QST

DEVOTED ENTIRELY TO

AMATEUR RADIO

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

IN THIS ISSUE

THE SHIELD GRID TUBE

December 1927

25¢

Cunningham RADIO TUBES

SINCE 1915 — STANDARD FOR ALL SETS

Gifts

that bring happiness at Christmas time and throughout the year.

Radio sets and radio equipment make immensely popular Christmas gifts.

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E. T. Cunningham, Inc.
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In the Still of the Arctic Night

In the still of the Arctic night, broken only by the occasional bark of a far-off walrus, the Radio Operator cannot leave his ship, frozen into the ice pack, and run around the corner to the Radio Shack for a new filter condenser to replace the one that just blew out.

He has got to be sure when he starts that his equipment is not going to give out.

That is why Cliff Himoe took TOBE Condensers with him on the Bowdoin for the MacMillan Arctic Expedition.

Here is a Radio message just received from the boat: The TOBE'S are up to the mark!

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THE AMERICAN RADIO RELAY LEAGUE

HEADQUARTERS: HARTFORD, CONN., U. S. A.

RADIOGRAM

CITY OF ORIGIN	STATION OF ORIGIN	NUMBER	DATE	CHECK
	WNP	627	Oct. 4	

TO Tobe Deutschmann Co.

(STREET AND NUMBER, OR PHONE)

Cambridge, Mass.
(PLACE)

THIS MESSAGE WAS RECEIVED AT
AMATEUR RADIO STATION 1SZ
OWNER Clark C. Rodimon
STREET ADDRESS 1711 Park St. PHONE
CITY AND STATE Hartford, Conn.

Your filter condenser standing up well on Bowdoin's transmitter, with no signs of trouble at continuous 2000 volts dc regards from the arctic

Himoe WNP

SENDER'S ADDRESS AND PHONE NUMBER FOR REFERENCE:

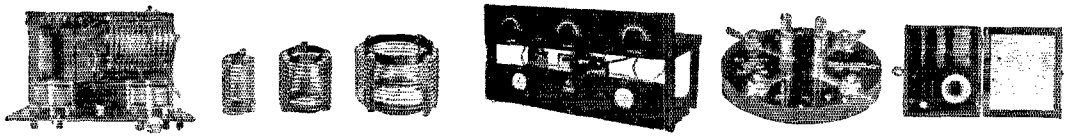
	FROM STATION	LOCATED AT	DATE	TIME	OPERATOR
Rec'd	WNP	Nain, Labrador	Oct. 4	5:33	cr
Sent	TO STATION				

PRINTED IN U. S. A. PLEASE READ OTHER SIDE—IMPORTANT

The University-of-Michigan-Greenland Expedition is also equipped with TOBE Condensers.

Make sure that your Radio Power Equipment includes TOBE Condensers. TOBE Condensers cure condenser worries permanently and painlessly.

Tobe Deutschmann Company
Cambridge Massachusetts



— Radio Engineering Laboratories

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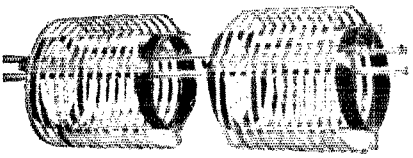

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Ultra construction embodies flatwise wound copper nickel plated ribbon mounted on high insulating glass spacers. Three clips furnished with each unit. The last word in Transmitting Inductances. Prices on application.

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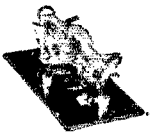

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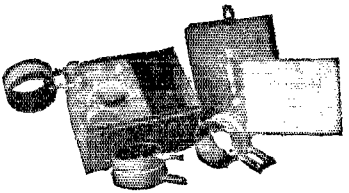
Short Wave Equipment - - -



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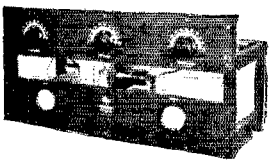

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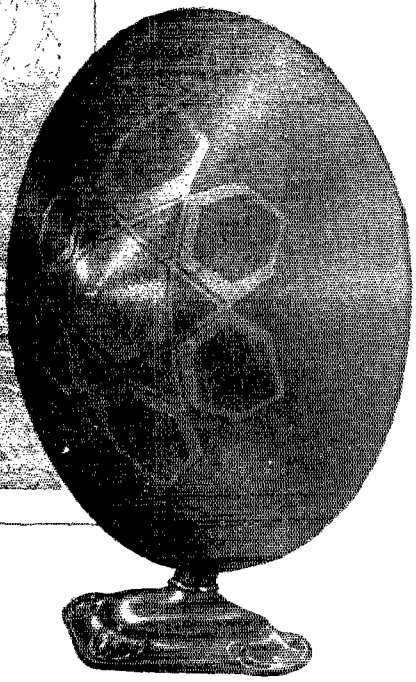

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QST

The Official Organ of the A·R·R·L

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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

Washington.

IF anybody had been able to tell us a month ago what this International Radio Conference was going to be like, we would have taken flight on the next ship to Patagonia or St. Helena or some other quiet jumping-off place, or found some convenient way of leaning accidentally against the high-tension terminals of our plate supply, or something. As it is, we expect to be a candidate for Elizabeth Hill or whatever the pretty name is of the big Government nut-house near this fair city. We have been right here for the longest month of our life, while our optimism has slowly seeped away like the charge in a bum condenser, and right here we're going to stick "for the duration". We started out with gay ideas of flitting back and forth about twice a week between here and Hartford, keeping an eye on both jobs. But that was forgotten in the first week, when we got a wire recalling us here when we sneaked home for the first week-end, and so Hartford is having to manage to get along without us and of course the Washington conference has the benefit of our picturesque presence and all that sort of thing.

What we most marvel at is our ability to write a paragraph as light and blithesome as that first one, when, really, fellows, it comes from a heart as heavy as lead. Things aren't going a bit well and the outlook is just as black as the inside of an Eskimo's boot. It is time to change seats and get a perfectly new picture of this radio situation.

The conference has been a marvelous affair in many ways. There are some forty or fifty countries represented, maybe more. The plenary sessions are colorful affairs, with frock coats and silk hats, uniforms and brass braid and plumes and medals and a hushed air of dignity in the main hall. People of many nations, the smartest minds in radio. Many languages in the corridors. Big delegations from the big countries, small delegations from the small countries. Big men, little men, government men, commercial men; official delegates, technical advisers, representatives of special interests; ministers, generals, captains, presidents of corporations, hangers-on; big-minded men, narrow-minded men. Men. Hundreds of them. Interpreters. Dozens of them. Mimeographed literature and minutes. Tons of it. A busy, busy scene.

Of course the conference is organized into committees. The committees in turn have one to three sub-committees. Some of the sub-committees have sub-sub-committees. There the actual work is done. Then it gets reported up the line, discussed some more, and finally adopted. Then at the plenary sessions the work of the committees is presented for final adoption. The committees really work very hard. They start off early in the morning and they work all day until a very late dinner, and always there is a number of the committees in session. There is a committee on general regulations, one on the mobile services, one on the fixed services, one on technical matters, and so on. Their chairmen are able men and they work hard and thoroughly.

This is the scene in which we have been working the past month. We have cards that admit us to all the meetings. We can't participate in the discussion but we can listen and we can sit near our American delegation, and when it's a subject that concerns us they will speak in our behalf. Nearly a month of this has gone by, and we don't dare to leave for an hour. Nearly a month more of it is in prospect, and the worst is yet to come.

We amateurs have our friends but they are few in number. We have our opponents, for one reason or another, and they are legion. By the time these words are in print we hope a merciful Providence or the exhaustion of the delegates will have brought this conference to an end. By that time the newspapers will have heralded the results far and wide and every amateur will know how we fared. But it is time right now to take new stock of the situation and put across a few new ideas, because there is every indication that the story is going to be a shocking one.

Few amateurs realize that amateur radio has grown to noticeable proportions only since the London Conference of 1912. There has never been an international agreement on amateur matters before. Amateur radio has just grown, receiving recognition in accordance with the inclination of the Administration concerned. Now the important fact in that connection is that many countries permitted amateurs to exist and gave them

some wavelengths only because they thought they might as well do so until this Washington Conference, when the matter would be settled for keeps. And so almost all these countries come to Washington feeling that their amateurs are only in possession of temporary privileges and that now they'll get together and agree what those privileges should be—and see that they aren't very much. Fellows, they don't like us. We're a nuisance. We want wavelengths, and wavelengths are mighty valuable things, so necessary for government and commercial needs that we oughtn't to have any. Of course the United States and Canada have their thousands of amateurs and seem to like them, and Australia and New Zealand believe in encouraging the amateur, and so the amateur is going to be recognized as a valuable asset for those that want him, each country being free to do as it pleases in that respect. But the wavelengths are precious and the amateur can't have many of them. Another thing is that most of the governments of the world control their own communications systems, and at this conference they are out to protect their state monopoly. Nobody must send a message that would deprive the government communication service of revenue. And it won't do just to pass a law that amateurs mustn't handle messages in these countries. The very number of the amateurs shows that they would be so difficult to control that the only safe way to protect the situation is to restrict the amateurs technically, so that it will be difficult for them to operate that they won't have the chance to deprive the state of many tolls. So again we reach the conclusion that amateurs should be severely restricted in their privileges.

That, in the main, is the situation confronting the amateur representatives. The delegations of the United States and Canada are for us, there are a few countries that believe we should be encouraged and have modest privileges considerably less than our own governments would propose for us, and possibly there are some governments that don't care. But most of them agree that the amateur ought to be severely restricted to very narrow bands, and there are a few delegates at least who do not think we should have any waves that are known to be useful for communication purposes.

It has been agreed, so far, that the allocations sub-committee ought to assign amateurs a band around 150 meters and a variety of narrow short-wave bands distributed thru the spectrum and arranged in harmonic relation. It is tentatively agreed that each nation shall set the maximum power that her amateurs shall use, and thus we in this continent escape that ideal figure of the European governments, 10 watts. It is agreed that any nation can prohibit her amateurs from engaging in international communication, and that amateurs can't handle any international messages or anything that looks like a message except by special arrangement between two countries.

Now all this doesn't sound so bad. In fact it sounds rather like a recognition of the amateur. He's discovered to be a good fellow, an asset, one to be encouraged; he ought to have wave bands, and some of them ought to be short waves. Doesn't sound half bad. But it doesn't mean a thing if the wavelengths aren't adequate to support existence, and that, dear little friends, is exactly the rub. How wide is narrow? Where will these bands be located?—how many of the bands will be useful waves?

We have been fighting our hardest. We have been talking amateur radio to everybody who would listen. We've made a few speeches. We've sat at scores of committee meetings. We have some delegations strongly for us and a few moderately for us. But most of them are against us. It is time to sound the note of warning, of impending disappointment. It is time right now for all amateurs to realize that we are practically certain to get badly short-changed and definitely trimmed at this conference. The odds are too much against us. We're going to suffer heavily. Our friendly nations have but a few votes. The opposing nations, who think it unwise or positively dangerous to give adequate frequencies to amateurs, have many votes. The outcome is almost certain. Get ready right now, fellows, for just the saddest news you could hear short of actual extermination. If we can get, from this conference, any privileges sufficient to insure any enjoyable operating, we're going to be lucky. It's no particular secret that England, who is very strong in the conference, wants to give us merely "spot waves" or bands of zero width, and the widest band anybody has proposed for us within our earshot has been 100 kilocycles. We wonder if they didn't mean 100 cycles—it wouldn't be much worse, and, besides, such generosity is just too much to bear. Putting it another way, if we can succeed in carrying home from this conference as much as 40% of the frequency widths we now enjoy in this country, we will regard ourselves as the most smiled-upon children of Fortune. Five per-cent is a much better guess at what we'll get, in spite of all that earnest talk, sleepless nights and the ardent efforts of a few friendly delegations can do.

Of course the fight isn't over and the day is by no means already lost. We haven't an ounce of courage or an erg of energy and somebody else besides ourselves is going to know that there was a scrap. But

there is no use blinking the fact that our chances for decent privileges are mighty slim and we wanted to tell you about it now, so that you can get ready for a jolt that will blow everything in sight. Understand, we are not sunk yet but it looks like we were going to get a sock that will shake us to our foundations. If we can duck it —oh, baby!

We positively do not mean to give the impression that in our opinion amateur radio is about to suffer an injury which will cause it to dwindle and disappear from the face of the earth. Nothing short of the denial of existence could do that. It is merely that it seems inevitable that we will get cheated out of a lot that we have thought ours, a lot that we have regarded as essential. But whatever we get, we can find a way to carry on with it, somehow. It may alter the game entirely, it may require new methods and a new order of coöperation amongst ourselves. But it may prove to be exactly what we need to inject new vim into a game that threatens to stagnate, now that everybody has worked all continents with a peanut. We've positively flourished under difficulties before. Perhaps what we need is a fresh lot of difficulties so we can do some more flourishing.

In the meantime let us all make the effort to adjust ourselves to the contemplation of a new set of regulations which, because they will be largely based upon the Europeon idea of radio things, promise to give us some heart-aches at first and a few unpleasant months of readjustment. The A.R.R.L. telegraphic broadcasts from the Communications Department Official Broadcasting Stations will put out the hot news as the story progresses at Washington. By all means listen for them.

And so to work.

K. B. W.

Big Dividends

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

THESE might easily have been dark days for Amateur Radio. There is an international radio conference in session in Washington. Representatives of fifty-two nations are engaged in drawing up a world wide radio agreement. Forty eight of these nations have no use for radio amateurs. Their delegates frankly say so.

Fortunately, our U.S.A. and our steadfast brother to the North, Canada, believes in us. I wish every one of you fellows could see for himself how much our own country believes in us. A.R.R.L. would go up many pegs in your estimation. Thanks to the fine reputation we have established down through the years, we have the good will and the respect of our Americans' authorities. It easily might not have been. But reasonableness, loyalty to each other and a high standard of conduct have prevailed, and as a result, amateur radio in our country anyway, is an established institution.

Canada is for her amateurs also. And Australia and New Zealand are kindly disposed toward theirs. This makes it four against forty eight. In whatever compromise is eventually reached, and there must always be compromise in radio, if chaos is to be avoided, the influence of the forty eight is bound to crowd down what the four would like to do for us. How far this crowding will go is unknown and unguessable at this writing.

The influence of our I.A.R.U. has been very helpful. Things would certainly have been worse had I.A.R.U. never been organized. The other countries have at least learned a little about amateur radio from I.A.R.U. But its two short years of life has not been enough to make all the nations amateur-conscious, as is the case with U. S. A., Canada, Australia and New Zealand. It has done something, and it is this something that has enabled the four pro-amateur nations to at least save us a place in World's Radio.

The amateur's place in World's Radio is to be a small place, compared to what we Americans have enjoyed in the past, but it will be something. It might easily have been NOTHING.

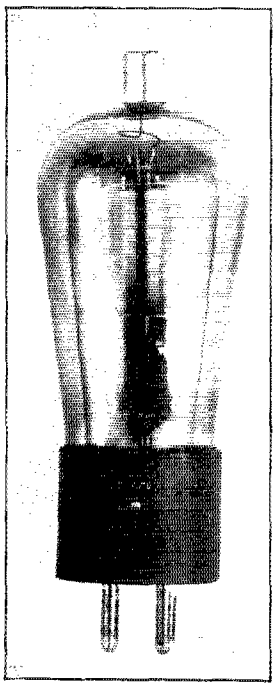
And so, we can be thankful. We are now drawing down the dividends from the investments in good judgment made in past years.

The UX-222 Shield-Grid Tube

By Robert S. Kruse, Technical Editor

THE audience for this story is not only interested but has been sitting on the doorstep and clamoring for the performance to begin. Everyone in the radio industry has of course known for a long time that some day there would be a commercial American two-grid tube and we have been urged to start talking about it. Unfortunately, talk is not very filling stuff and until the tube itself should arrive talk seemed worthless, for after all a tube that someone may have in a laboratory at Schenectady or Paris or Berlin does not help many of us to receive or transmit signals.

Now however, we have the tube; not only that but we have the shield-grid variety which seems to be the most desirable of the two-grid tubes. We can therefore begin to talk about a thing that is no longer a laboratory device but a commercial radio article with a great array of interesting uses — all of which may be bought over the counter as soon as the local radio store has managed to obtain a supply.



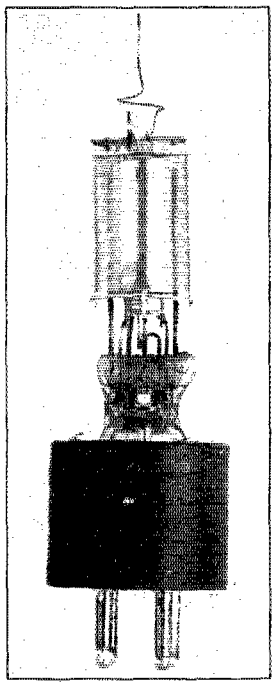
EXTERNAL VIEW OF THE UX-222 TUBE
Showing method of bringing the lead to the inner grid thru top of tube.

WHAT THE TUBE IS

First of all let us examine the tube's construction. Viewing the first photograph, we find that externally it looks like a CX-301-A with an additional terminal in the shape of a small brass cap where the tip of older tubes used to be. This cap connects to a small diameter spiral grid (see the "exploded" view) which surrounds the straight filament. This grid and filament appear to have been taken outright from the CX-220. Outside the grid there is quite naturally a cylindrical plate, of a rather larger diameter than the grid and filament would lead us to expect in an ordinary three-electrode tube or "triode".

The real difference comes in the "shield-grid" which is a sort of screen, insulated from the plate but covering both its outer and inner surfaces. Actually this screen consists (as the exploded view shows) of two overgrown spiral grids of close mesh but different diameter. One is of a size to slip between the plate and the ordinary grid, the other is of a size to fit over the outside of the plate. The two are connected together and brought out to the ordinary "grid" connection of the tube base.

As a final result we have a tube in which the plate is screened very thoroughly from the grid, even the *leads* from the two not coming near each other but being brought out at opposite ends of the tube. The question then naturally is—"Why should anyone want such a thing?" This automatically brings us to the uses of the tube.



STRIPPED VIEW OF THE UX-222 TUBE
Showing internal assembly with the "shield-grid" surrounding the plate.

These uses are appallingly numerous and almost all of them offer some show of usefulness in amateur radio. A very little thought will show that if after some 20 years we are still explaining the uses of the three-element tube (triode) then there must certainly be many more possible combinations for the four-element tube (tetrode). It is accordingly necessary to talk of the tube by the general process of suggesting the various ways in which it may perhaps be useful and supplying

enough information about the action of the tube to permit everyone to follow up his

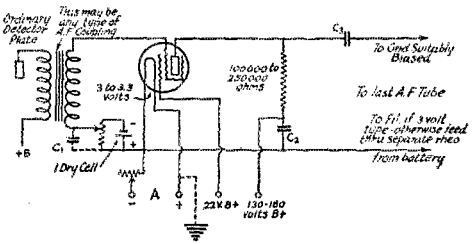


FIGURE 1. THE 222 USED AS A "SPACE-CHARGE-GRID" TYPE OF AUDIO AMPLIFIER

In this method of operation we can think of the inner grid as the source of the electrons on which the plate and outer grid operate This method of operation does not prevent feedback, hence is not advantageous for r.f. amplification. Since this is a "universal" diagram it must be modified to fit with various input and output tubes and to accommodate various tubes before and after the 222. If all the tubes use 3-3.3-volt filaments they may be operated from the same rheostat but if the other tubes are 5-volt type the 222 should have a separate rheostat. The grid of the tube following must be biased by resistance leak or inductance leak, each with a battery suited the tube.

C1 Optional but desirable, capacity ½μfd or more.
C2 Absolutely necessary if other resistance couplings ar used, capacity 1μfd or more.
C3 Mica condenser with leakage resistance above 100 megohms and capacity of .005 to .05 μfds. Only the better mica condensers will do, paper is rather hopeless.

own pet hobby in the hope that he will not swallow his own smoke but make a smudge with it so we may locate him, together with whatever information he has dug out during his trials.

THE SEVERAL STYLES OF 2-GRID TUBES

At the very beginning we find that there are several possible sorts of 2-grid tubes. Leaving out some of those that seem less important we have the following—

The space-charged-grid tube.

The two-grid tube with separate actions for the two grids.

The shield-grid (purpose for which the 222 is mainly designed).

The pliodynatron.

It is quite out of the question to make bare mention of all the possible ways in which these types can be used and again we must try to guess which will be of the greatest interest, leaving the others out entirely.

THE SPACE-CHARGE-GRID TUBE

The 222 may be used in the space-charge-grid connection, for audio amplification. Certain European types such as the Telefunken RE82 and RE212 may be used as audio amplifiers or (according to some experimenters) as detectors. With the usefulness of the 222 as a detector I have no experience, though the connection is given herewith.

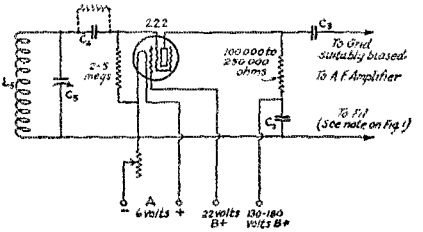


FIGURE 2. THE SPACE-CHARGE-GRID METHOD OF USING THE TUBE AS A DETECTOR

The same precautions must be taken with regard to filament voltages as were mentioned on Fig. 1. The constants are the same. L5 and C5 are chosen for the desired wavelength which may be anything that is wanted. C4 is the usual grid condenser. The leak may return to negative filament directly or across the grid condenser but care must be taken to avoid returning it to the battery side of any fixed resistors that may be used in the filament lead.

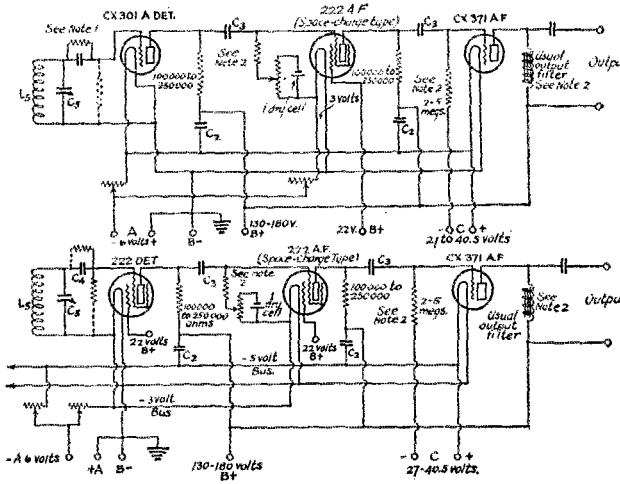


FIG. 3. THE SPACE-CHARGE-TYPE A.F. AMPLIFIER USED WITH DIFFERENT DETECTORS

All constants are as in Figs. 1 and 2. Note. 1—The grid return and position of the grid leak of this tube may be changed to suit the custom of the builder. Note. 2—The grid leak of this tube may be replaced by an audio-frequency choke.. If a tube other than the 371 is used the plate and grid voltages should be changed accordingly and if a 301-A is used the output filter may be omitted.. This last would not be advisable except in c. w. reception.

In the space-charge-grid connection the small grid next the filament is made *positive* by a connection such as that shown in Fig. 1. The purpose of this grid is now to

do away with the "space charge" which normally consists of a cloud of electrons hanging about the filament. These electrons are naturally snatched away by the positive grid, which increases the mutual conductance of the tube because the electron cloud normally constitutes a sort of screen. That is a sufficiently inexact explanation but will answer for the moment. The practical effect is to produce a condition under which the tube *operates* with a "mu" of 60 and at the same time maintains a mutual conductance high enough so that the voltage amplification obtained may run as high as 40. The plate resistance is high so that the output must be taken from a resistance coupling as shown but at the same time it is not so high as to destroy the usefulness of the high mu just referred to, as would tend to be the case if one attempted to obtain a mu of 60 with three elements.

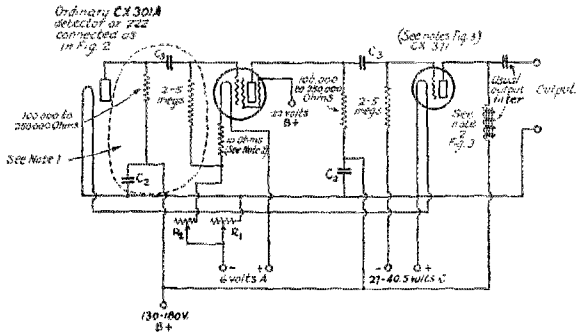


FIG. 4. THE SHIELD-GRID METHOD OF USING THE TUBE AS AN AUDIO AMPLIFIER

This is not the customary way of using the tube but it may be employed where high audio gain is desired, taking care not to operate above the power limitations of the tube. More than a single stage is seldom to be thought of and shielding of the input and output circuits is then practically essential just as in the circuit of Fig. 5. The shielding must of course be adapted to audio frequencies.

Note 1—The method of coupling the detector to the 222 amplifier may be of any sort suited to the detector tube used, the plate voltage being changed accordingly.

Note 2—The grid bias may be provided by the drop thru a 10 ohm resistance as shown, or by a C battery. It is not especially critical.

LOW PLATE VOLTAGE OPERATION

For some reason not at all clear to me there was some time ago a wild outburst of enthusiasm over the fact that a 2-grid tube may be made to operate as a detector or audio amplifier at very low plate voltages. For instance, the RE82 and RE212 Telefunken tubes previously referred to will

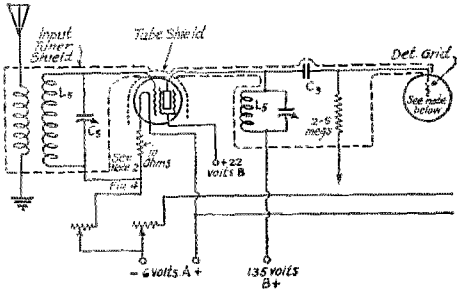
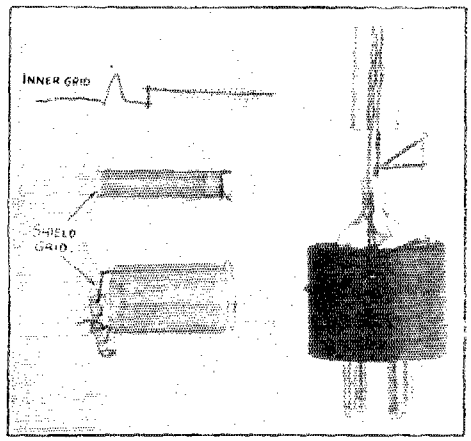


FIGURE 5. THE SHIELD-GRID METHOD OF USING THE TUBE AS AN R.F. AMPLIFIER

Examples of such use are shown elsewhere in this issue. The constants are as in the other figures. Note the connections to the detector are shown in an incomplete manner because of the very many possibilities. Thus the grid leak may return to the positive or negative filament or to a C bias depending on the use of the set while the plate circuit may contain a tickler coupled back to the second L5, or a separate tuned circuit not coupled back or may simply feed a headset or loudspeaker or an amplifying transformer primary. All this has no effect on the arrangement of the r.f. stage with the exception of the tickler which must enter the detector shield in a suitable manner as shown in the sets described in this issue.

perform as good audio amplifiers or as detectors with plate voltages in the vicinity of 4-15. The question then is—"What of it?" Dry batteries are neither expensive



EXPLODED VIEW OF THE 222

At the upper left is the inner grid, consisting of a wire spiral welded at each turn to a straight wire. This wire is supported at the upper end by the glass bead as seen in the stripped view while the lower end is held in line by projecting into a disc of lava resting in the lower end of the inner part of the shield grid, shown next below. The filament passes through the exact center of the same lava disc and goes up thru the center of the inner grid to another support held by the glass bead. The inner grid is used as the control (input) grid when operating by the shield-grid method but is biased positively and used as a space-charge grid when operating under the space-charge method. The inner shield-grid lies between the inner grid and plate while the outer surrounds the plate. They are connected together by a plate which may be seen at the left end of the outer portion of the grid. It is spot welded and acts as part of the shield. The shield is biased positively when operating under the shield-grid method, while with the space-charge method it serves as the control member.

nor bulky and one may just as well use a somewhat simpler and cheaper tubes, omit a few things from the circuit and add 40c worth of B battery. Of course as a stunt it is interesting to do the thing and one may with careful handling even make the tube detect or amplify with no plate voltage except that obtained from the A battery by returning the plate circuit to "plus A." If anyone is sufficiently interested to try the arrangement a reading of the last year's radio literature will produce various ingenious circuits for the purpose.

SEPARATE USES OF THE TWO GRIDS

The tube in which the two grids are used for separate purposes is rather obvious, and incidentally the 222 is not especially aimed at that purpose and not especially good for it. The combinations that one can think of readily are—

Reflex systems with one grid for r.f. and the other a.f. Reflex systems with one grid for detection and the other for r.f.

Neutralized r.f. stage with the extra grid used for the neutralizing feedback.

Examination of these uses seems to suggest that they, too, are more interesting than useful, though there is no intention to suggest that there is no room for experiment and study.

THE SHIELD-GRID TUBE

Elsewhere in this issue the theoretical basis of shield-grid r.f. amplification is discussed at some length. It is accordingly not necessary here to go into detail and it suffices to say that the use of the UX-222 as a shield-grid tube offers for us the finest advantages we may expect from the tube in reception, and transmission—and both for the same reason, namely that this type of tube at last offers an escape from the ancient bugbear of plate-grid capacity inside the tube.

The importance of this can hardly be over-emphasized for at once we have offered us—

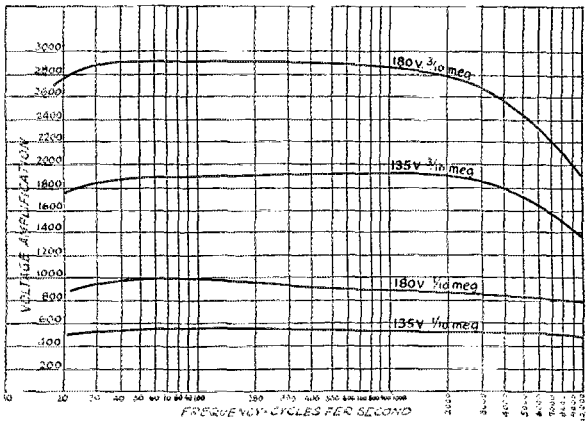
Very large gains per stage of r.f. amplification.

Freedom from the necessity of neutralizing.

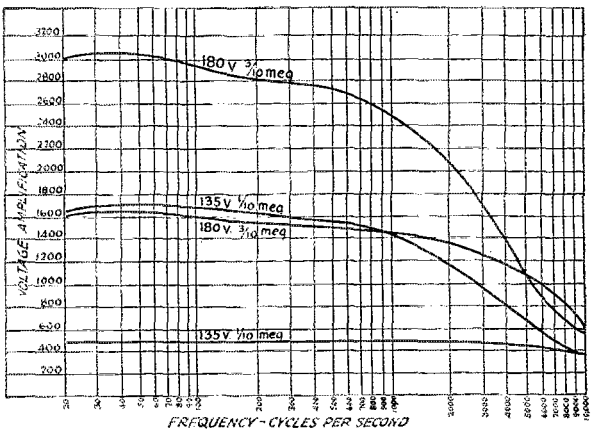
The ability to amplify successfully at wavelengths as low as 3 meters.

Oscillators relatively free from variations caused by tube heating and tube vibration, and effects caused by voltage changes.

Very large gain per stage of a.f. Amplification.



UX 222 AUDIO AMPLIFIER SHIELD GRID CONNECTION



UX 222 AUDIO AMPLIFIER SPACE CHARGE CONNECTION

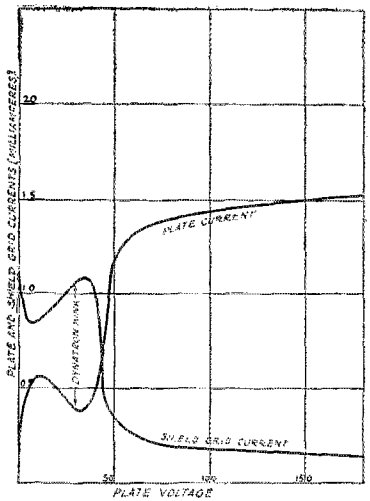
FIGURE 6.

Audio amplification obtained from two stages of 222 plus 1 stage of 371, all resistance coupled under the following conditions:

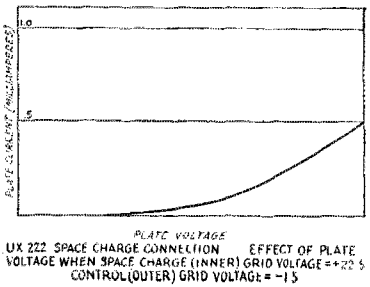
Plate load resistance for the 371 tube 2500 ohms.
Plate coupling resistors for 222 tubes changed as indicated on curves.
Plate voltages for all tubes changed as indicated on curves, bias of 371 changed from 27 to 40.5 to correspond.
Coupling Capacities in all cases .015 µfd and leaks 5 megohms.
Other conditions for shield-grid method.
Shield grid voltage + 22.5
Inner (control) grid bias — 1.5 volts

NON-NEUTRALIZED R. F. AMPLIFIERS

Elsewhere in this issue there are shown two receiving sets using a stage of 222 for r.f. amplification ahead of the detector. Either of them can be made to operate in the broadcast or other wavebands by simply changing the tuning coils and condensers. The theoretical background of these sets is discussed in a separate article and will not be taken up here except only to point out that whereas there is



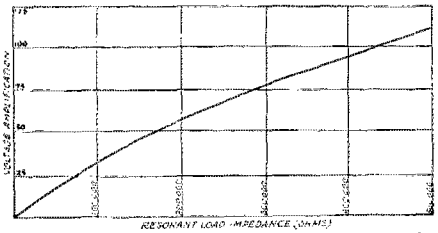
UX 222 SHIELD-GRID CONNECTION. EFFECT OF PLATE VOLTAGE WHEN CONTROL (INNER) GRID VOLTAGE = −1.5 SHIELD (OUTER) GRID VOLTAGE = +45



UX 222 SPACE CHARGE CONNECTION. EFFECT OF PLATE VOLTAGE WHEN SPACE CHARGE (INNER) GRID VOLTAGE = +22.5 CONTROL (OUTER) GRID VOLTAGE = −1.5

some question as to the usefulness of such terrific amplifications in 3 stages of broadcast-wave amplifier (200- to 600-meter region) there is no question at all as to the desirability of a very great increase in sharpness and sensitivity in *one* stage of amplification at the short waves, and especially in amateur telegraphic and telephone work.

The biggest difficulty has been that the 301-A type of tube was not suited to short-wave r.f. and we had no means of bringing up the signal level except by using a larger antenna or coupling closer to the old antenna, the effect in both cases being to bring the noise up with the signal—making a net gain of 0 as far as readability went.



UX 222 SHIELD-GRID CONNECTION. EFFECT OF IMPEDANCE OF RESONANT LOAD ON VOLTAGE AMPLIFICATION WHEN PLATE VOLTAGE = +135 OUTER (SHIELD) GRID VOLTS = +45 INNER (CONTROL) GRID VOLTS = −1.5

Now, however, we have an r.f. amplifier tube that is actually effective at all wavelengths above about 3 meters and therefore we are able to amplify the desired signal while at the same time the selectivity of the amplifier prevents the surrounding "background" from coming up with the signal. In a clear receiving point this is not fully appeciated—in a noisy one it is a godsend.

SHIELDING

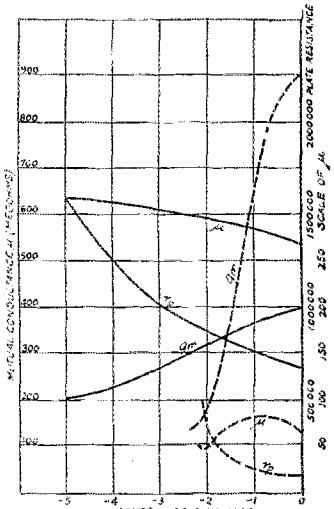
As will be seen from the description of the tuners made by Messrs. Westman and Bourne, it is not sufficient to shield *inside* the tube, we must also shield the input circuit from the output circuit—and this holds at all wavelengths if the most is to be gotten from the tube. Feedback through the batteries must also be prevented, either by filters as in Bourne's receivers or by the use of separate batteries as in Westman's and in the crude affair used by the writer. Without these precautions the full beauty of the shielded-plate method of operation (which is of course another way of saying shield-grid) cannot be appreciated.

SUPERHETERODYNE WORK

It was suggested above that the tube works at all wavelengths. This of course includes the "intermediate frequency" region in which the superheterodyne amplifiers work. Since the possible voltage gain of one stage of 222 is so large there seems an excellent chance that a single stage of such i.f. will out-perform the usual 2- or 3-stage affair. One or possibly two receivers of this sort will be described later. Various combinations are possible and these will be considered at that time.

OSCILLATORS

As we all are only too well aware our big difficulty in making oscillators operate at constant wavelength is that the tuned circuit does not entirely fix the frequency.



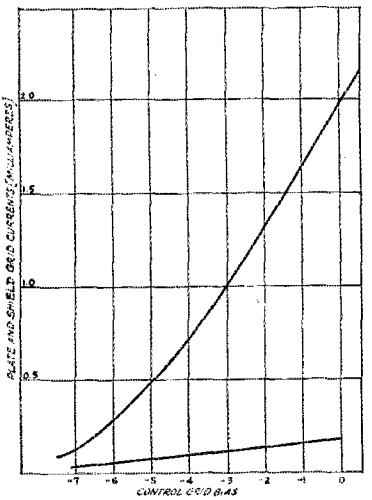
UX 222 EFFECT OF CONTROL GRID BIAS ON G_m, μ AND r_p FOR BOTH SHIELD-GRID AND SPACE-CHARGE METHODS OF OPERATION, THE CONTROL GRID IN EACH CASE BEING THE ONE APPROPRIATE FOR THE METHOD.

THE DASHED CURVES APPLY TO THE SPACE-CHARGE METHOD.

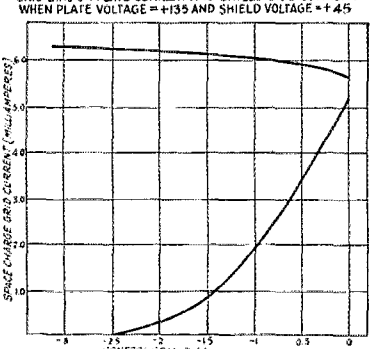
We come fairly close to it sometimes by running the tube cool and using a large capacity and a low-resistance coil but we never quite hit the thing at the shorter waves unless crystal control is resorted to. The reason is that the tube capacity insists upon working its way into the argument and upsetting things. The most troublesome of these possible tube capacities is the plate-grid one which permits feedback through the tube. The forcible removal of this feedback by the introduction of the shield grid leaves us in a more favorable position for providing our feedbacks by external means that are under better control with a possibility of smoother and steadier operation. This is a subject in itself and more will be said of it later. The 222 is of course a small tube and with it nothing more than experimental work may be done but perhaps that is not the end of the story and we may in the end have not only laboratory oscillators but actual transmitting oscillators which are somewhat more free from the undesired effects spoken of.

THE PLIODYNATRON

One type of oscillator which is possible with the 222 may be of considerable use for laboratory work at least. This is a sort of oscillator which does not use the ordinary principle of feedback from plate to grid but instead takes advantage of a very curious reverse-current effect caused by "secondary emission" from the plate. This effect is shown in one of the curves herewith and is explained in the article on the use of shield-grid tubes as r.f. amplifiers. Just now we are interested in it from the stand-



UX 222 SHIELD GRID CONNECTION EFFECT OF CONTROL GRID BIAS ON PLATE CURRENT AND SHIELD GRID CURRENT WHEN PLATE VOLTAGE = +135 AND SHIELD VOLTAGE = +45

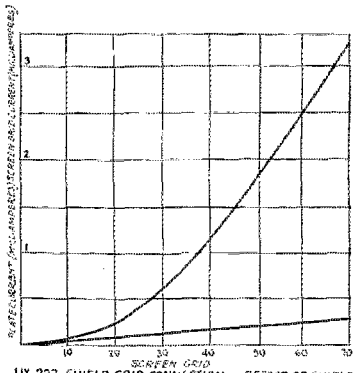


UX 222 SPACE-CHARGE CONNECTION EFFECT OF CONTROL GRID BIAS ON PLATE CURRENT SPACE-CHARGE GRID CURRENT WHEN PLATE VOLTAGE = +135 SPACE CHARGE (INNER) GRID = +22.5

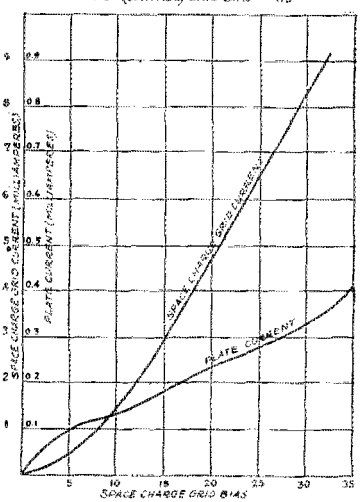
point that any tube or arc curve with such a kink in it can be used to produce oscillations in a tuned circuit associated with the device. The tube and the circuit can be connected in several ways and it suffices now to say that the advantage of the affair would be the use of untapped coils without ticklers and tuned by a single condenser. It is hoped that we will be able to describe such a device later and it therefore need not be discussed here in detail.

TRANSMITTING AMPLIFIERS

What has already been said with regard to r.f. amplification must make one think how nice it would be to have a big brother of the 222 as an amplifier for transmission. One could then get large amplifications in a single stage, and with reasonably careful screening could work without frequency doubling while at the same time being reasonably sure that the oscillator would proceed steadily though the antenna was



UX 222 SHIELD GRID CONNECTION EFFECT OF SHIELD GRID BIAS WHEN PLATE VOLTAGE = +135 INNER (CONTROL) GRID BIAS = -1.5



UX 222 SPACE-CHARGE CONNECTION. EFFECT OF INNER (SPACE CHARGE) WHEN PLATE VOLTAGE = +135 OUTER (CONTROL) GRID VOLTAGE = -1.5

swinging, or the plate voltage of the amplifier changing. The main advantage would seemingly be that one might expect to operate a reasonably large amplifier by an oscillator small enough to be battery-driven. Note however that the curves of the 222 (plate voltage against plate current) show an increase of only 7% (1/10 mil.) in plate current when the plate voltage is changed from 85 to 160. Compare this with an increase of 170% (9.5 mils.) for the 301-A tube. Thus a bad ripple in the plate supply (poor B sub) should not bother the 222 greatly while its transmitting "big brother" should be able to operate decently in the face of a poor plate supply filter or bad regulation of plate voltage—or perhaps even the effect of key thumps.

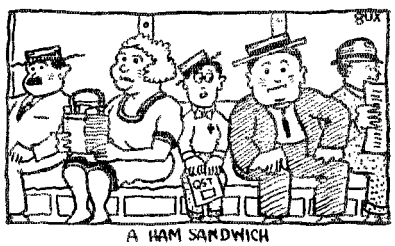
This has, as was suggested at the start, been a most hasty and general discussion. That it has been possible to cover the subject even in part is due to the coöperation of several of our good friends in the League and of Mr. Harold Westman of this staff.

Corrections on International Test Results

SINCE the results of the International Relay Party appeared in *QST*, the following changes and additions have been made in the list of certificate winners: With 40 points, svAYRE becomes OFCS for Venezuela; ep3FZ wins in Portugal with 11 points; and sa FC6 gets the certificate for Argentina with 24 points. It is unfortunate that an error was made in naming oz2AC as winner in New Zealand with 72 points. Oz3AR, whose report arrived after the article was printed, shows a total score of 88 points, which has been checked and found to be correct. This therefore means that 3AR receives the certificate for New Zealand instead of 2AC.

On the American end of things, further reports have necessitated two changes. It develops that 7DF tied 6AM with his one point for China, and nc5AJ with his one point for New Caledonia. This means that in spite of the announcement previously made, no certificate can be awarded for either of these two countries. We are sorry that these changes are necessary, but it appears that 7DF's first report was lost in the mails, so that we had no record of his scores until now.

—*L. A. J.*



A HAM SANDWICH

The Shield-Grid Tube as a Radio Frequency Amplifier

The material presented here is obviously not the sort that could be obtained without a great deal of work and we are indebted to the staff of the Radio Frequency Laboratories for it. It is from their notes, and conversation with them, that we are able to present these facts concerning tetrodes.
—The Technical Editors

SINCE the early days of the high-vacuum audion, various experimenters have proposed the use of one or more electrodes in addition to the usual control grid and the plate. Their purpose has generally been to exaggerate certain of the amplification or rectification effects which characterize the simple triode, either by modification of the primary electron flow or by the introduction of useful secondary emission currents, or both in combination. An extensive laboratory technique in the use of multiple electrodes for purposes of amplification alone has been built up both in this country and abroad, which has been utilized in European radio apparatus to a considerable extent. But, although American physicists have done their share in contributing to the existing knowledge of these devices, the results of their work have thus far enjoyed practically no public use in this country, presumably because it has not previously seemed of commercial advantage to release the tube.

Of the extensive group of multiple-electrode tubes which have been proposed for various purposes one of the simplest and most useful forms is the four-electrode amplifier or *tetrode*,[1] which comprises a heated cathode as the primary emitter, an anode or plate, one control grid (as in the ordinary audion), and a second positively polarized grid which acts on the primary electron stream. Secondary emission[2] from all of the cold electrodes is either absent in the operating range of the tube or, if present, is so managed as to prevent it from influencing appreciably the relay action.[3] The present discussion is limited to some experimental results of practical interest obtained at Radio Frequency Laboratories using standard commercial circuits and circuit elements, with tubes of this general type as amplifiers at broadcast frequencies.

The use of a stationary, or polarized grid next to the filament, while the second

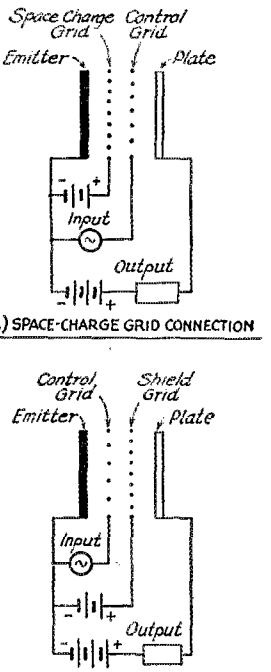


FIG. 1. THE DISTINCTION BETWEEN THE SPACE-CHARGE VARIETY OF TWO-GRID TUBE AND THE SHIELD-GRID VARIETY WHICH IS HERE DISCUSSED

grid, between the stationary grid and the plate is connected to the input circuit as a control grid, has come to be called the "space-charge grid" connection. This arises from the fact that the sole function of the stationary grid in this case is to accelerate the electrons emitted from the filament and neutralize the relatively in-

1. This term is a logical extension of the system of vacuum tube terminology introduced several years ago by Prof. G. W. O. Howe.

2. Secondary emission is the emission of electrons from a relatively cool electrode (plate or grid) caused by the violent impact of the electrons arriving from the filament. The secondary emission may equal or even exceed the normal electron flow so that reverse currents "against the voltage" may exist.

3. In a paper read before the Philadelphia Section of the Institute of Radio Engineers, May 24, 1926, Ballantine described some work he had been doing over a period of several years on various applications of the tetrode to r.f. amplification, a.f. amplification, detection, crystal oscillators and automatic volume control, using the tube in both space-charge and screen-grid connections.

tense space-charge field which surrounds the cathode. The cloud of negative charge surrounding the filament in an ordinary *triode*, when the control grid is at or near the potential of the negative end of the

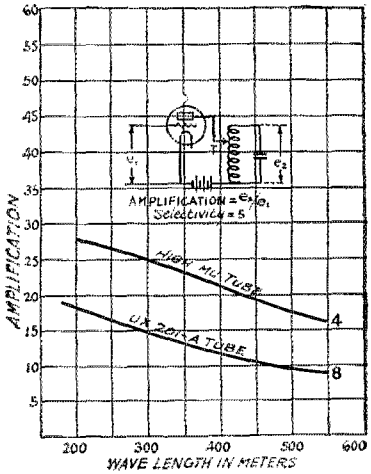


FIG. 2. REPEATER AMPLIFICATION FOR TRIODES

The position of the tap T is adjusted to obtain selectivity 5 as expained in the text. The numbers of the curves correspond to those on the tubes in the photograph.

filament, becomes more and more dense as the gradient out to the plate (determined by the plate voltage) is made less. It follows, therefore, that a partial neutralization of this congested condition by the interposition of a positive grid near the cathode (see Fig. 1A) tends to allow the control grid to operate effectively at lower values of plate voltage. As a supplemental but not equivalent action, the space charge grid may be thought of as increasing the effective emission of the filament, so far as the effect of grid and plate on the plate current are concerned. The space charge tetrode, as proposed by Langmuir,[4] Schottky[5], and Seibt[6], has been exploited for a number of years in commercial German tubes (such as the old Siemens-Halske "Model 92" and the modern Telefunken Type RE-82) as a means for obtaining a good value for the control factor at unusually low values of plate voltage. The space-charge tetrode is particularly suited for use in aperiodic amplifiers. It may, as shown by the German technique, yield a larger factor of merit even in a resonance amplifier, in the special cases where it is necessary for other reasons to work with low filament emission and plate voltage.

4. German patent No. 239,539. See also U. S. Patent No. 1,558,437.
5. German patent No. 310,605.
6. U. S. Patent No. 1,592,387.

At the present time in this country, where power units are generally available for supplying high d.c. plate and grid voltages, the space-charge tetrode loses its usefulness in the special field of amplification between high-impedance tuned circuits. For such applications the "shield-grid" tetrode proposed by Schottky[7] can be arranged to yield almost as much amplification in one stage as two standard triodes in two cascaded stages, using tuned circuits having the same factor of merit in each case. This article will be confined to a description of the shield-grid tetrode in a resonant amplifier stage.

It is customary to define the factor of merits of an *amplifier tube* as follows:

$$\text{Factor of merit} = g\sqrt{R_p}$$

$$= \mu/\sqrt{R_p}$$

where μ is the amplification factor of the control grid on the plate, R_p is the a.c. plate resistance of the tube, and g is the control factor or mutual conductance. This factor of merit is simply proportional to the maximum repeater amplification which can be obtained from the tube, using a given resonant circuit coupled or connected between plate and filament with optimum coupling. Of course in practice it may be difficult to vary the coupling over a wide range without altering the constant of the tuned circuit. But the following is a good working rule, borne out in practice:

Provided that the plate resistance is kept sufficiently low to allow adjustment of the plate load to match the tube plate resistance (optimum coupling) the repeater amplification of a stage is greater for a tube having the greatest value of the factor.

In considering how to make the tube factor a maximum it must be kept in mind that there are definite limitations as to where the operating point may be situated in the tube characteristics. The control grid must either draw no current at the operating point (since it is to be operated from a sharply tuned circuit) or the slope of the control-grid-current, grid-voltage curve should be small enough to make the grid resistance of the order of a megohm or more. This usually requires that the control grid circuit be returned to the negative end of the cathode or that it be given a slight negative bias, depending

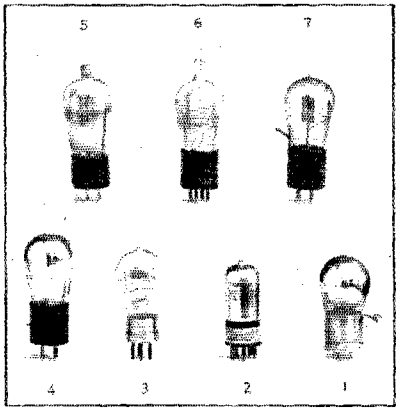
7. German Patent No. 300,617. U. S. Patent No. 1,537,708. See also:
Schottky, Arch. für Elekt, 8, 1919, p. 299.
Möller, Elecktronenröhren, Vieweg, 1922, p. 44.
Zenneck-Ruhkop, Drahtlose Telegraphie, 5th ed Euke, 1925, p. 559.
Barthelemy, L'Onde Electrique, 6, 64, p. 152.
Hull-Williams, *Physical Review*, 27, 4, p. 432, 1926.
Beatty, *Experimental Wireless*, 4, 49, p. 619.

upon the position and density of the grid. Furthermore, for motives of economy it is desirable that the stationary grid shall not draw an excessive current. Thus although the design of a tube to maximize the factor of merit may be guided by considerations of the distribution of field due to the electrodes and by examination of the current flow under the assumption of unlimited emission, such considerations are necessarily only general and qualitive.

For a qualitative discussion of the maximum tube factor, it simplifies matters to consider the maximization of the quantity gR_p which is simply μ, the amplification factor, and which increases as the quantity gR_p increases.

Suppose then, that we start with a given cathode or filament, of fixed electron emission. The control grid is usually placed as close to the emitter as the physical safety factor will permit, in order to increase the grid control factor, g. If then the plate is the only other electrode in the tube, the plate resistance R_p will depend largely upon how thoroughly the grid shields the region of dense space charge near the filament from the electric field of the plate. The greater the density of the grid, the greater will be this shielding effect and the larger R_p will be. Over a certain range of variation in the grid density, the control factor g is practically independent thereof. Thus $\mu = gR_p$ will increase rapidly for a time with increasing density of the grid mesh. The shielding effect, and hence R_p, is also increased by increasing the distance from the plate to the control grid. However, this cannot be carried far, if we are limited to a specific bias on the grid unless the plate voltage is also increased. In general, it will be noticed that all "high-mu" triodes have a denser grid than "low-mu" tubes and the plate spacing is usually about the same as in a "low-mu" tube unless higher plate voltage is specified. After the grid density has been increased to a certain value for a given grid and plate spacing, it is found that the control factor g decreases rapid with increasing density of the grid. Thus for any given filament, and operating voltages, a definite maximum in the amplification fact, μ, is found, which cannot be exceeded on account of the decrease in g that eventually accompanies any change in tube geometry which increases R_p.

