proximity of the 25-watt lamp. The 25-watt lamp, power supply and neon bulb may be covered, leaving only the 'phone clips and key exposed. — *H. C. O'Dell, W8UJK.*



For the job that must be done

★ By the thousands, Simpson Instruments are going forth to assume vital responsibilities in America's march to victory—to help do the job that must be done. ★ You will find them in active service on the fighting fronts—maintaining vital communications, and keeping watch over the men and machines that carry the battle to America's enemies on land and sea and in the air. ★ On the home front they are helping importantly in the production of planes, tanks, ships and guns.

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BUY WAR BONDS AND STAMPS FOR VICTORY

INSTRUMENTS THAT STAY ACCURATE

Splatter

(Continued from page 10)

we advise you to order ahead, or at least buy it early. You'll find it wise to conserve your file, too, to avoid need for replacement; back copies will be quite a bit scarcer than they have been.

There may be other changes, too. If so, bear in mind that it's all part of the national program of conservation for war needs.

• • • —

FOOTNOTES

THE number of non-staff contributors represented in this issue is small, but that they are interesting people helps make up for the fact. **McMurdo Silver** (p. 16) counts himself a relative newcomer to the radio game, having been in it a mere 32 years. Well known first as a prewar (edition 1) ham, later in the commercial field under his own name and with a notable list of other firms, he is now busy with war research at Fada — but not so busy that he can't still squeeze in time to haunt junk shops looking for examples of old radio gear for Henry Ford's Edison Memorial Museum at Greenfield Village. (Suggestions or contributions welcome — with full credit to the donor.) **W. J. Mertz, VE4UN** (p. 20), on the other hand, messed around with radio for a good many years but never got on the air until 1934. He doesn't know just how many hams he has worked since then, but it has been a lot. He met quite a few more at the 1938 ARRL national convention in Chicago, and to prove it will show you a Wouff Hong that once stood on a table in the Hotel Sherman dining room. (No, he didn't steal it; he won it.) He won a Sweepstakes award once, too. Apart from that, right now he earns a living as accountant for the City of Weyburn, Sask., but he has done many things at various times — including newspaper work.

• • • —

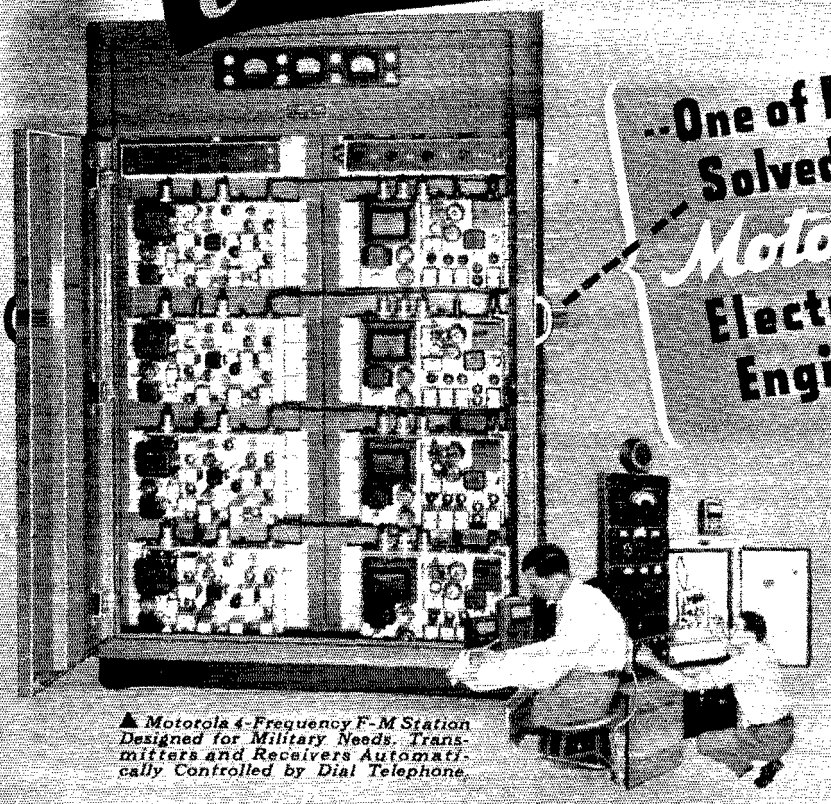
FEED BACK

IN THE last column of W8SKW's chart showing the Arabic code (p. 34, January, 1943, *QST*) there appears an Arabic character which corresponds to a lower case *d* with a subscript dot. This character should also have a dot *over* it. Apparently the upper dot disappeared in processing somewhere between the drafting table and the time the line-cut got on the press.

Two numerical errors occurred in Dawkins Espy's article "How's Your Math?" in the December issue, we regret to report. On page 34 the result of a division is given as 0.87; the correct figure is 0.93. On page 84 the correct antilog of 6.1 is 1,260,000.

Dr. Gadwa has called our attention to the fact that a radical sign was inadvertently omitted from the equations for curves 32 and 35 in his article, "Standing Waves on Transmission Lines," in December *QST*. In both equations $R_o/2$ should be $R_o/\sqrt{2}$. This change does not affect the curves themselves, since the correct value was used in making the plots.

A PROBLEM IN *Communications*



--One of Many Solved by *Motorola*- Electronics Engineers

▲ *Motorola 4-Frequency F-M Station Designed for Military Needs. Transmitters and Receivers Automatically Controlled by Dial Telephone*

Motorola engineers are today applying their accumulated skills and scientific knowledge to problems which confront our country, its states, counties, cities and towns. Housed in a new Engineering Building, with greatly expanded facilities, the Motorola capacity for service is greater than ever. Electronic knowledge thus gained will one day be applied to the peacetime demands of a nation eager for better things in all phases of its living.

THE ARMY-NAVY "E"—Awarded for excellence in the production of Communications Equipment for America's Armed Forces

Motorola Radio Communication Systems
Designed and Engineered to Fit Special Needs

GALVIN MFG. CORPORATION · CHICAGO

Correspondence

(Continued from page 44)

operation, be restricted to use of 160 c.w. and 'phone/c.w. above 56 Mc. This "Class D" license would automatically permit use of the 40-, 80- and 20-meter bands one year from date of issuance. 28–30 Mc. would require a Class A license for the use of 'phone.

