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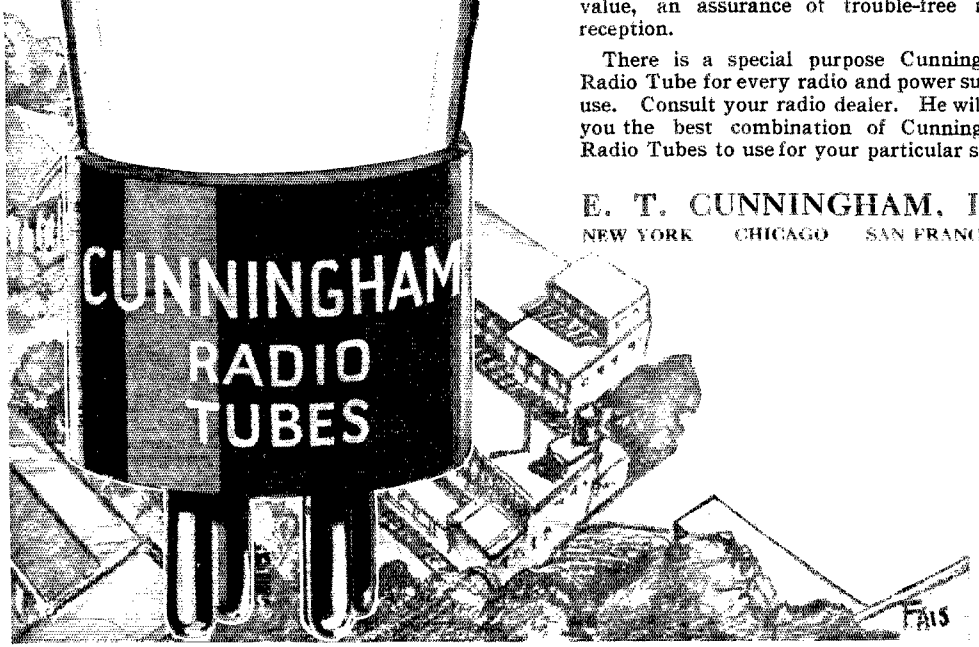

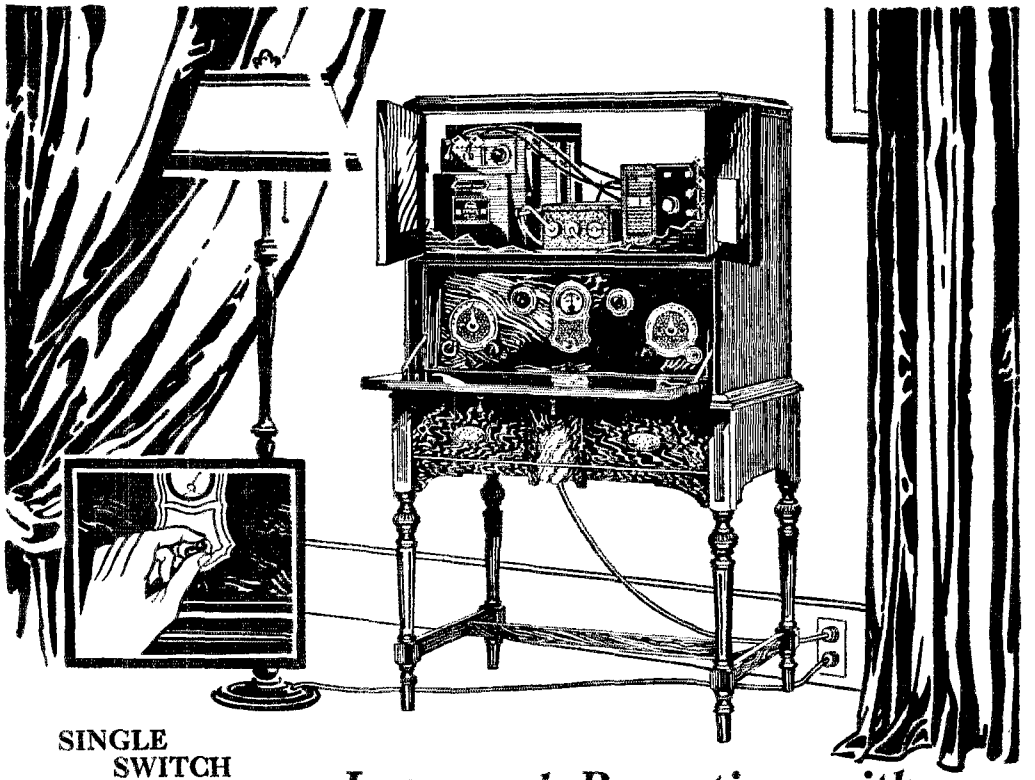

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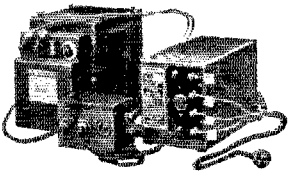

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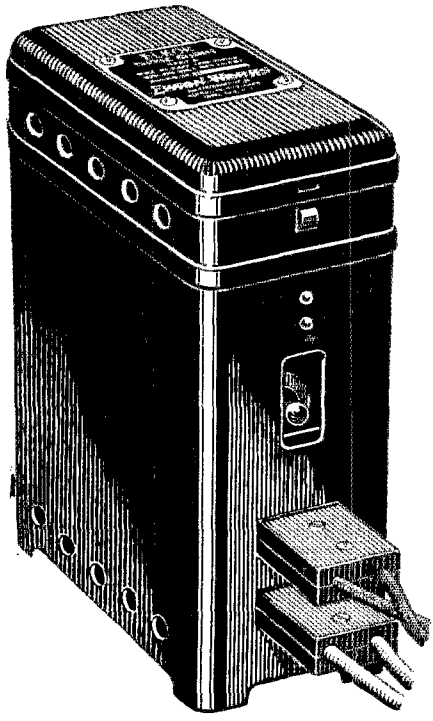

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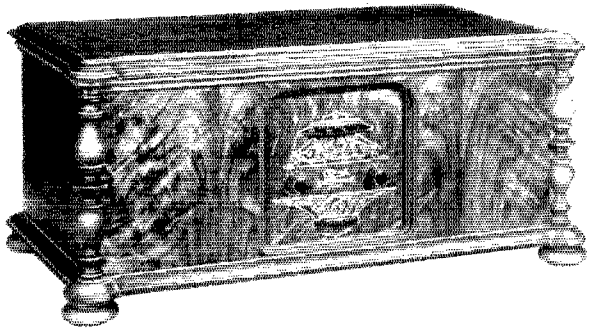

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QST

The Official Organ of the A·R·R·L

VOLUME XI AUGUST, 1927 NUMBER 8

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The American Radio Relay League

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

"Of, by and for the amateur", it numbers within its ranks practically every worth-while amateur in the world 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.

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EDITORIALS

NOT to change the subject at all, the sermon for this month is going to be about our old American Radio Relay League and how it still is what it always has been; a democratic self-governing organization of the transmitting amateurs of the United States and Canada and a few more places.

This League of ours is no accident. It didn't just happen. Its start was carefully thought out by its founders: it was to be purely amateur; it was to be non-commercial; orderly; it was to operate for the good of the whole. Its fundamental purpose, as we've so often said in *QST*, was to bring the member greater pleasure and benefit from his pursuit of his hobby than would be possible without organization.

That start was over twelve years ago. The League has continued its existence down the years because of the nationwide conviction amongst us amateurs that we need it—that plus a lot of unselfish hard work on the part of its members, directors and field personnel. It has flourished because it has lived up to its principles and achieved its aims. If it had not, it would have lost momentum and died and no amount of high-pressure bogus enthusiasm could have kept it going. It lives because it is worth while. It is our medium for helping ourselves and each other, coördinating the manifold activities of all of us, looking after our interests in legislation and regulation, representing us wherever we need to be represented. In its more than twelve years of existence it has demonstrated times without number that it is of immense help to amateur radio; in fact there are instances where it may be said that our League positively saved amateur radio to us.

It is therefore worth our every effort and support. Of course it is by no means perfect, and nobody knows that better than we at Headquarters. But the point is that it can not be any better than we amateurs, by united effort, make it. Its future is exactly what we make it.

The League needs and deserves your help and support, O. M., and, to quote the old familiar sign, "this means you". If you're already a member, fine! If you're not, you still have a little duty to perform on behalf of this game. That's why we print that application blank in the latter part of every issue of *QST*.

OUR fancy was quite taken by that Figure 5 in the first part of Mr. Rice's paper in the last number of *QST*. Here is the whole story of radio in one chart—the performance of different wavelengths at different distances—and it shows a couple of amazing things.

It is pointed out that the world's worst wavelengths for DX in term of miles per watt are those waves just above 200 meters, where we amateurs so long congregated. We've often heard that when amateurs were first given 200 meters it was regarded as a useless wavelength, but even the people responsible for the assignment could hardly have known that of all the wavelengths in the spectrum it was the worst, because it bumped smack into the earth's natural period or something of that sort!

And another thing we notice is that the waves around 40 meters, where most of our DX men have finally concentrated after the migration down from 200, are the very best in all the spectrum for the ultimate miles-per-watt DX!

Is it any wonder that a maximum-DX man can't be blasted loose from 40 meters and seduced into returning to 200, and is it any wonder that commercial radio enterprises turn jealous eyes towards the short waves?

WHICH reminds us that the stage is being set for the international radio conference at Washington beginning October 4th, when representatives of all of the governments meet at the invitation of the United States to rehash the London Convention. Already the governments are appointing their delegates. The agenda for

the conference, consisting of propositions made by all the governments concerned, are assembled in what is known as the Book of Proposals, with the total of the proposals running around seventeen thousand. So there will be lots of people and lots of talking, and this time short waves will be one of the big issues.

Most of the representatives from foreign governments will be "government people", appointed from the diplomatic corps or the military. It would be almost an accident if any of them knew and understood amateur radio; they are much more likely to have the usual European view of communication as a government monopoly. It seems important, then, that the amateur societies in all these countries make it their business to get in touch with their country's representatives as soon as they are named, tell them what amateurs are and what they are doing, and persuade them to provide a place in the picture for amateur radio when they get to parcelling out short waves at Washington.

K. B. W.

Rights Vs. Responsibilities

By Hiram Percy Maxim, President A. R. R. L.

EVERY now and again we hear somebody holler about his rights. He usually drags in the Constitution and his American citizenship. If he is a radio amateur he drags in his membership in the A.R.R.L. and the radio law of 1912, notwithstanding the fact that the latter is now defunct. There is one thing he never drags in and that is his responsibilities.

In my position as President, I see a lot of this sort of thing in amateur radio. There seem to be two kinds of us. The folks of one kind are always noisy and always continually clamoring for their "rights". They appear never to have heard of the word "altruism". They believe firmly in the policy of grabbing everything that is not riveted on. They think the highest aim in life is to get as much as you can for nothing, even if it takes a Mack truck in broad daylight to lug the stuff off. They respect no one's rights, and yet they make night and day hideous howling for their own.

The other kind never clamors for its rights. When they raise their voice for something, it is usually for the good of the whole. As a rule, they need no watching. Things that are not riveted on do not disappear. They decline to accept things and privileges to which they are not clearly entitled, whether anyone is looking or not. They appear to have thought about the word "altruism" and also about that other important word, "ethics".

The first kind do not understand that nice difference that exists between rights and responsibilities. Their codes are "Every man for himself", "Do nothing you can shove onto the other fellow", "Take everything you can get away with". These people are never builders. None of the fine things we have is the result of their efforts. Our civilization, our country, our law and order and our organized amateur radio are in spite of them and not on account of them.

The second kind recognize their responsibilities as citizens and members of society generally. They realize that their rights must balance with the rights of others. Their code is, "Accept a certain amount of personal sacrifice for the good of the whole". They are our builders. Everything we possess is due to their efforts. Our civilization, our country, our organized society and our A.R.R.L. are their handiwork.

When we think our rights are being trampled upon, let's always try to keep our responsibilities also clearly in mind.

The ¾-Meter Band Officially Opened

By Boyd Phelps* and R. S. Kruse†

FOR the first time, an amateur band of wavelengths has been formally opened before an A.R.R.L. audience.

It must not be understood from this, or from the title of this article, that the band has not been used before. To make such a claim would be utter nonsense. Many A.R.R.L. men have operated oscillators and receivers in the region and there have been examples of short-range transmission that seem promising.

The occasion of the demonstration at the Hudson Division Convention was simply to show to a convention audience that ¾-meter communication was not mysterious and that it could be carried out with existing radio materials.

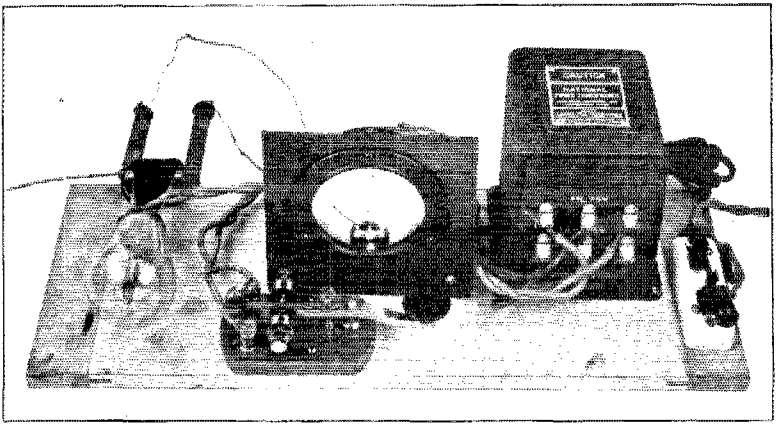
STARTING IN

It will be remembered that on page 27 of June *QST* there appeared a story which included some work on oscillators, wavemeters and chokes in the ¾ meter region, most of the work having been done by Phelps at various times. Some check work and a series of circumstances having to do with the convention brought the present co-authors together for the demonstration just referred to. We combined our individual apparatus, bought and borrowed more and in the *QST* Work Room put together the demonstration equipment.

Previous life tests were confirmed (we now have a stop watch for this purpose) and it was decided that they were unsatisfactory from that standpoint although workable enough as long as they lasted. We therefore did not wish to take them to an audience, preferring to use something that could be depended on for a reasonable period of time—in other words something that was reliable as a transmitter.

In this connection it was decided at first to drop the old 201 and 202 tubes in favor of a 210, which has the plate lead brought out thru the side of the stem instead of the mash, therefore is less likely to be damaged by electrical leakage thru a heated stem. However, the tube is not well adapted to operation at wavelengths below 1.6 meters as the stem is rather long. Just why this is of any importance can be seen from Fig. 1. The tune of the Ultraudion circuit is determined by the capacity Cs, the inductance of the plate lead L1 and the inductance of the grid lead L2 *and the plate-grid capacity* Cgp. All these things are connected in series and since Cgp is very small we cannot hope to tune much with Cs, therefore the way to change the wavelength is to change L1 and L2—which cannot be made shorter than the stem.

Tests had also shown that both the 210 and the 852 sometimes show a very short filament life when used at wavelengths as long as 5 meters. As a check, several 210



COMPLETE TRANSMITTER

The 110-volt line and switch at the right supply and control the National transformer which supplies 7.5 volts a.c. to the filament and 600 volts, 20 milliamperes to the plate. The milliammeter and key are in the positive high-voltage lead. The 1½ meter Ultraudion oscillator is at the left and the feed wire from it runs off to the left where it connects to the antenna feed condenser as shown in another photo.

*2EB, Consulting Engineer, Jamaica, L. I., N. Y.
†Technical Editor, *QST*.

tubes were run at wavelengths in the vicinity of 1½ to 2 meters with the circuit shown in Fig. 1. These tubes lost their filament emission within 45 minutes and when flashed and aged they came back for only about three minutes, although the plate input was sub-normal. While it is by no means certain that the X-L filament is at

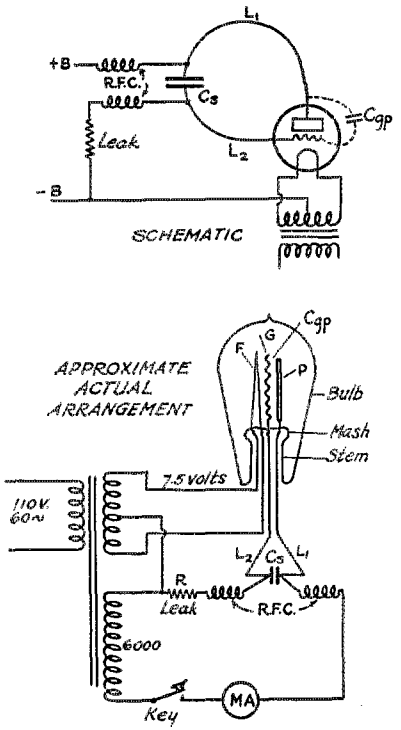


FIG. 1 THE ULTRAUDION CIRCUIT USED, SHOWING SCHEMATIC AND ACTUAL FORMS

The labels in the figures correspond. The tuned circuit is a series one including Cgp, L1, Cs and L2. Cgp is very small and fixed hence Cs has small tuning effect and is made large to reduce the work of R.F.C. 1 and R.F.C. 2. Changes in tuning are made by changing the length of L1 and L2. The resistance R is the usual grid leak but is made of rather high value.

the bottom of this effect it is true that the 852 sometimes does the same thing at wavelengths as long as 6 meters, therefore we felt that it would be better to stick to something that did not give the unexplained effect—in other words a plain tungsten filament.

The tubes used were therefore UV-202 "5-watt" tubes, three of which were debased and made into oscillators, all operating steadily and easily for many hours with no tendency to stop.

The story at this point has gone somewhat ahead of itself. It is necessary to retrace and explain a dodge that was being used.

A CIRCUIT TRICK

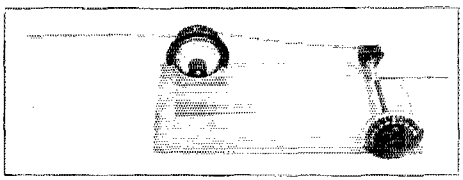
Since tubes tend to become rather erratic when operated near their lowest workable wavelength—or highest frequency if you prefer—it had been decided to operate the oscillator at double the desired wavelength and to pick off the 2nd harmonic to be amplified and fed to the antenna. This is of

RECEIVING ANTENNA WITH FOOT RULE FOR COMPARISON

This was mounted vertically on a small rubber standard rising from the metal receiver panel. The very small condenser served to vary the coupling to the receiver.

course a familiar stunt in these crystal control days and has been used at the wavelengths we are talking about by Frank Jones of 6AJF and Harry Lyman of 6CNC.

If the 2nd harmonic is to be at ¾ of a meter the oscillator's main wave must of course be at 1.5 meters. Accordingly, the



SENDING ANTENNA

The small variable feed condenser at the right was controlled by the dial and insulated shaft. The feed lead from the oscillator can be seen coming in from the right.

Ultraudion oscillator shown in one of the photographs was put together and tuned to 1.5 meters. To cut down the work to be done by the r.f. chokes the drop across the condenser Cs was made small by making Cs itself large, namely .01μfd, or if one prefers, 10,000 pfd. As has been explained, this changes the tuning very little and in fact a greater change is made by changing the length of L1 or L2 by 1/10" than is made by changing Cs from 10,000 pfd. to 100 pfd.

It now became important to find out if the 2nd harmonic of so small an oscillator with normal plate voltage was of any use. This was tested with the freakish "antenna" of Fig. 2A which may not look convincing but has later proven to tune rather decently to ¾-meter. When this was held near the oscillator a deflection of the meter followed. Check-tests have shown that if the *overall* length of the contrivance is doubled the

main wave will give about 10 times the deflection (100 times the power) while the tube is operating normally but that other lengths for the wires give very little response.

By raising the plate voltage to 600 and keeping the plate input current low (large negative grid bias) the 2nd harmonic was made relatively much stronger, so that we

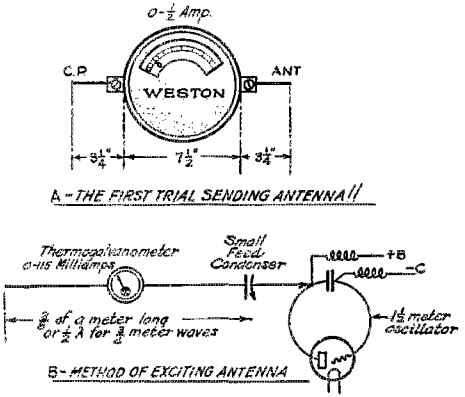
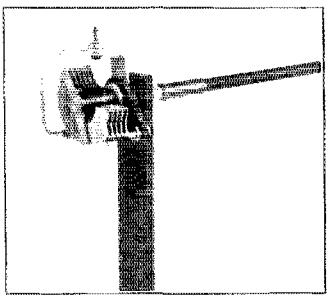


FIG. 2 THE SENDING ANTENNAS

Antenna A is for testing only. B is the sending antenna and also shows the method of end-feed or voltage feed. The tap may be made anywhere along the plate "coil" but the point shown gives enough output for present purposes and is stable.

were able to discard the amplifier for such a short-wave demonstration as we had in



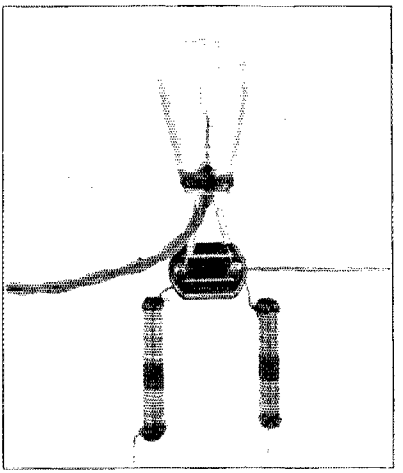
THE 1.2 METER AND-UP WAVEMETER

With this meter the tests of Fig. 3C were made. The .9 meter-and-down wavemeter was of the same sort with a smaller condenser capacity.

mind. For a longer range the amplifier still is to be considered.

THE SENDING ANTENNA

A less weird antenna was now put together. It is shown in one of the photographs and the method of exciting it is given in Figure 2B. With the tube operating at 600 volts and 20 milliamperes, which is below normal input, the antenna current was 115 mils. The feed condenser acted normally, that is to say it did not tune but simply increased the coupling up to the point where the load stopped the oscillator.



THE OSCILLATOR

A UV-202 tube with a short stem. The fixed stopping condenser is a Sangamo 10,000 pfd. or .01 μfd. receiving condenser. The lead to the right is the antenna feed lead, the twisted pair at the left supplies the filament current. The two chokes are in the positive plate supply and grid-leak lines. Note their method of winding. The end sections are effective at ¾-meter and are loaded by the center section so as to be effective at 5 meters also. Having a spaced portion at both ends permits connecting them in either way. The chokes are so effective that if one is put in each filament supply lead the grid may be grounded but the oscillator will continue oscillating.

Doubling the antenna back so as to reduce the radiation resistance raised the antenna current—just as we ordinarily get more current in a bent system (horizontal top and c.p. with vertical connection) than in an elevated straight "Hertzian" wire, either horizontal or vertical.

IS IT A ¾-METER SYSTEM?

Naturally one wonders whether the antenna of so simple a system is really working at ¾ of a meter or if it is simply accepting some of the energy at the oscillator wave—1½ meters. To determine which was going into the antenna several tests were made, some of them before the lecture and a few check tests since that time.

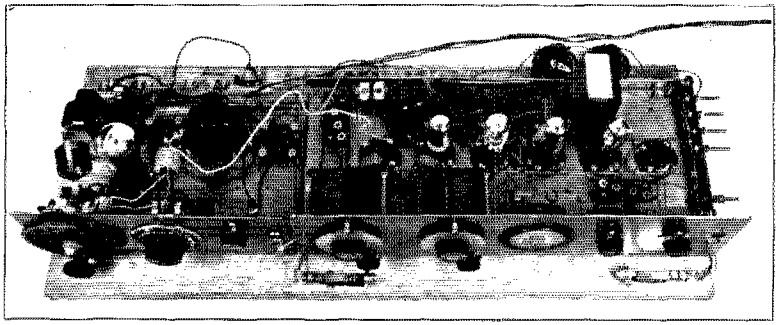
First of all, if we look at Fig. 3 we will see that if the antenna is not *working* at ¾-meter but is accepting 1½-meter energy the voltage distribution will be as the dotted line, therefore a ground at the point 2 will upset things and lower the meter reading, also there will be some place 4 back along the feed wires where a ground will upset things. Neither of these things happened.

On the other hand, if the antenna is working as a half-wave Hertzian ¾-meter an-

tenna as at B, then a ground at the meter will do nothing to the antenna current. This is what we found.

Further tests were made with a small wavemeter, shown in one of our photographs. This meter went down to just a trifle under 1.2 meters. When it was placed at the oscillator and tuned to 1½ meters the current fell sharply—but at the antenna no effect whatever was secured, showing that there was very little 1½-meter energy there.

Since the demonstration, another wavemeter has been made that has a range entirely below .9 meter. This produced very weak effects at the oscillator compared to the other wavemeter, but almost completely stops the antenna current when coupled in at the meter. (See Fig. 3C.)



THE SUPERHETERODYNE VERSUS-AUDIO RECEIVER USED FOR DEMONSTRATION

This set was described on pages 14, 15, and 16 of the June issue. It is not as complicated as it looks since most of the parts are not in use. This is the receiver used by Kruse at 1OA for 5-meter and 20-meter reception.

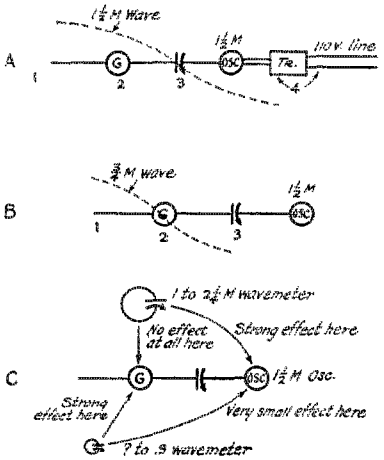
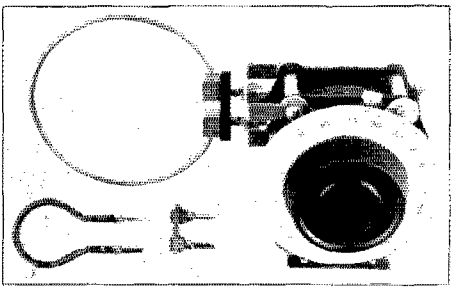


FIG. 3 METHODS OF CHECKING TO FIND IF ANTENNA ENERGY IS AT ¾-METER OR 1½ METERS

If antenna is operating at 1½ M. the voltage distribution will be as in diagram A and a ground at 2 will change the antenna current greatly. If the antenna is working at ¾-meter the voltage distribution is as in diagram B and a ground at 2 will not change the current much. C illustrates the use of 1½-meter and ¾-meter wavemeters to check the antenna wavelength.

The quite natural question as to the correctness of the wavemeters can be answered by saying that they were good enough for the purpose, though certainly not precision affairs. Calibration was by a combination of harmonic pickoff and Lecher wire, the check being a reasonably good one, and also comparing well enough with a curve obtained by connecting to the condenser a rather large loop that tuned to 5 meters (where it could be checked against the General Radio 458 meter) and progressively making this loop smaller. By watching the drift of measurable points as the loop grew smaller one secured an added check.



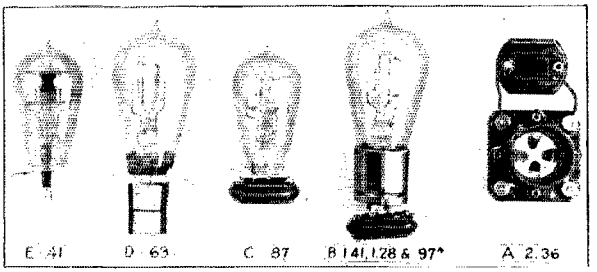
THE TRIPLE RANGE WAVEMETER USED TO TIE THE TRANSMISSION INTO THE 5-METER REGION. THIS IS SIMPLY A GENERAL RADIO TYPE 158 METER TO WHICH PHELPS HAS ADDED A 4- TO 2-METER and 2- TO 1-METER COIL IN ADDITION TO THE ORIGINAL 6½- TO 4-METER COIL.

THE RECEIVER

Since the immediate object was simplicity and the use of existing material, it seemed worth while to try using the general-purpose superheterodyne that has been re-

ferred to before in *QST*. Connections were made as in Fig. 4 and it was found that when the 7th harmonic of the oscillating detector was placed on the ¾-meter wavelength a very good signal was gotten. This adjustment put no harmonic of the oscillating detector on the fundamental of the transmitter tube circuit (one and one-half meters).

To check the point of possible reception from the oscillator directly the sending antenna was removed from the oscillator, whereupon the strong signal went almost to zero. An antenna provided with a ground and tuned to 1½ meters has since showed good antenna current but produces practically no signal at the ¾-meter receiver, showing that the latter is really working at ¾-meter. The *grounded* antenna was used to prevent appearance of the 2nd harmonic—i. e., ¾-meter signals.



GROUP OF SHORT-WAVE ULTRAUDION OSCILLATORS SHOWING CONSTRUCTION NEEDED WHEN OPERATING AT ¾ M. DIRECTLY AND ADVANTAGE OF WORKING IN MANNER SUGGESTED. THIS IS THE GROUP MENTIONED BEFORE AS USED BY PHELPS AT 2EB.

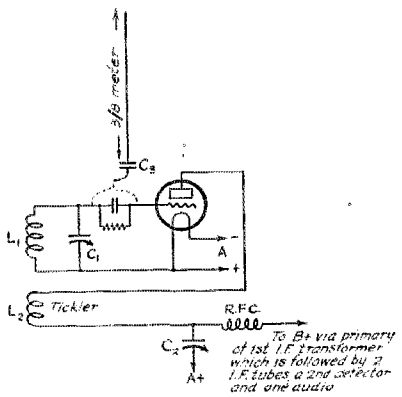


FIG. 4 RECEIVER CONNECTIONS

The tube shown is the oscillating first detector of a superheterodyne. It is tuned by means of L1 and C1 to operate at 7 times ¾ meters or 5¼ meters. The receiving antenna end-feeds the tuned circuit thru the small capacity C3 which is connected to either side of the grid condenser. If connected to the grid directly the effect is to increase the coupling. It is important that the choke R.F.C. stop the 5-meter oscillation but pass the intermediate frequency. Thus at one wavelength it is a choke and at the other it is a joke.

FIELD TESTS

With "Chris" Kenefick of the H. Q. staff patiently pounding the key of the transmitter in the *QST* Work Room we then made some very hurried field tests, trundling the receiver around the neighborhood in Phelps' coupe. Nothing very strange happened, the ¾-meter wave acted like a normal and proper radio wave—even to having a "poor signal" zone around the station with better signals beyond. Incidentally—why do people insist that the bad signal belt is a recent discovery? Certainly all spark amateurs had noticed by 1912 *at the latest* that 200-meter signals were poorest at something like 150 to 200 miles and before that ship operators had observed the same thing at 300 and 450 meters. The *thing* isn't new—only the *distance* and the *intensity* of the effect changes as the wave is changed. Therefore it seemed quite natural that as we drove up the road the signal intensity acted somewhat as shown in Fig. 5—exactly the sort of thing that happens at 5 meters but on a smaller scale because of the shorter wavelength.

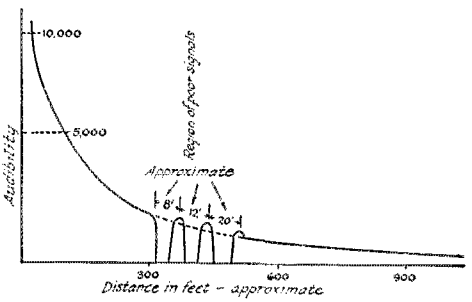


FIG. 5 CURVE SHOWING APPROXIMATE MANNER IN WHICH LOW-POWER ¾-METER SIGNAL VARIED IN AUDIBILITY WHEN RECEIVER WAS MOVED AWAY FROM STATION

The pattern of "dead spots" shown is not general but varied sharply. On the opposite side of the street there was a 6 foot shift in the location of the humps.

The signal remained readable up to about 1000 feet which is not at all bad considering a high noise background and bad screening at both transmitter and receiver. The tests were repeated to find out something of the importance of the screening at the receiver. It was found that with the

coupe turned toward the transmitter the signals were roughly 5 times as intense (audibility meter) as with the car turned the other way, the change being probably due to the large front windows as compared to the small rear window surrounded by the metal covering of the car body.

THE DEMONSTRATION

The apparatus was taken to New York by automobile and before one of the Convention audiences, the story just told was recounted. The receiver had been set up on one side of the room and the transmitter at the other. It had not been possible to reach President Maxim, accordingly the demontration message copied from the loudspeaker by the A.R.R.L. men present was not from him but was signed by us and addressed to the audience. The time was about 4 P. M. and the date June 5. The calls 1BAO and 1HX are the portable calls of Kruse and Phelps respectively. The short message ran thus—

"QST nu 1BAO es 1HX. Date. This message marks the opening of the three-quarter meter amateur band. Kruse and Phelps."

Strays

6ANV wanted to get an A.R.R.L. emblem for his shack. He bought one of the sweater emblems advertised in *QST* and also a black picture frame measuring nine by six inches. The glass was removed and a piece of black felt laid over the back. The emblem was placed upon this and the glass put on again. The result is good looking in spite of the small cost.

We are told by 9AIL that vinegar and salt makes a good solution for cleaning transmitting inductances. It will make them bright and shiny and cut spots that soap and water won't touch. He noticed an increase in antenna current after cleaning his.

9BDQ sez he would gladly furnish free of charge, a hunk of solder for some of these bugs he hears.

Some QSL cards state that the station works all bands. We believe it alright. Particularly after hearing an American roll in on top of some Aussie or other foreign station.

The Grand Secretary of Alpha Sigma Delta Fraternity, Box 731, Hollywood, California, would be interested in hearing from the secretaries or other officials of genuine collegiate radio fraternities, or similar bodies. Communications from non-collegiate fraternities (radio) are also welcomed, but it is the former which are particularly desired. Address correspondence to K. V. R. Lansingh, Grand Secretary.

Financial Statement

By order of the Board of Directors the following statement of the income and disbursements of the American Radio Relay League for the first quarter of 1927 is published for the information of the membership.

K. B. WARNER, Secretary.

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED MARCH 31, 1927

REVENUE

Advertising sales, QST	$19,983.82	
Advertising sales, Handbook	1,207.50	
Newsdealer sales	14,766.95	
Handbook sales	4,862.86	
Newspaper syndicate sales	516.75	
Dues and subscriptions	13,013.12	
Back numbers, etc	919.33	
Emblems	62.34	
Interest earned, bank deposits	247.56	
Cash discounts earned	367.97	
Bad debts recovered	44.45	
		$55,982.65
Deduct:		
Returns and allowances	$7520.33	
Less portion charged to reserve for newsstand returns	815.97 6,704.36	
Discount 2% for cash	313.62	
Exchange and collection charges	14.94	7,032.92
Net Revenue		48,949.73

EXPENSES

Publication expenses, QST	14,986.76	
Publication expenses, Handbook	1,612.85	
Salaries	12,702.73	
Newspaper syndicate expenses	168.00	
Forwarding expenses	681.61	
Telegraph, telephone and postage	2,124.64	
Office supplies and general expenses	2,256.08	
Rent, light and heat	985.66	
Traveling expenses	270.74	
Depreciation of furniture and equipment	215.27	
Bad debts written off	81.24	
Communications Dept. field expenses	56.48	
Total Expenses		36,092.01
Net Gain from Operations		$12,857.72

ALIBI – "ONE OF MY TUBES WENT OUT LAST NITE, OM."

Better Audio Amplification for Short-Wave Receivers

By L. W. Hatry*

WE amateurs pride ourselves on constant improvement. In spite of this, we too frequently get into a rut. It is so easy to copy.

For instance—what does the average amateur use for receiving? Almost invariably, an oscillating detector followed by one single stage of "distortion" audio amplification. The exact arrangement of the oscillating detector circuit is varied a little now and then, but the audio amplifier never seems to improve at all. Why does it *always* use a distortion transformer? Why does it *never* have two stages—or three?

When pressed for an answer the owner of the set will answer, "Don't need any more" or, "Too much noise."

These are thin excuses. On weak signals one *does* need more amplification than one stage can give, while there is the claim that more stages or better transformers are noisy—that is simply an admission. The broadcast listening amateur can *and does* build affairs having from 2 to 5 stages of audio amplification which (*with the antenna disconnected*) can be borne by sensitive ears, under good phones. Borne? Why, the affair doesn't make a sound *when nothing is fed into it.* That is one reason why an inefficient "tuned r.f." (broadcast receiver) will bring in concert after concert with plenty of loud-speaker volume when a headset in the detector circuit strains one's hearing. In radio telegraphy, such a gain is worthwhile on those weak Chilean or Australian signals that one can not quite read.

However, even if the amplifier is not making any noises of its own, the user may still object to the way in which a local signal bursts in while one is straining after a Tasmanian. Many have tried to overcome this by the use of jacks or switches to cut off a stage whenever such a thing happens. Neither is quite satisfactory. A jack gives an abrupt jump-and a click, together with a lapse of time long enough to upset the ear and therefore to introduce an additional lag consequent to readjustment. This is a waste of time that makes poor operating efficiency. A switch is just as violent but at least is more rapid and thus not so bad, though the click still introduces lag by requiring readjustment of the ear sensitivity. The jack is, from my standpoint, useless. The switch is worthwhile.

*Radio Department, Hartford Times, Hartford, Conn., also 1OX, same address.

THE PRACTICAL MULTI-STAGE ARRANGEMENT

To make two, even three stages of audio bearable on the headset for constant operating use is a simple trick. The circuit is shown in Fig. 1. The assumption in the figure is that the usual throttle control of regeneration is used, but no matter what the control, the amplifier scheme remains the same; the only difference usually being in the lack or presence of an r.f. choke at x

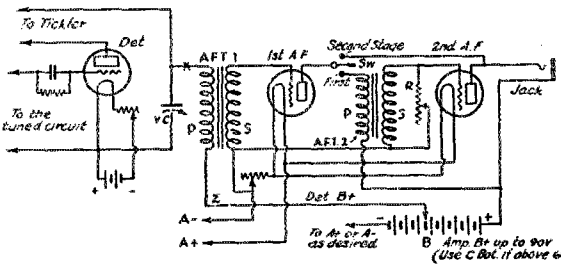


FIG. 1. A TWO-STAGE AUDIO AMPLIFIER WITH RESISTANCE CONTROL OF AMPLIFICATION AT THE INPUT OF THE SECOND TUBE, ALSO SWITCHING ARRANGEMENT FOR CUTTING OFF THE 2ND STAGE

The detector circuit shown need not be used but may be modified into any of the standard arrangements by such changes as adding a variable resistance at Z, fixing the condenser V. C. or putting in a choke at X.

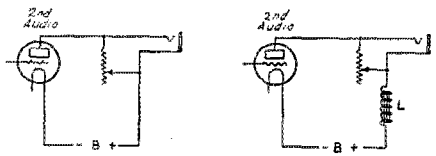


FIG. 2. OUTPUT CONTROLS

A is a resistance shunted across the phones. B is a modification which permits use of the resistance as an audibility meter—provided the resistance is good enough so that it does not change with the weather or use. L is a choke described in the text.

or a variable high resistance at z. Both amplifier tubes are controlled by one rheostat because separate rheostats offer no gain. Filament rheostat control of amplifiers is anything but satisfactory. A rheo-

stat is noisy and upsets the ear, also reducing the filament current of one or more tubes brings the amplifier near the state of oscillation, which causes every sound to have a tail on it and unpleasantly alters the tone of the signal. The rheostat should be set and then *left alone*. The grid returns,

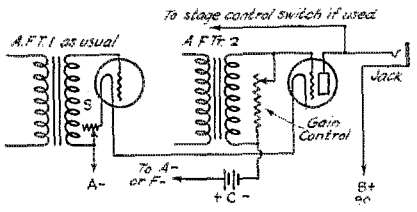


FIG. 3. HOW THE C-BATTERY SHOULD BE CONNECTED IF ONE WISHES TO USE A PLATE VOLTAGE IN EXCESS OF 60 ON THE 2ND AUDIO TUBE

please notice, are connected on the far side of the rheostat to obtain a biasing drop from it. This saves some B-battery "juice". The stage control switch may be fashioned of the old rotary type with points, a single pole-double throw knife type, or a jack switch such as the Carter or Yaxley. The "volume control" variable resistance R, should have a value of 500,000 ohms. It is used merely to shunt the secondary winding of the second audio transformer in varying degree and should have an "off" or open position to permit utilization of the transformer without the shunt. It acts partly as a "cushion" for sudden clicks. Its main function, however, is as a volume control, permitting one to adjust the two-stage output to suit the ear. Reducing the amplification often puts an interferer below audibility, which is a real help.

Volume control at the second stage is contrary to usual practice in broadcast sets. Broadcast set practice, however, is no criterion since quality of reproduction is the prime consideration, while *quantity* of reproduction is most important for telegraphy. The idea for the former is not to allow any tube following the detector to be overloaded, which can be prevented by putting the volume control on the first transformer, thus varying the input given to all of the audio tubes. We c.w. amateurs live under a headset. This means that any sudden loud noise will be concentrated on a pair of strained ear drums. If the volume control is in the first stage (before the first audio tube) the second audio tube will always be working at maximum, and a trifling click originating after (i.e. beyond) the volume control will race through the a.f.t., be properly amplified and do all but raise one's cranial horticulture permanently. This will not do, so the control is put at the second stage on the secondary of the transformer that runs the last tube and thus controls anything that gets to that last tube, which is first aid to the ear. Naturally, one here thinks of the possibility of putting the volume control still further along in the system; that is, beyond the last tube. It then becomes a resistance shunted across the phones as in Fig. 2A. This naturally suggests that one might as well calibrate the resistance and use it as an audibility meter—assuming the resistance to be good enough for that purpose. Unfortunately, the thing isn't quite that simple, as the load on the last tube is changed by moving the resistance slider and the whole amplifier is more or less upset. This can be gotten around and the thing made workable enough for ordinary purposes by the arrangement of 2B. The choke, L, is almost anything that has an inductance which is at least as large as the inductance of a pair of phones (in fact an extra pair of "cans" will do in a pinch) or as much larger as is convenient. The larger the inductance of the choke, the better the audibility meter.

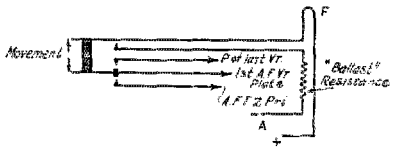


FIG. 4. FILAMENT CONTROL SWITCHES OF VARIOUS SORTS MAY BE CONNECTED AS SHOWN TO PUT OUT THE FILAMENT OF THE 3RD TUBE (2ND AUDIO STAGE) WHEN ONLY ONE STAGE IS WANTED

The connections are such that the switch does not affect the operation of the first two tubes. The switch as shown controls the 3rd filament and also transfers the phones from the 3rd to 2nd tube.

An old audio transformer or a filter choke from a "B sub." will do. These arrangements are not so good in one way as the one of Fig. 1. If a very strong click comes thru the detector it can easily choke up the 2nd audio tube in Fig. 2 which it could not do so easily in Fig. 1. Accordingly, Fig. 2 gives one a chance to use the volume control as an audibility meter and Fig. 1 probably gives better protection against momentary blocking of the amplifier—during which time signals are *not*. The choice depends on the sort of interference you have, also your personal likes.

With these circuit arrangements, not more than 45 volts of B are needed. If you like 90 volts (it permits greater volume) use it on the second stage only, for that's all that needs it and the B-battery power should be conserved. With 90 of B, the last tube should also have a 4.5 v. C-battery connected

as in Fig. 3. The C-battery cuts down the B-battery load, increases the tube life and helps the audio quality, which last feature is virtueless for telegraphy. The detector voltage is used as needed.

The 199 tube is the logical one to use, for even three of them on a set of dry-cells provide economical filament operation. However, 201-As are satisfactory. The 120 power type or the 112 power types are needless.

A rheostat on the audio tubes is not necessary. It only means another knob on the panel, another device to wear out, another set of spring connections to go bad or another rotating hickey to loosen or stick. Overcome this with a filament ballast resistance such as the Amperite, Elkay stabilizer, or Daven ballast; as examples. Get one for the 120 tube, it will control two 199's when it is connected in place of the rheostat, or get the type for the 112 tube to control 201-As, or one of the 201-A type for two 201-As if you wish. If no ballast resistors are handy, use a fixed 2-ohm resistance for the latter, or a fixed 12½-ohm resistance for the former. If even these are not at hand, set the rheostat back on the baseboard and forget it. Use a battery switch on the panel to turn the whole business out at will. The better battery switches are designed to last a life-time.

If the wish is to turn off the third tube when using only the first two, the interstage switch can be obtained with filament

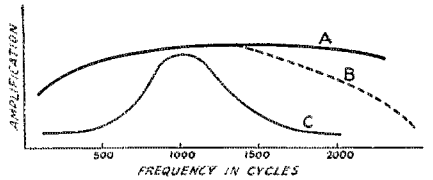


FIG. 5. AUDIO AMPLIFYING TRANSFORMER CURVES

A is the curve of a well-known "music transformer" when used between 201-A tubes with a plate voltage of 60.

B is a modification of the upper end of this curve, such as might improve matters by cutting off the high-pitched parts of static and other noises. Some of this effect can be gotten by shunting condensers across the secondary winding.

C is a peaked curve such as given by a "distortion" transformer, and also by ordinary transformers with the 240 tube or by a "music" transformer with 201-A tubes but the tuned trap of Fig. 7 connected across the primary. Cutting the trap in and out would cause one to go from curve A to curve C and back.

control contacts which are connected in series with the third tube's filament line. With filament control to cut out automatically the last tube, separate filament resistances or rheostats will be necessary for each tube to avoid having to readjust for one only as when one resistance is used. The filament control is indicated in the Fig. 4. Turning off the last tube doesn't

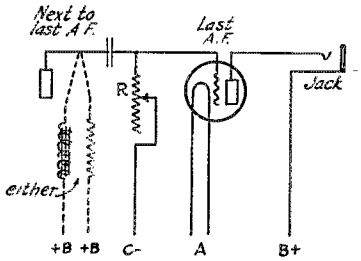


FIG. 6. RESISTANCE AMPLIFICATION CONTROL APPLIED TO RESISTANCE-RESISTANCE OR IMPEDANCE RESISTANCE AMPLIFIER. IF ONE OF THESE IS TO BE USED

The controlling resistance here becomes the variable gridleak R on the last amplifier tube. It is convenient to use a resistance with a maximum of 500,000 ohms.

save much, with a storage battery, and, if you rig up an amplifier like this Fig. 1 circuit, there will never be any desire to drop to the lower stages; for the volume control can always be set down to less

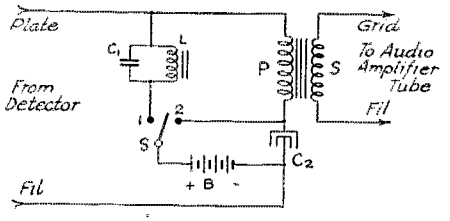


FIG. 7. TUNED REJECTOR OR AUDIO FILTER TO MAKE AN AMPLIFIER EITHER PEAKED OR FLAT AT WILL

By putting the switch on the point 2 the trap is cut out so that we obtain the natural curve of the transformer, which would be like Fig. 5A for a good transformer. By putting the switch on point 1 the trap acts as described in the text and the result is a very Peaked amplifier such as represented by curve 5C. The condenser C1 may have a capacity around 1/10 microfarad and C2 around that same value or as large as 1 microfarad depending on the preference of the user. The capacity of C2 somewhat controls the sharpness of the arrangement. L is a 1-henry iron-core choke described in Fig. 8.

amplification which leaves the reverse gain, always ready at the mere turn of a black knob. Useful? I'll say so!

WHAT KIND OF AUDIO TRANSFORMERS

The kind of audio transformer to use is the *best one you can afford.* A pair or trio of big transformers do the trick. We don't care about small distortions, in fact distor-

tions may help our volume, but we don't want a peaked or "tuned" transformer with all its performance on one frequency. If the curve has small humps it doesn't matter.

We usually talk as if we were dealing with "d.c. notes" so that we only need a peaked amplifier operating at some pitch

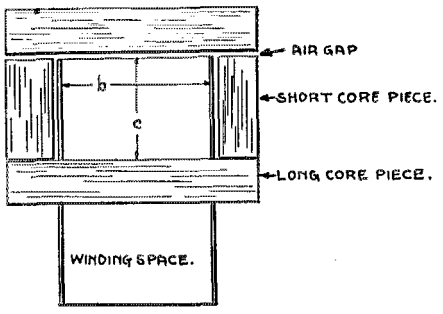


FIG. 8. ONE-HENRY IRON CORE CHOKE ON F. S. DELLENBAUGH'S DESIGNS

This choke will handle 50 milliamperes but a smaller one is hard to build at home. The long core pieces measure 1.7" X .55" and the short ones .5" X .55". Dimensions b and c are .50" and .66" respectively. The core is .50" thick, the airgaps total .02" and the winding has 2300 turns of No. 33 enameled wire. Slight readjustments of the airgap by means of paper separators will give the desired tuning of the trap.

convenient to the ear, a pitch such as 1000 cycles to which we have set the received beat note.

