Perdix, Mechanical Engineer

Perdix, if you will remember your mythology, was an ingenious chap. Inspired by the structure of a fish’s spine he invented the saw, and by connecting two pieces of iron at one end with a rivet he made a pair of compasses. Sounds pretty crude now. But in his day it was truly remarkable. Similar is the spirit of innovation that has made Collins world famous for the mechanical refinements of its transmitters. Nothing is overlooked, whether it is as simple as a door latch or complicated as a network tap-switch. Our mechanical engineering department is adroit and capable. Its sole duty is the designing and refining of all the mechanical features which make your Collins transmitter look better, last longer, and work more efficiently.

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* Officials appointed to act until the membership of the Section chooses permanent S.C.M.s by nomination and election.
In every branch of the electronic industry Centralab Controls play a major part in producing certain, smooth, flawless attenuation. Set manufacturers, servicemen and experimenters turn to Centralab for positive performance. Whatever your Volume Control needs may be... specify Centralab.

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

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

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.
"IT SEEMS TO US—"

THE "RADIOLOCATOR"

URGENT military needs have a habit of giving great impetus to technical development. The last war vastly accelerated the unfolding of the radio art by giving us the first good vacuum-tube transmission and reception — "hard" tubes, the first good amplifiers, the first practicable radiotelephony, the superheterodyne. It is inevitable that from the stimulus of the present war will come comparable radio marvels to open new vistas to the amateur.

One such comes already to light as the hard-pressed British, in sharp need of maintenance personnel, decided to release to the world the major outlines of the device they call a radiolocator, that its appeal to the imagination might implement their call for technicians. It is this device which locates oncoming planes while they are yet too far away to be seen or are lost to vision by clouds, fog or night. It operates by radiating a beam of waves which, striking a metal plane, are reflected back to the starting point and suitably detected. By measuring angles and by sending timed pulses, the altitude, direction and distance of the planes may be determined. There is nothing novel in this idea: there is a considerable literature on obstacle detection, and indeed any amateur immediately recognizes this basic functioning as patterned on the technique of ionosphere measurement — which is what first suggested it six years ago to R. A. Watson-Watt, the British physicist who has fathered its development there. What was long a guarded military secret was the vast scale on which the British, mass-producing many types of the apparatus for various uses, are employing it. Another was the success they are having with it. Jointly with the RAF fliers, it is credited with winning the first Battle of Britain. It is now a major weapon in the defense of cities from night bombing. Indeed, one form of it is installed directly in night fighters. It is reputed to be similarly effective in detecting ships at sea. Its effect on military strategy will doubtless be tremendous.

Hot on the British disclosures the War Department announced that our Signal Corps, as the result of six years' work at Monmouth, has perfected a locater of its own, similar to Britain's, and called for technicians to receive training in the operation of the devices along our coasts and at our bases. No great imagination is now required of the average reader to see the point behind the recent solicitations of specialized radio personnel. Indeed, numerous American scientists and engineers have been silently collaborating for a long time on the improvement of the apparatus, knowing that here was a development of the first magnitude. We ourselves were aware of it and eager to suggest to American amateurs the importance of absorbing u.h.f. and cathode-ray technique. But all of us were bound to secrecy until the recent disclosures.

How much of the technical side may now be discussed? As far as we're concerned, it's only that which has already appeared in the press. Some types of locators seem to employ a sharp beam, requiring a high-gain directive antenna which must be easily steered for quick sweeping of the skies. This means that the wavelength must be very short. It must also be small in comparison with the dimensions of the object to be detected, and again to minimize the effect of ground reflections. The answer is an exceedingly high frequency, a microwave — in the centimeter range. How to generate such frequencies? A recent article in the Saturday Evening Post, "The Klystron Boys," indicated that U. S. technique is to use the Klystron or similar velocity-modulated tubes. But there is no indication that the British use other than the usual group-modulation method, for which satisfactory tubes do exist. The British require applicants to have a thorough knowledge of superhets, implying that much about the receivers. Articles in the press have frankly stated that the detecting device used is a cathode-ray tube, giving a visual indication. The British say nothing about antennas beyond the fact that they are complex and require maintenance; you might ask yourself what kind of microwave antennas you know about from reading QST. But that some of the rigs employ antennas that are fixed in at least one
plane is indicated by the statement that tele­
vision technique has lent electrical scanning
and synchronization, with considerable specu­
lation on the part played by f.m. No mention
of power, and range unstated except that it is
far beyond visibility. Curt refusal to indicate
the nature of the means that distinguishes
friendly ship from enemy.

This is no time to talk military secrets. We
summarize above what has already been
revealed, to go as far as we can in suggesting
to you the technical fields worthy of your study
this summer. But do you not also thrill to
the beautiful ingenuity of this development
and take pride in the fact that it was our radio
art which produced it? And do you not, with
us, glimpse a future in which wartime develop­
ments again give immense new zest and im­
petus to the practice of amateur radio? Un­
questionably there will be many new things
some day to discuss and eagerly apply. One,
we know, will be the new microwave technique.

P.S. ON “FRITZ”

Last month on this page we mentioned
the arrest in a Middle Western city of an un­
licensed amateur who signed himself Fritz,
and we chided amateurs of the vicinity for not
having turned in such a bootlegger long be­
fore. To keep the record complete it must now
be reported that there were two Fritzes, the
Illinois one apparently a sort of cheap copy.
The original and genuine one, who had been
going for some years, was caught in the act in
New England in early June and is at present
doing bunk-fatigue in a Massachusetts cala­
boose. This time, we are happy to say, there
was notable collaboration by a group of ama­
teurs. They kept him busy and held him on the
air while the FCC’s monitoring officers con­
verged on him.

These fellows, and three others similarly
arrested recently, were not amateurs and never
had been. What they were doing was unim­
portant alongside the fact that they were op­
erating without licenses. But licensed amateurs
who flout the Commission’s ether patrol are
receiving similarly hardboiled treatment.
In two actions taken in the month of June, the
Commission suspended the licenses of nineteen
amateurs for trying to sneak a foreign contact
in violation of Order No. 72. There was no
evidence of subversive activity in any of these
cases and therefore the fellows aren’t in jail,
but they give graphic evidence of the futility
of such endeavors. FCC now has a hundred
monitoring stations scattered all over the
country, and mostly manned by hams who
know all the tricks! It just can’t be done.

K. B. W.

SPLATTER

OUR COVER

Does this remind you of a hamfest you once
attended? We don’t know where this particular
ham hodgepodge took place. In fact, any re­
semblance to any actual hamfest, living or dead,
is purely coincidental, and only one with Gil’s
prodigious imagination could cook up such a
brawl!

FEEDBACK

In the article, “Tube Keying,” on page 30 of
the June QST, the side of the key that is con­
nected to the filament of the 80 rectifier should
have shown connected to ground as well. This re­
turn is necessary to place the bias on the keyer
tubes.

Rocky Mountain Division
Convention
Pueblo, Colo., August 16th-17th

The San Isabel Amateur Radio Associa­
tion promises an interesting and instructive
cardboard corner of the city of Pueblo, Colo. A banquet and business
meeting will be held Saturday evening, followed
by some sort of entertainment; Sunday morning
there will be a “chuck wagon” breakfast, and a
luncheon at noon. Headquarters will be at the
Hotel Whitman. Registration fee is $2.50, or
$2.00 in advance. For further information write
Secretary Charles A. Lannon, 811 Veta, Pueblo.

President Bailey says . . .

General Marshall, Chief of Staff of the
U. S. Army, in his speech recently at Trin­
ity College, had this one thing to say: “The
great need to-day is UNITY.” Think it
over. That’s it — unity. ‘Phone men and
c.w. ops, think it over. Two rival clubs in a
big city — why not have a union meeting?
Two or three hams in a small town — why
not all meet at somebody’s house? That
ham on the other side of town with whom
you have not been on the best of terms —
why not go over to his house? It may be
that you will meet him half-way, coming
to see you! Unity of effort, unity of pur­
pose. General Marshall is right.
The Signal Corps School at Fort Monmouth is located about fifty miles south of New York on the Jersey coastal plain near Red Bank, N. J. Established during World War I as a Communication Training Center, it was at first known as Camp Alfred Vail. In 1925 the post was renamed Fort Monmouth after the Battle of Monmouth in the Revolutionary War. It rapidly earned an enviable reputation as one of the finest of the service schools, although until recently it had facilities for training only a relatively small group of students drawn from permanent Signal Corps organizations within the regular army.

To meet the needs of a rapidly growing and highly mechanized army in which signal communications has become increasingly important, the Signal Corps School at Fort Monmouth has undergone an expansion that appears to be nothing short of miraculous. In September of last year the ground was broken for the erection of buildings to house classrooms and laboratories as well as barracks for the men. In January of this year, the Signal Corps Replacement Training Center was established at Fort Monmouth to train selectees inducted into the service as Signal Corps personnel, and send them out completely trained to Signal Corps organizations in all sections of the country. From Reception Centers all over the country the rookies stream in in lots of five or six hundred. At Monmouth they are given intelligence tests and the Signal Corps Code Aptitude Test, and are classified as to their adaptability to receive and absorb specialist training. Signal Corps organizations must function as self-sufficient army units, and the Signal Corps Replacement Training Center, therefore, turns out cooks, clerks, and motor mechanics, as well as communication specialists of all kinds, within the three months time allotted for training. From the six thousand rookies trained at the Replacement Training Center every three months, roughly one thousand picked men are enrolled in the Enlisted Men's Department of the School.

Besides the rookies furnished by the Replacement Center, the Enlisted Men's Department receives an almost equal number of men from the various Signal Corps Organizations scattered throughout the army. This would make a total student body of approximately two thousand—an increase of about five-fold from the enrollment at the beginning of the year. Approximately half of these men are trained in the Wire Division as telephone specialists and receive much the same training as personnel employed along similar lines by commercial telephone companies. The other half are enrolled in the Radio Division, and are given training in any one of four specialties, namely, as field radio operators, fixed station radio operators, radio repairmen, or telegraph printer operators. When you consider the fact that this department of the School alone can turn out two thousand enlisted specialists every 15
weeks, a total of approximately eight thousand graduates a year, three quarters of whom receive the equivalent of an apprentice engineering course, you would rate the school at Monmouth as one of the largest engineering colleges in the country. For the task its instructing staff and its laboratory facilities cannot be equalled. But the Enlisted Men's Department is only part of the School. There is an Officer's Department with an enrollment of 280 quarterly, an Officer's Candidate Department with an enrollment of five hundred, and a department for training specialists for aircraft warning organizations.

The post of Fort Monmouth, including the Signal Corps School, is under the command of Brig. General Dawson Olmstead. All departments of the School are under the command of Lieut. Colonel W. O. Reeder. The Director of the Enlisted Men's Department is Maj. Paul L. Neal. Maj. M. G. Wallington is in charge of the Radio Division, and Maj. R. G. Swift of the Wire Division.

While the Radio Division offers courses in both operating and radio theory, it is naturally impossible to train a man in both specialties within the allotted 15 weeks' time. Only students in the radio repairmen's course get radio theory, and the course they get in that is one of the toughest courses given to enlisted men in any branch of the army. It is thorough because it must be thorough. The army needs good radio maintenance men. Today every tank carries a superheterodyne receiver, and a great many of them are equipped with complete transmitting and receiving equipment. The number of radio sets in an armored division is unbelievable. Then there is the radio equipment with the infantry, the artillery and other arms. Maintenance of this equipment is the responsibility of Signal Corps personnel.

Roughly forty per cent of the men enrolled in the Enlisted Men's Department — that is about seven hundred — are given the radio repairmen's course. Many of them start from scratch without any previous knowledge of radio and with little electrical background to begin with. They are first given a complete course in electricity and magnetism, subdivided into Principles of Electricity, D.C., and Principles of Electricity, A.C. This is elementary electricity, and the student is expected to complete this course in about four weeks. Only after he has passed alternating currents, is the student enrolled in the Elements of Radio Course. There is also a short course in basic shopwork. Upon completion of Elements of Radio, the student is sent on to receive a month's training in the actual testing and repairing of Signal Corps radio equipment. All instruction in theory and practice is given by the "self instruction" method. Information sheets are furnished the students; these contain all the essential theory. If, after perusing their contents, the student fails to understand certain details, he asks the instructor for help. All instruction is in the hands of keen-witted non-commissioned officer personnel, who are always patient and helpful. Attached to each sheaf of information sheets (each lesson) is a review quiz which is followed by a laboratory exercise. After finishing each group of lessons, the student is given a progress test — a "P. T." By his marks in such tests, the instructor maintains a complete check on each student's progress. Thus it is evident that each student is, in effect, a separate class, and progresses, within limitation, at his own rate. The average time to complete each course has been determined, so that the instructors have a...
definite check on each student's work. If a man should fall down in his studies, he is interviewed by the officer-in-charge, who is, in effect, Dean of the School. If, in the opinion of the O.I.C., the student does not have the qualifications necessary to make a radio repairman, his relief from school is recommended, or he may be changed to a course more suitable to his aptitude.

The Elements of Radio course alone, comprises twenty-nine lessons, most of which are supplemented by laboratory experiments. The equipment is, for the most part, all new, and of the latest commercial design. Breadboard layouts illustrate the principles of grid detection, plate detection; r.f., i.f., and audio amplification; oscillatory circuits; and the master oscillator power amplifier combination. Instruction is given in dynamic testing, using the Rider Chaanalyst. There is an illuminating lesson on the use of the oscilloscope, and there are plenty of these around. If the student wishes to learn more about radio theory than is required to pass the course, he has access to a number of standard reference texts. There are also stacks of the ARRL Handbook available. Elements of Radio is the bailiwick of two experienced master sergeants, H. J. Ward and H. Elliott, who have had years of radio instruction experience in the Signal Corps.

In the course in Test and Repair, the student first comes into contact with the Signal Corps sets, which are used in the field by the modern Army. Many of these are complete vehicular sets—receivers, transmitters, and power supplies. He is taught the use of test equipment, and where to look for trouble. First Lieut. Frederick C. Shidel, assisted by Master Sergeant R. F. Ranson, is the instructor in charge of this course.

It may be readily seen that the radio repairmen's course is no pipe. There is no time for loafing or day-dreaming, and the student must make every minute count. If the student does not have an adequate background (and the school prefers high school graduates with at least a year of algebra, experienced amateurs or radio servicemen), he may find himself behind in his studies before he realizes it. However, the instructors keep tabs on his progress, and let him know how he stands. It is not unusual to find men who come through the school with an average grade of 95 or over. If the student possesses the proper personal qualifications he may be recommended for an instructorship.

The classes for operators are for the most part housed in a large airplane hangar, which is a relic of World War I days, when the "Air Corps," was "The Aviation Section" of the Signal Corps. Field station operators are taught to receive and send code, or the "International Morse Alphabet" (Continental Code), and are given courses in field procedure — handling traffic — and in the installation and operation of field nets. In three months the student must, in order to qualify as apprentice field radio operator, have attained a receiving speed of twenty words per minute, and a transmitting speed ("perfect copy") of fifteen words per minute, and must have passed procedure and qualified on the nets. All code is fed to the students by means of Wheatstone perforated tapes, and Boehme photo-electric keying heads. Each character reaches the student's ears with the same spacing it would have if it were part of a twenty-word-per-minute transmission. Thus, beginners in code practice, taking down copy at five words per minute, hear each character as it

(Continued on page 49)
An Inexpensive 112-Mc. M.O.P.A.
Linear Tank Circuits and an 815 Amplifier

BY WILLIAM A. JOHNSON,* W2KPB

If you're interested in a better-than-average transmitter for 112 Mc. but not the trouble of a long line of doublers working down from a crystal oscillator, here is a simple transmitter that will fill the bill. The cost, including tubes, is less than $10.00, and the mechanical work involved isn't enough to scare off anyone.

The interest in the 112-Mc. band is mounting rapidly, and it is to be expected that it will increase considerably during the summer months. Knowing that most of us cannot afford to build expensive equipment, I thought perhaps many would be interested in this 21/4-meter transmitter. It is a trouble-free layout that can be constructed easily by anyone, and most of the parts can be built with very little effort. During the past few months I have tried several different types of circuits using an 815 in the final, and the one to be described was found to be the most practical. In my initial layout I tried to use the 815 without neutralization, but it was found necessary to neutralize it at 112 Mc. It is no trick, however, and no other difficulties of any kind have been encountered with this transmitter. As can be seen from Fig. 1, it uses a pair of 76's in a push-pull oscillator circuit to drive the 815 amplifier, and lines are used for the circuit elements everywhere except in the grid circuit of the oscillator.

Construction

The transmitter is built on a chassis 24 inches long, 6 inches wide and 4 inches high. The chassis was made at home from a piece of 24-gauge sheet iron obtained from an old sign.

As can be seen from the photographs, the isolantite sockets for the 76's are mounted on brass pillars about one inch below the top of the chassis, to give short leads to the plate rods. These sockets are rotated so that the grid prongs of the sockets face the end of the chassis. The grid coil is soldered to the prongs of the socket, and the grid leak is soldered directly to the center of the coil.

The grid rods for the 815 are cut, tapped for the tuning condenser $C_6$, and mounted under the chassis on one-inch stand-off insulators, two to each rod. The leads from the grid rods to the grid terminals at the 815 socket should be made as short as possible. Next the 76 plate rods are cut and mounted on one-inch stand-off insulators mounted on bakelite strips at the bottom of the chassis. Iron or brass brackets are used to fasten the bakelite strips to the sides of the chassis, as can be seen from the photograph. The strips are mounted so as to give approximately 1/4-inch spacing between the 76 plate rods and the 815 rods and also to have the rods lap over each other for about 8 inches. The holes in the angle irons of these 76 plate-rod mounts are made oblong-shaped so that the coupling between the rods can be varied slightly by moving them closer to or farther from the grid rods. The leads from the plates of the 76's to the rods are about 1/4-inch long and are made of stranded wire to allow enough flexibility during adjustment. The leads to the by-pass condensers at the socket of the 815 are made short as possible.

The 815 plate rods on the top of the chassis are mounted 3 3/4 inches above the chassis on stand-off insulators in a position to allow quite short leads to the 815 plate terminals. The neutralizing condensers consist of small copper tabs 1/2 inch by 3/4 inch soldered to No. 14 wire and supported by small feed-through insulators. The plates

*Shelter Island, Long Island, N. Y.
A view underneath the chassis shows the plate rods of the oscillator and the grid rods of the amplifier. Note the grid coil of the oscillator at the extreme right and the method of supporting the plate rods of the oscillator.

of the 815 act as the other halves of the neutralizing condensers.

**Tuning the Transmitter**

The transmitter should be adjusted by first setting the oscillator to frequency with no plate or screen voltage applied to the amplifier. The shorting bar of the 76 plate rods is set to about 14 inches from the plate end of the rods and about 225 volts put on the plates of the 76's. The 76's should draw about 35 ma. The frequency can be checked by any convenient means (receiver, absorption-type wavemeter or Lecher wires) and adjusted to the desired frequency by adjusting the shorting bar. A low-current meter can be plugged in the grid-circuit jack of the 815, and the grid circuit tuned to resonance by adjustment of \( C_6 \). The grid current to the 815 should be about 5 or 6 ma., and if the current is less than 5 ma, the coupling should be increased by moving the 76 plate rods closer to the 815 grid rods. If this doesn't do the trick, squeeze or pull apart the turns of \( L_1 \) until the 815 grid current is a maximum. If neither of these methods gives sufficient drive, it may be necessary to increase slightly the plate voltage on the oscillator tubes.

After sufficient drive has been obtained, the 815 is ready for neutralization. Using the grid meter as an indication, tune \( C_7 \) until resonance is reached, as indicated by a dip in the grid current. Vary the distance of the neutralizing tabs from the 815 plates until no flicker in grid current is obtained as \( C_7 \) is tuned through resonance. When this is done, the tube is neutralized. It will be found very easy to neutralize the 815.

A 0–60 milliammeter should be plugged in the 815 screen-current jack and a 0–200 milliammeter inserted in the 815 plate current jack, and reduced voltage applied through the 815 plate-power terminal. Tune \( C_7 \) for minimum plate current and then couple the antenna through \( C_4 \) and \( C_5 \) to the 815 plate rods. The antenna taps are most easily made with small battery clips that can be slid along the plate rods. Caution should be exercised when tuning \( C_7 \) to resonance to insure that the screen current doesn't go too high.

The input to the 815 can be run as high as 150 ma. at 400 volts and, at this input, will require a modulator capable of delivering about 30 watts of audio.

A half-wave antenna 30 feet above the ground is used, fed by a two-inch spaced line of No. 14 delta-matched at the antenna. My location is in the open and practically at sea level, but I have worked New York City, almost 100 miles away, with reports of S7 to S9.

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**Fig. 1 — Circuit diagram of the 112-Mc. m.o.p.a.**

- \( C_1, C_2, C_5 \) — 500-µfd., 500-volt mica.
- \( C_4, C_6 \) — 0.001-µfd., 500-volt mica.
- \( C_7 \) — One-eighth-inch brass disc, 1/4 inches in diameter, soldered to 3/16-inch brass screws 1 inch long.
- \( N \) — Neutralizing condensers. (See text.)
- \( J \) — Closed-circuit jack.
- \( R_1 \) — 7500 ohms, 1-watt.
- \( R_2, R_3 \) — 15,000 ohms, 1-watt.
- \( R_4 \) — 15,000 ohms, 10-watt, wound.
- \( L_4 \) — 5 turns No. 14 enam., 3/4-inch outside diam., spaced to occupy 1/4 inch.
- \( L_4 \) — 13 inches 3/4-inch o.d. copper tubing, spaced 1/4 inches center to center.
- \( L_4 \) — 13 inches 3/4-inch o.d. copper tubing, spaced 3/4 inch center to center.

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August 1941
Eliminating some of the trimmings but giving full attention to fundamentals, this variable-frequency transmitter control gives a high order of stability, is easy to build, costs little. It is described for 3.5-Mc. output, but readily can be converted to 1.75 or 7 Mc. by following the principles outlined in the article.

Let's Talk E.C.O.

Getting Performance With Low Cost

BY W. J. STILES, W2MBS, AND G. S. BLAIR

Simplicity is the keynote of this transmitter frequency control unit. It has two stages, gang-tuned, with an output of 5 or 10 watts, depending upon the power supply voltage, and is contained in a 7 by 12 by 8 cabinet. Only the standby switch, tuning control and keying jack are mounted on the panel.

Generally speaking the design and construction of amateur equipment is governed more by the dollar exchange available than the creation of, and adherence to, an idealistic concept. To obtain the maximum results under this limitation the prospective builder must choose one of three well-defined methods of procedure: Design for the ultimate performance and then cut corners to come within the cost limitations; design for rock-bottom cost and try to add only sufficient material to obtain acceptable results; or endeavor to find more efficient means for the accomplishment of each requirement. We chose the latter, and for a total cost of seventeen dollars produced the unit pictured.

Attacking the problems in the order of their relative importance, our first undertaking concerned frequency stability. Thumbing through early papers on the e.c.o. we found that the accepted standard was a large power tube of the 802 class running with low plate voltage and light loading. Its shortcomings were twofold—mechanical instability and frequency drift. The mechanical instability was practically eliminated by resorting to the smaller, more sturdily built "G" series of receiving tubes but the frequency drift remained. While the drift was no worse, with the smaller tubes, it certainly wasn’t much better. Temperature compensation, a costly and painstaking job if properly done, represented the accepted procedure for dealing with this drift, but actually was a remedy and not the cure. Here we had an interesting observation. The reason for using the large tube in the first place was to minimize element heating and yet the receiving tubes having much smaller elements and operating at the same plate voltage did not drift at any higher rate. This appeared to eliminate plate and grid heating as major elements in the drift problem. There remained but two alternatives: tank circuit heat distortion and filament heating. The former was nullified by the intelligent placement of parts and the use of conductors of the proper size. Thus, by the process of elimination, attention was focused on filament heating as the culprit.

The most obvious way of dealing with this unwanted heat was to resort to tubes of the 50- and 60-mc. filament types. While tubes of this type had been successfully used by W2JT and W2GT they had three shortcomings that made them undesirable where low cost was the governing factor. Their low output, d.c. filament requirements, and microphonic characteristics were entirely out of keeping with the financial situation involved. The next best series was the 150-ma. type, of which the 6G6G was the most suitable for our needs, since it required only 150 ma. at 6.3 volts and was built ruggedly. In actual practice the frequency drift on 14 Mc. was extremely low, even taken over 30 minutes from a cold start.

Voltage Stabilization

Several considerations contribute to the stability with changes in voltage. These are, in the order of their importance, cathode coil adjustment, tank capacity, grid-leak resistance, screensupply adjustment, and operating plate voltage. The adjustment of the cathode coil, while of utmost importance, is not complicated, because the coil is a separate winding as shown in Fig. 1 and its size can be altered much more easily than a conventional tap can be changed. The optimum adjustment is determined by first selecting an arbitrary size and then varying the plate voltage.

* 19 Beachwood Drive, Packanack Lake, N. J.
** 77 Williamson Ave., Bloomfield, N. J.
over a range of say 50 to 75 per cent. If the frequency increases with a decrease in plate voltage the coil is too large; conversely, a decrease in frequency with a decrease in plate voltage indicates too small a cathode coil. In the unit pictured the frequency changes less than 100 cycles (at 14 Mc.) with a plate voltage variation from 135 to 350 volts.

Silvered mica condensers are used for the oscillator tank circuit lumped capacity. They are cheaper and more convenient than air condensers and their temperature coefficient is low enough to be negligible. The value of the lumped capacity, 350 µµfd., was selected as the minimum value that would provide the desired stability, and should not be lowered.

The large value of grid-leak resistance employed is a compromise between maximum stability and maximum output. The 1-megohm value provides a far superior frequency/voltage ratio, without greatly reducing the oscillator output, than the 50,000-ohm leak commonly employed. Raising the value still further adds but little improvement and seriously limits the output.

Oscillator screen voltage variations affect the frequency much more than plate circuit changes. The series-parallel circuit, first introduced by W6CUH, proved to be superior to everything else tried. Under no conditions should an attempt be made to stabilize the screen separately from the plate. To do so will introduce a serious drift that is very difficult to remedy.

Original plans called for the use of a VR-150-30 to stabilize the oscillator plate voltage within the unit itself. (This tube is shown in the pictures but not in Fig. 1.) Subsequent tests showed the frequency/voltage ratio to be so favorable that this tube may be eliminated except when high output is desired.

The actual applied plate voltage should be the subject of some consideration. Generally speaking the voltage change of a supply furnishing 400 volts will be twice the change experienced if the supply delivers only 200 volts, all other conditions remaining constant. Therefore if electronic voltage regulation is to be avoided the operating plate voltage should be as low as is consistent with proper oscillator action and the desired power output. With a 200-volt supply the oscillator operates very near maximum efficiency and the output stage delivers approximately 5 watts. Should higher output be desired the power supply voltage can be raised to 350 volts, which should be applied directly to the 6L6 stage but dropped, by means of a series resistor and a VR-150-30, to 150 volts for the 6G6G. This gives a power output of 10 watts while all other characteristics remain unchanged.

The question of using a transformerless power

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Fig. 1 — Circuit diagram of the variable-frequency transmitter control unit.

C1 — 140-µµfd. variable (Hammarlund MC-140-S).
C2 — 350-µµfd. silvered mica.
C3 — 0.01-µfd. mica.
C4 — 100-µµfd. silvered mica.
C5, C6 — 0.01-µfd. paper.
C7 — 0.001-µfd. mica.
C8 — 0.01-µfd. paper.
C9 — 100-µµfd. silvered mica.
C10, C11 — 0.001-µfd. paper.
C12 — 0.006-µfd. mica.
C13 — 0.01-µfd. silvered mica.
C14 — 75-µµfd. variable (Hammarlund MC-75-S).
C15 — 100-µµfd. variable (Hammarlund MC-100-S).
C16 — 10,000 ohms, 1-watt.
R1 — 10,000 ohms, 1-watt.
R2 — 50,000 ohms, 25-watt, with slider.
R3 — 75,000 ohms, 1-watt.
R4 — 1000 ohms, 10-watt, with slider.
R5 — 50,000 ohms, 1-watt, for low output; 15,000 ohms, 2-watt, for high output. See Fig. 2.
RFC — 2.5-mh. r.f. choke.
S1 — D.p.e.t. toggle switch.
J1, J2 — Closed-circuit jack.
L1 — 26 turns No. 22 d.c.c., length 2 inches, diameter 1½ inches.
L2 — 27 turns No. 20, wound on same form with L1 at ground end.
L3 — 27 turns No. 22 d.c.c., length 1½ inches, diameter 1½ inches.
L4 — 4 turns No. 20, wound on same form with Ls, at ground end.
Coil data for oscillator on 1.75-Me. band, output on 3.5 Mc.
is adjusted so that the no-signal plate current is equal to the operating plate current plus the oscillator's combined screen and plate current. With 200 volts available the oscillator draws 9 to 11 ma. (cathode current) and the 6L6 about 50 ma.