Such restriction of radiotelephone will be inevitable if untenable jamming in the choice amateur bands is to be prevented or minimized. Radiotelephone simply "hogs too much room" to be practical for amateur use on the lower frequency bands, especially so if they are narrowed. Four or five stations using A-1 emission can occupy the channel of a single radiotelephone station. And receiver selectivity is infinitely more easily obtained with A-1 than A-3 signals. And, more important to ham radio in the long run, c.w. operation makes radio operators while 'phone is parasitic in this respect. Amateur bands of the future must be used increasingly more in an effort to justify their existence as such, with their use as merely a source of individual entertainment place secondary. This will mean greatly increased activity in emergency networks and the like. . . .

Much more can be said, but I guess the ARRL knows what it is up against. I know we hams can leave it up to you to try to do the best you can for amateur radio as a whole. . . . Amateur radio is a world institution in its own right, and as such should demand recognition. That's where the ARRL comes in. . . .

— *Rodney H. Newkirk, W9BRD*

Signal Corps

(Continued from page 15)

classes, while "Fundamentals of Radio," edited by W. L. Everitt, is used in JRT. The ARRL *Radio Amateur's Handbook* is used as a supplementary text and practical reference book in both.

Classes are surprisingly informal, with conversational give-and-take between students and instructors during theory as well as lab sessions. Trainees learn by talking the subject out among themselves as much as from formal lectures. The students' visualization of theory is aided by blackboard illustrations, models, display boards and an RCA "Dynamic Demonstrator." In lab and shop sessions actual gear — of which there is a surprising variety and amount — is employed.

The course is arranged to give the student all the essential information needed to fit him for Signal Corps work. Non-essentials are eliminated, and the required elements are presented in such a way that the student can assimilate them in the shortest possible time.

The student is given every opportunity to make good, including supplementary individual instruction if necessary. But if he fails to make the grade he is not permitted to slow the progress of the class as a whole. Reservists who fall behind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(Continued from page 92)

are ordered to immediate active duty as regular soldiers; civilians are dismissed.

The majority of the class come through with flying colors, however, and in eight weeks progress satisfactorily through ML and enter JRT.

As Junior Repairman — Trainees, the changes in the daily routine are largely in details and the intensiveness of the work.

JRT Shop Class

Let's visit a typical JRT shop class. The classroom is on the second floor of one of the new buildings — a large place more than 250 feet long. Down its length stretch long rows of new work tables. Around these tables students cluster in small groups. Everyone is busy, and a weird bedlam of raucous noises, squeals and bursts of music smites the ear.

At first glance every group seems to be doing different things at random, but gradually a pattern appears. It seems that the students work in teams of four. One team will build the r.f. unit of a transmitter, for example, while another group assembles the modulator. Then they join forces and make the two units work together. Afterward the process is reversed, the first group building the modulator and the second the r.f. end.

General layouts are provided for these constructional jobs. A good deal of latitude is allowed for individual initiative, however. When the course was first installed the students started from scratch, cutting and bending chassis from sheet metal, drilling all holes, making cut-outs, and so on. Now a standard punched chassis is supplied; it speeds up training, and the students learn about as much.

Parts are used over and over, of course, being issued from a well-stocked supply room adjoining each shop and returned there when the unit is dismantled following final testing. While under construction the partially-completed assemblies are stored in box-shelves along the walls or in the ample bench drawers at each working position.

During the course each student participates in building at least one complete transmitter and receiver. The transmitter is a multi-stage job with either crystal-control or e.c. oscillator, buffer, final and a modulator arranged for either microphone or pick-up input. The receiver is a progressive design, beginning as a simple regenerator and ending up as a superhet.

Each job is built up complete to the last detail, tested, aligned and made to operate satisfactorily. There are plenty of meters, test sets, oscilloscopes, etc., around to aid in this job — and, incidentally, give the students training in their use. The climax of each project is a final session on frequency measurement and calibration.

The students are required to iron out any troubles that arise. If none occur naturally the instructors find ways to see that they develop. One of the reasons for allowing considerable latitude in the design of equipment, rather than having the students lavishly assemble detailed kits, is to give them practice in eliminating bugs. Thus they learn by actual experience the differ-

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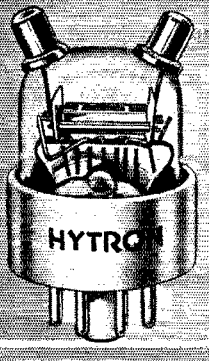
HYTRON'S SOLE PURPOSE for the duration is to maintain an always-increasing flow of tubes into the radio and electronic equipment which is playing a vital part in winning this Radio War. It is our firm conviction that the torch of Liberty which Hytron is helping to keep burning will light the way to the unconditional surrender of our enemies and to an electronic age which will amaze a freed world.



HYTRON CORP., Salem and Newburyport, Mass.

. . . Manufacturers of Radio Tubes Since 1921 . . .

HYTRON RADIO TUBES

(Continued from page 94)

ence between desirable and undesirable practices. In addition, they are given defunct b.c. sets to service for trouble shooting practice.

Instructors Are Tops

That's the thorough kind of training these MLs and JRTs get at Lexington — and, of course, at the other vocational schools as well. The student finds that it's stimulating training, for it inspires him with genuine personal interest and enthusiasm. The fact that his instructors take a personal interest in his progress helps, too.

As time goes on the ability and understanding of the instructors impresses him more and more. "We feel that we have some of the best instructors in the country," Dr. Woods asserted. There is justification for that belief, too. Few are professional teachers. Many are hams who learned radio the hard way themselves, and know how to make it easy for the newcomer. Others are ex-Signal Corps technicians, commercial operators, etc.; all are practical radio men.