This is all wrong. In practice, we mostly deal with signals that are not "pure d.c." but carry a ripple at 60, 120, 240, 500 or 1000 cycles. It is seen immediately that amateur reception deals with a gamut of audio frequencies partially *below* the good amplifying range of a "poor" transformer. A good a.f. transformer, with an approximately flat curve of amplification against frequency, the flatness of which curve (Fig. 5A) tends well down to 30 cycles is what we amateurs need to handle this range of useful audio frequencies. We could, however, be entirely satisfied with an a.f.t. whose curve like that in Fig. 5B drops off abruptly above 1000 cycles but keeps up below 30.

I have done considerable reception with several different types of audio transformers for experimental observation of the things I have mentioned. The "bad" transformer, the one that like Fig. 5C drops the bass notes, or one that has a big "hump", is right enough on "d.c. notes" whose tone is a single beat-note, which is under control. However, even these suffer since any jumping in the pitch of the note results in such a wabbly volume that the thing is nearly impossible to read. With a good audio transformer that handles *all* audio frequencies with discretion, wabbly waves aren't *nearly* so bad, particularly if the wabble is slight. In addition to this, the way some a.c. or semi-a.c. tones pick up "body" in a good transformer is a pleasure; the low ripples frequency gets respectable amplification, and the super-imposed beat tone is also well-treated, which results excellently. Tuned transformers obviously are not satisfactory for such signals.

It is obvious to me that it is better for us to choose a good audio transformer because it helps out part of the radio game, and results too in an affair of fine audio quality for music reproduction, and music is sometimes a pleasant noise to have handy.

A little distortion hurts nothing, and the ear nearly refuses to recognize it anyhow, so there is no use in having resistance-coupled amplification nor impedance-coupled amplification. At the same time, if such an amplifier *is* handy, use it. But remember that these systems of coupling are good for the bass tones if the inter-tube coupling condenser is large enough; that means .1 microfarad or better. The last grid-leak becomes the variable resistance used as volume control to the last audio tube. See Fig. 6. These systems have the disadvantage of requiring three tubes to produce the gain of two transformer stages.

STATIC REDUCTION IN A PEAKED TRANSFORMER

A reduction of static and other exterious noises is often claimed for the (more or less) tuned audio amplifier or for the audio amplifier filtered to pass but one frequency. Mainly, this does not happen because the

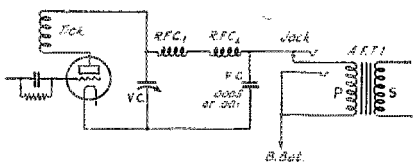


FIG. 9. AN ARRANGEMENT TO PERMIT CUTTING PHONES INTO THE DETECTOR PLATE CIRCUIT WITHOUT DETUNING THE INCOMING SIGNAL

The scheme amounts to a filter which keeps r.f. out of the jack. The filter consists of two r.f. chokes which are described in the text and the fixed condenser f.c. which has a capacity of .005 to .001 μfd.

unfortunately necessary beat reception adds other frequencies not natural to the interference within the band of the amplifier and these *are* amplified by the careless audio stages. This paper as first written contained the sentence, "We do not gain a reduction of the noise in a distortion transformer and a 'good' transformer, I think, amplifies the signals more than the noise." Upon reviewing some experimental results and some of the effects obtained at 1MK (and mentioned in *QST* for April, in the Editor's note on page 30) this seems to be

too general a statement. There are, evidently, cases where the distortion amplifier *is* of actual assistance in suppressing the background although it seems probable that the statement of the April issue was likewise too general and that the distortion transformer is not a sure cure.[1]

IF YOU LIKE PEAKED AUDIO OCCASIONALLY

Because of the things just mentioned, also because you might some day meet an amateur signal that was steady and had a "d.c. note" it is interesting and possibly useful to be able to shift rapidly from the "good" amplifier (Fig. 5A) to the sharply peaked (Fig. 5C) "bad" amplifier.

There are several ways of doing this. In the General Radio laboratory, audio transformers are mounted on square bases of sheet-bakelite, and a spring plug is put in each corner of the base, and connected to the terminals of the transformer. The whole arrangement plugs into a base with 4 jacks, so that transformers can be exchanged in a hurry.

Of course one does not have to change transformers—the same effect is obtained by changing the 201-A or 199 tube for a tube with a high plate impedance, such as the 240. This is simplest of all as one does not need to change any wiring if the set was made for 201-A tubes. The details of this are given on page 30 of the April issue as mentioned before.

WITHOUT PLUG-IN ARRANGEMENT

One can see quickly enough that these plug-in changes cannot be carried out without losing the signal for a moment and making terrific noises.

This can be avoided and the change made instantly by the arrangement as suggested in July, 1926, *QST* by myself and shown again in Figs. 7 and 8. The idea is to shunt a tuned trap or "rejector" across the trans-

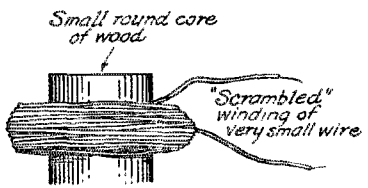


FIG. 10. CONSTRUCTION OF R.F. CHOKES USED IN THE VARIOUS CIRCUITS

former primary. The trap is usually tuned to 1000 cycles and offers very high impedance to that frequency—in other words, "rejects" it, and compels it to go thru the transformer and be amplified. Other frequencies close to 1000 cycles are treated similarly. High frequencies are bypassed thru the condenser C1 and do not go into the transformer primary strongly. Low frequencies go thru the choke L and also do not enter the transformer as strongly as before. Thus the effect of the trap is to cut off both high and low pitches and to turn curve 5A into curve 5C. Whether this is an advantage or not can be found by a flip of the switch without losing a dot. If it isn't—better flip the switch back again.

Such a tuned trap can be applied to the first audio stage, while the variable resistance volume control remains on the second stage just as it was in Fig. 1.

AN ISOLATION PROBLEM

Many amateurs desire to be able to transfer the headset for the last amplifier to the detector itself by the usual plug and jack, or by a switch, to listen on one tube at

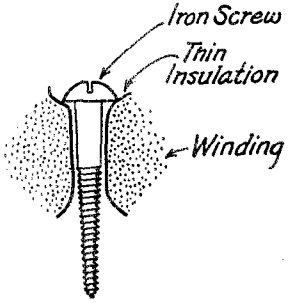


FIG. 11. ANOTHER CHOKE CONSTRUCTION

the same time a signal is coming in without detuning or losing that signal. This is not difficult to do. It merely requires a little circuit rearrangement. The correct circuit at the primary of the first audio transformer is shown in Fig. 9. Two r.f. chokes are necessary. One is R.F.C.1 with 300 turns like Fig. 10. The other choke R.F.C.2 is smaller, having but 100 turns wound on in the same manner. These chokes are not bulky if wound with 30 wire or smaller and enameled wire may be used. The chokes should not be closer together than is necessary. If close together, they should be at right angles. They should be used in any case. It will not harm them a great deal if they have to be near the a.f.t. or other apparatus. Using two different sizes of chokes reduces the dead-spot troubles. The chokes may also be made as in Fig. 11.

1. Naturally when the antenna is put on, the amplifier seems to become somewhat noisy because noise is now being *fed into it*. Usually the noise is not nearly as strong as the signal—frequently there is practically no noise at all. Amplification is then very much worth while. It is a very rare thing to find stations like 2FZ or old 1XM where there is a constant tremendous noisy background and the only hope is to use a stage of distortion audio to get the signal up a bit without bringing too much of the mess along. If all of us were so situated there would be no A.R.R.L.—Tech. Ed.

The fixed condenser f.c. across the transformer (Fig. 9) makes certain that only a trifling amount of residual r.f. gets into it. If such care is not taken it is perfectly possible for the gain controls or stage controls to upset the detector adjustment. The circuit can be varied by the use of a 12,000 ohms resistance where the r.f. chokes are shown, which has the further advantage of never causing dead spots. This of course does not mean that the *antenna* has been stopped from causing dead spots. Such must be avoided by loose coupling. The resistance may actually be anything between 10,000 and 25,000 ohms. The B-battery at the detector will have to be from 40 to 60 volts that 22 or so may arrive at the plate after going through the resistance. Usually, B-battery voltages are used with the r.f. chokes. With this Fig. 9 circuit, the headset can be plugged into the detector plate circuit without detuning the signals; or the headset can be moved up into the amplifier without losing the signal tuned in on one tube.

In the early part of this article I challenged the old assertion that more than one stage of audio amplification is of no help in the reception of telegraphy. That this is not an individual notion is shown by the commercial stations where the use of two stages, when available, is the habit. The better proof is a trial with good transformers and a volume control. It is obvious that a weak signal properly amplified becomes more audible; if it doesn't, *proper* amplification has not occurred. An amateur may be careless but he shouldn't be incompetent.

Strays

The Radio Engineering Labs are now supplying their regular inductances with plugs and mounts for plug-in work. The plugs are large and should not cause losses due to poor contact. These should be a big help in building a set to work in several bands.

We understand that 4BN is using a pair of 216B Kenotrons to supply the plate of a 203A. These poor rectifiers are staggering under a load of ten volts on the filaments and 1500 on the plates. The output is 1200 volts at 150 mils. Wonder how long they'll last.

Here are a few smiles supplied by 9FO.

9AHA and 9HI are both in Chicago.

9BVY is located in Hartley, Iowa.

5IR's name is Waterhouse. He lives on Fountain Street and the town is Hot Springs! Bet he uses water-cooled tubes and his note is all wet.

Standard Frequency Transmissions

THE Official Wavelength Station Committee of the Experimenters' Section, A.R.R.L. announces the following standard frequency schedules. The frequency values at 9XL are based on the standards of the Bureau of Standards and have been checked by the Cruft Laboratory at Harvard University and by the Communications Laboratory of the Massachusetts Institute of Technology. While an accuracy of 1/10 of 1% is to be expected, no guarantee is made. Station 1XM has suspended for the summer. Details on station 9XL may be found on page 8 of the June issue. 9XL now operates with a small percentage of "tone" modulation to distinguish the signals from broadcast harmonics.

In the following, "f" is the frequency in MEGACYCLES and the *approximate* wavelength in meters follows.

SCHEDULES

(Figures are frequencies in MEGACYCLES per sec.; approx. wavelengths in parentheses.)

Friday Evening Schedules Central Standard Time					Sunday Afternoon Schedules Central Standard Time	
Time (PM)	Schedule A		Schedule B		Time (PM)	Schedule C
	f	λ	f	λ		f λ
8:30	3.50	(85.7)	6.50	(46.1)	3:00	10.0 (30.0)
8:42	3.60	(83.3)	6.75	(44.4)	3:12	12.0 (25.0)
8:54	3.75	(80.0)	7.00	(42.8)	3:24	14.0 (21.4)
9:06	3.90	(76.9)	7.25	(41.3)	3:36	14.5 (20.7)
9:18	4.00	(75.0)	7.50	(40.0)	3:48	15.0 (20.0)
9:30	5.70	(52.6)	7.75	(38.7)	4:00	15.5 (19.3)
9:42	6.50	(46.1)	8.00	(37.5)	4:12	16.0 (18.7)
9:54	7.00	(42.8)	8.25	(36.3)	4:24	18.0 (16.7)
10:06	7.50	(40.0)	8.50	(35.3)	4:36	20.0 (15.0)
10:18	8.00	(37.5)	8.75	(34.3)		
10:30	8.50	(35.3)	9.00	(33.3)		

August 5,	B	9XL
August 14,	C	9XL
August 19,	A	9XL
September 2	B	9XL
September 11	C	9XL
September 16	A	9XL
September 30	B	9XL

DIVISION OF TIME

3 minutes—QST QST QST nu (Station call letters)

3 minutes—5 sec. dashes broken by station call letters every half minute.

1 minute—announcement of frequency in megacycles per second (8.75 megacycles per sec. is sent as "8 r 75 MC.")

1 minute—announcement of frequency in megacycles cycles per second.

Special Notice—The continuation and possible extension of these transmissions depends entirely upon the response of the A.R.R.L. If you use the transmissions send a note to Experimenters' Section, A.R.R.L., Hartford, Conn.

—*R. S. K.*

Cuban 6XJ

By Frank H. Jones* and Harold P. Westman†

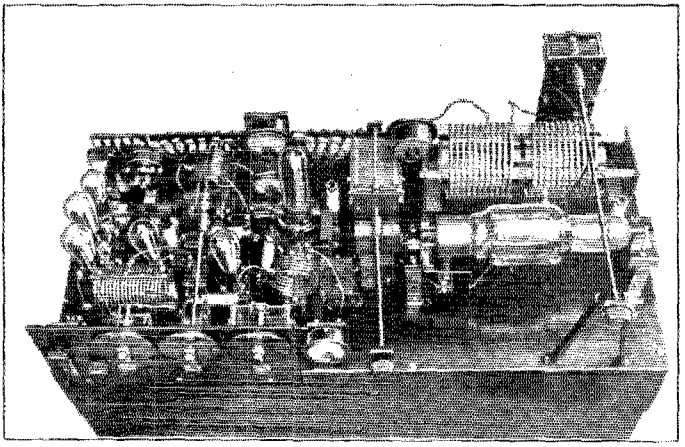
AS will be noted in Correspondence Department of this issue, there are several requests for information on phone transmission. Unfortunately, there is very little available data on amateur phone installations capable of putting out a signal that is both steady and of good quality.

A good phone station must be a combination of an excellent c.w. transmitter and a first rate audio amplifier system such as is used in a really good broadcast receiver. Any c.w. station that does not have a steady pure d.c. note cannot be made into a phone station which may be expected to have a high standard of modulation with a quiet carrier wave for background. In a like manner, a set giving a good steady radio frequency output will not give good quality modulation unless the microphone and the necessary amplifiers are of the best.

Even with two good units, there is still the problem of putting them together. This, in itself, is no small task and requires more than a hit and miss adjustment of clips which commonly goes under the title of "tuning up". If you don't believe this is a matter calling for more than just a superficial knowledge, listen in on the family's broadcast set for a night. Confine your activities to the higher frequency (lower wavelength) end of the spectrum. Tune from one of these stations to another and critically examine both the quality of output and the steadiness of wave. Then, run up to the higher end of the wavelength spectrum and listen to one or two of these stations. Note the vast difference in the naturalness of the reproduction.

An examination would probably show the chief difference between these stations as being that those on the longer waves are, in practically all cases, the product of an excellent engineering organization and many months of time spent by a number of specialists who worked on only those small portions of the problem that came within their particular field. The shorter wave ones are generally the result of the ability of one or two men who are not specialists in all phases of the work but are of the "all around" type. These men are usually considered as being more advanced in the theory and practical application of radio than is the amateur and have available more time and money for the building and adjusting of those stations which they operate. If they cannot always make a finished product that is pleasing to the ear it should certainly be difficult for the amateur to come up to even this standard.

The description to follow while not being that of a typical amateur station will give so many good pointers that are applicable



CRYSTAL-CONTROLLED 6XJ

*Tuinucu Sugar Co., Tuinucu, Cuba.
†Assistant Technical Editor, QST

to amateur installations that it will be worth much attention from the man intending to install such an outfit. It was built by Frank H. Jones and is to be used for experimental tests on the short waves in conjunction to the regular broadcast station, 6KW, of the Tuinucu Sugar Co.

Crystal control of the transmission frequency is used. A crystal having a fundamental frequency corresponding to 159.6 meters is amplified through three stages each of which is used for frequency doubling. The crystal tube and first stage are UX210 tubes, the second stage is a 203-A and the final stage is a 204-A. Because of this frequency doubling, very little trouble is had due to feed back and, as will be noted in the photograph, an extremely compact arrangement is used.

THE SERIES MODULATION METHOD

The modulation arrangement consists of a Western Electric 7A amplifier (to be described later) the output of which is fed to a UX112 through a special transformer. The UX112 swings the girds of two UX210 tubes in parallel. The plate circuit of these 210s is in series with the plate circuit of the crystal tube and acts as a resistance in the plate supply line and causes modulation by varying the voltage applied to the plate of the oscillator[1].

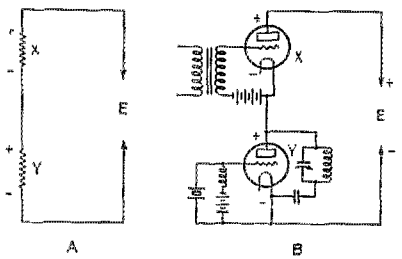


FIG. 1

Figure 1A shows two resistors, x and y in series, connected across a source of potential E. If the resistance of these units is equal, there will be an equal voltage drop across each of them. If, however, we make the resistor x of but half the value of y it will then represent one third of the total resistance and will only have one third of the total impressed voltage across its terminals. The unit y, will then have across it a voltage equal to two thirds the impressed voltage. If we were to reduce x to zero, then the whole impressed voltage would be across y. Also if x were made extremely high, y would be correspondingly lowered. Therefore, even though we have not changed the value of y or the total impressed voltage, we can effectively change the voltage drop across it.

Now, if we substitute for these resistances, the plate circuits of two vacuum tubes and so adjust our circuits that the plate resistance of one of them remains comparatively fixed, we can, by varying the plate resistance of the other tube, change the voltage applied to the plate of the first tube. Figure 1B shows two tubes, one of which is the crystal oscillator y, and the other, the modulator x. The plate resistance of the oscillator tube y, remains comparatively constant. On the other hand, the plate resistance of the modulator tube x, will vary in accordance with the voltage applied to its grid. We can let this act as the variable resistance.

When the signal voltage applied to the grid is negative, the plate resistance of the tube becomes higher and the voltage drop across it increases leaving less voltage across the oscillator plate circuit. On the other half of the cycle, when the grid of the modulator is positive, the plate resistance goes down and the voltage drop across that circuit decreases leaving more voltage across the oscillator tube. From this it is seen that modulation occurs both by an increase as well as a decrease in the radio frequency output. Of course, as the voltage applied to the plate of y varies, its plate resistance will also vary somewhat but this will be small as compared with the resistance change of the modulator tube plate circuit.

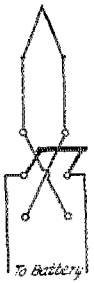


FIG. 2

The radio frequency energy present in the plate circuit of the oscillator tube is prevented from getting into the modulator tube circuits by means of a radio frequency choke and by-pass condenser as shown. The filament of this tube is at ground potential and may be tied in with the filaments of the other radio tubes. The filament of the modulator tube is not at ground potential and in this case a separate storage battery is used to supply the necessary current and voltage. This filament runs several hundred volts above ground potential depending upon the plate resistance of the tube. A special transformer having very good insulation between primary and secondary is used to couple the grids of the modulator tubes to the preceding amplifiers.

When using the Heising constant cur-

1. It would seem to be more desirable to modulate in the first amplifier plate circuit. When modulating in the crystal tube circuit, the crystal will tend to iron out all modulation. This is due to the fact that the mechanical inertia of the crystal will cause it to absorb or give out energy in order to keep the output constant and this is one of the reasons for getting a d.c. output from a poorly filtered plate supply.—Asst. Tech. Ed.

rent method of modulation it was necessary to detune the plate tank circuit of the crystal tube considerably from the wavelength of the crystal in order to get a fair amount of modulation. The detuning had to be so great that the circuit had a strong tendency for self-oscillation. With this series method of plate modulation this trouble was not experienced and the tank

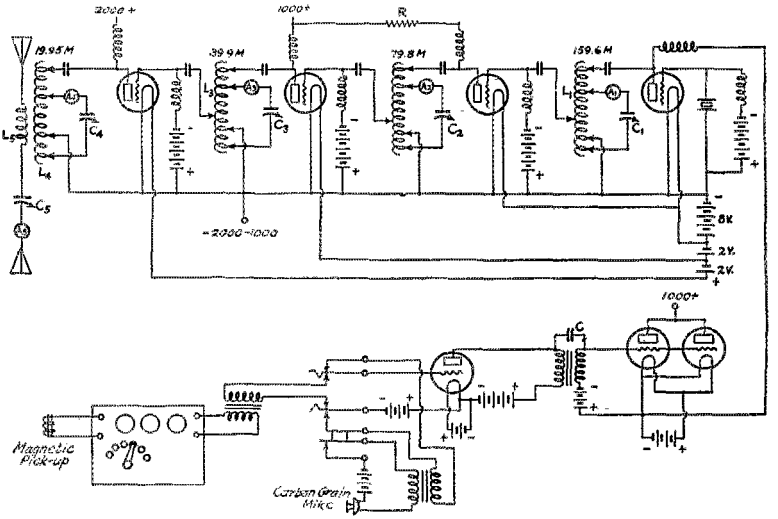


FIG. 3

A1, A5—0-1 amperes.
A2—0-2.5 amperes.
A3, A4—0-5 amperes.
L1—18 turns, flatwise wound strip, 5 inches diameter.
L2—10 turns, flatwise wound strip, 5 inches diameter.
L3—5 turns flatwise wound strip, 5 inches.
L4—5 of the 11 turns of flatwise wound strip, 5 inches in diameter.
L5—11 turns.
C—.5 μfds.
C1, C2, C3—250 μμfd. Receiving type.
C4—440 μμfds. Transmitting condenser.
C5—500 μμfds. Receiving type.
R—12,000 ohms.
Radio frequency chokes are 100 turns of No. 30 d. c. c. wire on a 1-inch form.
Plate blocking condensers are .002 μfds. each.
Grid coupling condensers are .001μfds. each.

will be somewhat reduced over what would have been obtained if a.c. were used and supplied from a transformer having a center-tapped secondary. This is due to the fact that when d.c. is used, the plate current is not as evenly distributed over the length of the filament. That half of the filament nearest the point connected to the negative of the plate supply will carry more circuit could be tuned to obtain benefit of the crystal action without materially decreasing modulation. It is, therefore, quite superior in that the transmission frequency remains much steadier.

The filaments of all the tubes are run from d.c. obtained from storage batteries. The rheostats to drop the voltage of the storage battery to the required value for the filaments are not shown in the diagrams but are placed in the positive filament leads. For two UX-210s in parallel, a .2 ohm unit is used and for the 204-A, a resistance of .28 ohms is required. The 203-A runs directly from the 10-volt tap of the battery.

When using direct current to supply the filaments of power tubes, the life of a tube of the plate current than does the other half and, in large tubes where high plate currents are obtained, this may be enough overload to materially shorten the life of the filament. In order to improve matters, a double pole-double throw switch is inserted between the filament of each tube and the supply lines are connected so that it reverses the filament leads. This is shown in Figure 2. At regular intervals, the switch is thrown and the resulting wear on the filaments is more even, thereby lengthening their life.

The plate voltage is obtained from either a bank of high voltage storage batteries which are used regularly or else from two motor-generator sets which are on hand for

emergency use. Meters for indicating plate current are not placed in the leads to the various amplifier stages. Only one is used and is located in the plate circuit of the 204-A. However, radio frequency ammeters are placed in all of the tank circuits and have been found to be very useful in the tuning of the set.

The 500 volts applied to the plate of the first frequency doubling stage is obtained from the 1000-volt source and is reduced by inserting a resistance in that lead.

A magnetic pick-up is used for studio work and a carbon grain microphone used for speech. Two extra stages of amplification are required to bring the output of the magnetic pick-up to an equal level of that obtained from the carbon grain mike. Another stage is used between this point and the grids of the modulator tubes. This makes a total of three stages for the magnetic and one stage for the carbon grain microphone preceding the modulator tubes. The single stage common to both microphones employs a UX-112 whose plate circuit is coupled to the modulator tubes through the well insulated transformer referred to previously.

The extra two stages used for the magnetic pick-up take the form of a Western Electric 7A amplifier which has been somewhat modified to fit the particular use. This is the amplifier designed for use with the 10D loud speaker and was very popular before the cone type of loud speaker came into its own. It consists of a single stage employing a 216-A Western Electric tube followed by a push-pull stage using two of these tubes. The secondary of the input transformer is tapped to give a volume control of the output. The output winding of the plate push-pull transformer has a low impedance and a special transformer had to be wound for coupling between this circuit and the grid circuit of the following stage.

A switch, to allow the use of either microphone, is used and when thrown to a position for using the speech microphone, it automatically completes the microphone battery circuit. It disconnects this circuit when the magnetic pick-up is in use.

The set is located in a small shack in the yard of the 2,500-Kw. electric plant of the Tuinucu Sugar Company. This shack is just about large enough to hold the set and the control switch for operating it. This switch is an electrically driven rotary affair and operates the filaments and plate supply switches as well as the antenna disconnect switch. It also starts up both of the motor-generator sets when they are to be used. All this is controlled by a simple two-button push switch located in the studio. Another larger building contains the large bank of storage batteries as well as the 1000- and 2500-volt d.c. generators which are normally used for the regular broadcast transmitter under the call of 6KW.

The antenna system consists of two 2", 6-wire cages each of which are 20 feet long. They are stretched rigidly between two wooden masts about 30 feet high. A two-wire current feed system is used and the normal antenna current is .8 amperes.

In tuning the transmitter, UX-112 tubes were installed throughout and about 175 volts of B battery applied to the plates. This allowed the succeeding stages to be tuned without any danger of fireworks which might have taken place under misadjustment. It is also good insurance as far as the crystal is concerned. After the set had been adjusted, the proper tubes were inserted and the voltages raised gradually. Only relatively slight changes in the tuning adjustment were necessary to take care of the different characteristics of the larger tubes.

Ohio State, Central Division Convention

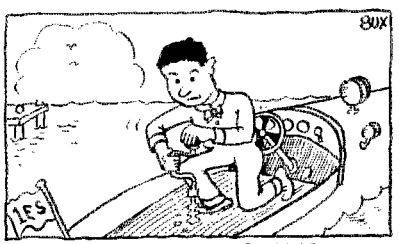
Hotel Ohio, Youngstown, Ohio
August 19-20

FELLOWS, note the above dates the city and hotel where the sixth annual Ohio State Central Division Convention is to be held. The Mahoning Valley Amateur Radio Club will have charge of the convention and the tentative program shows good amusements for the delegates at Idora Park besides the traffic and technical meetings.

Past Ohio Conventions have always been of the best and we have it from V. D. Gettys, Chairman of the Convention Committee, that they will uphold the past records. Everybody is cordially invited to attend.

Strays

A Dutch station in giving his reply message in the recent International Tests said, "Here no transmitter. Dutch amateurs not being licensed". Suppose it must have been "two other fellows".



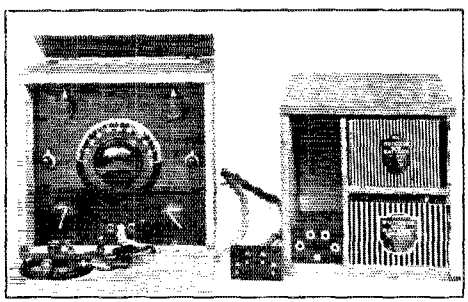
HOW TO STOP MOTOR BOATING

A One Gnat-Power Portable

By Harold P. Westman, Assistant Technical Editor

THERE are many types of sets that are called portable. They range from the half-kilowatt phone set mounted on a Mack truck and used for out of studio broadcasting to the hunk of galena with a small coil, a couple of condensers and a pair of cans that can be fitted into your jacket pocket. All have their place in this scheme of things and all are useful in their place.

The amount of equipment that can be used depends to a great extent upon the available means for transportation. If it must be packed by man power, the limiting factor will be the amount of batteries that can be carried. The length of time away from the source of supplies and the ease with which new batteries may be obtained will dictate the number and size of tubes that may be used. In cases where the total trip may not take more than a couple



FRONT VIEW OF PORTABLE SET INCLUDING BATTERY BOX

of weeks to a month, these matters may be so balanced that there is no need for renewing batteries until the trip is over.

This particular set was constructed with a view of being used primarily, as a receiver, and secondarily, as an extremely low-powered transmitter. Its receiving range should be as great as that of any of the non-portable type of receivers using the same circuit arrangement and tubes. The set covers only the 40-meter band but can be made to cover both the 40- and 80-meter bands but this entails an extra amount of work that is quite out of proportion to the gain.

Its ability as a transmitter is, no doubt, small but should offer many possibilities for successful two-way communication, particularly if a good antenna is available. Though its normal range will probably not exceed ten or fifteen miles, it is quite possible to cover very substantial distances under favorable conditions. At least, there will be some incentive toward trying for greater distances even though a great deal of success does not result.

The set is divided into two parts; one box carrying the set proper and another box, the batteries and other incidentals such as phones, antenna and tubes. The same pair of tubes is used for both transmitting and receiving. Change-over is accomplished by means of two multi-pole switches.

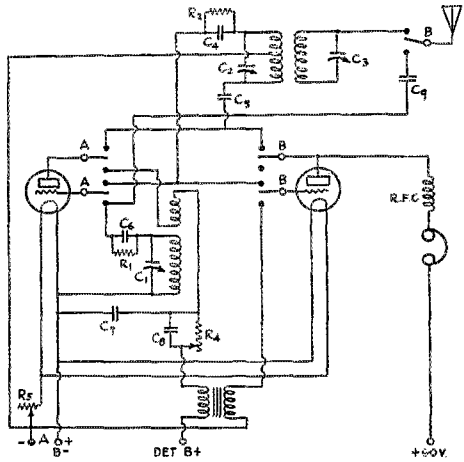


FIG. 1

C1, C2, C3—General Radio type No. 368, 50μμfd. condensers.
C4—500μμfd. Sangamo receiving condenser.
C5, C7—1,000 μμfd. Sangamo receiving condenser.
C6—100 μμfd. Sangamo receiving condenser.
C8—.1μfd. by-pass condenser.
C9—Antenna coupling condenser (described in text).
R1—5 meg grid leak.
R2—5,000 ohm grid leak (Daven).
R3—Filament rheostat. 20 ohms for two 199s.
R4—Variable high resistance, 50,000 ohms.
RFC—No. 35 Remler choke.

The filaments are not controlled by these switches. They are connected directly to the A battery through a rheostat and are turned off by rotating it to the "off" position. This is advisable because as the batteries are used, the terminal voltage will drop due to polarization. In order to compensate for this, the rheostat is advanced and after an hour or so of operation, there may be several ohms less in the circuit. Now, if the filaments are turned off

by a switch, and the batteries allowed to rest for several hours, when turned on again, the battery voltage may be back to where it was at the start of the previous period of use. There will not be enough resistance in the circuit and the filament will run at too high a temperature resulting in the shortening of its life. The life of the batteries will also be reduced.

The circuit is shown in Figure 1. It may look a bit complicated by having the switching arrangement mixed up with it

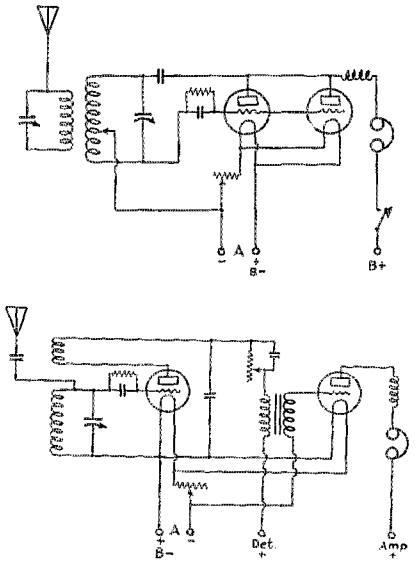


FIG. 2

but examination will show it to be quite ordinary. The two circuits separate and without switches are shown in Fig. 2.

The switches are manufactured by Yaxley and consist of a number of flat springs carrying contacts similar to those used in telephone jacks. They may be obtained in various number of sets of contacts. Although, four pole, double throw ones are shown, those having only three poles will do.

In the diagram, the switches are labelled A and B. Each switch takes care of the grid and plate of one tube. The B switch also changes over the antenna. The grid of the detector tube is connected to the second pole from the bottom of the A switch and makes contact to the receiver coil when pushed downward. The antenna when on the receiver side is connected to the next switch blade directly below this and the capacity between the two blades acts as the antenna coupling condenser. Regeneration is controlled by means of a variable high resistor placed in the B battery lead to the detector tube. A single stage of audio frequency amplification is employed and uses a small "Hedgehog," ten-to-one ratio transformer.

The transmitter is of the usual Hartley arrangement and a voltage-feed half-wave Hertz antenna is used. This is a piece of flexible wire about 60 feet long. A flash lamp is placed in the center to indicate resonance. The set end of the wire connects to one side of a resonance circuit that is coupled to the primary circuit inductance.

The inductances are all on bakelite tubing one and a half inches in diameter and with the exception of the tickler which is close wound, are wound with number 22 s.c.c. wire spaced one diameter. The spacing of the wire should give no trouble.

The "live" winding should be securely fastened to the maching screw which acts as the terminal at the end of the winding. The "dead" winding, whose space is worth more than its presence, is also caught under a nut on the same screw that holds the "live" wire. Both wires are then wound side by each and pulled good and tight. This matter of getting the wire on tightly is the most important point of the whole proceedings for, if there is any looseness at all, the wire will shift its position and the spacing become very irregular. After the proper number of turns has been put on, the end of the "live" wire is scraped and fastened to the machine screw which acts as its terminal. The spacing winding can then be removed. This should be done with care to see that it does not pull against any turns of the good winding and alter the spacing. Immediately after the winding is completed, it should be painted over with collodion which will hold it firmly in place thereafter.

The receiver secondary winding consists of fifteen turns and the form is three and one-half inches long. This winding is put at one end of the form to get it in the clear where it can be connected to and that part of the form below the winding is left vacant. The tickler coil is wound three-eighths of an inch below the bottom turn of the secondary winding and has eight turns. This winding is not spaced but is put on in the regular manner.

The form is held in place by drilling two holes at the bottom end of it. These are just large enough to pass a piece of bus bar and are located about one-eighth of an inch from the edge and at opposite sides of the tubing. A piece of bus bar is run through them and eyelets turned in each end

of the bus. They are just large enough to hold two wood screws which screw into the wooden baseboard and hold the whole unit in place.

The transmitter inductance has twelve and a half turns. Three taps are taken out at the sixth, seventh and eighth turns respectively. The filament lead is connected to the one that gives best results. The coupling circuit winding has eighteen turns and the distance between the two windings is approximately one-quarter of an inch. This coil is mounted by means of two pieces of heavy bus which are fastened to the two condensers used for tuning the transmitter. They are also used as the leads to the condensers.

The variable condensers used in the set are all General Radio type 368, 50 μμfd. ones which are of the "midget" variety, having a single hole mounting arrangement. The two in the transmitting circuits are put on the panel in the normal manner but the one for the receiver tuning control is mounted a bit differently. This is due to the use of a National 'Velvet Vernier' dial, a very smooth running one that has about the right ratio for the size condenser used. The dial itself is fastened to the panel by means of four screws which extend through it and are held by nuts. There is a short hollow shaft on the dial assembly that extends through the panel and into which the shaft of the condenser fits. This requires that the condenser be mounted about an inch and a half from the panel. As the dial assembly is plenty strong enough to support the condenser, it is only necessary to get an arrangement to keep the entire condenser from rotating with the dial and also to keep the correct amount of tension on the rotor section to insure good contact at the bearings. This is done by bending a piece of bus wire so that it will be gripped by the mounting nuts on the condenser and its ends will be held by the same screws that hold the dial in place.

The batteries are connected to the set through a four-wire cable. The key is placed in the positive B battery lead. It is impractical to put it in the negative lead as this is connected to the A positive lead at the battery box to save the running of an extra lead. However, the radio frequency choke does its work and no reaction is had due to the hand coming in contact with this lead. The voltage at this point is not high enough to cause any trouble.

The battery box is divided into three compartments. Two of these hold the batteries (this is really one compartment with a shelf so that the batteries will pack better and keep out of each other's way) and the other holds the antenna wire, phones, tubes, etcetera.

Tuning is simplified to a considerable degree by having the phones in the plate circuit of the tubes. In order to find the proper tap for the filament lead, throw the switches for transmission and light the tubes up. Put the filament lead on the

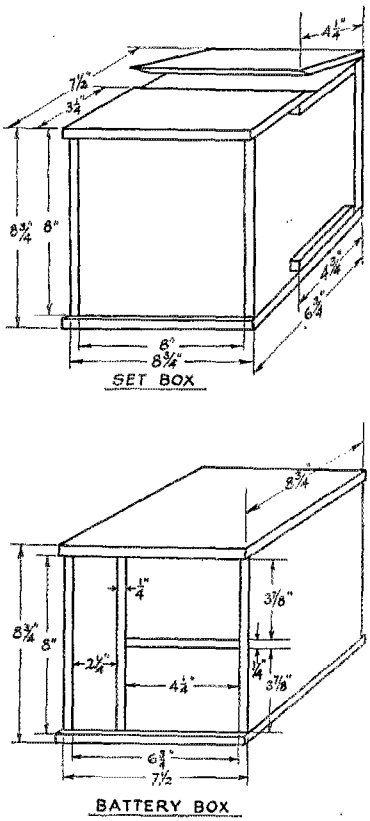
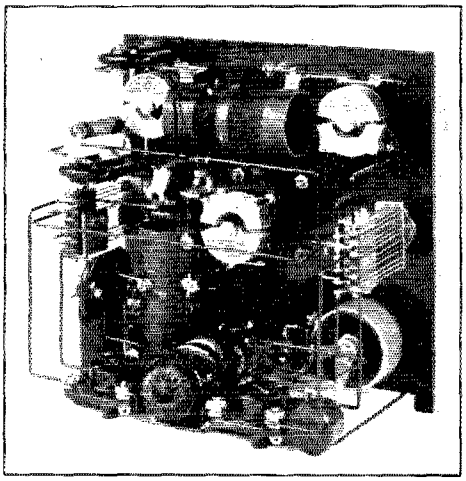


FIG. 3

tap nearest the grid end of the coil. Rotate the condenser across the primary coil and keep touching the metal pointer on the condenser. This is equivalent to touching either the grid or plate lead and will stop the tube from oscillating. As it stops and also as it starts when the finger is removed, a click will be heard in the phones. The condenser should be rotated over its whole scale and it may be noted that the set doesn't oscillate over that entire range. Try the filament lead at the next tap and test for oscillation. This will probably be all right. If not, try the tap farthest from the grid. If that doesn't work, there is probably something wrong in the connections or a defective piece of apparatus. Check everything over carefully and be sure that all soldered joints are making

good contact. When everything is in proper shape, there should be no difficulty in getting it to oscillate.

Leaving the primary condenser alone, swing the condenser in the antenna coupling circuit until a click is heard in the phones. This indicates that the two circuits are in resonance. In the condition of exact resonance, the circuit will stop oscillating as the amount of power absorbed by the coupling circuit is too great. This circuit should, therefore, be detuned somewhat and the point at which maximum energy is present in it can be found by touching the pointer of the condenser. Most reaction on the primary circuit will be had



REAR VIEW OF SET

when there is maximum current in the coupling circuit. Therefore, touching the coupling circuit and causing its resistance to increase will be reflected into the primary circuit and stop oscillations. It follows that the greatest change in the primary circuit will take place when there is the greatest amount of its energy being fed into the coupling circuit. That point where the loudest click is heard in the phones is the point where maximum current is flowing in the coupling circuit. The antenna may then be connected and the circuits readjusted for highest antenna current. This, of course, is indicated by the brightest indication on the flashlamp in the center of the antenna.

The boxes are made of 3/8-inch wood and the dimensions are given in Figure 3. In both these cases, the hinged front lids are not shown. In the case of the battery box, the lid or door is hinged on the left side and the top and bottom pieces are extended out to be flush with the outside of the door when it is closed.

The door on the box housing the set opens from the top and acts as a shelf to hold the key. The top and bottom pieces of the cabinet are also extended to be flush with the outside of the door when it is closed.

In order to hold the panel in place (it fits two inches inside of the front edge of the box to give room for the dials etc.) there are four square pieces of wood 3/8" by 3/8" fastened into the corners of the box. The panel is screwed to the ends of these. A small lid is in the top to allow tubes to be put into and taken out of the set. The panel is 8" by 8" by 3/16" and should fit snugly into the box.

When used with two 199 tubes and four each of the No. 5156 and 2370 type Burgess batteries or their equivalent, the set has proved that it should be good for two hours per day operation over a period of a month without the need of renewing batteries. Both sets of batteries should give out at about the same time. The No. 5156 battery is a pound and a half, 22.5-volt one and the four are connected in series for the plate supply. The No. 2370 type is the heavy duty C-battery and the four are connected in parallel for the filament supply. If conditions permit, a pair of 120 tubes may be used and will have a considerably larger output. If the same A-battery is used though, their life will be much shorter. With these tubes, three of the regular six-inch dry cells should be used to get a life that approaches that of the plate battery. It is also possible to use a pair of 201-A tubes if the filament rheostat is changed. It will be necessary to use a storage battery for filament supply and this may be done if the set is to be used in an automobile. In this case, the plate batteries begin to get too small for the job and a larger size should be used. When being packed on foot, a leather or web strap may be passed around the boxes and used as a shoulder strap.

The set itself when ready for carrying weighs approximately seven and a half pounds. The battery box containing all batteries, phones, antenna, tubes, etc. weighs about fifteen pounds making the total weight of the two units, twenty-two and a half pounds.

This Short-Wave Amplifier Business

By R. B. Bourne*

MOST amateurs have at one time or another wondered why the combination of simple autodyne detector and one stage of audio amplification has been for so long the most popular type of receiver for short waves and at the same time wondered why r.f. amplification at short waves was, as it appeared to be, a useless adjunct. Many amateurs threw the very idea of a tuned amplifier out of their minds simply because it necessitated another control. An untuned amplifier is absolutely out of the question, because of the very doubtful gain obtainable.

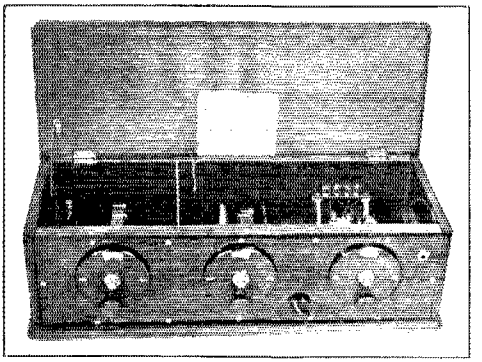
The writer has been experimenting with various short-wave r.f. amplifiers for several years. With most of them, it was the same story—not good enough. There must be a reason for their failure, and the present shielded job was constructed with the idea that if well known principles were to be applied and *given a chance to function*, some real results should accrue. These results would have to more than justify the extra tuning control involved.

First of all, it appeared that if an amplifier could not be made so as to be free of objectionable reaction on the detector tuning, it had better be left alone.[1] To attain this independence of the two tuned circuits, several things had to be done. The whole receiver is shielded with .05" thick copper, with all possible seams soldered up. The amplifier stage is shielded from detector by a partition, through which the necessary holes are drilled to accommodate wiring. The shielding thus obtained is far from perfect, but is a step in the right direction. Perfect shielding is almost impossible to obtain unless one resorts to double shielding, that is, two complete shield systems separated by about half an inch.

Granting the shielding to be fairly good, it is then necessary to watch out for stray couplings, in common leads, etc. Filament and plate power leads are braided together, where they carry no r.f. of intention. It is desirable to get r.f. currents to ground as quickly as possible, after they have performed their intended function rather than allow them to run loose.

Fig. 1 shows the complete wiring connections. It is seen to be a straight enough neutrodyne, as far as the r.f. part of the set is concerned. The two tuning condensers are 7-plate affairs, cut down from a larger size. The regeneration control is a .0005-μfd. condenser, but one of much less capacity is ample. It is found that a variation of only 30 micro-microfarads is sufficient to cover the needs for regeneration capacity over the entire frequency band involved.

The two grid coils, L_1 and L_3 are identical, having 6 turns of No. 16 bare wire on a



FRONT VIEW OF THE SET IN ITS SHIELDED CABINET

The r.f. amplifier is at the left of the partition thru which it feeds the r.f. transformer. The primary of this transformer is the lumped white winding just beyond the partition and the secondary is the spaced coil next to that. When the set is in operation these coils are screened against capacity coupling by the wire and cardboard screen which is seen leaning against the lid of the set. This screen does not stop magnetic coupling. The left control is the r.f. tuning control, the detector input tuning is controlled by the center dial and the regeneration by the right hand dial.

2¾" diam. The coils are self-supporting and turns are spaced about the diameter of the wire by means of string woven thru them. The string is paraffined, which increases its rigidity. The antenna is connected to the r.f. coil at the second turn from ground. A separate antenna coil was tried, but gave slightly inferior results. No danger here from "dead spots" due to antenna tuning. The antenna has practically zero coupling with the detector. The primary of the r.f. transformer, L_2 has 7 turns of No. 18 D.C.C., bunch wound. Three of these turns are the actual primary, the other four providing the balancing potential which is applied to the grid of the r.f. tube thru the neutralizing condenser C_n. A great many such coils were constructed and tried out. This one

*IANA, Maxim Silencer Co., Capitol Bldg., Hartford, Conn.

1. This very vital point is usually overlooked entirely; if an amplifier amplifies the owner assumes that it is good. Very soon after he is cured of this belief by finding that the thing is absolutely worthless and a nuisance if there is any considerable interaction between the tuned circuits.—Tech. Ed.

gave the greatest amplification and at the same time permitted an adjustment of the balancing condenser which held constant for the widest band. With the type of circuit shown it is not possible to get an adjustment of the balance which will hold perfectly, independent of the frequency. The neutralizing condenser is homemade and has a thin piece of mica cemented on one plate for protection against possible short-circuit of plate potential. It consists, briefly, of two brass plates ½" x ⅞" separated a sixteenth inch, one plate being rotatable. The tickler coil L_4 is jumble wound of No. 26 and has 7 turns. All coil diameters are about the same. It would probably be better to use coils of less diameter on account of the shielding. All coils are mounted in binding posts on a hard rubber sub-base. There is no reason why plug-in coils should not be equally serviceable, if not more so.

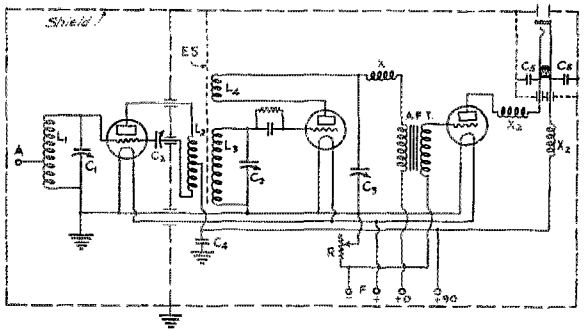


FIG. 1—THE COMPLETE CIRCUIT DIAGRAM

L1 & L3—Grid coil.
L2—Plate or r. f. transformer primary coil.
L4—Detector tickler coil.
X1, X2, X3—R. F. Chokes.
A.F.T.—Audio frequency amplifying transformer.
C1, C2—Tuning condensers.
C3—Regeneration control condenser.
C4—R. f. bypass around amplifier B supply.
C5, C6—Jack filter r. f. bypass condensers.
Cn—R. f. neutralizing condenser.
E. S.—Electrostatic shield.
All coil dimensions and condenser capacities are given in the text.

X_1 is an r.f. choke in series with the primary of the a.f. transformer. E.s. is an electro-static shield which is placed between the primary and secondary of the r.f. transformer to reduce capacity coupling. This is shown in one of the photos lying against the cover of the cabinet. It consists of a grid of insulated wire threaded back and forth on a piece of cardboard. One end of the wire is grounded, the other being left free. The shield is only partially effective and probably should be made much larger and have a much finer pitch. The filaments of all the tubes are controlled thru the single rheostat R. This control is not at all critical.

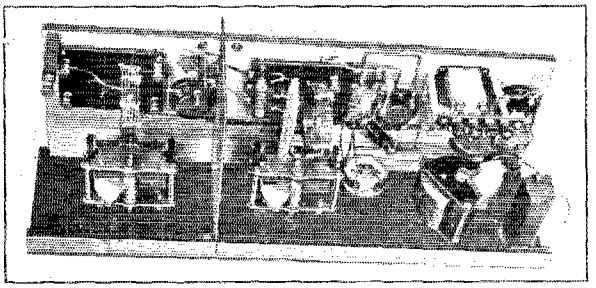
The output jack is both shielded and filtered. This shield may be seen in the photo. The short length of braid is used to connect the front and side shielding together where it is split, the set being removable from the cabinet. The purpose of this shield and filter is to prevent coupling between the detector, and r.f. stage via the capacity between the operator, phone cords etc., and antenna. The condensers C_5 are of .001 µfd. mounted inside the jack shield, and the chokes X_2 are similar to X_1, both consisting of about 200 turns of fine wire, wound in "wafer" form. These may be seen in the photo under the jack shield. C_4 is a bypass condenser of .006 µfd.