In a conventional three-electrode receiving tube operating at standard voltages the maximum obtainable value of μ is of the order of 50. In Figure 2, curve 4 is the repeater voltage amplification at broadcast wavelengths of a special three-electrode tube operating at a point giving $\mu = 51$, with a plate resistance, $R_p = 85000$ ohms. The amplification was measured in the usual way with a calibrated, low impedance attenuator on the input and a vacuum tube voltmeter. In the plate circuit of the tube there was connected a standard tuned secondary circuit, consisting of a condenser-tuned shielded coil of a type commonly used in broadcast receivers, coupled to the plate-filament circuit by a coupling somewhat less than the optimum value for maximum amplification. The degree of coupling was set to give a certain stage selectivity at 300 meters, the selectivity being defined by the index number 5 on an arbitrary scale. (A selectivity of 5 on this scale can be described as the selectivity found by a number of independent experiments to yield, on the average, satisfactory broadcast reception when three similar stages are cascaded,



THE VARIOUS TUBES FROM WHICH THE CURVES OF FIG. 2 AND 3 WERE OBTAINED

The numbers correspond to the curves. Tubes 1, 2 and 3 are foreign models, tube 5 is the UX-222, tube 6 a laboratory model and tube 7 a laboratory model with a heavy filament. Tube 4 is a high-mu triode.

using four equal tuned circuits. Roughly speaking the value of 5 for the stage selectivity is characteristic of the better grade of six-tube receivers having three non-regenerative t.r.f. stages). Curve 8 of the same figure is the voltage amplification for a UX-201-A tube operated at $\mu = 8.6$, $R_p = 9500$, using the same tuned circuit with coupling adjusted for selectivity equal to that in the circuit represented by curve 4.

The advantage of using the "high-mu" tirode is clearly shown. At 550 meters the μ-50 tube gives twice the amplification of the μ-8 tube for the same stage selectivity.

Having established the fact that the upper limit of a three-electrode tube is defined by a μ of the order of 50, the next step is to increase the tube factor by converting the tube into a shield-grid tetrode. It has been stated that the plate resistance increases as the electro-static shielding be-

tween plate and filament is increased. From this point of view, we see the high resistance triode as a device in which the grid serves the double purpose of a (1) *direct control element for the plate current*, and a (2) *shield which reduces the control of this current by the plate.* The shield tetrode is merely a tube in which these two functions are separated; the control function is retained by a grid placed close to the filament and the shielding function is assigned to a second, stationary grid, which is interposed between the control grid and the plate. These connections are shown diagrammatically at Fig. 1b. An assisting field is created between the control grid and plate by impressing a substantial positive bias on the shield grid. The mesh of the shield grid is made relatively dense, like the grid of a high-resistance triode, and the tube is rendered almost free from the mutually opposing connection between shielding and space-current control that exists in the single grid tube. For the same value of the control factor, g, that is obtained in the best triode, the plate resistance may be increased almost at will. by properly positioning and biasing the shield grid. Viewed in terms of the amplification factor, μ of the control grid on the plate, the situation may be described as follows: *The amplification factor of any one electrode with respect to a second electrode is determined by the relative effects of the two electrodes upon the space change at the surface of the filament.* In this form of tetrode, the relative effects of the shield grid and control grid define one partial amplification factor, which corresponds to the amplification factor of a single triode. The relative effects of the plate and shield grid upon the space charge define a second partial amplification factor. The overall amplification factor, namely that of the control grid on the plate, is actually equal to the product of these two. *Thus it is not inappropriate to regard the shield-grid tetrode as two ordinary amplifier tubes combined in geometric ratio into one.* It is convenient in practice, for reasons connected with the location of the operating point in the region of reasonable battery voltages, to make the amplification factor of the control grid on the shield-grid somewhat smaller than the amplification factor of the shield grid on the plate. This proportioning of the partial amplification factors is, incidentally, consistent with the practice of using a shield grid having a very narrow spacing to reduce the electrostatic capacity between control grid and plate, which may be desirable for external circuital reasons.

The following are typical values of amplification and plate resistance for different tetrodes all having five-volt, quarter-ampere filaments, operated with a maximum battery voltage of 135, and negative control grid:

μ	R_p
162	250,000
195	260,000
200	500,000
235	375,000
285	810,000

These values are simply taken at random from a number of different model tubes in order to show the order of magnitudes of the quantities involved. It illustrates the point that when using the separate shield grid, the control factor g and plate resistance R_p are less dependent on each other than in any *triode*.

Tubes of this type naturally yield much higher amplification *for the same selectivity* than the best three-electrode tubes. In the broadcast band, with practical tuned-circuit couplings the amplification does not increase as rapidly as the tube factor increases unless the selectivity is disregarded entirely. Furthermore, an increase in the plate resistance above 200,000 ohms is not of much practical value so far as amplification is concerned because of the difficulties of coupling the circuit to the tube to obtain optimum voltage transfer.

These points are illustrated by the curves of Figure 3 which show a collection of measurements of repeater amplification for different shield-grid tetrodes using the same tuned circuit in the plate. The coupling in each case is adjusted to give the same *stage selectivity* at 300 meters, corresponding to the index number 5 referred to in connection with Fig. 2. Curves 1, 2 and 3 are measured amplifications for tetrodes of Dutch, German and British manufacture respectively. These tubes all exhibit low filament emission and were ostensibly designed to operate as shield-grid tetrodes. Hence the high amplification effect is not as conspicuous as it might be in a tube designed for one purpose only, although considerably better in all cases than could be obtained with *triodes* having the same filaments and operated at the same voltages.

Curve 5 shows the repeater amplification of an American shield-grid tetrode recently introduced to the market, type UX-222, using the same circuit, adjusted for the same selectivity as before. At the operating point for this curve the constants of the tube were:

$$\mu = 285, \quad R_p = 810{,}000$$

Curve 6 is the repeater amplification of an RFL laboratory model (type ES-11) using the same circuit. The filament in this tube has about the same total emission

as tube 5 but the electrode structure is entirely different in shape. At the operating point the constants were: $\mu = 168$, $R_p = 375{,}000$.

Curve 7 is an excellent illustration of the value of a compromise, wherein the plate resistance is lowered below the maximum attainable value and the control factor is increased. This tube is another RFL model, type A-3, and has a shield grid of wider mesh than tubes 5 and 6. The emitter is a heavy oxide filament *adapted for use with a.c.* The same tuned circuit was used in the plate adjusted for the same selectivity. The amplification at 300 meters is 30% higher than that obtained with the tubes of higher resistance, reaching the value of 55,—noteworthy for these frequencies. At the operating point the constants are: $\mu = 178$, $R_p = 209{,}000$.

No mention has been made here of a matter which has been given considerable publicity in connection with shield-grid tetrodes, namely the question of the reduction or suppression of grid-plate capacity in such tubes accompanying the introduction of shield grids, which renders the tube a one-way circuit element. It is possible, with a tetrode having a dense mesh in the shield grid, and additional shielding of the plate from the lead-in wire to the control grid, and its external connections[8] to construct a shielded cascade amplifier which gives practically repeater amplification for each stage. It is likewise possible, by careful circuit design, employing a suitable balancing circuit, to use tetrodes of simpler construction, in which the shielding is confined to the space between control grid and plate, and obtain in a structure having appreciably less shielding than that required with the non-balanced tetrode, a value of amplification per stage which is within 10% of the repeater amplification. The choice of one method or the other is, in the last analysis, merely an economic question. Each scheme possesses, from a practical standpoint, certain defects which are not shared by the other. From the standpoint of cost for a given performance, neither method appears to have an outstanding advantage.

In conclusion it may be appropriate to call attention briefly to the fact that a stage amplification of 40 to 50 is not an unmitigated blessing in broadcast reception. Experiments with amplifiers of this description having two, three and four stages, open up a new realm of problems of noise suppression,—both internal tube noises ("hot-effect") and all the electrical noises which originate outside the amplifier. One fact is clear, that when shield-grid tetrodes are used throughout in a r.f. amplifier, the problem of selectivity becomes vastly more important than the problem of sensitivity, which is virtually eliminated. The consideration of how amplification *is desirable* in a tuned amplifier of conventional form is an extensive and complicated subject in itself.

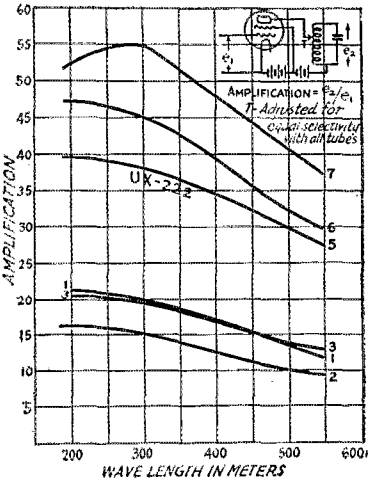


FIG. 3. REPEATER AMPLIFICATION FOR TETRODES OF SEVERAL TYPES UNDER THE SAME OPERATING CONDITIONS

The position of the tap T was adjusted to obtain equal selectivity with all tubes. The numbers of the curves correspond, as before, to the numbers in the photograph, curves 1, 2 and 3 being obtained from foreign tetrodes, curve 5 from the UX-222 and curves 6 and 7 from experimental tetrodes.

Strays

9ASE tells us that after the house was painted, his antenna current jumped from .7 amperes to 1.5 amperes. Submitted for the benefit of those who aren't happy unless the needle on the antenna ammeter goes around three times.

It has been suggested by 4DD that amateurs use the standard abbreviation of "QRG?" when asking the occupation of the other chap. There seems to be some connection between the two and we'll let you dig out the list and find out what it is.

Superintendent of Documents, Gov't Printing Office, Washington, D. C. has just informed us that the June 30, 1927, edition of *Amateur Radio Stations of the United States* (a government publication) is now available. Please order direct from the Sup't of Documents, remitting at the rate of 25c per copy, by Money Order or *Certified* Check—not stamps.

8. The necessity for this was pointed out by Schottky (Jahr. d. drahtl. Tel. u Tel. 16, 97, Aug. 1920) *in reply to* Barkhausen's criticisms. This is somewhat obvious and is common practice as Schottky justly observed.

Changes in Amateur Regulations

THE regulations governing amateur radiotelephone stations in this country have been changed by the Federal Radio Commission in such a manner as to permit telephony in the entire range between 150 and 190 meters and in the top quarter of the 20-meter band, but the authorization to use phone in the 80-meter band is rescinded. At the same time the Commission officially instituted as regulations for amateur stations many of those regulations which were formerly in effect under the administration of the Department of Commerce but which had not been affirmed by the Commission since it took office.

These matters are set forth in detail in the following letter of the Radio Division:

DEPARTMENT OF COMMERCE
WASHINGTON

October 28, 1927.

Supervisors of Radio and Others Concerned:

For your information and guidance, the Federal Radio Commission has established the following regulations governing the licensing and operation of amateur radio stations:

Amateur radio stations are authorized for communication only with similarly licensed stations and on wavelengths or frequencies within the following bands:

Kilocycles			Meters		
401,000	to	400,000	0.7477	to	0.7496
64,000	to	56,000	4.69	to	5.35
16,000	to	14,000	18.7	to	21.4
8,000	to	7,000	37.5	to	42.8
4,000	to	3,500	75.0	to	85.7
2,000	to	1,500	150.0	to	200.0

and at all times unless interference is caused with other radio services, in which event a silent period must be observed between the hours of 8:00 p.m. and 10:30 p.m., local time, and on Sundays during local church services.

Amateur radio telephone operation will be permitted only in the following bands:

Kilocycles			Meters		
64,000	to	56,000	4.69	to	5.35
14,000	to	14,500	20.68	to	21.4
2,000	to	1,580	150.	to	190.

Spark transmitters will not be authorized for amateur use.

Amateur stations must use circuits loosely coupled to the radiating system or devices that will produce equivalent effects to minimize key impacts, harmonics and plate supply modulations. Conductive coupling, even though loose, will NOT be permitted, but this restriction shall not apply against the employment of transmission-line feeder systems to Hertzian antennas.

Amateur stations are not permitted to communicate with commercial or government stations unless authorized by the licensing authority except in an emergency or for testing purposes. This restriction does not apply to communication with small pleasure craft such as yachts and motor boats holding limited commercial station licenses which may have difficulty in establishing communication with commercial or government stations.

Amateur stations are not authorized to broadcast news, music, lectures, sermons or any other form of entertainment.

No person shall operate an amateur station except under and in accordance with an operator's license issued to him by the Secretary of Commerce.

W. D. TERRELL
Chief, Radio Division.

It is uncertain, of course, how long these regulations can remain in force. The whole amateur picture will be changed more or less seriously as a result of the International Radio Conference which is in progress at Washington at this writing. But until the International Conference has completed its deliberations, and the United States Government has ratified the new international agreement, these are the regulations that govern us.

Their most important feature is the new privileges accorded amateur telephony. The phones have long felt cramped in their 100-kilocycle portion of our upper band, and the use of the band for telegraphy has lessened materially. Many phone men have asked the League to endeavor to get their territory extended in this band. The entire range from 150 to 190 meters is now made available. The upper ten meters is reserved as a guard band to protect broadcast listening from amateur phone QRM.

At the same time it has been felt that the recent introduction of amateur telephony into a portion of the 80-meter band has proven most unwise. The mutual interference has been very serious—the phone men were often unable to do good work because of telegraphy and the phones caused a most serious interference with the code work on our most useful telegraphing band, the band where the real operating and the real traffic-handling centers. Most of the phone men have felt that this 85-meter privilege was worth little or nothing to them, and they needed more space in the 160-meter region where quality was better and interference less. And so now the phone is taken out of the 80-meter band completely, and everybody should be happy.

At the same time it has seemed very desirable to give telephony a chance on international waves. It is a brand new privilege, one that we have never before had in this country. Now the range from 20.68 to 21.4 meters is open to telephony as well as telegraphy. It is a real opportunity to see what the phone will do. We'll write an editorial on it some time when things are normal.

And the 5-meter band has been opened to telephony too, there being no objection and the possibility existing that something very interesting can be developed there.

These regulations, the Department advises us, are now in effect; they actually went into effect as of the date of issue, October 28th. Amateurs are now in possession of full permission to operate phone in the

(Continued on Page 30)

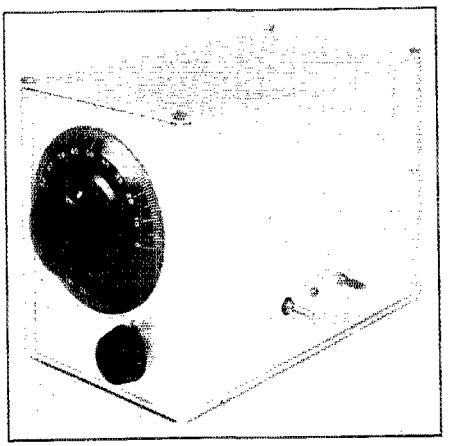
Effective Short-Wave Radio Frequency Amplification

By Harold P. Westman, Assistant Technical Editor

RADIO frequency amplification has for many years been considered of great importance in all branches of radio communication. Such amplification offers methods of obtaining high values of sensitivity and, what is more important in most cases, advances in selectivity that have allowed the operation of a greater number of stations within a given band of frequencies than otherwise could have been tolerated.

It was not many years ago that it was thought impossible to obtain good radio frequency amplification at wavelengths as low as 200 meters. However, with the advent of many circuit improvements that either minimized or cancelled out the feedback voltages that caused the circuits to be unstable, such amplification became not only possible but also quite practical.

Unfortunately, as far as amateur operation is concerned, when it became practical to build amplifiers for 200-meter operation interest had chiefly centered on wavelengths below 100 meters. While many attempts were made to build successful amplifiers for these waves, it was found that the capacity between the grid and plate of the amplifier tubes was such that at these high frequencies it was impractical to build amplifiers to operate in a stable manner at the same time giving a worthwhile gain at waves in the neighborhood of twenty and forty meters. Even on eighty meters, in order to obtain an appreciable gain, it is necessary to go to great pains in order to maintain stability. While the superheterodyne method could be used, it made a very expensive proposition that was beyond the reach of most amateurs. For this reason, and the multiplicity of troubles that could originate in it, it was used by an exceedingly small number.



THE R.F. AMPLIFIER STAGE

It is the capacity between the grid and plate of the tube acting as a coupling capacity between the input and output circuits of the amplifier that prevents it from being a stable device. As the frequency increases, the impedance of this capacity is reduced and the amount of energy fed *back* from the output to the input circuit is increased. This results in the circuit reaching an oscillatory state unless means are provided to either reduce or nullify this feedback.

It has been found to be rather impractical to try to nullify the effect of the feedback at these high frequencies and all that remains is to reduce it by designing a tube with a considerably lower capacity between the grid and plate.

While tubes fulfilling these requirements were known and experimented with in laboratories for a number of years, it is only just now that they have become commercially available.

THE UX-222

The tube that has now made short-wave r.f. amplification practical is the UX-222, a "tetrode" or four electrode tube. It has the three electrodes found in the standard triodes now on the market and in addition a screen or shield in the form of a grid inserted between the control grid and plate. A continuation of this shield allows it to almost completely enclose the plate. This results in extremely small effective capacity between the control grid and plate.

While the tube may be correctly referred to as a four electrode tube, this may cause some confusion in view of the fact that there are tubes having two grids in which the second grid is *not* intended for use as a shield between the plate and other elements. It is therefore more positive to refer to this particular tube as either a "shielded plate" or "shield grid" tube, remembering that it is the plate that is shielded and the grid that is doing the shielding.

The filament requires .132 amperes at a

voltage of 3.3 which means that a 21-ohm rheostat or its equivalent is needed if the filament is to be heated from a six-volt source. It may be connected across the filament of a 201-A or similar tube thus being supplied from a 5-volt source. Under these conditions the amount of resistance needed is only 13 ohms. However it is not recommended that this method be used for if the 5-volt tube be removed from its socket, the voltage across the UX-222 will be considerably increased. It is therefore better to supply it through a separate rheostat from the 6-volt source that is used for the other tubes. In sets employing dry cell tubes, it may be considered as equivalent to a UX-120 as far as the filament is concerned.

CIRCUIT

Figure 1 shows a circuit that is adaptable to the tube. The normal tuning circuit connected between the control or inner grid and the filament is used. Because the tube is to be operated as an amplifier, it is necessary to apply a biasing voltage of from 1 to 1.5 volts to the control grid when using from 90 to 135 volts on the plate. The outer or shield grid is connected to the plate battery at about 45 volts although this is not at all critical. A by-pass condenser, C1, insures a low impedance radio frequency path from the shield grid to the filament and ground. The extremely high plate impedance of the tube is most easily matched by use of a tuned trap circuit and the voltage across it is applied to the grid of the succeeding tube. Another by-pass condenser, C2, is employed to prevent the resist-

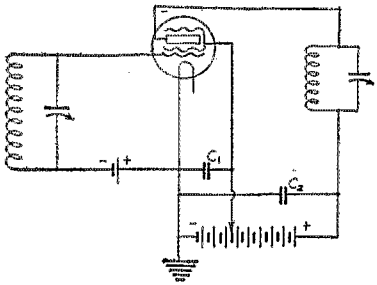


FIGURE 1

ance of the "B" battery (which may be considerable when it is old) from entering into the argument.

Although the tube itself has an effective internal capacity between the control grid and the plate that is insignificant as far as feedback through the tube is concerned, precautions must be taken to reduce the feedback due to the external circuits. It is highly desirable to shield the grid and plate circuits from each other. Figure 2 shows the necessary changes that must be made to allow these circuits to be shielded. In order to do away with the use of dry cells for obtaining "C" voltage, this is obtained as a drop off the filament resistor.

If a 10-ohm fixed resistor is connected in series with a 12-ohm rheostat, the voltage drop across the fixed unit when the proper filament current is flowing will be 1.32 volts, a value that is satisfactory for bias purposes. As the bias on the grid must be negative, the resistor must be connected in the negative filament lead and in order to impress only 1.32 volts on the grid, the unit should be connected directly to the filament. The positive A battery is connected to ground and the shield as is the rotor plates of the tuning condenser. It is therefore necessary to apply the bias voltage between the rotor of the tuning condenser and the low potential or grounded end of the tuning inductance. The use of a pair of by-pass condensers takes care of the radio frequency currents which flow in the grid circuit.

DETECTOR

The detector circuit is changed but slightly from the commonly used arrangement. The grid is connected through a small isolating or grid condenser to the high side (the one farthest from ground) of the trap circuit that tunes the plate circuit of the preceding tube. This condenser prevents the plate voltage of the r.f. amplifier tube from being applied directly to the grid of the detector tube and in conjunction with the grid leak that is connected between the grid and the positive side of the filament in this particular case causes detecting action. The usual tickler coil is used and regeneration and oscillation is controlled by means of a variable 50,000-ohm resistor in series with the d.c. supply to the plate. In order that the resistor may be mounted on the metal panel, it is necessary to put it between the negative of the detector "B" battery and the positive filament lead which is at ground potential. The use of a separate B battery for the detector is therefore required but when it is considered that this also prevents feedback between the detector and r.f. circuits which might easily be caused by the internal resistance of the B battery, it is well worth having. It is certainly cheap insurance as the smaller sized batteries will have a long life considering the small current consumption of the detector (usually about .5 to 1. milliampere). It really doesn't cost any more than the by-pass condenser that would be needed were the supply taken from the battery supplying the rest of the tubes.

AUDIO AMPLIFIER

Why it is that one must build an amplifier that peaks at 500 or 1,000 cycles or else

be considered as being outside the fold, is a deep, dark mystery? Why 500 or 1,000 cycles (it usually depends upon whom you happen to be talking to) and not 750 or 1,500 cycles is likewise an unenlightened vale of darkness. It's very possibly an echo of the gone-by spark days when *QST's* "Correspondence" columns were filled with discussions concerning whether a high or low note was more desirable. Perhaps, if I hadn't favored the low side of the argument, I'd say it was an indication that the "highs" had won. At any rate, it is absolutely unnecessary to peak an amplifier at any particular frequency in these days of c.w. when notes that are of the d.c. or near d.c. variety may be shifted to suit ones own particular taste.

However, it must be considered that by no means all notes are of the sort that may be heterodyned to a high beat frequency and still be pleasant to listen to. There is still a mighty large number of 60- and 120-cycle notes to be heard on the air and it is just as poor policy to discriminate against them as it would be to discriminate against notes of 500 cycles or higher. Why not use an amplifier that will give them all an even break? It hardly seems consistent for a station to have a transmitter, the characteristic note of which he builds his own receiver to discriminate against. And yet, he expects the other fellow to copy it on a similar receiver.

Of course, it is realized that the peaked amplifier may be of considerable help in places where there are power leaks and similar disturbances which may occur at low audio frequencies. The statement is not being made that they are no use under any circumstances. However, the large majority of amateur stations are not located in places that are bothered by such disturbances and there is no particular reason why they should stick to peaked amplifiers when better results may be had with those having a flatter frequency against amplification curve. Not when there are lots of signals to try the low frequency end of the amplifier on.

There also seems to be firmly imbedded in the mind of the average amateur that it is some sort of a disgrace to have to use more than one stage of audio amplification. You'd think it was a reflection on either the detector tube or a man's ears to need more. While it isn't particularly comfortable to use a two-stage amplifier on strong signals, it is certainly an advantage to have that much amplification on tap when listening to extremely weak signals. It is also neither comfortable nor convenient to be continuously jumping from one stage to the other and wishing for intermediate positions for some signals. The answer is to use a two-stage amplifier and employ some sort of control over the amount of amplification that may be had. A 500,000-ohm variable resistor shunted across the secondary of the last amplifying transformer serves the purpose admirably. Any amount of amplification or deamplification from no signal whatever to the maximum output of the set may be had by a twist of the knob or the resistor unit. Each signal that you are copying may be adjusted to your own satisfaction.

While an amplifier, the range of which extends well down toward the 60-cycle

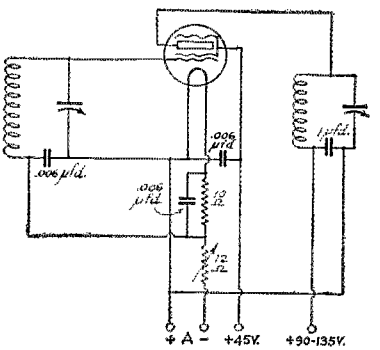


FIGURE 2

point is desirable, good amplification above 1,500 or 2,000 cycles is not particularly advantageous. It is this band that supplies a large percentage of those whispery, hissey noises that one listens for to tell if the set is working or not. Those same noises that submerge weak signals, particularly the ones we just know are real DX, (wherever that may be). We can usually bypass quite a bit of this without particularly damaging amplification of the lower frequencies. Shunting a condenser across the secondary of the last audio transformer will do it nicely. The size of the condenser will control just how much of these higher frequencies are being by-passed and if it is made too large, the frequencies in which we are interested will also suffer. With the pair of Sangamo transformers used in this particular amplifier, a capacity of 15,000 μμfds. (.015 microfarads) noticeably cut off down as far as 60 cycles but under some conditions seems worth using. This was decided upon as the maximum value that would be needed. Using the capacities specified in Figure 3, the following approximate values of capacity are shunted across the transformer winding in steps: 390, 880, 1810, 3750, 7500 and 15000 micromicrofarads. A switch having seven taps is employed. As there is only six condensers, there is an open position for the switch so that the amplifier may be used without any modification of its characteristics.

At first glance, it seems foolish to buy large condensers and put them in series when it is possible to get the same results by putting small ones in parallel. It would be all right to use the smaller ones if a fan switch were used but if a switch making contact to only one tap is used is is necessary to employ the larger sizes. It is also more satisfactory to connect them in series so that when the contact arm in passing from one contact point to the next one shorts both contact points, the capacity across the winding will not jump from the value of the original capacity to the sum of both and then to the value of the second unit.

An r.f. choke is inserted in the lead to the plates of the amplifier tubes to prevent the by-passing of r.f. energy from the radio stage through the audio circuits.

"FRINGE HOWL"

"Fringe howl" is a name suggested by Major Raven Hart for that howl that sometimes occurs when the detector goes into

there is a certain drop of potential across the resistor due to the current flowing through it which reduces the voltage applied to the plate of the tube. As the tube goes into oscillation, the plate current decreases and this causes the voltage drop across the resistor to be correspondingly reduced thereby increasing the voltage applied to the plate of the tube. This would tend to increase the strength of the oscillations and make it impossible for the circuit to go into and out of oscillation rapidly which seems to be the reason for the howl. The only drawback to this method is that the circuit doesn't go into and out of oscillation so smoothly, in many cases causing a click as the change is made.

Another method that works without this drawback is to shunt the secondary of the audio transformer with a 100,000-ohm resistor. The value is high enough to prevent any appreciable loss in amplification and the circuit seems to work exactly as before except that the howl is missing. It is wise to make provision when building

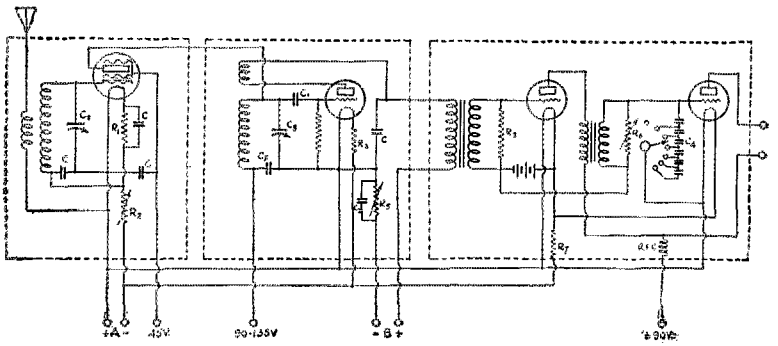


FIGURE 3. THE COMPLETE WIRING DIAGRAM OF THE RECEIVER

The dotted boxes represent the limits of the individual shields.
C—6,000 μμfds. (.006 μfds.)
C1—100 μμfds. (.0001 μfds.)
C2—.1 μfds.
C3—Cardwell 191E, 75-μμfd. taper plate condensers.
C4—Bank of six condensers. Starting from the one connected directly to the grid, their values are 15,000, 15,000, 7,500, 3,500, 1,750 and 700 μμfds.
R1—10-ohm fixed resistor.
R2—12-ohm rheostat.
R3—100,000-ohm "grid leak".
R4—500,000-ohm variable resistor.
R5—50,000-ohm variable resistor.
R6—Amperite for single 201-A.
R7—Amperite for two 201-A tubes.
RFC—Remler choke No. 35.
The open switch point on the back of by-pass condensers should have been shown at the other end of the set of switch points.

and out of oscillation. (Don't mistake this for the howl due to too much feedback which blocks the tube). It is a most annoying thing and may reach an "R9" audibility in some cases. Major Raven Hart suggested the insertion of a high resistance in the "B" positive lead to the detector tube. This usually stops it and is probably effective because of the large change in voltage applied to the plate of the detector tube as changes from one state to the other. When the tube is in a non-oscillating condition,

the set for the insertion of this resistor assuming that the howl will be present rather than taking a chance that it won't be. Under the latter conditions, it is almost sure to make its appearance.

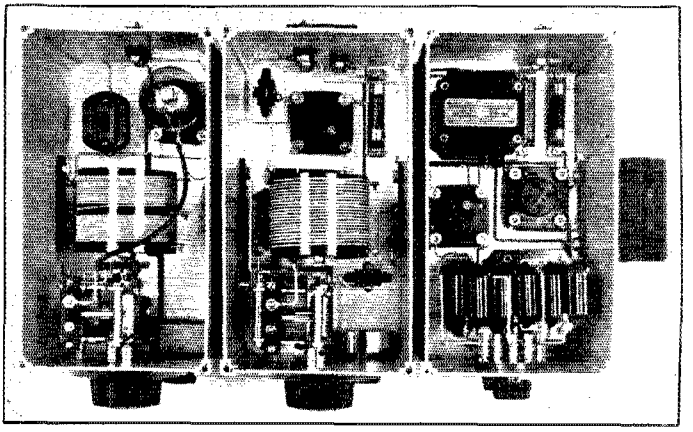
SHIELDING

The set is built in three separate aluminum boxes that are made by the Aluminum Company of America and are of heavy material, .080 inches thick. They are five

by six by nine inches in size. Heavy strips of spongy rubber are glued to the bottoms of the boxes to prevent the screws holding the base from marring the table top. One box contains the radio frequency stage, the second holds the detector and the third contains the two stage audio amplifier. Terminals of General Radio plugs and jacks make it possible to quickly change the number of units used. If it is desired, the three units may be built in one large box with partitions. The corner posts, sides and "U"-shaped sections to hold partitions, may be obtained from the manufacturers.

In order to insulate the jacks where they pass through the grounded walls of the boxes, small insulating bushings such as are screwed into the end of the brass collar on an electric light bulb socket to keep the wires going into the socket from chaffing, are used. The jacks just fit into the bushings which may be obtained in any electrical supply house for about a cent a piece. They are cut off until they are about the same thickness as the box wall and a strip of bakelite with holes drilled to take the jacks is used to back them up. The plugs are mounted on a strip of bakelite and the box wall cut away where they come through. They are also used as terminals for the various batteries which may be disconnected from the set by pulling out the terminal strip and thereby disconnecting the plugs from the jacks.

Because plug-in-coils are used, it is necessary that the top may readily be removed from the box as it would be impractical to stop and use a screw driver. G. R. plugs are fitted to the four corners of the cover and holes drilled into the uprights to take them. A No. 18 or 19 twist drill will do for the spring part of the plug and a ¼ inch drill will be as large as can be used to take care of the shank of the plug. It will be necessary to file down the shank to fit into the hole. The box containing the audio amplifier does not need to receive this attention and the cover may be left screwed down.



TOP VIEW OF THE COMPLETE RECEIVER
For front view, see illustration on front cover

TUNING EQUIPMENT

The tuning condensers are Cardwell 75 μμfd. maximum capacity, taper plate units They are mounted directly to the end or 5 by 6 inch side of the box without the use of any other panel material. National Velvet Vernier dials offer a very smooth and pleasant feeling control of the condensers. The pointer which comes with the dial is used and has the advantage of fitting well over the engraved lines making the reading of the position of the dial a simple matter.

The inductances are wound on G. R. bakelite forms and the terminal strips into which they plug are mounted directly upon the tuning condenser. The windings in the grid circuits are connected to the outer plugs and the tickler and antenna coupling coils are connected to the two inner plugs. The coils may therefore be reversed in their mounts without changing the relative positions of the windings. The tickler and antenna coils are bunch wound affairs supported by their own leads. They are slightly over an inch in diameter which tends to reduce the amount of reaction caused by the regeneration control on the tuning.

Wavelength Range	R. F. Stage Antenna	R. F. Stage Grid Circuit	Detector Stage Grid Circuit	Detector Stage Tickler
74.0-97.0	10	29 No.26	21 No.20	10
34.5-46.2	15	13	9	8
18.7-21.5	20	6	3	7

The tickler and antenna coils are wound with No. 26 wire. Insulation on all the wire used is d.c.c. and except for the 29 and 21 turn coils, No. 16 is used. The windings on the 29-, 21- and 13-turn coils are spaced one diameter and the others are spaced somewhat more depending upon the number of turns. Each winding employs the entire length of the coil form.

CONTROLS

The two large Velvet Vernier dials are for the tuning condensers. In the r.f. stage the smaller knob is on a 12-ohm rheostat in the filament circuit.

The small knob on the detector box controls regeneration and oscillation. The upper knob on the amplifier box controls the bank of condensers for varying the characteristics of the amplifier and the lower one controls the amount of amplification. The resistor controlling amplification must be insulated from the panel. This is easily accomplished by making the mounting hole larger than necessary and using a piece of ordinary friction tape as the insulation.

Amperites are used to control the filament current of the detector and audio amplifier tubes. They are not used on the r.f. tube because of the necessity of employing part of the total drop for biasing.

A Pacent multi-jack has two G. R. plugs screwed into it which plug into the output jacks on the audio box. This allows from one to three pairs of phones to be used and if the audio amplifier is not wanted for any reason, the multijack may be plugged into the detector output jacks. The r.f. amplifier may also be easily removed and if a small condenser is connected in the antenna lead, it may be connected to one of the input terminals to the detector box This allows any unit to be used separately which greatly increases the usefulness of the outfit.

R.F. STAGE SEPARATE

For those who do not desire to construct the entire set, it is quite practical to build the r.f. stage only and use it with your regular set. Some slight changes will be necessary in the wiring of the present detector circuit but these will not interfere with its normal operation. It will be necessary to connect the grid leak from the grid to the filament of the tube instead of across the grid condenser. A 2,000 μμfd. fixed condenser must be connected between the tuning coil and condenser at the ground end, the condenser being left connected to ground. A lead from the ground side of the coil goes to the B battery to supply voltage to the plate of the r.f. tube and another one from the grid end of the coil goes to the plate of the amplifier. When the r.f. tube is not being used, the lead to the B battery will cause no trouble and the lead from the grid end of the coil may go to the antenna through a small capacity or may be left disconnected and an antenna coupling coil used if this is desirable.

Changes in Amateur Regulations

(*Continued from Page 26*)

bands specified, and from this date on the permission to operate phone in the 80-meter band is definitely withdrawn. All amateurs should govern themselves accordingly, and pass on the word.

The new regulations incorporate another new feature of value and significance to us —all wavelengths are now on the same basis as regards quiet hours, and whether or not interference results is the criterion for operation without their observance. Since any station that interferes seriously is to be obliged to observe the quiet hours, there is no reason why operation on any amateur wave, with any legal apparatus, should not be permitted if it can occur without interfering with other services—which means the BCLs.

At last, and for the first time, we have a definite regulation forbidding the spark. But of course there have been no sparks for a long time anyway.

The balance of the regulations are in general those which we had under the Department of Commerce before the 1927 radio law. They lost their force when the new law was passed but now are reinstituted by the Commission.

The Commission has prepared a new form of amateur station license which is now being distributed to Supervisors, who, in the name of the Commission will license amateur stations as in the past. The new form will be used for all *new* applications, or whenever it becomes necessary to issue a new station license as in such cases as change of location, etc. And, as rapidly as time for it can be found in the Supervisors' offices, new licenses on this form will be sent out to amateurs now licensed, to replace the old station licenses of the Department of Commerce. However, it should be clearly noted that, until further notice, all old station licenses issued by the Department remain in effect, and no action by the amateur is necessary. In time you will simply receive either a new station license to replace your old one, or a demand to return the old one with an application for a new one. Until then, just sit tight.

The new license is a close approach to the ideal we have had in mind for years. It recognizes the principle that an amateur ought to be free to change his apparatus and experiment, with no other requirements upon him, as far as the Commission is concerned, than that the output effect of his station is legal—that it is within the amateur bands and does not interfere with other services. The new license, then, will describe the apparatus merely as c.w., i.c.w., phone, etc., and state the power output in watts as determined by the manufacturer's rating of the tubes employed. The license recites the wave-bands allowed for telegraphy, and those in which telephony is permitted as described in this article, and it contains several of the provisions of the letter of October 28th reproduced above. It looks good to us.

—*K. B. W.*

Announcement of Another International Test

World-Wide Competition Will Be Held in February—Valuable Prizes for the Winners

By F. E. Handy, A.R.R.L. Communications Manager

RECENTLY a questionnaire was sent to a large number of A.R.R.L. member-stations, asking among other things for comments and suggestions on the subject of communication contests. An overwhelming majority voted for "another International Relay Party" to be pulled off as soon as possible. In the announcement made herewith, please note some changes in the arrangements that were effective during the last contest. These changes are based on our experience with the international tests held last May. In the coming February tests, participating stations will be limited to sending but one test message to each station worked as before. Now, however, as many messages may be sent to a given foreign locality as you can work stations there. This will make it possible to add materially to one's score almost every time a different station is worked, eliminating the difficulty which resulted when an "nu" or "nc" station worked several stations in one country and could not exchange messages due to having already sent the one message allowed for the given foreign locality to the first station worked.

Do you remember that last A.R.R.L. prize contest when over $4,000 worth of apparatus was donated by the manufacturers? In this contest, prizes are going to be offered again, thanks to the generosity of our friends that make radio equipment. (1) There will be valuable prizes for the station in the United States and also the station in Canada with the highest total score. (2) Twenty-five prizes are offered to go to the stations making the twenty-five highest scores in the U. S. or Canada considered together. (3) Prizes will be presented to the *only* station in the U. S. or Canada to score with a particular foreign locality. (4) Valuable prizes have also been provided for the highest scoring station in each locality outside the U. S. and Canada.

The list of prizes will be announced later. All will be useful radio apparatus for your ham station. Instead of giving certain prizes for each achievement, the highest scoring men in the North American continent will be allowed to make a selection of the available prizes, so each will be suitable and useful to the winner and a true reward for his achievement. Each prize winner will be given a list of prizes and allowed to select whatever he likes up to a certain total valuation depending on his standing in the tests. In all other localities, the prizes will have as nearly the same valuation as possible and the selection system will be modified somewhat to avoid delays in making the awards. We cannot promise anyone an *absolute* choice in picking out his prize but we hope to approximate this. It is at once apparent that by giving each winner an absolute power of choice in turn the correspondence would drag over many months before the awards could be made. One more thing before we get off this subject of the awards—there will be no duplication of prizes. The winner of the highest prize becomes ineligible to receive further prizes of lower order. While stations owned and operated by the personnel of the A.R.R.L. Headquarters' staff will undoubtedly participate in the tests, the owners and operators are ineligible to receive any of the prizes.

The list of international intermediates adopted by the I.A.R.U. will be strictly followed in partitioning localities as a basis for determining awards. Due to the fact that reports straggled in for months in the last contest, a new rule has been added definitely closing the contest by a certain date to prevent undue delay in making awards. All the changes have been made to make your participation in this contest just as enjoyable from every standpoint as possible. We shall all have some good fun with relaying and international DX. New contacts and friendships will be made. The contest will show which stations in each locality are the best for making North American contacts. The identity of the best U. S. and Canadian stations for work with particular localities will be established better than before. Both operating ability and station performance will play a part.

Any wavelengths used by amateurs may be used in this contest. The choice of wavelengths depends on your government's regulations and which of the possible wavelengths you think will give you best results. The 20-meter wavelength proved best in the last tests for day and early evening work while wavelengths between 35 and 95 meters were fine for work between stations when both were on the "dark" side of the world. Every amateur in the whole world is eligible—the only requirement, an ama-

teur radio station. There are test messages to relay which will insure that actual solid two-way QSOs are made but these messages are entirely of an experimental nature so that no governmental message-handling regulations can prevent anyone from taking part.

U. S. and Canadian stations must be entered in the contest in advance to be able to participate and to be eligible for prizes. Stations in all other localities need only take part on the dates announced and report results in full at the end of the tests as provided in the rules of the contest. Unfortunately, many of the several hundred U. S. and Canadian entries in the last tests came in at the last minute so that valuable time was lost before these stations could be equipped with full information and test messages. The closing date for entries is February 1, 1928. Letters and cards stating intentions of participating and asking for the official list of messages to be used must be received before midnight (GCT) this date to receive consideration. Only stations entered before this time will be eligible for any of the prize awards.

Stations in the United States and Canada signifying intention to participate by card or letter will each be provided with official test messages just in advance of the opening date of the contest. Stations outside the U. S. and Canada will try to work as many "nu" and "nc" stations as possible to get the test messages. As soon as each such station is in possession of one of the official test messages which has been acknowledged to the station from which it was received, a reply message will be written and assigned to exact serial number given in the North American test message. This reply message may be sent to *any other* "nu" or "nc" station than the one from which the message bearing that serial number was taken. No address is necessary on any of the test messages. The distinguishing serial number and letter group is very important for identification purposes. The return message will not count for anything in the score if returned through the same station that sent the original test message or if the text and signature duplicate a message already sent. No station can accept a reply message bearing his own serial number combination. Messages with incorrect or unofficial serial numbers don't count for anyone. The text and signature (if any) of reply test message must total at least ten words to count as a message—ham abbreviations aren't words either. Five figures or fraction thereof count as one word when sent en group.

Just as soon as a few test messages are off the hook, the replies will be coming back. Everyone will be looking for replies because those count for more in the scores of the stations handling them. Every station operator has equal opportunity during the contest. A great deal depends on the judgment of the individual operators in determining the times and wavelengths for operation of each station as well as on operating ability itself. Low power apparatus succeeds as often as high power on 20 meters. Handicaps in location can often be overcome by a little careful planning. A full report of the results will be printed in *QST* with scores. There will be many names of prize winners, and all the information most pertinent to the contest. Reports are requested from every station whether the score is one or one thousand and whether you live in the U. S. A. or in China. Get in on the fun and coöperate with your fellow ham by sending in your log and messages as confirmation of his score. You are just as likely to win a prize on some of your work as not.

Here is an example of the way the messages should be handled under the rules of the contest—more of them later. Suppose at the start of the test, fqPM works nu1CMX and takes one of his test messages selected at random from his list of messages provided by A.R.R.L. HQ just before the tests begin. After the stations finish the QSO, 1CMX looks for other countries to work while fqPM writes out an answer to give to some *other* station in the U. S. or Canada at the first opportunity. On his next QSO, fqPM hopes to send this reply message and at the same time receive another message to boost his score all he can. If the message he takes on the second QSO happens to have the same text as the previous message, he can take it or ask for a different message if he likes. If he takes it he must be sure to answer it differently before QSRing back to a U. S. or Canadian station. Late in the contest, fqPM may work 1CMX again and while unable to take another message from him, he can give 1CMX a reply to a message taken from any U. S. or Canadian station except 1CMX. 1CMX will know it is a different message because it will bear a different serial number than the one assigned the similar message by 1CMX. Every set of message assignments bears a cipher number which *must* be used in numbering the reply test message for identification and checking purposes.

Sample messages as sent by U. S. or Canadian amateur stations

TEST MSG FM NU/NC (Insert call).
NR 2271A32 (Insert date).
WHAT IS THE WAVELENGTH OF YOUR TRANSMITTER PLEASE — — — —

Answer as worded by any amateur in

another locality and sent to some *other* U. S. or Canadian station:

Answer as worded by any amateur in another locality and sent to some *other* U. S. or Canadian station:
REPLY TEST MSG FM OA/OZ/EG/FO, etc. (Insert call).
NR 2271A32 (Insert date msg returned to U. S. or Canada).
- - - - - MY WAVELENGTH IS TWENTY THREE METERS TO BEST OF MY KNOWLEDGE - - - - -
(Sign your QRA if you wish for identification).

RULES OF CONTEST

1. The contest opens February 6 at 0000 G. C. T. and closes February 19 at 0000 G. C. T. Only work falling between these dates and times will be counted —*be sure to remember the dates, February 6 to 19* inclusive.

2. United States and Canadian amateurs may *each* send and receive just ONE test message to any one particular station in a given foreign locality. As many stations as desired may be worked in this fashion as long as not more than one message is handled each way.

3. *Evidence of more than one test message to any* one station from a single U. S. or Canadian station will make a contestant ineligible for either a prize *award or honorable mention in QST.* All stations must abide by the regulations of their respective countries or become ineligible. Other evidence of intentional infraction of the rules will make the contestant ineligible similarly.

4. United States and Canadian amateurs may receive only one reply test message from any one station in a foreign country. Reply messages may be accepted from several foreign stations in each country—but only one message may be taken from any one station. (This rule is to prevent a single *North American station from gaining a great num*ber of points too easily and to give all contestants an equal chance with all amateurs outside the U. S. and Canada.)

5. Reply test message must contain *ten* or more words in the text and signature together. These replies are prepared by the contestant himself, who exercises his own ingenuity to make each message different than other messages for checking purposes. Reply test messages are counted only when sent to a station in the U. S. or Canada other than the station from which the original message bearing the distinguishing serial number was received.

6. Credits: United States and Canadian stations—Sending the test message counts 1 point.
Receiving a reply test message from abroad counts 2 points. Stations in all other localities—Receiving the test message counts 1 point.
Successfully transmitting a reply test message to a United States or Canadian amateur station other than the one from which the original message was received from counts 2 points.

7. *A report of logs by mail is required of all* participants at the close of the contest. Whether your score is 1 or 100, we want the dope for *QST.* All *reports should be in the mails within three days of* the close of the contest. Late reports and logs will not receive consideration in the analysis of results to *determine the prize winners or for QST mention.* U. S. and Canadian logs and messages will be received up to midnight March 10, 1928. Reports and confirmation copies of messages handled in the tests will be received from stations in other localities up to midnight April 21, 1928. Reports received after these dates will be returned to the senders as they cannot be used in computing the results.

a. United States and Canadian stations must return the message assignment sheets with the record showing when the message was sent, call *of station to which message was given,* date and wavelengths in the spaces provided on the special log that will be issued. The copies of all messages received from foreign localities must be turned in as evidence of QSO with stations in the different localities. The information on time, call, date, and wavelength should also be included directly on each message.

b. Foreign confirmations: Copies of all test messages received and reply test messages must be turned in with the information requested under (a).

8. All reports should be mailed to the following address promptly at the conclusion of the contest: *International Contest Headquarters, Care A. R. R. L.* 1711 *Park St., Hartford, Conn.*

9. The test *message serial number must be used* in the reply test message. It is suggested that foreign participants include name and QRA at the end of *their reply test messages for identification purposes.* This is not a requirement necessary for proper credit but it is desirable in a contest of this magnitude.

10. U. S. and Canadian amateurs must signify that they desire to enter the contact-contest by sending a QSL-card or letter to the following address signifying their intention to participate. This will be acknowledged promptly but the actual message assignments will not be given out until just before the start of the contest. The closing date for entries is midnight of Feb. 1, 1928. There is no way in which one may enter the tests after that or become eligible to receive an award. Send your QSL card at once to the following address if you expect to participate in the February international tests. INTERNATIONAL CONTEST HEADQUARTERS, CARE A.R.R.L., 1711 PARK ST., HARTFORD, CONN.

- - - - -

Every foreign amateur will have a chance to make an unprecedented number of U. S. and Canadian QSO's!

Every U. S. and Canadian ham will be in on the fun!

Two weeks of opportunity to smash all previous records!

All amateurs in the world are cordially invited to participate.

COME ON IN. OM. Get your station in trim now and plan to grab off some of the many valuable prizes. U. S. and Canadian amateurs, get your QSL-entry cards in early to make sure that you comply *with the Rules and are eligible for a prize.*

Dakota Division Convention

(South Dakota State)

Sioux Falls, S. D.

Dec. 28th-29th, 1927

HEAR the call of the whistles fellows, and prepare to come to the 7th Annual Convention of the State of South Dakota, to be held at Sioux Falls on the dates shown above. Write to, W. S. Gough, 9BQV, 116 No. Duluth Ave., Sioux Falls, S. D., and tell him you will be there.

Strays

When too high a voltage is applied to the plate of a 210, it sometimes breaks down the insulation between the grid and plate prongs where they go through the base. A raised portion or blister usually appears. When this occurs, it is not always necessary to debase the tube but the trouble may be overcome by cutting through the blistered area with a hack-saw blade. The airgap formed prevents any leakage.—*6LJ-6CJ.*

A Possible Method of Voice or Key Modulation

COMBINING various suggestions that have been received with some notions of our own there occur several possible methods of either voice or key modulating a crystal-controlled transmitter by operating on the crystal, rather than on one of the amplifier tubes as is the custom.

In Fig. 1 there is shown a crystal in its mounting, the connection to the circuit being a common one. Now if the upper electrode A of the mounting be raised or lowered the output of the tube will be changed as to both wattage and frequency, the amount of each change being dependent on the original spacings in the crystal holder, the amount of movement of the plate A and the circuit conditions—and also on the nature of the crystal itself.

Suppose first that the crystal has only one natural frequency within the working range of the set. Then as A is raised beyond the best position the output of the set will be decreased and its frequency changed slightly. If as in Fig. 2 the electrode A is the diaphragm of a telephone it will be possible to super-impose some degree of either voice or key modulation on the oscillations generated by the system. The key modulation must not be carried too far for if the crystal is stopped by excessive rise of A the dots will not "pick up" promptly. A similar limitation applies as to voice modulation. This modulation would seem

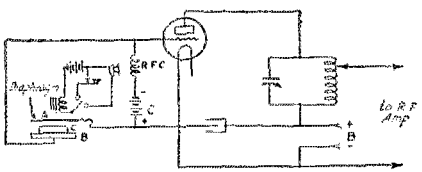


FIGURE 1

to be a mixture of amplitude variation (the usual sort of modulation) and "wobbulation", which is to say "frequency variation". The amplitude variation will naturally be similar to the usual effect had with the Heising system of plate voltage variation and will therefore generate the usual sidebands.

Another scheme might be worked on this —though this is speculation only. Suppose that the crystal were out with such proportions as to have two natural frequencies not too far apart. This can be done by making the crystal "stepped" (two thicknesses) as in Fig. 3 or by putting two different kinds of oscillation within a short range of each other. The latter idea can perhaps be expressed more clearly this way; a crystal may oscillate in several possible manners. One of these manners depends mainly on the thickness alone but the others are dependent also on the other dimensions and *perhaps* on the shape of the crystal. By selecting several dimensions suitably it should be possible

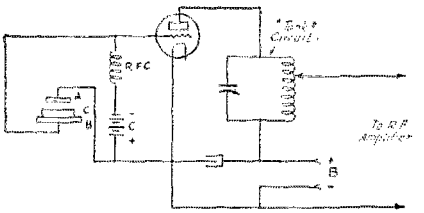


FIGURE 2

to make a crystal which had two good strong frequencies spaced apart by an audio frequency—either high or low, depending on the cutting.

If a two-frequency crystal such as was just suggested were put into the circuit of Fig. 2 there seems a fair possibility that by changing the position of A we could cause the crystal to "flop" from one frequency to the other. For telegraphy this would mean that we would use one wave for the "signal wave" and the other for the "spacing wave" or "back wave". For this they could be within an audio frequency of each other and that frequency would not need to be higher than 500 cycles. For telephony one could space the two waves further apart if desired. The proper spacing would depend on the method of reception. The legality of such a system would need adjudication. Certainly the old "Compensation wave" is not in accord with the spirit of our radio laws.

This second method of modulation is a little troublesome to label. At first sight it appears to be a method of jumping from

FIGURE 3

one wave to another and therefore one might label it with the trick name of "frequency modulation"—though that is admittedly a rather senseless term since the ordinary methods create new frequencies in the shape of sidebands and therefore have some title to such a label. The sidebands would exist in this new scheme (if it works) since the effect is undoubtedly partly amplitude variation after the orthodox method.

—*R. S. K.*

Getting the Most Out of the UX-222

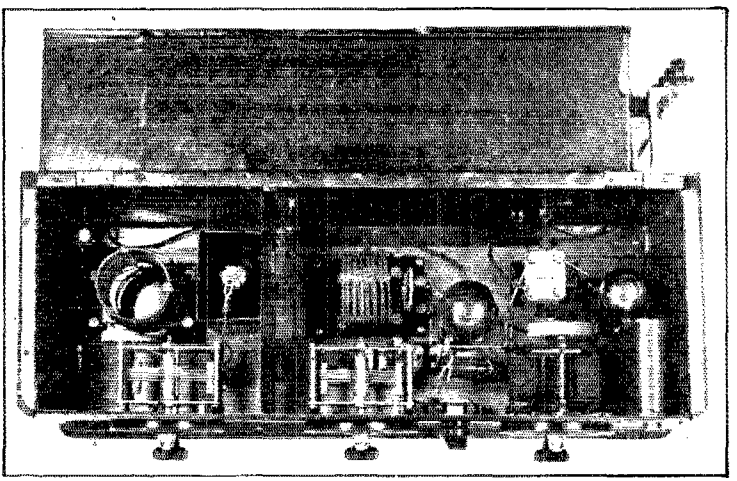
By R. B. Bourne*

RADIO frequency amplification at high frequency has long been an alluring target for the experimenter. The path has certainly been strewn with difficulties, most of which were due to the very high frequencies with which we amateurs communicate. Much good work had been done using available apparatus, and it seemed that the limit had about been reached with the shielded and carefully neutralized amplifier. It is doubtful if any one ever obtained any real amplification below thirty meters, even with the utmost in circuit design, layout and construction.