Perhaps as typical an example as any is Chief Instructor Wingfield MacDonald, W9BPB. It would be hard to find a man in a similar position with less academic background than has Mac — or one who does a better job. The automobile business was this amiable, warm-hearted Scotsman's life's work until Pearl Harbor. His entire background in radio was as a ham, his knowledge of the subject entirely self-acquired. He was equally an amateur at teaching when he undertook to instruct a small night-school class in radio in 1941, but so successful were the practical approaches to the teaching problem he devised from his own hard-won experience that when the state-wide program began he was asked to help.

Again the amateur approach proved astoundingly successful, and before long Mac was asked to give his full time to the post of chief instructor. It was an opportunity for service that could not be ignored, and he accepted the call. To-day there are thousands of trainees, many already in active service with the Signal Corps, who can be grateful for the quirk of fate that compelled a Lexington garageman to take up amateur radio as his hobby twenty-odd years ago.

Lexington Signal Depot

A student's pre-service training over, he leaves the Lafayette Trade School. The next stage comes when he enters the Post Schools at the Lexington Signal Depot.

The Lexington Depot is a new Signal Corps post, developed from scratch starting a little over two years ago. Its functions and facilities have been greatly expanded to meet accelerating war needs. Originally merely a Signal Corps supply depot, that function is now subordinated to the training activity being conducted at the Post Schools — four of them on the post and one in Lexington proper.

The Lexington Depot is unique among Signal Corps posts in that it is classified as an "exempt station," which means that it does not operate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(*Continued from page 96*)

under any individual service command, as do other schools, but supplies men to all.

A tour of the headquarters and classrooms at the Signal Depot is practically the equivalent of a running hamfest. The commanding officer, Col. Laurence Watts, and his executive officer, Lt. Col. Frank L. Tyrec, are both old-line Army men with a genuine appreciation of amateur radio. Capt. Thomas M. Hahn, W9WNP, the officer in charge of the technical training branch, is as thorough-going a ham as you'll find, in addition to being a top-notch radio physicist and engineer. His technical assistant, in civilian status, is W. E. Marquart, W9CKT. And there are some fifty other licensed amateurs scattered through the staff.

Five classifications of training are carried on at the Post Schools. Four are for servicemen, including field radio and f.m. The fifth supplies vocational training instructors for the pre-service schools.

Some students come direct to the Depot without pre-service training; these are mostly hams or others with equivalent experience. Most are JRT graduates, however. Before acceptance they are given an aptitude test comprising 200 multiple-choice questions.

The new student first takes what is known as "field radio" training. This training is solidly practical. There is very little theory, as such; the students are expected to have the fundamentals in hand from their previous training. Most of the work is with actual Signal Corps equipment, and the objective is to make the student completely familiar with each detail of every piece of standard field equipment.

Field Radio Course

Chief Instructor, Edward Stachura, W9JUE, took us through the school and explained how the field radio course is conducted.

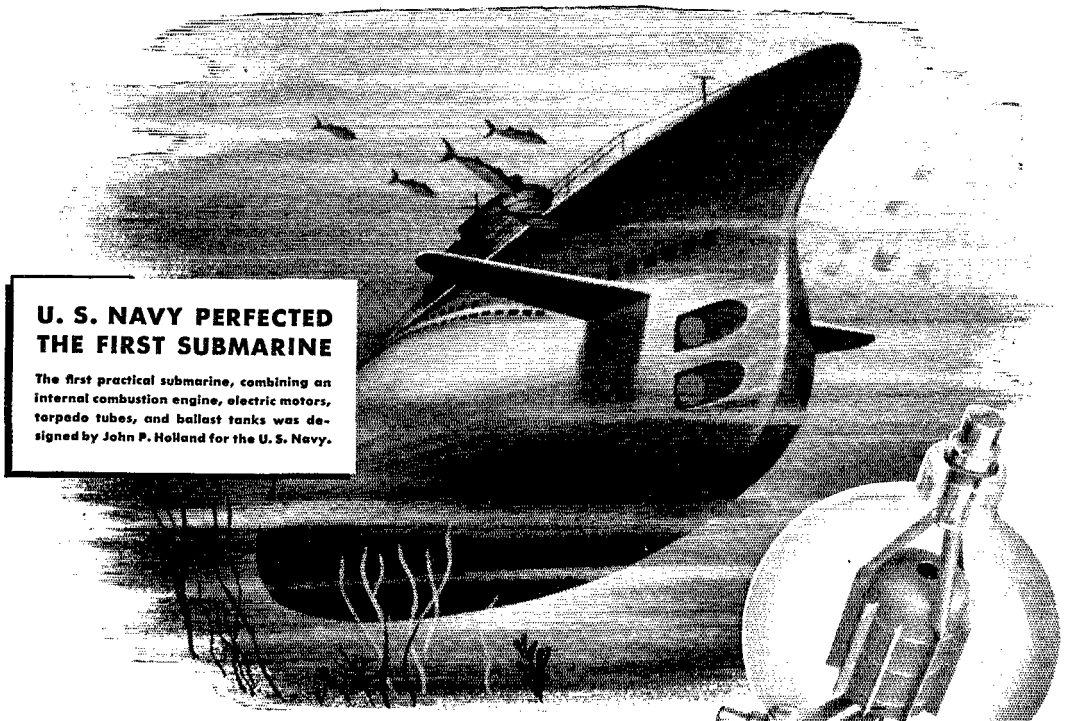
A class starts out with a complete field installation of a certain type. First, they consider it as a whole, identifying the separate units. Then they take up the individual components — receiver, transmitter, power unit and accessories.

Basic lesson notebooks are supplied, together with drawings giving a partial circuit diagram, the location of controls, etc. With these aids the student traces the circuit as a whole and draws it in his own notebook. This not only gives practice in analysis but also familiarizes him with the location of components better than any routine drill could do.

When this process is completed for any particular unit, the class is given a quiz. The purpose of the quiz is not so much to grade as to teach; afterward the instructor goes over his paper with each student, question by question, until all the weak spots are ironed out.