The set was first tried without the electrostatic shield and output filter. It could be only partially neutralized. Complete neutralization means absolutely no reaction between the two circuits. In other words, passing through resonance with the amplifier circuit should have *no effect whatsoever* on the beat frequency heard in the phones, only a change in amplitude being noticed. In the present receiver, there is some pickup in the detector stage, getting in through cracks in the cover and by way of the battery cable. The more complete the shielding and filtering, the less will be this effect and the sharper the r.f. stage will tune. A large part of the original stray detector pick-up came by way of the phone cord. The jack shield and filter eliminated this entirely. To do a real job, each battery lead should have both an r.f. and a.f. choke, both being heavily by-passed to ground, and each individual filter enclosed in its own grounded shield. To check on pick-up in the battery leads, touch the terminals of one of them with a metal object held in the hand. If a click is heard in the phones or a beat note is changed in pitch, be sure there is pick-up. The electrostatic shield helped somewhat in obtaining a good balance. The best obtained, for the 40-meter band, meant a change of only 100 cycles or less in the beat note. At one particular frequency, no change whatever is had.

Does it amplify? There seems to be a definite gain down to about 33 meters. On 45 meters, the gain is easily noticeable, to be conservative. On 20 meters, no amplification could be observed, but the r.f. tube serves as an excellent coupling tube, making the set independent of antenna. For this band, L_2 has 4 turns, with mid tap to plus B. L_3 has 3 turns. For the 80-meter

band, L_2 consists of 11 turns, 5 of which are the primary proper. L_3 has 20 turns. The same tickler is used for all three bands. The amplification obtained on the 80-meter band compares favorably with what one might expect on longer waves, say 8- or 10-fold.

With all these precautions, there are certain stray capacities which can not be eliminated or balanced. This is due to the circuit itself. It is very probable that the Rice circuit, used with tuning condensers, both sets of plates of which have equal capacity to ground, would be a distinct improvement.



THE SET LAID FORWARD ONTO ITS PANEL

At the left is the r.f. stage with the auto-transformer input coil tuned by the variable condenser and the neutralization effected by the small brass-and-mica condenser above the socket. At the right of the partition are in turn the plate coil of the r.f. tube (acts as primary of r.f. transformer), detector input coil and tuning condenser (secondary of r.f. transformer), double grid leak mount to permit plus or minus return, and finally the regeneration control, audio amplifier and jack filter. The jack filter consists of the condensers in the can attached to the panel plus the two pancake chokes screwed to the baseboard. The third pancake choke is in the detector B lead.

One method of simulating the operation of an improperly constructed r.f. amplifier is to deliberately destroy the balance and allow the r.f. tube to oscillate, controlling oscillation by detuning the two circuits. The tickler can be left alone for a wide range. This reduces the controls to two, but leaves you with a set which cannot be calibrated. It is possible to tune out a signal, with this arrangement, on the detector dial for instance and tune it in again with the amplifier control. There are therefore an infinite number of settings for any one station. This fact is mentioned because it is the way in which a r.f. amplifier should *not* work.

When the shielding is good and with a good balance, it is possible to receive signals on a separate antenna, on 39 meters, with the transmitter in operation in the same room on 41 meters with no interference. With better shielding and filtering of battery leads, it should be possible to approach the transmitter wave very closely, thus opening up the possibilities of duplex operation, as is commonly done in modern commercial practice. It is furthermore evident that two such receivers can be simultaneously operated on the same antenna *and same wavelength*, if desired, with no mutual interference.

Strays

The choke in the grid circuit of the crystal tube should not be tuned to the exact wave of the crystal but to a wave somewhat higher. If it gets too close to the crystal wave, trouble will be had due to the circuit tending to oscillate at both these waves.

"Little gummed triangle corner-stickers used for attaching photographs and post cards in albums make excellent mounting devices for QSL cards. They will stick anywhere, cost only ten cents a hundred, can be obtained from any photographic store, and make a much neater job than thumb tacks." —*8BEN.*

About two months ago, 8AIR was fooling around with a Hertz, and, of course, placed an electric light bulb in the center of the system to indicate resonance. On making a trip to the station recently, he noted that about a dozen of the neighboring BCLs had 110-volt, 40-watt lamps hung in their antennas, probably laboring under the impression that they are marvelous DX getters. Who said that the market for gold bricks is shot!!

It must be remembered when putting fixed condensers in series with the neutralizing condensers that the impedance of the condenser varies with its capacity. When the capacity is high, the impedance is low and as far as the high frequency currents and voltages are concerned a very large condenser in series with a small one offers but a small amount of protection. However, as far as the d.c. is concerned, high voltage insulation of the larger condenser is effective insulation for the smaller.

2TY says that if we took the advice of all the well-meaning amateur efficiency experts to heart, a CQ would look something like, "CQRCEP nu 2DUB". Interpreted after much effort, we have the following.

CQ—Garden variety.
R—Want a report.
C—Willing to chat about WX, women or what ever's bothering you.
E—Speak English.
P—Occupation, plumber.

And so on, far, far into the night and even morning if that much time is needed in the decodeing process.

Reducing Static at Short Waves

ONE reads a good bit these days of various methods for reducing static. Peculiarly enough the ones that get the most attention are not at all the ones that transmitting amateurs have found to be most successful. The loop is constantly being set up as being a great device for reducing static. Now in point of fact, the ordinary loop picks up just about as much energy from a signal as does a ten-foot antenna, and between the two the 10-foot antenna is decidedly easier to handle, gives just as good signals, and gives no more static. However, the 10-foot antenna only does give "just as good" signals, and that isn't very good. Neither one of the two devices strikes me as being worth while for serious long distance receiving during difficult weather.

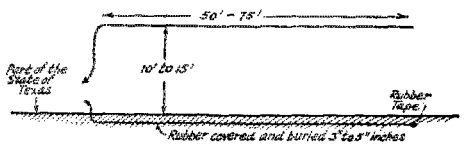


FIG. 1. THE UNDERGROUND "ANTENNA" SYSTEM AT 3HS

GROUND WIRE.

Mr. Cecil Patterson of 5VU at Frost, Texas, some time ago recalled to my attention the very great usefulness of a buried wire for receiving during the summer. There is nothing new about this; work was done on it many years ago by Wien in Germany and subsequently by Rogers in this country but as far as I know it was not applied to amateur work until 1920 at which time it was used by Kral of 3HS at Washington, D. C., the detailed results being reported in a Washington Radio Club bulletin. It was found possible to receive consistently at this station through conditions that made reception with an antenna absolutely impossible, no matter how small the antenna was. In this case the pick-up wire was about 35 feet long and made of ordinary rubber covered house-wire with the end put in a bottle of asphalt. It was buried as shown in figure 1. There was very little possibility of any fake effect because the station itself was below the ground level and the antenna had to go down to get to it. The ground lead was only a few inches long and went immediately back into the earth in the same yard where the pick-up wire was buried. There was an antenna on the premises but the results were not changed in the slightest degree by grounding, ungrounding, or even removing this antenna. Since space at 3ABI, the writer's station at the time, did not permit checking the results we went into a vacant lot and ran tests with various members of the Washington Radio Club on one particularly hot Fourth of July when local thunderstorms were scurrying around the District of Columbia. Our transmission results were poor enough. We could transmit with the buried wire but the range was low for the power and some bad directional effects were encountered. The receiving was very satisfactory and in consequence the wire was buried at 3ABI in the small space available. It did not prove successful, probably because of the very long lead-in which had to go up to the third story.

At 5VU a buried wire was also used but serves as a counterpoise and therefore belongs in the next paragraph.

RECEIVING COUNTERPOISES

A great deal can be done towards removal of static by simply lowering the antenna to a point less than 20 feet above the earth and then dispensing with the ground connection in favor of the counterpoise. The counterpoise may be several wires spanned out and suspended about three feet above the ground. If the family owns a garden this process seldom meets with very great favor and one must resort to the device used at 5VU. This is to use a receiving counterpoise very much like the buried receiving antenna at 3HS. Mr. Patterson recommends an antenna fifteen feet

Test	Antenna	Result
A	100' Buried 6"	Reception good at 200 and 600 meters. Transmission fair to S.W. and N.E. only. On 180, 250 and 300 meters.
B	50' buried 6"	Reception good at 200 but poor at 600 meters. Transmission poor at all three waves.
C	100' buried 12"	Results all thru same as in test A.
D	100' top of ground	All reception very weak. Transmission tried only at 250 where very weak.
E	100' 4' off ground	Reception weaker than others. Static stronger. Transmission very poor 300, fair 250, and about equal to A for 180 meters.

Earth a dry clay of very high resistance, results probably different for other soils. Observation stations from 1 to 6 miles away.

FIG. 2. WASHINGTON RADIO CLUB TESTS ON RECEPTION AND TRANSMISSION WITH UNDERGROUND WIRES

All tests made with one ground connection to a hydrant and with other terminal of set to various wires all laid to the southeast of the set. Buried wires rubber covered No. 14 house wire.

high and 50 to 75 feet long together with a 60 ft. rubber covered counterpoise buried from 3 to 5 inches, as in Fig. 3.

This scheme gives materially louder signals than the one at 3HS but it also picks

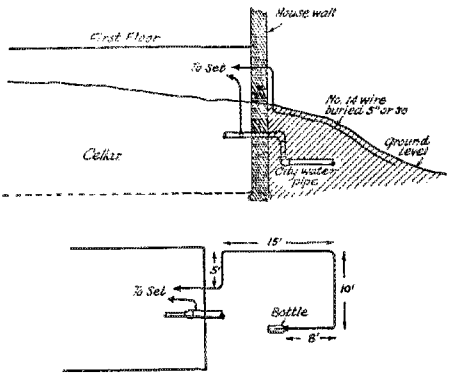


FIG. 3. THE ARRANGEMENT USED FOR RECEPTION AT 5VU, STATION OF CECIL PATTERSON AT FROST, TEXAS—WHERE THERE IS STATIC

up somewhat more static although still an enormous improvement on the usual antenna.

A STATIC FILTER

It seems worth while here also to recall the scheme of Dr. Jack Rogers of Eldorado, Arkansas. To repeat Dr. Rogers' own words, "I don't know how the signal gets through

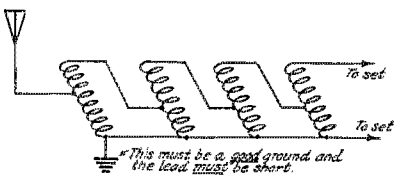


FIG. 4. DR. JACK ROGERS' "STATIC DRAIN" SYSTEM

For the broadcast range the coils have 66 turns of No. 24 wire on a 3½" form and are center-tapped. The set itself can be screened with advantage as can the coil system. The coils are preferably spaced apart and set at the "sacred angle" used in neutrodynes to prevent inter-coil coupling.

but it certainly does." Some signal is lost but the static is lost to a considerably greater degree. The coils shown were made for the broadcast band. It is not known just what changes one would have to make to work on other bands but the thing is very much worth investigating for its performance on the broadcasting is very nice.

Will our readers please let us know of any results they may have?

—*R. S. K.*

Strays

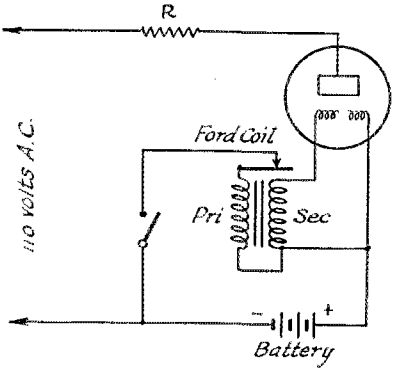
Some suggestions for the assembly of the pie-plate condenser described by Louis F. Lenck on page 55 of the April issue, are given by 1ADR.

For spacing the plates, wooden counters from a game of "Lotto" were used. They were originally 5/16" thick and 1/2" in diameter but were cut in half for this job. They were boiled in paraffin and floated in the solution. The plates can then be filled as they are stacked, something which was found difficult to do with the other method.

To prevent accidental short circuit, the sides of the plates were painted inside and out with black enamel. A worn-out 45-volt "B" stands on either side of the unit and the wall on the third. The problem of reforming does not look so gloomy now.

Don't throw away your burnt out Tungar tubes. They can be made to perk even after their filaments have opened up. The accompanying diagram supplied by 8CMW shows how.

The secondary of a Ford spark coil is connected across the filament terminals of the tube and its primary energized by the battery to be charged. When the switch is closed, a spark will jump across the open



filament ends and the electrons emitted being attracted to the plate will start rectification. As the normal amount of current flowing from the plate to the filament is as large as the normal filament current, it is quite possible to let this current heat the filament. Therefore after the first spark has taken place, the tube will continue to operate even though no regular filament current is supplied.

In order to prevent the whole power supply from "walking through the tube" a resistance, R, is placed in the power lead. You can use an electric iron or toaster.

If the tube is an obstinate one, a small glass plate condenser shunted across the secondary of the coil will often help.

The Identification of Radio Frequency Harmonics

By J. E. Waters*

WHEN using harmonics of a laboratory oscillator which is generating waves of a known frequency, as a source of calibration for a wavemeter or frequency-meter, it is often difficult for the uninitiated (and frequently for the experienced radioman) to identify the harmonic being heard. Many false harmonics intrude themselves and occasionally are of considerable strength. They may be found quite close to the expected frequency of the true harmonic, and thus deceive any one who has no means of differentiating them from the latter.

The following is the method used by the author, 6EC, assisted by 6CHS and 6CNK. While no originality is claimed we have failed to find any mention of this procedure in *QST* or any other current amateur radio publications, and therefore deny any allegations of intentional plagiarism.

To begin with, a straight wavelength-line condenser of seven plates was cut down to six plates, and a series of inductances four inches in diameter were constructed of one, three, and six turns. This wavemeter was calibrated from 42.8 m. to 33.3 m., inclusive, directly from the standard frequency transmission of 9XL. It had previously been roughly calibrated over this band by the harmonic method, from known frequencies above 50 meters as sent by WWV and 6XBM, and in checking from 9XL at no point in the curve was an error of more than 0.3 m. exposed.

On a sheet of millimeter co-ordinate paper, the wavelength being plotted against the degrees on the meter, the points accurately determined from 9XL (42.8 m. to 33.3 m. inclusive) were carefully laid off. With the meter used, the curve drawn through those points proved to be a straight line within 0.1 m. at any point. Consequently it was felt to be within the probable accuracy of taking readings on the wavemeter to consider same a straight wavelength-line meter so far as our purposes were concerned.

The curve being next continued in a straight line downward, the probable meter reading for 20 meters was ascertained. The receiver used to detect the harmonics was then set at 40 m. by the click method, the wavemeter being kept, as it always should be, as far from the receiving inductances as possible and still stop the oscillations of the receiver when in exact resonance.

*6EC, Anaheim, California.

Next, the laboratory oscillator was tuned to the receiver, which placed it at 40 m. To check, the wavemeter was then placed near the oscillator and adjusted until the oscillations thereof were blocked as determined by listening in the receiver. This also proved the oscillator to be in 40 m.

Then, using again the click method, the receiver was set at 20 meters as predicted by the extended curve of the wavemeter. And exactly there was found the harmonic (2nd) of the 40 m. oscillations of the oscillator, with a strength almost as great as that of the fundamental or first harmonic (40 m.).

A little curious exploring showed other harmonics (false) in the vicinity of the 20 m. point, but they were very weak in comparison to the true harmonic at 20 meters.

The curve was again extended, in a straight line, through the now determined 20 m. point, on and across the 16.66 m. line of the co-ordinate paper, this being the third harmonic of 40 m. With the receiver the next lower strong harmonic was found to be a trifle off the approximated curve, showing that the deviation from the straight line which could barely be detected in the 40 m. band was so multiplied in the lower waves as to be plainly evident. Correcting the curve thru the now ascertained 16.66 m. point, it was continued through to the fourth harmonic, or 10 m. and now knowing that the curve was not a perfectly straight line the harmonic was expected to be a shade below the value as predicted by the curve. It was, but not as far below as was expected. The curvature was more acute as the capacity in the wavemeter was decreased, i.e., as the wavelength was decreased.

These determinations were continued until the 7th. harmonic of 40 m., or 5.71 m., had been found, this being the limit of the receiver which was constructed for 40 m. work, the Weagent circuit being used.

In using various coils (inductances) on the meter it was only necessary to have an overlapping which would throw two points from the determinations on one coil onto the curve of the other, in order to give the approximate curve needed.

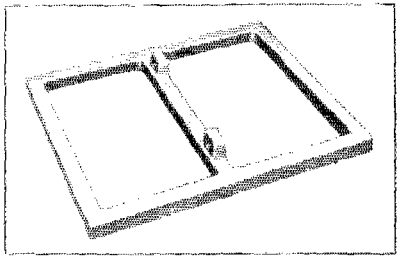
It is surprising how well the true harmonics hold up in strength as they progress down the scale. And it was equally surprising to note that the 15 m. signals from 9XL were the strongest received from any of his standard frequency transmissions.

Since calibrating the wavemeter in the 20 m. band, as described in the foregoing, by harmonics from signals of longer wavelengths, we have had an opportunity to check it against 9XL from 25 to 15 m. inclusive, and have found it to be as correct as the coarseness of its readings will permit its determination, certainly closer than 0.2 m. in the band mentioned.

Aluminum Frames

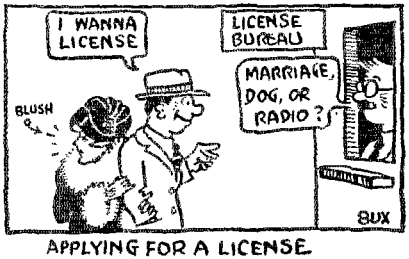
THERE are many times when one would like to have an all-metal cabinet for a receiver or transmitter. This is particularly true of the man who is putting in a crystal or other amplifier-oscillator arrangement.

If you have ever collected together six metal plates with the intention of soldering them together in the form of a box, you will appreciate the extent of the job as well as the distorted product that usually results. Your troubles are materially reduced though, if you are able to get some sort of a skeleton frame to start with. The illustration shows a cast aluminum frame that should prove of great help.



The cross section is 5/8" square. The outside dimensions are 10 inches by 12 inches and there is a dividing column located almost in the center. This has two raised portions to which may be screwed a plate of metal to make two separate compartments. They may be obtained from the Radio Engineering Laboratories of 100 Wilbur Street, Long Island City, N. Y.

—*H. P. W.*



APPLYING FOR A LICENSE

Concerning Those "Phone" Articles

THERE has been some excitement because of our statement that *QST* will consider the use of some material on radiophones.

Let us make our position perfectly clear.

We believe that with few exceptions, the American amateur radiophone is very poor in all its parts, oscillator, plate supply, modulator and microphone. We think that such stations are not desirable and that we should give no space to information about them.

On the other hand, we feel that if there is to be amateur radiotelephony it is better to have good stations than bad ones and that it is proper for *QST* to give some space to high grade amateur radiophones in which many A.R.R.L. members are showing an interest.

It is our view that a good radiophone is a thing that must be built with much more care than a c.w. station and that one must begin by understanding this and also being ready to spend at least as much for the speech end as for the rest of the station apparatus. A good radiophone must have an oscillator better than we are used to, must have an almost perfect power supply for the plate, must have a first-rate microphone and a speech amplifier that compares favorably with the ones used to work loudspeakers in broadcast reception. The percentage of modulation must be reasonably high, therefore the system used must be a sound one and not of the "freak" variety.

From this one can see that good low-power phone seems a better thing than the large mediocre phone.

This means that while we are interested in actual high grade radiophone stations to a degree we are of the opinion that more good will be done by discussions of the things that go to make a radiophone station: "the radiophone oscillator, how it must differ from the c.w. oscillator"; "plate supply and filter systems for radiophones"; "modulation systems"; "what ails your speech amplifier?" and "adjusting the radiophone."

If such material can be obtained—if any reader knows where to get it—then it seems entitled to be considered with *QST*'s other material and to be allowed space in the magazine in case it is able to stand the test of comparison with other contributions. If it cannot stand that test it does not belong in the magazine, just as the phone itself will deserve more space in the ether only if it can prove itself the equal of c.w. in effectiveness without an undue creation of undesirable situations.

—*R. S. K.*

Short-Wave Radio Transmission and Its Practical Uses

Part 2*

By Chester W. Rice**

THE variation of signal strength with distance when the effect of multiple reflections is taken into account is illustrated qualitatively in Fig. 10 for the case of a 20-meter signal on a summer day. As we leave the transmitter, the "ground wave" signal rapidly dies out and reaches the lower useful limit in the vicinity of 60 miles. The signal then remains practically out until we pass the skip distance at 850 miles where it becomes strong again. The next peak occurs at 1700 miles where the first reflection from the skip distance returns to the earth. At 2200 miles we have the peak at the tangent ray focus etc. A less detailed but more comprehensive picture of the distribution of short-wave energy over the surface of the earth is given in Fig. 11 for summer day conditions. Here we have marked the location of the skip distance and tangent ray foci and their five reflections for different wavelengths. The positions of the skip distance and tangent rays are taken from the calculated curves of Fig. 12. The ionization values used in calculating Fig. 12 are those required on the present theory to best represent the assumed experimental radio data on skip distance of Fig. 5. If more recent data require a revision of the summer day skip distances of Fig. 5, the numerical values of Fig. 11 will require modification but the general nature of the pattern should remain the same. To remind us of the loss of energy by reflection and refraction, the lengths of the lines decrease as the number of reflections increases.

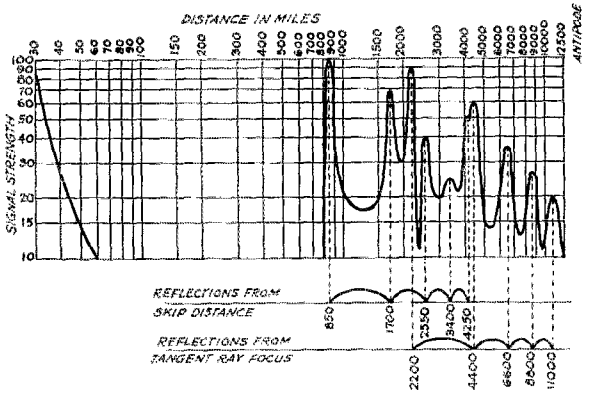


FIG. 10. CALCULATED SIGNAL STRENGTHS AT VARIOUS DISTANCES FROM A 20-METER TRANSMITTER ON A SUMMER DAY

Similar charts can be calculated for other wavelengths and are of help in gaining an idea of the probable performance of various waves for a particular task.

CHOOSING THE BEST WAVE

By way of illustration, let us inquire what is the most favorable wavelength for short-wave communication between Schenectady and London, great circle distance, 3,300 miles (5,300 k.m.), on a summer day. Inspection of Fig. 11 indicates that a wavelength between 12 and 13 meters will place the first reflection from the skip distance in London.

A wavelength between 20 and 22 meters would place the 3rd reflection from the skip distance in London. The 12-meter signal is probably the better of the two because fewer reflections are required. Take the case of Schenectady to Buenos Aires, 5200 miles (8,370 km.). Here a wavelength close to 12 meters will place the 2nd reflection from the skip distance at Buenos Aires. This will place the skip distance at 2700 km. (1680 miles) from which point the first reflection takes place. The next time the wave comes to earth at 5400 km. 3500 miles). Inspection of a globe shows that the initial reflection will take place at sea which is probably favorable when the sea is not too rough and the second point of reflection occurs in the middle of South America just below the equator. This appears to be a fertile country and therefore the reflection coefficient is probably fairly good. Schenectady to Los Angeles, 2300 miles (3700 km.) falls at the tangent ray focus of 14 meters or near the 3rd reflection from the skip distance for 28 meters. Probably the shorter wave would be preferable especially as the last reflection point on 28 meters may fall among the mountains.

*The first part of this article was pubished in July, 1927, *QST*.

**Research Laboratory, General Electric Co. Schenectady, New York.

DIVERSITY FACTOR ON SHORT WAVES

Let us now see what appears to be the most logical method of obtaining reliable communication between two distant points such as Schenectady and Buenos Aires. In the first place, we have seen that the selected wavelength in the vicinity of 12 meters is none too attractive due to the uncertainty of the sea and land reflection conditions to which we must add an allowance for the possible changes in sky refraction. We also have to take into consideration the variation in atmospheric refraction due to changes in density and temperature gradients. The amount of bending due to these atmospheric effects has been calculated by Fleming[21] and later by Larmor[20].

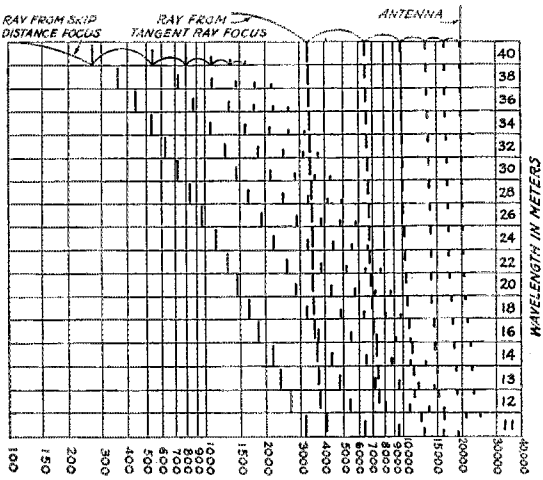


FIG. 11. ANOTHER GRAPHIC CHART TO SHOW PROBABLE PERFORMANCE OF DIFFERENT WAVES IN SUMMER DAYLIGHT AT VARIOUS DISTANCES

The short vertical marks extending upward from the base lines are points of strong signals caused by rays from the skip-distance focus. The short vertical marks extending down from a base line are points of strong signal due to reflection from the tangent ray focus. The length of the vertical marks of both sorts gives an idea of the signal strength.

A CURE FOR FADING

As we approach the short-wave limit (i.e. in the vicinity of 10 meters) the effect of atmospheric refraction will become increasingly important. (It seems advisable to suggest that this "limit" is a *predicted* limit. We have no real data at .01 meter, or .1 meter, or even at 1 meter.—Tech. Ed.) Our problem therefore is how best to deal with a shifting multiple refraction and reflection pattern. Under these conditions no economical amount of power in a simple antenna or concentration of energy by a beam can be relied upon to give complete continuity of service. When conditions are favorable a few kilowatts in a simple antenna will give a good signal and when the conditions are wrong (i.e. the pattern has shifted to some other point) no reasonable amount of power can be expected to bring back the signal. The ideal thing would be to have the receiving station follow the pattern around but since this is impossible, the next best thing is to spread a number of receiving stations over the nearby country and thereby improve our chances of having one station in a position to receive the signals. The signals from the nine or ten receivers spaced several wavelengths apart, more or less along the line of transmission, would be sent by wire or radio to a convenient central point where they are combined. There are now three possible methods of combining the several signals.

A. Adjust the circuits to give like radio phases under the steady conditions and add the radio amplitudes.

B. Add the signals in the radio circuit in random phase.

C. Make no combination in the radio circuit and add the detected currents in phase.

Under steady conditions, A gives us a directive receiver of the "end on" type which has certain well known advantages over a non-directive receiver. When conditions become unsteady (i. e. rapid fading) it would appear that A and B become equivalent since we lose all control of the radio phases. Under these conditions Rayleigh[22] has shown that where "n" signals of amplitude "a", are combined in random phase, (n being a large number) the amplitude of the resultant will average $a\sqrt{n}$, but this does not mean that it will at all times have a value $a\sqrt{n}$. It may vary throughout the range from O to na.

The method C on the other hand does at all times give a signal amplitude equal to $a\sqrt{n}$ (i.e. gives energy addition).

To apply method C in the case of c.w. elegraphy we may amplify the radio signals by any of the well known methods (i.e. the superheterodyne frequency changing system) then detect or rectify and combine the direct current components of the several receivers in a moving coil etc., type of recorder. For ear reception, we may chop the combined d.c. or use some of the other well known methods of rendering it audible.

21. J. A. Fleming, Proc. Phy. Soc. Lond., Vol. 26, p. 315, 1913-1914.

22. Lord Rayleigh Sci. Papers, Vol. I, p. 491.

Obviously, we cannot use the ordinary heterodyne method of tone reception since this retains the phase relations of the radio circuits (i.e. make C equivalent to A or B). If the transmitted wave is modulated we radio amplify then detect and add the signals in the audio circuit. The audio circuits will obviously all be in phase since the time

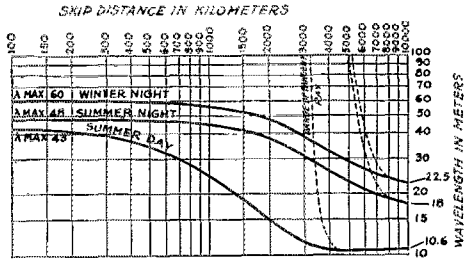


FIG 12. CALCULATED SKIP DISTANCES BASED ON PRESENT EXPERIMENTAL VALUES

difference between the various receiving stations is small compared with an audio cycle.

It is of course a good thing to use directive antennas to feed the individual receivers in the above schemes.

FADING CURES AT THE TRANSMITTER

To improve the continuity of service still further our next step might be to add a multiplicity of radiators at the transmitting station each sending the same signal. We then have four cases to consider.

I. Same wavelength on all radiators.

II. Slightly different wavelengths but not separable at the receivers.

III. Wavelengths separable though silent.

IV. Wavelengths widely separated so as to give different numbers of ground reflections.

For case I, a rigorous equality of frequency will be required. This means supplying all of the transmitters from the same master and if the transmitters are located at a single point the result is the same as increasing the power in a single transmitter, since frequency, phase and position are coincident. If we spread the radiators out over space our phase relations should be adjusted so as to produce amplitude addition at the distant receiving point which means that we have produced a beam transmitter. If we are to obtain much of a diversity factor from this beam, we probably require that the individual radiators of which it is composed should extend over many wavelengths which results in a costly structure. At the same time, the beam gets very sharp and can be easily deflected from the receiving area by small changes in either the atmospheric or electronic refraction conditions.

BEAM OR PLAIN ANTENNA?

It would therefore appear that the principal value of a beam transmitter is to increase the average signal strength at the receiving point. With the tubes available at present for short-wave work it is generally not convenient to produce more than say 10 Kw. of high frequency power. If we supply this 10 Kw. to a suitable beam antenna we may obtain an average tenfold increase of signal as compared with that obtained by using a simple radiator. When conditions are favorable, the increased signal is of no value, but when the refraction pattern has shifted away from the receiving station the increased intensity of the fringe and scattered radiation may be sufficient to yield a readable signal. A one-hundred kilowatt tube on a simple antenna structure would probably be a cheaper way of accomplishing practically the same result.

Transmission through sunset and sunrise and during auroras, etc., will in general require an entirely different wavelength and here the simplicity of wavelength change on a simple antenna system should give it an advantage over the beam.

SEVERAL WAVELENGTHS

Case II. Some experiments have indicated a benefit from a geographical diversity factor corresponding to a separation of receiving antennas by one or two wavelengths, or a very small percentage of the distance traversed by the signal. This favors the presumption that equally small changes of frequency would suffice to bring signals in which would otherwise be lost. The result sought here might be obtained by having a number of radiators transmitting the slightly different wavelengths or by means of a frequency "warbler system" and a single radiator. The frequency difference between the several transmitters would have to be sufficient to give a number of beat cycles in one dot of telegraph code; this corresponds to a very small percentage change in frequency.

Case III. If further tests show that a wider separation of wavelengths than are contemplated in II improve the diversity factor and reduce the chances of losing the signal, then advantage should be taken of the possibility of actually separating the different transmitted wavelengths by highly selective receivers (probably of the superheterodyne or double heterodyne type). Combination of the various signals would then be made after the final detection. This

method is obviously costly of space in the ether and should not be resorted to except for important work and where the necessary diversity factor cannot be obtained by one of the other schemes. The several transmitters may all be located at a convenient central point for it does not seem as though spreading out over a moderate area would add greatly to the diversity factor.

SEVERAL WAVE PATHS

Case IV. Here we select the next most favorable wavelength band and repeat the above schemes. For our example Figure 11 indicates the 18-meter band. In this way, use is made of a widely different path in the lower and upper atmosphere as well as different reflection points.

Before complicating things too much in an effort to obtain direct communication, we should of course consider the use of one or more relay stations. In this case, one at Panama or Pernambuco would probably be sufficient.

The numerical wavelength values deduced in the above examples are of course uncertain, due to our present lack of accurate data on the ionization conditions in the upper atmosphere. It is also clear that a great deal of systematic experimental work will be required before the relative merits of the various ways of increasing the diversity factor on short waves can be determined.

MAKING WAVE ACTION VISIBLE

The following optical experiment illustrates very beautifully the bending of radio waves in the upper atmosphere. The idea and necessary information for the experiment was obtained from the description of a similar experiment by Wood[23]. Some difficulty was experienced at first in making the experiment work and therefore a rather detailed description is given below for those who wish to try it. The effect is very striking, and well worth the trouble of personal observation. Fig. 13 shows a general view of the apparatus used.

The plate glass trough about 18" long by 4" high by 2" wide is filled about one quarter full with the following solution which has previously been mixed up in a bottle:

Solution No. 1.—

400 c.c. of 95% grain alcohol (see note 24).
2000 c.c. of water.
200 c.c. of concentrated sulphate of quinine solution.
10 drops of concentrated H_2SO_4.

The sulphate of quinine solution which renders the solutions fluorescent, was made by stirring an excess of the powder in water and then filtering off the clear solution. It is very important to have all the solutions very nice and clear. A second heavier solution is then allowed to flow slowly under the first solution from the flask shown in the photogragh. The second solution is fed in parallel to the bottom of the trough through a tube which has a small right angled capillary at the bottom. The hole in the capillary is about the diameter of a pin. The flow is regulated by the stop cock shown on the flask. This second solution was from a bottle containing:

Solution No. 2.—

1500 c.c. clear pure glycerine.
900 c.c. 95% grain alcohol.
100 c.c. sulphate of quinine solution.
10 drops concentrated H_2SO_4.

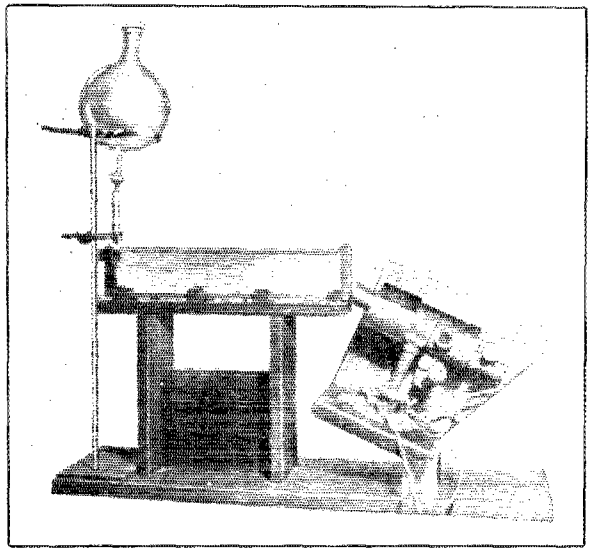


FIG. 13. OPTICAL APPARATUS TO ILLUSTRATE THE THEORY OF REFLECTION WHICH IS BEING DISCUSSED
The lantern at the right represents the transmitter and throws a ray of light, angling upward thru the end of the glass trough into a liquid which is to represent the air. This liquid is of two layers of which the upper is lighter and represents the thin ionized upper air. The two liquids are slightly diffused into each other where they meet, thus representing the diffused reflection condition of the Heaviside layer. The effect of putting the light ray in at different angles is shown in Fig. 14.

23. R. W. Wood, Phil. Mag., Vol. 47, pp. 349, 1899.

24. A denatured alcohol was first tried and found to give milky solutions which are not suitable. Further trials would probably have shown that some of the various denaturing agents yield clear solutions which is all that is necessary.

After the solutions are put in as described above, they are allowed to stand for about 24 hours to allow diffusion to produce the desired thickness of transition layer. The distortion due to the presence of the transition layer can be clearly seen in the photograph. We thus obtain a condition analogous to that existing in the upper atmosphere. From the ground up to a certain height, the refractive index remains practically constant. When we pass the lower

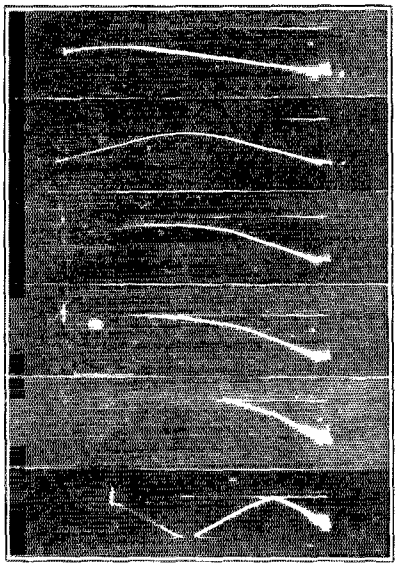


FIG. 14. EFFECTS OBTAINED WITH THE APPARATUS OF FIG. 13

A—Low angle radiation being bent slowly down by the Heaviside layer and coming to earth at a great distance—or missing the earth entirely.
B—Higher angle radiation coming down nearer the transmitter.
C—Still higher angle radiation passes the critical angle and again lights far away.
D—Still higher angle radiation just grazing the layer.
E—Very high-angle radiation penetrating the layer and escaping.
F—A shortened-up illustration of the effect that occurs in such a reflection as B, the ray striking the sea and going up again. This may repeat several times.

edge of the ionized layer, the refractive index gradually decreases to a minimum value and then increases to its normal value at great heights. Our optical experiment carries us to the minimum point which is all that is necessary, since any radio rays which are not turned back toward the earth before penetrating to the minimum point go out into space and are lost. The approximately parallel light beam which represents a radio ray was obtained by putting a slit approximately ½" long by 1/16" high in front of an ordinary oscillograph arc lamp. This brings the slit about 2½" in front of the condensing lens.

The following series of photograph Fig. 14 taken in a dark room illustrate some of the points of interest. For low angle radiation the ray goes out to a great distance and is gradually bent back to earth. As we increase the angle, the ray returns nearer and nearer to the transmitter until finally the first critical angle is reached for which the ray comes down at the nearest point to the transmitter. A further slight increase of angle causes the ray to recede from the transmitter until a second critical angle is reached at which the ray goes out into space, never to return. To imitate this last condition, a piece of black felt wet with solution No. 1 is held in contact with the top of the solution to act as an absorber and prevent surface reflection.

The trough is not long enough to show multiple reflections with bending in the upper atmosphere, but the general effect may be shown by using the sharp reflection from the top surface as in the last photograph. In a dark room the experiment may be shown to a large audience and the beautiful blue fluorescent ray is very striking.

CONCLUSIONS

We may now conclude by reciting some of the results which appear to follow from the present theory.

(1) We are now able to estimate the most

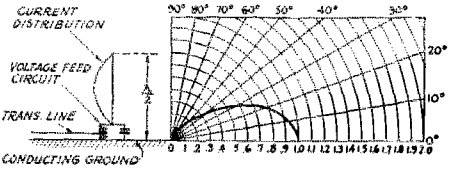


FIG. 15. AN ANTENNA SYSTEM THAT RADIATES MAINLY AT A LOW ANGLE

The method of feed is not important; the essential thing being the vertical half-wave antenna with the lower end near the earth. The radii represent signal amplitude, hence the polar curve shows the effectiveness of the antenna at various angles. Compare with Fig. 16.

suitable wavelengths for night and day, short-wave communication between any two points on the earth's surface.

(2) There will be a minimum wavelength in the vicinity of 10 meters below which long distance communication probably becomes impossible. This limitation is due to the fact that the horizontal ray leaving the transmitter will strike the lower boundary of the ionized medium at an angle greater

than the second critical angle and will, therefore, not return to earth but be refracted out into space.

Taylor and Hulburt[11] have predicted a similar short wave limit. The 5-meter experiments now under way by the Experimenter's Section of the A.R.R.L. will be of great value in trying to locate the true position of the short wave limit[25].

(3) The ray paths and energy flux density in the wave front of the sky waves are independent of the plane of polarization of the transmitter. Therefore, the best polarization can be considered from the point of view of ground losses, ease of mechanical construction and such questions as nearby interference due to the ground wave, etc.

(4) There will be certain favored distances for which the same wavelength will give good night and day communication, whereas, in general, different wavelengths are required for best results between two given points.

(5) Inspection of Fig. 11 shows that a wide wavelength band is available for use in the vicinity of 3600 km. (2240 miles), 7000 km. (4350 miles) and 10,500 km. (6530 miles) due to the small change in the location of the tangent ray focus with wavelength.

(6) For long distance work, on short waves, low angle radiation is most effective, since the high angle radiation does not return to earth.

CHECKING THE THEORY

Following a suggestion by Van der Pol[26], we could check the present theory by radiating the same wavelength first from an antenna system which is known to give a large percentage of low angle radiation, and then from a system giving mostly high angle radiation, and compare the signal strengths at a suitable distant point. The two antenna systems shown in Figs. 15 and 16 constitute convenient arrangements for which the directive curves are known[27]. We have illustrated voltage feed at the ground end from a high impedance multiple tuned circuit (i.e. $[L\ \omega]^2/r$ approximately equal to 10,000 ohms at resonance for impedance fit at voltage loop of antenna).

The transmission line would probably go across about 1/5 of the coil turns to give an impedance fit (i.e. effective impedance across 1/5 coil turns=1/25 x 10,000 ohms= 400 ohms an average value for the surge impedance, $\sqrt{L/C}$, of the transmission line to neutral). After sending for a while on the half-wave antenna, we could pull up an additional half wavelength of wire and send on the full-wave system of Fig. 16. The feed system and wavelength would remain fixed. A good wavelength for day testing would be around 12 meters. The value of the second critical angle for our assumed summer day ionization conditions is (1)

$$Q=\cos^{-1}\left\{1.0318\sqrt{1-5.4\times10^{-4}\lambda^2}\right\}$$

where λ is the wavelength in meters. For 12 meters this give Q=8.°1 and Fig. 11 shows that good signals should be received at 1680 miles, 2360 miles and 3350 miles.

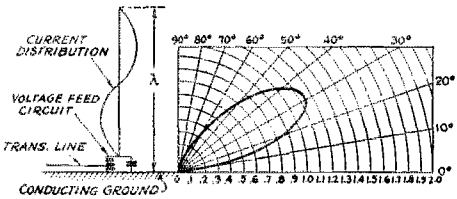


FIG. 16. AN ANTENNA GIVING MAINLY HIGH-ANGLE RADIATION

Again the feed method is secondary, the main thing being that it is a vertical full-wave antenna with the lower end near the earth. Compare with Fig. 15 and 17.

From Schenectady the first zone receiving stations might be located at Denver, Colorado, or Kingston, Jamaica; the second at Panama, or Los Angeles and the third at Para, Brazil. The tests should be made in the middle of the day, and a north to south direction would be preferable, especially for the longer distances to obtain the most uniform ionization conditions along the path. Inspection of the two directive curves shows that for the same current in the antennas, the signal amplitude from the half-wave antenna would be approximately unity for angles between the horizontal and 8° whereas the full wave antenna would give from zero to approximately .2 of the unit signal between 0° and 8°. Thus, if the high angle radiation does not return to earth but is lost in space, the signals from the full wave antenna should sound considerably weaker than those from the half wave antenna. The antennas should preferably be located in a flat country with an unobstructed view of the horizon, and over ground of high conductivity. A salt marsh near the sea shore would be ideal.

Another convenient antenna system for low angle radiation is shown in Fig. 17. Here a parallel-tuned circuit of approx. 10,000 ohms effective impedance is put in the middle of the full-wave antenna as a phase reverser. We thus cut the antenna

25. At this moment I feel inclined to suspect that the "limit" is subject to considerable interruption at 5 meters. With quite reasonable power, signals are being sent to distances in the order of 1000 miles by daylight.—Tech. Ed.

26. Balth Van der Pol, Proc. Phys. Soc. Lond., Vol. 29, pp. 269, 1916-1917.

in two and obtain currents of like phase in the upper and lower halves and the directive curve shifts from that of Fig. 16 to Fig. 17. Thus, by opening and closing a shorting switch around the parallel-tuned circuit with a rope we can shift conveniently from low angle to high angle radiation without making any outside changes.

(7) Short-wave radio transmission ex-

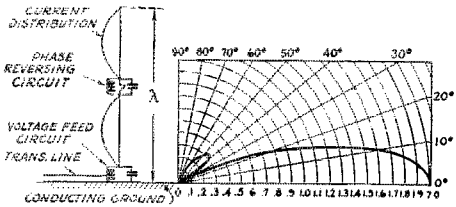


FIG. 17. A VERY LOW-ANGLE ANTENNA WHICH CAN READILY BE CONVERTED INTO THE FORM OF FIG. 16 BY SHORT-CIRCUITING THE PARALLEL-TUNED CIRCUIT AT THE CENTER

This is a 3/2 wave system with one half-wave in the tuned circuit at the center, hence not radiating. Here also the method of feed is not the main thing, although convenient.

periments are probably the most direct method we have of estimating the ionization conditions in the upper atmosphere.

(8) Skip distances etcetera which depend upon the ionization conditions are probably not constant, but will be found to vary from year to year following the 11 year sun spot period; the last minimum of which occurred in 1922.

The writer wishes to express his appreciation of the many helpful suggestions contributed by Mr. E. W. Kellogg.

QRM

GREENSBURG, Pa., has had an interesting case of amateur interference with broadcast reception. It appears that Francis Gault, 8BPD, had been receiving numerous complaints that every time he opened up with either phone or c.w. all the neighboring broadcast receivers went dead. In self-defense, he and LeRoy H. Smeltzer, ex8NS, started a campaign to see just what did happen.

In the same square with the transmitter, there are eight receivers, the owners of which were complaining. 8BPD started up the transmitter and Mr. Smeltzer went around to visit the receivers. The first stop was a Radiola IIIA using plenty of regeneration. In fact, it made a tolerably good transmitter. The next stops were all sets of better grade. On only the IIIA could 8BPD be heard. It also picked up a number of short wave phones and WIZ came in like the proverbial "ton of bricks."

All the BCLs were then requested to tune in WCAE and by manipulating the IIIA, they could practically all be switched to KDKA. At certain setting of the IIIA, the other sets could be killed completely. They heard only what the IIIA was tuned to. All this time, 8BPD was off the air.

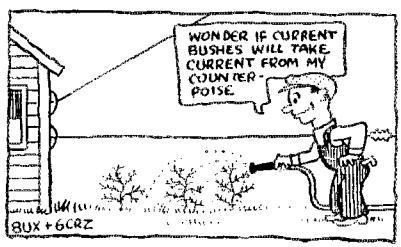
After the matter was explained and demonstrated to the rest, they agreed that the amateur was in no way to blame. This is one more proof of what the right kind of investigation will do in cases of bad interference which may apparently be caused by an amateur but which is not his fault.

—*H. P. W.*

A.R.R.L. Information Service Rules

Please help us by observing the following rules:

1. Keep a copy of your questions and diagrams and mention that you did so.
2. Number the questions and make a paragraph of each one.
3. Make diagrams on separate sheets and fasten them to the letter.
4. Print your name and address (not merely your radio call) on your letter. Don't depend on the return address on the envelope as this is destroyed when the letter is opened.
5. Don't ask for a comparison of the various manufacturers' products.
6. Before writing, search your files of *QST—the answer probably is there.*
7. Address all questions to Information Service, American Radio Relay League, Inc., 1711 Park Street, Hartford, Conn.
8. It is not essential to enclose an envelope as long as you supply postage and PRINT CLEARLY your name and address on your letter.



I.A.R.U. NEWS

AUSTRALIA

The amateurs of Queensland have banded together under the name of, "The Queensland Radio Transmitters League" which organization has for its object the furtherance of amateur radio in Queensland. All holding fourth district licenses are members and arrangements have been made for several tests and relays. Traffic for the fourth Australian district should go through the League. oa4CG and oa4CM are the international correspondents and all communications to them will receive immediate attention.

VIRGIN ISLANDS

The radio affairs of the Virgin Islands are now being administered by the United States Supervisor of Radio of the Fourth District in the same manner that the affairs of Porto Rico are being handled. There has already been issued a license to Richard C. Spenceley of St. Thomas, Virgin Islands under the call letters of 4AAN.

BERMUDA

The following information concerning the conditions under which the amateur exists in Bermuda has been supplied by nbBEM, Ian C. Morgan.

All wavelengths between zero and 125 meters and also from 135 to 199 meters may be used for transmission. That band between 150 and 199 meters shall not be used between 7 p.m. and midnight. The rest of the assigned wavelengths have no time restrictions on them whatever.

Transmission may be in the form of c.w., i.c.w., m.c.w. or phone. The maximum output allowable is 20 watts and inductive coupling to the antenna circuit is compulsory. No messages may be handled unless they be of an experimental nature concerning amateur operation. The usual requirements regarding secrecy of messages, wartime and the keeping of a record of operations are also included.

Station licenses may be issued to persons holding an operator's license issued at Bermuda, a Commercial Marconi Operator's License, one issued by the proper U. S. A. authorities or to any one having other qualifications approved by the Governor of the Islands.

There are at present, four active amateur stations. Call letters consist of the letters BE followed by a numeral or, in special cases, by another letter.

BE1 is also the operator of the local broadcast station and may be addressed at Wadson's Bicycle Store, Front Street, Hamilton, Ber.