With the coming of the 222-type tube, an entirely new field has been opened up; real amplification at 15 meters is a fact, and the whole audibility scale, which was largely based on the conventional detector and one stage of a.f., ceases to have much meaning. This sounds like a fairy tale.

A few months ago, the writer described a shielded receiver using one stage of r.f. amplification, which represented nearly the limit of attainment, using ordinary 201-A tubes.[1] The limitations were set forth in a recent issue of *QST*.

The layout shown in that article was used as a starting point of the set described herein, simply because it was available, and the necessary changes could be effected with no great amount of trouble.



DOWNWARD VIEW OF THE RECEIVER WITH THE COVER REMOVED

The filter bank here appears simply as a copper case at the back of the receiver. The lid of the set has flanges which reach downward and overlap the sidewalls and also the partition wall dividing the R.F. stage from the detector.

At the left is the "antenna coupler compartment" and within it the "R.F. amplifier tube compartment." The walls of the latter do not extend clear up to the cover. The large compartment occupying most of the length of the set contains the regenerative detector and audio amplifier and also the phone-cord filter which in turn is surrounded by the copper can projecting back from the panel and almost touching the audio amplifier tube. The tubes from left to right are the UX-222, R.F. amplifier, UX-210 detector and UX-201-a audio amplifier. In the same way the condensers are in order the input tuning condenser, C1, the condenser C2 tuning the coupling reactance and finally the regeneration control condenser C3. The coil at the left is the coil L1 with L4 concealed beneath it; coil L2 with its tickler L3 may be seen in the main compartment.

The UX-222 tube and its characteristics are described elsewhere in this issue, so let us pass directly to a consideration of what must be done to give this remarkable tube every opportunity to function to the limit. It is evident that the r.f. currents must be kept in their proper paths and not become enmeshed with other r.f. currents trying to do either the same thing at a

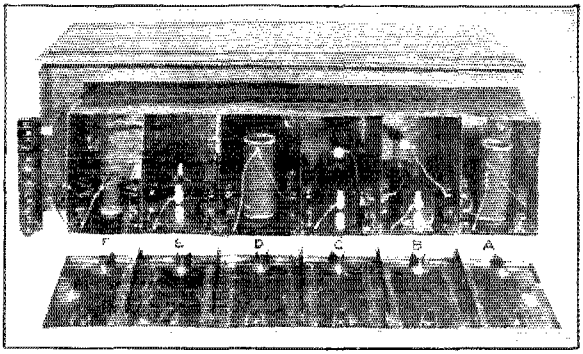
*1ANA, Maxim Silencer Co., Hartford, Conn.

1. August, 1927, page 29.

different time or some other thing at the same time. Nor must dissipation in the form of heat sap too much of the energy of the feeble (at first) currents. Energy lost in heat in a radio set cannot be recovered.

To this end, shielding *must* be used, if fields are to be kept out of the way of each other. This applies to electrostatic as well as electromagnetic fields. The shielding used in the previous set was found to be inadequate. There were leaks in it. The shielding of the present set is made so that joints are either soldered up tightly, or are fitted with generous overlapping aprons or sleeves. In order to make the set proper removable from the cabinet, and in order to have the covers fit tightly, a very considerable amount of this sort of thing had to be done. Even the amplifier tube itself is shielded from the rest of the set.

In addition to the shieldings, every wire which leads out of the set is filtered before it returns to the common battery. This is done not only to prevent coupling between the r.f. stage and detector, but to prevent any stray pickup in the battery wires, batteries or phones from entering the receiver. How effective this shielding and filtering is can be realized from the fact that, with the antenna disconnected and pulled out of the cabinet, a 75-watt transmitter using raw a.c. three feet away can be barely heard with the set tuned right to its wave. This is an extreme test, of course. No doubt the transmitter could be heard even if the whole set, batteries and operator included were shut up in a solid copper box.



REAR VIEW OF THE SET SHOWING THE FILTER COMPARTMENTS AND THE FLANGED COVER

The small V shaped pieces on the cover are to press the edges of the case against the flanges of the cover so as to insure contact. The apparatus in the various compartments may be identified from Fig. 1 except for resistance R2 which does not show in the photo. The feed wires go from the terminal strip at the end of the set in cable form below the filter cans, entering thru small holes at the bottom and after going thru its filter each wire proceeds thru the back of the filter compartment to the appropriate compartment of the set itself.

Before proceeding further, lest you be discouraged, let me say that these precautions are necessary only if the utmost is to be attained. That it is worth while is beyond question, at least with the writer. This receiver will give back in results all that is put into it in labor, provided, of course, that the labor is judiciously expended. This will take care of itself, more or less, because one is not strongly tempted to add useless frills after the essentials have been taken care of.

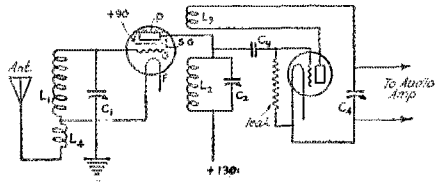


FIGURE 1. THE SCHEMATIC DIAGRAM OF THE R.F. AMPLIFIER STAGE AND THE DETECTOR
L4 Primary or antenna coupling coil.
L1 Secondary or input coil for the R.F. tube.
C1 Tuning condenser for S.
L2 and C2 Tuned plate circuit also acting as input circuit for detector.
L3 Tickler coupled to L-C2 so as to produce detector oscillation.
CG Condenser feeding the detector from the circuit L-C2.
C3 Usual regeneration control. Any other scheme may be used here.
The tube elements are the usual ones plus the shield-grid which is marked S.G.

Having thus lured you this far, perhaps it is time to describe the circuit used. Fig. 1 shows the elementary wiring scheme. A glance will show that it is simply a tuned grid—tuned plate circuit for the amplifier tube, the reactive drop across the tuned plate circuit being applied to the detector tube through a coupling condenser, regeneration in the detector being accomplished in one of the orthodox manners. The amplifier tube is prevented from oscillating or having any tendency in that direction by completely isolating the plate and grid circuits excepting for the one-way electron stream on which the tube functions.

The construction of the tube itself provides the necessary isolation within the tube and it is one purpose of this article to describe what is necessary to preserve this isolation outside of the tube.

Fig. 2 shows the complete diagram of connections. The six compartments at the bottom are the six filter shields shown in one of the photographs, but reversed from left to right. For example, the compartment at the extreme left of the drawing is that appearing at the extreme right of

the photo. We will return to the filters later.

In order to simplify the diagram and to show more clearly the actual connections, many "grounds" are connected to the copper shielding at the nearest point. It does not seem to matter whether the set as a whole is "grounded" or not. That is another story in itself, and will not be labored here. All connecting wires not carrying r.f. currents of intention, and leading to the filter compartments are shielded by covering them with copper braiding.

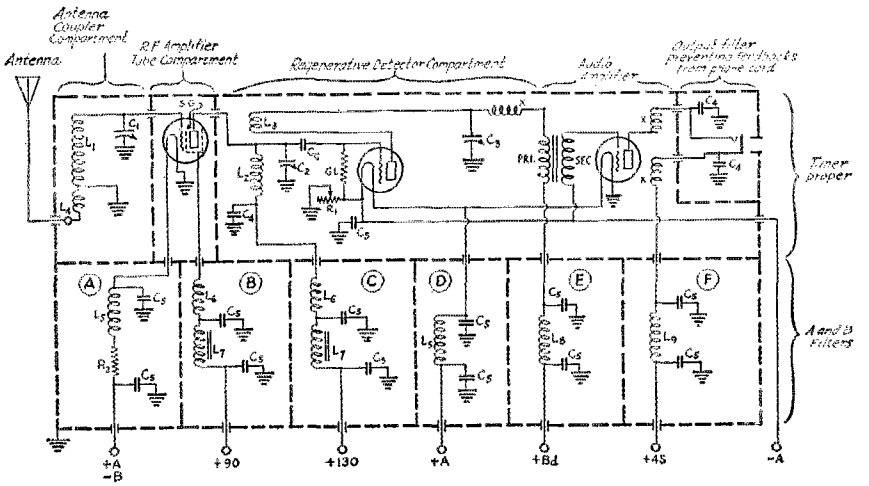


FIGURE 2. THE COMPLETE DIAGRAM OF THE SET

The heavy dashed line is the copper shielding. In this shielding the upper row of compartments contains the receiver proper while the lower row contains the filters in the different battery lines to prevent interaction between tubes, also to cut down body capacity effects. An additional filter is found in the upper right hand compartment. It is connected into the output to the headset to prevent capacity effects from the phone cord. In the actual receiver the "tuner" row of compartments is at the front and the "filter" row is not under the receiver but behind it. Coil dimensions are given in the text.

L4 and L1 Antenna coupler or input tuner.
L2 and C2 Tuned circuit acting as plate reactance for the R.F. tube and producing r.f. voltage drop which is fed thru the condenser C_g to the detector grid. L2 and C2 therefore also act as tuned grid circuit for the detector.
L3 and C3 Tickler and regeneration control for detector.
C4 Insulating condensers separating L2 and phone jack from shield to avoid ground on 130- and 45-volt B battery.
AFT Audio frequency transformer feeding audio amplifier.
X r.f. chokes separating audio amplifier from detector and phones.
R2 Resistance to lower battery voltage to proper value for the odd filament of the UX-222
C5 Paper filter condensers.
L5 r.f. filter chokes. (Air core.)
L7 a.f. filter chokes. (Iron core.)

The coils shown are for the so-called 40-meter band and have an actual range of 26 to 54 meters. This is very great, and without a doubt would justify the use of much smaller tuning condensers. But the set does not *work* any better using smaller condensers. Many coils were tried and finally those shown in the photo were adopted as having the lowest resistance and distributed capacity of any. They are, in effect, miniature transmitter coils, wound with No. 10 cotton wire, the turns being spaced a distance apart slightly greater than the diameter of the wire. Some improvement would no doubt be effected by using bare wire. The coils are made by winding up the wire in a close solenoid over a 2¼" form, later slipping the wire off the form and spacing the turns with twine. The whole coil is boiled in paraffin(!).

L_1 has eleven turns and L_2 eight turns at 2½" diameter. The coil expands to this diameter on being slipped off the form. L_4 is the antenna coupling coil and is of two turns of annunciator wire, fairly closely coupled to the grid coil L_1. It should be noted that L_2 is at high d.c. potential, and, therefore, cannot be directly shunted by its tuning condenser C_2, if the latter is to be grounded to the shield. To avoid this embarrassment, a blocking condenser, C_4,

is used as shown. The relatively large capacity of this condenser makes its presence unfelt on the tuning of the plate circuit. Needless to say, it should be a mica condenser, at least.

L_3 is the tickler coil, and has eight bunched turns of No. 30 d.c.c. wire about an inch in diameter. The coupling condenser, C_3, is in reality the grid condenser of the detector tube and is of .00025 μfd. capacity. The grid leak has 1-megohm resistance. The detector tube used is a UX-210, with about sixteen volts on the plate. For one thing, it will not paralyze easily, under strong signals and the writer found that, of all the detectors tried, it was by far the most satisfactory. Its filament is run directly from the six-volt A-battery with no rheostat. The filament rheostat, R_1, controls the audio amplifier tube and partially controls the voltage on the filament of the 222 tube. Since this latter is run at 3.3 volts, an additional resistor, R_2 is placed in the plus A line for that tube. Little need be said about the remainder of the set proper except to call attention to the output filter and jack shield shown in the upper right-hand corner of the diagram (Fig. 2) and depicted in the lower right-hand corner of the photo. This shield and filter are for the purpose of preventing coupling and pickup through or by the telphone cords and operator. The three coils marked X are small wafer-shaped r.f. chokes having about two hundred turns of No. 28 d.c.c. wire, jumble wound.

Passing now to the filters, let me say at once that the layout should be made in a manner that wires leading into the filter compartments go in as direct a path as possible and not through any other compartment. Furthermore, these wires should be shielded by slipping copper braid over them.

Compartment A (see Fig. 2) contains an r.f. choke coil and a resistor of 15 ohms (not shown in the photo), by-passed to ground as shown. This choke is 1½ inches in diameter and is wound with No. 22 d.s.c. wire for a length of four inches. The condensers in all compartments are .5 μfd. paper dielectric telephone condensers, which happened to be available. It may be a mistake to use paper condensers since they may have appreciable resistance and inductance at high frequencies. Their presence may very well account for the fact that there is still some reaction in this receiver between the amplifier and detector sections. Mica condensers, as large as the pocket-book can afford, are to be strongly recommended.

Compartment B contains both an r.f. choke and one for audio frequencies, by-passed as shown. The r.f. coil, L_5 is wound on a paraffin impregnated dowel stick 2½ inches by ½-inch in diameter, with No. 40 enamelled wire. This seems to make a very good choke coil for everything from 100 meters down. The audio frequency is a Samson and was put in to prevent audio frequency modulation of the tube shield S. Compartment C is similar to B and compartment D is a duplicate of A except that no resistor is used. Compartments E and F each have one r.f. choke, by-passed on either side. Probably the slender chokes L_6 would be better than those shown in the photo. All compartments are soldered up and isolated from each other and from the set proper. They have a common cover, shown lying before the open cans. The cover gives a good idea of what was meant by over-lapping aprons or sleeves, previously mentioned. The V-shaped pieces are for the purpose of pressing the sides of the cans against the cover. Out-going wires are cabled together and are run under the row of filter compartment to the terminal strip. Negative A wire has no filter compartment but is by-passed inside the cabinet with a .5 μfd. condenser. This condenser is shown near the a.f. transformer in the photo.

Presumably, in order to handle the strong signals fed into the a.f. amplifier, this last should be fitted with a C battery and be run at high voltage. This raises the question of the necessity of using a.f. amplification at all. Certainly on most stations it is not necessary.

Enclosing the r.f. amplifier tube in a shield of its own was necessary to overcome some reaction which existed at first. The clip connection to the grid terminal is clearly tuned since there is no high resistance passes directly into the detector compartment through a small hole. The wire from the electrostatic shield S is shielded until it gets into its filter compartment. It would be disastrous to have this shield act as a grid, in this circuit at least. Various combinations of voltages for shield and plate were tried. 90 and 130 seemed to give the greatest amplification. A C battery on the r.f. tube reduced the selectivity of the grid circuit. This may be a blessing, however, in that stations are "found" a little more easily if we have but one sharply tuned circuit to manipulate.

The plate circuit of the r.f. tube, which may be considered as the grid circuit of the detector tube, is more than normally sharply tuned since there is no high resistance circuit like an antenna system associated with it. In addition to this we have the selectivity of the antenna input system, which (though less than that of the former) contributes (by virtue of the unusually loose coupling employed) substantially to the over-all selectivity of the receiver.

At the risk of straining the credulity of the reader, I may add a word of caution.

In using the receiver it is not wise to pass over a signal whose regenerated but unheterodyned hum can be heard all over the room, since it may very well happen that the "local" is an Australian!

Coils for the other bands? Simply make them to cover the wave range you want and they will work.

Experimenters' Section Report

THE series of reports from members of the Section is interrupted this time by the presentation of the most interesting device for the Experimenter that has been given us in years. This is of course the UX-222 tube which justly occupies a large portion of the space in this issue.

The tubes will perhaps not be immediately available at all radio stores, therefore it is suggested that the material in this issue be studied carefully, together with any other that may be at hand with the object of being able to make full use of the special properties of the tube as soon as it may be had. The full benefit of the tube will of course be obtained only if experiences with it are fully noted down and sent to *QST* for distribution to its readers.

New Motor Generators

A NEW line of rotary converters, dynamotors and motor generators for the operation of a.c. driven radio sets and amplifiers from a 110 volt d.c. source has recently been announced.

These new machines operate at the comparatively slow speed of 1800 r.p.m. and are exceptionally quiet as to mechanical operation.

The motor generators and dynamotors are equipped with special filters to eliminate interference to receiving sets which would be caused by commutator and other disturbances. These may, therefore be used for the operation of a.c. driven receivers while the rotary converters which are not equipped with such filters are recommended only for audio amplifiers such as are found in the Orthophonic Victrolas and Brunswick Panatropes.

These converters should be of aid to those who must demonstrate a.c. operated sets while being located in sections having only d.c. As they may be obtained in standard sizes up to 550 watts, they could be used by the amateur who has moved into a "d.c. area" and who already has a full complement of a.c. transmitting equipment. These are announced by the Electric Specialty Company of Stamford, Conn.

—*H. P. W.*

John F. Dillon

Lieutenant Colonel John F. Dillon, one of the five Federal Radio Commissioners and former Supervisor of Radio for the Sixth District, died at the Letterman General Hospital at San Francisco on October 9th after an illness that took him from his official duties in Washington in June of this year. He was 61 years old.

Colonel Dillon served in the Army from 1883 to 1912, when he retired to become one of the first of the Radio Inspectors of the Department of Commence under the new radio law of 1912. He served at New York, Washington and Cleveland and then became the Inspector at Chicago for the Ninth District, where he was in charge of this large district during the formative period of American amateur radio under the new law. During the war he organized several signal battalions and himself saw service in France as Signal Officer of the Army Artillery during the Meuse-Argonne. In 1919 he became Supervisor of Radio at San Francisco for the Sixth District where he served until, in March of this year, he became one of the new Federal Radio Commissioners under the 1927 radio act.

Colonel Dillon was one of the most beloved of Supervisors. We believe that every amateur liked him. He graced the board at many an amateur hamfest and for many years was always a guest at amateur affairs in the Sixth. When he was appointed to the Commission, the remaining Commissioners by common consent regarded him as the member to handle matters affecting the amateur, because of his long and varied experience with us. It was good to have a member of the Commission who understood us so well. He was always fair and square, and we know no greater tribute. We have lost a friend, both in the man and in the official.

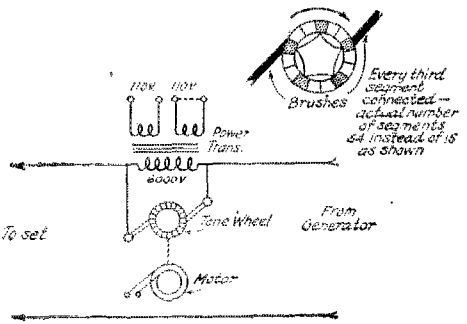
The New Tone at 9XL

By Ivan H. Anderson*

Editor's Note. 9XL is a standard frequency station approved by the O.W.L.S. Committee of the Experimenters' Section, A.R.R.L. The station is operated without charge by the staff of WCCO as a contribution to the radio art. The schedules appear at intervals in *QST*.

MANY letters have come to us asking how the tone used on the A and B Standard Frequency Transmissions is produced. A few months after 9XL started broadcasting Standard Frequency Transmissions, reports came to us that due to our "DC note" we were very hard to separate from broadcast harmonics.

After scouting around in our junk pile, the following apparatus was found and assembled. A 54-segment commutator was mounted on a 60-cycle, 110-volt, 1200 r.p.m. motor. Two woven wire brushes were mounted on a bakelite strip, which was fastened to the base of the motor. These



brushes make contact on the commutator, which has every third segment connected together. The brushes are adjusted to make contact to any two of the segments that are connected. This would, when the motor was running, give us an interrupted circuit with a frequency of about 360 interruptions per second.

The percentage of modulation, or tone to be imposed on the carrier of 9XL, does not have to be any more than about 10%. If more than that were used it would be hard to obtain a zero beat from it.

The plate supply for 9XL and 9WI are the same, 9WI being 9XL's transmitter, crystal-controlled on 7052 Kc. We find that it is necessary for reasons that do not matter in this story to use a choke in the positive plate supply lead when the set is used as 9WI. This choke remains there permanently. The choke in reality is a power transformer, primary 6000 volts, secondary two 110-volt windings, rated at about 1½ KVA. The primary is used as a choke and when the tone wheel is used, one secondary is shorted so as to absorb the transient currents that would cause excessive sparking at the commutator. The tone wheel brushes are connected directly across the primary (6000 volt) leads, as in the diagram. This then would cause a voltage variation in the plate circuit of the tube corresponding with the drop in voltage in the choke.

All settings used for Standard Frequency Transmissions are first obtained without the tone wheel to see that they have the required power and are steady and not "chirpy". When this condition is acquired the tone wheel is connected in the circuit again. The setting is then gone over to see that it still holds the above requirements. A resistance would do very well in place of the choke.

*Operator at WCCO-9XL-9SW-9DGM, Gold Medal Radio Station, Anoka, Minnesota.

Strays

8DPA had some trouble in getting his current feed Hertz to operate properly when using direct coupling to the oscillating circuit. The "fundamental" of the antenna went up from 40 to 46 meters and could be varied by inserting a series condenser proving that the feed system was at fault. By inductively coupling the feeder to the oscillator, the wave dropped to the fundamental of the radiating portion and the insertion of a condenser in the feed wires had no effect upon it. The results as far as making contacts was concerned was also materially improved.

The Electrad Control Manual issued by Electrad, Inc. of New York City gives some interesting information concerning the uses of resistances in the construction of receivers and "B" substitutes. The booklet may be obtained from them for 25 cents.

9AWE says that the clip terminals used on electric iron plugs are useful as helix clips. Seeing we received the same dope from W. Market of Chicago, it must be so.

1CCZ

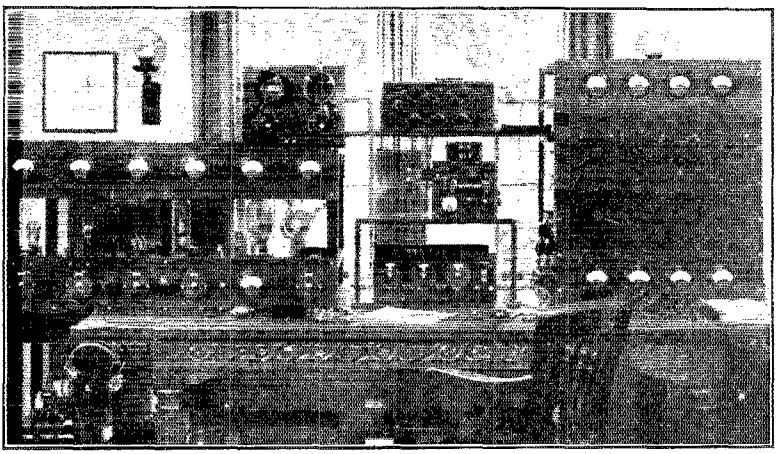
THE transmitter at 1CCZ, of the crystal controlled type, is capable of operating on all waves between 15 and 100 meters. It is, however, used only in the 20-, 40-, and 80-meter amateur bands, there being no need for working elsewhere.

A crystal, the fundamental wavelength of which is approximately 160 meters, is normally used and controls the output of a UX-210. A second 210 always operated as a frequency doubler brings the wave to 80 meters. If transmission is desired on this wave, the next stage (UV-203A) and the final stage (UV-204A) are both used as straight neutralized amplifiers. For 40-meter operation, the 203A is on 80 meters and the 204A is employed as a frequency doubler while for 20-meter work, all stages are doublers.

By means of General Radio plugs and jacks, all the inductances and chokes are made interchangeable which is of great convenience when it is necessary to change waves. Those inductances for the crystal and first amplifier circuits are wound with No. 14 bare copper wire on three-inch ribbed hard rubber forms which were notched on a screw-cutting lathe to space the turns ⅛ inch apart.

The forms on which the inductances for the last two stages are wound are made up of four strips of hard rubber, ¼ by ½ by 10 inches long, the ¼-inch faces of which are fastened by means of machine screws to three hard rubber rings ¾ inches wide which are cut from the same stock used for the smaller coils. The outer edge of the strips were notched by means of a square file so that the copper strip with which the inductances are wound will fit snugly in place for all time.

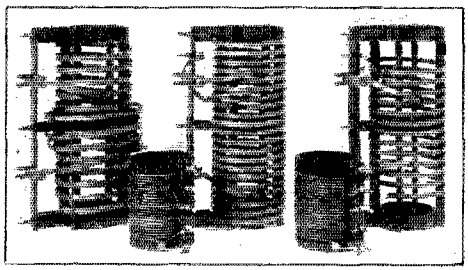
The copper strip for the coils in the 203A circuit is ¼ inch wide and was made by flattening No. 8 soft drawn wire in a heavy rolling mill. The strip on the 20- and 40-meter coils for the final stage is somewhat heavier and wider. They are fitted with plugs for the filament, plate, neutralizing and excitation leads but the connections to the tank condensers are made through ⅝ inch brass lugs fastened by thumb screws. This not only takes care of the heavy circulating tank currents but also serves to hold the coils rigidly in their mountings.



A VIEW OF THE STATION

The crystal controlled transmitter is the large double panel unit at the left. Mounted to the top of the frame at the right end is a panel holding the antenna tuning equipment. On the floor below the transmitter is the filament transformer and in the box nearer the table is the small tube rectifier for the 210s. The receiver described herewith may be seen in the center of the table. Above it is a General Radio precision wavemeter having a range of from 15 to 200 meters. It is in a position to give just enough coupling to the receiver to allow the wave of any signal to be checked with the minimum amount of trouble. Above the wavemeter is a Grebe CR18 which is always kept ready for immediate operation. The large panel on the right is the 200-meter phone and c.w. transmitter, the modulation system of which may be used to modulate the crystal controlled set. The "floating" key may be seen on the table to the left of the receiver.

The antenna coupling coils are wound directly over the centers of the inductances in the plate circuit of the 204-A. The two coils are separated by ½ by ¼ inch hard rubber strips set on their ¼ inch faces. The strips and coupling coils are lashed in place



THE PLUG-IN-INDUCTANCES USED IN THE TRANSMITTER

The two smaller coils are for the two 210 tube circuits, there being 24 turns for the oscillator and 23 for the doubler. The 203-A or second amplifier stage uses 21 turns for 80 meters and 13 turns for 40, while the output stage requires 21 turns for 80, 13 for 40 and 7 for 20 meters. The heavy lugs make contact to the tank condensers.

with oiled silk fish line. Numerous small holes in the strips make it possible to do a neat job of the lashing. Coupling coils placed at the plate end of the amplifier inductances were first tried but did not prove as satisfactory as the present method of coupling.

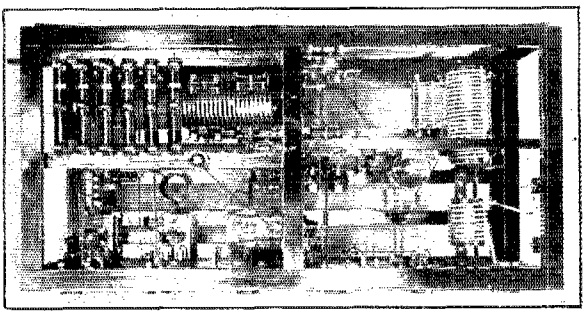
The radio frequency chokes were made by cutting six slots ¼ inch wide and ¼ inch deep in a piece of ¾ inch hard rubber rod which is 3½ inches long. The slots are wound full of No. 30 d.s.c. wire. There are also a number of Lavite resistance units ranging from 12,000 to 25,000 ohms mounted on hard rubber strips and fitted with plugs to take the same mountings as are used for the chokes. As there are two pairs of jacks in series in each circuit, any combination of battery or resistance bias may be used. Choke and battery bias is normally employed and seems to give better results than the use of resistors. Separate batteries are used on each stage.

The filaments of both the 210s are heated by a 25-watt Acme transformer. The 203-A and 204-A filaments are lighted by a 200-watt Acme giving 11 volts. There are two variable resistors in the leads to the 203-A filament to drop the voltage across its terminals to 10.

The plate supply for the crystal and first amplifier tubes is obtained from a rectifier-filter system employing a pair of UX-216B tubes and a "brute force" filter consisting of an input capacity of 4 μfds., a 30- henry choke, capable of carrying 300 milliamperes in the positive lead and an output capacity of 8 μfds. Both the high voltage and filament supply for the rectifier is obtained from an Acme BH-1 transformer. The output which is approximately 500 volts is applied directly to the plate of the amplifier tube and through a resistance of 25,000 ohms to the plate of the crystal tube. The resistance consists of two Lavite 50,000-ohm units in parallel.

A motor-generator or tube rectifier may be used for the plate supply to the two last stages. The rotating equipment consists of two 1250-volt, 1.5-ampere maximum current output, Esco generators in series driven by a 7.5 h.p. Century induction motor operated from 220 volts a.c. A separate machine supplies 110 volts d.c. for the fields of the generators.

The rectifier consists of six UV-204 tubes with their grids and plates tied together. Three tubes are in parallel on each side of the plate transformer center tap. The filter consists of an input capacity of 4 μfds., a 30-henry choke in the positive lead, a 6-henry choke in the negative lead and an output capacity of 12 μfds. The input capacity consists of 36 1 μfd. condensers in a series parallel arrangement and the output capacity employs 108 similar units. The



A TOP VIEW OF THE TRANSMITTER

which shows the relative mechanical positions of the various circuits.

chokes are capable of handling 2.5 amperes.

There is also an arrangement whereby from 1 to 6 microfarads in steps of 1 μfd. each may be shunted across either choke. The filament and plate transformers were built by Thordarson. The motor-generator set and rectifier-filter units are located in the basement at the opposite end of the house and are remotely controlled from the operating table.

Under normal operation, the output voltage is adjusted to 2000 which is applied directly to the plate of the 204-A. The sup-

ply for the 203-A is obtained from a tap off a resistance shunted across the high voltage supply. The resistance consisting of six Ward Leonard 5,000 ohm "grid leaks" in series. Due to the generous dimensions of the power supply, the leakage loss in the resistance shunt is not of much importance.

Keying is accomplished by means of a double contact relay which breaks the plate and grid bias circuits of the 203-A stage simultaneously. No signal background is left when the key is open and the method has proven to be a very satisfactory one. The key itself is a "floating" affair. It is mounted on a baseboard with a 1 µfd., 1750-volt Faradon condenser which is heavy enough to keep it from "walking" while being operated, at the same time permitting it to be placed in a position on the table which is convenient to the operator. A plug on the end of a flexible cord connects the key to the relay circuit through a jack on the transmitter panel. The condenser is shunted across the key to absorb the spark that would normally take place and prevent break-in operation by causing a click in the receiver. Small switches shunt the relay contacts when it is desired to use voice modulation.

For phone work, the output amplifier stage is modulated by the Heising method. The modulation portion of a 500-watt, 200-meter phone and c.w. set employing a pair of 203-A and a pair of 204-A tubes is used for this. A switch on the transmitter panel cuts in the constant current choke when phone transmission is desired.

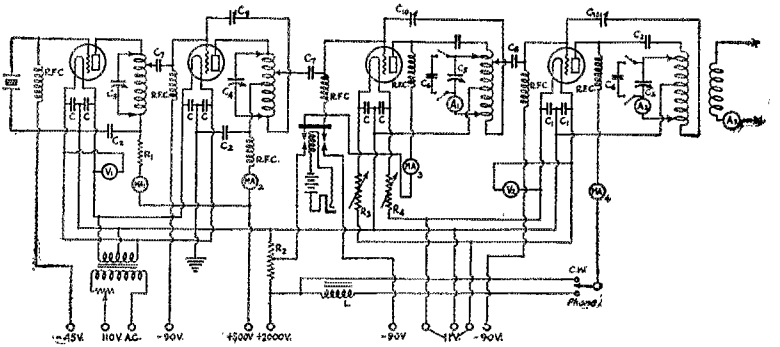
After the transmitter had been completed, all metal parts were taken out and nickel plated. The inductances were plated when completed by immersing the whole coil and mounting in the plating bath. The plating was especially necessary on account of the salt air, the set being located less than a hundred yards from the ocean.

A current fed antenna system consisting of two No. 10 enameled copper wires each of which is 77 feet long is used. Due to the particular surroundings, it was impossible to run the counterpoise directly below the upper half of the system and it was necessary to run the two wires pointing directly away from each other. The maximum heighth of the upper portion is 70 feet and the lower part is 35 feet above ground. Ten-inch Pyrex strain and pillar insulators are used for all outdoor insulation.

The fundamental of the system is 95 meters and it is operated just below this for 80-meter transmission. For 40- and 20-meter transmission, the antenna is loaded to 120 meters and operated at its third and fifth harmonics respectively. The 500-watt, 200-meter c.w. and phone set may be operated on this system by tying the antenna and counterpoise together and working them against ground.

The receiver is of the autodyne detector type and although two stages of audio frequency amplification are provided, the second is seldom used. Regeneration and oscillation is controlled either by a variable bypass (throttle) condenser or by a 100,000-

(Continued on page 64)



CIRCUIT DIAGRAM

C—.006 µfds.
C1—.02 µfds.
C2, C8—.002 µfds.
C3, C6, C7—250 µµfds.
C5—160 µµfds.
C9—40 µµfds.
C10—.70 µfds.
MA1—0— 50 milliamperes
MA2—0— 100 "
MA3—0— 300 "
MA4—0—500 "
V1—0—10 volts a. c.
V2—0—15 volts a. c.
A1—0— 5 amperes, radio frequency
A2—0—10 " " "
A3—0—1.5 " " "
R1—25,000 ohms
R2—30,000 ohms
R3, R4—.5-ohm rheostat
L—Constant current choke

A Simple Cure for An Old Ailment

By A. J. Haynes*

WHAT'S the trouble with the high voltage electrolytic rectifier? Here is a simple inexpensive source of plate supply which should be more reliable and fool-proof than a motor-generator and to my mind is to be preferred to the latter for amateur C.W. work.

Certainly there is nothing fundamentally wrong with the principle of electrolytic rectification. Almost any old timer will remember the lead and aluminum rectifier which charged his storage battery in the days before such devices could be bought at the corner drug store or "where are you," for the price of three or four good meals. While they were undoubtedly cumbersome and messy when compared to the modern charger yet they served their owners long and faithfully provided they were given sufficient water to keep them below the boiling stage and that's about all the attention they did get.

Trouble seems to develop only when we try to make a series of these rectifying units handle a high voltage. From the time the optimistic amateur presses the key and starts his first electrolytic rectifier bubbling and sparking he usually begins to look forward to an M.G. set.

I understand on good authority that one of these Mason jar contraptions was the indirect cause of the most severe case of electrolysis ever contracted by the Old Man's cat. (Or what is it that cat develops when the O.M. scores a ringer?)

Of all of the articles which I have seen on electrolytic rectifiers, I have yet to find one which goes to the seat of the trouble and offers a cure. The authors seem to limit themselves to constructional details and favorite solutions.

Either very little serious thought has been given to this subject or else the proverbial bushels are concealing the results.

Some months ago I had the good fortune to overturn one of these figurative bushels in the cellar of an old friend who has recently discovered the lure of brass pounding. I tried to infect him with the germ some twelve or fifteen years ago but at that time he didn't seem to consider the distance obtainable worth the effort involved. He admitted that one could make a good deal of noise and fuss considering the few kilowatts consumed but argued that too much money was necessary before equipment to handle *real power* could be obtained. Now, he couldn't see that radio could be compared with—well, for instance, that search light he had built and operated from his roof until official notice had been taken of it. Now *there* was a real thrill with some man-size power behind it! No telling what would melt next! Untold kilowatts surging through No. 4 (ground wire) leads from a source that was nobody's business, (that is, for a while it wasn't)!

Today this same fellow, L. A. Brown, takes great delight in a little 50-watt bottle at 2VH. He claims that married life and family cares have brought him to this sad state of conservatism.

To get back to that overturned bushel; 2VH is operating his 50 watter from an electrolytic rectifier consisting of a surprisingly small number of half-size drinking glasses with one-inch wide strips of lead and aluminum in each together with common 20 Mule Team borax solution. Now the point is that this rectifier runs cool, never sparks on the plates and has continued to perform consistently without attention for several months!

The secret of success lies in a 1 meg. leak which is placed across each cell!

Do you get the idea? Let's go back to the beginning and consider a single cell. One small lead and aluminum cell will rectify a reasonable 220-volt alternating current with only 1 milliamp or less of reverse leakage current, *providing the cell is properly formed!* Why is it, then, that we are invariably advised not to allow over 30 or 40 volts per cell if we want successful results? The answer is that most of the cells are imperfectly formed and the majority of the work is being done by a few which are heavily overloaded and spark badly.

If the average rectifier is tested by placing a high resistance voltmeter across the individual cells, it will be found that some of the cells have little or no voltage drop across them while the few cells that are working properly divide the whole load. It is the same old story of the series condensers where the good ones take all the load and the poor ones act merely as high resistance leaks.

The worst possible condition exists where all the cells of a rectifier have been formed together after they are connected up in series. The cells are bound to vary slightly and the few that are the quickest in forming cut off the current before the rest are formed. In this case the few well-formed

*Northern Tube Lights, 250 W. 57th St., Fisk Building, New York City.

cells are the only ones that play an important part in the rectifying action and the others might better be thrown out. In this case the few good cells will spark badly due to the excess voltage which is across them.

It is absolutely necessary, therefore, that the cells be formed individually and this can be done very easily by placing the 110 V. a.c. across them with a small 25-watt bulb in series with the line.

It is important that each cell be formed perfectly the first time. If this is not done no amount of doctoring will fix it up. The whole forming process must be done over by first removing what film has formed on the aluminum. For this same reason it is necessary that the aluminum be absolutely clean of any film or foreign material before the forming process is attempted.

I know of only one method of doing this successfully and that is to dip each aluminum electrode in hydroflouric acid. This acid is not expensive and can be obtained easily but should be handled with care. It must be used in a wax or rubber receptacle. A porcelain container heavily coated with wax will do, but be careful and do not scratch through the wax as this acid will eat glass, porcelain or metal, to say nothing of hands and clothes.

The film which forms on the aluminum surface is a silicate, first cousin to glass, and must be handled accordingly.

Let us suppose that we have the unit cells all formed reasonably well. The next problem is to keep them in this condition. There are no two cells which are *exactly* alike. While the resistance of each cell to the reverse phase of the current will be very high yet there is bound to be some variation in the voltage drop across them. As time goes on the best cells will be burdened with an increasing voltage while the poorer cells will deteriorate until they are assuming only a negligible part of the burden. The remaining good cells will start sparking and overheating until it becomes necessary to pull down the whole works and start over by cleaning the aluminum plates and reforming.

Right here is where the little shunt resistances come in! If the voltage rises across one of the cells its shunt takes part of the load and distributes it across the other cells. On the other hand, where the resistance of the cell is below normal it takes the major part of its shunt's load which keeps it in condition and prevents it from becoming inoperative.

A brief description of the rectifier at 2VH might be of interest and will serve as a practical illustration. There are 30 cells altogether, 12 on each side of a 3000 volt center tapped transformer in the conventional center tap circuit. These cells consist of small half-size drinking glasses which were obtained from Mr. Woolworth's 5 and 10 cent emporium. Their dimensions are 3½ inches tall by 2 inches diameter at the top and 1⅜ inches at the bottom. The electrodes are 1 inch wide strips of aluminum and lead which extend to within ½ inch of the bottom of the glasses. The electrolyte is a saturated solution of borax. A thin film of Nujol covers the electrolyte in each glass to prevent creeping and evaporation.

The electrodes are made long enough so that when they are bent over at the top the lead and aluminum electrodes in adjacent cells will overlap. These adjacent electrodes are fastened together with long brass machine screws. These screws or bolts are passed through paraffined wooden strips which extend across the top of the rack holding the cells.

The bridging resistances consist of a ¼" wide strip of heavy drawing paper coated with a mixture of India ink and graphite. The best procedure is to coat a fairly large sheet of paper by painting it with this mixture as evenly as possible and after it is thoroughly dried cut into ¼" strips with a ruler and sharp knife.

Of course, the exact width of the strips will depend on the mixture used and the thickness of the coating. On the other hand, the exact value of the resistances is not critical as long as they are in the neighborhood of .5 to 1 meg. and fairly uniform.

The resistance strips are placed along the top of the wooden electrode supporters adjacent to the brass bolts which support the electrodes. Large washers are slipped over these bolts which serve to hold down the resistance strips and make contact with them.

While it is true that a well formed cell will operate perfectly under voltages as high as 200 and over, at the same time it is just as well to be conservative and not carry the thing too far. In the case of the rectifier described above, for instance, Mr. Brown has allowed 100 volts per cell and while it could undoubtedly be made somewhat smaller than this, yet it hardly seems necessary as the jars used are of such small dimensions that the entire 30 cells assembled in two neat racks one on top of the other are no bigger than some receiving B eliminators I have seen. When such an installation is compared with a cellar full of Mason jars that supply current to some amateur transmitters, it is indeed a contrast. When the builder sees this little rectifier working efficiently, week after week with no heating or sparking I think that he will agree with me that the little extra labor and care in its construction is well worth while.

Adjusting the Current-Feed Hertz Antenna

By Robert Whitmer*

THE device known as the current-feed Hertzian antenna consists, in its commonest form, of a single wire, $n/2\lambda$ in length, broken at the center by an insulator. From both sides of the insulator down-leads go to the secondary coil, which is coupled to the oscillator as shown in Fig. 1.

The work of our recent experiments was to determine the current and voltage relations in a system of this type; especially to learn if it were possible for the two down-leads, known as the "feeder line" to act as an untuned circuit, not affecting the period of the straight part, or "flat-top." The work was also to determine a means of tuning the system for maximum radiation.[1]

The results obtained for the first part of the work were entirely those which might be expected of a single wire, folded part being as much a part of the oscillating circuit as the flat-top. No condition was found where changes in the length of the feeders did not alter the resonant frequency of the system. A condition *was* found in which the number of turns in the secondary coil did not affect the frequency of resonance. The details of this will be given later.

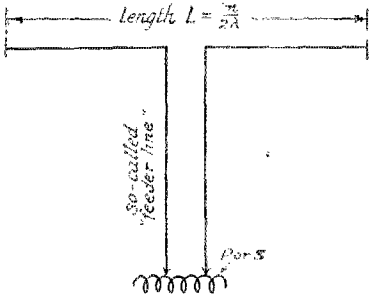


FIG. 1. THE TYPE OF ANTENNA SYSTEM DISCUSSED

It is ordinarily assumed that the paralleled wires are nothing more than feeders but they are an actual part of the oscillating system and best radiation efficiency demands that they be adjusted for minimum radiation while the antenna top is adjusted for maximum radiation.

As to the methods of these measurements, meters were inserted at several points in both feeders, and also in the flat-top. *They were all found to have maximum readings at the same frequency,* and their relative values, the physical dimensions of the system, together with the value of the resonant frequency, resulted in the above conclusion.

FIG. 2. TWO CONDITIONS POSSIBLE WHEN THE LENGTH OF THE TOP IS INCORRECT

At A the top is too short and a portion of the half wave is not in the top but in the folded or feeder portion. At B the top is too long and carries more than a half wave, the surplus opposing the half wave which should be present. Where operation over a band of waves is desired these two conditions cannot be avoided but the departure from the correct condition should not be made too great.

The second part of the work is simple in theory, but the explanation is more involved. Voltage relations in the flat-top only, are shown in the diagrams.

In Figure 2A $1/2\lambda$ is greater than L. Obviously, the device is not radiating to full efficiency, since the full standing wave is not obtained in the flat-top. If the relations are as shown by the solid line, the feeder lines are in phase with each other and radiate. Since the object of using the system is to avoid radiation anywhere from the flat-top (which is to be supported well above the earth) this is not desirable.

In Fig. 2B $1/2\lambda$ is less than L, and the radiation from part of the system opposes that of the rest. As in 2 (a), the feeders may or may not radiate.

In Fig. 3, $1/2\lambda$ is equal to L, but the feeders are in phase and so radiate.

In Fig. 4, $1/2\lambda$ equals L, and feeders are 180° out of phase, each neutralizing the radiation from the other. This, then, is the condition we wish to obtain.

In order to make $1/2\lambda = L$ we must obviously know L and λ. L means the electrical length which is the physical

FIG. 3. AN ANTENNA TOP OF THE CORRECT LENGTH BUT FED BY A FEEDER OF INCORRECT LENGTH

The feeder is radiating while the antenna is radiating very feebly.

*1351 Washtenaw Ave., Ann Arbor, Michigan.

1. Correctly used and actually meaning radiation—i.e., *watts* leaving the antenna.—Tech. Ed.

length plus the loading effect of all nearby objects. The measurement is most simply made by removing one feeder, shorting the center insulator with a meter, and moving the other feeder towards the end two or three feet. The system is then excited by the common single-line voltage-feed method, the wavelength at

FIG. 4. THE CORRECT OPERATING CONDITIONS

The antenna top has the correct length, carries exactly one half wave with opposite voltages at the ends of the top. This gives maximum radiation from the antenna top and should insure minimum radiation from the feeder lines.

which the meter reads highest being 2L. This fundamental is the wavelength at which the system should be operated. If the length of the feeders is such that the condition of Fig. 4 obtains, the matter is simple: Tune the secondary inductance *until maximum current occurs* anywhere in the circuit at that wavelength.

If condition 3 obtains, the problem is more involved. By drawing voltage diagrams of the feeders, it is seen that in this condition a voltage antinode must occur at the center of the system, which is in the secondary coil. These diagrams also show that this can never occur in the condition shown by 4. In this experiment, when a voltage antinode appeared in the secondary coil, the number of turns in the coil had no effect upon the resonant frequency of the system. The coil used may have been a freak, as to distributed capacity or ratio of distributed capacity to inductance, or it may take a freak to act otherwise; no explanation is offered. A voltage antinode is not to be desired near the set anyway, since high losses would result. The remedy is to increase the effective length of the feeders by means of loading coils, one in each line. Since for maximum radiation the system is to be operated on a harmonic of the whole, this means that the fundamental of the flat-top must be such a harmonic of the entire system that a voltage node appears in the secondary coil. Thus condition 4 is obtained artificially.

It should be noted that if the system is properly adjusted for fundamental operation, these same adjustments are not correct for operation on harmonics of the fundamental.

There is another means of finding the fundamental, which is rather hard to interpret as to theory. In this method, short the center insulator as before, but leave both feeders connected. Knowing the physical dimensions of the system, it is possible to estimate whether condition 3 or 4 will hold, at the frequency at which it is desired to operate. If 3 is the condition, tune the primary circuit until the highest maximum reading of the meter is obtained, This is the desired frequency. It is not known whether or not this method will work when 4 holds. It seems that it should, however.

The theory is believed to be as follows: The closed part of the system appears to act as a coupling or link circuit, exciting the flat-top on its (the flat-top's) fundamental. Another peak will also be obtained, as condition 2 (a) or (b) is reached. Since the two sides of the system can never be perfectly balanced, the ends of the insulator will not be at just the same potential when (a) or (b) is reached, and a little current will flow through the meter. The short does not affect anything else at this particular frequency. This method is rather difficult to manipulate, but the results checked perfectly with those obtained by the voltage-feed method. Its advantage is that the complete antenna may be put up of two pieces of wire,

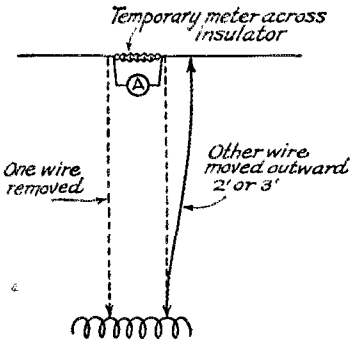


FIG. 5. A METHOD OF FINDING THE WAVELENGTH OF THE ANTENNA TOP

eliminating splices and soldered joints, as would be necessary if a feeder were removed to measure the fundamental.

The antenna used was an indoor system having a fundamental of about 33.5 meters. The driver was a UV202 tube in Hartley circuit, the plate supply being 220 volts d.c.

I.A.R.U. NEWS

AUSTRALIA

WE note that our Australian friends are gradually losing much valued territory in the vicinity of 35 meters. They originally started out with a band of from 32 to 37 meters and this has gradually been pruned down to the present 32- to 33-meter band. It seems that a wavelength of 32.5 meters has been allotted for international short-wave broadcasting and it is hard to conceive how so many signals will be fitted into such a small band.

We are showing a view of oa7BQ who tells us that although the Australian 7th

A VIEW OF oa7BQ

district is a small one containing only about thirty licensed stations, there are about ten really active ones who are very much in evidence in all tests and competitions.

GREAT BRITAIN

The Incorporated Radio Society of Great Britain has just published an interesting booklet entitled, "What is Amateur Radio?" It not only tells about international amateur radio but gives a clear insight into the objects and conditions and advantages of membership in the R. S. G. B. It also tells some of the early history of amateur radio in Great Britain and explains some of the difficulties that were encountered when the idea of organized broadcasting was put up to those in charge of radio affairs. It is an altogether interesting and instructive broachure which may be obtained from the Honorary Secretary of the Society, 53 Victoria Street, London S.W.1, England. Request should be accompanied by a one penny stamp if they are available or two cents in coin to cover mailing costs.

We are told by eg2NU that it is practically impossible to make contact with "nu" stations when their CQs are answered on a wave of 23 meters. They never seem to listen on that wave unless they have definitely called "CQ Europe" or "CQ eg". As the law will not allow the "eg" stations to shift down to 20 meters, it is almost useless for them to answer any but directional calls.

CZECHOSLOVAKIA

There have been no changes made in the legal aspect of amateur radio and the amateurs are working under cover on 45, 32 and 20 meters. OK1 who formerly used high power and made contacts with stations all over the world, is now using a low-powered transmitter with an input of ten watts. He has a portable station also and uses a mast that may be folded up when not in use. AA2 did some very nice work during the summer with a portable set having an input of from two to ten watts. 1AB is located in the center of the city of Prague and uses an indoor aerial. With an input of about 20 watts, he has worked Nijni, Novorod, U.S.S.R., a distance of over 2200 kilometers.

1KX and 1RV who use 220 volts a.c. have had some fine results on the 20-meter wave with from one to seven watts input. 2UN and 2YD who also work on this band have been using powers up to sixty watts.

The best DX of 3SK has been about 2500 kms., a very nice piece of work when it is considered that his power is only about one-tenth of a watt.

FRANCE

We are showing herewith a photo of ef8FD which is perhaps better known as ef8YOR. It is the station of Prof. J. Reyt, Professor of Physics, Lycee de Orleans, Orleans, France.

A push-pull oscillator circuit is used with two 60-watt tubes. Plate supply is rectified by means of a pair of Kenotrons and the input is usually about 150 watts.

The antenna is a vertical one and operated against ground. Its fundamental

(Continued on page 68)

Calls Heard

eg-2KK, Ralph H. Parker, The Bungalow, Willow Ave., Edgbaston, Birmingham, England
(Heard during Sept. and Oct.)

1aa 1csx 1eh 1as 1py 1ql 1afn 1ahv 1bvx 1bhs 2tm 2ar 2dh 2arv 2ahm 2fm 2qv 2eyx 2cuq 2bv 3jo 3fc, 3blc 3gp 3ua 3ak 3ab 3ba 3ajc 3agg 3aoh 3afn 3rc 1hz 4gp 4bn 4km 4si 4fa 4cz 4qb 4ahh 4rn 4ak 4io 5apo 5aqs 5afu 5apr 5agh 5qb 5aio 5mn 5ar 5dq 5hv 5avs 5kc 5bg 5auf 5uh 5arg 5df 5aep 5adz 5ajm 5av 5ww 5sh 5au 5ajs 5df 5ef 5aep 6aat 6abm 6aej 6am 6aod 6apa 6atc 6auk 6ax 6bgb 6bh 6bhv 6bkj 6bsd 6bvm 6bwc 6bxc 6bxd 6bzf 6gzm 6cak 6cc 6cdw 6dam 6dan 6dck 6dcr 6dgy 6dp 6ek 6ew 6fg 6gc 6kl 6oi 6ba 7adw 7aij 7ek 7gb 7jc 7wb 8axa 8anb 8avb 8amy 8bfa 8cvg 8dew 8dse 8dsy 9abc 9oex 9abm 9any 9anz 9aol 9ara 9awq 9baf 9bbh 9bbl 9bbt 9bhi 9bhr 9bi 9bl 9bna 9bsk 9bwi 9byl 9bzq 9eaa 9caj 9cey 9chs 9eib 9eiq 9cjy 9ckl 9cmj 9en 9ent 9ep 9epq 9eri 9etw 9ewv 9cxx 9cyb 9dax 9dbc 9dbw 9des 9dga 9dij 9dip 9dkm 9dir 9dnv 9dod 9dol 9dra 9drh 9drw 9dsv 9dyl 9eae 9eas 9edi 9ef 9eff 9efh 9ein 9eir 9ek 9erv 9ik 9kq 9kv 9hb 9bl 9hz 9mh 9nm 9ph 9qe 9rf 9uh 9um 9vy 9xm 9xx.

eg-5LY, Kenneth C. Lay, 3 Brands Hill, Colnbrook, Bucks, England
(20 meters)

1adm 1aep 1ahi 1ajm 1akz 1asu 1ban 1bbm 1bbr 1beb 1bdi 1bhw 1big 1bux 1bw 1byv 1byw 1ccz 1cjh 1cmf 1cmx 1dm 1fd 1ia 1ie 1ii 1nf 1nv 1sw 1sz 1zl 2ahm 2aoi 2atk 2avb 2awx 2ayj 2cuz 2bg 2gp 2ie 2jn 2nm 2or 2ox 2tp 2we 3ekl 4ft 4nh 4tu 4xe 8adg 8afq 8ahc 8aj 8alo 8axa 8bes 8bhz 8bpq, 8dae 8dgx 8dhx 8dns 8don 8gz 8nt 9bbh 9bli 9cei 9cmv 9dws 9kv nc-1br nc-2bg sa-fe6 sb-1ac sb-1ad sb-1aw sb-1br sc-1ab sc-2ah sc-2ar sc-3ag su-1cd.

gi-6YW, Mr. T. P. Allen, 59 Marlborough Park North, Belfast, N. Ireland

1adl 1ajm 1arx 1avj 1bux 1caw 1em 1ka 1pa 1rd 2afg 2agn 2ahg 2aun 2awn 2bxu 2crb 2cuq 3aie 3ali 3bkt 3bqz 3car 3ebn 4du 5acl 6apq 8adg 8ahc 8ahd 8aly 8auq 8cdv 8cil 8cpf 8cro 8cxd 8eq 8oq 8wo 9cvn 9nev np-4sa np-4kd nc-1ap nr-2fg nq-7ex aq-1mdz fl-1ab fo-aga oa-6ag oa-2ne sa-cd8 sb-1ah sb-1ar sb-1au sb-1aw sb-1br sb-1cg sb-1id sb-2ag sb-2ar sb-5aa sb-6qa sb-fp su-1oa su-2ak ardi nixb syrie wnp.