Once the circuit and physical layout of the unit are learned, the student gets down to details. First he measures the resistances between all points and notes them down. Then he measures voltages and, where desirable, currents. Finally, he puts an oscilloscope on the set and observes

PIONEERS...in war and peace



U. S. NAVY PERFECTED THE FIRST SUBMARINE

The first practical submarine, combining an internal combustion engine, electric motors, torpedo tubes, and ballast tanks was designed by John P. Holland for the U. S. Navy.

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The presence of gas, released slowly at operating temperatures, or suddenly by overloads, shortened the life of all vacuum tubes until Heintz and Kaufman engineers introduced Gammatrons in 1928.

The name Gammatron stands for tubes that are inherently gas-free. Plates and grids are made of tantalum, a remarkable element which absorbs gas readily, and replaces the unstable chemical "getters" previously necessary.

Gammatron design has also eliminated the need for internal insulators, which are a source of gas.

The long life of Gammatrons, and their ability to endure terrific punishment, is especially valuable in time of war. These same qualities, plus new Gammatron developments in the ultra-high frequency band, will make a major contribution to the peacetime era of electronics.

HK-854 TRIODE

OPERATING DATA

(As an R. F. Power Amplifier, Class C, Unmodulated)

	Typical	Maximum
Power Output.....	1800 Watts	—
Driving Power.....	40 Watts	—
DC Plate Voltage....	5000 Volts	6000
DC Plate Current....	450 M.A.	600
DC Grid Voltage....	-575 Volts	-1500
DC Grid Current.....	45 M.A.	80
Peak RF Grid Volts..	915 Volts	—
Plate Input.....	2250 Volts	2250
Plate Dissipation....	450 Watts	450

HEINTZ — HK — KAUFMAN

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GAMMATRONS...OF COURSE!

Continued from page 98)

waveforms at various points, under both correct and incorrect adjustment, making pencil sketches of the patterns.

With this data he should be able to identify any trouble that might occur, and this ability is put to a practical test. The instructor deliberately introduces various kinds of trouble — starting with bad tubes and open circuits and going on to shorts made with almost invisible No. 42 wire, tissue paper or finger-nail polish applied between relay contacts to simulate gummed points, and so on. These simulated defects correspond to typical faults encountered in the field.

Confronted with such a doctored set, the student sets to work to locate the trouble. The instructor meanwhile observes his technique. If his approach shows a lack of system or logical analysis, he is given pointers on procedure.

When the student has completed this phase, he takes the individual units and puts them together into a complete assembly, installing cables and making interconnections from memory.

Then comes what amounts to a final exam. It is called a "system analysis," and in it the student must locate several unrelated troubles introduced in the complete assembly. This analysis may be done individually or by small groups. In the latter case, of course, there is competition to see who can spot the trouble first.

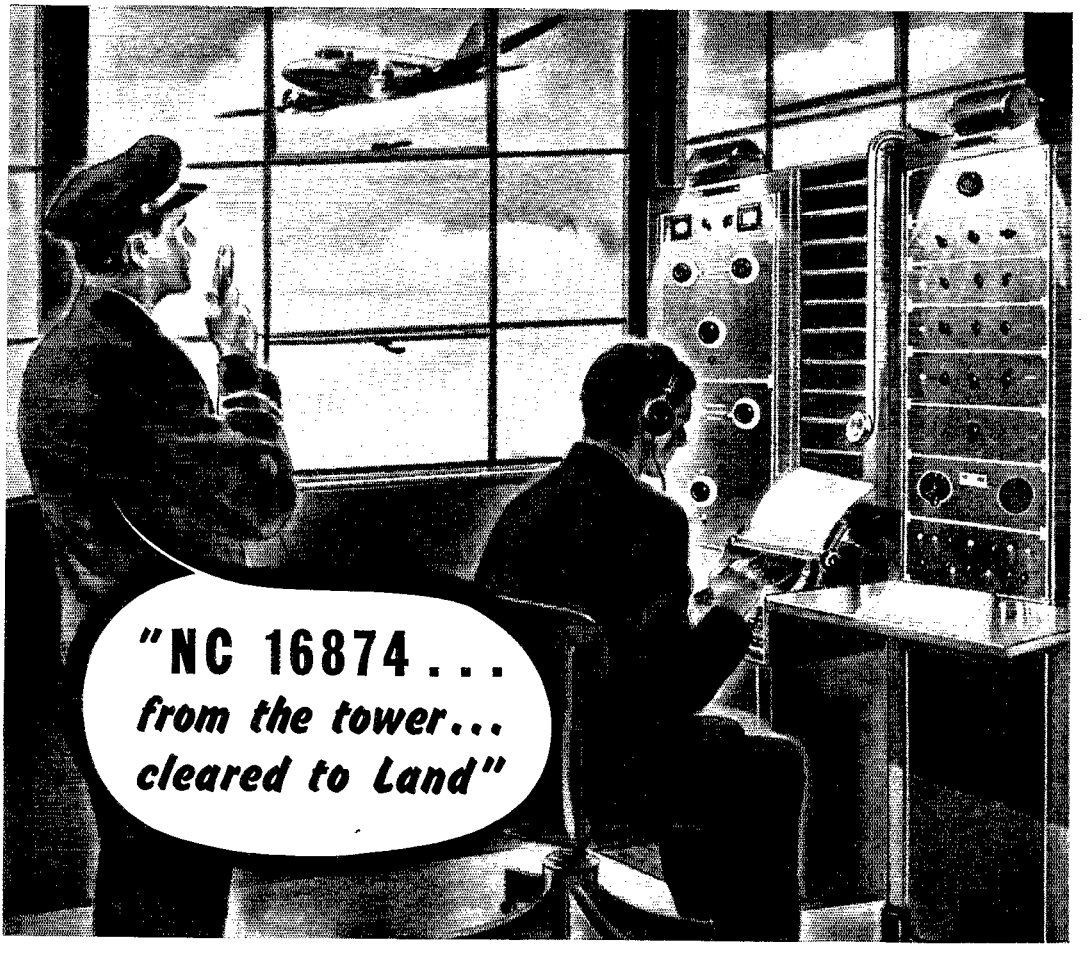
A similar procedure is followed with various representative types of Signal Corps equipment, beginning with the obsolete BC 148 small field set — chosen because it is the closest to a "breadboard" job the Army has — and continuing up through the most elaborate modern installations. Mimeographed lesson sheets are supplied for each unit and the student records complete details in his notebook. When the shop work with each unit is completed a multiple-choice quiz double-checks the student's assimilation.