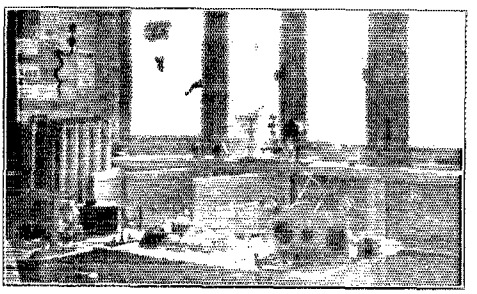
BE2 is using a five watter with 350 volts d.c. on the plate. His QRA is Mr. Hunt, c/o G.P.O., St Georges, Ber.

BE3 uses a coupled Hartley and also a tuned grid and tuned plate transmitter. The wave is about 23 or 34 meters and the power output is 20 watts. QRA is A. E. Redman, Devonshire, Ber.

BEM is using a tuned grid and tuned plate circuit with two 201-As or two 5 watters. 550 volts a.c. is applied to the plates. The antenna is a vertical wire 25 feet high and the counterpoise is 20 feet long. Wavelengths of either 32 or 45 meters are used. Postage from the U. S. to Bermuda on a QSL card is two cents. Quite a few are held on account of this.

BELGIUM

The accompanying photograph shows the equipment at eb4AU, the station of



eb4AU

Jacques Mahieu, at Le Manoir, Peruwelz, Belgium. The small table on the left holds a transmitter to cover from 33 to 45 meters. This is a tuned grid, tuned plate

affair using a Philips 150-watt tube. Next to the transmitter is a wavemeter.

On the table is the switch for antenna change-over, rheostats for the filaments, a.c. and d.c. voltmeters, two keys and a "Schnell" type receiver. One stage of audio amplification is used.

The shelf under the window holds the 20-meter transmitter. A Colpitts circuit is used. Two r.f. chokes are used in series. One is the usual broad tune affair and the other is a coil and condenser combination which can be tuned to the exact wave of transmission.

In the closets below the windows are the storage batteries and plate supply equipment. A chemical rectifier of 120 jars is used in conjunction with a 4,000-volt transformer capable of delivering 250 mils.

The antenna is a single wire Hertz, 85 meters long and used for the 20-, 30-, and 43-meter transmissions. No earth or counterpoise is used. There is also being used a Zep type having the single wire part 80 meters long and the double feed line 5 meters long.

A 20-meter schedule with an "nu" station to be kept once a week is wanted for the handling of traffic. Someone who can speak French is desired.

eb4CB has supplied us with the following news of general amateur activities.

"The interest in amateur radio is growing rapidly in this country and there are some three-hundred amateurs already in existence of which a hundred or so have received their licenses. The greatest input allowed is 100 watts and c.w. must be used.

"Some of the older amateurs have QSYed to 23 meters and are doing excellent work. Among the latter are 4AU, 4BC, 4CU, 4UU, 4WW and 4ZZ.. These last two have been keeping a regular schedule with af1B. ARCX and AQE. 4SA, who is our old friend P2, expects to be on the air shortly with a crystal controlled transmitter on 20 and 30 meters.

"The QRA of the Reseau Belge, which has been officially recognized by the Belgian Government and is also the official Belgian I.A.R.U. Section is 11 Congress Street, Brussels, Belgium."

—*A. Depuydt, eb4CB, exP7.*

CHINA

This message from ac8HB was received via nu6HM who took it in two sections on successive mornings.

"Amateur transmitting in China is, at present, chiefly confined to work on 33 to 38 meters. Though no records are at hand, quite a lot of international and local traffic is being handled. 1CRS easily heads the list, handling an average of 200 messages a month on schedules with op1AU, op1DL and op1HR. He successfully staged a chess match with op1AU. Three games were played at the same time and were concluded in 12 to 13 hours! 1CRS and 1RCC have begun experimental work on 20 and 5 meters. 8EM and 8AG are QRT as they have gone home to France. 8ZW is temporarily QRT as he is visiting in Manila.

"8OC and 8PM (late y2PM) are both in one room about two by four. Their best gear is pooled in the make-up of 8PM with which they have worked several "nu," "oh," "op" and "su" stations. They have handled lots of traffic.

"2FF and 2AW in Tientsin have been pounding away regularly and have both done good DX as well as having handled a considerable amount of traffic. 4TO was driven from his home by the Reds but after a short period of silence has set up elsewhere and is doing his share of the traffic work and DX. Three or four low-power men, 2PA, 1AL, and 8RJ have just come on the air and will be doing good work before this is in print.

"2NR is owned and operated by a young and enthusiastic officer on one of the Yangtse River steamers. He is doing a lot of excellent work, especially in connection with 8OC. They are handling a lot of messages for anxious wives and relatives in Shanghai who, during the recent troubles, have been wanting news of husbands and friends marooned at up-river ports. This work was largely the order of the day and with all telegraph communication cut, these two have been quietly rendering a great service. (Fine work, OMs!)

"Hot weather now and x2NR says fan motor QRM bad and 'SMD'; an expression he picked up in Kobe, meaning, 'Situation most damnable'. Local disturbances and authorities have put 8GG and XL1 off the air. (XL1 is a Chinese boy who is using 350 volts on the plate of a 5 watter in a Colpitts circuit.—*6HM*) However, it is believed XL1 will be on again shortly. 8HB's indoor Hertz antenna has probably saved him from a similar fate. It has also enabled him to get the coveted WAC. He has been keeping a regular schedule with nu6HM. The Colonel has been a real friend to us "ac"s who are mostly raw recruits in the game. From his distant station he has been a constant source of encouragement and has helped tremendously in getting our stations going and in getting us together. On behalf of all, a million thanks to nu6HM! We shall miss his cheery note this summer.

"Conditions during May have been very good for QSO U.S.A. around 12.00 G.C.T., but contact South has fallen off badly. We seldom hear our Aussie and Zedder pals

these days. Contact West is extra difficult; possibly as it is over land all the way and very mountainous land at that. Contacts with "'fo" stations seem equally difficult.

"As a special request, please, if you QSL "ac"s (I sed "if", nuf sed. Hi!) do so under cover and don't mention radio or the name of a station in the address. Any QSLs for stations here may be sent to H. B. Wilson, P. O. Box 266, Shanghai. They will be forwarded. Thanks, OMs and 73."

—*ac8HB.*

Remember fellows that a QSL card sent openly many mean the closing of the station it is addressed to. Be sure the card is in an envelope and don't put your own radio call on the return address either.

ESTHONIA

In the early part of 1927, the amateurs of Esthonia banded together and decided upon the arrangement of call letters they would use. There are now the following stations on the air; et3AZ, formally TE4L, 3BY, 3CX who was T2X, 3MM and 3XY ex TE-XX.

They work on about 33.5 meters. As they are unlicensed, all QSL cards should be sent under cover. They may be sent to the secretary of their club whose address is Mr. Olof Leesment, Parnu, Aia tan, 6, Esthonia.

FRANCE

A general meeting of the Reseau des Emetteurs Francais was held in one of the halls of the "Palais d'Orleans" on May 22nd. About 100 amateurs were present among whom were eg5AD and eg5KU representing the R.S.G.B., nu1RD from America, op3AA of the Philippines, aiDCR of India, Madame Jamas, af1B, of Indo-China, M. Forthoffer of Syria and M. Thuillier of Algeria, 8AY.

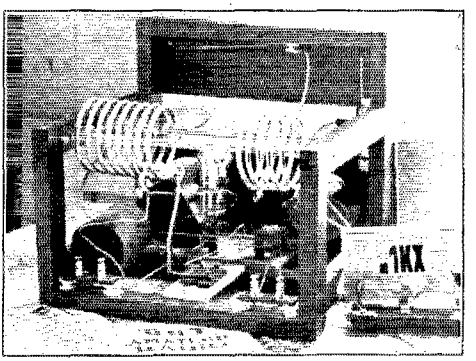
M. Deloy opened the meeting which was under the direction of Jack Lefebvre, 8GL. M. Levassor, 8JN, reported on the works of the Reseau during the year. He stressed all the difficulties encountered and all the efforts that had been made to give the membership all the advantages it had. M. M. Deloy, Levassor and Larcher were loudly applauded and G. Veuclin, 8BP, given thanks for his untiring efforts to the cause in his work as editor of the Journal des Huit.

The election of officers took place with the following results. Honorary President: M. Lefebvre, 8GL; Presidents; L. Deloy, 8AB and P. Louis, 8BF: Vice Presidents; A. Levassor, 8IN, and E. L. Blanc, 8DE: Secretaries; R. Audureau, 8CA, R. Martin. 8DI, L. Groizelier, 8JC and R. Larcher, RO10.

M. Levassor presented a diploma and gold cup to Mr. Reyt, 8FD, for his work in the first contact between Europe and Hawaii. A diploma was also given to M. Bouchard for the fine results he has been having.

The opening which preceded the banquet was interrupted by the arrival of M. Johnson, op1ZA, who came in a Ford, equipped with a transmitter, receiver and detachable antenna. After the arrival of M. Mesny who accepted the Honorary Presidency of the gathering, all entered the banquet hall. The banquet lasted until quite late and was greatly enjoyed by all present.

It is probable that many amateurs are planning to visit Paris and would like to meet the members of the R.E.F. It is requested that such amateurs communicate with the "Chief of the Section of Paris" of the R. E. F. whose QRA is Aronssohn, Radio 8FT, 2 bis rue J. Deville, Colombes (Seine), France. Give information concerning your expected QRA in Paris, date of arrival and proposed length of visit.



THE LOW-POWER TRANSMITTER AT ec1KX

ICELAND

There are only two stations in Iceland, ni3SN who was formerly icSN1 and ni3AG ex icAG1. They usually work between 41 and 44 meters although they are allowed to use from 39 to 49 meters. QSL to Snorri P. B. Arnar, P. O. Box 354, Reyjavik, Iceland.

JAPAN

There is now a licensed amateur station in Japan. It has been assigned the call of JLZB and is owned and operated by Tessue J. Kusumoto, 3256 Kakoi Nakano, Tokyo, Japan.

The transmitter uses two VT2s or two UX-210s in a Hartlev circuit. The plate supply is 450 volts d.c. and an antenna current of 1.2 amperes is obtained on 80 meters.

The unlicensed stations 3AA, 3WW, 1AB and 1KM were prosecuted for illegal opera-

tion and were fined 50 yen. This is a good example of what can happen if QSL cards are not mailed "under cover" to those stations not licensed. Remember this, fellows and be careful.

NEW CALLS

ed7CZ—Tubbs, Ameliegrade 32, Copenhagen, Denmark.
ne8AF—124 Duckworth Street, St. Johns, Newfoundland.
nr2FGL—Federico Gonzalez, San Jose, Costa Rica.
nr2GPH—Gonzalez Pinto Hernandez, San Jose, Costa Rica.
nr2HV—Higinio Vega, San Jose, Costa Rica.
sh7AB—Miss O. C. Chaves, Av. Nazareth Nr. 105 Belem, Para, Brazil.
sc2AS—Leon Schlegel, Casilla 17, Vina del Mar, Chile.
se1FG—Mission St. Aliara, Quito, Ecuador.
swGREN—R. M. Brown, Grenada, British West Indies. Intermediate should be "nl".
sh6BR—M. Solomon, 125 Carmichael Street, Georgetown, Brit. Guiana.
fm1TZ—J. Bardin, Sergt. Aviation, Rabat, Morocco.
fm8AFA—Fremont, Aviation, Ajadir, South Morocco.
KFVM—Yacht Idalia bound for China with nu6OC and 6AYC aboard.

The Atlantic Division Convention

JUNE 23, 24 and 25, will go down in the history of A.R.R.L. Conventions as the three days during which the Golden Triangle Radio Association of Pittsburgh, Pa., staged one of the best of conventions. After the formal address of welcome by Biddle Arthurs, Jr., general chairman, there was a continuous round of meetings, stunts, entertainments and visits to points of interest.

Capt. Hildreth, U.S.A., of Baltimore, representing the 3rd Corps Area, spoke interestingly on the progress of Army-Amateur work and made a number of friends because he showed himself a real good fellow. Our old friend Gawler, a real old timer now representing General Radio Co., gave us food for thought by his good address on the "business end of radio." Dr. Mason of the Aluminum Co. covered quite fully the subject of "rectifiers" and there is no doubt but the future will bring us more information along the lines covered. The General Manager of the Ceco Mfg. Co., of Providence, R. I., who happened to be in Pittsburgh, was most generous by giving the gang an opportunity to see two reels of films descriptive of the manner in which their tubes are manufactured. The Willard Storage Battery of Clevland, Ohio, very kindly sent their Mr. H. S. Scott, Radio Engineer, who gave us another angle on rectifiers, and moreover we discovered he was an old-time amateur of pre-war days. Director Woodruff was given an opportunity to show us his latest box of "tricks" and if he continues to experiment we are afraid the next time we see him he will have a complete radio outfit that can be slipped into one's ear.

Hebert, Handy and Budlong of A.R.R.L. Headquarters, were kept busy speaking at different meetings, where executive, traffic and P.R.R. Emergency work were fully covered. This was especially so of the P.R.R. Gang as some 29 of those good and loyal followers of "BUD" were present from every part of the division.

The "Stunt" night brought out some unique entertainment. The Buffalo gang, with Eichman as leader, had every one on the anxious seat in staging a real-to-goodness initiation of the ITK's; but the Niagara Falls fellows were not to be outdone and sprung the surprise of the evening with something original. This consisted of a method of radio transmission and reception of telepathic waves and had picture transmission beat a mile. We understand

(Continued on Page 71)

Experimenters' Section Report

BECAUSE of the questionnaire and the impossibility of giving full results on the 5 M. tests now the report this month is short.

THE 5-METER "CQ PARTY"

It seems as if the 5-meter CQ party has brought out the most interesting thing that has happened in that band of wavelengths. The reports are as yet very incomplete and it is too early to talk—though this is being written at the latest possible date for this issue, namely, July 2nd. All members of the Section have been asked to send their reports in, therefore they should all be at Hartford and the whole thing studied out by the time you read this.

Look for the whole story in the next issue.

REFERENCES NOTED

The following references are offered as bearing on some of the things members of the section have asked about:

Ditton Park Research Station—J. F. Herd, Wireless World, June 15.

Emissions Dirigees par Rideaux D'antennes, antennes en Grecque. R. Mesny, L'Onde Electrique, May. (Excellent article.)

Simplified Neutralization Discussion—Glenn Browning, Christian Science Monitor, June 27.

Harmonic Distortion—E. E. Hiler, Radio Engineering; April, May, June.

A discussion of advantages to be derived from deliberate introduction of resonances in audio amplifiers.

Inductance and Capacity Charts—V. T. Baird, Radio Eng., June.

Comprehensive Report on Standard Frequencies and Absolute Frequency Measurements (Zusammenfassender Bericht, Normal frequenzen und Absolute Frequenzmessungen) A. Scheibe, Jahrbuch, April.

The Short-Wave Echo Effect—Experimental W. & W. E., May, 1927.

Phase & Group Velocities in an Ionized Medium—G. W. O. Howe, E. W. & W. E. May, 1927.

The Solar Eclipse & Its Effect on Radio—H. A. Donisthorpe, E. W. & W. E. May, 1927.

Battery Eliminators—P. R. Coursey & H. Andrews, E. W. & W. E. May, 1927.

The Alignment Method in Linear Valve Characteristic Fields—W. L. Barcley, E. W. & W. E. May, 1927.

The Rheinlandsender (50-Kilowatt Rhine-region Broadcast Station) Austrian Radio Amateur, May, 1927. Excellent Description.

Coil Resistances at 40 Meters—L. B. Root, General Radio Experimenter.

Inductance Chart For Easy Work—Radiofona, Rome (April, 1927).

Oscillographs & Their Use In Radiotechnique—Austrian Radio Amateur, May, 1927.

30 Jahre Funkentelegraphie—Guglielmo Marconi, Radio Umschau, May, 1927.

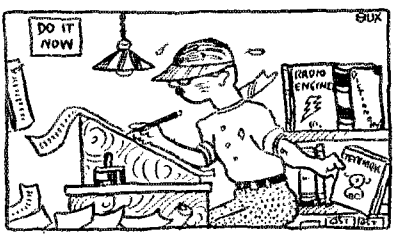
Baird's Infra-Red Television—Popular Radio, May, 1927.

New Tubes—A Dinsdale, Popular Radio, May, 1927.

Articulation Curves (page 147)—Radio Broadcast, July.

SPECIAL REFERENCES

Particular attention is attracted to the following references as having particular usefulness for the section. The American Inst. of Elec. Engineers has held two conventions at which papers in our territory were presented. At the summer convention held in Detroit there was presented on June 23rd a series of papers by Dr. Hebert Ives, Frank Gray, J. W. Horton, R. C. Mathes, H. M. Stoller, E. R. Morton, D. K. Gannett, E. I. Green and Edward L. Nelson on the Bell Telephone Research Lab. system of television. All members of the Section will find the well illustrated 50-page report of the greatest interest.



"Never do today what you can put off 'till tomorrow," does not apply to the outstanding report on the 5-meter CQ party and that recent "X" Section questionnaire. Send them along fellows.

The Standards Year Book has just been issued by the Bureau of Standards as miscellaneous publication No. 57 and can be obtained from the Superintendent of Documents, Government Printing office, Washington, D. C., at $1.00 per copy. As usual the money must be sent in postal money order or Government coupons. Personal checks

are not acceptable. Those who know the Standard Year Book will not fail to secure a copy.

SPECIAL OBSERVATIONS ON 2XS

The observations for Dr. Alexanderson on the transmissions of 2XS have been carried by Mr. C. D. Grunow of Ballentine, Nebr. almost without assistance for a number of months. Mr. Grunow's work has been very good and deserves support from other members.

THE CHOKE COIL ARTICLE

It will be noticed that the choke coil article is not here as promised. This is because there has just turned up a new way of doing the thing which was supplied by Dr. D. W. Pierce of Harvard University, also some additional work has been done by Mr. Austin Lidbury of Niagara Falls and by the General Radio Labs. The conclusions do not at first sight appear to be in entire agreement and some additional check work must be done.

LONG ANTENNAS

It will be remembered that long since Mr. Don C. Wallace recommended very strongly that an extremely long receiving antenna at a good height be used to improve the ratio of signal over noise. Tests at some 20 stations have produced rather contradictory results in this regard though part of the contradictions seems to be caused by operating the antenna through a primary coil to ground, and coupling this coil to the grid circuit of the detector (or r.f. amplifier if one is used). These long antennas appear to operate more favorably at short waves if used with very loose capacity coupling or even with the antenna simply brought into the room. Any experimental results on the use of receiving antennas from 100 to 1000 feet long will be very much appreciated.

BOOK REVIEWS

By R. S. Kruse, Technical Editor

All books reviewed in *QST*, with the exceptions stated below, may be obtained from *QST's* book department. Please send the order in a separate letter addressed Book Department, American Radio Relay League, 1711 Park Street, Hartford, Conn. Government publications should be ordered direct and books for which no price is stated should be obtained from the publisher.

Engineering as a Life Work, J. V. Lynn and E. S. Baird. Published by Engineering Extension Department, Iowa State College, Ames, Iowa, 62 pages, 17 illustrations.—

In view of the many letters that are received at *QST* asking "How do I become an Engineer?", such a clean-cut analysis as is given in this little book cannot help being of material assistance to many of the members of A.R.R.L. In reading it, one will not only gain a better sense of proportion as to the Engineering Profession but will incidentally gain a clear picture as to the relative position of things *inside* the profession. I can think of but two things that would appear to contribute to the book; a somewhat sharper distinction between the power and communication portions of electrical engineering and the addition to the excellent bibliography of Waddell & Harrington's "Addresses to Engineering Students."

Standard Yearbook, 1927, United States Department of Commerce. To be obtained from Superintendent of Documents, Government Printing Office, Washington, D. C. at $1. 392 pages and 39 illustrations.

To report or analyze this book is almost impossible because of the exceeding complexity of the material covered. The book explains the national and international standards for all manners of electrical, chemical, physical and commercial things. It outlines the agencies handling these matters and reports on the work of standardization done by the United States Bureau of Standards, which of course ties in with similar bureaus in other countries. Incidentally—our Bureau of Standards is also a bureau of research and one must not gain the impression that even this book covers all its activities. A series of 35 photographic and line illustrations shows the standards used by the United States.

This book is certainly worth a dollar to anyone engaged in any engineering, experimental, or industrial work.

Wireless Pictures and Television, T. Thorne Baker, 188 pages, 99 illustrations, D. Van Nostrand Co., 8 Warren Street, New York City. $2.50 Net.

I am a bit diffident as to reviewing a book on a subject with which *QST* does not deal very closely, for the comment may not be at all accurate. The present book creates the impression of considerable completeness, is clearly presented and must certainly have interest to anyone interested communication after all—isn't visible communications in a thing we audible communication folks have been too much inclined to neglect? Perhaps Mr. Baker's book will aid in a cure.

Robison's Manual of Radio Telegraphy and Telephony, 7th evised Edition, 737 pages, 424 numbered illustrations plus frontispiece. Published by The United States Naval Institute, Anapolis, Maryland. New price $5.50 postpaid.

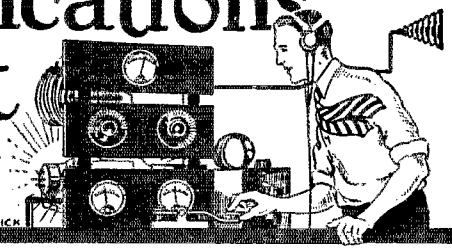
After *QST*'s statement that the 6th Edition of "Robison" was the best radio book ever received that edition did not last long, in spite of the price of $8.50. Incidentally, the Naval Institute very graciously accepted A.R.R.L. orders at 50c below the proper price to meet our incorrect statement of the price. When the edition was exhausted many orders had to be returned by the Institute and by *QST*'s Circulation Manager.

The 8th edition has been written with the announced intention of advancing the book to cover recent developments and of including consideration of the needs of the A.R.R.L. men who showed such interest in the last book. To meet the first requirement there has been added material on crystals and other such matters while the space for laws, Naval procedure and mathematics have been reduced. That this has been done competently is proven in advance when one states that the revision was done by Commander Stanford C. Hooper and Lieutenant Commander T. A. M. Craven.

The nicest feature of all is that this newest edition, in the same sturdy Navy binding, is offered at $5.50. It is the very best possible sort of a purchase.

The Communications Department

F. E. Handy, Communications Manager
1711 Park St., Hartford, Conn.



Amateur Week

THE HAMS of the East Bay Section of California recently put over something that is worth a great deal to amateur radio, and other sections would do well to follow in their steps. The move was backed by the Oakland Radio Club and the Central California Radio Club, spurred on by 6CKC.

The fellows, deciding that people in general didn't know enough about amateur radio, designated a certain week some time ago to be known as "Amateur Week." A fitting introduction to the week was a ham program given at the Oakland Tribune station KLX, lasting for an hour in the middle of an evening. The hour was opened by Mr. Linden, the Radio Supervisor of the Sixth District, who explained what amateur radio is, what it accomplishes, what the A.R.R.L. is, and what the whole thing means to young chaps who are growing up. 6BFU's Radio orchestra then played several jazz selections.

A skit was put on by 6CEJ, 6CRO, 6CKC and 6JS, which gave the listeners a further insight into the activities of us amateurs. 6ASX rendered a violin solo, 6CEJ a saxaphone solo, and then some more selections were played by the orchestra, concluding the hour. Several phone calls were received at the station during the hour, asking about amateurs.

Amateur stations were installed at several theaters in Oakland by 6CRO and 6CAX which brought a huge bunch of messages. The Central California Radio Club held a picnic, and a swimming meet was held between the Oakland hams and the San Francisco Radio Club. On the final day of Amateur Week, a dandy banquet was held at the Alpine Hotel in Oakland, with attendance from all the cities of that section of California. 6RJ was one of the speakers.

The whole week was a success in every sense of the word, and much credit is due to 6BXH, 6CEJ 6DDN and 6CKC, who worked night and day to make the week a success. Incidentally, the ham program broadcast over KLX was so fine that the bunch are to give one each month from now on.

A Fishing Trip With Portable 1OF

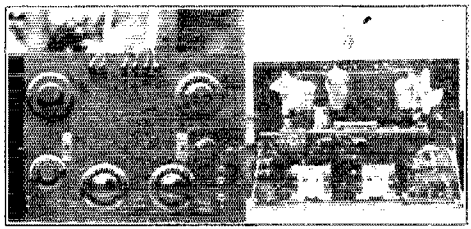
By T. F. Cushing*

AT 3:00 P. M. on June 4, 1927, a very heavily laden automobile could have been observed leaving Springfield, Mass., for a point in the Northern part of New Hampshire, 275 miles away. In the automobile, buried under mountains of blankets, fishing togs, tent, camp cook stove, etc., could be found 1WP, 1AWW (myself), and a third party by the name of Mr. Bartholomew, a BCL, but a fisherman. Very choicely placed among the soft blankets was a portable transmitter and receiver all in one case (18" x 12" x 6"). The necessary twelve-volt storage battery was riding comfortably on the running board, and a twelve-volt dynamotor furnishing 750 volts output was carefully stowed in the auto trunk.

Before bidding good-bye to Springfield, definite arrangements had been made to have certain amateurs there; namely, 1AQF, 1BYW, 1AEP and 1EO, listen for the signals of our portable station at ten-thirty p.m. each night while we were away. The portable call was 1OF.

*1AWW, 78 College St., Springfield, Mass.

It commenced to rain shortly after leaving Springfield, but we pitched camp in the rain, the first night, about ten miles north of Bellows Falls, Vt., under a large pine tree, at about eight p. m. While two were getting supper and making the camp comfortable from the wind and rain, the third camper could have been noticed deftly hurling an empty



THE PORTABLE TRANSMITTER-RECEIVER, 1OF
Two anti-capacity switches change from sending to receiving. One UX-210 was used in the tuned-plate tuned-grid circuit, though there is provision for two in the set. Plug-in coils and standard condensers were used in this convenient outfit.

soda bottle high up into an adjacent tree. Around the neck of the bottle was tied light but strong fish line, and when the bottle had nicely passed over a high limb and descended to earth, a No. 14 antenna wire was substituted for the bottle and pulled up taut. A similar wire was run to a nearby fence for a counterpoise. After supper the radio set took the place of dishes on the table, and radiation was nil

CLARK, 1WP, AND THE 3½-POUND TROUT THAT ANSWERED HIS CQ.

according to a perfectly good Weston meter, with our schedule only fifteen minutes away. 1WP suggested a small loading coil, which was tried, and the meter went up to one ampere. A CQ was then attempted, and—lo and behold! 1AEP of Springfield answered us. Needless to say, we all got the thrill of our lives sitting there in a tent with the wind howling

and the rain descending in torrential sheets with high mountains all around us, getting through on the first try. The BCL has not gotten over it. When he filed a message for his wife, and got an answer in ten minutes or less, he would have been willing to kiss that amateur set, had anyone suggested it.

We broke camp early the next morning, and that night found us 200 miles farther north, near Errol, N. H. Again we pitched camp in the rain, and put up an antenna and counterpoise in the same manner as previously. Now we had the entire White Mountain Range between us and home, with Signal Mountain just to our South with an altitude of over

THE CAMP NEAR ERROL, N. H.

2500 feet. This time also we all had our doubts, but ten-thirty p. m. found us in communication with Springfield, exchanging messages with our wives and families. The wind and rain were very bad all night —and the next day so bad that the tent blew down (ask 1WP, he was all alone at the time, and had to recover the wreck), but fortunately, we had taken a picture of the layout before this happened.

We remained there for a week, fishing in the daytime, and running amateur radio at night. We were in communication with Springfield every night, and worked numerous other stations during the week. Contact was established as far west as Ohio, and as far south as Norfolk, Va. Lots of experience was gained in setting up portable outfits, in connection with camp life, and by the end of the trip the set could be erected and dismantled in a very short time.

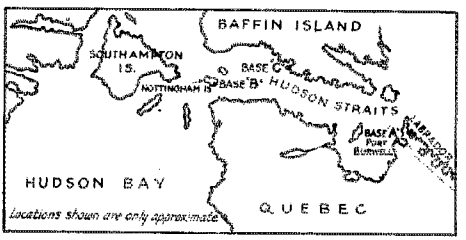
I know that the pleasure of our trip was at least doubted by the pleasure of having a portable amateur outfit with us.

CANADIAN AIR EXPEDITION TO HUDSON BAY —VDE

Fifteen pilots and six Fokker planes sailed North from Halifax in mid-July aboard the *C. G. S. Stanley* and *C. G. S. Larch*. It is the purpose of the expedition to thoroughly map the whole region from the air as well as from the vessels accompanying the expedition. Three aeroplane bases will be established, one near Port Burwell at the eastern end of Hudson Straits, one on Nottingham Island at the West end of the Straits, and one midway between the two and North of the Straits. The whole project is to determine the practicability of the proposed Hudson Bay Railway by mapping the channel in Hudson Bay which may be used by freighters to carry wheat from the Canadian West. The planes with men enough to maintain the three bases will remain at the three bases during the winter, though the *Stanley* will return in October.

Radio communication will play an important part in affairs as usual. While VDE (*C. G. S. Stanley*) will be the only station in operation until the three bases are established, *each* base will have radio equipment including 3 160-foot guyed steel masts. The Canadian Marconi Co. built the base-station equipment which will be used for contact with the planes and with Ottawa. 200-meter sets at each base will be used for working the planes. Base B (see map) is to have a 500-watt long wave transmitter, two super-het B/C receivers, det. 2-step long wave receiver, det. 2-step short wave receiver and apparatus enough to build an experimental short-wave transmitter. Base C is to have a 500-watt long wave transmitter, 500-watt short wave transmitter, det. 2-step long wave receiver, super-het B/C receiver, and super-het short wave receiver. Base A will be equipped like Base C except that the transmitter will be a 1600-watt affair. Base C has been assigned the call VCJ and will work on 37 meters.

VDE has a 500-watt CW-ICW 600-2100 meter transmitter and a 500-watt M.O.P.A. set on 37 meters. Power supply is from a 6 K.W. automatic-starting remotely controlled gas-engine driven generator. There will be about ten ops aboard the *Stanley* on the trip North so a continuous watch will be kept. A 7-tube short-wave super-het is used for receiving. C. H. Starr (nc1AE), R. L. Bunt (nc8MX). Lieut. Bill Laurie and a bunch of other ops will handle traffic with the Militia Station at Ottawa (XWAB, 37 meters). In the periods when there are no official schedules we can rest assured that there will be plenty of opportunity to get QSO with VDE and later on with the short-wave base stations. The *C. G. S. Larch* carries only long wave radio equipment for contact with the *Stanley*. Both ships are heavily loaded with planes, four heavy motor launches, three Ford tractors, 900 barrels of gasoline, 80 ton of coal and tons and tons of building material and food supplies.



"Three aeroplane bases....."

We are greatly indebted to OM Starr for the full information in this report. Look for him at the key of VDE and be ready to QSR for any of the stations of this expedition when necessary, gang. While it may be necessary to send official reports through Ottawa, everyone will have a chance to work VDE and get in on the fun. Good operators of good stations will be given preference over those with rotten notes, sloppy fists, and a line of "R9 73 CUL" stuff —because in the somewhat limited operating time it will be impossible to work everybody.

THE PUTNAM BAFFIN ISLAND EXPEDITION —VOQ

Everyone who reported VOQ to A.R.R.L. Headquarters during the month reported good signals and contacts with operator Ed Manley (8FJ) of the *Morrissey*. There were more reports on VOQ than on any other expedition out at the present time.

8DME handled 28 messages for VOQ during June, copying him regularly from June 13 on and handling from one to six messages each of the several times worked (June 16, 17, 18, 19, 23, 24, 25, 27). 2FG worked VOQ June 14 taking six messages. 9CUX heard VOQ working 4RN on June 15. 9APY also copied VOQ when off Martha's Vineyard working 8CWP. nc8AEL copied VOQ June 15 and 16 while QSO with 2UO and 8DME. 9CMV worked the *Morrissey* handling and delivering several messages while she was north of Labrador ploughing through the first ice with a high wind and rough seas. 9CP worked VOQ June 28 and 29 making a regular schedule. Miller would like to do as well with VOQ as last year but is hampered by necessary overtime work for the Western Union Co. at Hammond, Ind.

9EGH at Madison, Wisconsin, was in contact with VOQ July 3 handling two 75-word messages which were forwarded by wire. The *Morrissey* was ice and fog bound off the entrance of Hudson Straits at the time. Manley told 9EGH that he succeeded in marooning himself on a big piece of ice just before the QSO and nearly had a cold bath as a result. (Hi) 2WH at East Hampton, N. Y., worked VOQ the same date taking a long message for the New York Times and a couple of personal messages all of which were phoned. 2WH says, "VOQ on 33 meters, R6 here, very good operator. The expedition off Cape Chidley at entrance to Hudson Straits." Next month we hope to have some dope from Manley himself. In any case send in your reports whenever you hear or work VOQ so we can tell the communication story of the trip as it progresses.

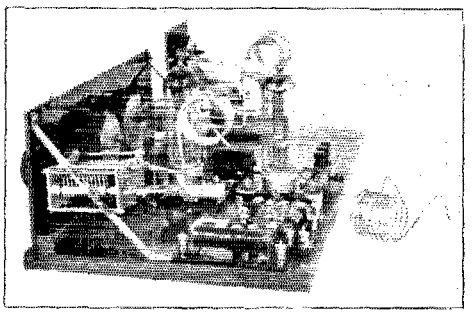
MacMILLAN EXPEDITION—WNP—WOBD

A radiogram for A.R.R.L. Hq. rec'd by Fred Ells of 1CTI on July 1 brings us the most direct word from the Schooner *Bowdoin* (WNP) at that time at Sheet Harbor, N. S.: "WNP is on 36 meters every evening 8 to 10 EST, 21.5 meters around noon EST. Working schedules 1XV, 1CKP, 1CTI, 2CRB, 2BBX, 6CUA, 9ADG, and nc8AZS. Have been QSO ships near New Zealand and Azores. Messages moving nicely. Schooner *Radio* has been assigned call WOBD, 37.4 meters. We expect to join the *Radio* at Sydney, N. S. WNP is using a Hartley circuit. Antenna is a half-wave Hertz on 36 meters, full-wave Hertz on 21.5 meters. Zeppelin feed is used. The receiver is tuned-grid tuned-plate type. 42 messages have been handled in the last five days. Regards to gang. (sig) Himoe WNP ex9AOG".

6AAK (Santa Barbara, Calif.) reports copying WNP on June 27 when the *Bowdoin* was QSO 2BN. On the day previous 3VM heard WNP but was unsuccessful in raising her. On June 30 9SK at Arcola, Ill., succeeded in having a good-two-way contact. July 2nd 1ABA and 8ASF both worked WNP but QRN was terrible and though several attempts were made to take some of WNP's traffic, neither station was successful. 8DCM had an enjoyable conversation with WNP on the morning of July 7. 1CTI has a Wednesday and Friday schedule at 9pm EST and will be glad to forward any traffic for the MacMillan expedition.

1ATV (Skowhegan, Maine) worked Gold (nu1AAY) operating WOBD on the *Radio* on July 3 right after WOBD finished with 1KL at 8.40 pm EST. One message was handled. At this time the *Radio* was at Sydney waiting for the *Bowdoin*. So all is well with the MacMillan expedition's ops and apparatus. Let's have more reports from those working this expedition. Make 'em QSL-cards and we will turn them over to Himoe and Gold as soon as they return from the North. What sa, OM.

The short-wave T.P.T.G. 100-watt transmitter KGEG of the Borden-Field Museum Arctic Expedition aboard the schooner-yacht Northern Light.

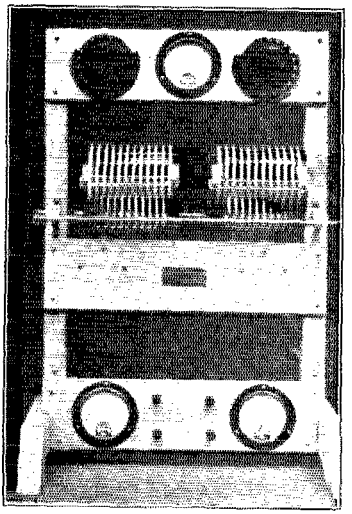


Note the plug-in coil construction for QSY and the Leach Keying relay in the foreground. Listen for KGEG on 23 and 37.5 meterrs.

Former Section Manager L. E. Smith, 6BUR, sailed from Los Angeles July 1 as sparks on the private yacht *Ripple* (KFLF) bound for Honolulu and the South Sea Islands. The *Ripple* is Diesel powered, twin screw, 150' long and well equipped for short wave work. A 204A in T.P.T.G. circuit (similar to the outfit on KFUH) operates near the 40-meter band from 500-cycle plate supply. Another 204A works on 600-meters. Revamped Aero coils, a Grebe CR6 and CR7, constitute the receiving equipment. Operator Smith says he will see all the gang on the air from KFLF.

1BHS and 8DBM were QSO xnc2BN June 15 and June 21. xnc2BN is a Canadian steamer bound from Montreal to New Zealand and at the time worked located about 1500 miles from the West Coast just south of the equator. The set employs just one five watter with 500 volts on the plate.

9AO has a couple of new 293A's and reports QSO with the *Modoc*, NIDK, of the International Ice Patrol, located in the North Atlantic.



The main transmitter of the University of Michigan, *Greenland Expedition*. A ¼-KW tube is used in a Reinartz circuit at nx1XL. This type of mounting with a couple of back braces works nicely with any circuit. nx1XL works on 25, 35, and 45 meters wavelength.

Jamison (8BIT) and Clark (8BQS) of Pittsburgh started on a six months tour in the West in late June. A portable transmitter (one UX210, B-bats, and a Hertz) signing nu8ZZB has been taken along with which to work the gang from the different stopping places. QSL's should be sent Care 6RJ, 2901 Rawson St., Oakland, Calif.

H. M. Y. Adventuress, GLYK, will be working on 45, 23, 10, and perhaps 5 meters during July and August. Reports should be addressed to Mr. R. F. Durrant, c/o Colonel Millard, Westhill, Shanklin, Isle of Wight, England.

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nc5AV (New Denver, Brit. Columbia) worked the Hudson Bay Company's auxiliary schooner *Baymaud*, CKA, on June 26 taking some traffic and arranging a bi-weekly schedule for handling further messages. The *Baymaud* is at present located in the Coronation Gulf, Arctic Ocean. CKA has a 500-cycle note and may be heard on 42 meters wavelength.

When Zane Grey's Yacht *Fisherman*, KNT, went aground at Rangiroa, in the South Seas, 6PW did some fine work in keeping the newspapers informed of conditions. The San Francisco *Chronicle* got all its dope on the accident through 6PW, and much publicity was furnished amateur radio. 6PW stayed at the key practically all one night watching for a QSU from KNT ,and finally managed to get in contact again the next evening, when he learned that KNT had blown their generator the night before.

6BOL has been handling messages between a lady in Portland, Ore., and her son in Alaska. A very fine letter was received by him from this lady, telling how much this work was appreciated, and how much she thought of amateur radio in general, since it had been the means of her being in constant communication with her son, with a time lag of a great deal less than the mail could offer.

6FP softly sobbed, "And it has come to this," as he pointed to the magnet which was drawing iron filings.

—*The Ham-Meter.*

20-Meter Work

CONDITIONS are uniformly fine on the 20-meter band if we are to judge by all the reports received from different sources this month. 9DTR (Danville, Ill.) predicts that once it is discovered that foreign stations can be worked at most any time of day and that QRN is greatly reduced, the 20-meter band will be as crowded as "forty" is now. It is suggested that more of the gang get down on "twenty"' Saturdays and Sundays to try this wave out fully. New foreign contacts will result. If we all concentrate on "twenty" at the same time of the week more good contacts will be made in each individual's limited operating time and we can more quickly find out some of the things remaining to be discovered about this wavelength.

sc3AG (Santiago, Chile) says, "Undoubtedly, the 20-meter band is better by far than the 40-meter band for U.S. contact. Only twenty of my 232 points in the International Relay Contest were obtained on 40 meters."

8VE (Pittsburgh, Pa.) reports "Twenty-meter QSO can be maintained *all night* with Europe nearly every night. '20' is much more reliable than many fellows think.....they are merely afraid to try it."

1CRA (West Newton, Mass.) found plenty of traffic on 20-meters during the month.....handling nearly half of his total of 294 messages on that wave. When a chap gave him a QRU he didn't complain but gave him some messages to QSR.

1AJM (Leominster, Mass.) says. "I have heard 24 countries on 20 meters to date, and worked 'em *all*. '20' may be a little peculiar at times but it is without doubt the *best* band."

6VZ (Santa Monica, Calif.), "I was QSO eb4WW on twenty meters from 9.45 p.m. to 11.15 p. m. P.S.T. on June 7. Signals R6 both ways. On June 9 at 8.07 p.m. P.S.T. I worked ef8GM also on '20'."

1BUX (Fall River, Mass.), "I think '20' is great. Since June 8, I've worked at least one foreign station a day. Have worked eb-4AX, ef8EO, sb1AC, ef8FT, eb4AU, eg5YX, ef8CL. eg5YK, gc6KO, sb1AD, ef8PX, sb1AW, eb4UU, eg6IZ, fmTUN2, ei1CR, ei1GW, en0VN sb2AB, sb1BR, saFC6, nc8AF, ed7CZ and many sixes and sevens....don't bother to stay up to work the oz and oa boys. Just received a card from foA4F confirming our QSO on '20' April 18 and stating that it was the first 20-m. QSO between the U. S. and South Africa. I came up to '40' for a short while the other night but the QRN was bad and I soon went back to '20' where it's quiet."

oa5BW (Gleneig, South Australia) requests us by radio (via 1BUX) to insert the following for the benefit of South American amateurs: "oa5BW will CQ on 20-meters at 5.30 G.M.T. and look for answers from South America in the Australian Saturday and Sunday afternoons. sc2AH is one of the loudest stations heard from your continent."

8BRC (Van, Pa.) will be glad to arrange 20-meter tests with those who desire schedules at noon. He says, "The skeptic who thinks 20-meter sigs can't be handled O.K. at short range please write and we will let you hear for yourself. Then come up and we will show you how."

9AWB (Montrose, Iowa), "20-meters is one of our most useful waves if it is further developed. Fords, broken strands in aerial wire, and any pieces of metal in the vicinity that rub together will cause noises in the receiver that resemble a boiler factory. 20-meter sets should be well cushioned to prevent mechanical vibration. About hollow signals, I have noted a distinctive timbre of some 6th district stations and can tell a 'six' before he sines tho this doesn't hold true of all sixes. On the whole if you keep your wave *steady* and have a good antenna you will have more results and fun on '20' than enough!"

5UK (New Orleans, La.), "I am hammering away at the 20-meter band with the hope that conditions will improve. Some nights we hear many NU stations and possibly one or two European or Australian stations, but conditions here are erratic though perhaps sigs are FB elsewhere. When we do hook stations the signals fade out and as far as daylight work is concerned, there doesn't seem to be any such animal. I cannot account for these conditions in view of so many good reports in *QST* from other parts of the country."

Mr. C. D. Roberts (Sydney, Australia) has had very good success in receiving 20-meter signals and has made some excellent measurements of variation in audibility throughout the 24-hour day. In November, 1926, measurements on WIK (22-meters, New Brunswick, N. J.) showed that the signals reached a minimum at noon in Australia rising steadily and gradually thereafter. The decrease in the Australian morning appears to take place more quickly than the increase in strength in the afternoon. Mr. Roberts says: "In three months of listening on 20-meters I have copied amateurs with the following intermediates: af, eb, ef, eg, na, nc (4), nu (1, 2, 4, 6, 8, 9), oa, oh, oz. On May 15, nu2AHM was readable all day except for a half hour before and after noon here. I shall be glad to listen for any hams on schedule."
(40) 7, 10.30 pm. Tues., Fri., (81) 7, 10.30 pm.

1AID (Providence, R. I.) says, "Twenty meters is wonderful. DX is coming along great and ragchewing is just as good as on 40. It always depends on the individual and not on the band."

8DME (Auburn, N. Y.), "Made QSO with ef8FT at 7 pm. June 27 and he reported me R8 on 19.8 meters Called 8AHC and introduced him to ef8FT as they had heard each other but not been QSO. They clicked at once after I gave QRH's and signalled to go ahead. FB for '20'!"

VOQ (Schooner Morrissey off Cape Harrigan), "20-meter signals are excellent when engines are not running. 8DME R7-R8 steady and FB."

X2K (the Spanish whaler Flor de Madruga, Long. 81°, Lat. 53°, 600 miles S. E. McDonald Island, QRD the antarctic) is anxious for more QSO's with the U. S. A. 20-meter calls heard and worked from Cape Ste. Marie, Madagascar to the present location by R. Galdames, operator, by radio via 9BSK, 1RD, 1CMX, 1CMP 2BRB, 6ZAT, 7EK, 9BSK, 9DIJ, ei1ER, eg5YX, oa4RB, oz3AG, oz2AC, XIQ, af1B, op1CW, foA5X, foA5O, eb4AX, eb4AU."

9BSK (Hammond, Ind.) says, "I work X2K four times each week on schedule on 20-meters and have followed him from 6,000 miles to his present location, about 13,000 miles. 9DIJ worked X2K with his new UX852. I think this is great DX and value this work more than all."

nc3BT (Hamilton, Ont.), "20-meters can't be beaten for daylight DX. Worked nc8AF and eb4WW the first week on this band, the latter at 1 pm. EST, good sigs and daylight at both ends. ef8FIZ has been worked at 5 pm. EST. European stations hardly readable on 40-meters are R6 and 7 when they go to '20'."

9CEI (Michigan, N. D.), "The major part of my 20-meter work has been done with one and two 203A's in a tuned grid and plate circuit. Difficulty in keeping the plate dissipation down within reason (with T.P.T.G. cct.) was overcome by trying different sized grid and plate blocking condensers, plate chokes and grid leaks. ef8YOR, five oa's and one oz have been worked, all between 11 pm. and 4am CST. As long as I used 40-meters I rec'd no cards from eg stations but now they come regularly when 20-meters is being used. A large antenna has been found more satisfactory than a half-wave current-fed Hertz. I now use a 4/2 wave combination horizontal and vertical radiator with 2-wire tuned voltage feed, a tunning condenser being in parallel with the antenna coil. This steadies the wave over a series condenser arrangement that was tried and tone reports are 'DC', where 'RAC' was the rule when using the series antenna condenser. It is gratifying to me to see the increasing number of stations on '20' but I have been disappointed in noting little improvement in the tone and steadiness of these stations. I think many stations are working with too-high plate dissipation, the overloading of tubes causing some of the wabbly notes. Yours for better 20-meter work." 9CEI reports that with his final adjustments of the T.P.T.G. circuit he gets a plate input to tube output efficiency of about 65%. A telegram received July 9 from 9CEI reads. "Just QSO eb4WW and eg5HS—R6 on 20-meters!"

INF (Beverly, Mass), "With a lonesome much-abused 210 in a T.P.T.G. circuit I find '20' the 'rosy red berries'. Have worked a six or two every night for a month....about 45 9's in daylight, eg5YX np4SA, eb4AA, XX1 (QRA?) and ei1AIX (Stavanger, Norway). I have heard several 20-meter stations supposedly within the skip-distance: 1AJM, 1ON, 1AXA, 1SW, 1BYV. Also heard: oa2AK gi2IT, eb4AU, eb4WW, eb4AX, en9B7, sc8AG, sc1AD, 1AD, sb1AC, sb1AB, sb1BR, ef8YOR, ef8FT, ef8PX ef8EO, ef8GI, ei1CR, ei1GW, nc4DU, nc1AD, nc8JM, em8MUK, PCRR, TVE, UL. I have two transmitters and can QSY from '40' to '20' in 10 seconds.

I find that the DX records, skip-distance, swinging and fading experienced on 40-meters will be just about doubled by using 20-meters. Have 60-cycle induction which makes it necessary for me to use a kerosene lamp to light my station at night. Find DC much better than RAC or AC especially in QRN. In my experience on '20' and '40' I get 8 replies to 10 CQs on DC and about 2 in 10 on AC. Hope this report helps someone to QSY to '20'."

6AGR (San Pedro, Calif.), "Was QSO eb4RS the other night and he wanted his QRH. Worked eb4WW tonight (July 3) and gave him a msg with the dope for eb4RS. 4WW delivered it to 4RS on schedule and had an answer back to me in five minutes. Fast work! My wavemeter detuned the receiver so I couldn't give him the information when I worked him."

