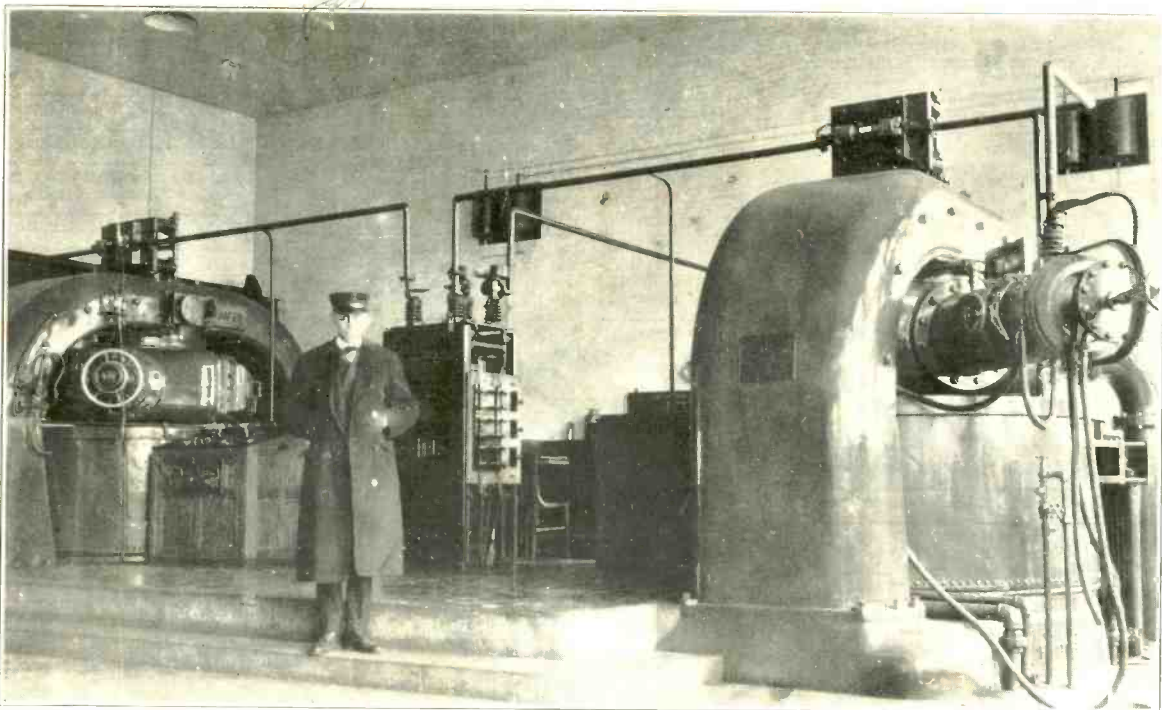


# RADIO TOPICS

MARCH, 1921

A Journal of  
Human Interest

15 CENTS



ANNAPOLIS, "NSS" 500 KW ARCS

The Heterodyne *by* J. J. Novak  
Vacuum Tube Transmitters *by* Dr. Lee DeForest  
My Experiences as Operator on a Limy *by* F. L. Schoenwolf

SIGN THE SUBSCRIPTION BLANK ON PAGE 18

*Published Monthly by The Chicago Executive Council*



# Quality Radio Apparatus



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No. 80 Mesco 1/2 K. W. with binding posts	4.00	No. CR-1 170-600 meters with tube control self contained.....	\$90.00	No. LC-100 with gears unmounted.....	\$10.00
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<b>Mesco Wireless Sparks Coils</b>		No. P-401 De Forest in cabinet.....	14.25	No. U-200 "A" Bat. Switch & Tel. Jack	3.25
No. 459 1/4 in., operates on 5 dry cells	5.00	No. P-500 De Forest in cabinet with 45 volts "B" battery	25.00	No. U-300 "A" Bat. Switch & Tel. Binding Posts	2.20
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Marconi	1.50	Brandes' Navy Type 3200 ohms.....	14.00	DL-400	2.60
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Perfection back mounting	\$ 1.75	No. 4 Chelsea .0006 MF. unmounted.....	4.00	<b>Antenna Wire</b>	
No. 12474 Paragon back mounting.....	1.75	No. 12087 Clapp-Eastham .0006 MF Balanced type	7.50	No. 10177 7 strand No. 22 tinned copper per ft.	\$0.01 1/4
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<b>Jacks</b>		No. 12089 Clapp Eastham .0005 MF.....	11.50	No. 14 Hard drawn copper per lb. (80 ft. per lb.)	0.50
No. 12158-W Federal N. P. 2 circuit.....	\$ 1.00	<b>Oscillation Transformers</b>		No. 1443 7 strand No. 20 Phosphor-bronze, per ft.	0.02 1/2
No. 12157-W Federal N. P. closed circuit	0.85	No. 270 Murdock	\$ 5.00	500 ft. or over per ft.....	0.02
No. 12156-W Federal N. P. open circuit	0.70	Thordarson	12.00	<b>Insulators</b>	
<b>Loose Couplers</b>		No. Z-652 Clapp-Eastham 1 KW. size	20.00	No. 498 Ball insulator	0.45
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No. 335 Murdock 1500 meters.....	9.00			No. 497 10 1/2 inch strain type.....	1.00
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No. 384 100 Amp. 600V. ground switch	\$ 5.50				
Weather-proof No. 4 ground wire ft.....	0.10				
Heavy porcelain cleats with screws for wire, complete	0.12				

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## Stop and Consider the Advertising Value of This Magazine

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OUR CIRCULATION IS RAPIDLY INCREASING, BUT IT IS NOT THE NUMBER THAT IT REACHES, IT IS THE RIGHT READERS THAT IT REACHES.