Graduates Know Their Stuff

All in all, when a student finishes with any given unit he knows it inside out, backward and forward — all its weaknesses and its little idiosyncracies.

We were told of one instructor who vowed defiantly one day that, when a man left his class (dealing with a particular variety of receiver), nothing could go wrong with that type of receiver that he couldn't locate and fix. Some of the other instructors challenged this claim. They fixed up a set with a variety of the most obscure troubles they could devise and students were selected at random to dig them out. They did, too, and the defiant instructor was vindicated.

Each instructor in the school has his own specialty. That is to say, each deals with one particular unit or type of equipment, and the trainees pass through his classes in rotation. The instructors are of all types and backgrounds, each chosen for his fitness for his particular job. We met one Ph.D. there, but most of them are ordinary fellows, with adequate practical background and a knack for teaching. A high percentage are hams.



Communications and other radio equipment made by Wilcox are at work to help carry on flight control safely under the increased strain of wartime activity. Present Wilcox manufacturing is devoted exclusively to the Government's needs to coordinate fighting forces on land, sea and in the air with vital communications. Until peace is won, the sign on our door reads, "Uncle Sam comes first."

Communication Receivers
Aircraft Radio
Broadcast Equipment
Control Apparatus
Transmitting Equipment

WILCOX ELECTRIC COMPANY

Quality Manufacturing of Radio Equipment

14th & Chestnut
Kansas City, Missouri

(Continued from page 100)

Many are themselves graduates of the school. Most of the instructors are civilians.

The ratio of instructors to students is high, making it possible for them to work closely with the individual trainees. This accomplishes the dual purpose of giving every possible advantage in instruction and enabling keeping a careful check on each student's attitude and ability.

Every item of a student's progress, from the results of the aptitude test at the start through the assorted personality comments by the various instructors, is recorded by an extensive Kardex record system. Individual cards show in detail the student's performance on each lesson.

On graduation an efficiency rating report is prepared, summarizing the student's progress and predicting his service capabilities. One copy goes to Washington and another to the commanding officer of the outfit to which he is assigned for active duty. This report contains a rating based on the student's performance in the school. These ratings are graded to indicate a range of ability extending over 20 levels. The basic grades are (1) Technician (a man capable of doing any kind of radio work including research and design), (2) Repairman (a man qualified for any kind of field service), (3) Apprentice Repairman, and (4) the lowest grade, Repairman's Helper. Each of these grades is in turn subdivided in terms of personal qualities — native intelligence, initiative, alertness, speed and accuracy of analysis, etc. Field experience indicates that a man usually develops just about as his rating predicts he will.

Apart from this rating report, which is confidential even from the student himself, each man who completes the course receives a diploma certifying to the fact. There is another reward for successful reservists, too, for these can expect to become non-coms; the minimum grade is corporal, but those who display ability at handling men may receive ratings up to master sergeant or the chance to attend officers' training school.

Advanced Training

The foregoing deals only with the first phase of the training at the Lexington Signal Depot — the field radio work. A majority of the students who complete this course go directly into active service. The top-ranking men are, however, assigned to further training in either the f.m. or to special training in electronics.

We can't tell you much about these branches, because they deal with classified materials. We can report, though, that the instruction is as thorough and effective in its way as is the other work.

Of interest in connection with this advanced training is that analysis of the student records indicates that the top men — those who go on to receive the special training by reason of their superior ability — are mostly those to whom radio has been a hobby. Licensed amateurs rank highest, on the average, while those with some previous interest in the game, even if they held no tickets, come next. These rank head and shoulders above the rest — even above those with college

(*Continued from page 102*)

degrees in engineering. In fact, Chief Instructor Stachura emphasized that he wishes that every student in the school could have had previous ham experience. Since that isn't possible, the best they can do is to instill as nearly as possible the equivalent of an amateur's experience — and that's just what they do.

Of course, not even the most ardent student thinks of nothing but radio during every waking hour. To the pre-service trainees, reservists and civilians, their time outside of school hours is their own. They can live where they please and play when they please. The regular soldiers live in military barracks.

Despite the heavy training schedule, recreation is not overlooked. Outside of class periods sports are encouraged; facilities for volley ball, basketball, tennis, etc., are available. There is swimming at the YMCA, and student dances are held every two weeks. It's the Post Victory band that provides music for these occasions, by the way, and any musically-inclined student is eligible to try for the band.

Apart from entertainment as outside activity, students who can afford the time without prejudicing their regular work are encouraged to take courses at the State University in either Spanish or trigonometry. These courses, which are available without charge, give college credits, and are so arranged that the student can attend during his free time regardless of his shift and can complete them within the training period.

Join the Battle of Training

A concluding word concerning the most important topic of all — the need for trained instructors. No exception among radio training establishments, Lexington stands in critical need of instructors — both in the state vocational schools and at the Signal Depot.

"The strength or weakness of the program lies in our instructors," Captain Hahn summed it up. "If there are any faults or shortcomings in the training job we do, it will be because we are forced to use green or incompetent men. It is vital to winning the war that we get good instructors."

The qualifications required of instructors at both pre-service and in-service schools have been given in the "U.S.A. Calling" pages of past issues of *QST*; there is no need to repeat them here. We must add, however, that any reasonably well-equipped amateur with draft deferment is urged to investigate, as are qualified YLs.

Working conditions in the schools are congenial. The pay is good, too — ranging from $2000 to $3800 at the Depot and from $2160 to $2700 for ML instructors or up to $3300 for JRT instructors in the pre-service classes. And in a community where a haircut costs 40¢, that isn't hay!

Even more important, though, is the chance to aid in a vital war-training job — to help assure that the great offensives now in prospect won't stall for lack of key technicians.

How about you? Should you be in there, helping to "Keep 'em Learning" — for Victory?