BRS90, W. B. Shaw, 198 Abington Ave., Northampton, England
(Heard between Sept. 17 and 27)
(20 meters)

1aq 1aqt 1ari 1asu 1awe 1bcv 1bgt 1bjk 1bok 1bqs 1bw 1byv 1caw 1csx 1dl 1dm 1fh 1fs 1hh 1iw 1kl 1xi 1xv 1zl 2bac 2cvj 2gp 2jn 2tp 2vi 3ajd 3akw 3bgg 3nz 4km 4wh 8abw 8adg 8ago 8ahc 8aro 8axa 8bcb 8cfa 8cfl 8cfr 8cjv 8epq 8eug 8evj 8jq 8lj 8ve 9ara 9asx 9bwe 9cei 9cfn 9cmv 9crd.

(40 meters)

1abd 1ahv 1amd 1aqp 1ccz 1yb 2agu 2apd 2auh 2aun 2ayj 2eua 2euq 2eyx 2ty 3aef 3hqz 4bn 8bhz 8bjb nc-1ap nc-1br nc-1bt nc-2fo nc-3mp nm-bnm sa-da8 sa-en8 sb-2ag sb-2ar sc-3ag se-3ak su-2ah.

Miss B. Dunn, Stock, Essex, England
(Heard during September)

1abd 1adl 1amu 1aqp 1awn 1axx 1ayl 1br 1bux 1cio 1emp 1fl 1ic 1og 1vc 1xv 2ahb 2aqk 2bbx 2bm 2bs 2cep 2cf 2crb 2cyx 2gkc 2tlf 2tp 2vm 2xaf 3af 3aim 3alq 3ank 3auv 3bms 3bqj 3pf 3qe 4ob 4rq 4xe 8jq 8ua 9crj 9dku na-1jt nc-2bg ne-8rg ni-tfhv nn-1nic nr-2fg nx-1xl sb-1ao sb-1ar sb-1aw sb-1ax sb-1bn sb-1cg sb-2aq su-2ak oa-2fc oz-2al oz-2bg oz-4aa af-hval as-1xc as-2wd fm-8vx fq-pm eh-9oc eh-9xf ek-4afg ek-aeq ek-aex xek-4ap ep-1bk et-pach arex arcv atc eu famp ffq gdkb gfa gkt glyk k2x kzet kfzq mhn nujk ocly ocxs pqs sas sln s7h vwx wnbt wuby yr.

5PK, J. F. De Bardeleben, Opr. on S. S. Jupiter, WYCC, Box 1017, Memphis, Tenn.

1aba 1ahv 1ahk 1asf 1awb 1ask 1arn 1caa 1ck 1en 1lw 1auz 1xv 1yb 2aeo 2abp 2aqo 2avq 2aog 2apn 2aun 2abt 2aq 2amv 2ahb 2ago 2aes 2ase 2aut 2avk 2agw 2az 2alu 2asv 2bez 2bec 2bme 2bbc 2ca 2erb 2cuq 2ez 2erc 2mb 2mu 2gp 2uo 2ix 2iz 2qh 2md 3nm 2qi 2dr 2ie 2tp 2sz 2cf 2fh 2og 2hr 2qp 2xv 2xai 2xam 3aa 3au 3afl 3aib 3ajd 3aim 3acu 3bmc 3bnc 3bgs 3cab 3cvg 3chg 3et 3en 3fh 3wj 3qe 3ta 3jn 3tu 3sz 3lq 3zr 3pr 3gb 3rf 3mv 3ku 3qh 3ge 3ww 4aba 4aw 4aby 4bn 4bav 4bu 4co 4eg 4ca 4du 4dl 4fu 4gy 4wu 4hz 4jd 4rp 4ll 4pa 4px 4nq 4uo 4iz 4px 4tk 5aua 5aav 5ajq 5ar 5ant 5auz 5apa 5arg 5arf 5adz 5anc 5atf 5adw 5amk 5ain 5we 5uk 5vh 5ez 5pt 5vi 5nl 5rg 5gd 5bu 5pd 5pm 5rp 5oa 5rj 5ws 5ms 5wz 5dx 6arn 6agr 6amd 6bq 6ber 6bxi 6bfl 6bxa 6bwd 6bjx 6brk 6cm 6cze 6dph 6dct 6dkx 6dbc 6dch 6hr 6oi 6gg 6rl 6fs 6ee 7aa 7am 7alk 7jf 7bb 8ajt 8axt 8aoc 8ane 8avd 8ave 8akv 8axg 8asf 8aju 8amb 8akk 8asm 8aub 8alr 8ajc 8bep 8bjx 8bbg 8bwn 8bal 8brt 8bum 8bqm 8bn 8baz 8bqq 8bau 8cau 8cxw 8cxd 8ckx 8ciu 8cam 8cxa 8epf 8cym 8cev 8cnt 8efb 8ego 8ejw 8exi 8emj 8dbj 8dmm 8dnf 8dng 8dbm 8eq 8ena 8eek 8ey 8ea 8jp 8fl 8sx 8nc 8gc 8rd 8xix 8wo 8wk 9acl 9ald 9axx 9aok 9aid 9axu 9axf 9azg 9abu 9abn 9abm 9ah 9adn 9anh 9aff 9agu 9ain 9amo 9axo 9axf 9afx 9ack 9ahk 9aeg 9bqc 9bzi 9bnq 9bz 9bef 9bat 9beb 9bib 9brh 9bsm 9bov 9bjl 9dri 9bqy 9bfk 9bbg 9cix 9cnt 9cwq 9eav 9czi 9clg 9ckv 9cev 9cnb 9crj 9efl 9cia 9cmv 9dli 9dud 9dng 9dqn 9dgd 9dwp 9dzl 9dpw 9dku 9dmb 9dpb 9dsu 9dfz 9dba 9dei 9ef 9efu 9eag 9emm 9emj 9ecx 9ekw 9ehr 9efn 9ebb 9emr 9mn 9lm 9nt 9ld 9fo 9kb 9ux 9fl 9gb 9qj 9hm 9fi oa-2rx oa-8gr oa-3gh oa-3hr oa-3es oa-5hg oa-5dx oa-5em oa-7am oa-7cw ef-8ere ef-8vvd ef-8cu ei-1er eg-6xp ek-4dbs nc-3cj nc-2be nc-4ga nc-2cf nc-4bp nc-7ex nc-1ap nm-9a nm-9nm nm-5c nm-1aa nm-1n 6lxc 67xc nq-2ac nq-2am nq-2cf se-1fg sv-1xc nm-1j nm-1n 6lxc 67xc nq-2ac nq-2am nq-2cf se-1fg sv-1xc sb-1ao oz-1ao fq-pm.

Charlie Du Vall, Opr. KTUI, S. S. Samoa, Terminal Island, Calif.

1lu 2ag 2beo 2hr 2uo 3avc 4akn 4ap 4ll 4rp 4qz 4jw 4on 5zav 5afb 5ck 4auz 5zl 6bdl 6nw 6pw 6buc 6col 6bbe 7ip 7pp 7mn 7ef 8adg 8cau 8dld 9elb 9drd 9ajp 9chs 9ccv 9cye 9amz 9ehn.

1BVL, R. S. Briggs, 393 Ashmont St., Dorchester, Mass.
(On board S. S. San Pablo, Santiago, Cuba, Sept. 15)
(20 meters)

1aq 1ii 1zl 1bjk 1bux 1byv 4ab 4km 6agr 6ann 8kc 8efr 9dwe eb-4rs.

(40 meters)

1nf 1xv 1adl 1amu 1bca 1caa 1ekp 2ca 2et 2fs 2mu 2qu 2sg 2tp 2ub 2awi 2ayj 2ccd 2ewm 4ha 4aba 5eb 5acy 6qi 6bgv 6bjf 6bjl 9akk 8bbg 8chp 8eno 8erp 8dpo 9auu 9evn nc-2br nm-ig kfzq.

(At Puerto, Columbia, Sept. 19, 20, 21)
(20 meters)

1kl 1zz 1abx 1akz 1beb 1bwl 1byv 1ccz 2aig 4du 8sh 8adg 8bta 8cvq 8djv 9gk 9bzi 9dpw 9dwe np-4kd.

(40 meters)

1cd 1fl 1kl 1mp 1pa 1za 1adp 1amp 1aqt 1arv 1bnn 1bqd 1caa 1ekp 2hr 2kr 2mb 2rs 2uo 2vd 2vm 9agn 2ahm 2apd 2aqk 2aun 2ayj 2bad 2bec 2bch 9bdc 2bdm 2cua 2cyx 8sz 8afw 8aib 8aim 8bcd 8bnf 3bqz 4br 4dg 4du 4oc 4qb 4rm 4we 4aba 8ac 8cj 8oq

(Continued on page 84)

Correspondence

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

Standards

Cambridge, Mass.

Editor, *QST:*

On my return to the office today, I found your letter of September 20, asking if I would explain the announcement just made by the Radio Manufacturers' Association that it had dropped its standards and was endeavoring to prepare strictly industry standards. Your letter also asks how these standards fit in with the standardization program of the Institute of Radio Engineers. I am going to answer this latter question first.

The I.R.E. is made up of individuals—not of manufacturing companies. Its interest is that of the technical advancement of the art. This, accordingly, limits its standardization activities to terminology, rating and methods of testing. It is the outstanding body in radio technical matters, and its activities are entitled to the support of every radio engineer. It is to be regretted that other organizations have from time to time attempted a duplication of terminology work undertaken by the Institute.

Trade associations are made up of member companies, rather than individuals. The standardization problems of these associations are commercial rather than technical. They deal with dimensions, tolerances, colors, etc. While the work of the I.R.E. endeavors to bring about an interchange of knowledge of technical matters with a common understanding of the terms and test methods used, the standardization work of trade associations enables the parts of one manufacturer to be interchanged with those of another. Grid leaks and vacuum tubes are good examples, as each require holders or sockets often made by a different manufacturer.

There are two trade associations of manufacturers, each of which has done important standardization work. The younger association, and the smaller, is really the older when one considers that it has been in existence under two separate names. It is now called the Radio Division of the National Electrical Manufacturers Association, but was formerly the Radio Section of the Association of Manufacturers of Electrical Supplies.

A group of members of the old Radio Section of A. M. E. S. felt that radio problems were being continually made secondary to electrical problems, which problems of course were the main ones of an electrical trade association. This group, with a faith that the radio industry was large enough to handle its own problems, organized the Radio Manufacturers' Association. That their faith in the industry was justified is evidenced by the fact that it has a membership over eight times that of the Radio Division of its sister organization. The question is often asked if these associations represent RCA vs. independents. The answer is, "No." The RCA is in both associations. There is, however, the basic problem on which the two associations disagree, namely, whether the radio industry is able to speak for itself or whether it should speak through the electrical trade association.

The A. M. E. S. standards were the oldest radio trade standards still existent. When the R. M. A. became the largest radio trade association, and when its membership disagreed with certain of the A. M. E. S. standards, it adopted its own code. Its code had only a small number of differences with the A. M. E. S. standards, but these differences were on sufficiently important points to give rise to a duplicate set of standards.

Radio moves rapidly. Last February, an Engineering Division of the R. M. A. was created. This Division made a thorough study of the entire standardization situation. This study revealed the fact that there were in both codes items which could well be reconsidered. It further felt that there were companies outside of both associations who were entitled to be heard.

At a conference held with N. E. M. A., it was evident that at this time it would be difficult, because of its inter-related electrical code, for that association to drop its radio code. In order to avoid embarrassment, and to bring about harmony, the R. M. A. has dropped its code and will lend its activities to forming a strictly Radio Industry's code. As N. E. M. A. has invited the R. M. A. to attend its meetings and the R. M. A. has invited not only N. E. M. A., but all interested persons to attend its meetings, this common code should not be too difficult to formulate. This new code will be the adopted code of the R. M. A., and it is hoped, of N. E. M. A. as well. The latter organization will undoubtedly want to continue to include in its radio code certain items which will not

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Long life, convenience, and dependability are built into Faradon Condensers. These points of quality are reasons why you will find Faradons in most of the high grade sets.

Assure yourself of freedom from condenser trouble. Look for the name "Faradon".

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BOSTON, MASS., U. S. A.
Est. 1907

Faradon

1371

Electrostatic Condensers for All Purposes

be included in the Radio Industry Code.
—*H. B. Richmond, Director, Engineering Division, Radio Manufacturers' Association, Inc.*

"Live and Let Live"

309 Third St.,
Oakmont, Pa.

Editor, *QST:*

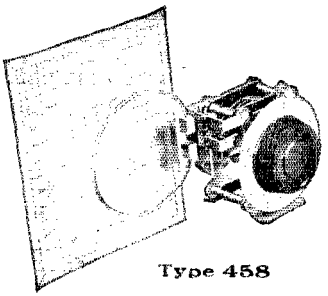
We radio amateurs have been sailing along under fair skies for some time, with very little, if any, opposition to our activities. Our recent problems have been those of development and in view of the coming International Radio Conference it will be well for us to consider carefully any line of activity which might stir up opposition because our natural opponents are numerous and powerful. It behooves us to be wary.

Right along this line comes a question which is being discussed in a healthy manner in the columns of our beloved *QST*. I refer to amateur telephones. It would be a mighty poor sport that would attempt to regulate the activities of others according to his own personal tastes. We pride ourselves that we would not attempt to shut a station down simply because we want to use his wavelength for ourselves. "Live and let live" is the amateur's motto. On the other hand we do not desire to usurp the rights of others by using more room than is necessary. We take pride in doing a certain thing with less effort and in a more effiecient manner than is usual. To my mind the question of amateur phones is not whether or not we shall use them. It seems to me that since our government says that we may use them on certain waves and if there are those of us who desire to use phones, then we should go ahead and use them. But in doing so we should not be content for even a short time with the widely interfering signal which is typical of amateur phones at the present time. In the first place, with the ordinary loop system of modulation or the Heising method using too few modulator tubes it should be remembered that the area covered by the voice or intelligible part of the transmission is considerably less than that covered by the unintelligible part. Beyond a certain range, the signals are simply noise, the more annoying because impossible of identification. I believe that we would adopt some system of modulation whereby this feature would be eliminated, such as doing away with the carrier wave and using the side bands only or by the use of crystal modulation in some form. I believe this to be possible and practical. If the only thing heard was voice, when phone was being used, very little opposition would be had. Let us have our phone experiments, but let us strive to produce *good* phones, better than has ever been made by any other class of experimenters, so far in advance that instead of being condemned as nuisances, they will

Amateur Short-Wave Equipment

For over a decade the General Radio Company has been supplying the needs of amateur transmitters for quality apparatus.

A few items specially designed for amateur use are listed below.



Type 458

Type 458 5-Meter Wavemeter

The Type 458 5-meter wavemeter is supplied unmounted, having only brackets to support the condenser in an upright position. The silver plated coil consists of a single turn of ⅛" copper tubing and connected to the condenser by General Radio plugs. Each wavemeter is furnished with an individual calibration chart.

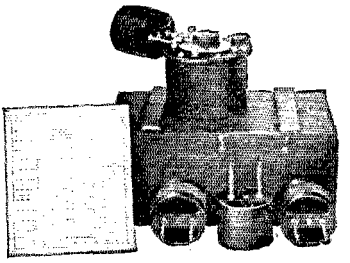
The Type 458 5-meter wavemeter is obtainable from the General Radio Company only. It will be delivered post paid and insured anywhere in the United States upon receipt of $8.00.

Type 358 Amateur Wavemeter

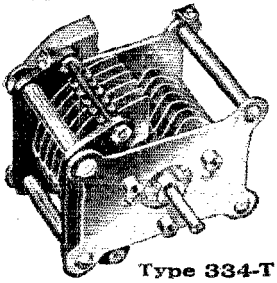
This instrument covers a wavelength range of 14 to 224 meters and consists of a set of four mechanically rugged coils of low loss construction, mounting interchangeably on the binding posts of a shielded condenser. The condenser capacity is 125 M.M.F. A small lamp serves as a resonance indicator. The lamp may be removed, however, as the circuit is automatically restored.

The 358 Wavemeter is supplied with four coils, a calibration chart, and wooden carrying case.

Type 358 Amateur Wavemeter .....Price $22.00



Type 358



Type 334-T

Types 334-T and V Condensers

The Types 334-T and V condensers have double spacings for use in short wave transmission and reception. They may be used on voltages up to 2000. The Type 334 condensers have metal end plates with shielded rotor. The plates of both the rotor and stator groups are soldered thus insuring perfect electrical contact.

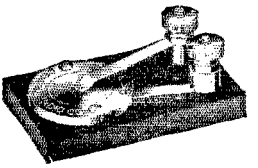
Type 334-T Capacity 100 MMF .....Price $4.25

Type 334-V Capacity 50 MMF .....Price $3.75

Types 276-A and E Quartz Plates

The Types 276-A and 276-E Quartz Plates are intended primarily for amateurs in controlling the frequency of transmitters.

The Type 276-A crystals are for use in the 40, 80 and 160 meter bands, and are supplied at random frequencies between 1750 and 2000 k.c. for $15.00 each.



Type 276-A

The Type 276-E Quartz Plates are for use in the 40, 20 and even 5 meter bands. They are also supplied at random frequencies for $25.00 each.

Type 356 Spring Pressure Holder (suitable for above crystals) .....Price $1.00

Notice to A. R. R. L. Members

In addition to the equipment listed above the General Radio Co. manufactures numerous other items for amateur use which are described in Bulletin 928. Every experimenting amateur should have at hand a copy of this bulletin which will be sent on request.

If you are not located within shopping distance of a dealer selling G. R. parts, we will ship post paid anywhere in the United States any G. R. item on receipt of list price.

General Radio Co.

Cambridge Massachusetts

(like our short-wave telegraph transmitters) attract favorable comment and draw that sincerest form of flattery, imitation.

—*A. W. McAuly, 3CEO*

Phone Once More

597 North James Street,
Hazelton, Penna.

Editor, *QST:*

I would like to chip in something toward that "Hello-Goodbye" discussion that is appearing in these columns.

Disregarding slams, bright remarks and what-nots, we must remember that there is room, both in *QST* and on the air, for all of us. While I am a traffic fiend, I do not contend that the DX hound or phone fan should be eliminated in ham radio. On the other hand, I can see no reason why all hands insist upon trying to squeeze into a couple of bands, ignoring the rest of the available territory.

The 80-meter band is the backbone of the traffic handling waves carrying practically all the messages being handled within the U. S. A. with the 20-meter band being used for most of the DX traffic to foreign countries, expeditions, et cetera. That traffic handled entirely within the limits of the U. S., is very important from our League's point of view and it is advisable that its territory shall not be curtailed. This work cannot be carried on in the 20- or 40-meter bands due to the skip distance effects and the 200-meter band is unsuited due to the necessity for quiet hours and the reduced range for a given power. It is therefore hoped that anything tending to reduce the amount of traffic that may be handled on the 80-meter band will be discouraged.

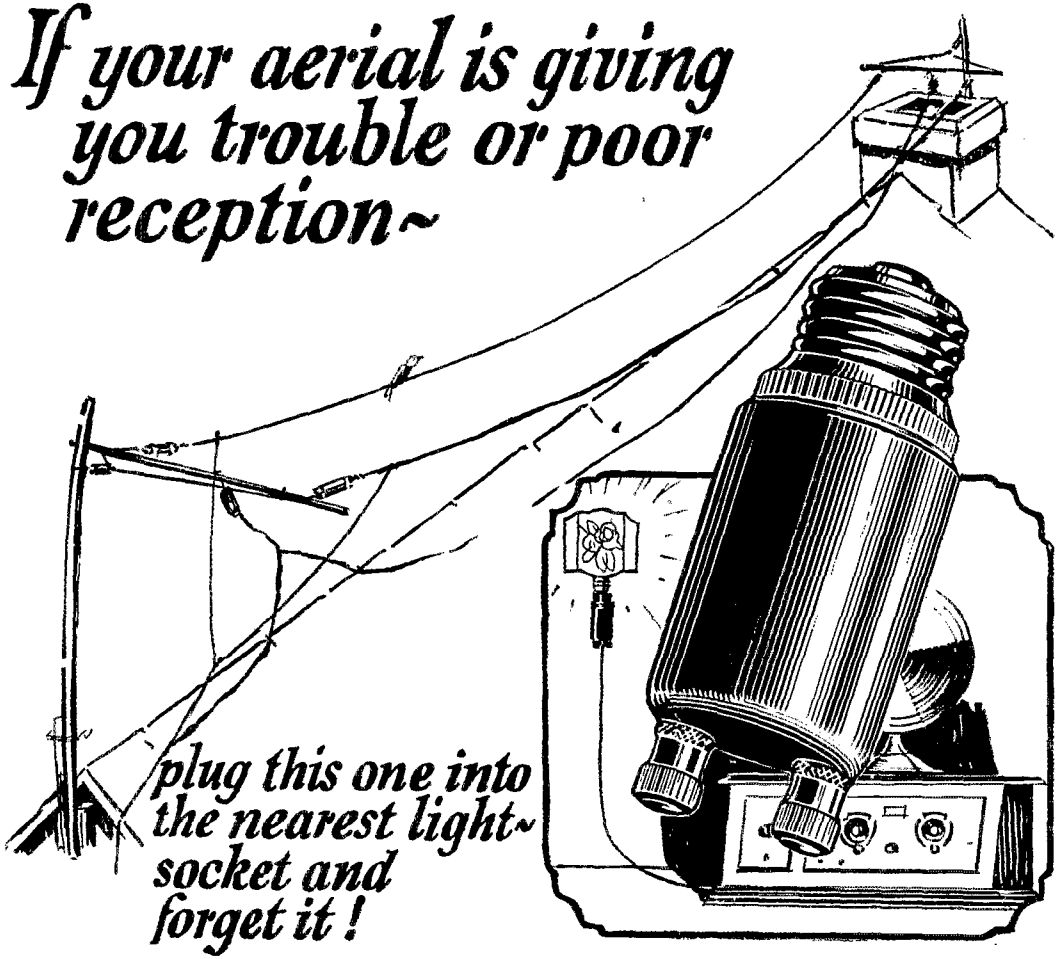
It is well known that the great majority of phones stations take up many more kilocycles than do c.w. sets, even those using a.c. on the plates. One phone set will take up the same amount of the band as would several c.w. transmitters and in a band of such importance, every cycle should be carefully conserved.

The 40-meter band is overflowing at the present time and it is doubtful whether either the telegraph or the phone enthusiasts would want phone transmission in this region. It is only due to note variations and relative signal intensities that it is possible to make as many contacts as are being made at this time.

This, then, leaves the 20- and the 200-meter bands for phone work. It is probable that the 20-meter band needs more exploration before it is possible to make successful phones (viewing the matter from a point of quality and not extreme DX) as the mattter of making a good phone gives enough trouble in itself, it not being advisable to add to it the extra trouble of transmission idiosyncracies.

The 200-meter band remains as the logical one for phone work. It has sufficient width, the transmission characteristics cause less distortion than is encountered on the lower wave bands and

If your aerial is giving you trouble or poor reception~



plug this one into the nearest light-socket and forget it!

Dirty wires and corroded connections are the faults of most outdoor aerials. It takes time, money and trouble to keep them in efficient shape. So why be bothered when a Dubilier Light-Socket Aerial will do the job better, and do it *indefinitely* without care or attention? Just connect this modern aerial to your set and plug in. It uses absolutely no current, requires no lightning arrester, and improves reception by reducing both static and interference. Your dealer will let you prove it with a 5-day, money-back guarantee. ***Price $1.50***

Dubilier Light-Socket Aerial

METALEAK—*for accuracy*

Grid-leaks *must* be accurate and *must* be noiseless or they are of no value at all. To avoid tubular grid leaks of doubtful quality ask for Dubilier Metaleaks. Most good dealers carry them in all standard resistances.

Prices—20,000 ohms to 200,000 ohms — 65c
¼ meg. ohms to 5 meg. ohms — 40c

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In economy and dependability no form of radio power can compare with a Dubilier-equipped light-socket power unit. Dubilier condenser blocks, type 350 BA-1, 2 and 3 are built expressly for use with the new Raytheon type BA rectifying tube. Dubilier's high factor of safety and unusually long life assure an adequate and constant source of A B C Power night after night, month after month.

Dubilier Condenser Corporation
4377 Bronx Blvd., New York City

the amount of telegraphing interference is less.

When we traffic men, DX hounds, experimenters and phone enthusiasts congregate for a hamfest or convention, harmony and good-fellowship is king. There is no reason why the same cannot be applied to our work if we forget our petty, personal antagonism and pull together, considering the other fellow's rights. I move we limit *QST*'s "Correspondence Section" to a place to express *constructive* criticism and not as a place to heave bricks from a very safe position that insures small chance of the other fellow's socking you back.

—*H. M. Walleze, 8BQ*

175-Meters

Rockford, Ia.

Editor, *QST:*

The request of 8RD in the August issue for information on results of phone transmission in the 170- to 180-meter band prompts me to present these facts.

Mr. C. M. Aurand, 9DWJ, of Rockford, Iowa, uses two UX-210 tubes in a very loosely coupled Hartley circuit with three hundred volts of storage batteries on the plates. Modulation is accomplished either by the Heising system or else by placing a microphone transformer shunted by a small condenser in the grid leak lead. About .7 to .8 amperes flow in a single fifty-foot wire and a fan counterpoise. The tubes draw from 70 to 90 mils. 9DWJ has been QSO all over the U. S. except for the far West Coast with this simple outfit.

In one Sunday afternoon's work when I was operating his station, I consistently worked stations in Canada and the U. S. which were at distances of between 300 and 500 miles. Out of the eleven calls made, in two hours, 10 were answered. This is not a bad percentage when it is considered that only twenty-seven watts input were being used at the highest power.

How does this compare with some of the 80-meter results?

—*A. P. Mitchell, 9CWP, ex 9DCK.*

Cards Again

Crooked Billet Street,
Morton, Gainsborough Lines,
England

Editor, *QST:*

I have sent cards to over sixty "nu" stations which were heard here between February second and March twenty-fourth. In return, I received only five cards, which is less than 10%, in answer. Of the cards sent, nineteen were for 20-meter, one for 15-meter and the remainder for 40-meter reports. The five cards received were from the 40-meter stations. It was my opinion that reports on 20-meter operations were welcomed but apparently I am mistaken. As the A.R.R.L. will forward cards to the R.S.G.B., postage should not break your bank balances.

I may take the air on 23 meters presently and it would only be justice if I made no

acknowledgment to all cards received from across the "pond". I am seriously thinking of retiring from the arduous game of one-sided QSL as it is a waste of both cards and labor.

With 73 and luck to *QST* (the best ever), I remain, yours (with bare walls),

—*E. R. Cook eg2AVR.*

(It seems strange that although the "nu" operators are willing to accept the statement of "lack of funds" as a reasonable excuse for the scarcity of foreign cards arriving here to find that the foreign men will not accept a like excuse from this side of the "pond". The printing of cards is an expensive matter and even if they are forwarded by Hdqs it takes some postage to get them that far. It should also be considered that "nu" stations usually have a larger number of QSOs each night of operation and get more reports on their signals than do other stations. It is not at all unusual for an active station to send out forty or fifty cards each week. For this reason, many operators QSL only to stations worked and in many cases only upon receipt of the other man's card or his specific request for one. There are other stations who have the time and money to allow them to acknowledge all contacts and cards received but these are few. Perhaps, if it is remembered that the average "nu" amateur is not a millionaire's son and must spend most of his time earning enough money to be able to eat regularly (his amateur equipment being in existence only because other pleasures were passed up) one will feel that the absence of an answering card is neither oversight nor an insult but due to an unfortunate circumstance, "lack of funds". Assist. Tech. Editor.)

Re: Saving Calls

Alliance,
Altoona, Canada

Editor, *QST:*

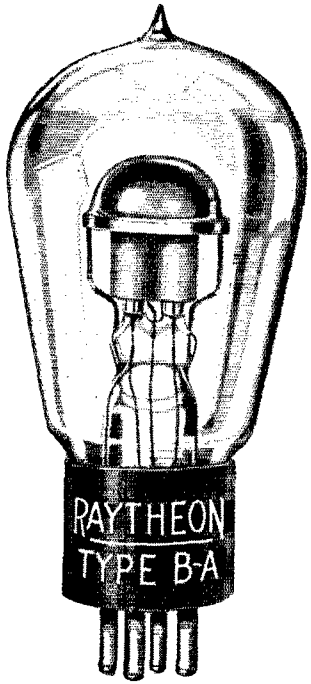
The letter by 2ARM in the July number on "Saving Calls" is timely.

If one is in one end of a band, however, it is obvious that stations starting from opposite ends of the band will reach him at different times. Shall we call for one minute for the man in our own end and if we don't hear him, wait two or three minutes and then start up in time to catch the fellow starting at the other end?

If we could all agree to start on one end or the other, it would seem the simplest way to solve it. If we can't get together on that, the next best plan might be for each to start always at the top or always at the bottom, as he prefers, and when CQing to give this information by sending "T" for top and "B" for bottom as in a directional CQ.

We might go farther if we chose and add a figure as, "2," "3," "4," et cetera indicating the probable length of time it will take us to cover the band. This will depend somewhat on the number of sta-

TYPE BA



the Rectifying Tube that Banished the Drawbacks to Electrified Sets

Raytheon Type BH

An improved Heavy Duty Rectifier for radio power service. Maintains a constant flow of smooth, silent power, at full voltage throughout its life. Type BH is standard in those units designed to supply the type 171 Amplifying tube. Guaranteed for 1000 hours over a period of one year.

Rating: 125 m.a. at 300 v. Price $4.50.

Of all the various devices and methods for securing complete light-socket radio operation, only one has equalled the success predicted for it. The most satisfactory solution to this problem is found in receivers using Standard 201-A or other new tubes powered by A B C units equipped with the time-tested Raytheon BA Rectifying Tube.

Only One Tube for Complete Battery Elimination

Due to its unique characteristics, the Raytheon type BA tube, when incorporated in the proper circuit, provides ample noiseless and dependable power for receivers employing any number of type 201-A tubes in series. Current consumption is especially low, in that the total filament current required for any quantity of tubes in series is no greater than that taken by one tube. These and other demonstrable advantages of this scheme, together with the dependably long life of the Raytheon type BA tube, are winning over many manufacturers who cannot afford to risk their reputation with experiments.

RAYTHEON MFG. COMPANY
CAMBRIDGE, MASS.

Raytheon

LONG LIFE RECTIFYING TUBE

tions on the air and a man's ability. On a fine Sunday when most of the men are otherwise engaged, two minutes are as good as six are on a good night when the band fairly bristles with signals.

If these suggestions are ng, let's have some that are worthwhile. Come on OBs, let's clear the ether.

—*D. I. Gue, nc4FF.*

Re: Snobby Operating

621 Washington Building,
Los Angeles, Calif.

Editor, *QST:*

Just noticed the letter of 1BFX in re what I call "snobby operating". I agree with him heartily, but he doesn't offer a suggestion for a remedy.

I guess you might call me an old timer. I hit my first telegraph key twenty-four years ago. I've worked everything in the line of communication that can be worked by electricity and it sure hands me a laugh to hear some of these smart kids bite off a beginner, when they themselves have had probably a year or eighteen months experience.

Why not form some sort of a "Ham Club". It doesn't have to be a "paper" organization and the members may be self-appointed although only those who have had at least five years experience and are willing at any time to work a beginner should be eligible. They may follow their CQ with the letters "HC" or something like that. The new man would then be able to pick those signals which indicated that the sender was willing to help him along.

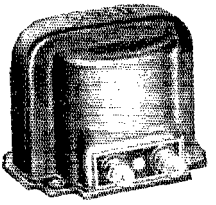
My station is off the air temporarily as I have just moved into a new house, but it will be perking shortly and I would be willing to go on record as one station in the sixth district willing to push the game along by helping the newcomers rather than discouraging them with a snippy "73 cul".

—*John A. Saxon, 6EG.*

The San Diego Convention

ANY recollection of an ordinary convention at San Diego would have been erased completely from this reporter's mind by the fine Southern welcomes at San Antonio and New Orleans on the return trip. It is well therefore that Manager Don C. Good and the Silver Gate Amateur Radio Association had invented a new scheme on which to operate the 8th Annual Convention of the Pacific Division. They had contrived somehow an organization such that the convention seemed to run itself without any visible leadership—and that takes more than mere skill, it approaches the miraculous. The program was followed to be sure, but wasn't regarded as a Federal law; if anyone had a better idea at the moment—bring it on! If anyone objected to these joyous varia-

Iron and Wire Plus



All Transformers have iron and wire. But Acme Transformers have iron and wire "*Plus*"

Insist on Acme Transformers

The Acme "*Plus*" makes Acme Transformers stand up in oil burners and neon signs as well as radio sets.

Insist on Acme Transformers

It's the "*Plus*" that distinguishes the Acme Transformers—engineering research, brains, years of experience.

Insist on Acme Transformers

Skilled workmen, superior factory equipment, and scientific experiment have made it worth your while to—

Insist on Acme Transformers

ACME TRANSFORMERS

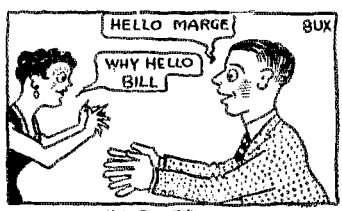
tions he said nothing but came along and helped put the new idea over.

At the same time—when the meetings opened the horns and whistles were stepped on and in a moment Dr Fuller of G. E. had an intent audience for his discussion of Carrier Frequency Work on High Tension Lines, as did Don Wallace when discussing the tame or amateur radio type of mercury arc and also Garett Lewis whose Life of a Tube Repair Man should be published. Yes, there was plenty of serious thought. Traffic conditions were analyzed, the Wilmor, Kentcky czarist ordinance came up for review, several communications from Director Babcock were talked over and there was the closest attention to a most excellent talk by Colonel Frank J. Griffith on the plans for the immediate extension of the Army-Amateur Network on the west coast.

At the same time—when serious matters are aside for the moment, why be serious? If it happens that Don Wallace accidentally puts his car at the head of the parade is it not fun to make him lead though he has no idea where to go? Isn't the joke good enough to repeat on McCreery during the trip to the 80 K.w. tube station, NPL? If the boat ride across the great bay happens to terminate at the incredible airplane carrier ship Langley instead of the flying school, isn't that all right? We can always quiet down in a hurry and give respectful attention to the explanation of the equipment at NPL and at the Point Loma control station, to the resolution of sympathy to the family of the late Colonel Dillon of the Federal Radio Commission, to the tale told of those men who flew into the west with a short-wave transmitter and did not return, or to the award of the Modesto Wouff-Hong trophy or the Ham-Meter cup for the work with the *Idalia*.

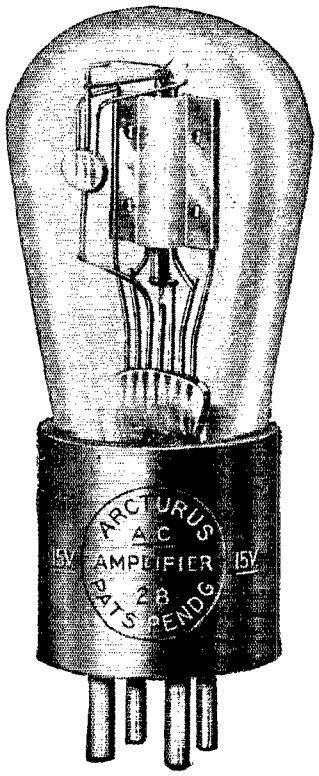
After that—start up the contest, have a Wouff-Hong initiation, call a kangaroo court and accuse MacLafferty of something, just to see if he will explain his way out in Italian dialect or call for help from Jack Ward and his blank-cartridge revolver. If things slow up perhaps we can persuade the San Diego State College Girl's Glee Club to sing again—or recall the blackface boys or the dancer that performed last evening—or hunt up another reel of movies—or award some more of that big stack of prizes. At *this* banquet there are no speakers to interrupt us and this crowd can continue to think up something interesting as long as the hotel will let us stay.

—*R. S. K.*



"METER"

A New Standard of A-C Operation



With

Arcturus A-C Tubes

The unique advantages which we claim for Arcturus A-C Tubes are directly traceable to unique features of construction and exceptional operating characteristics.

The exceptionally long life of Arcturus Tubes is due to the enormous electron supply, resulting from the heater operating at a low temperature.

The highly efficient cathode is responsible for the unusual sensitivity of Arcturus A-C Tubes and for the exceptional volume and tone quality which their use insures. This cathode produces: 1. A high amplification factor (10.5). 2. A low plate impedance (9,000 ohms). 3. A high mutual conductance (1160 micromhos).

Since the base of the Arcturus A-C Tube is of the standard four-prong type, no additional terminals are required, making Arcturus Tubes adaptable to existing circuits with all the simplicity of D-C tubes. No center taps or balancing are required. A common toy transformer may be used. Filament voltage is the same (15 volts) for all types, detector, amplifier and power.

The freedom from hum which is one of the most important features of Arcturus A-C Tubes, is due to the use of low A-C current, only 0.35 ampere. Arcturus Tubes in all stages are four element tubes with indirectly heated cathodes.

Normal variations in line voltage do not affect the operation of Arcturus A-C Tubes. The amplification factor is practically constant over a wide range of filament voltages—13.0 to 18.0 volts.

ARCTURUS RADIO COMPANY, INC.

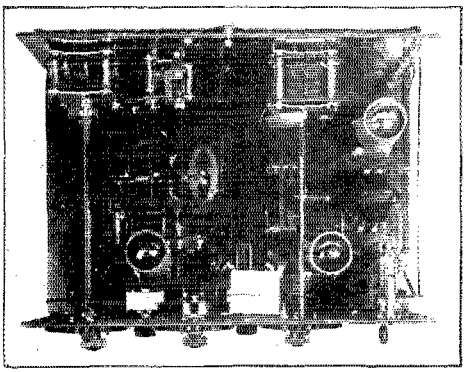
261 Sherman Avenue, Newark, N. J.

(Continued from page 43)

ohm variable resistor in the plate circuit of the detector tube.

The tuning condenser is a metal frame General Radio one that was cut down to have a maximum capacity of approximately 50 μμfds. In order to spread out the tuning, a fixed condenser made from plates of a Cardwell receiving condenser is placed in parallel with it. A switch is provided to disconnect this fixed unit which increases the tuning range at the expense of crowding the scale.

A jack mounting for the radio frequency choke is provided and allows the use of the same chokes or resistors as are employed in the transmitter. A plug and jack arrangement is also provided to allow the grid



THE RECEIVER

The Cardwell condenser to the right of the tuning condenser is used as a fixed condenser in shunt to the tuning condenser.

and plate circuit returns to be made to either the positive or negative side of the filament. In this particular set, the negative return works better.

A Federal anti-capacity switch mounted on the panel is "off" in the neutral position, "on" in the down position and "send" in the up position. In the "send" position the amplifier plate circuits are open. Break-in may be worked by leaving the switch in the "on" position except when listening close to the transmitting wave. A separate 50-foot vertical antenna and ground are used for receiving.

While a look at the photo of the receiver might indicate that it is a "three handed" affair, this is not the case. The dial on the left operates the tuning condenser; the middle dial, the resistor controlling regeneration and the one to the right operates the condenser controlling regeneration. Either of the methods of controlling regeneration may be used at will. The two knobs between the dials are detector and amplifier tube rheostats. A small red switchboard lamp is located just above the anti-capacity switch and indicates when the set is turned on.

Below the switch are the jacks in the plate circuits of the audio amplifiers. The method of mounting the condensers on a rear panel and connecting them to the dials by means of long insulated shafts eleminates all hand capacity effects. Pieces of rubber tubing slipped over the tubes helps greatly to reduce tube vibration noises.

The station was put in operation in May, 1921 for the purpose of communicating between the summer residence of Mr. Crossett and the yacht, *Betty R* (KDTF). The original installation, a deForest 1 k.w. commercial transmitter, was made by Mr. I. R. Lounsberry, old 2BB, and operated by him that summer. The transmitter aboard KDTF was a small deForest phone and c.w. outfit using eight Moorhead tubes. Consistent communication up to 250 miles was maintained.

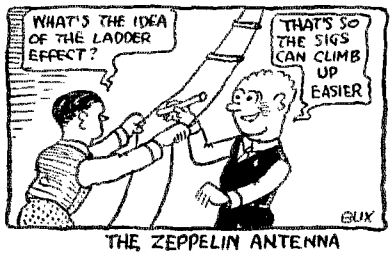
While the deForest transmitter would operate around 200 meters, its efficiency dropped rapidly below 225 meters. It was therefore rebuilt for 200-meter work and the deForest modulation system replaced with a Heising unit. The station was operated during the summer of 1922 by Mr. W. A. Remy (2KV) who worked all nine U. S. districts between 8 p.m. and 5 a.m. of the same night.

During the summers of 1923 and 1924 the station was operated by Mr. J. J. MacDonald (2AMU). An 80-meter transmitter using one UV-204-A tube was added in 1924.

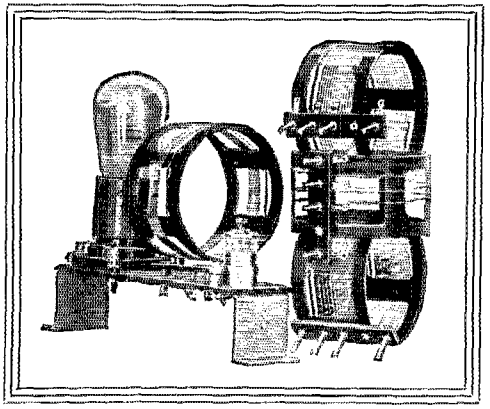
Mr. R. E. Seamans of Boston was operator during 1925. To the other equipment, a 40-meter transmitter was added using two 0/150 Mullard valves in a "symmetrical" or "push-pull" circuit, with very satisfactory results.

During 1926 and 1927, Mr. P. S. Hendricks has been in charge of the station. In 1926 an experimental crystal controlled transmitter was constructed. It was later elaborated and put into the more permanent form described. Aside from the old 200-meter outfit this is the only transmitter now in use.

A 20-watt outfit was installed aboard the yacht in 1923 and later replaced with a hundred-watt c.w. and phone set. Consistent communication is established each summer between the two stations.



THE ZEPPELIN ANTENNA



NEW
Bremer-Tully Products

The Original Short-Wave Outfit "Improved"

QST readers are quite familiar with the original short wave tuner developed by Bremer-Tully; the first of its kind on the market, and also the original short wave outfit, likewise the first commercial success.

Bremer-Tully are now pleased to announce a new short wave outfit of greater efficiency, easier to build, detector unit wired for uniformity and lower in price.

Special attention is called to the antenna coupling unit which gives true micrometer precision in its adjustment and much greater permanency of setting than is possible with an adjustable primary coil.

The outfit includes the base or detector unit with antenna coupling, very greatly improved mounting method of interchangeable coils, a wired in cushion non-microphonic socket, four interchangeable coils covering from 15 to 200 meters, with diagrams and instructions. Price $11.00.

A set of two broadcast coils interchangeable to cover the broadcast band. Price per set of two $5.60.

New Audio Coupler Unit that Eliminates Harmonic Distortion

"Amplification Curves" have been used considerably as a basis for comparing transformer efficiency. Bremer-Tully believe that such curves represent only one characteristic of only very minor importance. They believe the problem of harmonic distortion to be a much more important factor and have attacked the problem from that standpoint, seeking to do away with harmonic distortion caused by saturation, eddy current and hysteresis losses.

In six years Bremer-Tully have never put out a product that was not a continued outstanding success and they now sincerely believe that the new B-T Audio Couplers will give better amplification than any other method regardless of price or size.

Two Types

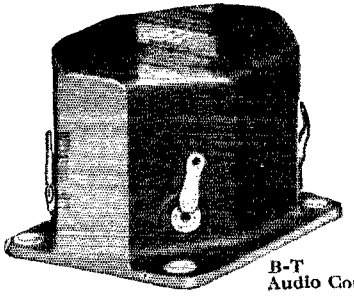
The 331 is for first stage only. It includes a core of the very finest lamination, air gap construction and a tertiary loading coil, all calculated to suppress the regenerative and oscillatory tendencies found in the audio, as well as the radio, stages. Type 331 for first stage. Price $6.00.

Type 22 is similar and for use in the second stage or for all stages where three stages are used such as in replacing resistance coupling. Price $6.00.

The Real A. C. Set

The many thousands of owners of the B-T Power-Six will be pleased to know that the new B-T "A" Transformer with diagrams and instructions makes it possible for them to change their set to operate direct from the light socket. The price of "A" Transformer $7.50. Diagram $1.00.

If your dealer does not have these products in stock, order direct. Complete circulars on request.



B-T Audio Coupler

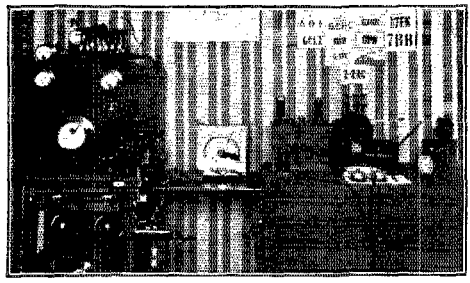
520 SO. CANAL **Bremer-Tully** CHICAGO, ILL.

I. A. R. U. News

(Continued from page 43)

wavelength is 93 meters and transmission on 44, 32, 20.5 and 18 meters is had. Various harmonics of the antenna circuit are used for transmission on these waves.

In two years, 8YOR has worked 520 American stations, 22 of which are in the sixth district. In February, 1927, the first



ef8FD-8YOR AT ORLEANS, FRANCE

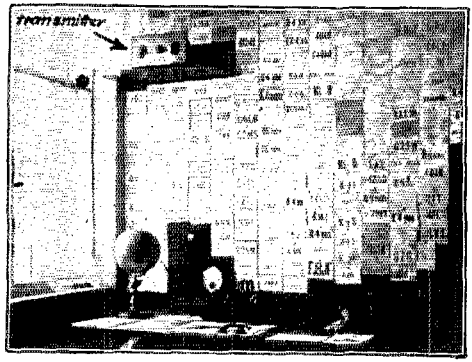
daylight schedule was held between nu6VZ and ef8YOR. In April the first QSO between Europe and Hawaii was established when oh6AXW was worked.

Regular schedules with af1B in Saigon are kept on 20 meters. Practically all of the civilized world (civilized meaning having amateur radio stations) has been communicated with.

GERMANY

The accompanying photograph shows the equipment in use at ek-4YO who may be addressed at Deutscher Funktechnischer Verband, Berlin W, 57, Germany, Blumenthalstrasse 19.

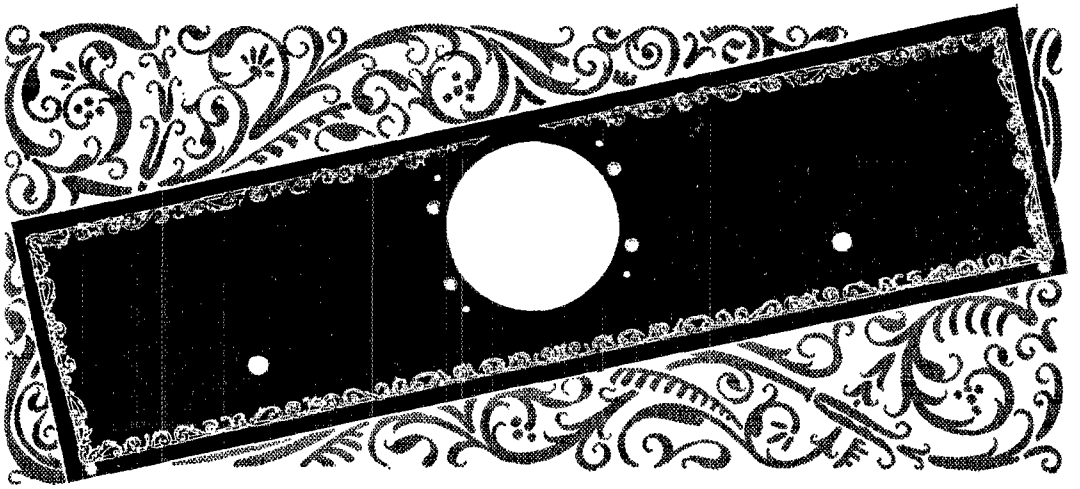
The transmitter consists of three Telefunken RE 209 tubes in parallel in a



ek4YO
The transmitter is on the shelf in the upper left hand corner near the window.

Meissner circuit. The antenna is a one-wire affair about 58 meters long and 18 to 22 meters high.

220 volts d.c. is used on the plates of the tubes and the plate current is 240 milli-



Handsome Panels For These Kit Sets!

Formica has prepared handsomely decorated panels for the leading kits of the year so that home builders can make sets of better appearance. Many of these panels are fully drilled and ready for assembly.

Among the panels offered are Magnaformer, front and sub; World's Record Super Ten, front and sub; Camfield Nine, front and sub; Tyrman, front and sub; Madison-Moore International One Spot for A. C. operation and many others.

Plain Formica panels of any size are also available.

The Formica Insulation Company

4620 Spring Grove Avenue Cincinnati, Ohio

Leading jobbers everywhere can provide you with Formica products

FORMICA

Formica has a complete insulating service for manufacturers

amperes giving an input of approximately fifty watts.

The transmitter is placed on the shelf in the upper left hand corner of the photo. It is well away from the operator and will not be easily affected by anyone coming near it. The antenna current is normally about a quarter of an ampere.

JAPAN

We have received word from several Japanese amateurs that our report in the August issue concerning JLZB is incorrect to the extent that the station is not a general licensed amateur one but is operated by the inspector for the Tokio Communications Bureau. Its main reason for existence is to obtain information and particularly QRAs of Japanese amateur stations which will be used to enable the authorities to close them up. It is therefore requested that no information be given this station or JMPB which is doing this same sort of work. Under no circumstances send QSL cards to either of them for forwarding or give them any QRAs you may know. JLZB is working on 80-meters and JMPB is on 38-meters.

We have heard through ex3AA that Mr. Kankichi Kusama, ex3JJ, has been granted a license for amateur work. The call is JXAX and ten watts are put into the antenna at 38 meters. It is not allowed that traffic be handled but the station may carry on experimental short-wave communication only.

Mr. T. Kitamura informs us that since May first the following short-wave stations have been in operation handling commercial traffic in conjunction with the telegraph service: at Tokio, JYX (26 meters), JYZ (16, 25, and 54.5 meters), JYB (27.5 and 39 meters), JPP (39, 57 and 73 meters); at Osaka, JES (23, 33 and 41 meters), JEW (55, 61 and 71 meters); Kagoshima, JBK (30, 42.5 and 70 meters); Sapporo, JPS (29, 38 and 60); Kanasawa, JKV (37.5, 56 and 75) and at Hiroshimapost, JHL (32, 56 and 74 meters).

NICARAGUA

While Nicaragua may not be overpopulated with short-wave radio sets, NEM certainly kept a constant stream of signals pouring out of its boundaries. It will be quite a surprise to many to know that these were all the result of a small portable transmitter. Linwood A. Gagne, RM 2/C, U.S.N. (nu1TO) has passed us some interesting information concerning this outfit.

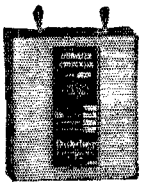
"The original idea on the set was that to be portable, the set must be light enough to be carried with all accessories for a considerable distance by not more than two men.

"Our first attempt was made in the park on Riverside Drive, New York City using a 201-A with 120 volts on the plate in a Hartley circuit, over a distance of about a mile. Results—nil.

"Arriving at the Canal Zone, the re-

HIGH VOLTAGE
FILTER CONDENSERS

Manufactured by Dubilier Condenser & Radio Corp.



1¾ mfd. 1000 volts rated D.C. Working Voltage — Extra Special at **$1.35** each

7 mfd. 600 volts. rated D.C. Working Voltage — Extra Special at **$3.50** each

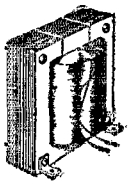
3.9 mfd. 900 volts rated D. C. Working Voltage — Extra Special at **$2.70** each

Manufactured by Stromberg-Carlson Tel. Mfg. Co.