**Construction Notes**

The coil specifications given will permit the amplifier plate tank to track well over the entire tuning range. While this information is for 3.5-Mc. output there is no reason why similar results cannot be obtained on 1.75 Mc. or even 7 Mc. The important consideration is that the oscillator always should be operated on half the output frequency. Output on 14 Mc., with the oscillator on 7 Mc., is practical only after some experimenting with the oscillator plate choke and is not recommended. Assuming all capacity values are followed as given the bandspread will be approximately 90 dial divisions between 3500 kc. and 4000 kc.

A study of the frequency change encountered with mechanical vibration showed the variable air condenser to be a major offender. While it is not practical to eliminate such condensers entirely only one, the tuning condenser itself, is employed. The use of fixed padding condensers makes the original coil adjustments somewhat more critical but pays large dividends in the completed unit.

Oscillator keying is employed for c.w. operation and the note is remarkably free from chirps, lags or other distortions. Observation on an oscilloscope showed the keyed wave form to be superior to that of a conventional crystal oscillator.

Switch S1 is located on the front panel and

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**A top-of-chassis view, with coil shields removed. The output circuit pad, C14, is just visible behind the nearer coil. The bakelite socket is for the power cable plug, the isolantite socket for r.f. output. The chassis measures 7 by 9 by 2 inches.**

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supply is bound to be raised in connection with such a low-voltage low-cost unit. While space and other considerations prevent a lengthy explanation it is the opinion of the authors that a transformer supply is preferable.

The cathode resistance in the 6L6 output stage is completed unit.

Oscillator keying is employed for c.w. operation and the note is remarkably free from chirps, lags or other distortions. Observation on an oscilloscope showed the keyed wave form to be superior to that of a conventional crystal oscillator.

Switch S1 is located on the front panel and

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**Fig. 2 — Power supply details. The circuit is the same for either 5- or 10-watt output except for the additions shown below in the case of high output. The VR-150-30 regulator tube is not needed with low voltage, but is installed in the e.c.o. unit with a high-voltage supply. Resistor R7 is added at "X" for high voltage; with low voltage terminals 4 and 5 are connected together. The values below will give output voltages of approximately 200 for low output and 350 for high output.**

C14, C16 — 16-µfd., 450-volt electrolytic.
R7 — 7500 ohms, 25-watt, with slider.
J3 — Closed-circuit jack.
L4, L5 — 30 henrys, 80 ma.
T1 — Low output: 275 v. each side c.t. at 80 ma; 6.3 v. at 1.5 amp.; 5 v. at 2 amp.
High output: 425 v. each side c.t. at 100 ma; 6.3 v. at 1.5 amp.; 5 v. at 2 amp.
Z indicates connection to jumper inside VR-150-30, used only for high output.
serves the double purpose of applying plate voltage to the unit and shorting the key. This permits the frequency of the e.c.o. to be set with no additional stages of the transmitter in operation. In normal operation this switch is not used, its power contacts being shorted by a relay in the transmitter which is excited in parallel with the high-voltage power-transformer primary.

Power is brought to the unit from the power supply by means of a 4-wire shielded cable. The shield is the only direct ground connection for the e.c.o. cabinet.

R.f. output is taken from the unit by means of a flexible concentric cable terminated in a five-prong plug. This plug fits the isolantite socket at rear of the chassis.

The cabinet shown, while requiring slightly more desk space than absolutely necessary, is highly recommended because of the excellent ventilation provided. In operation a sponge rubber kneeling pad (25c at any dime store) is placed under the unit to absorb shocks. Installation precautions such as the use of a shielded microphone cable for the keying leads, the rubber pad mentioned above, and the physical isolation of the entire unit from strong r.f. fields spell the difference between just another e.c.o. and one the boys talk about.

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**Code Proficiency Award Schedules**

**Last Chance to Get Certification Essential to Participation in September 12th, 13th, 14th, 19th, 20th, 21st CP Frolic**

**Invitation** is extended to every FCC licensee to qualify for an ARRL Code Proficiency Award at some speed above government requirements for an amateur license. The certificate and sticker awards are made available in a continuing program. The aim is to give proper recognition to each amateur who has the requisite interest and capabilities.

Besides this operating achievement award for which there are two opportunities for qualification each month, the thousands of U.S. radio amateurs holding ARRL certificates will be eligible for participation in a September “Code Proficiency Frolic” full details of which will be announced in next QST. This will be a simple, enjoyable radio activity with a scoring system . . . some operating fun for the group holding Code Awards based on W1AW runs at any speed whatsoever. For those not yet having qualified for a certificate, the August W1AW-qualifying-runs will represent the last opportunity to get one as the ticket of admission to the September activity.

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**Qualifying Run Dates**

The next W1AW Qualifying Runs for getting the League’s Code Proficiency Certificate Award or the Silver Endorsement Sticker for demonstrating increases from the original certified word speed, are as follows:

- July 20th (Sun.) 9:45 p.m. EST (Text at 10 p.m. EST)
- Aug. 3rd (Sun.) 1:30 p.m. EST (Text at 1:45 p.m. EST)
- Aug. 18th (Mon.) 9:45 p.m. EST (Text at 10 p.m. EST)

Copy the test text at the best speed you can. Underline the full minute of perfect copy necessary to qualify at any speed. Tell us if you copied by ear without help except for your pencil or mill, mentioning which was used, and if you are working for certificate or first endorsement, etc. Send in copy and statement and ARRL will check your paper with the official transmission, advising you of success or failure within about thirty days from the date of the qualifying run with any appropriate award due you.

**Code Practice — Frequencies Used**

Code Practice is sent nightly except Friday from W1AW simultaneously on the following indicated frequencies, at the starting time indicated:

9:45 p.m. EST (8:45 p.m. CST, 7:45 p.m. MST, 6:45 p.m. PST) — 1762, 3825, 7280, 14,253, 28,510, and 58,970 kcs.

Approximately ten minutes’ practice is sent at progressive speeds of 15, 20, 25, 30, and 35 words per minute. Besides this special practice material ARRL official messages are sent by tape “to all radio amateurs” at 8:30 p.m. and midnight EST at one of the three lower speeds which gives opportunity for additional practice for those interested.

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*W9FWN*

An auto-starter switch makes a good foot-operated safety switch for the high-voltage supply. The spring is strong enough so that the weight of the foot alone will not keep it closed. Additional pressure is necessary.

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*W1AW* operates a Road Roller

-and has carried on QSO’s from it.

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**August 1941**
A Modulator and Power Supply for the Inexpensive 56-Mc. Transmitter

Completing the Low-Power Five-Meter Outfit

BY VERNON CHAMBERS, W1JEQ

The modulator and power supply units which are the subject of this article were designed as companion pieces to the low-power 56-Mc. transmitter described in June QST. The circuits, while perfectly straightforward, have several features which will be useful to those interested in the transmitter, and the construction, on chassis of identical size, makes for uniformity of appearance.

Probably the most important feature is the fact that 6A6 tubes are used in all stages of the speech amplifier and modulator, which means that a single spare tube can be used to replace any tube in either the r.f. or audio line-up. The power supplies, using broadcast-receiver replacement transformers and electrolytic filter condensers, are inexpensive. The speech amplifier and modulator unit will accommodate single- or double-button carbon microphones as well as the crystal type. A meter switching system which makes a single milliammeter take care of either r.f. or modulator is provided. The cost of the audio gear, including microphone battery, chassis, switches, sockets, etc., will be approximately $15.00, plus another $3.00 or so for the tubes. The cost of the microphone is entirely up to the individual, with prices ranging from a few dollars for a carbon or cheap crystal mike to twenty dollars or more for the better crystal jobs.

The Audio Circuits

Fig. 1 shows the circuit diagram of the speech amplifier-modulator. The first 6A6 tube is wired so that one section can be used as the input amplifier for a crystal microphone. When this type of microphone is used the second half of the tube serves as a second speech-amplifier stage. With carbon microphones less gain is needed, so the first section of the tube is not used; it is made inoperative by removing the microphone plug from J1, thus grounding the grid, and the output connection is broken by means of Sw1. Plate voltage is left on the stage so that the same bias voltage will be developed across the cathode resistor, R2, whether both sections of the tube are in use or not.

Carbon microphones are transformer-coupled to the second section of the first 6A6. The type of jack shown at J2 in the circuit diagram must be installed if a double-button microphone is to be used. On the other hand, J2 may be the same type of jack as J1 if a single-button microphone is to be used exclusively; in that case, however, some provision must be made for opening the battery circuit when the amplifier is not in use. Removing the microphone plug from the jack will open the battery circuit with the arrangement shown in the diagram.

The gain control is connected in the grid

The complete 56-Mc. station consists of three units, r.f., modulator and r.f. power supply, on identical-sized chassis. The r.f. section was described in June QST.

The two units described in this article supply all the power, d.c. and audio, needed to put the low-power five-meter transmitter described in June QST on the air. The modulator, which has an output of slightly more than ten watts, can of course be used with other low-power transmitters.
The audio unit is complete with power supply. Three double triodes provide a four-stage amplifier with Class-B output. Any of the popular types of microphones may be used.

circuit of the second section of the first tube. The plate of this section is resistance coupled to the driver grid circuit. The driver tube, also a 6A6, has its two sections connected in parallel. Cathode bias is used, and the tube is transformer-coupled to the Class-B stage.

The modulator circuit requires no biasing arrangement since the 6A6 is a zero-bias tube when working Class-B. The modulator transformer is designed to work between 6A6 plates and a 6500-ohm load, which is an approximate impedance match for the transmitter previously described. A milliammeter can be connected across $R_1$ to measure the Class-B plate current; a switching arrangement will be described later in connection with the transmitter power supply circuit.

A circuit diagram of the modulator power supply also is shown in Fig. 1. The supply is of the simple condenser-input type and will deliver 350 volts at 90 ma. A switch, $Sw_2$, in the transformer center-tap lead is used for turning the plate voltage on and off without affecting the filament supply.

Construction

The front-view photograph shows how the parts are laid out on a chassis measuring 4 by 17 by 8 inches. The power transformer is sub-mounted at the left end with its short sides facing the front and back of the base. The rectifier tube is located 8 inches in from the left end of the chassis. $L_1$, the filter choke, and $T_a$, the modulation transformer, are to the left and right of the

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### Diagram Diagram

**Fig. 1 — The complete audio system.**

- $C_1, C_2$ — 0.1-µfd., 600-volt paper.
- $C_3, C_4$ — 10-µfd., 50-volt electrolytic.
- $C_5, C_6, C_7, C_8$ — 8-µfd., 450-volt electrolytic.
- $R_1$ — 25 ohms, ½-watt.
- $R_2, R_3$ — 900 ohms, 1-watt.
- $R_4, R_5$ — 50,000 ohms, ½-watt.
- $R_6, R_7$ — 0.25 megohm, ½-watt.
- $R_8$ — 5 megohms, ½-watt.

- $T_1$ — Driver transformer, parallel 6A6 plates to 6A6 Class-B (Stancor A-4216).
- $T_2$ — Output transformer, 6A6 Class-B to 6500-ohm load (Stancor A-3845).
- $T_3$ — Power transformer, 700 volts at 90 ma, c.t.: 5 v. at 3 amp; 6.3 v. at 3.5 amp.
- $L_1$ — Filter choke, 5 henrys, 200 ma., 80 ohms (Thordarson T-67C49).

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rectifier. The driver tube socket is mounted 1 1/4 inches in from the right end of the base and the speech-amplifier tube socket is 4 3/4 inches in from the same edge. T3, the driver transformer, is at the rear of the driver tube and the Class-B tube is to the rear and in line with the speech-amplifier tube. For convenience in wiring the audio tube sockets should be mounted with the filament prongs facing the right end of the chassis.

The plate voltage switch is on the front of the chassis 4 1/4 inches from the left edge. A heavy-duty toggle switch should be used, since an ordinary low-voltage toggle may break down. (This type shown in the photograph is made by Cutler-Hammer; it is available only in the double-throw type with neutral position.) The microphone switch is 4 1/4 inches in from the right-hand end of the chassis, with the gain control to its right and the microphone jacks to its left; J1 is mounted near the top and J2 directly below.

The bottom-view photograph shows the layout for the components mounted below the chassis. T1 is mounted at the left end with the primary taps accessible. Wiring to the driver tube socket and the transformer secondary winding should be completed before the transformer is bolted in place, as it is difficult to reach the connecting points with a soldering iron afterwards. Short leads between the gain control, microphone switch, and the tube socket can be obtained by making the gain-control contacts face toward the switch as shown. The remaining connections in the unit require no special wiring precautions.

The microphone battery specified in the parts list can be held securely in place without the assistance of any brackets or clips if it is wedged in between the bottom of the power transformer and the lips on the bottom of the chassis. A 3-volt battery is sufficient for most carbon microphones, and low current will frequently give better speech quality. It might be, however, that a 6-volt battery will be needed to get enough output with some of the very cheap microphones. The 115-volt a.c. and meter lines (rubber-covered lamp cord) enter the chassis through rubber grommets. A three-contact terminal strip is located at the right end of the base (left end in the bottom view). One of the contacts is for an external ground connection and the other two are connected to the modulation transformer output winding. The locations of the cord holes and the terminal strip correspond with those on the r.f. chassis.

Operation

When the audio equipment is ready for testing a 0-150 milliammeter may be connected to the modulator meter leads. A 20- or 25-watt slider-type resistor adjusted to 6500 ohms makes an excellent test load. A pair of headphones should be connected across approximately 500 ohms of the total load.

When a.c. is first applied to the power transformer primary the plate switch, Sw2, should be in the "off" position until the tube filaments warm up. On closing Sw2 the milliammeter should register 60 ma., which is the total no-signal plate current taken by all stages. To check the individual stages it is necessary to remove tubes one at a time. For instance, the current will fall to 10 or 12 ma. after the modulator tube has been taken out, and will decrease 7 or 8 ma. more when the driver tube is removed. The plate voltage should measure 350 or 360 volts under full load and rise to 430 or 440 volts with the modulator tube removed. The rise in voltage under these
conditions causes the plate currents of the preceding tubes to be higher than normal, but the values given above will serve for checking purposes.

The microphone may next be connected to the proper input jack and Sw2 set to the right position. With the gain control at about half scale, talk into the microphone and observe the plate current. At full output (with ordinary speech, not a tone or whistle) the current should rise to approximately 80 ma., and the gain control should be set so that this is the value obtained on peaks when talking normally. The quality of the modulator output may be checked by listening in the headphones. A loudspeaker cannot ordinarily be used to replace the headset because of howls caused by acoustic feedback from the speaker to the microphone.

This simple test procedure will give a fairly good indication of the performance of the equipment since such things as obvious distortion, high hum level, and other common faults will be shown up readily by the headset. The hum should be at a satisfactorily low level at the gain control setting which gives full output at normal speech intensity; it will be higher, of course, at full gain, but this simply represents an excess of amplification. Best microphone technique is to talk close to the microphone so that the gain can be kept to the lowest value for satisfactory operation, since this will minimize the effect of room echoes, hum, and other extraneous noises which detract from the clarity of the transmitted speech. Reports received from other amateurs when the complete transmitter is put on the air will give a final check. The overall characteristics of the unit may of course be measured with more elaborate equipment such as an audio signal generator and cathode-ray oscilloscope, the construction and use of which are described in The Radio Amateur's Handbook.

The measured output of the unit shown in the photographs was 11 watts at the point where distortion just began to be noticeable on the oscilloscope. This power is ample for modulating the 56-Mc. transmitter described last month, or in fact for any low-power outfit running 20 watts or so to the final stage.

**Transmitter Power Supply**

Fig. 2 shows the circuit diagram of the power supply for the transmitter previously described. The circuit is similar to that of the audio supply circuit, but the unit is capable of somewhat higher output because of the heavier transformer and rectifier tube used. The supply delivers 365 volts at 150 ma. The voltage at the plates of the modulated amplifier drops to about 350 because of the d.c. resistance of the modulation transformer secondary winding.

A milliammeter and meter switch are mounted on the power supply chassis. Although these components are not actually part of the supply, the supply chassis provides a convenient location for them. The meter terminals are connected to the center contacts of the d.p.d.t. switch. Meter leads from the r.f. section and modulator are connected to the end contacts of the switch so that the meter may be switched to either unit.

The power-supply photograph shows how the parts are mounted on the 4 by 17 by 3-inch chassis. The spacing of the switches mounted on the front panel corresponds to the switch spacing on the audio chassis. The 115-volt line cord and the meter cables run through rubber grommets in holes drilled through the rear wall of the base. The three-contact terminal strip is also at the rear. Construction at the rear matches up with the other units. Two positive terminals are provided to simplify connecting the separate positive high-voltage leads that run to the exciter and final stages of the r.f. section. A direct connection should be made between one of these terminals and the exciter stages in the transmitter (left-hand + 350 terminal in Fig. 1, page 14, June QST), while the output winding of the modulation transformer connects between the remaining terminal and the right-hand + 350 terminal in the June diagram.

The audio and r.f. power supply diagrams are marked to indicate how the two “B” on-off switches should be tied together. Connecting the switches in parallel simplifies operation of the complete transmitter because the r.f. and

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audio equipment can be turned on and off simultaneously by either switch.

Provided the simple test as outlined previously has shown the modulator to be working satisfactorily, no difficulties should be encountered in getting the r.f. and audio units to work in combination. The loading on the final r.f. amplifier should be adjusted to give a plate current of 55 to 60 milliamperes, which will represent a satisfactory load resistance for the modulator. At voice levels which give full audio output on peaks (80 ma. as indicated by the milliammeter in the modulator circuit) the r.f. plate current should show no variation from its unmodulated value. If an oscilloscope is available it may be used as described in the Handbook to determine the value of modulator plate current at which 100% modulation occurs; the exact value will vary somewhat with different voices, and the figure above represents an average. After the preliminary testing is finished, the meter may be left in the modulator circuit to serve as a modulation indicator in normal operation.

Relay-rack panels were not made up for the complete transmitter because it was planned to place the gear on a shelf, table, bookcase, or one of the many other places where it could be fitted in easily. The units readily could be panel-mounted, of course, but there is no objection to installing the equipment out in the open because the units are practically enclosed, so far as positive high-voltage points are concerned. The terminal strips at the rear of the chassis are the only accessible "hot" points — but we aren't going to operate with the tuning controls toward the wall!

Strays

ANOTHER P.S. ON "FRITZ"

In our July editorial, mentioning the midwestern "Fritz," we said that he had "led the government authorities a merry chase for several months while he played tag on War Department frequencies." At that time, of course, we didn't know that there were two Fritzes and that the Punk from Peoria was but a cheap imitator. Actually he had a very brief life in his Fritz mantle. He first came to government notice on April 17th when an unknown station, later identified as he, crashed the net of FCC itself for a few minutes. On April 19th the Army reported this station on their 6990 frequency. On Monday, the 21st, as the result of long-range d.f. bearings, FCC dispatched mobile units to the area of Peoria. On the 22d the block of houses in which he operated was established, and on the 23d the actual house was spotted. They then QRX'd a few days while FBI investigated. On April 30th he was arrested, held in $2000 bond, and on May 1st, at a special session of the Grand Jury, was indicted for violations of Secs. 301 and 318 of the Act. Considering the duration of the periods of operating by Fritz No. 2, actually only six hours of activity were required by FCC to locate his station and take him into custody. Our compliments to FCC's National Defense Operations Section — that's moving!

Silent Keys

It is with deep regret that we record the passing of these amateurs:

Justus C. Allen, ex-W9NBI, ex-Downers Grove, Ill.
F. R. Beech, ZL2CC, Picton, New Zealand
Morgan W. Brantlinger, W9PQU, Oakl-
don, Ind.
Charles Goudy, Jr., W2GTK, Glen Rock,
N. J.
W. M. Manley, VK2XH, Glen Rock,
N. S. W.
Lt. Warren P. Reece, ex-W5DOR, ex-
Dallas, Texas
G. J. Shorten, G2SQ, Croydon, England
H. D. Simonsen, ZL2KY, Wellington,
N. Z.
Lindsay C. Wolfe, W4EPV, Tampa, Fla.
Five-Meter Wave Paths

BY MELVIN S. WILSON,* WIDEI

In Two Parts — Part I**

This summer the many former short-wave DX men who are on the five-meter band are finding thrills perhaps greater than those experienced on the ordinary short waves. To realize the full opportunities of the band, however, an operator must have a solid foundation of fundamentals. Contacts can be made occasionally without special equipment or technique, but for consistent work the phenomena must be understood. Since two openings are rarely exactly the same each skip presents a challenge to the DX man, and the only way to meet it is to recognize, interpret, and visualize the various conditions suitable for DX work. Since five-meter skip is never constant and a good period lasts but a short time, opportunities for making unusual contacts often slip by unless anticipated.

All five-meter contacts can be classified within one of five groups, and it is a distinct advantage to be able to distinguish between them. These groups with their approximate range and major differences are:

1. Local; up to about 50 miles with moderate power from ordinary locations.
2. Lower tropospheric bending; 50-400 miles. Refraction space close to the earth’s surface and essentially continuous over the contact distance.
3. Sporadic E-layer skip; 400-1250 miles. Refraction space at base of ionosphere and very small in size.
4. Aurora-type skip; 0-15 degrees. Scattered and diffused reflection from highly ionized concentration in polar region formed during ionospheric disturbances.
5. F-layer skip; up to 2400 miles. Refraction space within Appleton layer. No data for analysis.

* 131 Beacon St., Natick, Mass.
** Part II will appear in a forthcoming issue.

A little time and thought given to a study of each of these groups will repay the operator many times in increased enjoyment of the band. For best results special equipment and technique are required for each group. The last group, F-layer skip, is extremely rare, and probably occurs only when the normal layer is ionized to an unusual extent during periods of sun-spot activity. Local contacts, of course, can be made with almost any type of equipment and very little knowledge of the fundamentals, but the DX man by definition is interested in establishing communication over greater distances.

The How and Why of 56-Mc. DX

Of interest to every five-meter man, this article not only helps explain some of the puzzling phenomena of 56-megacycle DX — it will also lead to better results because it indicates the equipment and methods most suitable for the various types of propagation. During the past several years the author has devoted a great deal of time to the study of long-distance five-meter work, and here offers explanations of the observed effects. To make the picture complete, other types of transmission also are reviewed, although sporadic-E refraction is given chief attention.
Fig. 2 - Possible signal paths when reflection takes place from a highly ionized "curtain" near the magnetic pole. This is known as "Aurora" type transmission because the extremely high ionization is accompanied by Auroral displays. Since comparatively little is known of what happens in the Auroral region, the shape of the ionized mass as shown in the drawing should not be taken too literally.

Air-Mass Bending

The second group, or those contacts made possible by lower tropospheric bending, requires an understanding of the phenomena as well as proper equipment. The cause of the bending has been well described by Ross Hull a number of years ago, and a system of prediction offered. The equipment necessary for this type is a sharp low-angle beam and a sensitive receiver. The polarization of the antenna system should be the same as that used at the other end of the contact. The choice of polarization depends upon the amount of bending present and the distance of the contact. Vertical polarization seems to be bent more than the horizontal for any given condition of the troposphere, and thus is to be preferred for regular work. However, when a great amount of bending is present maximum distance can better be reached using horizontal polarization.

In this type of propagation the actual bending, although much greater than under "normal" air conditions, is still quite small in comparison to that which takes place in the ionosphere at lower frequencies. Therefore the heights of the transmitting and receiving locations are important factors, just as they are in the case of local contacts over reasonable distances. A hilltop location, well above the surrounding territory, will do much toward insuring successful work with this type of transmission.

"Aurora" DX

Group 4 type of contact, or aurora type, is so named because the aurora borealis can usually be seen while the condition lasts. In this type all signals must be sent to and received from a northerly direction since the reflection space is near the magnetic polar region. The wave path is not refracted but is weakly reflected from a "vertical" curtain of turbulent ionization which merges the ionospheric layers during a disturbance. This curtain is very unstable, causing the various wave paths to combine and cancel. The change in absorption and dissipation at different frequencies causes the garble in modulated signals, and the use of c.w. is usually necessary.

This type of DX is measured in degrees rather than miles, since the actual great circle distance between stations in contact is meaningless. The maximum distance south which can be reached is determined by the height of the curtain, the amount of ionospheric refraction, and the north-south component of lower tropospheric bending. Although the effect has been noticed as far south as Georgia and Texas, the extreme rarely falls below about 35 degrees of latitude.

The maximum DX, or degrees of longitude, it is possible to cover is not known, and until more observers are placed at proper distances, this maximum can only be guessed. The maximum reported to date has been about 15 degrees, and since refraction would be necessary for more turning, this is probably the limit. Very little of this type of DX has been done, and the possibility of international contacts makes it most interesting.

E-Layer Skip

Sporadic E-layer skip is perhaps the most confusing of the possible methods of propagation on five meters, and since the easiest way to understand it is to form a picture of the wave paths, we will begin with the simplest possible case, gradually expanding to include complications arising from the mechanics of refraction, tropospheric influences, and multiple ionospheric refractions. This discussion is based on observations and analyses of contacts and conditions within the conti-
applying the laws of refraction a theoretical picture can be assumed that the discontinuity formed by the mass is not perfect, although the rate of change of density must necessarily be of high natural has no sharp corners. From a qualitative analysis only, it appears that these masses are usually longer in one direction, and have appreciable thickness of usable ionization. Since little reflection takes place, except at very small angles, it can be assumed that the discontinuity formed by the mass is not perfect, although the rate of change of density must necessarily be of higher order to refract five-meter waves back to earth.

By visualizing the mass in three dimensions and applying the laws of refraction a theoretical picture of various possibilities can be built, which, if not absolutely correct, can be very useful in attempting to understand the phenomena of five-meter skip. Fig. 3 shows a wave path a which is reflected from the bottom of the mass at some possible well-formed discontinuity. The angle of incidence equals the angle of reflection, and from simple geometry it can be shown that the smallest angle possible is about ten degrees, assuming a ray tangent to the earth and a layer height of about 70 miles. Wave path b enters the mass and is bent at the discontinuity, refracted by any change of density within the mass, and bent again upon emergence from the mass. This is the usual wave path. Wave path c enters the “edge” of the mass and is refracted in the same way as type b. A wave path entering the exact plane of the mass is of course not bent, as in d, but this would be an impossible wave path from any point on the earth's surface, or from any other mass.

The single refraction, or one-hop skip, is the simplest and most common encountered during five-meter skip DX. The bending for this case takes place in a small “cloud” or mass of very dense ionization, approximately half way between the transmitting and receiving locations. Previous discussions have shown how these wave paths are bent and returned to earth for this simple case, and the picture is no doubt familiar to everyone. The distance limitations, however, must be kept well in mind. The maximum great-circle distance a five-meter signal can travel is, of course, determined by the tangent to the earth from the height of the reflecting layer, but because of absorption this distance is ordinarily reduced to about 1250 miles. The minimum great-circle distance is determined by the density of ionization, and can theoretically become zero for pure reflection. The elimination of a skip zone would require tremendously high ionization and probably will never occur, but it is well to keep in mind that there is no definite minimum skip distance. The shortest great-circle distance of this simple skip ever reported was about 450 miles, and this took place during the high peaks of ionization a few years ago. Signals are said to be from the shorter skip if they originate from locations distant 800 miles or less. The longer skip zone falls between 800 and 1250 miles.

56-Mc. Wave Paths

Fig. 4 illustrates a few simple wave paths. The three points, transmitting location, abnormal

For example, “The Ionosphere and Radio Transmission,” QST, March, 1940.
ionization mass, and receiving location, roughly determine a plane, and this will be called the wave-path plane. For the simple case this plane is perpendicular to the earth's surface. If the mass is such as just to bend the wave path enough to return the signal to the earth, the band is called "open." This condition would be suitable only for maximum great-circle skip distance, since it represents the tangent case, or a line drawn from the core of ionization tangent to the earth's surface. As already mentioned, the actual maximum great-circle distance is ordinarily somewhat shorter than this mathematical tangent.

The angle of radiation is very important when attempting an analysis of conditions, and the limitations should be kept well in mind. This angle should not be confused with the tilt angle. The latter is determined solely by the wave-path plane, while the former depends entirely upon the position of the mass can change. In Fig. 4 the mass is half way between T1 and R1, but as ionization increases T1 can be heard at R2 and the mass is no longer half way between the two contacts.

Besides a change in ionization causing this effect, the actual position of the mass changes in accordance with the disturbance. This results in changing the wave-path-plane tilt for contact between two given points. Fig. 5 shows a wave path from transmitter T2 bent by the mass at M1 and received at R1. As the position of the mass shifts to M2 the same bending will carry the signal to R3, and more bending is required to continue the contact with R3. Thus the wave-path-plane tilt changes with movement of the ionized mass, and also depends on the relative positions of the transmitting and receiving points.

