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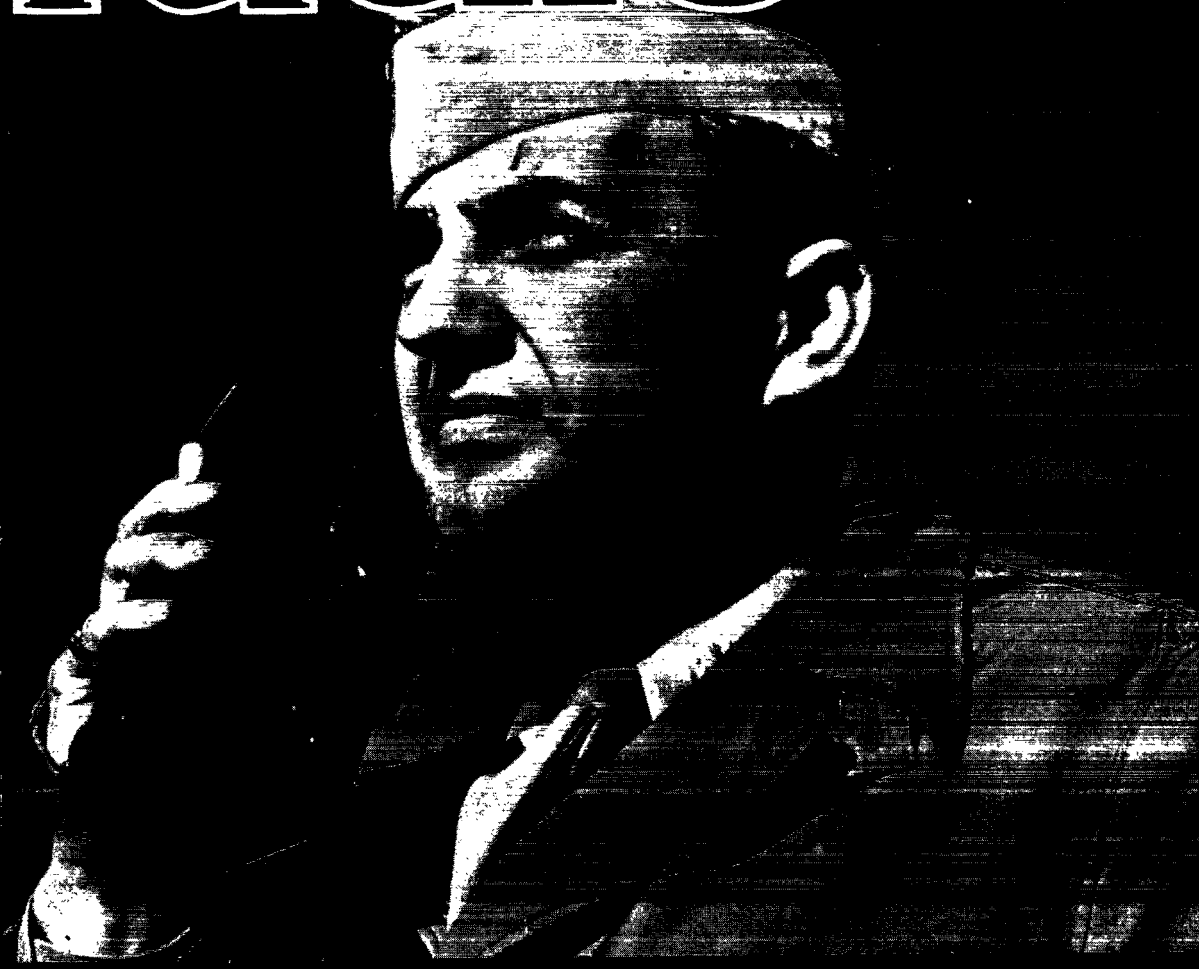
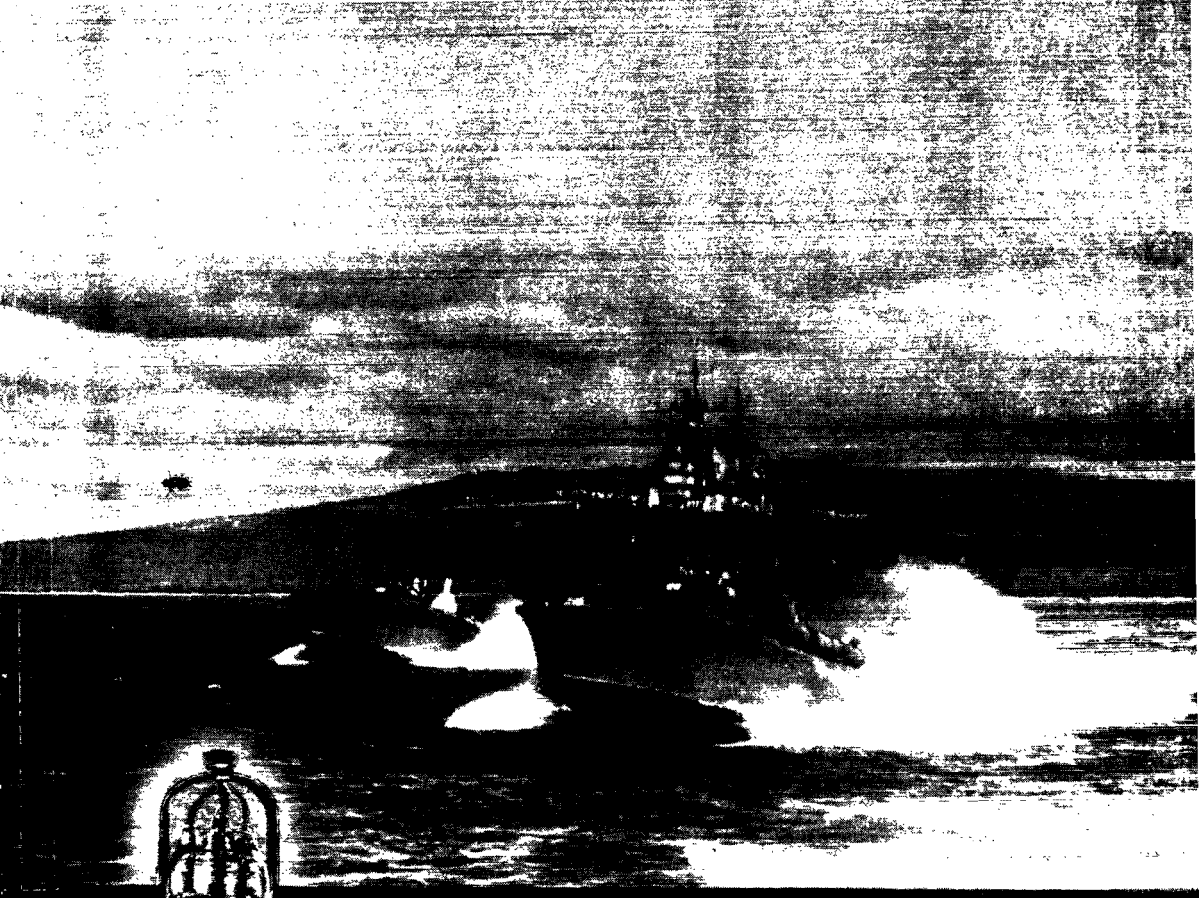
amateur radio





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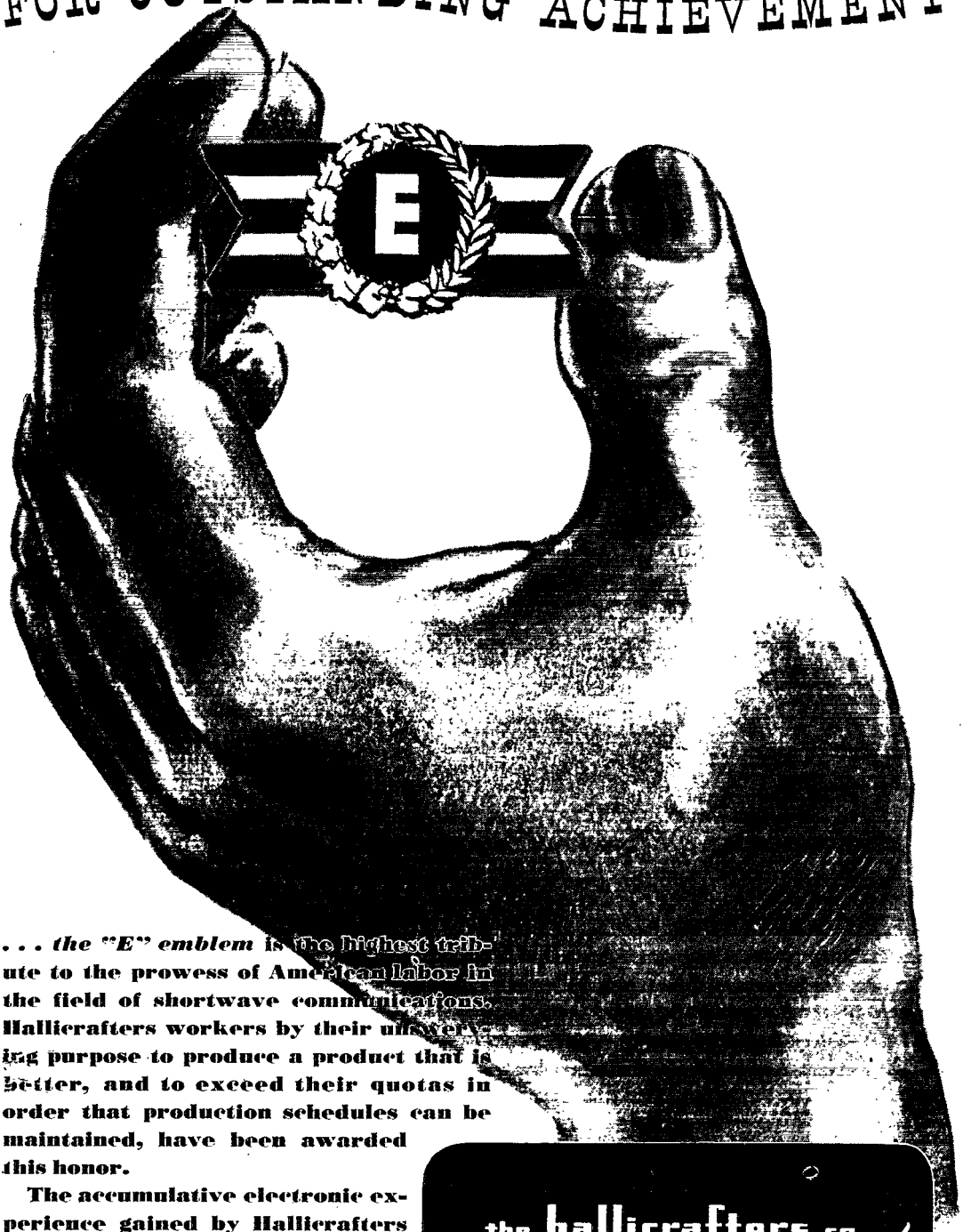

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NOVEMBER 1942

VOLUME XXVI

NUMBER 11

★

★

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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

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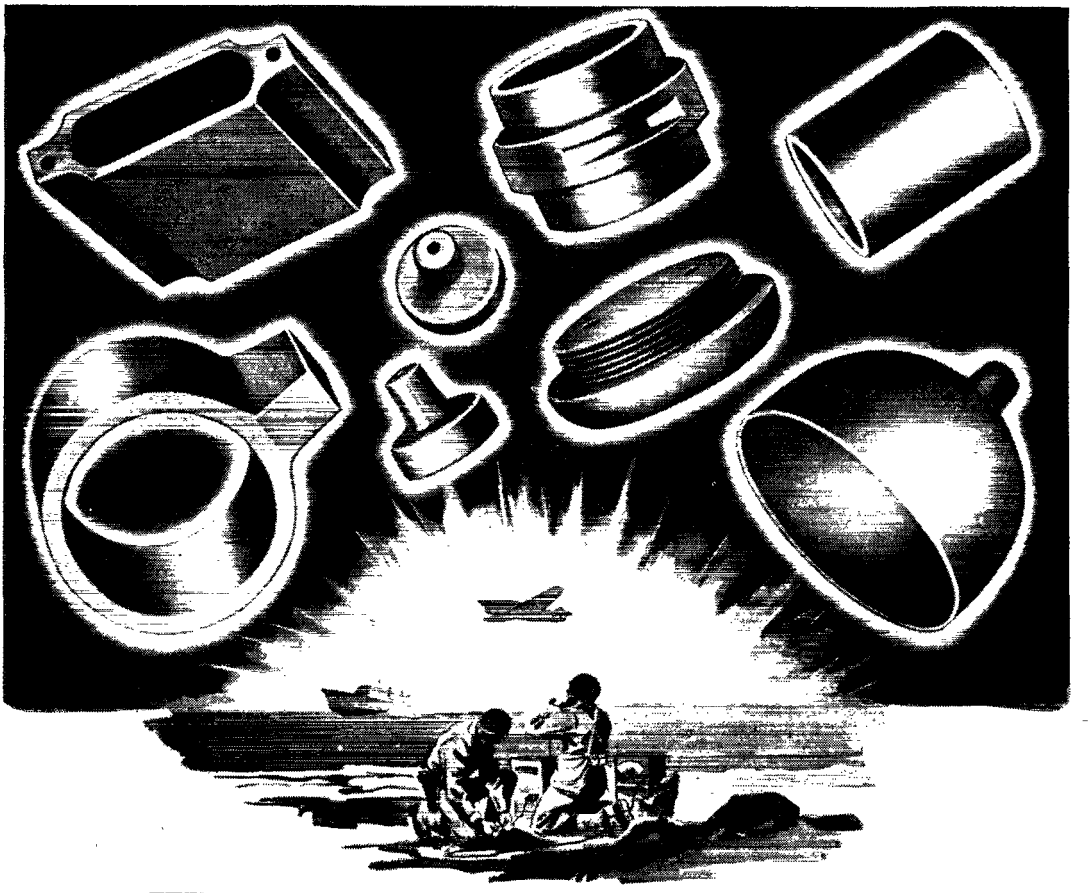

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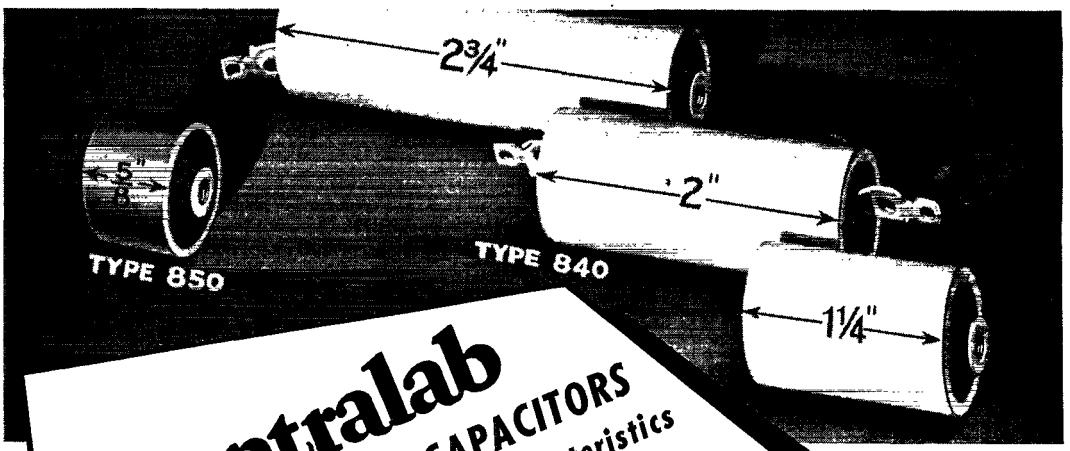

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Section Communications Managers of the A.R.R.L. Communications Department

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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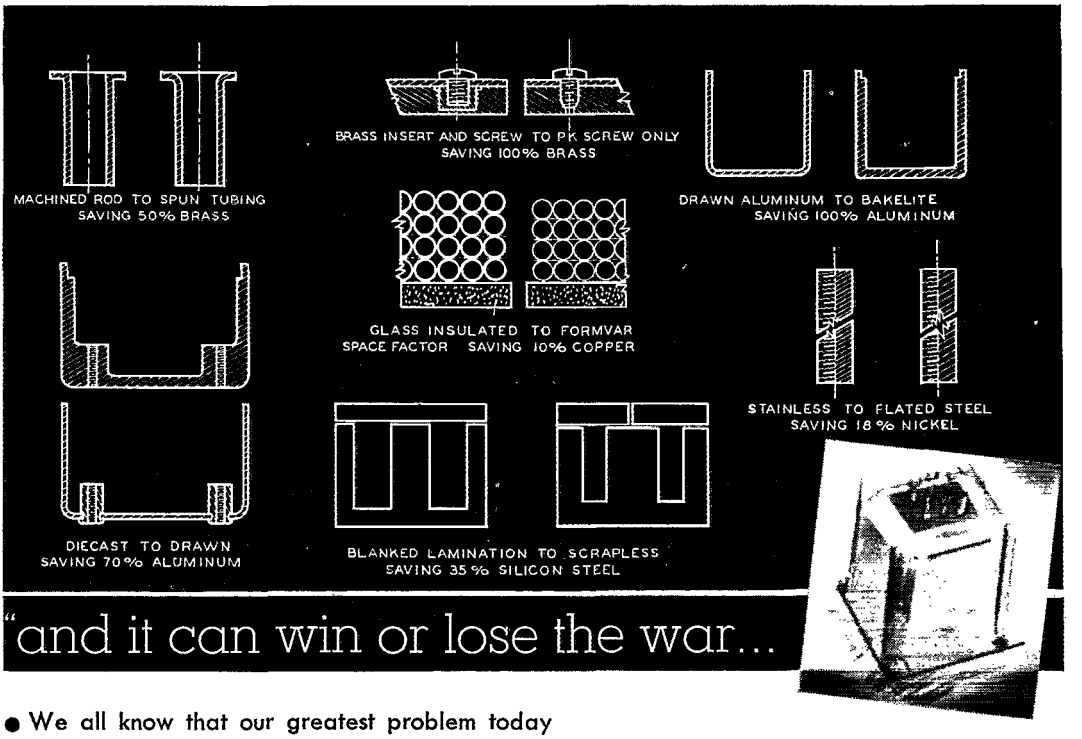


"and it can win or lose the war...

● We all know that our greatest problem today lies in material shortages. The bulk of this problem . . . and it can win or lose the war . . . lies in our hands. A waste of materials, particularly critical materials, in an engineering design today, is as damnable as sabotage.

Here are a few cases in our organization:

1. **On one job our redesign combined two pieces of apparatus. The resultant unit, while more efficient, is smaller than either of the individual units. On the basis of projected requirements, the saving in aluminum alone is 500,000 lbs.**

2. **On this job our delivery schedule would have been delayed five months for the nickel iron core material and shielding cases required. Redesign made possible a unit using silicon core material and silicon shields with actually 10 DB less hum pickup than the original.**

3. **In this job substitution of a drawn aluminum housing for a die casting effected an aluminum saving of 70%.**

Designs must be improved constantly. Take a look at that job you have been running and see whether an extruded rod or a spun bushing won't save the scrap involved in a screw machine part. Check with the Government Engineering Bureau involved as to whether they would not allow a change in material to something lower on the critical list. You will be surprised at their cooperation.

Only when you can say to yourself, "There isn't one of my designs left that can be reduced in amount of material or to less critical materials," can you feel that your share in the War Program is effective.

THE AMERICAN RADIO RELAY LEAGUE

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.

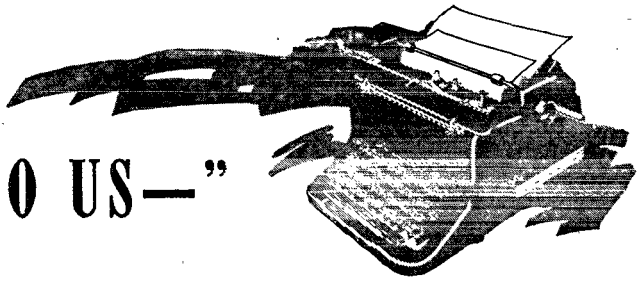
"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

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.

**The Communications Manager, F. Edward Handy, W1BDI, is on leave of absence.*

"IT SEEMS TO US—"



WHAT ARE *YOU* DOING?

THE Assistant Secretary of the Navy said, in late September:

"We are still losing this war, and we should damn well understand it! It will take all we've got to win. What are *you* going to do about it?"

The men in uniform know what they're going to do about it. He was talking to those of us who are still at home. Supposing you're in that category, here are some of the things that you can and ought to be doing:

Turn in your scrap, particularly the copper and other non-ferrous stuff which we amateurs accumulate more than most people. And particularly your copper. If we win the war, you can easily replace it. If we don't win, you'll never need it.

Keep your amateur operator license going and file application for the renewal or modification of your station license as may be necessary. There will be many reasons why you'll be glad you did, and in particular you can never tell when you'll be required to prove your operating ability.

Register with FCC the amateur transmitters in your possession, to help guard against the possibility of radio apparatus finding its way into the hands of our enemies. Help the wives and mothers of absent amateurs to make proper registration.

Join the ARRL Emergency Corps. Get in on the War Emergency Radio Service work in your community on behalf of the ARP communication needs of civilian defense. Lend them your u.h.f. apparatus. Accept an operating assignment. Help teach other local men and women to become WERS operators to protect your community.

Sell the government your factory-built transmitter and receiver, by registering them for sale with the ARRL Apparatus Bureau. Buy bonds with the proceeds.

Lend or sell your oscilloscopes and testing and measuring apparatus to a training school in your vicinity which needs them for the instruction of radio mechanics and operators.

If you are in position to shift your civil occupation to something more important in radio, register with the ARRL Personnel Bureau and let us put you in touch with someone who needs your services badly.

If you're qualified to teach theory or code, take a job as a teacher in one of the evening courses near you. They're starving for instructors.

Keep alert to use your radio knowledge. Listen in when you can. Learn to identify, and not become excited over, friendly tactical communication. When you spot something fishy, report it at once to the nearest FCC monitoring station. If you're near the coast, don't neglect the u.h.f. If what you spot is phony people rather than phony signals, report them to FBI instead of FCC.

Help keep your local club going, as your only medium for accomplishing things jointly and for fraternal contacts — until we get this war won. Help in its code classes.

Keep yourself informed on what's going on in the amateur radio world. Know your duties as an amateur. Keep up your code speed. Study to remedy your deficiencies in theory. Prepare to give a good account of yourself in whatever may lie ahead.

Whatever your job, give it your very best.

K. B. W.

SYNTHETIC GENIUS & THE AMATEUR

IN THE February, 1942, issue of the *General Electric Review* there appeared a column's length of comment under the heading "Design Engineering" that got stuck in our mental craw. We have thought about it many times since, for it seems to offer a useful explanation of the accomplishments of the amateur fraternity.

The point of the piece, which appears in a review of progress in engineering knowledge in 1941, is the conception of a "synthetic genius," the term chosen to represent the collaboration of a number of individuals, each talented in certain spheres, in research development. This conception is based on the thesis that some fifteen distinct faculties are required to make up one complete engineering genius. There are probably only eight or nine persons among the entire U. S. population who possess all these qualities in high degree. These faculties include specific knowledge, general knowledge, con-

structive discontent, originality of vision, courage, analytical ability, ability to synthesize, common sense, enthusiasm, persuasiveness, perserverance (determination to overcome obstacles), energy, initiative, sense of humor and coöperativeness.

The odds against any one man possessing all these qualities in high degree (ranking with the top third of the group) are so great that only three such men may be expected to exist in a group of fifty million. But if fifteen men, each possessing just one of these qualities, are combined into a team, there will be material for a million composite "geniuses" in the group. Or, if three men, each outstanding in at least five qualities, are selected there will be available among the fifty million enough teams to provide 200,000 synthetic combinations probably capable of doing exceptional development work.

The *Review's* point is that much industrial progress in the U. S. has been the result of close coöperation on the part of many talented individuals in this fashion. "Instead of waiting for the chance occurrence of some new Edison to pioneer a new invention or industry, the American plan is to gather a group of specialists, each having some essential knowledge or ability, and to so guide their united efforts that they function effectively as a single collective genius. It is by this device that American industry has pioneered so many great achievements, and can so well adapt itself to the changing requirements of the hour."

We see an additional point that may be made. It relates to the process of selecting the individuals who are used in the making of these composite geniuses. If there were but one field in which development was required the process would be an easy one. But in the modern age there are hundreds of separate fields, each clamoring for investigation, and necessarily many suffer in the competition even for creative teams. The field which comes out best in this competition logically is the one which has initially attracted to it through personal interest the largest selection of potential "upper-third" minds.

And that, we submit, is a logical explanation for the thoroughness and extent of America's research performance in the radio field. Because so many alert and intelligent youngsters have been attracted to the radio profession through their practice of amateur radio, it is inevitable that the engineering talent in the field must assay very high in the proportion of genius — both collective and individual, but especially collective.

If this point needed proof, it was never better provided than by the highly-organized research work in radio and electronics now being done under war stimulus. Necessarily staffed largely by hams or equivalent self-taught enthusiasts, simply because there are not enough available men with formal academic background to go around, these research groups daily collectively cover ground which would have occupied a Sir Oliver Lodge or even a Steinmetz or Edison an entire lifetime. Other fields than radio, too, are deriving wartime benefit from the amateurs they have attracted — optics, photography, aviation.

Our leaders might well write down the moral for future reference: The most fertile source of "synthetic genius" a science or art may have lies in the amateur devotees it sponsors.

C. B. D.

★ SPLATTER ★

OUR COVER

PLENTY of our soldier-hams will henceforth be found doing as W9JGL is on this month's cover — listening to one of the Army's latest gadgets, the "handie-talkie," little brother of the walkie-talkie.

Incidentally, W9JGL, one of the Chicago 10-meter gang, now a 1st lieutenant in the Signal Corps at Fort Monmouth, had plenty of experience with the business end of b.c. mikes (as a WGN announcer) as well as the ham and military variety before going into the service.

•••—

FOOTNOTES

AMONG our contributors this month we are privileged to number **Philip Rand, W1DBM,** whose career as a Remington-Rand executive has not hampered his outstanding work in the radio field, first as a pioneering explorer of 28 and 56 Mc. and currently as an active advocate of civilian-defense communications who practices more than he preaches. Our other WERS contributor, **T. G. Hieronymus, W9BLS,** is an old-timer whose radio career dates back to 1909. In World War I he wrecked the local radio club by coercing most of its membership into a National Guard signal company, taking them to the Mexican border in 1916 and to France with the AEF (Rainbow Division) in 1917. In World War II, as president of the Heart of America Radio Club, he has been doing his fighting on the home front — training beginners and plugging civilian-defense communications. The poetic contribution from Sgt. **Richard Becker, W8CSE,** actually came via V•••— Mail from "Somewhere in Australia," by the way, and he postscripts:

(Continued on page 110)

The Navy Trains Radio Technicians

Radio Hams Prepare to Learn a Fascinating New Art

THIS is the story of a radio technician. He's one of the lads who, sooner or later, will be found out in the front lines — the first line, in fact, of America's defense. On the front line of battle — and on the front line of science, too. For his job it is to run one of the important new scientific developments that in the end will win the war.

Not that we're going to be able to tell you just what he does, of course. That's a deep dark secret — and we'd better all pray, fervently, that it remains so. Even he himself doesn't know, in all probability — yet. His present job is to train himself to the point where he will be fit to find out.

For he is a student at one of the Navy's primary EE and RM training schools.

There are seven of these schools scattered around the nation. There's one at Grove City College in Pennsylvania and another at Utah State Agricultural College, Logan, Utah. There are two in Texas — one at the University of Houston and another at A & M College of Texas. Oklahoma A & M College at Stillwater has one, too, and the Bliss Electrical School at Takoma Park, Maryland, is now devoted entirely to this training.

Then there's the school at 190 North State Street in Chicago — except that instead of being last on the list it should have been first, since it was the first to start instruction and its commanding officer, Lt. (jg) William C. Eddy, USN (Ret.), did a great deal of the work in setting up the curriculum for the uniform course taught at all the schools.

Which of these schools does our hero attend? Any — and all. All you have to do is to look for a fellow with a trim white uniform, a collection of books and papers under his arm and a look of concentrated absorption on his face. It won't be hard to find him, either — there are hundreds of him at each of these seven schools, and hundreds more coming and going every thirty days or so.

Let's hear from some of his buddies speaking from the campus of the Utah State Agricultural College at Logan, Utah:

"The Battle of Logan"

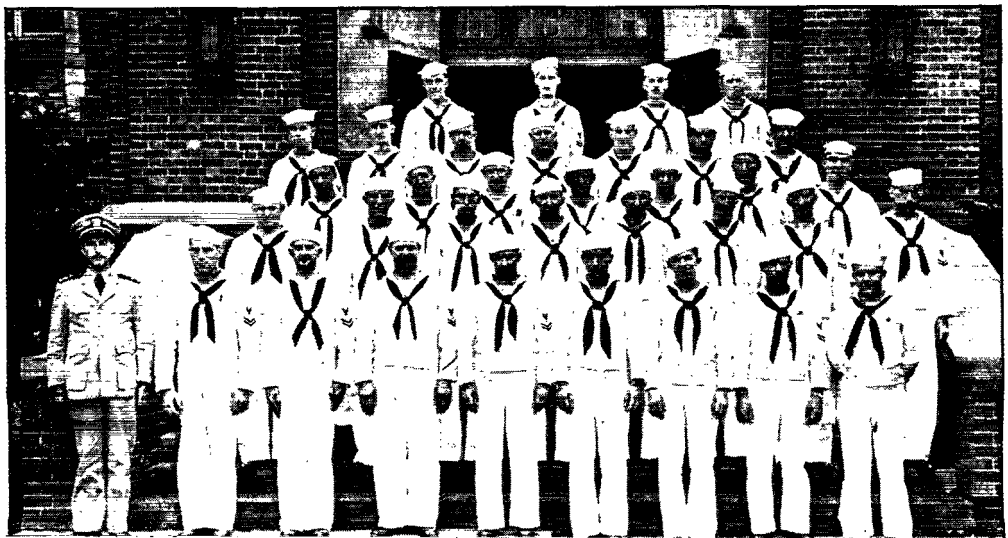
"In a sparkling green valley tucked between the mountains of Northeastern Utah, far from the whine of planes and the roar of guns, several hundred sailors and marines are, as they call it, fighting the Battle of Logan.

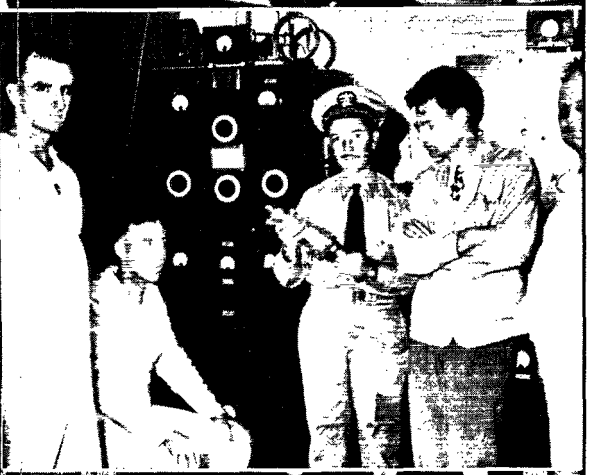
"The Battle of Logan? You've never heard of it? Well, probably not. It isn't heralded in the press or broadcast to the firesides. It is, however, far more important than the average American will realize for some time to come.

"Who are these sailors and marines? Where are they from and what are they doing?

"Most of them held ham radio licenses or were engaged in radio repair service in their respective home towns. Towns that ranged from the East Coast of New England to the West Coast of California, from the plantations of Louisiana to the rolling prairies of the Dakotas.

Hams in the current Navy RT class at Grove City College: First row, l. to r.: Lt. Comdr. W. F. Grogan, USNR, ex-W4QY, Commanding Officer; W3FGA-W3HYL; W8PGM; W8TTK; W3DYM; W2LWS; W8QZO; W2NPH; W8VYM. Second row; W8SC; W3JMO-W3JWL; W1ELR; W1EQG; W2AFM; W3JIX; W1EII; W1DZB. Third row: W2OOU-W3IAY; W1LTR; W8OST; W8OTO; W3GYY; W1JTG; W1NCQ. Fourth row: W3EJA; W3HHY; W8LWV; W8NNW-W8SAA; W3CTS; W3GCI; W8KWA. Fifth row: W7HKW — ex-W2IDO; W8VZK; W3IQO-ex-AD47; W2HEO — ex-W1AZK.





"Swapping white collars and workshirts for the blues of the U. S. Navy and the forest-green of the Marine Corps, these fellows are taking advantage of the chance of a lifetime, learning more about u.h.f. than they ever would have learned elsewhere — and with all expenses paid, plus a salary.

"At present the Battle of Logan has its campaign of action raging at the Utah State Agricultural College, Logan, Utah, where the men, under the command of Lt. (jg) Carlos J. Badger, USN (Ret.), are undergoing an intensive 12-week course including mathematics, electricity and radio. There one may hear the peculiarities of the fundamental laws set forth by Ohm and Kirkchoff thoroughly cussed and discussed by a dark, drawling, softspoken former cattleman from Louisiana and a blue-eyed ex-highway patrolman from Iowa.

"An ex-newspaper reporter finds that learning the 'five Ws' of the u.h.f. presents several new angles. Those who are fortunate enough to be hams and are more or less familiar with the work — well, they begrudge even taking time out to eat.

"Available to the men for their work are the well-equipped laboratories of the College, containing more than $250,000 worth of equipment for use in radio experiments.

"During the intensive 12-week course, each man will build a u.h.f. superhet. Another important phase of the course includes thorough drilling in the fundamentals of a.c., d.c. and resonant circuits, motors and generators. Such a background is necessarily required before the men are qualified for advanced training in the operation and maintenance of the u.h.f. gear which is so vital to the Navy.

"Most of the hams attending the school are Navy men. The Navy offers men with ham and repair-work experience the opportunity to learn the secrets of u.h.f. work which will be doubly use-

Veteran or neophyte, all primary EE and RM students are taught radio principles and practice from the ground up — and learn a lot about fundamentals they passed up in earlier training. These photos show Grove City students in typical lab sessions. *Top* — Making a study of the factors affecting the performance of a Class-A resistance-coupled amplifier. Front, D. F. Burdett; rear, R. Spencer, ex-W2DEG. *Second from top* — Lt. Comdr. W. F. Grogan, ex-W4QY, explaining the construction of one of the "bottles" from the 1-kw. ham transmitter. The 100-watt college transmitter is visible at the right. L. to r.: R. W. Somers, RT2c, W3HHY; Lt. Comdr. W. F. Grogan; T. S. Austin, W8HUJ, and R. J. Parker, RT2c, W8NNW-W8SAA. *Second from bottom* — Obtaining data for saturation and magnetization curves of shunt and series wound generators. Note the terminals and meters visible in the background; these are on the main switchboard in the college electrical engineering laboratory. L. to r.: W8VJV; W2LOK; unidentified; T. S. Austin, W8HUJ, and G. M. Vrooman. *Bottom* — An experiment on tube characteristics, obtaining data for families of curves. Reading from l. to r.: W8KWA; W8LWV; W3IQO; W3JIX; W3JMO-W3JWL, and T. S. Austin, W8HUJ, instructor.

Shop work starts with bending sheet metal chassis, cutting holes, etc., carries on through construction of 5-tube superhet. *Top* — Students operate all types of machine tools in Bliss Electrical School's well-equipped machine shop. *Below* — Drilling, punching and soldering chassis in Grove City's third-month radio lab. L. to r.: W. B. Stryker; A. M. Pontus, W3FCR; F. L. Pratt, and P. H. M. Tippin.

ful to these men when they return to civilian life. The training alone which they are now receiving would be prohibitive in cost to them as civilians.

"In addition to this training the Navy offers men ratings that mean the equivalent of $200 or more per month in civilian life. All that the Navy asks in return for this training is the willingness and coöperation of the men.

"So once again this little Mormon Valley awakens to the same fighting spirit that was exemplified by their own pioneer ancestors, as the Battle of Logan rages on!"

Those were the words of Marine Corps Pvt. D. E. Giersdorff and RM2c F. M. Viles.

They could as well have been speaking from the sultry plains of Texas or the noisy bustle of Chicago's Loop or even the Nation's capital; the words might have been different, but the thought would be the same.

For, apart from the external details of structures and climate and topography, the spirit and training at each of these schools is very much the same. And geography doesn't seem so important in the mind of a fellow who may — and probably will — find himself serving on the seven seas, on coral strand or frozen reef, in the air and along the shores and on the sea.

At the Corner of State and Lake

Suppose you were talking with a student from 190 North State Street, Chicago. "Odd sort of name for a school," you'd say. How did it get that name? Well, here's the story.

You've probably heard of Lt. (jg) William C. Eddy, USN (Ret.). There was a *Saturday Evening Post* piece about him some months ago — one of those yarns featuring extraordinary combinations of American genius and success. Lt. Eddy is the former submarine commander who, upon retirement from active duty, promptly began one of

Through classroom, lab and shop the Navy's radio technicians get a thorough grounding in basic electrical principles, as well as radio, u.h.f., cathode-ray tubes and all the rest. *Left* — Measuring the characteristic impedance of a telephone line at Grove City. Front (hand on dial) W8KWA; standing, Instructor Smock, chief operator WSAJ, owned and operated by the College; center, two Marine privates; right, W3GCI. *Center* — Typical classroom scene at the 190 N. State St. school. At left in the laboratory are Instructors William Kunz, W8SNS, and Stanley Osterlund, W9TJL, inspecting a 20-inch Cathode-Ray Oscillograph, one of the three now in existence in the country. At right, A. H. Brolly, ex-W6RG, chief instructor lecturing from a drawing of a triode crystal oscillator and the E_g-I_p curve of a triode tube. *Right* — For fifty years Bliss students learned about electricity in this testing lab, now used exclusively in teaching Uncle Sam's sailors. Completely equipped for all types of power and physical measurements, his work here equips the student to handle testing and measurement problems.

the most amazing inventive careers on record. The tale of that career is far too long even to hint at here; let it suffice to say that a couple of years ago Lt. Eddy left NBC and took a job as television director of Balaban and Katz, operators of television station W9XBK — which is located in the State-Lake building in downtown Chicago. That W9XBK, wholly staffed by hams and built much like a ham rig, quickly forged into the forefront of television research is now certainly no secret.

When the war came along B & K — as symbolized in the person of Lt. Eddy — found there was a job to be done. The Navy needed trained men for the operation and maintenance of its special equipment. So they turned over to the Navy a substantial part of the space devoted to their television laboratories in the State-Lake building at 190 North State Street — whence came the name of the school. Lt. Eddy participated in the work of preparing the curriculum to be specified by the Bureau of Naval Personnel for this and subsequent Radio Materiel schools. They devised a standard examination designed to disclose the qualifications of men seeking enlistment in the new branch.

And along about the first of this year the school got going — although it wasn't until May that the Navy made public announcement of the fact.

Now men from all over the country and from every walk of life, ranging in age from 17 to 50, assemble daily on the top floor at 190 North State Street.

The school utilizes a wing of the television station, including three large classrooms with the necessary secondary study halls, a reception room and the administrative offices. Roosevelt Hall, the laboratory section, is equipped with something like half a million dollars worth of u.h.f. transmitters, antennas, c.r. oscilloscopes, oscillators and other special equipment. Washington Hall, with its lecture rooms, is equipped to handle the non-technical subjects such as mathematics and radio theory.

There the V-6 reservists go for twelve weeks of intensified training. Those who make the grade go on to receive advanced instruction.

At Grove City

The Naval Training School at Grove City College, Grove City, Pa., was the first of its kind to be organized in the East.

Authorization for that school was given in early February, 1942, when the second semester of the regular college course was already under way. To it as commanding officer was assigned Lt.-Commander William F. Grogan, ex-W4QY, one of the orginal staff at Noroton (see August *QST*).

In less than one month, with the unstinted aid of Dr. Weir C. Ketler, president of the college, and Russell P. Smith, educational director, the training program was organized and under way. It was the Noroton story over again; in that brief time it was necessary to vacate a dormitory to provide barracks for the students, organize an instructional staff and equip laboratories and classrooms.

On March 1st the first hundred RT2c reservists started training; by May 1st the full complement had arrived. On this same day a Marine training detachment was authorized, and from then on the

Students work in groups during lab and shop sessions. *Left* — a Grove City group making measurements on an amplifier. L. to r., back row: W8LWV; Marine Pvt. Merriam; W8HUJ, instructor. Front row: Marine Pvt. Mazzeo; W3JMO-W3JWL. *Right* — Atop the Balaban & Katz building in Chicago a group of 190 N. State St. students investigate performance of equipment in frigid February weather.

school was jointly occupied by a mixed group of marine privates and naval personnel.

Apart from the major business of training, each of the Navy's primary schools has its own special attractions. Grove City is no exception. The college gymnasium and athletic field are available to the enlisted men of the school, and various forms of athletics — tennis, basketball, swimming, horseshoes, softball — are available under the direction of a Chief Specialist of the Navy. Wolf Creek, which separates the college into an upper and a lower campus, is dammed, affording an ideal skating pond in winter.

No more hen-scratched circuit diagrams — the Navy wants the job done right! Drafting class at Bliss, where students learn time-saving methods for turning out neat, accurate mechanical drawings and schematics.

The college is located in the pleasant community of Grove City, whose six thousand inhabitants have warm feelings toward the uniformed men in their midst. Every Sunday the local community swimming pool is reserved for the men of the naval school. The local churches and homes welcome the sailors and marines. The local USO provides varied entertainment — dances, picnics, lounges, reading rooms and many other thoughtful aids to the maintenance of student morale in their few brief hours of relaxation.

And that's the way it is at all the schools. The circumstances may differ, but the pattern is the same. Our information on the Texas and Oklahoma schools is not first-hand — but we refer you to the letter from Oklahoma A & M naval station graduate RT2c George Bird, W5HGC, on page 78 of August *QST*; his report of the spirit there is sufficient evidence of the fact.

At the Nation's Capital

At venerated Bliss Electrical School over half of the initial class were hams or former hams.

The Bliss School was established in 1893, when electricity was just coming into widespread use and the first need arose for trained men to make installations and supervise operation and maintenance. Its founder, Louis Denton Bliss, who began his engineering career with the original Edison Company in the pioneer days of electric lighting, is still its president and active head.

There, in an atmosphere hallowed in electrical annals, the students live in comfortable dormitory bedrooms, usually two to a room, and make their daily treks over tree-shaded walks around the oval grounds between the various buildings, the dormitories and the dining hall.

One of the interesting features of the Bliss school is an 8-room frame house which each year was completely wired as a practical shop project by the current civilian class, now converted for use in special phases of the RT training.

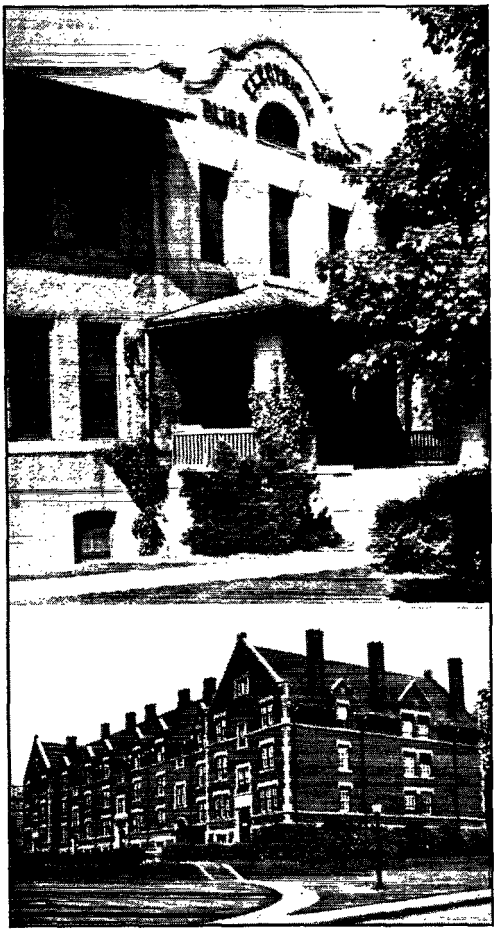
As usual, there is a liberal sprinkling of hams on the instruction staffs of most of these schools. For example, there is Lt.-Commander W. F. Grogan, the commanding officer of Grove City College. As W4QY he was an active ham for many years, having been SCM of Florida for about as many terms as there are fingers on your hand. Joining the NCR as a ham when it was first formed in 1925, he soon moved up to command of the Fort Myers unit. When the Noroton school was founded in the autumn of 1940 he was ordered to join the staff there, remaining until the end of last year. On December 22, 1941, he was transferred to Philadelphia as assistant District Communications Officer, and on February 8th he was ordered to take command at Grove City.

As another example, take the training staff at the 190 North State Street school. Among the instructors who are amateurs or ex-amateurs at this school are A. H. Brolly, chief instructor, ex-W6RG; William Kunz, W8SNS; Stanley Osterlund, W9TJL; William Kusack, W9QEE; H. E. Crow, RM2c, USNR, W9FHI; E. B. Hensley, RM2c, USNR, W9HUW; R. L. Martin, RM2c, USNR, W9CTQ; Richard Mueller, RT3c, USNR, ex-W9OHZ; and Alvah Rogers, RM2c, USNR, W9OZE.

A Look at a Radio Technician

Having seen where our radio technician lives and studies, let's look at the man himself a little more closely. Remember, of course, that he is a composite figure — resembling no one individual, but typical of all.

First of all, he's somewhere between 17 and 50 years of age. If he is 21 or over he's been given a rating as Radio Technician Second or Third Class,



Left — Main entrance to the Administration Building at Bliss Electrical School, near Washington, D. C. In this building are the general offices, reference library and reading room, lecture hall, drafting and conference rooms, machine shop and electrical testing laboratory. *Below* — Memorial Hall, one of the dormitory buildings at Grove City College, now used as barracks for the Naval and Marine personnel.

depending on his qualifications. He is probably — but not necessarily — a high-school graduate. He has, however, completed at least two years of high school mathematics; the more he knows about algebra, geometry and trigonometry, the easier the course will be for him. His knowledge of physics will be helpful, too — and of course he has a genuine, deep-seated interest in radio, with experience either as a ham or serviceman.

When he enlisted at his nearest navy recruiting station he was given a qualifying examination, consisting of elementary questions on mathematics, physics, shop practice, electricity and radio. After he passed that exam he was given the regular Naval Reserve physical examination.

When it was all over he found himself in the Navy. His pay — which with allowances runs as high as $130.50 per month — began the day he enlisted, and on top of that he was supplied with uniforms, food, quarters, medical and dental care, and of course with textbooks and training, all free of charge.

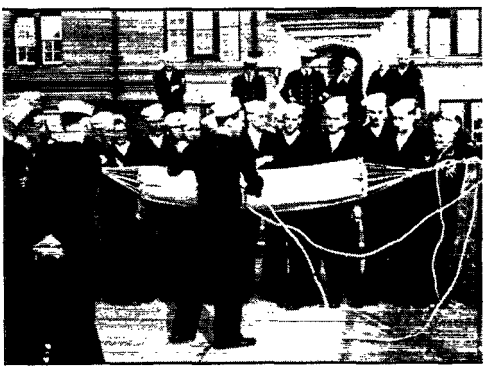
The first stage in his training began at the indoctrination station. There he learned the rudiments of Navy life — and quickly found and almost as quickly lost a bunch of new buddies. For in a very short while he was on his way again — this time to the primary training school to which he was assigned.

At the school he found some hundreds of other sailors or marines much like himself, divided up first into classes and then into sections. The sections, each consisting of some 30 or more men, are the basic instruction units. Each section has its own instructors — usually three — and goes through the course as a unit.

He found that he was required to put in a minimum of a 70- to 80-hour week, 7 days a week — half of the time being spent in class and shop, the remainder in supervised study. He found that he spent 4 hours of each day in lecture and 4 hours in the laboratory, the actual periods being two hours long minus a 10-minute rest period at the end of each hour.

He found, too, that it was to his own advantage to attend every period in an alert, receptive frame of mind, and to get in his outside studying faithfully, as well. For, because of the intensive nature of the three-month course, every step interlocks with the next and all study assignments are carefully chosen and coördinated. And when a subject is covered it's finished — there's no back tracking.

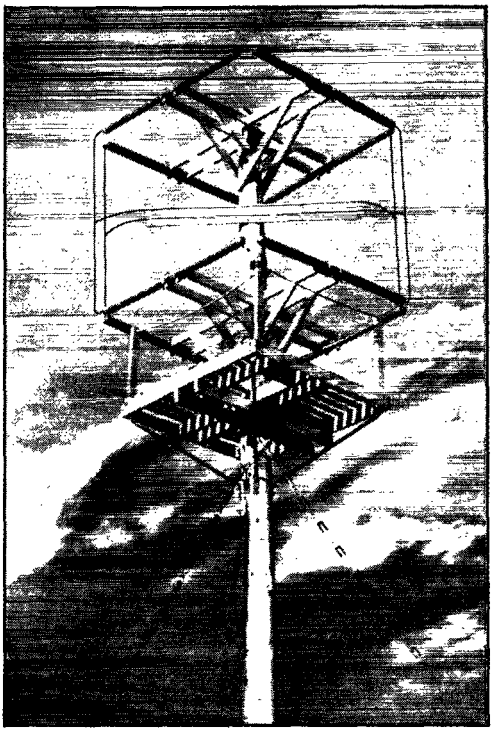
(Continued on page 116)



There's more to being a Navy radio technician than just learning radio, and the primary schools also teach Navy ideals and the Navy way of doing things. Here a Grove City group is being instructed in the correct method of lashing a hammock, preparatory to departure from the school. Included in the group are W8TJH, W1DSJ, ex-W2AMM and W2NJW.

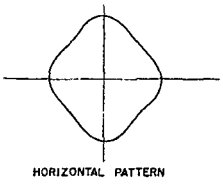
Technical Review

A Circular Antenna for U.H.F.



The cubical antenna for television broadcasting. The eight half-wave elements are arranged in two groups of four, each group forming a horizontal square.

ONE of the problems that keeps life from getting dull for the radio engineer is that of designing antenna systems suitable for u.h.f. broadcasting. What is wanted is a horizontally-polarized system which radiates equally well in all horizontal directions, has relatively little vertical radiation and at the same time is as simple as possible both mechanically and electrically.



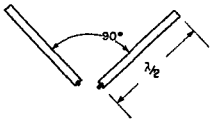
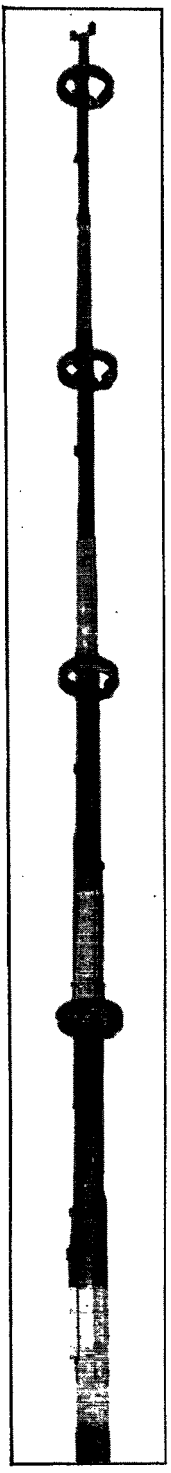


Fig. 1 — The 90-degree **V** antenna and pattern.

An interesting type of antenna which fulfills these requirements was described by M. W. Scheldorf of the General Electric Company in a paper presented at the I.R.E. Summer Convention. It might be called a "circular end-loaded folded dipole" were it not for the contradictions inherent in such a description. Designed for f.m. broadcasting, the antenna gives a substantially circular radiation pattern in the horizontal plane, is a simple mechanical structure (at least from the commercial viewpoint), and can be mounted without insulation on a grounded metal pole. The latter feature is of course highly desirable from the standpoint of lightning protection. Individual antennas can be stacked to form a multi-unit system giving an increase in field strength over a single unit. While its resonance characteristic is not broad enough for good television transmission it is amply broad for wide-band f.m. The resonant frequency of the antenna is readily adjustable after installation.

The final antenna design was a product of evolution, starting with the cubical antenna shown in the photograph. This antenna, the first one used for television broadcasting at the G. E. Helderberg station, consisted of two horizontal sets of four half-wave elements each, the elements of a set being arranged in the form of a square. Subsequent work showed that the same effect could be secured by replacing the square set of four elements by a pair of elements arranged in the form



A four-bay circular antenna system model. The bays are fed in pairs from two main transmission lines.

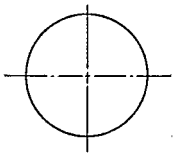
of a V having a 90-degree opening, as shown in Fig. 1. This gave the horizontal pattern also shown in Fig. 1; the shape could be controlled by altering the angle between the arms of the V, an angle smaller than 90 degrees giving an improvement over the pattern shown. However, the antenna was still bulky and the elements had to be insulated from the support.

The next step is shown in Fig. 2, where the antenna consists of two quarter-wave sections each bent in the form of a U having sides of equal length, the two sections being fitted together in the form of a square with two of the sides overlapping. This gives a circular radiation pattern, since the currents in the overlapping sections are in phase and the resultant "effective" current tends to be uniform around the square. This type of antenna also is obviously much smaller than the V or cubical arrangements. Because of the capacity between the adjacent sections of the antenna, the overlapping square antenna is practically the equivalent of a loop antenna having capacity loading, as shown in Fig. 3.[1]

The final system used is shown in Fig. 4. Because the radiation resistance of a circular antenna such as that shown in Fig. 3 is quite low, a second element was added to provide a step-up impedance transformation, using the principle of the folded dipole.[2] The effective length of the elements, including the loading of the end capacity C, is one-half wavelength overall.

[1] A. Alford and A. G. Kandoian, "Ultrahigh-Frequency Loop Antennas," *AIEE Transactions Supplement*, 1940.

[2] P. S. Carter, "Simple Television Antennas," *RCA Review*, October, 1939.



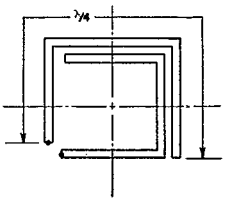
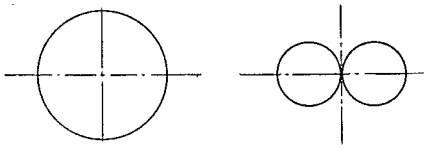


Fig. 2 — Overlapping square antenna.

The actual physical arrangement is shown in the close-up photograph. Point D, Fig. 4, is at ground potential and the antenna therefore can be mounted directly on a metal supporting pole at this point, without insulation. In the practical antenna the elements are made of steel pipe formed into a circle having a diameter of 33 inches, for a center frequency of about 46 Mc. This compares with a length of slightly over 10 feet for a half-wave dipole at the same frequency.

Fig. 5 shows the development of the antenna from the plain folded arrangement. In the top drawing, the current distribution is close to that characteristic of an ordinary half-wave antenna.