3½ mfd. 600 volts rated D.C. Working Voltage — Extra Special at **$1.75** each

All of these High Quality Filter Condensers, are brand new, and guaranteed as rated. They are excellent for use in your Transmitter, Eliminator or Experimental Work.

FILTER CHOKES



50 Henrys—85 Mills.

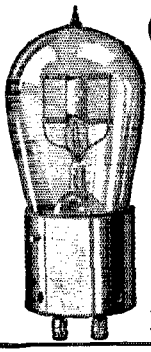
These are very efficient chokes for use in Filter Circuits for your Transmitters, A & B Eliminators or Power Packs.

These Choke Coils are very well constructed and are made with air gaps to prevent magnetic saturation from direct current.

SPECIAL AT **$1.75** Each

KENOTRON RECTIFYING TUBES

(Type T.B.I.)



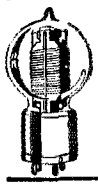
MFD. BY GENERAL ELEC. CO.

These rectifying tubes operate on a filament voltage from 8 to 10 Volts and draw 1½ amps. They will safely stand an A.C. input voltage up to 750 Volts and pass plenty of current and voltage for the plate of the Transmitting Tubes.

They are also very efficient rectifiers for use in "B" Battery Eliminators.

STANDARD BASE
NEW IN ORIGINAL CARTONS

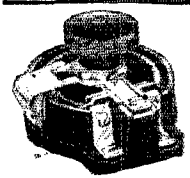
PRICE ONLY **$1.25 Ea.**



Western Electric V.T. 2 Tubes (Rated at 5 Watts)

Fine for C. W. and Phone transmitting also Power Amplifying tube.
Filament 7½ Volts. Normal Plate voltage, 350 volts.
Oxide coated filament of pure platinum. New and standard base.
SPECIAL at **$4.50 Each**

These Are First Grade Tubes, Not (2nd Grade) Yellow Capped



POWER RHEOSTATS

Model PR-535

For controlling filaments of UX210, 216B and 281 Tubes, also the new R.C.A. UY227 and UX227 A.C. Tubes.

Each Rheostat has two windings giving four different resistance values from 1.5 to 6 ohms, and has a large rated current carrying capacity up to 2.5 amps.

LIST PRICE $2.75 Ea. **SPECIAL PRICE, 65c Ea.**

MESCO WIRELESS KEYS

MFD. BY MANHATTAN ELEC. SUPPLY CO.

These keys are well balanced, fully adjustable and mounted on wood base. New. List $2.00 each. SPECIAL AT **95c Each**

G. E. and Ward Leonard Resistors (Heavy Duty)

Fine for Grid Leaks and for use in Eliminators.

G.E.—5000, 1600, 3200, 4000—(Tapped at 3380), 4000—(Tapped at 2600), 8500—(Tapped at 4250), 1100—(Tapped at 900), 1100—(Tapped at 700 and 800) ohms.

W.L.—2600, 7000, 1100—(Tapped at 300 and 400) ohms.

The General Electric wirewound resistors will carry 55 Watts and the Ward Leonard Vitrohm resistors will carry 60 Watts in continuous duty.

Your Choice at Special Price of **85c Each**

A FEW LEFT U. S. Army Aeroplane Radio Spark Transmitters, 75 watt portable. New. Government Cost $47 ea. **Special at $4.75 Ea.**

AMERICAN SALES CO. **21 WARREN ST., NEW YORK CITY**

modeled set was sent to the West coast by train to test with the *Denver* as she came through the Canal. This was a distance of forty-eight miles. The set was installed in a repair shop at the Balboa base and the antenna and counterpoise were run to steel girders. No signals were heard from NEM which proved that a skip distance of forty-eight miles existed across the Isthmus of Panama (for NEM).

"While at Corinto, Nicaragua, we redesigned the set to use a loop for transmission and reception and at Colon it was tried out from the pier to the *Denver* which was at the submarine base at Coco Solo. Signals were R7 at the *Denver*, very steady with no directional effect on either transmission or reception. Tests were continued on leaving the dock but QRM from

NEM1 AT BLUEFIELDS, NICARAGUA, (CITY OF REVOLUTIONS AND RAIN)

the boat engine and salt spray made it impossible to work after getting beyond the dock.

"At Bluefields (NEM1), we sent a landing force ashore to relieve the U.S.S. *Rochester*. As the boat came alongside the dock, the *Denver* operator found four radiomen from the *Rochester* waiting to help him carry his set to the shack, so picking up a battery in each hand and with the set under his arm he walked past them before they recovered from their shock. Eleven minutes after the set was placed ashore it was in operation with the *Denver* which was anchored ten miles away and an incoming and outgoing test message handled. During our eight months stay, signals were from R5 to R9 and but two schedules were missed due to the failure of the set to operate. Later, a 30/350-volt dynamotor was substituted for plate power and six schedules a day were handled, two of which were at night. On Sunday evenings it was almost impossible to work due to QRM from the church choir, the set being located in a room just below the Moravian Mission.

"A set was also installed at El Bluff (NEM2) with Bluefields five miles away on the lagoon side and the *Denver* five miles away on the sea side, with a 300-foot bluff intervening. It was found that NEM1 could be worked R5 to R6 but NEM could

be neither worked nor heard. To get out of this dead spot, the set was taken to the top of the bluff which completely cured our troubles. A Reinartz was used at NEM2 and later a Hartley circuit was used. This station could work NBA R4 when NEM's 250-watt crystal control transmitter could not be heard there, a thing that we have never been able to explain as both were on the same wave, 36.6 meters.

"At Pearl Lagoon, NEM3 was situated on the edge of the most mosquito infested swamp in existence. It used a 201-A with 160 volts on the plate in a Hartley circuit. As NEM was thirty-eight miles distant, at Bluefields, he was seldom over R3 to R4. Sometimes it was necessary to copy your imagination but regardless of that fact, and heavy mosquito QRM, over 12,000 words were handled with this station.

"NEM4, the Marine Headquarters of the fifty-first company, with regiment, at Rama was seventy-six miles from NEM and a 350-volt generator run from a Delco outfit was used as plate supply. R5 signals were put into NEM.

"Over seventy-thousand words were handled by these stations during eight months and all the sets were constructed aboard the *Denver* at a cost low enough to make a Scotchman enthusiastic.

"Many amateurs were worked during this time and although very little long distance work was attempted, NEM3 worked the U.S.S. *Memphis* (F9C) while she was at Corfu, Greece. We proved to ourselves that a set can be really portable and still be reliable, having good traffic-handling qualifications."

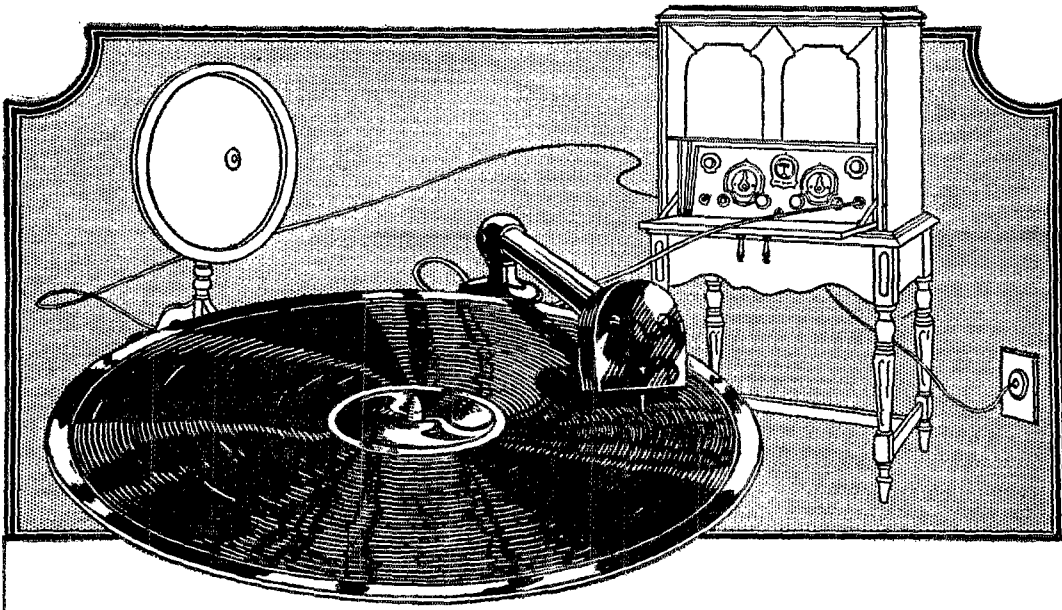
SPAIN

"In spite of the calm in radio activities during the summer months, the number of applications for membership in the Spanish I.A.R.U. Section (Association EAR) is increasing rapidly. This is in consequence of the excellent propaganda disseminated by Association through the EAR Bulletin which is devoted entirely to amateur radio.

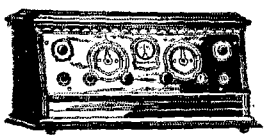
"A transmission contest organized by the EAR has proven to be a great success. The winners were EAR6 and EAR28 who worked Argentine, Brazil, Chile and Uruguay on a wavelength of 30 meters. Titles of "Member of Honor" have been granted by the EAR to the amateurs on the other side who have carried on a great number of QSOs with Spanish stations. saCB8, saDE3, sb2AF, sb1AO, se2AH, se2AS, su1AO and su2AK have received these titles.

"The Radio Club Catalina operates a station under the call of EAR25. Their phone transmission on a wavelength of 45-meters has been reported from all over Europe.

"The number of licenses issued for transmitting stations is now 75 and there are 55 short-wave receiving stations. The calls of the transmitting stations run from EAR1



All Stromberg-Carlson A.C. Receivers *May be used to* Play Records



No. 523 Stromberg-Carlson A.C. Receiver. Treasure Chest.

Price, with Audio-Power Unit and 8 R.C.A. Tubes—but not including Cone Speaker:

East of Rockies . . .	$295.00
Rockies and West . .	315.00
Canada	390.00

The
Stromberg-Carlson
HOUR
Tuesday Evenings 8 to 9
Eastern Standard Time
through the NBC and associated stations
WJZ, WBZ-WBZA, KDKA, KYW, WJR, WHAM and WBAL

TWO FIELDS of enjoyment are available with these new instruments. Radio with the celebrated Stromberg-Carlson tone brought to even greater excellence—Recorded music with a new quality which comes from passing the record output through the superlative audio system of the Receiver and the Cone Speaker.

To play records with an A. C. Stromberg-Carlson you merely need to equip your standard phonograph with a Stromberg-Carlson magnetic pick-up device and plug into a jack provided in the Receiver.

Stromberg-Carlson A. C. Receivers take all "A," "B" and "C" voltages direct from the house lighting circuit. No batteries, no liquids, no bother. One lamp socket or baseboard connection delivers correct power in unfailing supply.

[The Stromberg-Carlson plan of convenient terms of payment is ready. Ask your dealer.]

Stromberg-Carlson Telephone Mfg. Co.,
Rochester, N. Y.

Stromberg-Carlson

Makers of voice transmission and voice reception apparatus for more than 30 years

to EAR75 and those of the receiving stations from EO01 to EO55.

"All members of the Association receive an emblem and a diploma which is supplied without charge. The Association has recently appointed two new delegations, that of the Canary Islands, the delegate of which is frEAR75 and that of the Morocco Zone, represented by fmEAR50.

"The president of the Association has made known to the Spanish representative to the Radio Conference at Washington, D. C., the wishes of the amateurs of Spain concerning such matters as wavelengths, traffic handling, power, et cetera and also their absolute accord with the opinions of the representatives of the I.A.R.U. and A.R.R.L."

—*Miguel Moya, President, Association EAR.*

WEST AFRICA

We have just heard that fqPM now has a native boy as assistant operator and can now work twenty-four hours a day if that is necessary. He is usually on between 0200 and 0600 G.C.T. daily on 34 meters.

VENEZUELA

The following message was revceived via ef8FIZ and nu1AAO.

"Station 1XC enjoys the position of being the only amateur transmitting station in Venezuela. The station was started primarily as an experimental one in conjunction with the broadcast station, AYRE. It originally used two UX-210s in a coupled Hartley circuit with 35 watts input. After about three months operation, the mail was found to be so great that it was confusing as to whether the broadcast or the short-wave was meant so the call was changed from AYRE to 1XC. The present equipment is two Western Electric 212Ds in a self-rectified Hartley circuit with 1500 volts a.c. on the plate. The supply frequency is 50 cycles. A 60-foot vertical antenna is operated against ground. DX has been very satisfactory except for stations in the Argentine which are seldom heard. Receiving conditions are good but QRN is bad because the station is located in a valley 2,000 feet above sea level with mountains on all sides."

—*sv1XC.*

NEW QRAs

ewH4—Radio Amateur, Barosh, U 109, Budapest, Hungary. (by nu2CUQ)

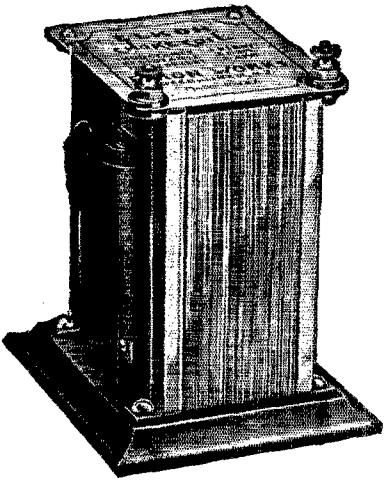
fe2VO—Cairo, Egypt. QSL via nu2TP. (by nu2AYJ)

fl1AB—Government Radio Station, Monrovia, Liberia, Africa. (by nu2BG)

fm8MA—Box 50, Casablanca, Morocco (c. w. and phone)

fqOCDL—Duala Wireless Station, French Cameroun, Africa. (by nu1AQT)

niTFHV—Dr. Vopler, Akureyri, Box 63, Iceland. (by Miss B. Dunn)



The

ELKON CHOKE COIL

INDUCTANCE 0.1 HENRY RESISTANCE 0.3 OHM
MAXIMUM CURRENT 2 AMPERES

Possesses substantial advantages experts are quick to recognize. It is used with charger ONLY DURING RECEPTION, having ample capacity for supplying undiminishing "A" power up to full capacity of charger. Connected with full wave rectifier it will provide filament "A" Power of uniform high quality with any good "A" battery.

$6.00 everywhere

Made by the manufacturers of

ELKON TRICKLE CHARGER
The original silent bone dry Trickle Charger. 1 amp. capacity. Tapers automatically.

ELKON "A" POWER
Flawless filament "A" Power Instantly. No liquids, tubes or moving parts.

ELKON 3 AMPERE CHARGER
The silent rugged rectifier. Bone Dry. Recommended for use with the Elkon Choke Coil.

ELKON WORKS Inc.
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Radio Division

PORT CHESTER, N. Y.

nm23A—Antonio de la Pena, Apartado Postal 82, Satillo, Coah, Mexico.
se1FG—Fava Giovanni, Major of Artillery, Italian Military Mission, Quito. Ecuador. (appeared incorrectly in August issue)

This list of commercial stations was obtained through the courtesy of nu2VW and np4KD.

AYG—La Guaira, Venezuela.
HJG—Bogota, Colombia, S. America. (22 meters)
LR1—Pisa, Italy. (about 24.5 meters)
PJC—Willemstad, Curacao, Dutch West Indies.
PJD—St Martins, Island, Colony of Curacao, D. W. I.
PJN—Paramaribo, Dutch Guiana, S. A.
ORU—Brussels, Belgium.
UEW—S.S. *De Grasse*. (French Line)
WGT—San Juan, Porto Rico.
Bo is an abbreviation for Bogota used on commercial circuits.
1XR—Manila, P. I.

REFERENCES and BOOK REVIEWS

By R. S. Kruse, Technical Editor

Le Onde Corte nelle Communicazioni Radioelettriche by A. Ducati published by Nicola Zanichelli, 637 pages, 606 line drawings and half tone illustrations. Price not known.

Adriano Cavalieri Ducati is well known to all readers of *QST* as the operator of the pioneer Italian short wave amateur station ACD. Perhaps not all readers are aware of the tremendous activity of ACD in almost every field of amateur radio and some may therefore be surprised at the splendid familiarity with the practical applications of radio at short waves that is shown by the book here reviewed. Even more impressive must be the remarkable manner in which the information in this book is brought up to the moment, a thing most difficult to accomplish in any bound volume because of the constant and rapid changes the art undergoes.

It must not be thought from what has been said that theory is omitted for it is presented well and concisely together with liberal references for any who care to study further. However, unless I have mistaken the author's intent seriously, his view is that theory is a means to an end, that end being the advance of radio communication by both amateur and professional. For that reason every theory is at once given practical application to our problems and I do not know at this moment of any book which can be more promptly useful to the experimenter than this one. It is to be regretted that our experimenters cannot all read the Italian language readily but even those who cannot do so will be able with a smattering of Latin and the assistance of the very numerous illustrations to derive much information from this exceptional book.

Principles of Radio Communication by J. H. Morecroft assisted by A. Pinto and W. A. Curry. 1000 pages, 731 line drawings and half tone illustrations. John Wiley and Sons. Price is $7.50.

To review a book whose position is so thoroughly established is almost wasted time and one needs but say that in the second edition differs from the first as does the radio art of today from that of 1921. To those who are familiar with the first edition it may perhaps seem that my review of Ducati's books is also a review of "Morecroft". Therefore one must at once say that "Morecroft" is the more mathematically inclined of the two and that it is on the whole somewhat more concerned with theory and a trifle less

32 Pages Bigger!

THE new edition of the RADIO AMATEUR'S HANDBOOK has 32 pages more than the last edition. That's because additional information has been inserted in all parts of the book and everything has been brought right up to date. Two hundred and sixty-six pages of dope, data and details—all for one dollar, postpaid anywhere.

OF course you can struggle along with the old edition—or it's even possible that you can do without the Handbook entirely—but why handicap yourself when it costs only a dollar to have the new Handbook in reach whenever you need some radio information?

This is easier than writing a letter →

AMERICAN RADIO RELAY LEAGUE,
Hartford, Conn.

Here's my dollar—you know what I want.

Name.....

Address .....

.....

with practice also that it gives much more attention to long wave work and consequently somewhat less to short wave work than does Ducati. Like the first edition it is a notable work and this reviewer has but one real criticism to offer. It was perhaps a convenience to the editors to start a fresh set of figure numbers in every chapter but the arrangement is a thorough nuisance to the reader.

Theory of Thermionic Vacuum Tube by Leo J. Peters. 247 pages, 81 illlustrations together with several charts and tables. McGraw-Hill Book Company, New York, price $3.00.

To my mind, Professor Peters' book fulfills a very definite want, that of the man who desires an understanding of vacuum tube theory without being dragged into a mathematical swamp which only the pure physicist can cross safely. The present book calls for no mathematics which the engineering graduate or student does not have available or within easy recall.

One thing is rather painfully absent from this book and that is references to other literature on the subject. Having given the pupil a good start it would seem kind also to direct him along other possible paths for there are many and the literature is exceedingly extensive.

All About Television by H. Windfield Secor and Joseph H. Kraus, 112 pages and numerous illustrations, Experimenter Publishing Co., New York, 50c.

While the title of this book is entirely too ambitious there is none the less presented a considerable amount of information on television and on the transmission of images by processes not swift enough to permit actual television. One rather has the feeling that the stories were written for casual reading and that this may account for the imaginative illustrations and the almost complete lack of any discussion of the engineering difficulties, such as the non-linear response characteristics of the inspection and reproduction units with regard to both intensity and duration of illumination.

None the less the book is an interesting compilation of methods now in use.

Radio Coördination, serial report of the Engineering National Section of National Electric Light Association, August 1927.

Of this series, which has been alluded to before this report is much the best and most practical.

Drake's Radio Cyclopedia, By Harold P. Manly, Radiotechnic Laboratory, Chicago. Published by Frederick J. Drake, Chicago, price not stated, 425 pages approximately.

Books of the type represented by this one are exceedingly hard to review because the author has been compelled to write so that the information will be valuable at once to the beginner and the technician. The author of the present book has probably done as well with this almost impossible task as one has any right to expect; I cannot say with certainty since after all one looks at any book from one's own standpoint, which quite probably is not the one occupied by most of the prospective readers of the "Cyclopedia". By attempting to imagine various standpoints one comes to the conclusion that the book is a good job. Certainly it is (outside of transmission) rather comprehensive, also it is excellently illustrated with over 900 pictures, cleanly printed, well bound and thoroughly cross-indexed. The information is so put as to be of most immediate use to the constructor and repair man and, remarkably enough, includes apparatus of most recent origin.

Aquino's Newest Sea and Air Navigation Tables, by Commander Radler de Aquino, Brazilian Navy, with numerous illustrative figures, 166 pages, published by U. S. Naval Institute, Annapolis, Maryland, and sold at $5 postpaid; also sold by J. D. Potter, Admirality Agent for Charts, 145 Minories, London, E1, England.

The reason for reviewing a book primarily meant for navigators is easily guessed when one considers that distances over the earth's surface interest the short-wave radio man quite as much as the navigator. The tables may be worked without a knowledge of loga-

rithms. Captain H. A. Baldridge, U.S.N., Secretary-Treasurer of the Naval Institute brings the book to our attention and also suggests that those interested in the distance problem only refer at once to page XXXVIII of Chapter 5.

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Calls Heard

(Continued from page 49)

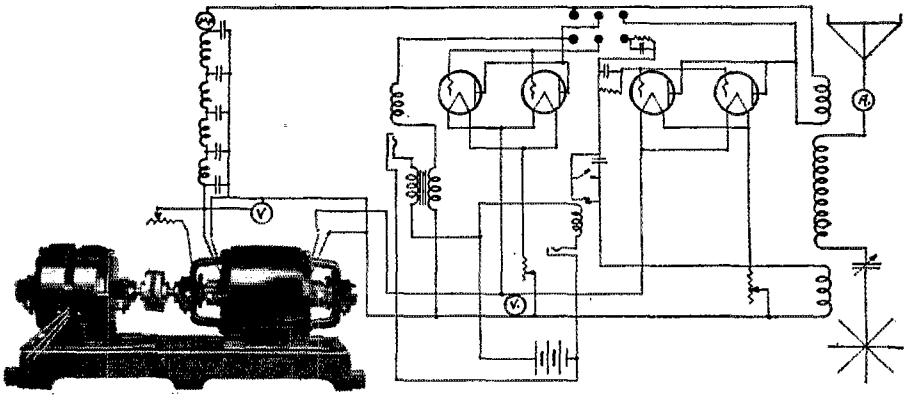
8tn 8uy 8adg 8agi 8akk 8amu 8brc 8bum 8ccs 8cxd 8cxi 8dme 9bil 9evn 9cxc 9dro 9ekt 9eky nc-8cs bnm nixb.

(At Kingston, Jamaica, Sept. 26)
(40 meters)

1fl 1kk 1caa 1ckp 2tf 2agj 3au 3cc 3ez 3afw 3afx 3ckj 4fm 4jd 4acz 5acl 6cpf 6dct 8akk 8cer 8xd 9axo 9bpl sb-1ao.

J. Arends, Chief Op. S. S. Leerdam, c/o Holland-America Line, Rotterdam, Holland
(Heard in Gulf of Mexico)

1aac 1ahv 1ait 1ajx 1akz 1bl 1bgt 1emp 1emx 1enz 1ic 1zw 1zz 2acd 2agn 2agp 2akv 2alu 2ang 2bvd 2crb 2cuq 2cx 2hh 2md 2ol 2qh 2xd 3aed 3ag 3ajh 3ali 3aks 3bgg 3cab 3cx 3lq 3qe 4aar 4aba 4ac 4acn 4acz 4fu 4gl 4gv 4jd 4jl 4km 4ll 4nq 4ob 4on 4rm 4rn 4rp 4uo 4wsz 5aak 5adp 5aep 5afn 5aj 5akn 5aky 5amk 5aot 5api 5aqw 5ara 5atf 5av 5avs 5ayl 5dk 5dq 5eb 5eyp 5he 5hn 5im 5jd 5kc 5ki 5kl 5kms 5la 5ms 5oa 5qa 5qj 5qo 5rg 5uk 5ml 5yb 5zak 5zav 6aak 6adm 6agd 6agr 6ahn 6aij 6akm 6ap 6apb 6awy 6beh 6bf 6bfp 6bfq 6bhz 6bjf 6bil 6bjq 6bod 6bph 6buy 6bwn 6bwk 6bxi 6bzf 6cap 6ccl 6cgc 6chl 6chz 6cii 6cin 6cpf 6crg 6csq 6csv 6cww 6cyx 6czc 6czf 6czq 6czu 6deq 6ddq 6dec 6dev 6dfr 6dfs 6dfv 6dgt 6dgy 6dhq 6dhs 6dkx 6dle 6dlt 6dly 6dor 6ec 6gw 6ha 6hu 6ih 6tu 6lh 6or 6pp 6qi 6qy 6rn 6ta 6to 6uf 6wh 7abh 7aek 7aib 7al 7aw 7bb 7br 7ek 7io 7iz



Item 37, 2 unit four bearing set, delivering 1000 volts, 600 watts for plate and 12 volts, 300 watts for filament. The "ESCO" Set is shown here furnishing Power Supply for 4—50 watters in a phone or telegraph set. This is the Item used by CB8 in pioneer achievement of the first two way amateur wireless communication between North and South America.

ELECTRIC SPECIALTY COMPANY

Mark "ESCO" Trade

522 South Street **Stamford, Conn., U. S. A.**

Manufacturers of Motors, Generators, Motor-Generators
Dynamotors and Rotary Converters, for Radio and Other Purposes

GROSS COILS

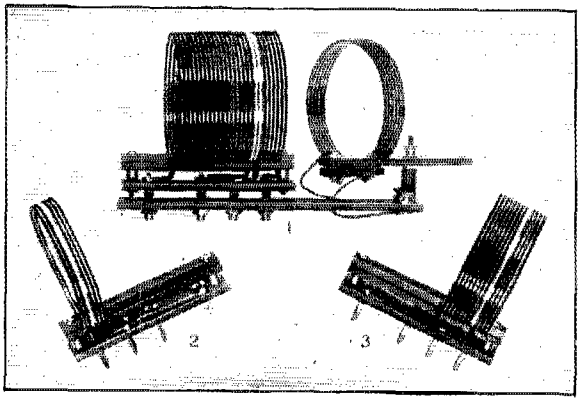
GROSS SHORT WAVE LOW LOSS "PLUG-IN" COILS

The coils you will eventually use. Wound with number 16 double silk covered wire with turns spaced the diameter of a turn. It is a recognized fact that the space wound solenoid is the most efficient form of inductance. The distributed capacity is at a minimum and dielectric losses are too low to be measurable!

An extremely thin film of celluloid which only touches the turns at the very bottom, is the binder which serves to make this coil as rugged as if it were wound on a solid form. No impregnating dope of any kind is applied to the winding. The winding is extremely rigid and may be grasped firmly in the hand.

Each of these coils will cover a sufficient range to overlap with the next smaller and larger coil. There is one for each amateur waveband and it can be plugged in and out as easily as a pair of phones.

The base which contains the jacks, also holds the antenna coil on a small swinging arm, which permits all degrees of coupling from zero to 100.



These coils will unquestionably improve the appearance and operation of any short wave receiver.

Price of base with coil for one band, **$4.50**

Price of coils only:

20 meter band	$2.75
40 meter band	2.75
80 meter band	2.75
200 meter band	2.75
600-200 meters	3.25

GROSS RECEIVER KITS

Composed of high grade material throughout.

2 Tube Kit	$15.75
2 Tube Assembled Receiver	18.00
3 Tube Kit	18.75
3 Tube Assembled Receiver	21.00

Above Receivers or Kits supplied with one plug in coil for 20, 40 or 80 meters, as you select. Extra coils $2.75 each.

GROSS COILS ARE USED BY 2UO

2UO is probably the best known and loudest short wave station on the air to-day after trying several other makes of coils in their receivers, they have replaced them with gross coils because same were more satisfactory in performance and able to stand much more handling due to their extreme ruggedness. This station has used receivers with gross coils to keep schedules up to 10,000 miles consistently.

Dealers and Representatives Wanted. Write for discounts.

J. GROSS COMPANY, 30 Park Place, New York City

7mo 7ok 7vg 7we 8agy 8ahc 8aip 8ajv 8alu 8auq 8bau 8hbg 8boo 8bor 8bqi 8byn 8eau 8ces 8ehz 8et 8eno 8eoj 8epq 8erf 8ewt 8exw 8dan 8ddk 8det 8dgl 8dkx 8dod 8doo 8drt 8it 8kc 8li 8lt 9aa 9abv 9adn 9aff 9ahq 9aid 9ajp 9aof 9aok 9avg 9axo 9axz 9bam 9bat 9beq 9beu 9bjw 9bkz 9blk 9bmm 9bmw 9bn 9bnb 9bp 9bpl 9bqc 9brp 9bwn 9cat 9cej 9cfd 9civ 9cmz 9cn 9est 9cvn 9cyx 9cya 9cyb 9cyw 9dbj 9dck 9dfj 9dli 9dll 9dng 9dpj 9dqn 9dqv 9dr 9dso 9dte 9duc 9dyb 9ecs 9eev 9ef 9efh 9efk 9ejo 9ejw 9ekn 9ekw 9eky 9ff 9fu 9gj 9hl 9my 9nt 9pb 9pn 9ra 9rv 9uy 9wr 9xi nc-1bt nc-3cs nc-4fv nc-5au nc-9co nm-1g nm-1t nn-1nic nq-5by nr-cto nr-2ea nr-2fg nz-ez5 eb-4ac eb-4ww eb-4zz ef-8cf ef-8cp ef-8fd ef-8ix ef-8vvd ef-8xo ei-1no ep-1ae oh-6dqq oh-6oa oo-geo oo-kflf sa-hd4 sb-1ah sc-3ag su-2ak sv-1xc oa-2jw oa-2mh oa-2sh oa-3bq oa-3es oa-3wm oa-4go oa-7ew oa-7jk oz-1ao oz-1fb oz-2ac oz-2ad oz-2ae oz-2al oz-2at oz-2bg oz-2bp oz-2ga oz-2me oz-3aj oz-3ap oz-3ar oz-3cp oz-4ac oz-4am oz-vlb aqe arcx ardi atc advb jyb lgn oik pjc pwa sfv tve wnbt wnp wnu wqn wva wvb wyg xam xdj.

1BAT, L. C. Jensen, 132 Bayard St., Providence, R. I.
(Heard from Oct. 11 to 21)
(20 meters)

7ek 7if 7rl eb-4ar eb-4cb ef-8cl ef-8eo ef-8px eg-2bm eg-5ml eg-6vp ek-5dba fo-a8z fo-a8p wnp oik.
(40 meters)

7mx ea-gp ef-8eo ef-8est ef-8fd ef-8gi ef-8xix ef-8xo eg-2sz ei-1dm ek-4yo en-0gw en-0qq fo-a3b fo-a8z fo-a4z nq-2ef nq-5by nq-5ry nq-7cx nr-2ea nr-2fg nr-cto nx-1xl sb-1ah sb-1ax sb-7aa se-1fg sv-1xc oz-3ar wnp oik.

np-4KD, E. W. Mayer, Box 103, Ensenada, P. R.
eb-4zz eb-4au eb-4ww ef-8cl ef-8ix ef-8jr ef-8xo eg-5ku eg-5yx ek-4aci xen-oqq en-oga en-oja nc-9ai ne8rg nl-5mm nr-2fg nq-2ac nq-7cx oa-2jt oa-2jy oa-2rc oa-2ro oa-2sh oa-2xi oa-3es oa-3vp oa-3yx oa-4nw oa-5by oa-5hg oa-5ja oa-5wh oa-7cw oa-7gh oa-7hl oz-1ao oz-2aj oz-2bg oz-3au oz-4ac oo-kflf sb-2aj sb-7aa sb-7ab sv-1xc.

np4RX, A. Percy, Box 241, Ponce, P. R.
1avy 1dm 1bhm 1byv 1awe 1akz 1bhs 1fl 1bvb 1asf 1sz 2ph 2rs 2md 2aeo 2ags 2ase 2aun 2nm 2ac 2ns 2bad 2wc 2bg 2xad 3ach 3acm 3ez 3cee 3wm 3gs 3bnf 3akw 4oo 4px 4lk 4rp 4km 4gy 4acy 5uk 5zay 5zav 5avs 5arf 5apo 6cmx 8aul 8dtp 8ajt 8bgf 8ahc 8ded 8brf 8ane 9crh 9nc 9mn 9erd 9erv 9dku 9mr 9bgn 9bpw 9ux 9ejs 9dwe 9bff.

nc-4FV, D. B. Sinclair, 205 Cambridge St., Winnipeg, Man., Canada
(20 meters during September)

1abx 1afl 1aiq 1ajm 1ame 1aqt 1ari 1asu 1atz 1awe 1axq 1acm 1bat 1bbm 1bjk 1bkq 1bux 1bw 1bxm 1byv 1cdp 1cfo 1ckk 1cmf 1cti 1dl 1fl 1gr 1ip 1kl 1kj 1mu 1nv 1ql 1qv 1rd 1rp 1ry 1sw 1sz 1uz 1xr 1zl 1zz 2acy 2agf 2aqn 2aiu 2amg 2anb 2aol 2ary 2ate 2aue 2bhw 2bcv 2bcw 2bda 2bev 2bm 2cmu 2cmx 2cs 2ctq 2evj 2fn 2fs 2gp 2sg 2tp 2va 2vs 2vw 2wh 2xad 2xv 3afl 3ahr 3aim 3akw 3ank 3aue 3bqz 3cc 3jm 3ow 3rr 3vx 4ih 4km 4mw 4nl 4on 4px 4pz 4rn 4wh 5aeb 5aga 5aip 5air 5al 5apo 5aqe 5ara 5avs 5axo 5bh 5dq 5gk 5jr 5oh 6apa 6aaz 6alv 6aod 6aqm 6akm 6ann 6baj 6bax 6bff 6bjv 6btx 6hxi 6hzc 6che 6esj 6cto 6cxu 6eyx 6dch 6deq 6dfv 6dgx 6dhq 6dhs 6dkd 6jn 6ju 6rm 6rn 7acp 7add 7dd 7gw 7mo 7op 7sm 7vh 7vz 8adg 8aki 8ago 8ahc 8aly 8amu 8arb 8auc 8avd 8axa 8ayo 8bau 8ben 8bes 8bfg 8bgn 8bjb 8bkm 8bnu 8bpq 8bqf 8bsr 8buh 8ced 8cer 8cfl 8cfr 8cgd 8cil 8cij 8cnt 8cpq 8cqr 8cug 8cvj 8cvq 8dax 8dds 8ded 8dia 8djv 8dkt 8dkx 8dne 8dpo 8dqk 8dse 8dsy 8jq 8kr 8re 8rh 8sh 8sy 8wf nc-1ar nc-1ap nc-1br nc-1bt nc-2fn nc-2fo nc-3bt nc-3fc nc-3jm nc-3qs np-4pq np-4sa eb-4rs eb-4ww eb-4zz en-0ja gi-2it se-1fg su-1cd sb-2ar sc-3ag anf kfzq voq wnp fz-1.

Henry P. Holm, 609 Laurel St., Preston, Ont., Canada
(Sept. 11 to Sept. 25)
(22-50 meters)

eb-4ww eb-4zz ef-2tap ef-8fi ep-4aci fq-pm nc-8rg nq-7cx sb-2ak sb-2aj ag9 arbm arcx ardi aqe cu fchg bgh gbj gbk gbw hbc hyg kutg kzet lgn lfs nixb ptaa ptb pjc stb sgjj sjg tfu voq vb wax wnp wuz wvby.

nz-EZ5, Henry P. Karr, Hq. Btry 2nd U.S.F. A. Bt., Gaiun, Panama Canal Zone
(Heard Sun., Oct. 17—20 meters)

1abx 1ajm 1gh 1rd 1rw 2al 2xad 3lq 3mv 3qa 3tn 4rn 5aga 5ara 5axo 5bh 5yb 5zav 6vz 8adg 8eam 8ejv 8eug 8hl 8re 8ve 9as 9baf 9bi 9hxi 9cjl 9erd 9eu 9euh 9eap 9ux eb-4cb eb-4ww eg-5mr nc-2be.

(40 meters)

1ach 1bak 1cak 2ag 2agb 2ami 2amt 2arn 2ass 2avq 2az 2bed 2bdh 2bff 2crn 2cuq 2ro 2tp 2uo 2vo 3aef 3am 3ctx 4dg 4ei 4uz 5ain 5eb 5ot 5pk 5te 5uk 6nw 8alu 8bbg 8bdm 8bkx 9ac 9aue 9bjh 9bsw 9cwq 9dck 9dkk 9dny 9dpj 9tp eb-4fu eg-6yq nc-1br nr-2fg kfzq.

NBA, Don Harris, U. S. Naval Radio Station, Balboa, Canal Zone, Panama

(Heard during September)

(20 meters)

1asu 1aiq 1aq 1atz 1dl 1fl 2aoi 2fn 3agu 3bqz 3hg 4on 4km 4qb 5apn 5kh 5ku 6agr 6bq 6csj 6cuh 6dg 8aly 8avk 8djv 8dme 8re 9aop 9cei 9cgi 9dbw 9dqu 9dws 9eag 9ef 9efh 9ekq sa-da9.

(40 meters)

1acv 1afl 1amj 1aqp 1are 1asf 1auk 1ayi 1bcy 1bhs 1bkp 1caa 1ccz 1cio 1ic 1ii 1ka 1kc 1mv 1og 1rf 1uu 1xv 2aby 2aad 2afr 2agw 2aja 2am 2ang 2api 2apd 2avq 2avw 2ayj 2bo 2cc 2crb 2cub 2fs 2kr 2kx 2nf 2rs 2ro 2sg 2zl 3afu 3aio 3ajp 3ajx 3apn 3bqj 3cbt 3chg 3ef 3ec 3lo 3lq 3lw 3pf 3sz 3ta 4aba 4bn 4br 4du 4gp 4hl 4iz 4ll 4na *4oc 4oh 4on 4pd 4pf* 4rm 4rp 4tb 5acl 5acy 5aq 5ash 5ce 5gr 5jk 5ki 5nl 5ql 5vx 5zk 6aak 6abg 6adm 6agr 6ahn 6atu 6bjl 6bjv 6brd 6buc 6bvv 6cco 6chz 6cmq 6cng 6cuw 6dfs 6dki 6dlr 6dpm 6ih 6la 6qi 6rb 7add 7bh 7lz 7mo 7ti 7tj 8adg 8alu 8amu 8arg 8avp 8baq 8bbg 8biv 8bgc 8bja 8bnh 8box 8bpl 8bqm 8hth 8hub 8bum 8cfr 8cng 8cno 8cpq 8cpx 8cxi 8djf 8dld 8eb 8ey 8hx 8ij 8jb 8ol 8pl 8rh 8uy 9aoi 9ahq 9apv 9axo 9axz 9baz 9bce 9bgq 9bht 9bld 9bnd 9bol 8bpl 9cjh 9cmq 9coq 9crj 9cwq 9czh 9dkk 9dku 9dpj 9dqy 9dr 9dro 9eev 9efg 9efk 9efo 9kg 9kv eb-4ww eb-4zz ei-1za nc-1ax nc-3bt nc-3cs nc-5go nq-2ac nq-2cf nq-2ro nq-7cx nm-8a nm-9a nz-ez5 oa-1oa oa-2ij oa-5bw oa-5hg oz-1ao oz-2al oz-3ap oz-4ac sa-1ba sa-da9 s-3ak ss-2bn ay aa7 aqe, arcx cb8 famp fy gbk gbr gkt ice kbgd mf, ohk ocdj pjc ptaa (snni) wfy wuby wvy.

(80 meters)

1bm 1apl 1bfq 2sc 2xad 2fn 4jr 8avk.

sb-2IG, Livio G. Moreira, Rua Paula Gomes 6, Curityba, Brazil

(20 meters)

1aal 1afu 1akz 1asu 1bux 1byv 1ii 1sz 1vw 1xv 1zz 2agn 2ahm 2amp 2bcw 2cuz 2or 4qb 5dx 8aly 8axa 8axl 8ben 8cfr 8cmb 9afa 9bzi 9cg 9crd 9ddu 9dxb 9dzu eb-4ww ef-8cl ef-8ft eg-5qv eg-5yx eg-6ko sa-de3 sa-fc6 sa-da8 sa-dt9.

Toin Radio Research Society, c/o S. Handa, Tokyo, Japan

(Heard on 40 meters during August)

1mr 3ac 1lp 9fo op-1ad op-1ak op-1bd op-1cw aj-jes aj-jbk aj-jhl aj-jkv aj-jpp aj-jrw aj-jyb aj-jkzb a-4ck aj-988 ac-2ff nop ppn xn3 xnf wuk.

ns-3JG, Jose Gallardo, Santa Ana, El Salvador

(Heard from Sept. 14 to Sept. 30)

1auk 1fl 1amd 1br 1atv 2afr 2hq 2cuq 3ag 4aba 4qb 4rp 4jo 4on 4ll 4tf 4rs 5za 5aay 5eb 5fh 5akr 5pt 5apg 5la 5ql 8cro 8agi 8akv 9dce 9ld 9bca nr-2fg nr-2ea nq-2jt sda spw.

ef-R268, M. Thomassin, 16 bis. Boulevard St. Jacques, Paris, France

(Heard during Aug. and Sept.)

1abd 1adl 1axx 1bcz 1mp 1mo 1rd 2amh 2avn 2ayj 2bcv 2cyx 3aim 3aiv 3cgf 3ckl 3gi 3kj 3qe 3sz 4cl 4jo 4pe 4tn 5wz 8axa 8azg 8bat 8bkm 8cro 8drj 8jo 9bcl.

Harold G. Fownes, 110 Riddiford St., Wellington, N. Z.

1acv 1ad 1adm 1aik 1ajx 1ama 1amu 1ase 1auc 1avm 1awe 1azd 1ba 1bes 1bfx 1bhs 1bmg 1brc 1bs 1bux 1cje 1cke 1cmf 1cmx 1cnz 1ds 1gu 1hr 1no 1oj 1pq 2aei 2aer 2age 2akv 2amr 2apd 2atb 2aur 2axx 2bbx 2bfi 2bhf 2bs 2bv 2cka 2crb 2cuq 2cvj 2cyx 2czr 2fs 2or 2qf 2rr 2su 2wv 3aff 3afu 3agg 3ajl 3aun 3awt 3bc 3bl 3ckl 3cjw 3dw 3hg 3lw 3mp 3qe 3tm 3ux 4ao 4ci 4cy 4dt 4es 4fo 4fy 4ge 4nek 4nq 4ob 4pk 4px 4rm 4rn 4rp 4rv 4sq 4sy 4tk 4tw 4ug 5acl 5adz 5aew 5af 5ajk 5aqf 5bt 5bw 5ck 5cw 5df 5ew 5gt 5hj 5jd 5mx 5gj 5ql 5rf 5rg 5rk 5rs 5to 5vp 5yl 5zaf 6abg 6aej 6aiw 6ajl 6ajm 6alk 6amm 6anq 6arw 6atq 6atu 6auf 6ave 6awv 6avj 6bee 6bep 6bfp 6bft 6bhq 6bhv 6bhz 6bjl 6bjx 6bmo 6bmz 6bna 6bnz 6bos 6bpp 6bpz 6bqo 6btd 6bts 6buw 6buy 6bvv 6bvy 6bws 6bzc 6bzt 6cae 6car 6cbv 6cbx 6cgm 6clp 6cnv 6cof 6cot 6cpk 6cry 6cto 6ctq 6cua 6cuu 6ewy 6czk 6dap 6dec 6dkx 6dn 6dmt 6ec 6er 6fh 6ju 6my 6nw 6pn 6sj 6tx 6wx 7abm 7acf 7ae 7ail 7bk

7gl 7if 7ok 7qa 7sf 7st 7uq 7ut 7vy 7xf 7zu 8acl 8ael 8agi 8agz 8ahf 8akv 8aqx 8avk 8bau 8bdu 8bey 8bng 8bpf 8bpl 8btf 8bww 8ceq 8cxh 8dlq 8ey 8jk 8nf 8tk 8wr 9aky 9anu 9app 9apt 9ara 9arr 9auc 9azp 9bmb 9bnl 9bom 9bov 9bqe 9bsh 9caa 9cee 9cer 9cjh 9cnc 9coq 9cp 9rj 9ddx 9del 9dih 9dqy 9dr 9dvj 9eua 9efw 9efj 9eic 9elt 9emc 9fo 9if 9lk 9nk 9pu 9sa 9ux 9wr na-7km na-7wl nc-1cx nc-2cw nc-3bo nc3oc nc-3zv nc-4ey nc-5bj nc-5go nm-1a nm-1o nm-7x np-4rx ny-rxy nq-6jk nr-2gtu oa-5lf oa-5hg oa-5bg oa-5bw oa-5by oa-5dx oa-5wh oa-6ag oa-6kx oa-6mu oo-bam op-1ad op-1au oh-6bue oh-6exy oh-6dba oh-6deu oh-6dki eg-5rk ef-8cu ef-8co ef-8ii ef-8oe ef-8sm ei-1ay ei-1er ei-1uu ek-4yo ek-4yoe ek-4uah ek-4uar er-5aa sa-bai sa-cb8 sa-dh2 su-dr9 sb-1br sb-2af sb-5aa sc-2as ss-2bn su-2bn sc-2ff sc-8em aj-abc agb cct irb jcx jcv nl ntk rfn.

W. A. Bousfield, York St., Bellerive, Tasmania

1adm 1aff 1ajm 1asu 1beh 1bgq 1bhs 1byv 1cmx 1ve 2aan 2agn 2ahm 2avr 2cvs 2ens 2ie 2mu 2or 2tp 2uo 3agg 3af 3ahl 3bg 3bhv 3bma 3apn 3chg 3ld 3qw 3wf 4bl 4du 4iz 4km 4lk 4ll 4px 4si 4wj 5aaq 5aq 5aqf 5bh 5eh 5id 5ql 5rg 5uk 5vu 5wri 5wz 5zai 5zav 6abg 6adm 6agr 6aiv 6ala 6am 6amm 6anh 6ann 6aol 6auk 6bdl 6bfl 6bgh 6bgv 6bjf 6bjl 6bjv 6bkd 6bpm 6bq 6brd 6buc 6buy 6byz 6bzf 6bzn 6ceo 6cer 6cct 6chk 6chz 6csx 6csz 6ctz 6ctz 6cvk 6cwj 6cxy 6cyx 6dau 6dct 6dfe 6ee 6hm 6hu 6in 6kb 6kg 6mu 6rb 6rn 6tx 6ud 6zi 7add 7bm 7ek 7lr 7wu 8ahc 8aly 8ash 8bau 8beq 8bwa 8hyn 8ces 8cot 8dcm 8dgx 8dld 8ew 8li 8pl 9adg 9adk 9and 9auu 9bqe 9che 9ek 9cn 9ctg 9coq 9cvn 9cvy 9dr 9dka 9dns 9eev 9ef 9efo 9fo 9ku 9vo 9xi na-7dq nc-3wab nc-1ad nj-2pz nm-5b nm-9a nn-m3y nn-1nic nr-cto nr-2fg ca-gp ea-cm eb-4aa eb-4ac eb-4au eb-4ax eb-4ar eb-4bc eb-4ck eb-4rs eb-4ww eb-4zz ef-8ais ef-8aro ef-8cf ef-8cl ef-8en ef-8ct ef-8ee ef-8eo ef-8ez ef-8fj ef-8fk ef-8fr ef-8ft ef-8cp ef-8gm ef-8ix ef-8jj ef-8kg ef-8ku ef-8max ef-8nn ef-8oeo ef-8qrt ef-8sm ef-8vvd ef-8xo ef-8yor eg-2it eg-2kf eg-2nh eg-2od eg-2rg eg-2sz eg-5dh eg-5hs eg-5kh eg-5nj eg-5uw eg-5xy eg-6mu eg-6td ei-1ay ei-1er ei-1dm ei-1er ei-1no ei-1rm ei-1uu ek-4abg ek-4oa ek-4uah ek-4ya ek-4yo el-a1x el-a1f eu-0ja eu-2pz ep-1ae es-2co ac-8hb af-1b af-hva aj-1ak aj-1km aj-1sk aj-1ts aj-jk2b am-2se fm-8ma sa-cb8 sb-1ax se-2bl od-pk9 oh-6acg oh-6adh oh-6axw oh-6bc oh-6bue oh-6cxy oh-6dea oh-6kg oo-bam oo-geo op-1au op-1bd op-1hr op-3ac ardi aqe knt arcx ds wvx wyj wnbt oedj 2yt lgn icho wup ved x-erlo glky nitt ss2bn nqt ohk kzet voc.

ei-1ER, Ing. Santangeli Mario, Via S. Eufemia No. 19, Milano, Italy
(Heard during Aug. and Sept.)
(20 meters)

1aep 1amd 1app 1awe 1bik 1byw 1cmx 1dm 1mv 2agn 2jn 2tp 4wh 8adg 8ahc 8aly 8axa 9afa wnp sb-1ad.

(40 meters)

1ahi 1aix 1aqp 1avj 1bqs 1bux 1crb 1cdp 1cg 1go 1kh 1lv 1mr 1td 2abp 2abt 2aed 2aee 2ahg 2ang 2api 2apo 2aub 2aun 2axw 2bai 2hbc 2bez 2bxu 2dr 2ef 2hr 2ij 2rh 2tm 2vm 3acu 3aef 3aga 3aks 3aib 3ali 3als 3cab 3cbt 3ee 3gem 3pr 3qm 3ss 3sz 4aba 4ip 4jd 4ob 4rq 4wh 4wo 5aga 5aqe 5aud 5ll 5lu 7akz 8ajn 8alu 8auq 8btu 8bj 8bjx 8bmr 8bob 8btf 8bwa 8coi 8cxh 8dal 8dgp 8dnf 8dpa 8ey 8lc 8wk 9aix 9bld 9emq 9emw 9erj 9dku 9dud 9wr ac-7xx eu-1ora fq-pm fo-aa9 nc-1dm ni-tfhv nq-2gf nq-2fg nq-8cx nr-nic nr-2fg oa-3ks oa-7pf oz-3ap oz-3bf oz-4ae ss-2bn su-2om cx7 kzet naz nyt ocly oik ptaa wyg wuby wuk.

eb-4BC, Louis Era, 46 Avenue Van Put, Antwerp, Belgium
(Heard from July to Sept.)

1asu 1avl 1bux 1sw 2avd 2gp 2uo 3qe 3bva 3sz 4dd 4cn 4aah 5kc 5oa 7ek 8ben 8aly 8baj 9dah 9eev 9ek nc-1bi nc-8jm nj-2pz nz-2fg nr-cto np-4sa np-4ig sa-de3 sa-db2 sb-2aa sb-2au sb-1ib sb-3ag su-1cx su-2ak oa-1ap oa-2hs oa-2ss oa-3eb oa-3hl oz-2bg oz-2bx oz-2at oz-3ac oz-4ac oz-4ae oz-4bd oz-4av oz-4ao oa-7ew oa-7hl voq wnp hva nuix wiy.

eb-4CB, 6 Antwerp St., Ostend, Belgium
(20 meters)

1aal 1aep 1ait 1aiw 1ape 1asf 1awe 1af 1bat 1bhs 1bux 1byv 1bxm 1bw 1cmx 1ia 1rd 1ry 1sz 1yb 2aep 2aim 2atr 2dv 2jn 2md 2nm 2vs 2tp 3amd 3ank 3bqz 3cfz 3ee 4dv 4qy 8adg 8ahc 8ayu 8axa 8cbi 8cmo 8djv 9civ 9cu 9ux nc-1ar nc-1br nc-1co nc-3ak ne-8af ne-8rg nr-2fg nr-4sa sb-1ad sb-1aw sb-1ib sb-2ag su-1cd fo-a3z fm-tun2 en-0qq wnp sjd.

HAM-ADS

NOTICE

Effective with the July issue of **QST** the policy of the "Ham Ad" Department was altered to conform more nearly to what it was originally intended that this department should be. It will be conducted strictly as a service to the members of the American Radio Relay League, and advertisements will be accepted 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, 4887 Rockwood Rd., Cleveland, 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 lbs. 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*. 10c extra on all orders for less than $1.00 net. Air pocket *insulators blue glazed porcelain 8" leakage path fine for* transmitting, 4 for $1.00 prepaid. Geo. Schulz, Calumet, Michigan.

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.

DODGE Radio Shortkut fixes signals in mind to stick. Users report rapid advance to 25 per. Also state Intensive Speed Practice (as follow up) most efficient speed booster known and Morse Shortkut eliminates code mixup. William Nadol, USS J. K. Paulding (Radio Division) reports: "Speed was 15 very uncertain. Using Shortkut increased quickly to 25—gained confidence." 6CLM Winnegar "Mastered code your way 20 minutes. Qualified easily." 6BTY Cacho "Shortkut produced license for me in two weeks—present speed 25 per." Reports on request. Radio with Appendix and Better Key Work $3.50. Speed Practice $2.50. Morse $2.50. Money Order. Foreign add fifty cents. No C. O. D. C. K. Dodge, Mamaroneck, N. Y.

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200 WATT filament transformers 8-11V $7.50, 200 watt 25 cycle 8-11V $11.00, 700 watt 1000-1500 each side $14.25, 700 watt 2000-2500 each side $18.00, 250 watt 550-700 each side $10.25, 250 watt 25 cycle 600-800 each side $14.00, 700 watt 25 cycle 1000-1500 each side $18.00, 30 Henry 150 mil. choke $12.00. 1 kw 2000-2500 each side $30.00. 9CES, F. Greben, 1927 S. Peoria St., Chicago, Ill.