It is apparent that to understand five-meter skip these paths must be visualized in three dimensions, since waves can penetrate the edges as well as the bottom of the mass. When the wave-path plane becomes tilted many new possible wave paths appear. Fig. 6-A represents the "end view" of skip, and the lines represent the edges of various possible wave-path planes. Wave-path plane a is normal to the earth's surface, and only in this position is it possible to work maximum distance without the help of some other influence. If the mass is off to one side the plane becomes tilted as at b, and the locus of the tangent representing the refracted ray sweeps closer to the transmitting location, shortening the great-circle distance than can be covered. Although the plane theoretically could be tipped to a tangent position, pure reflection would be required and there would be no skip zone. This condition can exist at lower frequencies, but the ionization has never been high enough for five-meter reflection and probably never will be. From an analysis of all reported five-meter contacts it appears that actually the projection of the tilt angle upon the earth's surface seldom exceeds 34 degrees.

The top view of tilted skip is shown in Fig. 6-B. The bending occurring within the mass is still within a plane, although relative to the surface of the earth the bending has horizontal and vertical components. From this point of view it can be seen that the horizontal component of bending must be increasingly greater than the vertical as the tilt angle of the wave-path plane becomes larger, since the limiting factor is the tangent to the earth. Fortunately, the mass is usually longer and wider than it is deep, and thus it is possible to obtain the greater amount of bending necessary for the horizontal component.

The angle of radiation is very important when attempting an analysis of conditions, and the limitations should be kept well in mind. This angle should not be confused with the tilt angle. The latter is determined solely by the wave-path plane, while the former depends entirely upon the

(Continued on page 88)
QUIZ CONTEST
An AARS Quiz Contest on Army radio procedure for members of the Army-Amateur Radio System was started on July 7th. This unique contest will run during the summer months as a further means of continuing the training of AARS members and other interested amateurs in Army radio procedure.

The nine Corps Areas will compete against each other. Scores will be based upon the number of correct answers submitted and the Corps Areas’ activity percentage. This competition will comprise a series of questions on Army radiotelegraph and radiotelephone procedure which will be included in the weekly ZCVA messages transmitted from Army-Amateur net control station WLM/W3USA, Washington, each Monday, on the following schedule:

<table>
<thead>
<tr>
<th>EST</th>
<th>Station</th>
<th>Call</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:00 P.M.</td>
<td>W3USA</td>
<td>7010 kc. and 14,280 kc.</td>
<td></td>
</tr>
<tr>
<td>5:00 P.M.</td>
<td>WLM</td>
<td>3497.5 kc. and 6990 kc.</td>
<td></td>
</tr>
<tr>
<td>7:00 P.M.</td>
<td>WLM</td>
<td>3497.5 kc. and 6990 kc.</td>
<td></td>
</tr>
<tr>
<td>10:00 P.M.</td>
<td>WLM</td>
<td>3497.5 kc. and 6990 kc.</td>
<td></td>
</tr>
</tbody>
</table>

Army Amateurs participating in this contest will send their answers by radio to their net control station. Each NCS will consolidate the replies received from his net stations and forward the summary through channels to his Corps Area Signal Officer for scoring.

ARMY QUESTIONNAIRES
More than 42,000 of the WD OCSigO Form No. 170 questionnaires have been filled out and returned by amateur radio operators. This is about 72% of the number mailed out (to every licensed amateur radio operator in the United States). It is indicative of the enthusiastic support given to this national-defense statistical study by the American amateur. The work of coding and tabulating the data is now in progress in the Office of the Chief Signal Officer.

ZCB LOCATION CONTEST OPENS SUMMER SEASON
The ZCB Location Contest held on June 2nd, inaugurated the continuation of AARS operations throughout the summer months. From 5 P.M. to 3 A.M. of the following day, the amateur channels, especially the 3.5-Mc. and 7.0-Mc. bands, were literally filled with Army-Amateur stations sending “ZCAA”, meaning “Calling any Army-Amateur radio station.” Contacts only with other Army-Amateur stations were counted in this contest. Participants were required to send a message in the standard AARS (same as the ARRL) form to each station worked, giving the city, state and corps area location of their station. Points were credited as follows:

- Each contact with another AARS station ......... 2 points
- Transmission of location data to station contacted ...... 4 points
- Reception of location data from station contacted ...... 4 points

Thus, an Army Amateur scored a maximum of 10 points for each contact made if location messages were exchanged. In addition, there were multiplication factors allowed in scoring to give extra credits for distance and scope factors. These included additional points for working the different states, corps areas and overseas departments outside the continental limits of the United States. As an example, assume that an Army Amateur worked and exchanged location messages with 61 different AARS stations; 48 of them were located in all the different states and therefore the nine corps areas; one in the Panama Canal Zone, one in Hawaii and another in the Philippine Islands. His score would be as follows:

For stations worked and location messages exchanged:

| 61 X 10 = 610 points |

Multiplied by 48 different states worked:

| 610 X 48 = 24,480 points |

Multiplied by 9 different corps areas worked:

| 24,480 X 9 = 220,320 points |

Multiplied by 3 different departments worked:

| 220,320 X 3 = 660,960 points |

(TOTAL SCORE)

(Continued on page 89)

Chief Signal Officer Mauborgne and other persons participating in the Army Amateur-Veteran Wireless Operators Association program that was broadcast over the NBC Red network on May 30th, in connection with the presentation of the Marconi Memorial Award for Code Proficiency to William B. Hollis, WSFDR/WIJR, the winner of the 1941 Annual AARS Code Speed Contest.
WHAT THE LEAGUE IS DOING

CHANGES IN 10-METER BAND

At the request of the ARRL Board of Directors, FCC on July 9th changed the portion of the 10-meter band open to "phone to read 28,100 to 30,000 kc., by amending Sec. 12.115 of our regs. Thus 'phone may now be used in all but the lowest 100 kc. of the band. Our first chance to use f.m. on a band possessing (sometimes!) DX characteristics also comes with the opening of 29,250-30,000 kc. to this mode of transmission by an ad­

Calling and Signing

As we forecast some time back, FCC on July 9th amended the first sentence of Sec. 12.83 to read as follows:

An operator of an amateur station shall transmit the call letters of the station called or being worked and the call letters assigned the station which he is operating at the begin­ning and end of each transmission, and at least once every 10 minutes during every transmission of more than 10 minutes' duration. In the case of stations conducting an ex­change of several transmissions in sequence, each transmis­sion of which is of less than 3 minutes' duration, the call letters of the communicating stations need be transmitted only once every 10 minutes of operation in addition to trans­mitting the call letters, as above, at the beginning and at the termination of the correspondence.

This is important; get it right. In ordinary change-over operation, you must show the calls of both stations both at the beginning and again at the end of each transmission, and insert both calls every ten minutes if a transmission lasts longer than that. If you're working either break-in or "simplex" in very brief bursts, so that you're sure no single transmission goes over three minutes, you show both calls both at the begin­ning and at the end of the whole-QSO and then need drop them in (both calls) only every ten minutes of contact. But not over ten. Purpose, of course, is to facilitate government monitoring. Don't get cited for failure to comply with this new rule.

Remote Control

Sec. 12.83 requires both the station location (i.e., antenna location) and control point to be on premises not controlled by an alien. Sec. 2.53 re­quires an operator to be on duty at the trans­mitter location unless special authority has been granted for remote control. Some amateurs have installed remote control without authority. To make the requirements plain, FCC on July 9th added the following to Sec. 12.63:

Authority to operate by remote control will be granted only upon the filing of a proper application, and supported by a showing of the applicant's legal control of the control point, the means employed to control emissions, the equip­ment and method for monitoring, and the precautions adopted to prevent access to the premises by unauthorized persons.

I.e., if you want to change to remote control, you must apply for modification and make the required showing — most of which is provided for on the application form itself.

Temporary Changes in Location

Sec. 12.93b of our regulations was amended June 10th to put a minimum term of fifteen days on temporary moves of a fixed sta­tion from one permanent location to another with intention to return to the first location in time to avoid modification. In addition to notifying the district inspector when such a move occurs, we must now also notify Washington, and such notices must also be filed upon return to original location. The rule now reads as follows:

(b) The licensee of an amateur station who changes resi­dence temporarily and moves his fixed station equipment thereby or the licensee-trustee for an amateur radio society which changes the location of its fixed amateur station may operate from the new location provided that such new resi­dence or location is to continue for a period of at least fifteen days and not to exceed four months; and provided further, that the following requirements are fulfilled:

(1) Advance notice in writing shall be given by the li­cencee or licensee-trustee to the Commission's office in Washington, and the Inspector in Charge of the district in which such fixed station is to be operated.

(2) A notice as above shall be required for each change in residence or location, and a move to the original, former, or new location shall require additional notice before engaging in operation.

(3) A station operating under this Section shall employ the calling procedure specified in Sec. 12.83, using the fractional bar character followed by the number of the amateur call area in which the station is then operating.

Some amateurs had abused the earlier lan­guage as a dodge to get around Order 73 for a couple of days. In excess zeal to prevent such abuses, some inspectors were preventing ama­teurs from enjoying normal rights in a bona fide temporary move, and further confusion was con­tributed by a ruling that a club station could not be moved temporarily because it was an inani­mate thing without a residence. Chief feature of the amendment is that we are no longer permitted to move a fixed station from the licensed location to a temporary location (without applying for modification) unless the duration is to be at least fifteen days.

Note the following carefully to avoid confusion. This new language on temporary change of fixed location now requires only one notice for a period of up to four months, but with a copy to Washington. Sec. 12.93a (permanent move await­ing modification) still requires a notice every thirty days, but only to the district inspector concerned.
EASY RENEWALS FOR SERVICE MEN

The government hopes that amateurs will maintain their licenses. Those in temporary service with the Army and Navy find it difficult to comply with the formal FCC requirements for obtaining blanks, etc. To make it easier, FCC on May 28th adopted its Order No. 81 by which:

It is ordered that, until further order of the Commission, amateur radio operator and station licensees, serving with the armed forces of the Nation, who desire to renew outstanding licenses may submit to the Commission, by letter, an informal application for renewal in lieu of formal application required by the Commission's rules; provided, however, that such informal application for renewal by letter must set forth the fact that the applicant is serving with the armed forces of the Nation and must be accompanied by a signed statement of the applicant's immediate commanding officer, verifying that fact.

Beyond being immediately helpful to the amateurs concerned, the League considers the enactment of this order as a good sign of confidence in the American amateur.

REGISTER YOUR AVAILABILITY

You see a lot of defense jobs offered in our department “U.S.A. Calling.” In addition, scarcely a day goes by that ARRL headquarters does not receive calls to find people for positions in radio defense work, all the way from a single expert for a particular desk up to hundreds at a crack for some service need. If you are available for service needs, or would consider a change in civilian radio employment, pull down your copy of QST for February and clip out or copy the questionnaire appearing on page 25 and file it at once with ARRL headquarters.

MOVING INTO A CLASS B CIRCLE?

Sec. 12.45 of our regs requires a Class C amateur moving into a Class B circle to qualify for Class B within four months or lose his license. Sec. 12.93a permits him to operate up to four months in the new location while awaiting modification. But modification now involves reissuance for a new term of three years and Sec. 12.45 does not require FCC to reissue a license until the amateur has passed the Class B exam. Net result is that amateurs who wait until late in the four months’ period to take the qualifying exam cannot hope to receive their modified licenses before their authorized operating period is over, and must go off the air. Such amateurs will therefore be exceedingly well advised to take the examination as early as possible after moving. Another advantage is that if they fail the examination, there will still be time in the four months’ period to try it again.

AMATEUR LICENSING

FCC’s licensing of amateurs again is in a pretty satisfactory state, despite the fact that we are showing a definitely healthy growth. For the week ended June 21st, 725 new amateur licenses were issued, by far the greatest number ever issued in a week. In several recent weeks the issuances of new licenses were higher than in any week last year, and for the first half of this year are as great as for that period last year, showing that the difficulties of proving citizenship and the temporary restrictive orders have not affected our growth. In fact, for the last several months the number of amateur examination papers received at Washington for grading has been materially higher than in the corresponding months of last year.

DISTRICT BOUNDARIES

W7 amateurs should note the following changes in FCC districts:

The counties in northern Montana formerly part of the 15th District, with headquarters at Denver, were transferred May 27th to the 14th District, Seattle, so that all of Montana is now under the Seattle office. In the state of Washington, the counties of Wahkiakum, Cowlitz, Clark, Skamania and Klickitat were transferred from the 14th District, Seattle, to the 13th District, Portland. The remainder of Washington remains under the Seattle office.

DEFENSE COMMUNICATIONS BOARD

No announcements have yet come out of DCB but its committees continue work. Both DCB and the new Office of Civilian Defense have appointed subcommittees for liaison between those organizations. While they will have close relations, it is understood that all the communications aspects of OCD plans will be dealt with by DCB.

Are you ever asked whether there are any amateurs in the Amateur Radio Committee of DCB, which suggests plans for amateur participation in defense work? Just look over the following list: ARRL President G. W. Bailey, W1KH; Major H. L. Cavness, W4DW; Ensign W. A. Green, W5BKH; K. T. Hill, W2AHC; J. L. McCargar, WOYE; FCC Engineer L. C. Quaintance, W3JQ; Lieutenant-Commander John L. Reinartz, W3IDS; Lieutenant-Commander F. H. Schnell, W6UZ; Dr. B. T. Simpson, WSCFC; ARRL Secretary K. B. Warner, W1EH. ARRL has also named as an expert adviser in its ARC work H. E. Pomeroy, assistant national
Further Developments in the Foolproof Rig

Simple Improvements Including Expansion to Push-Pull

In this department of QST for June, a two-stage transmitter for the beginner was described in which an inverted amplifier was used. This arrangement differs from the usual form in that the output of the oscillator is coupled between cathode and ground, rather than between grid and ground. With the inverted arrangement, positive feedback through tube capacities is eliminated and, therefore, no neutralization with triodes or incompletely-screened tetrodes is required. Feedback through the plate-to-cathode capacity, which corresponds to the grid-to-plate capacity of a non-inverted amplifier, is degenerative, rather than regenerative and, while this effect is relatively small, it is augmented by the degenerative effect of the coupling inductance in series with the cathode. The result is a simple, but highly stable, amplifier. Its only disadvantage is that degeneration increases the driving voltage requirements but, since the additional power can usually be obtained without exceeding the capabilities of the oscillator in a low-power transmitter, the advantage of better stability seems to make the simpler inverted arrangement well worth while.

In the original transmitter described in the June issue, every effort was made to reduce the circuit to the simplest-possible form. The amplifier tube was connected as a high-µ triode to eliminate biasing problems as well as those of screen supply. Subsequent tests have shown, however, that the efficiency of the amplifier can be increased materially by using the tetrode connection. At the same input (100 ma. at 450 volts),...
output is increased from between 20 and 25 watts to between 30 and 35 watts. Only the minor additions of a screen dropping resistor, grid leak and three by-pass condensers are required, so that those who have already built up the original model may easily take advantage of the improvement obtained.

The revised circuit diagram is shown in Fig. 1. It will be noted that the screen voltage-dropping resistor, \( R_4 \), and by-pass, \( C_6 \), have been added. Grid-leak bias has also been introduced as a result of the tetrode connection. Since the plate current will not now fall to a low value when excitation is removed, as it would were the tube connected at a high-\( \mu \) triode, both stages are keyed simultaneously in the cathode returns.

Fig. 1 includes the circuit diagram of a suitable power supply and shows the connections between the power supply and the transmitter. If two plate milliammeters are not available, a single meter with a scale of 200 ma. may be used, switching it back and forth between the two circuits with a well-insulated switch. Dial lamps may be used as a fairly satisfactory substitute for meters. These lamps give a rough indication of current variation by change in brilliance. The 60-ma. type (No. 48, orchid bead) should be used in the oscillator circuit and the 150-ma. type (No. 40 brown bead) for the amplifier.

When power is applied and the key closed, both tubes will draw high plate current. \( C_1 \) should be adjusted until the plate current dips. It will be noted that a dip in plate current will be obtained both near maximum and near minimum capacity. The dip near maximum capacity indicates resonance at the fundamental frequency of the crystal, while the dip near minimum capacity indicates resonance at the crystal harmonic at 7 Mc.

As soon as the oscillator has been tuned, the amplifier plate tank circuit should be tuned to resonance. Here, again, plate-current dips will be found near either minimum- or maximum-capacity settings of \( C_2 \), depending upon whether the plate circuit is tuned to the harmonic or fundamental of the crystal frequency, respectively. The key should not be held closed for long periods until both circuits are tuned to resonance. When operating the oscillator at the fundamental frequency of the crystal, it may be necessary to tune the oscillator plate circuit slightly to the low-capacity side of resonance for most satisfactory keying. When operating at the crystal harmonic, the oscillator plate circuit may be tuned to exact resonance. With a plate voltage of 450, the oscillator plate current will run about 30 ma. when the oscillator plate tank circuit is tuned to the crystal frequency and about 40 ma. when tuned to the crystal harmonic.

Dimensions for a separate amplifier coil for 7 Mc. are given. A coil of lower inductance for this band may be required with certain antenna arrangements to facilitate coupling.

The output link, \( L_6 \), is for the purpose of coupling to an antenna tuner. The values to be used in the antenna tuner will depend upon the type and dimensions of the antenna system. With an antenna 136 feet long, fed at the center with 67-foot tuned feeders, parallel tuning may be used on both bands. The condenser should have a capacity of 300 \( \mu \)fd or more and may be a small receiving-type condenser or one from an old b.c. receiver. The coil for 3.5 Mc. should have 13 or 14 turns No. 18 enamelled wire on a 1½-inch diameter form spaced to occupy a length of 1½ inches. The coil for 7 Mc. should have about 8 turns of the same diameter and length. The link winding should be wound at the center of the coil as shown in Fig. 1.

When the antenna tuner is coupled to the output link and the antenna feeders connected, tuning of antenna tuning condenser should cause the amplifier plate current to increase to a maximum at one point in the range of the condenser. If this does not occur, the length of the feeders should be altered, or a change made in the dimensions of the antenna tank coil, until the increase is obtained. If the amplifier plate current peaks at a value below 100 ma., the size of the link windings may be increased a turn at a time until it does. If the current peaks at a value above 100 ma., the number of link turns should be reduced. It is always advisable to start in with only a few link turns and gradually work up to proper amplifier loading.

After all adjustments have been made, the proper antenna tuning procedure is, first, to tune the final amplifier tank circuit to resonance, while the antenna tuning condenser is set at minimum capacity, and then tune the antenna circuit to the point of maximum plate current. This procedure will result in minimum detuning effect upon the amplifier plate circuit. The last act of tuning, however, should be to try retuning of the amplifier tank circuit to make sure that it is set at a point where tuning on either side causes the plate current to increase.

A plate current of 100 ma. indicates about optimum loading when the plate voltage is 450. At 350 volts, the plate current should be limited to about 75 ma.

While a single-tube amplifier probably represents the best balance between power output and power-supply cost, two tubes may be used in push-pull. Fig. 2 shows the circuit diagram. The diagram includes an antenna tuner as well as a metering system. Aside from these features, the two circuits are similar. The cathode coil is tapped at the center to provide out-of-phase voltages for the amplifier input circuits and a split-stator condenser is used in the plate circuit of the amplifier.

The antenna tuner is link coupled to the output of the amplifier. The terminals \( A \), \( B \) and \( C \) should be of the jack-top type so that the leads marked
D and E, which terminate in insulated banana plugs, may be plugged into the proper terminals to provide for either series or parallel tuning. One feeder is always permanently connected to the terminal marked C. For parallel tuning with low capacity, lead E is plugged into terminal C and the loose feeder is connected to terminal A. For parallel tuning with high C, lead E is plugged into terminal A, lead D into terminal C and the loose feeder connected to terminal A. For series tuning, lead E is plugged into terminal A and the loose feeder connected to terminal B. The high-C tank circuit may be required with certain feeder lengths to facilitate coupling to the amplifier. When high C is used, the antenna coil for the next higher-frequency band should be used, i.e., the 7-Mc. coil for the 3.5-Mc. band. The smaller coil will also usually be more suitable when series tuning is used. For the antenna previously mentioned, parallel tuning should be used.

A power supply designed for heavier duty will be required for this transmitter if it is to be operated at the input which it is capable of handling. A 250-ma. transformer delivering 550 volts each side of center will give just about the required 450 volts d.c. output at full load through a double-section filter with choke input.

Tuning procedure should follow that previously outlined for the single-amplifier transmitter. The oscillator plate current may run somewhat higher and the amplifier may be loaded until the plate current reaches 200 ma. With a 450-volt plate supply, the output at full load should be between 55 and 65 watts.

--- D. H. M.

**BRIEF**

Give W1AW a call for an accurate frequency measurement, to communicate with any department of A.R.R.L., to rag-chew when time permits, or to pass a message to ham friends, making use of the Headquarters station's multiband facilities.

W6EEFC claims to be the only ham who has operated an amateur station from four states simultaneously. He set his portable rig on the geological survey post which locates the northeast corner of Arizona. This is the only point in the United States which is common to four states, namely, Arizona, Colorado, New Mexico and Utah. Several contacts were made from the location.

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![Circuit Diagram](image)

**Fig. 2** — Circuit diagram of the push-pull version.

| C1 | 250-µfd. variable (National TMS250) |
| C2, C3 | 250-µfd. per section (Hammarlund MTCD-250C) |
| C4 | 100-µfd. mica |
| C5 | 0.001-µfd. mica |
| C6, C7, C8, C9 | 0.001-µfd. |
| C10 | 0.01-µfd. |
| C11 | 0.001-µfd. mica |
| C12 | 0.001-µfd., 1000-volt mica |
| R1 | 0.1 megohm |
| R2 | 500 ohms, 2-watt |
| R3 | 50,000 ohms, 10-watt |
| R4 | 25,000 ohms, 1-watt |
| R5 | 12,000 ohms, 10-watt |
| R6, R7 | 50 ohms, 1-watt |
| RFC | 2.5-mh. r.f. choke |
| RFC1 | 1 mh., 300 ma. (National R300) |
| MA | D.c. milliammeter with 300-ma. scale |
| L1 | 1.75- and 3.5-Mc. bands — 36 turns No. 20 d.c.c., 1½-inch diam., close-wound. 3.5- and 7-Mc. bands — 20 turns No. 18 enam., 1¼-inch diam., 1½ inches long |
| L2 | 1.75-Mc. band — 55 turns, No. 22 d.c.c., 1½-inch diam., close-wound, 70 µh. (B & W 160 JCL). 3.5-Mc. band — 26 turns, 1½-inch diam., 13½ inches long, 7 µh. (B & W 40 JCL). 7- and 14-Mc. bands — 14 turns, 1½-inch diam., 1½ inches long, 4.6 µh. (B & W 20 JCL). Links wound over center of coil with insulated wire. L4 | Same as L2 |
| L5 | 1.75-Mc. crystals — 32 turns No. 22 d.c.c., close-wound |
| L6 | 3.5-Mc. crystals — 10 turns No. 22 enam., 1 inch long, 100-µfd. mica condenser mounted inside coil form and connected across coil |
| L7 | 7-Mc. crystals — 6 turns No. 22 enam., ½ inch long |
| L8 | 3.5- and 7-Mc. bands — 20 turns No. 24 enam. 7- and 14-Mc. bands — 8 turns No. 24 enam. Above coils wound on form below Lt, tapped at center. |
Trainee Traffic Grows

Get in This Amateur Radio Opportunity: Do Your Part

BY F. E. HANDY, W1BDI

March QST outlined "a defense job for every amateur." The subject of handling of trainee messages was also bulletinized to ARRL officials. Now progress can be indicated and some new methods of procedure detailed. The many camps, cantonments, and training schools are well filled, spelling opportunity for continued expansion of amateur radio message and training service to the nation.

In the camps and schools the high spirits and well-being essential to success require freedom from worry about the folks left at home. Those at home must have good contact to be constantly aware of the well-being of soldier or sailor. Maintenance of morale is a first essential. Without high morale nations are defeated before they start! By our amateur message handling we can contribute usefully on this important defense front! Radio communication is our hobby and an accepted defense job. This is to ask each amateur to do his share in this program. Incidentally, traffic handling is one of those things that besides being good fun, returns direct satisfaction in the accomplishment of results, and results in increasing operator keenness, efficiency and proficiency.

Stations in and Near Camps

A goal to be realized is the establishment of an amateur contact point for the origination and delivery of amateur radio traffic in or near every post. Numerous stations are reported in operation. Few military commanders in the continental United States but place a high value on the morale-maintaining possibilities of amateur radio, once they are explained. Security considerations rank higher in remote bases and island territories but even when near-by amateur facilities instead of a station in the military establishment itself are concerned, a message box placed in the canteen and handled by the camp recreational officer can bring results. Such collection boxes should carry a concise typed explanation setting forth the use of the facilities and possible results of the unguaranteed, uncompensated, non-competitive service that is amateur radio.

Contact with the officer in charge or his representative usually is all that is necessary to arouse interest and assure some message originations. A clear picture of the limitations and advantages of amateur radio should be given. Following the idea of discussing arrangements with the O-in-C after getting the approval of the SCM to represent him, successful plans have been developed for several commanders. W2JZX, for example, made a visit to the base morale officer at Mitchel Field and was met with enthusiasm. The C.O. located an enlisted amateur who will now be permitted to have a station at the field and keep daily skeds. Trainee traffic is reported growing daily.

Here follows a short list of amateur stations operating at certain camps. We shall be glad to

letters from many amateurs show a general desire to make their operating efforts most useful to the nation, most productive of training to themselves, most in line with the defense needs of the nation. Here is your answer to all such expressions. ARRL cordially invites your participation in Section organizations and in that number one job, the efficient handling of an increasing volume of morale building trainee traffic.

Amateur Radio Traffic from Uncle Sam's Trainees is already on the air. It is increasing. A small part of the originating stations are listed herein. This is an amateur radio job to help the morale of our soldiers and sailors and trainees for the air service. Your assistance, please. It is amateur radio fun and self-training to keep every frequency possible busy with the traffic.

Get in touch with your SCM (see p. 4) to get into a net or to accept an organizing post if RM-PAM vacancies exist. Use the daily time known as the General Traffic Period (6:30-8:00 P.M. local time) for unscheduled message swaps to get trainee messages from outside organized nets into the nets and develop new schedules helpful to the general plan to move traffic effectively by Amateur Radio.

You know where your local boys are in training. Do your part by working with the ARRL officials in your territory to keep them in touch with folks at home by amateur radiograms. Keep some schedules for handling traffic daily, or on two or three nights per week as a minimum. Get in this. Do your part.

Get the new booklet Operating An Amateur Radio (free on request to ARRL members, 10¢ to others) for information on message handling and the different field organization posts.

HAMS—GET IN THIS!

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supplement this by further QST listing, if those operating similar trainee-amateur stations will send us a postal card addressed to the Communications Department giving their call, address, frequency, hours, operators and other data of interest.

W1GXY  Ft. McKinley, Portland, Maine
W1JYE/1 -
WUA  Ft. Devens, Mass.
W1LDR/5  Camp Hulen, Texas
W1LEV-
W1LQ/4  Camp Blanding, Fla.
W1LOZ/4  Camp Blanding, Fla.
W3DKB  Fort Dix, New Jersey.
W3EZT/K4  Borinquen Field, P. R.
W3HZK/4  Fort Benning, Georgia.
W4HHG/4  Camp Forrest, Tenn.
W5LID/5  Mitchel Field, L. I., N. Y.
W8LJD/3  Fort Jackson, S. Carolina.

A special caution to amateur operators at camps: Besides getting proper authority from the responsible camp commander before amateur equipment may be installed and operated, you are still personally responsible to the FCC for full observance of government regulations. You must notify the inspector in charge of the radio district in which you are located (per FCC Sec. 12.92) before you may engage in any low frequency amateur band operating. Written notice can cover only 30 days, and such notices must be sent at intervals up to four months or application made to FCC for modification of license if you will operate for a longer period. Responsibility must be exercised, to see that the call is fully signed and properly, station records kept properly, transmissions properly supervised to make them reflect favorably and with proper dignity on the service, to refuse and censor traffic in accordance with security requirements unless you wish to invite a complete prohibition of camp amateur operations for yourself and perhaps others.

Two or three draftees have asked us about shipping their amateur radio equipment ahead of them to the camp. In each case we have advised against it, suggesting that the equipment be packed and held ready, but that full permission and arrangements with commanding officers must be forthcoming ahead of any station-establishment! What if every trainee took his individual equipment! In one barracks midget broadcast receivers are tolerated, for example, but strict rules prohibit more than one of the animals being used for entertainment — and even when an amateur station has been authorized for a camp it does not mean that a dozen of the same will be equally welcomed in the close quarters that often must prevail. At any rate, get permission first, and avoid heartaches.

To build up a traffic service one experienced and leading traffic man (W3BW7) uses letters with "deliveries" to trainees to complete the understanding and good will for amateur radio. Excerpts from one of his letters:

"Glad to send the messages for you and any other fellows at the Fort. Each one should be written on a separate sheet with full name and address at the top of the party to whom the message is to be sent. The text should usually be held to 15 or 20 words. Messages should be in plain English with names or unusual words printed for clarity.