20-meter calls heard at 6BQ (May and June 1927): 1adm 1amd 1amu 1asf 1beb 1byv 1caw 1cmx 1py 1ue 1uw 1vc 1zz 2ahm 2aib 2aol 2arm 2atk 2awx 2bg 2bsc 2bur 2etq 2ev 2gx 2in 2nm 2sb 2tp 2xr 2xt 3aed 3agu 3ahl 3alq 3aqe 3bwj 3cch 3cfg 3ckg 3tn f4a 4io 4iz 4km 4lm 4qb 4qy 4rn 4rr 4si 4tu 4xe 5ado 5ahx 5ak 5amt 5amw 5aop 5aqe 5arf 5auz 5avs 5aqe 5dq 5eh 5hs 5hz 5ie 5uk 5vm 5wu 5wz 5za 6am 6amm 6bpg 6cxi 6vr 7acb 7adm 7ax 7ay 7bm 7je 7mh 7nc 7pu 7uw 8acz 8adg 8afd 8ahc 8ahk 8aji 8ajp 8alc 8alg 8aly 8aov 8arg 8aro 8asb 8aul 8avb 8ax 8axa 8ayo 8ben 8bev 8bna 8bxa 8cil 8cmb 8cse 8esr 8dea 8dgx 8ddn 8dds 8dld 8dsf 8eq 8ex 8gk 8gz 8hj 8jg 8zz 9aex 9ajj 9amq 9ara 9asc 9awr 9bjp 9bqq 9bqy 9bvh 9bvc 9byl 9caw 9cei 9cef 9chd 9cld 9cn 9cvy 9cxl 9cxx 9dgx 9dia 9dij 9dkm 9dly 9dpw 9dps 9dqu 9dul 9dws 9eae 9ee 9ef 9efh 9ekn 9nm 9uy nc-2benc nc-2al nc-3cs nc-4fy nc-4hs nc-5go np-4sa oa-2sh oa-2uk oa-4bd oa-4rb oa-7dx oh-6acg oh-6bdl su-2ak su-2cd sc-2ah sc-2as sc-8ag nr-cto x-crlo.

6ZAT-6UF (Bill Eitel, Los Gatos, Calif.) sends in a diagram of the circuit he is now using which is a modification of his own on the regulation T.P.T.G. arrangement. To work two 203A tubes satisfactorily in parallel on 20-meters, he uses a separate tuned-grid coil and a separate grid leak and grid-condenser for *each* tube, the tuned-plate coil receiving the output of both tubes through the usual blocking condensers. The antenna coil is coupled to the plate coil. A parallel plate-feed to both tubes has nothing unusual about it. The two grid condensers and the two this particular transmitter. Bill says, "I get better plate blocking condensers happen to be variable in reports on the note and the output is just about double. I built the new set to take to 6UF. I pulled 6ZAT down last night right after working eilGW."

6ZBJ (Santa Barbara, Calif.), "Recently I handled a bunch of messages for Shanghai China which I gave to 6AJM (Lemon Grove, Calif.) who got down on 20-meters and put them across within 18 hours and had delivery on them. This gave us quite a boost here."

OFFICIAL BROADCASTING STATIONS
(Local Standard Time)

Below we are listing again the up-to-date schedules of the active A.R.R.L. Official Broadcasting Stations. These stations use the wavelengths specified in parenthesis after their calls and broadcast regularly at the times given, the time specified in each case being local standard time for the city where each station is located. The schedules become effective automatically upon their publication in QST and remain in effect until corrected or supplemented in later issues.

It is now possible to select one or more stations in order to listen for the broadcast at a definite time and wavelength, although you will probably "run across" the broadcast at some time during the course of ordinary listening.

Q.B.S. are requested to send the broadcasts slowly enough and with steady, even, keying so that even beginners can make use of the broadcast information. Each week the latest news of expeditions, A.R.R.L. schedules, tests and important amateur news of the hour will be sent from the League's Official Broadcasting Stations.

The operators of the various station sare willingly giving up part of their time to this work and will appreciate it if you will drop them a card saying that you copied the Official Broadcast from them on schedule. Headquarters will be pleased to have any suggestions for making this service of still more interest and value. Only thus can we improve. There are plenty of stations in this list so that some of them can be heard in every part of the country. Listen on the wavelengths given and see for yourself.

1AID (19.5) 7, 12.30 pm. Mon., Wed., Fri.; 1AOX 7.30 pm. Mon., Wed., Fri.; 1AMU (19) 7 pm. Tues., Wed., Sun.;1BEP (80) 10.30 pm. Tues., Thurs., Sat.; 1BFZ (79) 7, 10.30 pm. Sun., Wed., Sat.; 1BIG (75.5) 7 pm. Mon., Wed., Fri.; 1BVB (42) noon, Mon., Wed., Fri.; 1MK (76.5) 7.30 pm. Wed., 11.00 pm. Tues., Wed., Thurs., Fri.; 2APD 5.15 am. Sun. 6.15 pm. Tues., Thurs.; 2CQZ (41) 7, 12.30 pm. Mon. Wed. Fri. (84) 7, 12.30 pm. Mon., Wed., Fri. (184) 12 midnight, Sat.; 2CTH (20) 7 pm. Tues., Thurs., 1 pm. Sun. (37.5) 10.30 pm. Thurs.; 2PF (77.4) 10.30 pm. Wed.; 3AX (82) 7 pm. Mon.; 3ALE (41) 7, 10.30, 12.30 pm. Tues., 12.30 pm. Thurs. (80) 7, 10.30, 12,30 pm. Sun.; 3LL (37.9) 7, 10.30 pm. Sat.. 7 pm. daily. 3SJ (42.6) 7 pm. daily except Sat. & Sun.

3ZI (81) 7 pm. Mon., Tues., Thurs.; 4IZ (88.84) 7.30 pm. Tues., Fri., 2 pm. Sun. (20.5) 3 pm. Sun.; 4JR (78) 7 pm., Mon., Wed., Fri.; 4LK (37.5) 5.30 pm. Mon., Wed., Fri., 6 am. Sun. (38) 12 midnight Sat.; 4SJ (40) 7, 10.30, 12.30 pm. Mon., Fri.; 4TR (40) 7, 10.30 pm. Tues., Fri. (81) 7, 10.30 pm. Thurs.; 5ACL (41) 7 pm. Tues., Thurs., Sat. (20.1) 12.30 pm. Sun.; 5ADA-5CQ 41 7 pm. Sun.; 5AKP (20) 8 pm. 5.45 am. Sun., Wed.; 6AMM (39.7) 7 pm. Tues., Thurs. (19) 7, 12.30 pm. Sat.; 6APA (38.9) 7.45 pm. Mon. Thurs.; 6BBJ (85 phone) 7.30 pm. Mon., Wed.; 6BJX (40) 6 pm. daily except Sun.; 6BXD (38.5) 7 pm. Mon., Wed., Fri.; 6BWS (39.2) 7, 10.30 pm. (39.2-19.1) 12.30 pm. Mon., Wed., Fri.; 6CDU (42.2) 8 pm. (21.1) 7 pm. Mon., Wed., Fri.

6UO (76) 10.30 pm. Mon., Wed., Fri.; 8AHK (39) 7 pm. Wed., Sat.; 8APC (19.3) 12.30 pm. Sun.; 8AVK (81.5) 7 pm. (38.3) 12.30 pm. Tues., Fri.; 8AYU (20.5) 7.30 pm. (41) 10.30 pm. daily, 12.30 pm. Sat.; 8BMJ (81.5) 10.30 pm. Mon., Tues., Thurs.; 8CEO (76.5) 7 pm. Mon., Wed., Fri.; 8CJC (81.15) 10.30 pm. Fri., Sat., Sun.; 8DME (38.45) 7 pm. Thurs., Fri.; 8GJ (20) 7 pm. (80) 10.45 pm. (40) 11.30 pm. Mon., Wed., Fri., Sun.; 8HW (42) 7, 10.30 pm. Wed., Fri., Sun.; 8PL (37.9) 5.30 pm. Mon., Wed., Fri.; 8ZH (76) 7 pm. Tues., Fri.; 9ADR 9BWN (84.6) 10.30 pm. Mon. (21) 7 pm. Wed., Thurs., Sat.; 9BYQ (178.6) 2, 7 pm. Tues., Sat., Sun.; (37.5) 7, 10.30 pm. Thurs. (20) 12.30 pm. Sun. 9AUG (42) 10.30 pm. Wed.; 9BKJ (78.8) 7 pm. Sat. (38.8) 12.30 pm. Fri.; 9CET (38) 11 pm. Mon., Thurs. (18.9) 1.00 pm. Sun.; 9CNL (38) 7 pm. Mon. Wed., Fri.; 9CVR (40) 10.30 pm. Sat., Sun.; 9CZC (76) 10.30 pm. Wed.; 9DAE (41) 7 pm. Tues., Thurs., Fri.; 9DPJ (80) 7 pm. Mon., Wed.; 9ECJ (41) 7 pm. Tues., Thurs. (83) 7 pm. Wed., Fri.; 9HP (38-39) 7, 11 pm. Tues.; 9JU (38.5) 10.30 pm. Tues., Fri.; 9KZ (81) 7, 10.30, 12.30 pm. Tues., Sat.; np4JE 7 pm. Tues., Sat.

ARMY-AMATEUR NOTES

SECOND CORPS AREA—Athough schedules between the NCS's and their various AA stations have been discontinued for the summer months, each NCS will continue to keep its schedule with 2SC, the Corps Area NCS. 2APD is assisting 2PF in the Brooklyn Net schedules, and 2AFV is back on the job. 8HJ, 8VW, 2AVB, and 3HW continue to be active in their respective Nets.

FIFTH CORPS AREA—Work in this Area is practically at a standstill during the summer months, but it is expected that activities will start in the fall.

SEVENTH CORPS AREA—A new experiment is being tried in this Area, and it is expected that much activity will show up as summer progresses. 9BAY has been forced to resign his appointment as NCS for business reasons. His work has been excellent, and it will be difficult to find one who can adequately take his place.

EIGHTH CORPS AREA—5FJ has been appointed to the Governor's Net of Oklahoma. Not many new developments in the Area, but the work of all concerned has been very satisfactory, and the showing of the Area in the last AA tests was very gratifying.

We're learning new things every day! Here's an interesting little quotation which was found in the *Pittsburgh Press*: "'CQ', meaning 'Come quickly, Danger!' is the present-day wireless distress signal. The first letter of the word 'danger' is no longer used." Howzat? We think it's quite a gem.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
3CGT	27	27	438	492
8BAU	39	46	367	452
op1HR	110	77	134	321
6BJX	96	149	72	317
1CRA	91	21	182	294
3CFG	76	12	192	280
6AMM	43	110	120	273
8XE	27	31	183	241
8AVK	52	16	162	230
8EU	41	33	150	224
8CGZ	2	13	202	217
4DX	79	40	84	203
8CWT	22	30	150	202
7AEK	110	85	4	199
op1AU	62	43	90	195
6AYC	28	5	152	185
6ZBJ	45	39	82	166
6BVY	57	109	—	166
1BYM	23	23	112	158
9CMV	47	24	73	144
6GW	4	11	124	138
4NE	83	40	10	133
6BJF	25	7	99	131
6DDO	41	60	28	129
6BUC	106	20	1	127
8CDC	41	18	67	126
6BHI	25	—	100	125
4AAO	34	50	38	122
7AM	40	20	62	122
2ALP	31	76	12	119
1UE	9	12	94	115
6CKC	4	—	108	112
8CYK	29	12	66	107
8AVB	57	5	40	102
3CAB	81	19	—	100

3CBT takes the prize position this month with 8BAU right on his trail for the honors. op1HR and 6BJX deserve special mention for the worthwhile traffic work they accomplished. 6AMM, 7AEK and 6BVY also show some remarkable figures in the DELIVERY column. Every station in the list is operated ON SCHEDULE with other stations. Messages are handled QUICKLY and ACCURATELY and DELIVERED SURELY when they pass through these stations. That's why it's an honor to "make the B. P. L." Any station interested in good operating work that cares to qualify can do so by adopting a regular plan of operation in line with the policy of our high stations in the B. P. L. Why aren't you there, too, OM?

With the Route Managers

By Lawrence A. Jones*

WE'VE DONE it! Here's our full page back again! Although the traffic totals are still pretty well down, we want to keep right on our toes, because it's time for some of the gang to return from their summer vacations, and we'll be needed to show 'em where to route all their messages. You all deserve hearty congratulations for the fine bunch of letters you sent us this month. Keep it up!

By this time a lot of you should begin to realize that no matter how hard each of you may work individually, it's going to take cooperation—and lots of it—to really get results of which we as a bunch may be proud. This cooperation is of two kinds. First of all, the ORS must be in back of us. Without their cooperation our task becomes doubly difficult, and in fact almost impossible. Therefore it is up to us to dig into the ORS hand and foot until we make them realize just how important our work is to the old League, and just how necessary their cooperation is to make our work a success. The second kind of co-operation we can take care of easily. Two or three times we have quietly suggested five point systems between RMs, in the hope that some of you would see the advisability of this sort of thing and try it out on your own hook. A few of you have "seen the light," and done a fine piece of work. The rest of you should take a lesson from those few, and get in touch with your neighboring RMs right away. They can be of much help to you in getting routes lined up to and from your section. How about it?

Ed. Raser, 3ZI and RM for Southern New Jersey, says, "Traffic here is in good shape for this time of year, in fact the best I've seen it in the last 15 years. You see I've followed this die relay game right through since its beginning in 1915, and haven't quit yet! We have quite a few good routes working in this territory, and I am getting good co-operation from my neighboring RMs, namely 3AIY of Philadelphia, and 8EU of Williamsport, Pa. Apparently the gang seem to see the value of routing traffic over known and established lines which have been built up and are already in good working order. So far we have Central New Jersey and Eastern Pennsylvania pretty well covered. I wish our bunch the best of healthy growth and co-operation from the gang, and pledge myself to do all in my power for the cause." There you have a sample of that co-operation we just spoke about, and you see that it *does* bring results. Now let's see you all take the hint from 3ZI, and get after the nearby Route Managers.

1BQD, the RM of Rhode Island, is putting his whole heart in the work, but says that he has been able to get next to no co-operation from his gang. That's tough, but sooner or later the Rhode Island bunch will open their eyes to the fact that the other sections are getting way ahead of them, and then, if they have any loyalty to their section at all, Mathewson will get all the co-operation he needs. Incidentally, he says, "I operate on 80, 40, and 20, and have no trouble at all in picking up loads of traffic on 80. If the rest of the gang would quit the everlasting chase of super-dx and take a crack at 80, we would see a great change in traffic totals." And he's right. It's ok, fellows, to go after dx some of the time—every one wants to do that—but you ought to make up your minds to devote some time to traffic handling. Don't be narrow-minded enough to give up all your radio time to just one goal.

5SI, RM of Arkansas, tells us, "Here's the dope on what I've done so far: Sent every ARRL member in Arkansas a multigraphed form letter, regardless of whether they owned a transmitter or not. With each of these letters I sent one of my 'Schedule Report Blanks,' on which those who were actively engaged could report to me. Since then have written every ARRL member in this state from one to four personal letters, trying to get their interest stirred up to the message handling point. Generally speaking the results obtained so far have been very gratifying. Several fellows are now on the air who were entirely off, and others who were operating in a very haphazard manner are now on with regular schedules. Each month as I send out my schedule report blanks, I drop each fellow a few lines to 'pep' him up. I had to start in from the ground floor, you might say, for at the time I became RM, there was not a single ORS in this state. We have three or four now, and I am expecting several others to kick in before long. By the time real weather opens up this fall, I expect to have a vy fb traffic organization going." There, gang, is a sample of the work that we can do when we really get down to business. We have had the opportunity to see copies of Ariedge's multigraphed letter, and his schedule report blanks, and they surely "fill the bill." If any of you wish to get some more dope on them, 5SI would probably be quite willing to offer suggestions. By the way, Arledge did a lot of fine work with his station in connection with the Mississippi flood, and we are proud of him.

Here's a suggestion on beating static from RM Brown, 1AAL. He says, "I always start in the evening on 80, and if the QRN is bad, go down to 40, and if still bad go on down to 20, and then I'm all set for a pleasant evening." Just another of the many advantages of having a set that will QSY easily to all amateur bands.

McElwain, 9CZC, RM of Iowa, says, "I notice that several of the ORS report QRN so bad that there is ND. This is a 'give away' as anyone who has been on the air knows that it is possible to handle traffic most nights on 80 meters, and that mornings are very FB for short distance work. So I think it's time to get a new alibi, or else tell the truth."

6APA, the CRM of the East Bay Section of California is helping to pioneer the 20 meter band, and

*Assistant to the Communications Manager.

wants to see more schedules on this frequency, where he sees better possibilities for daylight traffic handling. He says more traffic routes are needed, as some have been dropped owing to vacation trips, or what have you? Give your Route Manager your support, fellers, and let him know what schedules you have or want.

4NE, RM of North Florida, tells us, "The co-operation I am getting from the gang in my district exceeds my fondest expectations. I sent cards to everyone asking for dope on their schedules and operating hours, and practically everyone of them have replied. I am planning to assemble all this dope on one sheet (or card if possible), and send a copy to each fellow in my gang, and to the RM of South Florida. It's going to be a job to get out these schedule cards each month, but I think the gang will appreciate them." Yes, the gang will appreciate them, alright, especially when they realize how hard you are working to bring their section to the top. When you're sending out copies of your cards, don't forget to include HQ on the list. Incidentally, Webb is another RM who is encouraging "Sunrise Parties," because there is less QRM and QRN then.

9DLD, the RM of Wisconsin, is having trouble getting enough co-operation from his gang. 'Smatter you fellows in Wisconsin? How's to get in back of your RM and give him the dope he needs? He's working hard for you, and it's up to you to show your appreciation.

8EU, of Eastern Pa., is another one who can't get the bunch to help him. He says, "When it comes to co-operation from individual ORS in this section, there just ain't no sich animule.' They must be bashful, or scared, or something, but heck, I'm not the R. I.! A few here are always on their toes ready to keep schedules or anything we ask, but the majority certainly are anything but." Once more we see it, fellows. Without co-operation we are next to helpless, and it's up to us to dig up some way of getting that help.

Well, gang, guess we've said enough this time. You're all working hard on the job, and that's all that we can expect. Remember that we are in back of you, and stand ready to help in any way possible. Let's hear from you between now and next month's report 73 de LJ.

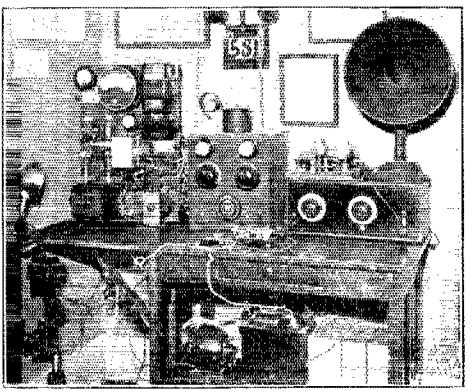
Amateurs on the Job

As always happens in the case of an emergency, amateurs in the flooded areas of Arkansas, Mississippi, and Louisiana stood watch faithfully, hour after hour, in the event that they might be of some service. And needless to say, they did a wonderful job, and are to be heartily congratulated, one and all, on their tireless efforts.

In Arkansas, the gang was hampered somewhat by the fact that very few stations there are equipped to operate on eighty meters, thus being forced to do most of their good work in the daytime. 5SW, of Hot Springs, was able to give the first news from the outside world to his local newspaper, since all wire communications had been cut off. He handled a large number of messages, including AP and National Guard Medical Relief, keeping schedules with 5CK, and 5ABI, 5SI in Pine Bluff, handled all official army messages between Arkansas and the 7th Corps Area Headquarters at Omaha, Neb. Messages were being delivered from Pine Bluff to Omaha in less than an hour. 5SI earned a nice bunch of newspaper publicity together with a fine and sincere letter of appreciation from Major-General Poore, USA, for the excellent work done by him in the time of need. 5SI's work with Omaha was carried on through a schedule with 9DR, which was kept practically day and night until all need was past. 5ABI in Little Rock, was in constant communication with 5JB at Hot Springs for three days and half of the nights. During this time many messages were handled, the most important ones being for the Military Dept. and the Red Cross. Hot Springs was also supplied with general news from this station. 5CK, Havana, operated on schedule with 5JB, 5SW, and 5AIP, handling much important traffic. Through the schedule with 5AIP, the Union Trust Company of Little Rock kept in touch with several of its correspondent banks in western Arkansas. Incidentally, 5SW helped hook KVOO and KTHS on schedules handling flood news.

In Louisiana, 5QJ wired Adjutant General Toombs, who is in charge of the flood situation in that district, offering the services of amateur radio. 5UK in New Orleans kept schedules with 5AGS in Meridian, Miss., and with 5AEN at Crowley, La., for handling Associated Press. Communication in Louisiana was not a great deal under normal.

In Mississippi, 5AKP, 5AGS, and 5API stood by constantly for flood work. 5AKP was QSO Cleveland, Miss., New Orleans, La., and Memphis, almost at



5SI—A REAL RM LAYOUT

Note dynamotor at bottom, which furnished emergency plate supply during the Mississippi flood.

will, and 5AGS of Meridian was QSO Cleveland, New Orleans, and Plaquemaine, La., thus affording quite reliable routes for various kinds of emergency traffic. 5API was the station at Cleveland worked by both these others. Radio conditions were very poor, but still the gang was able to keep the lines of communication open between Meridian, Memphis, Cleveland, New Orleans, Shreveport, and Plaquemaine.

Undoubtedly many more amateurs did their part in the great work, but they are not known as yet. Every fellow deserves individual credit for his tireless efforts, and once more amateur radio has chalked up a performance that will bring it before the public.

MORE EMERGENCY WORK

Weeksburg, Ky., is a little coal mining camp, isolated in the mountains of north-eastern Kentucky, its only connecting link being the C & O RR, which terminates at this point, and the C & O RR Phone, which is a part of the RR's excellent phone system.

About a month ago, that part of Kentucky was hit by a terriffic cloud burst, drowning several persons, and damaging a great amount of property. Incidentally, Weeksburg was cut off from the rest of the world as no trains could run, and the railroad phone was down.

Hence the only possible connecting link was radio station 9DVT, located there. Nightly 8DOI, of Huntington, W. Va., kept a schedule with Phipps of 9DVT, and all messages to the outside world were handled through these two stations. These messages included reports of railroad officials there to the Elkhorn Piney Coal Mining Co. in Huntington. In fact, the two amateur radio stations acted as a means of traffic handling for the C & O, through the means of the Elkhorn Coal Co.

At one time the grocery supply in Weeksburg was running low, and one of the messages stated that unless groceries arrived within a week, the situation would become critical. The two amateurs gave reports on a relief car sent in answer to this message, and finally it got through, saving a very unusual situation. This information rather disproves the C & O's statement that they had no need for the help of the radio amateurs of the U.S. 8VZ, also in Huntington helped these other stations out by keeping long nightly watches at his outfit during the critical time. These three men deserve a great deal of credit for the unselfish way in which they gave up their time in order to be of assistance to those in need.

DIVISIONAL REPORTS

ATLANTIC DIVISION

EASTERN PENNA.—SCM, H. M. Walleze, 8BQ—3AAX will be off the air until the first of Oct. He is going to Denmark. 8AVK will be on his BC skeds as usual. We need several more good stations for this work. Who will take the job? Don't forget to report new tfc pushers as they show up. Now that "school" is over, some of the boys should be on more. 3CBT tops the list and sent a nice report. 8EU says tfc is good and is going to QRO. Tfc holds out very well for 8AVK and 8CGZ, as usual. 3BGG, an ex-ORS, reports York on the map. FB. 3HH handled his on fone. 8CMO is installing a 250 watter and an arc rectifier. 3QY is doing very good work on 80. 3NP can work two bands at once, when the second op is on deck. RM, 3AIY has a 50 in action now. 3VF handled tfc to Lindy. 8CW is working for a commercial ticket as is 8BSZ. 3JJ is still QRMed by BC rig next door. 3HD visited York and says its the best radio location on the globe. 3CDS is busy on 40. 3ZM is cutting hay after being parked in a hospital. 3ADE is rebuilding. 8AVL is doing very good work on 20 and is fussing with 5M tests now. Vacation gummed 8BFE's total. 8ADQ is having his troubles on 40. 8RQ and 8WJ are stepping out FB on 80. 8CCQ works on 20, 40 and 80 meters with good QSY systems.

Traffic: 3CBT 488, 8EU 224, 8AVK 230, 8CGZ 217, 8CMO 47, 3QY 37, 3NP 27, 3HH 23, 3AIY 15, 3HD 14, 8CW 13, 3CDS 13, 3BGG 11, 3ADE 10, 8AVL 8, 8BFE 5, 3JJ 4, 3VF 3, 3ZM 2, 8CCQ 24.

WESTERN NEW YORK—SCM, Charles S. Taylor, 8PJ—The Western New York gang attended the Pittsburgh Convention, and succeeded in winning the big Silver Cup which was put up by the Four Horsemen of Pittsburgh. Western New York can lead the country in traffic monthly but the gang must work hard and keep schedules etc. This being done the results will amaze us all, so give us your utmost support. 8AHK says Rochester will have a get-together August 5 and 6. State Convention and it is known that several Canadians will be there. 8AIL will be on the air now that school has closed. 8ANZ is rebuilding the set and wants to be an OBS. 8BAG keeps traffic schedules. 8BMC transmits msgs to Iceland. 8BCZ is in New York City on a visit. 8BLI has a new 75 watt tube and needs some more volts. 8BLP had a 50 watter but grid kissed the plate. 8BMJ just handled traffic. 8CDC has arranged schedules with 8XAM. 8CNH is off on account of school. 8CNT handled traffic. 8CUR handled some traffic. 8CVJ handled traffic from VOQ. 6BXI has schedules with 8HJ and 8VW. 8BBU was heard in England. 8CHL is ready to come on air. 8BNS is off for good. 8CYK was scheduled with 1ACA-8COL also handles traffic. 8DDL handled traffic only. 8DHX has two transmitters now on 20, 40, and 80 meters. 8DME handled 15 msgs from VOQ. 8DNE works a few EGs. 8FU is now on with a 201A. 8HJ says things are dead in the district. 8NT now has a commercial ticket and is operating the Great Lakes. 8QB is slipping fast—announcements will be made later. 8TH reports that he wil be active during the summer. 8UL attended the Convention but forgot to report. 8VW handled Army Amateur work. The SCM is back on the air with a 204. Applications for ORS will be gratefully received, but you will have to live up to the rules of an ORS. 8AHK 8.

Traffic: 8AHK 8, 8ANX 7, 8APK 19, 8BAG 8, 8BMC 18, 8BCZ 3, 8BLP 27, 8BMJ 8, 8CDC 126, 8CNT 25, 8CUR 78, 8CVJ 15, 8CYK 107, 8DDL 17, 8DME 68, 8DNE 14, 8NT 21, 8TH 5, 8VW 10.

WESTERN PENNA.—SCM, G. L. Crossley, 8XE—Reporting this month was very lax due partly to the Atlantic Division Convention being held at Pittsburgh and a number of the active men working on the committees, and because of pressing work the former route manager asked to be relieved and Anderson, 8GI is to take his place. Anyone wanting schedules can arrange for them thru 8GI over the air or by mail. 8AWR, 8CMP, 8GK, 8CFR, 8AXD, and 8APC are on "20". 8CRK is rebuilding and will have a new rectifier soon. 8APC is going to have a transmitter on 40 and 80 again soon. 8DGL is putting up a new antenna. 8BVK, 8GU and 8BHN are experimenting on 5 meters. 8DKS reports things are slow at Uniontown. 8HM is taking a vacation. 8AXM is building a new transmitter. 8AYH has a new rectifier. 8DNO is rebuilding receiver and will be on 20 soon. 8DFY is QRW with work for the Railroad. 8ARC and 8AGO have been QRW with the Convention. 8CWT has been FB using mercury arc. 8CYP is rebuilding the transmitter. 8GI is on 88 meters. 8BXE and 8OJ are on 80. 8CMW has a good phone in the 80 and 150 bands. 8CSZ is now using an MG set. 8BWV now has 500 watts on the air and is QSO foreigners. 8BDI is on 80 and 175 meters. 8BRC will be glad to arrange 20 meter tests with those who desire schedules at noon. Come on gang don't let the summer weather stop you from reporting. The SCM can't sent a report in to *QST* if no reports come from the ORS.

Traffic: 8XE 241, 8CWT 202, 8CEO 53, 8CYP 27, 8GI 26, 8AKI 26, 8BRB 12, 8DKS 12, 8BVK 12, 8DFY 12, 8CFR 10, 8APC 8, 8GK 7, 8ARC 7, 8DNO 6, 8AXD 6, 8VE 6, 8OJ 6, 8CRK 4.

DELAWARE-MARYLAND-DIST. OF COLUMBIA—SCM, A. B. Goodall, 3AB—Maryland: 3CE is a newly active station beginning traffic handling. 3CFX continues to be active with low power battery supply. 3CGC is heard occasionally on 40 meters.

Dist. of Columbia: 3BWT had the antenna mast come down in a wind but promptly got it back up to keep the key warm. 3GP using crystal control, is probably the most permanent station in the district. 3JO is closing down for the summer. 3ALF is a new station using 3 watts input. 3CAB is doing good work in interesting a large number of BCLs in ham radio. 3AB is limited to 80 meters almost exclusively.

Traffic: 3GP 20, 3CAB 100, 3ALF 5, 3CFX 16, 3CE 32, 3AB 15.

SOUTHERN NEW JERSEY—SCM, H. W. Densham, 3EH—A real incentive for the ORS who consistently report that they cannot find traffic, can be gained from scanning the monthly reports of 3CFG. Jim is consistently the high man of the district and this month comes thru with a total of 280, 76 of which were originated. He reports 247 contacts in 22 days (36 in one day) among which were several urgent, rush messages to New York and Porto Rico.

3KT has a new 50 watter on the air. 3UT has dismantled his transmitter, preparatory to installing some new equipment. 3AIO now has a 100 watts on the air. 3BEI has been busy building screens for his new home. 3SJ is on a vacation trip thru New England and expects to visit HQs. 3BTQ has been on 20 meters for the past few weeks, and reports it FB. 3ZI has installed a new copper pipe antenna and reports that his signals are getting out better than ever. 3AIO has reported a condition that has been brought to the attention of the entire league many times. MESSAGE DELIVERY. One of the keenest disappointments in the amateur game is to start a message across the continent and have it hung up somewhere before it reaches its destination. I know the South Jersey gang maintain a 100% delivery on rec'd traffic and the only solution to maintain the same percentage of delivery on the traffic reoriginate is to route it through ORS that we know will live up to the rules of the game.

Traffic: 3CFG 280, 3KJ 2, 3UT 7, 3AIO 3, 3BEI 1, 3BTQ 5, 3AC 12.

CENTRAL DIVISION

WISCONSIN: SCM, C. N. Crapo, 9VD—9BOM-9DXI is a new station in Superior operating under both calls. 9DLQ and 9EMD were visitors here during the month; the former spent two days here and helped 9DLD put up a very good 80-meter antenna. 9BWZ has pretty good luck working hams in Mich., Ind., Ohio, Ill., N. Y., N. J., Tex., Mo., etc., on 7.5 watts. The grid and plate of 9DTK's 250 watter fell in love with each other and were united. 9BPW is on every evening on 20 and 40 meters but finds more QSO on the 40 band. 9BJT hopes to have a few skeds going by next month. 9JM works up in the cherry country but pounds brass occasionally. 9EHM does most of his work in daylight Sunday P. M. on 20 m. 9CAV blew his last

fifty so has not been on the air very much. 9BWO did not handle much traffic but was QSO ef8GM on 40 meters. 9EGW blew a new 203-A. 9EEI built a new receiver. 9CFT will tour the northwest this month on a Ham Tour GG to Spokane, Seattle, Vancouver, B. C., Portland, Salt Lake City, Denver, Kansas City and Chicago, leaving August 20th and returning September 30th.

Traffic: 9BOM-9DXI 36, 9DLD 30, 9BWZ 27, 9DTK 26, 9BPW 19, 9BJY 9, 9SA 14, 9JM 7, 9EHM 7, 9CAV 6, 9CDT 9, 9BWO 6, 9EEI 4.

OHIO—SCM, H. C. Storck, 8BYN—The SCM wishes to thank those who reported with traffic and those without, as well. That's the spirit and don't let's drop off thru the summer. 8BAU takes the cake again with 452 msgs which is certainly FB and should set a good example to the rest. He keeps at least 7 skeds all the time besides doing a whole lot of stunts along with it. 8AVB comes next with 102 messages which is very FB. 8AVB is working in a chain route which extends from the east coast to about Colorado now. 8BEV handled 18 messages the first day on 20 meters. FB. 8BNW did some work with the Wilkins expedition. 8BPL is going to school in Calif. and will be off for a year. 8DSY is QRW but turns in a nice total. 8HW is using a 7½ watter and says it does just as much as his 100 watt set. 8CMB evidently had no news but turns in a nice total. 8CTD is on 20 and says FB. 8CPQ is working a lot of DX thru bad QRN. 8AKO keeps a flock of schedules. 8AYO says he will be on 20 meters for some time to come as DX is good. 8DPF is working in Akron, Ohio and is using B batt. plate supply. 8ALU will be in Maine all next month. 8ARW says 8BHE just got back from college and is pounding brass at 8ARW most every night. 9DJG says messages are scarce as hen's teeth but has been working DX. 8BKM is laid up with a combination of rheumatism and gout. 8CFL and 8BHZ are on very consistently. 8BIK is a new ham in Columbus. 8GZ failed to report and the SCM thinks GZ's YL is responsible. Hi. 8DBM just got married. Congratulations, OM. 8DIH is still using a UX112. 8OQ has been too QRW to be on much but expects to be on regularly after this. 8DQZ is leaving us until Sept. 8AWX is QRW the Convention which is going to be held Aug. 19th and 20th at Youngstown, Ohio. 8PL says he has been QRW working on Lizzies and rebuilding station. 8DMX will be on 80 and 20 soon. 8GL has no filament transformer any more and says that summer is here, anyway. 8DIA is working away from home and doesn't get much time to operate. 8DO-8CBP will be on regularly now that school is out. 8AEU has been out of town but will be on full force in a few weeks. 8ACY has the wanderlust. 8BBH says he needs a bigger set as he can't raise 'em. 8BKQ is trying to make a Xtal perk on 18.85 meters. 8BOP is getting ready to move. 8BAH is still off on account of trouble with masts. 8CQU is back from school and will be on for a while now. The SCM has had his set on the air on 40 quite a bit lately and has surely enjoyed his QSO's with Ohio ORS. The SCM wishes to uphold QST in the matter of getting down to 20. It is really a very good band and may develop into the best we have. Besides, QRN is not so bad down there, and if more would get on, it would be a real traffic band. Keep reporting thru the summer, OMs, because you'd be surprised also to know how hard it is to get an ORS back after a cancellation. There will be a lot of new stations starting up this summer and let's all extend a helping hand to these newcomers and help them along. A QSO means a lot to them.

Traffic: 8BAU 452, 8AVB 102, 8BEV 69, 8BYN 68, 8BNW 51, 8DSY 46, 8HW 34, 8CMB 31, 8CFL 22, 8CTD 19, 8CPQ 16, 8AKO 14, 8AYO 13, 8DPF 12, 8ALU 12, 8ARW 12, 8DJG 10, 8BKM 10, 8BIK 9, 8DBM 9, 8DIH 8, 8OQ 7, 8DQZ 5, 8AWX 4, 8PL 4, 8DMX 3, 8GL 2, 8DIA 1.

Kentucky—SCM, D. A. Downard, 9ARU—Seems as tho everyone has taken the same month off for vacation time. You fellows that haven't mailed reports for the last two months should at least drop the SCM a card to let him know you are still alive altho you didn't handle any traffic. If you are off the air temporarily, ask for a temporary suspension. This reduces the work of the SCM and HQ. 9ATV says he is now ready to handle traffic regularly on 40 meters. 9OX and 9WR (united) have two operating tables from which, by method of relays, either op can work the 20 or 40 meter transmitter. 9BWJ is working on 40 and 80. He reports having handled emergency messages during the Eastern Kentucky flood. 9ABR is still working West Africa on 39.5 meters. 9BAZ reports having worked a Canadian ship in the Panama Canal on the way to N. Z. signing ss2BN.

Traffic: 9BAZ 25, 9ABR 15, 9BWJ 14, 9MN 10, 9OX 1.

INDIANA—SCM, D. J. Angus, 9CYQ—9DXH has just come on the air with two 210 tubes on 40 meters. 9BK, 9ABW, 9CNC, 9DRS, 9ASX, 9DLM, 9RBJ, 9BQH, 9ABP are off due to various reasons. 9OG is back on the air on 20 meters. 9DDZ does foreign DX with a 13 foot antenna. 9AEB is on 20 meters now. 9AUX has a new 50 on 40 meters. 9BYI, 9EF and 9AFA are on 20 meters. 9DIJ has a sked with x3K. 9CP uses a 900 watt water cooled tube. 9DBA will have a motor generator as soon as his wife lets him. 9EEY is going big with a UX852. 9AXO moved from LaFayette to Indianapolis. 9CLO is back with xtal. 9CHC's tube objects to 20 meters. 9BUZ and 9XE are off till fall. 9PD, 9CIZ and 9CMV are getting going as school is finished now. 9CVX says traffic is slow on 40. 9ASX installed a new Zcp antenna. 9DPJ is again rebuilding, moving and revamping. 9EGE is building a new shack. 9AIN wants skeds on 40. 9AEB specializes in long distance stuff. 9CMJ is going again. 9BYO is going after an ORS. The Indianapolis Radio Club is going to have a picnic next month for themselves and visitors.

Traffic: 9CMV 144, 9CBT 34, 9PD 33, 9CYQ 23, 9CRV 17, 9DSC 11, 9CUD 3, 9AXO 60, 9EEY 22, 9DBA 16, 9EF 14, 9BSK 14, 9DDZ 11, 9BQH 9, 9BYI 8, 9BBJ 7, 9AEB 7, 9AUX 6, 9CP 3, 9BK 2, 9BYO 5, 9CMJ 9, 9AEB 12, 9AIN 14, 9EGE 23, 9DPJ 16, 9ASX 3, 9CVX 12.

MICHIGAN—SCM, C. E. Darr, 8ZZ—8DED and 8ALY did fine work in the International Relay Tests both scoring many points. 8DED, RM of Western, Mich., is anxious to hook the fellows up with schedules so please write him. 8CEP is about ready to resume operation. 8DDS of Battle Creek says not much traffic on 20 but lots of DX and rag chewing. 8DIV complains about finding it hard to raise stations when he uses crystal. 9CM is perking on Xtal. 8AUB says business is light up his way. 9CE is on 20 meters daytime. 8BOK broke his jinx and worked SO1A. 8BKC had his transmitter stolen.

Traffic: 8BGA 10, 8GWK 56, 8BOK 72, 9CE 12, 8AUB 6, 8ZH 5, 9CM 10, 8DDS 7, 8ADK 7, 8ZZ 13, 8DED, 53.

ILLINOIS—SCM, W. E. Schweitzer, 9CAA—Well, summer is here once more and old man static is trying to do his stuff. Traffic is holding out well considering the many diversions of this period of the year. One of our new stations is the high man this month and this time 9DKK has a leg on the CRTA traffic cup. Let's go, gang, and see if we can't handle at least a few messages at each station. 9AEG used up another electric light of the RCA, model UX-120. 9AFB plans to try 20 meters for the summer. 9AFF is back on the air two nights a week. 9ALJ has a static eliminator working FB. 9ALK was very QRW with YLs hence his low traffic total. 9ALW is installing his new transmitter on the second floor of his garage. 9APY attended the Pittsburgh Convention. 9AWX is one of our newer stations and is studying why the old set works than how it works. 9AXZ wants some schedules with the west coast. 9BBA is a radio checker shark. 9BHM has been laid up in the hospital but will be on the air soon again. 9BHT is working on 20 meters with the new UX-852. 9DAY has moved to Calif. 9AZF will be on soon. 9BRX is working in a battery shop. 9ECB is pounding KFSA on the lakes. 9BTX blew his plate transformer. 9BVP says he can't hear eastern stations when he has traffic for them. 9BWL's antenna blew down. 9CIA just returned from his vacation. 9CN is building a new chem. rectifier 9CNB likes his new location. 9CSB worked oa, ep, and oh. 9CSL is trying out different antennas, and oscillators at the station to see which is the most satisfactory. 9CWC says traffic and YLs don't hitch so good. 9CYN is going to be inactive for some time. 9CZL is on every evening from 8 to 12. 9DDE is playing a sax in an orchestra. 9DGA is operating on 20, 40 and 80 meter bands. 9DKK worked nn, nr, and nq besides having the highest traffic total for the state. 9DOX is still laid up with sickness. 9DYD says his tower is about ready to be put up. 9DXG is keeping a schedule with 9DGR four days a week. 9DZT sends in a fine report from Quincy. 9EAI is QRV for traffic and will

stay on the air all thru the summer. 9EGC is going to take a portable transmitter along in the car when he goes to Minneapolis. 9EHK sent in his report from Toledo where he is on a vacation and learning to fly. 9IZ's receiver went on the bum and the transmitter acted foolish. 9KA and 9BA are making plans for their wedding. 9NE reports traffic plentiful on 80 meters. 9MR is going to be on the air shortly. 9PU back from college, is handling lots of traffic. 9UX is sure going strong.

Traffic: 9DKK 60, 9PU 55, 9CNB 53, 9AEG 52, 9UX 51, 9CZL 43, 9APY 42, 9DXG 25, 9CN 24, 9AMO 23, 9CSB 22, 9BTX 18, 9AXZ 16, 9EAI 15, 9BVP 13, 9DGA 10, 9ALK 10, 9DDE 8, 9AFF 9, 9BBA 7, 9CSL 7, 9CDX5, 9IZ 6, 9AWX 6, 9CIA 5, 9NE 5, 9KA 2, 9BWL 1, 9AHJ 1, 9BHM 2.

DAKOTA DIVISION

SOUTHERN MINNESOTA—SCM, D. F. Cottam 9BYA—Traffic this month is not as much as it should be and it seems as though the great open spaces are attracting the hams to a great extent. An occasional hamfest holds some of the gang together and visitors revive the old spirit so that the gang tries to show that they are not as bad as this report might appear. Some of the best traffic men are out on trips or are away for the summer. Many of the fellows are rebuilding. It is pleasing to see that a good number are now on 20 with a quick change-over set for both 40 and 80. 9DBW is high traffic man this month. He handled a message for the good will flyers at Lincoln, Nebr. 9DEL is doing some nice work with a new set. 9EFK is using a 50 on 20 meters. 9CIX is on most of the time and holds one sked on Saturdays. 9AIR holds two skeds and has been taking trips to see other stations nearly every week. 9DGE is on his way to California. 9BHZ is on 20 and 40, daily. 9DMA is home from school and is on the air every night. 9BYA has been on his annual vacation and visited both Northern Minn. and North Dakota stations enroute. 9EFO is rebuilding. 9DHP is on 21 and 39 meters. 9COS is having "8" tube trouble and will not be on until he gets in a mercury arc. 9DEQ has not been on the air because Mrs. DEQ has been seriously ill. 9CPM is going to Calif. for a year. 9AQD has been bothered with QRM from carrying mail and lots of QRN.

Traffic: 9DBW 31, 9DEL 23, 9DGE 20, 9EFK 22, 9CIX 10, 9AIR 8, 9BHZ 7, 9DMA 7, 9EFO 7, 9DHP 3, 9COS 1, 9CPM 524, 9AQD 3.

SOUTH DAKOTA—SCM, F. J. Beck, 9BDW—Traffic has taken a slump this last month. The general swing to 20 meters is largely responsible, together with general rebuilding. 9DB leads in traffic practically all of which was on 20. 9DNS, a new ORS, lost his antenna in a storm but is putting up a higher one. 9BOW says 20 sure is great stuff. 9DIX has a pair of "H" tubes. 9DLY is coaxing a 210 and a "D" tube to work together. 9BBF hooked his crystal control set up a la 2BRB and made it work. 9CJS hooked eb-4WW with a 3-dollar transmitter on 20. 9AGL is pounding brass on a ship again and 9BKB is in Canada. 9AJP, a new ORS, is installing a mercury arc and a 75-watt tube.

Traffic: 9DB 23, 9DNS 7, 9BOW 5.

NORTH DAKOTA—SCM, G. R. Moir, 9EFN—9DYA says too much QRN on 80 so he stays on 40. 9BJV has been visiting and vacationing so no traffic. 9BYA visited him a short while ago and gave him some good pointers. 9DKQ worked sc-2BL. 9DYV is not home much to operate. 9DM is going to the U. of Minn. this summer but will be on Aug. 1st. 9CDQ sold his five watters and is getting a 75 watter soon. Hope to see you on soon, OM. 9EFN is rebuilding the set and will be going soon.

Traffic: 9DM 12, 9DKQ 8, 9BJV 1.

NORTHERN MINNESOTA—SCM, C. L. Barker, 9EGU—9BVH had a 5-meter transmitter all ready to go for the tests, but was out of town. 9BHY figures on locating at Red Wing very soon. 9ABV has been visiting the lakes of Minnesota. 9EHO says nix. 9EGF is on the lakes this summer. 9BMR says that WX is too warm to pound brass, but gets the bug once in a while. 9EGU has been off most all the time, due to business. 9QT is now using portable phone-cw sets at Camp. 9ADS is back from the U. and on the air again. 9CTW uses a 1500-volt dynamotor, but says he can't charge his batteries fast enough to use it. 9BJD is getting a new rectifier. 9AOK is starting out on the road, but finds it impossible to carry a portable set with him. 9EGN says fishing is good, but he didn't say what KIND of fishing. Hi! 9CIY, the new station at Hibbing is turning into a whirlwind, and no mistake. 9CKI blew his power transformer, "H" tube, and filament transformer. 9BTW, another new station, leads the section in traffic.

Traffic: 9BTW 42, 9CKI 35, 9CY 34, 9EGN 31, 9AOK 27, 9BJD 10, 9CTW 10, 9ADS 9, 9QT 6, 9BMR 5, 9EGF 1, 9EHO 1.

DELTA DIVISION

ARKANSAS—SCM, Wm. L. Clippard, 5AIP—Traffic handling in Arkansas seems to have taken a slump this month but most of the gang seem to be busy putting in newer and bigger bottles or else dreaming about it. 5AKF borrowed a lineman's rig and hoisted up two 42' sticks. Says he didn't have a bit of trouble. Hi. 5AW has been off for a while. One of his fifties went West. We hope to have old 5AQH, 5AQN and 5EH back with us soon. 5SI is installing a 250 watter. Wish we could all do that. 5AR must have a secret under his hat. 5SY is new at the game but is showing up many of the others. 5HN has a dandy crystal rig but QRM from work is bad. 5ABI moved but is established once more. 5JK says his set balked on him. 5CK handled some foreign messages this month. Good, OB.

Traffic: 5JK 24, 5CK 22, 5SI 18, 5HN 8, 5AW 8, 5ABI 3.

LOUISIANA—SCM, C. A. Freitag, 5UK — 5IE states that due to absence during the first part of the month he has handled only 7 msgs. 5EB reports summer business will keep his totals down for a while. 5NS is keeping schedules with 5AVA, 5WA and 5VK and is on the lookout for more schedules. 5PM has left New Orleans for a few months and consequently his station is closed for the time being. 5QJ has been on the air but very little of late due to heavy QRN and QRM. He seems to be confining his efforts to the 20-meter band and has done some nice DX. 5AEN is again active, having located a fan with an induction motor to use in his shack. I don't know whether he intends to use the fan for cooling the "bottle" or the operator. Hi. 5ASE is just getting on the air and after considerable trouble, his transformer burned up and is now at the factory being repaired. Upon its receipt he will be with us again. 5GR has bought the transmitter formerly operated by 5ItH. 5TQ has gone out of the game and has sold his entire equipment to another ham who will have a license within a very short time and will be going full blast. We hope to see 5TQ back with us at no distant date. 5UT is still using his 15 watt set, but is not heard locally very often. The warm weather seems to have hit him pretty hard.

Traffic: 5IE 7, 5EB 14, 5UK 18, 5NS 17.

MISSISSIPPI—SCM, J. W. Gullett, 5AKP—5FQ complains of QRN and is still trying 40 meters with fair results. 5QQ has been away most of the month. 5AUB will spend his vacation in Dallas, Texas and will carry a portable transmitter with him. 5AGS has moved to Laurel, Miss., and is going in the commercial game. 5ANP has been off the air as he is without plate supply. 5QZ has quit the game and wants to sell his 250 watt layout, as he is leaving on a N. R. cruise and from there will go to Calif. 5AYP is now on the air at Greenwood with a 7½ watter on 40 meters. 5API reports that he is pretty QRW lately. 5AQU has added sc-2AS to his DX on 20 meters but says he hasn't gotten any traffic. 5PJ is off the air now and will go with 5QZ to Calif. 5ARB-5ALZ is rebuilding and is going to try 20 meters for a change. 5AKP has his junk heap going on 20 meters.

Traffic: 5AKP 11, 5FQ 17, 5QQ 13, 5API 8.