HAMS—Discount 25% to 40% on parts, sets and tubes. Myron Martien, Galion, Ohio.

THE new Jeffries plate transformer. 1000 watts, 4400, 3300, 2200, 1650, 1100 volts, all voltages have center taps. Price $19.00. Write for descriptive folder. Carl Schwenden, 7427 Alameda Blvd., Los Angeles, Calif.

WILL trade new standard typewriter for good transmitter parts. Carl M. Leidholdt, Chippewa Falls, Wisconsin.

FOR sale or trade—Grebe thirteen. Send for list. Want motor generator. Lowell Ecker, Sedan, Kansas.

ESCO motor-generator, 750 volts, 247 watts; motor is for single phase 110 volt A.C. Excellent condition. $45.00. Ross Moorhead, 8ARO, R. F. D. 9, Box 69, Findlay, Ohio.

MUELLER tube 150 watt input, $10.00. Good condition. 5ATN, Leighton L. Morse, Jennings, Louisiana.

NEON tubes—standard base .85 prepaid. Small candelabra base, fb for wave-meters, 70c prepaid. Mounted, center-tapped filament transformers for 210s $3.50. 9ACA, 1322 E. 27th St., Kansas City, Mo.

FOR sale—complete 20-40 meter transmitter and receiver with transmitting rectifying tubes, filter, key, meters, phones, storage battery, wavemeter, etc., $65.00. DX, Belgium, France. E. E. Brady, 727 North C Street, Tacoma, Washington, nu7NC.

FOR sale—transmitting and receiving apparatus. Write for list. W. F. Todd, Tucumcari, New Mexico.

FOR sale—Emerson motor generator 1000 volt 400 watt double commutator generator directly connected to 110 volt 60 cycle motor. Perfect condition $90.00. William G. Mayer, 58 West 40th Street, New York City.

SALE, half price or less: Marco miniature knife switch, d.p. d.t., 50c ea.; 3 p. d.t., 75c. Rotary ser-prl. switch, 40c. Airline fones, with cushions, $1.50. Edison A. battery, large, neat (bargain), $30. Full set 12 Branston mounted honeycomb coils, only $10.00! Branston 3-coil Geared back-panel Mounting (best made), $2.25. Cabinet, roomy 25x16x13, *unvarnished veneer, with extra base and* genuine h.r. panel (fine value), $8. Century buzzer, 40c. Kellogg vernier condenser, .00025, 60c. Chelton midget condenser, 50c. Western Electric amplifier and horn (complete 10-A Outfit), special bargain, $40. Remit with order. A. B. Tripp, 237 St. Helens, Tacoma, Washington.

ARN receptacles are fb for those baseless tubes you're using for ¾ and 5 meter work. 75c prepaid. A. Mallins, 89 Webster Ave., Brooklyn, N. Y.

New UV204, sixty dollars, 203A, twenty dollars, 203, seventeen fifty, six "S" tubes, five dollars, nine hundred watt Thordarson plate transformer, twenty dollars, big $125 panel, sell twenty-five dollars. Anything you want. 8KF, Star Theater, Monessen, Penn.

QUARTZ crystals ground to your desired frequency for use in the various amateur bands as follows: 160 meter band, $15; 80 meter $25; 40 meter $50. Quotations on other sizes at your request. J. C. Fountain, Radio 8IM, 3591 Springle Ave., Detroit, Mich.

WANTED—Volume one to nine inclusive of *QST* or separate volumes. Give price and condition. E. E. Ford, 305 S. Wilson Ave., Alhambra, Calif.

EMERSON motor generator with high voltage meter. Rebuilt and belted giving 750 volts D.C. Cost me 115 dollars last year. Make offer or will trade for fifty watter, 1500 volt transformer, milliameter or what? R. E. Turner, 6TN, 1101 West 29th Street, Los Angeles, Calif.

HAMS: Get our samples and prices on printed call cards made to order as you want them. 9APY Hinds, 19 S. Wells St., Chicago, Ill.

SELL 1 week old 15 dial Omnigraph for any reasonable price. 8CSV, 1235-21st Ave., Altoona, Penn.

QSL cards, *two color* $1.00 per 100. Free samples on request. F. L. Young, 9CKA, Corwith, Iowa.

WANTED—a 1000 volt, 300 watt generator only, or what have you that will handle two 5 watt tubes. Geo. Voss, Pomeroy, Iowa.

QSL cards, two colors, government post cards, $1.90 per hundred, white cards $1.00. Real ham stationary at $1.40 per hundred sheets and envelopes, pad form. Postage 10c. Free samples. 8DTY, 257 Parker Ave., Buffalo, N. Y.

1000 V. 300 W. Esco motor 110 V. single phase $95.00. 400 V. 100 W. Esco coupled to 220 V. 3 phase A.C. motor $25.00. 400 V. 100 W. Generator only $8.50. 900 V. 300 W. double commutator with 110 V. single phase motor $65.00. 2500 V. 2 kilowatt Generator double commutator, coupled to three phase 220 V. 1750 speed motor. 2500 V. 600 W. double commutator generator coupled to 110-220 V. 60 cycle, single phase motor, 1750 speed. Filament motor generators 50 to 200 amp. capacity. Also many others. *James J. Smat*, 1734 Grand Ave., Chicago, Ill.

OMNIGRAPH five dial nearly new, fine condition, $11.00. Lloyd Pettygrove, Oxford, Nebraska.

CURTIS-GRIFFITH 250-watt power-filament transformers 350-550 each side $10.50. 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. Aluminum square foot 85c; Lead square foot 85c. UX-852 75-watters $32.50. "Ham-list" 4c. James Radio Curtis, 5-A-Q-C, 1109 Eighth Avenue, Fort Worth, Texas.

HEADQUARTERS for hams: Immediate deliveries on Mueller 150-watt input tubes $15.00. RCA 5-watters $3.15. 15-dial Omnigraphs $20.00. Aerovox 1000-volt tested 1-mfd condensers $1.75. Citizens Amateur Call-books 85c (postpaid). Potter 2000-volt 1-mfd condensers $2.50; 2500-volt 1-mfd $3.25. Robert Curtis, 1109 Eighth Avenue, Fort Worth, Texas.

COMPLETE plug-in short wave receiver. 20-40-80 meters. Get with 2-stages and tubes $25.00. Price Griffith, 1109 Eighth Avenue, Fort Worth, Texas.

BARGAINS—2-WE 7-A amplifiers with tubes horn, $50. Several Baldwin type C phones $3.50; Grebe CR-13 new $20; 250 watt short wave transmitter with tube $150; 500 watt master osc. power amp. with three tubes $250; Corona portable $25; Weston Jewell AC DC and TC meters, all manner of small transmitting and receiving equipment. Write me what you are looking for, I may have it. Prices fob Parkesburg, Penna. Colman, 3QT, Parkesburg, Penna.

3ZO selling out. Everything to go. Acme 500 watt plate trans. 1000 and 1500 each side center $15. 150 watt fil. trans. $10. 3-600 mill 30 henry chokes $25. 3-RCA Helices $5. 14-UC490 filter condensers, $2.50. Cardwell 147-B var. trans. cond. $7.50. Weston AC, DC voltmeter 0-6000v perfect $100. 2-211A tubes new $20. 6 UV204 tubes used $50. 1000v Esco mg 220 AC 3 phase $125. 2000-14V Esco mg 220 AC 3 phase $175. 500-10v Esco mg 32v motor $50. Write for complete list. Prices fob Parkesburg, Penn. F. Richardson, 3PY, Media, Penn.

BARGAIN—110 AC to 1500v-600w DC motor generator with field rheostat. Condition excellent. Price $125.00. E. H. McWhorter, Jr., New Bern, N. C.

QSL cards and ham stationary. Send for samples. Your own special setup at reasonable price. H. M. Selden, Cranesville, Penn.

TRANSFORMERS 110 volt 60 cycle 420 with midtap and 6 midtap for UX280, $4.00. 190-6 for 201A tube. 100 watt 650v, 325 each side and 7½ midtapped for UX281 or UX210 $7.25. 550 volt midtapped for Raytheon $3.50. 280 no tap $2.00. 1½ volts, $3.50. Chokes—150MA, 30H, $5.75. 100MA, 50H, $2.50. 60MA, 30H, $2.25. 30MA, 20H, $1.00. 500MA, 1H, $3.00. 1000MA, 1½H, $5.75. General Radio 174B wavemeter $25.00. All parts for Raytheon "BH" $16.75. Galvanometer $6.00. Silicon cores $2.00. Few odd meters left. Write for lists. M. Leitch, So. Park Drive, West Orange, N. J.

FILTER Chokes—Can supply all material for building any choke described on page 137 Radio Amateurs Handbook. Easy to build at one third the cost of other good chokes. Enameled magnet wire—No. 33, 87c pound; 30, 82c; 28, 77c; 26, 70c. Single cotton enameled—28, $1.25; 26, $1.02; 23, 92c. Choke cores complete—Any ½ inch core $1.00, ¾ inch $1.50, 1 inch $2.00, 2 inch 25c pound, 3 inch 20c pound. Mounting brackets with bolts, sets of 4 each 35c to 75c. .014 Silicon steel 15c pound. Add postage on all items. Nat G. Scott, New Albany, Mississippi.

OMNIGRAPH No. 2, fifteen dials perfect. $21.00. G. Kohler, 16 Mosgrove Ave., Roslindale, Mass.

SPECIALS in flush panel meters. 0-100 milliammeters, $1.15. 0-10 A.C. filament voltmeters, $1.65. 0-500 D.C. voltmeters, $6.25. Ed. Keers, 9CJR, 2300 E. Washington St., Joliet, Illinois.

FOR sale 110-DC to 110-AC Rotary Converter brand-new, cost $85.00, sell for $50.00. 110 Kennedy receiver with two steps $25.00 f. o. b. Rome. D. G. Goings, Rome, Georgia Radio 4AI.

EDISON storage "A" batteries, type B-6, 6 volt, 112½ ampere, $16.00. Shipped charged and guaranteed. Only few left. Also 225 and 450 ampere cells. 5 tube gang sockets, for UX or UV tubes. All Bakelite, 70c prepaid. Steel case Edison element storage "B" batteries. 100 volt type 5-G, 3000 MA, $12.50. 140 volt, $16.00. Type A elements with welded connector 5c per pair. Type 5-G, 9c. Prices include separators. Potash lithium for 5 lbs. Edison solution, 85c. J. Zied, 934 N. Randolph St., Philadelphia, Penn.

FIVE watt set, meters, transformers, other parts. Harry Kinney, 2857 Litchfield, Shaker Heights, Ohio.

ALL Postpaid and guaranteed brand new. R.E.L. Transmitting Inductances, double unit with glass coupling rods and clips, Type L, $8.90. R.E.L. 50 watt sockets, $2.00. R.E.L. mountings for "H" Tubes, $2.00. R.E.L. Radio Frequency Chokes, $1.00. Vitrohm center tapped grid leaks, 5000 ohms, for 50 watt tubes and less, $2.10. Dubilier 2000 volt stopping condensers, .002 mfd., $2.25. R.E.L. short wave coil kits, 10 to 110 meters, $4.50. General Radio Wavemeters, Type 358, $19.25. G. F. Hall, 535 West Hortter St., Philadelphia, Pa.

HOLTZER-Cabot fifteen hundred volt three hundred watt separately excited motor generator, motors one hundred ten volt. Complete with field rheostat, seventy dollars. R. B. Cooper, 326 Nicholas St., Vincennes, Indiana.

THE response to the last ad was tremendous but we still have a few left so here they are again. Westinghouse 0-300 flush mount milliammeters, nickel finish, black face, requires only one 2¼" hole to mount, all new and in original boxes. Complete with information, only $1.25 each. Also 30 henry 200 milliampere chokes. Special at only $2.50 each. All articles sent C.O.D. A post card will do the trick. Discounts on sensitive Neon tubes to all ORS. Send self addressed envelope for other bargains. E. P. Hufnagel, 879 South 18th St., Newark, N. J.

RADIO Book 150 Hook-ups postpaid .25 cents Conserve radio energy with Pyrex Transmission Insulators No. 10 Enameled wire, Cardwell Condensers, Marco Dials, write F. Ellert, 693 Mission Street, San Francisco.

NEON tubes. Best indicator obtainable for wavemeters except expensive thermo-galvanometer. Also used for oscillators, locating stray RF., and in laboratory work such as telephotography and synchronization. Type "A" small tube, $.85. Type "B" ultra sensitive has sealed in electrodes for positive contact, $1.25. Special low voltage type "C", for low power transmitters, $2.00; $8.00 list Dudlo wound chokes. 50 henry 150 milliampere, weight 5 pounds, special $2.95 each. United Scientific Laboratories condensers. Capacity, .00035, grounded rotor, low loss, modified slf. Single Condenser, $1.25. Double tandem for single control sets, $2.50. Please add some for postage. Send for our bargain list. G. L. Lang, 2 A W H, 1128 Springfield Ave., Irvington, N. J.

SPECIAL Flechtheim filter condensers. 1000v. 2mf. $2.25; 4mf. $4.50; 2000v. 1mf. $2.65; 2mf. $4.25; 4mf. $6.75. All unconditionally guaranteed. All sizes unmounted honeycomb coils, less than half price. Write for list and prices Meyers tubes. Detector-amplifier, plate and grid leads at opposite ends. Excellent for high frequency oscillators, receivers. With mounting clips and directions, $.95. Corwico enameled antenna wire, No. 12, $.85; No. 14, $.65, 100. Pyrex antenna insulators. 3½" $.45; 7½" $1.40; 12" $3.30; 1/16" sheet aluminum cp. $1.00; lead $1.00 sq. ft. Genuine bakelite panels 10"x14" $1.50. All articles guaranteed as represented. Please add postage. D. L. Moon, 3344 Hudson Blvd., Jersey City, N. J.

LICENSED amateurs only—Aero Short Wave Kit—$8.13. $60.18 Aero 7 Kit—$36.39. $146.34 Tyrman Ten Kit—$87.81. $25.00 Browning-Drake Kit—$16.25. $10.00 Ensco 36" Cone Kit—$6.18. $31.00 Modern B Eliminator, with Raytheon—$19.23. Discounts on Cardwell (transmitting items—15%), AmerTran, Jewell (transmitting meters—25%), Thordarson, Benjamin, Samson, Ward-Leonard—35%. On Sangamo, Daven, Karas, Deutschmann, Aero, Hammarlund, Kodel, Silver-Marshall, Abox, Yaxley, Bodine, Ceco—40%. Prepaid. Our weekly data sheets give more "dope" than all radio magazines combined. Twenty weeks—$1.00, 52 weeks—$2.50. Over two pounds, catalog, data, circuits, prepaid—25c. Fred Luther Kline, Kent, Ohio. (Established 1920.)

AS Christmas gifts A.R.R.L. sweater and station emblems are ideal. They are yellow and black diamond 5"x8" with felt letters and embroidered symbol. Price $1.00. Same emblem mounted on yellow felt background 6"x10", suitable for framing, price $1.50. These improve the appearance of any station. C.O.D. 15 cents. Eric Robinson, Jefferson Road, Webster Groves, Missouri.

275 VOLT new generators give up to 500 volts at 120 watts, $8. 500 cycle new motor-generator 120 volts dc drive ½ and 1 kw. Crocker-Wheeler, ½ kw navy spark sets, navy power units, ½ kw 500 cycle gas engine drive. 5 kw navy 500 cycle motor-generator, 500 cycle transformers, Dubilier mica 12000 volt spark condensers, $15. 6 volt input dynamotor, output 400 volts at 200 watts $15, used 500 cycle generators, 200 watt $10. ½ kw $15. Phone Havemeyer, 3577-W, R. Wood, 46-20 102nd St., Corona, N. Y.

You will miss it, "if you miss it". So send for your copy of our new fully illustrated catalogue. Contains those items you look so long to get. Foreign orders solicited. Harris, 5RM, 104 East 10th St., Fort Worth, Texas.

FOR sale—Gross type "A" two tube short wave receiver with 80 meter coil $12. Also parts and books. W. Nangle 949 Lake Street, Oak Park, Ill.

GENUINE RCA UX201 As, $1.19, UX210s, $6.90; imported 10 watters, $4.90; Fifties, $9.00; UX200s, $1.50. Power filament transformers, Silver Marshall, for UX210s, $6.25, transformers, Silver Marshall, for UX210s, $6.25, for UV203As, $9.00. 30H, 100 mil chokes, $2.50, 30H, 150 mil, $4.75. Milliammeters, 0-100, $2.00; 0-300, $3.00; 0-400, $3.25. Completely assembled, all bands receivers, $18.00. Transmitters, $26.00. Kenetrons, $2.05. 150 watt, 500 volt motor generators, $25.00. Grid leaks for fifties, $1.84. Rectifier elements, aluminum, lead, pair 1"x4", 7c; 1"x6", 10c. Calibrated wavemeters, 17-160M, $5.00. QSL cards, $1.00 per 100, two colors. Free samples Radio catalog free. Terms, cash or COD. William Green, 207 Cathedral Parkway, N. Y. C.

Wanted: Western Electric broadcasting microphone; G.R. 231M microphone transformer. Edward Fanley, 235 Buttles, Columbus, Ohio.

QSL hams; neat and appreciative cards. Reasonable and clean cut. Samples on request. 1NQ, 206 Metropolitan Ave., Roslindale, Mass.

HERE'S a bargain you've been looking for. ReadRite 0-10 A.C. voltmeter $1.50, 0-25 D.C. milliammeter $1. Postage 10c. 8RNB, Waterville, Ohio.

FACTORY made, guaranteed forty meter transmitter equipped, thirty-eight fifty. Excellent values receivers, etc. Roger Curran, Dundee, N. Y.

COPPER ribbon 3/16 in., 1c per turn. Herrick Brown, Greenville, Tennessee.

ARE you tired of ordering from concerns who substitute cut prices and rotten service for good merchandise and quick deliveries? Try us and note the difference! A new "Hamalog", the original Ham Catalog is waiting for you, free. See our new Transmitting Filter Condensers advertised this issue. They'll stand up where others fail. Order DeForest transmitting and receiving tubes from us —we ship quickly. Latest Amateur Call Book 75c. Our No. 20 Stand-off Insulator, 20c—use it for supporting wiring and instruments, etc. Get details of our Silver Plated Short Wave Inductances. E. F. Johnson, 9ALD, Waseca, Minnesota.

POSITIVELY for this month only—as our Xmas gift to the amateur we are offering the well-known Aero short wave coil kits at a special price of $7.97. Order now. These bargains also. RCA UV202 five watters $2.25 each. Thordarson chokes 30 henry 85 mils $4.30. General Radio Amateur Wavemeters type 358 $19.75. National transmitting condensers 17 plate, only $7.40. Karas Harmonic AF transformers $4.75. Acme 800 volt condensers 2 mfd. $3.25. All items prepaid. Please remit by check or money order. Send for our catalog of amateur radio apparatus. B. C. Mitchell, 3520 Sheridan Rd., Chicago, Ill.

HELP pay Santa. RCA UP1654 fifty henry choke, 300 milliampers, $8; UP1626 thirty henry 160 milliamperes, $6; RCA fifty watt sockets, $1.50; UP1658 ten volt filament transformer, 150 watt, $7.50; UP1656 7.5 volt filament transformer, 75 watt, $5; UM578 500 volt DC voltmeter, $6.50; RCA OT clips, 20c; UL1655 rf choke coil, $1; Signal antenna switch, $1; Western Electric 284W microphone with desk stand, $5; UV202 five watter, $1.50; all used but in fine condition. 2 AHO, W. M. Derrick, 80 Leslie St., East Orange, N. J.

10000 VOLT 5 kw transformer $35, super sync used on above transformer, $35, 3000 volt transformer, one k.w. $10, 50 henry choke one amp. capacity $5, 12 volt ½ k.w. filament transformer, $5. H. Siebens, 2802 Olive Street, St. Louis, Mo.

AM going to higher power. Have Heintz and Kaufman Bumblebee transmitter, complete, practically new, for sale, including 900 cycle motor generator. What am I bid? Write Jack Kaufman, 55 Forest Ave., San Anselmo, Calif. 6DZ.

SELL—cabineted panel transmitter complete with built-in direct current power supply. Fifty to two-fifty watts output on 20-40-75-150 meter bands. Plug-in inductance provided for use under 40 meters. An exceptional value at a bargain, $190.00. 9FX (ex) 9BSH Cape Girardeau, Mo. A. B. Jordan.

SELLING out—complete low-wave transmitter and receiver. Send for particulars. 1ADP, H. K. MacKechnie, 14 Upland Road, Cambridge, Mass.

FOR sale—Surplus transmitting and receiving parts, including 1500 v 600 watt Esco generator. All items first class condition. Write for list, etc. Robert W. Thielke, Radio 9BZI, Ackley, Iowa.

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. Jacobson, 535 West 135th St., New York City, 2AHE.

BUY at Ben's—Save on everything you need for your amateur, broadcast transmitting requirements. Complete 10-110 meter short wave receiving kit $21.00. R.E.L. 40 meter OTS—$4.75; pr. $9.50 with rods. Copper 40 meter OTS—$2.50; pr. $4.50; 0-10 volt A.C. Volt-meter—$4.95; 0-50 Milliammeter—$2.69; Black Vernier dial 35c, pr. 60c; Kellogg 11 plate condenser and dial 45c. 18 in. Electrose Insulators—$0.50. 110V A.C. motors 1800 RPM about 1-20 HP—$4.95. All meters at a saving. Write for prices on Radio Transmitting Apparatus. P. P. extra. Ben Wolf—228 Tremont St.—70 Stuart St., Boston, Mass. See Ben in Boston.

Q R A SECTION

50c straight with copy in following address form only:

1BNS—Witoldo Bakanowsky, Box 1227, Jewett City, Conn.

1BR—M. G. McCarroll, 32 Laurel Ave., Wellesley Hills, Mass.

1WV—Miles W. Weeks, 40 Norfolk Road, Brookline, Mass.

3HL—Edward N. Dingley, Jr., 3715 Livingston St., N. W., Washington, D. C.

3KP—4828 N. W. 16th Street, Washington, D. C.

4ADI—John Anderson Brabson, Westerly, Greeneville, Tennessee.

4DP—49 West 4th Street, Atlanta, Georgia.

4ES—455 N. E. 28th St., Miami, Fla.

6DSG—M. F. Sterling, 316 Oak Street, Ventura, Calif.

6XAS—P. M. Hayes, C. C. Radio Labs., 6716 Washington Blvd., Culver City, Calif.

8BJX—Celeste Yob, 163 W. Main Street, Massillon, Ohio.

8CWK—F. Kelwin Kearney, 16580 Outer Drive, Detroit, Michigan.

8RD—C. H. Vincent, Packard Motor Speedway, Utica, Michigan.

eg5ML—F. W. Miles, Royal, Beechwood Ave., Coventry, England.

nc3AP—G. H. Hardy, Lambeth, Ontario, Canada.

oa3CP—C. I. Patterson, 82 Burke Road, East Malvern, Victoria, Australia.

The following stations belong to members of the A.R.R.L. Headquarters gang. Mail for them should be addressed care A.R.R.L., Hartford, Conn. When operating 1MK they use personal sines as indicated.

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1AL H. P. Westman "ws"	1ES A. A. Hebert "ah"
1BAO R. S. Kruse "lq"	1GO L. A. Jones "lj"
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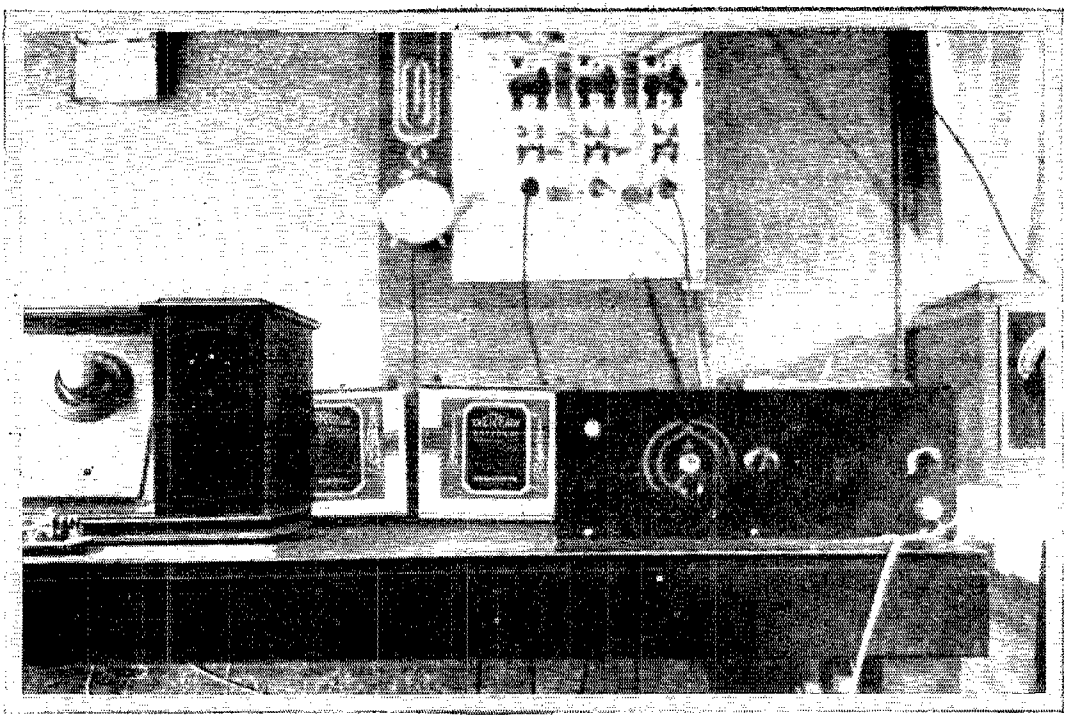
1BIZ C. C. Rodimon "rod"	1SZ C. C. Rodimon "rod"

FOR YOUR CONVENIENCE
QST'S INDEX OF ADVERTISERS IN THIS ISSUE



It's not the bottle but the *kind of juice* that counts

USING a UX-199 tube as an oscillator with Eveready No. 770 Heavy-Duty "B" Batteries for plate power, H. A. Mackley, 9 LF, Peoria, Ill., has done some remarkable work. "Daylight communication has been held with the 5th and 6th District, New Mexico and California, on the south and west," he says, "and with the 1st and 3rd on the east." In this and in more severe tests, the 770's "stood up exceptionally well and the curve was very flat during the first 200 hours' use. I can heartily recommend Eveready batteries, especially the 770 and the Layerbilt, for amateur use on up to 5-watt tubes. If some of the amateurs would try to perfect their apparatus instead of crowding some of the 50-watt bottles to the limit, they would get remarkable distance with a 201-A or a 5-watter." Eveready "B" Batteries produce pure DC only, which is why they are the preferred source of plate power not only for short wave work, but also for BCL receivers.

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Tuesday night is Eveready Hour Night—9 P. M., Eastern Standard Time, through the WEAF network.

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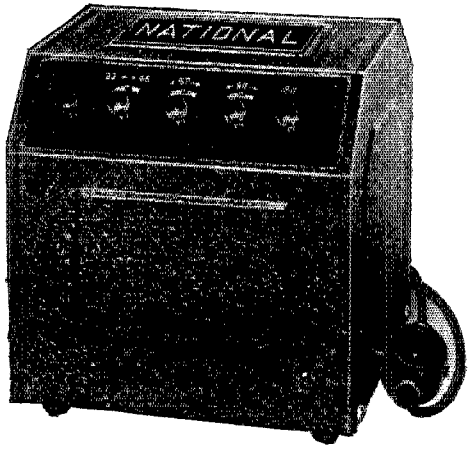

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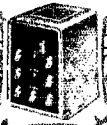
FOR BETTER TONE AND SPEAKER PROTECTION



FILAMENT TRANSFORMER
NO. 124 FOR THE NEW A.C. TUBES

THE ORIGINAL VELVET VERNIER DIAL TYPE A

POWER TRANSFORMER FOR PLATE SUPPLY UNITS

R-26 BATTERY-CHARGER
2½ TO 5 AMPERES

IMPEDAFORMER
FOR QUALITY AUDIO

ILLUMINATED VELVET VERNIER DIAL TYPE C

FILTER CHOKES
TYPE 80

NATIONAL-B

Type 7180 — A "B" That's Built for Service

A Strictly Heavy-Duty Power-Unit Supplying

Detector Voltages 22 to 45 adjustable

R. F. Voltages 50 to 75 adjustable

A. F. Voltages 90 to 135 adjustable

Power Tube Voltage 180 fixed

Protects Tubes, Condensers against excessive and harmful voltages. Designed for lasting service with liberal factors of safety.

Rating

Output rating is 70 mils at 180 volts. Uses R. C. A. UX 280 or Cunningham CX 380 Rectifying Tube.

Licensed Under Patents of Radio Corporation of America and Associated Companies. For 110-120 volts, 50-60 cycles A. C. only.

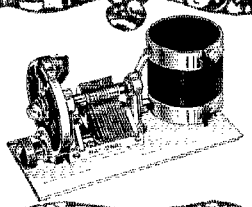
List Price with Cord, Switch and Plug $40.00. Rectifier Tube $5.00.

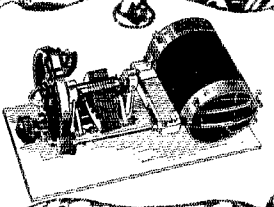
Write National Co. Inc., W. A. Ready, Pres., Malden, Mass., for new Bulletin 124.

NATIONAL POWER TRANSFORMERS and FILTER CHOKES for AMPLIFIERS

Specified generally. Transformer Type R, center tapped 600 v. secondary, Price $12.50. Transformer Type U, both 600 and 460 v. secondary $14.50.

NATIONAL FILTER CHOKES - per pair in heavy case - Type 80, $10.00





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More National Tuning Units have been used by set builders than all other similar components combined.

Standard since 1923 — *Approved By* — The OFFICIAL Design

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SUPER-SENSITIVE

INDUCTANCE UNITS

The Perfect Inductances for All Low Wave Work

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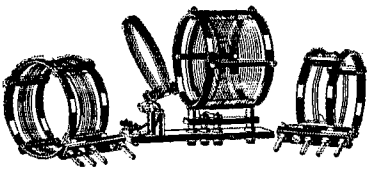
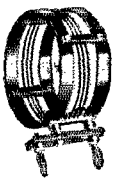
AERO LOW WAVE TUNER KIT — Price $12.50

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

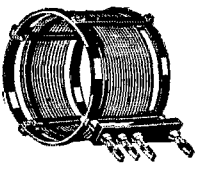
Range 13 to 29.4 meters. This is the most efficient inductance for this low band. Code number INT-0.

Price $4.00

INTERCHANGEABLE Coil No. 4

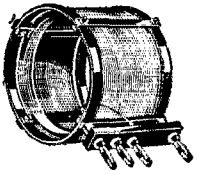
Range 125 to 250 meters. Fits same base supplied with low tuner kit. Code number INT-No. 4.

Price $4.00



THE NEW AERO INTERCHANGEABLE COIL No. 5

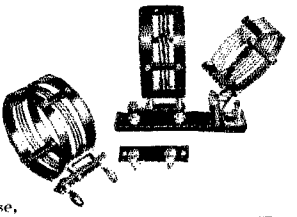
Normal range 235 to 550 meters. However, by using .0001 Sangamo fixed condenser across the rotor and stator of the .00014 variable condenser, the maximum wave band of this coil is increased to 725 meters. This gives you coverage of the following bands: Airplane to Airplane, Land to Airplane, Ship to Shore (Great Lakes) Ship to Shore (Atlantic and Pacific Oceans). Code number INT-No. 5. Price $4.00



FOR TRANSMITTING

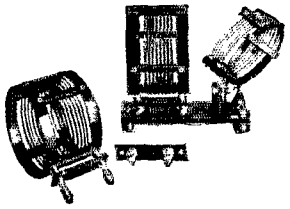
KEY 2040 KIT — Price $12.00

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.



KEY 9018 KIT — **Price $12.00**

Completely interchangeable with either of above kits. Range 90 to 180 meters. Contains 2 coils and mounting base.

COMPLETE AERO TRANSMITTER KITS

Complete Aero Transmitting Coils for the 20-40 and 40-80 bands, $20.00. Complete for 20-40, 40-80, and 90-180 bands, $28.00.

AERO PARTS

Transmitter coils (17 to 50 meters, Key 2040C, 36 to 90 meters, Key 4080C and 90 to 180 meters, Key 9018C) **$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.**

RADIO MANUFACTURERS ASSOCIATION — RMA MEMBER

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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.**

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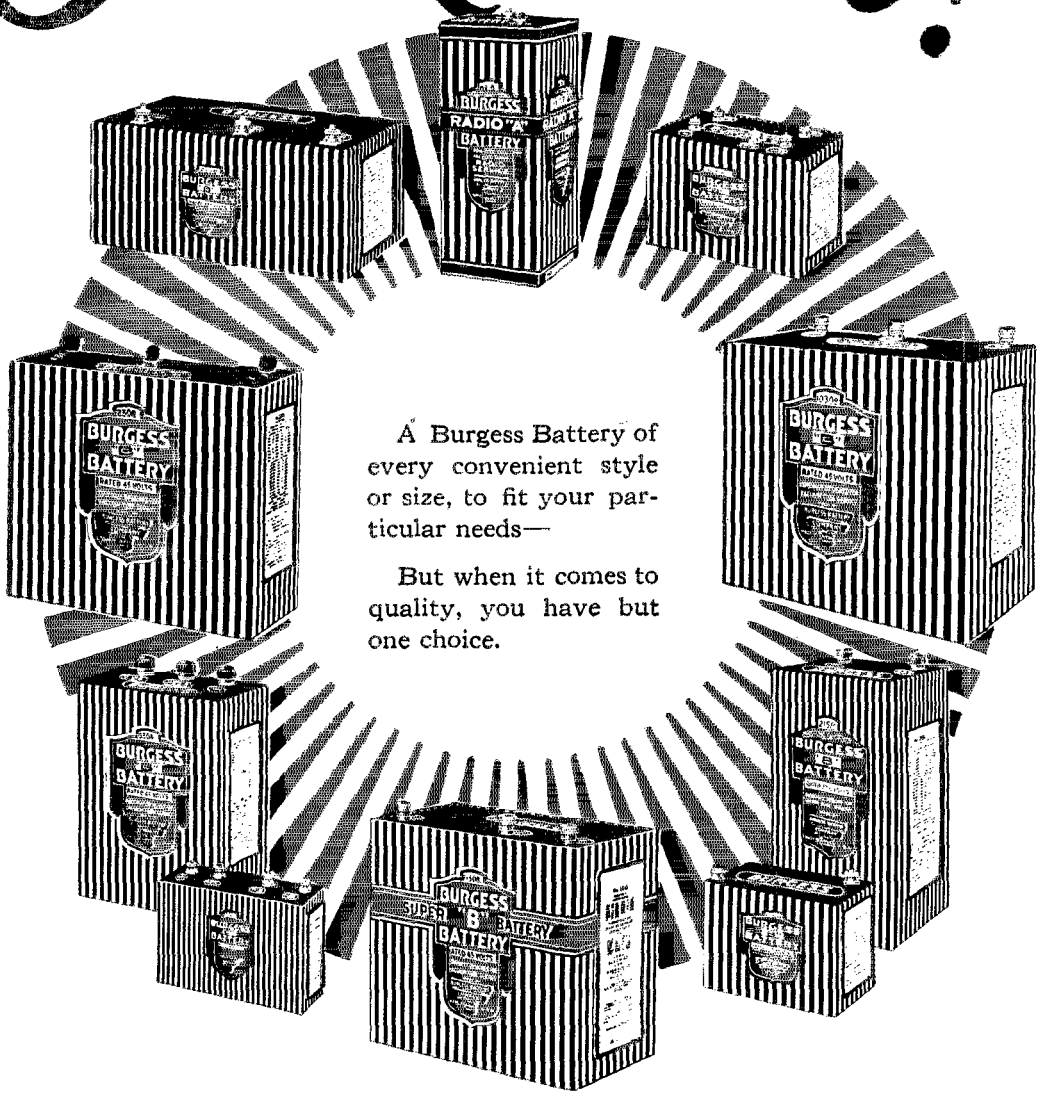


A Burgess Battery of every convenient style or size, to fit your particular needs—

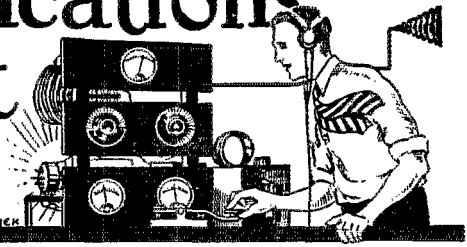
But when it comes to quality, you have but one choice.

"Ask any Radio Engineer"

BURGESS BATTERY COMPANY
MADISON, WISCONSIN

The Communications Department

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



Break-In

By O. W. Viers, 7AAT*

HERE is a little instance that happened at my station a short time ago. Break-in played an important part. I was working an eastern station whose sigs were steady and R7. The operator reported my signals the same. Fortunately both of us were able to use break-in. When the operator started to QSZ (repeat words twice) and QRS (send slowly) I immediately broke saying "BK PSE QRQ SINGLE" (send faster, words once). This was received OK and the station complied with my request. We had a fine time after that. Bk-in is certainly THE thing for traffic handling.

It is not usually necessary to QSZ and QRS when a fellow is above R5. I do not believe that one should ever QSZ unless requested to by the other op. One might even try a QRS first because if signals are only R3, a QRQ and QSZ may make things worse. QRS in this case.

Let me add another word about break-in, 9BRR and I have a daily schedule with signals usually R7 at each end. We both use break-in and when either loses a word in a message, a tap of the key and the sending of just the last word correctly received starts the transmitting operator off again at the usual 25-to-35-word-per-minute clip. Just listen to 9BRR and 7AAT using bk-in some night and see if you aren't convinced that it's a pretty good thing to save time and patience. Write me for dope on putting in a simple bk-in system without using change-over switches, relays or remote control.

*S.C.M. Montana, Northwestern Division, A.R.R.L., Red Lodge, Montana.

"Z" Signals

A NUMBER of the gang has asked the meanings of the abbreviations used at RCA commercial stations—two-letter abbreviations following the letter Z. The meanings are entirely different from the Z signals used by the Navy Department. By definition some of the RCA Z signals vary just a shade from some of the familiar Q Signals. A few examples of the RCA Z signals may be of interest to those who have copied 'em.

ZAN We can receive absolutely nothing.
ZAP Please acknowledge.
ZSH Strong static here.
ZHC How are your receiving conditions?
ZSA Stop automatic traffic.
ZRO Are you receiving OK?
ZHA What are conditions for automatic reception?
ZOK We are receiving OK (at maximum speed).
ZNG Conditions are unfavorable for code reception.
ZWR Your signals are weak but readable.
ZMR Your signals are moderately strong and readable.
ZSR Your signals are strong and readable.
ZSU Your signals are unreadable.
ZWO Send words once.
ZWT Send words twice.
ZLS Lightning storm here.
ZSJ Stop automatic traffic because of jamming.
ZMQ Stand by for a moment.
ZTA Send traffic automatically.
ZNN Clear of traffic.

Radio Show Stations

ONE of the most useful things an amateur can do for his fraternity is to place himself in front of the people of his community. Installing and operating an ARRL booth and station at Radio Shows is one of the several seasonal activities which, if handled properly, will make a good name for the amateur. During the past few months many such affairs have been conducted, and this article is an attempt to describe those on which information has been received. Many good suggestions for the operation of future stations and booths will be found in these descriptions.

THE A.R.R.L. BOOTH-STATION 7DR AT GRAYS HARBOR COUNTY FAIR, ELMA, WASHINGTON (SEPT. 1-5)

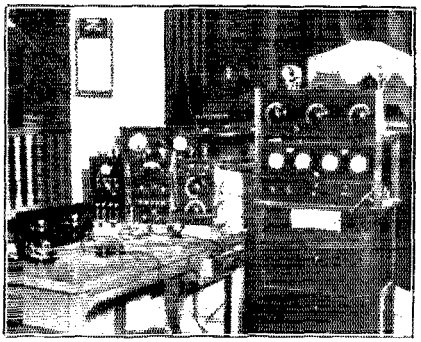
Note the radiogram blanks on the table with pencils and copies of *QST* fastened to the edge of the table so they might be read without being taken from the booth. Break-in was used with a receiving antenna six feet above the floor and twenty feet long.

One of the accompanying photos pictures the booth installed at the Grays Harbor County Fair at Elma, Wash., by 7DI, 7NO, and 7BM. These three men worked hard, and succeeded in attracting a great deal of favorable attention, both on the part of the people at the show, and the various county newspapers. The station collected a goodly number of messages, and worked very good dx, considering the unfavorable antenna and QRM conditions.

At the Los Angeles Radio Show, two booths were installed, one by the Los Angeles Radio Club, and one by 6BJX and 6BXD. In the Radio Club's booth, which was installed by 6CMS and 6BRO, a storage battery *dc* transmitter was operating on phone entirely, under the call of 6WH. Hundreds of messages were transmitted to 6BRO, who relayed them on from his own station. 6BJX and his friend, 6BXD, expended a great deal of time and energy in installing their booth, but were rewarded by having a great deal of fun together with one of the most popular booths at the show. The station operated under the call 6CVE, and handled a great many messages from famous people. After the show, a banquet was held, at which many interesting talks were enjoyed. The program was in charge of 6AVJ, 6BJX, and 6CHZ. The *Pasadena Star-News* mentions another booth at the show, run by the Pasadena Short Wave Club, on which we have no further information.

Over a thousand messages were handled from the New Orleans Radio Show through 5GR, the station installed there by hams of that section of the country. The booth was continually crowded, and the transmitter was kept in operation nearly 24 hours daily, thanks to the good work of 5PK, 5UK, 5KH, 5ASE, 5ABA, 5LA, 5QJ, 5UT, and 5PM.

The Sacramento Valley Amateur Radio Club installed a booth and station at the California State Fair. An operator was on duty at all times during the fair, and 388 messages were handled. The display attracted a great deal of attention, and considerable publicity was gained for the club, the ARRL, and amateur radio in general.



THE 50-WATT TRANSMITTER AND 7½-WATT PHONE SET INSTALLED AT THE CALIFORNIA STATE FAIR AT SACRAMENTO BY THE SACRAMENTO VALLEY AMATEUR RADIO CLUB

Thousands of people, including hams from every district and almost every country visited the booth installed at the Radio World's Fair in New York City. A fifty watt crystal-controlled transmitter, loaned by 2AMJ, was installed, and operated as 2JA, on 37.88 meters. 2AMJ, 2EV, 2BW, 2PF, 2TI, 2FZ, 2ARM, 2IK, 2BAL, and 2APV deserve special credit for their work in connection with installing the booth and operating the station. Other members of the Bronx and Brooklyn Radio Clubs helped. A novel publicity stunt tried during the fair was the equipping of an Army truck with a powerful search-light and a transmitting station on a wavelength of 50.4 meters, using the call 2XAY. This truck toured the important parts of the city, and attracted a great deal of attention. Signs telling about the ARRL and the show were carried.

The OBP booth at the Kansas City Radio Show seemed to be the main attraction, judging from the crowds that were continually flocking around it. A station was set up, and messages were handled for the visitors. The boys received a letter from the management of the show complimenting them on the exhibit. At the close of the show a good old hamfest was enjoyed by the gang.

At the Toronto Radio Show, the local ham club had a booth which, as usual, proved to be the premier attraction. The feature at the booth was a two meter beam transmitter which actually worked, together with a duplicate antenna and reflector system as a receiver, which used a low reading RF ammeter as an indicator. The demonstration was a huge success, and the credit for making the outfit work goes to nc3EL, 3BL, and 3CG. A low power short wave outfit was also on the air with the call nc3AL, on 41 meters.

An old spark set, nc2BM's phone outfit, and a guessing contest were the attractions that drew the crowds to the booth at the Quebec Radio Show. A considerable amount of traffic was handled by nc2BR and 2BB, and the educational department was conducted by 2HV. Many prospective hams were supplied with information. As was to be expected, the exhibit was a full success.

—*L. A. J.*

The Utah Amateur Radio Club installed a booth and station at the recent Utah State Fair, and a lot of attention was attracted to the amateur. Several new club members were obtained, and amateur radio was explained to the many interested visitors.

Th amateurs of Chicago were represented at the Chicago Radio Show with interesting displays in two booths which were donated by the management of the show.

During the San Diego County Fair, a short wave station was installed by the Silver Gate Radio Club. Under the supervision of 6AJM, the booth proved a huge success.

TRAFFIC BRIEFS

The Milwaukee Radio Amateur's Club is again sponsoring a code class, and about 20 pupils are taking advantage of the instruction. 9DTK conducts the class every Thursday from 7:30 to 8 PM. As soon as the class is far enough advanced, a local ham station will go on the air with daily code practice. This is a good idea for any clubs who wish to build up a solid membership.

The Cleveland Wireless Association also reports starting a code class, as many inquiries have been received from those wishing to learn the code. Beginning amateurs in the vicinity of Cleveland and Milwaukee cannot do better than to get in touch with these live organizations.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
5GR	819	15	841	1675
op1HR	139	121	244	504
8EU	44	73	368	485
3CFG	43	30	300	373
8DBM	39	34	293	366
9LV	19	50	282	351
8CMO	17	4	306	327
9BWN	23	18	286	321
9DXZ	15	55	248	318
8GI	15	20	282	317
9ENC	310	—	—	310
9SO	166	53	88	307
9CZC	5	7	268	290
8AVK	23	20	234	277
9BAT	47	4	217	268
6BVY	71	193	—	264
6BJX	95	156	20	261
9DWN	14	14	227	255
9DLD	25	42	184	251
1FL	52	37	159	248
8BAU	54	19	174	247
3AWT	31	43	168	242
1AKS	27	12	202	241
9BKV	29	17	186	232
1MK	65	62	100	227
1APL	9	21	195	225
3QY	71	20	124	215
1BIG	10	48	150	208
9BVF	50	12	129	201
6AMM	44	51	8	103

In spite of the increased B.P.L. requirements a big group of the *real* traffic men qualified their stations for special mention. 5GR (New Orleans Radio Show) rated first place. By the usual consistent work op1HR and 8EU came next at the head of the column. 6AMM is the only station using the "50 delivered" as basis for B.P.L. membership. The reason it was only 50 was that he spent some time after the San Diego convention pounding 'em out at 6BJX.

If you didn't note the new B.P.L. policy mentioned in these columns last month look it up again. 200 messages handled in all or just 50 *deliveries* will put you on the honor roll. Deliveries count—unless a message is delivered it might just as well never have been originated. The new requirements are designed especially to encourage deliveries. If it is apparent that a message is going to hang on the hook more than 48 hours be sure to mail it to the addressee and score one in the delivery column. A speedy QSR will net you two points toward a total. Schedules with picked reliable stations only taking a short while each day will put you over the top. Why not make a bunch of good ones, OM?

WNP

A MESSAGE from operator Himoe to A.R.R.L. Headquarters (via 1SZ) dated November 1, brings all the latest communication news from the Arctic. The *Bowdoin* is now in winter quarters at Anatalok Bay, Labrador. It is hoped that one more boat will call at Nain bringing a new oil supply from civilization so that it will not be necessary to curtail full operation and forego radio contact. Himoe has a fine record for the number of stations worked this month. Here is the message:

"Greetings. WNP perking as usual. Message total for October, total 303 (191 sent. 112 rec'd). Twenty meters was used almost exclusively for traffic handling. Best QSO was with 1SZ who was worked 27 times during the month. 1FL was worked 14 times and 9AFA 23 times. These three stations handled nearly all our traffic. During the latter part of the month two schedules a day, morning and evening, were kept with 1SZ and 9AFA. One daily schedule with 1FL accounts for his small number of QSOs. One afternoon during QSO with 1FL enough traffic was moved to amount to 435 dollars 67 cents commercial rate. Am now starting to use thirty-two meters in evenings so it will be ready in case 20-meters goes bad. Calls worked during October are as follows:

TWENTY METERS

1ACH, 1AIT, 1AKZ, 1AMU, 1ASF, 1AWE, 1BAT, 1BQ, 1BVL, 1BXM, 1BYV, 1BW, 1CD, 1CFO, 1DM, 1FL, 1NF, 1SW, 1SZ, 2AIU, 2ATF, 2BCW, 2BEV, 2KV, 2TP, 2VI, 2VW, 3ADM, 3AKW, 3ANK, 3CAQ, 3HI, 3JM, 3LQ, 3MV, 4DV, 5DQ, 5JR, 5ZAV, 6AAK, 6COL, 6CYX, 6VZ, 7OR, 7OU, 8AHC, 8AJN, 8AOP, 8ASK, 8AVB, 8AVD, 8AXA, 8AYU, 8CAM, 8CFR, 8CJV, 8CMO, 8CUG, 8CVJ, 8DHX, 8DJV, 8DLD, 8DMX, 8MQ, 8RE, 9AAO, 9AFA, 9AJI, 9AXF, 9BAF, 9BZI, 9CE, 9CEI, 9CMV, 9CU, 9CUH, 9DFJ, 9DIJ, 9DRD, 9DWE, 9DWS, 9EF, 9EFH, 9EK, 9KV, 9SA, gw1SB, gi2IT, eg2AO, eg5ML, g5BY, eb4CB, nc1CO, nc1BY, ef8CT, nc2AL, nc4CP, foA3Z, eg6VP, saDA9, ef8PX, ef8CL, nc3GG, nc3QS, eb4WW.

THIRTY TO FORTY METERS

2HC, 3ACF, 3PF, 3QE, 6AM, 8BRF, 8CAU, 8CKC, 8DNE, 8JQ, 9ADG, 9AEX, 9CNB, 9CVY, 9CXC, 9UZ, ef8ZB, ef8EO, xedOIK. Best regards to all. Himoe, WNP."

In addition to the fine list of stations worked WNP was heard just about everywhere. de0313 (Deutschland), de0362, brs 26 (England), g5RS, g5LY, g6VP and W. W. Crabbe, 25, Leighton Rd., West Ealing, London, Eng., reported reception of WNP's signals to Himoe by sending a QSL-card through A.R.R.L. Headquarters—not to mention the other reports which poured in from every station worked.

Early in October KFLF was reported QSA in Chicago by 9UX. np4KD heard KFLF (the yacht *Ripple*, Operator L. E. Smith, 6BUR) working nu3BQZ. KFLF was using 32.5 meters and had a 500 cycle note.

ARMY-AMATEUR NOTES

SECOND CORPS AREA—The new short wave transmitter at 2SC, the N.C.S., was placed in operation on the eighty meter band with good results. Considerable effort was made toward putting the AA nets on a working basis after the summer slump. All army Amateurs have been requested to re-submit applications, giving complete data of their station.

EIGHTH CORPS AREA—5AIN, the N.C.S., has been having good communication with other amateur stations, but no official messages were handled. Activity has been light in this area.

OFFICIAL BROADCASTING STATION

Changes and Additions
(Local Standard Time)

1BIL (76) (84) 7 pm Tues., 6:30 pm Sat.; 9DQN (41) 11 pm Mon., Wed., Fri.; 9CJQ (80) Mon., Wed., Fri., 6:30 pm; 4MS (39.7) Mon., Wed., Fri., 6:00 pm.

TRAFFIC BRIEFS

Look for eg5AT on 45.43 meters. A nice crystal controlled job is in operation there. Incidentally, there are many other English stations to be heard in the neighborhood of 43-45 meters. Why not take a crack at some of 'em, fellows?

NAVY-DAY HONOR ROLL

On the evening of October twenty-seventh, seven previously announced short-wave stations sent out broadcasts concerning Navy Day. There was an unprecedented amount of interest displayed in the Navy Day program this year, as is evident from the fact that the number of reports was quadrupled over those received last year.

Now, first, let us see how the transmitting stations stack up in reliability. NAA heads the list with an apparent copiability of 81%. NRRG follows close on NAA's heels with a percentage of 73. These two stations stood out prominently above the other five, whose order is like this: NISP, NRRL, NPG, NPC, and 1AW. It may be interesting to note that NISP, the U. S. S. *Detroit*, was located at Gibraltar, and seems to have put a very good signal into most parts of this country.

Just as last year, the Navy Day Honor Roll has been made up from copies of the broadcasts sent in to Headquarters. The following ten men stand at the top of the Honor Roll, and therefore will receive a letter of commendation from the Secretary of the Navy. They are arranged in the order of high scores:

1FI.	R. A. Hilferty, Hudson, Mass.
2ZA	G. O. Milne, Clifton, N. J.
NRRL	Don Mix and F. H. Schnell, Madison, Wisc.
1ATJ	V. W. Hodge, Claremont, N. H.
9CE	T. H. Lokken, Ishpeming, Mich.
8CEO	A. W. McAuly, Oakmont, Penna.
2EB	Boyd Phelps, Jamaica, N. Y.
2EV	J. B. Kilpatrick, New York, N. Y.
8AHC	A. C. Gifford, Union Springs, N. Y.
1IP	L. E. Jacob, Manchester, N. H.