"Our organization, the American Radio Relay League, is made up of amateur radio operators all over the country. Relay networks cover the 48 states and possessions. There is no charge for sending the messages, nor can there be a guarantee of delivery, but we are especially glad to send word from men at the many posts to wives, sweethearts and families. Also from the home folks back to them. I trust we may be of continued service to you and your buddies at the Fort. Many who are too busy to write use amateur radio frequently to send a word or two back home. . . ."

In connection with the work of another active traffic amateur a local newspaper printed a sample message form, inviting readers to send messages to them to be turned over to the amateur for radio handling to camp! In still another locality, W3CGT arranged a solicitation of trainee traffic to be portrayed on the screen of the local theater. A proper precaution in such instances is to see that the amateur schedules for handling are set up first, or the solicitation limited to points for which adequate radio performance is reasonably certain.

All Members Help, Please

The handling of traffic from trainees wherever they may be located and the origination of traffic to those trainees is an important service to the nation. If you know members in the services, start the ball rolling by sending them a message by amateur radio. Make it a point to make what your station can do in this line of activity known to others . . . especially to the families of those with men in the service in different parts of the country.

This summer is one in which to expand our
amateur activity and our networks. Section Managers, Route Managers and 'Phone Activities Managers are all called upon by ARRL to expand and reshape networks connecting points in their states or sections so that these may contribute to this program of assisting the services, and so that the radio operating groups will have increased coverage to contribute to civilian defense measures. ARRL Section Communications Managers are asked to complete appointments at once for the conduct, organization, and leadership of organized delivery and connecting city-to-city defensive networks. Three qualified Route Managers are needed in each Section to maintain and expand (1) a 3.5-Mc. band c.w. net (2) a 1.75-Mc. band c.w. net (3) a 7-Mc. c.w. net. Three live wire 'Phone Activities Managers are likewise needed by each SCM for (4) a 1.8-Mc. 'phone net (5) a 3.9-Mc. 'phone net and (6) a u.h.f. network. Where vacancies exist for these specific appointments SCMs will make early appointments from among those in their territory advising of availability and interest and in the light of their qualifications of course.

Quite a number of RM, PAM, and net vacancies are being created as many top-notch men go into some branch of defense radio work. It is an opportunity and challenge to the remaining members of the amateur body to take over operations and even expand the ARRL-organized coverage of the nation by radio. The civilian morale and defense front is the most important front in any emergency, and this is a call to do your part by learning how to handle record traffic and work in organized self-disciplined fashion — right on the job of relaying and originating and delivering messages for the men in service training.

If you have never held a post in ARRL organization before, get into the swim of amateur radio right now. Send us a postal card today for ARRL suggests dedicating efforts particularly to the handling of camp trainee (cantonment) traffic to and from people in each of the cities represented by a net membership. Here is the system of establishing a real service. It is a major job for the individual netter, and his assignment, to find, make and keep schedules with a station in or near a particular Army camp, or with the network that gives a direct delivery to such a station. Once made, each such schedule can take care of the traffic for several cities in your locality and the traffic "to and from" can be routed appropriately via the individual network member who has the schedule. A second netter takes another camp as his specialty, and services as outlet to that point for all net stations. The RM, PAM, NCS, etc., may well start by making a survey of net members, giving them a day to respond to a general message or letter. After some planning, analysis of the distribution of trainees to different points, as known from local officials, newspapers, etc., individual allocation of the remote points in accordance with exact local needs can proceed, and traffic to back up the whole scheme can start rolling.

Consulting the "Station Activities" section of QST and the call book is a valuable help in identifying the activity of stations in other sections. Correspondence direct with the ARRL-organized coverage of the nation by radio. The civilian morale and defense front is the most important front in any emergency, and this is a call to do your part by learning how to handle record traffic and work in organized self-disciplined fashion — right on the job of relaying and originating and delivering messages for the men in service training.

If you have never held a post in ARRL organization before, get into the swim of amateur radio right now. Send us a postal card today for a copy of the new booklet "Operating an Amateur Radio Station" which explains each of the different field organization posts, and contains an application blank to be sent to the SCM in getting lined up for appointment. In all sections three months successful participation in regular net training will earn a new man who rates if one of the ARRL Section Net certificates.

The way to get to be tops in operating is to learn by doing. Make a regular practice of operating certain nights and times. Don't make this just a haphazard business. Fix up some regular planned schedules with the more reliable operators that you hear. Participate in the networks organized by your Section Manager, RM, and PAM!

A Word to Network Leaders

All ARRL officials (RM's or PAM's) and NCS (net controls) should be careful that networks are not isolated operating units by themselves even though the function of supplying communities of an entire territory with communication may be a prime motif. By assignment of special jobs to spe-

President Bailey says . . .

Keep pounding brass! Keep the dust off the mike! Don't let up! Don't pay any attention to rumors you hear on the air — or off! The League will keep you posted — listen to W1AW. What we want is activity. Living here in Washington, I know how great is the need for radio men, both in the armed forces and right at home. Keep active!
NAVY COMMISSIONS FOR ELECTRONICS SPECIALISTS

Last month on this page we reported that ARRL President George W. Bailey, as chairman of the radio section, Office of Scientific Personnel, National Research Council, is looking for qualified specialists for immediate appointment to the grade of second lieutenant, Signal Corps, U.S. Army, for work with “devices which employ high-frequency apparatus of an extremely complex nature.” It doesn’t take much guessing to figure what this is about. The offer is still open. Those interested in the Signal Corps’ “Electronic Battalion” should consult last month’s QST and communicate at once with Mr. Bailey.

But now comes along the Navy, wishing to procure through Mr. Bailey’s office a limited number of specialized officers for precisely the same sort of task. Their conditions are considerably more elastic and may serve to interest men who could not qualify under the Signal Corps offer. In the first place, the Navy offers original appointment in the rank of ensign, lieutenant (jg), lieutenant or lieutenant-commander, depending upon age, experience and other considerations. Where the Signal Corps will take men only between the ages of 21 and 36, the Navy will take them up to 45. Where the Army accepts only unmarried candidates without dependents, the Navy has no such restrictions. Candidates must have a college degree (or its practical equivalent) in electrical engineering and have specialized in communications or electronics physics. The average amateur is not qualified for this work—it requires specialists—but in our ranks are doubtless many who are professionally qualified. Appointment in this service gives complete exemption from the draft, and qualified men already drafted and in camp can be released for this commissioned service. Candidates must agree to serve outside the United States, if necessary. Full particulars may be had by writing immediately to George W. Bailey, National Research Council, 2101 Constitution Avenue, N.W., Washington.

CIVILIAN TECHNICAL CORPS

Britain calling this time: With the full blessing of our government, the British have issued an urgent appeal for radio servicemen and amateurs to come help them in the maintenance of the marvelous microwave “radiolocators” discussed on our editorial page. In mass production, they are desperately short of personnel, particularly for servicing and maintaining. For these and other needs they have formed what is called the Civilian Technical Corps, members of which are noncombatant technical workers performing under a civil contract, accompanying and servicing units of the British Army, Navy or RAF but not subject to military law or discipline, no oath of allegiance, no loss of U.S. citizenship. Our government also says it is to the benefit of the U.S. that some of our citizens receive training in this new technique, and Britain agrees to release the men instantly if the U.S. needs them.

The radio mechanics assigned to this special duty must be practical technicians, able to shoot trouble rapidly in the most elaborate superhets, thoroughly adept of soldering and the use of tools, and with sufficient knowledge of theory to master the special two-months’ course of instruction that will be given. Educational requirements will be overlooked for the thoroughly-proficient mechanic. Men with two years’ high-grade service work are specially wanted, as are practical amateurs of long experience. Age limits, 18 to 50; physically fit. Normal pay is $24.12 per week, rising to $38.65 per week for chief foremen, plus free board, quarters, distinctive clothing, medical care, two weeks’ vacation, transportation abroad and back to one’s home town, 30 days’ pay upon discharge, same disability and death benefits as RCFC. Married men may allocate 50% of their pay to dependents in this country; single men, 25%.

Britain says she needs up to 25,000
Americans to help in the locator service. A man with good knowledge of radio requires eight weeks' training before becoming useful in this new branch. Later this schooling will be given in Canada, but for the present it's in England — via Montreal. The locator technique will doubtless find many peaceful commercial applications, so that knowledge of it would also be valuable later. Those itching for travel and adventure overseas in a new kind of radio work may obtain full particulars and forms by writing the CTC in care of the British Consulate General, 25 Broadway, New York, or by applying to the nearest office of the Radiomarine Corporation of America.

AIR CORPS COMMUNICATIONS

The Army Air Corps offers opportunity for enlisted men in the field of communications. A comprehensive course for radio operators and mechanics, of some months' duration, is given at Scott Field, Belleville, Ill. They maintain communications between plane and ground and between ground bases, not only operating but including the installation and maintenance of gear. No flying instruction, but opportunity to get into the air for test flights and operating.

Men desiring enlistment in the Air Corps should communicate with the nearest Army Recruiting Office. Applicants must be single and without dependents, between 18 and 35 (written consent of parents for those under 21), have four years of high school or its equivalent. A year of radio experience or training will count for a year of high school, but all applicants must be fully proficient in arithmetic.

CIVIL SERVICE JOBS

We have a handful of announcements of U. S. Civil Service examinations for various types of engineers and technicians connected with radio work. They offer a wide variety of opportunity. Numerous government agencies (for instance, the Signal Corps Laboratories at Fort Monmouth, N. J.) draw their civilian personnel from the Civil Service list, and the range of duties, qualifications and salary is so great that there is something likely to appeal to any person wishing civilian employment in communications. Information and the necessary forms are to be obtained from the Secretary, Board of U. S. Civil Service Examiners, at any first- or second-class post office except in a few major cities where the Civil Service has district offices.

Illustrative of some of the fields in which applications are now being sought are six grades of electrical engineering aide with salaries lying between $1260 and $2600, to perform subprofessional engineering work under professional guidance; five pay grades of electrical and radio engineers, to perform or supervise professional engineering work, with salaries running from $2600 to $5600; junior communications operator for high-speed radio equipment, $1620; junior engineers in any branch of engineering, $2000; senior radiosonde technicians at $2000; assistant communications operator for ground-station work in the air navigation service at $1620, with junior c.o.'s at $1440 and under c.o.'s at $1260. If possible, call and ask to see the announcement of the particular jobs that interest you; it will contain full particulars. Amateurs particularly interested in the engineering aide jobs at the Signal Corps labs may communicate direct with Capt. F. B. Valentine at Ft. Monmouth.

Field Day Scores

The following are high claimed scores reported for the ARRL Field Day, June 7th-8th. These are all subject to cross-checking and grouping by number of simultaneously operated transmitters used at each station. Complete F. D. results will be presented in a later issue.

Jersey Shore Amateur Radio Association, W2AER/2 12348
York Radio Club ..•.. W9KA/9 8829
Northwest Amateur Radio Club ..•.. W9POP/9 7716
St. Paul Radio Club ..•.. W9KIC/9 7263
Cuyahoga Radio Association ..•.. W8URJ/8 7053
Wisconsin Valley Radio Association ..•.. W9BOM/9 6927
Delaware Valley Radio Association ..•.. W3AQ/3 6975
South Hills Brass Pounders and Modulators .•.. W8UUK/8 4842
Non-club group, 16 operators ..•.. W9BSN/9 4703
Amateur Transmitters Ass'n of W. Pa. ..•.. W5KWA/8 4293
Schemectady Amateur Radio Association, W2ACB/2 4050
Warren County Radio Club ..•.. W8DBO/8 3879
Non-club group, 8 operators ..•.. W2VYQ/3 3744
Harrisburg Amateur Radio Club, Unit 2 ..•.. W3IGH/3 3607
Non-club group, 4 operators ..•.. W1EH/1 3542
Dells Region Radio Club ..•.. W9HBR/9 3492
Non-club group, 9 operators ..•.. W5BB/5 3227
Non-club group, 4 operators ..•.. W9VGL/9 3067
Non-club group, 3 operators ..•.. W5DVM/5 3011
Manchester Radio Club, W1DUC/1, 2979; Toledo Amateur Radio Association, W8DV/8, 2925; Suffolk Amateur Radio Club, W2US/8, 2781; Non-club group, 2 operators, W1HJ/1, 2664; Ponce City Amateur Radio Club, W8ASQ/6, 2564; Non-club group, 4 operators, W8BAM/6, 2430; Non-club group, 3 operators, W2JQB/2, 2358; Canton Amateur Radio Club, W8MLW/8, 2268; Non-club group, 3 operators, W8HJP/5, 2252; Radio Club of Arizona, W6CMF/6, 2241; Trico Radio Club, W1EP9/3, 2233; Tri Town Radio Amateur Club, W9MWJ/9, 2133; Starved Rock Radio Club, W9MKS/9, 2043.

Ham convention committees will be interested to know that Lieutenant-Commander John L. Reinartz is still frequently available as a speaker at amateur conventions. Requests for his appearance may be addressed either to the Director of Naval Communications or to John, care of the Director, Navy Department, Washington.

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The 227-Mc. rig at W1AIY uses an HK24 ultra-audion oscillator built into a square-corner reflector antenna system. The entire framework is mounted on rubber-tired casters and can be easily rotated.

Most of the amateur 1¼-meter work is in the hands of a faithful band of experimenters, limited in numbers by the work required to make equipment work well on the band and by the short range normally obtained. However, each section of the country has its group of men working on the development of gear for the frequency, and W1AIY, the station of Alfred Winchell of Waterbury, Conn., is a typical example of how far the technique has advanced. In seven years of attention to the band (sandwiched in between activity on 56 and 112 Mc.), the equipment has gone through many stages of evolution.

The present 1¼-meter transmitter at W1AIY uses an HK24 in the "good old" ultra-audion circuit, and the only departure from convention is in the use of concentric filament lines instead of the more usual filament chokes. Although not the very latest circuit, it has been found to give excellent efficiency and it is very easy to adjust. The series-tuned plate tank is inductively-coupled to a single turn at the center of a half-wave dipole made of ¼-inch diameter copper tubing. Normal input to the tube is 65 ma. at 400 volts, and the oscillator is modulated by a 6N7 modulator for both voice and m.c.w.

As can be seen from the photographs, the oscillator is built into a square-corner reflector which has dimensions identical to those given in QST. The reflector elements are made of No. 10 brass wire, and a single director is used ahead of the driven dipole. The entire framework of the square-corner reflector is made of 1- by 2-inch strips, and it is mounted on rubber-tired casters so that it can be readily rotated. The station is located in the attic of the house.

The receiver uses a stage of 954 t.r.f., a 955 superregenerative detector, a 7A4 quench oscillator, a 7A4 first audio and 7B5 output. The receiving antenna is 8 half-waves in phase, horizontally polarized and rotatable.

The best 1¼-meter DX is W1HDQ at Wbraham, Mass., a distance of slightly less than 50 miles away.

Kraus, "The Square-Corner Reflector Beam Antenna," QST, November, 1940.
A close-up view of the oscillator shows the method of coupling to the antenna and also the director element to the left of the antenna. The antenna coupling is varied by sliding the entire oscillator assembly back and forth in the antenna framework.

miles, with S9 signals at both ends. However, considerable time has been spent trying to put a decent signal into W1HDF at Elmwood, Conn., at a distance of only 18 miles but over a considerably more difficult path. So far the best report has been S5, but high-gain antennas and the use of horizontal polarization have brought the signal up to that level from complete inaudibility. That the path is not easy one can be readily realized by a profile map of the route, which shows that slightly over half of the optical path is obstructed by hills and peaks that rise as much as 300 feet above the line of sight.

—B. G.
A warm word of greeting from Eric Holden, VO1H, secretary of the Newfoundland amateur society, says, "We have enjoyed entertaining the ham members of the U.S.A. forces here. The tribe runs about the same all over. They are now attending our meetings regularly. Let others who may be coming know that the NARA has a wide welcome for them."

Our hearty thanks, OM.

Eddie Dieckmann, 2NDZ, on board the Borie, wants us to say, "It would be a great help if you fraters and sorosis of the amateur organization cooperated by building up a QSO party via mailgrams with our service members. There must be a wealth of material to exchange with the members who are serving with the military forces. Cuba, Hawaii, Panama, China, and the multitude of Man-o-War vessels that are cruising about the blue green waters of the tropical seas, all afford to exchange many colorful pieces of correspondence with you bravo pounding home guards. . . . What could be better than to keep in touch with your old OM's and YL's than by letter? Let's keep the spirit of friendship at a high standing amongst American amateurs, now and forever."

We are under a handicap in printing addresses of hams in active service, as 2NDZ requests, particularly in the cases of Navy personnel since we cannot divulge the location of any ship. But Army addresses can be used as mentioned in these columns, and a letter addressed to your Navy friend, in care of his ship mentioned herein, routed care of the New York or San Diego postmaster, will eventually reach him.

Amateur radio's own Johnny Reinartz of 1QP-IXAM fame, now Lt.-Comdr. J. L. Reinartz, 3IBS, is stationed at Washington in the office of the Director of Naval Communications. In charge of NCR operations up to the time the reserve was called into active service, he handles the continuing relations between Naval communications and the amateur body. Former FCC engineer Cecil Harrison, 3HZY, is now CRM in the Navy office. Edwin Lovejoy, formerly of the FCC amateur section, is a Lt.-Comdr. now taking a special training course at Bowdoin College, Me. Lt.-Comdr. Harry Dobbs, 4ZA, former director of the Southeastern Division, is now on active duty as district facilities officer of the 6th Naval District at Charleston (S. C.) Navy Yard. Fred MaDan, 2CUD, is being commissioned as Ensign and awaits an assignment to duty.

We find these amateurs in far-flung ports of the Air Corps: Sgt. Bennett, 9JUA, bombardment group operator at Anchorage, Alaska; Pvt. Ernst, 9LOZ, receiving schooling at Jefferson Barracks, Mo.; Lt. Martin, 8JSS, located at Mitchel Field, N. Y., and in charge of communications for Northeast Air District; Lt. Stafford, 9KWP, doing more flying than radio work at Will Rogers Field, Okla.; Plt. Burch, 9NFX, riding the back of a B-18 over Lowry Field, Colo.; Pvt. Horowitz, 3IBR, Williams, 5JNP, and Nearhood, 9TJK, learning the ropes at Scott Field, Ill.; Sgt. Nurse, 9YNK, at Selfridge Field, Mich.; and Capt. Clarke, 5DZ, post signal officer at Ellington Field, Texas. The 108 Observation Squadron at the Chicago Municipal Airport has sent to active duty Tech. Sgts. Delighter, 9CBJ, and Barger, 9WBP; Sgt. Herndobler, 9RNY, and Pvt. DeLapp, 9TOI, and Vore, 9QBJ.

More lieutenants in the Signal Corps: Cubertson, 9CSY, who promises us a picture of the new ham station at Fort Monmouth; Jones, 9ES-BX, in charge of the message center at Ft. Leonard Wood, Mo.; Colvin, 6AHI, head man at WVV in San Francisco. Ed Long, 7ENC, reports that other Signal Corps men in Fairbanks, Alasks, are: McPherson, K7HIE; Vaughn, K7GIN; Brown, K7GTA; Cobb, K7EMS; Slack, K7QRF; Rossasoe, 60AV, and Doyan, 7HUF. Mullings, 5BVF, teaches code to the boys at Ft. Crockett, Texas. Pvt. Krupp and Bradley, 9BMC, and Sgt. Yeates, 5GNT, pound brass at Ft. Lewis. Wash. Sgt. Clemens, 3DZB, and Pte. Richardson, 3GUV, handle the AARS nets from WLM. Pte. Gaudreault, 1LLE, works in the WAR Net from the Canal Zone. Draftees Sgt. Wilson, 8XXG, and Pvt. Calvin, SLEE, are learning Army ropes at Ft. Monmouth. CRM Corbett, 8DPV, has two sons in service: Howard (no call), at Ft. Monmouth, and Harold, 9HKV, at Ft. Hayes, O. Pte Hathaway, 9YWS and KAIQH, takes care of the Army's transmitters at Fort Mills, P. I.

Cpl. Unger, 6PQR, in the radio section at Camp Haan, Calif., Cpl. Peterson, 5VGC, chief operator at Ft. Custer, Mich., and Pvt. Day, 9INP, at Ft. Riley, Kans., are three fellows who have found their AARS training invaluable. Cpl. Stippick, 9BLB, is in the 50th Sig. Bn., Camp McCoy, Wis., along with Pvt. Strezyk, 9ANK. Cpl. Bigger, 5GBR, instructs at Ft. Sam Houston, Tex. Pte. Fenn is getting 9EPU modified to Ft. Benning, Ga., so he can operate in his spare time, too. Pvt. Stoll, 9YPA, has AARS duties at Ft. Omaha, Nebr. Capt. Jeffrey, 8GDC-9ZDH, com-
dmands a light tank company at Ft. Knox, Ky., where is also located Paul Russnak, formerly at K5AE. Draftee Cass, 7FCK, is at Ft. Benning, Ga., and Reichenbach, 2KIF, at Ft. Dix, N. J. The Ft. Warren, Mass., mailman, when looking for Pvt. "Wijci" found he was actually Waldo Clark, W1JCI! which reminds us to say it is just as well not to include amateur calls on mail going to your friends in Army camps.

At Ft. Bragg, N. C., we find Privates Brasted, 8FAL, McCurdy, 9P1D, Sgt. Finger, 9EIZ, and Pte Toben, 9AO, in communications work. Ft. McClellan, Ala., boasts Pte Hobling, 2MMP, Wood, 8UCO, and Jacobs, 2JGC, among those handling radio duties. Staff Sgt. Watson, 8SBR, is another Camp Shelbyite. Staff Sgt. Knappenberger, 8OWX, commands a radio detail at Ft. George Meade, Md., where is also located Pvt. Emerich, 8MCX. At Ft. Jackson, S. C., are Staff School. Lt. McRae, 4GP, has extensive personnel Staff Sgts. Barbeau, lMNY, and Kaufman, Sgt. Nilsson, 4ALW, and Pvt. Greene, 4HAE.


Some guardsmen on active duty there is Pte Atkinson, 1MYH.

The Semmes radio personnel includes: Lt. Engleman, ILOC, Lt. (jg) Bruckman, ex-2AOV, and radiomen Miller, 2MQB, Gardner, 1MJY, Revilee, 1MVA, Rodman, 1MUZ, Parrott, 1MVM, and Christie. RM3c Roberts, 5HRA, is finishing his training at Charleston, S. C., Navy Yard. RM2c Baker, 9FIN, has been called to serve on the Kilauea. RM1c Guile, 1EBO, and RM2e Wessenberg, 1HVF, left commercial radio for service at the Navy's Fort Blakely, Wash., radio station. RM3c McCormick, 4GWX, operates on the Ogala. RM3c Petersen, 6FDL, studies at Los Angeles, and awaits an assignment. RM2c Sawya, 6CAX, is stationed at the Maris Island Research Lab. RM3c Fraga, 9JIT, is aboard the Kilauea. RM3c Mrozczka, 8UHN, has been recovering from an illness at the San Diego Hospital. Muskegon, Mich, has sent to active service Ens. Warren, SBRT, and radiomen Brill, SQT, Shante, SUBO, and Votaw, 8VHX. Burlington, Iowa, reports S1c Bischoff, 9DYP, on the Brooks, and Lt. (jg) Jeffrey, 9UDR, at Washington, D. C., message center. RM3c Meyer, 2GKH, operates on the sub chaser, 128. S2c Conover, 4GIX, is on the Arkansas. RM3c Dodge, 75TV, has shore duty at the Bremerton, Wash., naval station radio.


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WORKING skip DX on Five is always packed with thrills. Signals pop in from almost anywhere, weak fading carriers one minute and receiver-blocking roars the next. "Sporadic" is the word for it! We feel certain that things are going to pop open — and the band leaves us high and dry. Another night we say that there will be nothing doing — and almost immediately our ears are pinned back by a rush of signals from some distant section of the country. When ionization develops at several widely scattered points simultaneously — then five-meter enthusiasts have something to tell their grandchildren!

Such a condition prevailed on June 5th and 28th. This "double-hop" business used to be a rare occurrence. Not that the condition did not develop, but because of limited activity in many sections of the country the ionization had to be in just the right spots in order to produce multiple-hop contacts. But with only North and South Carolina, Mississippi, North Dakota, Utah, and Nevada now missing, the picture is quite different; and work on Five beyond 1500 miles is showing up more frequently all the time. Were we to list all the skip-DX contacts reported for these two dates alone there would be room for nothing else in this month's column, so here are a few highlights.

June 5th: W3ASD, Crum Lynne, Pa., worked W6BRO, Los Angeles, Cal., 2400 miles. W6OVK, Tucson, Ariz., worked W1's AEP, HDQ, and EKT, and heard W2KLZ, W1DLY, and W1KLJ. W6SLO, also of Tucson, worked W1's AEP and HDQ. W5JGV, Hurley, New Mexico, worked W1's AEP, EKT, DLY, and W2KLZ. It is interesting to note that the stations worked by W5JGV, W6SLO, and W6OVK, while spread over a stretch of 150 miles east to west, are in an almost exactly straight line. Stations 20 miles north or south of this line were completely out of the picture!

W5HYT, Amarillo, Texas, was busy at this same time, working 43 W8's and W9's in the course of the evening. Last, but not least, Vermont's lone representative on Five, W1MEP/1, Glastenbury Mt., worked his first skip DX. With less than three watts input, Chet worked W9ZHB, Zearing, Ill., and W9NFM, Solon, Iowa, for an all-time high in miles-per-watt for 56 Mc. From reports it appears that this June 5th opening was an all-day affair, running from 10 A.M. to midnight.

The affair of the 28th is too recent to permit complete reporting. This is, in fact, being compiled on the “morning after,” so we can only include our own observations and guess at what may have happened. Big news was the first appearance of a signal from W7 here in the East. W7ACD, Shelley, Idaho, was heard by W1's LLL, KLJ, and CGY/1, that we know of — and worked by W1AVV, Stamford, Conn., and possibly several other East Coast stations. W5JGV, Hurley, New Mexico, was in there again, working a bunch of W1's, including W1CGY/1, Cape Cod, and your conductor. W5HYT and W5WX, Amarillo, Texas, had their first contacts with W1's. All Call Areas except W6 were heard by a number of W1's. W6's were apparently out of this one, though several were being called at times. Several W9's were looking for W6 in order to complete a WACA in one night!

As for the rest of June, it followed the familiar early summer pattern — hot days and cool nights, with fine temperature inversions and consequent extension of the local range, interspersed with frequent bursts of skip to keep the gang on their toes. The “sunset inversion” (which results when air, heated by the day's bright sun, rises and is replaced by cooler air pulled in from the ocean, a nearby lake or river, or even from large areas of forest land) is at its best in this season of the year.

Antennas at W1MEP/1, Glastenbury Mountain, Vermont. Located six miles from the nearest power line and five miles from the nearest road, State Fire Warden Maloney has a QTH to dream about! Chet's rig has an HY-114 in the final, running 3.5 watts input on 56496. Antennas include a 3-element rotary, a vertical extended double Zepp, and a "V" beam aimed west.

*329 Central St., Springfield, Mass.
Operators on all u.h.f. bands should make an effort to be active during the two hours around sunset, as signals are often 10 db stronger during this period than later in the evening or during the early afternoon hours. Early morning hours are also excellent, if activity can be promoted between 5 and 10 A.M.

**HERE AND THERE:**

Horizontal antennas are showing up in ever-increasing numbers, with the 4-element "W6QLZ Beam" getting the big play at the moment. These have recently appeared at W1MG, W2BYM, W3HTZ, W5DNN, W6ANN, W7ERA, W7AMX, W7DNE, W8KED, W9EQC, W9GCQ, W9PMQ, and W9EK, to name a few. Two high-gain horizontal elements, at opposite ends of a 200-mile hop, can make a tremendous improvement in signal strength as compared with vertical antennas of the "Q" or extended double-zepp variety, but we plead with all workers to figure in all the factors before going overboard for either vertical or horizontal polarization.

Remember WGI, Medford Hillsdale, Mass., one of America's earliest broadband stations, with its was announced back in the early Twenties? That same voice, Eunice Randall's, may now be heard on Five from W1MPP, Watertown, according to W1DJ. Arthur reports more than 70 stations now included in the New England Net, with upwards of 30 reporting in for the weekly roll-call on Thursday nights—a swell chance to see who is on and to give the new ones a chance to get acquainted.

Go home for lunch? Five will bear watching around noon at this time of year. Several of the gang have been snatching contact between bits of lunch this summer. This is a break for those fellows who work nights and have been out of the picture heretofore. Several nice noon-time openings for work between the Middle West and East were reported during June.