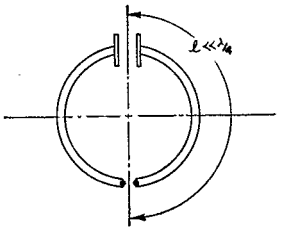


Fig. 3 — Simple loop antenna. To obtain a truly circular horizontal pattern the total length of the loop must be small enough in comparison to a half wavelength so that the current is substantially the same in all parts.

By adding end capacity, Stage 2, the current distribution is made more uniform because an appreciable current flows into the end capacitors. In the final stage the antenna system is formed into a circle with the end capacitors facing each other to form a condenser.

The relative diameters of the two elements A and B determine the magnitude of the impedance step-up. It has been found experimentally that a wide range of impedance change can be obtained. In the commercial design the terminal impedance is about 35 ohms, at resonance at 46 Mc., when the antenna is mounted on a 4-inch diameter steel pole. With poles of larger diameter the radiation resistance decreases because of out-of-phase currents induced in the surface of the pole.

Since the antenna is appreciably smaller than an ordinary dipole, some loss of signal strength is to be expected as compared to the latter. However, it turns out that this loss is only one decibel

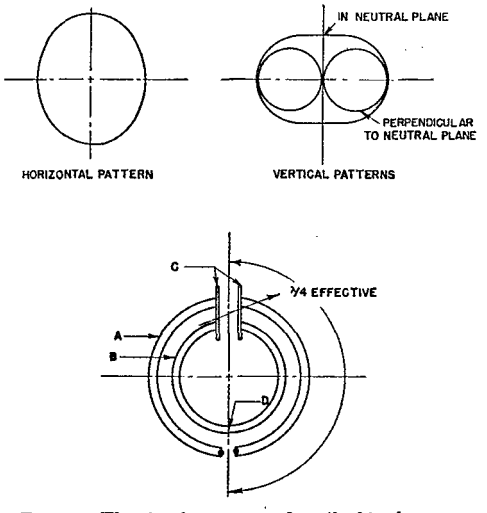
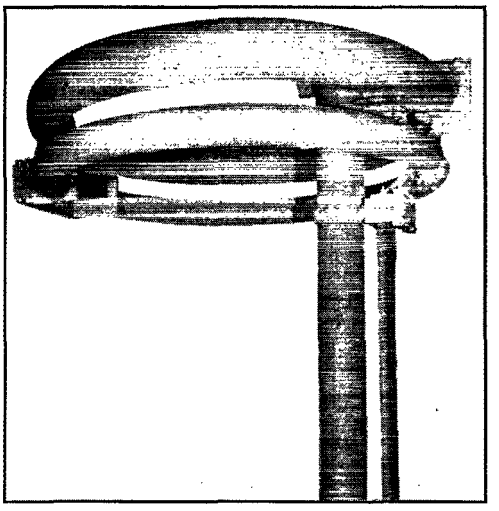


Fig. 4 — The circular antenna described in the text.

as compared to a vertical dipole (which also has a uniform horizontal pattern). The antennas can be stacked vertically to increase the field strength, and it has been found that optimum gain is obtained when the spacing between units is about one wavelength. The gain in decibels over a vertical half-wave antenna, as a function of number of antennas or "bays," is shown in Fig. 6. It can be seen that doubling the number of elements results in approximately 3 db. gain. This is to be expected in view of the fact that the mutual impedance between antenna units or bays has been determined experimentally to be very low, when the spacing is one wavelength, hence the bays act almost independently of one another.

A four-bay antenna for the f.m. broadcasting band is shown in the third photograph. Each bay



Circular antenna for the f.m. band. It gives a substantially circular horizontal pattern and does not need to be insulated from the supporting pole.

is provided with a quarter-wave matching section which matches the antenna terminal impedance to that of the concentric transmission line used. The matching sections are lengths of concentric line so constructed that the inner conductor and the spacing insulators both can be removed after installation. This makes it possible to vary the size of the inner conductor and also the number of spacing insulators used when it is desired to bring about an exact match. It has been found that the surge impedance and velocity of propa-

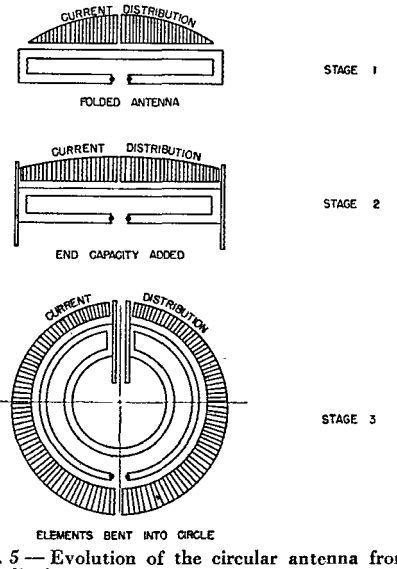


Fig. 5 — Evolution of the circular antenna from a folded dipole.

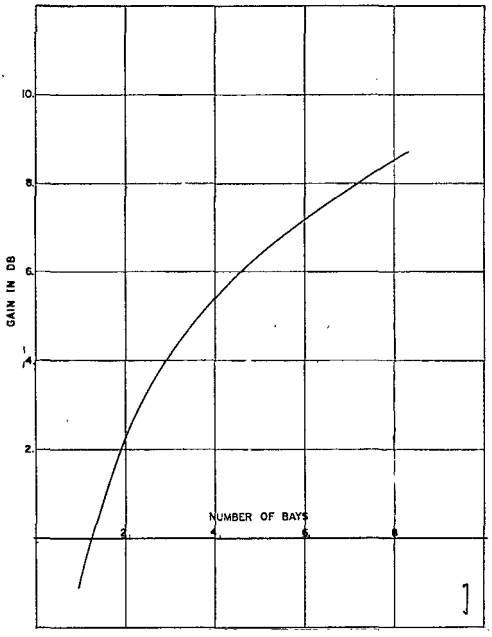


Fig. 6 — Gain of circular antenna over a vertical half-wave dipole. Bay spacing is 1 wavelength.

gation in the line are both inverse functions of the square root of the average dielectric constant, regardless of the shape of the insulators used. This relationship makes it possible to predetermine the performance of the matching section.

— *G. G.*

Strays

Thoriated filaments are not suitable for use in certain types of tubes, especially those operating at very high plate voltages. If satisfactory life is to be obtained from the tungsten filaments used in these tubes, it is important that all traces of thorium be removed from the tungsten. Until recently, thorium could be detected only by chemical or mechanical means. In the former process, wire was dipped in several acid solutions and the residue examined for thorium content. The other method consisted of heating the wire and if it snapped very easily, it was considered to contain thorium.

In a new method, recently invented by Dr. N. C. Beese of Westinghouse, a sample of the wire is burned in an electric carbon arc while its spectrograph is examined. Two lines appear in the spectrum if the wire is pure tungsten, while four appear if it contains any thorium.

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Don't let your operator license expire!

★ BOOK REVIEW ★

The Radio Code Manual, by Arthur R. Nilson. Published by McGraw-Hill Book Co., New York City. 174 pages, 5½ × 7½; illustrated. Price, $2.00.

The name of Nilson on any book connected with preparation for license examinations commands respect, yet we cannot escape the feeling that Author Nilson's attempt at code-training literature shows an inexplicable lack of understanding of the principles now accepted as basic in modern methods of teaching the international version of Mr. Morse's code. The principal difficulty, as we see it, is the text lacks material on how to *learn* code, from its first chapter which says "Let us assume you know how it sounds . . ." to a final training section which says ". . . the (code) machine is very easy to copy once it becomes familiar to the ear . . . ," thereby intimating the student probably has not up to that time learned the correct formation of characters. As a matter of fact, the text gets off on what strikes us as the wrong foot almost at the start by stating, "The best way to learn the formation of the radio-code characters is to perform the operation of sending them to yourself on a code-practice set. . . ."

Despite this basic lack, the book has a good amount of material for practice and brief but helpful data on operating, such as "radiotelegraphing tricks of the trade." A section is included on code-practice apparatus. Twenty-six pages of question-and-answer material in connection with the restricted radiotelephone operator permit (which includes no code test) would seem to be out of place in a code manual. — *A. L. B.*

—···—

I took a tip from the b.c. stations and stored my tubes away in an upright position. If they are laid down, they should be turned often to eliminate filament sag. — *W2VP.*

—···—

When one of the fine wire brushes used for cleaning suede shoes is screwed to the work bench, it is just the thing for keeping the soldering-iron tip bright. Also, the small wood sandpaper paddles used for fingernails are swell for cleaning relay contacts. — *W8TSZ.*

—···—

The name of Jimmie Allen seems to be unusually popular among police radio operators. One of them will be found at each of the following stations: KADJ, Sacramento; WPDA, Tulare; KSCY, Yreka; KPDA, Alameda. — *W6BIL.*

—···—

A type of fertile earth which can produce poisonous plants has only recently been discovered. The poisonous substance is the metal selenium which is used extensively for photo-electric cells. Certain plants can absorb this metal and animals eating these plants have their hoofs drop off. This disease was reported by Marco Polo in Turkestan in 1295, although, of course, the cause was then unknown. — *Ohmite News.*

A Simple Transmitter-Receiver for War Emergency Work

An Easily-Constructed Station for 112 Mc.

BY PHILIP RAND,* W1DBM

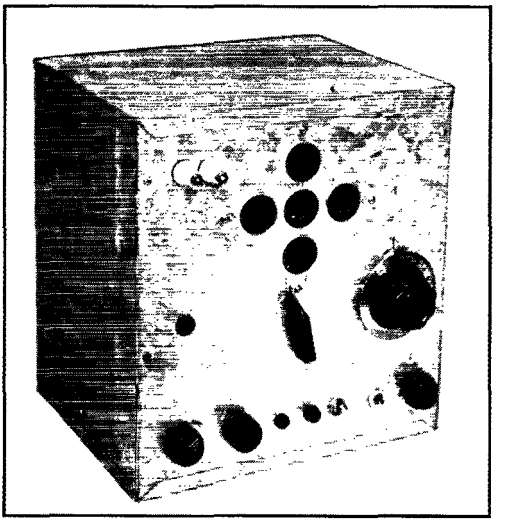
AMONG the decisions which must be made in the design of a portable station for WERS work is that of whether it shall be of the transceiver or the transmitter-receiver type. Arguments may be presented for either side. The case for the transceiver was logically presented by George Grammer in the October issue.[1] At the outset, the fact that the transceiver costs somewhat less and requires fewer hard-to-get parts cannot be disputed. However, when it is possible to obtain the needed material, these drawbacks are not always sufficient to offset features of the transmitter-receiver which many consider to be important. For instance, at a given setting of the tuning control of a transceiver, the transmitting and receiving frequencies are not exactly the same. The tendency of the operator, especially if he is inexperienced, is to retune his unit, when receiving, for maximum signal. This, of course, throws his transmitting frequency off, requiring further retuning by the station with which he is working. In this way, it is possible for a pair of operators to chase one another all over the band. The possibilities for confusion when a net of several stations is attempting to operate spot frequency can readily be visualized. With separate transmitter and receiver oscillating circuits, this difficulty is avoided. Another advantage of separate circuits is that the antenna coupling to each may be adjusted to optimum value. If a station is called upon to act as sub-control, there may be circumstances under which independent adjustment of transmitter and receiver frequencies becomes desirable.

Before launching into a description of the construction of the unit shown in the accompanying photographs, it might be well to consider the details of the circuit diagram shown in Fig. 1. For the most part, it is quite conventional, but it does contain certain features worth mentioning.

In the receiver section, a 6J5GT is used as a self-quenching superregenerative oscillator. R_9 is the regeneration control. With proper adjustment, this aids in reducing receiver radiation. A 6V6, with its plate and screen tied together to form a triode, is used in the transmitter. The circuit is a parallel-fed Colpitts with the plate-cathode and grid-cathode capacities furnishing the voltage division.

* 10 Wesleyan Place, Middletown, Conn.

[1] Grammer, "A Transceiver for WERS," *QST* October, 1942, page 11.



The completed unit in its sheet-iron case. The dial is the receiver tuning control. The transmit-receive switch is at the center below the speaker opening. The adjusting hole for transmitter tuning may be seen at the left. Along the bottom, from left to right, are microphone gain control, receiver audio gain control, headphone pin jacks (which may be used to replace the open-circuit jack, J_2, in Fig. 1 if desired), headphones-speaker switch, microphone jack and regeneration control. Output terminals are in the upper left-hand corner.

The audio section consists of a 6J5 speech-amplifier stage, resistance coupled to a Class-A 6L6 modulator. This section may be switched to act either as speech amplifier and modulator for the transmitter or as a resistance-coupled amplifier for the superregen detector in the receiver when its output is coupled to a p.m. speaker. Most transceivers require a different setting of audio gain for correct audio levels for both transmitting and receiving. It has been our experience that about ten per cent of the transmissions had to be repeated because the operator forgot to advance the volume control when shifting to the transmitting position. Therefore, it was considered highly important to incorporate separate transmitting (R_3) and receiving (R_4) audio gain controls.

Since a microphone transformer of the usual type was absolutely unobtainable, we were stumped until we discovered that an ordinary bell-ringing transformer made a very satisfactory substitute. For modulation purposes, the primary of the output transformer is connected as an autotransformer with a one-to-one ratio. In this manner, the d.c. plate currents for the modulator and oscillator flow through separate sections of the primary winding and in such directions as to buck in core-magnetizing effects, thereby increasing the effective inductance of the primary winding.

Headphone signal is coupled off the primary of T_2 through the condenser C_{14}. We found it important to have provision for switching from headphones to speaker. If there are other people talking in the room where the unit is operated, the speaker volume must be turned up to override this noise, thereby adding to the confusion. However, a speaker is important, since one cannot

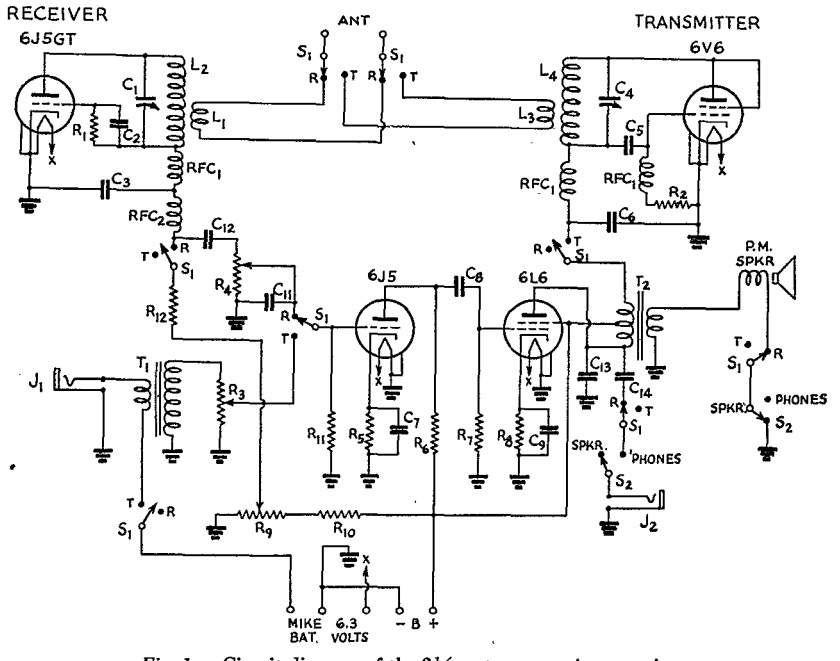


Fig. 1 — Circuit diagram of the 2½-meter transmitter-receiver.

C_1 — 2-plate midget variable condenser (Hammarlund MCM type)
C_2 — 50-$\mu\mu$fd. midget mica.
C_3 — 0.01-μfd., 600-volt paper.
C_4 — 5-plate midget variable condenser, air-trimmer type, approximately 20 $\mu\mu$fd.
C_5 — 50-$\mu\mu$fd. midget mica.
C_6 — 0.001-μfd. midget mica.
C_7 — 10-μfd., 25-volt electrolytic.
C_8 — 0.01-μfd., 600-volt paper.
C_9 — 10-μfd., 25-volt electrolytic.
C_{10} — 0.01-μfd., 600-volt paper.
C_{11} — 100-$\mu\mu$fd. mica.
C_{12} — 0.01-μfd., 600-volt paper.
C_{13} — 0.001-μfd., 600-volt paper.
C_{14} — 0.01-μfd., 600-volt paper.
R_1 — 5 megohms, ½-watt.
R_2 — 15,000 ohms, ½-watt.
R_3 — ½-megohm potentiometer.
R_4 — ½-megohm potentiometer.
R_5 — 1500 ohms, ½-watt.
R_6 — 50,000 ohms, 1-watt.
R_7 — 100,000 ohms, ½-watt.
R_8 — 500 ohms, 1-watt.
R_9 — 50,000-ohm potentiometer.
R_{10} — 50,000 ohms, 1-watt.
R_{11} — ¼-megohm, ½-watt.
R_{12} — 25,000 ohms, 1-watt.
RFC_1 — U.h.f. r.f. choke (Ohmite Z-1).
RFC_2 — 80-mh. r.f. choke.
J_1 — Open-circuit mike jack.
J_2 — Open-circuit 'phone jack.
L_1 — 1 turn No. 14 wire, ½-inch diameter.
L_2 — 4 turns No. 14 wire, ½-inch diameter.
L_3 — 1 turn No. 14 wire, ½-inch diameter.
L_4 — 3 turns No. 14 wire, ½-inch diameter.
S_1 — Sections of 8-pole, 2-gang rotary switch (Centralab).
S_2 — Sections of d.p.d.t. toggle switch.
T_1 — Mike transformer (bell-ringing transformer).
T_2 — Universal output transformer.

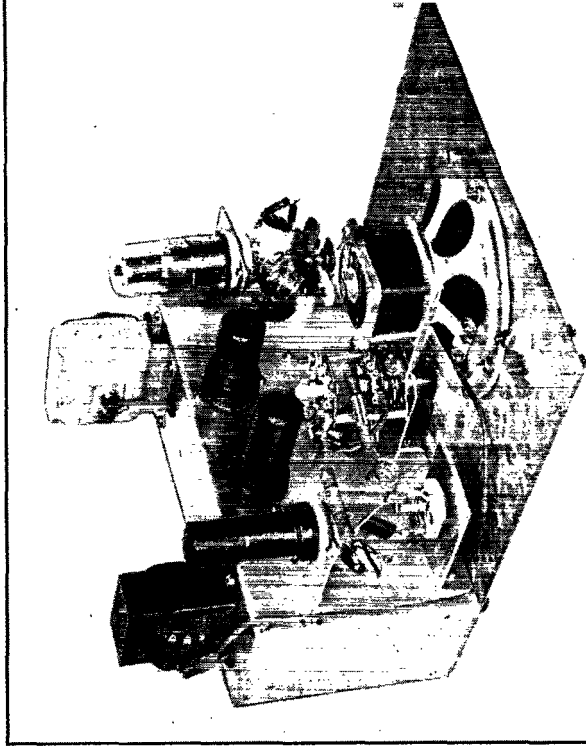
monitor a channel wearing headphones and still be free to walk around the room. Interchange between headphones and loudspeaker may be made through the double-pole double-throw toggle switch, S_2. An 8-pole dual-gang switch takes care of switching operations when transferring between receiving and transmitting. In the receiving position, the plate supply is connected to the detector, the audio input is shifted to the detector output, speaker and headphones connected to the output of the audio section, the mike battery and plate supply are disconnected from the transmitter and the antenna is shifted to the receiver. In the transmitting position, the plate supply is disconnected from the detector, the audio input shifted to the output of the mike transformer, speaker and headphones disconnected from the audio output, mike battery and plate supply connected to the transmitter and the antenna shifted to the transmitter.

Some may feel that there are too many sections on the switch. However, we believe they are justified by the ease of operation, especially for an inexperienced operator who doesn't have to remember that he has three or four switches to throw back and forth. When more than one switch is used, one will be forgotten a certain percentage of the time, necessitating repetitions.

Most of the constructional details will be clear from the photographs. A chassis 10 inches long, 5 inches wide and 3 inches deep forms the foundation for the unit. Since a new chassis of suitable size was not available, a used one was salvaged for the purpose. This accounts for the empty socket holes in the top of the chassis. These holes came in handy, however, for feeding leads through between the top and bottom of the chassis.

The receiver components are grouped closely at one end of the chassis, while those for the transmitter are similarly grouped at the other end. The 6J5GT detector tube is mounted horizontally by means of a metal bracket in which the ceramic socket is set. The receiver tuning condenser, C_1, is mounted on a small stand-off insulator to space it from the chassis and to bring its terminals up close to the plate and grid prongs of the detector socket. The detector inductance, L_2, is soldered directly across the terminals of C_1, while the grid leak and condenser are connected between the rotor of C_1 and the grid terminal of the detector socket. A ceramic flexible coupling is used between the shaft of the condenser and the tuning dial. The dial shaft is passed through a rubber grommet set in the panel.

At the other end of the chassis, the 6V6 is also mounted horizontally by setting the socket in a vertical metal bracket. A similar bracket serves to hold the transmitter tuning condenser, C_4. This condenser is adjusted by screwdriver through a hole in the front panel. This type of control eliminates the possibility of throwing the transmitter frequency off by accidentally bumping a dial.



Plan view of the 2½-meter transmitter-receiver. The transmitter section is in the foreground, while the receiver section is at the other end of the chassis. This photograph was made before the output terminals were connected to the switch.

Short-circuiting of the plate supply while adjusting the condenser is prevented by lining the adjusting hole with a rubber grommet. As in the receiver, the coil L_4 is soldered directly across the condenser terminals.

At the center of the chassis are the submounted sockets for the two audio tubes and the changeover switch. The latter is mounted on a bracket fastened to the chassis. The microphone transformer, T_1, and the output transformer, T_2, are mounted off the rear edge of the chassis.

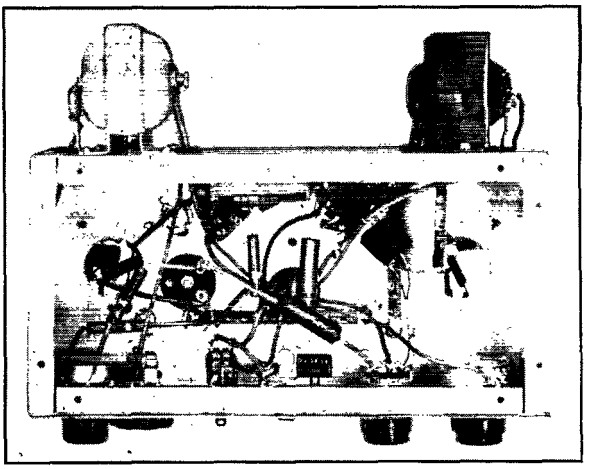
The panel is made from ordinary galvanized sheet iron. There is room on the panel for a five-inch permanent-magnet speaker. Large holes are cut in the speaker area as grille work. These holes are backed up with dust-proof cloth fastened under the rim of the speaker. A pair of feed-through insulators serve as output terminals.

The case for the unit is also made from galvanized sheet iron. The sides and back are made from a single piece bent into U shape with flanges at the front edges to which the panel may be fastened with machine screws. The top and bottom are identical with edges bent to overlap the sides, back and panel. If desired, the case may be dressed up by giving it a coat of "metal" preparer followed by a coat or two of enamel or Duco. Another possibility is to have it sprayed at a garage or automobile-body works before mounting parts on the panel.

The unit is designed to operate from either an

a.c. or battery-operated pack or from a combination pack delivering 300 to 350 volts at 100 ma., such as described in *QST* for January, 1942. Unloaded, the transmitter oscillator should draw but a few milliamperes. When loaded, the plate current should rise to 50 or 60 ma. The value may be adjusted within certain limits by altering the value of grid-leak resistance, higher resistance values resulting in lower plate current. The audio section should draw an average of about 50 ma. Normal power output should be about two watts.

In normal operation, only the one central control, the send-receive switch, need be touched after the transmitter has been put on frequency, the receiver tuned to the desired channel and the gain controls set to proper levels. Occasionally, the regeneration control may have to be touched when receiving signals of different strength. This control should be kept at as low a point as possible both for weak-signal sensitivity and for minimum receiver radiation.



Bottom view of the 2½-meter transmitter-receiver.

Strays

The War Department announces arrangements with the communications companies for handling fixed-text messages to members of our Expeditionary Forces at a greatly reduced rate. The notice contains the fixed texts for these EFM messages, each indicated by a number, in the usual manner of these things. We supposed there'd be one for "Best regards," so we first looked up 73, but we were to be disappointed: 73 means "Are you all right worried about you." In the closest approach we could find to it, the Army reverses the digits: 37 means "Greetings from us all." We thought of 88 but the numbers from 87 to 90 are blank. However, "Fondest love and kisses" are No. 44 — half-price to the men in uniform! Good news is conveyed by 101: "Have sent you . . . dollars"; and the bad news by 109, "Unable to send money." One a soldier won't like to receive is 99, which used to mean "Keep out" but now means "Please send *me* . . . dollars." But the one that gets our vote for something or other is No. 136: "Hearing your voice on the wireless gave me a wonderful thrill."

—•••—

Anyone who has ever done any radio service work is familiar with the complaint which begins, "Ever since you fixed my radio . . ." Al Winchell, W1AIY, reports that the advent of f.m. receivers has given this time-honored approach a new twist. During the summer DX season Al hardly dared to touch any f.m. jobs, as the customer was almost certain to call up within a few days and report that "Since you worked on my set I've been getting interference from Chicago and Milwaukee. It *never* bothered this way before!" — *W1HDQ.*

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Toward the end of a long list of applicants for a YL class in radio operating and theory, W3JMZ noted that the name of one applicant was Jones.

"It's funny, we haven't received a single Smith yet," he remarked.

"No," retorted the applicant. "You don't have a *single* Jones either." — *W3EVH.*

—•••—

Lt. Col. Claude H. Oliver, W6FPF, wagers that he is one of the oldest hams in active service. He is 62 years of age!

—•••—

Don't let your operator license expire!

CIRCULATION STATEMENT

PUBLISHER'S STATEMENT OF CIRCULATION AS GIVEN TO STANDARD RATE AND DATA SERVICE

This is to certify that the average circulation per issue of *QST* for the six months' period January 1st to and including June 30, 1942, was as follows:

Copies sold	42,892
Copies distributed free	624
Total	43,516

K. B. Warner, Business Manager
D. H. Houghton, Circulation Manager

Subscribed to and sworn before me on this 11th day of September, 1942
Alice V. Scanlan, Notary Public

Easy Lessons in Cryptanalysis: No. 5

BY JOHN HUNTOON,* WILVQ

"AHH, *mi amigo. Como está usted?*" Ed Wilson moved to slam the door on this obviously Anglo-Saxon countenance which spoke such a strange language, but boyish Jim Bremer got his foot in first.

"It's only me, Ed," he grinned.

"So now you add lousy English grammar to horrible Spanish! If your uncle wasn't principal I believe you'd never graduate. Downstairs and the dunce cap for you!"

"Okay, Mr. Legree," Jim said as they entered Ed's shack. "What's the menu this session?"

"Well, you remember the other night we talked about solving multialphabet substitution ciphers by what is called the Kasiski method? We searched for a common denominator of repeated sequences of letters in the hope of finding an interval or period which would indicate the length of the keyword used. Tonight I'm going to show you another method of attack which can be used in conjunction with or in place of the former."

"By the looks of all that paper you're taking out, it's going to be a lulu," Jim said in anticipation. "But then, you told me long ago that charts and tables were the principal weapons of the cryptanalyst, and I guess you weren't kidding."

"I wasn't. Now, in a keyword substitution system we notice, for example, that by enciphering the word **the** in Beaufort — which I trust you remember as the system with one standard alphabet against one reversed — using the key *WIN*, we'd get the cipher segment **DBJ**. If in a cipher text unknown to us prepared in such a manner, we assumed that **DBJ** represented **the** and worked backwards to determine what key would have produced it, we'd of course get *WIN*."

"Anybody can see that — even I! What're you getting at?"

"Take your time, m'boy," Ed cautioned. "Now, it is virtually impossible to write a message of any appreciable length without once or more using certain common words or trigraphs such as **the, and, for, ing, ion** and the like. If we have a strange cipher that we determine is Beaufort but cannot find any indication of an interval by the Kasiski method, we can assume that one of these common words or trigraphs has appeared in the message. We select one, try it in every possible position in the unknown cipher, and in each position we use our Beaufort sliding alphabets to determine what key would have been used to obtain such cipher segments for the assumed plain text word. Here, let me show you what I mean. Suppose we have the cipher text

VMEAM NJXZK EBHIM PNSOY YPNPX,

which we determine is in Beaufort but we can't be certain of an interval. We'll assume that the word **for** appears in it — actually it does in this case since my purpose is to show you the method of solution, but if that were not a true assumption we would have to try other words. We make a chart containing every possible three-letter consecutive sequence in the cipher text, write the test word **for** above each such segment, and determine what would be the keyword fragment necessary to produce each cipher segment. Like this —" In a few moments Ed had a sheet looking thus:

```
f o r  f o r  f o r  f o r  f o r  f o r  f o r
V M E  M E A  E A M  A M N  M N J  N J X  J X Z
A A V  R S R  J A D  F A E  R B A  S X O  O L Q

f o r  f o r  f o r  f o r  f o r  f o r  f o r
Z K E  K E B  E B H  B H I  H I M  I M P  M P N
E Y V  P S S  J P Y  G V Z  M W D  N A G  R D E

f o r  f o r  f o r  f o r  f o r  f o r  f o r
P N S  N S O  S O Y  O Y Y  Y Y P  Y P N  P N P
U B J  S G F  X C P  T M P  D M G  D D E  U B G
```

"I think I see the light," Jim offered. "Is what you're looking for some key sequence that appears to be good English and might be a fragment of the keyword?"

"Exactly. See any possibilities?"

"Heck, yes — there's *JAD, RBA, NAG, RDE, UBJ* and *DDE,*" Jim pointed out. "But now what do we do?"

Ed explained. "We'll select the one which looks most like it might be part of a word — *RDE.* Using it as a possible keyword fragment, we'll decipher each and every three-letter consecutive sequence of cipher text with it. Like this —" and another few minutes of pencil work on cross section paper netted this material:

```
R D E  R D E  R D E  R D E  R D E  R D E  R D E
V M E  M E A  E A M  A M N  M N J  N J X  J X Z
w r a  f z e  n d s  a r r  f q v  e u h  i g f

X Z K  Z K E  K E B  E B H  B H I  H I M  I M P
u e u  s t a  h s d  x n c  q w w  k v s  j r p

M P N  P N S  N S O  S O Y  O Y Y  Y Y P  Y P N
f o r  c q m  e i q  s p g  d f g  t f p  t o r

P N P  N P X
c q p  e o h
```

"Holy smokes!" Jim exclaimed. "I once knew a guy who engraved the Lord's Prayer on the head of a pin and I thought *he* was nuts! If any more people take up cryptanalysis there'll be a paper and lead shortage."

*Assistant Secretary, ARRL.

"Quiet, nipper. Now, if indeed *RDE* is a fragment of our keyword, in this test it should produce several three-letter sequences of what appears to be good English text, and they should all be at some common interval apart. See any?"

Jim wrinkled a youthful brow. "Sure — **nds, arr, igf, sta, for,** and **tor.** Assuming **for** is correct, **tor** is an interval of 6 behind it, **sta** ahead of it by an interval of . . . 6, oboy! And **nds** still another interval of 6 ahead! But no help from **arr** or **igf.**"

"Some of the test fragments will appear to be English, by chance, but I think the four you've found at 6-letter intervals are conclusive. So we'll write the text in rows of 6-letter length, like this, to see what we can see." Ed fed a sheet of paper into his mill, and typed:

—— *R D E* —
V M E A M N
n d s
J X Z K E B
s t a
H I M P N S
f o r
O Y Y P N P
t o r

"From here on in, it should be a cinch," Jim said. If our keyword assumption is correct there, the second letter of it must be a vowel . . . **a** looks good and gives us **o** for **M** so **onds** is probably **bonds.** It's all over but the shouting."

"Right. Of course, in these examples I chose the correct fragment for each of our assumptions. If they had led down a blind street, however, we'd have had to try another word and go through the entire process again. Let me point out something else, Jimmy. In military messages the cryptanalyst usually has a pretty good idea about certain words which probably appear in the unknown text — such as **division, command, attack, officer,** and the like. By trying such a longer word by the system we've learned tonight, a similar number of letters of the keyword will be discovered when a correct test word is assumed. If the test word is longer than the key length, the entire keyword will come to light, and begin repeating itself."

"But I suppose nobody uses this kind of cryptogram, either," Jim complained.

"Probably not. It's pretty vulnerable to an experienced man. But I repeat I'm just showing you the fundamentals. Perhaps next session we can get a little closer to an actual military cipher."

"Okay, *Señor Eduardo. Adiós, hasta la vista.*"

"And if you use that bum Spanish I won't even let you in the door next time. Don't forget your homework."

NMNIJ TNIEA ESUEN SVNRS DAEIE BSUGD RNRYT PEBTF JHOEH YOEUI WRIHW RDSAI MIAIG MROIS ROEAD RNMDR ANHSS AIS

BESKI VVEGU OKIIS XBEGZ JWAGB VNXCK ZITDE MMTSR KRIGV FSHLK OYEPS VXRTO LVZMZ YENXG WEDZN OLVAV AZSOS IQ

UCZWL FRAFI BVUIA SFCZT HOSGV VRAHV VIGBC UKGUW EUOHT BOTKF YOMKC AWQAC NSNFH RMOLM PHFAB MXYXA GJSVP HUWME OEETS PVIND GCVSL BOO

— *The Cryptogram*

CAVLM YIKYL SNKAA TCYHA E

PAVHA JHNWK QKMBB CMYHE P

Strays

Students of cryptanalysis will find an interesting code and an interesting solution in the Lord Peter Wimsey mystery, "Have His Carcase," which can be purchased in a 25-cent edition. — *Ex-K6RRA.*

—·—

Garage Mechanic: "What's the trouble, lady?"
Mrs. Newdriver: "They say I have a short circuit. Can you lengthen it while I wait, please?"

—·—

W9IEX, now a naval radio op, has the appropriate name of Sparks. — *W8VNN.*

—·—

Don't let your operator license expire!

—·—

From *Punch* of London via *Broadcasting*

"We teach them the three Rs—reading, writing and radiolocation."

A Code Machine Utilizing Wheatstone Tape

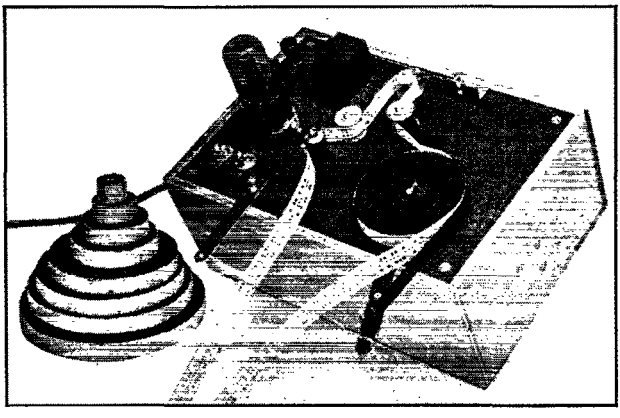
A Homemade Code Practice Device Constructed from Odds and Ends

BY GEORGE GRAMMER,* W1DF

Not long ago we were confronted with a problem — possibly not the kind that amateurs are likely to encounter frequently, but one which must have popped up here and there at least several times during the past few months. We had on hand a fairly ample stock of punched Wheatstone tape (old W1AW code-practice runs, as a matter of fact) and a group of code learners eager for practice — but no way to get the two together, since no "head" was available for translating the mysterious looking holes in the tape into intelligible code. The question, then, was to devise a workable substitute — from odds and ends — for a commercially-made mechanical device which could not be duplicated without machine-shop facilities. Of course, we did not expect to produce anything which would equal a commercial head in speed range or performance. For one thing, there was no need. The commercial job is inherently, if not primarily, a high-speed mechanism. The speeds which interested us were those below 20 words per minute, and we expected to be satisfied if we could get reasonably decent code at those speeds.

As most hams probably know, standard tape is not perforated in dots and dashes but is punched with round holes lined up laterally with a series of smaller center holes, the latter being evenly spaced and used in the tape-pulling process. Two large holes in line with a small center hole make a dot. One large hole on one side of the center and a second on the other side, opposite the next center hole, make a dash. This is shown in Fig. 1, borrowed from the booklet, "Learning the Radiotelegraph Code." This sort of thing does not lend itself very well to the reproducing system employed in most of the simpler code machines.

Providing the holes could be used to close some sort of electrical circuit, the problem of translating non-continuous holes into dashes was not very difficult. (In the commercial head pins go through the holes and operate electrical contacts which control a polarized relay arrangement to produce dots and dashes.) By using the holes on one side to close a holding relay circuit and the holes on the other side to open the circuit, the keyed circuit will stay closed during the entire time from the instant the "leading" hole permits contact to be made to the instant the "following" hole closes the circuit to the "break" relay. The electrical circuit is shown in Fig. 2, which also includes the power supply and motor connections incorporated in the final unit. The "make" relay, Ry_1, is double pole with normally-open contacts, one set of contacts being used to key the external tone circuit. Ry_2, the "break" relay, is single pole with normally closed contacts (back contact). The "make" and "break" switches indicated are the contactors operated by the tape. When the "make" contact closes it sends a current through Ry_1, causing its contacts to close. The lower pair short-circuits the "make" switch through the contacts of Ry_2, thus Ry_1 holds itself closed even though the "make" switch is opened (as it is, almost instantaneously, by the tape) until the contacts of Ry_2 are opened by an impulse from the "break" switch. To make a dot it is necessary to offset the "make" and "break" switches slightly so that the former is actuated by the hole in the tape on its side somewhat ahead of the "break" switch controlled by the holes on the other side. If this is not done both relays will be actuated practically simultaneously and the dots either will not be sent at all or will be very short. By regulating the offset between the



A general view of the code reproducer with a set of pulleys for various speeds. The plywood box is 9½ x 6½ x 3¾ inches.

* Technical Editor, *QST*.

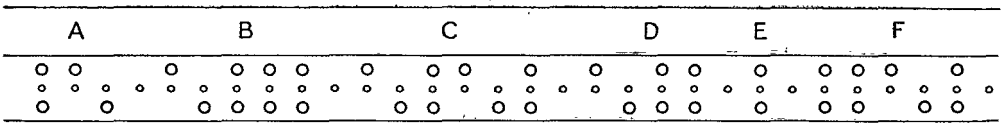


Fig. 1 — Wheatstone tape shown with the dots and dashes corresponding to hole punchings. In the actual tape the holes are much closer together, but are spread apart here to correspond with the dot-dash representation.

two contactors the dots and dashes can be made heavy or light at will, but the correct relationship between dot and dash length will be secured at only one setting.

Contactors

Getting suitable contactors to work through holes in the tape proved to be much more difficult than the circuit question. The only general method which appeared at all practicable without fairly elaborate workshop facilities was the use of some sort of "feeler" arrangement which would operate by dropping through a hole in the tape and thereby closing a contact, and then depending upon the thickness of the tape itself to open the contact when the hole passed by. The idea of making the electrical contact directly through the tape did not appeal to us, in view of the possible effects of sparking on the tape itself and on the contacts. It seemed much more reasonable to make the feeler operate external contacts by lever action, in which case suitable contacts could be taken from such things as old jacks, relays, etc. Several schemes of this type were tried without doing a great deal more than indicating that at least the basic idea was all right. We could get usable code for a while, but the wear on either the tape or the feelers, or both, was much too rapid. Brass feelers wore out rapidly under the friction of the paper, and in wearing developed sharp edges which cut the tape. Eventually we simply swiped the Instructograph idea practically intact, and it worked out so well that the machine has been operated for several months now with no feeler troubles except occasional misadjustment. The feeler is a steel cone, rounded off at the apex, mounted on a long, fairly soft, flat spring. It was made by filing the end of a 4-36 machine screw to the proper shape, cutting off the head, and fastening the screw with nuts in a hole in the spring. The spring, complete with contact, was taken from one of the telephone-type relays in the keying circuit, these having quite a few more contacts than we had use for. Two of these springs are needed, of course, one for "make" and the other for "break." They are screwed to the wooden block in the upper left corner of the unit (in the panel view) and spaced so that the feelers are just the width of the tape holes apart. The contact ends complete the circuit through contacts on old jack springs which are bolted to an L-shaped piece of brass. Although the photograph does not show the details very clearly, it should not be difficult to grasp the general idea. The positions of the fixed contacts are adjustable by means of screws pushing against them through threaded holes in the L mounting. The feeler springs can be moved up and down slightly and also lengthwise sufficiently to permit adjustment of the actual point of contact with the tape to give the desired "body" to the dots and dashes. This is made possible by using a slightly larger hole at the mounting end of the spring than the diameter of the screw which holds it to the wooden block.

Although the actual movement of the springs is only equal to the thickness of the paper tape at the point of contact, the circuit contacts themselves move a bit more because of the leverage obtained by having them an inch or so farther out. A great deal of movement is not necessary, as a matter of fact. The pressure on the tape should be as light as is consistent with positive operation, to prevent wear. At the point where the feelers go through the holes in the tape the tape should be turning on a quite small radius. We used a brass mounting pillar of the type made for mounting wafer sockets, filed to be just slightly longer than the tape width, and fastened down with large washers at each end so that it was both a guide and bearing. The tape should be kept under enough tension so that it will not tend to spring away from the bearing when passing over its surface. The general arrangement for accomplishing this is shown in the top-view photograph. The tape winds through a second bearing similar to that on which the feelers operate, and is also pulled past a pillar covered with felt to provide some friction. Incidentally, the felt does a nice job of cleaning off the dust and dirt which seem to accumulate on the tape despite reasonable precautions to keep it clean.

Tape Pulling

Building a pulling mechanism also has its difficulties. The motor is a major problem, and about the only thing that can be said about it is that something will have to be found that will work. It must have more power than is necessary, so the tape can be pulled through at constant speed. If the motor is too light, small changes in friction will cause the speed to change, resulting in the undesirable condition that the code speed also varies. It will also be found that some parts of letters will be sent rather rapidly while other parts are slow, because the friction naturally is greatest when the feelers are on the tape rather than in the holes. This effect can be overcome

only by using a motor which ignores small changes in load, insofar as its speed is concerned. We tried several arrangements, including toy motors and fan motors with gear trains to cut down the speed, but none of them were very satisfactory. The gears were noisy and hard to align properly so that the loading would be uniform enough to prevent the speed from wobbling. No doubt with sufficient care an arrangement of this type could be made to function satisfactorily, but we were considerably relieved when we discovered a motor which made any mechanical work on our part unnecessary. This was a showcase type of motor complete with reduction gears and cooling fan, having a speed of about 7 r.p.m., extremely quiet in operation and developing ample power for our purpose. Ours was made by the Speedway Manufacturing Co., Chicago; possibly similar motors are made by other concerns. At any rate, this type of motor seems to be just what the doctor ordered for code-practice machines.

To change code speed it was eventually decided that it was simpler and more satisfactory to change a series of pulleys rather than to attempt to control the motor speed by electrical means. The former method has the advantage that each pulley gives a definite code speed which can be measured rather accurately, and the power developed by the motor is the same at all speeds.

After several unsatisfactory attempts to pull the tape by various means, the friction drive shown in the photograph was installed and, while not without a few operating disadvantages, it has proved to be quite reliable. The pulleys are made of half-inch wood with fine sandpaper glued to the perimeter to get a grip on the tape. A collar was made to fit the motor shaft, by cutting and drilling another shaft pillar to the proper size, and a brass pin was soldered to the outside of the collar to project in the same direction as the shaft. The center of the pulley is drilled to fit the shaft and then slotted to accommodate the pin. This gives positive drive for the pulley, and changing pulleys requires no more than pulling one off and sliding on the new one so that the pin rests in the slot. To hold the tape firmly against the pulley a length of flexible smooth brass strip about 5/16-inch wide ("dial cable") bears against the tape by spring pressure. One end is looped around a guide bearing and the other around a pin on a strip of 1/16-inch steel anchored near the motor shaft, as shown in the photograph. The spring pulls between the end of the steel arm and a somewhat similar anchor shown to the left of the tape in the photograph. Some means must be provided for regulating the spring tension so that the tape does not slip and so that the braking effect is not great enough to stop the motor. The chief disadvantage of this scheme is that various expedients have to be resorted to to get a given length of metal strip to give sufficient pressure against a wide range of pulley diameters, but for a limited speed range — say from 10 to 25 w.p.m. — a single metal strip cut to the right size will serve.

The pulley diameter to give a desired code speed can easily be figured out if the speed of the motor is known. A tape speed of one foot per minute is equivalent to a code speed of five words per minute. The peripheral velocity of the pulley in feet per minute therefore must be equal to the desired number of words per minute divided by 5. It is more convenient to use inches, so the velocity becomes 12/5 times w.p.m. This velocity is also equal to the circumference of the pulley multiplied by the speed of rotation in r.p.m., and since the circumference is equal to πD, where D is the diameter of the pulley in inches, the following relation holds:

$$\pi D \times (\text{r.p.m.}) = \frac{12 \times (\text{w.p.m.})}{5}$$

The pulley diameter in inches required for a given code speed is then

$$D = \frac{12 \times (\text{w.p.m.})}{5\pi \times (\text{r.p.m.})} = \frac{0.76}{\text{r.p.m.}} \times \text{w.p.m.}$$

In our case, with a motor speed of 7 r.p.m., the constant was 0.76/7, so that the pulley diameter was simply the speed in words per minute multiplied by 0.11. For a speed of 20 w.p.m. this gives a diameter of 2.2 inches.

Assembly and Operation

The inside view shows the two relays, the motor, and the power supply components. Aside

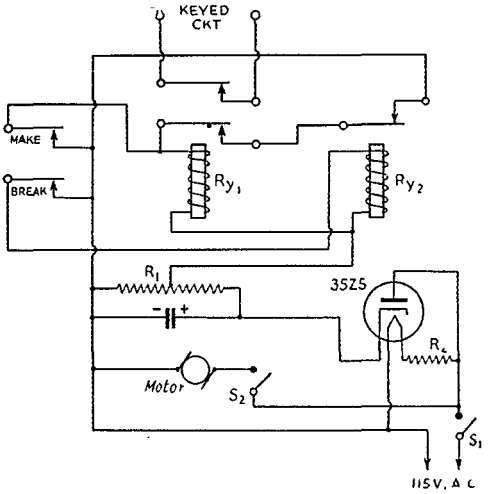
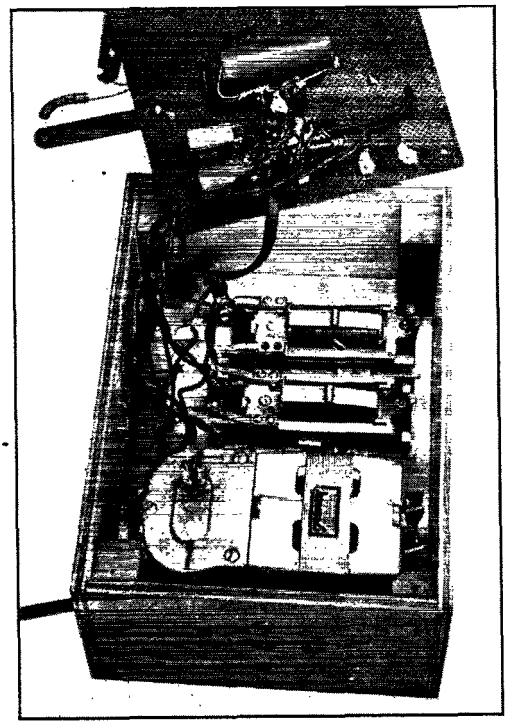


Fig. 2 — Circuit diagram of the code reproducer.
C — 40-μfd. electrolytic, 150 volts. (Smaller capacities will do.)
R_1 — 6000-ohm bleeder, tapped to give about 40 volts for the relays used.
R_2 — Heater dropping resistor, 500 to 550 ohms.
Ry_1, Ry_2 — See text.
S_1, S_2 — S.p.s.t. toggle.



An inside view, showing the motor, power supply and relays. Long leads are left on the parts mounted on the panel for ease of access to the inside.

from the contact arrangement, the kind of relay used should not matter particularly, although the relays must be fast enough to operate at code speed, of course. The telephone relays (every ham seems to have acquired a couple) are fast and will supply the extra parts needed for the feeler mechanism. They require around 35 or 40 volts for snappy operation, but the current is quite small. A simple transformerless power supply of the type shown in Fig. 2 gives reliable operation and is more convenient than batteries. The values are not critical. The relays should be mounted on felt or a similar sound-absorbent material to reduce the noise, and the box should be ventilated if the motor is mounted inside as in our unit.

The top view also shows a collection of pulleys made to give various code speeds in steps of approximately 5 w.p.m. As a matter of interest in finding out what the machine would do, pulleys were made up to the largest diameter it was possible to accommodate in the structure, giving a top speed of 45 w.p.m. At this speed the reproduction was fully as accurate as at the lower speeds, so it seems that the limit is not reached.

This type of reproducer is considerably less tolerant of the condition of the tape than the regular commercial head. The latter will ignore such things as small breaks between holes and the presence of splices, but our machine will not. The feeler simply rides through a break and keeps the relay in question closed when it should be open. Splices, being twice as thick as the normal tape and a great deal stiffer, do not go around the bearing smoothly and the feelers frequently are unable to penetrate far enough through the holes to make contact. Thus the machine may miss when a splice is passing through. This can readily be overcome by making the splice in an unpunched part of the tape, cutting out a small part of the practice text if necessary. In other respects the system has proved itself to be highly reliable, for a more or less haywire mechanical job, and a missed character is very rare if the feelers are kept in proper adjustment.

Strays

The name of Hygrade Sylvania Corporation was recently changed to Sylvania Electric Products, Inc., at a meeting of the stockholders.

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As the development of model gasoline-powered planes progresses, the performance of their engines becomes more amazing. Recently one of these engines, a nine-ounce unit, was operated with wide-open throttle for 420 hours at a speed exceeding 7500 r.p.m. without any replacement except spark plugs. This would be a tribute to any internal-combustion engine. — *Ohmite News.*

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Lightning, which sometimes causes damage, does far more good than harm. In its passage through the air, oxygen and nitrogen are combined by the electric-arc action to form oxides which unite with the rain drops to form nitric acid. In this manner, the soil is enriched to the extent of 100 million tons of nitric acid annually — more than is produced by the combined output of all the world's fertilizer plants. — *Ohmite News.*

Silent Keys

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

Dean A. Baker, W9HZQ, River Forest, Ill.
Minto Bradley, W9NCK, Marion, Ill.
Herbert Pearson, W4FLP, Franklin, Tenn.
E. J. Simmonds, G20D, Ascot, England
Walter Tervo, ex-Can. 5CO, Victoria, B. C.
Harold C. Tuttle, W2FCM, Eastport, N. Y.
Sgt. James W. Wright, W6SAP, Stockton, Calif.

HAPPENINGS OF THE MONTH

NO MORE STATION LICENSES

FCC has had so many difficult administrative problems in the renewing and modifying of amateur station licenses that it decided, on September 15th, by its Order No. 87-B, to discontinue renewals and modifications of station licenses for the duration. In a public statement, it gave as one reason the fact that a large number of amateurs away from home are not able to exercise proper legal control over apparatus and premises. There were many cases where an amateur professed to have no apparatus to register under Order 101 but claimed the possession of apparatus when applying for a renewal. The resulting correspondence was more than could be kept up with by the Commission's depleted staff. Renewing had been carried on since Pearl Harbor in the thought that maybe there would be jobs for amateur stations to do, but that has now taken the forms of WERS. Moreover, many hams in the services were finding it beyond their ability to apply for renewal and numerous good amateurs who had lent their apparatus in the war effort were being denied renewal on the grounds that they no longer had stations. The result was that the whole situation came to have not too much meaning during the period of our inactivity, and FCC decided to rid itself of the paper load during the war. Calls will be retained for their present holders until well after the war.

However, the Commission desires to continue to receive applications in the usual manner for the renewing, or the necessary modifying, of station licenses, even though it will not act on them. The reason for this is that it is foreseen that, when amateur privileges are restored after the war, there will be a tremendous burden of license applications and it is hoped that some short-cut method can be found to permit the immediate resumption of operation by all those who have been able to keep up with the Commission's requirements. It is probable, for example, that all amateurs who maintain valid operator licenses, and who have pending with the Commission an application for the renewing (or modifying, if necessary) of their station licenses, will be permitted, by a general order, to resume operating pending the issuing of the new station license. The Commission therefore says that "The holder of an amateur operator license desiring to maintain his amateur status should submit application for amateur operator and amateur station license renewal in accordance with the Rules." It is therefore just as important as ever to file renewal applications sixty days before expiration, and to file application for modification when the station location is changed. Since operator and station licenses run concurrently, and are applied for on a joint form, it is easy to fill in the station portion and to put it on file even though we know the Commission will take no action on it. ARRL earnestly recommends this course to all amateurs.

FCC tells the League it will also plan some appropriate post-war rehabilitation of amateurs who fail to obtain renewal through causes beyond their control. Calls will be reserved.

The above actions are absolutely without effect upon amateur operator licenses. The Commission continues to issue new or renewed operator licenses and to modify them as necessary.

GOOD-BYE NOW

HE SWAPPED a senior assistant secretaryship for a senior lieutenancy in the Coast Guard for the duration. It's now Lieutenant Arthur L. Budlong, USCGR, on leave of absence from the League, on duty in the office of the Chief of Communications of the Coast Guard at Washington. Thus W1JFN joins the ranks of the hams in the services.

Bud first came to the Headquarters' staff nearly nineteen years ago as the editor of a syndicated newspaper feature service the League maintained in those days. Later he served a hitch as assistant communications manager (PRR Gang: Remember?), then became assistant secretary. He's done a great deal of traveling for the League, having covered the country repeatedly on visits to conventions and club meetings, so that he's well known to the gang. He also represented the League at the last inter-American conference in Chili. But this mustn't sound like an obituary: he's just on leave and will be back with us at Hq. after the brawl is over.

BUD

THE NEED FOR COPPER

IN MULLING OVER this serious shortage of copper, we got to wondering whether our antennas can possibly be worth as much to us hanging there on their skyhooks as they would be helping to fill that gap in the national need for metals.

We need something to receive on, to be sure,

but that takes a lot less copper than is generally used in the transmitting antenna. Most of our very long antennas are made of copper-clad steel and they are almost outside this argument because it's doubtful if they possess an interesting amount of copper. But aren't our solid-copper antennas rather more of a nuisance now than a benefit? Ten to one they've stretched out of the proper length, and we wouldn't trust them for transmitting without remeasuring. The whole antenna system has been neglected these many months, halyards are probably frayed, and the whole caboodle is likely to come down in the winter storms and ice. Moreover, although we don't like to admit it, there are still plenty of people who think that the very possession of a transmitting antenna is a subject for suspicion.

On the other side of the picture, consider how many scores of tons of copper must be swaying uselessly in the breeze over the shacks of American amateurs, and imagine how many vital manufacturing activities are being held up for want of perhaps only fifty pounds of copper. Doesn't it make you think that it would be a pretty good idea to pick up your side-cutters and go out in the back yard right now and take down the old sky-wire and turn her in? You can pack away the insulators and spreaders for the day when you'll know how to make a more effective antenna out of shining new copper. You can give your guy wires a going over against the storms of winter while you're out there; you'll save your halyards; you'll probably discover a pretty good place to fly Old Glory. Then you can take that roll of high-grade copper and start it rolling back through the salvage system after the suggestions of the WPB letter on page 77 of September *QST:* if it's a small amount, donate it to a local charity which collects waste materials; if you are the proud owner of half a dozen rhombics and have a goodly poundage, sell it to a waste material dealer; if you have any difficulty, get in touch with your local salvage committee.