The remaining 119 stations on the Honor Roll are here also listed in the order of high scores: 2GX, 1AJK, 9DBW, 3FW, 8DME, 1BOE, 2AGQ, 3ADE, 3ZI, 9DVF, 2AFV, 9CTW, 8BKM, 8CFQ, 3CFX, 3CEB, 2BCB, 3AWT, 3CFG, 8MF, 4HZ, 8DKX, 1BDV, 8BCL, 8AXZ, 2CRB, 4IE, 9BYC, 4JR, 8BVI, 8HJ, 9DUV, 9AOK, 9CNC, 3KU, 9CNN, 8BZM, 1NP-BKQ, 6BVY, 8ARO, 8ALK, 9DAC, 9AMG, 8CVJ, 5DL, 1AIT, 1ACH, 1ANI, 1RY, 9ABL, 8OA, 8AYF, 8AVP, 9BDA, 8GL, 2APR-AWJ, 6DCH, 4LK, 1ADW, 4RN, 5APG, 1BIG, 2AVR, 4GE, 8MY, 8BAS, 1APK, 1AMC, 6APA, 6UO, 9EAM, 2CO-JX, 1ATG, 9BKX, 1ALY, 8CCS, H. Kenyon, 4TR, 9BAN, 9ABV, 9EJQ, 9BIB, 1VE, 1BFT, 8ARC, J. E. Ash, 8ARR, 6BBQ, 8JG, 4UO, 6BZU-DGS, 1NV, 6BMW, F. L. Johnson, 1AQL, NRRG, 9BEQ, 6BUF, 9AWX, 6BAJ, 2KA, 9MN, 9EHN, 8DCG, 8BFG, 4IG, 4PP, 6CHT, 1AQP, 9CIS, 6DPY, NRRQ, 2CC, 3IE, 9AIR, 6CAG, 9DYA, 8BJE*, 6CZT*, 5ADO*, D. S. Little*. It is well to mention that two unsigned reports were received, which, of course, will prevent proper credit being given to the senders.

*Received too late for inclusion in proper sequence.

With the RMs

LAST month we listed some schedules. Did any of you use them? If not, better try originating some messages this month, and route them over one of the schedules on this page. You'll be surprised at how rapidly and efficiently traffic moves in this way. Following are the daily (five times per week) schedules reported this month:

80-meter band

Claremont, N. H. 1ATJ with
Hartford, Conn. 1MK with
Cranbury, N. J. 3CFG with
1LM Chelmsford, Mass.
3AWT Phila., Pa.
3QY Phila., Pa.
8AVK Montoursville, Pa.
2AIZ Locust Valley, N. Y.
8AKC Utica, N. Y.

Trenton, N. J. 3ZI with
Wellsboro, Pa. 8BQE with
8BQE Wellsboro, Pa.
8AKC Utica, N. Y.
8ASK Elmira, N. Y.
8DIH Norwalk, Ohio
8OJ Arcadia, Pa.
3NF Easton, Pa.
8HJ Elmira, N. Y.
8TH Buffalo, N. Y.

Williamsport, Pa. 8EU with
8AVK Montoursville, Pa.
3ADE Harrisburg, Pa.
8GI Ellwood City, Pa.
8BQ Hazelton, Pa.

Harrisburg, Pa. 8ADE with
8ADE Buffalo, N. Y.
8EU Williamsport, Pa.

Montoursville, Pa. 8AVK with
8EU Williamsport, Pa.
3CFG Cranbury, N. J.
3AWT Phila., Pa.

Milwaukee, Wis. 9DKT with
9DLQ Hartford, Wis.
9DXZ Chicago, Ill.

9LV with
9DLD Jefferson, Wis.
9GE Cicero, Ill.

Jefferson, Wis. 9DLD with
9LV Milwaukee, Wis.
9DLQ Hartford, Wis.

Oto, Iowa. 9DEA with
9BKV Akron, Ia.

Akron, Ia. 9BKV with
9CZC Blencoe, Ia.
9DEA Oto, Ia.
9DWN Pierre, S. D.
9DGR Huron, S. D.

40-meter band
Westerly, R. I. 1BVB with
1BQD Newport, R. I.

Wellsboro, Pa. 8BQE with
3FP Wilmington, Del.

Tampa, Fla. 4BN with
4KY Atlanta, Ga.

MiMlwaukee, Wis. 9DTK with
9EK Madison, Wis.

Hartford, Wis. 9DLQ with
9BJY Racine, Wis.

Racine, Wis. 9BJY with
9AVG Kenosha, Wis.

Denver, Colo. 9CAA with
6CLQ Salt Lake Cy U.

San Diego, Calif. 6BWI with
6COT Los Angeles, Calif.
6BTS Los Angeles, Calif.

6AJM with
6JZ Santa Barbara, Calif.
6RJ Oakland, Calif.

6DAU with
6BBN Los Angeles, Calif.

20-meter band
Albuquerque, N. Mex. 5BH with
5ARA Louann, Ark.

Providence, R. I. 1AWE with
ef8FD Orleans, France.
9EFC Milwaukee, Wis.

Hartford, Conn. 1SZ with WNP Anatalok Bay, Lab.
9EFH Newton, Iowa

That seems to be all—and remember, these schedules are being kept for the purpose of handling traffic, so all you ORS see that they get some. We cannot have big totals and lots of traffic if we don't originate our share.

—*L. A. J.*

TRAFFIC BRIEFS

The Chicago Traffic Ass'n tells us that all amateurs who are A.R.R.L. members and who reside in Illinois are eligible in the WNP contact contest, for which suitable trophies will be awarded to the amateur handling the most WNP traffic.

Code classes for prospective hams are being organized by the South Jersey Radio Association. Anyone interested in these or in radio from any angle are cordially invited to get in touch with the secretary, C. H. Jenkins, 617 Third Ave., Audubon, N. J. for information on the place where classes and meetings will be held pending completion of the new club house.

Deliveries count—unless a message is delivered it might just as well never have been originated. The new requirements are designed especially to encourage deliveries. If it is apparent that a message is going to hang on the hook more than 48 hours be sure to mail it to the addressee and score one in the delivery column. A speedy QSR will net you two points toward a total. Schedules with picked reliable stations taking only a short while each day will put you over the top. Why not make a bunch of good ones, OM?

20-METER REPORTS

9CEI (Michigan, N. D.), "Was QSO ek4DBA for two hours afternoon of Oct. 18—my 20-meter sigs R7 and has his R5. His QRA is ek4DBA, Fagien Exerzierplatzstr 3, Prussia."

9CN (A.C.A., Chicago, Ill.), "oz2XA reports 20-meter signals from the U.S.A. QRZ in N. Z. However, he has been keeping a schedule with eb4RS on that wave at 0745 Greenwich."

1BYV (Framingham Center, Mass.), "This sudden change in the weather (Oct. 22) has put the real old kick into 20-m sigs. Working foA3Z every noon and on Oct. 20 QSO for two hours, sigs R5 each way. foA3Z describes '20' as 'very very fine business'! foA8P and fqOCDL are also knocking the cans up in these parts. Am filling 9CEI's sked at 7 pm with nr2FG until he gets set up at new QRA. Worked nm9A on '20' and his QRA is Carlos Cosio, 50 Daigave Ave., Queretaro, Mexico. Have worked 31 countries on '20' with my 60 watts input. Made a sked with ai2KT for Sun am and hope to have six continents to my credit soon."

8DJV (Cleveland, Ohio), "Am all het up about working fqOCDL Oct. 31 on 20-meters. Have I put one over on 1BYV or has he been QSO too? Hi! Hooked foA3Z, R5, RAC, 21.2 meters at 5:30 pm EST Oct. 22 and am wondering if any other 8's are getting there. Hw?"

8CFL (Columbus, Ohio by radio via 1FL), "Twenty meters sure FB. For those hams who expect a hard job getting their sets on 20-meters let me say that most sets work easier on 20 than on 40. Let's have more try 20-meters!"

WVC-9CKK (Fort Leavenworth, Kan.), "We start on 20-meters at 8 am and keep up until 9 or 10 pm working WVY in Frisco, WVB Fort Sam Houston Tex., and WVX Fort Douglas, Utah with the bug. Handle ¾ of our traffic on that wave. At about 10 pm when 23-m fades to Washington D. C. we swap to 46-m. We handle nearly 800 messages a day and have about ten operators working. 20-meters is great—the only wave we can use in a storm. Lightning doesn't affect it half as much as 33 or 46 and we can work even when conditions are so bad the antenna series condenser flashes over intermittently. Hoping more of the boys will shift to 20 and try a REAL band looking forward to QSO with them. Visitors are welcome at WVC any time, day or night. Come one, come all."

(Mr. Forest F. Redfern, 255 Hull St., Brooklyn, N. Y.), "The freak existing on 20-meters from 6.20 to 9 pm EST Oct. 30 and tests made then should be important. It was not as far as known caused by a weather condition but rather by earth currents which could not be measured with the apparatus available. We think the region of bending and angle reflection was shifted. Barometer 30.37 here (high area over inside region of skip zone); wind, 7 MPH south with disturbances over Calif where sunlight prevailed—it was cloudy there with rain in SF. There were disturbances over Western Ont. and Ireland (gales). 8's in Ohio were R8 during the afternoon with no signals from eg, ef, eb, etc. At 6.20 pm upstate stations (8ADG-Utica, N. Y.) were R8 with tendency to block tube. A strong ground wave was evident with a sky-wave intermingled making the note sound like RAC with 500-cycle modulation behind it. 8AYU and 8CDB (NY), 8ANC (Pa.) 1AJM, 1SW and 1AKZ (Mass), 1AIT (Maine and near normal skip region though), 8BTO (a NY station wkg 1CL or 1LC) and 3TN (Va. station wkg 2BCB) were noted to be equally strong in rapid succession. I worked 1ATU at 7.15 pm. His note and all the others sounded as if it was the same station, blocking the tube most of the time. X's were almost totally absent. 6AAK, 7AIJ, 5ZAV, 5AKP and the usual nines were in evidence with NORMAL signals, the 9's with bad QSS as the period for their fadeout became near. 4KM had a far away other-side-of-globe characteristic. The shift seemed to start from Maine passing gradually to Virginia as when 3TN was heard not a 1 was recorded though upstate 8's were still strong. 3QE sending on 40 and 2BCB sending on 20 and receiving on 20 were QSO which seems to be proof of ground wave if confirmed that 3QE was really on the 40-band. "Reports with other observations made on October 30 conditions are solicited for Mr. Redfern. If your log has anything unusual to offer please write him.

nc3AD (Grimsby, Ont.), "I find 20 FB when anything is on at all. Have had Puerto Rico R7 at noon and eg5SW R6 at 5.45 pm, the latter using fone on 24-meters."

eg5ML (Coventry, Eng.), "Not finding DX par-

(Continued on Page 6)

Our Section Managers

C. B. DIEHL

SCM Nebraska, started the ham game in 1924, when he graduated from the BCL ranks. He obtained the call 9BYG, and has held it ever since. He is a telegraph operator for the Missouri-Pacific Railroad.

ORVILLE W. VIERS

SCM Montana, is a 17 year old high school student, and owns 7AAT-7QT. He entered amateur radio in 1926, and has had his station in the BPL many times. 7AAT is a real ham station—always glad to chew, test, or QSR.

C. R. STEDMAN

SCM Colorado, became interested in radio along about 1920. The license of 9CAA was issued to him in 1922, and he has made the call well-known in the past five years. He has been 1st op at KFFL, a local broadcasting station, and is now a night-switchboard man for the Mountain States Telephone Co. Ray is 21 years old, unmarried, and says that radio will go on as long as he lives—a possible future wife, notwithstanding. 9DXW and 7RF are the other calls that have been used from time to time.

C. S. HOFFMAN, JR.

SCM West Va., has been in the ham game since 1916. Besides his present call, 8BSU, Mr. Hoffman has held 8QY and 8AKZ. He is a bachelor, and is an auditor for the Wheeling News Lithograph Co.

ALFRED W. KRUSE

SCM Iowa, entered amateur radio in 1922, and operates 9BKV. He has held the office of Chief RM and SCM-pro-tem as well as his present one. Farming is the occupation indulged in when not handling traffic. He expects to take up commercial radio in a year or so.

A. H. ASMUSSEN

SCM Alberta, made his first radio outfit in 1907. His present station, nc4GT is a WAC. Mr. Asmussen is 36 years old, married, and is traveling salesman for car parts, batteries, and radio.

JUNE W. GULLETT

SCM Mississippi, had his first "wireless" experience in 1914. During the war he operated in the Navy. He has also done tricks at KQE, KFSE, and WBD. June may be heard now pushing the key of 5AKP. His years number 28, and he is a Bookkeeper and Radio Trouble Shooter. He says that on account of his first name a number of hams have written him love letters, thinking him a YL, hi! And he says, "Believe me, some of the BPs are no slouches at making love!"

R. H. WRIGHT

SCM Oregon, entered amateur radio in 1922. His station, 7PP, is on the air regularly handling traffic. He is a student at present.

CLARENCE N. CRAPO

SCM Wisconsin, entered the amateur radio game in 1915 and is the holder of 9VD. During the war, he served overseas in the photographic section of the air service. Since then he has been a CM and an ADM. Mr. Crapo is 32 years old and is engaged in shoe designing.

DON C. WALLACE

SCM Los Angeles, is the holder of 6AM, 7MB, and 6MA, and previously held 6OC, 9DR, 9ZT, 9XAX, and operated at 9XI. He entered amateur radio in 1912. In commercial line, NPG, KPJ, and others were all operated by Don at one time. 9ZT won the Hoover cup in 1923, and both 9ZT and 6AM are WAC stations. Mr. Wallace is traveling factory representative for several radio and electric manufacturing concerns, and is the proud father of three Junior ops.

ticularly good on 40, it was decided to make tests on the 20-meter band. A TP-TG xmitter was adjusted for 23 meters and 1BYV answered the first call I made to 9BIL reporting R7 steady DC. An average of five nu's per night have been worked. Usually several nu's answer a test call but of course one can't work more than one at a time! 1cmf, 1rd, 1byv, 1sz, 1aba, 1bw, 1asf, 1sw, 2jn, 2jp, 2bac, 2aiu, 2cvj, 8adg, 8bki, 8cfn, 8ago, 8djv, 8axa, and WNP have been worked up to Sept. 27. NU's heard here in the evening (1800-2200 GMT) are logged with an audibility never experienced on any other wave. 20-meters is sure the 'goods'!"

eb4CB (Ostende, Belgium) by radio via 1SZ, "My sigs reach out much better on 20-meters than on 45. Have lately worked the States and So. America several times, also WNP, SJB, and OIK, a Danish ship QRD Danzig using 7 watts input that reports QSO often with the U.S.A. Have worked sb1AW regularly. Lots of U.S.A. stations and WNP are very loud. Am on 20 every evening after 2100 GCT."

2EB (Boyd Phelps, 8505 167th St., Jamaica, L. I., N. Y.), "Using 350 watts input I have kept half hour schedules with 5JR-5AOW on 19.8 meters without missing once in three weeks and have handled some test messages with fair speed. The signals are always commercial readibility copying about 25 w.p.m. (words often repeated once though occasionally single) and it is a good opportunity to check consistency and hourly variation. The signals get louder after 3 pm every day, reaching unbelieveable strength after dark here. When the sun sets here at 5:07 EST and in Houston at 6:40 EST we worked till 7:14. Every day our cut off is earlier according to the number of minutes earlier the sun sets though there is bad swinging the last 20 minutes usually. Then I have worked stations about 200 miles further west with good strength for another 20 mins when we both die. In the past two weeks I have not noticed the slightest variation in signals comparing the same hours of each day, except some swinging during a recent wind and rain storm. We will keep particular check on the 20-meter band during the five meter tests to see if the signals go dead as they were reported as doing during the last five meter test."

1BUX (Touisset, Mass.), "ai2KT says that from November to May is the best time for getting U.S. 20-meter signals over there. He will be on all winter and wants reports. Only ai2KT and ai2KX work on '20' now but 2KW and 2BG are on higher waves. Their operating hours are 1100-1900 and 2330-0200 Greenwich. HJG is the 22-meter commercial station of the Marconi company at Colombo, Ceylon. Tho 9's are weaker and west coast stations scarcer lately last week-end was better. Was QSO ne8WG (Grenfell Mission, Northwest River, Labrador) and took some traffic—also heard a few 20-meter Europeans, some South Americans and So. Africans and many U.S."

9EFK sends in a message which reads as follows: "Amateur sigs on 20 meters very scarce here lately. 3WM and I are on every Sunday from 0200 to 0400 GCT in the hopes of QSO NU. 73, (sig) Reid, oa3HR." There's your chance to QSO some Australian sigs on twenty, fellows.

NOTICE

November 5, 1927

Valid nominating petitions for Section Managers in the Montana, Washington and Eastern Mass. Sections were filed before Nov. 5, 1927. In each case a single petition was received naming a candidate for the office. As provided by our Constitution and By-Laws, when there is but one candidate named by one or more valid petitions, that candidate shall be declared elected by the Communications Manager. Messrs. Viers (7AAT), Johnson (7FD) and Battey (1UE) are herewith declared elected for the next two-year term of office, in their respective Sections. Please give your officials your cooperation in all they are attempting for *your* Section of A.R.R.L.

Due to some resignations and to vacancies in our line-up previously existing, *nominating petitions for Section Communications Managers are hereby solicited from the following Sections*

Section	Petitions to be valid must be filed on or before
Philippine	Noon, January 7, 1928
Hawaii	Noon, January 7, 1928
Eastern New York	Noon, January 7, 1928
Del.-Md.-D of C.	Noon, January 7, 1928
Alaska	Noon, January 7, 1928
Manitoba	Noon, January 7, 1928

The closing dates for receipt of nominating petitions in the Sections listed is given above either as previously announced or extended when necessary due to the failure of members in filing petitions in certain Sections. Petitions must be filed at A.R.R.L. Headquarters on or before the time announced to be valid. The proper form for nomination was shown on page 45 of April 1926 *QST*. The candidate and five signers of a nominating petition for Section Communications Manager *must* be members of the A.R.R.L. in good standing and the signatures on the petition must be authentic or the petition will be thrown out as invalid. Members are urged to take initiative immediately, filing petitions for the officials of each Section now operating under temporary officials, so that the work of organization can go forward everywhere without further delay.

—F. E. HANDY, Communications Manager.

DIVISIONAL REPORTS

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, H. M. Walleze, 8BQ—The following ORS have been QSK'd for failure to report: 3AIG, 3JJ and 3PY. These two at holders' request: 3NP and 3BLC. What's wrong with you 3's? Several new applications arrived which will help fill in but we need some more. If you know of good action stations who are not ORS, line them up. RM Hackenyos, 3AIY, went over with the N. J. gang and we will miss him very much. Morgan of 3QP, will carry on as Phila. RM so please go along with Morgan as you did with Hackenyos. Phila is in better shape than ever, so keep up the fine work, men.

3AWT always has a nice collection of news on his reports. 3QM replaced the jars with S tubes. 8AVK has the Xtal bug. 8WJ has several nice skeds working. The old 50 went soft for 8CMO but it works on 20 and 40 while NG on 80. 3AIY had the best reports in months. 3ADE sure does put them through these days. 3CDS is always on the job for traffic. 8EU is going to the dogs. YLs! Hart's kid brother is keeping 3NF in action. Things are coming better for 3BFL and skeds did it. 3VF is getting out good, too. That sore fist is still giving 3BIT trouble but he uses the left one now. A YL arrived at 8RQ's shack and QRM everything he says. Congrats. 8CW reports 8BYZ on KQH now. 3BQP is glad to be back on again. 40 meters is bringing 3BVZ some traffic now. Cool weather drove 8CGZ to warmer quarters and remote control. WNP passed a lot thru 3AKW. 1RP visited 3HH and was charmed with the low power DX down there. A new vertical antenna boosted 3AFJ's work nicely. 3QP mailed his big batch for checking and it's all good stuff. 3AIL is an op at 3LC now. 8AVL is rigging up a reflector on his 5 meter outfit. Lack of sleep don't go so well with 3AFA. Look at 3QY's dust. The cider is on tap at 3ZM joint again. So many new stations on the air has 3HD rattled. 3KN is doing well on 40. 3AKB is a new one with a fine report. 8BIR got Bucknell's football scores through to Gettysburg when WJBU could not. FB.

Traffic: 8EU 485, 8CMO 327, 3AWT 242, 3QY 215, 3ADE 140, 3QP 107, 8BQ 82, 3AFA 65, 3AIY 59, 3BFL 53, 3NF 51, 3AKW 49, 3BVZ 40, 8WJ 39, 3AFJ 35, 3BIT 34, 8CGZ 31, 3LC 30, 3HD 25, 3HH 18, 3VF 17, 3CDS 15, 3KN 15, 8AVL 14, 3BQP 11, 8CW 9, 8RQ 5, 3QM 2, 8BIR 7, 3AKB 148, 3QP 109.

WESTERN PENNSYLVANIA — SCM, G. L. Crossley, 8XE—Why did four ORS have to fail to report? That is not so bad, however, out of 32 ORS, 28 reported. The reports of some however were not so much but they at least sent in their card. I am afraid very soon that it is not going to be sufficient as the HQ gang and the SCMs in general are thinking very seriously of placing a message minimum restriction on the ORS. It may not be so good in some cases but in the long run, it will eliminate the man holding the ORS for the sake of saying he is an ORS. There are several stations being rebuilt as always, 8AJU, 8JW will be on again soon on 80 meters. 8GI is rebuilding as he goes, never shutting down for a day. 8BGW has a new transmitter with two 210s. 8BLS will have his xtal going soon. 8CSU has a new short-wave transmitter. 8ARC says his chemical rectifier is reported xtal. 8CEO replaced his sinc with a UX-281 and has plenty of capacity for

a 50 watter. 8CRK has shifted to the bottom of the 80 band because his sigs get out better. 8BRM has moved again but doesn't have room for an 80 meter antenna so he has to be content with 20. 8AMU handles his traffic on 80 with success. 8AKI is getting out very well on 80. He is looking for schedules. 8AGO is QRW traveling. 8DOQ is QRW with YLs. 8CES is QRW installing BCL sets. 8GG is learning to be an undertaker. 8CFR has a schedule with 4SA on 20 meters. 8AYH blew all his B batts and his tubes. 8VE is QRW school and says poor weather for 20 meters. 8APC is going strong on 80 meters 8DFY is having trouble with the BCLs. 8CYP reports back on duty after a summer vacation. 8GK reports poor weather for local and DX. 8BRB has been on KDO but will be home again for a couple of weeks at Xmas vacation. He has a short wave set on the ship. 8XE has now 16 ops for this year, of which 5 are new men. The station is in operation full blast. 8AGQ has a 250 watt transmitter now. This is Oakmont High School and they also have several YLs in their code classes. They have something new there, too, in the order of a H.S. traffic and news or bulletin service. They are interested in having schedules with high schools for this work. Last but not least, one of our gang has again taken the step—8ABW is married and promises that the OW will keep him home now so he will have more time at the key.

Traffic: 8GI 317, 8CEO 159, 8DOQ 137, 8XE 70, 8AKI 50, 8DFY 42, 8CFR 36, 8AMU 33, 8BGW 19, 8CYP 18, 8BRM 9, 8GK 7, 8ARC 6, 8AGO 5, 8APC 3, 8CRK 3, 8CES 1.

WESTERN NEW YORK—SCM, C. S. Taylor, 8PJ—Reports again this month show a slight increase over last month as to schedules. More stations reported and several new ORS are on file pending investigation. Our Official Observer, 8BAG, has beat it to Europe with a short wave receiver to check hams over there so don't be surprised if you are listed. 8ABG has increased his power to 250 watts with self rectification 8ADE has been doing good work recently with schedules with an increase in his traffic and worked Australia. 8CYK worked nl-3PF, and nu-9EAM. 8DDL worked WNP, Porto Rico, KEZQ (Yacht *Rohador* in Atlantic Ocean). 8DHX worked Australia and WNP. 8DME handled important press msgs. from VOQ. 8DNE handled traffic with Nicaraguan INIC, NR, NH, NQ. 8DRJ worked AP and CA and handled quite a bit of traffic. 8GJ has missed reporting due to rebuilding his station and has just started up again handling traffic. 8QB got married and has settled down with the promise of lots of traffic with his transmitter at his new home. 8TH has shown a decided increase after two year's absence. 8UL has a big report this month with schedules included. 8VW reports not being on.

Traffic: 8ADE 22, 8AHC 20, 8AYB 46, 8AYU 15, 8BCM 45, 8BFG 2, 8BGN 5, 8BLV 1, 8BMJ 32, 8CDB 84, 8CDC 23, 8CNT 44, 8CPC 10, 8CVJ 11, 8CYK 11, 8DDL 19, 8DHX 5, 8DME 59, 8DNE 56, 8DRJ 40, 8GJ 11, 8TH 19, 8UL 53.

MD-DEL-D. of C.—SCM, A. B. Goodall, 3AB—3CAB established three schedules; one with Boston in reference to the National Guard, 1st Corps Area; the second, with a destroyer off the Atlantic Coast; and the third, with a station on the Pacific Coast. 3CFX has schedules with 3ZI, 3BFL and 3QY. 3BWT reports most of operating done by "CJ". 3CGC is QRW at J.H.U. but keeps a schedule every day. 8ASO is on 42 but let's hear more about you, OM.

Traffic: 3CAB 117, 3CFX 39, 3BWT 40, 3CGC 74, 3ASO 18.

SOUTHERN NEW JERSEY—SCM, H. W. Densham, 3EH—Activity in this district is returning to normal after a dull Sept. and August. The number of stations reporting has increased and several new stations on the air have reported their traffic. 3AOC has a small R.E.L. transmitter using 201A tubes and in two days, clicked with 20 stations in seven states. Poor 3BEI has to chop down eight monstrous trees before he can string up even a 20 meter antenna. 3UT, Smith of Atlantic City, is now a student at Rensselaer Polytechnic and reports from there. 3AIE expects to be down on 20 in the near future. 3SJ reports good DX with his new UV211 and also reports two new men on the air, 3ABO and 3ALO. If any of the gang needs inspiration in getting an active station going, spend an evening with 3CFG and you'll get plenty of it. In Sept. he made 348 contacts and handled 373 msgs, including a msg of 150 words to India via England. Another high man this month is RM Raser. One of the main reasons for these totals, fellows, is the contacts maintained day in and day out on schedules. Get in touch with your RM, fellows.

Traffic: 3CBX 4, 3ZI 67, 3SJ 22, 3CFG 373, 3KJ 3, 3AOC 4, 3AUH 10, 8ABO 9.

CENTRAL DIVISION

KENTUCKY—SCM, D. A. Downard. 9ARU—QRN season is practically at a close and the rebuilding period has passed so there is no reason why our state should not be one of the "Headliners." Let's have the application for an ORS certificate from every active ARRL man. 9CRD is a new ORS. 9BAN is working OH stations with one UX210 and a Zeppelin antenna. 9WR has an 852 tube on the way. 9EI moved from Lexington to Ashland. After trying all antennas and combinations, 9ARU has finally (to the relief of the gang) decided on the current feed Hertz.

Traffic: 9OX 77, 9BAZ 45, 9BAN 31, 9WR 20, 9MN 11, 9ATV 7.

MICHIGAN—SCM, Dallas Wise. 8CEP—8CWK is moving to new location but will be on again in short order. 8SY moved up to 80. He also worked a couple of Aussies on 40. 8AMS has his new Hertz working on both 80 and 40 and is on mostly mornings. 8ZF-8KN has a UX852 perking and has a box at the high school to collect messages and gets all they can handle. Why don't some of you other fellows try that stunt? 8DKX works crystal controlled set on 40 but expects to be ready to work all waves soon. 8DIV is QRW work in the evening and is looking for some early morning schedules. 8BRS is hooking up a five point schedule and expects to boost his traffic total some. 8ASO together with 9ALM are rebuilding the outfit and intend using fone. 8CYM and 8CNT play checkers via radio and are looking for a game. 8DED is still the star performer of Michigan and sure knows how to originate messages. 8AAF is a newcomer at Bloomingdale. About fifty hams attended the Hamfest held at Monroe, Mich. October 22 and all report a good time. President Barnes of Toledo presided. 8FX of Detroit was elected Secy. and Treas. for the coming year. Technical talks were given by Capt. Baldwin, 8DKX, and Dr. Van Becclaere, 8WO. Mr. C. Wise of 8WF suggested that the fone band be widened from 175-200 and that fones be removed from the 80 meter band. This seemed to meet the approval of most of those present. The meeting was then adjourned and everybody rushed for the dining hall. The next meeting was set for January 22, 1928.

Traffic: 9CEX 9, 8SY 103, 8AMS 1, 8ZF 11, 8KN 7, 8DKX 19, 8BRS 7, 8CYM 10, 8AUB 81, 9CM 7, 8ACU 4, 9EAY 34, 8DED 195, 8CEP 10.

OHIO—SCM, H. C. Storck, 8BYN—Another month, gang, and the Ohio Traffic Trophy contest well under way. You all saw the announcement in the last *QST*. LET'S GO! The reporting already is better—more reports and more traffic. 8DBM leads the gang with 366. Hurray! That's the biggest total for a long time. He is in earnest about the trophy—says to wrap it up, lay it aside, and when the three months are up—mail it to him. How about it gang? Are you going to let him get away with it? 8BAU had tough luck for various reasons. 8DJV gathered in his share of messages which is FB. 8CQU had a good total, too, but not what the others had. Don't forget to turn in your totals to 8ALU for check and don't forget the difference in counting them. Read your rules again, and let's go. 8CFL is on 80 meters and says traffic is better up there. 8JB comes in again with 43 handled. 8DIH has ditched his water grid leak. 8BYN is on the air every day around noon and nights around midnight and after—other times when possible. Glad to QSO any time, any of you. 8AKO got his new tin pole up. 8CMB has been doing very good work with low power. 8ALU, the RM, says anyone who wants a sked in any district, write to him and he will fix them up. 8CPQ turns in a good total and says traffic and DX are on the up and up. 8APB will be on 80 meters with a 210 and on 40 with an 852. 8AVX is trying out a new Hertz antenna. 8EQ has a new C.C. transmitter. 8DSY seems to think that he is losing interest in radio. 8AYO worked 300 stations since May 22nd. 8OQ reports 20 meters good for DX but not for traffic. 8BQJ has been rebuilding and now has a new mercury arc. 8DDK is runner-up for ORS and going good. 8CNO

was off the air most of the month but on FB now. 8DJB got 14 in 5 days. 8CAU burned out the motor in their MG set. 8HW just got back from a month's vacation east. 8DQZ is very QRW college. 8GL suggests everybody start their Xmas msgs now so they will get through on time. Hi. 8PL is at last satisfied with his new station and says he is going after tfc from now on. 8AWX reporting nothing of special interest in Warren. 8BKM claims hardest luck this month. Burned out his 50 and then two fivers. 8DIA has a mercury arc now. 8KC complains nothing much doing on 20 meters after 6:30 pm. Some of you 20 meter hounds QSO him. 8BBH is QRW and will be back on the air soon. 8AQU is rebuilding but put 16 thru at 8DCE. 8ADH is almost gone. 8DQZ reports the YLs have him. 8SI has another set under construction. Very good reports this month and let's keep it up. You non-ORS who are handling traffic, apply for appointment. Don't forget to make the difference in message count to the RM and SCM as explained in Nov. *QST* and when competing, send your message file to 8ALU for check if you want them to count.

We are going to have a big clean-up of dead ORS shortly- so don't be surprised if you get weeded out if you have not reported for some time. Don't forget to report whether you have traffic or not.

Traffic: 8DBM 366, 8BAU 247, 8DJV 143, 8CQU 51, 8CFL 49, 8JB 43, 8DIH 42, 8AKO 42, 8CMB 38, 8ALU 35, 8CPQ 32, 8APB 29, 8AVX 24, 8EQ 21, 8DSY 19, 8AYO 18, 8OQ 15, 8BQJ 15, 8DDK 15, 8CNO 14, 8DJG 14, 8CAU 12, 8HW 12, 8DQZ 10, 8GL 12, 8AVB 9, 8ARW 7, 8AEU 6, 8PL 5, 8AWX 4, 8BKM 3, 8DIA 2, 8KC 2, 8BKQ 1, 8CCO 1, 8DPF 1.

WISCONSIN—SCM, C. N. Crapo, 9VD—Business seems to be picking up this month, perhaps its because of the numerous Radio Shows in this part of the country and again perhaps it is just because the leaves are beginning to fall and the hands get that old familiar itching for a key. At any rate, the reports came in from all sources this month and several fairly large totals. 9LV sent in his largest total this month—radio shows do help a lot. 9SO handled 200 msgs during the Radio Show. He has been working Aussies and Zodders during the past month. 9DLD made his biggest message total this month. Skeds were kept with 9LV, 9BPW and 9EMD. 9BWO handled no DX this month because he was too busy. 9BPW's four skeds are a great help in msg handling. 9DLD routes all his Minnesota traffic thru 9BPW. 9EHD is pretty busy with college work and has reliable skeds now with 9ABM, 9EMD and 9BPW. 9EMD reported via radio. 9BIT sends in his first report but has been on the air several months. 9CAV's license has expired and he has written for a new one. 9BAW just finished building a Master Oscillator using chem. rect. 9DTK is on the air again with the old 250 watter. 9EFC worked all districts at least three times each and worked 30 states. 9AFZ has been trying 20 meters but doesn't find it as satisfactory for general use as 40. 9EEF is very QRW—not much time to operate. 9ARE is going full blast on 40 and 171.5. 9ABM, ex9AGV, is putting about 225 watts on the fifty at times and gets an R7 report on both coasts on 40. 9BWZ had a poor month. 9ASL wants schedules but says he can't make contact. 9DJK just got the call 9LU. 9EPN is a new station at Madison—reports a small amount of traffic and is ready for more. 9AZN reports DX poor the last two weeks. 9CFT just finished building a new antenna system and is now ready to go full blast.

Traffic: 9LV 351, 9SO 307, 9DLD 251, 9BWO 109, 9BPW 109, 9BJY 84, 9EHD 80, 9EMD 49, 9BIT 27, 9CAV 25, 9BAW 24, 9DTK 19, 9EFC 32, 9AFZ 15, 9EEF 14, 9ARE, 13, 9ABM 7, 9BWZ 6, 9ASL 4, 9LU 4, 9EPN 3, 9AZN 3, 9CFT 2.

INDIANA—SCM, D. J. Angus, 9CYQ—9CYQ will be on the air to handle ARRL business Monday's, Wednesdays, and Fridays between 6:30 and 7:30 CST on 84 meters, DC crystal controlled. ORS, be sure to get your reports in, otherwise you will find yourself a non-ORS. 9JP and 9DJP have resigned as RMs for Indiana. 9BKJ has been appointed RM. All stations in the Ft. Wayne district, excepting ORS, report your traffic to him each month before the 25th. 9EF and 9CSP applied for ORS appointment. 9EGE, RM, reports 9AIP, 9EBV and 9ENX new stations at Connersville. The fire dept. stopped in front of 9RS's house and when he went out to see the fire, he found that a neighbor had seen the light in his Hertz and had turned in the alarm. 9EGE is putting in a xtal and Hertz antenna. 9AXH will soon have separate 40 and 80 meter sets. 9AGW is rebuilding rectifier and will be on again by the time this is published. 9BQH made the BPL four times but was credited but twice due to reports being lost. 9DBA is on regularly and is now an official observer. 9CVX has a new 852 tube and a Zepp antenna. 9BKJ is keeping skeds with 8DJV, 9OX, 9WR and 9LV. 9AIN is on again with generator and pure DC on 80 meters. 8BYI has a sked with 9BAW and is on for skeds Mon., Wed. and Fri 9EBP is a new station in Elkhart. 9CMV is on 24 hours per day, 20 and 40 meters to handle Purdue University student traffic. 9BZZ is after an ORS.

Traffic: 9CMV 67, 9BZZ 60, 9BYI 24, 9AIN 33, 9EKW 35, 9BKJ 39, 9CVX 20, 9AXO 19, 9DDZ 23, 9DBA 16, 9BQH 140, 9EAA 33, 9DBJ 24, 9CSP 11, 9AEB 8, 9EJH 12, 9CMJ 9, 9EGE 9, 9ASX 8, 9BKJ 5, 9AXO 10, 9BK 4, 9DRH 19, 9DSC 28, 9CYQ 84, 9CRV 2, 9AXH 2, 9CBT 1, 9EF 46.

ILLINOIS—SCM, W. E. Schweitzer, 9AAW—The SCM is proud to announce that this report is the largest ever turned in to *QST* from this Section. Inasmuch as we have held almost every other kind of a contest in amateur radio, the SCM hereby challenges all other SCMs to a new kind.—Last month Illinois had more stations reporting than any other section in the League. This can then mean only one thing—we have the most active live-wire gang. We will continue to believe this until some other section can show a bigger traffic report, that is, in numbers of stations reporting. This should certainly be an interesting contest because it will involve every member of the League. It will show which section has the most active supporters. Let's go Illinois!

One of our OT, 9AA handed in his first traffic report this month, and announced the arrival of an 8 pound junior op. Congratulations, OM. 9AAE is operating WSBC. The 500 cycle power supply at 9AAW passed quietly away the other night. One of the fields blew. 9ACN is now using a dynamotor supplying a UX210 on 41.5 meters. 9AEG is off 50 watters. His last one popped after he had it two days. 9AFA has been keeping regular schedules with WNP. 9AFF is active with Army work. 9AHJ operating on 41 meters worked nc5BY. 9ALJ was not on the air last month but will be on in the future. 9ALK has schedules with 9BII on Tues. and Fri. He is looking for more skeds. 9APY on 39.5 and 85 meters has skeds with 2CC and 9DXZ. A sked is being arranged with 5ANL. 9AQA was married last month. Will the reports increase now OM? 9AWX whose neighbors heard that he could talk to ham stations in Tennessee have circulated the report that RCLs should live near ham stations because they attract radio signals. Will wonders never cease? 9AVP built a 96 jar rectifier. 9AYB being at the U. of Ill. is off the air. 9BHT just arrived back in Chicago after a 3 months stay in the north woods. 9BHM reports that 9AJJ was killed in an auto accident in which 9DYP was also injured. 9BLL has the following skeds—9DLD Tues, Thursday, Sat. at 5:30 am—9PG daily, 6 am—9BQH daily at 5:30 pm. He is looking for two more. 9BLS using a 50 watter is operating on 20 and 40 meters. 9DNI visited Chicago recently. The station is looking for skeds. 9BPX is keeping skeds with 9BAD, 9ACU,9BOV, 9EAI, 9DMG, 9BAZ, 9EJW, operating on 41.3 meters. 9BRX is QRW attending Armour Institute. 9DSU has remarkable reports with his 210 tube. 9DXG bought a new old flivver. 9DXZ is rebuilding his crystal controlled transmitter. 9EAI says it sure will be a job to meet the BPL now. 9EAJ sent in his first report—he is working with a 50 watter on 40. 9EDS has a new rectifier and says 9EIN is working on 40 and 80 with a crystal. 9CEL is using remote control on 40 and 9BKS is coming on with an 80 meter phone. 9EGX says the YLs are only R2 because of a flat pocketbook. 9EHK is trying various receiving circuits to find a good one. 9EJO blew two 20 watters and is on the air with a fiver he bought for 75c. 9ELR finds it hard to be on the air at present. 9EPJ is a new East St. Louis station on 40 meters. 9GE thinks the present method of computing traffic is bad. 9IZ has a 20 meter Hertz, he says 9EPG is a new Chicago ham with a new 900 cycle generator and that 9CJG has a junior operator. 9KA is having trouble with key clicks and BCLs. 9LL is getting out good with a Zep antenna. 9NV is on again with the old 204, the string of operators include 9UM, 9BPR, 9BR, 9IS, 9EJY, 9BRS, 9TT, 9DAA, 9BNA, 9BDV, 9EMC, etc. attending Armour Institute of Technology. 9OD is going to start some schedules soon. 9RK will be on soon at his new QRA with a 250 watter. 9RP an

old timer pre-war 9MC now operating at KYW is back in the ham game. 9TN was the call assigned the CRTA radio show station and worked some excellent DX with an indoor antenna. 9TQ will be on the air soon from his new location. 9UX is having trouble getting his Hertz to work properly.

Traffic: 9DXZ 318, 9CEH 168, 9DKK 140, 9AWX 114, 9BPX 107, 9APY 105, 9AFA 95, 9DSU 63, 9CIA 57, 9ACN 51, 9GE 47, 9AEG 40, 9NV 40, 9AMO 34, 9CNB 34, 9TN 33, 9CNY 33, 9DGA 33, 9DBI 31, 9CN 30, 9EAJ 30, 9ACN 28, 9AFF 25, 9EJO 24, 9LL 23, 9BLL 22, 9UX 21, 9ALK 20, 9EDS 17, 9EGX 16, 9EAI 16, 9DOX 15, 9DSO 13, 9CUH 13, 9IZ 13, 9BLS 13, 9ASE 13, 9ELR 12, 9CCZ 9, 9BNI 7, 9CZT 7, 9AQA 6 9,AA 6, 9CWC 6, 9QD 6, 9AHJ 6, 9AAE 5, 9BHM 4, 9BVP 3, 9DAF 3, 9DWP 2, 9AAW 2, 9AKA 1.

DAKOTA DIVISION

SOUTHERN MINNESOTA—SCM, D. F. Cottam, 9BYA—The matter of reporting is really getting serious in this Section. If the rules and regulations are consulted, a large number of you will realize you are violating one or perhaps more rules. This is in the form of a warning because cancellations will be in order very soon and you may be one of the boys that will be dropped if a report is not received from you very soon.

A number of new men are settling in Minneapolis, some attending the "U", others in business, etc. They are all active hams and it is a pleasure to greet them into the activities of this Section. 9EGN, 9BTW, 9ELA, and 9CLK are some of them.

9DGE is now an op at WRHM but he says he isn't a BCL yet. 9EFK is keeping four skeds and has been QSO FQ, SE, OA, OZ and NA this month. 9BKX has rebuilt with 100 watts on 40 and 80. 9BHZ reports two new stations at Waterville.—9EGP and 9EEI. FB. 9BHZ also keeps one sked. 9XI is on the air again with its general consistency, with a good staff of ops. 9EFO has separate transmitters on 20 and 40. 9COS has been sick in bed for a week. He sent his 203-A into the 6th dist. but 8ALU is delivering him another one. Hot dawg! 9DBC has been ill with an infected hand and so was not on much this month but will be soon. 9DBW is on 80 mostly because the fellows answer him there. He is QRW at college. Also reports two new hams, 9EOH and 9EPE, both using low power. 9DHP holds one sked and wants another on 20 at 7:00 a.m. 9BYA has been very busy during the month but will be on regularly now. 9DEQ is going down to 20, then look out. 9AIR took part in the 9XH plane test. He has one sked and is rebuilding for 500-cycle set.

Traffic: 9DGE 47, 9EFK 26, 9BKX 24, 9BHZ 21, 9XI 21, 9EFO 18, 9COS 15, 9DBC 11, 9DBW 6, 9GH 5, 9DHP 4.

NO. MINN.—SCM, Cy. L. Barker, 9EGU—To be effective at the time that this report reaches the readers and members of this Section, weeding out of "dead" stations is going to "Start to commence" in earnest. The stations that wish to retain their Official Relay Station appointment must live up to the Rules and Regulations without fail. Quite a few stations have asked for, and have been granted, inactive privileges, and the terms of these privileges expire when the November reports are due, so be on the job with the reports at that time, and thereafter. 9AOK leads us in traffic this month, making a wonderful showing with his new transmitter, both in traffic and in contacts, both DX and otherwise. We wish that more of the stations took the attitude and showed the interest that this man does! 9ABV comes second high in traffic. 9QT, the Army-Amateur control station for this state, makes a good showing, and reports 3 new National Guard stations starting up. FB. 9BBT reports working 9XH (the Burgess airplane) consistently during the tests conducted by Burgess. 9EHO also reports working 9XH when he was at an altitude of 5000 feet. 9AKM, reports that there is a lot of traffic if one has the time to keep schedules. 9CIY makes complaint of the QRM on the 40 and 80 meter bands. 9EGN is attending the University of Minnesota so does not get very much time to pound brass. 9CWA now has an 80 meter phone and reports that he gets out FB. 9EGF is on irregularly, but has a new antenna perking. 9EGU, we are sorry to say, is not yet on the air, due to delay in getting some material ordered. 9DUV had some real hard luck—first blew out his 50 watter, burned out his generator and then his milliammeter. WOW! 9CTW is getting a new 75 watter and as soon as it gets here, he will be on consistently again. 9BVH has been off for the past two months, and has now rebuilt with plug-in coils for 20 and 40 meters.

Traffic: 9AOK 73; 9ABV 32; 9QT 21; 9BBT 17; 9EHO 14; 9AKM 9; 9CIY 7; 9EGN 5; 9CWA 4; 9EGF 3; 9DUV 2; 9CTW 1.

SO. DAKOTA. — SCM, F. J. Beck, 9DB — The Y.M.C.A. Radio Club of Sioux Falls is working hard on the seventh annual A.R.R.L. Convention to be held in the Cataract Hotel on December 28th and 29th. Let's all go, gang, and don't forget the special prize for the high traffic man present. 9DWN has hit his stride keeping seven skeds and handled a big bunch of traffic. 9DGR has a few fine schedules and in spite of QRM fm college work nearly made the B.P.L. 9DB lost the H tube but is on as much as the BCLs will let him. Hi! 9AJP puts out a terrific signal on 38 and is working lots of DX traffic. 9EY, our new U. of S. D. Stn., has a 3000 v M.G. on the jog and also running code lessons for over a dozen new hams. Crosby of 9AGL who operates KUSD is getting the xtal set on air with a mercury arc. Good work, OM. 9BKB is on 40 at School of Mines and 9DBZ has been temporarily dismantled. 9BQV is leaving us. Sorry to lose you, OM. The South Dakota Section led the Division in traffic last month. Let's all get going and keep it there.

Traffic: 9DWN 255; 9DGR 83; 9DB 20; 9AJP 17; 9EY 11; 9BKB 8.

NORTH DAKOTA—SCM, G. R. Moir, 9EFN—The SCM is QRW work and too tired to do much radio work at night. 9DM has his Hertz up and perking nicely now.—He is QRW school work but pounds brass some. 9DYA has a new CX310 tube now and it works fine. 9BRR's kenotrons went west last month. He will have about 500 volts on a UX210 as soon as rectifier tubes received. 9CVT has an omnigraph to practice receiving code on. 9CDO blew his milliammeter and so he had to double space his variable condenser. 9CEI is off the air for good now, having left for the East. Sorry to lose you OM, but wish you good luck in your new work. 9BVF has skeds with 9BWN, 9BKV and 9AAT.

Traffic: 9BVF 201, 9CEI 24, 9BRR 10, 9DM 87.

DELTA DIVISION

ARKANSAS—SCM, W. L. Clippard, 5AIP—The Arkansas gang has certainly picked up this month. Keep up the good work, fellows, and let's hold first place in the Delta Division next month. The Atkins bunch has been experimenting with antennas. Does anyone know about the Pine Bluff gang? 5ABI is QRW weekends due to fierce QRM from a Conway YL. 5IQ passed into the fifth stage of amateur radio last month. Now will he stay in nights? Hi! 5SY will soon be on the air with an 852. His DeForest went west. QRM from golf has been very bad for 5HN. Duck season soon opens so no hopes for 5AW. Hi. Sure glad to have 5AAJ back with us. Let's hope 5EP and 5JB are still alive. 5PX has certainly been doing some fine work. Hope to see 5ZAA on the air soon. 5CX is a new op and welcome, OM Let's go, fellows,and give the Midwest bunch some competition.

Traffic: 5ABI 64, 5JK 58, 5CX 35, 5AVA 31, 5AAJ 23, 5SS 6.

LOUISIANA—SCM, C. A. Freitag, 5UK—This is the largest traffic total that Louisiana has sent in since I have been SCM which is due, to the great number of messages handled by 5GR from the New Orleans Radio Show just closed. We are very proud of these figures and wish we could make at least as good a showing each month. 5PK and Mr. Clem-5TE is a hard and determined worker. We are contemplating organizing a new amateur club in New Orleans and expect to have things in shape within a very short time.

Traffic: 5GR 1675, 5UK 166, 5PM 67, 5EB 60, 5IE 57, 5LV 23, 5ANC 12, 5KC 11, 5NS 9, 5AOZ 1.

TENNESSEE—SCM, L. K. Rush, 4KM—Most of the ORS in this state have gone to college and cancellations will be in order. No reports have been received in the past few months and we need some new active ORS. Appointments are in order. There are several new stations in the state who should send in their reports. 4FI continues to be our best

known and most consistent traffic station. He is also RM and we expect much from him this winter. 4FA, 4FD and 4JN are at Univ. of Tenn. 4AD is at Ga. Tech. 4ABR sends in a nice letter and is spending some time climbing those east. Tenn. hills. He is also rebuilding. 4EF, 4JU, 4QU, 4TJ, 4DG, 4HK and 4ADI should send their reports and dope to the SCM for *QST*. 4KM still insists that 20 is the best band and is very active weekends. 4KX pounds most of the brass at 4KM. 4ABD is a new station in Bemis and will be on the air soon.

MISSISSIPPI—SCM, J. W. Gullett, 5AKP—5FO is still trying 40 meters but will try 20 with a UV204 with raw AC on the plate. 5API blew all his transmitting tubes and will he off the air for a few days. 5ANP reports that he is unable to arrange skeds with anyone else. 5AKP moved all his traffic on 20 meters and can work everyone he hears on this band although it seems to be no good after 7:30 pm. down in this neck of the woods.

Traffic: 5API 3, 5ANP 4, 5FQ 7, 5AKP 66.

HUDSON DIVISION

NEW YORK CITY & LONG ISLAND — SCM, F. H. Mardon, 2CWR—Manhattan: 2ANX is QRW business but says he will be on in November strong again. 2EV has his crystal working now on 77.6, 38.8 and 19.4 meters. 2KR has finally decided to put in a crystal. Only needs the crystal now. 2BNL still sticks to 40 meters. 2BCB has received a first grade commercial ticket. 2ALP is on again on the three wave bands working good DX. 2AET says he tried three different Brooklyn stations not long ago to get a message through but none of them would accept them. That's not good business, gang. Bronx: 2AET would like a sked with some reliable Brooklyn station who will take a message and send to its destination. 2ALW has resigned as ORS as apartment house QRM is too much for him. Sorry to lose you, OM. 2ARD reports DX great in his neck of the woods 2BBX worked 14 countries last month. 2AWU is on regularly now and expects to improve power soon. 2CYX works lots of foreigners and takes lots of traffic. Has made application for Naval Reserve appointment.

Brooklyn: 2ADZ says Christmas being so near and having lots of relatives, he thinks he won't get on the air until the first of the year. 2BDA sure works lots of stations. 2BAZ's 50 is perking now and is FB. 2PF has his new receiver in an Army airplane and it worked fine. 2WZ-2BGK has been off on account of college QRM. 2CRB handled some nice traffic from fm-FMB. 2BO handled msgs with St. Louis hams and he in turn telephoned and got replies back to N. Y. in less than 10 minutes. FB, OM. 2AVR has gone to Poly. Institute of Brooklyn and is busy now. 2APB says his call wasn't in *QST* last month? (Did you report, OM?) Long Island: 2AUE is QRW attending school and wants to be on the inactive list. 2AGU reports traffic slow lately and is QRW work. 2ASP is very busy with his buzz wagon. 2BSL is QRW college. 2PR will be on with a big wallop. 2ALS says "every night the DX gets better" due to cooler weather. All stations wishing Army-Amateur appointment are requested to get in touch with him. 2AIZ says it's an awful job to QSR N.Y.C. and Brooklyn. Wish some of you fellows would have a change of heart soon and show some action. 2AKR is home for a while and is ready for a sked with a reliable ham on all waves except 150-200 meters. 2AFV has schedules with KFAQ (S.S. *Robador*) on Tues. Thurs. and Sat.

Traffic: Manhattan: 2ALP 131, 2BCB 32, 2BNL 10, 2KR 38, 2EV 28. Bronx: 2CYX 85, 2BBX 47, 2AWU 109, 2ARD 45, 2AET 12. Brooklyn: 2APB 6, 2AVR 5, 2BO 80, 2CRB 43, 2WZ 2, 2PF 23, 2BAZ 18. Long Island: 2AIZ 106, 2ALS 7, 2BSL 1, 2AGU 5, Richmond: 2AFV 50, 2AKR 24.

NORTHERN NEW JERSEY—SCM, A. G. Wester, Jr., 2WR—Traffic this month shows quite an improvement over last month but it is still far from satisfactory. 2GP has been appointed RM for Union, Middlesex, Monmouth and Ocean counties. An RM is wanted to handle Essex County and another to handle Hudson, Bergen and Passaic Counties. 2AGN has been appointed an ORS and the gang welcomes him to our fold. 2AT is having a hard job getting going on 20. 2CP has an 852 perking and is all set for his job as RM. 2OW manages to keep two exmitters QRW, one on 20 and the other on 40. 2JC has 6 new operators and will be on the air every night for traffic. 2KA is joining the Naval Reserve. 2ASZ has been having fine QSO with Australia on 40. 2ALM has been fooling on 20 but is QRW school. 2ANB is trying self rectifying circuits but is having poor results. 2AGN hooked up with Jugo Slovakia which is a new country for him. 2BQQ is still off the air due to other things of interest. 2CJX maintained nightly schedules with a ship from N.Y. to Buenos Aires with excellent contact. 2JX lost an 852 and is awaiting the new UX-250 which is due on the market shortly. 2AOP has been playing with 5 meters and also rebuilding the 20 meter transmitter. 2CX still is stepping to all parts of the globe on 40 with a 210. 2BY, our YL station, is increasing power from a 201-A to a 210 and has handled a few messages. 2CJD is getting ready to install crystal control. 2IE reports that a current feed Hertz works better than a voltage feed. 2AOG is kept off the air due to BCL trouble. 2ABE is back after a long vacation and is now using an 852. 2AAT has filed application for an Army-Amateur Station and will try later for an ORS.