We have said this before, and we repeat that there is no place in the country where five-meter signals cannot be heard. The splendid work of W5HTZ, Cromwell, Okla., W1BLY, Harvey, New Mexico, W7IFL, Cheyenne, Wyo., W7ACD, Shelley, Idaho, and many others bears this out. Working all Call Areas on Five, not so long ago an almost impossible task, is now being done by many operators in the Middle West. First WACA outside of W5 or W9 went to W8CIR, Aliquippa, Pa., who worked W7IFL on June 23rd. Ed had been waiting for four years for that W7! Now it's a 5-Mc. WAS. This is not at all impossible—if everyone will bear down on Five, as we work on those hard-to-get stations on other bands. We believe that W9ZHZ is the lead in this department. Ed got all the W7 states on the 23rd of June and now is but a mere five or six states short of a WAS on Five.

W5VY wound up his activities "for theduration" in a blaze of glory on June 5th. Wilmer is now on active duty in Washington as a captain in the office of the Chief of Air Corps, Communications Section. That killowatt will be sorely missed, but there should be no lack of hamming around Washington, D.C., these days!

W6AGJ worked W7GBI, Great Falls, Montana, on June 6th. Leroy reports GBI as the loudest W7 signal ever heard, peaking just before the W5s and W9s started to break through. W6AGJ worked more than 40 of the latter—another of those poor evenings when the band was not so good!

W5WX reports openings for the Amarillo trio, W6's HYT, CHG, and WX, on May 30th. June 1st, 5th, 9th, 12th, 18th, and 23rd. Most of the work was to W5 and W9, though HYT worked W7GBI and several W4's and W6's. With the splurge of the 28th, HYT must now have WACA easily. Thus antennas can make a difference is demonstrated by the outstanding signal of W5HYT. John is using a converted 4-element 28-Mc. rotary array. On Five it is now two halfwaves in phase with two reflectors and four directors. Pair elements are also phased.

Another pretentious array is that of W9YXK, Woodbine, Iowa. Bill has 12 elements, horizontal; four halfwaves in phase with quarter-wave-spaced reflectors and directors. Many reports from widely separated points tell of the signals of W9YXK and W5HYT as the steadiest and strongest on the band in every opening—the first to be heard and the last to go out. These extra driven elements help in horizontal arrays, too!

Being in active service has not kept W3FJ, W4ELZ, or W9BJV off the band. W3FJ, formerly of Richmond, Va., is a captain, 179th Infantry, Fort Meade, Md. Ted reports that W4ELZ is an Ensign on special duty at the Naval Academy, and is on Five regularly. Lt. S. L. Burghardt, 84th Sig. Co., Camp Claiborne, La., was W9BJV, Watertown, S. Dak. Stan now has W5X5S and, as such, is ready to give the gang a Louisiana contact on Five.

How do these W5's get their wives interested in u.h.f. work? W5JGV, formerly W6GQJ of Douglas, Ariz., is assisted in his task of keeping New Mexico on the five-meter map, by Mrs. Hester, who is now W6QJQ. Also in Hurley is the OM-XYL team of W6CD-W6JXL. This pair were expecting to be on Five, but JGV tells us that ICD is laid up in the hospital at present.

W6QVX, Tucson, Ariz., reports Five open 15 days between May 31st and June 23rd, with DX every day for eight in a row, June 5th-12th! Most of the openings are to the W7's, and improved activity up there has helped to make things very lively in comparison to former years when Jim and W6QVLZ used to have to listen to the commercial harmonies in order to hear anything on Five when they thought it should be open. W6SLO "pulled a blitx" on the W7's June 1st at noon. Neal worked W6's CIR, CLE, OBF, CZA, OXY, QOF, and W6GQJ, in a snappy bit of lunch-hour activity. All these are in the golden territory over 1500 mile OVK had a bunch of 160-meter boys out to demonstrate the reliable character of communication between Phoenix and Tucson. Signals are better on Five than on 160 over this 107-mile mountainous path, and the DX worked by both QLZ and OVK on Five exceeds the fondest dreams of most of the gang on 100—to say nothing of the freedom from QRM. Come down, boys, it's wide open.

W6QAP has taken over W6FCB's QTH for the summer. A "W6QLZ Beam" has been installed, and six halfwaves in phase, horizontal, is going up. Bud was able to work W8CIR from his home location on June 1st, while using only a 6L6 doubler. It is a comments on the frequent openings to W7 and wonders if they are in some way associated with unusual wind movements to the northwest, resulting from changes in the Japanese Currents. Openings frequently coincide with sharp drops in temperature. This belief in the possible correlation between weather and skip is something for all of us to work on, Bud.

---

**FLASH**

As a result of the wild excitement of the multiple-hop opening of June 28th, there have been many conflicting reports as to who worked W7ACD on Five. Here is the correct dope, straight from W7ACD's log. Last week worked W7s IFB, OLY, NFM, YKX, ARN, RGH, HAQ, ZHR, CLH, W2BYM, W9's BDL, IOD, W8CLS, W9's RRX, and PK, in that order, between 6:22 and 8:28 P.M. MST. W1AVV heard W6QAP, W1SI heard W60VK and W1NF logged W7IFL. Another late report adds W8RKE, Grand Rapids, Mich., to the list of those outside the 5th and 9th Call Areas who have worked them all. W8RKE worked W7GBI on June 23rd, less than two hours after W8CIR had worked W7IFL to become the first W8 to make WACA.

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**W1HDQ**
Most of the DX worked this year from W9ZQC, Brockings, S. Dak., has been the work of W6NLR. Now Curly is going into the Army, and Fred promises to keep things hot.

The record of W9NLR-2ZQG is WACA and W9ZQL on June 5th is a single T-40, cathode modulated, at 120 watts. Two horizontal arrays are used, a 3-element close-spaced job, and a 4-element "W9ZQLZ Beam." Curly sends along some W7 frequencies: ECI 57.0, AXR 57.4, AOA 57.8, FFE 57.1, ERA 57.0, FDI 57.1, CIL 57.0, ACD 57.8, IFL 57.15.

Another W9 leaving for the Army is UTZ, Lisbon, Iowa. His rig is now being used by WBSBU at Mt. Vernon.

W9PKD, Salina, Kansas, reports a session with the same list of W9's as were contacted by W6SLO on June 1st - W9's GHW, NYV, NKW, and WAL, made the grade on Five. Most of the DX worked (as were contacted by W6SLO on June 1st - W9's GHW, NYV, NKW, and WAL, made the grade on Five. Most of the DX worked through Striteites June 16th in.

W6QLZ turns in some heard reports on the June 5th opening which are of interest. Clyde reports W3EFFY (all morning) and W3SIS, W2TJ1, W1LSN, W1HDQ, and numerous W8's and 9's. Apparently W6QLZ was on the northern edge of the territory from which signals were coming into the First Call Area this time, in exact contrast to last year when W9YKX helped on extended DX work.

The record of W9NLR-ZQ0 is W850, Brookings, S. Dak., has been the work of W6NLR. Now Curly is going into the Army, and Fred promises to keep things hot.

The record of W9NLR-2ZQG is WACA and W9ZQL on June 5th is a single T-40, cathode modulated, at 120 watts. Two horizontal arrays are used, a 3-element close-spaced job, and a 4-element "W9ZQLZ Beam." Curly sends along some W7 frequencies: ECI 57.0, AXR 57.4, AOA 57.8, FFE 57.1, ERA 57.0, FDI 57.1, CIL 57.0, ACD 57.8, IFL 57.15.

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U.H.F. Round-Up — Get in It
August 9th—10th

Summer All Out U.H.F. Test May Produce Transcon—8th U.H.F.
Activity has Simplified Score Plan—Don't Miss It

The Round-Up Period: August 9th (Saturday), 3 p.m. local standard time (EST CST MST PST) to April 27th (Sunday), 7:59 p.m. local standard time.

Purpose: To round up all u.h.f. amateurs and all u.h.f. equipment available for a grand, good operating time; to round up more results for everybody by a mass attack on the wide-open spaces and u.h.f. DX; to round up some new states and marathon points for good measure. Local round-up time is any old time. The U.H.F. Round-Up gives us a national round-up time, so each of us has the greatest possible chance at DX contacts and nationwide u.h.f. results! Each quarterly test has brought us closer to that goal of seeing a message go ALL THE WAY transcontinental or coast-to-coast during the test. Any ham with u.h.f. gear has a chance to be in on it if alert and on deck and one is sure of other round-up virtues. See you in this Round-Up.

All amateurs with u.h.f. gear are invited to start short test messages to go across the country entirely by u.h.f. This test has all the advantages of the summer season. A few words from those in ARRRL's April u.h.f. doings may have interest:

"Activity . . . was at its highest peak. "More MCW being used to get accuracy and DX than I ever heard on the band before." . . . "I feel certain Arizons can be worked from this range of mountains." . . . "Had fun, and met many new friends. . . . "Two cars full of equipment on Bear Mt. We may have missed some calls, our four half-waves in phase was so directive for reception." . . . "Sunday morning contacted W2JB. Worked Vince every hour in P.M. and took logs fm California, but conditions were not then good to the east." . . . "The big kick was the W6ANN-W9OQI contact." . . . "Great fun, let's have another real soon."

Scoring Contacts: List all different stations worked in the contest period. Shoe the location of the stations obtained as you work them for the claimed points. In a given band, a fixed or portable station may be worked but once for contact regardless of location. Show the band your transmitter was on for each contact or group of contacts.

Credit yourself with 1 point for every such different contact with stations under 100 miles, and 2 points credit for stations at distances of 100 miles or over.

Message Credits: To the sum of points computed as above, add points for message copies submitted with your point summary.

For originating and sending a test message of approximately five to ten words, specifically addressed or "to any amateur" in remote sections of the county and submitting copy with handling data,* (but one such message per station will be credited) 10 points.

For relaying such messages away from the starting point toward destination and submitting full copies (1 for receiving by radio, 2 for relay onward) 3 points. Reply messages relayed, with (Continued on page 71)

*The handling data is the call of the station from which message was received, call of station to which the message was sent by radio and the time and date of acknowledgments of receipt between stations. The call of the reporting amateur should be on each message for identification.

August 1941

45
Bigger and better than ever — that, we think, quite adequately describes the Fourth Annual ARRL Member QSO Party held in January. In this latest yearly two-day operating jamboree, which is becoming second to the November SS in popularity, 541 League members submitted reports of activity. More successful than any of its predecessors, the party proved that the American amateur is right up in the top brackets insofar as operating capabilities are concerned!

To the Winners — Congratulations!

To the highest scoring members in each of the 62 ARRL Sections (out of a possible 64, no reports having been received from Arkansas or P. L.) reporting, attractive certificates have been presented. The following are recipients of the Section awards: W1BIH, W1FM, W1KJ, W1LY, W1MEK, W2EQ, W2ED, W2IP, W3B, W3FQZ, W3IWM, K4HEB, W4AUW, W4BSJ, W4BYF, W4CFC, W4DMZ, W4FDT, W4GXB, W5AQE, W5CJP, W5PZD, W5HQN, W5JII, W5KC, K6PAH, W6HMC, W6CLZ, W6CW, W6HST, W6LMZ, W6PBV, W6PCE, W6RBJ, W6RM, W6SD, K7CZY, W7AKP, W7BCE, W7GQZ, W7KL, W8DCM, W8XJ, W8NDS, W8PYN, W8UNH, W8BBS, W9DM, W9FS, W9GJ, W9YQK, W9KL, W9PKW, W9QDF, W9RQM, W9SJT, W9VBQ, W9YKF, W9WUJ. Congrats, gang! The calls of winners listed in italics are those who have led their Section in one or more previous ARRL Parties. Of particular note were W2KZN, with 41,400; W9PKW, 41,382; W6PCE, 40,560; W9WUU, 40,208; W9RQM, 39,720; W9DIR, 39,624; W3BAQ, 39,572; W1HA, 39,400. Among other high scores worthy of mention are: W3DGM, 44,840; W3FQZ, 41,552; W9RQM, 41,400; W9PKW, 41,382; W6PCE, 40,560; W8NDS, 40,208; W9TH, 39,720; W9DIR, 39,-

Perhaps the biggest kick I got out of the whole contest was when on contacting K4HEB he called me by name, asked pertinent questions that indicated he knew me well, etc. Inquiry developed that it was none other than the fifteen-year-old son of old K4KD. I worked with K4KD ten years ago and knew his family well."— W2KZN. "The contest was a very fine one and I enjoyed operating in it very much."— W5JII. "I sure enjoy the ARRL QSO Party more than any other contest we have. I had a swell time in this one, and am sure looking forward to the next one."— W3PQZ. "The finest thing that I can say for those whom I worked is that it was necessary to ask for repeats in only one instance and that was definitely due to QRM."— W8TOJ. "I certainly had a swell time in the twelve hours I was able to operate. Am really looking forward to the next one."

For years I have been looking forward to contacting New Mexico for my 80-meter WAS. At last the long sought after State was raised during this Contest."— W2EQS. "It was a swell party and I enjoyed every minute of it. Worked all districts and K4 on 80 meters before turning in on Saturday night. Hope to be in there pitching on the next one."— W9GFU. "I was able to contact at least one member on each of the eight assigned amateur bands from 14 through 160 meters."— W9QDU. (Note: ARRL President, George W. Bailey, W1KH, also worked on all bands from 1.75 to 224 Mc.— Ed.) "The contest gave me very much fun, not to speak of a few new states that were contacted. I used my ABC radio gear for the entire contest. The transmitter was run at 80 watts input on three bands. All districts plus a K4 were contacted on 3.5 Mc. in six hours."— W3BAQ.

Star Performers

The highest score for the whole shindig was that of our old Kentucky contest hound, Bert Brown, W9FS, who topped the 1940 record of W3BES by finishing up with 56,974 points. Right behind Bert we find W3BES with 54,240 points. The third best total, 50,264, was made by W3BAQ. 224 Mc.— Ed.) "The contest gave me very much fun, not to speak of a few new states that were contacted. I used my ABC radio gear for the entire contest. The transmitter was run at 80 watts input on three bands. All districts plus a K4 were contacted on 3.5 Mc. in six hours."— W3BAQ.

(Continued on page 78)
A SIMPLE FILTER FOR ELIMINATION OF B.C.I.

W3QY is in the “under-100 watts” class, a group which should normally be exempt from b.c.i. difficulties. However, located in a row-house district in Philadelphia, we encountered an aggravating form of b.c.i., even though we were using a mere 60-watts input to an 809 on 10-meter ‘phone. The next-door neighbor had a Philco a.c.-d.c. set which picked up our transmission all over the dial regardless of the setting of the volume control. Another, two doors away, suffered the same trouble on a Farnsworth which is also of the “transformerless” type.

After going through the pages of several QST’s we decided against taking any of the almost heroic steps found therein and for some time merely ceased operating. Recently, when we discovered our signal about R9+ on one of our own little a.c.-d.c. midgets, we decided to do something about it, somehow or other, in order to be able to go on “ten” once in a while.

If we had been using a kw. input, we would have expected b.c.i. trouble, but with a puny little 60 watts we were rather dismayed about it all. In looking about for the trouble, we first became aware that our antenna was practically parallel to and some 15 feet away from the light lines which run along the backs of the houses in the row. It seemed probable that pick-up through these light lines might be responsible for the trouble, since the tuning function of the receivers in question didn’t enter the picture in any way.

Since there was no possibility of moving the antenna or shifting the directivity, we decided that some sort of filter to keep the carrier out of the b.c. sets was in order. We first tried an r.f. filter in the power line to the transmitter, but this had no effect upon the interference, thus strengthening our belief that the line pick-up was directly from the antenna. Further tests also showed that there was no interference when the antenna was disconnected and the rig operated with a dummy load.

The second idea tried out proved to be the most satisfactory and it consisted simply of interposing two self-tuned coils in the a.c. leads going to the b.c. receiver as shown in Fig. 1. On the midget set which we had in the house, the addition of these two coils completely squelched the pick-up, so a unit was built for the next-door neighbor. It consisted of two coils of No. 16 wire, each having about 16 turns wound on a 13/8-inch diameter form. The coils were mounted in a small wooden box which was painted a cream color to match the woodwork in the house. A short cord with an attachment plug on the end was connected to one end of each coil, while the other ends were connected to a receptacle mounted in the opposite end of the box.

When the filter was installed next door, it was as effective as the one we tried on our own receiver and the neighbor was overjoyed. The use of this sort of filter removed the necessity of tinkering with the b.c. set, a procedure which we wished to avoid if at all possible.

Obviously this arrangement will not take care of those situations where the transmitter field is strong and the signal gets into the receiver by way of the air. For those cases where it comes in through the light lines, however, it should be generally effective. Whether the scheme would work on another frequency is not known. In our own particular case we do not contemplate using ‘phone on any band but 10, so this does not become a problem. — E. E. Pearson, W3QY.

THE SW-3 AS A PRESELECTOR

Receivers of the regenerative-detector and r.f.-amplifier type, which have been retired from service with due honors are often recalled to work as pre-selectors ahead of superhet receivers where they usually do excellent jobs.

In the usual arrangement, a tuned circuit and link are required in coupling the output of the preselector to the input of the receiver. Fig. 2 shows an arrangement which has worked out successfully in which the need for the tuned circuit and link is eliminated by using the audio tube in the regenerative receiver as a low-impedance coupling tube. Only a few changes are necessary in converting the National SW-3 to suit the new requirements. The audio coupling impedance between the detector and audio amp-
Fig. 2 — W3COG's arrangement for using audio amplifier as low-impedance coupling tube when using an SW-3, or similar receiver, as a preselector. C1 and C2 are each 500 µfd., C3 is 0.02 µfd. R is 1000 ohms.

plifier is removed. The plate of the former detector is then coupled to the grid of the former audio amplifier through a 500-µfd. mica condenser and the grid connected to ground through an r.f. choke. The plate of the former audio amplifier is by-passed to ground and the plate voltage fed to it through an r.f. choke. The audio cathode resistance and by-pass condenser are removed and a 1000-ohm resistor to ground substituted. The output of the preselector is then taken off across this resistor with a 500-µfd. condenser in series as shown in the diagram. The link to the input of the receiver should preferably be shielded. It might also be well to substitute an isolantite or other low-loss socket for the bakelite socket in the audio amplifier circuit. — Louis N. Seltzer, W3COG.

CONNECTING DISSIMILAR PLATE TRANSFORMERS IN SERIES

Boy Wheadon, W6KTY, suggests the circuit shown in Fig. 3 to solve the problem of connecting unlike transformers in series to obtain higher plate voltage. When identical transformers are connected in series, no problem is involved, since a center tap is impossible and the only means of using such a combination has been by use of the bridge-rectifier system which requires no center tap but does require four rectifier elements.

In the system suggested by W6KTY, only two rectifier elements are required, but each filament must be insulated from the other. Double rectifiers, like the type 83, may be used by connecting plates in parallel and using a separate tube for each element shown in the circuit diagram. Balanced output is obtained by connecting one of the transformer secondaries in the rectifier return leads and using both center taps. As with any series arrangement, the transformer on the positive side must have sufficient insulation to take care of the additional voltage. Correct polarization of the primary windings will be required. This can be determined by trial. Incorrect polarization will result in bucking voltages.

HINTS ON IMPROVING THE FB-7 RECEIVER

From the experience I have had with an FB-7 receiver, which I purchased a short time ago for five dollars, I believe one or two improvements I have made would be worthwhile to anyone using this type of receiver.

To begin with, the input selectivity can be improved by reducing the number of turns in the antenna coil. I have found that three turns for the 160-meter band, two turns for the 80-meter band and one turn for the 40- and 20-meter bands is about optimum for use with a 25-foot receiving wire. Some slight variation from these figures might be better for antennas of different lengths.

With the primaries altered as described, it may be necessary to readjust the trimmer condenser inside the coil form. It should be adjusted with the receiver connected to the antenna with which it is to be used.

Harmonics of the high-frequency oscillator are sometimes responsible for spurious responses in the amateur bands. It has been found possible to reduce these harmonics by lowering the oscillator plate voltage. This also has the effect of lowering

Northwestern Division Convention

Olympia, Wash., August 23rd-24th

The sixteenth annual convention of the Northwestern Division will be held at Olympia, Wash., August 23rd and 24th. Headquarters will be at Hotel Olympian. A good time is promised all attendants, and there will be many features such as emergency equipment demonstrations and contests. Registration fee is $4.00, or $3.50 before August 10th; YL's and XYL's fee, $2.00. For additional information write Convention Chairman O. U. Tatro, W7EPN, 513 North Central St., Olympia.
the hiss level appreciably. A most convenient way
to make this alteration is to replace the two-
thousand-ohm resistor in the plate circuit of the
24A with one of fifty thousand ohms. A wire-
ound resistance is recommended to avoid possi-
ble drift.

After making the above changes, I found that
the old FB-7 compared favorably with most
modern receivers and it has proven more than
satisfactory for general amateur and traffic work.
— Chas. F. Rockey, W9SCH.

Signal Corps Radio School
(Continued from page 11)

would sound if sent at a twenty-word rate —
there is then a considerable pause equivalent to
somewhat over four characters duration — then
he will hear another character sent at the twenty-
word speed. Thus he learns the sound of charac-
ters sent at normal operating speed, and not by
counting dots and dashes. The student is always
taught to print, not write, on paper, what he
hears. Writing the characters down will not do.

Army transmissions are for the most part sent in
code or cipher groups, and all characters must be
perfectly legible not only to the operator but to
those who may be called upon to decode or de-
cipher the copy. Twenty words per minute is gen-
erally the upper limit that an operator can attain
in pencil printing.

Operators with previous experience may be
given the fixed station operators course. This in-
cludes elementary instruction in touch typing,
and the student gradually increases his speed from
five words per minute on the mill (typewriter)
until he qualifies as a thirty-five-word-per-minute
operator. He is likewise given practice with the
bug. Thirty-five words is not the upper limit,
however, if he has the ability he may work up to
any speed that is possible for him to attain. Fixed
station operators are taught the so-called "War
Department" procedure, which is very similar to
commercial procedure. Chief of the code instruc-
tion is Master Sgt. Reuben Abramowitz (known
as "Abe"), who has been training
radio operators for seventeen years. He claims
that there is no limit to the training an operator
can get at Monmouth.

Being enrolled as a student in the Signal Corps
School does not mean that the enlisted man is re-
lied from the daily tasks that are part of the
duties of all soldiers. He must take his turn at
K. P., and with the various fatigue details to
which he may be assigned. On Saturday mornings
he stands inspection with his own organization.
After 1:00 p.m. on Saturdays his time is usually
his own. He may find recreation at any one of the
various beaches along the Jersey Shore; Long
Branch and Asbury Park are only a few miles
away. There is convenient bus and rail transporta-
tion to New York City.

On the post, each organization has its own base-
ball team, and there are other organized athletics.
There is also an active theatrical group here with
a considerable amount of Hollywood and Broad-
way talent, and there are movies at the War
Department theatre every night.

All men who are radio amateurs, or who have
had radio experience of any kind, or who have
the desire to learn theory or operating, belong in the
Signal Corps. Should you be drafted, be sure to
request the authorities, at your induction center, to
send you to Fort Monmouth. The opportunities
offered you here are without parallel, and it can
be truly said that a soldier learns while he earns,
when attending this school.

★

New Receiving Tubes ★

RCA announces two new receiving-
tube types. The 5Y3/5Y3G is a new full-wave,
high-vacuum rectifier having the same char-
acteristics as the 5Y3G which it supersedes. It
employs GT-type construction and is directly
interchangeable with the 5Y3G.

The 12SL7GT is a new single-ended, high-µ
twin triode with separate cathodes. It is recom-
ended for use in resistance-coupled circuits as a
voltage amplifier or phase inverter. Operating
data are as follows:

- Heater voltage ............................................. 12.6
- Heater current (amperes) ..................................... 0.15

Values for Each Section

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<th>Plate dissipation (watts)</th>
<th>Plate voltage</th>
<th>Grid voltage</th>
<th>Amplification factor</th>
<th>Plate resistance (ohms)</th>
<th>Transconductance (umhos)</th>
<th>Plate current (ma.)</th>
<th>Base connections</th>
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SYLVANIA announces the following revi-
sions of ratings given on page 74 of QST for the
types 6A1H7GT and 12A1H7GT: At a normal plate
voltage of 180, the recommended biasing voltage
is 6.5. Transconductance is now given as 1900
umhos, normal plate current 7.6 ma. and plate
resistance 8400 ohms.

NEW TRANSMITTING RECTIFIER

RCA announces a new mercury-vapor,
half-wave rectifier designed primarily for trans-
mitter use. Its dimensions are such that it
requires less than half the space of the type 866/
866A. Its ratings are the same as those for the
866/866A except that the peak inverse voltage
should be limited to 5000 and the peak plate
current to 500 ma. The average plate-current
rating for the tube is 125 ma. per tube or 250 ma.
for a pair in a full-wave rectifier.

August 1941 49
A BOUQUET FROM MR. FLY

Federal Communications Commission
Washington, D. C.

Dear Mr. Warner:

Thank you for your courtesy of June 16th in sending me a copy of the June issue of QST.

The latter is no stranger to me, for each issue finds a welcome place on the reading table in my office. However, your letter affords me a long-desired opportunity to personally hand an orchid to The American Radio Relay League, and to that great fraternity — the “hams” — in general.

Our experience here has been one of pretty consistent understanding and cooperation on the part of the amateurs. This loyal spirit is now reflected to a marked degree in the present emergency. Our experience here has been one of pretty consistent understanding and cooperation on the part of the amateurs. This loyal spirit is now reflected to a marked degree in the present emergency.

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Warning. Fifteen Amateur Licenses Suspended. Because they violated the FCC emergency order prohibiting communication with points in foreign countries, fifteen amateurs’ licenses have been suspended...thirteen in June, plus a W8 and a K6 on July 1st! The Commission reports no evidence of subversive activity, but stipulates that the licensees were clearly violating Order No. 72, and that these suspensions are “exemplary of emergency requirements and demonstrate the futility of trying to flout the ether patrol.” Those suspended suffered a 60-day suspension. In the June issue we identified an out-and-out revocation for this offense!

Space prohibits our identifying all these operators. If the fifteen thought they were getting away with something, their simple reasoning has been found at fault. The penalty was prompt! FCC means business, and the lesson will not be lost on all amateurs interested in staying on the air. ARRL again urges...upon amateurs the thought that violations of this order must completely cease. Besides the personal risk of incurring the most severe penalties, as the radio security of the country takes on increasing international importance, the irresponsible DXer is wantonly destroying the faith and trust of the government in the responsibility of radio amateurs as a class. All good amateurs should watch...violations of FCC orders, should be vigilant against deception while themselves operating, and quick to report promptly to ARRL or FCC any observed violation!

There is scant amateur sympathy for any licensee who loses his ticket for violation of the order prohibiting foreign communication. The view is becoming general that the sooner violators are turned over to the government for attention, the safer and sounder amateur radio privileges will be made for the rest of us amateurs, who are doing all we can to show responsibility and to prepare ourselves for defense work and public service. The answer of so many of those caught calling and working contrary to Order 72 that “it sounded like a W prefix” caused some of the government officials to politely “regret” the circumstances, but perhaps with the tongue-in-cheek. Even the smartest alibis didn’t save licenses!

U.H.F. Round-Up Coming Aug. 9th–10th. The nation’s u.h.f. enthusiasts are to have a mid-summer round-up on the air. The basic point scoring system has been simplified so it is the same for work on any u.h.f. band. Multipliers take care of the ability to work portable, use c.w., or cover different bands. Besides the chance of getting in on a transcon, there’s fun and marathon points guaranteed for all. See details elsewhere in this issue, and tune up on u.h.f.’s, August 9th, everybody.

Code Rhythm. The ear is a forgiving organ. Once one views a tape recording of what sounds like pretty passable stuff, glaring defects in spacing become apparent. By mental adjustment we quickly recognize and “read” passable code, once we have our habitual responses trained by practice, and more practice, in reception and transmission of Continental. What a wonderful sensation it is to run into an operator now and then who really has highly-developed code rhythm, who can skillfully put emphasis and expression in his rhythmic sending. A lot of amateur sending lacks “poise.” We earnestly hope a two-part QST article starting soon on good fists will help thousands interested in the Code Proficiency Program to arrive at the ability to make the good old key really talk. The experienced way in which he slings Continental is the mark of the real amateur!

We hear that many are using the daily-except-Friday WIAW practice sessions, as had been suggested for sending practice. Therefore, we continue to give the listing of subject material for three of the six weekly practice runs each month in QST. To get sending help, hook up your own key and buzzer (or oscillator), turn to the QST material, tune in WIAW, and attempt to send right in step with the tape signals. It will help you to adjust your spacing in the direction of automatic or ideal sending as no visual record can.