Who needs that transmitting antenna most right now, you or Uncle Sam?

APPARATUS WANTED

THE ARRL Apparatus Bureau continues its important work of centralizing data for government agencies on the location of apparatus which amateurs are willing to sell. The raw material for this work is a "registration" by you of the factory-made apparatus you can let Uncle have. A blank form and further information appeared on pages 31–32 of August *QST*, pages 16–17 of the April number.

There continues to be a great need for factory-built transmitters of standard makes. They go to the "hot spots" and do a useful job. Are you willing to sell yours? We have a call right now from Sam for a *hundred* such transmitters, of from 100 watts up, either 'phone or c.w. or both, capable of working from 1.6 to 20 Mc. or anywhere in between. You can get a very decent price for your rig, help the war by buying bonds with the money, and thereby have funds on hand to buy more modern gear after the Duration is over. If you're willing, shoot us the dope on your rig at once.

The innumerable colleges and schools engaged in the training of radio personnel are badly in need of equipment for classroom demonstrations and laboratory instruction. Most of this is gear which is critically short and which they cannot hope to obtain except from the amateurs of the vicinity. It includes such items as test oscillators, oscilloscopes, meters and v.t. voltmeters. You are asked to get in touch with the training institutions in your neighborhood and see if you can't give them a lift. Affiliated clubs are particularly invited to undertake the patriotic job of establishing contact, finding out what is needed, and locating it amongst their memberships, either for loan or sale.

NO MORE TRANSFERS THROUGH *QST*

IN THE past we have had very good luck in getting transfers of radio men in the Army who have been assigned to duties not pertaining to radio. Every such transfer was of advantage to the Army in that it was just as good as getting a new radio man into the service from outside. This avenue is now closed to us; requests from "outsiders" are no longer considered. The only way now existing is for the enlisted man, or officer, to make application in writing to his immediately-superior officer. He should state that, for the good of the service, he requests transfer to radio work so that his particular talents can be usefully employed in the war effort.

This emphasizes anew the importance of getting a radio assignment in the first place. Selectees, in particular, should take along with them their amateur and commercial licenses, proficiency certificates, graduation certificates from radio courses, etc. Early in his military training each drafted man is called before an examining board and tested to determine where he would be most useful. This is the time that the amateur needs to show evidence of his radio ability and it is simply vital to have that license along. When queried, orally or by questionnaires, he should state that his main interest in life has been amateur radio, that he has held a government license so many years, that he has built such-and-such gear. Put all your zizz into this first effort to get radio duty; you can be practically assured of a communications assignment if you do.

"IN THE SERVICES"

BY A government count there were 15,000 hams in the armed services last March, but from our records we couldn't give you the names of over 5300 of them. Are all you guys too busy to drop us a card, showing rank, and branch, and

arm of the service and old home-town call? No military secrets wanted; we just want to pile up at Headquarters a record of what the amateur is doing, so that we can lay the (3 × 5) cards on the table after the war, if necessary. Incidentally, such dope supplies the material for the individual mentions in our column of service notes, and tells the rest of the gang at least a few words about you. Drop us a card, won't you? Data on other hams in the service also appreciated.

Just tear the top off a Jap or a Heinie, scribble your few words on it, and drop it in the mails.

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.

TRANSMITTER REGISTERED?

IN AGAIN reminding you that FCC orders require the possessor of every transmitter belonging to an amateur to apply for a certificate of registration, we point out that this requirement continues to exist even though FCC has decided not to renew expiring station licenses (see above). Full information appears at page 29 of August and September *QST*.

This order requires amateurs to notify FCC within five days of any change of address. The Commission announces that this applies only to permanent addresses, and that amateurs who are in the armed services should not report to FCC changes of address incidental to military service.

The Amateur's Program:

BUY WAR BONDS AND STAMPS
GET IN THE SCRAP—*NOW*
WORK WITH RADIO FOR VICTORY
RENEW YOUR OPERATOR'S LICENSE

The Die-Hard

A "Hey, Marge!" Story

SHE says they really ought to call on the Smiths as she hasn't seen Amy for ages. He says the Smiths are bores; Smith is always talking about his dahlias. She says he raises beautiful dahlias and has helped her no end with advice about her gladioli. He says he doesn't see anything difficult about growing dahlias as the grower doesn't have much say in the matter — that all you do is put seeds and fertilizer in the ground, sit back, and watch them grow. She says that just goes to show how uninformed he is because in the first place you plant bulbs, not seeds. This gives him his opening and he says speaking of bulbs, what does Smith know about the function of those bulbs in his radio. Does he know that the power picked up on his antenna is so small that you can measure it only with delicate instruments and by feeding it into those tubes properly the power is amplified to the point where it becomes useful? She says there he goes, always radio, it's no wonder their friends have dropped them. No one can bring up a topic without his switching it around to radio. He admits they have lost a few friends but she will observe that they have cultivated many more people with a scientific turn of mind. She says if he's referring to Bill Adams, Ted Wilson and that Jackson chap, in her opinion they aren't scientists at all, they are hams and he needn't give her that song and dance about hams making radio possible because personally she wouldn't care if they never had radio. He says she doesn't have the proper respect for scientific achievement and that he knows for a fact that Smith once called in an electrician to replace a blown fuse. She says that may all be true but has he noticed how much more attractive the Smith's garden is than theirs what with both of them always working on it. He says he hadn't noticed, and besides if she thinks he is going to sit around admiring the Smith's dahlias in the moonlight she is very much mistaken as he has a schedule right after dinner with W2XXQ and some vitally important traffic to handle. She says that's old stuff as all he has is a message from someone's Aunt Lizzie to her niece in Florida and if Aunt Lizzie only knew it she could get a postcard to her quicker. She says anyway she's going to call on the Smiths and he can stay home if he chooses.

The storm subsides; he is alone and settles down for a pleasant evening. Hearing his call, he springs into action. An unfamiliar voice knifes through the QRM. "Say, old man, W2XXQ wanted me to tell you he couldn't keep the sked tonight as his wife dragged him off to the movies and it looks like I'll be on my way there too. You fellers who have radio-minded wives are sure lucky. . . ."

— Whit, W8IBX

WERS Gear, 1942 Style

Kansas City Group Overcomes Parts Shortage

BY T. G. HIERONYMUS,* W9BLS

Here's the story of what happened when one WERS group refused to be stumped by such a little thing as not being able to get components suitable for 112-Mc. equipment. The old ham ingenuity always finds a way!

The transmitter discussed here is essentially the same as that described in December, 1941, *QST*, revised circuit for which appears in the January issue of this year on page 8.

BUILDING 2½-meter gear in normal times is an interesting job, often full of difficulties which sometimes seem almost insurmountable. But to build a number of such complete outfits when it is impossible to get the necessary parts, and yet have them work satisfactorily and stay on frequency, is a problem that probably could be solved only by a dyed-in-the-wool radio ham. This article will attempt to explain some of the tricks employed in Kansas City in the building of fifteen 2½-meter transmitters for WERS.

Of course, the first big problem was for a main tuning condenser. George Shirling, W9AHZ, the Radio Aide, bought the last double-section 100-$\mu\mu$fd. variable to be had in Kansas City, so we were confronted with the necessity of finding a substitute. We could have used two separate variables but that was not desirable, so I proposed substituting a compression-type mica-insulated condenser. George thought the idea was worth trying, so we each built a unit with mica insulation, using the ends of the horse-shoe inductance as the stators.

Leonard Sorg, W9MNH, assistant supervisor of engineering and construction of the Kansas City WERS group, next tried his hand at building a similar unit. All three were very successful, so far as working into a dummy load would indicate. Two such units were put in operation by Leonard and the beat note from them tuned in on a receiver. They operated for several hours with a surprisingly low variation in frequency.

We then undertook the construction of fifteen complete units. George and two others took on the job of rewinding transformers and building power supplies. Leonard and a crew of helpers took the job of building the modulators and receivers, and the writer undertook to build the fifteen transmitters. It is hoped that at a later date George and Leonard will write up some of the tricks they employed, since this article covers only the transmitters.

Quantity Production

It was realized that it was desirable to make the fifteen units, all of which had to work at the same spot in the 2½-meter band, as nearly identical as possible. So after studying the situation it was decided to use jigs so that all parts would be similar. One of the local hams who was a tinsmith volunteered to cut out all of the horse-shoe inductances, and he did a fine job. One of the girls in a local radio parts house wound the r.f. chokes.

The various parts and the jigs used in marking them are shown in one of the photographs. At the lower left is one of the inductances prick-punched for the five holes required. By using three brads it was quick work to punch all of the inductances alike. These were all drilled and then it was necessary to countersink two of the holes for flat-headed 3–48 machine screws. A piece of flat steel strip (3) was drilled and countersunk in such a way that it was possible to mash or upset the inductance metal by the simple expedient of inserting a flat-head screw through the inductance and steel strip and hitting the screw with a hammer. This produced the countersunk effect shown in (5) in the photograph.

Leonard had a large piece of ¾-inch thick polystyrene. I sawed this sheet into pieces ½-inch wide and ¾ inches long; a sample is shown at (8). An ordinary 8-inch circular power saw was used; there was some chipping, but by feeding the material slowly it was reduced to a minimum. Laying the polystyrene on a thin board and sawing through both at the same time helped a lot to minimize chipping.

In order to drill the strips of polystyrene identically the gadget shown at (7) was used. It is a piece of sheet brass bent and prick-punched so that when it is laid against the polystyrene with one end of each properly aligned, it is possible to mark the three holes in the flat face and the two holes in the edge. The center hole in the polystyrene strip is drilled and tapped for a 3–48 round-head brass machine screw, which is used to adjust the compression-type condenser, as shown in

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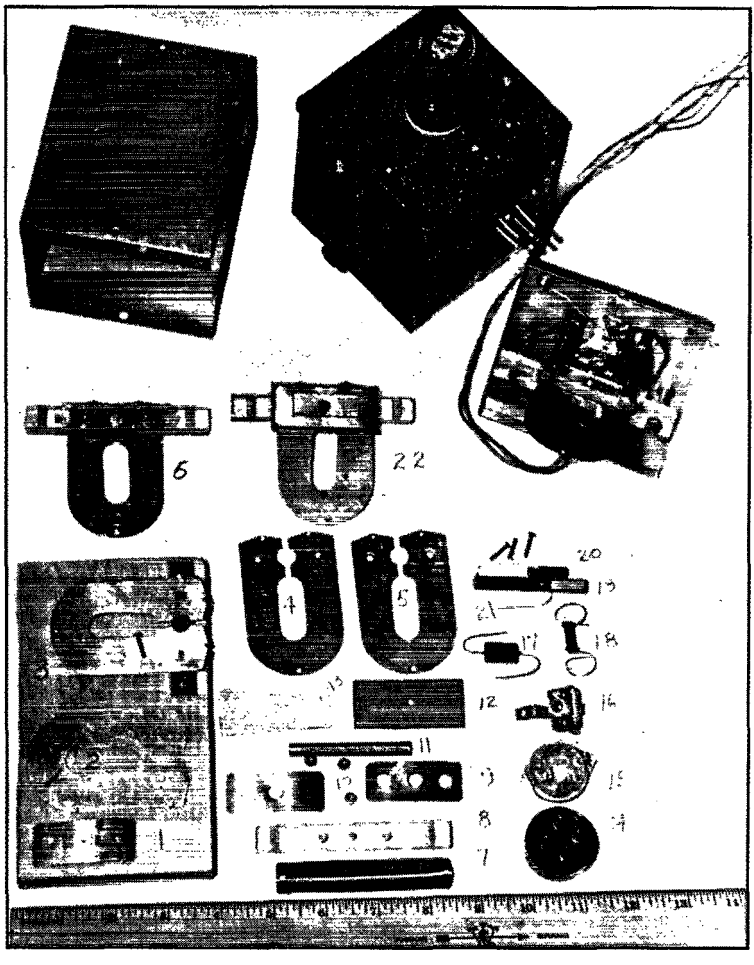
(22). Then the two holes adjacent to the center are countersunk, drilled and tapped for 3–48 flat-head brass machine screws. These holes support the horse-shoe inductance. The two end holes drilled at right angles and edgewise through the polystyrene are tapped for 8–32 screws and are used to mount the entire inductance-condenser unit to the lid of the box, as shown in the photograph of the completed device. An alternate method is to use a No. 18 drill and hold the polystyrene in place with nuts on the long screws, above and below the polystyrene.

Mica for the compression unit consists of two pieces about 0.004-inch thick, as indicated by (12) and (13). While it was possible to use a single movable compression plate and hit the 2½-meter band, it could be done only by using very thin mica and screwing the movable plate down very tightly. Since this was considered undesirable two plates were used, one being fixed and the other adjustable. These two plates are shown at (9) and (10). They are made of very thin sheet copper similar to shim stock; the only requirement is that (10) have some springiness.

To mark the correct points for punching the one hole in (10) and the three holes in (9) a pattern, shown at (1) in the photograph, was laid out. Then a special punch (11) was used to make the holes. The punch is an ordinary piece of drill rod a quarter of an inch in diameter, turned in lathe so that one end is perfectly flat with the exception of a small point at the center. This point fits into the prick-punched hole and perfectly centers the punch for correct location. Three of the little



Brought together in this photograph are the various components which go to make up a transmitter unit, together with the jigs used in producing the homemade parts. The various stages of tank circuit assembly also are shown, as well as a completely-assembled transmitter.

punched out pieces of copper are shown between (9), (10) and (11). They indicate the clean-cut punching and the center hole made by the point on the end of the punch. For punching, the sheet of copper was laid on a block of soft wood with the end grain of the block upward.

Assembling the Oscillators

In the assembly of the condenser-inductance portion of the device, the parts go together in the following order: A polystyrene strip is laid flat with the countersunk holes turned up. Next a copper sheet (9) is laid in place, then a mica sheet (13). This is followed by the horseshoe inductance (5). Two flat-head 3–48 machine screws are put in place and screwed down. Just as the screws pull all the parts snugly together, (9) is carefully adjusted so that the holes are properly centered. Then the two flat-head screws are screwed down tightly. The upset portion of the inductance around the two holes mashes the mica down through the holes in the copper sheet (9) and into the countersunk holes in the polystyrene strip (8). While the mica is actually mashed, it is sufficiently thin so that it does not break off, and since the voltage is relatively low no trouble due to breakdown has been experienced in tests. If such trouble should be encountered it is proposed to make the holes in (9) just a little larger. Actually (9) is floating electrically and the only voltage will be the difference of r.f. potential across the ends of the inductance.

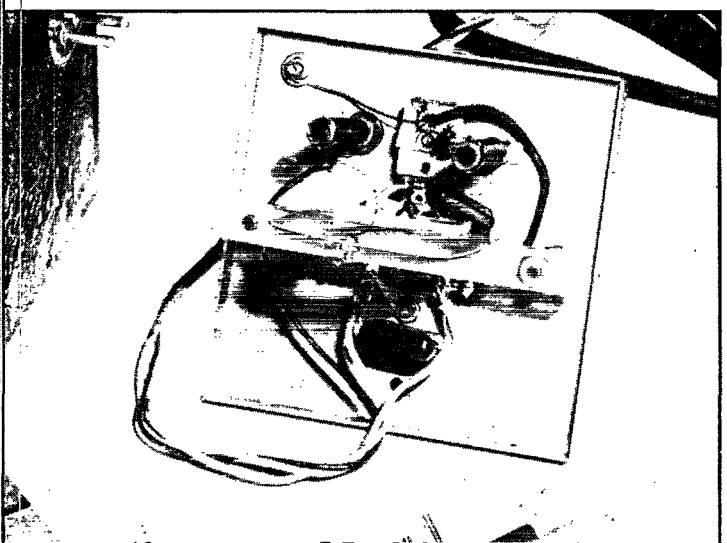
After this assembly has been finished, mica sheet (12) and copper sheet (10) are laid in place and held down with a 3–48 round-head brass machine screw. Most anything can be used to compress copper sheet (10) but I used scrap pieces of $\frac{1}{16}$-inch thick polystyrene with a hole drilled in the center as shown in (22). The punched hole in copper sheet (10) made it possible for the 3–48 compression screw to be completely isolated so that the condenser could be adjusted with a screw driver through a hole in the metal case, without interference from body capacity during the adjustment.

The r.f. chokes are wound on $\frac{1}{4}$-inch glass tubing, which is easy to get at any chemist's supply house. A 3-cornered file is all that is necessary for cutting the tubing to proper length. Just scratch the glass with the file and bend it at that point and it breaks clean. After the wire is wound it is doped with ordinary coil dope, which holds it in place without trouble. In order to support the chokes a small mounting piece was turned out of wood as shown in (19) and (20). A piece of ordinary $\frac{1}{4}$-inch dowel was turned so that it would fit loosely into the glass tubing for about $\frac{3}{8}$ of an inch. The other end was drilled to take a 6–32 or a self-tapping screw. After the wooden support is securely fastened with a screw through the lid of the transmitter cabinet, the glass tubing of the choke is cemented in place on the wood support with a bit of coil dope.

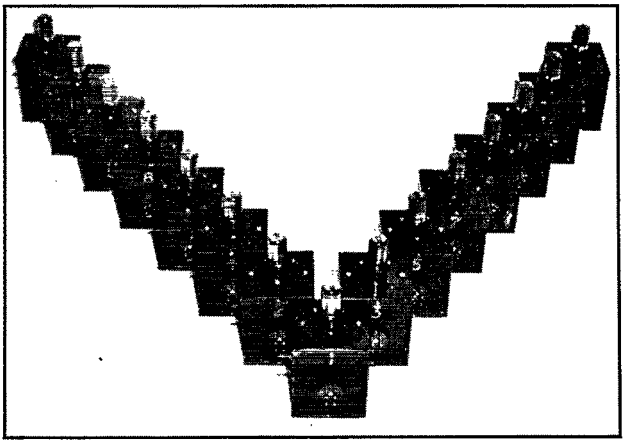
A view looking straight down on the completed oscillator unit is given in one of the photographs, and it shows the relative positions of the small compression mica grid condenser and the two chokes.

A large sheet of copper is difficult to solder, especially if a small electric iron is used. To facilitate making the connection between the socket and the inductance, a short piece of tinned copper wire was inserted through the hole in the end of the inductance and soldered in place with the ends coming out at right angles. It was thus possible to use plenty of heat to get a good solder job on the end of the inductance. This piece of wire was clipped to length and the other end soldered to the plate and screen terminals of the polystyrene socket, using a minimum amount of heat to avoid melting the socket.

We were fortunate in being able to get fourteen small compression mica condensers already equipped with a mounting bracket as shown in (16). One of the chokes was so located that the same screw held the choke and the bracket of the small mica condenser in place. For the condenser without a bracket a $\frac{3}{4}$-inch 6–32 brass screw was screwed tightly through the lid and so located that one end of the small mica condenser could be



A closeup of the transmitter (inside-case view) showing how the tank circuit and other circuit components are connected to the oscillator tube socket.



A real "V for Victory" — victory over the parts shortage! Fifteen complete units, alike as peas in a pod, constructed for the most part without benefit of manufactured parts.

soldered to the screw and the other end of the condenser soldered to the grid terminal of the socket. This made a rigid support for the grid condenser. A hole was drilled in each lid at the proper place so that a screw driver could be inserted for the purpose of adjusting the grid condenser while in operation.

As shown in the photograph, the plane of the inductance is at right angles to that of the socket, and the inductance is so located that one end fits directly above and between the plate and screen terminals on the socket. The other end is above an unused socket terminal which is clipped off close to the polystyrene. A 50-$\mu\mu$fd midget mica condenser (17) is soldered to the inductance before the latter is put in place. Just enough of the pigtail terminal is left between the condenser and the inductance (about $\frac{3}{8}$ inch) to allow bending the former into proper position so that the other pigtail can be soldered to the grid terminal on the socket. The photograph of the assembly shows how short all of the important connections are.

To provide connections for filament and high voltage leads we took the bases from old-style 4-pronged tubes, broke the glass away and sawed the base in two, leaving about $\frac{3}{8}$ of an inch of that part of the base through which the pins are riveted (14). A hole in the exact center was drilled for mounting this piece of tube base against the cabinet, as shown in the photograph. Holes are drilled in the cabinet at the proper places to pass the two filament leads, the high voltage lead and the mounting screw. Care was taken to see that the insulation on the wires ran well up into the tube base pins because the plate voltage is 300 volts.

A temporary ground lead running to a screw in the corner of the lid is shown in the photograph. This was done only in the experimental model. All the permanent units were grounded at one point — where the bracket of the grid condenser and the grid choke are fastened with a screw through the lid.

The output link consists of a single turn of No. 12 copper wire bent approximately in the shape and size of the horse shoe and connected to screws insulated from the base by polystyrene washers. The washers were turned in a lathe out of $\frac{1}{2}$-inch polystyrene rod. Two washers were used for each screw, one flat and the other having a shoulder fitting into a $\frac{3}{8}$-inch hole drilled through the case. This link seemed to work best when spaced from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch from the inductance, when used with a dummy antenna. Scrap antenna wire provided the links, No. 12 copper being used for rigidity.

It is quite important that the 6V6GT tube be mounted outside the cabinet and thus shielded from the inductance. In one experimental model the tube was inside the cabinet and considerable trouble was experienced from parasitic oscillations and heat. The troubles disappeared when the tube was put on the outside as shown.

Lecher wires were used for adjusting the oscillators to frequency. A single-turn link connected to the Lecher wires was coupled to the oscillator inductance through the open bottom of the case. Just enough coupling was used to get a slight dip in plate current as the Lecher wire shorting bar was moved through resonance. It is expected that before putting these units into service a more accurate frequency adjustment will be made, using a sensitive resonance indicator (crystal detector, low scale milliammeter and tuned circuit) so that measurements can be made without absorbing energy directly from the tank circuit, thereby avoiding reaction on the oscillator frequency.

The fifteen completed oscillator units are shown in another photograph. All of them have been tested on a dummy antenna and adjusted to the same spot in the 2$\frac{1}{2}$-meter band. After the bugs were ironed out in the experimental models, the fifteen finished units went together without a hitch. No trouble of any kind was encountered, which goes to prove what was said in the first paragraph!

U.S.A. CALLING!

RADAR OFFICERS WANTED

THE commissioning of radio and communications officers direct from civil life has practically ceased in all the services. The one big exception is the continuing quest for specially-qualified men to become radiolocator officers, dealing with the installation and operation of radar stations. Instead of commissioning civilians, most of the branches of the services now make their own officers by the special schooling of their enlisted men. Take the Army, for example: both in the Signal Corps and in the communications branch of the Air Forces, the need for thousands of radio officers is being filled by the selection of promising enlisted men who, after receiving their basic military training, are sent to Officer Candidate's Schools. There is even talk of eventually cutting off voluntary enlistments — so that, if the war lasts long enough, we may come to a system whereunder everybody enters military service at the bottom through the draft and the better-qualified men work their way upward to commissions. Officers for all ordinary duties are now being supplied in this manner.

Radar is the one big exception. The Army, the Navy and the Marine Corps are all looking for trained communications engineers and electronic physicists to receive immediate commissions and immediate active duty, which starts with very special schooling. The requirements in these services are very similar, so that, speaking generally, you can take your choice.

In the Army, this is the Electronics Training Group of the Signal Corps. Candidates must be graduates of an accredited college, either in science with a major in electronic physics, or in electrical engineering, preferably with emphasis on communications. The age limits are 16 to 46. Second lieutenancy. The equivalent naval officers are ensigns in the branch called Aviation Volunteer (Specialist) and must be EE graduates, or the practical equivalent, between 19 and 50 years of age. This work in the Marine Corps is called the Aircraft Warning Service. While similar technical graduates are desired, in special cases two years of college will do; and in this service there are some appointments for specially-qualified men up to the rank of major. However, the minimum age limit in the MC radar work is 30½.

If you are interested in one of these services, write full particulars of yourself to George W. Bailey, Secretary of the Committee on Scientific Personnel, Office of Scientific Research & Development, 2101 Constitution Avenue, N. W., Washington, D. C., for full information.

ENLISTMENTS FOR SPECIALISTS

BY THE end of this year, Army training schools will be turning out skilled mechanics and technicians in sufficient quantity to keep the Army equipment in operating order. But, in the meantime, there is an emergency need for a hundred thousand of these specialists *now*, with the result that voluntary enlistments for technical men have been reopened in several branches of the Army. Although many different technical skills are wanted, the communications openings are in the Air Forces and the Signal Corps.

Applicants must be between 18 and 45, citizens, physically qualified — although men slightly below the physical standards can often be taken in for limited duty, being given noncombatant assignments at continental bases. Although the men will enlist as privates, their technical training will generally bring them an NCO warrant or a technical rating within a short time. A master sergeant, the highest rank of NCO, receives $138 a month, the lower ranks in proportion — in addition to which the Army pays all a man's expenses. Men assigned to foreign service receive an additional 10 per cent of their base pay, while in the Air Forces those on flying duty receive an extra 50 per cent of base pay. To prevent interference with industrial production, men wishing to enlist as mechanics and technicians must now be cleared by their local Selective Service Board before acceptance by the Army. Recruits go first to a reception center for the few days of "processing" which every man receives when he enters the Army, then go to an Air Forces station or a Signal Corps Replacement Training Center for military training and to become acquainted with the Army's particular ways of carrying on its maintenance and operating jobs.

For a short while yet, there will be present at every regular Army recruiting office a special representative of the Air Forces and the Signal Corps, for the purpose of interviewing applicants and giving detailed information to inquirers. They are equipped to answer all questions — not always true of regular recruiting officers.

The Air Forces want operators who can handle ground equipment and make adjustments and minor repairs. Some can become flying operators, part of the Air Crew. They also want mechanics to adjust and repair various types of transmitting

and receiving equipment as members of the Ground Crew. The Signal Corps wants operators and mechanics and also men whose experience qualifies them as telephone and telegraph cable splicers, installer-repairmen, telegraphic printer operators, telephone and telegraph wire chiefs. The Signal Corps will accept an FCC amateur or commercial license as evidence of satisfactory operator proficiency. For a mechanic, membership in either the Radio Manufacturers' Service or Radio Servicemen of America is acceptable. Air Forces men must pass a special intelligence test as well as an oral trade test given by the U. S. Employment Service.

Because most officers are made nowadays by selecting candidates from the ranks, this mechanism will result in many an advance from private to officer. In any event, it is a chance to bring your skill to an army which sorely needs it, a chance to fight with the devices you've always worked with. You can get full particulars in a personal interview at the nearest Army recruiting station. If necessary, ask your postmaster for directions.

U.H.F. TRAINING IN THE NAVY

AN OUTSTANDING opportunity for amateurs to serve the country in Class V-6 of the Naval Reserve, and at the same time to receive training of great interest and value, is offered by the Navy's need for thousands of hams to learn radiolocator maintenance and operation. The innate ingenuity of amateurs makes them particularly desirable candidates for this service.

Applicants holding amateur Class A or B licenses, or experienced in service work or in the design or operation of high-frequency radio gear, may apply for a rating in Class V-6 of the Naval Reserve. They will be given the so-called "Eddy test," which is an examination to test their education. As a result of this examination they will be given one of four ratings: either seaman second- or first-class, or radio technician third- or second-class. It is thus possible for an amateur who does well in the "Eddy test" to be enlisted immediately as a radio technician second-class — equal to four promotions over the ordinary original enlistment as apprentice seaman. Very special schooling follows. Code knowledge is not required. The age limits are 17 to 50. In addition to pretty good pay, all living expenses and medical care are furnished by the Navy, together with a complete outfit of uniforms.

Further details and application forms may be had at the nearest Navy recruiting station.

SIGNAL CORPS CIVILIANS

MANY more men from 16 to 70 are urgently needed for civilian employment in the Signal Corps, to repair and maintain radio, telephone and telegraph equipment. The Signal Corps has waived physical requirements and each individual is measured solely according to his capacity for the job. A recent announcement listed radio engineers, radio mechanics, repairmen, service men, telephone engineers and telephone men as badly needed, salaries running from $1440 to $4600 per year. These are Civil Service positions, on which you can get further information at your post office, or at any district office of the Civil Service Commission.

General Olmstead, the Chief Signal Officer, recently said:

"I cannot tell you how many men the Signal Corps is going to require, but I can tell you that for every hundred soldiers in the Signal Corps we must have fifty civilians. That is why we have been compelled to open technical schools in every part of the country, and we are taking in men who cannot get into the military services because of age or minor physical handicaps. An airplane without a radio has been called a dead pigeon. A tank with defective communications is like a blind horse. The man responsible for the condition of the radio, which makes it possible for a bomber to reach Berlin and knock the daylights out of the Nazi capital, is contributing as much to the winning of the war as the bombardier who drops the bombs."

To get these trained technicians in sufficient numbers, more than 250 vocational schools are conducting Signal Corps courses for approximately 20,000 trainees — in addition to the schools operated by the Corps itself and several operated by manufacturers. Not only do they prepare for this civil employment; many young men desiring to serve in the Signal Corps, enlist in the Signal Section of the Enlisted Reserve Corps and complete civilian training courses before being called to active duty. These trainees are selected through the Civil Service, in several different grades. One is called Mechanic Learner and trains students to help in the maintenance of equipment; no previous radio knowledge is necessary and the pay while learning is $1020 per year. Women are wanted as much as men. For those with some previous radio experience, there is a course called Junior Repairman Trainee, paying $1440 per year, giving training as repair man and inspector. You can get full particulars from the Civil Service clerk at your post office.

FOR ACTION, JOIN THE MARINES

THE tough Marine riflemen aren't the only heroes in the Corps. The Marines who man the communications system have their share of heroes, too. The average citizen seems to have the idea that the rifle-totin' Marine gets all the action, fighting and excitement. Not at all. The members of the communication section have a job that requires steady nerves, and quick thinking while under fire. And to prove that, already in this war nine Marines in communications have received citations and awards.

For instance, there's the story of 22-year-old Corporal Harold R. Hazelwood of Stark City, Mo. Corporal Hazelwood was one of the first enlisted men to be singled out for courageous action in World War II. He received the Navy Cross for his bravery and devotion to duty during the initial Jap attack on Midway Islands, December 7th.

When two Jap ships fired the first shots on the group of islands that historic night, Corporal Hazelwood was standing by on Sand Island as switchboard operator. He was at the command post of a defense battalion, under the command of First Lieutenant George H. Cannon. Coolly all hands waited as the Nipponese cruiser and a destroyer plowed confidently near the range of the shore batteries. Twenty minutes passed slowly. Then a violent exchange of fire between ships and shore began. Before the action ceased, one of the Japanese shells struck the command post in which Corporal Hazelwood was stationed. A fragment of the bursting projectile pierced his left leg, inflicting a severe fracture. The same shell seriously wounded his commanding officer, Lieutenant Cannon, and temporarily disrupted communications to the gun battery. The young corporal ignored his wounded condition and instantly set up his switchboard again and reestablished communication, transmitting the commands of Lieutenant Cannon, who refused to leave his post. Both men were removed and Lieutenant Cannon died from loss of blood, being awarded the Congressional Medal of Honor posthumously for his heroic action.

Another outstanding case occurred during the same attack on Sand Island. The hero: Corporal Dale Peters, of a Marine communication platoon. When the Jap attack came, a shell struck Corporal Peters' station and the explosion blew him through a window onto the roof of a hangar. He staggered to his feet, dazed and hurt. Making a misstep, he fell to the ground, 14 feet below. In spite of his condition he staggered over to a nearby hangar which had burst into flames, and started helping Marines who were working furiously removing large aerial bombs stored in the structure. Flames and smoke enveloped the men. Any second one of the powerful charges might explode. But Peters and his comrades stuck to their jobs until the bombs were all removed. For this heroic action, 25-year-old Corporal Peters, of Breckenridge, Mich., was awarded the Navy Cross by the President. Subsequently, he was promoted to the rank of sergeant and later to staff sergeant.

Other Marines in communications who have received awards and citations are: Corporal George Merton Beuthe, who was awarded the Order of the Purple Heart for gallantry in action in the Manila Bay area; Corporal Francis S. Parker, awarded the Silver Star, also for gallantry in action in the Manila Bay district; Private First Class Donald E. Lake, awarded a Silver Star for valorous action in the Manila Bay area; and Silver Stars also were awarded to Private First Class Thomas L. Steward and Sergeant John R. Breeze for their heroic service in the same area. Corporal Floyd B. Jimerson was awarded a letter of commendation for the part he played in the Manila Bay region, and also earned a silver life-saving medal from the Treasury Department.

So if it's action you want, join the Marines and get into communications!

CALLING ALL RADIO TECHNICIANS

ARE you unable to serve in the armed forces because of age, disability or dependency? You can do your bit in winning the war by relieving a commissioned or noncommissioned officer now teaching at the Midwestern Signal Corps School, Camp Crowder, near Neosho, Mo.

Civilian instructors in radio operating, radio mechanics and all branches of telephone work are urgently needed to release technically-trained officers and soldiers for combat duty. Every civilian employed in relieving one of these men means there will be one more highly-trained man at the front. Qualified persons accepted for faculty positions under Civil Service regulations will teach advanced and specialist subjects connected with the operation and maintenance of Signal Corps radio and telephone equipment. The students are soldiers who have already completed their basic training at the Signal Corps Replacement Training Center. Salaries pay up to $3200 per annum.

Applications should be addressed to the Assistant Commandant, Midwestern Signal Corps School, Camp Crowder, Missouri.

ARMY SPECIALIST CORPS

OUR latest information is that there is going to be room for only about 5 per cent of those who have applied for commissions in the Army Specialist Corps but that there is still a chance for good men — because when the Corps gets a call for men of certain qualifications, it digs out the folders of all those in that specialty and picks the best ones available. This corps is really of specialists, men with specialized executive or technical experience of any description.

Chief difference between this and other branches is that the medical examination is only strict enough to insure capability of performing the duties for which the officer is appointed. His appointment releases a trained officer for combat duty. Men under 30½ years of age are not eligible unless classified IV-F in the draft; nor are men in Classes I-A and II at any age. There is no upper age limit. Incidentally, the idea of a maroon arm-band for ASC has given way to the use of a brown plastic for the buttons and collar insignia.

More information and forms are obtainable from Army Specialist Corps, Washington, D. C.

ON ENLISTING

IT IS surprising how many amateurs go to Army recruiting offices to enlist and, upon producing their amateur radio licenses, are still told that they may not enlist direct in the Signal Corps or Air Forces. In some cases they are refused outright, in others they are told that they must first be sent to reception centers to be classified, and when they get there they are refused classification. Our dope is correct: You *can* enlist if you have your amateur license and are otherwise qualified.

If you get in a jam of this sort, telegraph George W. Bailey at 2101 Constitution Ave., N. W., Washington, D. C., or telephone him at Executive 8100, Washington. He remedies such situations in short order. Unfortunately, some hams do not try it and get shunted off to other duties — which is a pity, because radiomen are so badly needed. If you need help, let George do it.

JOBS FOR WOMEN

THE two items for women reported on page 22 of our October issue are still in effect as we go to press.

The Army Air Forces want several thousand women instructors for four radio schools. The minimum requirement seems to be the possession of an amateur license or six months' attendance in a technical radio course. Civil Service. Student instructors are accepted at $1620 a year and given three months' intensive training before being sent to class work with promotion and salary increase. Those already sufficiently experienced to instruct are hired at $2000. All correspondence should be with the Commanding General, Air Forces Technical Training Command, Knollwood Field, North Carolina. But if in doubt as to your qualifications, after reading October *QST*, write to George W. Bailey, 2101 Constitution Avenue, N. W., Washington.

There will be another class for women mechanics opening at the Signal Corps general development laboratory at Ft. Monmouth on December 1st. This involves a six months' course of instruction in the maintenance of Army communications equipment, with $120 a month during instruction; thereafter, employment in the development labs at Monmouth, assisting engineers, at $135. Ages, 16 to 50. Blanks and information from Lt. John T. Freeman, Assistant Personnel Officer, General Development Laboratory, Signal Corps, Fort Monmouth, Red Bank, N. J.

INSTRUCTORS NEEDED

THE urgent need continues for instructors in radio, both theory and code, particularly the former. Air Forces and Signal Corps schools offer Civil Service positions and free schooling in schools-for-instructors, with pay while learning. Innumerable vocational schools across the nation seek instructors on the ordinary oral-contract basis. See the notices beginning on page 19 of September *QST*, page 21 of October. We invite you also to register with the ARRL Personnel Bureau by the form on page 38 of October *QST*.

Your Milliammeters Desperately Needed!

The Signal Corps is in acute need of thousands of milliammeters. They are most urgently required in connection with the production of other radio gear. Lack of them is retarding the manufacture of important military apparatus. The situation is really critical.

Amateurs have thousands of milliammeters and the Signal Corps wants to buy them, but regulations would require formal contracts with every selling amateur and would delay the procedure beyond endurance. ARRL has leaped into this situation at the request of the Signal Corps and, to speed things up, will purchase and pay for meters in their behalf and turn them over as fast as they can be collected.

This is a clarion call, fellows. Send in your milliammeters to ARRL! On behalf of the Army we will pay $3 for every d.c. milliammeter of up to 500 ma. full scale which is sent in to us, of whatever make, the amateur list price of which exceeds $3 and which is accepted by the Signal Corps. Meters not accepted will be returned. *Only* milliammeters and *only* d.c. May be either (1) in good working condition or (2) burned out but otherwise OK — movement, glass, scale, pointer must be OK. The crying need is for low values, preferably 0–1 ma., 0–5 and 0–10, but we'll take everything up to 0–500. Don't hold out your Weston 301s; this is for Uncle Sam and every one of these meters will do a most important job, the details of which we can't tell you. Three dollars for a burnt-out dog may be big money but it isn't much for a 301; everybody admits it. It's just a token payment, not representing value returned. We must count on your patriotism, your appreciation of the criticalness of the need, your acceptance of a flat average price of $3 for all your milliammeters, good and bad, which are accepted. Reimbursement by ARRL.

This is a case of dire necessity. Much depends upon this drive. Remember, too, that a favor to the Signal Corps now is a favor to hamdom later. Your meter will help cement a friendship that will last a generation. Besides, it's your country. The hell with the holes in the panels; you can get more milliammeters when you need them. Come on with them, you fellows! At once! Pack carefully in shock-absorbing material, mark package "Meters," be sure to show your name and your own complete mail address clearly, prepay charges, ship any way you like, to:

American Radio Relay League
38 LaSalle Road
West Hartford, Conn.

IN THE SERVICES

As we go to press each month before the previous issue is in the hands of readers, there has been no opportunity to receive comments on the new form of this department. Hence it continues as is. Be sure and drop us a line whether you like it or would rather return to the old form with less names and more news.

Again let us urge you to send your name, call, rank or rating, outfit and P. O. address to League Hq. for our roster of amateurs in the service. If you do not wish this information to appear in *QST*, it will be held confidential, but many of your friends in and out of the service ask for your latest address and incomplete data causes delay, postal confusion and possible non-delivery of a letter.

NAVY—RADIOLOCATOR DUTY

1HBV, Semolic, RT2c, Brooklyn, N. Y.
2NQO, Pope, RT3c, Bellevue, D. C.
3AKG, Colen, Ens., address unknown.
4EKJ, Maslowski, RT2c, Chicago, Ill.
4GSS, Stancil, Treasure Island, Calif.
5HSQ, Mooring, RT2c, Houston, Texas.
5JIW, Kocher, RT2c, Houston, Texas.
5JYM, Perron, RM2c, Logan, Utah.

The many friends of Lt. Goodwin L. Dosland, 9TSN, USNR, and ARRL Director, Central Division, will be glad to know he has been named Commanding Officer of the U. S. Naval Training School for Radiomen, Miami University, Oxford, Ohio. The new school, accommodating 600 students, will give courses in specialized study and graduates will be sent to sea duty with the fleet or shore duty at a Naval station. Official U. S. Navy photograph.

6JPU, Saroyan, RM2c, Treasure Island, Calif.
6PYO, Bent, RT3c, Logan, Utah.
6QAA, Walters, RT2c, Logan, Utah.
6RRT, Lutz, RT2c, Treasure Island, Calif.
7CAL, Earle, RT2c, Logan, Utah.
7EPS, Treadwell, RT2c, Logan, Utah.
7HCN, Thun, RT2c, Logan, Utah.
8EDJ, Leibold, RT2c, Chicago, Ill.
8LDD, Douthett, RT2c, Chicago, Ill.
8SST, Dudek, RT3c, address unknown.
8VIT, Musson, RT3c, Chicago, Ill.
9AZX, Block, RT2c, Chicago, Ill.
9BFQ, Wehner, RM2c, Ft. McDowell, Calif.
9CDS, Zalom, RM3c, Texas A & M, Texas.
9DFV, Gresso, RT2c, Chicago, Ill.
9DZB, LaRue, RT2c, Houston, Texas.
9EZG, Knickerbocker, RT2c, Texas A & M.
9HBU, Welley, RM2c, Treasure Island, Calif.
9JQZ, Thoreson, RT2c, Chicago, Ill.
9LSR, Hood, RT2c, Chicago, Ill.
9LYO, McKenzie, RT3c, Chicago, Ill.
9OBC, Olson, address unknown.
9SWY, Campbell, RT3c, Great Lakes, Ill.
9UDZ, Pleasant, RT3c, address unknown.
9YFC, Scriven, RT2c, address unknown.
9ZQW, Thompson, RT2c, Treasure Island, Calif.

Operator's license only:

Mandelco, RT2c, Chicago, Ill.
Munson, RE, Washington, D. C.
Schattauer, RM2c, Chicago, Ill.

ARMY—SIGNAL CORPS

1ADB, Muise, Pvt., Ft. Monmouth, N. J.
1FL, Meserve, Major, Presque Isle, Maine.
1HJA, Sullivan, Staff Sgt., foreign duty.
1LZB, Lanoue, Pfc., Langley Field, Va.
1MKD, Bosse, Grenier Field, Manchester, N. H.
1MNJ, Satterlee, address unknown.
1NBT, Holmes, Pvt., Ft. Monmouth, N. J.
1NTD, George, Spec., Ft. Monmouth, N. J.
2CA, Dreyfus, Major, Ft. Hancock, N. J.
2EQD, Skinner, Lt., Ft. Monmouth, N. J.
2FNI, Cross, Pvt., Ft. Monmouth, N. J.
2HVR, Kling, Pvt., Ft. Monmouth, N. J.
2KIZ, Aclin, Lt., Camp Gordon, Ga.
2NZQ, McGuire, Master Sgt., Ft. Monmouth.
3BNK, Eppley, Pvt., Camp Murphy, Fla.
3CKF, Stanley, Pvt., Omaha, Neb.
4DCT, Spainhour, Staff Sgt., Ft. Monmouth.
4GPV, Ham, Pvt., Memphis, Tenn.
4HXM, Trued, Pvt. Camp Crowder, Mo.
4TZ, Hunter, Ft. Monmouth, N. J.
5BDA, Alexander, Pfc., Camp Crowder, Mo.

5BRS, Hornburg, Pfc., Camp Crowder, Mo.
5EIS, Porter, address unknown.
5EIV, Wopsley, Cpl., Ft. Monmouth, N. J.
5GZR, Holt, Sgt., Ft. Huachuca, Ariz.
5IBY, McKee, Lt., foreign duty.
5JYR, Samson, Pfc., foreign duty.
6KNP, Hertel, foreign duty.
6NNX, Glidden, Pvt., Omaha, Neb.
6OSM, Stern, Tech. 5th, Ft. Monmouth, N. J.
6PRM, Boyd, Cpl., Kansas City, Mo.
6RFY, West, Pfc., Camp Crowder, Mo.
6TFD, Glaspell, Pvt., Ft. Monmouth, N. J.
6TFE, Ebersol, 1st Lt. MIT, Cambridge, Mass.
7DTH, Barnes, Pvt., Ft. Monmouth, N. J.
ex-8CML, Evans, Capt., Greenville, Miss.
8MYQ, Lucia, Sgt., foreign duty.
8NQV, Gough, Pvt., Camp Crowder, Mo.
8NXK, Craig, Cpl., Ft. Monmouth, N. J.
8OSH, Foster, address unknown.
8QOD, Kochendarfer, Pvt., Ft. Monmouth, N. J.
8LRL, Mast, Pvt., Ft. Monmouth, N. J.
8SCE, Becker, Sgt., foreign duty.
8THK, Eckles, Pvt., Omaha, Neb.
8TKU, Satterlee, Pvt., Ft. Monmouth, N. J.
8TPL, Liccione, Pvt., Ft. Monmouth, N. J.
8UQT, Agresti, Master Sgt., Ft. Monmouth, N. J.
9BEC, Siggins, Staff Sgt., Ft. Monmouth, N. J.
9DNS, Stoker, Pvt., Camp Crowder, Mo.
9DPU, Kiewel, Cpl., Omaha, Neb.
9DRF, Naylor, Pvt., Omaha, Neb.
9FOS, Trusler, 2nd Lt., Ft. Monmouth, N. J.
9GZS, Resl, Pfc., foreign duty.
9ISM, Forrest, Pvt., Camp Pickett, Va.
9IWH, Irwin, Pvt., Omaha, Neb.
9KPG, Heinrich, Pvt., Ft. Monmouth, N. J.
9KTS, McAbee, Tech. 4th, foreign duty.
9KTU, Austin, Pvt., Ft. Monmouth, N. J.
9KVZ, Mack foreign duty.
9LMQ, Fleming, Pvt., Ft. Monmouth, N. J.
9PBI, Rosenberry, Pvt., Ft. Monmouth, N. J.
ex-9QOD, Smith, Sgt., Omaha, Neb.
9RPE, Scryver, 1st Lt., Chicago, Ill.
9RWN, Nelson, Pvt., Ft. Monmouth, N. J.
9STI, Watterberg, Pvt., Ft. Monmouth, N. J.
9SZE, Stewart, 1st Lt., foreign duty.
9UPM, Gerlach, Staff Sgt., Ft. Monmouth, N. J.
9YJV, Siik, Pvt., Ft. Monmouth, N. J.
9YWC, Hills, Pvt., Ft. Monmouth, N. J.

Operator's license only:

Cude, Pfc., Camp Crowder, Mo.
Froke, 2nd Lt., location unknown.
Fullerton, Cpl., Dilworth, N. C.
Hessler, Pvt., foreign duty.
Lavetsky, Pvt., Camp Crowder, Mo.
Payouk, Pvt., Ft. Monmouth, N. J.
Wilson, Pvt., Camp Crowder, Mo.

COAST GUARD

1AII, McHenry, CRM, Atlantic City, N. J.
1JFN, Budlong, Lt., Washington, D. C.
1KBP, Craddock RM3c, Atlantic City, N. J.

RM3c Charles Louis Yesensky, 7IAX, recently graduated with honors from the U. S. Naval Training School (Radio), University of Wisconsin, Madison, achieving the highest grade among the shipmates in his class. He is seen here receiving his diploma and rating badges from Lt. Cmdr. Elmer H. Schubert, 8ALW/8NC, Commanding Officer of the school.

1KKO, Chase, RM2c, Atlantic City, N. J.
1LWF, Watson, RT2c, Boston, Mass.
2KFC, Jarnefeld, RM2c, address unknown.
2NZA, Siegler, RM3c, Atlantic City, N. J.
2PGX, Roberts, CRM, Atlantic City, N. J.
3GMI, Pallett, RM3c, Atlantic City, N. J.
3JYM, Charley, RM3c, Atlantic City, N. J.
5JPN, Johnson, RM3c, Atlantic City, N. J.
ex-6GJ, Gaugh, CRM, Atlantic City, N. J.
6NVN, Lucchi, RM3c, Westport, Wash.
ex-6PFE, Baumann, RM3c, San Pedro, Calif.
6RDW, Bryan, RM3c, Alameda, Calif.
6RSO, Garner, RM3c, Atlantic City, N. J.
8GJS, Golding, address unknown.
8LXP, Sharp, EM3c, Cleveland, Ohio.
8RCQ, Brown, RM3c, Atlantic City, N. J.
8TBW, Ogden, RM3c, Atlantic City, N. J.
8UJE, Watt, RM3c, Atlantic City, N. J.
8WDQ, Brewster, RM3c, Atlantic City, N. J.
9GKX, Beaupre, RM3c, Atlantic City, N. J.
9GNG, Schuckhart, RM3c, Atlantic City, N. J.
9KYW, Weinberger, RM3c, Atlantic City, N. J.
ex-9NKM, Hibler, RM3c, Atlantic City, N. J.
9OMN, Watson, RM3c, Atlantic City, N. J.
9OZO, Albee, RM3c, Atlantic City, N. J.
9QEL, Swentzel, RM3c, Atlantic City, N. J.
9VQE, Bellman, RM1c, Boston, Mass.
9YKK, Scroggs, RM3c, Atlantic City, N. J.
9ZVC, Petroski, CRM, Atlantic City, N. J.

Operator's license only:

Bolt, RM3c, Atlantic City, N. J.
Gaskin, RM3c, Atlantic City, N. J.

AIR FORCES

1BPU, Grzegorowicz, Pvt., Galveston, Texas.
1EMG, Morris, Pvt., Sioux Falls, S. D.
1HTQ, Mackiernan, Lt., Washington, D. C.

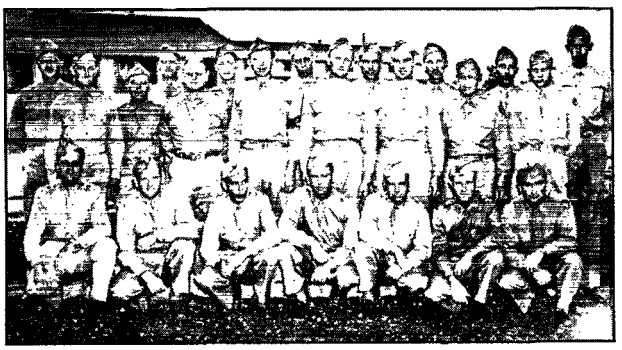
1HWY, Sinclair, Pvt., Sioux Falls, S. D.
1KQV, Owen, Lt., Randolph Field, Texas.
1KTV, Newick, Pvt., Jefferson Barracks, Mo.
1LMU, McDade, Pvt., Scott Field, Ill.
1MGT, Griswold, Bradley Field, Conn.
1NNP, Mills, Staff Sgt., Bradley Field, Conn.
2GGH, Stephen, A/Cadet, Scott Field, Ill.
2MQD, Soltis, Pvt., Camp Young, Indio, Calif.
2NWN, Behnke, Pvt., Sioux Falls, S. D.
3ALB, Lewis, Pvt., Goldsboro, N. C.
3HJC, Batte, Major, Mitchel Field, N. Y.
3HVJ, Hannum, A/Cadet, Scott Field, Ill.
3IRX, Thoemmes, A/Cadet, Scott Field, Ill.
3JPH, Davis, Pvt., Ft. Knox, Ky.
4COV, Buchwald, address unknown.
4EIW, Clark, address unknown.
4ERU, Burgess, address unknown.
4GEE, Heuer, address unknown.
4GYK, Carpenter, A/Cadet, Maxwell Field, Ala.
5BHO, Calk, 2nd Lt., Miami Beach, Fla.
5BKJ, Johnson, Kelly Field, Texas.
5BKW, Havard, 2nd Lt., Randolph Field, Texas.
5BNG, Harbin, Brooks Field, Texas.
5BVG, Gassett, Kelly Field, Texas.
5BWM, Hasbrook, address unknown.
5CQI, Larson, 2nd Lt., address unknown.
5FAY, Jaggi, address unknown.
5GSB, Swanson, WO, Kirkland Field, N. M.
5HBQ, Fry, Sgt., Brooks Field, Texas.
5HHE, Garren, Kelly Field, Texas.
5IQQ, Strickland, 1st Lt., Uvalde, Texas.
5ITU, Bryan, Ellington Field, Texas.
5IYN, Lupton, Biggs Field, Texas.
5JEP, McKinney, A/Cadet, Scott Field, Ill.
5JFI, Scott, Ellington Field, Texas.
5JVK, Teesdale, Ellington Field, Texas.
5JXU, Holbrook, Ellington Field, Texas.
5JZX, West, Biggs Field, Texas.
5KDZ, Benskin, A/Cadet, address unknown.
6FZQ, Spitz, Lt., Miami Beach, Fla.
6IUQ, Miller, Lt., Miami Beach, Fla.
6OGP, Hilbun, Hensley Field, Texas.
6PHS, Parks, 1st Lt., Long Beach, Calif.
6ZF, Marton, 1st Lt., Miami Beach, Fla.
7EAA, Hale, Tekoa, Wash.
8MFV, Bettelon, Pvt., Sioux Falls, S. D.
8OQY, Barrett, Sgt., Ft. Knox, Ky.
8OTT, Shotwell, 1st Lt., Miami Beach, Fla.
8QOT, Devereaux, Pvt. Jefferson Barracks, Mo.
9PTI, Fox, 2nd Lt., Miami, Fla.
9QIT, Wilson, Biggs Field, Texas.
9RHP, Pietraszewicz, Pfc., Muroc, Calif.
9TZS, Millburn, Kelly Field, Texas.
9VZR, Benson, A/Cadet, Scott Field, Ill.
9WEN, Littlewood, A/Cadet, Scott Field, Ill.

Operator's license only:

Gendron, A/Cadet, Roswell Field, N. M.
Matragola, 2nd Lt., Scott Field, Ill.
Tramer, Technical Sgt., Atlantic City, N. J.

MARINE CORPS

1FCC, Story, Staff Sgt., Corpus Christi, Texas.
1NOW, Hunt, Capt., Camp Murphy, Fla.
ex-2QS, Waugh, Capt., West Palm Beach, Fla.
3ATF, Reed, Staff Sgt., Quantico, Va.
3EWF, Green, Lt., San Diego, Calif.
3RK, Kern, 1st Lt., Camp White, Oregon.
4IGT, Giddings, Pfc. Quantico, Va.
5AQN, Wright, Galveston, Texas.
5AXA, Maupin, Technical Sgt., San Diego.
5COH, Davidson, Staff Sgt., Bellevue, D. C.
5CUR, Wharton, Staff Sgt., San Diego. Calif.
ex-5EDA, Deltz, Staff Sgt., Bellevue, D. C.
5ENI, Gillett, Capt., Santa Barbara, Calif.
5GLJ, Marti, Staff Sgt., Bellevue, D. C.
5GNX, Carabin, Staff Sgt., Bellevue, D. C.
5GQA, Hilbun, Staff Sgt., Bellevue, D. C.
5IZA, Holland, Staff Sgt., San Diego, Calif.
5IZH, Stuart, Staff Sgt., Corpus Christi, Texas.
5KRS, Young, Staff Sgt., address unknown.
6CRK, Rathbun, Staff Sgt., Bellevue, D. C.
6KEO, Creighton, Staff Sgt., Bellevue, D. C.
6PNH, Snow, Technical Sgt., Washington, D. C.
6QUY, Handsaker, Staff Sgt., Bellevue, D. C.
6QVY, Fehr, Staff Sgt., Corpus Christi, Texas.
6RGO, Vaughan, Capt., Quonset Point, R. I.
6RMJ, Lemke, Staff Sgt., Bellevue, D. C.
6SDL, Lord, Technical Sgt., Washington, D. C.
7HXQ, Dyer, Staff Sgt., Camp Elliott, Calif.
7ISM, Dreher, Staff Sgt., Bellevue, D. C.
8IGB, Wolpert, Staff Sgt., Bellevue, D. C.