HUDSON DIVISION

NORTHERN NEW JERSEY—SCM, A. G. Wester, 2WR—50% of the ORS reported this month which is very discouraging, however, our traffic total was only 3 messages lower than last month. 2JX, 2AWZ, 2AOP, and 2GX are new ORS in this section. 2WR maintained a schedule with 9CEB handling traffic with VOQ. 2CW is maintaining a nightly schedule with ARDI, a ship coming from Norway to NY. 2FG is stepping out FB with a 210. 2EY is building a 5 meter receiver. 2KA is finding it hard to make

schedules and find traffic. 2ASZ is finding it hard to step out using a jar rectifier. 2BIR using a voltage feed Hertz is having fine QSO with South America. 2IS is giving all his time to BCL work at WKBO in Jersey City. 2QI after July 15 will have a new QRA with a much better location. 2ADL is another who reports fine DX and gets R7 reports from the Pacific coast. 2BAL is QRW everything but traffic. 2JX maintains daytime schedules with 8AKI and NC 1AP for traffic. 2AOP had the misfortune of having the BCL's cut down his antenna. 2GX handled important traffic with the SS Canadian Seigneur enroute to NZ. The captain was seriously ill with no medical attendance aboard so NC 2BN at the key gave 2GX the symptoms of the case who in turn phoned the Newark City Hospital who prescribed a treatment for the sick captain. 2ABE is the proud owner of a new UX 852. 2CJD is having fine QSO with England and France and also maintains a schedule with NP 40I. 2IE has a failing for YL's and tennis which accounts for his small radio activity. 2AVK has trouble with BCL's so therefore must observe quiet hours.

Traffic—2WR 8, 2CP 19, 2CW 14, 2KA 1, 2ASZ 4, 2BIR 8, 2QI 1, 2ADL 23, 2JX 60, 2AOP 35, 2GX 28, 2ABE 8, 2ANG 5, 2UR 1, 2BSJ 8, 2CJD 61.

NEW YORK CITY & LONG ISLAND—SCM, F. H. Mardon, 2CWR—Manhattan—2Kr is back from Chicago and already has started his good tfc work of the past. 2AMG is soon to increase power from 2-20la to 2-210s. 2EV and 2BNL are just going and has nothing new to report. 2ANX is back in town and going again. 2BCB says no luck on 20 but 40 going FB.

Bronx: 2BBX worked about every European and Australian and South America this month on his 7½ watter bottle has been going constantly now for four years. Hope it goes four more. 2ALL has been very busy at school but expects more time for himself in future. 2CYX is stepping out fine on a Hertz. 2AHG is back from the West coast and will be on soon with 50 watts. 2AWU is getting his 50 going. 2ALP expects to go to sea this summer so won't be on ham waves much.

Brooklyn: 2CRB is keeping a schedule with W.N.P. 2ADZ is going on a much needed vacation for a while. 2PF, 2APV, 2FZ, & 2CYX were at the Atl. Div. Convention at Pittsburgh and had a fine time 2PF has finished night school for the summer and will be on the air much more. 2WC is going strong as usual. 2BO just returned from a vacation and will again punch holes in the air. 2AVR has been very busy with exams, but now that they are over will be on the air oftener. 2AMI is installing V.F. Hertz and expects better results.

Long Island: 2AWQ is out of school and will have more time on the air. 2AJE is turning in his ORS as he is going to Rensselaer Polytechnic Inst. 2ABP is going to the seashore for the summer and is forsaking Radio for Yls during the Summer. 2AGU is now using a C. F. Hertz with twisted telephone wire feeders. 2BSL is building a set for 8AGM. 2AWX is having trouble tuning his T.P.T.G. circuit. 2AIZ says no more 40—too much like an OW—you can't depend on it. Hi. 2AB is blowing Kenotrons three at a time nowadays. 2APB-CCD has been operated on recently, best of luck OM and hope you get better.

Richmond: 2AFV is having a hard time trying to get tfc and keep his position as R.M. of Richmond but he is getting results both ways. Keep it up OB. 2ADB has a new 50. 2AYH is still after inter-borough Tfc. 2ABH reports tfc bad this month. 2AKR is sailing for Buenos Aires in a few days. When he returns he will inaugurate a crystal on 20, 40, 80. 2CEP is keeping the air hot these days with good results.

Traffic: Manhattan—2BCB 39, 2ANX 13, 2BNL 8, 2EV 8, 2AMG 7, 2KR 84. Bronx—2ALP 119, 2CYX 45, 2ALL 5, 2BBX 57. Brooklyn—2AMI 1, 2AVR 13, 2BO 35, 2WC 24, 2PF 14, 2ADZ 22, 2ABP 27, 2CRB 28. Long Island—2AVB 45, 2APR 2, 2AIZ 36, 2AWX 7, 2AGU 40, 2AYS 5, 2AQW 21. Richmond—2CEP, 20, 2AKR 3, 2ABH 6, 2AYH 6, 2AFV 47, 2ADB 10.

MIDWEST DIVISION

NEBRASKA—C. B. Diehl, SCM, 9BYG—9AL was bitten with spring fever but is coming out OK. 9CJT is resting up a bit and is soon to be on regularly again. 9QY is very busy with his corn crop at this time. 9EEW is on vacation at this time. 9AWS works on 80-M most of the time now. 9DR is vy QRW with his Sax—. 9BYG is back on the air at times. 9EHW reports fair business in daylight. 9ASD is still waiting for his fifty to get back from Frisco. 9DI works on 175 mostly these days. 9BOBQ is QRW with summer work. 9DAC slipped a sky hook and his fifty hasn't returned from Frisco. 9CGQ is back at it again. 9BBS is QRW railroad now. 9BQR is still pegging away. 9EBL is back on again after his illness.

The Observer reports stations in our section are staying within the band in excellent shape.

Chatter....Fetterman works with 5 meters these days but has turned in no reports as yet. Neilson works on 20 meters mostly. 9QY works on all bands but reports business very light at this time of year. Cox is in Ohio on his vacation and is looking for us from the 8th. Badgerow says is going to stay on 80 for a while and see if can't get some results that way. Henry has "stooped" to a Saxophone and we surely pity his neighbors. Diehl is back on the air again after over a year's silence and is QRV any and all daylight traffic. Crozier is QRV traffic on 41 meters all day. Williams is on both 40 and 80 but kinda QRW these days as this is his busy season. Bamer is QRV traffic on 40. Magnuson is QRX this Spring but is coming back for the summer. 9DTO "lost" his pole. Miller has the usual hard luck, lost his pole and also his fifty, but hasn't given up yet. 9CGQ is QRV any and all times on 40. Barimore is having rush on railroad so he can't be on the air as much as he would like. 9BQR has at last got her to 40 and waits traffic. Cumming is back on again after his sick spell and we all hope that "Ol' Slim" will be back with us for good now. 9DNN, a new station at Oshkosh, is pepping up and ready to bust out. 9QY advises that a joint Northern Kansas and Southern Nebraska Ham picnic was held at Republic, Kansas, June 19th and reports fun galore.

Traffic: 9QY 10, 9EEW 2, 9AWS 5, 9DFR 3, 9EHW 4, 9ASD 3, 9DI 13, 9DAC 2, 9CGQ 6, 9BBS 2, 9BQR 1.

IOWA—SCM, A. W. Kruse, 9BKV—Well, gang, we fell down on traffic a bit this month but here's hoping that next month will see us right up to our usual summer average. The bulk of traffic is moving on 80 meters which proves that 80 meters need not be abandoned during the summer. True, the weather is hot and the QRN is bad at times but let's do all we can to keep things moving, thus helping the RM with his work and keeping our section on top. 9BWN takes the cake this month and is planning to install crystal control. 9BPF is home from college and is pounding brass for all he is worth. 9CZC reports the old "hay wire" outfit going fine on 40 and 80. 9DAU is leaving for school and has requested that his ORS be cancelled. Sorry to lose you, OM. 9DPL, a newcomer at Huxley, is using a UX210 with 6 watts input on 42.5 meters. 9FK, Clinton, Iowa, is the new OO and has sent in several fine reports. Watch your step, fellows, 9FK has a REAL wavemeter and he will be sure to catch you if you are off-wave.

Traffic: 9BWN 59, 9BPF 22, 9CZC 14, 9DAU 6, 9DPL 5.

KANSAS—SCM, F. S. McKeever, 9DNG—The most important event of the month was the meeting of the Imperial Brass Pounders at Parsons. Plans are being made for a State Convention and your opinion sent in via the SCM will be appreciated. Fellows, let's keep busy—traffic took an awful slump, falling off 60% in one month! 9CKV, who has been a leader in traffic work, lost his antenna in a storm so ND this month. 9CFW is one of the new ORS and is letting out a cry for skeds. 9HL says ditto and reports traffic at a standstill. Lawrence has a newcomer, 9EBM, who shows promise. 9CLR has left for the Gulf to get a ship job. 9LN blew his 50 so is QRT; however 9DNG will lend him his. 9DNG has been away part of the month but worked Netherlands, Venzuela, and several others. 9CET, 9AEK, 9CV and 9CFN are all on 20 meters and report it FB. 9BUY and 9JU are very active. The latter has a new shack and will be able to QSY to nearly any band when his installation is compete. 9CCS, the old ADM, shows signs of waking up after a long sleep. Topeka is pleased to announce a brand new station with a YL op under the call 9OW. Congrats. 9BII and 9CNT are on right along. Let's have some traffic, boys! 9BGX, the RM, is keeping up his traf-

fic and is on some daily. Don't forget to send your operating hours to him, OMs!

Traffic: 9CET 25, 9BUY 13, 9CFW 5, 9HL 5, 9AEK 1, 9CV 20, 9CFN 25, 9BII 1, 9CNT 30, 9BGX 23, 9CCS 3, 9LN 5, 9DNG 14, 9EBM 2, 9CLR 5, 9EHT 4.

MISSOURI—SCM, L. B. Laizure, 9RR—9ZK sent in the only report of messages from St. Louis this month, despite handicap of T.O.M. being in hospital 24 days. 9DZN says no traffic on 20 meters, no filament in 210, no more report cards. Hi. 9ZD, who is in St. Louis for about 3 weeks, ought to send in some good dope next month. 9LI of Monroe City, is a new applicant for ORS. 9ARA and 9CVY are on 20 meters. The former tried 5 meters with no results. 9BQS was unable to operate due to business QRM and sickness. 9BGO kept skeds with 9CZZ, 5AOV and 9CTS on 40. 9DAE was off all month on account of summer school, hot wx, hot QRN and hot tennis. 9DMT has been trying 40 meters with pretty fair DX on low power. 9DIX returned home from an extended visit in Chicago the last of June so no traffic. 9DSL of Iowa is rooming with 9DIX. 9EBV is expected there also for vacation period. 9CYC was not on very much but DX about as usual. 9HY rebuilt station and is on for traffic. 9NW is QRT. 9AJW is on again. 9BZM put in xtal control. 9HY is looking for skeds. 9ZD handled the only traffic reported in Kansas City. 9DXY is rebuilding in St. Louis and lacks only the antenna. BCL antennas are the chief QRM on his apartment roof.

Traffic: 9ZD 7, 9HY 8, 9LI 7, 9CYC 1, 9ARA 5, 9BGO 31, 9ZK 40.

NEW ENGLAND DIVISION

RHODE ISLAND—SCM, D. B. Fancher, 1BVB—Reports show very little traffic this month. Most of the gang are on 20 meters now. Your SCM will be down there with you as soon as he can get a minute from shooting stars at the silver sheet in the theatre. We understand that some of the Providence fellows are "peeved" at the SCM for ruling that an ORS must handle at least ten messages per month. Why is this fellows? I am only doing what all the other SCMs have done and I haven't heard of any peevishness in any of the other sections. I realize that there is very little traffic these days but it seems as if one could originate at least ten messages in a month. Try it, fellows, and please cooperate when I do as others are doing for the good of our section.

PROVIDENCE: We are placing 1CKB on the inactive list until Sept. He is going to sea. 1AMU has acquired a first class commercial ticket. 1BIL is back from sea and will be all set on traffic next month. 1MO didn't do so well due to business, QRM. 1AID is on 20 and says she is having lots of fun working the West Coast and South America. 1AID, 1AWE, 1BIL, 1AMU and 1CKB are on 20 now. 1AWE says no traffic on 20.

WESTERLY: 1BVB has been off a lot this month due to experimenting with antennas and sickness. Will be on 20 soon. 1AAP is having excellent luck with the MO-PA transmitter belonging to 1CDS. Hope that CDS will be on himself before long.

NEWPORT: 1BQD has been on the sick list this month, also. Had to cancel all his schedules.

Traffic: 1AMU 86, 1BQD 32, 1BVB 28, 1AID 16, 1MO 4.

EASTERN MASSACHUSETTS—SCM, R. S. Briggs, 1BVL—This month brought forth more traffic than last and we are again represented in the BPL. 1CRA and 1UE are the fellows that made it possible. The fine summer weather is too much for some of us but don't forget to report just the same, OMs. Lately the SCM has received a lot of reports in which the number of total messages does not check with the sum of the number originated, delivered and relayed. Somebody must be kidding or just punk at addition. Hi. 1AHV is now at his summer station, 1QZ, using a 201A. 1BDV has been doing a lot of auto DX in a flivver. 1AXA is now an op at WBZA. 1ABA blew a 210 but managed to work the west coast on 20 meters using a 201A. 1AIR was on some but is very QRW. 1APK tried for a commercial ticket. When do you sail, OM? 1CRA has been doing some real traffic work on 20 meters. He is going to Denmark for the summer and pound the brass at ed-7BJ. 1YC has a daily sked with 1BJL. 1RF has at last got around to crystal control. 1ON reports that the YLs are R7 or R8, hence little radio. The chemical rectifier at 1ACH took two weeks to form thereby giving 1ACH a vacation. 1KY is still sticking to 77 meters. 1ACA returned to 80 meters for a little traffic handling. 1AYX is manager of the Western Union office at Siasconset this summer. 1NV is another convert to 20 meters. 1UE besides handling traffic, used fone a lot on 80 meters. He and 1APX, 1AFV and 1BFE have conversations nearly every evening. 1PB took a cruise on the USS Flusier with the Naval Reserve. 1CPB and 1BVL worked each other on 5 meters during the recent CQ party with R7 signals three miles away. A number of the gang threaten to try it, also. 1AWB is on 40 meters but is busy at school. 1ADM was fortunate enough to meet Don Wallace, 6AM, while the latter was in Boston recently. 1BMS is now working on the railroad. 1BYV has been up to his old tricks working about everything on 20. 1OG was blessed with some 50 watt bottles and hopes to be on the air again very shortly. 1XM is pretty quiet now as the ops have gone home from school. W. A. Snyder of 1XM is going as an operator on the Ungava which was the Sachem last year. He will sign the same old call, KGBB on 37 and 110 meters. 1ALP and 1BVL took a flivver trip to New Hampshire on Memorial Day but had no luck in finding any hams at home. 1IA is a doctor but gets on the air occasionally. He says he can tell a Ford from a Franklin by listening to spark plug QRM on 20 meters.

Traffic: 1CRA 294, 1UE 115, 1ACA 87, 1KY 39, 1ACH 29, 1ADM 23, 1BMS 18, 1PB 14, 1BYV 12, 1QZ 12, 1ABA 9, 1AHV 8, 1AIR 8, 1APK 8, 1LM 8, 1AWB 6, 1RF 5, 1YC 4, 1BVL 3, 1NV 3.

NEW HAMPSHIRE—SCM, V. W. Hodge, 1ATJ—Not much news this month as many stations have shut down for the summer, among which are 1ASR, 1AER and 1AOQ. 1JN blew his fifty. 1IP says his plate power B batts are giving out after a year of constant service. 1BFT is making room for a 203A. He tried 150 with no luck. 1ALY, 1AVJ, 1AIP and 1AOH are on at times and kicking out FB. The SCM is on 20 and 80 with a 210.

Traffic: 1IP 52, 1JN 14, 1ASR 6, 1BFT 5, 1ATJ 3.

MAINE—SCM, Fred Best, 1BIG—1BFZ failed to make the BPL due to not being on the past month with his usual regularity. He made the rest of us step some just the same. 1BTQ crawled up with the leaders and bids fair to becoming one of the best of Pine Tree traffic handlers in a short time. 1AIT handled his usual string and managed to get QSO some big fish in his spare time. 1AQL in spite of being on the road during a great part of the reporting month, managed to do his stuff to the extent of 13 messages handled. 1COM reports that Norway has five sure enough hams on the air. 1FP reports that he is to be on the road almost all summer so his total will be low. 1CJR of Mass. is spending the summer at Medomak Camp, Washington, Maine and plans to start pushing traffic in a short time. 1ATV's new 50 is sure doing its stuff these evenings. He plans to QSO Oceania and Asia and become Maine's first WACer. 1AAV has returned from the U. of Mich. and has joined our traffic ranks. 1CDX is now located at Norway after moving from Kennebunk.

Traffic: 1BIG 38, 1BFZ 32, 1BTQ 25, 1AIT 22, 1AQL 13, 1COM 10, 1ATV 7, 1AUR 6, 1FP 1.

CONNECTICUT—SCM, H. E. Nichols, 1BM—Our report for this month shows a little decrease in traffic handled but from the observation of your SCM who has done considerable listening in, the summer fever has failed to silence very many and better contacts have been had than would have seemed possible before. 1BYM heads our list this month. He has notified us that he has hooked up with the Army Aviation Corps at Kelley Field, San Antonio to take up aviation and radio. We sure wish him success. 1BJK, 1AOX, 1ADW and 1VB are faithfully covering their territory and it is quite rare not to find one or all of them on the job most any evening. 1CTI reports having a schedule with WNP. We hope to keep it up as was done formerly and our division will get a real thrill. 1BHM, our State RM, reports that he has been doing a lot of DX on 20 and 40 but traffic is small on these bands. 1BQH reports sending a special test message from the Twin City Club at New Haven to Calif. which reached its destination in eight hours. This is not half bad, OM, as we have known some for nearer

points than this that never got there. 1IM failed to send his usual report due to his untimely demise. To those who knew Martin, he was a most likeable fellow and during the last of his lingering illness, his radio set was a source of much comfort and pleasure. We tender our sincerest sympathies to his bereaved relatives. 1BCA has been experimenting on 5 meters and is hoping to get going on 20 now that he is home from college. 1BEZ had the misfortune to get blood poisoning in his right arm so that he had to write his report with his left hand. Several prospective ORS are sending in reports before being appointed and this is a fine way to help your appointment along so please do not fail to continue.

Traffic: 1BMG 1, 1CJX 2, 1BGC 4, 1IV 4, 1BQH, 3, 1ATG 6, 1BM 15, 1BHM 18, 1BLF 20, 1HJ 25, 1CTI 28, 1ADW 29, 1BJK 36, 1MK 51, 1AOX 69, 1BYM 158, 1OS 13, 1BGC 40, 1AMC 12, 1ASD 41, 1DV 70.

VERMONT—SCM, C. T. Kerr, 1AJG—Well, boys, it's hit us. What? Why the slump. Waited until almost too late to send in the report thinking more would come in. Most of the boys are off the air till fall. 1AC, 1AJG, 1APU, 1BIQ 1CQM, 1YD, 1AVZ, 1BBJ are not on the air. What shall we do with them? 1IT is so darned QRW that he even reported. 1BEB is the most active in the State this summer. Fine, OM, keep us in the running. He is on 20 this time and says its great. 1BJP will be on when you read this—just got settled in his new home. 1FN is on 20 now, too, and says it sure is FB. Tell us what you are going to do, gang.

Traffic: 1IT 4, 1BEB 2.

WESTERN MASSACHUSETTS—SCM, A. H. Carr, 1DB—1AAL, our RM for Western Mass. has appointed 1APL as Asst. RM. 1APL has been a hard worker for the League and surely deserves his appointment and still more, our cooperation. 1AJK has got going again and asks if he shall teach his YL code? Why not? 1ASU and Mrs. 1ASU are the proud parents of a new baby girl. The gang surely wishes them and the new future operatrix the best of luck. 1APL is the star man in our section again this month although he has been QRW enjoying a new motorcycle. 1AJM is handling all his traffic on 20 now and claims it is the best. 1AKZ has gone down to 20, too. 1AMZ is back from college for the summer so see if you can connect with him. 1AOF has the best 500 cycle note ever and will be on with it all summer. 1AWW has got back from his fishing trip. He used a portable transmitter with the call 1OF while in southern Vermont and northern N. H. 1EO says he worked 1OF. 1PY is going to try portable game, too. 1LC, a non ORS, gives us a report this month. He has had his set at the Worcester Armory for two months and using the call AR8 so if you work them, you will know 1LC is operating. 1WQ has graduated from school and has had some QRM from a YL who likes to dance but now that he has an extended vacation he expects to give us some good totals.

Traffic: 1AAL 26, 1AJK 20, 1APL 42, 1AJM 21, 1AMS 3, 1AOF 15, 1AWW 8, 1OF 26, 1EO 9, 1LC 10, 1WQ 5.

NORTHWESTERN DIVISION

WASHINGTON—SCM, Otto Johnson, 7FD—7AM takes traffic honors and makes the BPL this month. 7LZ has everything perking again. 7ACB and 7TX work So. America on 20. 7MZ and 7RL are home from school and going strong. 7DF worked fo-A3Z the long way around. 7EK has a portable set at his summer camp. 7PH built a new rectifier. 7AU, 7AET and 7AEV are new Seattle hams. Welcome to the ranks, OMs. 7LZ had some trouble with filtering but thrashed it out OK. 7FDF has a sked with na-7AFX. 7AW has completed his Xtal transmitter. Mason and Hemrich are back from the Wilkins Arctic expedition. 7KO still pounds out. Everybody is looking forward to the annual convention to be held at Spokane September 2 and 3rd. Seattle and Tacoma are holding their annual joint picnic at North Lake. 7NC worked ef-8FD and ef-8YOR.

Traffic: 7AM 122. 7LZ 40, 7ACB 35. 7DF 29, 7TX 13, 7RL 12, 7PH 8, 7FD 6.

MONTANA—SCM, O. W. Viers, 7AAT-QT—It is rather surprising how the nice summer days take the pep and lust out of our great game, fellows. I know it is hard to stick with the set when the fish are biting good or the swimming hole is beckoning you to take a plunge. But, we have made a good start with this game and there is no reason for slumping on the job. We must have as much advancement as possible and the only way to do it is to stick with the set. Let's go now, gang, and do everything in our power to keep the game alive during the summer months as well as the winter. Some of the ORS had better watch their reporting dates or their appointments will be CANCELLED! The 26th of each month is the reporting date for all ORS that desire to continue with the work. 7AFM is having a hard time to find "hay hands" to relieve him of the duty so he can devote more time to the RM and OO work. 7DD has installed a MO PA set with a mercury arc rectifier. FB! 7AAT-QT has his new station partly assembled and hopes to be with the gang soon. He is the proud owner of a first class ham license now.

Traffic: 7DD 34, 7AFM 9.

OREGON—SCM, A. C. Dixon, Jr., 7IT—7AEK with a 204a and sync rect. handled many messages for Alaska, leading the Section and making the BPL. FB! 7PP is attending CMTC this month. All active stations are requested to send dope for this report to SCM R. H. Wright, 7PP, 310 Ross St., Portland, Ore., promptly on the 26th of each month.

Traffic: 7AEK 199, 7ABH 4, 7AV 4.

PACIFIC DIVISION

LOS ANGELES—SCM, D. C. Wallace, 6AM—6BJX has his usual high total. 6BXA graduated with high honors. 6BXD says DX is good with new 50 from 6BJX. 6CQP is going down to 20 about July 1st with 4 minute QSY back to 40. 6QL could use a sked East at 7pm Mon. and Thurs. 6AGR is a new ORS and has a good message total as has also 6AWQ and 6CMY. 6CHT tries 20 but don't like it. 6BVM sends in a good total. 6AIO, 6CLK, 6CMT came through with a report as usual. 6ZBJ has a large total as usual and handled a chess tournament. 6DDO has a sked with KNT and Zane Grey and party are very appreciative. 6BHI tried 20 and found it FB. 6BUX is handling Boy Scout traffic on 80. 6CAG sends in a good report. 6CZT, 6PY, 6BRO and 6AJQ all have good traffic. 6AKW is getting good DX, working Africa and Japan. 6DEG says that everyone QSK'd their skeds with him this month. 6RF, 6CDY, 6BHR and 6IH came through with a report as usual.

Traffic: 6BJX 317, 6BXD 73, 6CQP 60, 6QL 53, 6AGR 32, 6AWQ 27, 6CMY 22, 6CHT 13, 6BVM 8, 6AIO 8, 6CLK 2, 6CMT 1, 6ZBJ 166, 6DDO 129, 6BHI 125, 6BUX 64, 6CAG 41, 6CZT 25, 6PY 25, 6BRO 22, 6AJQ 20, 6AKW 5, 6DEG 3, 6RF 2, 6CDY 2.

6BZC is applying for an ORS. 6AWQ has moved to Lake Arrowhead and is handling lots of traffic. He gives a dance once a week and the director of his orchestra is 6CRZ. 6AJQ is moving to Long Beach for the summer and is taking a semi-portable set with him.

EAST BAY—SCM, P. W. Dann, 6ZX—Asst. SCM, J. H. MacLafferty, 6RJ—The ASCM is very grateful to all you fellows for your faithful support of ARRL activities in the Eastv Bay Section, especially during these summer months which usually bring a slump. Last month 11 ORS reported 303 messages handled and this month 15 reports were received showing a total of 520. FB, gang, and let's keep up the good work. Visits to a number of your stations during the past month show that in addition to handling traffic, you are practically all engaged in "trying something new." 6AYC wins the traffic laurels in our Section again this month with 6CKC and 6BZU coming to the foreground. 6AYC will soon have three transmitters doing their stuff on amateur bands. His trip on the Idalia is postponed and to be honest with you, OM, we're glad of it. Another ham excursion was postponed when 6CKC had to forego a transcontinental trip with 6CLS of SF on account of illness of a relative. 6RJ is on 40 meters keeping traffic schedules and trying to work DX in between the power leaks. 6BZU has replaced his MG with a self-reflected set using two 210s. 6EY is owned and operated by J. L. McCargar. Mac is out to learn all there is to know about vacuum tubes and high frequencies. 6CZR has two reliable sched-

ules with OH and is big-hearted. Any traffic you want for OH? 6CTH expects to return from his vacation August 1st. 6ALX is using a Zep and is going to install a self-rectified tuned plate and grid. 6BER is handling traffic on 37.7 meters and says his new location is FB. 6AKF has a schedule with BAM in Tahiti and doesn't even brag about it. 6AMI and 6BBJ are rebuilding. Lack of time, power leaks, etc. have kept 6ALV, 6DKA and 6CLZ off the air during the last month but they sent in their form 1 reports just the same. That's the spirit, fellers. We want to know what's doing at your shack even if you have no traffic to report.

Traffic: 6AYC 185, 6CKC 112, 6RJ 45, 6BZU 40, 6EY 36, 6CZR 30, 6CTH 27, 6ALX 18, 6BER 15, 6AKF 8, 6AMI 3, 6BBJ 1.

HAWAII—SCM, J. A. Lucas, oh6BDL—6BUC is planning to assist the Mainland-Honolulu flyers by developing a portable 37 meter transmitter for the planes and maintaining listening-in stations at various points in the islands. 6ACG sold his 250 outfit to 6DBA and is now using a 50 watter with which he gets the same results. 6BDL was out on maneuvers most of the month. Got cards from EG and EB reporting 20 meter signals. 6BWV reports working KFSH and x4MK also XDJ. 6CXY kept a business-man in Hu on vacation in touch with his office by schedule with nu6CDW. 6DCU now an ORS and school's out so he'll be on regularly.

Traffic: 6BUC 127, 6ACG 85, 6BDL 62, 6BWV 54, 6CXY 52, 6DCU 37.

PHILIPPINE ISLANDS—SCM, M. I. Felizaro, op-1AU—This report received by radio via op-1AU and nu-6BVY—op1HR leads the Philippine traffic list this month handling both amateur and official army messages. He keeps a number of skeds. op1AT has been very QRW so handled little traffic. op1DL failed to report in time, due toYL QRM probably. Hi. op1AU continued his China to U. S. traffic handling. Also keeps sked with Europe via el-LAIX. op1GZ is a new QRA in Manila who reported FB.

Traffic: op1HR 321, op1AU 195, op1AT 12, op1GZ 2.

SANTA CLARA VALLEY—SCM, F. J. Quement, 6NX—The SCM stepped out this month and got an OW so if you were neglected the last couple of months, the reason should now be plain. The new QRA will be 252 Hanchett Ave. and all mail should be addressed accordingly. 6AMM and 6BVY still maintain their OP contacts and together handled 439 messages to the Orient. 6BMW handled important traffic with KFZH in Alaska. 6DDN is transferring to the San Francsico Section. Good luck. 6BNH was in the I. R. Tests. 6ACQ will be QRW for the summer but will be on full blast in the fall. 6ASB is a new station starting up in L. G. 6AZS became a WAC when he worked 55 foreigners in a month. 6BTJ is moving near Reno, Nevada. 6CJD is working portable station 6CVR at school. 6BYH moved during the month so traffic suffered. 6CKV relieved the SCM last month and thanks to him for the report in July *QST*.

Traffic: 6AMM 273, 6BVY 166, 6BMW 56, 6DDN 13, 6BNH 12, 6ACQ 7, 6ASB 7, 6AZS 6, 6BTJ 5, 6CJD 6, 6BYH 3.

ARIZONA—SCM, D. B. Lamb, 6ANO—6BJF leads the state for traffic this month. Most of the gang are on 20 and doing good work down there. 6DCQ says 20 is the cats meow and like the rest of us reports bad QRN and QRM. 6DCQ has one bad power leak that raises the roof. 6CBJ reports a new ham on the air under the call 6DJG using a UX210 on the 40 meter band. 6BJF is working everything on 20 and 40. He is using 6BWS's 50 watter till 6BWS shoots his UX210. Hi. 6BJF has at last made the BPL. 6AZM has fan QRM and QRN at night, power line QRM and office work days. 6CDU says 20 meters sure is FB. 6CDU uses B bats for plate supply. 6BWS moved to 519 West Madison St., Phoenix. 6DIB has gone to Marmon Lake for the summer where it's cool and is going to use 6EL's portable. 6DIE is heard pounding the brass often. 6CUW is going on his vacation about the middle of July and will visit hams on the west coast. 6ASA is back from the U. of A. and will be on the air again till school starts next fall. 6ANO is on 20 and 40 meters.

Traffic: 6CBJ 16, 6DCQ 8, 6BJF 131, 6CDU 34, 6ANO 40, 6BWS 34.

SAN FRANCISCO—SCM, J. W. Patterson, 6VR—Summer is here and with it vacations for most of the gang. Traffic hasn't taken a slump yet so it looks like those left are working the harder. 6CCR left for Guernewood Park after kissing his new 50 farewell. 6GW made the BPL again. Congrats, OB—too bad the 50 went west when it did. 6BIA has spring fever (YLs). 6CLS left for the east on an auto tour best of luck and regards from the gang, Steve. 6RW is back on again with the old wallop using two ¼ KW bottles. 6HJ is still the checker champ of the Section. 6KW is off until the 300 watt DeForest arrives. 6WS is home from college so finds plenty of time to experiment with a Zep antenna. 6PW did some fine work handling a distress message from Zane Gray's Yacht KNT. 6ASI is now on with a new 75 watter. 6DEK reports the new UX210 better than the 50 on either 20 or 40. 6ADM visited prominent S. F. stations and is now rebuilding to TP-TG. 6CXI is undecided on how to tune his Zep. 6VR is rebuilding.

Traffic: 6GW 138, 6CCR 75, 6DEK 61, 6BIA 58, 6ASI 34, 6VR 33, 6RW 31, 6CLS 26, 6ADM 26, 6PW 25, 6KW 23, 6HJ 17, 6CXI 15, 6WS 8.

SAN DIEGO—SCM, G. A. Sears, 6BQ—RM, 6AJM, has replaced his half wave rectifier with chemical. Works all continents on 20 meters. 6BXI is back after a short absence. 6BAM says not much traffic on 20. 6AXU sold out and says he's thru. 6FP is QRW with interference. 6BQ finds little time to pound brass. 6DCT is attending summer school. 6CQT says he's decided to go to sea. 6SB is thru school for a while and finds time to handle traffic now. 6OX will be in his new location soon. 6MB is building a new 20 meter set. 6ANC reports it's hot and "don't mean maybe". 6BXN is learning tricks of chemical. 6SJ rebuilt his set. 6HU has a new 852 going now with a TP-TG circuit. 6BAS's crystal controlled transmitter and super receiver are all set for DX. 6AKZ is looking for a better location. 6CTP is QRW school work this month. 6BFE is still of rebuilding.

Traffic: 6AJM 62, 6BXI 41, 6BAM 24, 6AXU 16, 6FP 15, 6BQ 15, 6DCT 14, 6CQT 13, 6SB 12, 6OX 9, 6MB 9, 6ANC 8, 6BXN 5, 6SJ 5, 6HU 5, 6BAS 3.

NEVADA—SCM, C. B. Newcombe, 6UO—6ABM is doing some good work on 20 meters—doesn't have much luck on 40.

Traffic: 6ABM 24, 6CHG 6, 6UO 6.

ROANOKE DIVISION

WEST VIRGINIA—SCM, C. F. Hoffman, 8BSU—Some important relay work was accomplished this month by 8VZ and 8DOI of Huntington. The town was entirely cut off from the outside world, and these two stations handled all messages to the outside world. Reports of railroad officials were relayed and the hams acted as a means of traffic handling for the C. & O. One message stated that foodstuffs were running low and that immediate aid was necessary. The C. & O. a short time ago refused an offer from the amateurs of that section that they act as an emergency staff (as the PRR gang) stating that they did not need the help of the amateurs. Congratulations to the amateurs of that section for helping.

8AK instigated a ham section in the B & O Bulletin Magazine. 8AMD is now 8OK. 8IT is now on board ship at Australia. 8SP is on with several ops. 8BNF works the west coast. 8BJB keeps schedules with Chicago and Iowa. Several other hams reported busy with school and new sets. 8ASE was blessed with a Junior Operator. The SCM was very glad to see so many of the WVA gang at the Pittsburgh convention. 8BSU worked ss-2BN. 8DOI is a new ORS.(*)

Traffic. 8BJB 20, 8QH 4, 8WK 30, 8BSU 15.

(*) 8CYR has schedules with 8DIC. 8ACZ works west coast regularly. 8DCM, 8CDV, 8ACZ and 8AUL reported 20 meter activity.

VIRGINIA—SCM, J. F. Wohlford, 3CA—Summer seems to have killed most of our stations and the reports are few and far between this month. The great out-of-doors is all right but remember those ORS must report every month or get canned. 3AHL worked 20 meters last month and was QSO several foreigners. 3KU worked 80 meters a few days and says its punk. 3CEB sends wx reports at 3P'M daily on 38.5 meters. 3AG is a new station at Falls Church, Va., using two UX-210s in self-rectified Hart-

ley circuit. 3RL is back on the air on 20 meters. 3AAA is the portable set of 3RL. 3CFY is at sea on SS Acme. 3BGS and 3KG picked up some traffic on 40 meters and were Qso west coast. 3BGS last reported at convention Pittsburgh and having glorious time. 3GX, 3AEV, now removed to summer station at 4BT, will report through 4JR. 3NM reported by Western Union.

Traffic: 3BZ 6, 3NM 2, 3BGS 5, 3AG 8, 3CEB 37, 3KU 50, 3AHL 11.

NORTH CAROLINA—SCM, R. S. Morris, 4JR—The position of RM is still open. Write 4JR if interested. 4PP is QRW with his eating house until fall. 4SJ says he gets out better with 500 volts on his 50 watter than with 1000. 4OH has put in a 50 but finds it no better than his 210. 4BX is giving 20 a trial. 4PR reports good luck on 20. 4TS is using storage battery supply on a MO-Pa set. 4EC has put in two 50s in a self-rectified circuit. Activity is lax at 4FV. 4VQ has gone to Madison, Wisc., to work for Franch Battery Company. 4BT saw lots of ham stations while on his way from Richmond to Montreal. 4VH shot his 210 but is now on with an "H" tube. 4RY says he is QRW work but turns in a good total anyway. 4JR has been holding off somewhat waiting for Kenotrons. 4OC went to Atlanta and passed his exam OK.

Traffic: 4TS 46, 4RY 43, 4EC 28, 4OH 25, 4PP 24, 4SJ 10, 4VH 7, 4FV 3, 4JR 3, 4PR 1, 4BX 1, 4OC 18.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, C. R. Stedman, 9CAA—Traffic has taken a terrible slump this month, fellows. Other sections are requiring that all ORS handle a certain minimum total in order to retain the ORS appointment. If this were done in Colorado this month, there would be only six ORS left in the state, two of them having left on their vacation. Let's step on it, fellows. 9CAA has at last filled the gap in the transcon route, via 9PU and 9APY and promises to be in the BPL next month. 9DSU another new station in southern Colorado, comes second in traffic totals and is holding his end up in fine shape. 9DWZ says his new Hertz antenna is going fine. 9CJY is on 5:00 to 7:00 pm daily and also 1:00 am to daylight. 9DGJ is using a self rect. set. 9CDE wrecked his MG so will be crippled for a while. 9BYC and 9DVL are at military camp. 9CDW is YL crazy for the summer. 9AOI was too busy with KFXF to be on much. 9QL ditto at KOA. 9CNL is the new RM temporarily. Give him your cooperation gang and let's get Colorado back on the map.

Traffic: 9CAA 81, 9DSU 30, 9DWZ 12, 9CJY 10, 9DGJ 7, 9CDE 4, 9BYC 2, 9CDW 1.

UTAH-WYOMING—SCM, D. C. McRae, 6RM—Things seemed to have slowed up a bit this month because quite a number of the fellows have gone out of town for the summer. 6CLQ heads the list this month with a total of 32 messages and has regular skeds with 9CAA and 6BYH. 6BAJ lost his tube, aerial, and counterpoise all in one week. 6ZT has just returned from a trip East. 6RM is in California spending an enjoyable vacation visiting the ham stations there. 7DA reports that he is getting wonderful results on 20 meters. The Utah Amateur Radio Club is progressing in great style. A small gold pin shaped like a 250 watter has been adopted for a coat emblem. 6BTX got married, but will be back on again in about a month. 6CQL is up in Idaho for the summer using the call 7VO. 6CRR hopes to be on again in about a month with two 250's. 6RV just returned from a trip to California.

Traffic: 6CLQ 32, 6BAJ 15, 7DA 5, 6RV 4.

SOUTHEASTERN DIVISION

FLORIDA—Acting SCM, C. E. Ffoulkes, 4LK—We sure were sorry to see Grogan, 4QY, leave us as SCM but he is very QRW. Hope I can serve as well as he did while I am acting SCM. Certainly appreciate the way you fellows turned in your reports. Many thanks. 4NE made the BPL and says a dependable sked is the thing. 4AAO, a new one to report, is also a BPL. RL of 4LK made a two days trip to Atlanta. 4DD and 4LG have gone north for the summer but we hope to have them back this fall. 4CJ has worked every oa and oz district but one. 4DU has a sked with uq-5AZ. 4CK reports a new station in Miami and Key West. 4QY QRMs the 6's on 20 meters. 4VS is the RM in Miami. 4OB and 4TK have a 250 and should be WAC soon. sb-1AP reports 4HY steady as a rock using a MO set. 4JZ has QRM from electrical storms in his Section. Well, fellows, let's shove Fla. to the top.

Traffic: 4NE 133, 4AAO 122, 4LK 44, 4DD 32, 4CJ 21, 4DU 26, 4CK 16, 4QY 15, 4VS 15, 4TK 14, 4OB 13, 4HY 3.

GEORGIA-SOUTH CAROLINA—SCM, H. L. Reid, 4KU—South Carolina: 4WA, 4JK, 4KZ all have been on rag chewing but no traffic. 4DX is back from college and will be on soon with a 50 watter and mercury arc rectifier. 4AAM at Charleston is building his YL a ham receiver and hopes to have her on the air soon. 4OY is trying for a commercial ticket and job. 4OW is at Charleston. 4KI has moved to Columbia, S. C.

Georgia: 4TU has been devoting his efforts this month to 20, and 40 and as a result worked quite a few foreigners. 4RN is using Hertz and is working a good many foreigners. 4GY is on and doing nice work.

Porto Rico: 4JE is on 19 meters with an H tube. 4KT is waiting for his mercury arc to result and if it does, he will install a 250 watter. 4OI is on again after quite an absence. 4JA lost his pet dog "Sparkie" and hasn't been heard on the air much. 4LZ still uses a UX210 in TG-TG. 4RJ is experimenting with low power and receiving tubes. 4UG is on regularly. 4TC is at the Naval Radio Station, St. Thomas, V. I. 4UR will be on soon in Caguas with a new 50. 4AAG has been experimenting and has worked the entire PR gang. 4BM is coming back with an H tube soon. 4PQ is coming on again with a 201A. 4KD is having bad luck with tubes. Three 5'ers in three weeks. QRN is not bad as yet and it is hoped that it will take a summer vacation this year. A letter from sv-AYRE reported his call changed to 1XC now. HIK at Barahona, R. D. uses two 50 watters. 4AAM is a new call at Christiansted St. Croix, Virgin Islands but isn't on the air yet.

Traffic: 4AAM 12, 4OY 98, 4DX 203, 4KD 2, 4GY 3, 4RN 22, 4TU 37.

ALABAMA—SCM, A. D. Trum, 5AJP—Vacations must be interfering with reports as the showing this month seems to drop off to practically nil. What's the matter, gang? Come on across with your part. Four stations are on at Selma—5VX, 5AV, 5LU and 5DI. 5DI is just getting into shape for the summer. 5LU has returned to the fold again with a 210 and worked all dists. in 10 flat. 5AV has probably slowed up this month as we didn't hear from him. 5VX is very promising. Although 5ABS went out of town for nearly a month on vacation, he sent in his report. Montgomery is buzzing with activity. 5AJP has been on consistently this month with a pure DC note. 5ANJ, our newcomer, is pounding hard on a 210. 5ATP is back at the key again and makes Montgomery like old times. 5NL had trouble with getting the old set on 40 again with that old R.C.A. OT. 5JY is about the most consistent ham we have. 5ADA has a job for the summer trying to get enough jack to buy that MG set that he wants.

Traffic: 5ADA 20, 5AJP 28, 5ATP 18, 5ANJ 14, 5JY 80, 5DI 61, 5ABS 8, 5LU 6.

WEST GULF DIVISION

SOUTHERN TEXAS—SCM, E. A. Sahm, 5GW—. The summer slump is here. Those stations that are working are doing good work but there are entirely too few on the job. Let's pep the thing up a little and try to make a better showing next month. QRN seems to be as hard on reporting as it is on working. We have with us two new ORS, 5MU and 5RR. 5UX-CZ, our old standby of San Antonio, reports that he will now be on regularly. 5HS reports that 5GN has now moved to San Antonio. 5AVI paid the SCM a visit which was much appreciated. He and JDH Anderson operate 5AVI and 5ARF jointly at Uvalde and are doing very good work. 5EW reports that 5PK, who joined him several months ago, has given up radio. 5AHP has had some trouble coaxing UX852's to action. 5LY is visiting in S. A. 5WP will be off the air for a short time.

Traffic: 5AVI-5ARF 75, 5EW 5.

CANADA

MARITIME DIVISION

PRNCE EDWARD ISLAND—SCM, F. W. Hyndman. 1BZ—1AP worked lots of DX on 20 this month. 1CO worked eb-4WW and eg-2NH.

Traffic: 1AP5.

NEW BRUNSWICK—SCM, T. B. Lacey, 1EI—There has been quite a slump in ham activities here during the past month due to good weather. Receiving conditions have been extra poor and static very heavy. We have a new station in Fredericton, nc-1BX. 1AD has been moving but has not been able to be on much lately. 1AN of Fredericton paid the St. John gang a visit and brought his new QLC tube with him. 1AM reports plugging along on both 20 and 40 but finding the call of CAR and outdoors too much to resist. 1AK has rebuilt his transmitter and is trying to get his 204A down to 20. 1AX worked an ef station and kept regular schedules but complains that traffic is slacker than usual. 1AQ finished up his exams in fine style and now is on the air regularly. 1EI is experimenting on the 20 meter band with indoor antenna and has worked considerable DX using a fiver.

Traffic: 1AQ 4, 1AX 7, 1AK 10, 1EL 2.

QUEBEC DIVISION

QUEBEC—SCM, Alex Reid, 2BE—Well, the gang plus their wives, sweethearts and other QRM motored to Chambly, Que., for their Annual Field Day. (Yep 14 cars and 2 Fords). If 2BG keeps practicing, he should be some sprinter. 2CG nearly won the Biscuit Race but he could not whistle CQ. 2BE reports that someone swiped the Dill Pickles. 2BM is some Nurmi, he won a pair of 216B tubes and has a DC note now. 2DN says "il connais ses legumes". 2EV was so darned excited that he forgot to talk radio. 2BV—nuff sed—Horses, Horses. 2AD took moving pictures of the Ladies' Tug of War when the rope broke??? 2HT made an efficient judge of all events. 2AL won the Fat Men's Race. 2VH made one short speech. Oh boy! The ladies sure put up *some* eats. You can't get along without them. 2BE looked after the kiddies and was kept busy blowing up toy balloons. The Ball Game was a failure on account of having sofa cushions for bases. 2BG wanted to sit down on each base to rest. The day was voted a complete success and here's hoping that we have another one next year.

Traffic: 2AL 11, 2BM 8, 2AV 4, 2BE 12.

ONTARIO DIVISION

ONTARIO—SCM, W. Y. Sloan, 9BJ—NC-9BZ OF UNIVERSITY OF TORONTO OPERATED BY JIMMIE HILL NC-4AJ WORKS OZ-2AC ON TWENTY METERS USING RECEIVING TUBE WITH 2.3 WATTS INPUT. NO FREAK WORK AS EUROPE HAD BEEN WORKED TWICE ON THE SAME WAVE AT FIVE WATTS.

Reports have been remarkably scarce this month, presumably because of the advent of the vacation period. A majority of the fellows are using the 20 meter band and finding it very much to their liking and others are building new sets with the avowed intention of breaking out on the most useful of all our bands.

Central Dist: 9AL is on with a crystal-controlled set going great guns on 20, 40 and 80 meters. 9BZ has been doing some very notable low power work and the credit should be divided equally between the operator and the antenna at the station. 3CJ is on the air at every opportunity but the operator has been very QRW at school. 3DY is building a new receiver and says that he is waiting for its completion before passing final judgment on his location. 3CJ also says that he was able to QSR some traffic for the University of Mich. Expedition in Greenland inside of one hour after receipt and that he is soon going to Bobcaygeon, Ont., for the summer and will take his station along. 3BL has been rebuilding and experimenting with different antennas so has not done any traffic handling. 3BT is on 20, 40 and 80 meters and is installing a new Tuned Grid-Tuned Plate transmitter. 3HR is selling out and 3DC now has his power unit.

Southern Dist: 3CS is on 20 meters generally and is doing consistent DX. 3IA attended the Michigan convention at Detroit, and won a set of Aero Transmitter coils, which are already perking at 3IA. 3DZ is on the air and promises to get the other fellows in Sarnia in line. 3DZ and 3CB are applicants for ORS.

Northern Dist: 3HP and GG are active and doing very good DX work and traffic handling. 3GG is working on both 20 and 175 meters.

Traffic: 9AL 19, 9BZ 20, 3CJ 14, 3FC 9, 3HP 20, 3DY 8, 3CS 11, 3CB 2, 3IA 2.

VANALTA DIVISION

ALBERTA—SCM, A. H. Asmussen, 4GT—The SCM has moved to 10723—111th Ave., Edmonton. This information has been mailed to all the ORS in this Section so there is no excuse for so few reporting. Please get the reports in each month not later than the 18th. 4HM has rebuilt his transmitter and is ready to step on it. 4CU has some real equipment and waiting for a quart bottle with which he hopes to set up a record. 4FF is back on the air. 4IO burned out his remodeled Ford generator and is fooling around with AC. 4DG had the big msg total last month but is second this month. 4GT expects to be on stronger than ever in a short time. 4AF will be using a portable soon. 4OG and 4AF reported at the last minute.

Traffic: 4IO 30, 4HM 3, 4AH 1, 4CU 8, 4AF 10, 4DG 19.

BRITISH COLUMBIA—SCM, E. S. Brooks, 5BJ—The gang is brightening up again and things look prosperous. 5GO is experimenting with various types of aerials. 5AU steps right out on 20 working lots of DX. 5AC comes third with traffic. 9AJ has a competition on and all BCARA members are competing. 5BJ has two skeds with Alberta using an 8 foot high aerial and inside counterpoise. 5BG says a UV199 works better than a 50. Hi. 5CU will be on again soon. 5AV connected with oh for the first time. Everyone in Victoria is 20 meter mad just now and some fine reports have been rec'd from the East Coast. 5AR won't look at 40 any more. 5CO was QSO Japan on 40 and is reported to have a fine DC note. 5CE hooked three OA's on one CQ and QSO'd them all. FB. 5AJ was QSO Japan, fifteen oa's and nineteen oz's during the month. ORS No. 15, 5GF, is hereby cancelled for failure to report.

Traffic: 5AJ 27, 5BG 24, 5AC 18, 5GO 14, 5AV 8, 5CO 6, 5AU 2, 5J 1.