Got Your Ticket to the Code Proficiency Frolic? This major ARRL September operating fun is to be September 12th–13th–14th, 19th–20th–21st. No details here. The September issue will have the brief, simple outline. This is only a reminder...a last call for those who need to get into the group of those having ARRL Proficiency Awards on the currently announced runs for qualification. Many thousands of amateurs having the proficiency certificates will be taking part, and you will want to be one of them! Look up all dates of qualifying runs and be in on this big September event. To wait until September will make you too late.
Invitation. If not already lined up, and if you have a good amateur station, we invite you to help in expanding our ARRL Section networks for handling messages to and from those men in the services. Each SCM, RM and PAM is working for additional city and town coverage in creating interconnecting city-to-city defensive networks in which you should seek a place if you are a licensed transmitting amateur wishing to combine radio operating training and practical service to the nation. Your Section Manager, whose address appears on page 4 of this QST, will gladly take care of your application for ORS or OPS posts which can be earned by consistent operating and reporting to the SCM. Networks for both c.w. and voice operators are being built up. A special organizing effort is being made by the leaders in each Section, starting with a survey by leaders by radiogram during July 26th/27th activities. Whether your interest is in expert c.w. or voice operating, ask your SCM to line you up with his networks if possible. Give him your operating frequencies and brief station-operator details, so he can put you in touch with the proper RM or PAM.

New Booklet Free to Members. A new edition of the 20-page Operating an Amateur Radio Station has added sections on Code Proficiency and network organizing and a tabulation of the new special FCC Orders. Any amateur may receive this booklet by sending 10¢ to ARRL to cover mailing charges, and any League Member may get it free on request as part of his membership service. Since part eight of the booklet has several pages of detailed information about the field organization appointments, duties of officials, etc., every operating amateur, especially those interested in becoming part of the defensive networks of amateur radio, should secure this publication that explains the different appointments and League Awards to radio amateurs.

--- F. E. H.

BRIEFS

Just before noon on May 20th, W1UIU received a call from the Forestry Department and the State Police of New Hampshire that a communications emergency existed at the scene of a forest fire in Stoddard, N. H. The telephone service for that territory being a private arrangement, the Forestry Department was unable to get a special line, the nearest being four miles distant. W1UIU contacted the Exeter and Hampton Electric Co. who released W1LISN. Together these two amateurs proceeded to the scene of the fire with 50-Mc. mobile equipment. There, in spite of a path very unfavorable to u.h.f. signals due to mountainous terrain, the gap between fire headquarters in Stoddard and the nearest "phone in Antrim, N. H., was bridged and 100% contact maintained until the fire was put out.

Notes on Receiver Usage

BY GEORGE W. MARTIN, W6STT*

The advent of the electron-coupled oscillator as a reliable means of excitation for amateur radio transmitters has introduced a multitude of advantages with which most of us are familiar. It is the purpose of this article to discuss briefly the cause, effect and remedy for one of the few disadvantages that has arisen from e.c.o. operation. Specifically, this lies in an increasing tendency on the part of amateur radio station operators to limit the scope of their receiver tuning either to the exact frequency to which their own transmitter is adjusted, or, at best, to a few kilocycles each side of this frequency.

Happily, the disadvantages that e.c.o. operation has introduced are so overwhelmingly in the minority, that even the "die-hards" must admit that this welcome addition to our amateur radio equipment is here to stay. For this very reason, we must consider diligently whatever disadvantages may arise from its operation, lest we lose sight of them altogether in our contemplation of the vast improvement it has made. Furthermore, it is not the way of the progressive amateur to overlook any disadvantages — even apparently insignificant ones. We have learned that it is in just such matters that our patience and diligence pay best dividends, that our perseverance in quest of the solution to a difficult problem is usually rewarded by the development of an effective remedy.

A few hours spent in listening on any of our active bands will convince most of us that, while there are a few exceptions, the average American amateur does not move his receiver tuning dial very far to either side of "zero beat" with his transmitter signal. We surely have come to expect that, since an operator can make highly satisfactory contacts almost at will and never move his receiver tuning far from his transmitter frequency (because answering stations shift by a.c. to his frequency), it is only natural for him to conclude that it is poor practice to ever move the dial at all!

We all know that this is certainly not true. Yet, one might believe after listening for a while, that there are FCC regulations which prohibit a station on, let us say, 3600 kc. from contacting one on 3700 kc., or a station on 7100 kc. from answering a "CQ" he has heard on 7200 kc. without first contacting one on 7000 kc. For this very reason, we must consider diligently whatever disadvantages may arise from this operation.

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do know that such regulations do not (and never should) exist. It must follow, that an effective remedy for such a deplorable state of affairs will depend, as usual, upon the rank and file of U. S. amateurs. Upon you and me. Upon our determination to develop an habitual receiver operating practice whereby our hours of station operation are characterized by constant vigilance within the channel we choose, not only in the narrow confines of five or ten kilocycles on either side of our transmitting frequency, but outward thence to the very edges of the band. In the universal adoption of this (or equivalent) procedure, and in this alone, can we hope to achieve the highest standards of alertness, efficiency and intelligence in receiver usage, as a function of our communication activity.

The pilot of a vessel would not consider navigating his craft through a narrow channel wearing "blinders" that would limit his vision forward to a scope of, let us say, ten or fifteen degrees. By no means! He would insist upon removal of the "blinders"—upon being able to see not only forward, but also to either side, so that he could do his job intelligently. By the same token, we should constantly strive to broaden our vision of the radio-frequency channel we would negotiate. For unless we take soundings at every depth (listen at all points on the band), how shall we discern the shallows and the shoals of that channel?

As an amateur who has held his ticket for over five years recently stated during a QSO that he was "new to the high end of the 7-Mc. band" (most of his previous work having been in the vicinity of 7100 kilocycles). He spoke as though he were blazing new trails. He was like a lost wanderer far from the familiar landmarks of a narrow realm beyond which he had not dared to venture; but having done so, he were like a true wanderer of the band to the other, will be heard, after each general call! But it is surprising how many other-wise efficient operators, influenced by no means! He would insist upon the removal of the "blinders"—upon being able to see not only forward, but also to either side, so that he could do his job intelligently.

One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-station operators make the B.P.L. on deliveries. Delivers count.

Brass Pounders’ League
(May 15th–June 15th)

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
W18EOQ | 85 | 160 | 1128 | 4034
W4FFL | 94 | 190 | 494 | 1188
W6GGB | 265 | 394 | 385 | 1426
W6LJU | 357 | 479 | 5 | 1309
W5OW | 177 | 193 | 944 | 2030
W3BWT | 96 | 117 | 769 | 11110053
W3K0Z | 106 | 98 | 774 | 8196
W3FUJ | 217 | 49 | 789 | 371012
W6GWW | 81 | 59 | 759 | 55951
W9JMC | 10 | 56 | 674 | 946
W6DHI | 56 | 85 | 691 | 43795
W6GKO | 11 | 40 | 780 | 3186
W6PDK | 105 | 149 | 424 | 105780
W6RWW | 38 | 174 | 356 | 151731
W6CIZ | 22 | 38 | 635 | 33728
W6LMI | 126 | 122 | 92 | 515
W5MN | 52 | 136 | 302 | 115605
W2MNT | 32 | 43 | 478 | 37590
W2NO | 38 | 470 | 44 | 577
W6IOX | 13 | 35 | 468 | 35550
W6HMG | 73 | 64 | 406 | 2545
W7RZM | 9 | 0 | 530 | 523
W6DD | 0 | 0 | 514 | 514
W6QIN | 16 | 8 | 480 | 458
W6LI | 21 | 7 | 372 | 25506
W9ESA* | 41 | 131 | 225 | 102500

**MORE-ONE-OPERATOR STATIONS**

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
KA1HR | 1739 | 1158 | 14 | 11324034
W2CQ | 35 | 54 | 927 | 541188
KA1HJ | 221 | 197 | 220 | 152820
W9KKR | 261 | 293 | 36 | 0590
W9NEP | 221 | 122 | 139 | 6451

**MORE-ONE-OPERATOR STATION**

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
WLMH (W6CDA) | 299 | 178 | 2041 | 1782696

A total of 500 or more or 100 deliveries + Ex. Del. Credit also rate B.P.L. standing. The following one-station operators make the B.P.L. on deliveries. Delivers count.

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
W8WKA | 365 | W9J0G | 119
W9JG | 146 | W6WQ | 118
W2MLW | 230 | W6QG | 118
W7APS | 228 | W6LLW | 139
W6CGI | 220 | W6JW | 126
W2CGG | 210 | W5DDW | 135
W2CGG | 228 | W6BVG | 127
W9WNV | 214 | W6RWW | 135
W7GWH | 129 | W6IOF | 123
W6HVF | 154 | W6LH | 126

**A.A.R.S.**

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
WLMH (W6CDA) | 299 | 178 | 2041 | 1782696

A total of 500 or more or 100 deliveries + Ex. Del. Credit also rate B.P.L. standing. The following one-station operators make the B.P.L. on deliveries. Delivers count.

**Call** | **Orig. Del. Rel. Credit** | **Total**
--- | --- | ---
W8AOK | 299 | 178 | 2041 | 1782696

**BRIEFS**

We've all heard of stringing up antennas for portable operation by tying the end of a piece of wire to a rock and heaving it over the limb of a tree. Here's a new wrinkle; In charge of FD arrangements for the Cuyahoga Radio Assn., W8AOK carefully laid out lengths of fish line on a table at the field location. He then tied sinkers into an old-fashioned slingshot, and proceeded to aim at tall trees near-by. Presto! Antennas up.

We have recently received many inquiries at A.R.R.L. from people who had asked us to forward QSL cards to the representatives of KC4USA/B/C regarding the possibility of obtaining confirmation of contact with Little America. Those who sent their cards via A.R.R.L. will be pleased to know that Elmer Lamplugh, who operated KC4USA/B/C August 1941
dropped in on us a short time ago and picked up all the cards we had on hand for K64. Your Little America card should be coming along any day.

For the benefit of beginning amateurs, W8RVO, of Springfield, Ohio, is conducting code practice daily except Saturday at 2:00 P.M. EST on 1900 kc.

SS correction: The winner for Western Pa. is not W80KC as listed in June QST. This station was incorrectly listed; it should have been included in the Eastern Pa. scores. W81KGN is the rightful winner and has been awarded the certificate award for his section.

On May 17th last, the amateurs of the Crystal Radio Club of Blauvelt, N. Y., participated in the Third Annual Mock Disaster Mobilization of the Rockland County Emergency and First Aid Council, Inc., under the auspices of the American Red Cross at Memorial Park, Nyack, N. Y. It was assumed that a disaster had taken place at the park in Nyack and that all types of equipment were needed to rescue the injured and restore order. W2BGI, operating at this location, on 112 Mc. issued a call for the N. Y. Tel. Co. and the Rockland Light and Power Company trucks, so that communications and light service might be restored. This was followed by calls for fire trucks, rescue squads and ambulances. Assisting in the working of the local Emergency Net were W2IRA, W2ITE, and W2FMI, with W2FMI in Tarrytown standing by in case assistance was needed from Westchester County. Meanwhile W2FVJ was cruising over the county in an airplane with a transceiver and standing by for orders. An interesting highlight of this phase of the mock disaster was the simulated rescue of a man and baby who had gone overboard from a canoe in Hudson River. Supposedly spotted by the plane, W2FVJ relayed the information to W2NII, stationed aboard the Sea Scouts boat moned an ambulance to the scene by working W2ITE at the Nyack Hospital. Shortly following all stations were released from duty after a thoroughly convincing demonstration of the public of the potentials of amateur radio communication during time of local emergency.

WIAW Operating Schedule

Operating-Visiting Hours:
2:00 P.M.-4:00 A.M. EST daily*, except Saturday-Sunday.

* Exception: During an Operators vacation, that is between dates of September 4 to September 19 inclusive, station hours will be 7:00 P.M.-1:00 A.M. EST in that period one attendant, instead of the customary two station attendants will be available.

Saturday and Sunday — 7:00 P.M.-1:00 A.M. EST.

Official Broadcast Schedule (for sending addressed information to all radio amateurs).

Frequencies
C.W.: 1761-3825-7280-14,253-28,510-58,968 kc. (simultaneously)

Note: Effective July 25th, the 7-Mc. frequency will be changed from 7150 to 7280 kc.

Starting Times (P.M.) Speeds (WPM)
EST GST MST PST M T W Th F Sat Sun
5:30 7:30 8:30 9:30 10:15 12:00 15 25 15 20 20 20
Midnight 11:00 11:00 9:00 15 25 15 20 15 15

PHONE: 1806, 3950.5, 14,237, 28,510, 58,968 kc.

Each code transmission will be followed in turn by voice transmission on each of the above frequencies.

CODE PRACTICE:
Besides the OBS times and word speeds given above, WIAW will adhere to a schedule for sending code practice transmissions at progressively increasing speeds (15 to 35 w.p.m. in 5 w.p.m. steps) daily except Friday, starting at 9:45 P.M. EST. The Proficiency Certificate Award qualifying runs, after a 15-minute advance notice at 9:45 P.M. EST, start at 10:00 P.M. EST, August 15th and September 20th. Daytime runs for qualification, after notice at 1:00 P.M. EST, start at 1:45 P.M. EST on August 3rd and September 6th.

GENERAL OPERATION:
Besides specific schedules in different bands, WIAW devotes the following periods*, except Saturdays and Sundays, to GENERAL work in the following bands:


WIAW Sending-Practice Subjects and Qualifying Runs

July 20th to September 1st., Sunday, Tuesday, Thursday.
(Daily, except Friday, practice starts at 9:45 P.M. EST)
Date Subject of Practice Test from July QST.
Aug. 3. 1:30 P.M. EST, WIAW daylight qualifying run. Unidentified copy.
Aug. 10. Apartment Size 150 Watt Transmitter, p. 12.
Aug. 29. In the Services, p. 32.
* June '41 QST.
It is by now an old story to most of our customers that the defense program is curtailing the use of certain materials in consumer products. Like nearly all manufacturers, National is faced with the necessity of redesigning products to meet these requirements.

Such being the case, we have decided to make a virtue of necessity. Whenever it has been necessary to abandon an old construction, we have engaged in intensive development to find a new and better way for which the necessary materials were available. This work has been going on for some time, and you may expect to hear about it from time to time on this page.

We can give you an example of one such change. Some years ago when the NC-100 was introduced, we used a condenser-input filter on the power supply, because such a filter gives the least hum per dollar of cost, and because the load current was so constant that there was no need for the better regulation of the choke-input filter. However, the filament of the Type 80 rectifier heated more rapidly than the cathodes of the output tubes, so that there was a brief period during which the B-voltage reached an abnormally high value. So to protect the filter condensers, we employed a certain type of self-healing wet electrolytic condenser in the filter output. Such a condenser provides a first-class voltage regulator, because the leakage current rises very abruptly whenever a certain voltage is exceeded. In fact, the only reason why these condensers do not make ideal regulators for general purpose work is their inability to dissipate energy fast enough to make them suitable for continuous duty. Over short periods of time they are thoroughly reliable and in this application, highly effective. Consequently, this same filter was used in the NC-200.

These condensers can be made only in aluminum cans, and are now no longer available. So the current NC-200's have been equipped with an excellent choke-input filter whose regulation is inherently good enough to keep the voltage where it belongs at all times. To this we added a special r.f. filter in rectifier output circuit, so that the hum level is, if anything, lower than before. (For all practical purposes the hum was zero with either system, so that this is really splitting hairs.)

Of course, improvements not prompted by the exigencies of the defense program are still being made. There is now, for instance, an audio input jack on the front panel of the NC-200, so that it can be used with phonographs or FM tuners. This is "by popular demand": -- for the audio channel of the NC-200 is flat within 2 db from 40 to 15,000 cycles. Another item of improvement is in the mechanism of the coil carriage which now shifts much more easily.

But the main thing we wanted to say is that the defense program will not result in a deterioration of National's quality. There will probably be inconveniences and delays for these we cannot help. But quality we will maintain. The cloud does have one silver lining. The intense research prompted by the defense program is resulting in great technological improvements. Some day we will reap the benefit in the form of finer equipment than we have ever known in the past. Let's hope that day will come soon.

JAMES J. FREELEY
Hamfest Schedules

July 27th, at Mackinaw Dells, Ill.: The Central Illinois and Peoria Amateur Radio Clubs will co-sponsor a hamfest to be held July 27th at Mackinaw Dells Recreation Park, halfway between Peoria and Bloomington on Route 150. Free beverages and ice cream will be served. A meeting place for each of the Illinois nets will be provided. Exhibits of portable equipment, u.h.f. gear, games, and speakers will feature the day's program and a 112-Mc. transmitter hunt is tentatively scheduled. Registration is $1.00 for the OM's, $0.50 for the ladies, and children will be admitted free. Secretary E. M. Matthews, W9UQT, of the CIARC will be glad to furnish further details.

August 2nd, 3rd and 4th, at Big Springs, Idaho: The Ninth Annual WIMU Hamfest (Wyoming, Idaho, Montana, Utah) will be held August 2nd, 3rd and 4th, at Big Springs, Idaho, which is located in Targhee Forest, 17 miles south of the west entrance to Yellowstone Park and may be reached via U. S. Highway 191. Accommodations at reasonable rates are available at the location. For reservations write to Manager, Big Springs Inn, Big Springs, Idaho. A public camping ground in a clean and beautiful place, complete with strong, tables and fire wood, is situated just south of Big Springs for those who wish to set up their own accommodations. Amateurs are urged to bring their families to enjoy the scenery, fishing and various other pastimes. For more information write to radio Lat D. Branson, W7AMU, 1002 E. 15 St., Casper, Wyo.

August 3rd, near Savannah, Ga.: The Amateur Radio Club of Savannah announces a hamfest to be held on August 3rd at the Gold Star Ranch, located three miles south on the White Bluff Road. Registration starts at 2 P.M. The program will consist of two short speeches, various games, including a soft ball game for the men and a Bingo game for the ladies. Refreshments will be served before the games and a banquet afterward. All amateurs are cordially invited to attend this gala affair. Fee: $0.50 per person.

August 10th, at Trenton, N. J.: The Delaware Valley Amateur Radio Association will hold its Fifth Annual Outing and Hamfest, Sunday, August 10th. The place: Trenton State Fair Grounds, Trenton, N. J. Admission: Adults, $1.50; children, 75¢. The program starts at 10 a.m., continuing all day, and will include various outdoor sports, games and all the refreshments you can eat and drink. Further details obtainable from Chas. Kayser, W3IOK, General Chairman, 73 Brook Lane, Trenton, N. J.

August 10th, at Shrewsbury, Mass.: The Worcester Radio Association announces its Annual Hamfest will be held on August 10th at Edgemoor Lodge, on beautiful Lake Quinsigamond, Route 20, Shrewsbury, Mass. Registration starts at 2 P.M. and the admission is $2.50. The activities for the day will include a 112-Mc. treasure hunt, swimming, boating, YL beauty contest, a special talk for the women, soft ball game, followed by a real good chicken banquet and dancing to an all-girl orchestra. Reservations are limited. Write J. J. Lyons, W1LBU, 94 Lovell St., Worcester, Mass., for additional information.

August 15th, 16th and 17th, at Cincinnati, Ohio: The Greater Cincinnati Amateur Radio Association will co-sponsor a hamfest with the Grand National SWL Club, the International DX'ers Alliance, and the International Round Table of St. Louis, on August 15th, 16th and 17th, in the Hotel Netherland Plaza in Cincinnati. A banquet will be served Saturday night. Price: $1.75. Registration for the hamfest only will be $1.25. For further details communicate with WSTPZ or WSVBG.

August 30th and 31st, at Chicago, Ill.: The Hamfesters Radio Club announces its First Annual Hamfester Jamboree, to be held August 30th and 31st at the Knickerbocker Hotel in Chicago. A big program is planned, including a hidden transmitter hunt, ultra-high frequency contest, B.C. network show, net meetings, topped off with a banquet. Registration: $2.50. Additional information may be obtained by simply addressing RADIO-KNICKERBOCKER HOTEL, Chicago, Ill.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Section, closing date for receipt of nominating petitions for Section Manager, the name of the present

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56
CODE PROFICIENCY AWARDS mean higher operating speed for the amateur. During a high speed QSO there is little time for fussing with the receiver. The "HQ-120-X" is free of those operating "bugs" which are a constant menace to high speed operating. Voltage regulation prevents detuning during power line surges; freedom from interlocking prevents strong stations from pulling the receiver off the station you're copying, and an excellent crystal filter permits changes in selectivity to avoid interference without retuning. The "HQ-120-X" is not sensitive to vibration and there is nothing which could cause detuning due to pressure on the controls or panel during normal operation. Select an "HQ-120-X" for unbroken high speed QSO's.

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Please send 16 page "HQ" booklet.

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Canadian Office:
41 West Ave. No., Hamilton
History-Making CARDWELLS

These two fore-runners of the popular XT-440-PS were used in this transmitter, which established first two-way transatlantic amateur radio communication on November 27th, 1923.

Built and operated by Fred H. Schnell, then 1-MO, (now Radio Supervisor, Chicago Police Department) this transmitter was heard by Leon Deloy, F8-AB, who called Schnell, I-MO, saying, "R R QRK UR SIGS QSA VY ONE FOOT FROM PHONES." Deloy then called Reinartz, 1-XAM, whose transmitting circuit was used at all three stations and they also worked. Transmission was on 100 meters and, consummated a year’s constant and unremitting effort by these three pioneers.

CARDWELL produced the first "low-loss" condensers years before these vital points of superiority were recognized and adopted as standard methods of construction.

Close scrutiny will reveal that there have been few additional major improvements in this basic patented design. It is a flattering tribute to the soundness of CARDWELL engineering.

THE ALLEN D. CARDWELL MANUFACTURING CORPORATION
83 PROSPECT STREET • BROOKLYN NEW YORK

58
THERE is hardly a place on this planet, where communication equipment is used, that can't boast of a "SUPER-PRO." From Alaska to Antarctic — New York to Shanghai — everywhere "Super-Pro" receivers are doing justice to their fine reputation. Services for which they are used include: military, news, rebroadcasting, diplomatic, and remote pickup.

Engineers have found in the "Super-Pro" two qualities which have long made it famous — RELIABILITY and FLEXIBILITY. Its reliability is a matter of record, its flexibility is the result of sound engineering. No matter what the requirement may be, you'll find as others have, the "Super-Pro" the one receiver most likely to do the job.

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CANADIAN OFFICE: 41 WEST AVENUE NORTH, HAMILTON, ONTARIO

EXPORT DEPARTMENT, 100 VARICK ST., NEW YORK CITY
The DK-3 features INDUCTIVE ANTENNA COUPLING, continuously variable and controllable from a special coupling knob on the front panel. This enables use of maximum power while the transmitter is in operation and permits a wide degree of receiver control. Weak signals, lost under ordinary conditions, can be worked. Effective range varies from 2 to 30 miles, depending upon terrain.

SPECIFICATIONS
- FREQUENCY: Covers the amateur 2 3/4 meter band (112 to 116 mc.).<br>- For Portable—Monobattery operation: Three 6 volt B batteries (Eveready No. 322 or Burgess M30) and four 1 3/4 volt batteries (Eveready No. 742 or Burgess 4FH).<br>- For Fixed Station, 110-volt AC operation: Use an AC power supply giving 135 to 180 volts DC output.<br>- INDUCTIVE ANTENNA COUPLING: Variable antenna coupling knob on front panel permits maximum power in transmit position and enables flexible receiver control for both weak and powerful signals.<br>- Antenna: For portable operation—two pieces of copper or aluminum tubing approximately 17 inches long or an adjustable vertical antenna. For fixed station operation—most standard antennas will work with the DK-3 variable inductive coupling.<br>- ONLY TWO INEXPENSIVE TUBES: 6COC as Audio Amplifier (to receive) or as modulator (to transmit); 6JSST as Super Regenerative Detector (to receive) or as Oscillator (to transmit).<br>- MICROPHONES AND HEADPHONES: Use any good single button 300 ohm carbon mike and any standard headphones. Handsets should incorporate 200 ohm microphone and high impedance phone.<br>- SIMPLE OPERATION: One volume control, with on-off switch, for both receive and transmit positions; microphone and headphone jacks; variable antenna coupling knob; ceramic antenna insulators; transmit and receive switch; large easy-turning knobs.

DK-3 Transceiver for 2 3/4 meter operation. Completely self-contained, battery operated, ultra high frequency radio-telephone transmitter or receiver. Compact, grey wrinkle-finish metal case with sturdy leather handle. Removable back panel for easy access to batteries and tubes. Size, 11" x 11" x 4 1/2". Shipping weight, 11 pounds. List price, less batteries and tubes. (Subject to Amateur discount) $32.

Available at local distributors everywhere.

The Month in Canada

Well, fellows, this column is getting bigger and better each month, and it is just beginning to be known. When the chaps Overseas start sending in their reports, I am afraid the Editor will have to increase the size of QST.

What a grand report last month—and from reports I am receiving this column will be for Canadians the most popular pages of our magazine. A little more news from central and western Canada would make a complete job of the Dominion.

Keep up the good work!
—Alex Reid, VE2BE

In the personal items appearing in this page seem to be centered mostly with members of the service units, there is good reason for it. We have it on the best of authority that at least 1700 of the 3380 individuals holding VE ham tickets at the outbreak of war are now in active service.

When it is considered that the 3380 total includes all ages, almost every civilian occupation and every kind of position, the showing becomes a truly extraordinary one. And when on top of that it is stated that of those 1700 more than 1/2 are commissioned officers (the majority of them in the RCAF), the performance almost passes belief.

Yet these are the facts. They tell a story of which every one of us can be deeply proud. FB, VE's, and carry on!

MARITIME—VE1

LU J. Facer, 1PQ, our indefatigable Nova Scotia recordist (both on wax and paper!), contributes another collection of VE1 doings gathered in his wanderings around the district with the Concert Parties Division:

EV is with the Canadian Navy (exact location unknown). FE, with the Avon Power Co. at Windsor, N.B., at the outbreak of war was about ready to try out a model yacht to be radio-controlled on five meters. FY is with the Dept. of Transport at Halifax. Previously he was with the Western Union Cable Co. as wireless operator on the cableship Lord Kelvin. GC is with the Telephone Co. at Halifax. He was previously in charge of maintenance work at their Lunenburg office. HG is in charge of SWP at St. John's, Newfoundland. IK is with the Dept. of Transport, located at St. Paul's Island off Nova Scotia. GIK is at Truro with the Canadian National railways.

GB is still watching the film feed a projector at the Garrison Theatre in Halifax. HP and JL are on the staff of Station CBA at Sackville, N.B. IB is with the Maritime Tel. and Tel., located at Truro. ID is still located at Berwick where he is associated with his father in a flour and feed business.

IK is with the Medical Corps of the Canadian Army, stationed at Halifax. IL is at Moncton, N.B., where he is connected with the Royal Canadian Mounted Police. IQ is now at Ottawa with the Civil Service Commission. IS is on the staff of the Atlantic Fisheries Experimental Station in Northern New Brunswick.

JV, KJ and OM are attending college at Halifax. All are members of the college band and dance orchestra. NW is doing service work for T. Eaton Co. at Halifax. QQ is a Wireless Air Gunner with the RCAF now serving in England. AW conducts a radio service business in Halifax, with OB as his assistant. KH is with the RCAF at one of the Training Centres in Western Canada. KB is doing radio service work in Halifax. LP and MN, the Stevens brothers, are with the RCAF.

AA, now with the Dept. of Transport, was on the staff of Douglas Aircraft in California. ET is with the Dept. of Transport, having served up north for eighteen months in a govt. wireless station. BV is with the Dept. of Transport as travelling maintenance man with headquarters in Halifax. JK, formerly with the Canadian Marconi Co., is with the
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**Champions or Transformers...**

There are lots of folks to whom any dog looks pretty much the same as another. But the champion that takes the grand prize at the Bench Show is the one with the pedigree... And there are people to whom one transformer looks pretty much like another. The same kind of case, the same general specifications, the same ratings. But what a difference there can be!

Smart buyers of transformers do not rely upon appearances. They buy them on the basis of Reputation and Prestige (which is just another way of saying “Pedigree”).

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Dept. of Transport. TV is with the Dept. of Transport in the Halifax Office. IH is with the Canadian Army in Ontario. HH is with the Dept. of Transport at Charlottetown.

JC (ex-NAV) is located in Nova Scotia as an electrical maintenance man with a mining concern. JF conducts a radio service business. IJ, the T. L. station for Halifax previous to hostilities, is attending college at Halifax. KY is located at St. John, N. B., in charge of the radio service dept. of the General Electric Co. MW is with the RCAF somewhere in Canada. MZ conducts a shoe repair business in Halifax. NB is with the Canadian Army. He is also a boxer of no mean ability. NI is with the Dept. of Transport and is at present doing isolation duty in the far north. NK is attending college at Halifax. MA is with the Canadian Army, stationed at Halifax. KG is in the Canadian Navy. DD, one of Canada’s pioneer radio amateurs, is station director of CNR at Halifax. NN is at Bedford, N. S., in charge of the CHNS transmitter. JF is foreman in a chocolate dipping room of Moirs chocolate factory at Halifax. DS is doing radio service work in Halifax. MF is with the RCAF in Ontario. HV conducts a radio service business in Halifax. Ex-AQ is with the Signal Corps in the Canadian Army, located at Halifax. The present AQ is with the Canadian Navy. He was formerly with the Canadian Westinghouse Co. at Halifax and held a VE2 call. EF is with the Signal Corps of the Canadian Army located at Halifax. 