Traffic: 2AT 9, 2CP 25, 2CW 8, 2EY 2, 2JC 9, 2KA 4, 2ASZ 11, 2ALM 5, 2AGN 10, 2CJX 24, 2AVK 4, 2ADL 32, 2AOP 14, 2GX 52, 2BY 1, 2CJD 11, 2ABE 7, 2AAT 8.

MIDWEST DIVISION

IOWA—SCM, A. W. Kruse, 9BKV—The RM reports a good bunch of schedules working throughout the Section which accounts for the splendid showing made this month. FB, gang, keep up the good work. Under the new requirements, four ORS made the BPL this month. Let's all try and arrange a few reliable schedules and see how many of us can hit the BPL next month. The axe is ready for those lagging ORS, so you fellows that are inactive, watch your step! Drop the SCM a card if you desire a list of Iowa ORS. Traffic honors go to 9BWN this month. He reports his xtal working FB with full power. 9CZ's total shows that he is keeping some reliable schedules. 9BAT is going to be one of our crack traffic stations this winter. Lots of cornfield QRM at 9BKV but he manages to keep a few schedules. 9DEA is going to try for a commercial ticket soon. 9DGW is very QRW work but he hopes to be going strong soon. 9CJL is doing some nice work on 80 meters. 9EHN blew his H tube and went back to the 210. 9EFS is constructing a 100 watt fone and CW set at KWCR. 9EJQ got his ORS and is getting set for the winter. 9AMG is getting some fine reports with his Hertz on 40. 9DZW is with us again after laying off most of the summer.

Traffic: 9RWN 321, 9CZC 290, 9BAT 268, 9BKV 232, 9DEA 132, 9DGW 69, 9CJL 49, 9EHN 34, 9DZW 27, 9EFS 25, 9EJQ 19, 9AMG 10.

KANSAS—SCM, F. S. McKeever, 9DNG—Fellows! We seem to be headed in the wrong direction—down instead of up! Why can't *every* ORS report *every* month? 9AEK reports a new ultra-audion smitter finished but was not on this month. 9CET and 9CV were on a little; the former is using a 210 until his 250 watter is replaced. 9CVL is at the key at 9AEC xtal controlled and hopes to also be on at his own set soon. 9CLR and 9LN are back on with brand new sets which work fine. The lattter is making good use of 20 meters with a 210. 9DNG has a new set coming along; 9ARY will be signed part time from this station as there are now two ops. 9BII is about the only station who shows an increase in msg. total this month. 9CFN is hooking fine European DX but also manages to keep his traffic up. 9BGX and 9DFK were both off the air all month but promise new activity soon. 9HL says he can't afford to loose any sleep and therefore no DX and not any too much traffic. 9BUY and 9JU are rebuilding as usual.

Traffic: 9BUY 4, 9DNG 26, 9HL 30, 9CET 22, 9CFW 9, 9BII 15, 9CKY 42, 9CFN 26, 9CV 6, 9LN 19, 9BET 21, 9CNT 23.

NEBRASKA—SCM. C. B. Diehl, 9BYG—The SCM is forced to accept the resignation of Crozier, 9EHW, as ORS and Asst. Observer on account of his too heavy BCL business. 9CJT is working in a downtown BCL shop and is not on quite so much. 9CNN is looking for a few skeds although quite QRV at his work. 9QY has had another stroke of work on his farm and not been on much the last month. 9EEW is on when he can be. He says his QRM factory has closed up now, so all OK. 9BYG is do-

ing some experimenting in general and operating some at 9DR. 9DI is attending Univ. at Lincoln and is on the air week-ends for traffic. 9BOQ has his new dynamotor all set and is tuning up for a large winter. 9DAC is at it again with his 201A 9EBL reports a visit to Denver and 9EAM. 9CJI is still open for traffic and asks for skeds with Texas, Okla. and La. 9CDB turns in 12 this time. 9EW is through with his summer's surveying job and will have a little more time to be home and operate from now on. 9DUH says business is too heavy for much ham work.

Traffic: 9CNN 1, 9QY 11, 9EEW 2, 9BYG 6, 9DI 3, 9BOQ 3, 9DAC 7, 9BQR 2, 9CJI 6, 9CDB 12, 9EW 19.

MISSOURI—SCM, L. B. Laizure, 9RR—St Louis activities were upset by the tornado there the last of Sept. but a good amount of traffic was handled. 9ZK handles the most. 9ZK, Jr. is not doing so much brass pounding since starting at the Univ. 9BHI handled two tornado messages. 9DZN reports his location keeps him out of traffic handling. 9DLB handled a few msgs. 9DOE is still aboard WNX and will not be home until the middle of December. 9HY closed down due to going to Princeton Univ. and expects to pound brass there if he can get thru the jam. 9AJW is setting up again at Fulton. 9LI is active and reports 9DVF is setting up his station again. 9BEU makes his first report this month with a good total 9DQN is on practically every night and early morning for Kansas City traffic on 40 meters. 9ZD has maintained a ship sked for over a month but details deleted by censor. 9ACA is on with more regularity. 9RR has been shut down since last March due to lack of cash. There are a number of new stations in Kansas City whose owners do not report and the SCM has not had the time to run them down. 9ENC whose traffic totals appear this month, was the radio show station operated the last week of October by the O.B.P. club.

Traffic: 9ZK 121, 9DLB 5, 9BHI 40, 9BEU 23, 9DKG 20, 9DMT 8, 9CXU 7, 9BQS 1, 9DAE 16, 9LI 10, 9ARA 16, 9BUL 15, 9BGO 8, 9DQN 45, 9ENC 310, 9ACA 15, 9BSB 45, 9WV 5, 9ZD 23, 9ACX 1, 9BND 7.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, H. E. Nichols, 1BM—Your SCM is taking the liberty of using our reporting space to give the other Sections an accurate list of who is handling traffic in the "Nutmeg State." 1PE, Stamford; 1CTI, 1BWM, 1NE, 1BGC, Norwalk; 1IM, 1BM, 1VE, 1ZL, 1ATG, Bridgeport; 1BHM, 1BJK, New Haven; 1AOX, 1CKP, Manchester; 1MK, 1MY, 1AFB, 1ASD, Hartford; 1AOI, Windsor; 1QV, Mystic; 1VB, Newtown; 1ADW, 1OS, Danbury; 1AMC, Torrington; 1ALF, Bristol; 1BBC, Wethersfield; 1AKU, Winsted. You will notice that the southern end of our Section is well taken care of and that the north and west are developing. We need more good stations and if you are not in the list or representing your city as above, why not come in with us and help to make our little section one of the livest radio centers in the East? These stations represent the fellows who have worked hard to establish a net over our district and it is with the idea of acknowledging their efforts that this report comes in this form.

Traffic: 1ATG 4, 1BLF 7, 1CKP 16, 1TD 10, 1AMC 17, 1OS 19, 1BWM 27, 1BHM 32, 1VB 32, 1BJK 39, 1ZL 40, 1BM 44, 1AOX 48, 1MY 61, 1AOI 66, 1ALF 101, 1AFB 108, 1CTI 172, 1MK 227, 1NE 54, 1QV 73, 1VE 30.

RHODE ISLAND—SCM, D. B. Fancher, 1BVB—For once, Rhode Island has a 100% report. All of the active ORS in the state sent in their reports. Thanks, fellows, for the cooperation. Let's have it like that all the time now. We have a new ORS this month and he has all the ear-marks of being a "humdinger." It is 1BAT and he is sure knocking off the traffic. How do you fellows like the idea of the monthly letter from your SCM and RM? If you don't like it, just say so. 1AMU writes us requesting that we correct the impression that he had lost his license due to his QRMing the BCLs. This is not so. He is on the air again with a "clickless" exmitter that doesn't bother anyone so will be in the swim again. FB.

Providence & Pawtucket: 1EI will be off till he can get an xmitter going on 20, 40 and 80 and then is going to handle all of the traffic coming through 1AWE. 1MO is running along at about the same pace. Has a sked with 9NS. 1AQP is also keeping a sked and also doing good DX. 1AWE keeps a sked with ef8FD and nu9EFC and says traffic is picking up on 20. 1BAT, our new ORS, keeps a sked with OIK (S.S. *Lituania*) and rolled up a fine total. 1BIL has a good total this month He works on the 80-meter band so guess that accounts for it. Notice the schedules that the Prov. and Pawt. gang are keeping.

Westerly: 1BVB rebuilt the xmitter and put in a new filter with the result of better DX and traffic handling. 1AAP is on the inactive list but expects to get going again before very long.

Newport: Here is the place that activities are sure on the increase. Three new stations are opening and will soon become ORS. 1BQD is coaching them and reports that they will all be set soon. 1BQD is knocking DX for a goal. He has rebuilt the xmitter which uses a UX-210 and he did the job right. He keep a daily sked with 1BVB.

Traffic: 1BIL 122, 1BVB 114, 1BQD 76, 1BAT 69, 1AWE 24, 1AQP 23, 1MO 9, 1EI 6.

NEW HAMPSHIRE—V. W. Hodge, SCM, 1ATJ—Traffic is still on the increase. Most stations report plenty of traffic and good conditions. 1IP continues to be the high man and says his 201-A gets out FB on 20. 1AOV had hard luck with schedules. 1ANS is QRV for traffic on all bands. 1JN handled a msg from WNP. School QRM held back 1AOQ and 1BFT. 1AVJ handled a msg from a Legion man in France to his home and is doing good DX. 1AEF, our newest ORS, has a 210 with complete battery supply for emergency use. As there are only seven ORS in this Section, this report must necessarily be brief. "News items" sent in with the monthly report will be appreciated. Please note the new requirements for the BPL and that your msg file is subject to inspection by the SCM.

Traffic: 1IP 189, 1ANS 60, 1JN 60, 1AEF 49, 1AOV 28, 1BFT 25, 1AOQ 13, 1AVJ 20, 1ATJ 10.

EASTERN MASS.—E. L. Battey, SCM, 1UE.—Let's aim for high delivery percentage next month and keep a good number of our stations in the B.P.L. The number of originated messages is rather high on some stations this month, due to Radio Show traffic. 1RR's appointment has been cancelled as he is not on enough to keep his appointment and has asked that we do this. 1AAW, 1BBT and 1WV all applied for O.R.S. 1BVL is with us again after a pleasant trip as commercial operator. While at Jamaica, he stopped to see nj2PZ, but found he was out. 1ACH has new tube rectifier going and handled some more traffic with WNP. 1BDV is QRW at Tech. but will be on soon with Zeppelin feed antenna. WRES, is operated by 1IS and 1RO. They both have fifty-watt ham stations which make quite a dent in the ether. 1ON is still working good DX. A new transmitter and shack may be found at 1NK. 1RF has his crystal perking on 20 meters but not much luck yet. 1BKV reports 1BRK is most ready to break through the ether. 1SL handled some important Army Amateur traffic and kept several schedules. 1FL handled the message from VOQ when they dropped their propeller. 1RY has school QRM. 1LM kept six schedules and thinks with 10 more he could make the B.P.L. Hi! 1ADM is constructing a new transmitter in honor of his new 75 watter. 1BMS will take his com't examination on November 10th. Vacation kept 1OG off a good part of last month. 1NV says he seems to get tfc without schedules. 1NQ is back at Tufts College with plans to get his big high powered set going there. 1ABA is now using an 852 with 1200 volts and is working across very consistently. SB2-AR and SUI-CD were worked at 1UE. 1AGS is still wrestling with his set, trying to get it to peep. 1KY is handling traffic as energetically as ever but says she doesn't think she will make B.P.L. any more now that the total is 200. 1CJR is another fellow QRW with B.C.L. work. 1AXA has just located in Lynn. 1GP is bothered with school QRM but will keep a few schedules soon. 1AHV reports 1AVF and 1GS as starting up again. 1GA is now in West Roxbury and getting out better than ever.

Traffic: 1FL 248; 1AKS 241; 1ACH 156; 1BMS 147; 1KY 147; 1UE 155; 1ADM 103; 1LM 95; 1NV 46; 1BZQ 44; 1AHV 42; 1SL 39; 1ASI 28; 1PB 25; 1RY 11; 1RF 10; 1GP 9; 1NK 7; 1ABA 6; 1BVL 5; 1AGS 12; 1NQ 4; 1ON 2; 1APK 2.

MAINE—Frederick Best, SCM, 1BIG—On October 22nd, the Maine gang pulled off a good Convention un-

der the auspices of 1QY, of Auburn. Handy, one of our own Maine products was there and gave us a fine lot of interesting dope. The interest was so great that one could hear a pin drop while he was speaking. He brought along a reel of films from A.R.R.L. Headquarters at Hartford, and gave those of us who have never been there a line on what *QST* factory is like. The feed was a corker, and 28 Maine hams did justice to a fine chicken supper. The contests brought out some swell competition. The 1BIG, by virtue of being judged the besst liar won a Jewell Thermocouple RF ammeter. Second prize in this contest went to 1BWE who also told a whopper! The code copying contest was cleaned up by 1FP, with OM 1BQ of WCSH doing his stuff on the transmitting end. Boyden, of Army-Amateur fame did his stuff and signed up a few before he went home. After the banquet the remainder of the gang who did not have to leave adjourned to 1QY's shack and chewed the fat until morning. Next year's convention goes to Augusta and should be a pippin judging from the enthusiasm shown at Auburn.

1BFZ handled his usual good string, but says he expects this will be his last time in the B.P.L. Don't forget, OM. 50 delivered messages (or 200 total) makes the B.P.L. from now on. Schedules were kept by 1BFZ with 1FP, 1IP and 1NK, all on 79 meters. 1QY handled a lot of WNP traffic via 1UE and 1FL. 1AQL had been on as regularly as possible on 78 meters. 1ANH reported for the first time. He is a new ham and is getting out in fine shape. 1AIT has been exploring the past month. He has been sojourning on 20 meters and reports DX very FB. 1FP has been working on 76 meters and handled a few. 1COM's time is taken up with football. Let's hope he finishes the season in good shape so that we can count on him for traffic this winter; 1AUR reported but handled only one message. He says that he will not be able to do much with radio for another month. 1BIG has a schedule with 1FL and clears all kinds of WNP traffic in this way. 1ADI an old timer, is now located in Rockland. He has a fine punch on the eighty meter band. 1ABS, another old timer, has started up in Houlton.

Traffic: 1BJP 31, 1BEB 3, 1IT 38, 1BBJ 8, 1EZ 47, 1ANH 11; 1AIT 9; 1FP 9; 1COM 1; 1AUR 1.

VERMONT—SCM, C. T. Kerr. 1AJG—1EZ is sure rolling out on 40 with low power. He is high man with 47 msgs. 1BBJ is on every Monday. Our CRM is beginning to get skeds together. In case you boys don't know him, he is 1IT, Clayton Paulette, North Troy. He wants to hear from 1EZ. 1BEB is on 20 now. 1BJP hopes to QSY to 20 soon—he sure is rolling now with traffic, though. 1BBJ, 1BEB, 1BDX and 1ARY all handled a great deal of emergency traffic on 40 and 80. 1AJG is on 38 yet but going down. Come on, 1FN and you other boys that owe me a report.

Traffic: 1BJP 31, 1BEB 3, 1IT 38, 1BBJ 8, 1EZ 47.

WESTERN MASSACHUSETTS—SCM, A. H. Carr, 1DB—1AAC is back on 80 meters again using a UX210. 1AAL, RM Western Mass. is on a regular wave of 77.2 6 to 6:30 daily and 10:30 to 2 Wed. Fri. and Sat. and is ready to arrange skeds for all who wish. 1AJK will soon be perking again on 80. 1AJM has handled more traffic for WNP, and kept skeds with several foreigners. 1AKZ also took some messages from WNP on 20 meters. 1ANI is keeping quite a few skeds and has a good total for a new ORS. 1APL, our Asst. RM, makes the BPL again with a fine total. He had a lot of traffic from the Springfield Radio Show. 1AQF is going again after having a broken rectifier. 1ASU was given the European traffic from the Radio Show but owing to poor conditions, has been unable to get them over very well as yet. 1AWW says his msgs were from the show, also. 1AZD sent in the best total from Pittsfield. 1 BIV's new address is 2 Boardman St., as he is now married. Congrats, OM. 1BSJ as instructor for the Springfield Radio Assn. hands in a good total worked by 1APN, the special station of the Assn. His station is now located with 1BWY. 1UM has been so busy preparing for the Worcester Hamfest that he had to let traffic slide. 1WQ wants a schedule with somebody in Pittsfield. 1AJO made his first report this month.

Traffic: 1AAC 9, 1AAL 83, 1AJM 42, 1AKZ 2, 1ANI 70, 1APL 225, 1AQF 61, 1AWW 83, 1AZD 57, 1BIV 1, 1BSJ 104, 1DB 12, 1WQ 1, 1AJO 31.

NORTHWESTERN DIVISION

OREGON—SCM, R. H. Wright, 7PP—Remember, gang, it isn't only your traffic total that is necessary but also your activity and your monthly activity reports. 7AEC is the star station this month. Daily skeds east, south and north provide routes for any traffic through his station, all handled in daylight. 7AHS says that his 150 W. Mallard is perking FB. 7EO has been inactive except for some 80 meter fone work. He is on regularly now, looking for traffic. 7AKK, after two years of silence, is coming back with B batts and increased power. 7ALK has installed M.G. plate supply. 7ACG and 7VP are kept busy with school work but manage to move traffic regularly. 7ADD is using an 852 tube on 20 and 40 meters and is doing excellent work, he has worked all continents but one. 7ABH gets R5 from cn-OAja on 40 meters. 7AEK and his beloved 250 are still with us and are tearing great holes in the ether hereabouts. 7JO is putting 2000 volts on a 203A, he says that it hasn't started to drip yet. 7AIX is a new ORS using low power at present but is increasing soon. 7NI is using low power crystal control with an indoor antenna and works coastwise. 7AGM and 7AC are new stations in the Dallas looking for traffic.

Traffic: 7AEC 109, 7JO 35, 7ACZ 35, 7AHS 33, 7GQ 33, 7NI 19, 7AEK 12, 7PP 12, 7ALK 10, 7ABH 8, 7AGM 8, 7MV 8, 7ACG 7, 7EO 3, 7AEF 2, 7MO 12, 7FS 6.

MONTANA—SCM, O. W. Viers, 7AAT—7DD has increased power and will be found on all three bands. 7AFM has a new MG and will be ready to go soon. 7ZU has been off the air most of the month due to attending a Frat. convention at Columbus, Ohio. He is a new ORS. 7FL is back on 20, 40 and 80 again after a long silence. 7AHG will soon be on from Red Lodge and will be glad to QSO. 7EL is working hard in a packing house, now. 7AFP is "trouble shooting" BCL sets so hasn't time to rig up the station just now. 7CK has quit the game for good and the SCM bought some of his apparatus. 7AAT is a new OWLS and will be glad to check your wavelengths.

Traffic: 7AAT 77, 7DD 18, 7FL 18, 7EL 2.

IDAHO—SCM, H. H. Fletcher. 7ST—Traffic is a little better but not good enough. Snap into it, gang. 7JF has been in the hospital. 7HK is on with skeds and three ops 7ST is on daily now. 7YA has a complete MG set for filament and plate. 7QA-1Y are on occasionally. 7AJA uses an 852 on 40 in Jerome. 7ST is operating at KFXD, Jerome, Idaho. 7CW ops at 7YA. 7FB at Lewiston is on once in a while. 7JL will be on this month. Watch the traffic report next month and help boost it. All together for Idaho!

Traffic: 7HK 22, 7ST 19, 7YA 7, 7QA 1.

WASHINGTON—SCM, Otto Johnson. 7FD—7AM takes traffic honors this month. He uses 20 meters to good advantage The gang are about evenly divided between 20, 40 and 80 meters. 7MG at Fort Lewis and 7AU at Tacoma are new ORS. 7VL handled a lot of traffic from a local radio show. 7TX is still on 20 meters. 7ACA is coming along fine. 7VJ is getting into the relay game. 7KO-7ACB and 7AEV are active Seattle stations. 7AW has his xtal xmitter going. 7 DF is building his. 7EK fails to report (too modest I guess). 7AG's generator BO a bearing. 7AIY is considering matrimony.

Traffic: 7AM 137, 7MG 49, 7VL 42, 7TX 39, 7ACA 38, 7VJ 32, 7KO 19, 7ACB 17, 7AEV 6.

PACIFIC DIVISION

LOS ANGELES—SCM, D. C. Wallace, 6AM—6BJX handled some marriage and birth notices. 6BZR QSO'd ac8SU on 20 meters. 6AGG built a new receiver and his traffic total went right up. 6DKX has cleared up the power leak that was bothering him and is keeping some fine schedules. 6BZC worked his first OA using 7.5 watts. 6ZBJ has crystal control working now on 40.3 and gets good reports. 6BFP's OH and OP skeds are very reliable so far although weather has not been so good. 6COT has been very busy with school. 6CAG still has QRM from Electric welding and pneumatic hammer and would like to share it with someone. 6QL joined the USNR with a rating of RMIC. 6AHS was heard in England and has some good skeds. 6CQM's favorite pastime in Los Angeles is chasing down power leaks. 6IH may go to sea again in a short while. 6CHT sent in a good total but says he blew his 7.5 watter to do it. 6AM had an interesting chat with WNP, 11 degrees from the North pole 6CMQ is working with 6BJX on the next banquet. 6DCH would like

skeds for traffic into Southern Calif. between 8 and 10 pm PST. 6BTS worked Africa. 6DEG moved to bigger and better QRA. 6CSW is on again after being off the air for quite a while. 6CLK was presented some rechargeable B batts from a generous BCL that must have wished to express his thanks for not QRMing the dials anymore. 6AKW wants to pull some Army or Naval Reserve Radio Net tests.

The next banquet for the Los Angeles Section will be in Pasadena on Friday, December 30, 1927 and will be the best yet.

6ALR, who is in commercial radio, reports that a man came in and wanted to send a message collect as he had been robbed and the company could not do it as it was against the rules so 6ALR got in touch with the man later and sent the message via radio and got an answer promptly by radio and the man's father sent him money by wire. The man was very pleased with the service as his father sent him a wire and a radio and the radio message arrived before the wire.

Several amateurs attended the meeting of the Communications Division, USNR, on Sept. 29, 1927. The proposed work was outlined as well as the objects, ideals, etc. and the purpose of the amateur net. 6ALS, on the Yacht *Dodeneia*, would appreciate it greatly if the gang would keep an eye open for them and give them a call. If they can't raise them, QSL the Culver City Radio Laboratories, 6716 Washington Blvd., Culver City, Calif., and on return will acknowledge all cards.

Traffic: 6BJX 261, 6BZR 138, 6AGG 123, 6DKX 117, 6BZC 112, 6ZBJ 110, 6BFP 95, 6COT 82, 6CAG 67, 6QL 56, 6AHS 55, 6CQM 46, 6AGR 44, 6AWQ 42, 6CQP 37, 6CUH 29, 6CZT 29, 6BGC 28, 6IH 27, 6CHT 21, 6AM 19, 6CMQ 18, 8DCH 18, 6BTS 16, 6DEG 15, 6CSW 13, 6CLK 11, 6AKW 11, 6RF 8, 6BHR 8, 6CNJ 5, 6BRO 2, 6CMY 40.

SANTA CLARA VALLEY—SCM, F. J. Quement. 6NX—6BVY and 6AMM kept their important schedules with PI this month, making the BPL and getting some important traffic. 6AMM took in the Pacific Division Convention in San Diego. 6BMW is the newly appointed OO and keeps skeds with KDCS. 6CTE operated 6BAX and handled some 20 meter traffic. 6CJD got his sheepskin from college and now finds time for radio. 6CSX handled his usual amount of HU traffic 6BNH hopes to have. 2 fifties in M O. circuit soon. 6ACQ will be QRV traffic and skeds from College of Pacific. 6AJZ and 6MP were QRW but hope to be on the air soon. 6NX is getting ready to erect two redwood trees for masts. The Section is at last perking. There are a few stations who will lose their ORS, however, unless they report. Seven members of the SCCARA: 6OI, 6HM, 6ZAT, 6CKV, 6NX, 6CDW and 6AZS are all WACs —three more in line for the honor.

Traffic: 6BVY 264, 6AMM 103, 6BMW 75, 6CTE 14, 6CJD 9, 6CSX 7, 6BNH 3.

HAWAII—SCM, John A. Lucas, oh6BDL—Reports this month are meager Two new stations, 6DLR and 6DPG and three of the older stations were thoughtful enough to report. 6CFQ just returned from Calif. and is building a traffic tuner. 6DJU worked aj4ZZ.

EAST BAY—SCM, P. W. Dann. 6ZX—At the regular ARRL meeting held Oct. 27th, 6RJ was elected as Convention Mgr. for the 9th Annual ARRL Convention to be held in Oakland. Oakland was decided upon by a large majority at the ARRL Convention held in San Diego.

6IP is back with us again and reported by phone. 6RJ, 6CKC and 6JS had a fine time at the Convention. 6RJ is rebuilding master oscillator for 20 and 40. 6COL says the 5 meter bug has bitten him and that he has a UX210 on 4.8 meters, 32 watts input. 6ALX has school QRM so not much time for brass pounding. 6AMI's MG went bad and he says he'll be on with slop rectifier soon. 6IM says he will be on the air soon with self-rectified 50 watter. If some of the gang would like to see a neat transmitter and receiver which also does the DX, just run out to Berkeley and see 6CTX's shack. 6BER sure works the Aussies and Zedders. 6ALV is now using TPTG circuit with 250 watter on 3rd harmonic. 6BUX is a newcomer from the south and was recently forwarded an ORS for this section. 6EY says very QRW lately and not much time for DX or traffic. 6BBJ is constructing a new lab so nil traffic. 6CKC was away to convention so no traffic. 6AFT is just getting back on the air and is one of our star 20 meter operators. 6AYC is QRW at present driving an auto stage so no report of traffic although he will be back soon. 6ZX will be back o the air soon with a Zep antenna at his new QRA. The SCM wants to warn all amateurs in this Section that off-wave transmission on any of the bands is to be severely dealt with by the R. I. as many of the fellows are getting careless about their QRH. The SCM has a wavemeter which he will be glad to check your station with so there's no excuse for you. Several complaints have also been received from NPG so watch your step, fellows, and not lose what you have.

Traffic: 6CTX 14, 6IP 89, 6BHM 30, 6RJ 103, 6APA 38, 6COL 20, 6ALX 19, 6AMI 15, 6IM 12, 6BER 12, 6CZR 12, 6ALV 9, 6CTH 9, 6BUX 5, 6EY 2.

SAN FRANCISCO—SCM, J. W. Patterson, 6VR—Traffic took a decided slump in the section this month due mostly to rebuilding for winter work. 6GW is still going strong and seems to be one of the leading traffic stations. 6OW is doing some consistent work in his new QRA. 6ADM worked en-OJA and received a report of R6. 6KW has a 50 going and is changing over to self-rec. 6ASI is the only active station on in Ukiah and from former reports, is a live wire. 6BIA has invested in a new overcoat, looks like the rainy season is over. 6CXI is now using a 75-watter—now we know where all the QRM comes from. 6DDN has a very bashful 15 watt self-rec. set. 6PN is installing higher power to keep his Eastern skeds. 6BUF is having his troubles and to top the climax, his antenna came down. 6VR is back on 40 once more and using his last 203A.

Traffic: 6GW 80, 6VR 50, 6PW 43, 6ADM 28, 6KW 28, 6ASI 28, 6CXI 10, 6DDN 5, 6PN 3, 6BUF 2, 6BIA 12.

SAN DIEGO, G. A. Sears, SCM, 6BQ—6DAU leads in traffic this month handling lots of messages for the boys at U. S. N. Training School. 6AJM says sure glad convention over! 6OC, 6CRO and 6AAH still visiting with him. 6BXN had good traffic total. 6BQ is QRW on road and on air but little. 6ANC reports 6KD coming back on air soon as KGEN can release his xmtr parts. 6BAM has a 6EX rebuilt fifty now and has put up a Zepp antenna looking for skeds again. 6OX put in kenotrons and worked af1CR first crack. 6BWI has three daily skeds with 6DKJ. 6CNK is going to put in more power. 6BXI is laid up with an injured back. 6SB is in college and not much time on air. 6DGW blew his bottle. 6BFE says ND hr now. What's trouble, OM? 6BAS is grinding crystals for the gang. 6AKZ still in poor location. Traffic down again, let's boost it next month fellows. Several of gang who usually have good totals did not get reports in on time. 26th, don't forget.

Traffic: 6DAU 126, 6AJM 86, 6BXN 55, 6BQ 25, 6ANC 18, 6BAM 14, 6FP 14, 6OX 13, 6BWI 12, 6CNK 6, 6BXI 6, 6SB 3, 6DGW 1, 6BFE 1.

ARIZONA—Dan B. Lamb, SCM, 6ANO—6AZM thinks it would take a 204 to keep schedules from this particular location. 6CDU says BCL QRM is about to get the best of me. 6BJF is using a 201-A with 400 volts for xmitter and gets out nearly as well. 6ANO has doped Zepp antenna out to exact fundamental and working fb on 41 mtrs. 6BWS says the YLs are about to get him. Say do I have to holler every month for reports? Can't some of you fellows remember the 25th of each month? Come to life the rest of you that are asleep.

Traffic: 6ANO 107, 6BWS 21, 6BJF 20, 6AZM 4, 6CDU 12.

PHILIPPINES—Acting SCM, J. E. Jimenez, op1AT —This report by radio via op1AT and 6BVY—op1HR has the same skeds. op1DR worked nu5AOT. 1DL will try hard to keep the 6BVY sked with Hongkong and Shanghai. 1GZ sent a 30 watter west. DX seems to be improving.

Traffic: op1HR 504, op1DR 170, op1DL 84, op1AT 22, op1GZ 22.

SACRAMENTO VALLEY—SCM, C. F. Mason, 6BWS—No report from this Section this month. Everybody is rebuilding and erecting new antennas.

NEVADA—SCM, C. B. Newcombe, 6UO—We are glad to welcome a new station, 6LB at Mt. Montgomery, owned and operated by H. M. Wollam, agent Southern Pacific Ry. This station will be very useful this winter in giving out road and weather information for tourists as Montgomery Pass is on the winter auto route Reno to Los Angeles, Calif.

Traffic: 6BTJ 2, 6ABM 31, 6UO 1.

ROANOKE DIVISION

NORTH CAROLINA—SCM, R. S. Morris, 4JR—4OC is at last well pleased with the results from his set. 4PP is going to Palm Beach for the winter, Old 4DQ is back on the air in Statesville with a 5 watter. 4EC is now using 100 watts but is having rectifier trouble. 4SJ is QRW work. 4VH is handling lots of traffic on schedules north and south. 4OH has QRM from YLs again. 4DB is afraid his 50 is shot. 4ADJ is a new one in Durham with B batteries on a 210. 4JR is looking for a reliable schedule with Florida.

Traffic: 4VH 38, 4JR 14, 4PP 13, 4DQ 8, 4EC 6, 4OH 6, 4OC 3.

WEST VIRGINIA—SCM, C. S. Hoffman, 8BSU-8HD—The past month seems to have been one devoted to the installing and experimenting upon new sets. Another noteworthy event was the stepping off into marriage of 8OK. Best wishes, OM. 8AGI is working Europe with a new 250-watt set. 8DCM is rebuilding. 8VZ is at WSAZ. 8CNZ has a schedule with 8MQ. 8BJB worked OA and several Europeans. 8DNN reports having trouble with the BCLs. 8BNF is putting in a set at school. 8AUL still experiments with antennas. 8ADI is on every day at 6 a.m. and QSO traffic. 8BSU was heard in Egypt. The SCM regrets the ORS cancellation of 8SP and 8WZ on account of their being QRW.

Traffic: 8AGI 22, 8CNZ 43, 8BJB 14, 8AUL 6, 8ADI 1.

VIRGINIA—SCM, J. F. Wohlford, 3CA—3AG threatens to add another ham to his station. This station continues to work DX all over the globe and does his part of the traffic handling. 3KU also works lots of DX and shoves over some traffic. 3JT is putting 1500 volts on two fifty watters. 3WM continues to work good DX. 3TN works 20 and 40 with one 210. 3WO will have an old timer at his station shortly. 3CEB has been rebuilding consequently, nothing to report. 3NM had to cancel schedules on account of too much school QRM. 3BGS continues to plug away whenever he has the time. 3BZ is working on 20 meters and reports QRM from power leaks run him off the air. 3CKL sems to be the star station of the State. Besides himself, he has 6CHS, 4HB, 3BHM, ex-3AJG. The station works sink rectifier on 38.3 meters. The station worked 193 different stations this month.

Traffic: 3AG 38, 3KU 21, 3NM 3, 3BGS 11, 3CKL 25.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, C. R. Stedman, 9CAA—Things are picking up again in Colorado in general although several stations are off the air as a result of school QRM. 9CJY, one of the oldest ORS in the state, says he may have to quit the game for a year or so to finish school successfully. 9BQO, the new RM, sent in his report but forgot all about the ORS report. Get your mind off YLs for a while, OM. Hi! 9CAA has a flock of schedules in all directions and is now prepared to hit the BPL next month. He would have made it this month if the requirements hadn't been changed. Rumors are around that 9EAM has already more messages in November than his total for this Month. FB. 9DKM *thinks he is going to Sunny Calif.* 9ENM was up to Denver again and says things are moving along in Pueblo. 9CDE is still using his old 201 tubes and DX seems to have suffered none. 9CAW says he has the BC craze and a new BC receiver will blossom forth soon. 9CJC sends in his first report. 9EJW says he is on ONLY Mon., Wed. and Fri. for two hours each night. 9DQD reports by radio. He has a couple of schedules working but not very successfully as yet.

Traffic: 9CAA 102, 9EAM 54, 9DQD 31, 9EJW 11, 9CJC 16, 9CAW 8, 9CDE 8, 9BYC 7, 9CDQ 4, 9DGJ 2.

UTAH-WYOMING—SCM, D. C. McRae, 6RM—Everything is moving along in fine shape this month and with the coming of winter, our traffic total should keep on growing. The Radio Club put over their booth at the Utah State Fair in great style and it attracted a lot of attention.

Quite a number of new hams are coming on the air and it should put our Section still further ahead. Some new ORS are to be appointed and some dead ones to be cancelled shortly. 6BAJ has made application for ORS. 6BUH reports finding three new hams in Provo. 6BTX did some fine work this month but came very near missing this report. 6BAJ is working out fine and reports QSO with Japan. 6CRR has finally decided to be on the air again for a change and has his new set working fine. 6CQL is knocking 'em dead with his new sync.

Traffic: 6BTX 63, 6RM 52, 6BAJ 27, 6BUH 14, 6CQL 17.

SOUTHEASTERN DIVISION

FLORIDA—SCM, C. E. Ffoulkes, 4LK—The Miami Radio Club will hold their first hamfest in January with quite a number of prominent amateurs present. The SCM regrets to announce the resignation of 4NE as RM of the North Fla. Section. *The good wishes of all the Florida gang are with you, OM, and we hope to have you back with us again soon.* 4MS will relieve Webb as RM so please give him your cooperation, gang. NRRG is handling lots of Naval Reserve traffic and has 5 skeds. 4CK is Pres. of the Miami Radio Club and is working hard for the January convention. 4TK has a sked with 4UO and works Africa. 4MS says "there's a reason" for QSO's with 5ARG. 4AAO still has a sked with Cuba. 4LK is playing with a 250. 4RK is on the air every night. 4BN likes the 852 better than the ole 50. 4NE has requested the cancellation of his ORS. 4OB is getting out FB with his 250. 4TR is on for Naval Reserve drill only at present. 4OO is putting up a new stick for a Hertz antenna. 4HY has the Asiatic Blues. Will anybody lend him a sked? 4DU is moving so is off the air. 4AY kept a sked with 4SB. 4BL will be home soon. There has been a number of cancellations this month so watch your step, OMs. It only takes a few minutes each month to report and you'll wish you had.

Traffic: NRRG 98, 4CK 64, 4MS 16, 4TK 23, 4AAO 14, 4LK 14, 4RK 14, 4OB 11, 4BN 10, 4NE 6, 4TR 6, 4OO 5, 4HY 4.

ALABAMA—SCM, A. D. Trum, 5AJP—Alabama hams are picking up this month. A good report comes in from Birmingham and Auburn. 5DT and 5PD have combined their stations and are building a 50 watter in 5PD's barn. They have a very nice layout using the breadboard type of mounting. 5AXN has been off a month now being on vacation in the Maine woods (his home). When he got home, he found the city had bought the place which housed the outfit and had started building a high school on the site. 5WQ is not on much except after 11 pm but QSO's most everywhere. 5ARY is a fairly new ham having just received his license. 5ARG has been holding a sked with 5YB at Auburn and handles long messages home, exceptionally good traffic for Birmingham boys that are in Auburn this year. In Auburn, 5YB has a 250 watter going; 5OA has a fifty; 5AGA and 5AQW two 210's. 5YB had the misfortune to have an MG bearing burn out. 5OA worked an African station for the first time. 5YB worked on 37.6 meters. 5GG, 5DI, 5OM, 5WI, 5JP, 5XQ, 5VW and 5LU are ops. 5ABS hasn't been getting out as good as usually and has ordered a pair of 216's to replace his old chem. 5ADA is on every week-end handling traffic in the old reliable way. 5JY is getting out fine on one 210 and handling the majority of traffic here. 5AJP handled some early morning traffic this month. 5AJP is using a breadboard layout that perks fine. 5ATS is another new ham for Montgomery. He is using 5NL's set for a while. 5NL is in "status quo" stage until the moving question is settled. 5ON has been heard on the air lately. 5ATP paid the gang a visit.

Traffic: 5PD 12, 5ARG 28, 5ARY 9, 5OA 15, 5AGA-5AQW-5AST 23, 5WQ 11, 5AYL 24, 5AV 19, 5VX 10, 5JY 116, 5ADA 12, 5ABS 10, 5YB 80, 5AJP 16.

GA-SC-CUBA-ISLE OF PINES-PORTO RICO—SCM. H. L. Reid, 4KU—South Carolina: 4AAM at Charleston has a 50 watter temporarily until his new 100 is ready. He is on every day at 9:15 AM. 4EI likes his 852 and says its sure a go-getter.

Georgia: 4TK at Atlanta gave a test msg to oz-1OA and it was at nu8CCS about 10 minutes later. 4RN is busy with school. Is teaching the kid

brother the code and will have an asst. op soon. FB.
Traffic: 4RN 8, 4UO 39, 4NQ 39.

WEST GULF DIVISION

NEW MEXICO—SCM, Lawrence E. Radka, 5TT—Activity in this section is picking up with the advent of DX weather but more reporting stations are desired. Come on, fellows, and do your part to put this section to the fore in traffic handling. 5TT and 5LG are busy at the state A. & M. college, but will have a transmitter on the air soon. A college radio club is being organized and a 500-watt transmitter constructed. 5APB is waiting on new fifty watters but is pinch hitting with a UX-210 on 40. 5BH uses 20 meters to good advantage but his traffic total is low, due to illness. 5RO is the proud owner of a new ORS certificate, the first to be issued in this section. 5KS is rebuilding.

RM report—Conditions in this Section are still very bad. To date, only two stations have replied to my circular letter. 5BH has four schedules in operation and can't handle any more. Come on, fellows, snap out of it. Don't let one fellow do all the work. More routes and schedules are needed badly.

Traffic: 5BH 31, 5APB 5.

OKLAHOMA—SCM, K. M. Ehret, 5APG—Traffic handling picking up, plans laid for a State Convention to be held the latter part of February and plenty of other activity lend an encouraging prospect to this section. Plenty of new stations starting up and the only thing we need now is more pep and determination to get in our reports to the SCM. 5ANT has a German 30 watter and received an appointment on the Army Amateur Net. 5ZM is ready to go as soon as the 852 arrives. 5DQ and 5AEQ are fighting DX hard and find no time for traffic. 5ANL is resuming his usual schedules on 80 and trying to line his "gang" up better. 5ADO will be back on again and 5ASC is moving to Cushing. 5AQE is in consistent operation and handling some good foreign traffic, continuing to QSO OA and OZ when southern Aurora will allow. 5FJ nearly made the 100 mark but his transmitter on the blink held out on the messages necessary to round out the mark. 5ZAV and 5FJ snuck off to 5ZAV and boiled the stuffin outa the ole owl with a result of nr-2EA, nm-iB and OJA and several Aussies and Zedders to their credit. 5VH is still on the air at regular intervals but reports that High school and radio do not mix very well. 5DQ did handle some traffic with VOQ. 5ARX and 5AXL building 200 volts storage B for 852 fone sets. 5AIR is going strong on 20 and 40 and we are wondering what he will do with the three 5KW pole transformers he talked the light company out of. 5AMO will be back on the air by the time this appears in print. 5OH is a new ham at Geary. The Alpha Sigma Delta, radio fraternity, pledged ten radio men including 5JU, 5ACG, 5VT and several others.

5NB and 5LO located at Kiefer are operating on 80 meters. 5AFX has a new 59 foot pole. 5AAV is oscillating between Zep, fundamental and 3rd harmonic antennas. 5SW almost handled a msg but it eluded him. The SCM, 5APG has his xtal and first amplifier working on 80.

Traffic: 5AQE 8, 5AAV 10, 5APG 8, 5AIR 15, 5ANT 37, 5DQ 21, 5ANL 21, 5FJ 97, 5VH 21, 5QL 6.

SOUTHERN TEXAS—SCM, E. A. Sahm, 5YK—5VL leads in traffic this month with 5HE a close second. 5VL's new break-in system is working well and VL says three-way break-in ragchews are the berries. 5AVI has a new 203A to take the place of his blown H tube. He says DX is rotten. 5HE has been out of town part of the month. 5APM says weather is too warm to pound brass. 5MS, 5EW and 5ALH have all been off the air for various reasons.

Traffic: 5VL 16, 5HE 12, 5AVI 10, 5APM 6.

5ALA has changed his QRA to Refugio. 5PK is a ship operator on the SS *Jupiter*. 5MS has a portable set 5EX now. 5ALH has also gone to Refugio from Mirando with the new call, 5OV. 5HE reports that the BCRA had a fine talk by Kruse on his recent visit. 5HS also reports on Kruse's talk. We were glad to have you, OM. 5AHP is trying to make a master oscillator-power amplifier work. 5EW reports that he will be on as soon as he can replace some receiving equipment, that needs replacing.

Traffic: 5AHP 4, 5MS 12.

CANADA

MARITIME DIVISION

PRINCE EDWARD ISLAND—SCM, F. W. Hyndman, 1BZ—1CO reports keeping schedule with Brazil daily and has worked several other South Americans and oa-2XI. 1AP has been doing great work and is maintaining schedules on 20, 40 and 52.5. 1BZ is quiet.

Traffic: 1AP 75, 1CO 10.

NOVA SCOTIA—SCM, W. C. Borrett, 1DD—The gang need reminding that reports must be made to 1DD by the 20th of the month. Cape Breton stations can report to Holmes, 1BT, Sydney. 1CL has just returned from a trip with a portable set but is not very enthusiastic about results. 1BH and 1BI are on 20 meters most of the time and have been heard in Europe many times. 1BT is still plugging away on 20 and 40 working medium distance stations. 1BK has a new H tube. 1ED is now back at Kings College and so will be silent for some time. 1AR is heard on 40 and 20 often but has nothing special to report. 1DJ is still alive but only gets home week-ends. 1DD is on 20 meters most of the time and has no trouble working USA stations on Sun. afternoons. The upper Canadians are making great efforts to revive the Wed. Prayer Meetings but as they do not start until one AM Atlantic Time, it is hard on Maritime stations. Will the whole Maritime gang please make a special effort on Sunday afternoons to get on 20 and 40 meters and see if we can get back to our old days of fame and QSO's.

NEW BRUNSWICK—SCM, T. B. Lacey, 1EI—The N. B. stations are gradually coming back on the air strong after the summer months. It is also understood that there will be at least three new stations in N. B. this fall, two in St. John and one in the province. During the past month, receiving conditions have been very poor and stations reporting no exceptional DX or QTC. 1AX has been on regularly and is star station for this month. 1AD is busy rebuilding his transmitter for the winter. 1AK has rebuilt his transmitter and receiver and set up in new QRA. Both he and his OW have arranged several skeds which will be faithfully kept this winter. 1EI has dismantled his set and is moving into a new location. 1CB is often on the air but mainly testing on various antennae for best results.

Traffic: 1AX 62, 1AK 7.

ONTARIO DIVISION

ONTARIO—SCM, W. Y. Sloan, 9BJ—The close of another month sees winter DX season in Ontario well on the way. During this month, much good work has been done throughout the section. Efforts have been chiefly directed toward the making and keeping of many good schedules and the popularity of the 20 meter band is increasing with leaps and bounds. Wednesday night prayer meetings on 52.5 meters are being well attended and transcon messages are all the rage.

Eastern Dist: Kingston is heard from but Ottawa is still dead. From 3VS we hear that he and 3HE are on the air in the former city and they promise increased activity this winter.

Central Dist: The annual radio show at Toronto has just closed. 3EL, 3BL and 3CG did fine work. 9AL has been in constant operation on both 40 and 80 meters crystal-controlled and also on 52.5 meters on Wed. night. 3BL has done a lot of traveling lately on his motorcycle, and tells us that he has been to Windsor and discovered that there are some active stations even there. 3EL is in operation on 20. 3BZ and 3HR are waking up after being asleep all summer. 3PG is getting out with low power and B batts. 3MP is confining his operations to 20 meters and getting out FB.

Southern Dist: 3CB works on 83 meters and operates normally in the early AM. 3CS works on 20, 40 and 80 and keeps schedules with nc-3BK regularly. 3DZ is busy rebuilding for the winter. 3FU has concluded his rebuilding program and is on the air again. 3IA sends in the reports as usual and operates regularly on 40 and 80.

Northern Dist: 3HP and 3GG are active but there are no details from the latter. 3HP is on regularly using 20, 40 and 52.5.

Traffic: 9AL 21, 9BJ 4, 3DY 9, 3CJ 27, 3EL 2, 3BL 8, 3FC 37, 9BZ 16, 3DV 4, 3BT 2, 3IA 5, 3FU 4, 3CS 15, 3CB and 3BK 4.

QUEBEC DIVISION

QUEBEC—SCM, Alex Reid, 2BE—We are in the midst of the best radio weather of the year, and the gang is certainly taking advantage of it. The Lakeshore and Southshore are sure putting it over the City Division. 2BR of Pointe Claire is our star station again this month. 2BG, 2HV, 2CW and 2BE are on every night. 2AL and 9CX are the only consistent city stations. Come on, Montreal, get the old set perking and we want every member to take part in the coming tests. A very successful Radio Show was held during the month. 2BR, 2BB, 2HV, 3NI, 2BM and Mr. Wilder of N. J. should be given credit for helping make it a success.

Traffic: 2BR 105, 2BB 30, 2AL 7, 2BG 6, 2BE 6.

VANALTA DIVISION

ALBERTA—SCM, H. A. Asmussen, 4GT—4CC is the only station having traffic—he is now teaching school and shows the real ham spirit. 4BV has a brand new Jr. op. Congrats, OM. 4IO has had power trouble— put in some larger fuses, OM. 4AL is attending Univ. at Edmonton. 9CT and 4AG will soon be going strong. A number of new stations in Calgary will be on shortly and the AREA is doing good work. The Edmonton gang have formed a new club. 4HM is Pres. and big things are expected. 4CU has worked Australia, Hawaii and only needs a few more continents to get his WAC. 4CL is going to be a close second. 4HA and 4BC are working on 20 and says it is FB. 4FF has worked HU on low power. 4FB is a new ham and hope he puts it over FB. 4DG has gone to Seattle trying for a commercial ticket. 4GT and family motored to Calgary last week-end and report many new stations will be heard from there soon. 4AF is the new RM for the South half of the Section. Kindly report to him so he will get them in time to forward on.

Traffic: 4CC 20, 4GT 6.

BRITISH COLUMBIA—SCM, E. S. Brooks, 5BJ—5GO says that "school girl complexion" makes the tube look wonderful. 5CT appears to be the only representative we have at present on the 52 meter band. He keeps a sked with nc3FC. 5CC connects with the Aussies and Zedders. 5CJ will be working soon. 9AJ blew a couple of plate transformers while setting up a 250. 5AL is having trouble with a BCL next door. 5AU is preparing for a mercury arc rectifier. 5GF has a nice wooden frame ready for his transmitter. 5BK paid Vancouver a visit and looked the gang over. 5AJ has completed his relief work at DN and will have the heat perking again.

Traffic: 5CO 34, 5CT 7, 5GO 6.

PRAIRIE DIVISION

SASKATCHEWAN—SCM, W. J. PICKERING, 4FC—How about doing a little traffic moving once in a while fellows and letting the SCM hear about it on the 15th of each month? 4IX held a very nice party at Qu'ppelle Lake on Labor Day. Eleven of the gang attended and had a whale of a time. 4CP has skeds with 3FC and 9BZ. 4CB has an 852 perking with 600 volts DC. 4HS has an 852 too, now and is reported R6-7 by both coasts. 4GB has a 210 on the air every night. 4GA comes on once in a while. 4AS is working on his set at present. 4IX is building a shack for his 50 watter. Doc Fox has his outfit ready but is waiting for his license. Irish Adams has moved to Kingston and will soon be a 3. 4FA has been up north with the Forestry Dept. on radio work. 3FC thinks the gang at Vancouver are fine. 4HH has replaced his 250 bottle with a 7½ watter and now that the golf has finished, is beginning to take an interest in life again.

Traffic: 4CP 17, 4HS 10.

MANITOBA—4DU reports the gang are all going to be on regularly now, particularly on 52.5 and that a traffic contest is being initiated to pep up the boys. Nominations have been sent in for a new SCM who will be elected in Nov. to replace Rutland who resigned on account of press from other work. 4BT reports from college in Minnesota that he will be off the air until Christmas, but will have a crystal set on 77.5 and its harmonics during the holidays.

ADDITIONAL REPORTS

2ABY has moved to 173 Washington St., Mt. Vernon, N. Y. and is down on 20 meters now. 2BOW is rebuilding his autenna system and receiver. 2AGQ takes part in the USNR drills from NRRC each week. 1AFB keeps skeds with nc3DV, 1ANO, 8CRF, 3AFE. 8ZH is very busy and does not have much time for radio. 8MF copied most of the stations broadcasting on Navy Day. Good work, OM. 9CSI says 40 is punk so he sticks to 20. 9LV sent his report direct to Hq. when he couldn't get in touch with the SCM right away. 9BWZ handled a few. 8AGM sent in a fine low power report. Good work.

Traffic: 2ABY 11, 2BOW 17, 2AGQ 21, 1AFB 108, 8ZH 3, 8MF 20, 9CS 17, 9LV 351, 9BWZ 6, 5SH 7, 5AUA 4, 5RG 6, 5NW 9, 5HY 14, 5AHX 7.

TRAFFIC BRIEFS

2TP informs us that nu2ABS, H. F. Meyer, is now located in Cairo, Egypt, and has a 40 cycle *ac* outfit on 34 meters, under the call fe2VO. 2TP sent Mr. Meyer the equipment, and it seems to be working out well, as several U.S. hams have reported QSO with fe2VO. QSL cards may be addressed care of A.R.R.L. HQ.

A recent bulletin issued by the 7th Naval District, U.S.N.R., tells of a new drill system being inaugurated, the purpose of which is to give each station more regular traffic and relay work to handle. Briefly, the system gives the chain of control from Master Control Station NRRG to unit control stations, NRRQ, 4ACM, 4QY, and special detached control station 4IE. Each of these U.C.S. will handle direct contact with their local stations. Other members in this district are: 4BP, 4EZ, 4FS, 4HY, 4HZ, 4KK, 4LK, 4TI, 4IZ, 4IW, 4MW, 4TV, 4PB, 4ACR, 4BL, 4BE, 4II, 4NU, 4TJ, 4TR, 4UA, 4WH, 4WR, 4XE, and 4DM.

The 11th Naval District, U.S.N.R., is organizing a net in Los Angeles, with a master control station NRRW at HQ. NRRW is on 4240 kc. from 8 to 10 PM Tuesday nights. There is room for many more active amateurs, and all those interested are urged to get in touch with Headquarters of the District.

8JQ (Pittsburgh, Pa.) says, "During the past two months we have handled over 300 messages from WNP, WOBD, and nn1NIC. We have found the recipients of the messages much more appreciative than in the past. One man was so kind as to send us a box of 15-cent cigars, so we lived in luxury for a couple of weeks, and the radio room was blue with smoke. Another fellow sent us a big bunch of stamps, which came in very handy. nn1NIC sent us a pair of alligator hide slippers."

Eg5BY, who won the OFCS certificate for England in the International Relay Party, also gets credit for sending in one of the neatest and best logs. He tells us of the hectic time he had during the tests, and the facts are just too good to keep. He says, "I used two different antennas (one for 23 and the other for 45 meters), and I had to haul down the 23 meter one and put up the 45 at about 2 AM each morning. Lovely job in the dark,—especially those nights when it rained!!" 5BY's certificate, like many another, was won by determined effort and consistent operating.

Speaking of a sense of humor—lookit what we found on a card from one of 1MK's sked stations: "Cancel my sked until further notice. My station completely submerged when river overflowed bank tonight. All apparatus under water in first floor of house. Hi, Hi!"

9DTK suggests that all hams having skeds with other stations make out a list of their schedules and send it to all stations they work on schedule, each month, supplementing with corrections as skeds are added or changed. In this way each fellow in the chain could always know what schedules the next fellow has, which would aid materially in speeding up traffic and perhaps increasing deliveries. Try it, fellows.

NzEZ5 reports an FB bit of receiving work on the part of nu8LI, in taking a 153-word message from him with very few repeats. He says, "It was *real* A.R.R.L. work."

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