PRAIRIE DIVISION

MANITOBA—SCM, F. E. Rutland, 4DE—Despite the fact that summer is in full swing and many of the gang are away on holidays, things in this district are moving splendidly. Traffic is somewhat slower with the tendency for DX and 20 meters. Most of the gang have been QSO with a goodly part of the Globe. Most of the activity is taking place around dawn and very encouraging results have been forthcoming. 4DU is king-pin for DX having been QSO most all countries. 4FZ has been getting out also. 4CV did a nice job working sc-3AG solid for an hour in daylight on 20 meters. 4DW has recently joined the ranks of the CNR radio department and consequently is out of town a good deal. Like 4FZ and 4AW, he works hard to make up for lost time when in town. 4DY has a car and reports his new MG etc., doesn't seem to work so good as it used to. 4EA has a bad case of YLitis. 4EK pounds away as usual and "gets there". 4DP and 4EH report lots doing on 20 meters and its FB. 4AA of Unity, Sask., was in town long enough to attend a little party with the gang. 4DU as publicity manager keeps the local papers supplied with articles each week and makes a fine job of it. 4DE has taken over the reins at CKY and has been very QRW.

Traffic: 4DU 9, 4FV 9, 4EK 3, 4DW 14, 4FZ 13, 4AW 1, 4BT 13.

SASKATCHEWAN—SCM, W. J. Pickering, 4FC—What's the matter, gang? Has the weather got all of you? Only one ORS reported. Come on, fellows, a form 1 card is easy to fill out. Regina, the city which has been dead, has come forward with 2 new stations—4GA and 4GB and two others on by now, not to mention others coming up. 4FA is still busy farming and 4FC is only on occasionally these days—bum "A" battery.

Calls Heard

KFZG, Detroit News-Wilkins Arctic Expedition, Base Station, Point Barrow, Alaska. H. F. Mason Opr.

1ic 1mr 1aur 1awn 2bc 2bg 2uo 2xs 2xt 2afb 2amj 3bqj 4bq 4fu 4ux 5bf 5ew 5rg 5ww 6gu 6hm 6ve 6zv 6acg 6aoi 6avb 6axc 6azs 6bgc 6bhz 6bjl 6cip 6ckv 6cmq 6cmu 6ctx 6cua 6cut 6cwj 6dan 6dau 6dba 6dfe 6dfs 6dgx 6dhn 6dic 7bb 7bm 7df 7ek 7fs 7fu 7gp 7je 7mo 7ol 7pn 7rh 7rl 7uh 7vl 7xf 7aai 7abe 7abh 7abk 8qb 8xe 8adg 8agi 8bdx 8bse 8byn 8evs 8der 8djg 9dr 9fo 9xi 9art 9bah 9beg 9bjw 9bpm 9cia 9byg 9doe 9dpw 9dxi 9elb aj-isk eb-4ww ef-8fk ef-8nox eg-5xy nc-4ac nc-5ce nc-5fs nc-cka nn-1nic no-ez5 oa-2gw oa-2hc oa-2no oa-2rb oa-2rt oa-2rx oa-2sh oa-2uk oa-2yj oa-3bq oa-3ef oa-3es oa-3hl oa-3ig oa-3tm oa-4cg oa-4cm oa-4nw oa-4rb oa-5bg oa-5hg oa-7dx oa-7hl oz-2ab oz-2ac oz-2as oz-2at oz-2bg oz-2bx oz-2sh oz-3aj oz-3ar oz-3au oz-3ax oz-4aa oz-4ae oz-4ai sa-cb8 sc-2bl pcxg naa nidk npc npg npl npm npn npo npp agb aqe bb3 jps spu cbz ffjp kft wiz wad wut wux wuan wvc wvz wxb wxp wwdo.

Miss B. Dunn, Stock, Essex, England
(Heard during May on 20 meters)

1aur 1bkv 1byv 1cx 1di 1fn 1sw 1xf 1zz 4tu nc-1br nc-2us ni-1pr nm-1aa nn-m3y nq-8kp nr-2ghp nz-5ez sa-cb8 sb-1au sb-2as sb-5oi sb-1ac sb-1ad sc-2ar sc-2as su-2ak fq-9m em-sjb.

(40 meters)

1alr 1amu 1aur 1awn 1bdw 1bez 1bhw 1bke 1ch 1ckp 1cnp 1dhm 1dl 1fl 1ic 1on 1rf 1sz 1vs 2af 2agq 2agu 2akz 2apd 2aqo 2ase 2atp 2bxu 2cin 2cnr 2cuq 2cx 2gk 2hc 2tf 2tp 2uo 2xaf 2xg 3ahl 3sh 3wf 4iz 4oy 4ux 7ek 8brc 8bth 8cc 8cpf 8ded 8ru 9adg 9btr 9cia 9cn 9in 9mz 9sa kdka nulx nulz niss ap4 cb3 crhb f9c glq hdo naa pjc pqs pts sgl spr sws wva.

eg-2ACI 22 Hurst Grove, Bedford, England

1aal 1aao 1ac 1aci 1aco 1ad 1ade 1adg 1ae 1afy 1ah 1aha 1ahl 1ahx 1ai 1aim 1aiu 1aiw 1ajf 1ajo 1ajx 1akz 1al 1all 1alr 1amd 1ams 1anv 1aof 1aos 1apz 1ar 1as 1av 1awe 1ax 1axa 1axx 1ayi 1ayl 1az 1ba 1bc 1bdt 1bdx 1bie 1bit 1bk 1bl 1blb 1blg 1bm 1bsd 1bvb 1bz 1bzp 1cab 1cai 1car 1caw 1cc 1ch 1ckp 1cme 1cmf 1cmu 1cmx 1cn 1cnf 1cnp 1cnw 1dd 1dh 1fi 1fl 1fu 1ga 1gf 1gw 1hj 1hn 1iw 1ja 1ka 1kai 1kl 1lf 1mv 1mx 1nn 1no 1pa 1ra 1rd 1rk 1rm 1sa 1siu 1sj 1sw 1sx 1ua 1uk 1uw 1vc 1vy 1wi 1ww 1xa 1xae 1xf 1xms 1xz 1yb 1yv 1za 1zao 1zl 1zs 1zt 2aci 2acp 2acs 2aes 2ag 2ago 2agx 2aha 2ahk 2ahm 2ai 2aim 2ais 2aj 2ak 2akb 2aku 2aky 2amj 2ann 2api 2apv 2ar 2atc 2atr 2avb 2awf 2ax 2bdn 2be 2bm 2br 2brb 2bs 2btu 2bva 2bwt 2by 2cc 2cft 2cip 2cj 2cjd 2cje 2cjj 2cm 2co 2ctf 2cvj 2cyq 2dms 2dx 2ev 2ff 2fo 2ga 2gk 2gp 2gv 2gz 2hp 2ip 2ka 2kg 2kr 2ku 2lz 2mk 2mm 2ng 2nn 2nz 2oa 2or 2qb 2rm 2rr 2rv 2sh 2tp 2ts 2uk 2xk 2xz 3awb 3ati 3auv 3bmz 2bne 3bva 3bw 3bwt 3cil 3cj 3cjn 3crj 3ck 3cmz 3fd 3fz 3hg 3im 3ja 3ka 3ld 3lu 3lw 3pf 3ps 3qt 3st 3tn 3wb 3xi 4ac 4ar 4av 4bt 4ea 4ec 4eu 4fa 4lk 4lz 4pe 4rm 4rr 4rz 4si 5acl 5ak 5alz 5ave 5bk 5da 5er 5gm 5gw 5ie 5je 5lc 5lz 5ph 5rr 5wb 5wx 5xai 5xm 5yd 5za 6al 6ed 6ur 6dl 6do 6dsg 6dt 6eus 6fc 6iw 6is 6na 6oi 6sw 7ak 7cp 7dl 7gb 7hc 7ir 7ne 7oe 7ok 7st 7ug 7ut 7vx 7zi 8adm 8aks 8aly 8atv 8awu 8ax 8az 8bby 8bdh 8bq 8br 8bso 8bt 8bww 8ca 8cac 8cc 8cq 8cug 8cz 8daa 8dan 8dgj 8djo 8di 8dm 8drs 8du 8dw 8es 8fa 8gk 8gm 8ija 8jm 8jn 8jq 8jy 8kc 8lx 8mc 8qb 8qe 8rf 8rr 8rt 8rv 8tk 8xe 8vb 8zk 9aak 9aau 9adg 9ado 9aoj 9bag 9bf 9bh 9bpb 9bpl 9cer 9ef 9eip 9en 9dyy 9ear 9eji 9lz 9pn 9sd 9st 9wz 9xe 9xi 9zt.

eg-5HS, M. F. J. Samuel, 16 Blenheim Rd., London, N. W. 8, England
(20 meters)

1aao 1aba 1aci 1adm 1ajm 1akz 1amu 1asf 1asr 1axa 1bux 1bvl 1byv 1cdp 1cfo 1cmx 1enz 1ia 1rd 1rw 1ry 1sw 1ue 1vc 1xm 1zl 1zz 2agq 2ahm 2aiu 2aip 2amj 2anm 2aol 2apa 2aqw 2bg 2ctq 2cvj 2gp 2in 2nz 2tp 2wc 2zl 3aqe 3cch 3hs 3jm 3jo 3qv 4bl 4hx 4io 4jr 4li 4nh 4rr 4si 5agq 5arf 5qj 6bb 6bpz 6bq 6bux 6bx 6df 6ea 6fr 6kg 6vz 6zat 7ek 7ni 7ny 8acy 8ahc 8ahd 8aks 8alg 8aly 8aub 8axa 8bag 8bau 8ccq 8cvq 8don 8drj 8gz 8nt 8oq 8zg 9aex 9afb 9aqo 9axb 9bht 9bjp 9bmx 9cip 9cn 9cp 9ctw 9cxx 9dbv 9dbw 9dqu 9eas 9eew 9ef 9kv 9ph na-7mn nc-1am nc-1ar nc-1co nc-1dj nc-1dq nc-3bt nc-8cs nc-3fc nc-3ni nc-4cn nc-4dw nc-4fv nc-9ai nc-9al nc-9aq np-4sa ac-9ab af-1b aj-jkzb oa-2no oa-4rb sb-1ad sb-1ak sb-1aw sb-5ab sc-2ah sc-2as sc-3au su-1bu su-1cd su-2ak.

eb-4AC, P. Duvignau, 16, rue de l'Eglise, Belgium

1bhw 1alr 1sz 2cuq 2arm 4iz 8dld sa-de8 sa-cb8 sb-1ac sb-1ar sb-1ax sb-1aw sb-1ib sb-1id sb-2aj sb-2as sb-2ag su-1oa su-1bu su-1cd su-2ak sc-2ar sc-2as sc-2bl sv-ayre sv-aqe sv-ardi oa-7cs oa-7hl oa-2yl oz-4aa oz-4ae oz-4am oz-2bg oz-3ar nj-2pz nz-5ez.

**eh-4AU, Jacques Mahieu,
Le Manoir, Piruwelz, Belgium**
(20 meters)

1adm 1ahi 1ajm 1awo 1bdi 1bfm 1bjm 1byv 1cjh 1cpb 1df 1ka 1nk 1rd 1ro 1ry 1sw 1uw 1vc 1zl 2aer 2ahm 2aim 2aol 2apa 2aqw 2atk 2bg 2bir 2bur 2bsc 2ctq 2cvj 2rd 2tp 2tr 2wg 3akw 3alq 3bgg 3bms 3hs 3jm 3qp 3ut 3wc 4io 4iz 4jr 4lm 4ob 4px 4qq 4si 4wh 8adg 8ahc 8aly 8axa 8ccs 8cek 8csr 8dgx 8ex 8gz 8nt 9bfb 9bjp 9bgh 9ef 9mn nc-1am nc-2be nc-3mp nc-3gg nj-2pz np-4sa ne-8af sa-fc6 sb-1ac sb-1ar sb-1aw sb-1ad sb-1bo sb-1ib sb-2ig se-2ah sc-3ag su-1bu su-1cd su-2ak oa-2ms oa-4rb oz-2ag ai-2kx af-1b fm-tun1 fm-tun2.

**eb-4KD, A. Blancquaert,
Roomstr 20, Lokeren, Belgium**
(Heard during May, 1927)

1xm 2kx 2abp 1aga 1ic 2pv 1ic 2co 2cuq 2uo nr-2fg sb-1bu sc-2as su-1oa su-2ak sb-1ic sb-2ax.

eb-4UU, 312 rue Royale, Brussels, Belgium
(20 meters)

1byv 1bfn 1amo 1ry 2jn 2nm 3aqe 8ahc 8adg nc-1ae nc-3mp np-4sa sb-1ak nidk.

ef-8FT, R. Aronssohn, 2bis rue J. Deville, Colombes (Seine) France
(Heard from June 1 to 12 on 20 meters)

1aep 1ahi 1bux 1ch 1io 2aep 2ahm 2bdj 2nm 2gf 2tp 3hg 4iz 8adg 8aly 8avd 8axa 8dgb 8don 9kv nc-1dm sc-2ah sc-2ar su-2ak.

(40 meters)

1aac 1aao 1abf 1aci 1ad 1adm 1aic 1adkm 1abc 1am 1bhw 1bke 1bxx 1ckp 1cmp 1cnz 1cd 1ic 1lw 1lx 1mk 1mr 1on 1rf 1sz 1xm 1zw 2ags 2ahw 2ase 2epb 2cs 2cug 2evj 2kn 2me 2gf 2sge 2tp 2ty 2wj 2wr 3adl 3bur 3hm 3lc 3pg 3og 3gf 3vw 3wh 3wj 4fu 4ft 4iz 4jk 4ok 4pf 5kc 6bjx 8avk 8axx 8byn 8ccs 8li 8zz 9aeb 9axh 9bp 9cyw 9dgd nc-1dq na-7aa nidk nd-hik sa-cb8 sa-bg8 sa-hgl sa-db2 sb-1ab sb-1ad sb-1ak sb-1al sb-1ag sb-1ar sb-1aw sb-1am sb-1ay sb-1bd sb-1bu sb-1ck sb-1ib sb-1id sb-2af sb-2ag sb-2ar sb-2ax sb-2ay sb-5ae sb-7ab sb-8ni sc-2as sc-2ah sc-2bl su-1cd su-1cx su-1oa su-2ak sv-ayre fc-f2 fo-a9a af-1b ai-2kx ag-1mdz ag-1dh fz-4zz oz-1ac oz-1fd oz-4ua oz-4av oa-5bg oa-7hl oa-7tr arex age wuby.

ef-RO91, C. Conte, Allee du Rocher 24, Clichy-sous-Bois (S-et-O) France

1adm 1aff 1aha 1atv 1aur 1asy 1avi 1avl 1awn 1bcb 1bcg 1bez 1bdi 1cdw 1chr 1dl 1ic 1lx 1mv 1xm 1rn 1rp 1bhw 2abp 2aeb 2aed 2aaw 2agu 2aho 2alg 2amq 2aqu 2arm 2arv 2aue 2avq 2bow 2bur 2buv 2bsc 2cuq 2eu 2es 2evj 2evr 2exl 2ef 2gp 2gw 2hc 2iz 2nm 2tp 2pv 2vd 2za 2wm 2aon 3afw 3bco 3bms 3buv 3bqj 3bwt 3cbm 3cjn 3ku 3mk 3mv 3ow 3py 3sd 3tn 3vx 4bn 4ce 4cj 4co 4ep 4db 4fu 4iz 4jd 4lk 4ll 4ns 4oh 4oi 4ok 4oc 4oq 4qy 4rh 4rm 5amg 5aio 5aq 5bg 5oa 5uk 7df 8ab 8adg 8ahk 8ayg 8azh 8bad 8bau 8bjb 8box 8buj 8bun 8bsc 8bwr 8byn 8cae 8cc 8cro 8ckc 8dea 8ded 8dpa 8ees 8eh 8fp 8hb 8vj 8xe 8atv 9aek 9arn 9baz 9bcs 9bhg 9bxi 9caj 9cmv 9cro 9eag 9egh 9fo 9dkx 9so 9vz 9xi 9bwj nr-2fg nf-bat nc-1ak nc-1br wuan ayre.

R. Dezerville, 46 rue St. Laurent LAGNY S. & M. France

(Heard between January and April)

1aac 1aao 1abz 1afn 1aer 1aeu 1aff 1ahv 1aiu 1aix 1aj 1alj 1alr 1aof 1asa 1asf 1asv 1aur 1avi 1avl 1avx 1awe 1axx 1azr 1bbm 1bdc 1bez 1bhs 1bkk 1bkp 1bvb 1caw 1cmf 1era 1cd 1cu 1ga 1kp 1lx 1mv 1nic 1nq 1ql 1rd 1rn 1sw 1trd 1vv 1xg 2aef 2afm 2agn 2ags 2agu 2aib 2ait 2akv 2apd 2apq 2arv 2avk 2avr 2avw 2awq 2axr 2ayj 2ayk 2azu 2bem 2bur 2cjd 2es 2evs 2eyh 2dh 2fa 2gv 2md 2or 2qu 2taw 2tp 3afz 3ahl 3ajt 3alq 3bn 3bqj 3bwt 3ee 3ep 3jo 3kr 3ld 3mw 3pf 3qf 3qw 3sj 3te 4aah 4aa 4ak 4bmf 4bn 4bl 4ck 4dba 4dn 4ft 4iz 4ll 4oev 5ah 5ck 5jf 5kc 5ma 8ahq 8anc 8avj 8axa 8aze 8cau 8cnh 8eot 8ewt 8eyi 8bno 8qb 8trt 8wo 8wy 9acu 9bkq 9dcg 9kz 9hp 9sj nc-1ac nc-1al nc-1br nc-1ap nc-1ak nc-1da nc-8af nc-8aw nc-8jc nc-8mc nc-9bz nq-4jt nq-5ky sb-1ar sb-1aw sb-1ax sb-1br sb-2ag oa-2tr oa-2rt oa-2yi oa-3bq oa-5wh oa-7cw oz-2xa oz-3ar oz-4aa oz-4ac oz-4ao nl-1aur nm-5c fo-3b fo-5x.

oa-6KX, Henry T. Simmons, 34 1st Ave., Inglewood, Australia

(Heard during April)

1eek 1ahg 1ec 1ic 2mb 2czr 2apd 2ckl 3oq 3blp 3afl 4ov 4ha 4iz 4bz 5of 9vo 9xi 9bpb 9eca 9mz 9dpw 9eih 9ben 9cmv.

L. C. Jackson, "Unley," 18 Braemar St., Essendon, Victoria, Australia

(Heard during the past year)

1ane 1aao 1aap 1azd 1aga 1arc 1aep 1ahv 1axa 1amd 1ana 1aay 1asf 1adm 1aae 1aac 1bhw 1bhs 1bsd 1bqq 1bux 1blf 1ch 1cmx 1cmp 1cmf 1csx 1de 1dh 1di 1lu 1ql 1rd 1uw 1vc 1zs 1zd 2aix 2apv 2amq 2awz 2arr 2agp 2agn 2akv 2aan 2ahm 2azk 2bgi 2bur 2bj 2czr 2cuq 2cuz 2cej 2ctf 2ch 2er 2fj 2ma 2nz 2or 2pj 2sq 2tf 2tp 2uo 2uf 3afw 3ahl 3auv 3bb 3bms 3bhv 3bwj 3bva 3bwt 3chg 3ckl 3cjn 3cc 3cl 3ckj 3ee 3ef 3gp 3jo 3kr 3lw 3ld 3qw 3te 3tr 3wq 3zo 4af 4ak 4aae 4aj 4bl 4dm 4dk 4fl 4fk 4ft 4fu 4fg 4hu 4io 4iz 4jk 4jn 4km 4lm 4ll 4mo 4oa 4oc 4ob 4pk 4qb 4rm 4si 4tv 4yb 5aky 5apo 5aur 5akn 5ava 5auz 5acl 5ain 5atf 5aqv 5agl 5aq 5aaq 5apo 5aka 5arf 5apg 5aqc 5ajr 5afb 5de 5dx 5eb 5fc 5fq 5hy-5in 5jf 5jd 5jr 5kc 5kl 5qv 5ql 5aj 5rh 5rg 5ux 5va 5vw 5vu 5wi 5wz 5ww 5yd 5zai 5zav 6ax 6ahp 6akm 6amm 6au 6aij 6aon 6alg 6adm 6ats 6alr 6anw 6anc 6adp 6ano 6abc 6ajm 6aa 6abg 6an 6adt 6aiv 6ala 6akw 6ahn 6ajj 6auk 6agr 6aod 6bzm 6bl 6bia 6btl 6bvv 6bvm 6buh 6bgb 6bzn 6bac 6bb 6bmy 6bkd 6bsd 6bhv 6bqt 6bkh 6bjh 6bhr 6bnh 6byz 6bch 6bq 6bhp 6bzf 6bek 6bhz 6bfl 6bux 6bav 6bvy 6boy 6bxl 6byo 6ben 6bxd 6bll 6bmw 6bpg 6bkc 6cwk 6cgw 6chy 6cz 6cub 6cae 6etx 6cua 6chl 6cyh 6clr 6cmq 6ccu 6cqr 6cyo 6cco 6cyu 6cnm 6cng 6cka 6cbg 6cyx 6ccl 6cta 6css 6cck 6cmy 6cfo 6cux 6cct 6cgc 6cpv 6cml 6cil 6cmw 6czu 6dch 6dfa 6dep 6dcq 6ddo 6ea 6er 6ew 6ec 6fz 6gu 6hc 6hm 6jn 6jp 6ja 6ju 6kb 6ln 6mu 6nx 6oi 6or 6pw 6pr 6rw 6rf 6rj 6rn 6ta 6tx 6uf 6vr 6zi 6zt 7ag 7adm 7aek 7aaj 7adm 7aam 7cs 7df 7ek 7ec 7gf 7gj 7gk 7it 7kr 7lr 7mo 7mh 7mf 7no 7ou 7rl 7sk 7tm 7uf 7vh 7vs 7wu 7xf 8ajn 8aks 8axf 8aly 8auh 8afq 8ahc 8adg 8aip 8ayf 8axk 8asb 8afj 8ahd 8bce 8bbl 8bl 8bf 8bsc 8bpl 8bau 8bgn 8baj 8bja 8byn 8bww 8ces 8ecs 8cnt 8cvq 8cau 8cyi 8cbp 8ced 8dld 8dei 8dof 8dor 8dsy 8dkf 8don 8dx 8ew 8eh 8gz 8kc 8la 8li 8nt 8vj 8wk 9axh 9auv 9ara 9axq 9abr 9ahu 9aaq 9asd 9aek 9arn 9adg 9adk 9axz 9axb 9auu 9bwo 9bdf 9bhz 9bay 9bwi 9bpm 9bwn 9bjn 9bht 9btr 9bez 9bqe 9bmm 9bkf 9bq 9btx 9bip 9bir 9car 9cor 9cvn 9caw 9cvy 9cwz 9ep 9csx 9che 9ck 9cay 9csb 9cnt 9cfi 9cgx 9cbe 9caj 9ckf 9cia 9epm 9en 9cet 9cer 9cgu 9cei 9dkv 9dge 9dws 9doe 9dkq 9dwp 9dkc 9dol 9do 9dkn 9day 9dra 9dng 9dpu 9dej 9ded 9dte 9ep 9eev 9ekn 9ekf 9eli 9hp 9iv 9in 9lk 9nk 9nr 9ph 9cd 9ub 9uq 9uu 9xa 9xi 9za 9zt oh-fx1 oh-fil oh-6acg oh-6akp oh-6axw oh-6ajl oh-6aff oh-6asr oh-6adh oh-6aof oh-6bwv 6bc oh-6buc oh-6bdl oh-6elj oh-6cxy oh-6dey oh-6dcf oh-6dba oh-6dea oh-6ddl oh-6kq oh-6nl oh-6oa oh-6sh oh-gdl oh-pdq eg-2nm eg-2lz eg-2od eg-2sz eg-2xv eg-2wj eg-2rg eg-2xy eg-2kf eg-5xy eg-5by eg-6dt eg-6td eg-6mu eg-2it eg-5nj ef-8jn ef-8cd ef-8gm ef-8aim ef-8ix ef-8fj ef-8qrt ef-8yor ef-8jf ef-8jj ef-8eo ef-8es ef-8sm ocdj oeyg ae-8hb ae-8em ae-8xx ae-8flo ae-8fr vps aj-1ts aj-1zb aj-1aa aj-isk aj-1sm aj-1ak aj-1k a aj-1ab aj-1sh aj-1sm aj-3ow aj-3ww aj-3kk aj-3aa aj-3yz jkzb ai-2kw ai-2jy ai-2bg ai-2zy frj aes dcr ei-1gw ei-1no np-4sa op-1dl op-1bd op-1hr op-1ar op-1au op-1at op-3aa op-3hb op-3ac wucc wuaj op-xc3 oe-8xz hvw af-1b af-8fok af-hva nm-5b nm-4c am-2se am-vaa7 vs-1ab fo-a3z fo-a3x fo-a4v fo-a4f fo-a5x fo-a6n fo-1sr fo-8sr ne-5aj ne-4du ne-4ez ne-4cl ne-3fc ne-9bz ne-2bg od-pk1 andir bnsk1 bnsk2 jc-4to rxy kfsx pada oo-dgk oo-bam es-2co es-2nm el-1x eb-f2 fs-ktc ee-car6 se-2as se-2bl sb-1aw sb-1br sb-2aj nj-2pz nr-cto su-1bu su-icg su-2ak fm-8st ae-1bk ra-o3 ek-4dba ek-4anh ek-4ya eb-4rs eb-4zz eb-4ww eb-4ac eb-4au p9ab x-en oqq ep-1ae na-7mn wunc jbk kel kio vkn giky zhc jyz and jva anc ane.

ek-4UAH, V. Gramich, Murnau, Bayern (Near Munich), Germany

(Heard between May 9 and May 24)

(20 meters)

1sw 1ac 1rf 1bhs 1rw 1ajm 1nw 1syv 1acp 1adm 1awe 2bg 2bj 2aff 2eh 2tp 2cbl 2agw 3bzg 4jp 4rr 4gg 4pr 4tn 4ku 5afn 5afb 6vg 8dgx 8aiy 8aul 8ees 8adg 8vl 8ave 8hc 9byl 9ee 9bz 9bpt nc-8mp nc-9bz sb-1ad sc-3ag sc-2ah wik.

(40 meters)

1ic 1sz 1adm 1ckp 1on 1gh 1xm 1rf 1aac 1bhw 1aur 1zs 1vs 1emp 1afo 1wi 1bdi 1amu 1gm 1epe 1air 1mk 1zd 1mv 1ber 1lj 1iw 2eug 2bgz 2agw 2gk 2ayj 2gx 2gf 2tp 2evj 2apd 2ase 2aan 2crb 2bow 2vd 2bbt 2czv 2iz 2azk 2sg 2tf 3buv 3og 3ld 3bwt 3cah 3hs 4oc 4iz 4jp 4fu 4ft 4cj 4tz 5atf 8atv 8adg 8ded 8box 8ru 8byn 8gz 8djp 8dei 9egh 9cpg 9dpj 9uz 9bpb 9adg ntt naa ni-tfhv nr-2ghp sa-cb8 sa-de3 sa-ba1 sb-1ih sb-1ar sb-1aj sb-1br sb-1ck sb-1ax sb-1bd sb-1bl sb-1ic sb-1ag sb-2ap sb-2ag sb-2af sb-2ak sb-5ae sc-2ar sc-2ah sc-2bl su-1oa su-1fb su-1bu su-1cd su-2ak oa-2yi oz-1ap oz-2ac arex.

su-2AK, L. A. & J. C. Primavesi, P. O. Box Nr. 37, Montevideo, Uruguay

(20-meter band)

1abz 1asf 1adm 1amd 1cmx 1caw 1cmy 1byv 1ii 1uw 1sz 2apa 2amj 2arr 2ahm 2bg 2gp 2jn 2tp 3adb 3bms 6vz 6zat 7ek 8ade 8aly 8ahc 8afq 8don 8dme 8nt 8bag 8zg 9ek 9hjp 9dkc 9da 9kv 9dqu ac-8em eb-4au ef-8et ef-8jn nc-3cs nc-9ai oh-6acg sb-1ad sb-1ar sc-2as sc-3ag.

(40-meter band)

1aao 1asf 1cmx 1ch 1kk 1sw 2ahm 2amj 2md 2pj 3hg 4go 4iz 5aka 5he 5ke 6aiv 6akx 6bq 6bux 6bzf 6bzm 6bye 6bxi 6hm 6vr 6wt 7adm 7df 8ada 8bpl 8brc 8dei 8kc 8zg 9ara 9auy 9epm 9exc 9dr 9xi ac-8hb ac-8flo ac-8xx ac-1crs ai-1ar ai-2bg af-8fok aj-1ts aj-1km aj-1tt aj-isk aj-1sm aj-1zb aj-3aa aj-3kk aj-3az aj-jkzb eb-4ac eb-4au eb-4ax eh-n33 ee-car6 ef-8el ef-8eo ef-8fiz ef-8fj ef-8gi ef-8gc ef-8jj ef-8jn ef-8jf ef-8qrt ef-8sm ef-8yor eg-2cc eg-2lz eg-5ls eg-5xy ei-1au ei-1cu ei-1gw ei-1ma ei-1no ek-4dba ek-4uah ek-4uu ek-4ya el-1se em-smuk ep-1ae ep-1aj es-2nm es-2co fc-f2 fo-a3m fo-a3w fo-a3u fo-a3z fo-a4l fo-a4x fo-a4z fo-a5t fo-a5x fo-a8p fo-a9a eg-2it eg-6mu oa-2sh oa-2xg oa-2yi

oh-6acg oh-6axw oh-6cxy op-1au op-1hr oz-2ga oz-2bg oz-1ap oz-1fq oz-1fs oz-3aj oz-3ar nc-2bg nc-2fo nd-hik nj-2pz nm-1j nm-1n nm-9a nq-8kp nr-cto sp-5oa.

ei-1ER, Ing Mario Santangeli S. Eufemia 19, Milano, Italy

(Heard during April and May on 20 meters)

1aye 1ajm 1rd 2ahm 2cvj 4jr 4rg 8ahc 9box af-lb ai-2kt nr-6u oa-7dx rcll.

(40 meters)

1abt 1aly 1arv 1awm 1bym 1cdw 1de 1gm 1gh 1xat 2abz 2ags 2ahc 2ase 2awx 2cs 2wr 3aau 3afu 3bck 3cco 3ef 3iu 3wc 4aao 4ap 4ce 4fa 4fu 4ox 4pk 4rg 4yp 4to 5ec 5ry 8adg 8aj 8awx 8bcz 8box 8bqi 8bun 8bzz 8cc 8cwp 8dan 8li 8sx 8sy 8xa 9adg 9aol 9buz 9cia 9ctg 9dyf 9efk ei-1se nm-5n nc-2al nn-2al nn-3ym nr-2fg sa-cb8 sa-sb5 sa-2bg oa-2sh oa-3hl oa-3ig oa-5bg oa-7hl oz-2ga oz-2hg vs-1ab dcz crho mnhv nidk wuby.

OIC, Operator, T. Krumbach Skovgaardsvej, 2 Charlottenlund, Denmark

1aff 1ak 1asa 1avf 1ii 1ja 1lu 1mv 1ql 1ro 1rs 1zd 1zw 2ags 2amp 2aou 2apd 2atk 2atx 2avr 2avw 2awr 2axe 2bvd 2bur 2bem 2ced 2crb 2gk 2gx 2is 2rs 2sf 3adb 3bdi 3cah 3cjn 3ckl 3ef 3pf 3qr 3wf 4db 4fa 4ha 4ok 4pk 4qb 4ry 4si 4uv 5aay 5abc 5kt 6ajm 6apf 6hqo 6bx 6bzm 6uj 7ti 8abw 8amc 8avk 8bas 8beo 8bi 8bja 8box 8bqi 8buz 8cpf 8dcm 8dmd 8dmm 8do 8xa 8xj 9auu 9avy 9axb 9baz 9bn 9bre 9caj 9cmj 9cn 9cpw 9dkc 9dws 9rk 9sd.

R. R. Maxson, Hq. 21st Brigade, Schofield Barracks, Hawaii

(Heard during April and May)

1nl nxr 2apd 2ud 3ld 4fu 4iz 4km 5aid 5ef 5pm 5rg 6aae 6ast 6aau 6abg 6aeb 6agr 6apf 6awt 6axd 6ay 6bap 6bhz 6biy 6hlt 6bwk 6cag 6cbz 6cei 6cfr 6cgm 6csj 6cuu 6cwk 6czr 6dfa 6dfm 6djx 6dp 6ix 6js 6rb 6ta 6tn 6pv 7abh 7df 7fd 7kd 7md 7op 7rh 8adg 8amc 8aur 8azh 8bit 8bqm 8bwr 8cau 8ces 8ced 8cp 8pl 9acv 9acq 9ahq 9ak 9cdw 9cpm 9cvb 9cwa 9deq 9ekf 9ekn 9uu 9xi 9za na-7aam na-7mn na-7np na-kfzh nc-5au nc-3go nn-1nic oa-2dy oa-2hm oa-2xi oa-3am oa-3ar oa-3au oa-3gf oa-4bd oa-5bw oz-1af oz-1fs oz-3ar oz-3gf oz-4aa sa-hd4 sc-2bl kfzq knt wet.

nz-EZ5, Cpl. Henry P. Karr, Hq. Btry., 4th F. A., Gatun, Panama, C. Z.

(Heard during May)

1amu 1asy 1aur 1bdi 1bfx 1bhm 1bhw 1ckp 1ic 1ru 1sz 2apd 2aqw 2arm 2bow 2cuq 2czr 2qf 2tp 3ce 3lw 3oq 3ux 4aao 4ce 4cj 4fu 4iz 4nf 5arg 5eb 5im 5io 5kl 5ww 6bhz 6bmw 6ec 7df 8adg 8bau 8bhz 8bsc 8ded 8gz 9aao 9anz 9auu 9bat 9bpb 9bwl 9ck 9enl 9cyg 9drd 9dwz 9egh 9hd 9mn 9rk 9uu nc-1dq eb-4ww oic.

M. Solomon, Mackenzie Wireless Station, Demerara River, British Guiana

(20 meters)

1emx 1caw 1bux 1ajm 1aep 2ctf 2ahm 8ex 8gk 8enx 8ahg eb-4au ef-8udi eg-2od eg-5ls ei-1da nc-1ad.

(40 meters)

1dl 1bez 2ahb 2amj 2edr 2tp 3sf 4rp 5jp 5ahp 5anv 6agr 6zt 6bxi 6cnk 6ju 6bjv 6bhz 6dfw 6buy 6bl 6vsj 6dan 6akw 6zat 6abg 6bzn 6cco 6cng 6dgq 6bvm 6bch 7abb 7ou 7lz 7gf 7xf 7fs 8aig 9axf 9bho 9xa ea-gp ea-jz ea-w8 eb-4au eb-4zz eb-4yz eb-4ww eb-4ax eb-4ft eb-4ac eb-k6 ed-7zg ed-7wc ed-7ec ee-earo ee-ear6 ee-ear28 ee-arc2 ef-8gi ef-8eo ef-8fk ef-8ez ef-8tis ef-8jf ef-8brt ef-8yor ef-8arv ef-8cp ef-8sm eg-2xy eg-2nh eg-2dn eg-2qb eg-2gf eg-5ms eg-5xy eg-5kl eg-5bd eg-5uy eg-5ad eg-5ls eg-5yk eg-6td eg-6lr eg-6pu eg-6yv eg-6at eg-6yq eg-6ut eg-6kk eg-6gh eh-9xb ei-1er ei-1au ei-1ay ei-1ma ei-1no ei-1er ei-gbd ek-4dba ek-4dka ek-4yab ek-4yae ek-4abg ek-4uah ek-4uu ek-4oa el-1se el-1alf ei-1alx el-1alw em-smua en-ofp ep-1aa ep-3gb es-2co es-2nd fm-8ay fm-8jo fo-a8x fo-a8z fo-a4z ar-8lha oa-2dy oa-2ij oa-2no oa-2yi oa-2uk oa-2yj oa-2rg oa-2ms oa-4bd oa-4go oa-7cw oa-7hl oh-6ajl oz-2bg oz-2ge oz-3ai oz-3aj oz-3ar oz-4aa oz-4ac oz-4am gc-6iz nc-2dn nc-2fo nc-3mp nc-5ac nc-9ai nd-hik ne-8jc nj-2yp nm-cxy np-4sa np-4kd np-4tc np-4oi nq-2mk nq-8kp nr-cto nz-ez5 sa-db2 sa-de3 sa-hd4 sa-bg8 sa-bp7 sa-fa3 sa-ba1 sb-1bo sb-1br sb-1id sb-1ca sb-1ia sb-2ar sb-2ax sb-2ab sb-2af sb-5aa sb-7ab sb-sqiq sc-2ar sc-2as su-1oa su-1cd sv-ayre aqe kle sjb ocly.

J. Arends, Chief Op. S. S. Leerdam, trip from New Orleans via. Vera Cruz and Havana to Bermuda

1afl 1bha 1arx 1asy 1aur 1bcg 1baq 1bms 1bnm 1cdw 1ckp 1dl 1lw 1nw 1vs 1zw 2aan 2aex 2afw 2aau 2amj 2apd 2ago 2agw 2arm 2avr 2awx 2axd 2bbt 2bow 2cbl 2cs 2cuq 2czr 2dq 2fa 2fj 2pv 2pz 2sz 2tp 2vh 2uh 2za 3alq 3bco 3bdi 3cch 3ckl 3cp 3rd 4aal 4ce 4db 4fa 4ft 4fu 4km 4ll 4ok 4pr 4qb 4qz 4vh 4wa 5aaq 5amx 5amy 5aqf 5ata 5auz 5avp 5ax 5axb 5df 5em 5fq 5le 5jp 5oa 5wz 6aij 6akw 6am 6ary 6bav 6bhz 6cgw 6dam 6dan 6djv 6fr 6ix 6ju 6xi 7aa 7ek 8aai 8ahd 8ajn 8alo 8aro 8au 8yf 8azk 8bas 8bau 8bev 8bqp 8can 8ceg 8emg 8cpf 8dbc 8dcm 8diq 8in 8kc 8kf 8li 8vj 8xe 8xx 9aao 9acq 9adk 9aek 9afa 9afe 9ain 9ak 9aka 9aju 9asd 9auu 9aw 9baf 9bba 9bcs 9bdw 9bha 9bjw 9bpl 9bud 9buz 9bwo 9bwr 9byo 9caj 9cet 9cia 9ck 9cnl 9cns 9cor 9cos 9ctg 9cyw 9day 9deq 9dit 9dju 9dmj 9dod 9doe 9drd 9drw 9dut 9dws 9dyl 9eas 9eca 9efk 9efo 9ehn 9ekf 9jh 9ln 9mh 9rf 9rl 9xi 9zk eg-ala eg-alq eg-alky ef-8jf ef-8eo nm-iaa pjc od-pkh 2fg sc-2ah agb fut irc fkzq knux nitc sal wuan xam.

(From Bermuda to Coruna, Spain)

1aao 1ac 1afl 1arx 1ary 1asy 1aur 1bez 1bnm 1cbh 1cdw 1chw 1ckp 1cmf 1on 1zw 2agq 2ags 2aqu 2apd 2aqo 2arm 2bir 2bow 2cuq 2fj 2gk 2gx 2qf 2tp 2vd 3ahl 3buv 3oq 3py 4ft 4iz 4ok 4rp 6aak 6dgy 6hm 6xi 7ek 8ab 8alo 8bdp 8bun 8byn 8cc 8cpf 8dpj 8hb 8jc 8tis 8xe 9auu 9amz 9bpb 9cev 9cia 9co 9cwa 9dai 9dut 9ehi 9nr 9qt 9rf 9sx 9xi 9za 9zk eg-5by eg-5uw eg-5xy ef-8eo ef-8fk ef-8ft ef-8rld ef-8yz eb-4ac eb-4cc eb-4rs eb-4ww eb-4yz ei-1ay ei-1dr ei-1mt ei-1uu ei-1alw en-ode en-pcpp em-smvg ea-gp ea-jz ea-th np-2fg nz-3ar nz-4ae arex aqe dnse gfa ick lgn nitc oic pwa sgl skb spw tve suc2.

D. R. Holbrook, 5 Central Place, Cliftondale, Mass.

(20 meters)

eg-5yk eg-2nh eg-6br eb-4zz eg-6mu eb-4au fm-tun2 eg-5by gi-2it ep-3fz eg-2zq sb-1br nj-2pz ef-8gm ne-8af nc-3gg.

E. J. Sahm, 265 E. 182nd St., New York City

6bha 6ddf 6xi ea-gp ea-jz ea-jl eb-4ww eb-n33 ee-ear6 ef-8eo ef-8fu ef-8yor eg-5ms eg-5zh ei-1au ei-1bd ei-1er ei-1fg ei-1er ei-1pf ei-1uu ek-4oa ek-4uah el-1se en-oga ep-1ae ep-3fg ep-3gb es-2co nc-1ad nc-1bd nc-1cx nc-1da nc-1dq nc-3cj nc-4pd nc-5ac nc-8azs ne-8jc nj-2pz ni-1p nm-1n nm-cyy nn-m3y nq-8kp nr-cto sa-cb8 sc-2ar sc-2as sc-2bl sc-1fg sh-bzi su-2ak agb agc bd8 bm cx6 dcz gbk glq hd ocly sgl sjb vde via wnbt wya xxl.

Donn Morris, 703 Maryland Ave., Fairmont, W. Va.

(20 meters)

1adm 1akz 1asu 1aur 1byv 1cmx 1rw 1sw 4cj 4cl 4dd 4dm 4gq 4iz 4ll 4ob 4oy 4qq 4qy 4tv 4wh 4xe 5aci 5adz 5afb 5aen 5aga 5agr 5ahk 5ajs 5ajc 5amo 5aqe 5arq 5avs 5ek 5lf 5nn 5ok 5qj 5qs 5qo 5ru 5sh 5uc 5wz 6aod 6am 6anp 6azs 6bam 6bav 6bq 6bnq 6bux 6bvx 6cax 6cby 6cck 6cer 6cep 6ci 6ckv 6cls 6cin 6cmy 6col 6cyg 6cyx 6czm 6czq 6daj 6dch 6dck 6dfe 6dgq 6ea 6fr 6gj 6jn 6ka 6km 6ku 6nx 6pj 6rv 6tx 6ux 6zat 7acb 7adm 7bb 7bm 7oa 7fu 7mh 7mx 7ne 7ph 7uj 9afa 9agd 9ahq 9akg 9amq 9anz 9aok 9api 9ara 9arl 9auu 9ayw 9bgh 9bcf 9bcn 9bdq 9bfb 9bjp 9bmh 9bmx 9bqq 9brh 9brm 9brr 9brw 9bvh 9bvs 9byv 9ccv 9cei 9cf 9cjt 9cka 9cos 9cpf 9cpq 9cpt 9csr 9cto 9cvn 9cwn 9cyg 9db 9dba 9dbz 9deq 9des 9dgt 9dhy 9dip 9dpb 9dpw 9dra 9eae 9eaf 9eer 9eew 9ef 9ehe 9eho 9gh 9if 9kv 9nm 9rx oz-2ac oz-2ae oz-3ar oz-4fa ef-8ct ef-8ix ef-8yor eb-4au eb-4ax eg-5hs sc-2ah sc-3ag es-2nm oh-6acg oh-6bdl np-4sa nc-1ap nc-1ar nc-8yx nc-8hp nc-4fv nc-4dp nc-4ek nc-5yx nc-5au nc-8af.

Correspondence

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

About That Phone

12694 Northlawn Avenue,
Detroit, Mich.

Editor, *QST:*

As a comparatively new ham, I don't like to speak right out in church, but when I see the "Three Guardsmen" (of Detroit) lambasting the 80-meter phones, I hasten to the rescue. As a starter, I will agree that phones and c.w. do not work well on the same frequency; in fact, most 80-meter phone conversations are more or less hashed up by c.w. I see no reason, however, why phone amateurs should not have a small short-wave band exclusively during certain hours of the day—say late evening.

I have read many articles by *QST* contributors all tending to show that phone work below 150 meters is N.G.—that phones were only local affairs anyway, good for ten or fifty or perhaps a few hundred miles under favorable conditions with high power. As a newcomer, I naturally believed all these things and took no particular interest in the squeals I sometimes noticed in the upper part of the 80-meter band.

Late last winter, however, as the result of some experiments with higher power, I found myself with an extra 203-A and some other parts nearly sufficient to equip my 50-watt transmitter for phone work. The results at first were a bit rough, but only a few hours testing were necessary to correct the troubles and I was surprised to find a consistent range of at least 400 miles. Cards came from Nova Scotia, Colorado, Florida, Oklahoma, etc., all reporting good reception on ordinary c.w. short wave receivers. Conservative observers report the modulation excellent and the signals quite steady—especially at the greater distances. Some repeat every word in long conversations correctly, while others make small errors. Again, if I spend an hour or two working other stations and talk perhaps fifteen minutes altogether, I will receive on an average of eight cards from all parts of the country, even though I only give my call letters a few times. Furthermore, I have never known but one amateur to answer my CQ with the call letters wrong, for instance—8RB or Z or G—as is so common in phone work. 8MS secures correspondingly good results with lower power and same circuits.

All of this convinces me that it is little more difficult to get good phone results on 80 meters than on 175 and that *the working distance is at least five times as great.*

Perhaps I should add that my location here is very bad for DX. I have never heard but one foreign amateur station and my c.w. signals are seldom reported outside the U. S. A. A pair of fifty watters in a loose-coupled Hartley oscillating circuit with Heising modulation is used. Any amateur should be able to obtain as good or better results from the same moderate power. I do not think it can be done, however, with one or two 210s and the loop modulation with which most of the boys on 80 stir up the so-called ether.

I would like to hear from anyone obtaining similar results on 175 meters. I wonder, however, if most of the fine results in that band are not obtained (in imagination) by those dyed-in-the-wool traffic hams who want the upper 80-meter channels for such important messages as—"Did you get my letter? Hope to see you soon," etc., etc., often a month old.

—*C. H. Vincent, 8RD*

Some More About It

Yakima,
Washington.

Editor, *QST:*

In regard to "Amateur Phone Work" in the Correspondence Department of the June *QST*, we have several things that we would like to bring to the attention of V. Sherman, 8BMV-8MX, and H. Allport, 8CBM. We have been on the air with spark, c.w., i.c.w., and phone since 1920. We have done our share of experimenting as far as the amateur fashion goes. We have worked the key here until we are tired of it and want to do a little experimenting with something else that has a kick to it. We have worked all the foreign DX possible and have heard so many "nil hr om pse QSLL cuagn 73" that we almost hate to touch the key any more.

Now, to get down to business, the main purpose of this letter is to find out the object in keeping amateur phone work on the 150-to 175-meter band when we have practically abandoned it for key work because of the more miles per watt and reliability of the shorter wave bands.

The average ham who is experimenting with phone wants to see how his phone signals compare with the c.w. signals on the same wave band and not on a band that has already proved less satisfactory for key work as to miles per watt input. It takes an outlay of cash to build an A-1 phone transmitter that every ham does not feel willing to make, but he does get a great kick out of comparing his c.w. and phone signals on the same wave, and with what equipment he is able to afford. Why keep him in the longer wave band where he does not get nearly the opportunity for coöperation and where it takes a larger amount of equipment to do the same things that can be accomplished on the shorter waves at less cost.

As to the bum ham phones that the key men rave about, it is largely the fault of the ravers themselves. From our experience we found that asking them for reports brought "good om cuagn" when it was rotten. We had to adopt the method of asking them a question and if it was answered then they must have gotten it o.k. in the first place.

We have had excellent help from the Seventh District hams with phone work and since we have been off with phone while we build a new speech amplifier and mike, we have had several letters, cards, and requests on the key as to when we will be on again with our phone. The station here is all storage battery equipped and we have been asked repeatedly when using the key if we could use phone too. We built a phone set and have found a great number of hams willing to work with us in the development of the phone work on the shorter waves. We don't approve of the use of phone with a plate supply that doesn't even give a good c.w. signal but we would like to see some of the fellows that can, do a little more phone work on the shorter waves. We believe there is a larger field open to phone work where the key has been used for some time.

We would like opinions from the hams on both sides of this question and see what the amateurs think of this phone business. The big noise seems to be to do something new and here some of the hams want to hold back what we consider one of the higher developments of radio. Why not turn our energy to making amateur phone something to be proud of? We have heard amateur phones that were superior to some of the broadcasting stations in operation at the present time.

Well, OMs, this is out of our system so we will sign off and here's to more and better amateur phone work on the shorter waves.

—*William Lawrence, 7OX, R.F.D. No. 3*

Still More

1131 Fischer Ave.,
Louisville, Kentucky.

Editor, *QST*:

Inasmuch as 8BMW-8MX and 8CBM ended their letter in the June issue of *QST* on "Amateur Fone" with, "what sa oms", I wonder if I will be allowed to voice my opinion regarding their suggestion. It seems to me, I cannot find in *QST* columns any letters in defense of the phone and as the key men are continually writing in I want to take exception to this one letter.

I am a B.C.L., very recently converted to amateur interests, such conversion being brought about by contact with phone operators and helpful suggestions and information furnished by *QST*. My interest has grown until I am very proud of my temporary 9AUH license. I am tenderly and religiously building a Hartley phone set for this Fall on 175 meters and am primarily interested in phone work. I might add I have read every word published by *QST* since March, 1926.