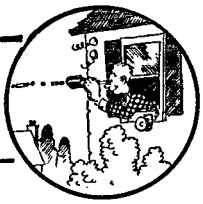
Among 115 graduates from the Officers' Training School, Aviation Cadet Training Center, San Antonio, Texas, are 23 amateurs from all parts of the country. Commissioned directly from civilian life, their graduation as Lts. marks the end of a month's training for special duties in the Army Air Forces. Front row — L. to r.: Keene, 1LYU; Harris, ex-5AXP; Fulwiler, 5DYN; Bolin, ex-9BR; Dukes, 8LLA; Carpenter, 9PIY; and Brougher, 5HPB. Back row — L. to r.: Mullany, ex-7IA; Worley, 5FNR; Princell, 9DWK; Rolls, ex-5AVD; Sill, 8RKN; Donavan, ex-5EDK; Rawlinson, 5CDK; Graham, 5IJK; Sigafoose, 8DDY; Obrig, 2BBV; Briggs, 1KHE; Gray, 9FLW; Pelle, 9BZS; Booker, 9WZU; Dugan, 9BJG; Belcher, KGZQ. Official U.S. Army photo.

8NTK, Gallagher, Staff Sgt., Quantico, Va.
8QIT, MacKenzie, Staff Sgt., Quantico, Va.
8RXG, Close, Staff Sgt., Washington, D. C.
8VDL, Old, address unknown.
9EUJ, Wheaton, Staff Sgt., Corpus Christi.
9GMB, Phenix, Sgt., San Diego, Calif.
9III, Laucks, Staff Sgt., Quantico, Va.
9JHL, Kohring, Staff Sgt., Bellevue, D. C.
9JKL, Dee, Pvt., San Diego, Calif.
ex-9JQU, Sutton, Staff Sgt., address unknown.
9JTV, Beasley, Staff Sgt., Bellevue, D. C.
9MTJ, Yoder, Staff Sgt., Bellevue, D. C.
9OEK, Brown, Staff Sgt., Bellevue, D. C.
9PHJ, Ladwig, Staff Sgt., Corpus Christi, Texas.
9RTZ, Cooper, Pvt., San Diego, Calif.
9STB, Hill, Staff Sgt., Bellevue, D. C.

ARMY—GENERAL

1AIO, Penney, Pvt., Camp Blanding, Fla.
1FFL, Lessard, foreign duty.
1FXQ, Cohen, Pvt., Ft. Devens, Mass.
1IJB, Bellerose, address unknown.
1JJD, Moran, address unknown.
1JOW, Dodd, Sgt., address unknown.
1JJY, Riley, 1st Lt., foreign duty.
1JXU, Twombly, Lt. Col., foreign duty.
1KMH, Shepard, address unknown.
1JNP, Kaplan, Lt., Ft. Ethan Allen, Vt.
1TA, Gallagher, address unknown.
2CLV, Harris, Lt., Mitchel Field, N. Y.
2DPB, Rauch, Cpl., Ft. Knox, Ky.
2FEC, Schermerhorn, Pvt., Ft. Knox, Ky.
2FJE, Hodson, address unknown.
2FKF, Meeker, address unknown.
2HDV, Colket, address unknown.
2HTU, Dickinson, Lt., address unknown.
2KIF, Reighenbach, Staff Sgt., foreign duty.
2KZV, Wolinsky, Sgt., address unknown.
2LBQ, Wilhelm, Master Sgt., Brooklyn, N. Y.
2LEL, Masten, Tech., West Point, N. Y.
2LRZ, Conway, Major, address unknown.
3EKS, Briggs, Pvt., Camp Pickett, Va.
3EZQ, Raney, Lt., foreign duty.
3FWF, Young, Lt., Baltimore, Md.
3GYU, Rintye, Pfc., address unknown.
3HBE, McNemar, Technical Sgt., Washington.
3HJE, Kreiser, Staff Sgt., address unknown.
3HLS, Danser, Capt. Ft. Lewis, Wash.
3HTX, Snyder, Pvt., Ft. Monroe, Va.
3IKQ, Neupauer, Pvt., Ft. Bragg, N. C.
3IWM, Shuler, Major, Ft. Belvoir, Va.
3MU, Welzel, Pvt., Camp Blanding, Fla.
4AKJ, Hamlett, address unknown.
4DEN, Beardsley, 1st Lt., MacDill Field, Tampa.
4DOV, Lewis, Major, Camp Shelby, Miss.
4EZO, Harrison, Sgt., address unknown.
K5AK/K5AX, Ziehm, foreign duty.
5BUV, Murgatroyd, 1st Lt., Goodfellow Field.
5CNA, Riely, Lt., address unknown.
5CQH, Mapes, Sgt., address unknown.
5DJA, Eversole, Sgt., Ft. Sam Houston, Texas.
5DRO, Moore, Lt., address unknown.
5DTI, Arnold, Lt., foreign duty.
5GOZ,Halliday, Major, Ft. Sam Houston, Texas.
5GWM, James, Sgt., Ft. Sam Houston, Texas.
5HIQ, Hoff, address unknown.
5HUV, Walker, Technical Sgt., address unknown.
5IBY, McKee, 2nd Lt., foreign duty.
5IHG, Batjer, Capt., Goodfellow Field, Texas.
5IHT, Nelson, address unknown.
5KBI, O'Connor, 2nd Lt., Camp Atterbury, Ind.
5KDX, Gardener, Ft. Sam Houston, Texas.
5KLS, Duer, foreign duty.
6GQT, Mundt, Cpl., foreign duty.
6KQG, Street, 1st Lt., Foster Field, Texas.
6QDN, Goranson, foreign duty.
ex-7BFQ, Messersmith, Sgt., foreign duty.
7GVN, Frazer, Pvt., Camp White, Oregon.
7HOJ, Herrick, Lt., foreign duty.
8AJV, Salitros, address unknown.
8ATN, Kelting, address unknown.
8BYG, Ettari, Pvt., Ft. Knox, Ky.
8JLR, Laycock, address unknown.
8LHE, Anderson, address unknown.
8LZE, Tune, Pvt., Ft. Benning, Ga.
8MCQ, Repp, address unknown.
8MQV, Shannon, Cpl., Camp Crowder, Mo.
8OWB, Webb, Lt., Harrisburg, Pa.
8PEU, McCauley, Camp Gordon, Augusta, Ga.
8PUZ, Bechtold, New Cumberland, Pa.
8QOU, Lang, address unknown.
8SIX, Volzer, Capt., Ft. Leonard Wood, Mo.
8SNQ, Howard, address unknown.
8SUD, Caswell, address unknown.
8TGG, Jakab, address unknown.
8TNF, McCall, Pvt., Washington, D. C.
8TXI, Englehart, address unknown.
8TZW, Repp, Tech. 4th, Camp Gordon, Augusta.
8UZO, Spechala, address unknown.
8VBZ, Perry, address unknown.
8WFW, Neitz, address unknown.
9AXR, Cohen, Pvt., Camp Robinson, Ark.
9BML, Wood, address unknown.
9CND, Schradsky, address unknown.
9CUV, Lynch, Staff Sgt., Camp Hood, Texas.
9DDU, Davidson, foreign duty.
9DGA, McGuyer, Cpl., Kansas City, Mo.
9DWD, Hughes, address unknown.
9FNL, Adams, Lt., Camp Murphy, Fla.
ex-9FSG, Conway, Capt., foreign duty.
9GKN, Little, Pvt., Jefferson Barracks, Mo.
9GOE, Gorman, Capt., Midland, Texas.
9IBZ, Johnson, Pvt., Camp Davis, N. C.
9IDZ, McKay, Lt., Ft. Wayne, Ind.
9IHK, Sorensen, Staff Sgt., foreign duty.
9IOG, Mitchell, Pvt., Ft. Monroe, Va.
9ISM, Forrest, Pvt., Camp Pickett, Va.
9IXC, Uthus, Sgt., foreign duty.
9KMY, McClain, Pfc., Camp Chaffee, Ark.
9LFU, Hargrove, Lt., Long Branch, N. J.
9LRL, Anthony, Pvt., San Francisco, Calif.
9NZF, Linn, Lt., Camp Funston, Ala.
9OLL, Holcomb, Lt., Ogden, Utah.
9OOG, Brainerd, address unknown.

EXPERIMENTER'S SECTION



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

PROJECT A

Carrier Current

WHILE awaiting authorization for WERS by FCC in this vicinity, members of the Charlotte Amateur Radio Club have participated in carrier-current tests using the apparatus described by W1JPE in March *QST*, page twelve. Our apparatus has been operated on 160 kc., and the first contact was less than one-quarter mile away by air, with the signal buried in interference with an estimated strength of S1 to S3. It was later learned that this signal had traveled three miles to a substation, transferred to a high line for about three miles and, from a second substation, another three miles to the receiving point — about nine miles by wire, although less than one-quarter mile by air!

Further tests were made at other locations with a distance of about one-half mile, by air or wire, and the signal was S9 plus using c.w. and 'phone. No interference with broadcast or any other service was reported or could be found. These tests have been participated in by W4BX, W4CAY, W4FUU, W4HJY and W4NX.

Some explanation of the variation in the above two cases might not be amiss to help others working on the project. These are offered without any intention of becoming involved in technicalities, but to give a broad, general picture which we have not yet seen in print as applied to this project. Power-distribution systems consist of multiple-phase circuits with the familiar three-phase circuit predominating. Three-phase systems of two general types will be found. In one type, delta-connected transformers are used, while Y-connected transformers are used in the other type. The Y- connection is used in systems in which a grounded neutral is desired. Various voltages are used for the high lines and in primary and secondary circuits. Y-type systems frequently operate at 13,000 volts, 4000 volts and 220 volts, while the delta systems may operate at 88,000 volts, 2300 volts and 220 volts. Other voltages may be found in some sections.

To provide adequate distribution, one or more high lines will serve a given area with substations in strategic locations from which may emanate five or ten or more high-voltage lines, each of which will feed any number of low-voltage secondaries to serve a single customer, part of a city block or several blocks. The substation may be fed from one high line at one time and from another at another time. From this, it can be seen that an infinite number of multiple or parallel circuits may form a network with varying impedances at any given location. For carrier currents, this impedance may vary from less than one ohm to over a hundred ohms, depending upon the frequency of the carrier current. This possible mismatch of carrier-current impedances can be noted each time it is necessary to pass a step-up or step-down transformer, since the voltage ratio is the determining factor. However, we have not found that it is important to determine the impedance. If the value is assumed to be in the neighborhood of or below 35 ohms, the signal will get there, even under extremely trying circumstances.

For those who can borrow a copy of *Electronics* for August, there is reported the results of some OCD carrier-current tests using a test frequency of 720 kc. on a Y system. The results of their tests and ours are not discouraging and the usefulness of this project is far from exhausted. Those who have the aerial delta-type distribution system are indeed fortunate, since the results seem to indicate that this type is superior to the grounded Y type (aerial or underground). Unfortunately, however, the latter type predominates, because it has certain advantages in power distribution. — *William C. Cloninger, W4NX.*

Of possible interest to those who have been playing with "other-than-radio" communication is the result of my recent experiment with the transmission of audio-frequency signals over the a.c. power lines.[1] As these lines are really designed for the transmission of low-frequency alternating current, it is reasonable to expect that their transmission characteristics would be somewhat better for signals in the audible region of frequency than for the high-frequency carriers being used by some experimenters.

In order to determine the suitability of the

[1] It is reported that audio frequencies are being used by power companies in some sections of the country for the remote control of domestic water heaters, etc Before attempting communication at these frequencies over power lines, it is important that experimenters first determine if such use is being made of the lines over which they plan to make tests. — ED.

power lines for communication of this type, a small 500-cycle alternator was coupled to the 115-volt line through a 4-μfd. condenser which served to prevent large 60-cycle currents from flowing in the generator. This "transmitter" was capable of producing line currents of 5 or 6 amperes. The "receiver," which was located a mile away airline, and about three miles away by wire, consisted of a microphone transformer coupled to the line through a 0.1-μfd. condenser, with a pair of headphones connected across its high-impedance winding.

With this simple set-up, which contained no amplifier whatsoever, perfectly readable signals were received at the very first try. Subsequent tests showed that a 10-volt filament transformer and a 1-μfd. condenser at the receiving end produced a somewhat louder signal than did the combination of microphone transformer and 0.1-μfd. condenser. A Millen Heterofil proved helpful in eliminating some objectionable harmonics of the 60-cycle current, but decreased the signal a bit. Lack of time has made impossible any further investigation of this type of transmission. However, as the transmitter and receiver in the experimental set-up were on separate branches of the city's distribution system, making it necessary for the signal to travel through the transformer which connects the city distribution to the high-tension line, it would not be too surprising to find the signal readable in some of the neighboring towns which are operated from the same high line.

The impedance presented to the generator by the power line is extremely low; it is of the order of one ohm or so, because of the very heavy resistance loading which is always on the power system. It is thus necessary to produce fairly large line currents in order to get any appreciable power output from the transmitter. An improvement on the transmitting connection used would have been to step the generator output down to 15 or 20 volts, and then couple to the line through a circuit series resonant at the signal frequency. Such circuits are not at all difficult to adjust, as a suitable variable inductance can be made by winding magnet wire around a cardboard tube, and providing a bundle of iron wire as a movable core which can be moved in and out of the tube. Such a circuit would present a sufficiently high impedance to the 60-cycle current to prevent short-circuiting of the power line through the low-voltage winding. A similar hook-up at the receiving end would serve to step up the voltage of the received signal to a usable level and would, no doubt, be an improvement over the elementary equipment used in the test. A husky modulator would probably be a better signal source than was the 500-cycle alternator, as the frequency would not vary with the load when keyed and higher signal frequencies could be obtained.

The most troublesome interference encountered was from harmonics of the 60-cycle frequency and from commutator hash from some small electric drills which were being operated on the same line as the receiver. Most of this trouble could be eliminated by using a higher signal frequency and an appropriate high-pass filter.

Amusing sidelight: the XYL (W1MTB/9) reported S7 signals emanating from her sewing machine, which was on the same house circuit as the transmitter! — *B. Whitfield Griffith, Jr., W1NJL/9, ex-W5CSU.*

After a period of trying to find time and enough interested parties, we are finally organizing a wired-wireless net here in Auburn, Ala. We would like to register for this work with the Experimenter's Section. The only hams affiliated so far are W4GPW, W4HIJ and W4IDB. However, these are several non-ham experimenters who are very much interested in the project.

We plan to work somewhere around 160 kc. Luckily, the longest distance involved is about six blocks. Since all of us are going to college and some of us are working in war-training schools, our time will be very limited. However, we expect to get things going within the next month.

I believe this will be the answer to our wartime ham problem, as well as being a big help to those who want to get a ticket after the war is over. Our thanks to you for the shove that got us started. — *Richard H. Houston, W4GPW.*

Shortly after starting work with the carrier-current transmitters suggested in *QST*, it became apparent that some changes could be made that would increase output and give better results. Accordingly, we changed our transmitters to the old-time oscillator-amplifier type. We use the shunt-fed Hartley for the oscillators and series-fed amplifier circuits. Usually we tune the amplifiers by changing inductance, since the capacity is fixed. The oscillators are usually tuned with a three-section broadcast-type variable condenser with all sections in parallel. This method enables us to tune the oscillator to the amplifier frequency. Since we use very large condensers and small inductances, the variation in frequency available is very small. We use from 0.005 to 0.007 μfd. for tuning. This means that the amplifier is usually tuned with a fixed capacity of 0.004 to 0.005 μfd. in parallel with the three-section b.c. gang. The chief advantage of large capacities is the gain in circuit Q for harmonic reduction. We use a Q of 12 as a basis.

Our inductances are usually from 225 to 300 μhy. These seem to give a range from about 140 to 160 kc. when used with the previously mentioned capacities. We use 6C5s or 6V6s for oscillators and 6L6s for amplifiers. The oscillators draw about 20 to 40 ma. and the amplifier plate current runs about 60 to 75 ma., depending upon the plate voltage used. We are using more loading than was suggested in *QST*; in fact, we use from

nine to twelve turns with a 0.1-μfd. condenser on one side of the line. This combination will load the amplifier up about 20 ma. from no-load to full-load conditions. The amplifier or oscillator always has to be tuned again after coupling to the line, since the loading seems to have a very pronounced effect on frequency. (This would appear to be the result of insufficient isolation between oscillator and line — Ed.)

The type of wiring at the transmitting and receiving location has a very pronounced effect on reception and transmission. If wiring is enclosed in conduit or BX, signal strength will be way down. The only remedy we have found is to carry the output of the transmitter to the meter box on an open line not shielded. Then this line is coupled as near to the incoming line as possible. If it can be done, it should be coupled ahead of the meter. In any case, be sure to connect a condenser in series with this line, preferably at the meter end.

The receiver works very well on the telephone line. Coupling is made at the point where the lightning arresters are placed, coupling ahead of them is possible. Be sure to use a series condenser here also. We have not figured out why the telephone line gives such good reception when transmitting on the power lines, but we think it is induction from the field around the power lines. The two lines travel on the same poles. This increase in signal strength holds even for stations on the other side of town. However, it does not hold if the telephone lines and the power lines do not parallel each other for a considerable distance.

Results include working an airline distance of five miles across town and through the power substation on c.w. with reliable communication. 'Phone communication is reliable for a distance of about three miles. This 'phone communication is all on one power circuit, although we have been heard at a distance of five miles but not reliably.

We are now working on an emergency communication net using power or telephone lines. This net will comprise about fourteen stations. Emergency-communications receivers will be revamped broadcast sets. We have padded the tuning end of two of them up to the 150-kc. band and they work fine with no other changes. We did add i.f. regeneration to one for c.w. and it puts out a pip of a signal. Four complete transmitters and receivers are now working regularly. — *Paul N. Brown and Raymond L. Wardle, W8KWL.*

Joseph Schneider, 42 Montrose St., Newton, Mass., desires to hear from anyone in his vicinity who is interested in carrier-current or earth-current work. He is in the process of building up gear for both.

In reporting the activities of the carrier-current group around Rochelle Park and Maywood, N. J., in the September issue, we neglected to mention the fact that Sidney Allen, WW2SRA is the leader for that group. WW2SRA was largely responsible for the forming of the group. As reported in September, WW2HMK handles correspondence for the group.

Several of us here in Lexington, Ky., have tried carrier-current communications and I am sure you would like to hear the results.

The distance by power line is roughly six miles, by air, between 2½ and 3 miles. The tube line-up in one unit is a 42 oscillator modulated by another 42. A conventional superhet receiver is used with this rig. I am using a 6SJ7 e.c.o. followed by a 6V6 r.f. amplifier with cathode modulation of the transformerless type utilizing another 6V6. A single-button mike drives a 6SJ7 degenerative speech amplifier.

We discovered that if low power is used (from 3 to 5 watts), it pays to take special care in the adjustment of the coupling to the line for maximum efficiency. The frequency is around 150 kc.

We should like to hear from anyone who has any ideas on improvement of carrier-current systems. — *Edgar L. Watkins, Radio Engineer, U. S. Army, 219 North Upper St., Lexington, Ky.*

PROJECT D

R.F. Induction Fields

I would like to register in the Experimenter's Section for R. F. Induction Fields.

Using a 56 e.c.o. modulated by a single 6J5, Class A, I have been getting fairly good results on a frequency of 600 kc. The modulation is perfect with absolutely no frequency modulation or carrier shift at 60 per cent. The signal can be heard on a car radio up to about 150 feet, but is very weak at this distance. The system exhibits distinct directional characteristics which I believe are due to the electric lines in the vicinity. The signal disappears at about 50 feet from the transmitter in front of the house but can be heard much farther at the rear.

I am thinking very seriously of trying carrier-current experimentation if I can get another interested party. I have an idea that a converter tuned to 175 kc. could be used both for long-range induction work and carrier current. — *Arthur E. Mack, W8WWQ, ex-W2NZH.*

Through a misunderstanding, we quoted W9TWW in last month's report as saying that a distance of 5000 feet had been covered in the last war by an earth-current system shown in Fig. 1 in the October issue. This statement actually referred to a system in which a single wire connected one side of each headset, the return circuit only being via ground. In other words, the system mentioned is the ordinary telephone circuit with ground return.

Hamfest in Khaki

Signal Corps Hams Get Together At Fort Monmouth

In a world at war, hamfests and ham conventions are strictly nonessential items. Nice if you have the time and rubber, of course, but way down on the priority list — for civilian hams, that is. A lot more worthwhile to put in the time organizing that WERS net. . . .

But for the fellows in the services it's another matter. An occasional get-together among the hams in the big military training stations is more than a pleasant supplement to the USO — it's a means of preserving camaraderie and combatting loneliness, and often of getting valuable technical assistance and coöperation. They found that to be true in England, you know; even at the height of the blitz the uniformed Gs still gathered for their gabfests — whether by the half-dozen in a candlelit underground shelter or by the scores in the quiet countryside of a week end.

That, then, is the new style trend in ham gatherings. It's to be "hamfests in khaki" — and blue, too, we hope — for the 1942–1943 season.

We had the privilege of being present at a première of this new order in hamfests on September 4th. Fittingly enough, this hamfest was held at the Signal Corps' Fort Monmouth, home of one of the largest collections of prime military hams in the country. So successful was it and so well did it fit the requirements of a gathering of the sort that we report it in detail for the benefit of the amateur aggregations at other training stations who may wish to follow suit.

We report it, that is, as well as a civilian can report any purely intra-military function. For it must be understood that a hamfest in uniform is in another world from the traditional peacetime camp meetings the Podunk Hollow Club used to hold. It's ham fraternization that provides the bond, true, but for all that the hams are "in the Army now."

As a civilian, you feel that from the first. It begins with the way the armed sentries look you over when you drive through the gates of the reservation. It grows stronger when you walk up the steps of Russell Hall and check in with the Officer of the Day. When the sergeant says, "The lieutenant is sending a detail for you immediately, sir," instead of, "A few of the boys will be over in a minute; stick around," the feeling grows stronger still.

And when you leave the olive-drab command car and enter Recreation Building No. 1, the only civilian in a crowd of khaki-clad soldiers, you know the truth. This *is* the Army.

The familiar hamfest trappings merely emphasize the distinction. The district placards around the walls, the QSL-size call card each ham present displays on his chest — these only accentuate the feeling. Old acquaintances come up to greet you and you look twice at their faces before their uniformed identities arouse civilian recollections.

They still talk ham talk, though, and before long you begin to feel more at home. But the strangeness returns for a time when the program gets under way. Looking over the rows of khaki, even when it is relaxed and "at ease" you know it is the Army. When a man stands up, erect and at attention, and prefaces whatever he has to say with "Sir," you know it even more emphatically. When everyone is attentive and alert and uniformly well behaved you know — well, anyway, you know you're not back at that boisterous Podunk Hollow hamfest of '38!

The program starts off with a community sing, for example. The first song has been given a ham flavor; it's to the tune of "Hail, hail, the gang's all here," and it goes:

> Hail, hail, the hams are here,
> Lemme hear your call sign,
> Then I'm gonna send you mine.
>
> Dit dit dit dah — dit dit dit dah —
> This is our way of talking.
> Dit dit dit dah — dit dit dit dah —
> That's why you hear us squawking.
>
> We're in the code-room now
> With sweat upon our brow.
> We're going to send until the end —
> This is *our* Army now.

Then Lt. Lyman O. Anderson (you find out later that he's the Signal Corps expert on "rangerology" [1] but now you'll settle with calling him the best songleader you ever heard!) swings the boys into "The Band Played On" and a few extra choruses of "Tavern In the Town."

By this time you've settled back and are really beginning to enjoy yourself. You'd like the singing

[1] "Rangerology" is a new type of effective hand-to-hand combat which has been dubbed "a system of silent slaughter." It is now part of the curriculum at Fort Monmouth for Signal Corps soldiers. Named in honor of the fighting exploits of the American rangers, many phases of the system were devised by Lt. Anderson, who now teaches it at Fort Monmouth. Rangerology is a combination of Japanese jiu-jitsu, the fighting tactics of North Woods lumbermen and other murderous tricks devised by Lt. Anderson, himself a former Univ. of Minnesota football, basketball and wrestling star.

to go on all night, but like any good entertainer who leaves the crowd wanting more, Lt. Anderson turns the program over to Lt. Spencer M. Allen, W9JGL, formerly a b.c. announcer on WGN and now assistant public relations officer for the post.

Lt. Allen brings the boys an old-time 10-meter roundtable welcome, and then proceeds to let them in on the newest secret hatched in the development labs. It's the latest thing in sending keys, he says — implying that here is the secret weapon that will whip Hitler. From behind the wings a puffing pair of signalmen haul it out — the one and only "two-handed key." It is a Gulliver-sized instrument with a 4-foot lever and 2-inch contact spacing — and instead of a knob it has handlebars! It's a "mechanized" key, you're told — the only key that carries the operator instead of his carrying it.

The idea, it appears, is that this key is to be used in a code-sending contest. Three two-man teams are entered, one sending and the other receiving. W1KRV sends "the mostest the fastest" to W2IDT and wins a flat fifty of cigarettes, with W9VFZ and W1LDL runners-up and W2MRZ and K5AP trailing. (It looked for a time like the key was "sending" one or two of the contestants instead of vice-versa!)

"Amid jovial hilarity" the sending contest ends and the gang settles down to hear Clinton B. DeSoto, W1CBD, essay the difficult role of seer and prophet under the heading, "Amateur Radio After the War," during which he (to quote *The Signal Corps Message*) "emphasized that the status of post-war amateur radio was in a large part dependent upon the hams in service and their continued demonstration of what their experience has contributed to the war effort."

The next act is a humorous skit by Cpl. Marks and Pvt. Conway of Special Services — and you believe them when they say they came, respectively, from Hollywood and the Broadway stage. They portray the tribulations of an impecunious soldier in the clutches of an avaricious (and completely nuts!) loan shark in a thoroughly professional manner. So professional, in fact, that as actors they disqualify themselves as "hams"!

Again a serious note — and again the Army atmosphere creeps in around you as Lt. Fred J. Skinner, W2EQO, of the Development Labs, displays and discusses some of the newer Signal Corps equipment, specifically the new "handie-talkie" and the cavalry "guidon" radio. The ham atmosphere returns, however, when your neighbor leans over and tells you *sotto voce* of Lt. Skinner's early 56-Mc. exploits as a ham at Columbia University.

Then comes the liars' contest. Actually, it isn't a contest of "lies," for the yarns that win are true ones. K6SAZ tells how, when stationed at Fort Shafter, Hawaii, he first learned that Japan had attacked the United States on December 7th, while QSO with W6QUU in Phoenix, Arizona, 3000 miles away — and then realized that the unprecedented ack-ack he could see over Hickam Field from his operating-room window was no practice but directed against Jap attackers. W5JYX claims that he heard 56-Mc. ham signals from W9 and VE on Army "walkie-talkie" rigs during exercises with the Texas National Guard early in 1939. He is awarded a prize by the judges because it was a neat bit of fabrication, in their opinion. However, he insists that it is fact, s'help him!

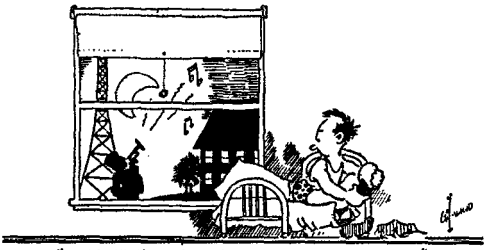
These fellows win the flat fifties that were allocated as prizes, but almost equally entertaining are W4UN, who tells a good old-fashioned lie about getting an emergency message through using umpteen-odd different kinds of power ranging from a hand-cranked generator to a waterless waterwheel; and W2LRG, who sticks to the truth with a tale of DX worked on seventy-five with 1 watt to the Type 19 battery portable described in *QST* a couple of years back.

Before the formal part of the program ends, m.c. W9JGL asks for the roll-call. Well, you tell yourself, here *is* some traditional club-hamfest atmosphere. But then you begin to wonder. Never before except at a national convention did you ever see *all* districts respond — and K5 and K6 on top of that! As might be expected, W9 is the best-represented call area, with 25 in attendance, but W2, W1 and W8 follow closely with 20, 18 and 17 respectively. There are two K6s and one K5 — the latter standing up to report half a dozen more C.Z. boys now on the post who had wanted to come but didn't get there.

Before you leave you garner more statistics. Of the hams present, 25 per cent are instructors in the various classes at the post, 40 per cent in Test and Repair and 25 per cent training to become operators. The ranks present range from buck private to major. There are eight commissioned officers around and a number of officer-candidates. There are even — Lt. Allen remorselessly drags reluctant admissions from the unfortunate wretches — three telephone wiremen with ham tickets!

Taps have long sounded when you reluctantly tear yourself away from the informal hamming and ragchewing that follows. Again the military

(*Continued on page 114*)



"AGAIN THE MILITARY ATMOSPHERE CLOSES IN UPON YOU"

A Course in Radio Fundamentals

Lessons in Radio Theory for the Amateur

BY GEORGE GRAMMER,* WIDF

No. 6—Modulation

THE present installment deals with various methods for modulating a radio-frequency carrier. The experimental work consists in determining the modulation characteristics of r.f. amplifiers, using the point-by-point method, under different conditions of operation. The influence of various factors on the linearity of a modulated amplifier is the chief subject investigated.

Contrary to what might be anticipated, the experiments outlined do not involve actual modulation of a carrier. Such modulation would require additional equipment to that already specified for the series, and under present conditions components of any kind — and particularly audio transformers — are extremely difficult to obtain. It is also a fact that, unless an oscilloscope is available for depicting actual operation with modulation, the use of a modulating signal would add comparatively little to the instructional value of the experiments. Those who do have an oscilloscope and an audio amplifier suitable for modulating the experimental amplifiers can, of course, extend the work. The obvious direction for such an extension to take is in comparing oscilloscope patterns with the performance curves obtained as described in the experiments.

ASSIGNMENT 20

Study *Handbook* Sections 5–1, 5–2 and 5–3, beginning page 84. Perform Exps. 31 and 32.

Questions

1) What is meant by the term "modulation"?

2) What is the function of the microphone in a radiotelephone system?

3) Name the three fundamental methods of modulating a radio-frequency current.

4) What is the "carrier"?

5) In present-day practice, what requirements must be met by the carrier in radiotelephone transmission on communication frequencies?

6) Why is a "buffer" amplifier necessary?

7) Define percentage of modulation.

8) What is meant by "linearity" of a modulated amplifier?

9) Define modulation capability.

10) An unmodulated carrier produces a current of 2.5 amperes in an antenna system. When modulation is applied it is found that the maximum instantaneous amplitude of the current is 4.3 amperes. What is the percentage of modulation, assuming that the modulated amplifier is linear?

11) What is the ratio of average power in a 100 per cent amplitude-modulated wave to the power in the carrier alone, assuming sinusoidal modulation?

12) What is meant by the term "modulation envelope"?

13) What are sidebands?

14) If the modulation applied to a carrier is unsymmetrical, how should the modulation percentage be computed?

15) Describe overmodulation. Why should overmodulation be avoided?

16) A 3900-kc. carrier is modulated by a sinusoidal signal having a frequency of 1600 cycles. What are the sideband frequencies?

17) The audio-frequency output of the modulator of a certain radiotelephone transmitter contains substantially no audio frequencies higher than 4200 cycles. What channel width is required for the modulated output of the transmitter?

18) A transmitter is modulated by a 1000-cycle tone which has pronounced harmonics up to the fifth. If the carrier frequency is 28,650 kc., what are the frequency limits of the channel occupied by the signal?

19) What are spurious sidebands?

20) Name three systems used for amplitude modulation.

21) What is the average ratio of power in speech waveforms to power in a sine wave? How does this affect the required power capacity of the modulator, when plate modulation is used?

22) Define modulating impedance of a Class-C plate-modulated amplifier.

23) A Class-C amplifier is operating at a plate voltage of 2000 and is adjusted so that the plate current is 150 milliamperes. How much audio power is required for plate modulation of the amplifier. for a modulation percentage of 100, assuming that the modulating signal is sinusoidal?

24) What is the modulating impedance of the amplifier in Question 23?

25) Draw a circuit diagram showing plate modulation of a neutralized triode Class-C amplifier, using a Class-B modulator.

26) An amplifier having an audio-frequency power output of 130 watts is available for plate-modulating a transmitter. If the modulation is to be 100 per cent, what is the maximum possible power input to the Class-C modulated amplifier?

27) How can the power input to a Class-C plate-modulated amplifier be adjusted to the proper value for 100 per cent modulation?

28) How may plate modulation be applied to a tetrode or pentode Class-C amplifier? Draw a circuit diagram.

29) Describe the method of using choke coupling between the modulator and modulated amplifier. Why is this system seldom used?

30) Does the d.c. plate current of a properly-operating Class-C amplifier change when the amplifier is plate modulated? Why?

31) A screen-grid Class-C plate-modulated amplifier operates under the following conditions: plate voltage, 2500 volts; plate current, 125 ma.; screen voltage, 400 volts; screen current, 30 ma. If the screen current is to be taken from the plate supply, what value of screen dropping resistor is required, and what is the modulating impedance of the amplifier? How much audio power is necessary for 100 per cent modulation?

32) Why is it necessary to neutralize a triode amplifier as completely as possible when the amplifier is to be modulated?

* Technical Editor, *QST*.

33) Describe the general operating conditions necessary if a Class-C amplifier is to have a linear modulation characteristic.

ASSIGNMENT 21

Study *Handbook* Sections 5–4 and 5–5, beginning page 88. Perform Exp. 33.

Questions

1) What are the advantages and disadvantages of grid-bias modulation as compared with plate modulation?
2) Describe the essential principles of the grid-bias modulation system.
3) Why should the source of fixed bias used with a grid-bias modulated amplifier have low internal resistance?
4) A tube having a rated plate dissipation of 80 watts is to be used as a grid-bias modulated amplifier. What is the approximate carrier power output obtainable? How much power could be secured from the same tube if plate modulation was used?
5) In a grid-bias modulated amplifier, what is the effect on linearity of adjusting for too-high carrier efficiency?
6) Draw a circuit diagram of a Class-C amplifier arranged for grid-bias modulation.
7) Describe the operating principles of suppressor-grid modulation. How does this method compare with grid-bias modulation?
8) Why is it necessary that the r.f. stage driving a grid-bias modulated amplifier have good output-voltage regulation? How can good regulation be secured?
9) Describe a method of adjusting a grid-bias modulated amplifier for proper operating conditions.
10) Why should the d.c. plate current of a properly-operated grid-bias modulated amplifier be constant under modulation? What is the permissible tolerance in this respect? Is constant plate current a certain indication that the amplifier is operating linearly?
11) What is the effect of load resistance on the carrier power output obtainable from a grid-bias modulated amplifier, assuming that the amplifier is adjusted for linear operation?
12) What is the effect of excitation voltage on the linearity of a grid-bias modulated amplifier, assuming that load resistance, d.c. grid-bias voltage, etc., are fixed?
13) Explain the operating principles of cathode modulation.
14) Two tubes each having a plate dissipation rating of 60 watts are to be used in push-pull as a cathode-modulated amplifier. If a modulator having an audio-frequency power output of 80 watts is available, what is the maximum carrier output power obtainable if the modulation percentage is to be 100 per cent? If the plate voltage on the modulated amplifier is 1500, what is the modulating impedance?
15) How should a cathode-modulated amplifier be adjusted for linear operation?

ASSIGNMENT 22

Study *Handbook* Sections 5–6, 5–7, 5–8 and 5–9, beginning page 91.

Questions

1) Why is a Class-B type audio amplifier generally used for plate modulation of a Class-C amplifier?
2) Why is it necessary to have good regulation of the output voltage of the stage driving a Class-B amplifier?
3) What design precautions should be taken to ensure good output voltage regulation of the driver stage?
4) A Class-C amplifier taking a plate current of 180 ma. at a plate voltage of 1250 is to be plate modulated. How much audio-frequency power is required? If the Class-B modulator requires a plate-to-plate load of 10,000 ohms, what is the proper turn ratio of the coupling transformer, assuming that the transformer losses are negligible?
5) Why is it necessary to use a voltage source having low internal resistance to supply grid bias for a Class-B amplifier?
6) Is it safe to operate a Class-B modulator without load?
7) What is the result of overdriving a Class-B modulator?
8) What requirements should be met by the plate supply for a Class-B modulator?
9) What is meant by the terms "sensitivity" and "frequency response" when used in connection with microphones?
10) Describe the principle of operation of four types of microphones and show suitable circuits for connecting them to an amplifier.
11) About what order of output voltage can be expected from a crystal microphone under normal conditions — that is, speech of average intensity — from single-button carbon, double-button carbon, and velocity microphones, when provided with appropriate coupling transformers?
12) What is meant by "stage gain"?
13) What is the general function of a speech amplifier in a modulation system?
14) Why is resistance coupling generally used in voltage-amplifier stages? Under what conditions is resistance coupling inapplicable?
15) What determines the frequency response characteristic of a resistance-coupled amplifier? Over what frequency range is it necessary to have "flat" amplification for satisfactory speech transmission?
16) What is a decoupling circuit, and why is it used?
17) What considerations determine the point in the circuit at which the gain control is placed?
18) An amplifier is to deliver an audio power output of 2 watts when excited by a crystal microphone having a peak output voltage of 0.02 volts with normal speech. Using the tube characteristic tables and the data in Table I, page 97, of the *Handbook*, select a suitable tube line-up and draw a circuit diagram, marking proper values on the components. Indicate proper plate voltages on the circuit diagram.
19) Describe the operation of a phase inverter. For what purpose is such a circuit used?
20) What precautions should be taken to minimize hum in a speech amplifier?

ASSIGNMENT 23

Study *Handbook* Section 5–10, beginning page 98. If an oscilloscope is available, use it in conjunction with Exps. 31, 32 and 33, making connections as described in the *Handbook*. Compare the oscilloscope patterns with the data obtained by measurement and plotted graphically. A suitable modulating voltage must be available for this purpose; 60-cycle a.c. will be quite satisfactory if the voltage can be adjusted to the proper value. A transformer having suitable turns ratio should be used between the modulated amplifier and the 115-volt a.c. line.

Questions

1) What is the difference between the "wave-envelope" and "trapezoidal" patterns used in checking modulation?
2) What connections are necessary between the transmitter and oscilloscope to obtain the wave-envelope pattern?
3) Show a method of connecting the oscilloscope and transmitter for securing a wedge pattern. What precautions are necessary in making these connections?
4) How can percentage of modulation be measured with the oscilloscope?
5) If the voice waveform is found to be unsymmetrical, what can be done in the speech amplifier to insure that "splatter," or spurious sidebands, will be minimized on occasional voice peaks which cause overmodulation?
6) Why is it frequently desirable to connect a tuned circuit to the vertical-plate terminals of the oscilloscope, coupling through a link circuit to the transmitter?
7) In using the wedge pattern, from what part of the audio system should the audio voltage for the horizontal sweep be taken?

8) How can the oscilloscope be used to check the linearity of a 'phone transmitter? Which type of pattern is preferable?

9) If indications of a carrier appear on the oscilloscope screen when the plate current of the modulated amplifier is completely cut off but the transmitter is otherwise operating, what are the possible causes?

10) What is the effect on the modulation pattern of the presence of a radio-frequency voltage on the horizontal plates of the oscilloscope? What can be done to prevent such a voltage from reaching the horizontal plates?

11) Describe a method of checking for spurious sidebands.

12) Name some possible causes for an upward shift in plate current with plate modulation; with grid-bias modulation.

13) If the carrier is found to have excessive hum modulation, how can the cause of the hum be localized?

14) What is the common indication of the presence of r.f. in the audio system? What precautions are necessary to prevent such r.f. pickup?

15) Name some possible causes of a downward shift in plate current with plate modulation; with grid-bias modulation.

ASSIGNMENT 24

Study *Handbook* Sections 5–11 and 5–12, beginning page 102. Perform Exp. 34.

Questions

1) How does frequency modulation differ from amplitude modulation?

2) Define frequency deviation and deviation ratio.

3) In what two respects does frequency modulation have distinct advantages over amplitude modulation? What is the chief disadvantage of frequency modulation from a practical communication standpoint?

4) Explain why a large deviation ratio gives an improvement in signal-to-noise ratio as compared to a low deviation ratio.

5) Why is a frequency modulation system less sensitive to natural static and other electrical noises than an amplitude modulation system?

6) Describe the operating principles of a simple type of reactance modulator.

7) What is meant by the "sensitivity" of the modulator?

8) A reactance modulator used in conjunction with an oscillator adjusted to a mean or carrier frequency of 3.58 megacycles is capable of causing the frequency to deviate linearly 1 kc. on either side of the carrier. If the output of the transmitter is to be in the 56-Mc. band, what is the output carrier frequency, and the output frequency deviation? What is the deviation ratio if the upper limit of audio frequencies to be transmitted is 4000 cycles?

9) What is meant by linearity of a frequency modulation system?

10) Why is it desirable to stabilize the d.c. voltages applied to a reactance modulator and its associated oscillator?

11) An f.m. transmitter to operate on 112.6 Mc. is to have a deviation ratio of 5, based on an upper audio frequency limit of 4000 cycles. If the oscillator and reactance modulator are to be operated in the 7-Mc. band, over what frequency range should the modulator operate linearly? What is the maximum frequency deviation required at the fundamental frequency?

12) What is the effect on the sensitivity and linearity of a reactance modulator of varying the circuit constants of the r.f. voltage divider across the oscillator tank circuit?

13) Describe a method of using a selective receiver to check frequency deviation of a reactance-modulator system.

14) What is the effect on linearity of excitation voltage and plate-circuit loading in the r.f. stages of a frequency-modulation transmitter?

15) How do the sidebands generated by frequency modulation compare with those set up in amplitude modulation?

EXPERIMENT 31

Plate Modulation Characteristic of Class-C Amplifier

Apparatus: The circuit diagram for this experiment is shown in Fig. 1. Equipment required includes the power supply, bias supply, crystal oscillator, tube board, circuit board, vacuum-tube voltmeter, and multi-range test instrument. A neutralized amplifier circuit similar to that shown in Exp. 30 is used. The grid circuit of the amplifier is coupled through the 100-$\mu\mu$fd. fixed condenser to the plate tank circuit of the oscillator. Bias for the amplifier is taken from the bias supply through the 2.5-millihenry r.f. choke, *RFC*. L_1 is the fixed coil on the circuit board, with 30 turns in use; the plate voltage lead is tapped on the coil at the 15th turn. C_1 is the 250-$\mu\mu$fd. condenser on the circuit board and C_2 is the small condenser (about 50 $\mu\mu$fd. maximum capacity) used in this case as a neutralizing condenser. In wiring the amplifier circuit keep the leads as short as the physical conditions permit, and use enough separation between the crystal oscillator and the amplifier tank circuit, C_1L_1, to reduce the inductive coupling between the two to a negligible amount.

The v.t. voltmeter is inductively coupled to the amplifier tank circuit through the movable coil, L_2, from the circuit board. Place the coil so that it is not intimately associated with the amplifier wiring. To do this it will probably be necessary to remove it from the circuit board entirely, setting it up off the board so that it can be coupled to the outer end of L_1 (assuming that the construction illustrated in Fig. 8, page 67, August *QST*, is used).

Separate milliammeters and voltmeters are shown in Fig. 1, but, as in the previous experiments, the single test kit can be used for all measurements if provision is made for closing those circuits through which current must flow — the amplifier grid-bias circuit and d.c. plate circuit — when the instrument is used elsewhere. Plate voltage measurements should be made with the highest-range scale which will give reasonably precise readings — at least a 500-volt scale.

For the resistor *R* shown in the diagram use 1-watt "carbon" resistors having values of 5000 and 10,000 ohms. Ordinary wire-wound resistors cannot be used. The two resistors may be connected in series to give a total resistance of 15,000 ohms. These three values will suffice for the experiment.

In using the plate power supply in this experiment, set the variable resistor (R_5, Fig. 4, page 65, August *QST*) to give maximum output voltage; that is, so that none of the load current flows through it. The currents to be drawn exceed the safe ratings of the ordinary small volume-control type wire-wound resistors. Sufficient voltage variation can be secured by means of the output taps.

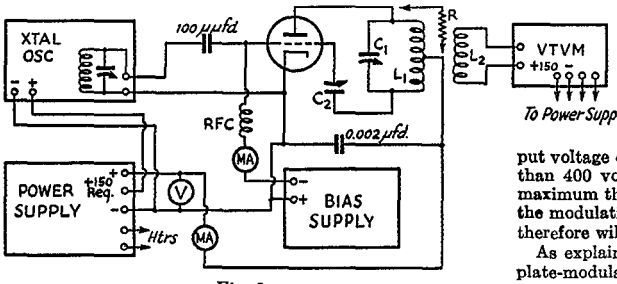


Fig. 1

Procedure: The purpose of this experiment is to show, on a small scale, the effect of load resistance on the linearity of a plate-modulated Class-C amplifier. Since the output voltage of the power supply is limited to somewhat less than 400 volts, it will be assumed that this voltage is the maximum that would be applied to the Class-C amplifier at the modulation peak. The plate voltage for the carrier alone therefore will be one-half this value, or 200 volts.

As explained in the *Handbook*, the plate efficiency of a plate-modulated Class-C amplifier must remain constant throughout the modulation cycle — that is, over the com-

plete range of plate voltage from zero to twice the carrier plate voltage — if the amplifier is to be modulated 100 per cent. To meet this condition, it is inecessary that the operating angle of the amplifier be not greater than 180 degrees at the modulation peak, since the plate efficiency decreases

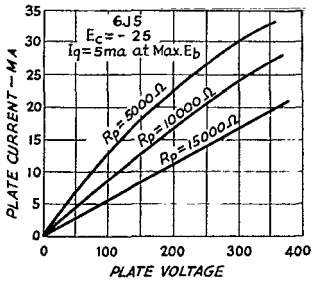


Fig. 2

rather rapidly when the operating angle is increased beyond 180 degrees. Therefore the grid bias must be at least the value which will give plate-current cut-off, under static conditions, at the *peak* plate voltage. This accounts for the customary rule that the grid bias for a Class-C amplifier should be "twice cut-off" at the carrier plate voltage. (In practice it is more likely that the grid bias would be set to a value which gives an operating angle of 150 degrees or less under carrier conditions, as described in *Handbook* Sec. 4–8. This leads to a grid bias value considerably larger than twice cut-off if the tube has a fairly high μ, but gives higher plate efficiency.) Using a 6J5 as an amplifier, the minimum grid bias required is approximately 400/20 (E_b/μ) or 20 volts. To be on the safe side a little higher bias, say 25 volts, may be used.

Set the bias to approximately 25 volts, disconnect the d.c. plate voltage lead to the amplifier, and apply power to the crystal oscillator, using the 150-volt regulated tap as the plate supply. Neutralize the amplifier circuit by one of the procedures described in Exp. 29, having first adjusted the oscillator output (by means of the oscillator tank condenser) to give an amplifier grid current between 5 and 10 milliamperes. Neutralize as completely as possible. If reasonable care has been used in separating the oscillator and amplifier tank circuits there should be no difficulty in neutralizing well enough so that the grid current will show no more than a barely perceptible change as the amplifier plate condenser is tuned through resonance. After neutralizing, apply plate voltage to the amplifier and set the plate tank condenser to resonance, as indicated by the setting which gives minimum plate current.

Now connect the 15,000-ohm load resistance between the "B+" tap and the plate of the amplifier tube as shown in Fig. 1. Set the plate voltage to the maximum available, check the setting of C_1 for resonance, adjust the oscillator

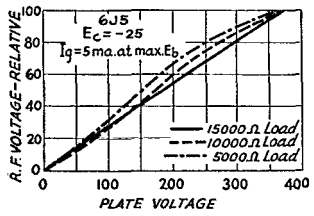


Fig. 3

tank condenser to give an amplifier grid current of 5 milliamperes, and then adjust the coupling between L_2 and L_1 so that the v.t.v.m. reads nearly full scale on its lowest range. All 35 turns of the coil L_2 may be used. Once the proper coupling is found, do not disturb the two coils during a run. Take the following readings: plate current, grid current, plate voltage, and v.t.v.m. current. Change the plate voltage to the second tap and repeat, continuing in this way until readings have been taken at all five taps (or at intervals of 50 to 75 volts in case a different type of power supply than that described in August *QST* is used; in such case the maximum plate voltage should be limited to 350 or 400 volts). Change the load resistance, R, to 10,000 ohms and repeat, then take a similar set of data once more with 5000 ohms at R. In each case adjust the grid current to 5 milliamperes with the highest plate voltage on the amplifier and with the plate tank circuit tuned to resonance.

When the load resistance is lowered the r.f. plate voltage will decrease, hence the v.t.v.m. readings will be smaller. The coupling between L_2 and L_1 may be increased to compensate for this drop in voltage, if desired; the readings are only relative and the values for different runs need not be compared. When the data have been obtained, plot the plate current against plate voltage as shown in Fig. 2, drawing a smooth curve through each set of points. Fig. 2 is a typical

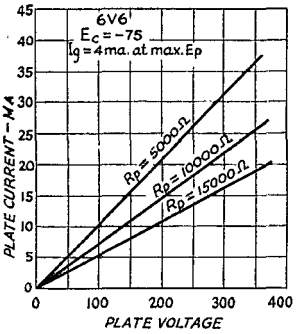


Fig. 4

set of curves taken on a 6J5, and Fig. 3 shows the corresponding variation of r.f. output voltage, plotted in terms of percentage of the maximum value in each case. The curves do not all end on the same ordinate because the maximum plate voltage was subject to small variations with changes in the plate current taken by the amplifier with different load resistances. The d.c. calibration of the v.t. voltmeter may be used for obtaining the relative r.f. voltages. Similar plots could be made of the rectified grid current; it will be observed that the grid current rises as the plate current falls, for the reasons explained in Exp. 30.

These curves show the behavior of d.c. plate current and r.f. output voltage with varying plate voltage, and hence show how the amplifier will operate with plate modulation. For distortionless modulation the plate current and r.f. output voltage should be directly proportional to the plate voltage; that is, the curves showing the relationship between these two quantities and plate voltage should be straight lines. With the particular tube used in these tests the "modulation characteristic," as such a curve is called, is linear (straight) with the 15,000-ohm load resistance, but shows curvature with the lower values of load resistance. In each case the r.f. output voltage, shown in Fig. 3, has approximately the same shape as the corresponding plate-current curve.

The modulation characteristic must be linear for distortionless modulation for the same reason that the grid voltage-plate current characteristic of an amplifier tube must be linear (Exp. 23, Fig. 11). If the modulation characteristic is not linear, the envelope of the modulated wave will not be a true reproduction of the audio-frequency voltage applied to the plate circuit of the modulated amplifier, hence distortion will be introduced in the modulation process. In addition, the relationship between plate voltage and d.c. plate current must be linear so that the modulator can work into a constant load resistance. The load resistance represented by the Class-C amplifier is equal to the slope of its plate voltage-plate current curve and is measured as

described in the introduction to Installment 4, September *QST*. Since the slope, and hence the resistance, is constant only when the modulation characteristic is straight, a curved characteristic indicates that the load resistance varies over the audio-frequency cycle. In Fig. 2 the slope at the lower end of the 5000-ohm curve is more than twice as great as at the upper end, which means that the load resistance into which the modulator works varies in a ratio of more than 2 to 1 over an audio cycle, when the amplifier is modulated 100 per cent. Since the audio output voltage of the modulator depends upon the value of load resistance into which the modulator is delivering power, a load resistance which varies will cause the waveshape of the modulator output voltage to differ from the waveshape of the signal applied to its grid Hence, even though a curved Class-C amplifier plate voltage-plate current characteristic could conceivably result in a fairly straight-line relationship between plate voltage and r.f. output voltage (if the plate efficiency of the Class-C amplifier should vary in such a way as to compensate for the curvature) nevertheless distortion would be introduced because of the varying load on the modulator.

The curvature of the characteristics in Fig. 2 for loads of 10,000 and 5000 ohms is chiefly the result of insufficient cathode emission. That is, the tube is being worked beyond its capabilities at the lower values of load resistance, where the peak currents reach high values. This can be shown by substituting a tube having a cathode which takes more power. There is no octal-based triode of heavier construction comparable to the 6J5 in general characteristics, but a 6V6 can be used by connecting its screen and plate together to make the tube into a triode. The amplification factor in this case is approximately 6 (this can be determined by measurement, using the procedure outlined in Exp. 22), so that for plate current cut-off at the highest plate voltage available the fixed bias on such a tube should be at least 400/6, or 67 volts. The curves of Fig. 4 were taken on such a tube, using the procedure described above but with the grid bias set

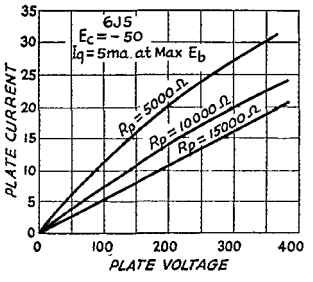


Fig. 5

at 75 volts (slightly above cut-off) and the grid current adjusted by means of the oscillator plate tank condenser to 4 milliamperes when the tube was operating at maximum plate voltage. The curves are straight lines, showing that this particular tube is capable of maintaining a linear relationship between input and output under conditions which resulted in considerable non-linearity when the 6J5 was used. The r.f. output voltage should be plotted in the same way as in Fig. 3, when it will be found that the curves are practically straight lines.

EXPERIMENT 32

Effect of Grid Bias and Excitation Voltage on Linearity

Apparatus: Same equipment and set-up as in Fig. 1, Exp. 31.

Procedure: In this experiment the investigation of the factors affecting the linearity of a plate-modulated Class-C amplifier is continued. Using the 6J5 as an amplifier tube, set the grid bias at approximately —50 volts and repeat the measurements described in Exp. 31. Plot the data in the same form as in Exp. 31. Fig. 5 shows the results of such measurements. It can be observed that there is no marked improvement in linearity at the lower values of load resistance as compared to the curves shown in Fig. 2 for a grid bias of —25 volts.

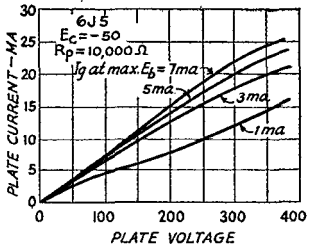


Fig. 6

Using a load resistance of 10,000 ohms and a grid bias of —50 volts, adjust the grid current to 7 milliamperes with the amplifier tube operating at the highest plate voltage, check the amplifier tank circuit tuning to make sure it is at resonance, and again measure plate current, plate voltage, grid current and r.f. output voltage as the plate voltage is decreased one tap at a time on the power supply. When the run is complete, repeat the procedure with the grid current set to 3 ma., and then repeat once more with the grid current set at 1 ma. with the amplifier operating at the highest plate voltage. Plotting the plate voltage — plate current data should give a set of curves resembling those of Fig. 6, taken on a 6J5 in such an experimental set-up. Increasing the amount of excitation, as measured by the d.c. grid current, improves the linearity, particularly at the higher plate voltages. The curves for a grid current of 1 milliampere does not conform to what might be expected from an inspection of the other three curves; the tendency for the slope of the curve to rise rather than to continue decreasing at the higher plate voltages is chiefly the result of a small amount of regeneration attributable to less-than-complete neutralization. In this case the grid current did not show the usual increase with decreasing plate voltage but was practically constant over the whole range of plate voltage. This regenerative effect is masked in the other curves because in those cases the regenerative voltage is small in comparison to the driving voltage from the oscillator.