★

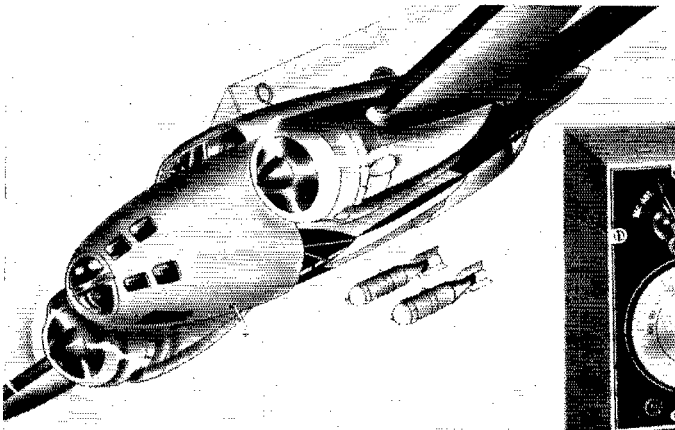
Making Proper Connections

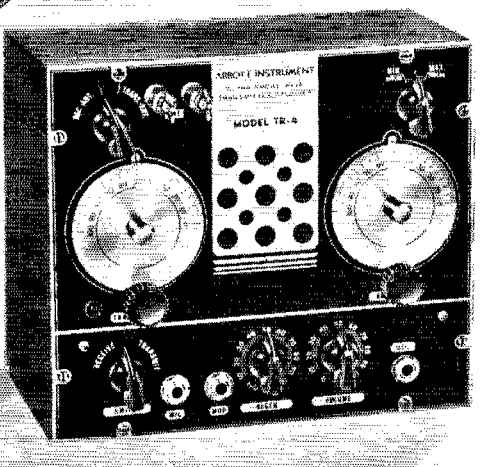
★ The successful functioning of radio equipment between ground stations, planes, ships, tanks and other machines of war depends upon the uninterrupted flow of communication through radio plugs, sockets and connectors. The manufacturing of these important parts has been entrusted, in part, to The Astatic Corporation, its organization and facilities. Production, on a volume basis, is now under way, supplying concerns holding government contracts for radio equipment. Inquiries from qualified manufacturers given prompt attention.

THE ASTATIC CORPORATION
Youngstown, Ohio

ASTATIC

In Canada:
Canadian Astatic Ltd., Toronto, Ontario



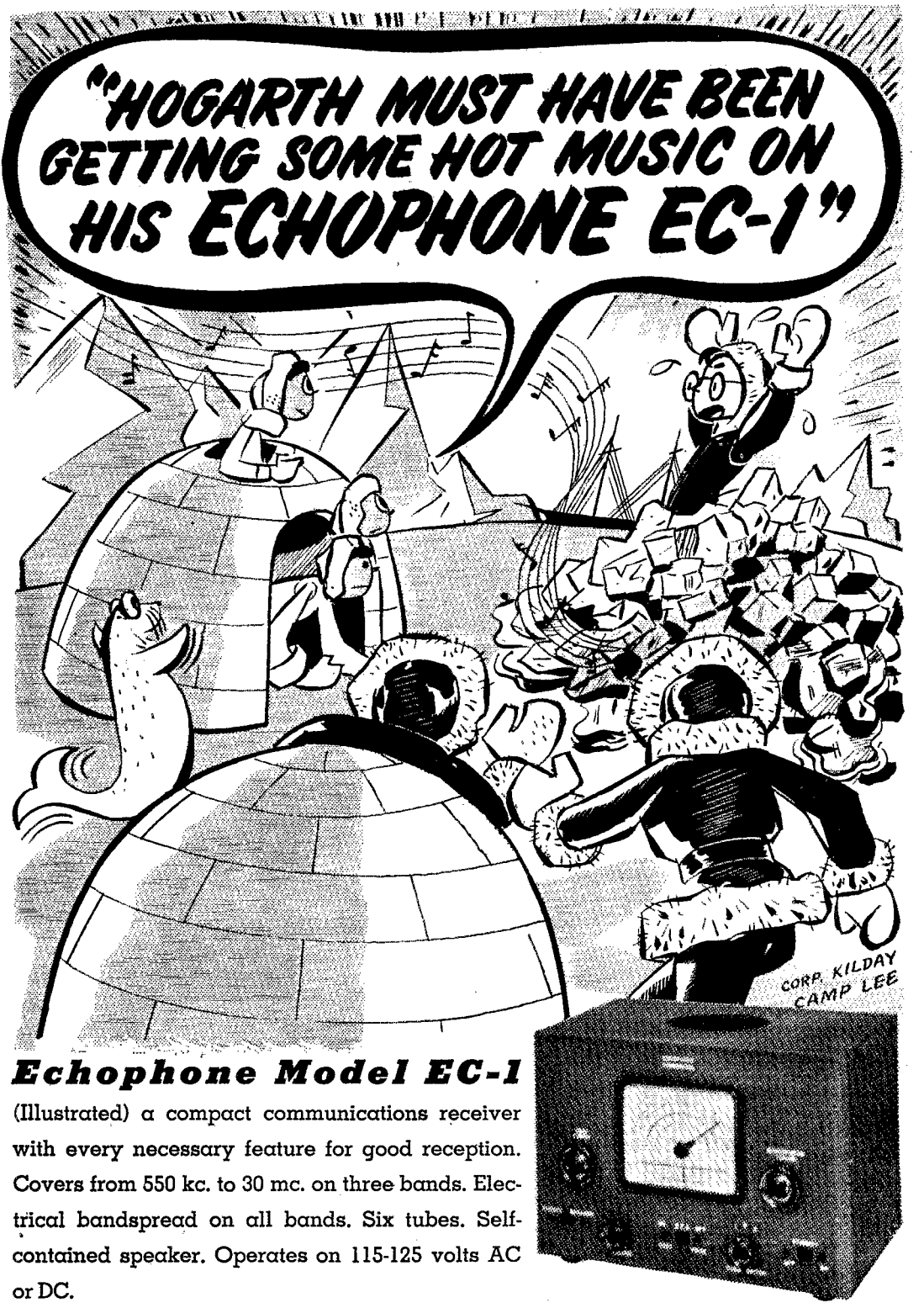


No Empty Promise

Our respect for scheduled delivery dates is positively old-fashioned. If we can't get your order out, we'll say so. But if we say that you can count on us, then you can be sure that we'll do everything in our power to have your order fulfilled. Basing predictions on past performances, you can rely on deliveries promised by Abbott.