I can agree with the above men that the 80-meter band is small enough, but I cannot understand how it is monopolized by a group of phones, referred to, as a scattered element, nor can I understand why this band is too important for phones. A glance at the Communications Department in June *QST* would tend to prove that the most consistent traffic was handled on 20 and 40 meters, sans a lot of QRM and QRN.

I understand that phones are permitted only from 170 to 180 meters and 83.28 to 85.66 meters while our honorable brass pounding brothers have six, count 'em, bands in which to pursue their feverish struggle for a W.A.C. certificate. More power to 'em! The small broadcasters *are* clamoring for this high band and if they keep on clamoring loud enough they will get it, exclusively, all arguments to the contrary, notwithstanding.

I want to say also, I am pleased to note in the June issue of *QST* a paragraph requesting phone dope. I hope someone will comply and give to *QST* readers some reading matter on the subject. If *QST* is to represent the amateurs it should do this, for phones are far more numerous than is supposed. It is indeed fitting that the amateurs' suggestions in regard to the new system of things, be heeded as much as are those of the commercial people and now is the time for someone to champion the phones. Why deny the phones 80 meters? It is admitted there are creditable phones on 80 meters, they can all become so with experimentation without which *QST* could not have presented its June issue of 5-meter finding.

In K. B. W.'s article "150 to 200 meters" page 31, June, *QST* underneath Commissioner Caldwell's letter of April 15th, the following: "Amateur radio then, continues in the 150- to 200-meter band as before, except that the region is now, *non-exclusive*." The phones *must* if called upon, share *this* band with more powerful ones, and I for one, hope the 80-meter "clickers" won't object too strongly to letting the phones play a little in "their" band. Sort of a "united we stand" idea, so please let's unify this scattered element, and pull together. I have corresponded with phones in 1st, 3rd, 5th, 8th and 9th districts for over a year and the sentiments herein expressed seem to be the consensus of opinion.

—*G. W. Mossbarger*

Twenty

815 Stewart Drive,
Dallas, Texas.

Editor, *QST:*

When I arrived home to-night I found *QST* smiling down from the mantel piece. Being a bit batty on twenty-meter stuff I promptly turned to page 1 of the C. D. to learn of the progress we had made in the last month. Only you other first-comers to our twenty-meter band can vision my horror at the publicity some of our dizzy brethren are giving our best DX band. Nay! Not only publicity, but the most tearful entreaties for everybody to come down to twenty! To get down where QRN is nil! Work Europe in daylight! Forget QRM! After reading all this I wiped away a tear and mournfully went back to the old set that has been such a joy since it was first tuned to twenty back in the Fall of '25. Soon it must be choked and crammed down to five meters. Very soon twenty will cease to be the wave it now is. It will be filled with the QRM, a.c. notes bum operating and all the evils that descended on forty back in '25 and choked it down to a whisper. Ye Gods, fellows! Don't you know a good thing when you see it? If you can QSO eg5HS at noon and oz2AC at midnight keep mum! Then we can go on working DX and having old time rag chews on 20 with never a "sorri om, QTA msg no. 148 QRM" or "sorri must QRT on acct QRM now om". Let nature take its course. The bright boys will QSY quickly enough and the rabble will be blissfully unconscious as usual. Come on and let's keep one secret at least. What sa?

—*M. E. Lawson, nu5ACL*

P.S. (One week later)

'Stu late now OMs. Let's all go to 5 meters.

—*M. E. L.*

Grid Meters

1640-50 Walnut St.,
Chicago, Illinois.

Editor, *QST:*

With the use of shorter wavelengths for transmission, an increasing amount of trouble is being had with grid milliammeters. We have received any number of grid milliammeters in our factory for repair, which have been claimed defective, and yet, when opened we have found the shunt or the moving element cooked to a crisp.

There is no question in the writer's mind but what this is due to the fact that the instrument indicates the direct current component only of the grid current and that there may be a much larger radio frequency component flowing through the meter not indicating, but burning it up. In other words, the meter may burn up when indicating only one-half scale because of this much larger amount of high frequency current.

This can be very effectively cured in a number of ways, and the simplest way is to put a radio frequency choke in series with the meter and by-pass the *meter and choke* with a condenser. Most any condenser will do the work.

Various other schemes may be used in special circuits and sometimes the choke and by-pass condenser may be made a part of the other apparatus in the grid circuit. However, the aim should be to be absolutely sure that the radio frequency component of the grid current is effectively blocked from the instrument circuit, since 1 ampere of radio frequency current will very soon cook a 50-milliampere direct current instrument and then the poor instrument manufacturer gets a letter about how the meter "burned out when indicating only half scale."

I trust you will give this fact proper publicity, as I feel that it is a factor which must be carefully watched, and I know that many a good milliammeter will be saved if this precaution is taken.

—*John H. Miller*
Engineer, Jewell Electrical Instrument Co.

WHAT'S WRONG WITH THIS PICTURE ?

The Atlantic Division Convention

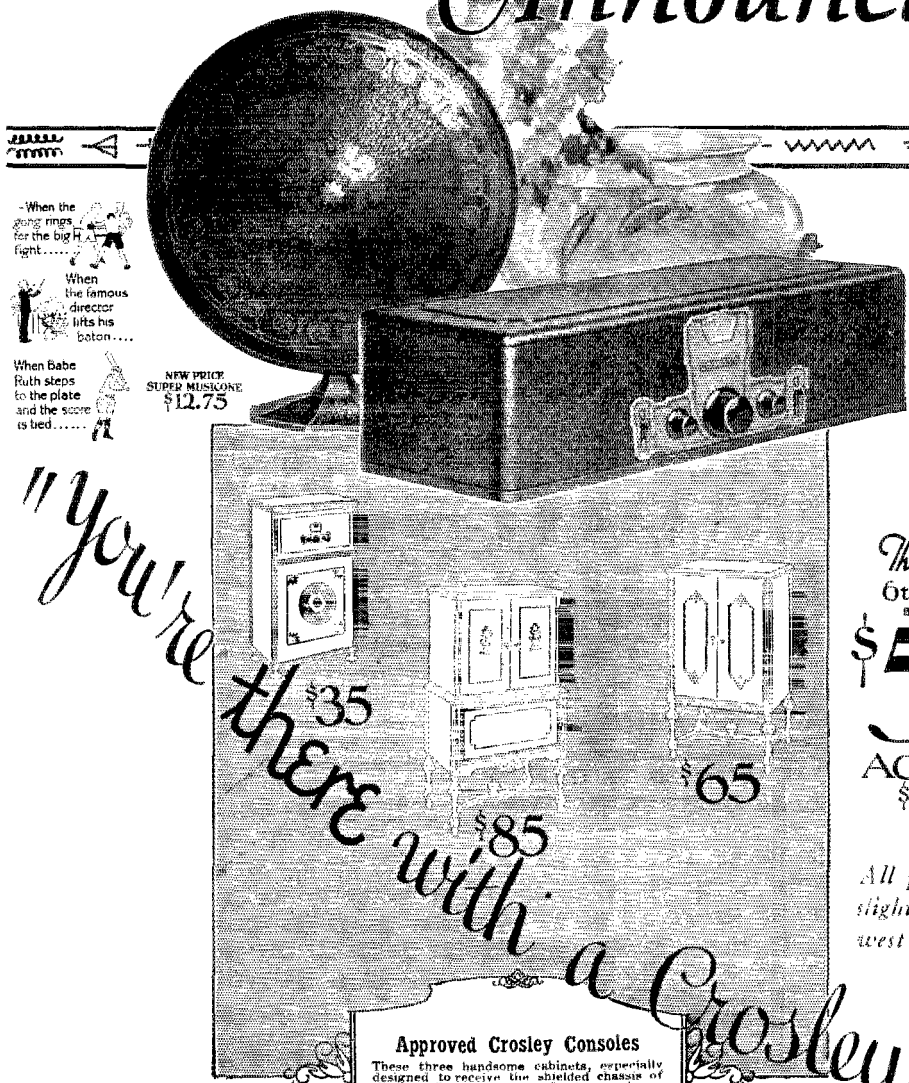
(*Continued from Page 48*)

that Lidbury, 8BAG, was responsible for this new invention. It won them the silver cup. The Pittsburgh fellows sent Fred Westervelt to Mars and we were sure surprised to have a visual demonstration of the advancement of radio on that planet. The climax of the convention was the arrival of Lt. Commander F. H. Schnell, who flew to the convention from Washington in Admiral Moffatt's personal plane the UO, with Lt. E. W. Litch, U. S. N., of the Naval Air Station, Anacostia, as pilot, and with one of the new Ford ships as escort plane. Mr. Schnell was the *piece de resistance* and entertained us for two hours by recounting his NRRL trip fully illustrated with some 150 slides. The courtesies of the Bell Telephone Co. and the Westinghouse Electric & Manufacturing Co. were much appreciated in giving all an opportunity to visit the big telephone exchange and the broadcasting station KDKA.

With a most delicious steak dinner being served on the last night, the distribution of prizes and last but not least an initiation of several candidates in the new radio fraternity, Pi Alpha Tau, the convention closed to reconvene next year at State College, Pa.

—*A. A. H.*

Announcing



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THE "BANDBOX"

is a new 6 tube set of astonishing sensitiveness.

Many exceptional features commend the "Bandbox".

The metal outside case, tho keeping out strong local signals effectually enough, did not fully satisfy Crosley ideals of fine radio reception. Signals must be kept in order inside the set.

TILT-TABLE MUSICONE $27.50

A new model built in the form of a Colonial Tilt-table and finished in brown mahogany stands 3 feet high.

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Coils and condensers are like families living in a row of houses with no fences between. The children run around the yards; they meet, talk it up, quarrel and squabble. No harmony.

Magnetic and electric fields are the offspring of coils and condensers. With no fence between, they, too, run around the house, quarrel and squabble. Howls and squeals result.

Individual Parts Shielded

So, to keep each "family" or field of individual coils and condensers separated, metal fences are erected (copper fences for the coils) and the individual parts of the Bandbox are shielded as only found in the highest priced sets.

Acuminators

For fans who love to go cruising for faint, far-away signals the "Acuminators" intensify weak signals like powerful lens revealing distant scenes.

The "Bandbox" employs completely balanced or neutralized radio frequency stages instead of the common form of losser method of preventing oscillation. In presenting this important feature Crosley is exclusive in the field of moderate price radio.

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Withal, in the beautiful appearance and modest size of the "Bandbox" is the utmost in adaptability to requirements of interior arrangement or decoration. The outside case is easily and quickly removed for installation in console cabinets.

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Volume control is another big "Bandbox" feature. Signals from powerful local stations can be cut from room filling volume to a whisper.

Each "Bandbox" is fitted with a brown cable containing colored rubber covered leads for power and other connections.

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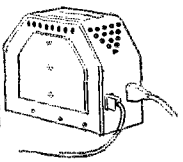
The "Bandbox" is built both for battery and A C operation. The new RCA-AC tubes make the operation of the set directly from house current both practical and efficient.

In the AC set the radio stages and the first audio stage use the new RCA-AC-UX 226 tubes. Filaments in these tubes are heated with raw AC current at proper voltage.

The UX-227, with indirectly heated emitter, is used with the detector. Power tube UX-171 at 180 volts plate.

There is no AC hum. The new RCA Radiotrons do the work.

The power supply convertor is a marvel of radio engineering ingenuity. Half the size of an ordinary "A" storage battery, it supplies A, B and C current direct from lamp socket to tubes. Price of Power Convertor $60.



Models for 25 and 60 cycles. Snap switch shuts down set and power convertor completely.

Write Dept. 18 for Descriptive Literature

Crosley Radio is licensed only for Radio Amateur, Experimental and Broadcast Reception.
Five UX 201 A and one UX 171 power output RCA Radiotrons recommended and supplied at standard prices with each Crosley Receiver.

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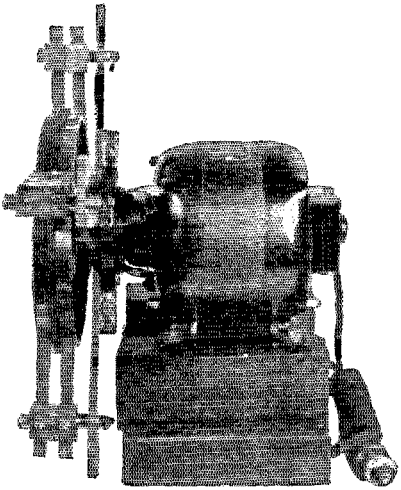

The motor which is supplied with this rectifier is for 110 volts 60 Cy. Motors with other name plate ratings can be supplied but will require a slight delay in shipment.

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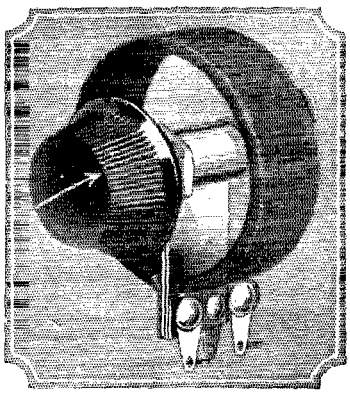

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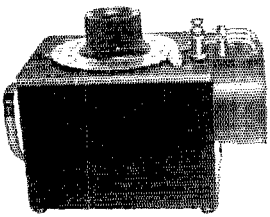
Designed especially for heavy current control. Impossible to break down under high temperatures. Limiting factor is the fusion point of the Nichrome or Advance Wire used. These units dissipate over 50 watts at 482° Fahrenheit. Diameter—2 inches, single hole mounting.

500 ohm Centralab Power Rheostat	$1.25
150 ohm Centralab Power Potentiometer	1.50

At your dealer's, or mailed direct.

CENTRAL RADIO LABORATORIES
20 KEEFE AVE. MILWAUKEE, WIS

Centralab CRL



A DANDY BUY

WAVEMETERS

15—110 METERS
1% ACCURACY
GUARANTEED

$12.50 Each

ALSO Short Wave Coils—Power Transformers and Filter Chokes—Receiver and Transmitter Parts.

JUST OUT—NEW FALL LIST—WRITE FOR IT

SEATTLE RADIO LABORATORY
3335 33d Avenue, South Seattle, Wash.

"FOR SALE: Parts for an ideal 100 watt transmitter including starting equipment. Esco 1000 volt D.C. motor generator, 1 50 watt R.C.A. tubes, 2 Kellogg microphones. This outfit was formerly WHBH and has been heard in practically all states. Equipment could also be easily converted into a high power C. W. outfit. The above will be sold as a complete unit or the sale of separate parts will be considered at a very reasonable figure.

CULVER MILITARY ACADEMY, Culver, Indiana

Have You Your A.R.R.L. Auto Emblem?

Price 50c

AERO COIL

SUPER-SENSITIVE

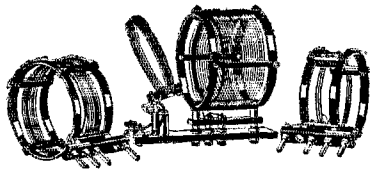
INDUCTANCE UNITS

The Perfect Inductances for All Low Wave Work

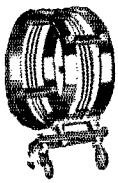
FOR RECEIVING

AERO LOW WAVE TUNER KIT **Price $12.50**

Completely interchangeable. Adopted by experts and amateurs everywhere. Range 15 to 130 meters. Includes 3 coils and base mounting, covering U.S. bands, 20, 40 and 80 meters. You can increase or decrease the range of this short wave tuner by securing the AERO Interchangeable Coils described below. All coils fit the same base and use the same condensers. Use Code No. INT-125 in ordering.



PRICE $12.50



INTERCHANGEABLE Coil No. 0

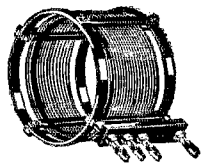
Range 13 to 29.4 meters. This is the most efficient inductance for this low band. Code number INT-0.

Price $4.00

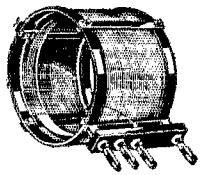
INTERCHANGEABLE Coil No. 4

Range 125 to 250 meters. Fits same base supplied with low tuner kit. Code number INT-No. 4.

Price $4.00



THE NEW AERO INTERCHANGEABLE COIL No. 5

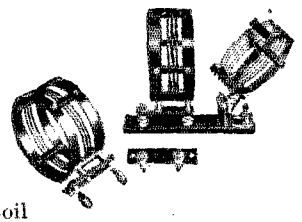


Normal range 235 to 550 meters. However, by using .0001 Sangamo fixed condenser across the rotor and stator of the .00014 variable condenser, the maximum wave band of this coil is increased to 725 meters. This gives you coverage of the following bands: Airplane to Airplane, Land to Airplane, Ship to Shore (Great Lakes) Ship to Shore (Atlantic and Pacific Oceans). Code number INT-No. 5. Price $4.00

FOR TRANSMITTING

KEY 2040 KIT **Price $12.00**

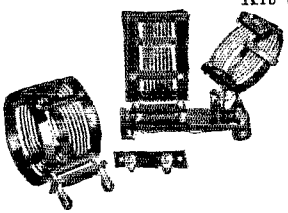
Kit contains 2 AERO Coils, 17 to 50 meters each, 1 AERO Antenna Coil Mounting Base, 1 AERO Grid Coil Mounting Base, 2 AERO Essential Choke Coils.



KEY 4080 KIT **Price $12.00**

Kit contains 2 AERO Coils, 36 to 90 meters each, 1 AERO Antenna Coil Mounting Base, 1 AERO Grid Coil Mounting Base, 2 AERO Essential Choke Coils.

If you desire to have this set tune also 20 meters, simply buy two AERO 20 to 40 meter transmitting coils, which plug in the same mounting bases, and work efficiently with the above items.



AERO PARTS

Transmitter coils (17 to 50 meters, Key 2040C and 36 to 90 meters, Key 4080C) **$4.00 ea.**
Antenna Base, Key PRI-300, **$3.00 ea.**
Grid Coil Base, Key GRID-100, **$1.00 ea.**
Choke Coils, **$1.50 ea.**

RMA RADIO MANUFACTURERS ASSOCIATION MEMBER

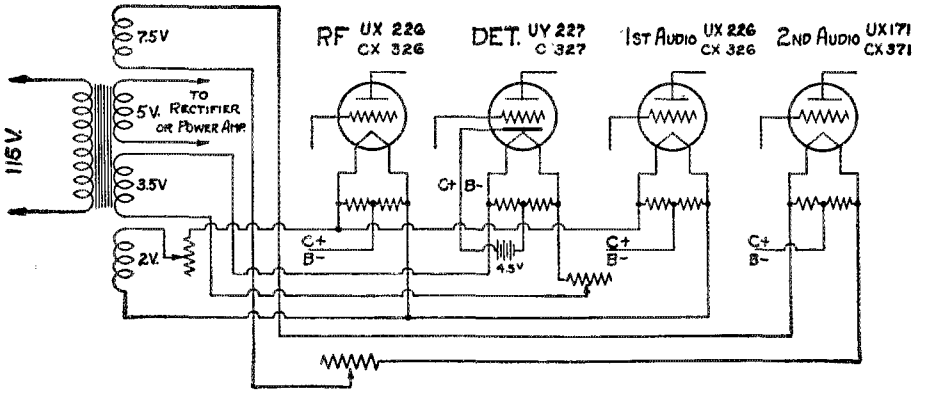
PLAN FOR D. X. RECORDS *NOW!*

Order these coils direct from us if your dealer hasn't them and start now for wonderful records. *Specify code or key numbers when ordering.* Or write at once for complete descriptive literature.

AERO PRODUCTS, Inc.

Dept. 16 **1772 WILSON AVE., CHICAGO, ILL.**

Complete A. C. Operation



For the past several seasons the trend has been toward complete battery elimination. Many satisfactory plate supply units operating from A. C. have been developed but filament operation from an A. C. source has presented more of a problem due to the larger currents required and increased expense in the rectifier and filter circuits.

The newly announced A. C. tubes offer an excellent solution to this problem. The above diagram shows how to adapt the filament wiring of the popular type of receiver to A. C. operation by use of General Radio parts especially designed for this purpose.

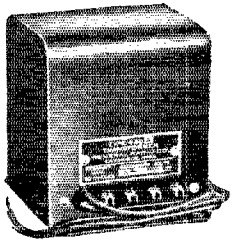
TYPE 440-A TRANSFORMER

The alternating current tubes require a source of low voltage capable of delivering large current. The various types of tubes require several different voltages. The Type 440-A Transformer supplies voltages as follows:

Priv. 115 V (for lines 105-125 volts) 60 cycles.

Sec.	2 volts	8 amperes
	3.5 volts	2 amperes
	5 volts	2.5 amperes
	7.5 volts	2 amperes

Price $10.00

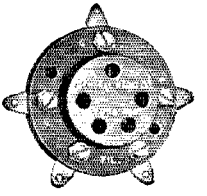


Type 440-A
Low Voltage
Transformer
Price $10

TYPE 438 SOCKET

The new UY-227 or C-327 detector tube has a separate heating element and requires a socket designed to take the new five prong base.

Price ..... $ .50



Type 438
Sockets
Price $ .50

TYPE 349 SOCKET

The various types of A. C. amplifier tubes are designed with standard UX base having four prongs and require a type 349 socket.

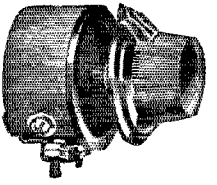
Price ..... $ .50

Type 439
Center
Top Resistance
Price $ .60

TYPE 439 RESISTANCE

The new A. C. tubes require a resistance with center tap across the filament as shown in the diagram. The Type 439 Resistance is adaptable to any socket in which the new A. C. tubes may be used.

Price ..... $ .60



Type 410
Rheostat
Price $1.25

TYPE 410 RHEOSTAT

The new A. C. tubes require low resistance rheostats capable of carrying appreciably more current than those used with D. C. tubes.

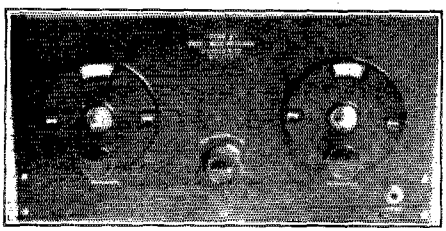
Resistance	Current	Price
.5 ohm	3. 5 amperes	$1.25
1.5 ohm	2. 0 amperes	1.25

Your local dealer should have the necessary parts in stock. If he is unable to supply you with all the items required, we shall be glad to send them to you prepaid upon receipt of list price.

GENERAL RADIO CO., Cambridge, Mass.

Gross Receivers & Transmitter Kits

LAST CHANCE! UP GO THE PRICES ON RECEIVERS AND KITS, NEXT MONTH



RECEIVERS

2 Tube Kit

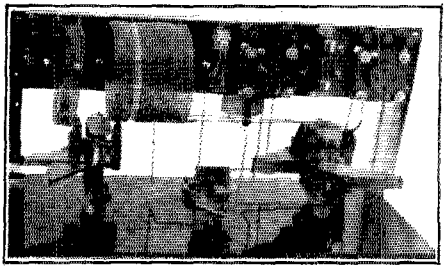
$15.75

Wired to order $1.50 extra

3 Tube Kit

$19.75

Wired to order $2.00 extra

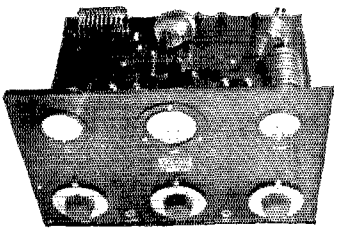


Please note the prices on Receiver Kits are special, same will be advanced shortly.

Gross short wave receiver Kits are composed of high grade parts such as Gross plug-in coils, Hammarlund middle condensers, vernier dials and other high grade parts necessary to complete the receiver.

Supplied with plug-in coil for any band you specify, 20, 40, 80 or 200 meters.

Extra coils .....$3.00 *each*



No C. O. D. Shipments

Transmitter Kits as illustrated composed of highest grade parts available, thoroughly metered, not revamped receivers.

Tuned Grid, Tuned Plate Type

7½ w **$47.50**

75 w **$65.00**

Coupled Hartley Type

7½ w **$43.50**

75 w **$65.00**

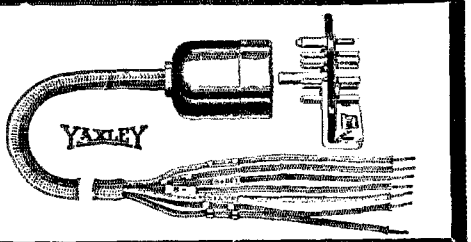
Frequency Meters for Broadcast Stations, $75.00.

Q S T Listen for our Amateur Station 2AUD operating on 39.5 meters. Code Lessons for beginners transmitted on the Teleplex. Send stamp for schedules. Tests invited.

J. GROSS & COMPANY, 30 Park Place, N. Y. City

YAXLEY

APPROVED RADIO PRODUCTS



Cable Connector Plug

Simplifies battery wiring, eliminates old-fashioned unsightly mass of wires, and is a positive guarantee of an instant and correct battery connection. Bakelite construction, neat and handsome in appearance. Metal cable markers and colored chart (RMA standard color code) on the connector plate simplifies installation on any set. Phosphor bronze double contact springs are mounted in Bakelite and cannot work loose. Connector plate has brass contact pins, tinned for soldering, mounts on reversible bracket adaptable for sub-panel mounting. Extra fine quality, seven-strand (RMA standard colors) five foot cable. Six extra markers packed with each plug.

No. 660—Cable Connector Plug Complete $3.50

At your dealer's. If he cannot supply you, send his name with your order to

YAXLEY MFG. CO.

Dept. S—9 So. Clinton Street, Chicago

TOBE

Trade Mark Reg. U. S. Pat. Office

VERITAS RESISTORS

A unique line of 2, 5 and 10 watt units in all values of resistance required for grid-leaks, plate resistors in amplifiers, plate power-supply voltage regulation. These resistors are non-inductive.

B BLOCKS

Condenser banks for all power-supply filter circuits.

CONDENSERS

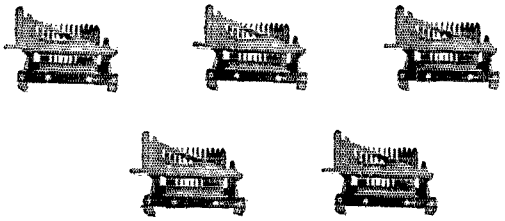
Tried in the fire of experience TOBE CONDENSERS have stood the test. Made for all usual working voltages and in all usual sizes. TOBE CONDENSERS stand up in service. Ask for—specify TOBE CONDENSERS always.

Tobe Deutschmann Co.

Engineers and Manufacturers of Technical Apparatus

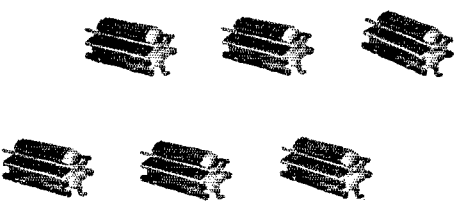
Cambridge, Massachusetts

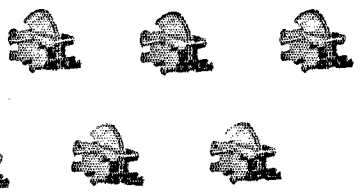
Cardwell

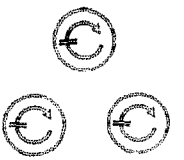


UNIFORM!

All Cardwell Condensers of any one type are exactly alike—uniform in capacity, low losses, strength, endurance and fitness for their job. See the June QST or write for specifications and prices.







Effective July 1st, prices of Xmitting Condensers on Pacific Coast will be $1.50 each higher than list.

The Allen D. Cardwell Mfg. Corp.

81 PROSPECT STREET BROOKLYN, N. Y.

Condensers

"THE STANDARD OF COMPARISON"

To Our Readers Who Are Not A. R. R. L. Members

Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of *QST* you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of *QST* delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

.....1927

American Radio Relay League,
Hartford, Conn., U. S. A.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3 in foreign countries) in payment of one year's dues. This entitles me to receive *QST* for the same period. Please begin my subscription with the ..... issue. Mail my Certificate of Membership and send *QST* to the following name and address.

.....

.....

Station call, if any .....

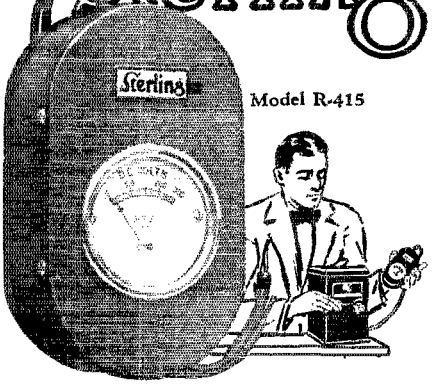
Grade Operator's license, if any .....

Radio Clubs of which a member .....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of *QST*?.....

..... Thanks!

"B" Eliminator TESTING Problem Solved by Sterling



Model R-415

TO GET full value from your "B" Eliminator you must *know* that your "B" Power is delivering the *right* amount of voltage to detector, amplifier and power tube.

Low resistance voltmeters suitable for testing batteries are worthless for testing "B" Eliminators. This specially designed High Resistance Sterling is accurate for both.

Whether this voltmeter is used in your *business or for your own set, it is essential* if you want the facts about any "B" Eliminator.

It is the Universal Voltmeter for the Amateur

R-415

Sterling voltmeter meets the special needs of the amateur in a variety of ways—for testing the output of D. C. Generators, and for every other purpose calling for a *high resistance* voltmeter.

Never before has a laboratory instrument been available at a price so reasonable.

Sterling

R-415 VOLTMETER

A laboratory meter at the remarkably low price of **$8.50**

Also Model R-417. A New 150v. Sterling A. C. Meter for Testing A. C. line current and all A. C. Circuits $7.50

THE STERLING MFG. CO.
2831 Prospect Ave. Cleveland, O.

ACME *Flexible* Celatsite Wire

A cable of fine, tinned copper wires with non-inflammable Celatsite insulation. Ideal for sub-panel or point-to-point wiring. Strips easily, solders readily. Nine beautiful colors; ***sold only in 25 ft. coils, in cartons colored to match contents.***

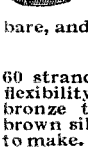
Acme Celatsite Wire

Tinned copper bus bar hook-up wire with *non-inflammable Celatsite* insulation, in 9 beautiful colors. Strips easily, solders readily, won't crack at bends. Sizes 14, 16, 18, 19; 30' lengths.

Spaghetti Tubing

Oil, moisture, acid proof; highly dielectric —used by leading engineers. Nine colors, for wire sizes 12 to 18; 30' lengths. (We also make tinned bus bar, round and square, in 2 and 2½ ft. lengths.)

Stranded Enameled Antenna



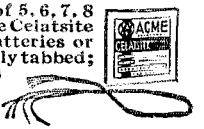
Best outdoor antenna you can buy. 7 strands of enameled copper wire. Presents maximum surface for reception, resists corrosion; this greatly *improves the signal.* Outside diameters equal to sizes 14 and 16. (We also offer solid and stranded bare, and stranded tinned antenna.)

Loop Antenna Wire

60 strands of No. 38 bare copper wire for flexibility, 5 strands of No. 36 Phosphor bronze to prevent stretching. Green or brown silk covering; best loop wire possible to make.

Battery Cable

A rayon-covered cable of 5, 6, 7, 8 or 9 vari-colored Flexible Celatsite wires for connecting batteries or eliminator to set. Plainly tabbed; easy to connect. Gives set an orderly appearance.



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THE ACME WIRE CO., Dept. S
New Haven, Conn.

ACME WIRE
MAKES BETTER RADIO

A. R. R. L. Members -- What about your friends?

You must have a friend or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

.....1927

American Radio Relay League,
Hartford, Conn.

I wish to propose

Mr. .....of .....

Mr. .....of .....
Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

.....

.....

HAM-ADS
NOTICE

This department of *QST* is conducted as a service to members of the American Radio Relay League. Advertisements can be accepted only under the following conditions.

(1) "Ham Ad" advertising will be accepted only from members of the American Radio Relay League.
(2) The signature of the advertisement must be the name of the individual member or his officially assigned call.
(3) Only one advertisement from an individual can be accepted for any issue of QST, and the advertisement must not exceed 100 words.
(4) Advertising shall be of a nature of interest to radio amateurs or experimenters in their pursuance of the art.
(5) No display of any character will be accepted, nor can any typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others.
(6) The "Ham Ad" rate is 7c per word. Remittance for full amount must accompany copy.
(7) Closing date: the 25th of second month preceding publication date.

THE life blood of your set—plate power. Powerful, permanent, infinitely superior to dry cells, lead-acid, Bs, B eliminators. Trouble-free, rugged, abuse proof, that's an Edison Steel-Alkaline Storage, B-Battery. Upset electrically welded pure nickel connectors insure absolute quiet. Lithium-Potassium solution (that's no lye). Complete, knock-down kits, parts, chargers. Glass tubes, shock-proof jars, peppy elements, pure nickel, anything you need. No. 12 solid copper enameled permanently perfect aerial wire $1.00, 100 ft. Silicon steel laminations for that transformer 15c lb. Details, full price list. Frank Murphy, Radio 8ML, 4837 Rockwood Rd., Cleveland, Ohio.

TO licensed hams only—$12.50 Aero Kit $8.13. Ferranti $12 audios $7.80. $25 Browning-Drake kits $16.25. $85.10 Loftin White kits $51.06. $10.00 Ensco Cone 36" kits $7.00 $32.50 modern compact B eliminators with Raytheon $19.50. Latest original packages. Discounts on Cardwell type E, Karas, Hammarlund, AmerTran, Aero, Jewell, Thordarson, Benjamin, Samson, Perryman, Ward Leonard 35%. On Sangamo, Lynch, Daven, Marco, Bodine, Yaxley, Pacent, Ceco 40%. All prepaid. Our weekly data sheets give more dope than all radio magazines together. 20 weeks trial $1.00. 52 weeks $2.50. Over two pounds data, circuits, catalog, prepaid 25c. Fred Luther Kline, Kent, Ohio.

PURE aluminum and lead rectifier elements holes drilled brass screws and nuts, pair 1/16", 1"x4" 13c, 1"x6" 15c, 1¼"x6" 17c, 1½"x6" 19c. Sheet aluminum 1/16" $1.00, lead $1.00 square foot all prepaid. Silicon transformer steel cut to order .014" 10 lb. 25c, 5 lb. 30c, less than 5 lb. 35c per lb., .022" thick 5c less per lb. Postage extra. Edgewise wound copper ribbon, 7 sizes, see Jan. *QST*. ¼" square copper wire better than copper tubing 50c lb. postage extra. Air pocket insulators blue glazed porcelain 8" leakage path fine for transmitting, 4 for $1.00 prepaid. Geo. Schulz, Calumet, Michigan.

THE Ensall Radio Laboratory six tube short wave receiver. Range 15 to 210 meters. Inductances, list at $18.50 with circuit drawing. Operates on loop or outside antenna. Parts list on request. We also are distributors of practically all types of radio apparatus. We also build transmitters, receivers, wavemeters, inductances, etc. Prices on application. We employ your parts in any apparatus desired. Blue prints and drawings furnished for any type of radio station, amateur, broadcast, or commercial. Special apparatus constructed to order. Quotations on application. Thos. Ensall (8BDN), 1208 Grandview Ave., Warren, Ohio.

JEWELL Meters, new, 25% discount. We stock Acme, Thordarson, National, Cardwell, General Radio, Nathaniel Baldwin, Crescent Lavite, Lynch, Tobe Deutschmann, R. E. L., Allen Bradley, Yaxley, Philco, Signal, Bakelite, Samson, Raytheon, CeCo, Pyrex, R. C. A., Grimes RGS, Browning-Drake, Fleron, Branston, All-American, Ferranti, Aero Products, Acme Wire Products, Ward Leonard, Westinghouse, Eby, Victoreen, Lincoln, Precise, Hammarlund, and many others. We allow discounts to Hams, custom set builders and dealers only. Tell us what you want. A complete line of Ham and BCL apparatus. Specializing in the best parts only. No junk. Roy C. Stage, Montgomery & Burt Sts., Syracuse, N. Y.

---

400 V. 100 W. Esco coupled to 220 V. 3 ph. A C motor $25.00. 1000 V. 300 Watt Esco motor 110 V. single phase $95.00. 2000 V. 1000 Watt Westinghouse double commutator $275.00. 2500 V. 2 kilowatt Generator double commutator, coupled to three phase 220 V. 1750 Speed motor. 2500 Volt 600 W. double commutator generator coupled to 110-220 V. 60 cycle single phase motor 1750 speed. Also many others. 1mfd Western Electric condensers 50c. New ¼ H. P. 110 Volt 3500 speed Robbins & Myers alternating current motors $8.50. Prices f.o.b. Chicago. James J. Smat. 1734 Grand Av., Chicago, Ill.

SAVE your hands! Pure aluminum and lead elements, complete, holes drilled, screws, nuts, pair 1/16", 1"x4" 12c, 1¼"x6" 17c. Square foot $1.00. Ammonium phosphate "beats borax", 50c lb. prepaid. J. J. Jacobsen, 400 West 150 St., New York City, 2AHE.

BEFORE buying the stuff for that new set drop us a line for a copy of our new catalogue. It is yours for the asking. We carry everything in stock for the short wave transmitter and receiver. All the leading makes such as Aero, Cardwell, National, General Radio, Acme, Thordarson, Jewell, Pyrex, Etc., 1/16" lead and aluminum, $1.00 per sq. ft. No. 12 solid copper enameled wire, 1c ft. No. 10, 1¼c ft. New edition Citizens Radio Call Books 75c. "Everything for the Ham", "Dynex for DX", 8BIN, E. J. Nicholson, 1407 First North St., Syracuse, N. Y.

BARGAINS. Esco motor generator, 150 watt, 110 volt AC to 500 DC, $25; Western Electric power amplifier, 7A, with tubes, $20; WE 2A power supply, A & B, for above, with tubes, $25; Western Electric phonograph attachment, 522AW, $5; Two Pyrex transmitting insulators, $1 each; two Fleron standoff insulators, .85 each; 100 ft. 12 enamelled wire, 85c; UC 1846 10,000 volt double tank condenser, $1; 2 UP 1656 filament transformers for 5 watters, $5.50; two UV217 kenotrons, $9 each; two UV203 tubes, $12 each; one UV 203A tube, $20; all tubes new; PT537 50 watt rheostat, $4.50; Kennedy No. 110 all wave receiver with two step No. 525 amplifier and tubes, $60; Navy CN113A receiver, 200-3000 meters, $10. 2AHO. W. M. Derrick, 80 Leslie Street, East Orange, N. J.

MAGNAVOX type R3 model C new for only $12. Elmer J. Salmina, St. Helena, Calif.

POWER transformers—100 watt 350-550 each side, $8.25. 250 watt 550-700 each side $10.00. 700 watt 1000-1500 each side $14.00. Guaranteed. COD or cash. 9CES, F. Greben, 1927 S. Peoria, Chicago, Ill.

DODGE Radio Shortkut fixes signals in mind to stick. Kills hesitation. Cultivates speed. Produces results. 8DRI Hale: Long time speed about 20. Few evenings with Shortkut raised to 25—passed First Class. Several trips to West Coast as op on KUP. Now op KXOE as prefer Atlantic ports. Quarter coupon and reports progress made by 200 users all licensed. 25c. Specimen reports each district on request. Shortkut with Appendix and Better Key Work, $3.50, U. S. and Canada, elsewhere $4.00. Reg. mail. None COD. Send money order. Check may delay. C. K. Dodge, Mamaroneck, N. Y.

TWO and four cylinder gasoline power units generating 50 volts 750 watts DC also 500 watts 500 cycle AC. Motor generators half to five KW de supply 500 cycle output. Some for external drive. Navy transmitters from portable type with power plants to 5KW. Suitable for ships, expeditions, etc. Sagamo watthour meters designed for battery use $10. Wavemeters 125-2500 $45.00. Half KW 500 cycle transformers 12.50. Easily tapped for any voltage. Used SE 1012 receivers 50-1000 meters $35.00. CN 240 1,000-10,000 meters $45.00, 27.5-350 volt .08 ampere Westinghouse Dynamotors $18.00. All ex-Navy material. Henry Kienzle, 501 East 84th Street, New York.

HAMS who want the best at a fair price and quick service will find this a good place to deal. The following apparatus is as good as new. One complete transmitter except plate transformer, panel mounted ¼"x18"x22", fil voltmeter, millimeter, tuned grid, tuned plate 2 tube (7) watt self rectified $75.00. Acme 1½ H choke $2.00. 5 dial omnigraph (new) $16.00. Acme 300 watt power transformer (new) $16.00. RCA UL 1008 OT almost new $6.00. Complete 50 watt transmitter panel mounted 3 meters $65.00. We have it, we can get it or it isn't made. William H. Brunt, 44 Whittier St., Rahway, N. J.

SELL low power Hartley. 9CYC.

ALL postpaid. REL transmitting inductances $8.00. G.R. standoffs, 15c. Write for sacrifice list. 9ACN, Raymond W. Terry, Jesup, Iowa.

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"H" tubes $17. 203As $25.00. Acme 500 watt transformers $20.00. "B" eliminator transformers, Jewell meters, few new "S" tubes and other transmitting parts. Charles J. Heiser, 55 Frances St., Auburn, N. Y.

WAVEMETERS ten fifty prepaid. Amateur bands. William Ford, Eldorado, Okla.

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WANT—12/350 or 12/500 dynamotor, prefer Westinghouse. State price and condition. M. Kramer, Tabor, S. D.

QSL cards, two colors, government post cards $1.90 per hundred, white cards $1.00. Real ham stationery at $1.40 per hundred sheets and envelopes, paid form. Postage 10c. Free samples. 8DTY, 257 Parker Ave., Buffalo, N. Y.

"S" TUBES—pair latest type, used 12 hours, $11.00 each; 500 watt Acme plate transformer, mounted, $22.00; WE 50 watter, $15.00. Everything guaranteed O. K. All letters answered. A. L. McCauley, 262 Garfield Ave., Battle Creek, Mich.

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EDISON "B" battery parts 110 volt knocked down unit $8.75, 140 volt $11.00. Large size elements connected 5 cents per pair. All parts carried in stock. Send for booklet. M. Rhine, 146 West 68th St., New York City.

WANTED UP1368 Radio Corporation transformer. A. R. Ueleke, Jackson, Mo.

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POWER transformers—for 7.5 watters, filament—7.5V., Plate—600V., center-tapped—$5.97. For fifties, Filament —12V., Plate—1100V., center-tapped, $9.00. Milliammeters 0-100—$2.00. D. C. Voltmeters, 0-8, panel-mount—$2.00. Transmitting Inductances. Bakelite throughout, for any band—single units—$3.50, Double units with glass coupling rod, and clips—$7.00. Rectifier elements, aluminum, lead, pair. 1"x4"—7c; 1"x6"—10c. Calibrated Wavemeters, 17-160 meters, complete $4.00. QSL cards, Two colors, highest quality, $1 per 100. Free samples. Postcard brings Complete Radio Catalogue. Terms—Cash or C. O. D. William Green, 207 Cathedral Parkway N.Y.C.

OMNIGRAPHS, teleplexes, natrometers, transmitters, chokes, meters, transformers, 50 watters, 210s S. tubes, motor generators, syncs, wavemeters, receivers—bought, sold, exchanged. L. J. Ryan, 9CNS, Hannibal, Mo.

8AQO-8XH selling out. Reason WSYR. One 600 volt 3Kw 240 cycle Eck Motor-Generator, 110 volt or belt drive. One 500 cycle Telefunken Type Crocker-Wheeler with 110 volt motor. 3Kw 110 volt Delco. RCA UV206 1Kw Tube used not over ten hours. RA10, CR13, and big list receivers, amplifiers and parts. Must have cash, no reasonable offer refused. Make offer or send for list. Clive B. Meredith, Cazenovia, N. Y.

HAWLEY Edison element battery and parts standard for over five years. Look at our patent pending connector—no thin wire to drop off—contains 20 times more metal than regularly used. Heavy shock proof cells, fibre holders, etc. Everything for a rapid-fire "B" supply. Complete assembled 100 volt "B" $10.00. Knockdown kits at still lower prices. Chargers that will charge in series up to 160 volts $2.75 to $4.00. Trickle B Charger for 90 to 150 volt "B" $3.75. Special transmitter "B" batteries up to 6,000 milli-amp capacity, any voltage. Write for interesting literature, testimonials, etc. B. Hawley Smith, 360 Washington Ave., Danbury, Conn.

9ALD's new Amateur Inductances going over big. See June, July *QST* display, also this issue. Our No. 29 Stand-off Insulator (June *QST*, p89) is only 20c and better than others like it; New 300 watt input De-Forest short wave tube, type R, $35.00; Very special double spaced condensers approximately 175 mmf. 3000 volts, very rigid construction, $1.50; New sizes edgewise copper strip, ¼"x1/16", 2½" inside diameter 6c per turn, 4" 8c; Don't forget the famous free "Hamalog," the first and still the best "Ham Catalog." E. F. Johnson, 9ALD, Waseca, Minn.

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CURTIS-Griffith 250-watt power-filament transformers 350-550 each side $12.50. Thordarson power-filament transformers for 7.5-watters $6.90. Thordarson power transformers 350-550 each side $11.00; 1000-1500 each side $16.00. Edgewound Inductance 6-inch turn 12c; 4-inch 10c. Aluminum square foot 85c; lead square foot 85c. 30-henry 150-milliamperes chokes $12.00. "Ham-List" 4c. James Radio Curtis, 5-A-Q-C, 1109 Eighth Avenue, Forth Worth, Texas.

HEADQUARTERS for Hams:—Immediate deliveries on Mueller 150-watt input tubes $15.00. RCA 5-watters $3.15. Tobe 5-MFD 2000-volt Condensers $13.75. Aerovox 1-MFD 1500-volt tested condensers $1.75. 15-dial Omnigraphs $25.00. "Ham-List" 4c. Romanyel Curtis, 1109 Eighth Avenue, Forth Worth, Texas.

FOR sale:—Two DeForest "H" tubes in original cartons, $12.50 each. Want motor generator or generator thousand or fifteen hundred volts. Radio 9AHG, R. E. Davis, Concordia, Kansas.

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6DIG—Joe A. Bowers, Box 87, El Centro, California.

6SM—A. E. Ekdale, 159 S. El Molino Ave., Pasadena, Calif.

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9ACU—Francis Walton, Browning, Ill.

9BLV—Ralph E. Sturm, 216 West Sixth St., Jasper, Indiana.

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nc4GB—Bert Wilson, 1713 Toronto St., Regina, Sask., Canada.

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nc4HM—C. H. Harris, 10806 125th St., Edmonton, Alta., Canada.

nc9AJ—British Columbia Amateur Radio Ass'n. (Inc.) 3423 Pender Street East, Vancouver, B. C., Can.

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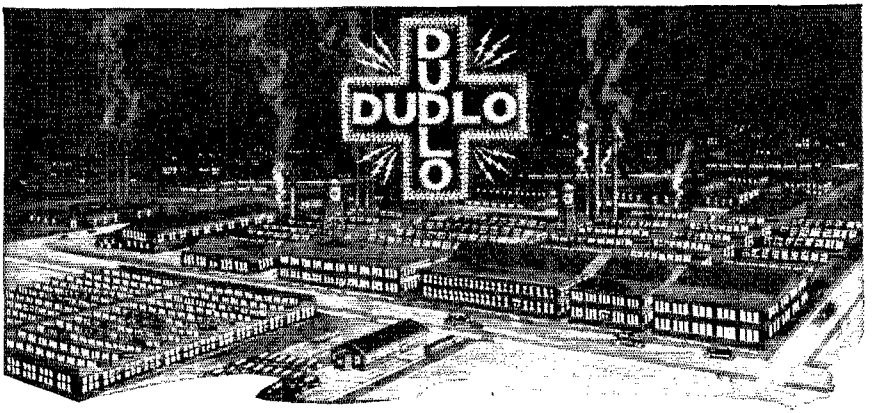

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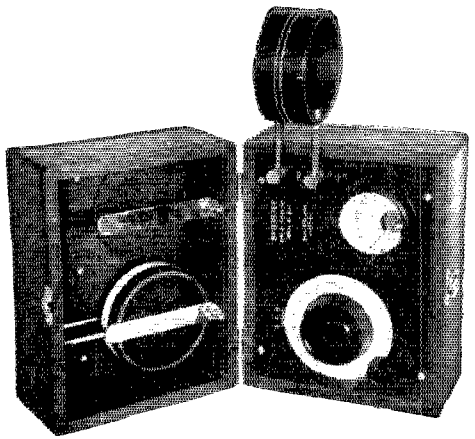

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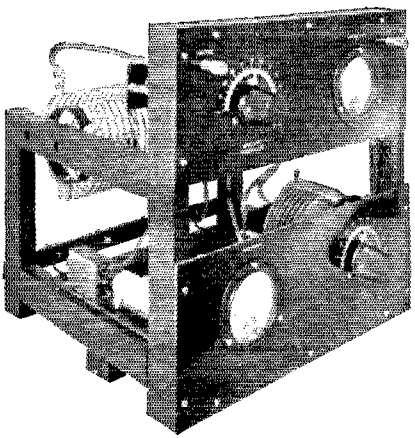

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