The effect of improper grid bias can be demonstrated by using the 6V6, connected as a triode with the screen grid and plate tied together. As explained in Exp. 31, the grid bias required for plate-current cut-off at a plate voltage of

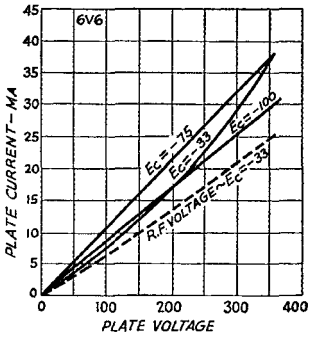


Fig. 7

400 is approximately —67 volts. Using a bias of —75 volts, follow the same experimental procedure and take the same data as before, then repeat with the bias set at —100 volts. Finally, set the bias to about —33 volts, the cut-off value for a plate voltage of 200, so that the amplifier is operating

Class-B under carrier conditions, and repeat the measurements. Fig. 7 shows a set of curves obtained in this way. The curve for E_c = —75 is straight, as is also the curve for E_c = —100. The grid currents at maximum plate voltage were 4 and 2 milliamperes, respectively, for these two curves.

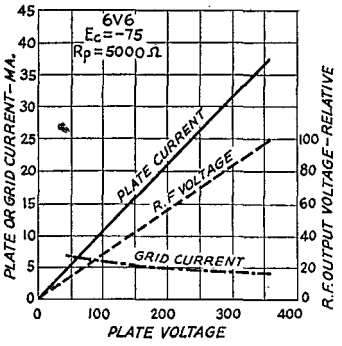


Fig. 8

With a bias of —100 volts a grid current of 2 ma. was approximately the maximum obtainable from the oscillator under the conditions of the experiment. The curve for —33 volts was taken with the grid current set at 4 milliamperes at the maximum plate voltage.

With the bias set at —33 volts the amplifier operates under conditions intermediate between Class B and Class A when the plate voltage is above 200 volts. Thus the plate efficiency shows a marked decrease as the plate voltage increases. However, the amplification ratio increases as the Class-A condition is approached, so that the r.f. output voltage curve is quite straight. Nevertheless, the non-linearity of the plate voltage — plate current curve would introduce considerable distortion in such a system because of the variation, with plate voltage, of the load resistance represented by the Class-C amplifier plate circuit. The effect of such variation on the modulator operation was described in the preceding experiment.

As shown by the curves, once the bias is at the cut-off value for the maximum plate voltage to be applied to the tube under modulation, the modulation characteristic of the amplifier will be quite linear provided the excitation voltage is large enough. Increasing the bias beyond this value will improve the efficiency and may also improve the linearity. The latter effect is too small to show on the graphs, but was detectable in the measurements. Fig. 8 shows the result of choice of suitable operating conditions with a tube having ample cathode emission. Notice that the grid current varies as the plate voltage is changed, for the reasons explained in connection with Exp. 30. This same variation will occur during an audio modulating cycle, so that the load on the driving stage also varies when the Class-C amplifier is modulated. This audio-frequency variation of driver loading is one reason why it is desirable to use a buffer amplifier between the oscillator and modulated amplifier, since a change in load will usually cause some shift in oscillator frequency and hence frequency modulation will occur if the modulated amplifier is excited directly by the oscillator.

EXPERIMENT 33

Grid-Bias Modulation Characteristics of Class-C Amplifier

Apparatus: The equipment and circuit arrangement are the same for this experiment as for Exps. 31 and 32, except that the voltmeter is transferred to the grid bias supply.

Procedure: The object of this experiment is to determine suitable operating conditions for grid-bias modulation of a Class-C amplifier. With this type of modulation the plate efficiency and d.c. plate current both are varied in accordance with the modulating voltage, but the d.c. plate voltage is constant. At the modulation peak the amplifier should reach its maximum plate efficiency and the d.c. plate current should be twice the carrier value of plate current. The amplifier can be adjusted for normal Class-C efficiency (about 70 per cent) at peak modulation; the operating angle therefore should be 180 degrees or less (grid bias at cut-off or higher) at the modulation peak. The minimum bias under modulation, at the instant when the modulating signal has its maximum positive value, therefore should not be less than the cut-off value for the tube and plate voltage used.

The 6J5 is a suitable type of tube for use in the experiment. The plate voltage should be the maximum available from the power supply — between 350 and 400 volts. At this plate voltage the negative grid bias required for plate-current cut-off is approximately 400/20 (E_b/μ), or —20 volts. Because of the tendency of the amplification factor of the tube to decrease near the cut-off point it is more satisfactory to use —25 volts as the cut-off value. The taps on the bias supply should be adjusted to give steps of 10 to 15 volts, starting with 25 volts and going to higher values. An additional slider tap on R_2 (Fig. 2, page 56, July *QST*) should be provided; it may be borrowed temporarily from R_3 since the taps on the latter resistor will not be needed. Two voltages will be available from each tap by setting R_4 either at minimum or maximum. The following represents a typical series of bias voltages obtainable by suitable settings of the taps on R_2: 25, 30, 35, 40, 57, 64, 75, 92. The first voltage is obtained by setting the clip on the lower end of R_2, the latter by setting the clip on the upper end to secure the full output voltage of the bias supply. The variation in voltage provided by R_4 at the two last taps is quite small, so it is sufficient to set R_4 at maximum in these two cases.

The measurement procedure is similar to that used in Exps. 31 and 32, except that the plate voltage is fixed and the grid bias is varied. First measure the plate voltage, then set the bias at approximately 25 volts, adjust the oscillator tuning to give a d.c. grid current of 10 ma., and measure the plate current, grid current, and v.t. voltmeter current. Adjust the coupling to the v.t. voltmeter to give nearly a full-scale reading on the low range. Then increase the bias one step at a time, recording the readings at each step as above, until the plate current is reduced to zero. Use the 10,000-ohm 1-watt resistor as a load, and before starting the series of measurements tune the plate tank circuit of the amplifier to resonance, as indicated by minimum plate current. The readings should be taken fairly quickly, since the load resistor will overheat at the lower values of grid bias. As in the previous two experiments, set the variable resistor in the power supply so that the output voltage is maximum — that is, so that no part of the resistor is in the load circuit of the power supply.

When the measurements are completed, take a new set with an initial d.c. grid current of 8 milliamperes, then take similar sets with initial grid currents of 6 and 4 milliamperes. Plot the measured data against grid bias voltage. A typical set of such curves is shown in Figs. 9, 10, 11 and 12. These show the effect of excitation voltage, as indicated by the

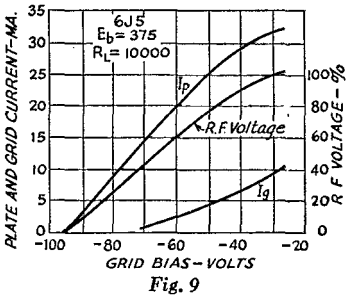


Fig. 9

value of grid current for a given bias voltage, on the input, linearity and grid bias. In each of these cases the values at minimum grid bias (approximately —25 volts) can be taken as representing conditions existing at the modulation peak. For carrier conditions the bias would be set midway

between the minimum bias and that required to cut off plate current completely; for example, in Fig. 11 the plate-current curve reaches the zero axis at a bias of −70 volts; the difference between this and the minimum bias (−25 volts) is 45 volts, which represents the total voltage swing required from the modulator for 100 per cent modulation. Half of 45 volts, or 22.5 volts, is the peak value of the modulating voltage on one side of its axis, and since the minimum instantaneous grid bias must not be less than the static cut-off value, this amount of voltage must be added to the cut-off bias to find the operating bias under carrier conditions. The carrier operating bias therefore would be 25 + 22.5, or −47.5 volts. At this bias the plate current is 13 milliamperes — half of the maximum value, which occurs at the minimum bias of −25 volts.

The r.f. output voltage at E_c = −47.5 also is half its maximum value, so that the power output (which is proportional to the square of the r.f. voltage) is ¼ its maximum value. Since the d.c. plate voltage is constant, the d.c. plate power input is half its maximum value (375 × 0.013 compared to 375 × 0.026). The proportionally greater reduction in power output therefore must be the result of a decrease in plate efficiency; in fact, the efficiency must have decreased to half its value under maximum conditions.

If the same value of fixed grid bias, −47.5 volts, is used for carrier conditions with other values of excitation voltage, serious distortion will result. In Fig. 9, for example, this value of bias would give a carrier plate current of 25 milliamperes. If the modulating voltage swings the instantaneous bias plus and minus 22.5 volts about the carrier bias (the conditions of operation which give 100 per cent modulation in the case of Fig. 11) the modulation peak will occur at −25

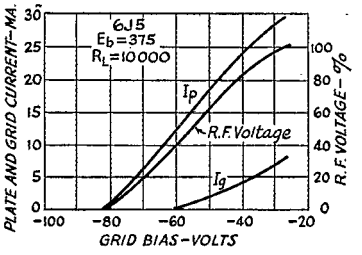


Fig. 10

volts and the valley at −70 volts. The grid bias-plate current characteristic is badly curved in the peak region, hence the modulated wave will be distorted. Also, the plate currrent and r.f. voltage do not go to zero at 70 volts bias, hence the modulation is less than 100 per cent. The same state of affairs exists in Fig. 10, although to a lesser extent. In Fig. 12, the same carrier bias and modulating voltage would result in overmodulation, since the plate current is zero at approximately −65 volts bias. Hence a negative swing to −70 volts would completely cut off the output for an appreciable period of time, giving a modulated wave of the type shown in Fig. 502 in the *Handbook*. It is evident, therefore, that for a given value of carrier bias and a specified modulating voltage, there is, in general, only one value of excitation voltage which will permit linear 100 per cent modulation. This is subject to the further restriction that the peak positive swing of the modulating voltage should not cause the instantaneous grid bias to reach a value lower than that necessary to cut off the plate current (without excitation). This restriction is necessary because bias less than cut-off would increase the operating angle to more than 180 degrees, with the result that at the modulation peak the plate efficiency would not be increasing at the proper rate. In grid bias modulation the efficiency must reach its highest value at the modulation peak.

Further inspection of the curves of Figs. 9–12 shows that, with the same tube and plate voltage, a large number of operating conditions all capable of giving linear 100 per cent modulation can be chosen. It is in fact only necessary to restrict the operation to the straight portion of any of the curves, choosing a modulating voltage such that the total swing (total voltage from positive peak to negative peak) will confine the plate current variations to a straight part of the curve. The carrier grid bias can be selected so that the plate current and output will just be reduced to zero when the modulating voltage reaches its negative peak. For ex-

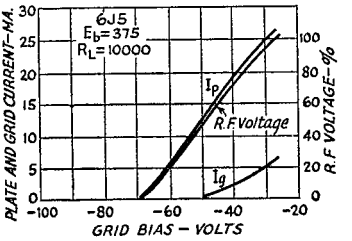


Fig. 11

ample, the characteristic in Fig. 9 is obviously straight from the zero point, which occurs at a grid bias of −95 volts, to the 20-ma. point, where the grid bias is −60 volts. The total bias change and hence the total swing of the modulating voltage, is then 95–60 = 35 volts. The peak value of the modulating voltage is half the total swing, or 17.5 volts. On the negative swing of the modulating voltage the instantaneous grid bias must just reach 95 volts, hence the carrier grid bias will be equal to the maximum instantaneous grid bias minus the peak negative swing of the modulating voltage, or 95−17.5 = 77.5 volts. It is not necessary to utilize *all* of the straight portion of the characteristic to realize linear 100 per cent modulation. For instance, if the modulating voltage has a peak value of 10 volts, the carrier bias would be 95 − 10 = 85 volts and the amplifier output still would be modulated 100 per cent. However, the carrier power output would be smaller in the latter case, since the plate current would be 6 milliamperes as against 10 for the first example, the plate voltage remaining the same. The plate efficiency also would be smaller, since the new carrier operating point is farther down on the grid-bias–plate current curve.

The upper ends of the characteristics in Figs. 9 and 10 show curvature because the excitation voltage is large enough to "saturate" the amplifier — that is, maximum instantaneous grid voltage and minimum instantaneous plate current are near equality — before the bias is reduced to cut-off. When this is the case the efficiency is high and changes rather slowly with changes in either excitation voltage or bias. As a result, the plate current and power output also change slowly and the curve is no longer linear. The object in adjusting a grid-bias modulated amplifier is to attain maximum efficiency at the modulation peak without operating in the curved region of the characteristic. When this is accomplished the carrier efficiency will have its highest possible value, resulting in the greatest possible carrier power output from the tube or tubes used, consistent with linear 100 per cent modulation. Since the maximum

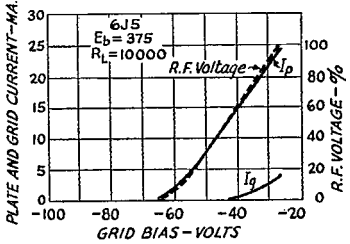


Fig. 12

efficiency is in the vicinity of 70 per cent, the carrier efficiency (which is half the maximum efficiency) will be approximately 35 per cent when optimum operating conditions are attained. The permissible power input to the tube can be calculated on this basis (power dissipated by the tube equals

100 — 35 = 65 per cent of the d.c. plate power input, carrier conditions) and a set of operating conditions worked out so that this carrier input can be used. The 6J5 used in the experiment has a rated plate dissipation of 2.5 watts so that the permissible carrier input is 2.5/0.65 = 3.85 watts.

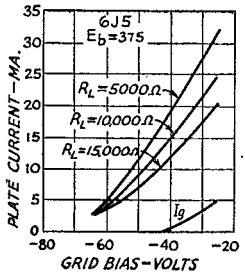


Fig. 13

At the plate voltage used in the measurements described, 375 volts, the permissible carrier plate current is therefore 3.85/375 = 10 milliamperes, approximately. The 10-milliampere point on the curve of Fig. 9 shows that the fixed (carrier) grid bias should be —77.5 volts and the peak modulating voltage 95 — 77.5 = 17.5 volts, the same operating conditions selected before. In Fig. 10 the 10-milliampere point on the curve occurs at a bias of 64 volts and the plate current and output are cut off at 82 volts. The peak modulating voltage required for 100 per cent modulation therefore is 82 — 64 = 18 volts. The modulation peak will occur at 64 — 18 = 46 volts, which is still on the straight portion of the curve. The corresponding operating conditions for the curves of Figs. 11 and 12 can be worked out similarly. It will be observed that in no case does the positive peak of the modulating voltage carry the minimum instantaneous grid bias into the curved region of the characteristic. This indicates that optimum conditions will not be secured with this particular set of curves since the efficiency at the modulation peak will not be as high as is permissible. In Fig. 9, for example, the curvature of the characteristic is negligible up to a bias of about —45 volts, so that it is at approximately this point that the efficiency begins to "level off" at its maximum permissible value of about 70 per cent. If the bias can be swung to —45 volts by the modulating signal the total swing required for 100 per cent modulation will be 95 — 45 = 50 volts and the carrier bias therefore should be set at —70 volts. This will give optimum carrier efficiency, but the plate current is 14 ma. and d.c. plate power input will be in excess of the tube ratings.

Since in every case the efficiency is too low at the modulation peak when the power input is limited to the value set by the tube ratings, a new set of operating conditions must be found which will result in higher peak efficiency. Higher efficiency can be secured by raising the value of load resistance. Take a new set of data with a 15,000-ohm load substituted for the 10,000-ohm load used in the previous measurements, plot the data, and compare the curves to those secured with the 10,000-ohm load. Work out the operating conditions on the basis of the permissible power input as described above. The set which results in operating slightly into the curved region of the characteristic at the modulation peak will be optimum.

Study of the curves of Figs. 9 to 12 will show that the characteristic becomes more linear in the low plate-current region when the grid bias is large and the excitation voltage (as indicated by the value of grid current at cut-off bias) also is large. For this reason it is advisable to operate a grid-bias modulated amplifier in such a way that the minimum instantaneous grid bias is higher than the static cut-off value; that is, the operating angle should be less than 180 degrees at the modulation peak.

EXPERIMENT 34

Operation of Reactance Modulator

Apparatus: The circuit arrangement for this experiment is shown in Fig. 14. The equipment required includes the power supply, bias supply, oscillator, tube board, test instrument, and a calibrated receiver. The reactance tube is a 6J7. The oscillator should be self-controlled, using the self-resonant grid coil. Coil L is the movable coil from the circuit board and is substituted for the regular plug-in oscillator plate coil, which should be removed from its socket. The oscillator and the 6J7 screen should be operated at approximately 100 volts; this voltage preferably should be taken from the regulated tap on the power supply, substituting a VR-105-30 for the VR-150-30 normally used. The 6J7 plate voltage, which should be 250 volts approximately, is applied to the tube through a 2.5-millihenry r.f. choke.

C_1 is a midget variable condenser of about 50-$\mu\mu$fd. maximum capacity; the small condenser on the circuit board may be used. The bias for the 6J7 is applied to the grid in series with a 2.5-mh. choke which provides a d.c. path to the grid. The various by-pass condensers, C_2 to C_6, inclusive, may be small mica or non-inductive paper units of 0.001-μfd. capacity or larger; the values are not critical. C_2 and C_3 are blocking condensers to prevent short-circuiting the plate and bias voltages through L; the other condensers confine the r.f. currents to the proper paths.

In setting up the circuit keep the r.f. leads short, and separate the plate and grid wiring of the 6J7 as much as possible.

Procedure: In this experiment the effect of circuit constants and operating conditions on the sensitivity and linearity of a reactance modulator are investigated. The frequency change is measured by means of a calibrated receiver. Although the exact frequency need not be known precisely there should be enough band-spread in the receiver to give a fairly open calibration curve, since the experiment can be performed more satisfactory if a frequency difference of the order of one kilocycle can be measured or estimated with fair accuracy. If a few points of known frequency can be spotted on the receiver dial it will suffice to draw a smooth curve through them and assume that the calibration is correct; this will give satisfactory *relative* readings, which is all that is needed for the experiment.

As a preliminary step, disconnect lead "A" from the coil and take the grid voltage–plate current characteristic of the 6J7 (Exp. 25). This is used for comparing the static plate current, at a given value of negative grid bias, to the operating plate current under different conditions of operation. Allow the receiver and oscillator to warm up thoroughly so that frequency drift will not affect the measurements. Set the receiver (with the beat oscillator on) to some value of frequency selected as a reference, such as 3600 kc. Reconnect lead "A", set C_1 at maximum capacity, use a 50,000-ohm 1-watt resistor at R, and set the bias on the 6J7 to some high value (30 volts or more) which will insure that its plate current is cut off. Using 25 turns in the coil L, set the oscillator plate tuning condenser to bring the oscillator frequency to zero beat with the receiver. Under these conditions the reactance tube is not functioning, since its plate current is

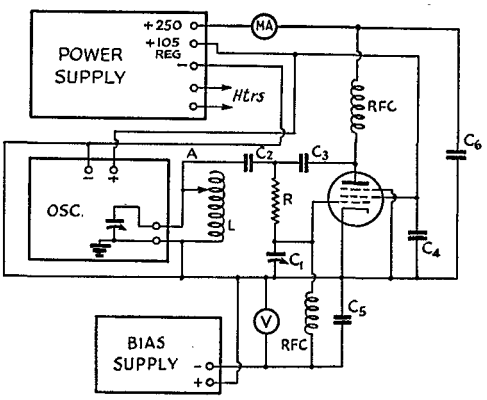


Fig. 14

zero, but the tube and circuit capacities are shunted across the oscillator tuned circuit and hence play their normal part in determining the frequency of oscillation.

Now set the grid bias to zero and measure the new frequency. Increase the bias to one volt and again measure the frequency; continue in this fashion at 1-volt intervals until the frequency has returned to its original value. When this run is complete, set C_1 at half capacity and repeat. Finally, set C_1 at minimum capacity and take a similar set of readings. Plot the data in the form of curves showing frequency as a function of grid-bias voltage applied to the reactance tube.

Fig. 15 shows the result of such a procedure, curve A being for maximum capacity (50 μμfd. in this case), B for half capacity and C for minimum capacity. The reactance of C_1 increases with decreasing capacity, but since the reactance in any case is small compared to the resistance of R the current in the circuit formed by R and C_1 changes relatively little. Hence the voltage across C_1 is approximately proportional to the reactance of the condenser, and increases as the capacity is made smaller. Since this voltage is applied to the grid of the reactance tube the r.f. component of plate current also increases when C_1 is made smaller, for a given value of grid bias. As a result, the shift in frequency also is larger.

All three curves have a straight portion in the middle, with curvature at both ends. In using the tube for frequency modulation only the straight portion would be used. In the case of curve A, the straight portion extends from approximately —3 volts to —6 volts. The operating point would be set in the middle of this region — that is, the fixed grid bias would be set at —4.5 volts — and linear modulation would be secured with a peak audio grid voltage of 1.5 volts. The total frequency swing is then 22 kilocycles, from a frequency of 3628 kc. at —3 volts bias to 3606 kc. at —6 volts bias. The frequency deviation, which is half the total swing, is thus 11 kilocycles. In curve B the approximately straight portion lies between the limits of —3 and —7 volts, so that the operating bias would be —5 volts and the peak audio voltage would be 2 volts. The deviation in this case is 14.5 kc. Curve C has a much longer straight portion — from —3 to —12 volts, giving a deviation of 24 kc. at the maximum permissible audio modulating voltage.

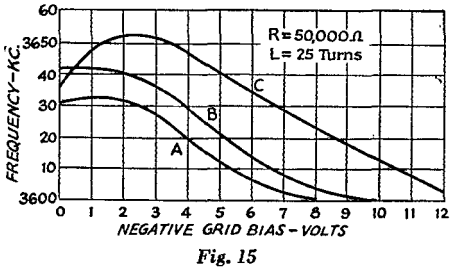


Fig. 15

In some respects the reactance tube operates in much the same way as a grid-bias modulated amplifier; that is, the amplification is a function of the grid bias, the amplitude of the r.f voltage applied to the grid being fixed. The curvature of the characteristics below —3 volts in Fig. 15 is partly caused by saturation effects similar to those observed with grid-bias modulated amplifiers when the grid bias is made too small (Exp. 33) and partly because the resistance of the grid circuit decreases rapidly when the grid is driven into the positive region. In the case of the reactance modulator this grid resistance is in parallel with C_1. When the grid resistance approaches the reactance of C_1 in order of magnitude, the phase angle between voltage and current in the circuit formed by C_1 and the grid resistance decreases. As a result, the r.f. component of plate current does not lag exactly 90 degrees behind the voltage across the tank circuit, and consequently the effectiveness of the tube as shunt inductance across the tank is reduced. If the grid resistance becomes comparatively low, the combination of the two effects can result in a reversal of the normal trend of frequency with changing grid bias. This is evident in the left-hand portion of curve C.

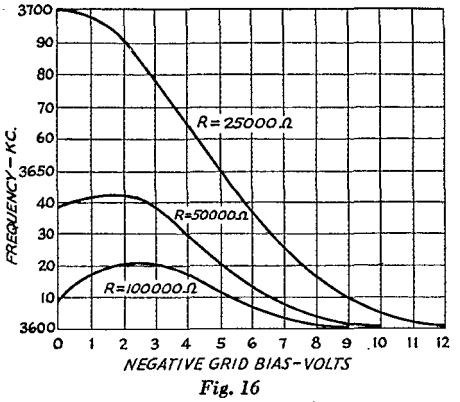


Fig. 16

The curvature at the high-bias ends of the characteristics is the "tailing off" effect usually encountered with variation in bias near the plate-current cut-off point, and is attributable to the change in tube amplification factor in this region.

For the second part of the experiment, set C_1 at about half capacity and take readings similar to the above, but with 100,000 ohms substituted for the 50,000-ohm resistor first used at R. When this run is finished, substitute a 25,000-ohm resistor at R and repeat. Plot the data in the same form as before. Fig. 16 shows the results of a typical run of this type. For a fixed value of capacity at C_1, the current through RC_1, and hence the voltage across C_1, is dependent upon the value of resistance used at R, smaller values giving larger current and vice versa. This is clearly shown by the experimental curves, since the frequency shift, which is proportional to the r.f. voltage across C_1, increases with decreasing resistance at any given value of grid bias. In other respects the curves have the same general nature.

The effect of the L/C ratio of the tank circuit on frequency deviation can be observed by repeating the first set of measurements, using 15 turns in L instead of 25. The sensitivity of the modulator can be expected to decrease; that is, the same change in bias voltage should give a smaller change in frequency, other conditions remaining the same. For a given value of r.f. voltage at the grid of the reactance tube the r.f. component of plate current of the tube will be the same (provided the tank circuit impedance has not changed greatly) regardless of the L/C ratio. However, the smaller the L/C ratio the greater the tank current. When the fixed reactance tube r.f. plate current is added to a small tank current its effect on the resultant phase angle, and hence on the frequency, is greater than when it is added to a large tank current. Hence the frequency swing for a given change in modulator bias is less when the L/C ratio is small.

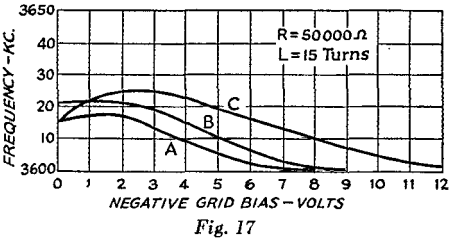
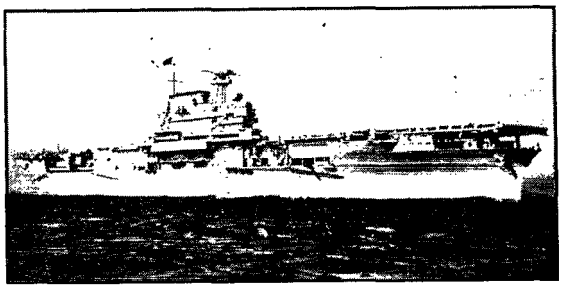


Fig. 17

The experimental measurements will show this. Fig. 17 is a typical set of curves, which may be compared directly with those of Fig. 15. It can be seen that the frequency deviation has been halved, approximately, by using 15 turns in the tank coil in place of the 25 used in securing the data plotted in Fig. 15.

(Continued on page 116)



Hamdom In the War

Left — The U.S.S. *Yorktown* before the battle.

K6SNL Commands the "Yorktown" in Last Battle

WHEN, the end of September, the Navy announced the passing of the carrier *Yorktown* at the height of the Battle of Midway, and you read in the newspaper accounts about "calm, straight-mouthed" Captain Elliott Buckmaster, who was last to leave the ship, did you realize that his voice, which at the end gave the order sending up the blue-and-white flag signalling "Abandon ship," was the same cool, calm voice once heard almost nightly on 20-meter 'phone behind the call K6SNL?

Well, it's true. The man who commanded the mighty *Yorktown* as she struck so courageously against the Japs in the shifting Pacific sea war and the dyed-in-the-wool ham who signed K6SNL at Pearl Harbor and W6SNL at San Diego are one and the same. But not many of the hams who worked K6SNL on casual, intimate terms in the old days realized the fact. "It was only after about a year's rag chewing with a very gentlemanly and interesting ham whose handle was 'Elliott' that I discovered, one day when I handled a message to his wife and daughter in Long Beach, that K6SNL was a four-striper in the Navy," says William R. Snyder, W6RKI.

The days when a captain in the U. S. Navy could join us on the air in the classless anonymity of a hamdom handle came to a temporary end when Jap planes sneaked out of the blue over Pearl Harbor. The captain laid down his microphone and went to war. He and the two thousand men of his command and the mighty vessel they sailed went valiantly into battle — once, twice, many times.

In early June they went forth once more, this time their mission the hurling back of the Japs off Midway. Their planes helped to sink three Jap carriers and attacked a fourth. Then, on June 4th, out of the enveloping substratosphere haze the Nip bombers and torpedo planes dove in waves.

You know the end. Bombs crashed through the decks, and the torpedo planes dropped their fish. Two torpedoes hit amidships in almost the same spot. Mortally wounded, the *Yorktown* turned slowly on her side.

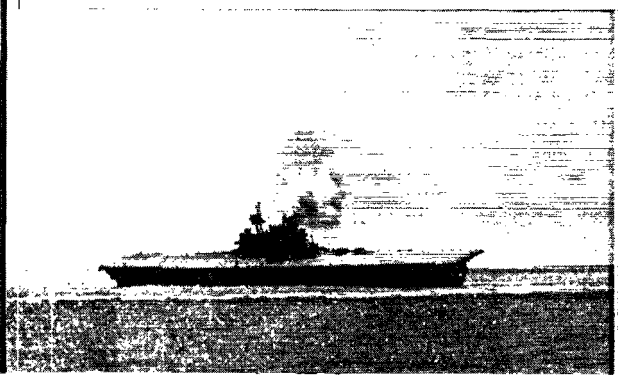
Captain Elliott Buckmaster, K6SNL–W6SNL

She didn't sink, then, but the next day two more torpedoes from a Jap sub struck the carrier's weakened plates. Stubbornly, she stayed afloat through the night. But at daybreak, her battle flags still flying, she went down, stern first, quietly, without fuss or fury, brave in defeat as she had been in victory.

The men of the *Yorktown* — those that were left — came home. September's end found Captain Buckmaster sitting on his porch in Norfolk, Va., reading the latest issue of *QST*. He and his men awaited their next assignment in the struggle to win back for all men the rights of free men — including that of talking, once again, with kindred spirits in the classless anonymity of a hamdom handle. . . .

(Continued on page 88)

End of the *Yorktown*. Listing heavily to port after savage battering by Jap bombers and torpedo planes, her guns still point defiantly toward the sky. *Official U. S. Navy Photographs.*



W1NLL Is Youngest Marine Sergeant

NON-AMATEUR visitors were never too welcome at W1HDQ. Situated as we were, part way up in an observation tower which was open to the public, we got more than our share of curious individuals who asked foolish questions and persisted in jabbering when the rig was on the air. We were not overly cordial, therefore, when a polite young lad of about fifteen knocked at our door one day a couple of years ago and asked if he could come in and look around.

But this one was different; he knew when to talk and when to keep quiet, and he asked intelligent questions. He explained that, a resident of Wilbraham a quarter of a mile below, he heard us on all bands on his Sky-Buddy; in fact, it appeared that we interfered with his code practice. He was quite speechless when confronted with the chance to talk to K6MVV on Ten, but he was even more thrilled when, on a later visit, Five broke out with the strange buzz-saw notes characteristic of aurora DX sessions.

Learning the code was easy for Bob. Under the expert guidance of Henry Baier, W1FOI, he was soon copying 15 w.p.m. solid, and before reaching his sixteenth birthday he was ready for the trip to Boston. When I heard, on Five, the harmonic of a snappy "CQ CQ CQ de W1NLL" I guessed, rightly, that the big moment had arrived for my young friend, and that Wilbraham now boasted a new ham station.

W1NLL was not to cause me any trouble on the

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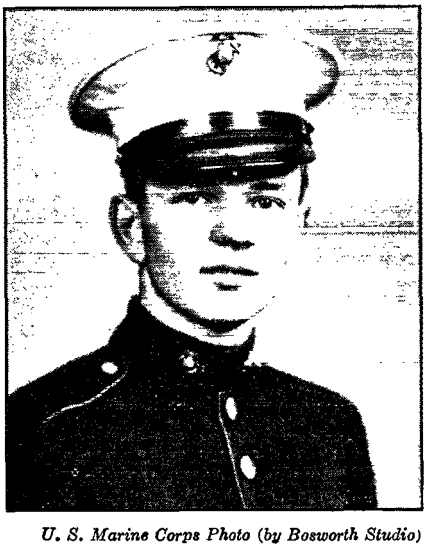


U. S. Marine Corps Photo (by Bosworth Studio)

Staff Sgt. Robert Enemark, W1NLL, youngest staff sergeant in the U. S. Marine Corps.

Joseph F. Eckert, W3GEX, with the device he created for speeding crystal production for which he was awarded one of the first 17 Certificates of Individual Production Merit.

W3GEX Winner of WPB Production Merit Certificate

WHEN the first 17 awards of Certificates of Individual Production Merit were announced by War Production Drive headquarters September 8th, near the top of the list was the name of Joseph Frank Eckert, jr., W3GEX, an X-ray operator at RCA's Camden plant, who received the award for developing a "new method to obtain a maximum number of radio quartz crystals from the extremely limited amount of raw material."

His suggestion — highly technical, and the details of which are secret — resulted in savings of saw set-up time and X-ray measurement time which increased production at the RCA plant to the tune of 27 properly-oriented crystals a day above the amount previously produced, using the same quantity of raw quartz.

Now 24, W3GEX received his call back in 1936. That year he also started work for RCA as a chassis inspector. After his first job he was transferred to the crystal lab, where he has been for the past five years. For the past year he has been working with the X-ray diffraction equipment used in the crystal manufacturing process — and "doing very well, too!" according to RCA's Press Division.

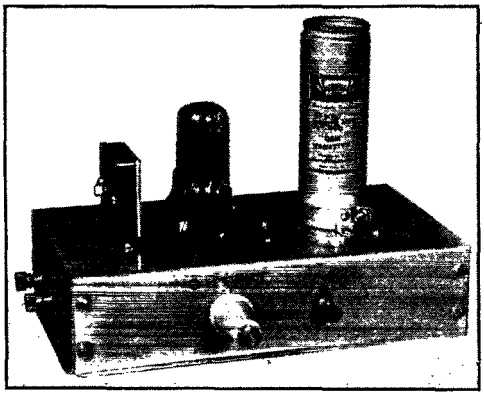
(Continued on page 88)

HINTS AND KINKS FOR THE EXPERIMENTER

SIMPLIFIED OSCILLATOR CIRCUIT FOR CRYSTAL CHECKING

WHILE searching for a suitable circuit for a simple self-contained crystal oscillator to be used in checking crystal frequencies, the author happened upon the "Pee-Wee" transmitter circuit of Hayes and Lawrence in *QST* for January, 1941. In this circuit a 117L7GT is incorporated in a conventional oscillator circuit to which plate voltage is supplied by the rectifier section of this dual-purpose tube. This design fulfilled nicely the requirements of simplicity and portability. However, since it was necessary to accommodate a large number of crystals of widely varying frequencies, it was decided to alter the circuit to the extent of substituting a Pierce-type oscillator for the conventional one used by Hayes and Lawrence. This modification provided the extra flexibility needed without sensibly decreasing the output of the oscillator. Several tests made with both circuits showed that at the low plate voltages produced by the rectifier section the Pierce oscillator was nearly as efficient as the one employing the tuned-plate circuit.

As is evident from the circuit of Fig. 1, the circuit is perfectly straightforward, its constituent parts having been kept at a minimum. In the rectifier section, some attention must be paid to the filter elements. A capacity of 16 μfd. was found to be sufficient to give good filtering, but for an absolutely pure note 40 μfd. is recommended. The 200-ohm resistor in series with the filter condenser is an advisable precaution if a large filter condenser is used, since the initial charging current of the condenser may be sufficient to fuse the cathode lead of the rectifier inside the glass envelope of the tube.



The simplified crystal tester. If desired, the unit could be built with much smaller dimensions.

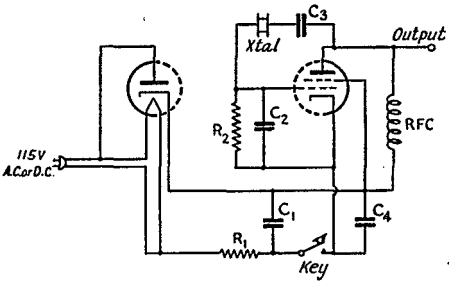


Fig. 1 — Simple circuit for crystal testing employing a 117L7GT.
C_1 — 16 to 40 μfd (see text).
C_2 — 100 to 500 μμfd. (see text).
C_3 — 0.006 μfd.
C_4 — 0.01 μfd.
R_1 — 200 ohms.
R_2 — 50,000 ohms.
RFC — 2.5-mh. r.f. choke.

The critical value in the oscillator section is the 250-μμfd. grid-cathode feed-back condenser, although even this may be varied over a fairly large range (100 to 500 μμfd.) without seriously affecting the operation of the oscillator. The circuit shown in the diagram gave excellent results with a series of crystals ranging in frequency from 500 to 3600 kc.

The physical lay-out of the oscillator is shown in the photograph. The crystal, tube, filter condenser, off-on switches and output terminals are all easily identified. The very few remaining parts are mounted beneath the chassis. As obvious, compactness was not a prime consideration and the chassis, although now 5 × 9 × 2 inches, might easily have been reduced to a fraction of this size.

Even though the oscillator can be readily constructed in an hour or two from the most meagre of junk boxes, its possible uses are almost unlimited. The ease with which it accommodates crystals of widely varying frequencies makes it an almost ideal means of checking crystal frequencies during the grinding process. Used in conjunction with a b.f.o., it becomes a serviceable code-practice oscillator. In normal times, it might readily be used as a QRP transmitter, since a measured

output of 2 watts if readily obtainable. — *James H. Green, Jr., W8MYW.*

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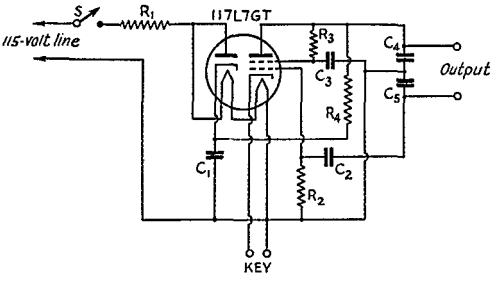

Fig. 2 — Circuit diagram of simple code-practice oscillator.
C_1 — 8-μfd., 150-volt electrolytic.
C_2 — 0.01 μfd.
C_3 — 0.05 μfd.
C_4, C_5 — 0.02 μfd.
R_1 — 50 ohms, 1-watt.
R_2 — ¼ megohm.
R_3 — 1 megohm.
R_4 — 0.1 megohm.
S — S.p.s.t. toggle switch.

SIMPLE A.C.-D.C. CODE-PRACTICE OSCILLATOR

FIG. 2 shows the circuit diagram of a simple code-practice oscillator which will operate from either a.c. or d.c. and which requires no transformers or other hard-to-get parts. The components can be thrown together on a baseboard within a few minutes. The oscillating circuit is a Colpitts with the headphone windings serving as the inductance. Either one or two pairs of headphones may be used across the output, or a dynamic speaker may be used by substituting the primary of the speaker transformer for the headphones. Naturally, the circuit will not work with crystal headphones.

The output of the rectifier section of the 117L7GT is filtered by C_1. The frequency of oscillation will vary depending upon the inductance of the headphones or output transformer used. This may be compensated for by altering the value of either C_4 or C_5. One-half-watt resistors will do for all except the line resistance, R_1. The toggle switch, S, should be connected in the "hot" side of the line and the key in the grounded side. — *George Masin, Long Beach, Calif.*

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MODULATION INDICATOR

FIG. 3 shows the circuit diagram of a modulation indicator which was popular among the boys of the "Farmer's Net." With the switch thrown to the left, the carrier level is indicated on the meter. By means of the variable resistor, R_1, the reading may be varied to suit the operator; I set mine at 0.8 ma. Once set, the point will remain the same. By a flip of the switch, the meter is returned to zero with carrier on, but if there is any noise or hum on the carrier, the needle will lift off zero in proportion to the amount of noise. Some of the net boys thought this the best feature. With the meter at zero with carrier, modulation will show by a lift of the needle. Modulation at a level of 100 per cent will make the needle go to the point of the original setting (0.8, in my case). If this reading is exceeded, overmodulation is indicated.

With the meter in plain sight on the operating desk, any transmitter failure is instantly spotted by watching the indicator. By inserting headphones in the jack, the gadget becomes a very excellent monitor.

The transmitter is not disturbed in any way when the monitor is used. It may be used without the tuned circuit by simply shorting the terminals intended for the tuned circuit and attaching the antenna lead directly to the transmitting-antenna feeder. I used mine that way on all bands without any tuned circuit and found that it did not bother the antenna circuit. An alternative would be to connect the input terminals to a line coupled closely to the final-amplifier tank. If the tuned circuit is used, the indicator may be placed anywhere in the operating room and will give fine results.

When used with the tuned circuit, the unit also makes a good field-strength or adjustment indicator.

I mounted mine in a 6-inch-cube standard steel

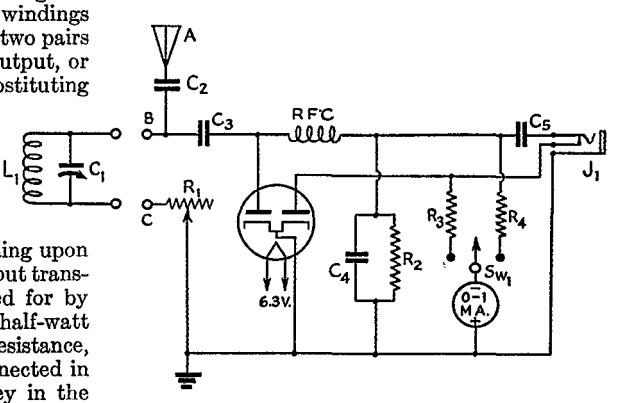

Fig. 3 — Circuit diagram of the modulation indicator.
A — Antenna, about 2 feet long (see text).
C_1, L_1 — Tuned to band (see text).
C_2 — 100 μμfd.
C_3 — 50 μμfd.
C_4 — 0.001 μfd.
C_5 — 0.1 μfd.
R_1 — 10,000-ohm volume control.
R_2 — 50,000 ohms.
R_3 — 50,000 ohms.
R_4 — 150,000 ohms.
RFC — 2.5-mh. r.f. choke.
J_1 — Closed-circuit jack.
Sw_1 — S.p.d.t. toggle switch.

box, and arranged it so that the indicator was turned on with the transmitter filaments.

Credit for the circuit should go to W1BZR and W1HSV. — *George W. Bailey, W1KH.*

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AUTOMATIC AIR-RAID-ALERT ALARM

FIG. 4 shows the circuit diagram of an air-raid alert which operates automatically when the carrier of the broadcast station to which it is tuned is cut off. The system was built from an old b.c. receiver with two stages of r.f. amplification using 24A tubes, a 27 detector, a 27 first audio and a 45 output tube. The detector and tone control were the only circuits changed. The detector was changed to use the grid and cathode as a diode. An audio volume control was substituted for the tone control so that the program could be cut off or on without affecting the operation of the alarm. The plate of the detector tube was connected to the 250-volt supply through the winding of the relay. The grid circuit of the detector and the audio volume control are entirely conventional, except that no a.v.c. is used. This gives a better signal on the grid of the detector.

The relay in the plate of the detector was made from a horn relay purchased from a local automobile-supply store. The coil was removed and rewound with approximately seventeen hundred feet of No. 38 enameled wire. The d.c. resistance of the coil is 1000 ohms. It was necessary to weaken the spring tension to make the relay operate when the antenna is removed from the set. The ground connection on the coil was changed to one of the terminals and the terminal connection was grounded. The extra door-bell transformer was used because the 2.5-volt filament supply would not ring the bell. — *A. W. Bradshaw, Los Angeles, Calif.*

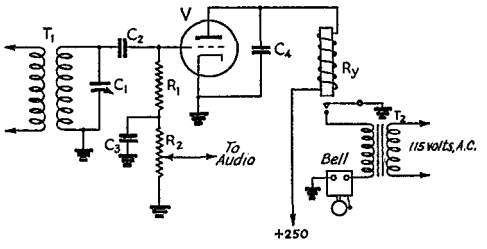

Fig. 4 — **Automatic air-raid alarm device operating from any b.c. receiver.**

C_1 — Usual detector tuning condenser in t.r.f. receiver.
C_2 — 250 μμfd.
C_3 — 500 μμfd.
C_4 — 0.1 μfd.
R_1 — 50,000 ohms.
R_2 — ½-megohm volume control.
Ry — Relay (see text).
T_1 — Usual detector transformer in t.r.f. receiver.
T_2 — Bell-ringing transformer.
V — Detector tube.

IMPROVING BUZZER TONE

TWO of the objections to the buzzer for code practice have been its irregular tone and unstable operation. In trying to find the cause of this, it was observed that the buzzer tone became bad whenever the contacts took a spell of sparking excessively. It became apparent that the vibration of the armature would be more regular if the sparking could be stopped. The old stunt of placing a condenser across the contacts was tried. Various values were tried and it was found that a condenser of about 8 or 10 μfd. worked best.

The buzzer contacts should be cleaned and the condenser connected. Then the buzzer should be adjusted for optimum operation, since the adjustment will be different when a condenser is used. There appears to be a resonant frequency of the condenser and the inductance of the buzzer winding to which the armature vibration can be adjusted. The contacts then do not spark, the tone is smoother and stability of operation is greatly improved. — *Horace J. Marriman, W5AYO.*

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INCREASED RECORDING TIME FOR G.I. RECORDERS

HERE'S a kink for those who own General Industries R70 recording units. By means of a simple change in the drive mechanism of such a unit I have been able to reduce the turntable speed from 78 r.p.m. to 54 r.p.m., thus effecting a substantial increase in playing time per disc. This may be accomplished by first removing the turntable from its spindle and then locating the motor shaft. You will notice that a machine screw is used to hold a bushing on this shaft. Remove the screw and the bushing from the shaft and replace the turntable on the spindle. After doing this, you will find that the recorder now operates at 54 r.p.m. This resulting slow speed is, of course, due to the reduced diameter of the motor shaft. Although this method can't be used where high quality is wanted, because of the decreased groove velocity, it should still be valuable where economy of discs is more important than quality. For either speech or code-class work, it should prove very useful. The change-over from 78 r.p.m. to 54 r.p.m. takes but a second, and the reverse operation is just as simple. One warning: Don't lose the bushing or machine screw! They may be hard to replace because of the scarcity of all materials. — *Hartland B. Smith, W8VVD.*

Missing in Action

The following amateurs serving in the war have been reported missing in action:

Maj. H. L. Andrews, VK3HY, Murchison, Vic.
W. C. Lauridsen, W60TX, Palo Alto, Calif.
Sam L. Miller, W5GMB, Little Rock, Ark.

Poems

"Somewhere in Australia"

BY SGT. RICHARD BECKER,* W8SCE

SOMEWHERE in Australia, where the sun is like a curse,
And each long day is followed by another slightly worse,
Where the brick red dust blows thicker than the shifting desert sands,
Where a Yank man dreams and wishes for the greener, fairer lands.
Somewhere in Australia, where women are never seen,
Where the sky is never cloudy and the grass is never green,
Where the dingo's nightly howling robs a man of blessed sleep,
Where there isn't any whiskey and the beer is never cheap.
Somewhere in Australia, where the nights were made for love,
Where the moon is like a spotlight and the southern cross above
Sparkles like a diamond necklace in a tropic balmy night,
'Tis a shameless waste of beauty when there's not a gal in sight.
Somewhere in Australia, where the mail is always late,
Where a Christmas card in April is considered up to date,
Where we never have a pay day and never have a cent,
But we never miss the money 'cause we'd never get it spent.
Somewhere in Australia, where the ants and lizards play,
Where a thousand fresh mosquitoes replace every one you slay —
Oh, take me back to Frisco and let me hear that mission bell,
For this God-forsaken outpost is just a substitute for hell.

* Hq. Detachment Sig. Sec., A.P.O. 923, c/o Postmaster, San Francisco, Calif.

"Ravin'"

(With apologies to Edgar Allan Poe)

BY MEYER DOLINKO*

ONCE upon a midday dreary, while I pondered weak and weary
In the class laboratory, idly tracing some old set;
As I nodded, nearly napping, suddenly there came a tapping
As of something gently rapping — rapping in my superhet.
Ah — I sharply recollect it came so fast I'd ne'er expect it,
But I quickly did detect it — and began to trouble shoot.
Took my faithful long-nosed plier, poked into my amplifier,
Deftly pulled upon a wire — one, or two — or four.
Then I spent ten minutes praying, heard myself quite softly saying,
"Quoth the speaker: 'Nevermore!' "

Stunned and filled with indignation, I withdrew in consternation
As the mystic oscillation kept on drumming in my ears.
"Stray capacitance!" I muttered, but the word was hardly uttered
When the speaker coughed and stuttered — adding greatly to my fears.
"Either this, or else distortion!" So I quickly seized a portion
Of my set, and threw all caution out the door —
With a swiftly mounting fever and the patience of a beaver
Swore I'd fix that damned receiver.
Quoth the speaker: "Nevermore!"

Now I looked up rather smartly, thought I had the answer, partly,
For it was my shunt-feed Hartley that was troubling me — I guessed.

* State Teachers College, California, Pa.

Not long ago Grantland Rice made a poetic plea for a bard with a Kiplingesque cadence to write the heroic ballads of this war. If no poet of that power has yet arisen, there is no lack of versifiers in general — professional and amateur, sublime and synthetic. War, in its bloody gurgitation and the melancholy of its interludes, whether of battle or training, seems to bring them to the surface.

Certainly that is true of hamdom. *QST*'s mail these days is laden with their efforts. Of these, many are, of course, quite devoid of merit; others, while readable, are unavailable simply because of space limitations. Yet so strong a flood of contributions must indicate at least a partially equivalent strength of reader interest. And so we present herewith a few offerings from the top of the pile. We enjoyed them; we think possibly you may, too. If you'd like to see more in these pages, please let us know.

Though my head was getting denser, and my nerves were growing tenser
I adjusted my condenser — 'till the resonance seemed best.
Then I studied my detector, and my band-pass preselector
And adjusted my rejector — and I swore.
With my tubes in operation, and enough regeneration
Quoth the speaker: "Nevermore!"

"Beast!" I cried. "You thing of evil! Weird contraption of the devil,
Why do you delight and revel in this torture of my mind?
I've examined all your stages, pondered o'er Chirardi's pages,
But my brain is not a sage's — and your trouble I can't find!"
So I spoke, and, having spoken, realized the set was broken,
So I put an r.f. choke in and I waited as before.
But my r.f. wave was fated to remain unmodulated
And I only heard the hated,
Cursed chant of "Nevermore!"

Hours of this, and then I rested; but I had not yet been bested,
So I rose and wisely tested for my continuity.
Since my grid was influential in controlling plate potential
I examined each essential of my complex a.v.c.
But, alas, it's two weeks later, and my problem now is greater,
For my wretched oscillator now is like a lion's roar.
Tell me, though I've great ambition, will I e'er win recognition
As a radio technician?
Ah — you said it — "Nevermore!"

"A Woman's View"

BY MRS. W3???

Being a ham may be a thrill,
But I have more than had my fill
Of having dinner ready, just
To hear the OM say, "I must
Go back once more before I leave."
So I watch my cooling food and grieve.

Or else I'm all dressed up to go
To some swell motion picture show;
My hair is combed, my teeth are brushed,
The dishes done — but how I rushed.
And then my better-half would chime,
"I'm on the air; some other time."

But that, of course, was all before
The nation started in this war.
Now silent rigs collect the dust,
Condenser cans are hosts to rust.
You'd think at last I'd be content.

Instead, I've found a new lament.
For now, and you can be the judge,
I've really found a fitting grudge.
Old Muzz, and Hitler, Hiro too —
I'd like to tell 'em what to do.
They closed my OM's station flat —
When *I'm* the one who should do that!
— *D.V.R.A. News*

The Trusty Key

BY PAUL M. WILSON,* W4HHK

The trusty key no longer pounds
The CQs loud and strong.
It lies deserted in the dust
And knows that all is wrong.

It served me as a friend so true
To chat on all the bands
And with it made more friends anew
In all the distant lands.

But now the speedy key is stilled —
Its spark of life is gone.
And only will it live again
When one day comes the dawn.

And now it's up to us, you guys,
To buy those bonds and stamps —
'Cause now's the time to all get wise
And fix those dirty tramps.

The Way I Feel

BY M. W. ROZAR, W4ERT**

I buy my bonds and stamps each day
and do it with a vim.
I like to think I lick a Jap
when I am buying them!

I walk a mile and save the gas;
the steel and rubber, too.
It's just a lark; I do not mind —
but Hitler, woe to you!

I pay my tax; 'tis true, 'taint fun,
but liberty is dear.
And cheap at such a price to pay —
foul Musso, fate is near!

I go along with all they say —
I should, to do my part.
But when they took me off the air
they darn near broke my heart!

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*Collierville, Tenn.
**P. O. Box 37, Macon, Ga.

Strays

A booklet, *Metering of Alternating Current* (Extension Course No. 10) may be secured from the industrial relations department, 3-N-52, Westinghouse Electric and Mfg. Co. The booklet contains 177 pages and 139 illustrations relating to methods of metering alternating currents.

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One of our ops here who was an ex-W6 left for foreign service and for a going-away gift, the boys appropriately gave him some quarts!— *Pvt. J. Wheaton.*

—•••—

If W5KOB is still wondering if he is the youngest W5, he can stop now, because I am 14 also, so guess we are about even. — *W5KIY.*

—•••—

Hand-made sapphire jewel bearings, the size of a pin head, formerly imported from Europe for use in electrical measuring instruments, are now being replaced by bearings of newly-developed hard glass. These may be produced in such quantities as to make the industry practically independent of European imports which have dwindled almost to the vanishing point because of the war.

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A booklet containing 50 pages of reference on u.h.f. subjects may be obtained upon request from the Zenith Radio Corporation. The booklet is known as the "Reference Guide to Ultra High Frequencies." Requests should be addressed to Miss E. Kelsey, Engineering Correlator, Zenith Radio Corp., Chicago, Ill.

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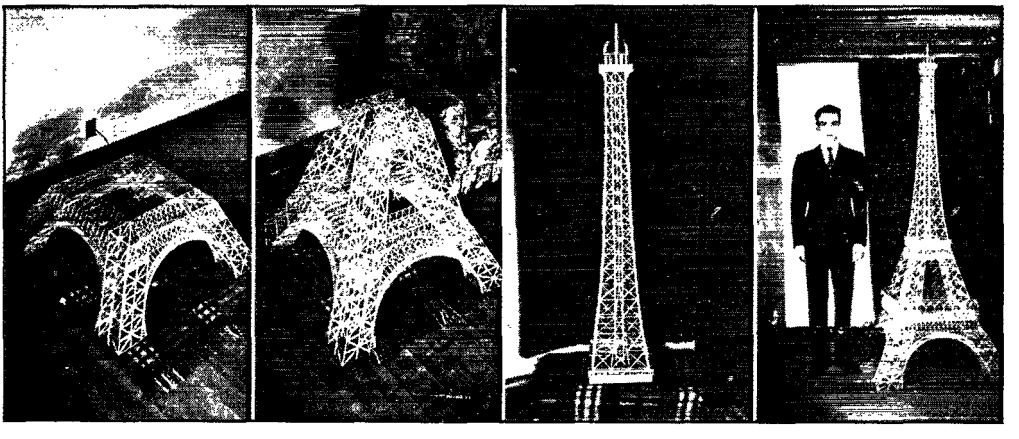
When the war clamped down on ham operation, Merrideth D. Wilson. W8MTR, engineer at Westinghouse Research Laboratories, looked around for a hobby to take its place. The rubber shortage inadvertently supplied him with the answer — equipping a bicycle with a small gasoline engine. W8MTR originally bought the bicycle to save tires and gasoline but found pedalling 10 miles a day in the hilly Pittsburgh area more than he had counted on. So he resurrected the gasoline engine shown here from an outmoded washing machine and tackled the job of remodeling it. He added a two-speed gear shift, a new gas tank, a speedometer and various other "gadgets," using sheet metal and angle iron originally intended for the rig. With a top speed of more than 30 miles an hour, he now makes the 5-mile trip from home to work in about 20 minutes. A single filling of the one-gallon tank gives him 100 miles of travel to and from his work at the laboratories.