ABBOTT TR-4, one of our standard models. A compact and efficient ultra high frequency transmitter and receiver. May we quote on your specific requirements?

ABBOTT INSTRUMENT, INC.
8 WEST 18 STREET • NEW YORK, N. Y.



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. Six tubes. Self-contained speaker. Operates on 115-125 volts AC or DC.

ECHOPHONE RADIO CO., 201 EAST 26th ST., CHICAGO, ILLINOIS

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.
(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.
(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.
(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised

* * * * *

Gear is short. You can sell your old and extra gear through Ham-Ads

* * * * *

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

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

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

CRYSTALS: 1700 to 7000 kilocycles, furnished under priority and M146 Certification. Nebel Laboratory, 1104 Lincoln Place, Brooklyn, N. Y.

OLD QSTs. Buy 1915/23. Sell 1915/41. Singles or files. W6SN.

WANTED: Skybuddy. State age, condition, price. W1BB.

WANTED: Hallicrafters SX28 or SX32. State condition and price. Francis Noble, 735 College, Sulphur Springs, Texas.

CRYSTALS are available on priority for Police, Defense, and other essential services. The M-146 certification is required. Good delivery on high grade type E62 and E64 Steatite units in the 1600 to 10,000 kilocycle range. Order from "Eidson's", Temple, Texas.

WANTED: Radio operators for merchant marine. Must have commercial license. Wages $340 to $380 monthly. Radio Officers Union, 265 West 14th St., NYC.

USED Teleplexes, Instructographs bought and sold. Ryan's, Hannibal, Mo.

SELL — Meissner Shifter, NC81X receiver, Gordon clock, transmitting coils, condensers, transformers, miscellaneous parts. Headen Thompson, Torrington, Conn.

IN STOCK for immediate shipment: Mac. No. 200 Keys, $2.50. Mac Deluxe Signatone code practice oscillators, $11.85; Vibroplexes, code machines, receivers; large stock of radio apparatus. Your inquiries invited. Henry Radio Shop, Butler, Missouri, and 2335 Westwood Blvd., West Los Angeles, Calif.

I PAY highest cash prices immediately for used communications receivers, transmitters, code machines, meters, testers, parts. Write, telephone or telegraph description or ship equipment for my offer. Satisfaction guaranteed or your apparatus back. Bob Henry, W9ARA, Butler, Missouri.

WANTED — Oscilloscope for cash. Send your price to Fred Rudolph, Stryker, Ohio.

SELL — 500 Watts CW Utah No. 1 Steel Cabinet Unit No. 4 on chassis, fibreboard panel, individual power supplies. Coils 80-40 XTALS 80-40. Miscellaneous tubes, parts, coil wire, $150, with Hallicrafter S-20, $175 f.o.b. North Hollywood, Calif. W6RVH 11506 Albers.

WANTED: 7 to 14 Megacycle coil for HRO. Russell Payne, 1527 West Main Street, Charlottesville, Va.

WANTED: Hickok Model 188X Signal Generator. Also RFO-5 Oscilloscope. Will pay cash. "The Radio Man", 1724 Central Ave., Middletown, Ohio.

HALLICRAFTERS SX23 Super Skyrider, highest cash bidder. 8 months old. Excellent condition. Triplett Voma-Signal generator. William Fells, R 29 USMSTS, Gallups Island, Mass.

WANTED: Thordarson Tru-Fidelity Transformers interstage T-90A04 and output T-90S13, also 50 feet microphone cable. J. D. Wood, W8SZX, 1355 E. 114th, Cleveland, Ohio.

WANTED: New or used RCA 1847 Iconoscope tube. Write JimWeaver, WCSC, Charleston, S. C.

SWAP Ecophone EC-3 in new condition and cash for SX-24 or SX-25 in good shape. SWL, 1828, Rozzells, Ferry Rd., Charlotte, N. C.

WANTED: 66½ inch Par-Metal relay rack. Faulkner, 3704 Bowne, Flushing, L.I., N. Y.

COMMUNICATION Receivers, Good-All's, Ogallala, Nebraska.

SELL — Howard 460, $50. Genemotor 6V input, 600 output. 2 milliameters, RCP 413P tester. 812, vr105-30, vr150-30, power transformers, etc. All offers considered. Keith Dannefer, Ness City, Kansas, W9HYF.

WANTED: Speaker with matching cabinet for NC-200 receiver, also Hallicrafter Sky-traveller. State condition, price. Lt Hotchkiss, 10982½ Roebling Ave., West Los Angeles, Calif.

WANTED: Vibroplex Bug, portable mill. Describe. Eugene Wiggins, c/o Dodge Radio, Valparaiso, Indiana.

WANTED: Modern Service Set capable of handling all BC receivers and tubes (such as Weston 775) Description and Price?; HRO coil 1,000 to 2,000 KC Sell Abbott TR4 with specially selected Tubes. Complete with microphone, Johnson Q antenna, meters, factory built 110 volt AC power supply etc. Offer?; Sell 400 Watt CW transmitter in W.E. totally enclosed rack. 42, 42, 802, 808, 304Bs. Also Meissner Signal Shifter with all coils; Transformers, meters, condensers, tubes etc., etc. Stamp for list. W2BNX, 85–12 165th St., Jamaica, N. Y.

Your Nearby Dealer Is Your Best Friend

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

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

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

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

BUFFALO, NEW YORK
Dymac, Inc.
1531 Main Street—Cor. Ferry—GA. 0252
One of the Largest Ham Supply Houses in Western New York

CHICAGO, ILLINOIS
Allied Radio Corporation
833 West Jackson Blvd.
Large Stocks—Dependable Service, Our Educational Division Will Assist Amateurs in Radio War Training Work Without Obligation.