He was formerly with the Northern Electric Co. here. BC, in the radio service business in Halifax, has one of the most up-to-date service shops east of Montreal. EH is with the Western Union Cable Co. at his old hunting ground in eastern Nova Scotia. BK, formerly one of the great VE1 DX boys, is with the Canadian Army. BP is now in Ottawa with the National Research Council in the radio Labs. BT conducts an electrical business at Berwick, N. S.

---

**Ontario—VE3**

From Len Mitchell, 3AZ, we hear:

IW has accepted a position with the Foreign Exchange Control Branch. EII was recently married and is now wire chief for the Canadian National Telegraphs at Kapuskasing. NR has accepted a commission as lieutenant in the Royal Canadian Navy. SG has been spending a great deal of his spare time teaching code to recruits for the Signal Corps. KA is now assigned to the Third Division Signals, in camp in New Brunswick.

According to 2OL of Asbestos, Quebec, last news from AU of Unionville, Ont., now in government employ in Ottawa, was in the form of a wedding announcement — mailed from London (England) early this year.

ADU left Toronto in the spring of 38 for the Northwest Territories as operator for a mining company. While on the Arctic Coast he used a portable box in the form of a wedding announcement — mailed from London (England) early this year.

ADU introduced KT and LZ to airline operations — both of whom use their calls as personal sines on the airlines e.w. network.

---

**British Columbia—VE5**

SOM C. O. Sawyer, 5DD, leads off this month with a clipping from the B. C. Electrical Employees Magazine for April, 1941: It represents a quotation from a letter from BI, now in England with the RCAF:

“Arrived here after a rough trip. We were not in convoy so we made fairly good time, and with the exception of one night when we were chased, there were no unusual incidents. It was a rather small boat of 4000 tons and a very poor sea boat so far as comfort was concerned... On arrival we received a few days’ leave, so I spent considerable time in London and was agreeably surprised to find not nearly the damage the headlines had led me to expect, although many districts, no doubt, have suffered badly. Since this is my first visit to this part of England I am really enjoying the sights.

“We were fortunate enough when on a tour of Windsor Castle, to meet Her Majesty, and had the great luck to be invited to have tea with Her Majesty and the two princesses. We chatted for over an hour,...
9, Cherry Orchard, 
LIGHTFIELD, 
Staffs.

24th May, 1941.

Dear Sirs,

I would like to place on record my appreci-
atation of a most pleasant transaction and add that I am
delighted with the Receiver. During the last eight
years I have owned various models of well known Comm-
munications Receivers, about ten in all I think, some
bad, some good, but not one has come anywhere near to
the H.R.O. in performance.

The money spent during this period would
have bought several H.R.O. Receivers and it is only
when one has used an H.R.O. that one realizes what a
shocking amount of money is wasted in looking for
something good and cheap, it simply does not exist.
The H.R.O. is worth every penny spent and
is first class value.

Yours faithfully,

(signed) JOHN M. FOOGO
Warm summer days beckon the
amateur to the open country with his
U.H.F. portable rig. The thrill of
operating on ultra high frequency only
U.H.F. portable rig. The thrill of
operating on ultra high frequency only
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Thordarson the reputation of being
over 46 years.

Build your U.H.F. equipment with
Thordarson Transformers and ex-
pertise real DEPENDABILITY.

Top Performance

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in U.H.F.
W8RHZ (Harry L. Steffan) with a pair of Eimac 250T's gets R9 Sigs in 45 states, R9 - in Kent, England

"...I think Eimac Tubes are the best on the market... and when I build my 10 meter rig it certainly will have Eimacs in it."

Close-up view showing the Eimac 250th's in full operation. Note plates are running at extreme temperature yet tubes do not "gas out."

Harry says: "There is a certain feeling of confidence when a fellow has Eimacs in his transmitter and it seems that the most consistent stations that I have contacted, all use them."

The "confidence" of which Harry speaks is probably contained in the fact that Eimac tubes consistently turn in superior performance, even under adverse conditions...and...that they are the only tubes on the market which are unconditionally guaranteed against premature failures caused by gas released internally.

Put Eimacs in your transmitter and enjoy this better, safer performance.

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G. G. RYAN, 549 W. Washington Blvd., Chicago, III.

N. Caro., S. Caro., Georgia, Tenn., Fla., Ala., Miss.
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PEEL SALES ENGINEERING CO., R. Peel, 154 E. Erie St., Chicago, Ill.

Export Agents: Frazier & Co., Ltd., 301 Clay Street, San Francisco
This leads to the second fundamental thought: "For what purpose do the ARRL issue these certificates and appointments?" The answer is obvious—to designate an amateur of better-than-usual accomplishment. Logic leads to the conclusion that the person receiving these appointments should be a better-than-usual amateur in all phases of amateur activity. The type of appointment is a designation of the special branch of amateur operations the station desires and is best fitted to perform.

After all, an ARRL Code Proficiency Certificate can be secured to 15 w.p.m. That's only 2 w.p.m. over the FCC examining speed! Certainly that is not too much to ask of any station desiring recognition as an amateur of more than average accomplishment. And it does make these certificates mean something!

--- Frank E. Lyon, WSHML/WLQA

CODE PROFICIENCY AND THE NAVY

U. S. Naval Training Station, San Diego, Calif.

Editor, QST:

Your code proficiency campaign is a real contribution to the U. S. preparedness program. However, I think we have placed too much emphasis on speed. Speed in radio traffic is very nice, but it should be placed secondary to accuracy. I qualified for the thirty-five w.p.m. certificate on W1AW's first transmission in the proficiency program, and naturally was proud to think I was a fast operator. Since being on active duty in the Navy, however, I have found that one hundred percent accuracy at a slow speed is much more valuable than fast operating.

What the average amateur operator needs is more accuracy. We have all gone along chewing the rag or copying straight press for practice. We should have picked out the mixed code groups or some kind of encrypted messages for practice. The sort of code used in the Copying Bee, only more mixed up, is what we need if we are going to be of much value as military operators. I realize it is not as much fun to copy seemingly meaningless code groups as straight code at higher speeds, but I think you can sell the idea to the amateur who really is interested in doing something for our nation.

--- U.S.S. Barney, Key West, Fla.

Editor, QST:

The speed runs have been copied by many of our ops while down in Panama. Your sign were RST489X until the South American ham came on the air with a plus 9 signal.

"It is too bad that Navy operators are overlooking your daily slogan in plain language, for I strongly believe that it would help greatly, since everything is code stuff. Not belitting the navops ability at copying code, but codes are sent at a comparatively slower speed than plain stuff.

--- R. A. Dickmann, RM (USN), WNDZ

IN RE WIKUY

Los Angeles, Calif.

Editor, QST:

Never before, in my 12 years as an active amateur on all bands, have I penned a note for the Correspondence department. However, the letter of WIKUY's in the May issue of QST has finally convinced me that I have blood in my veins. (My XYL swears it's just a transfusion from an unwary mosquito.)

Yes, Mr. Allen, we are all in this greatest of all hobbies for the relaxation we get, but it is just your type, F. A., that would "squa-w-k" the loudest if an emergency were to exist. Well, if you, for instance, were high and dry but your loved ones were in an area hit by a catastrophe which left it isolated from the outside world? Would you be anxious for their safety? Would you wonder if they were "carrying on"? Would you care to entrust messages for your loved onee with operators who had never handled traffic before? By the time one reached its destination, if the operator at the other

--- H. A. Dieckmann, RM (USN), WSNDZ
If you are planning to own a new receiver within the next year or two, it will pay you to buy it now. Prices are advancing rapidly, and all materials used in radio manufacture will steadily increase. A purchase today is a sound investment, and merchandise shown below is now in stock and can be made immediately available. Send down payment and credit references with your order today.

HAMMARLUND HQ-120-X only $13.80 down!

Pay balance only $10.95 per month for 12 months

The famous HQ-120-X... dual stabilized with voltage regulation and drift correction! Strictly to the minute with the kind of performance demanded by the exacting professional, amateur, or short wave listener. Special high gain RF stage with antenna compensation; 3 IF stages with silvered mica condensers and permeability tuned transformers. Covers 9.7 to 555 meters in 6 bands. Cash price, including tubes, 10" PM Dynamic speaker and crystal...

SUPER-PRO only $27.90 down!

and $2.18 per month for 12 months

18-tube "super" with improved noise limiter, two stages tuned RF, variable selectivity crystal filter, S meter, and continuous bandwidth tuning through entire frequency range. Tuning unit has 40 laboratory adjusted coils on isolantite bases, four gang main tuning condenser, and 12 to 1 ratio direct reading dials. A host of other exclusive features make the Super-Pro one of the most desirable sets on the market.

Available in two tuning ranges... SP-210-X, 15 to 560 meters, and SP-210-SX, 7 1/2 to 240 meters. Cash price, complete with crystal, tubes, 10" speaker, and separate power supply...

OIL FILLED-OIL IMPREGNATED DISPLAY YOUR FILTER CONDENSERS

The lowest price Newark has ever featured... on a condenser value that already has made thousands of friends for us. Quality built by variable maker. Guaranteed at rated voltage.

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Your call letters in gold on your ham shack door or auto window will look mighty fine!

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WRITE TODAY!
end had hung on without giving in to poor aendini, no num•ber, no filing time, no check, rotten spelling, etc., it might
probably convey an entirely different meaning than when
originated. Yes, me lad, the answer to that is a good net.
whether it be 'phone or c.w. Rag-chewing is a wonderful
safety valve — but I think if I were that ham, I would want
to know if the message was ever going to get there. It seems
to me that you have never discovered the truly wonderful
part of ham radio.

I have nothing against 'phone — possess a Class A ticket.
Most good 'phone men work c.w. too, and when asked
"pse QSP" they don't come back with that old one about
"QRM getting you down pse QSV" — they take that dad-
hurned message. It's no sin to be a moron, but it is a sin to
be a liar.

I don't get the time now, so I think I'm indigible to join
one of the truly good nets. However, I'm on spot frequency,
and my friends in other nets know how to locate me when
I'm not working during the traffic period. I have yet to
refuse a message — even if it means I pay a telephone toll
charge if I can hear the guy at all.

If you want to hear some beautiful operating procedure,
me lad, just tweak your dial to 6990 kc. and give a listen
to the AARS boys banging away. One of my finest friends
from San Francisco is a member, and they handle plenty of
traffic. I envy 'em. Would give a lot to "get in" — but my
working hours are such that I would have to miss all schedu-
les one week out of three. Not so good. But at least I can
"copy 'em and get good practice in laying it out on a mill
"ten to a line." Can you do this? Maybe you know how to
type. So do I — I can type 90 words per minute, but believe
me, I'm having a (censored) time putting down 20 from ear to
mill. Try it.

Yes, me lad, we are in ham radio for the amusement and
relaxation it affords. But if you will read the editor's note
at the bottom of your "gas," you will see that the FCC only
issues licenses "if public interest, convenience and necessity
will be served thereby." That means, little chum, that nei-
ther you nor I nor any other ham licensed by these United
States may take it upon himself to ignore his duty. . . .

These boys in the AARS haven't forgotten how to rag-
chew, but they believe that a man should tend to business
first, then pleasure afterwards. 'They work as hard
as some
commercial stations, but after their books are clear then they
really go to town. At times there are four or five of 'em in it
at a time, but with break-in keying and good operating, ev-
erything goes along at a nice, fast clip. . . . Indeed, if you
listen to them, you will have a doubt in your mind as to
whether you know how to rag-chew. . . .

Perhaps you, too, need a transfusion — but not from a
mosquito. From Uncle Sam!

— Warner R. Wilcox, WBEZJ

Editor, QST:
Just finished reading W1KUW's lament on your March
editorial.
I suggest that he be sent back to the "old country."
— Norm Cartmill, WILHY

A FEW WORDS TO QST
Radio WAR, Fort Myer, Va.

Editor, QST:
Just a few words to QST and its many readers. As I read
in QST about hams from coast to coast, a thought struck
me. Why not tell the hams and QST about the hams here
at WAR?
If you fail to work WAR, why not give one of us a shout?
You will find some one on some band from 160 to 10 almost
every day.
W3JGU works on 40 c.w. W3JIE works 40 as well as 80
c.w. W3JHF (ex-W5HML) works on 160 and 75, while
W3JHG (ex-W5GRL) calls away on 20 and 10. (By the way,
what has happened to 10?)
We may not put out sigs like WAR, but what chance has
Mickey Mouse against Superman? — Sgt. Jack Bowdon, W3JHG

(Continued on page 70)
DID YOU KNOW--

That the Taylor 866 has carried the ratings of the 866A since April 1939* and that Taylor Tubes was the first to offer a shielded rectifier.

*QST Adver.—April 1939.

EACH TUBE IS CUSTOM BUILT . . . TO GIVE "MORE WATTS PER DOLLAR"

Not only in the United States are Taylor Tubes popular—you will find them doing yeoman service for amateurs in every corner of the globe. Whether they are beginners building their first low power rig or old timers with their "Kilowatts", TAYLOR offers amateurs the tube that will give outstanding performance with longer life at the lowest cost.

Since its founding, TAYLOR TUBES sole policy has been to give the amateur "MORE WATTS PER DOLLAR". This aim, perhaps more than any other single factor, accounts for TAYLOR'S rapid growth, sales leadership and the thousands of TAYLOR TUBE BOOSTERS heard nightly on the amateur bands. TAYLOR'S broad guarantee of satisfactory service is proof of genuine quality and dependability. There's nothing finer than TAYLOR TUBES for your rig.

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Today, more than ever, it pays to use Ohmite Parts because you can depend on them to give the fullest measure of performance and service day in and day out. They're designed right and built right—they stand the gaff in any climate, under the toughest operating conditions. Get them for your rig—at your jobber.

Send Coupon and 10¢ for New Ohmite Ohm's Law Calculator

THE POCKET TRANSMITTER IS IN THE ARMY NOW

Republic of Colombia,
Ministry of War, Bogota, Colombia

Editor, QST:

I have pleasure in sending you... two photographs in which can be seen the "pocket transmitter" unit described in the January, 1941, issue of QST and with which we have obtained truly astounding results in communicating at a distance of approximately 600 kilometers (QST 5 R 7) with a 7100 kc. crystal.

Captain Laverde and Captain Alvaro Roldan S., Chief Signal Officer of Colombia, with the pocket transmitter described in QST for January, 1941.

Also we believe that this transmitter, in the not too distant future, will be giving reliable service in the Signal Corps of our Army where communication between units is over relatively short distances.

— Capt. Alvaro Roldan Salado,
Chief Signal Officer, War Dept.

New Midget Tubes

The types 9001, 9002 and 9003 are receiving tubes of a new series recently announced by RCA. They are designed for u.h.f. applications. They combine the bulb and base structure of the miniature receiving tubes with electrode structures similar to those of aeorn tubes. Two cathode leads are provided in each type to permit the completion of the plate and screen r.f. circuits with a minimum of circuit inductance common to the grid circuit. Electrically, the 9001, 9002 and 9003 correspond to the types 954, 955 and 956 respectively.

Strays

For some years, Don C. Wallace, W6AM, has been carrying a portable ham station with him on his travels, communicating with many amateurs from the various hotels at which he stayed. One of these, the Whitcomb Hotel of San Francisco, had a broadcast station operating from the roof, with harmonics which interfered with Don's operating while he was there. The broadcast station has now moved out, and the hotel manager informs Don that he is welcome to use the 250-foot towers on the hotel for his portable. San Francisco hams, beware!
Higher power output, increasing operating frequencies, the tendency to more compact design and the demand for improved safety factor have placed new responsibilities on insulation.

AlSiMag has kept abreast of these demands by constant research and laboratory development of new AlSiMag ceramic compositions with controlled physical characteristics.

Furthermore, to meet successfully the requirements of difficult insulation applications, special sizes, shapes and forms had to be evolved. Almost every AlSiMag piece is the custom-built answer to a special insulation problem, not only as to material but also as to form. More than 15,000 AlSiMag designs are produced every year. Production runs into millions of pieces a day. This is possible because efficient manufacturing methods and equipment produce custom-built AlSiMag insulators at costs competitive with standard mass production costs.

In many instances it is found that custom-built AlSiMag pieces cost less than the most nearly satisfactory standard pieces available. In other instances, reduced assembly costs and savings in space and in complementary materials will pay the entire cost of custom-built AlSiMag pieces.

When you use equipment insulated with AlSiMag you can be sure that the insulation has the controlled physical characteristics and the form, shape and size best suited for that use.

This advertisement is one of a series designed to give you a better understanding of the advantages of AlSiMag insulation. It is not a solicitation of business. Custom made AlSiMag is sold direct to the manufacturers.
NEW ENGLAND DIVISION

CUTICUT - SCM, Frederick Ellis, Jr., WJOT - SJC, Joe Toffolo, for the New England Railroad Club, has announced the deferring of the semi-monthly test cards during summer months. The net will resume early in September. KQY has closed the Nutmeg Net for the summer. 3040 kc. is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final. BPS, Seaman 1st Class, reported for physical examination and is working out, he wants to get back into active duty. 1HYF-2NLQ got his first-class phone and second-class telegram tickets May 26th. KKS visited the gang at Camp Blanding, Fl., on his motorcycle. DJC/1 worked 180 stations in FD including K4, MVE and MVF received qsl cards from K7. MVE is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

MAINE - SCM, Ames R. Millett, W1BAV - Thank you, listers. BDF/1, FWZ and JNE/1, who replaced him, are working on 14-Mc. They have 200 watts on other bands. NLS is the new radio engineer in Portland. KVK 26 EAO 20 KUK 18 NCV 16 CTI 14 GB 11 BHM-1111, who replaced him, is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

RHODE ISLAND DIVISION

Traffic: W1WJ 398 (WLMK 7) TD 202 BIJ 43 UE 41 KQY 26 EAO 20 KUK 18 NCV 16 CTI 14 GB 11 BIHM-1111, who replaced him, is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

VIRGIN ISLANDS - SCM, - Thank you, listers. BDF/1, FWZ and JNE/1, who replaced him, are working on 14-Mc. They have 200 watts on other bands. NLS is the new radio engineer in Portland. KVK 26 EAO 20 KUK 18 NCV 16 CTI 14 GB 11 BHM-1111, who replaced him, is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

11th annual dinner June 5th. UE was guest of honor. CBA/1 worked 100 stations on FD. Most contacts were made on 3.5 and 22 Mc. They have 200 watts on other bands. NLS is the new radio engineer in Portland. KVK 26 EAO 20 KUK 18 NCV 16 CTI 14 GB 11 BHM-1111, who replaced him, is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

Connecticut - SCM, Frederick Ells, Jr., W1OT - Sorry to have to announce the resignation of DJP as our REC. Bill is moving to Florida in the fall. Luck and we will miss you. EHT took over as new REC, New GC's, LAD for Brookline; AOX for Pembury; LYR for Enfield; EPP for Northfield; and W1YV for Stratford. NHM reported for physical examination at the Naval Radio School at Noroton Heights. Harvey 200R is still living in New York City and is now workin' on 14-Mc. 'phone. KM6X is now member of Yankee Network. FBX/1, BKD 809 kc. is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

Traffic: W1WJ 398 (WLMK 7) TD 202 BIJ 43 UE 41 KQY 26 EAO 20 KUK 18 NCV 16 CTI 14 GB 11 BIHM-1111, who replaced him, is now waitin' for assignment to active duty. TO 5 is still only 5. He sold the cows. NKM 1111 is still a popular spot on the band, and CN Net will resume after Labor Day and will be operating all over the 3.5-Mc. band with his e.o.o. He sold his Harvey 200R and is building a new job with a 514 final.

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Boy Scouts in code to help them get tickets. ALP had a visitor from England — George Evans, 2AVY. Lb's of lunch to you and glad to have met you. BXC is new FM for 14-Mc. e.w.

Traffic: W1BDU 388 JSM 290 5XC 241 AAR 214 LWH - BME - 3Y1J - W1JAE — W1BDU is making a habit of leading the scoring parade each month. Nice work. Pres. IOR and LTA attended Horsetraders Banquet at Saybrook, Conn., June 15th. MND and MVF are new ORS. That's the story for this month. If interested in joining an active net, just listen in on 1050 or 7920 evenings at 7 and Sunday mornings at 11. For dope on the summer months you will continue to communicate with First CA AARS in Boston. At least seven separate groups in West, Mass., were active in FD. Nice going, fellows. DUZ had to pass up AARS meeting due to eye injury. KLX moved to Grafton. KZU reports that AZ, KK, LRE, AEP, HFO, DNT and 3FFM are among others attending AARS in Boston. She appreciates your cooperation.

Traffic: W1WIV 158 (WLGJ 5) IOR 157 (WLGJ 26) AZW 122 (WLGJ 64) LUA 117 MIM 95 JAQ 80 (WLGJ 20) 29 FN1 21 DUZ 17 M9R 9 FOI 48 MYZ 16 MBT 11 LWN operated during FD at NLO's shack with their generator. From there they went to Wallis Sands for picnic lunch, and bathing. They then returned to CEA's where a most enjoyable "chiffest" was held until late afternoon. All the New England states were represented. NFI is new ham in Concord. NEI is now a member of the RCC. He was active on FD, controlling 101 stations from home station. He has worked Canal Zone and the Virgin Islands. He has taken a position as Production Engineer at Camp Blanding. He is a Sgt. and instructor in the signal corps, etc. He appreciates your cooperation.

Traffic: W1JWZ 146 (WLGJ 21) L262 157 (WLGJ 26) AZW 122 (WLGJ 64) LUA 117 MIM 95 JAQ 80 (WLGJ 20) 29 FN1 21 DUZ 17 M9R 9 FOI 48 MYZ 16 MBT 11 MSR 24 JWY 9 JFA 11 LHW 16.

NEW HAMPSHIRE — SCM, Mrs. Dorothy W. Evans, W1WJF — With the hot summer weather upon us, we can see you will be busy operating. But we want to remind you that throughout the summer months you will continue to communicate with your SCM, letting her know of your activities, traffic handled, etc. She appreciates your cooperation. N1U is new ham in Goffstown. He is now in the Army and will be away for some time as secretary of the AARC, and we are very glad to welcome him to the rank of "ham." LHX and M0I were recent visitors at MKM. MKM is now working mostly on 7- and 14-Mc. e.w., and is reported as being heard and worked from the West Coast. ND0 has an electric organ well shaped up, and reports interesting results. CGX is being heard occasionally. MXV is installing a new antenna since the heavy wind in June. MZO completed his 16-watt portable emergency rig. NJM is working on a larger rig. AZV is active on the phone. And, reports many enjoyable contacts. AEC registrations recently received include MMU, LYA, MJU, FGO, MMV and L4R. If you have not registered with AEC within a year, please do so now. Blanks may be obtained from the SCM or from ARRL. The recent meeting of the New England Traffic Club was held at the residence of Mr. and Mrs. John R. Mitchell, formerly of Medford, Mass., is operator at WWSR with Paul, KWB. Paul has acquired a "jalopy" and hopes to see some of the gang around Vermont this summer. CB8 of the W1BDU club has completed his 30-watt portable rig put to a 78 longs rig. EKU spent FD with his outfit on Ipswich Knob, near Plainfield, Vt. CGV was at Burke Mountain. MMV, with KUY, MJU, MLB and NDB as operators, set up near the CCC camp at Hier, Vt., using "Herm" Marston as general assistant. MFL received his First Class license, W1LWA 129.

VERMONT — SCM, Clifton G. Parker, W1KJG — WINDL is reporting some work on 112 Mc. In Barre and Montpelier. NLO is now called as Burt Dean at Burlington, who is now on 7100 kc. He has been active for some time as secretary of the AARC, and we are very glad to welcome him to the rank of "ham." LHX and MOI were recent visitors at MKM. MKM is now working mostly on 7- and 14-Mc. e.w., and is reported as being heard and worked from the West Coast. ND0 has an electric organ well shaped up, and reports interesting results. CGX is being heard occasionally. MXV is installing a new antenna since the heavy wind in June. MZO completed his 16-watt portable emergency rig. NJM is working on a larger rig. AZV is active on the phone. And, reports many enjoyable contacts. AEC registrations recently received include MMU, LYA, MJU, FGO, MMV and L4R. If you have not registered with AEC within a year, please do so now. Blanks may be obtained from the SCM or from ARRL. The recent meeting of the New England Traffic Club was held at the residence of Mr. and Mrs. John R. Mitchell, formerly of Medford, Mass., is operator at WWSR with Paul, KWB. Paul has acquired a "jalopy" and hopes to see some of the gang around Vermont this summer. CB8 of the W1BDU club has completed his 30-watt portable rig put to a 78 longs rig. EKU spent FD with his outfit on Ipswich Knob, near Plainfield, Vt. CGV was at Burke Mountain. MMV, with KUY, MJU, MLB and NDB as operators, set up near the CCC camp at Hier, Vt., using "Herm" Marston as general assistant. MFL received his First Class license, W1LWA 129.

Traffic: W1LWA 129.

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CREI Home Study Training is helping more than 5000 professional radio men toward a more secure future in Radio and better-paying Radio jobs!

Many radio men are willing to "drift with the current" to find work, but for a better one when business is good. But the ambitious man knows that when he is equipped with modern technical training he is insuring his future in radio for all time — he isn't depending on "hope."

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Right now — there are good-paying jobs in radio waiting for qualified men to fill them. Right now — the time to train not only for these better jobs but for a secure place in an industry that recognizes ability and rewards it with good pay. NOW is the time FOR YOU to act — to find out how CREI can help you get ahead and STAY AHEAD!

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Our free booklet and personal recommendations may hold the answer to your future success. In your inquiry please state briefly your background, education, present position — and whether interested in Home Study or Residence School training.

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A MODERN GENIE
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The NEW "PRECISION" SERIES 834
31 Range AC-DC compact circuit tester
- 6000 Volts • 600 MA
- 5 Megohms • 70 DB
- All ranges self-contained — NO EXTERNAL multipliers or batteries needed — 6 DC — 6 output voltage ranges — 12/60 /300/600/1200/6000 V.
- 1000 ohms per volt • 4 current ranges — 1/2/12/60/600 ma • 3 resistance ranges — 0-5000 /500 M/5 Mgs • 6 DB ranges from —10 to +70 DB • All measurements from ONLY two pin jacks except 1%, 5000 and 6000 volts • New type, extra large, easy reading 400 microampere rectangular meter • 1% multipliers and wire wound bobbins • Overall size only 7" x 4½" x 3½".

An INCOMPARABLE "PRECISION" value at only $17.95 net.
WRITE FOR "PRECISION" CATALOG 47-Q describing more than 40 radio and electrical test equipment models . . . Tube Testers, Combination Tube and Set Testers, AC-DC Multi-range Testers, Signal Generators, Industrial Circuit Testers, etc.

PRECISION TEST EQUIPMENT
Standard of Accuracy

PRECISION APPARATUS COMPANY
647 Kent Avenue Brooklyn, New York

U.H.F. Contest
(Continued from page 45)

copies submitted, also count as just explained, but for originating stations, but 1 point.

Multipliers: Points may be multiplied in turn by multipliers designed to credit (a) ability to use more than one ultra-high frequency band; (b) ability to use c.w. or m.c.w. as well as A-3 (voice) emission; (c) ability to work from field locations under portable designation.

(a) If one or more contacts are made, with contestants transmitter fundamental on 56-, 112-, 224-, or 448-Mc. assignments, the sum of scoring points may be multiplied by the number of such bands on which work is thus demonstrated (not to exceed four).

(b) Points made with your transmitter using c.w. or m.c.w. (both for contacts and message credits) may be multiplied by two before other multipliers are applied. (C.w. aids identification at distant points and this also credits demonstration of ability in its use.)

(c) Stations under portable indicator, may multiply all points made while actually operating portable or portable mobile by two.

Answering some questions: The band your transmitter is on is the brand on which the contest is counted in your report. If your transmitter is on c.w. and the man contacted uses voice, you report your work for c.w. credit; he reports his as "phone. A buzzer keyed in front of a mike produces m.c.w.
If a message is sent using c.w. or m.c.w., both contact and message credit may receive the multiplier (b). If all operation is in a portable status and using c.w. or m.c.w., it is convenient to use multipliers after all the contact and message points have been added. If part of the work is in a portable status, or only part use is made of c.w. only those parts of the total score may be given the appropriate multiplier.
If you transmit in different u.h.f. bands, the same station may be worked more than once to count in the contact score.

After you get your test message off, the aim is to work as many as possible and push other test communications on their way in a responsible manner.

Be sure we get your report, with claimed score and message copies, promptly. Do not use marathon forms in reporting results.