Another war-time diversion replacing on-the-air activity is that shown below. It's not likely that many Ws will find time these days to duplicate it, but then Cliff Norman, VE2OM, has been off the air longer than most of us. Starting shortly after the Canadian ban, he built the model of the Eiffel tower pictured in 5½ months, using 10,000 toothpicks and 10 tubes of Duco cement. It stands 7½ feet high and comes apart in three sections for convenience in transportation. Although now nearly three years old, the tower is still in perfect condition.



CORRESPONDENCE FROM MEMBERS

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

LETTER FROM ENGLAND

Applethwaite, Stand Lane,
Radcliffe, Manchester, England

Editor, *QST:*

. . . During the last war I did a couple of years as radio officer in convoys bringing and taking American troops, and a lasting friendship has resulted between anything or anybody American and myself. Over here I have a short-wave receiver. How often during the last three years have I tuned into your amateur band, and listened almost with "homesickness" to your happy land. When your fortunate hams were talking about the wonderful times in Florida, etc., we were being blitzed until the sky glowed red with cherished possessions burning up. How I longed for America to sing again, "The Yanks are coming!" Never did I doubt but what you would ultimately come in, but oh! it did seem a weary time to wait. One of the red letter days of my life came when I heard WCBX interrupt his program with the stupendous news of Pearl Harbor. Someone had made the idiotic mistake of hitting Uncle Sam in the back!

At once I knew what the result would be. The answer came quick and adequately. Forgive me if I relate that I literally wept for joy over Pearl Harbor. Sincerely I sorrowed for your stricken ones, especially those in the sea service I served with, but at that moment I was conscious of a strong arm going round us. Hope came bounding back in my heart. 1917–1918 came true again. We should win together again! Nowadays I am a schoolmaster mainly concerned in geography, and all British lads leaving my school are ardent pro-Americans. In my spare time I try to keep in touch with radio and through radio with American thought and affairs. . . .

The copy of *QST* was wanted for its description of a good receiver in which I was keenly interested, mainly in latest constructional advice. It is frightfully difficult to get any radio literature over here from America. You see we cannot pay, and the Radio Society of Britain can only secure a very limited quota insufficient to go round. By great good fortune I managed to get hold of the 1942 *Handbook*. You would laugh to see how I cherish it! Every night before turning in I read some chapter or other and forget the immediate worries around.

Carry on with the preparation of the 1943 *Handbook*. All strength to your efforts, and never forget you are not merely engaged in distributing technical material. I am absolutely sure that hundreds like myself must bury their heads in your books as a solace in weary days. . . .

God forbid the lovely cities of New York, Boston and Philadelphia, which I knew so well, should ever go through the ordeal of fire and shell such as we know. Over here we are prepared to go on seeing our cities laid waste, month after month, but the end is sure with your help. We will hold on until once again you help us to give the knockout. This time, however, we must not drift apart again during the years of peace. As soon as possible I shall take out my peacetime transmitting license, and begin contacting America. Now, as never before, I can see the mutual interchange of goodwill messages via radio across the Atlantic will be one of the hopeful guarantees of future peace and happiness. Some day I may be lucky to touch you!

You . . . can wield a mighty influence. Carry on, sir! And one Englishman returns a most sincere thank you. . . .

— *G. T. Wetson*

OBJECTION TO "QRR OFF MALAYA"

Valhalla, N. Y.

Editor, *QST:*

I have just finished reading "QRR Off Malaya" and am so burned up over it that this letter may not be very clear.

I can't make up my mind whether this is fiction or truth, for you have made a terrible blunder in printing it at all, much less neglecting to label it correctly.

The story is just too realistic, especially the description of climbing the bamboo fence — "How we did without disturbing the guards I'll never know; it sounded to me like horses jumping down in the quiet and still of the night" — the escape on the beach and ride to the destroyer.

We are at war, definitely, and articles such as this — underestimating the enemy, making him out as a clean fighter or one who will give a break — is the worst possible thing that could be put into the minds of prospective Army and Navy ARRL members.

Regardless of fact or fiction, we must make the enemy out as a fanatic who hates the white race and is taught to hate us and treat us as inferior and spineless. It must be drummed into every American's mind that he must expect no quarter, that if captured he will be treated as a dog,

brutally whipped, used for bayonet practice or shot down while prisoned. This is not fiction; it is truth, and has been proven by stories of correspondents returning from the Far East. We must believe that it is better to fight a suicidal battle to the end rather than be captured alive and subjected to tortures and horrible treatment.

I can see no way of retracting such a story, but I believe you should print an explanation of this story and a few of the true facts. . . .

— *Owen J. Dowd, W2JHB*

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831 W. Lullwood Ave., San Antonio, Texas

Editor, *QST:*

Knowing from years of experience in reading *QST* that you may receive comments from literary critics in regard to my story in the September issue, "QRR Off Malaya," I believe an explanation is in order. In all fairness to yourselves and myself, it was supposed to be pure fiction and intended as entertainment. I have written other published articles, but this was my first attempt at fiction. I remembered an editorial, a darn good one, by Mr. Warner, in which he stressed the common interests of all hams and the invaluable spirit of friendship won by our international DX contacts. On December 7th this, of course, could still exist.

In "Splatter" you stated that I had disqualified myself as "an expert on Japanese character." I did. However, the story was written in late December and was not published until September of this year. To be honest with you, it was originally written for another magazine. They retained it several months . . . then wrote me and stated they found my story very interesting and entertaining, but, because of a change in policy, could not use it. . . . I therefore mailed it to you; you accepted it but told me that due to lack of space you did not know when it would be published. It therefore appeared in September, just nine months after it was written.

Meanwhile a lot of water had gone under the bridge — a helluva lot! Bataan, Corregidor, Hong Kong, etc. Believe me, from what I have heard, I could write a different story now. In December we thought we were fighting humans, but since then we have learned better. Anyway, I was writing the story for hams only. No one else could be expected to understand the peculiar ending.

Thank you for publishing the story. I really believe it was enjoyed from comments I have had, and after all one had to read the whole story to get the point, so evidently no one threw the magazine down failing to finish the story.

— *H. Frank Jordan, W5EDX*

EDITOR'S NOTE. — W2JHB's reaction, while undoubtedly sincere, is unique. Other comments received — including some from members of the armed forces — coincide with those reported by W5EDX. From the factual standpoint, the story *was* plainly labeled as fiction, both in the subtitle and in the "Splatter" note.

However, "regardless of fact or fiction" let *QST* readers in the U. S. armed forces take warning. Don't hope for mercy from a Jap in battle on the chance that he may be a sympathetic ham; the odds work out to, roughly, a hundred million to one!

"ACTIVELY ENGAGED"

75 Park Ave., Baldwin, L. I., N. Y.

Editor, *QST:*

For some time now I have been intending to write to express my appreciation for the part you must have played in aiding my establishment in the secret radio work being carried on in Long Island. You will recall that I applied for this work through the League early in this year. The first of June I received a call and have been "actively engaged" ever since. . . .

I know that the work being done by the League now is well without its scope of normal activities, and feel that you should be commended for this. You must derive enjoyment from the fact that you are doing so much to help our country at this time; knowing that the ability to do so is a direct result of the fact that there was amateur radio prior to the war — and knowing also that meanwhile you are fostering the greater amateur radio which should flourish after this war.

— *Edward M. Merrill, Jr., W8ONF*

FALSE ALARM

124 N. Rose St., Burbank, Calif.

Editor, *QST:*

While I was grazing through the latest copy of *QST*, I came across the words stating that publication was to be discontinued because the Editor had to go save the world for democracy, etc. For a brief instant I thought that it meant that *QST* was to be extinct as of October, 1942. You can never know how relieved I was when I found that I was actually reading an article reprinted under the heading of "25 Years Ago This Month."

It was during that brief instant that I learned what *QST* actually meant to me — and from now on I will appreciate its arrival on my doorstep a thousand times more than I used to. . . .

— *Stephen J. Taylor, W6UBB*

THE SIGNAL CORPS WANTED HIS RIG

6259 Hyacinth St., Chicago, Ill.

Editor, *QST:*

About a month ago I sold my transmitter to the Signal Corps. To say the least, I was very much surprised that they were interested in a homemade job.

Front and rear views of W9LQY's home made transmitter, purchased by the Signal Corps.

The night before they came to get it I made the enclosed photographs, and since then I show them around every opportunity I have. . . . As you see, the assembly of the transmitter is quite original, and I can assure you it did include quite a few new ideas.

The line-up is: 76 crystal, RK39 buffer-doubler, 35T doubler-amplifier and a pair of 100THs in the push-pull final; the modulator is a pair of Eimac 75Ts. Input is 100 watts to 999 watts c.w. and 600 watts 'phone. The third and fourth section is an independent 175-watt semi-portable transmitter. . . .

— *Arthur B. Damiani, W9LQY*

TIME FOR COÖPERATION

167 S. Wildwood Ave., Kankakee, Ill.

Editor, *QST:*

. . . Thanks for the nice job of work you fellows are doing for all of us there in West Hartford and in Washington. It is obvious that you are acting on the desires of every true "ham" in closely coöperating with the government in this time of war, and at the same time making stronger the reputation of the amateur radio operator for skill, loyalty and patriotism.

As EC for this County, and as president for the Kankakee County Radio Club, I have run into some unfortunate instances of the lack of coöperative spirit of a few amateurs. Locally, and in my jurisdiction, I have been blessed with a group which, though small, has worked as an efficient unit, attending meetings, working together and spending their hard-earned money for CD equipment, all at considerable personal sacrifice. In other communities, however, I find a regrettable lack of interest, some factional discord and a good deal of expression that the WERS rules hold us down to too low power and too little operating time. Unless this selfishness stops, I am afraid that your best efforts at bettering amateur radio's reputation will be lost. It is time now to make all sacrifices, in time, in money and in our very selves, to apply our knowledge and skill to the aid of our country. Uncle Sam says WERS is the way he wants help from us here at home. Let's give it to him. And every man should know that he is not the bad apple that spoils the barrel.

Club funds are accumulating rather than depreciating. Might it be a good plan to make contact, through ARRL and *QST*, between USO and such clubs and individuals as might care to coöperate, to purchase subscriptions to *QST* for USO reading rooms and recreation halls over the world? The double job would be done of helping ARRL and informing and entertaining our brother hams and prospective hams in the service.

— *Edward P. Drolet, W9IBU*

THE "SEA-GOING SOLDIER" IS BACK

c/o Port Signal Off., Ft. Mason, Calif.

Editor, *QST:*

A short time back I wrote you about the "sea-going soldiers." Well, I'm off the beach and back in harness now after two months.

So help me, this is a ham's idea of paradise. Four receivers, from the lowly crystal set to the superest superhet, and three rigs, two of them high-power stuff. All this is brand-new commercial equipment and a real joy to work with. The mill is handy on a separate stand, and, while the whole unit is compact, there is plenty of room for two men to work at the same time. All the controls are at your fingertips and there are meters galore.

About the only thing that would seem strange to a ham is the auto alarm. This is an automatic receiver that rings a bell to wake up hard-working radio operators at all unpleasant hours. I know one fellow who didn't know how to turn one off, and the poor guy really suffered! It seems the skipper's room was right off the wheel house and the bell disturbed his slumbers. Needless to say, the chap learned how in a hurry!

To give you an idea of what a day is here, or on most transports, I will give you a schedule. The watches are from 12 to 4, 4 to 8 and 8 to 12. You have four hours on duty and eight off. If you go in convoy, that is different entirely. The watches remain the same, but the work differs. We won't go into that. On ordinary trips, out of convoy, you copy all the stuff that is sent on general broadcasts and your press schedules. Each day you get a time tick for the bridge and keep a con-

(*Continued on page 80*)

OPERATING NEWS

JOHN HUNTOON, W1LVQ, Acting Communications Mgr. **GEORGE HART,** W1NJM, Asst. Coms. Mgr.

WERS License Applications. A principal shortcoming seems to be lack of suitable explanation of liaison with the Army Fighter Command (formerly Interceptor Command) to ensure immediate shutdown of WERS facilities if that should be ordered by the Army's defense commander. Warning district organization lends itself admirably to this requirement, of course, since every unit of the licensee is in radio contact — directly or through an intermediate net station — with the district warning center which is the terminus of the landwire from Interceptor Command headquarters for the particular region involved. At each d.w.c. there is a "district warning officer," usually a telephone company employee, who has charge of the operation of the telephone switchboard which constitutes the d.w.c. itself. He is on call 24 hours per day, and supervises his operators who work in shifts to keep the board ready for action. Arrangements may be made through him for immediate transmittal of any WERS shutdown order.

FCC at present states that evidence of continuous monitoring of one of the "key" broadcast stations will be satisfactory compliance. A "key" b.c. station is so designated since it is equipped and prepared for transmission of a 1000-cycle tone in the event of an Army order closing down radio stations. All broadcast and many other classes of stations monitor such key b.c. transmitters continuously, and shut down immediately upon the receipt of the tone signal (unless it is designated a test, of course). It is our belief that such liaison is fundamentally wrong for WERS units. Once the ability of Axis air forces to strike direct and continually at our cities is demonstrated, b.c. stations will certainly be shut down at the first definite report of enemy planes in the vicinity. At this point WERS are needed in readiness, and actually on the air if an attack follows; they'll be useless if shut down. (In time of actual bombing emergency, of course, a radio aide and his crew may decide to remain on the air regardless of any closedown order, choosing to establish later the absolute necessity of their violation.) But our belief is that in practice, during or before any such raid, any closedown of WERS and other emergency services will be separate from b.c. orders. We therefore urge adherence to the original proposal of radio liaison with the district warning center city. Once set up, that will enable maximum flexibility for multiple shutdown orders arranged by classes of stations, if that comes. — *J. H.*

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HAMFEST SCHEDULE

Friday, November 20th, at Queens Village, N. Y. The Federation of Long Island Radio Clubs will hold its Ninth Annual Hamfest at Community Hall, 215-32 Jamaica Ave., Queens Village, N. Y., on Friday night, November 20th. There will be many prizes, including ten ARRL memberships, Handbooks, radio books, turkeys and door prizes. The admission will be 35¢, including tax. *Everyone is welcome.*

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ARTICLE CONTEST

The article by Mr. Charles C. Hay wins the CD article contest prize this month. *We invite entries for this monthly contest.*

Regarding subject matter, we suggest that you pick a topic of current interest. Amateur radio is a broad field and our ways of contributing to the war effort need discussion and emphasis. Perhaps you would like to write on Radio Training programs, club methods boosting code proficiency, Emergency Corps registering for CDC selections and WERS activity, organizing or running a radio club, getting local groups QSO by light beam or wired wireless or ground currents now radio is out!

Each month we will print the most interesting and valuable article received. Please mark your contribution "For the CD contest." Prize winners may select a bound *Handbook* (Radio Training Course or regular edition), *QST* Binder and League Emblem, or any other combination of ARRL supplies of equivalent value. Try your luck!

A Strong Organization

BY CHARLES C. HAY*

When the U.S.A. was young, it was small in area and few in numbers. Your congressman was a neighbor. He spent little time in Washington because our legislative needs were few. As a neighbor you could call on him and discuss each law under consideration. There was plenty of time for that. Each individual citizen could make his opinion felt easily and effectively.

How different are conditions today. Our country is one of the largest and most complex in the world. The volume of legislation required merely to keep its essential services operating is such that your congressman spends the major portion of his time in Washington. The number of people in each congressional district is such, and so distributed, that for each to know his congressman in the old-time neighborly way is out of the question. There simply isn't enough time. As a result, the effectiveness of the individual citizen in shaping our laws and protecting his interests by direct contact has been reduced to the vanishing point.

But even as our country has developed, so have the means

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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. Those listed with two asterisks teach theory only. Others conduct only code classes.

Amateur Radio Transmitting Society, Louisville, Ky.
*American Women's Voluntary Services, New York, N. Y., and St. Louis, Mo. (Sponsored by YLRL).
*Bloom Township High School Radio Club, Chicago Heights, Ill.
*Burlington (Vt.) Amateur Radio Club.
Central New York Radio Club, Syracuse, N. Y.
*Denver (Colo.) Radio Club Council.
*Detroit (Mich.) Amateur Radio Assn.
*Detroit (Mich.) Edison Radio Club.
*Dumont (N. J.) Radio Club.
*East Texas State Teachers College Amateur Radio Club, Commerce, Texas.
*Electric City Radio Club, Great Falls, Mont.
**Federation of Long Island Radio Clubs, Jamaica, N. Y.
*Hunts Point Radio Club, Bronx, N. Y.
*Indianapolis (Ind.) Radio Club.
*Iowa-Illinois Amateur Radio Club, Burlington, Iowa.
*Joliet (Ill.) Amateur Radio Society.
*Mass. Committee on Public Safety, Boston, Mass.
*Minneapolis (Minn.) Radio Club.
*Nassau Radio Reserve Corps, Rockville Center, L. I., N. Y.
Purdue University Radio Club, W. Lafayette, Ind.
*St. Paul (Minn.) Radio Club.
San Joaquin County Amateur Radio Operators Assn., Stockton, Calif.
Shy-Wy Radio Club, Cheyenne, Wyo.
Sunrise Radio Club, Hollis, L. I., N. Y.
*Valley Radio Club, Spring Valley, N. Y.

of expression available to the citizen — not now by calling on your congressman in person, nor even by writing to him, but by the organization of numerous citizens with similar interests into groups and the application of the group influence. Over the past twenty years no other mechanism has been developed that is half so effective in reflecting, in legislation, the will of interested citizens.

Our ARRL is, in part, such an organization. To date it has been the most successful in the entire world in obtaining for the licensed radio amateur the rights and privileges he enjoyed prior to December 7th. But remember this: The ARRL is only one of many organizations having an interest in the ether waves. An unrelenting fight has had to be waged, ever since radio began, against powerful and sometimes unscrupulous interests who wanted the ether for themselves. That fight must go on.

War time, being a time of unease, and the reconstruction that follows, being a time of dislocation, is the natural period when "privilege grabbing" and "dog eat dog" actions flourish. Those citizens with the weakest organizations to protect themselves can be sure their interests will be sacrificed to the interests of a more powerful group whenever interests clash. Therefore, fellow amateurs, we had better see to it that our organization is strong.

To make our organization strong we must carry out a three-point program beginning *now*. (1) Have the largest membership in the ARRL that we can muster. (2) Deliver the largest measure of performance in the defense efforts of the ARRL as possible, and *report what we are doing to Headquarters*. We are doing pretty well at the former, but we are sloppy reporters. Let's get busy on that last item. (3) Advertise to every non-member we know the virtues and services of amateur radio to the community. Stress if you can the particular service we might render to the particular citizen to whom you are speaking.

These three things are easy to do, but they must be done continuously in order to be effective. It is hardly worth while for our country to win its war against our external enemies, if we, as individual citizens, lose the privileges which give us our greatest pleasure. Therefore let's follow this three-point program and make "di-di-di-dah" mean real Victory and not just a memory of yesterday's suffering.

ARRL Affiliated Club Honor Roll

THE tabulation below was compiled from information contained in a questionnaire returned in response to a yearly club survey. The clubs listed are in addition to those included on page 83 of August, 1942 *QST*.

All members of the following clubs are ARRL Members

Amateur Radio Relay Club, St. Louis, Mo.
Asheville Amateur Radio Club, Asheville, N. C.
Civilian Air Reserve Monitor and Relay System (CARMARS), Toledo, Ohio.
Finger Lakes Transmitting Society, Auburn, N. Y.
Frankford Radio Club, Phila., Pa.
Illinois Ham Club, Chicago, Ill.
Intercity Radio Club, Mansfield, Ohio.
Mid-Hudson Amateur Radio Club, Poughkeepsie, N. Y.
The Northwest Amateur Radio Club, Mt. Prospect, Ill.
Parkway Radio Association, Roslindale, Mass.
Ponca City Amateur Radio Club, Ponca City, Okla.
T9 Club, Beverly, Mass.
The 56 Megacycle Minutemen, Lexington, Mass.
Valley Radio Club of Eugene, Ore.
York Radio Club, Inc., Elmhurst, Ill.

—•••—

BRIEFS

W8VPN reports a British press station which transmits a summary of the day's news each evening at 8:30 P.M. EWT on 6.5 Mc. The transmissions are in continental code at approximately 15 w.p.m., sending double. This would make good practice material for beginners or for those amateurs who have let their code-copying ability slip to that extent. We should appreciate other information on slow-speed transmissions which appear to be made on regular schedules. Remember that such transmissions may be utilized for publication only by subscribers of the particular service. *Do not use them for anything but code practice.*

BRIEFS

The World Wide Broadcasting Foundation, Boston, Mass., has informed us that their "Code School of the Air" has concluded and probably will not be resumed. The final test was given on August 3rd and certificates were awarded. Changes in plans because of the war make it improbable that the course will be resumed or repeated in the near future.

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W8MHE, EC and radio aide for Zone 23, Allegheny County, Pa., found it impossible to attend WERS meetings because he worked nights as a motion-picture projector. He took up the matter with his local union, and it was arranged to cover his job during meeting nights so that he might attend. There is usually a way if you try hard enough to find it!

—•••—

The Australian News and Information Bureau, 610 Fifth Ave., New York, N. Y., would appreciate reports on reception of the following transmissions: (1) VLG6, Melbourne, 15.23 Mc., 9:30 P.M. PWT, directed to West Coast U. S. A. (2) VLG2, Melbourne, 9.54 Mc., 7:30 A.M. EWT, directed to East Coast U. S. A. (3) VLQ2, Sydney, 11.87 Mc., 8:00 A.M. PWT, directed to West Coast U. S. A. (4) VLG2, Melbourne, 9.54 Mc., 8:00 A.M. PWT, directed to West Coast U. S. A.

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W5GED says, "Buy war stamps and lick the other side!"

—•••—

The Month in Canada

QUEBEC—VE2

From Lin Morris, 2CO:

SQUADRON LEADER ED WURTELE, 2FD, came home on furlough. He has been with the RAF since 1935. Congrats to Allan Smardon, 2JO, on his marriage to Miss Kathleen Macrae; JO is a 2nd Lt. in the 8th Anti-Tank Regiment, RCA. If they ever get around to issuing a "visited-all-Continents" certificate, 2ID, 2BP and ex-2AG would just about be eligible. These boys are ops with the RAF Ferry Command and they do get about. Captain Bill Sugars, 2BM, in Britain with the Canadian Army Dental Corps, is the proud father of a junior op. 2HN has moved to Lachine and is in the chemical business. Tom Parkin, 2NR, has devoted most of his spare time for the last two years to training ops and has to date given individual instruction to no less than forty-eight men, all of whom are now on active service.

The many friends of old timer Roy Wallace, 2AL, will be saddened to hear of his son's passing. Young Wallace was a sub-lieutenant in the navy and met a hero's death at Dieppe. 2BB is a signaling instructor at the naval school at St. Hyacinthe. After a seven-year sojourn in the mining country, John Grant, 2CU, has returned to the scenes of his youth; his new position is with Northern Electric. 2CJ is now in the reserve army with Corps Signals. 2NY is with TCA at Dorval Airport. 2CR and CHF came down from Toronto for a week end.

Attention Montreal and district hams: There is an urgent need for instructors to teach code one evening a week to air cadet squadrons. Any hams who would like to volunteer for this useful war work are asked to communicate with 2CO, who will supply all the details.

ONTARIO—VE3

From Len Mitchell, 3AZ:

FROM 3AOR comes news of the Hamilton gang. 3MZ has joined the RCAF, Radio Division. 3PO is operating on the S.S. *City of Kingston*. 3VZ is at McGill University with the RCAF. 3ADJ has a new QRA at Kitchener. 3DO and 3XT are teaching at Westdale. 3GZ with the RCAF in England has purchased a motorcycle. 3WO is in California.

From London and District, via 3DU, comes word that 3AAO is still with the RCAF at Brantford; 3ACO is with G.M. at Windsor; 3AII is with C.B.C. at Ottawa; 3AJE is with Taylor Electric Co., and 3AJH is back from Windsor and is with Fleet Aircraft in London. 3AJQ is still looking after the farm. 3AKY is now in Egypt with RCAF. 3ALX has his sergeant's stripes and is instructing at No. 1 Wireless School, Montreal. 3AQF spent part of his summer holidays addressing ration books and is now back teaching school again. 3AQJ is now C.S.M. 1st (Res) Dist. Sigs. RCCS. 3AQK, who is with the RCAF, has left Blighty, and his XYL had a cable telling of his landing somewhere in the Middle East. 3AXD is still at No. 4 Wireless School. 3KC recently took unto himself a wife while stationed in Scotland with the Navy. 3QC is now chief inspector at Sparton Radio. 3VT and 3KD have not been heard from for a couple of years. 3WM has been on the sick list again but was recently appointed O/C of 1st Dist. Sigs. RCCS (Res). 3WP is still overseas with the RCAF as instructor. 3APH is on the control tower at No. 4 A.O.S. Crumlin. 3HZ is overseas with 1st Div. Sigs. 3AQG was home on leave from Halifax this summer. 3DU reports that he has no news from the St. Thomas gang. Whatsa fellows?

ALBERTA—VE4

From W. W. Butchart, 4LQ:

(*July–August*) 4XE received a promotion, and is now WO1. Nice going, Dick, old boy! 4AEN joined the RCN as an electrical artificier, and is now down at Halifax on a training course. After being turned down by the RCAF as unfit six months ago, 4EA is in receipt of his call under the NRMA scheme, and passed as A-1. Roy hopes that the RCAF will change their mind and take him in as a Radio Technician. They wouldn't be making any mistake!

4VJ, 4AH and 4AKK out at CFRN's transmitter are enjoying the company of a group of U. S. Signal Corps boys who are making their headquarters at the station for the time being. 4VJ says that they are a swell lot of chaps. Some of the "green" operators among the bunch received assistance from our boys, and of course Ken, Frank and Bob were in their glory being on the air again! Get Ken to tell you about some of the stunts the American boys pull off on one another!

While down at Sarcee, 4LQ went to Calgary to visit 4VO who works with the CWAC in the District Signals Office, but was disappointed to find that Dot had finished her shift and left the office. 4ANQ went out a week or two back and got himself married. To make matters worse he received his draft call too. What a life, eh, Don? 4AEV is now stationed at Mossbank, Sask., taking a bombing and gunnery course.

While holidaying at Vulcan, 4LQ bumped into 4AKG and an enjoyable hour was spent reminiscing. Some of you will remember that 4AKG at the time of receiving his ticket was the youngest ham licensed in Canada. He was a protégé of 4IN. And, speaking of 4IN, we were able to gather a few meager details from 4AKG as to that worthy chap's whereabouts. Apparently it would be almost impossible to "pin him down" in any one spot as he is operating on a coastal patrol plane on the West Coast. IN's YF is also in uniform.

4SL is still working for the Calgary Power Co. in Vulcan, where he has a nice little radio service business built up in addition to his other duties. 4BW and 4HT of "E" Troop Signals in Edmonton spent two weeks down in Sarcee this summer and report a very nice time. 4KK has a new movie projector. By the way, he got some pretty fair shots at the last NARC picnic. 4HM continues to turn out some swell pictures with his Leica.

(*August–September*) After much persuasion, Dot, 4VO, as keen a YL op as ever came out of Calgary, finally broke down and wrote us a swell letter. (Thanks a million, Dot; your letters are always welcome.) VO and her sister spent their holidays in Banff this summer and had a grand time canoeing, mountain climbing and taking pictures. They scaled 9000-foot Mount Rundle, and if you chaps know your Banff, Mount Rundle is no cinch to climb! They didn't take a clock along so they didn't know whether they were getting up in the morning or afternoon half the time!

Remember Glenn and Maude, 4AHZ and 4APA respec-

tively? Well, they are still at the same old stand, and we understand that Maude spends most of her time writing to all the boys she used to work on the air. Sounds like a grand gesture, Maude. Keep it up! And Glenn says that her letters usually contain six or eight pages, too. No one has heard from 4BH for some time. We hear that he is married, so that probably explains the silence. 4TY and 4ALU keep things moving down at the High River E.F.T.S. Gladys of 4AFT fame was holidaying in Calgary with her husband.

A former Calgary Radio Club member, Paul De Foo, wrote to Dot and told her that he is in Chungking, China, as a technical man on a radio station there. Says he spends his time worrying about insulation problems in that damp country and sitting in a dugout listening to bombs drop around him! Sounds more like London during the Blitz, eh?

4AAD, of Calgary, 13th District Signals Officer, holidayed at the Pacific Coast and stayed as far away from radio as possible. Can you blame him after listening to it all week in the operating room just outside his office? 4AMG is in Calgary on leave at present. He is stationed on the West Coast on special work with the Army.

We regret to announce that 4LK, one of Calgary's DX hounds was killed in aerial action over the desert. Our sincere sympathy is extended to his people and friends.

Jim Miller of Edmonton got himself married two or three weeks ago, and is at present operating a rig in McMurray. Jim has been bitten with the photography bug, and is concentrating on Kodachrome transparencies. 4HM is kept pretty busy these days and is away from home for a week at a stretch. Charlie has been kept busy in his spare time with xtal grinding for commercial airlines, and the Provincial Government Forestry Service.

4XE returned to Edmonton to resume his duties, and the latest dope we have is that he will conduct a Part 1 Signaling School for the Reserve Army starting the latter part of this month. Dick's YF is at present on sick leave after an appendix operation. 4BP has resumed his teaching duties after his summer holidays. Has anybody heard from 4ADW? Seems to us that it's about time he dropped us a line and gave us the dope on his activities in Saskatoon. How about it, Jack? We understand that XF is joining the Air Force.

That sort of winds up this month's news, fellahs. How about the odd letter from some of you? News items are hard to hunt up if you don't write in. What say? 73 for now.

VANALTA—VE5

From C. O. Sawyer, 5DD:

W. R. Peyton, operator on the S.S. *Catala*, sends in the following interesting letter:

"5ADU is p.o.w. in North Africa (Tunisia) according to the newspapers; he left Vancouver on a British ship as assistant operator in October, 1940, and we had not heard from or of him until the press report last spring. 5ADM is also operating on the Atlantic. . . . 5TR had his picture in the *Province* recently, marking his arrival overseas with the RCAF, if we remember rightly. Two of the boys are in coast stations: 5ACZ at Point Grey, and 5ADL at Dead Tree Point. Several are in radio range stations: 4YC at Fort St. John (where are also Alf Steigenberger and Leslie Georgy, who did not have licenses as far as we know); Ran Corran, Ted Chalmers and Bob Williamson at Whitehorse; Joe Wasylick at Edmonton; Nielsen at Crescent Valley (temporary); and George Gauld, 5AFU, also at one of the northern ranges. Paul Therrien is at Dorval Airport, Montreal. 4KI, late of CFCN transmitter staff, is signing CH5M at Surf Inlet this summer, and 4ABH (5ADD) is operating in Victoria for Western Air Command, along with Tom Grant of Lumby and Miss Ina Waller of Kimberly (our first YL commercial op). 5TQ still keeps the modulation up for Canadian Airways in these parts — we had heard of him, talked to him on the phone, traded junk with him, etc., but not until we were passing through Tofino recently did we meet him face to face; he was there waiting passage back to Vancouver.

"Our old friend 5TO left Canadian Airways last spring to join the RCAF; we understand he is now flying officer. It would not be wise to say where he is, but we are betting it's mighty interesting work. We learned the other day that 5RV is back on the mainland again; he has been on Vancouver Island with the RCAF since early in the war. 5BT helps keep broadcast station CJOR on the air. 4VU we last saw in the winter; he was then working for W. R. Carpenter & Co., in Vancouver following an illness. 5JG is working for Ed Lipsett & Co. in Prince Rupert — we saw him late in June and he was still oscillating strongly, says it's really great to be married. 5AAN joined the BC Police last January — we heard later that he was in Prince Rupert. W7AUC went up to Alaska last winter to pound brass, but returned to Yakima later. The latest one we met was 5GW, who has just gone to Premier to teach for the coming year.

"We met several U. S. amateurs a few months ago, including a couple of old-timers, but have not got their calls or names at hand just now; will send on the dope after we are next home and can get it. We also had the pleasure recently of meeting an old-time commercial radio and landline operator, Leonard James, who calls Williams Lake his home but is by no means always at home; in fact, he is now in the middle of a 4¼-month spell at upcoast stations. He was one of the original operators at PGD, Point Grey, around 1907. It seems a long time ago to us greenhorns, yet it was remarkable how many of the names Mr. James mentioned are those of men still active in the profession. Incidentally, Mr. James was interested to read in *QST* which we had in the shack here of the death of Colin Kennedy of St. Louis, as he worked landline with Mr. Kennedy years ago in the States.

"Our information is, unfortunately, confined to commercial and service operators, since these are the ones with whom we come into contact. If some of our dope concerns those who have not held amateur tickets, we realize that it is not within the usual limits of *QST*'s interests, but suggest that with the large numbers of amateurs now in commercial work it may contain news of some whom they may have encountered. As for yours truly, he is signing a variety of calls these days, the current one being VGNY of the Catala, but he will be shifting elsewhere in the next few days."

From 5HL, who is radio instructor for the Pacific Coast Rangers, we receive the following news:

"5AO is a shipyard electrician and installed their p.a. system. Game Warden 5KR is a captain in the Pacific Coast Rangers reserve outfit. 5VA is studying for a commercial ticket. 5AET is an op with Atlantic Ferry command. 5ADK was an instructor and 5KO a Corporal, both in RCAF, when last heard from. 5ACP is an op at a radio range station."

MAILBAG

A clipping from the Edmonton *Journal* received from one of our VE friends reports the death of Flt. Lt. W. L. Cameron, 4PX, in air operations over Germany. "A commissioned officer with the RCAF, Flt. Lt. Cameron arrived overseas this year after serving for nearly three years as instructor with the RCAF at Brandon, Camp Borden and Camp Trenton in Ontario," says the *Journal*. 4PX was a civilian pilot with Consolidated Mining and Smelting before the war, as well as a well-known ham.

3ATR accompanied his ARRL membership renewal with this comment: "During my train trip from the West Coast I met several hams and had a few very fine ragchews with them. In fact, I am continually meeting up with the breed wherever I go, and can assure you it is plenty of fun. I am with the signal sections of our unit, and can thank ham radio for a good start in this work." Thanks, OM. Now how about the names and calls of those you meet?

Sgt. A. V. (who requests his exact identity withheld) of the RCAF writes: "In your July issue I see that 2CO is making good use of your course — as he puts it, a 'set of lessons' covering the 'sending and receiving of Morse code.' Well, never being one to lag behind, I'm here to ask for the same thing. Here at this bombing and gunnery school we have our hands full with trainees who require Morse instruction. And in some instances the normal course of RCAF instruction just doesn't 'take' as it should. I feel that under those circumstances your course should be helpful. Could you please forward it to me at your earliest convenience?

"My *QST*s go through many hands and see much use before being filed away for reference, and I assure you out here it really does one good to know that most hams are not forgetting their country at this time. So let's keep the ball rolling and *QST* on the air, fellows!"

FOR nearly nine years we have been using this page to help amateurs with their problems in any way that we could. This month the roles are reversed, for National needs the help of amateurs.

You can guess what sort of help we need. In common with aircraft factories, shipyards and other plants engaged in the War Program, we are losing trained men to the armed forces. There just aren't enough eligible bachelors to go around.

This situation is particularly serious in testing and aligning receivers, for this work requires not only a general knowledge of communication receivers but also specialized training. For example, there are about ninety separate adjustments to make on each HRO receiver. It must track exactly throughout every coil range. Its calibration must check precisely with crystal-controlled oscillators at two points on each coil range. When properly adjusted it must meet exacting standards of performance, including tests for sensitivity, selectivity, images, noise, fidelity, power output, resonant overload, operation at off-normal line voltage, temperature drift and so on. In making these tests, 172 separate measurements are made and recorded. Altogether, this final laboratory work requires about four hours at the hands of a skilled worker with complete equipment. We have the equipment, but we need skilled workers.

From what we have said above, it is pretty obvious why we need recruits who know the general principles of radio communication. The rule-of-thumb methods which suffice in servicing broadcast receivers are of no help here. We have started a school, but when we have to start from scratch the course takes too long to be of much help. Most of our laboratory men were, and still are, amateurs. More amateurs are what we need now.

We know that there are many skilled amateurs in this country who are not in the armed forces and who, because of age or sex, are not likely to be called. If you are one of these, if you are not now employed in a defense plant and if you wish to do work which is vitally necessary, then may we hear from you? The need is urgent and time is short.

DANA BACON

Standard Frequency Transmissions From WWV

THE standard frequency service of the National Bureau of Standards station WWV has been extended to include another carrier frequency (15 megacycles). Temporary equipment is still in use while a new transmitting station is being built.

The broadcast is continuous at all times day and night from 1-kilowatt transmitters, and carries the standard musical pitch and other features. The radio frequencies are:

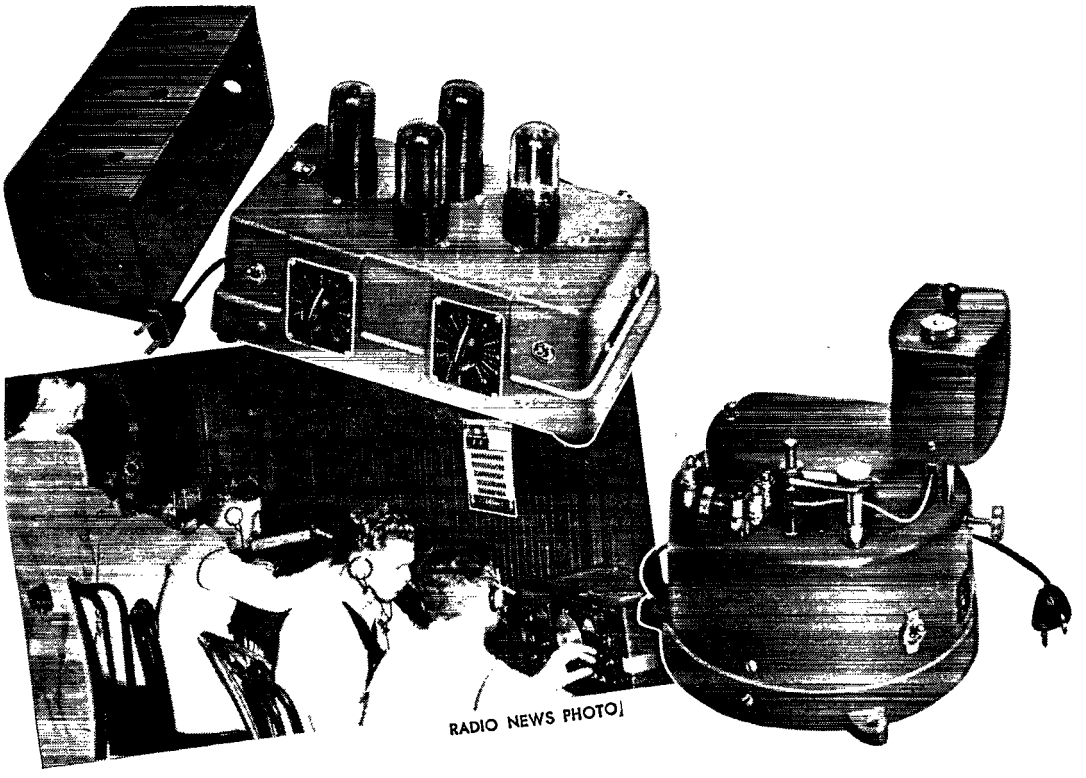
5 megacycles (= 5000 kilocycles = 5,000,000 cycles) per second
15 megacycles (= 15,000 kilocycles = 15,000,000 cycles) per second.

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

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

The accuracy on the 5- and 15-megacycle frequencies, and of the 440-cycle standard pitch as transmitted, is better than a part in 10,000,000. Transmission effects in the medium (Doppler effect, etc.) may result in slight fluctuations in the 440-cycle frequency as received at a particular place; the average frequency received is, however, as accurate as that transmitted. The time interval marked by the pulse every second is accurate to 0.0000001 second. The 1-minute, 4-minute, and 5-minute intervals, synchronized with the seconds pulses and marked by the beginning and ending of the announcement periods, are accurate to a part in 10,000,000. The beginnings of the announcement periods are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods; this adjustment does not have the extreme accuracy of the time intervals, but is within a small fraction of a second.

The service from the temporary transmitters will continue for some months. It will be continuous except for such breakdowns as may possibly occur because of the use of temporary apparatus. As rapidly as possible the Bureau is establishing a new station to provide more fully than in the past standard frequencies reliably receivable at all times throughout the country and adjacent areas.



IN ACTIVE SERVICE . . .

McELROY PROFESSIONAL COMMUNICATIONS EQUIPMENT

Signals at speeds from the lowest up to several hundreds of words per minute are fed from a good communications receiver, such as the Hallicrafter, into the signal leveller, SL990. Nearly all noises are eliminated and a clear strong signal is fed into the ink recorder SR900. Paper slip is drawn across a typewriter by Tape Puller TP890, the operator transcribing by sight reading onto the mill. One of McElroy's high speed recorders has been in use on a commercial communications circuit producing beautiful inked characters at 300 words per minute.

Note the McElroy chart on the wall in the photograph. Into the making of this chart has gone the 25 years of experience of the outstanding wireless operator of all time. Using this chart makes it possible for an operator to learn to read inked slip within one month at speeds exceeding 50 words per minute. We'll be glad to mail you a chart upon request. There'll be no charge and the chart contains no advertising matter.

McELROY MANUFACTURING CORPORATION

82 BROOKLINE AVENUE **BOSTON, MASSACHUSETTS**

Correspondence

(*Continued from page 78*)

stant watch on the distress frequencies. There are a couple of other things better left alone, so we will disregard them. You have your own stateroom and eat with the salon mess or in the petty officers' mess, and don't even have to empty your own ash tray!

The radio operator loses all identity as to name and becomes "Sparks" to everyone. When the operator is in port, all his time is his own to do with as he sees fit. It is a chance for travel and experience that cannot be tied, let alone beaten, by any other branch of any service. Imagine a week or two in K5 land or the same time in VK or XE! But even if you do have a good trip, it seems good to get back to a country that signs a W call.

It is amazing, too, some of the DX one can hear on the low frequencies. Try a listen on 468 kc. some time. I have a witness to verify the following statement: At 2000 GMT I set the radio room clock with a time tick on 115 kc. from NPG in San Francisco, while we were tied up in New York harbor. Stop and think about that — 115 kc. is a mess of meters, and the signal was a good S8! Just a word of warning: What goes on on the air is not for publication, so when you listen in, keep what you hear to yourself. . . .

— *Cpl. R. Almon Bent, W1JPK*

THE HAM LICENSE DID IT

A.P.O. 862, c/o Postmaster, New York City

Editor, *QST:*

. . . In order to protect the A.P.O. number I cannot tell you my location, but I can outline my Army "career" thus far.

My ham license got me out of the tank outfit to which I was originally assigned, when all else failed to do so. A letter to the War Department effected the transfer immediately.

Due to knowledge and experience gained through years of amateur activity, my progress has been quite rapid. I was rated after only four months of service, and less than a year later had progressed through all intermediate grades to my present one.

The combined experience of amateur operation and of Army procedure gained through AARS work made it unnecessary for me to attend any Army school. This not only made a favorable impression on my superiors but saved months of time for all concerned, and allowed my first rating to be made at a much earlier date than would have been possible otherwise.

I am sorry I cannot describe our work and equipment here, but I *can* say that among signal and radio officers, as well as among enlisted radio operators, ex-hams predominate to a most gratifying degree.

One profound effect of this war on ham radio will be bigger, better, and more ingenious stations in future ham shacks. One cannot operate and maintain such elaborate equipment as we are fortunate in having without visualizing improve-

(*Continued on page 82*)

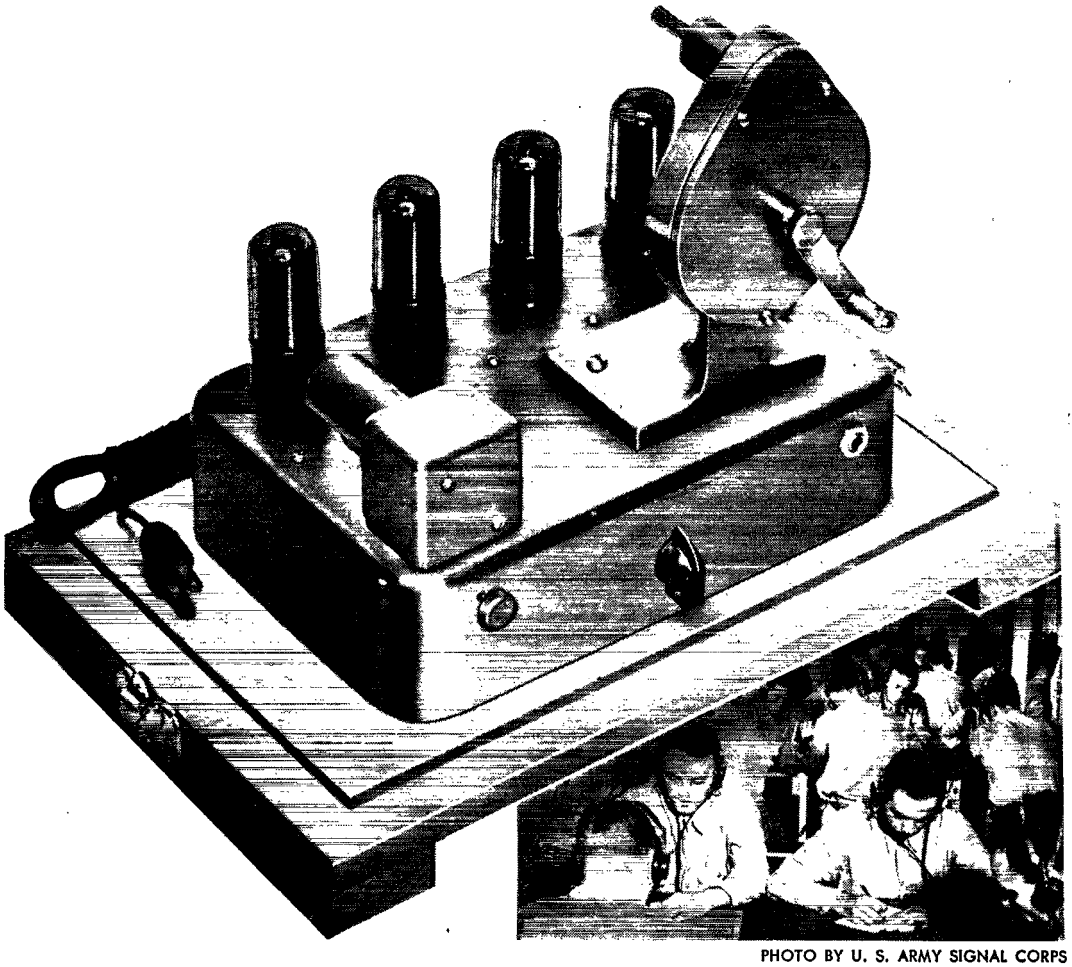


PHOTO BY U. S. ARMY SIGNAL CORPS

AS MANY AS 300 . . .

This McELROY model G813-742, designed by the world's champion telegraphist for individual or group instruction, incorporates an electron keyed, built-in tone source with an output of sufficient strength to energize three hundred sets. The unit is planned to teach wireless telegraphy with a minimum of time, effort and expense.

We provide tapes with a heavy writing line in black ink. The phone jack on the right is for monitoring; the center pointer for sensitivity control of the photo cell; and the knurled knob at the left for adjustment of the inked tape gateway between the exciter lamp and the photo tube. Four 117N7GT or 117P7GT tubes, 17 exciter lamp and 930 photo tube.

The slip, mounted on 16 mm., 400 ft. motion picture reels, is drawn between the exciter lamp and the photo tube, the tape puller rewinding the slip onto a take-up reel. At a character speed of 20 words per minute, each roll of slip will last approximately one hour, travelling at the rate of 12 feet per minute. Master rolls of a 15 roll set of practice tapes, G15AA, have been furnished to us by the U. S. Army Signal School at Fort Monmouth, N. J.

McELROY MANUFACTURING CORPORATION

82 BROOKLINE AVENUE **BOSTON, MASSACHUSETTS**

(Continued from page 80)

ments in the run-of-the-mill amateur equipment. "It's an ill wind ——"

Keep *QST* coming. It is a swell "bromide" for our suppressed ham desires!

— Staff Sgt. K. M. Reichenbach, W2KIF

A.A.F. QRM

A.P.O. 845, c/o Postmaster, New York City

Editor, *QST:*

Just a short burst of QRM from one of the gang now pounding brass overseas with the AAF. One of the boys picked up a copy of *QST* in a nearby town, and it was heartening to see that you are keeping up the home front and doing a swell job. You keep the home fires burning and we'll keep them burning in Berlin!

The courses on theory now being given in *QST* are of great help in keeping up on theory and help pass away what time we have off. Met quite a few of the gang en route, and we sure chewed the rag about the good old days. They are gone, but not for long — Benito, Adolph and that slant-eyed son of a "Son of Heaven" will get the works!

Noted in the August *QST* that I'm quoted as being against YL ops, but that is not the case. The truth is I am very partial to YL ops, especially those from the South! . . .

— Cpl. Joseph Fucetola, jr., W2OHN

ORTHOPEDIC PATIENTS LIKE *QST*

3136 South 25th, Lincoln, Nebr.

Editor, *QST:*

Although I'm not an amateur I have got great enjoyment from *QST*. After this is all over I hope to get my ticket, but right at the present I'm putting all I've got into getting a commercial license.

I believe you'll have no trouble in keeping the League going if you keep putting out *QST* like the ones in the past year. I'm proud to post my associate-member certificate on my wall.

To give you an illustration of how interesting *QST* is, one amateur in Lincoln took a pile of them over to the orthopedic hospital to one kid, and when he got them back he found that they had gone all over the hospital and were enjoyed by all who read them. Everybody around here that I know of who reads *QST* saves it like he would valuable papers.

It's the best radio magazine I've ever taken. Keep up the swell work.

— Bob Southworth

WANTS TO EXCHANGE VIEWS

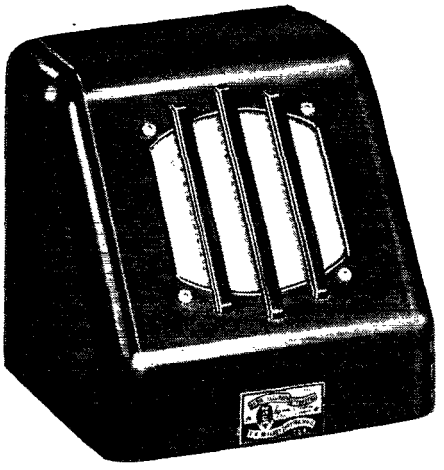
B. I. Signal Section,
Combined Training Centre,
Middle East Force (British)

Editor, *QST:*

I would be very pleased if you could put me in touch with some of your members who would be willing to write to me and exchange views and

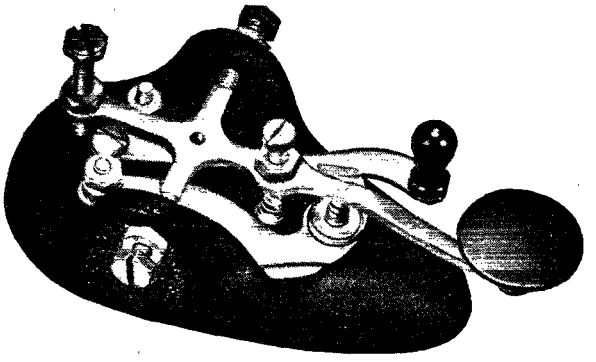
(Continued on page 84)

A FEW AIDS TO GOOD SENDING



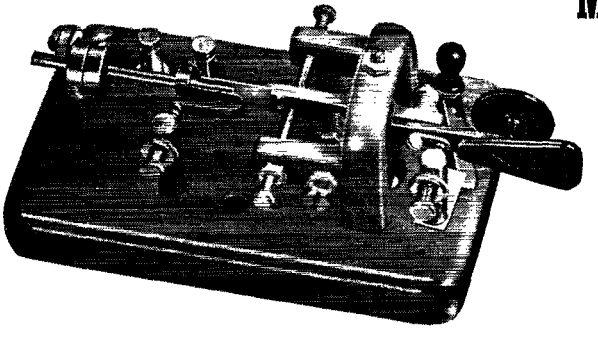
MASTER OSCILLATONE MS-700

This powerful audio oscillator may prove to be most valuable in teaching or learning code. Operates on 110 volts, either AC or DC. Uses 117N7GT or 117P7GT tube. Headphone output is "off the ground" with additional provision for keying "off the ground." Whenever desired, speaker can be cut out entirely. Encased in attractive plastic case with protective speaker grille.



MODEL 200 STREAMKEY

McElroy, the world's champion telegrapher, continues to set the pace in the design and construction of keys that are ideal aids to sending good code. This manual streamkey is well proportioned with the heavy metal base casting finished with two coats of baked wrinkle enamel. Balanced key lever with pigtail connection to base. 3–16″ platinoid contacts. A "natural" for any operator.



MODEL 500-742 SPEED KEY

An excellent, professional "speed key" incorporating all the design refinements developed by McElroy in his 25 years as a champion American Morse and wireless operator. Metal parts are either cadmium or chrome plated. Pigtail connections, bakelite paddle and knob, 3–16″ platinoid contacts, Swedish blued steel main spring and U spring.

Schools engaged in training operators, and distributors, in the middle or far west may facilitate deliveries of these products by contacting McElroy & Goode, Inc., 325 West Huron Street, Chicago, Illinois.

McELROY MANUFACTURING CORPORATION

82 BROOKLINE AVENUE • **BOSTON, MASSACHUSETTS**

(*Continued from page 82*)

ideas on amateur radio operating. Although I have not been an actual amateur in the broader sense, I have done quite a lot of experimenting in the Army. You see I have been a military radio operator for seven years now, and am very keen on the job. . . .

An interesting point to note is the "thirst" for your publications by British radio operators in the Royal Corps of Signals out here. We have two copies of your amateur *Handbook* in this section, and believe me, it's fast becoming our No. 1 textbook. I had my copy ordered nearly eighteen months ago, and received it about fourteen days ago! *QST* is also rare; I've only seen one copy, but I think it is a fine idea to have such a magazine and can assure you that *QST* is very much sought-after. . . .