CHICAGO, ILLINOIS
Chicago Radio Apparatus Company
415 South Dearborn Street (Est. 1921)
Electronic supplies of all Kinds

DETROIT, MICHIGAN
Radio Specialties Company
325 E. Jefferson Avenue
Ham Supplies — National & Hammarlund Sets and Parts

HARTFORD, CONNECTICUT
R. G. Sceli
227 Asylum Street
Radio Electronic Equipment

KANSAS CITY, MISSOURI
Burstein-Applebee Company
1012-14 McGee Street
"Specialists" in supplies for the Amateur and Serviceman

KANSAS CITY, MISSOURI
Radiolab
1515 Grand Avenue
Amateur Headquarters in Kansas City

MILWAUKEE, WISCONSIN
Radio Parts Company, Inc.
538 West State Street
Complete stock Nationally Known products

NEW YORK, N. Y.
Harrison Radio Company
12 West Broadway
Harrison Has It! Phone WOrth 2-6276 for information or rush service

OAKLAND, CALIFORNIA
W. D. Brill Company
198 10th Street
W6KLO — The House of Parts — W6FJX

PHILADELPHIA, PENNSYLVANIA
Eugene G. Wile
10 S. Tenth Street
Complete Stock of Quality Merchandise

ST. LOUIS, MISSOURI
Van Sickle Radio Company
1113 Pine Street
Owned and Operated by Amateurs

Index to Advertisers

PRINTED IN U. S. A.
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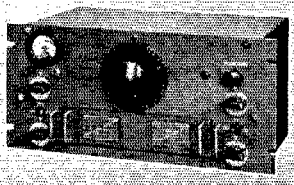
OFFICIAL
U. S. NAVY
PHOTOGRAPH

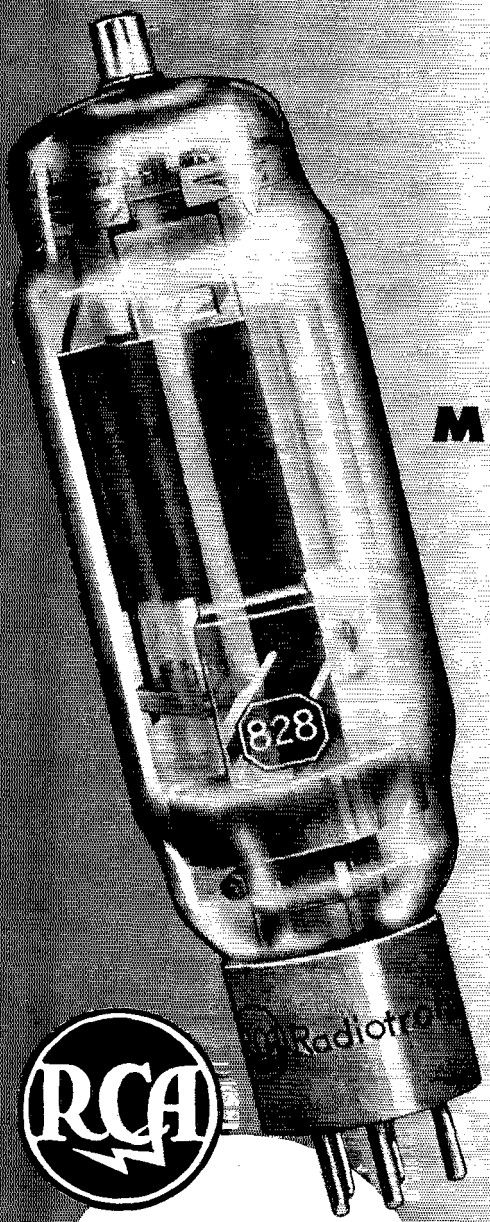
WHEELHOUSE OF A PC BOAT



Just as the wheelhouse is the nerve center of the swift little PC boats, so radio is the nerve system that links the Navy's ships together.

Like the ships, like the men who man them, the Navy's radio equipment can take it.

NATIONAL COMPANY, INC.
Malden, Mass.



Now...

MANY ADDITIONAL HOURS OF LIFE

BECAUSE OF EXCLUSIVE RCA DESIGN IMPROVEMENTS

RCA engineering scores again—this time with manufacturing improvements which make it possible for the famous RCA-828 Beam Power Amplifier to deliver its 150 watts* with only 2.1 watts of driving power many hours longer than heretofore.

Chief among the improvements has been the incorporation of the RCA zirconium-coated molybdenum anode in this popular tube. Actual service tests over a long period have proved that this construction change increases the life of the tube several fold!

Ordinarily, such a change might well warrant a substantial boost in the performance ratings of a tube—but not under war conditions. Longer and still longer tube life now looms far more essential than high "peak" performance. Thus, always conservatively rated in line with RCA practice, the RCA-828 now comes to you with a safety factor several times greater than ever before—just as similar improvements in other RCA Transmitting Tube types have been reflected, not in spectacular rating increases, but in terms of making the tubes perform better and lasting longer at the ratings at which you are already accustomed to using them.

RADIO CORPORATION OF AMERICA
RCA Victor Division, *Camden, N. J.*

RATINGS

FILAMENT VOLTAGE, 10 VOLTS
FILAMENT CURRENT, 3.25 AMPERES
PLATE VOLTAGE, 1250 VOLTS, MAX.*
SCREEN VOLTAGE, 400 VOLTS, MAX.*
PLATE DISSIPATION, 70 WATTS, MAX.*

*CCS rating for class C telegraph service.

828 BEAM POWER AMPLIFIER $17.50

HOW TO MAKE YOUR TUBES LAST LONGER

This valuable booklet, based on RCA Transmitting Tube advertising of the past year, contains dozens of helpful tips on getting maximum life from your old tubes. Get your copy today . . . free. Address: Radio Corporation of America, Commercial Engineering Section, Harrison, N. J.

RCA TRANSMITTING TUBES

PROVED IN COMMUNICATION'S MOST EXACTING APPLICATIONS