--- F. E. H. ---

RECORDS
(Continued from page 64)

For the sake of accuracy in reporting, however, it must be recorded that the messages were all BOOK FIVE. For the benefit of the uninstructed, a book of five messages refers to five messages sent to five separate addresses, all with identical texts, one original and four carbons of each text, all running up the officially recorded wordage, while the radio circuit rate was, after all, only 65 w.p.m. Dave tells us that it is not unusual in handling books to run 40,000 words per hour. In working commercial circuits, ACCURACY COUNTS, but there isn’t any Proficiency Award Certificate. ARRL invites every licensed U. S. amateur who hasn’t done so to qualify for the CODE PROFICIENCY AWARD. You may start on the date of any WIAW qualifying run, applying to ARRL for certification at the best speed you can get down solid, subsequently acquiring stickers (applied as endorsements on the certificate) at advanced speeds covering the range 15 to 85 w.p.m. See full announcement elsewhere in this issue, and get after your certificates to-day.
If you can do 15 w.p.m. or more, get what’s coming to you!
PIONEERING AND ENGINEERING

- It was Astatic's pioneering and engineering that made practical use of Crystals in the development of Microphones, Pickups and Recording Heads... and it was Astatic's pioneering and engineering that introduced "low pressure" in Pickup design. Ideas, of great practical value to the radio-phonograph field, are born and developed in the trained and experienced minds of Astatic's competent staff of engineers.

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Anytime! Anywhere! With KATOLIGHT PLANTS

Have special plant for operating portable radio receivers and transmitters close to or far away. Send for list. Hipower 500 watt A.C., Amateur's price: $67.50. Other sizes up to 10,000 watts. Also converters, AC and DC generators. Diesel and frequency changers.

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- Quality crystals of all practical frequencies supplied since 1925. Prices quoted upon receipt of your specifications.

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So Be Prepared. Help your Uncle Sam and help yourself by being properly trained for those advanced positions. Be ahead of the other fellow -- start learning code now!

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Street........................ City.................. State........
EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — EQD is active in AARS on 3540, 3541 and 3580 kc. EQD reports UL still rebuilding and getting prepared to take a YL for an Ed. KWC is doing swell work with traffic, and doing his bit in the U. S. Army. JRG reports LMII, VJ, JRG and EGI working portable mobile on 112 Mc. MEC operates regularly on 14,240 kc. He experienced a traffic jam at the beginning of the summer season and was grateful thanks to KG0AS. The Schenectady Amateur Radio Assn., under the leadership of EC ACB, aided by Ass’t EC’s, did a swell job in FD. LU visited W1VD, who is still pounding out good traffic. QSL cards was sent to JZX, who is put in a military station at USN Radio Station at Cheltenham, Md. Your SCM requests all members who have joined to drop him a card so we can know how things are going.

The Livingston Radio Club has three 50-foot masts erected, and is setting up on all bands. The family got Pop out of hospital after trouble with his appendix. JME has a new receiver. L1X is using a 200-watt rig for 1.75-Mc. phone, using c.w. and 3.9-Mc. ‘phone. At a recent meeting of the Freehold Amateur Radio Club, the following officers were elected: JME, honorary president; Walter Hamonton, pres.; Boris Zulkows­ky, vice-pres.; Edward Spuler, secy., and Edward Mohr, treas. The members of the club are building a new transmit­ter, and doing a swell job. QSL cards were recently re­ceived from JME, who is put in a military station.

STATE DIRECTIONS

NEW YORK CITY AND LONG ISLAND — SCM, Ed. L. Baunach, W2AZY — IXZ is now ORS. FPC is out for ORS. LZR is now CANC with call W1NL. BO is NCS for the 7-Mc. AARS, using the call WN1NL. DBQ reports a ter­rible increase in AARS membership due to the recent War Dept. questionnaire. AYZ cancelled all schedules except for the AARS, due to summer activity. MLY is now in the Army and will send his reports from camp. 1TQ reports from Ne­vada, where he spent a day testing Grand Canyon (for the first time we know) in all sorts of weather, from sunshine through snow. LRU and JAU had a swell time in FD. LR and CKU had a good time operating FD in Amityville, while 3CH did their FD operating in Babylon. JZX’s traffic on 14-Mc. ‘phone, and 281 contacts were made. The Kilocycle Club of the Weequaqua High School Amateur Radio Club, DOR, BOE, ALK and FDL are also on 1.75 Mc. FL was recently host to a group of hams at his home near Denville, N. J. The livingston Radio Club, had their share of troubles on FD. IKW, HFD, IYQ, LRR, and 3CH appear. It will appear in this issue, so W2LMN will continue to drop him a card so we can know how things are going.

The Beacon Radio Club developed carburetor trouble which ruined an otherwise bright prospect for FD. 3GAG /3, CMA, the Franklin High School Amateur Radio Club, had their share of troubles on FD. IKW, HFD, DBQ and BGO kept 3561 and 3.5-Mc. c.w. going. The Lakeland High School (Woodcliff, N. J.) Parent-Teacher Association recently demonstrated portable equipment at the Franklin High School Amateur Radio Club. DOR, BOE, ALK and FDL are also on 1.75 Mc. FL was recently host to a group of hams at his home near Denville, N. J. The Livingston Radio Club, had their share of troubles on FD. IKW, HFD, IYQ, LRR, and 3CH appear. It will appear in this issue, so W2LMN will continue to drop him a card so we can know how things are going.

AMATEUR RADIO DIVISION

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — W3BES must rate out York way by the looks of the newspaper publicity (and photos) he got during the Field Day Tests. SATF has been appointed to his local defense council as a result of his e. activities. He has the use of 25- kw. emergency power, 3CDY operated in FD with two transmitters from 1.75-Mc. ‘phone, and 220-watt rig which we hope will be an improvement over his 30-watts. ITO joined AARS. GKO is making plans for a picnic in August for the AARS exclusively. FJU is now W2LU. MLH reports a good time was had by all bands. 8UQM took part in the AARS ZCB contest. The following officers were elected: Theo. Morris, trustee and treas. ‘The members of the club are building a new transmitter, and doing a swell job. QSL cards were recently re­ceived from JME, who is put in a military station.

States Police and Military Radio Association: pennsylvania, Andover, N. J., 8UQM 1008 3CDY 862 3ASW 31 8UQM 19

MARYLAND-DELAWARE-DISTRICT OF COLUM­BIA

Hudson Division

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AMATEUR RADIO DIVISION

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — W3BES must rate out York way by the looks of the newspaper publicity (and photos) he got during the Field Day Tests. SATF has been appointed to his local defense council as a result of his e. activities. He has the use of 25- kw. emergency power, 3CDY operated in FD with two transmitters from 1.75-Mc. ‘phone, and 220-watt rig which we hope will be an improvement over his 30-watts. ITO joined AARS. GKO is making plans for a picnic in August for the AARS exclusively. FJU is now W2LU. MLH reports a good time was had by all bands. 8UQM took part in the AARS ZCB contest. The following officers were elected: Theo. Morris, trustee and treas. ‘The members of the club are building a new transmitter, and doing a swell job. QSL cards were recently re­ceived from JME, who is put in a military station.
standing traffic during recent Wisconsin flood.

Traffic: WA9WT 1003 CIZ 728 CXL 1188 (WLM 2696)
FE 39 FFN 3 HWJ 9 JHW 2 02 13 QIC 15.

SOUTHERN NEW JERSEY — SCM, Lester H. Allen
W3CCO — Ass't SCM and AARS Liaison RM. W3ZI — Regional Coordinator in charge of Emergency Coordination, W3BAG — RM's: 3BEI, BYR, ITU — P.M.: EUH, Section Net Frequencies: OFS, 1980 kc. (Thurs. at 8 p.m.) 3BE1, 3470 kc. (Thurs. and Sat. at 8 p.m. EDST during summer months); ORS 7280 kc. (Wed. and Fri. at 8 p.m. EDST). Gossip around the Section this month has been about the DVARA's 5th Annual Hamfest and Outing. Two baseball games of importance will be held, one between the 2nd and 3rd Districts and the other between the ORS and OFS men. Here's hoping I will see most all of you personally at the outing.

W3AVJ reports net attendance good. ITU and HAZ are experiencing good conditions, with Abbott DRK's, IMY operating with new equipment. A new station operating from a cottage at Silver Lake, using NXX's call. A number of fellows in Central New York are doing some interesting work on 14 Mc after a long absence. CBK set up most of the preparation was made by CSE and RMK with the following taking part in the test: CYDZ, NWZ, REL, BOA and OZB. A gas-engine-driven motor generator was run successfully by going on and off the air several times of out for refueling; 135 contacts were made. The Uteca Mike and Key Club also participated in FD under the direction of PFT. Others in the club who took part were ADM, UXY and WPLA. The Allegheny County Emergency Net was quite active, with four complete emergency-powered stations operating. KWS says, "Our first experience, and we sure learned plenty," BGO, IT, FEH, BG and DRY visited several of the FD setups. KRR is back on 75 Mc. after a long absence. CBK is changing to new QTH. BOA has a new 200-watt final. RCJ has new QTH. AOR has new Howard receiver, and will be looking for traffic all summer. VQO, a new ham in Rochester, has been operating his own rig again. IOH is a reliable contact on 1.75 Mc. for some time on Monday nights, has grown to expected that we will soon have a very respectable representation.

Traffic: W6USF 12 AOR 62 HWJ 187 KWS 16 RTX 85 RGH 41 SDLF 159 DSS 49 AOR 54 UXST 85 KRM 214 MV1 17 EBR 21 FCCG 99 RZ 20 AQG 8 54 APL 342. (May: WBSMM 34 DSS 41 DRB 138 SDF 200.)

Traffic: W3AVJ 151 32BX 98 3EWEK 94 3HSAZ 4 3Z1 79 30 31NF 53 3AQG 48 3LJD 46 3IMY 35 3GCU 34 3ITU 30 3ATF 29 3GMY 13 3HPX 10 3AEJ 18 3ACC 15 3ITV 11 3IHY 8 3ZB 6 3CWE 3 3JVD 3 3ABS 2 W1NF 12.

WESTERN NEW YORK — SCM, Fred Chichester, W8PA — The big events of the month were the AARS 25th Anniversary Contest and the AARC Army contest. It is expected that SBW, of Elmirra, will take first place in the Section. Conditions on 3.5 Mc. were halfway decent, and there was a good turnout. In FD, Western N. W. was very well represented, various clubs and quite a number of individual operators taking part. Mem-

ners of the Batavia Club operated from a cottage at Silver Lake, using NXX's call. A number of fellows in Central New York are doing some interesting work on 14 Mc after a long absence. CBK set up most of the preparation was made by CSE and RMK with the following taking part in the test: CYDZ, NWZ, REL, BOA and OZB. A gas-engine-driven motor generator was run successfully by going on and off the air several times of out for refueling; 135 contacts were made. The Uteca Mike and Key Club also participated in FD under the direction of PFT. Others in the club who took part were ADM, UXY and WPLA. The Allegheny County Emergency Net was quite active, with four complete emergency-powered stations operating. KWS says, "Our first experience, and we sure learned plenty," BGO, IT, FEH, BG and DRY visited several of the FD setups. KRR is back on 75 Mc. after a long absence. CBK is changing to new QTH. BOA has a new 200-watt final. RCJ has new QTH. AOR has new Howard receiver, and will be looking for traffic all summer. VQO, a new ham in Rochester, has been operating his own rig again. IOH is a reliable contact on 1.75 Mc. for some time on Monday nights, has grown to expected that we will soon have a very respectable representation.

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* Less speaker
† For four months
SPECIAL OFFER
During July and August Only
A.R.R.L. MEMBERSHIP
QST SUBSCRIPTION
and the HANDBOOK
$3.00
$3.50 U.S. Possessions; $4.00 elsewhere, U.S. funds. Only direct orders to A.R.R.L., West Hartford, Connecticut, U.S.A., can be handled at these special rates. This offer applies to new entries, renewals and extensions

AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD, CONN., U.S.A.

Army-Amateur Radio System Activities
(Continued from page 27)
The contest logs of participating members were checked by their Corps Area Signal Officers to verify the scores claimed. As this was a competition between the nine Corps Areas, the total points of each Corps Area were multiplied by its activity percentage to arrive at the final score. This percentage was based on the ratio of participating members to the total Corps Area membership. Detail results of this contest will appear in the next issue.

WAR-AMATEUR SCHEDULES
The daily WAR schedules on 6990 kc. will be continued during the summer months. WAR, Washington, may be heard on 6990 from 9:00 P.M. to 10:00 P.M. EST, every night except Sunday, calling “CQ ZCAA” to contact interested amateur stations on the 40-meter band. WAR also uses 4020 kc. each Saturday night from 7:00 P.M. to 8:00 P.M., EST, to work interested amateurs on the 80-meter band. The 7:45 to 8:00 P.M. portion of this period is used by WAR to listen for amateur “phone stations on the 3.9-Mc. band. The special WAR QSL card will be sent to all stations successfully contacting WAR who first submit their own card.

W3USA
Effective June 24th, the FCC authorized the assignment of call letters, W3USA, to Army-Amateur Net Control Station WLM, Washington, for use on the amateur frequency bands. This will replace the former call, W3CXL, which had been in use since 1929 when the Army-Amateur Net Control Station was moved from Fort Monmouth, N.J., to Washington, D.C., in connection with the expansion of the Army-Amateur Radio System. Call letters W3USA, which stand for “United States Army,” will serve to more readily identify the Army-Amateur Net Control Station in Washington, in case of emergencies.
New ABBOTT 2½ Meter TRANSCEIVERS
In Stock—at Terminal!

New ABBOTT MRT-3—
Net Price $28.81
A real high-powered transceiver! 20 watts of input delivers 6 to 7 times more power than ordinary 112-116 mc. transceiver. Compact, for easy installation in any automobile.
Tube kit: 6Y7S, 6G5, 6V6 ........... $ 4.60
Universal HAND Microphone ........... 5.88
Vibrator power supply for car .......... 12.61
AC power supply for home use .......... 12.45

New ABBOTT DK-3—
Net Price $18.82
Includes many features to satisfy every requirement for truly portable 2½ meter operation. Range is 2 to 30 miles!
Tube kit .......... $ .96
Handset ........... $5.88
Battery kit ......... 4.21
Antenna .......... .60

Order from this ad or visit us in New York City

TERMINAL Radio Corp.
68 West 45th St. • 80 Cortlandt St.
2 stores in NEW YORK CITY
VAnderbilt 6-5050 • Cable: TERMINAL

What the League Is Doing
(Continued from page 89)
director of disaster relief of the Red Cross. While DCB has made no releases of its plans, you may be sure that these committee members are all working for the amateur.

Five-Meter Wave Paths
(Continued from page 88)
great-circle distance from the ionized mass to the antenna location. When the mass is 600 miles away, low-angle radiation is necessary for all contacts regardless of tilt angles. As the ionization center approaches, the useful angle of radiation increases, slowly at first, then rapidly. From an analysis of past conditions the maximum useful angle of radiation appears to have approached about 28 degrees as a limit for a single refraction skip. The determination of this angle is not easy, and is not necessarily found by tilting a beam antenna. Antenna propagation characteristics are so altered by height, ground conditions, impedance matching, polarization, reactance off resonant frequency, etc., that a measurement of the exact angle of radiation or reception is a highly technical problem.
(The second and concluding part will appear in a forthcoming issue.)

Strays

To replace a nut on a screw which can be reached only with the tip of the finger pushed between several wires and around a corner, just put a piece of Scotch tape over the end of the finger, adhesive side out, binding it to the finger with a second piece wrapped around the finger. The nut will stick to the end of the finger. — W2LLU.

"While working portable on 160-meter 'phone at Mt. Sinai, L. I., I heard W1ASK, Bridgeport, Conn., calling CQ. I called and worked him on 160 meters, and after a QSO of 30 minutes he mentioned that he would like to change bands once in a while and work 20-meter 'phone, but that he had had enough trouble in keeping his rig on 75-meter 'phone. On my next transmission I asked him if he ever worked 160 meters. 'No,' he replied, 'I have never been on the 160-meter band.'

"Well, I use a good receiver and you are S8 on 160 meters now! I said. After each of us had listened to the other on both bands, I reported W1ASK S8 on 160 meters and S9+ on 75 meters; receiving in turn a report of S9 on 75 meters and S9+ on 160 meters."

—W2KJY.

Sleet can be removed from an antenna by throwing a rope, cord or wire over the antenna and dragging the length of the antenna. — Edmond Manna.
More and more amateurs are meeting on the 2½ meter band ... not only "open" for portable and mobile operation, but great for FUN too. If needed, for emergency Get one or both of the sets below ... We can ship AT ONCE from stock on hand.

New ABBOTT DK-3 PORTABLE MOBILE TRANSCEIVER for 2½ METERS

$18.82

less accessories

Range 2 to 39 miles. Size 11 x 11 x 4¼. Self contained battery operated model in carrying case.

* Set of tubes, 6G6G and 6J5GT, RCA ....... $13.13
* Set of fresh Burgess Batteries ........ $4.31
* Universal 820 receiver-monitor handset .... $5.88

ABBOTT MRT-3 For mobile or fixed station. 20 w. input, lots of "sock." Only 9 x 4 x 4. Built-in speaker. Less tubes and power supply ........ $28.81

* Tube kit HY75, 6CS, 6VE, $5.35
* Mallory Vibropack, 100 v, 100 MA, with tubes .... $13.66

ORDER NOW -- PRICES ARE ADVANCING RAPIDLY ... SAVE MONEY

NEWARK ELECTRIC COMPANY
332 W. Madison St., Dept. Q, Chicago, Ill.

---

PORT ARTHUR COLLEGE, a non-profit-making educational institution, offers a practical radio operator's course at the lowest tuition price in its history. Each radio graduate receives two months' actual operating experience at the college's commercial broadcasting station KPAC. This station is equipped with the latest type 1000 watt high fidelity RCA transmitter - 1250 kc., directional antenna system. KPAC operates in new modern studios located on the campus.

The college has never advertised jobs or positions in lieu of education. Today it is well known there is a shortage of radio operators in every branch of radio; therefore, we believe it is good common sense to mention that Port Arthur College is the sole radio school in America which owns a commercial broadcasting station with commercial advertising representatives in New York, Chicago, San Francisco, and many of America's leading cities. Port Arthur College is a member of the National Association of Broadcasters, and Broadcast Music Incorporated. Through these contacts the college receives from the broadcast industry alone a great many more calls for student radio operators than it is possible to supply.

AUTHORIZE TO TEACH RCA TEXTS

If interested, write for Bulletin R

PORT ARTHUR COLLEGE
PORT ARTHUR (World-Known Port) TEXAS

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READ AND SEND CODE

Learn Easily at Home
This Quicker Way

No experience needed. Beginners read code quickly, copy accurately. If already an op, speed up your wpm with this approved, amazing, all Electric Master Teleplex Code Teacher. Only instrument ever produced which records your sending in visible dots and dashes on specially prepared paper tape - then sends back your own key work at any speed you wish. Fascinating, fool-proof - get results because you learn by HEARING as well as SEEING. That is why thousands agree this method is easiest and quickest. While not designated standard equipment, Teleplex is used at many U. S. Army Posts, Naval Training Stations. We furnish Complete Course, lend you the New All Electric Master Teleplex, and personal instruction with a MONEY-BACK GUARANTEE. Low cost, easy terms. Write today for folder Q-8, no obligation.

"HAM" SPECIAL

TELEPLEX CO. 107 Hudson St. Jersey City, N. J.

Model EC-2. 8 tubes; 3 bands; covers 545 to 2100 kc. — 2.1 to 8.1 mc. — 7.9 to 30.5 mc.; built-in 5” PM dynamic speaker; preselection on all bands; calibrated handspread scale on 80/40/20/10 meter amateur bands; automatic noise limiter; electrical handspread at all frequencies in the tuning range; operates on 115/125 volts AC/DC. Now, for the first time you can have all these features at this low price.

Model EC-3. 10 tubes; 3 bands; covers 545 to 2100 kc. — 2.1 to 8.1 mc. — 7.9 to 30.5 mc.; Electrical handspread; Crystal filter (4 position variable selectivity) calibrated handspread; automatic noise limiter; preselection on all bands; 2 stage IF amplifier; fly-wheel tuning; separate 6” PM speaker; CW Monitor; operates on 115/125 volts AC/DC.
Gear is short. You can sell your old and extra gear through Ham-Ads.


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

COMMERCIAL—radio operators examination questions and answers. One dollar per element. G. C. Waller, W5ATV, 6540 77th St., N. Y.

FOR sale — new Meinemer preselector, $30. WSCIC.

WRITE Bob Henry, W9ARA, for best deal on other latest equipment. T20's, eighty different crystals for $1.60. 70.7% repeat sales — this carries a real meaning. Send for complete catalog. Amateur: buy those 49 and 89. Like new. Latest model demonstrator. $90 or make offer. B. Grinker, 139 N. Clark St., Chicago, Ill.

LEO, W9FGQ, offers the hams more and better deal always. Lowest terms without red tape on all new and used equipment. Free trial, personalized service. Write for big free ham bargain catalog and used receiver list. Wholesale Radio Labs., Council Bluffs, Iowa.

QSL — SWL's, Colorful, economical. W9XXL, 199 Wynadotte, Kansas City, Mo.

CRYSTALS; Commercial and amateur. Police, aircraft, marine and defense projects. A complete line of reasonably priced crystal units is available for all commercial services. Over a period of years Edison commercial crystals have a record of 70.7% repeat sales — this carries a real meaning. Send for complete catalog. Amateur: buy those 49 and 89. Write for list. CASH for high voltage power supply. W6SKW.

FOR sale — new belt drive, $65. W9UR.

WRITE Bob Henry, W9ARA, for best deal on all amateur receivers, transmitters, kites, parts. You get best terms (financed by myself); largest trade-in; personalized cooperation lowest prices. Quickest delivery of SX-81, NC-200's, all latest receivers. Let's get acquainted. Write for anything. Henry Radio Shop, Butler, Mo.

NEW Howard 430's $24.95, 435's $29.95; RCA AR-77's and other models at special prices. New Mao $7.50 bugs $4.50. W9ARA, Butler, Mo.

RECONDITIONED guaranteed amateur receivers and transmitters. All makes and models cheap. Free trial. Terms list. Free write. W9ARA, Butler, Mo.

NATIONAL SW3 three tube receivers and tubes $6, coils $1.00. National PFR-35, coils $2.50 pair. W9ARA, Butler, Mo.

FIFTY watt phone and CW transmitter in rack, complete with break-in relay, $55. RMS-69 (just realigned) and DB-20, $90. W9OSO.

WANTED: Experienced crystal grinder and finisher. State experience, abilities, salary and particulars. Write: Edison's, Temple, Texas.
"HARRISON HAS IT!"

Means more now than ever before

We anticipated this "Back Order Era" and placed our orders many months ago. So, right now we have more receivers, parts, tubes, etc., in stock than at any time in our busy sixteen year history!

"Harrison Has It!" means faster delivery — lowest prices — better service all around. Call on us whenever you need any radio or electronic equipment — we're here to serve you.

* HARRISON is HEADQUARTERS for ULTRA-HIGH EQUIPMENT

** HARRISON **

** RADIO COMPANY **

*** EASY TO LEARN CODE ***

It is easy and pleasant to learn the modern way — with an Instructograph Code Teacher. Ideal for the beginner or advanced student. Many tapes available, ranging from alphabet for beginners to typical messages on all subjects. Speed range 3 to 40 WPM. Always ready, no QRM, beats having someone sent to you.

FOR SALE OR RENT

STANDARD with 10 tapes and book of instructions, A.C. motor . . . . . . $24.80

With spring wound motor . . . . . . . . . $25.50

JUNIOR with 5 tapes and book of instructions (not rented) . . . . . . . . . . . . . . . . . $17.00

RENTAL Standard with 10 tapes and book of instructions $3.00 first month, $2.25 each additional month. Refer-

ences or $10 deposit required. All rental payments may be applied on the purchase price should you decide to buy the equipment.

Write for details today.

INSTRUCTOGRAPH COMPANY

Dept. Q, 4781 Sheridan Road, Chicago, Illinois

Representative for Canada:

Radio College of Canada, 54 Bloor St. West, Toronto
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!

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<td>What do you want? We have it. Radio exclusively</td>
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"Advertising for QST is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

*Quoted from QST's advertising rate card.*

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

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IS YOUR POWER SUPPLY PROTECTED WITH G-E PYRANOL CAPACITORS?

to BE a CHAMP!

GL-812

W2DUG runs 200 to 300 watts into the GL-812's in his 10/20-meter tone rig, with a GL-807 as driver, and push-pull parallel 6L6's as modulators.

Here's Performance!

ICAS Class C Telegraph Service
Max. plate input
Max. plate volts
Max. audio input
Filt. volts
Filt. amp

225
1500
150
5.3
4.0

ONLY $3.50

FREE! For your shack wall

☐ A Tribute to the Radio Amateur (GEA-3052A)
☐ Data and prices, G-E Transmitting Tubes (GEA-3315B)

General Electric, Section 161-25, Schenectady, N. Y.

Please send me items checked above.

Name.................................................................
Address.............................................................
City................................... State...................

161-25-8810
The greatest difficulties in producing high-Q coils of compact construction lie in the variation of inductance with applied voltage. Considerable research at UTC has licked this problem. A good example is a solution to one customer’s problem on a 1.5-Hz coil having a Q of 85 at 2,000 cycles. While this coil weighs only 8 ounces, the change of inductance from 0 to 100 volts is only 1/4 of 1%.

Light weight is one of the greatest problems in aircraft equipment. A typical UTC development along this line is an aircraft unit consisting of four complete band-pass filters with a total weight of only 12 ounces.

A few people realize the degree of safety factor in some submersion type transformers. One UTC test specification reads: The unit is submerged under hot salt water at 85 degrees C. This is followed by a submersion under cold salt water at zero degrees C. Following this it is submerged at room temperature for twenty-four hours. This cycle is completed five times. At the end of the week, the unit is cleaned off and the insulation resistance between windings must exceed one billion ohms.

High gain transformers with low hum pickup are a difficult problem. UTC developed a unit for one customer’s application which is phenomenal in this respect. The transformer developed has a 500:1 ratio with a 50 ohm primary (secondary impedance 12,500,000 ohms). With this tremendous ratio and a rather compact structure, the hum pickup in a field of 600 gauss is limited to -126 dB.
Either of these superb receivers is the basis of a fine Amateur Station

**THE NC-200**

- Sensitivity better than one microvolt.
- Series valve noise limiter.
- Improved crystal filter with rejection ratios as high as 10,000 to 1.
- Stability 3 parts in 100,000 for 20 volt line fluctuation.
- AC line or portable operation.
- Speaker in matching cabinet.

**Amateur Net Price $159.50**

without speaker

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**THE NC-45**

- Series valve noise limiter with automatic threshold control.
- Improved AVC Circuit.
- Eight tube superheterodyne circuit.
- Full vision dial with separate bandspread condenser.
- Tone control.
- CW Oscillator.
- Four range coil switch, 550 KC to 30 MC.
- Three models for batteries, for AC-DC and for AC only.

**Amateur Net Price $57.50**

including speaker and tubes
Actual-size illustration of the RCA-816 as compared to the famous RCA-866-A/666.

"JUNIOR OF THE FAMOUS RCA-866-A/666"

RCA-816 RATINGS

<table>
<thead>
<tr>
<th>Filament Voltage (A.C.)</th>
<th>2.5 Volts</th>
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</thead>
<tbody>
<tr>
<td>Filament Current</td>
<td>2.0 Amperes</td>
</tr>
<tr>
<td>Peak Inverse Voltage</td>
<td>5000 max. Volts</td>
</tr>
<tr>
<td>Peak Plate Current</td>
<td>300 max. Ma.</td>
</tr>
<tr>
<td>Average Plate Current</td>
<td>125 max. Ma.</td>
</tr>
<tr>
<td>Tube Voltage Drop (Approx.)</td>
<td>15 Volts</td>
</tr>
</tbody>
</table>

*For supply frequency up to 150 cycles and for a condensed-mercury temperature of 20 to 60° C.

- Designed and priced for real economy plus truly outstanding dependability in medium-power transmitters of 400 watts input or less.
- Small as a receiving tube—but handles a peak inverse voltage of 5000 volts, and peak plate current of 0.5 ampere!
- Two RCA-816's in a full-wave circuit can deliver a rectified voltage of 1600 volts at 250 ma. with good regulation, with exceptional life—and at a total rectifier tube cost of only $2!
- Famous RCA edgewise-wound filament of new alloy material assures big emission reserve and long life.
- Top cap construction eliminates electrical strain on filament stem.
- The rectifier tube you've been asking for—at a price within easy reach of all.

RCA's NEWEST AND FINEST TRANSMITTING TUBE GUIDE

Don't miss the new "RCA Guide for Transmitting Tubes"! 50% bigger than last year. Includes details on all RCA Air-Cooled Transmitting Tubes plus typical circuits and much important new construction data. Net price 25c, from your RCA Tube and Equipment Distributor or RCA Commercial Engineering Section, Harrison, N. J.

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