— *Tom Griffin*
(Signalman; No. 2323944)

OPERATOR SHORTAGE

1735 Darley Ave., Baltimore, Md.

Editor, *QST:*

In view of the number of amateur operators in this country, I find it little short of amazing that there should be such a decided lack of radio operators for commercial service, especially in the broadcast field. But I should not be surprised to find that the reason for this is the refusal of these various commercial services to pay salaries which can successfully compete with those of unskilled defense vocations.

I should like to say, as a statement of fact, rather than in an air of braggadocio, that I hold a commercial Radiotelephone operator license, First Class, but cannot see fit to work for a salary which is little short of ridiculous.

It is my belief that if the government would require an increase in remuneration in these fields, rather than a relaxation of requirements, so that operators with domestic responsibilities could see fit to undertake these positions for which they, unquestionably, are so well suited, a great forward step will have been made.

— *Edward G. Cummings, Jr., W3BHQ*

NOW IS THE TIME

150 So. Main St., Dolgeville, N. Y.

Editor, *QST:*

. . . It has been 8 years since I've been a member of the League, although I have been continuously active on the air and bought my copies of *QST* off the newsstands. I've meant to join a good many times in the past but kept putting it off until now.

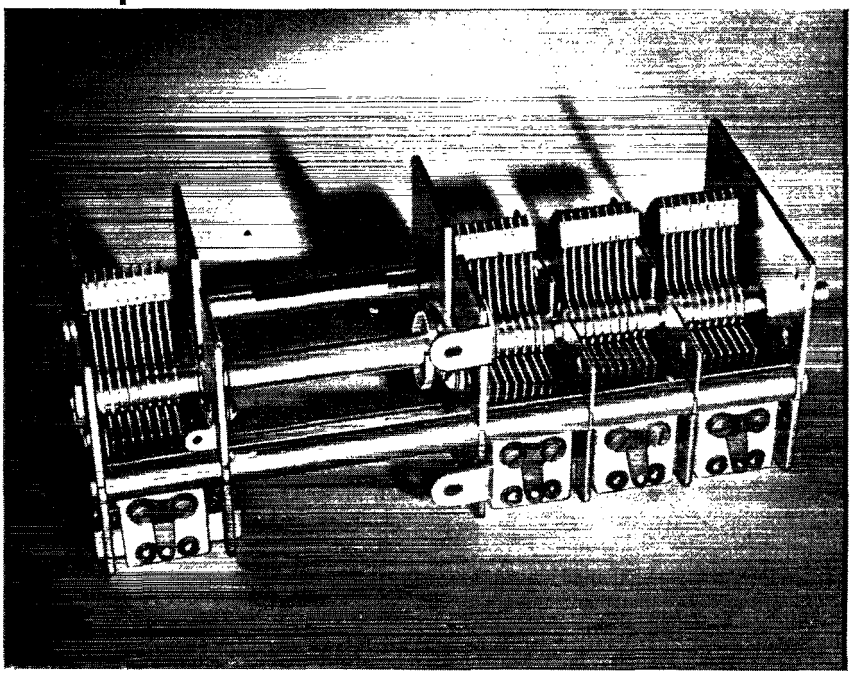
But I feel that every licensed ham should support the League now when the going is toughest, so that when this mess is over we shall again be able to enjoy our fascinating hobby.

Keep up the good work and keep *QST* coming.

— *Albert J. Santmier, Jr., W8AKX*

(*Continued on page 86*)

NOW IT'S WAR



B. C. Condenser Redesigned for Military Use

MANY formerly "peaceful" broadcast receiver condenser designs have been modified to go into implements of modern warfare. The one illustrated is a typical example — it is now made of invar, 100% soldered and silver plated.

THE HAMMARLUND MANUFACTURING CO., INC.

460 West 34th Street, New York, N. Y.

(Continued from page 84)

"KEEP 'EM FLYING IN ALL DIRECTIONS"

Pope Field, Fort Bragg, N. C.

Editor, *QST:*

Here is another of the boys letting you know his whereabouts and the dope about his connections with the Army. . . .

It was a sorry day for W1MYZ when the Hams went off the air, because he had planned on doing his one-year stretch for Uncle Sam and then returning to the shack to resume some good old contacts. But — well, Hiro, Hit and the boys seem to have thrown a screwdriver into the power supply and blown a few fuses.

So here I am, just waiting, as all the boys are, for the day when we can warm up the old filaments and start throwing switches.

Since last September I've been located down here in North Carolina as a captain in the Air Forces, acting as supply officer for the 92nd Air Base. In all the time that I've been here I've had only one chance to get at a transmitter and that was during a problem we had with the parachute troops, when they made a mock attack on our field. Being the only man with any radio experience, they threw a half-dozen walkie-talkies at me and told me to keep our control tower informed as to the movement of the parachutists. Boy — after ten months layoff, you'll never know how I felt to play around with those rigs!

The only connection I have with amateur radio now is through *QST*, and with everything closed down as it is I think you are doing an FB job of keeping the fraternity going. When I left home last year I had to leave the rig standing ready to go and I don't know when I'll be able to get back to store it. However, if the time should come when we are compelled to do so, it makes me feel good to know there are boys at home who will gladly take care of it for me.

Oh, for the good old days — may they come back soon.

Let's "keep 'em flying" in all directions.

— *Capt. Bernard L. Beaudoin, W1MYZ*

NORWAY SAGA

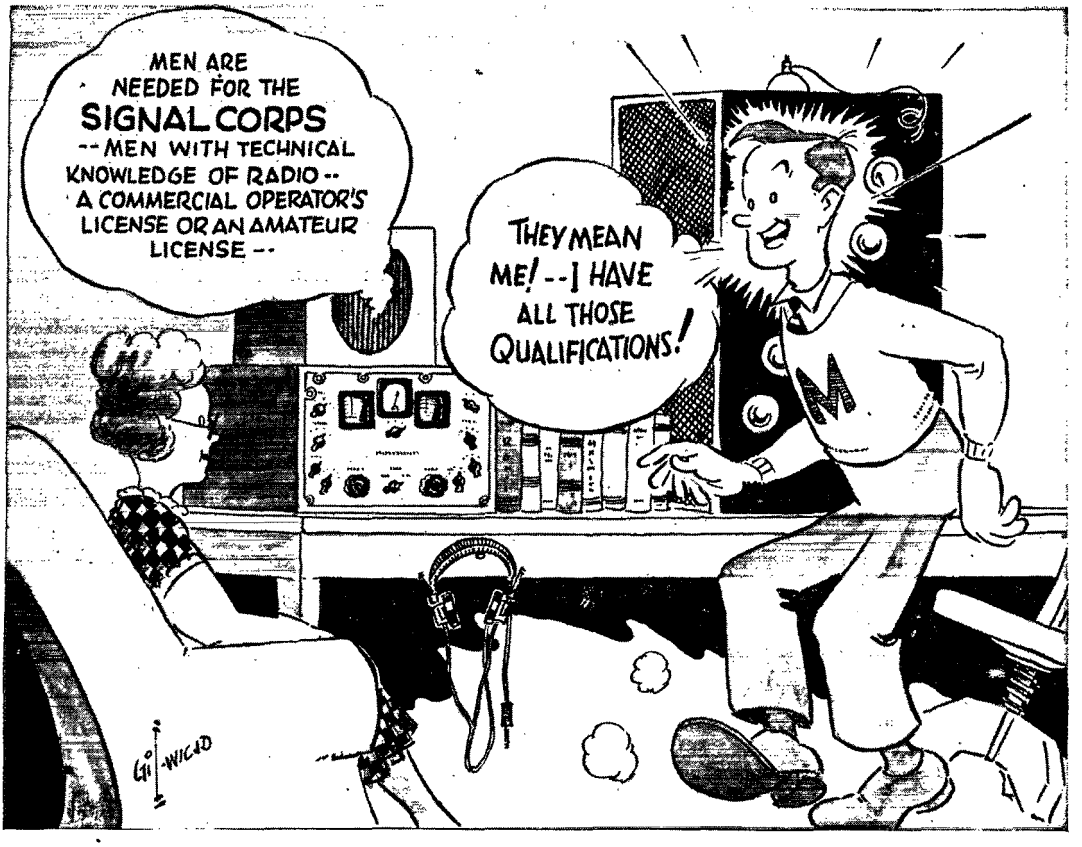
Seaman's Church Institute,
Box 474, 25 South St., New York City

Editor, *QST*:

. . . Please send me *QST* commencing with the August issue. . . . I want to qualify for the Merchant Marine service and will get a commercial license, when I have brushed up a bit. . . .

You may be interested to hear that I used to buy *QST* in Norway at the newsstand, and our club enjoyed the magazine immensely. We were all very disappointed when the Germans came, not only because they took that wonderful little country but also because our *QST*s were stopped. Our club had to disperse and members and material were scattered to the winds. Many of

(Continued on page 94)



THE skill and knowledge you have acquired as a radio amateur qualifies you for service in the Signal Corps. Men with technical experience are urgently needed. . . . Now's the time for all good hams to come to the aid of their country!

PRECISION PRODUCTS FOR BETTER RADIO

HAMMARLUND

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

K6SNL Commands the "Yorktown" in Last Battle

(Continued from page 62)

They only hope that, when that assignment comes, it will be for carrier duty in the Pacific — taking vengeance to the Japs. — *C. B. D.*

W3GEX Winner of WPB Production Merit Certificate

(Continued from page 63)

Like most "success" stories — and particularly those concerning hams — W3GEX's accomplishments are the result of plenty of hard work. In his high-school courses he concentrated on electricity, following that with seven years of evening-school E.E. at Drexel Institute, receiving his degree this past June. Now he's working on a graduate course in electronics.

Even before the shutdown such time as W3GEX had available for ham radio tended to go more for experimental work than operating. Nevertheless, he found time for quite a little 10-meter 'phone work, with occasional side-trips to 20 and 2½. On rare occasions he manages to get in a little photography.

And so, among the "soldiers of production" in the war plants of America (as WPB has it), as well as on the military fronts, we see that the hams are making good. — *C. B. D.*

W1NLL Is Youngest Marine Sergeant

(Continued from page 63)

ultrahighs, however; c.w. still makes converts, and Bob would rather use a key than a microphone any day. When not operating with his 6L6 and Sky-Buddy on Forty he could usually be found over at W1FOI keeping Army Net skeds and handling traffic on Eighty. When the Code Proficiency Program was started Bob copied the code-practice broadcasts night after night, fast developing into one of those real hams his country was soon to need so sorely.

Boys have a way of growing up very suddenly when there's a war on and Uncle Sam needs men with special skills. When I saw Bob about six weeks ago he seemed to have grown at least three inches. In a newly-acquired deep bass voice he informed me, with a glow of pardonable pride, that he had just returned from another successful trip to Boston — this time for a Class-A ticket. I told him that I would be sending him a WERS application form in a few days, and that I hoped he would sign up to make Wilbraham's amateur population 100 per cent in the Civilian Defense picture. He agreed, with the provision that he might not be around very long, as he was making the rounds of the recruiting offices.

The other day I received a letter from Quantico, Va. "Thanks for the WERS application, Ed, but I'm afraid I can't be of much help to you where I am now." Having passed his seventeenth birthday he had been accepted. Staff Sergeant Robert Enemark is now the youngest sergeant in the United States Marine Corps! — *W1HDQ*

Your Opportunity Is *Now!*

GET THE BETTER RADIO JOB YOU WANT

CREI Technical Training Enables You To Go After--*and Get* The Better-Paying Jobs That Will Always Mean Something in Radio

Mr. Radioman—let's face the facts. Present-day conditions which surround employment and promotion in all branches of both civilian and military radio are actually unbelievable. The tremendously expanded demand for *technically trained* radiomen has created a condition wherein there are many more jobs than qualified men to fill them.

Manufacturers are offering increased base pay to attract new additions to their staffs. The Civil Service Commission has revised its standards in many of its examinations, and the Army, Navy and Marine Corps are offering to properly qualified, technically trained radiomen ratings as high as staff sergeant and chief radioman as an inducement to enlist. All of this means that Opportunity . . . *is here, now!*

Hundreds of men have had new jobs at comparatively high pay literally thrust upon them. The Civil Service Commission in a letter addressed to and requesting the aid of Members of the Institute of Radio Engineers wrote: "Engineers—and today, particularly radio engineers—are needed in the government's drive for Victory. Publicity has been extensive, appeals to individuals have been numerous, to get qualified engineers on the employment rolls of the Civil Service Commission in order that jobs may be filled in vital war agencies on the shortest possible notice."

Every page in QST could be filled with more astounding facts concerning employment opportunities for trained radiomen . . . but this is not news to the majority of you who are now in radio. It may be evident in your own locality. The important thing is . . . *what are you going to do to obtain the greatest benefit from the present opportunities?*

If you have a commonplace job—a temporary job. If you are a "ham" who would like to make your *avocation* your *vocation*—if you have the ambition to hold a position of greater responsibility with higher pay . . . . . then enrolling for, and completing a CREI home study course in Practical Radio Engineering is the most important thing you can do toward accomplishing your ambition at this most opportune time.

CREI Training Leads To Better Jobs

"On February 6 I was employed by the Vega Aircraft Corp. in the electrical precision assembly department on the strength that I was enrolled with your school."

—Charles F. Hampton, 3/42.

CREI Training Leads To Promotions

"I wish to say that I believe CREI has been instrumental in making my promotion possible, as considerable background in radio is necessary before an operator can be transferred from the Communication Section to the Maintenance Section."

—Don W. Lowrey,
Senior Radio Electrician, CAA, 5/42.

CREI Training Helps Hold New Jobs

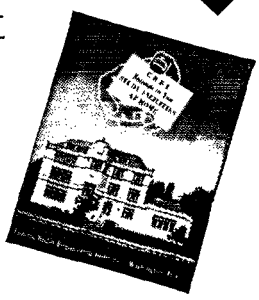
"I am writing this letter to tell you that again CREI has been a tremendous help, since I was studying the lesson on CR tubes and had received the Television lessons. I really obtained the information I needed about wide band amplifiers from Lesson 10 of the Television Course. That lesson is certainly crammed chuck full of information on peaking circuits of which amplifiers of the 305 Scope has several. It really makes one appreciate the CREI course when it falls in so readily with everyday work."

—Oscar Carlson, RCA Corp. 2/42.

SEND FOR THIS FREE BOOKLET

and facts about CREI Home Study Courses

If you have had professional or amateur radio experience and want to make more money—let us prove that we have something you need to qualify for a better radio job. To help us intelligently answer your inquiry—please state briefly your background of experience, education and present position.



CAPITOL RADIO ENGINEERING INSTITUTE

E. H. RIETZKE, President

Home Study Courses in Practical Radio Engineering for Professional Self-Improvement.

DEPT. Q-11, 3224 16th Street, N. W. Washington, D. C.

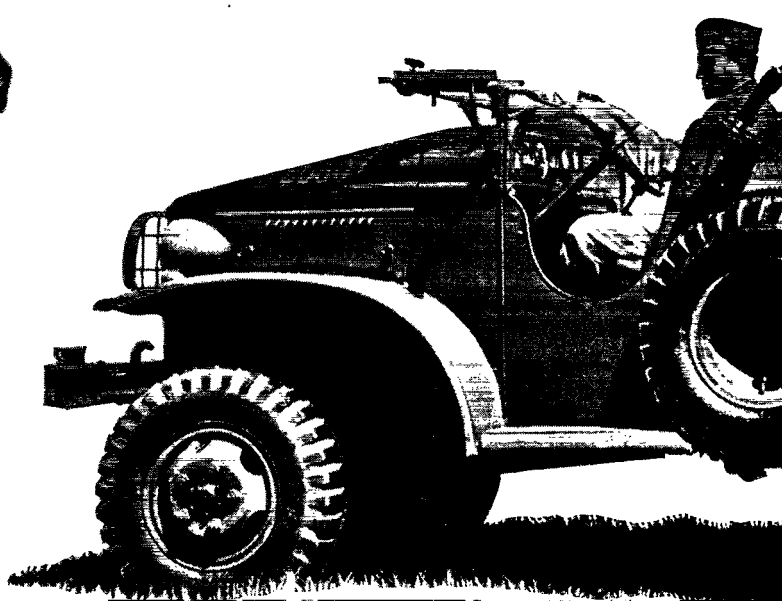
Contractors to the U. S. Signal Corps and U. S. Coast Guard
Producers of Well-Trained Technical Radiomen for Industry

Men wanted for the Signal Corps of the U. S. Army

You can (1) serve your country, (2) learn the rapidly advancing science of electronics, (3) prepare yourself for a promising career after the war by joining "The Nerve Center of the Army" now.

Men are needed now to man America's electronic weapons.

This is a war of communications. "The message must get through!" Radio communication equipment and electronic devices known only to the men of the U. S. Signal Corps are fighting the war on world fronts.



Here is an outstanding opportunity for radio and communications men to do their part, and at the same time get the finest possible training in one of the brightest after-the-war industries.

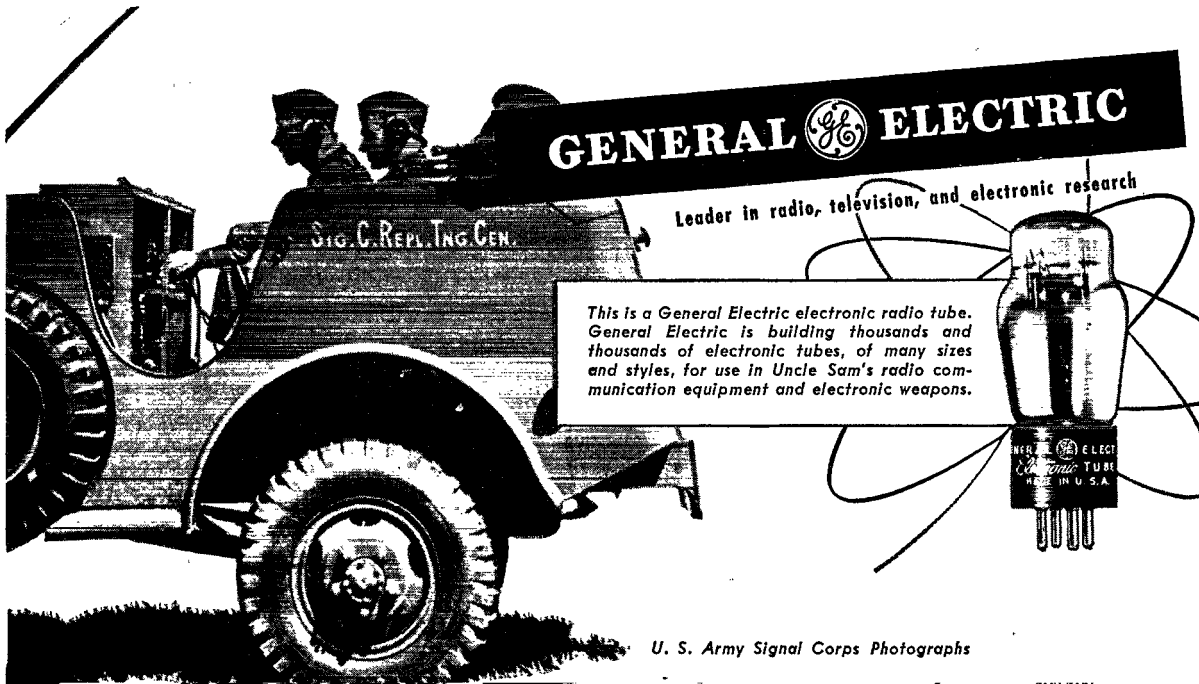
The electronics field is still in its infancy. Ten years ago there were comparatively few electronic devices. Today there are more than a thousand kinds of electronic devices at work in factory, hospital, office, cotton mill, steel mill, the home and on the fighting front!

General Electric is a leader in electronic research. We are definitely interested in having available, when victory comes, trained men for the sales and service of future electronic devices. This is a highly specialized field, and good men will be in demand.

If you are now an expert in radio, or are ambitious and willing to learn at good pay, General Electric urges you to consider the Signal Corps now. The Signal Corps is also sponsoring courses in the fundamental theories of radio and electronics in many colleges and universities. . . . Get in on the ground floor!

★ ★ ★

For further information regarding enlistment, call at the nearest Army Recruiting and Induction Station. Or write to "The Commanding General" of the Service Command nearest you. For Civilian Training information, call at any office of the U. S. Civil Service or U. S. Employment Bureau.



U. S. Army Signal Corps Photographs

Additional International Code Flags and Signals

FOR the benefit of amateurs making a study of the International Signal Flag Code as presented in the June, 1942, *QST* article on "Visual Signaling" (p. 42), the following supplementary material is provided.

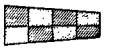
Immediately below is a group of special signal flags used to indicate special code meanings in the same fashion as the International Q-Signal Code. The operator should learn to identify these signals by the names opposite each flag. Color identification can be determined by reference to the original article (Fig. 3, p. 45).

On page 110 is a list of special international flag code alphabetical signals.

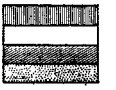
ANS 

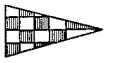
CODE 

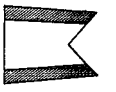
CORPEN 

DEPLOY 

DESIG 

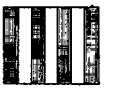
DIV 

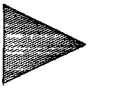
EMERG 

FLOT 

FORM 

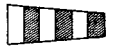
POSIT 

SECT 

SOPUS 

SPEED 

SQUAD 

TURN 

(Continued on page 110)

THE ALCO PLANT WAS ON THE FIRST LIST OF 43 AWARDS FOR EXCELLENCE IN QUALITY AND QUANTITY OF WAR PRODUCTION

AWARDED JULY 27, 1942

ARMY-NAVY PRODUCTION AWARD

★ ★ ★ ★ ★ ★ ★

IN THE SHADOW of war-historic Lookout Mountain, within gun shot of America's bloodiest battlefield at Chickamauga, on soil hallowed by the best blood of North and South — there proudly flies the Army-Navy burgee.

Nearly a hundred years ago in the Mexican War of 1846, when Tennessee exceeded its quota by supplying 30,000 troops instead of 2,800, it earned, and has retained, its title as the "Volunteer State." Perhaps there is significance in the fact that this area was one of the first in the land to receive an Army-Navy combination award for excellence in quality and quantity of war production. A star is offered by the Army-Navy for every period of six months in which the record of high production is maintained.

Our employees, whose achievements in the production of ALSIMAG steatite ceramic insulation constitute the real glory of the award, wish to publicly record their determination to earn a Service Star every 180 days. This is not at all for our aggrandizement, but as evidence of a stern resolution: "That our brave fighting forces on the water, on the land, in the air or under the seas shall never suffer from the lack of what we can supply." That shall be our goal and our pledge. This is our slogan:

WHILE AMERICA IS AT WAR,
AMERICAN LAVA IS AT WORK

Excerpts from Acceptance of the joint Army-Navy Burgee by Paul J. Kruesi, President

ALSIMAG
TRADE MARK REGISTERED U. S. PATENT OFFICE

AMERICAN LAVA CORPORATION
CHATTANOOGA, TENNESSEE

CHICAGO • CLEVELAND • NEW YORK • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • BOSTON • PHILADELPHIA • WASHINGTON, D. C.

(*Continued from page 86*)

our members were thrown into jail on flimsy pretexes; I, an American, spent nearly a half-year in prison without a trial, and on false premises. This was even before America was engaged in the war. I succeeded in getting back to America after nearly a year of hardships. But now I am getting on my feet again and looking forward to taking up my interests in radio and enjoying *QST*.

— *Wallace S. Buchanan*

SWLs SPEAK

Langley Field, Va.

Editor, *QST:*

We are not "hams," but just old-time SWLs. And in the Army. We're on the job. We didn't know code, but we sure tried to learn it.

We (myself and others) came into our regiment as radio men. Right away we were put on Army transmitters. Of course all communications are c.w. operated. We were stuck; what a mess we were in! We wanted to be in radio, but without code it was almost impossible. What to do was the question.

Yes, all the Army code schools were filled. We couldn't be taken at once. We just had to get that code. So we started, and on our own. First, we obtained two keys and two high-frequency buzzers from a New York supply house. Then we built ourselves two code-practice sets and set them up between barracks. Now we were ready, and we went to work every night and during all our spare time. The dots and dashes flew back and forth over those wires. We began to learn, not fast, but gradually.

Our next move (which was after pay day!) was to buy a Teleplex, so we could all take down code at the same time. This was great; it was fun. Just like the real thing! We encouraged others, and they got interested and joined us. Now we have eight members in our "private code school." Two of us know the code well enough to handle the Army transmitters, so we were assigned to them and have regular contacts. At night we teach others the code — sometimes until 2 A. M.! The boys are willing to learn and are going at it in a big way. When they are finished they will make good operators.

The Army wants good radio men but still cannot teach them all at the same time. So, fellows, if you do get called and get into radio, and you don't know the code and the Army is unable to teach you, do as we did and you'll go places. It's not hard; it just takes a little time. So what say, SWLs — join the Army and enjoy the fun!

— *Sgt. John B. Baum*

Strays

W6UMH is North C. Ham of Mesa, Ariz.

—···—

W4GPV is B. T. Ham.

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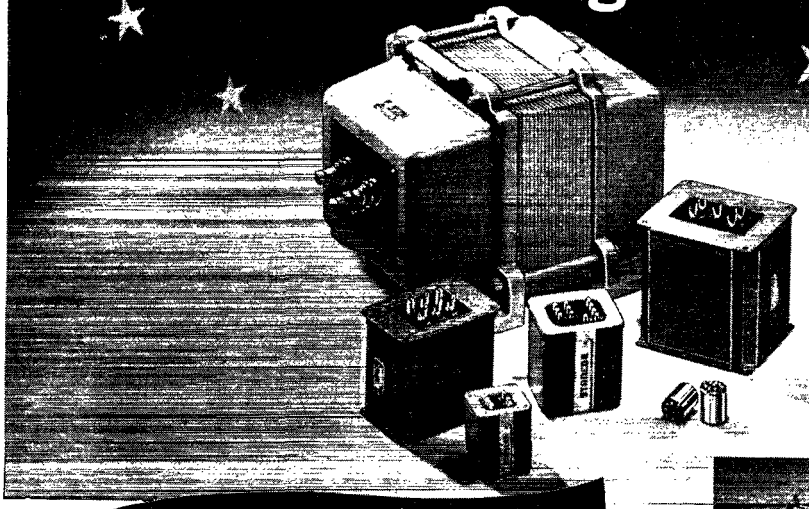

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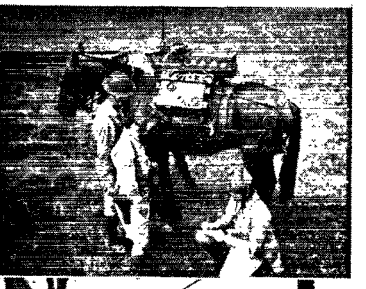

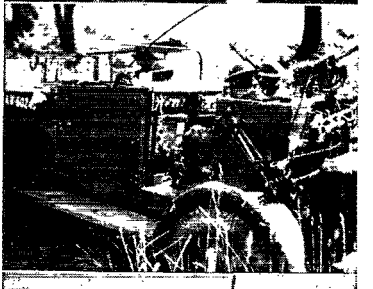

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ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — Communities in Eastern Penna. seem to be rather slow in getting their WERS licenses due to the maze of red tape involved. Allentown has received their license and call. 3HTS is the radio aide in charge. Philadelphia has appointed 3KD as radio aide and 3ITZ alternate. According to reports, the application for the license is just about due to be submitted. 3HFC is sergeant technician in the Signal Corps. 3IUD is sergeant photomapping squadron in the Air Force. 3HUS is private in the Signal Corps. 3GTV made RM2c Navy Radar. 3GRS enlisted in the Reserve Corps Air Corps studying at Drexel Institute. He will go on active duty in January. The SCM had a very pleasant chat with 8GV of Lehighton during the month. 3DOU is putting a lot of time in his job as radio aide for Lower Merion Township. Their license should be in force by the time you read this. 3BNU is itching to go, after the war. There is a lack of material coming in for this column. Help keep it rolling.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — Hermann E. Hobbs, W3CIZ — Meetings of the Washington Radio Club were held Sept. 12th at Pierce Hall and Sept. 26th at the Central YMCA. Perry Wightman, chief of WERS communications for Prince Georges County, gave a talk on "Covering One Hundred Square Miles of Prince Georges County by Wired Wireless." Regular meetings are now held on the second and fourth Saturdays of each month at the Central YMCA beginning at eight o'clock. Anybody interested is invited to attend.

SOUTHERN NEW JERSEY — Acting SCM, W. Ray Tomlinson, W3GCU — Asst. SCM, ZI; Regional Coördinator in charge of Emergency Coördination, BAQ; Emergency Coördinators: Atlantic City, EFM; Camden, KW; North Plainfield, CGU; Vineland, GMY; Somerville, EBC. Well fellows, this month finds our SCM, CCO, affiliated with our armed forces, and Les has requested me to send in the following letter of appreciation to the members of the Southern New Jersey Section:

> To All Members of the Southern New Jersey Section: Although I was unaware of it at the time of writing, last month was my final official contact with the Section as SCM. I entered the U. S. Air Forces on September third, and, as far as is known, will be stationed at Miami Beach for a brief training period. I wish to take this opportunity to thank each and every member of the Section for his loyal support while in office, and to request you to extend that same loyal support to GCU, whom I have requested to carry on the duties of Acting SCM for the balance of the unexpired term. Ray has consented to do this work, and you will find his address on one of the front pages of *QST*. I sincerely regret that I must necessarily sever direct contact with the Section, but I am also happy to be able to do my share in serving my country, and hope to maintain what contact is possible through this column; so keep up the good work, fellows, and when this is all over, we can sign with a capital "V," and carry on from where we left off.
>
> I thank you all again for your past support, and extend my 73.
>
> *Lester H. Allen, W8CCO, SCM.*

Thanks, Les. I will, as Acting SCM, do the best I possibly can to continue the excellent work. Good Luck and 73. Not so many reports this month, but enough to make the reading interesting. Incidentally, Les entered the U. S. Air Forces as a second lieutenant. JOL is doing research work at Palmer Labs, as is also AXU. ITR took himself a bride, we hear; so did HAZ. EED is groping for info on sound-on-film. ABS says that an antenna parallel to the power line is an aid to reception with wired-wireless, and reports further success in contact with ACC; they are on power lines of two separate companies, and contact has been very satisfying over 4-mile distance. Fourteen resident amateurs of Hamilton Twp., N. J., are well organized into WERS. Several units are ready, with several others under construction. JJX is civilian employee in Signal Corps in Chicago. GCU has 2½-meter superhet in January 1942 *QST* under construction. GRW is still at sea. EED lost half his antenna mast in wind. HPE is in Radar at Belmar, N. J. ZI is off on another inspection tour for Signal Corps. ABS reports his defense school progressing very nicely, and expects four or five more to take examination for licenses this month in N. Y. Stan gave a talk before the local defense council on August 14th, and says they are about ready to make application for blanket license. CFB is with Eastern Aircraft. The members of the Delaware Valley Radio Association, of which Les Allen is president, tendered him a surprise party on the eve of his departure for Miami, and presented him with a genuine leather traveling bag. EQF is now RM1c at radio central, Floyd Bennett Field. EEQ is with IBM in Omaha, Nebr. GNU is still teaching at Fort Monmouth. CCC, RM1c at U. S. Naval D. F. Station, wishes to be remembered to all the gang and sends his 73 to all. The D.V.R.A. *News* is still going strong. Until next month 73.

WESTERN NEW YORK — SCM, Fred Chichester, W8PLA — EBR, who has been acting as instructor in radio at Syracuse University and communication specialist for a group of the N. Y. State Civil Air Patrol, has sold most of his equipment to the Signal Corps and expects a commission in the Navy soon. UXH and FV conducted classes in radio theory and code until gasoline rationing made it impossible for many of their pupils to attend. Many of those who attended were called into the service and, with the experience gained, were able to receive assignment to the Signal Corps. UXH also conducted a class for the CAP of Glens Falls, and those serving as observers were able to obtain third-class permits from the FCC. STD, of Syracuse, reports that the Central New York Radio Club's three code classes are still going. Attendance has dropped off considerably, but the average attendance per class is still 15. BAL has replaced NA as instructor in one of these classes. Following a statement of approval by the Consolidated County War Council of a proposed WERS, STD called a meeting of interested hams on Sept. 9th. About 12 responded with offers of equipment and services. Others are expected to follow. Civilian candidates for operators in the WERS will have their meetings on Sept. 23rd and 30th. JPO will conduct their training classes. It is expected that application for WERS station license will be forwarded to the FCC by Sept. 30th. Due to WERS activities, the club will not resume their monthly meetings until some time late in the year. RNE is now a civilian employee with the Signal Corps. 1MEK is stationed temporarily with Western Union headquarters in Syracuse. PLA has been named sub-district director of the U. S. Army Aircraft Warning Service. FCG reports that the Binghamton Radio Club is still 100 per cent ARRL, although their membership keeps dropping off due to the boys leaving for Federal service. Guy says cripples, like himself, are doing their bit by buying war bonds, etc. SMH is now a nifty-looking lieutenant in the USNR. BQH is teaching radio in Philadelphia. From MC, Rochester, comes the following news items: The R.A.R.A. started its season off on Sept. 28th with the election of a FB bunch of committeemen and officers, and it looks like it will be a successful year for the club in spite of conditions. DFN, VUY, TWM, TEX, DKN and TRC have left their old jobs and are now working in a local defense plant. UPH has been "freshening up" by following and constructing the projects in the radio course in recent *QST*s. Rochester now has a number of L.S.P.H. (licensed since Pearl Harbor) hams. Two of them, both students of MC's radio classes, have their commercial tickets also. One of them, Abe Andzer, is working at WSAY. OQC has just received his commission as lieutenant in the Air Corps, Signal Division. NVH has been transferred to sea duty after putting in some time as instructor at a base. Pat's father, TKY, is also in the service. BHW now has a second operator, Charles, Jr. A bulletin just issued by the AARS shows the whereabouts of WNY fellows who were members prior to Pearl Harbor. Quite a number are shown to be in the Federal service, and the majority of the remainder are working on national defense projects. "Al" Keltz, TXB, and his xyl, WOW, have moved to Rochester, and are interested in getting acquainted with some "Flower City" hams. The new QTH is 178 3rd St. AQE wishes to take this means to say hellow to the gang from Alaska. Steve says that his next-door neighbor is MCF. OSH has been going places. He was inducted into the Army last spring and is now a 25-w.p.m. op in the Signal Corps. To add to his achievements,

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he went and got himself a blonde, so Archie really is an OM now, hi. Keep the news coming, fellows.

WESTERN PENNSYLVANIA — SCM, E. A. Krall, W8CKO. Asst. SCM in charge of EC, AVY. NCJ has sold some of his equipment and has invested the proceeds in war bonds — thus insuring a nest egg for some future transmitter. He has been active in AWS work and finds it interesting. TTD is now a radio instructor at a Signal Corps radio school at Camp Crowder, and is meeting licensed men from all over the U.S.A. He may be reached at 294 S. Ripley, Neosho, Mo. MHE of Brackenridge is quite impatient to get started on WERS work, and advanced some excellent ideas concerning same. Theresa, VYU, is anxious to get going instead of trying to convince local moguls of the importance of WERS stations. Experience in amateur work is profitable to TTM, HAF and CRJ, who are working for an eastern radio company. VRM passed his first-class telephone and is working at WMRF at Lewistown. KM is an RI at Washington, D. C. Lt. E. H. Glunt has a new call, W3JZP. WPA is working for RCA at Harrison, N. J. RFM passes regards to all, and is doing his best for Uncle Sam. KXS is at the Naval Research Laboratory. KQX is at Salem, Mass., working for Hytron. BTQ presided at a county WERS meeting at Mercer in connection with the coming activities. At last we seem to be getting started on our WERS venture. Most of the zone men in Allegheny County have received the forms necessary to quality as operators, so it will not be long until things are humming. Amateurs of W. Pa. are reminded that the Amateur Transmitters Association of W. Pa. meetings are the first Friday of each month, and the Pittsburgh Area Radio Club Council meetings are the fourth Saturday of the month. Both meetings are held at the Fort Pitt Hotel, Pittsburgh, Pa., 8 P.M. EWT.

CENTRAL DIVISION

ILLINOIS — SCM, Mrs. Carrie Jones, W9ILH — QJR and KOD are living in Belleville since Capt. Lattig was transferred to Scott Field. YST is new EC for Belleville. YZE has enlisted in the Army and now located at Camp Crowder. AOI resigned as EC and has accepted position with Aircraft Accessories in Kansas City. The Starved Rock Radio Club has obtained two 90-foot towers which they expect to have ready for MKS after the emergency. QLZ, NIU and LIG have second-class radiotelephone. CXT of Oglesby is new member of SRRC. LXD received Class A in July. JMG is working for the Illinois Central System and is now in Seward. The Joliet Amateur Radio Society is going along very nicely with the code classes, and are now teaching math. and theory. TAY is considering organization of code classes in Streator if bcl radio repair business slows up enough. JPT is a student instructor at Scott Field. The Elgin Radio Defense Council is making plans for fall and winter code instruction classes to be held at the local high school. YXP is back on the job after a nice vacation. HQH is now chief engineer's aide for the Signal Corps. DBO has been transferred and is now located in Chicago. JXT is enjoying her new home at Norfolk, Va., since she joined FIN in July. GFF, RVI and ILH are jr. instructors in the AAF at Scott Field.

INDIANA — SCM, LeRoy T. Waggoner, W9YMV — FOS has reported at Fort Monmouth as 2nd lieutenant. Nelson's job as radio aide has been taken over by JYP, with 3DSD/9 as assistant radio aide. SWH reports that Fort Wayne has applied for its WERS licenses. CJA now has Class A. LYY and DPL are back in Valparaiso teaching radio to Army men. JJZ is working in California. His XYL, LDN, will join him later. MKT visited Indianapolis, on leave from the Navy. HUV built a new freqmeter. SAG went East for a much-needed vacation. Art says ten students graduated from the Purdue University Radio Club's code school at 13 w.p.m. WEU is new radio aide for Gary. EGQ has a xtal controlled 807 on 2½ meters. KDT advises that Rensselaer will have central WERS station atop Court House Tower, and hopes to relay traffic with surrounding communities. YXT is teaching Signal Corps class. MJW reports Mount Vernon will have 20 WERS units. MLL is radio aide for Posey County. A code and theory class was inaugurated Sept. 14th by the Indianapolis Radio Club, Inc. The class will meet on Mondays and Wednesdays, under the instruction of 3DSD/9, theory, and UEM and AQQ, code. TE, former Hoosier SCM, returned to Washington after a furlough from the Navy spent visiting Indianapolis friends and relatives. HGT is teaching code as civilian instructor at Camp Crowder. Many thanks, gang, for your splendid coöperation in aiding the compilation of data on hams in the services. Keep up the good work! Now that summer is over, with its attendant distractions, let's get down to work on WERS. Don't forget, 15th of the month; reports! 73. — *Roy.*

MICHIGAN — SCM, Harold C. Bird, W8DPE — The DARA and Detroit Edison Radio Club, under sponsorship of The Thomas A. Edison Post of American Legion, are conducting code and theory classes. The first roll call showed 58 in attendance. The instructors are from three clubs. Saginaw Valley Radio Club is coördinating with their local OCD, trying to get something started in WERS in that vicinity. Oakland County has progressed to the point of lining up stations for OCD, and is taking things rather slowly, as they are ahead of their organization schedule now. UUV reports that Art Lyman of the Detroit 'Phone Association is making careful plans for WERS setup down that way. UMI is working for Uncle Sam. UFO is a sgt.; he is doing radio maintenance work. QDU is soon to go. Pat says that Royal Oak Section is preparing for WERS by building equipment. RMH has been granted some time before taking up other duties. FTW gets around when he can to the meetings. AKN is working seven days a week now. EFI has about finished his school course. FX is still peddling those bugs and building u.h.f. equipment. GP used his influence and got the club some nice chairs. IHR must be busy, has not shown up at club lately. TQA should have his house fixed up by now. TMN has been suffering with a cold. The DARA picnic at Bob-Lo was a big success. Some of the gang nearly got left at the dock because of lack of tickets. It was a beautiful day, although rather cool. After lunch a baseball game was started, with DYH and DPE chosen as captains of the teams. Think we had the best team, as we won by such a large score it would not look good in this column. Everyone seemed to have had a very enjoyable time. DSQ says he has turned to woodcraft as a hobby now, and has been sawing lots of wood. If you fellows would all send in a card as to what you are doing, I am sure we could get a lot of nice, newsy dope. Now is the time for all of us to get behind ham radio and push harder than we ever have. We are all busy, of course, but we want to have ham radio when the job is done and keep the home fires burning for the fellows who are not here to help; let's all of us at home keep the old ham spirit afire so the old familiar fists and voices will be ringing through the ether when the job is done. 73. — *Hal.*

WISCONSIN — SCM, Emil R. Felber, Jr., W9RH — Arbor-Vitae-Woodruff High School's War-time radio course has put out 20 people who can copy code 10 w.p.m. and know the radio law and theory OK for exam.; all this in about 70 hours' work. OTL is spending spare time now as ESMWT instructor in radio. He has four 16-week courses lined up, with requests for several 32-week courses and code classes. Woodruff High also offers a course in plane construction this year. A code and radio theory class has again been opened at the Shorewood Opportunity School at Milwaukee (night classes). HWO, GPI, and CCD are the instructors. Studies that will help the war effort are being emphasized this year, and classes are open to all. UFX is trying to arrange a code course to broadcast over the University station WHA at 3:15 P.M. He said there are more hams in Madison at the radio schools than in all of Wisconsin. He is planning to get the whole gang together at some big QRM Party, would like to have 'em drop him a postcard giving name, call and complete address. WERS has hit a snag there, but he hopes to get it straightened out soon. WXD of Albany, upon leaving Navy Radar School, took fatal step before going to Treasure Island for more work. HMG recovered from operation. NPK reports club planning a new drive for members and going to start a code and theory class. Contacted local officials about WERS. They didn't know anything about it, but said they would investigate it and notify him what could be done. CGX has sold his 600-watt band-switching rig. SZL has contacted the mayor, chief of police and local defense officials as to plans on WERS. Officials seem to be waiting for instructions on plans from Milwaukee. He has 13 boys signed up in the AEC with 2½-meter rigs. The fellows meet in each others' homes for the duration, and average better than ten every meeting. The Radio Club still meets once each month. ZRX of Benton has finished two 2½-meter rigs. WDI has been working for Northwest Airlines at Rochester, Minn., and was married to a nurse. GTD is attending AAFTS at Sioux Falls, S. D. JHP is attending radio maintenance school at Kansas City. GIL, sec. of

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MRAC, reports HRM attended meeting after a two-year absence due to illness. VD showed pictures of gang at local picnic, and SYT introduced 7 new members. EFX is a capt. in Signal Corps at Dayton, Ohio. JPS is ARM1c at Glenview, Ill. FY was commissioned a first lieutenant in Army Air Corps stationed at Miami Beach, Fla., for training. After listening to an inspiring speech by Major Holt of the Marines, last March, at the MRAC, JFO and LQR signed on the dotted line and today, as staff sgts., are Radar instructors at Corpus Christi, Texas. IQW has taken Naval Training School code instructor job at University. 73. — *Emil.*

DAKOTA DIVISION

SOUTH DAKOTA — SCM, P. H. Schultz, W9QVY — One report came in this month from Fran Beck, W9DB, which was more than welcome, as he gave the dope on several hams. His card reads as follows: "Bet you are wondering where all the boys disappeared to. Just come down to the Air Corps Training School here at Sioux Falls and you will find either as instructors or student instructors: CJS, FLK, CPM, OKF, JLI, RWF, DB. Ran across YVF, SCM for N. Dak., here last night. My shift chief is a ham from Milwaukee. We are forming a school radio club and expect to have over a hundred members from the instructors alone. We are all teaching radio operating, running from basic code to advance operating." Guess that's all.

NORTHERN MINNESOTA — SCM, Armond D. Brattland, W9FUZ — Several reports were received, which gives one a bit of enthusiasm toward continuing these feeble efforts as a reporter. YKV is at Wright Field as a Signal Corps inspector. EHO brings up the question as to what to do about EC certificates which have expired. All those who have certificates to be renewed, kindly send them to me and I shall make the proper endorsements and shape up the records. LAE is now in communication end of Air Corps at Hill Field, Ogden, Utah. QCP, now living in twin cities, favored me with a report on several former Iron Rangers. WNI, now a lieutenant in the Marines, is at Miami Beach, Fla. DVG, of Highway Patrol, has turned in his "boots and saddle" and is with Navy Radar at College Station, Texas. The UUF family, now at Portland, Oregon, announce the birth of a jr. op., David Louis. Letters from BHY and BMX give much interesting dope on members of St. Paul Radio Club: QPL, a technical sgt. of Signal Corps Training Center in Fla., was back on furlough. YUN is on his way into Air Corps ground forces. ZWW is flying west, checking equipment for NWA. HWS has accepted position as instructor in radio at Sioux Falls. JIE is busy with victory garden and WERS. HZV is control operator for KSTP. Len says it's a "stroke of good luck" that a two-room office in Endicott Building has been turned over to them for duration, to carry on both theory and code instruction. It's my opinion that it's the hard work of the SPRC gang and not luck which turns the trick. They plan to hold classes there five nights a week, Monday through Friday, starting around September 26th. Their enrollment now totals around 50, mostly youngsters who will need the training in the armed forces. A number of them are securing their tickets before leaving for service. RPT is with Minneapolis Radio Club instructor's staff. They have about 45 steady students, a number of whom have taken license examinations. Thanks very much for the good reports, fellows. Those of you who know the good YF will rejoice with me in knowing that she has fully recovered and, with the jr. op., we have moved into a furnished place at Warren, close by the school there, but glad to see visitors at Bemidji week-ends as usual. However, mail will reach me sooner now at War Production Training Center, Warren, Minn. Luck and 73. — Army.

DELTA DIVISION

ARKANSAS — SCM, Ed Beck, W5GED — As the report is being compiled this month, DU is conducting the regularly scheduled quarterly examinations in Little Rock which will make for some news next month, as there was a group of approximately 75 to take the various exams. IDQ changed jobs and is now chief op on the north side. GMB is reported missing in action, very shortly after being home on furlough. ARH is now located on new job as instructor in radio. HER is kept busy working at an ordnance plant. FRV is busy on similar work, and will dispose of recording equipment now on hand. HDR is doing a nice job as communications instructor on East Coast; the XYL is studying radio. BLG is in communications squadron in Tennessee. IDL is in flying school. IUE is now with the Signal Corps in Missouri. ITW is planning to take on an EC appointment. Jules and Wanda, KSP and 9MOT, are organizing a code class at Winslow, in addition to their experimenting. HYS was last heard from on the high seas, westbound. IYW is now on active duty with the Army. ICS went the other route and is now a Navy op. JAL and JYW both were ill lately, but were OK on last notice. JIC has new QTH in Ft. Smith and is back on the job again. Two previous SCMs, ABI and GNV, are unravelling the vagaries of Radar work, and ex-5SS is on the same shift as GNV. FUU at present has same QTH as GNV and is in same line of work. GWT is reported transferred and is with W.E. in Little Rock. After building test equipment through the summer, ICN returned to U. of A. GGW is reported as having an XYL and an instructor's job in the 9th call area. BM is now located in Little Rock and is officiating as instructor at the trade school there. PX is quite anxious to find an opening for a well-deserved vacation. EQA is the radio instructor at the extension school in L. R., in addition to his regular business. FXO has a plain case of converter-itis. Your humble servant the SCM wishes to express his sincere appreciation and gratitude to those of you who gave him your support in placing him in the office. It was not accepted with the idea of being "a bed of roses," particularly in these times when the going is rather tough. I can, however, assure you of every reasonable coöperation on this end and now, as always, this is YOUR column and is composed entirely of the material which you fellows send in monthly. 73 and all the best. — *Ed.*

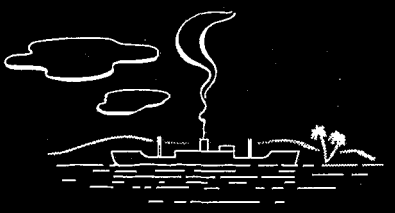
HUDSON DIVISION

EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — Sorry, boys, E. N. Y. has been missing in *QST* for some months, but now that reorganization has been effected with all hands aiding, we will continue. It is with regret we received the resignation of EC JQI of Albany; we hope he will be back soon. Ham activities are breaking out anew in Schenectady County, with BZL heading same as radio aide. First meeting was held Monday, September 14th. IOF will be located at Harvard College next few months, under instructions with the U. S. Navy. ACB is recovering from a broken rig. He couldn't lay it to antenna trouble. LH is appointed EC of his Section. GUW promises his fullest coöperation. A. Stuarts, Jr., recently appointed radio aide for Troy area WERS and EC of that Section, promises much activity this season. Two students of Valley Radio Club have passed the FCC examination and have their amateur operator's licenses. They are Robert Seidler and Emanuel Levine. Classes are on Wed. and Fri. nites with 19 students attending. Plans are being made to train personnel for their limited phone permits, and to supervise the installing, maintaining and operating of WERS gear. Robert H. Cassis was appointed Emergency Coördinator of Rockland County. IYE reports to the Army the 16th of this month. IZH is attending the University of Florida with the Signal Corps. News notes for E. N. Y. Section are welcomed from all members. Members who are in service are urged to drop your SCM a line so the boys can keep up on the old gang.

MIDWEST DIVISION

IOWA — SCM, Arthur E. Rydberg, W9AED — The Iowa-Illinois Amateur Radio Club is continuing its weekly classes in theory and code with great success. ROW is now on engineering staff of Collins Radio Co. ALC is with Signal Corps taking pre-radar instructions in Chicago. CTQ, now Navy Radar instructor, spent week's furlough at home. FPO is at Radiotron School, M.I.T. OJD likes Signal Corps school very well. AHP is now with WOC, Davenport. VKZ is waiting for civilian defense to get going on WERS. DDY is grinding crystals for Collins Radio. AEP is new EC. AED is in hospital recovering from operation. CCE reports his county getting set up for civilian defense, and he is ready for WERS. URK has been appointed radio aide to civilian defense command, Polk County. OLY demonstrated 2½-meter equipment to Des Moines Radio Club, whose members have all agreed to and signed up to build rigs. OLY was appointed asst. radio aide to civilian defense command, Polk County.

KANSAS — SCM, Alvin B. Unruh, W9AWP — BRQ reports Lyons is now sans hams. MQE is in Navy, MAR is working in defense plant in Hutchinson, and BRQ is chief engineer at KWBW. MAE, EC for Wyandotte County,



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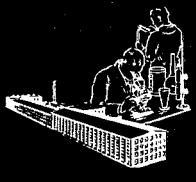

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reports WERS prospects pretty good in Kansas City. Following signed up with Emergency Corps: DLR, RGA, SPN. TVU is radio instructor at Ft. Sill, Okla., with rating of pfc. LNW is with police dept. in Garden City. IYI moved to KC, and joined Army as baker. QKV of KU physics staff was in Wichita, hunting equipment for laboratory. KFH visited Wichita friends following graduation from Radar school. George Marshall, commercial op. and well known to Wichita hams, re-entered Navy as warrant officer. IBN was Wichita visitor from KU. He will be called "Doc" some day. Ex-UQX, former president of WARC, is now a captain in the Army. ICV and YF spent short vacation in Colorado. Wichita University is offering credit courses in radio theory, international Morse code, and airways control tower instruction, in addition to the KU extension ESMDT courses. YYW, formerly communications officer of Civil Air Patrol, is on active duty in Mississippi. He is in charge of radio installation and operation. ZUY (Mrs. YYW) will be radio operator on his staff. The RI gave examinations in Wichita, Sept. 18th. How about some of you Kansas hams in the services writing the SCM and passing along the dope to the ole gang? 73. — *Abie.*

MISSOURI — Acting SCM, Letha E. Allendorf, W9OUD — It's going to take a bit of ingenuity to make a column of the few reports I received this month. AYP is now with the Merchant Marine. Remember 6KFC (ORS Ariz.)? Or perhaps you knew him as 7IXH in Wyoming last year? Now he is 9VDO with the CAA at Columbia, where he plans to attend the University part time this winter. AEJ is up there at MU now also, in Electrical Engineering, after obtaining a discharge from WVU. An interesting letter from TPK tells of his activities since he obtained his degree in physics, taught one year of high school science, and went to sea. He is now operating with the Mo. highway patrol at Lees Summit. WIS still does special monitoring, and is getting to know almost as much as his students. NSU won a 25-dollar war bond in one of those "25 additional words or less" contests. GZR is trying to get back at Scott Field. HGB is now assistant to the RI in KC. The Joplin NYA radio school has finally placed two YL students, one as civilian op. at Camp Carson and the other as transmitter attendant at the b.c. station in Salina, Kansas. Boys from the school are in the Army, Navy, Coast Guard and Marines, not to mention civilian radio jobs in N. Y., Ga., Neb., Wash. and T. H. OUD is just keeping the home fires burning at the same old stand. And that's all from here. How about more reports next month? A few lines on a penny post card will get your call in the column. If I don't get more reports I'll start writing poetry here — so be warned. 73 and the very best of luck to you all.

NEBRASKA — Acting SCM, Lt. Comdr. P. H. Quinby, W9DXY — UEV, pinch-hitting for UFD as EC in Omaha, reports gang has plenty 2½-meter equipment ready and QRX for civil authorities to act. EAT reports same for Lincoln. Gothenburg WERS is organized with MLB as radio aide and EKP as 2nd op. KQX is keeping tab on Western Nebr. Radio Amateurs Club members. EAT lost 70-foot stick in storm. On active duty in USNR, CGS, EMC, MGV and VSH are lieut. (jg); CP, CPH are CPO; AOS, FWN, GNH, IPZ are radiomen; QUQ is yeoman; IVT and GHY are at Navy lab., Washington. In Army ZZM is capt. in Medical Corps. OVH is capt., and BNC is 1st lt. in Air Corps; DHS and LLP are 1st lt.; HTE is 2nd lt.; WOB and ZFC at signal school, Ft. Monmouth; UFD in Air Corps; QMA and RVZ are ops at Ft. Omaha; EDN in enlisted reserve; QMY at signal school, Phila. In CAA is ARE at Washington and VRT at Mays Center. Teaching radio takes MTI to Greeley, Colo., and WKP to Lexington, Ky. GDB is teaching trade school at Milford. SIR is tool engineer for Douglas Aircraft at Seattle. ANZ is grinding xtals for Army, with THK and WBE assisting. AFH, GYM, JZQ, MYT, ROE, UAB, ZGX, ZHJ work at Martin Bomber plant, Ft. Crook. GNN is in Santa Monica, Calif. ONL is with AT&T at Burlington, Ia.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Edmund R. Fraser, W1KQY — The following district radio aides were appointed: EER, Stamford; IM, Bridgeport; KDK, Hartford; KXB, Torrington; KQY, New Haven and Frank Hales, Waterbury. Newly appointed ECs: EAO, West Hartford, in place of JFN, who is going into active service in USCG; CSX, Derby. NAM, master sgt., is attending officer's candidate school in Fort Monmouth. CTI, reporting for South Fairfield County, writes that they are waiting for WERS license. NCG has both vibrapack and genemotor supplies for his WERS rig. Ex-BYB and NY1AA is now lt. comdr. and third in command at Naval Radio School at Noroton Heights. ATH reports "BG" is starting another code class. KYQ reports JEI is civilian employee for U. S. Army, and COB has enlisted in the Signal Corps. Harry Graubard, moved from New York to Bridgeport to accept employment in defense industry, writes his operator license was instrumental in securing this position.

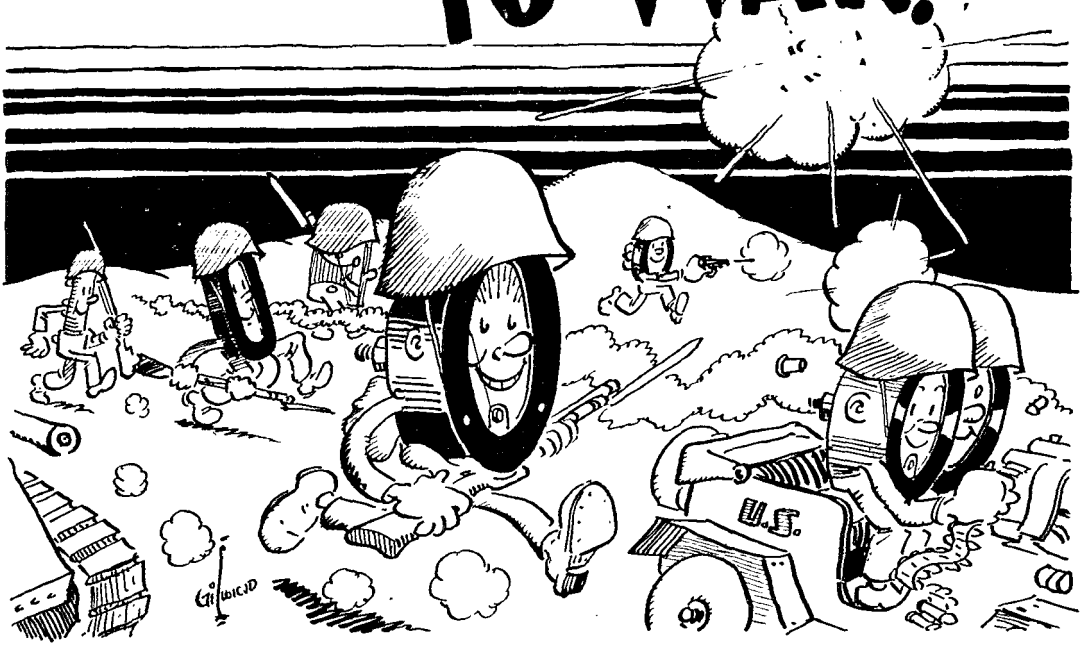
MAINE — SCM, Ames R. Millett, W1BAV — This report is of necessity very concise; either all the hams in the State are away, or they have forgotten that there is a monthly column. The PAWA in Portland is working in conjunction with the civil defense on a plan for a WERS set-up. GHT is running the show. The code and theory class of the PAWA has reopened for the winter; plans have also been made for their annual Hallowe'en party. LOA ran into BXE and MDK in Philadelphia recently. GVS has gone with the Signal Corps in a civilian capacity. BNG is now with the Civil Air Patrol.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, Jr., W1ALP — Two more new ECs for this Section: WS for Natick, LO for Somerville. To all ECs, please check the last date of endorsement on your certificate. Remember these have to be endorsed each year to keep them in force. HX is now a lt. and is in Ohio. HDJ is in Florida studying to be a radio op. MEG moved to Framingham, and has enlisted in Signal Corps Reserve. Your SCM received a letter from JXU, who is outside of this country. He is now a lt. col.; he also informs us that JJY is in the same place. We were wondering where you were. IXI is radio aide for his Section. NFQ, MLM and NCF are building a rig for Foxboro. Stan, MBQ, wants to be remembered to all the gang; he tells us that MBE is working at Woods Hole, and his XYL is running the gas station. MMI graduated from Gallups Island, and has his 2nd-class commercial. EX-ET is back in the ranks again with a new operator's license. MBG is raising some pigs. ALP is now working as a civilian in the Army Signal Corps in Boston with a lot of other hams. Some of the calls noticed so far are: MLL, SH, ADE, ENK, ICO, HM, LYA, AGR, FWS, and probably many others. FDN is now teaching radio theory. EXU is now working in Cambridge.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1FTJ — MLW and MMG have been students at Gallups Island. GDE has the commission of a 2nd lieut. in the Signal Corps of the New Hampshire State Guard. AVL's engagement has been announced. HJM is working at WMUR. JDP has been down at Orlando, Fla. MDX is with American Airlines at Boston. MZS is now working at M.I.T. Well known to New Hampshire hams, Bob Mawby, 3FFM, is now instructor in radio and mathematics at Ft. Monmouth. IVU has now taken unto himself a YF. LBJ is working at Portsmouth. MRD is at Lynn working on defense job. ITF is airplane spotter. DUB has a defense job at Lowell, Mass. MKD is with the Signal Corps. FGC is lieut. (jg.) in USNR. AFD has been given special work for the USNR. We understand that MUW and JMY have set the date! KKQ enjoyed a vacation trip to New York, recently. BFT/DMD was home at Bow, recently, for the first time in four months, getting re-acquainted with his son. All New Hampshire hams extend sympathy to IP, former state net control station for the New Hampshire Net, on the death of his father.

VERMONT — SCM, Clifton G. Parker, W1KJG — NDL has completed rig for carrier current transmissions at Montpelier. FRT is busily engaged at Montpelier with code classes. The Montpelier group has 44 enrollees and meets each Monday and Thursday night at the Community Hall, where space for the classes was donated by the American Legion. Demand is increasing for a similar course at Barre, and plans to initiate such work are in the making. MET has left for officers' training school in Florida for a six weeks' course, following which he expects assignments elsewhere. MET previously has served as Chief Engineer at WCAX for several years, also had charge of maintenance of police radio equipment at Burlington, and recently was commissioned. An inspector is available at Burlington for giving 3rd-class 'phone examinations, and any interested applicant can make arrangements by contacting Burtis W. Dean, W1NLO. HLH is now at 12 Marshall St., Hartford, Conn. LWN is new chief engineer at WCAX and has charge of maintenance of police radio at Burlington. JKF has joined the Burlington Amateur Radio Club. NJP has been transferred, present address unknown, but is with our armed forces. JVS has recently been in Delaware, and MJU has returned to college.

SEND YOUR METERS TO WAR!



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The Burlington Amateur Radio Club is actively engaged in WERS work, and the Mayor publicly appealed for old radios to furnish parts. Last account received here was to the effect the club was nearly swamped with old b.c. sets, etc. IQG reports Vermont Naval Volunteers are busy with assignments for patrol on the lake. The code practice group instruction at Burlington is continuing regularly, and has instituted elementary theory instruction. At Morrisville a code class has been instituted with 27 enrollees from that area. Meetings are held each Monday and Friday evening, 8:00 P.M., at the Copley High School, Agricultural Instruction Room, where a fine layout for such classes has been made available by the school authorities. Your SCM is in the pit on this work. AEA has enlisted in the Signal Corps, but have not received his address as yet. For use in WERS work, please drop your SCM a line reporting results of all 2½-meter experimental or test transmissions in which you participate under a municipal license, particularly as applying to any inter-community contacts which appear to be reliable. Anybody solved the problem of bending those signals "round the mountain"? If you have perforated code practice tapes available for loan to the various amateurs supervising code practice classes, drop a card to your SCM and tell him what you have for tapes, whether you will loan or sell them and how much you will sell them for, if a sale is in order.

NORTHWESTERN DIVISION

MONTANA — SCM, Rex Roberts, W7CPY — Electric City Radio Club code and theory classes have now resumed activities. This club is working with the city for WERS set-up which will probably be complete by the time this is published. They have twelve 112-Mc. rigs. FOA is now with Telephone Company at Billings. FSP is with the CAA at Medford, Oregon. HCV, one of the lucky ones who is still working radio (Indian Service), is in Phoenix, Ariz. CPY ran into the Rocky Mountain Division Convention at Denver, unexpectedly. HZJ has returned from summer school. CNP is in Radar under Civil Service with Army Aviation. BVE is now 8WRS and RI at Buffalo, N. Y. AHN is air-raid warden at Great Falls. DSS is radio aide in Great Falls. DXF visited the gang at the Falls. CC is expecting appointment in the Naval Reserve. Have we told you the "Doc," ABT, took unto himself an XYL? Great Falls Club has class of fifteen women for WERS operators. Thanks, fellows, for a number of letters and the Great Falls report from which the above was extracted. How about every one of you dropping me a card or letter giving location, rank, service, etc., of every ham you know for a complete report of "In the Services" for Montana in the next *QST*? Thanks, and 73.

OREGON — SCM, Carl Austin, W7GNJ — EC: 7JN. AMI is now teaching radio at U. of Idaho. ITG/YG reports YG dismantled for duration; HTD now an ensign; IMS now at local Pendleton station; IMU is shipyard worker; HGT out on a freighter; ION and IPB are also at sea; IBP at shipyards; and ITG and ECH with FCC. AOY of Portland may soon be an inspector. JN has had several talks with Portland authorities regarding WERS. BS will soon be warrant officer. IIK was second in Radar super-het building contest, at Houston. QP at Dutch Harbor. HAL has 112-Mc. rig ready. HJI's new XYL missed the code test, but will try again soon. The City of Bend wishes WERS, so the gang are lined up with 11 units, more coming up. ARZ is radio aide. HVX, Secy. of CORK, reports the following: Roy Mickel passed the amateur exam this time; club now running 3 code tables, starting new classes every few weeks; Ken Sawyer received 15 w.p.m. certificate after 10 weeks, and is going into Radar with GOC; GOC received 20 w.p.m. certificate; Leo Michel received 15 w.p.m.; club school denied priority, can't buy headphones for students; club wishes to buy Teleplex, with perforator, address W7HVX, Bend, Oregon. 73.

PACIFIC DIVISION

EAST BAY — SCM, Horace R. Greer, W6TI — ECs: OBJ, QDE: EC u.h.f.: FKQ; Asst. EC u.h.f.: OJU; OO u.h.f.: ZM. The regular East Bay Section Meeting, which is held the third Wednesday of each month, was held at the Hotel Leamington, Oakland, Calif., on September 16, 1942. KZN gave a fine talk on his 2½-meter rig. IMA and AEX had their rigs present. EE gave a report on WERS. The following were present: EY, DUA, AHG, exAYZ, UKZ, SFT, QAZ, TJP, KTI, MNG, FAQ, HS, KZN, QDE, KFR, EE, ACF, AEX, ROR, IMA, TI, JEE, J. Taylor, F. Arnberger, B. Corugan, G. Buckley, R. Kenney, D. Voll, E. Downey, R. Baker, F. Keller, H. Crow, E. Fox, S. Jansen, F. Seralde, E. Taylor, O. Payne, R. Morris, E. Woodard, D. Sewell, I. Hudson, O. Angello, D. Haight, G. Heldberg, E. Passetti, H. A. Schmidt and Mrs. TI. With some of the other cities not going in for WERS, the gang from Berkeley, Alameda, Piedmont, San Leandro, etc., are being asked to join up with Oakland, so gang it looks like everything is now under control for Alameda County. Get in touch with the radio aide, EE, at Te. 3600, for all the dope. ONO is technical sgt. in Army, in Middle East. KUT is 2nd lt. in Army, and is in England. HTS died September 15, 1942. Reported killed in action, BFA, CRZ. Missing on Bataan, IJB. OCZ is coaching at St. Mary's College. LCT is an acting chief observer for his local Army observation post. IMA is getting to be a ping-pong champ. BGY has new job with Tel. & Tel. PLC is at the Veterans' Hospital at Palo Alto as a result of shell shock received at Pearl Harbor. ZM is now working in the ship yards, along with IKQ, AKB. Would like to have all the dope on the gang in the service for these reports.

ROANOKE DIVISION

WEST VIRGINIA — SCM, Kenneth M. Zinn, W8JRL — OXO has finished with his code class at Elkins, and turned out a swell class of approximately 24 students at 15 w.p.m. ZW, who was Chief Engineer at WWVA, has enlisted in the Army and is a first lieutenant. BOW was promoted from ensign to lieutenant (jg) in the Navy and sent to M.I.T. for special radio course. GBF has left WMMN and is now with Westinghouse in Fairmont, working as an engineer. MZD, whom you all know as owner of Professional Radio Supply, is also with Westinghouse in Fairmont as assisting purchasing agent, but his radio business goes on as before. We have had some very fine reports from the code and theory class students throughout the State. Practically all of the boys who have entered the services are in the Signal Corps and are getting along fine. Let's keep up the good work, fellows, and this fall let's get some more code and theory classes going for the boys who may yet have to go. This is one way we can do our part. KWV has changed his residence again, from Morgantown back to Fairmont. KXB has entered the service with a commission. KKG is now a major in the Army. Fellows, we ask you once again, please send your reports to your SCM so we can keep this small column going in *QST*. 73. — *Ken.*

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Stephen L. Fitzpatrick, W9CNL — QYU reports for duty at Naval Research Department Washington, D. C. JB, first on the list for sergeant of Denver Police, appointment starts Sept. 1st. PTI, second lieutenant, left for Miami, Fla., for training in Air Corps. VTL, ex-LFS, has appointment as general agent for the Minneapolis and St. Paul Railroad Company in Denver. He will make his home there. HCQ is now in Florida, and says that he and YFJ managed to spend the week-end together in Washington, D.C. QDC is attending radio school at Steamboat Springs. All amateur clubs of Denver held an enjoyable picnic, August 29th, at Stapleton Park. BML is now in the U. S. Army. GHY is with the Naval Research Lab. in Washington, D. C. BVZ, KMYR'S engineer, entered the U. S. Navy. SVL, located with the General Electric Company, was home from Schenectady, N. Y., for his vacation. HHE is with the FCC. WYX, EC for Denver, moved to a new location at 2058 So. High St. EHC is now located at Wright Field, Dayton, Ohio. YCD is in Louisiana, on maneuvers. EZL has a sergeant's rating, and spends his spare time swimming. KHQ and wife returned home safely from Rocky Mountain Division Convention; they also spent a few days in Kansas. Attention, ECs! Some of your appointments have expired and have been cancelled. Please advise your SCM if you wish to have your appointment reinstated. Denver Radio Club Council has started two new classes in code and radio theory. Classes are for two hours, twice each week. Your reports are greatly appreciated, but let's get them to the SCM by the 15th of the month. All material goes to the Censor Bureau before being published in *QST*. 73.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Lawrence J. Smyth, W4GBV — GOX is now in the Army, stationed at Madison, Wis. ECF is 1st lt. in the Signal Corps. DPX is 2nd lt. stationed at Miami, Fla. DGS reports that all is well with him in Washington, D. C. EOX, who is a warrant officer in the Navy, was a recent visitor of DGS. JY is a captain in the Air Corps.

DUM is at Dallas, Texas, and about to go in the Navy. HWD and GUR are attending a civilian radio school in Gadsden, where they are learning radio repair and operation. DAU and BOU, both lts. in the Signal Corps, got together for a couple of days of rag-chewing. EVI is civilian radio engineer with U. S. Marines. BHB is in Hawaii. 73. — *Larry.*

WESTERN FLORIDA — SCM, Oscar Cederstrom, W4AXP — Roy Seale and Joe Hicks figured in a bad automobile accident this month. We are glad to say that all are doing nicely. PBW has been transferred from Naval Air Station. He was a lt. comdr. in the Navy and in charge of Communications at NAS. QU is now in Washington, D. C. He was formerly Postmaster at Naval Air Station. He is now lt. (jg). PE is in charge of Aviation Radio School, now, and doing a swell job of it. 6MYV, Ensign DuBree, is down at the school, too, in official capacity. Another Ex-W6, A. L. Ludwig, was promoted from chief radioman to chief warrant officer. 3FZL-4IID is now at the A & R Shop, and reports say he is making good. Red Flowers, one of our old-time NCR boys, is home on furlough from the Army; he is a full-fledged sergeant now. ECT-FJR, Rich and Lola, made a flying visit to Pensacola, where they visited HJA

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, H. F. Wood, W6QVV — More and more of the gang are now wearing the different uniforms of Uncle Sam, and more power to them. It's certainly up to us who are, for various and sundry reasons, left out of active service, to do our part in keeping ourselves and equipment ready and rarin' to go when and if we are called upon and, of course, to lend any and all support asked for by the League. Please let us hear from you soon as to what you are doing under the WERS setup. RNN reports QVS and QIL both in the Navy, now, and in radio school; also that the Inglewood Club is still holding regular meetings first and third Friday nights. BUK reports that OMQ and his XYL have withstood the "rigors" of Reno and are back at Santa Ana now. The Valley gang have been doing a lot of work on the WERS and are pretty well organized, as is the swell bunch at Long Beach. The Santa Monica Bay crowd are hanging together well, too. I'd like very much to be able to attend some of the meetings of all the groups if you'll only let me know far enough ahead of time so plans can be made. There certainly is a part for each of us, and a very important part it may be, too, so get busy at something so that we can in some measure help to draw this war to a close and once again resume the pursuit of our hobby — as we like it. 73 fer new es C U L. — *Ted, W6QVV.*

ARIZONA — SCM, Douglas Aitken, W6RWW — The Tucson gang is to be complimented on the way they are carrying on under war "silence." The club there has resumed meetings, and report 30 members still active. They are on the *QST* honor roll of active clubs. GS, TJH, SLO, USC are teaching code or theory in private classes or schools. A lot of hams are reported to be in the Air Base schools. USB is working in aircraft plant on the coast. ROP has been seriously ill, but reports he is on the road to recovery. KSO has a new XYL. HBR joins the Navy. FZQ and IUQ have joined the Air Corps. SOG is awaiting a call from the Marines, and LSK the same from the Air Corps. OAS is radio aide for the Maricopa County Sheriff's Office. The WERS setup there is waiting for authorization from Washington. The following will be on the operator list: ANO, BUX, HIB, HRH, IXC, MAE, NEL, NGJ, OMD, QJL, ROP, SXP and others have announced their intention of becoming active, if and when authorization comes through. RFE is attending glider school. Verde Valley Club hold monthly meetings. GS, with XYL and daughter, and QWG and REJ visited RWW. NYP and REO are following their other hobby of fishing. MLL is busy with radio theory and code classes. Many thanks to GS and TBR for their co-operation in gathering news for this monthly paragraph. How about a card once in a while from some of you others? Vy 73. — *Doug.*

WEST GULF DIVISION

NORTHERN TEXAS — Acting SCM, Gordon G. Ash, W5CY — Card this month from IIB reports on several of the boys in service: Ensign Prickett, FZU, stationed at Cambridge, Mass.; Ensign Powell, IZJ, at Galveston, Texas; RM2c Patton, GPJ, in Iceland; Private Edler, IEB, in Camp Callan, California; JMN at Ann Arbor, Mich.; Cadet EZU now at Ellington Field. HDU got a second-class telephone license. IIB is lab assistant at Texas Tech. ESMWT Course. KOB is learning Morse operating.

SOUTHERN TEXAS — SCM, Horace E. Biddy, W5MN — BFT is radio instructor for the Vocational Training School in Laredo. BGJ, JAH and HSV are with the Immigration Service Border Patrol in Laredo. IHG is captain in the 11th bat. of the Texas Defense Guard. BEF is still on the mail run between San Angelo and Fort Stockton. BYF is taking a radio engineering course at the San Angelo College. GCJ completed his training at the Navy Training School and is now stationed out West. BUV has been appointed 1st lt. in the 11th bat., Texas Defense Guard, in charge of radio and intelligence. HDY and Ex-K5AQ are radio instructors at Goodfellow Field. CIX, BYB, RA and Patrolman Goodrum are completing plans for WERS operation in Cuero community. IQQ is medical officer, 1st lt., in the Air Corps in Uvalde. EIR is radio repairman at Duncan Field. EIV is leaving for service in the Navy. JMP is attending RCA-Signal Corps School in Phila. HBI moved to Jourdanton. HQN is in Corpus Christi. FH has returned to the States from Canada, where he has been instructing classes in British Radar equipment. Upon his return to Lexington, Ky., he was surprised to find ZX, AET, IPE and Ex-BRY attending Radar classes at Lexington Signal Depot. JOJ is now stationed at station WACO in Waco. JOJ, KLC, and JLU may experiment with wired wireless.

NEW MEXICO — Acting SCM, J. G. Hancock, W5HJF — JWA is playing football, and seems to be blocking runs just like he used to my receiver on the nets. Jack's last QSO was to put an emergency message through on Dec. 7th. ENI has been transferred to Baltimore with Medical Corps. DLG is still cancelling postage stamps and running the shows at Tularosa. FSP is civilian maintenance operator at Fort Sam Houston. UU is reported to be in the Navy. David Erwin, a new ham in Portales, is now in the Navy. GGO is CAA operator at Socorro. HRB also with CAA at Socorro. IOB is still at Hobbs, and CNV is at Artesia. JZT is back on the job after a year convalescing. Harold Wheeler took his Class C in Portales just before leaving for Harvard. Miss Becky Sharp, a YL of Portales, is trying to get a hook-up via wired wireless with HJF for code practice. She already has light beam with JWA, but HJF is too far away for blinker. DER and KCW are still in Clovis. Let's all know what everyone is doing to keep his mind off those cold filaments. We are QRX always for a card.

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The Glacier Park Hamfest, held at Fish Creek camp grounds near the Belton entrance to Glacier Park, Mont., was a week-end affair held on July 18th and 19th. Some of the folks camped on the shore of Lake McDonald, while others rented cabins at Apgar, a short distance from Fish Creek. The attendance of about 20 members, smaller than on previous years, was just right for a congenial gathering. Featured was fishing, demonstration of the park communication system, discussions on transmitter registration and much fat-chewing among various hams present who had not seen each other for years. Officers were elected for next year, with W7IBG president, W7IWI vice-president and W7IEH secretary-treasurer. This is the sort of hamfest that makes city-dwellers' mouths water!

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W9UXH, who is faced with the problem of giving intensive code and theory classes during limited available time, has devised a system for combining the two. During his sessions he sends questions from the license manual on the key to his class, then follows the question with the initials of the student he wants to answer. If the answer is short, the student sends it back on the key; otherwise orally. This, he says, not only combines the two types of instruction, but makes the classes a lot of fun for all concerned.

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Don't let lack of operators stop you from organizing WERS in your community. As long as there is one ham and a few patriotic citizens, the latter can be trained to obtain a third-class commercial ticket, which is sufficient for a WERS operator permit. An article on the subject appears elsewhere in this issue.

BRIEF

Been looking for time signals? NSS sends them every hour on the hour except 11:00 A.M. and 11:00 P.M. EWT, on simultaneous frequencies of 4390, 9425 and 12630 kc., according to information from C. T. Florentine, Allston, Mass

A JOB WORTH DOING

★ ★ ★

COMMISSIONS, quick promotions and good pay are waiting in the Army, Navy and Marine Corps for every man with radio experience. You'll thrill to operating the finest equipment in the world, pounding out messages that are so necessary to the biggest job in the world—winning this war! You know why it's necessary, and the great, lasting good that will come of it. Now find out how you can best fit into the active combat picture. Read "U.S.A. CALLING"—then *do* something about it!

Here at Terminal, we're doing our best to supply our armed forces and many great industrial firms with radio and electronic equipment. We're buying War Bonds. And we're sending off our men to serve Uncle Sam. That's what we want to give *you* a send off for, too. It's worth it, brother!

★ ★ ★

TERMINAL RADIO CORP.

Distributors of Radio and Electronic Equipment

85 CORTLANDT ST. NEW YORK, N. Y.

TELEPHONE: WOrth 2-4416

(*Continued from page 92*)

INTERNATIONAL FLAG CODE SIGNALS

AM	Accident has occurred. I require a doctor.
AP	I am aground.
CU	Anchorage is dangerous.
DO	I am drifting and require assistance.
DQ	I am on fire and require immediate assistance.
DV	I have sprung a leak and require immediate assistance.
DZ	I require immediate assistance.
EU	Bar is dangerous.
FV	It is impossible to land.
JT	You should follow me (or vessel indicated).
JZ	I have damaged my rudder. I cannot steer.
LJ	I am disabled. Will you tow me in (or into place indicated)?
LO	My engines are disabled.
LP	My steering gear is disabled.
LT	I am dragging. Can veer no more cable and have no more anchors to let go.
LV	I am in distress for want of fuel.
NC	I am in distress and require immediate assistance.
PT	I require a pilot.
QW	I have on board mail for you (or vessel indicated).
RG	I have telegram (s) for you.
RH	Message has been received.
RJ	Have you any message for me?
RS	Is all well with you?
RV	Where are you bound?
RW	Where are you from?
SD	I am short of lubricating oil. Can you supply?
SE	I am short of petrol. Can you supply?
TH	I have lost my propeller.
TK	I require provisions urgently.
UW	I cannot distinguish your flags.
VB	Signal is not understood though flags are distinguished.
WU	What course should I steer to make nearest land?
XY	Can you take me in tow?
YJ	I require water immediately.

Splatter

(*Continued from page 12*)

"Don't take this poem too seriously. It is OK here!" Just to complete the ham circle, the letter was censored by 1st Lt. James Stewart, W9SZE! **Meyer Dolinko** is a trainee in the U. S. Signal Corps Radio Repairman Program at State Teachers College, California, Pa., and his poem was sent us by Dr. Karl F. Oerlein, W8SHW and W8SUS, its coördinator. Incidentally, Dr. Oerlein reports W8KTT, W8GQE, W8CAV and ex-W8BHJ also on the staff of instructors for the program, which is training 120 men monthly for the Philadelphia Depot of the Signal Corps.

...—

FEEDBACK

HAROLD E. JONES, W9JZI, points out the following errors which crept into his article on "Simplified Band Switching" as it reached type in the September issue:

In the plate circuit to the buffer where R_6 is shown, this should be a 2.5-mh. choke.

(*Continued on page 112*)

MEISSNER *Signal Shifter*

—now incorporates extended frequency range from 1,000 kc. to 16,500 kc.

Install the Meissner Signal Shifter and your crystal procurement problems are solved! The Signal Shifter provides continuous coverage of a frequency range from 1,000 kc. to 16,500 kc. without any sacrifice in stability . . . NO CRYSTALS REQUIRED!

The Meissner Signal Shifter is a variable frequency exciter of exceptional stability . . . may be used alone as an auxiliary or "Short-Haul" C-W transmitter. All tuned circuits are ganged—controlled by a high quality precision vernier dial.

THE MEISSNER SIGNAL SHIFTER PERMITS INSTANT FREQUENCY CHANGE IN ANY GIVEN BAND . . . RIGHT FROM THE OPERATING POSITION!

For further details see your Meissner distributor or write

Meissner

MT. CARMEL, ILLINOIS

"PRECISION BUILT PRODUCTS"

(Continued from page 110)

C_{19} is listed as a 500-volt condenser; this should be a 5000-volt rating.

The "C"+ of the bias supply should be returned directly to the filament centertap, so that grid current will not show on the plate meter for the final.

In the description of the cabinet its height is given as 20 inches. This should be 29 inches, the same as the desk.

...—

As the *Reader's Digest* puts it — the Japs can't talk straight; when they say yes they often mean no. Perhaps that doesn't excuse the following errors in the code chart (p. 24) in the September *QST* article on the Jap Code — but it may help to explain them. Correct the chart in your copy as follows:

The telegraph code equivalent for KO should have *four* dashes, instead of five as shown.

The equivalent for (W)I was shown as the International Morse symbol for the English letter L (·—··), whereas actually it should have been $\overline{AU}$ (··—·).

And PI should have been ·——· instead of ·——·—

...—

To top it off, we strayed pretty far in the October Strays page (p. 73) when we captioned Larry Walworth as K6BAZ. He is, of course, K6CIB. It only goes to show that two well-known calls are not necessarily interchangeable.

...—

FORT MONMOUTH ADDENDUM

WHEN the powers-that-be at Fort Monmouth checked our story on that establishment (October *QST*, p. 28), they noted a correction or two which, unfortunately, did not appear in the published draft. So that your picture of the place may be correct down to the last detail, we add them now:

Omitted from the list of training activities at the bottom of page 29 was the Officer's Department. This is a school for officers only, both from the Signal Corps and other arms of the service. That's about all we know about it (our rookie hadn't been there — yet!).

Over on page 30 the Signal Corps Aptitude Test referred to is actually two tests — the first being the school's code aptitude test and the second a general electrical information test.

There are now only three major specialties instead of four grouped under the Radio Division: radio repairmen, high-speed radio operators and fixed station operators.

On page 31, the present "E of R" course is given in 20 lessons. And the code speed the average recruit attains at the Replacement Training Center (p. 98) is now 10–12 w.p.m., while the required code speed at which the high-speed operators must send and receive has been boosted to 25. All of which serves to stress the conclusion reached at the end of the article — the present objective is not only to train 'em *faster* but *better*.

Hamfest in Khaki

(*Continued from page 58*)

atmosphere closes in upon you, for you must make curfew at the Guest House to which you have been assigned. You go to sleep with phantasmagoric images in your mind, and when you are awakened by first call and while you lie there waiting for reveille these images sort themselves into a kind of pattern — a set of rules for the conduct of "hamfests in uniform."

First, there is the distinction between a uniformed hamfest and a civilian affair. Don't try to mix the two; it doesn't work. Each group now has different interests — different things to talk about. The ham background unites the men in service, all right — but that uniform creates a distinction, too. Wait until we're all in civvies again.

Second is the emphasis on the lighter side. More even than in civilian life, where more of other forms of amusement are available, servicemen need relaxation, a chuckle or two, diverting entertainment. A little singing is a good idea these days, too. It may help, even, to let a few non-hams in on the entertainment committee. (At Fort Monmouth the capital program was arranged by Lt. Anderson, special services officer, not himself a ham at all.)

Third is a "but" — while emphasizing entertainment and the service angles, don't allow the ham atmosphere to drop too far in the background. Provide identification call cards or badges — most of the fellows won't have QSLs along and it *is* hard to identify once-met acquaintances in uniform. Give them plenty of opportunity for hamming and ragchewing, for "Didn't-I-work-you-once?" conversations and general mixing. Funny how long you can be on a camp and never meet another ham even though there are hundreds there — unless something like a hamfest comes along.

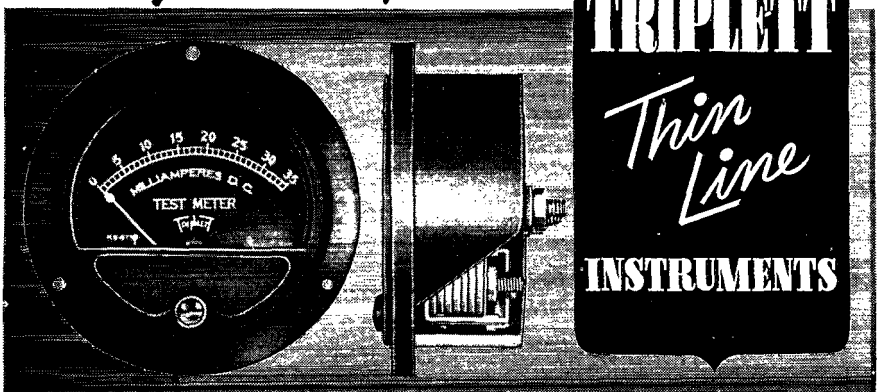
Fourth is the great importance of thorough publicity and advertising. It isn't enough to post the bulletin boards; the men are supposed to read them but somehow many don't seem to. Spread the word around the classrooms; get the instructors to make announcements; appoint one ham in every barracks to get the boys lined up if possible. It seems to take a lot more promotion to spread the tidings in the relatively restricted area of a military reservation than it ever did in a civilian community.

Finally, don't forget the cardinal rules of any successful hamfest — that there must be one moving spirit to boss the affair through to a conclusion, that adequate and easily-located facilities be provided, that the master of ceremonies be both capable and curt, and that every ham loves to look at a display of radio gear whether it be military or amateur.

With these ingredients leavened by liberal applications of the old ham spirit, hamfests in uniform can be worthwhile and productive interludes in the military training program. They'll help to make even better soldiers and sailors out of our fighting hams. — *C. B. D.*

When Space is at a Premium

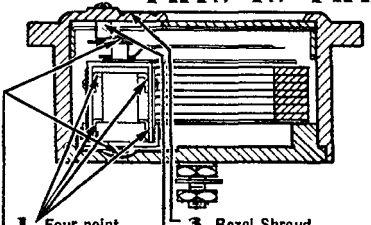
TRIPLETT *Thin Line* INSTRUMENTS



Full size of Instrument. Note deep shroud for glass protection and "Quick-Look" Scale.

This molded case contains full size Triplett Mechanism. Rugged Construction Compact Convenience.

THIS IS THE INSIDE STORY

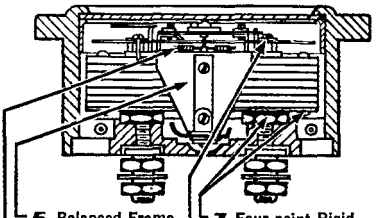


1 Four-point Core Support

2 Full Metal Bridges on Top and Bottom

3 Bezel Shroud Eliminates Unwanted Glare

4 One-piece Formed Spring Zero Adjustment



5 Balanced Frame Construction

6 Solid Balance Cross with Screw-type Balance Weights

7 Four-point Rigid Magnet Clamping

8 Separate Dial Mounting Independent of Top Bridge

Thin-Line Instruments also have Standard Large Coil Triplett Movements. Furnished with Osmium pivots for special requirements. All these features make for greater rigidity under vibration; greater permanence of calibration; greater user satisfaction.

TRIPLETT *Thin-Line*

Triplett Thin-Line Instruments meet rigid requirements for dependable performance. Though occupying minimum space they are *not* miniatures. Mechanisms are standard size with emphasis on excellent performance over long periods. Standardized installation. Made in three styles of cases—Molded, Metal Wide Rim and Metal Narrow Rim.

Triplett Thin-Line Instruments, available for many industrial applications, can be depended upon for precision performance in limited space. For full details write for "Triplett Thin-Line Bulletin."

THE TRIPLETT ELECTRICAL INSTRUMENT CO., Bluffton, O.

A Course In Radio Fundamentals

(*Continued from page 61*)

In each set of measurements it is useful to measure the d.c. plate current of the 6J7 and compare it to the static plate current at the same value of grid bias. The operating plate current in general will be larger. The increase over the static plate current gives an indication of the amplitude of the r.f. voltage applied to the grid of the reactance tube.

ANSWERS TO QUESTIONS IN INSTALLMENT 5

If no answer is given, it is to be found in the appropriate *Handbook* section or in the description of the experiment or experiments accompanying that Assignment.

Assignment 17:

Q. 16 — 250 μμfd. or larger.
Q. 17 — 60 μμfd. or larger.
Q. 18 — In plate circuit, 38 μμfd. and 13.7 μh; in grid circuit, 57 μμfd. and 9.1 μh.

Assignment 18:

Q. 6 — Operating bias, —133 volts; r.f. grid voltage, 179 volts r.m.s.
Q 7 — Operating bias, —260 volts; r.f. grid voltage, 280 volts peak.
Q. 8 — 21 ma.
Q. 9 — 160 μμfd. for B; 80 μμfd. per section for E.
Q. 10 — 7 μh.

Assignment 19:

Q. 17 — ¼ wavelength (2.2 feet) or integral multiple thereof. Frequency with tube connected would be lower.

NOTE. — Through a typographical error the first part of the answer to Q. 12, Assignment 12, October *QST*, was shown as 01.75 watts. It should be 0.175 watts.

The Navy Trains Radio Technicians

(*Continued from page 18*)

Here is the program for a typical day:

0600 Reveille. Bunks are made and rooms cleaned by 0620.
0630 All hands assemble for 30 minutes of setting-up exercises and drill.
0710 Breakfast.
0800 Classes and laboratory; two 2-hour periods.
1200 Lunch.
1300 Classes and laboratory; two 2-hour periods.
1700 Evening meal.
1830-2000 Athletic program and study period.

Course Stresses Math and Theory

As the training gets under way he finds that it is divided into four main headings: D.c. theory, and mathematics, a.c. theory and radio. The first two months are devoted to intensive math drills, physics, direct current and mechanical drawing.

And if he thinks that he already knows enough about these subjects to get by, he is in for some stiff disillusionment. Regardless of how good his earlier training may have been, he'll find there's plenty he didn't know. There was one graduate

Call to War!

★ Your volt-ohmmeters, testers, oscillographs can go to war!

★ The shortage of the valuable pieces of radio equipment is intense. The Signal Corps and vital WAR factories need them immediately.

★ New ones can only be obtained in 6 months, 8 months, 1 year and 2 years. War doesn't wait, production must.

★ Hatry and Young can get each thing into proper hands, proper use — Signal Corps, Navy or Industry.

★ Every item of the type idle and not on the firing line is potential death for our soldiers and sailors.

★ Every item you pass on is at work quickly saving lives.

INSTRUCTIONS: *Describe fully and we will answer at once with price. Payment is immediate.—Or ship what you have, without writing, for our inspection. Check at once subject to your approval. Equipment held inviolate and will be returned if you request.* ***WE WOULD RATHER NOT DELAY, WE WOULD RATHER RISK RETURN.***

★★ *We pay all shipping charges. You may ship collect express charges. If we return we* ***PREPAY*** *charges. (We are interested in mica condensers, filters, and all meters—send your list.) You risk nothing.*

★ Communication equipment: Meissner Signal-Shifters, Hallicrafters, National, R.M.E., Hammarlund receivers (not over 4 years old), Howard receivers. R.C.A., Hallicrafters, Collins transmitters.

FIRST—See Your Nearest Signal Corps Officer

OR IF YOU WANT IMMEDIATE CASH, SHIP OR WRITE US

HATRY & YOUNG

203 Ann Street ★ Hartford, Connecticut

(Continued from page 116)

electrical engineer from Ohio State we were told about who — well, there's no need to go into details, but by the time he realized how far behind he was, it was almost too late. Even veteran hams with years of practical and theoretical background find they have to give the course everything they have.

Besides the study of textbooks and the art of the slide rule and drawing pen, there's plenty of shop work, too. The text and lectures are supplemented in the laboratories with experiments on series and parallel circuits, generator characteristics, Wheatstone bridge measurements, vacuum-tube construction and many others.

The students are given intensive courses in the fundamentals of radio construction and operating principles. There are lessons on oscillators, detectors, amplifiers, coupling, transmitters, antennas and all phases of radio.

Here is Lt.-Commander Grogan's description of the final month in the course as given at Grove City:

"The course in alternating currents includes a detailed study of the principles of a.c., various series and parallel circuits, resonance, polyphase voltages and currents.

"The theory of the construction and operation of a.c. machinery, rectifiers and transmission lines is taken up. A trip is taken through the local light and power plant to study this machinery in actual operation.

"It is in this third month that the hams are in their glory. During the first three weeks, four hours per day are devoted to radio and electrical experiments. There are experiments dealing with resonant circuits, tube characteristics, Class A, B and C amplifiers, frequency response of transformers and amplifiers and many others. The well-equipped college electrical and radio laboratories are extensively used. In the electrical laboratory there are all types of single and polyphase a.c. and d.c. machinery, transformers and a large central switchboard.

"The radio laboratory offers many opportunities for the ham. The college owns a 1-kilowatt ham rig (W8NXW) and a 100-watt broadcast station (WSAJ) on 1348 kc., also a complete Western Electric loading panel and line-test apparatus. The latter set-up allows the men to test the frequency response of from 1 to 60 miles of telephone line. Oscilloscopes, vacuum-tube voltmeters, signal generators and beat frequency oscillators all aid in making the experiments vivid and complete.

"The last portion of the third month is spent in receiver construction. Then the ham's true nature comes to the front. He aids the instructors in teaching those with little or no previous radio training; he advocates his pet type of detector or oscillator, and bets his partner that his own set will have the greatest selectivity and sensitivity.

"When completed, these sets are tested with the 'scope and analysers. To more fully explain

(Continued on page 120)

ASK THE MAN WHO *KNOWS*

★ He's your Radio Parts Jobber! When you have an order that carries priority ratings or need some Astatic Product for replacement or repair of existing radio, public address or phonograph equipment, your Radio Parts Jobber is in a position to advise you concerning your requirements. Some products you desire may actually be immediately available in stock. Others may be procurable on order, and, of course, there will be those products in the Astatic line discontinued for the duration owing to the conversion of essential materials to wartime needs. Ask the man who knows . . . your Radio Parts Jobber!

ASTATIC

THE ASTATIC CORPORATION

Licensed Under Brush Development Co. Patents

YOUNGSTOWN, OHIO

In Canada: Canadian Astatic Ltd. Toronto, Ontario

SPECIALISTS IN

War EMERGENCY *Radio* SERVICE

ABBOTT experience and recently enlarged facilities are at your service for the production of communications equipment necessary to the successful prosecution of the War. Our TR-4, (2½ m. u-h-f Transmitter-Receiver) shown above, is but one of the many ABBOTT models. Tell us your problem and submit specifications for "special jobs."

ABBOTT INSTRUMENT, INC.

8 WEST 18 STREET•NEW YORK, N. Y.

(*Continued from page 118*)

the construction and theory, demonstrations are given on the RCA dynamic demonstrator in conjunction with the 'scope, signal generator and audio oscillator.

"Finally, the third month ends. The hams leave with a more complete understanding of the whys and wherefores of their work. To some come dreams of new and better receivers and transmitters; to others the future holds the promise of a new thrill — building a rig and having many QSOs with their new-found friends and associates."

Graduates Go On to Secondary Schools

Of more immediate importance, however, is that — if he has made the grade — the new graduate is transferred to a secondary school for advanced training. He may, too, be advanced to a rating of Radio Technician First Class or even Chief Radio Technician, with a base pay of $126 a month plus substantial allowances.

His primary training alone, however, will ensure him an education equivalent to that given by electrical engineering courses in commercial schools, plus the special u.h.f. and cathode-ray training he receives. In other words, he'll have a good grounding for a career in commercial frequency modulation and television as well as the more commonplace uses of radio and electricity when the war is over.

The radio world of the future is going to hear a lot from these naval radio technicians. Some, of course, will return to their original fields when it's all over — for they come from every niche in life. A good percentage of the students are hams and ex-hams, of course. Many are radio servicemen, b.c. station operators, commercial announcers, remote control men, oscilloscope experts and electrical and chemical engineers. Others are lawyers, chiropractors, accountants; we even found an undertaker in one of the schools (and he was near the top of his class, too!).

The ham is the nucleus, though. "We think highly of the amateurs," said Lt. Brady F. Dayton, resident officer at the Bliss school. "Amateurs throughout have made unusually good students," is the judgment of Lt. Eddy.

And those without amateur background quickly become innoculated with the bug — even though they can do nothing more right now than scratch the itch. "It is interesting to hear the remarks of those graduated, those going into a more advanced and specialized training," Lt.-Commander Grogan commented. "They say, 'We'll be seeing you on the air after this job is done,' or, 'I've never been an amateur or had a rig, but I'll sure have one after the war.'"

They will — you can be sure of that. But in the meantime they have a lot to learn and a whale of a big job to do. They'll do it, too — you can be equally sure of *that*.

— *C. B. D.*

Don't let your operator license expire!

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.

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

WANTED: Radio operators for merchant marine; must have commercial license; wages $300 to $350 monthly. Radio Officers Union, 265 West 14th St., New York, N. Y.

FORCED sale: Browning visual frequency meter same as new, $30; transmitter, entirely cabinet enclosed racks, c.w.-fone, variable frequency control, TZ-40 pushpull final, AB-1 modulation, beautiful job and much DX, $150; Mims 3 element 20 meter deluxe rotary, direction indicator, feed line, complete $100. All f.o.b. El Paso. First checks get 'em. P. O. Box 1796, El Paso, Texas.

WANTED: HK-24 tubes. WBNS Incorporated, Columbus, Ohio.

FOR sale: Howard 435-A. Condition like new. $30. W9NIC.

SWL'S? — Stationery? — W8DED, Holland, Mich.

WANTED — Bliley SMC-100 100/1000 kc. crystal. W4AYV, 221 E. Unaka, Johnson City, Tenn.

FOR sale — Breting 12 communications receiver with crystal and speaker, $35. R. Stimpson, 120 Ruggles Ave., Newport, R. I.

WANTED: VR150 tube new or used. Des Farrell, 1515 Milam Bldg., San Antonio, Texas.

SELL: Nearly new 437A communications receiver. T. F. Waters, 211 East 42nd St., Norfolk, Va.

FRITZ'S SWL's bring returns. 1213 Briargate, Joliet, Ill.

WANTED: A Sky Buddy or Champion or SX24 complete. State lowest price and condition. Frank Governale, 56–16 62nd Ave., Maspeth, N. Y.

GAS engine-generator, one horsepower, a.c., $35 f.o.b. Columbus, Ohio. Want bicycle engine. Capt. R. B. Jeffrey, APO 262, Camp Campbell, Ky.

WANTED — Head sets and telegraph keys, cash. Pendergrass, 1352 East 16, Brooklyn, N. Y.

USED equipment wanted. We pay highest cash prices for communications receivers, transmitters, equipment. Bob Henry, W9ARA, gives you the best deal whether you buy or want to sell. Write, telephone, telegraph description. Cash paid immediately. Henry Radio Shop, Butler, Mo.

WE still have large stocks of communications receivers, transmitters, tubes, mica condensers, meters, transformers, code machines, Vibroplexes, radio supplies of all sorts. Your inquiries and orders invited. Henry Radio Shop, Butler, Mo., and 2335 Westwood Blvd., West Los Angeles, Calif.

CRYSTALS: High grade Steatite type E62 and E64 commercial units for frequencies between 1600 and 10,000 kilocycles are available on high priority when orders are accompanied by WPB M-146 certification. Crystals also supplied to customers' holders and limited regrinding service available. Write us. Eidson's, Temple, Texas.

NEEDED: UTC A-24 or equivalent. Cash or what? D. A. Kemper, W2NTX, 164-05 32 Ave., Flushing, N. Y.

KOLORKARDS — A practical, new, copyrighted code memorizing and practice system that will enable you to learn the radio code easily, in your spare minutes. Designed by W8RW. Complete, handy, easily carried in your pocket. Only $1. KolorKards, Dept. QA, Bluffton, Ohio.

WANTED — Bliley 40 meter B5 and 160 meter LD2 crystals. Will pay full price. W7DTJ, Harley E. Steiner, Lewiston, Idaho.

QST 1921–1942 complete, condition new. Entire equipment of my station W8DK. Transmitters, 500 watt fone or c.w. composite of best possible construction, Collins 32A c.w., Deluxe Signal Shifter, RCA 3" oscilloscope, HRO power supply speaker, more than 50 meters, transformers, condensers, chokes, etc.; all first class equipment. Arthur Grolz, Mt. Clemens, Mich.

RCA, capacity operated, electronic control complete, new, $5. W8KJ.

WANTED: Hammarlund Super-Pro or HRO receiver for laboratory work — condition practically new. Box 511, Wakefield, R. I.

FOR sale or trade: practically new SX-24 receiver and matching speaker — also complete 200 watt c.w. transmitter to best offers. Want good recorder, SX-23, or what? Bill Godden, 6031 E. 13th, Kansas City, Mo.

HAMS — Help the war effort. Get in touch with us if you have one or more milliammeters with 0–50 or 100 ma. scales. Prefer square flush mount bakelite cases. Please state manufacturer's name and type. J. A. Maurer, Inc., 117 East 24th St., N. Y. C.

SEE my Sept. *QST* ad. Stebbins.

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.
Complete standard lines always in stock—W9IBC, W9DDM, W9AUK, W9BWP, W9CKD, W9JFM, W9SFW, W9TXZ

CHICAGO, ILLINOIS
Chicago Radio Apparatus Company
415 South Dearborn Street (Est. 1921)
W9RA and W9PST — Amateurs since 1909

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

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

HOUSTON, TEXAS
R. C. & L. F. Hall
1021 Caroline Street
Equipment for sale to students and civilians interested in radio

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

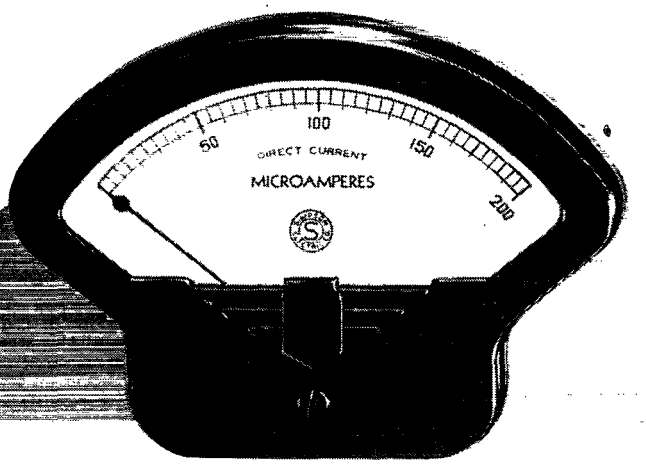
MILWAUKEE, WISCONSIN
Radio Parts Company, Inc.
538 West State Street
Complete stock Nationally Known products

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



Time is an important dimension of Accuracy

IN the strict meaning of the word, accuracy is not a measurable thing. An electrical instrument is either accurate, or it isn't accurate. There can be no more or less, no "almost".

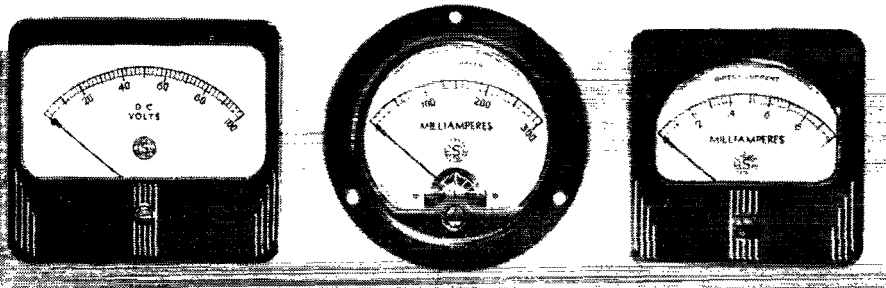
But there *is* one important way instrument accuracy can be qualified—if not in terms of "how much", then in terms of "how long".

How long will Simpson Instruments stay accurate? Examine the Simpson movement and you'll find your answer. First of all you'll find heat-treated, aged magnets—carefully selected springs, tested and tempered for permanent resiliency—specially processed pivots, completely Simpson-made.

But most important of all you'll find a fundamentally-better, stronger construction, with soft iron pole pieces for absolute accuracy, and full bridges at top and bottom that hold the moving assembly always in perfect alignment.

If your requirements are vital enough to give you the right to buy instruments, they are vital enough to rate the best. To those who have learned to measure accuracy in terms of "how long", best can only mean . . . Simpson.

SIMPSON ELECTRIC COMPANY, 5210 Kinzie St., Chicago, Illinois



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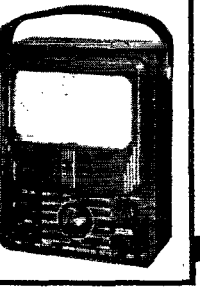
MODEL 260
High Sensitivity Tester

Here is a typical example of Simpson leadership. Ranges to 5000 Volts, both AC and DC, at 20,000 ohms per volt DC and 1000 ohms per volt AC. Current readings from 1 microampere to 500 milliamperes. Resistance readings from ½ ohm to 10 megohms. Five decibel ranges, —10 to +52 DB.



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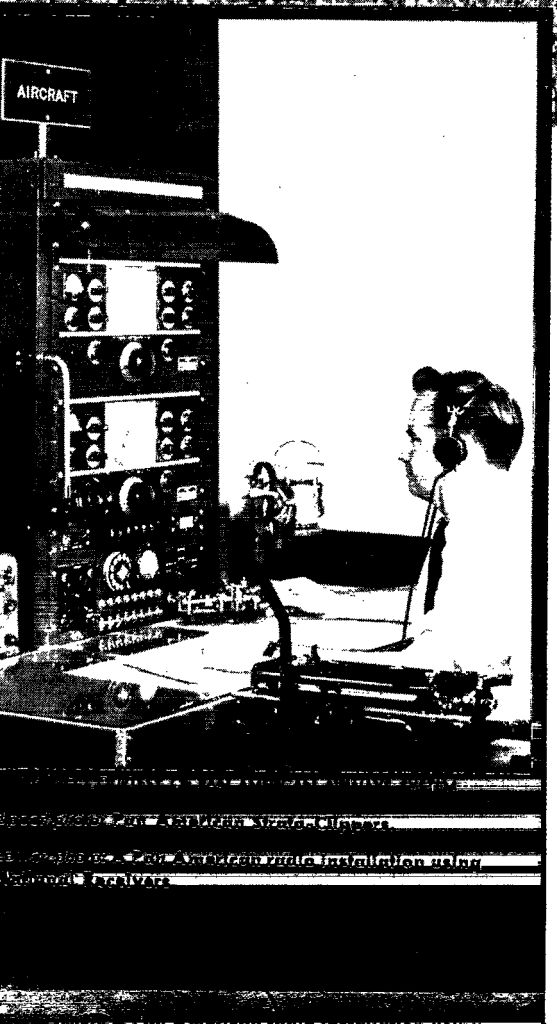

IT is not too much to say that Pan American Airways has invented the technique of trans-oceanic air transport; a technique based on superb skill, meticulous maintenance, and thoroughly reliable equipment.

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RESTS DURING STANDBY PERIODS

Mean Longer Life For Your Transmitting Tubes

It pays to let transmitting tubes "take it easy" during standby periods! Even though such care might not be considered normally, it now looms important in gaining the last possible hour of operation from tubes that may be difficult to replace.

HEATER-CATHODE TYPE TUBES—Where some operating delay can be tolerated, it is a good practice to drop the heater voltage as much as 20% during long or frequent standbys. This conserves the cathode and minimizes contamination of the grid by active material evaporated from the coating.

TUNGSTEN AND THORIATED-TUNGSTEN-FILAMENT TYPE TUBES—Every time a filament is turned on or off, it passes through a temperature range in which it has reduced strength. This repeated action may cause warping and, eventually, grid-filament shorts. Rather than turning off the filament during short standbys, reduction of filament voltage to 80% of normal will prevent warping, will enable the filament to come up to operating temperature quickly, and will avoid evaporation of emissive material.

During standby periods, tubes using thoriated-tungsten filaments should have their filament voltage decreased to 80% of normal provided the periods are of less than 15 minutes' duration. For longer standby periods, the filament voltage should be turned off.

Tubes using tungsten filaments should have their filament voltage decreased to 80% of normal for standby periods of less than two hours. For longer periods, the tubes should be shut down. At reduced voltage, a tungsten-filament tube will last about ten times as long as at normal voltage. Its hot filament also acts as a "getter" to maintain a high vacuum within the tube.

Care should always be taken in starting up tungsten filaments, and never should the filament current exceed, even momentarily, a value of more than 150% of normal. Wherever possible, it is wise to operate the filaments of all types of tubes on the low side—perhaps 5% down when only light loads are involved. As previously explained, even this small reduction may actually double tube life—a mark well worth shooting at these days, even at the possible cost of some slight decrease in station efficiency.

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