IT'S THE QUALITY, NOT THE QUANTITY OF A CIRCULATION THAT BRINGS YOU RESULTS.

A well known mail order house put in their first stock of radio apparatus about two years ago. They advertised every article in their catalog, which had a circulation of 10,000,000. They thought that they were reaching everybody and that their poor results were natural. They were recently persuaded to advertise in the radio magazines, with the result that they did more business with this circulation of less than 50,000 one month than they had done with their 10 million in two years.

JUST SO WITH ADVERTISING IN RADIO TOPICS; you reach the right FIELD AND GET RESULTS. HERE IS OUR PROOF: JUST WRITE TO ANY OR EVERY ADVERTISER IN THIS ISSUE AND ASK THEM IF THEY GET RESULTS. OR WE WILL GIVE YOU COPIES OF TESTIMONIAL LETTERS FROM ANY ONE OF THEM IF YOU SO DESIRE.

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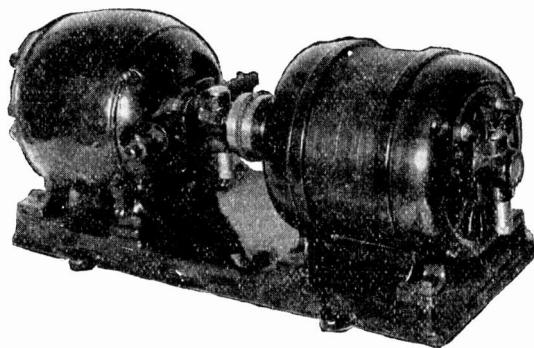
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CHICAGO

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"HYLO"

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RADIO 9 AG

CHICAGO, ILL.

# Attention Chicago Radio Men

The Chicago Radio Apparatus Co., formerly located at 3400 So. Michigan Avenue, announce their incorporation and removal to 508 So. Dearborn Street. On and after March 1st we will be in our new loop store and will henceforth do business under the name of Chicago Radio Apparatus Co., Incorporated.

Through the acquirement of greatly increased capital and resources, we will now be able to carry each and every piece of Radio Apparatus of merit, and our stock will be the largest and most complete in the Middle West. No matter what you want in the Radio line it can be found in our new store.

Our retail sales will be in personal charge of **Mr. Clarence Klentz**, who is without question the most able Radio Salesman in Chicago, and it is with extreme good fortune we have been able to secure his services.

**Local Customers:** We thank you for your hearty support which has made our expansion possible. In our new store you can easily reach us from all parts of the city, and we urge that you come and inspect our new apparatus without delay. **OPEN SATURDAY AFTERNOONS.**

**Mail Order Customers:** We thank you, too, for your trade which has been no small contributing cause of our success. In our new location, with greatly enlarged stock and personnel, you will secure even more prompt response to your inquiries than in the past.

We will continue to make "Immediate Delivery" our motto, and every order will be shipped same day it is received.

A new, big catalog will be ready for you soon. Watch for announcement. Send now for complete set of Bulletins, free upon request. Blue Print of a complete C. W. Transmitter for 10c in stamps. Kindly address all communications to our new store.

"Give us your business; we'll give you **SERVICE** you will like."

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Amrad Unit Detector .....	15.00
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Chelsea Panel .001 MF .....	4.50
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CHICAGO, ILL.

One-half block South of Dearborn Street "L" Station

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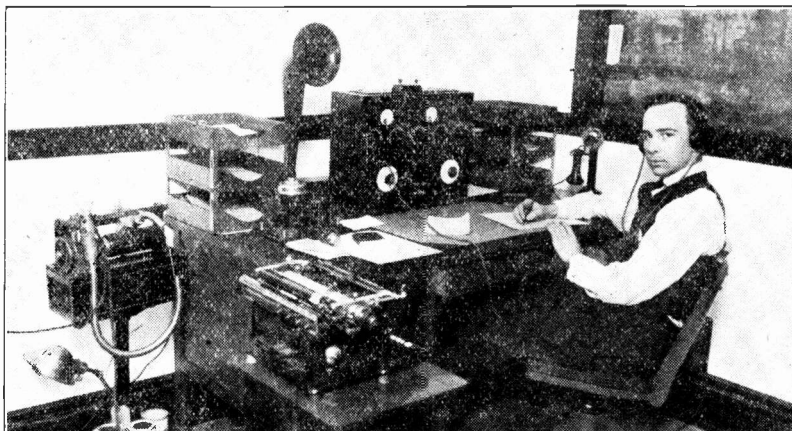
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Vol. I. No. 2



## Chicago Tribune Installs Radio *for Foreign Press*

Beating the Cable Route by Two to Six Hours

**R**EADERS of Chicago daily papers may be surprised to note the appearance of foreign news in the Tribune many hours before it is published in any other paper. This has become possible, much to the chagrin of their competitors, by the installation of radio equipment. Not only is the broadcasted press picked up, but their foreign correspondents now file their news for transmission via the new Bordeaux station in France. On the cover of last issue was a photograph of the towers of this wonderful station now signing LY and working on about 25,000 meters. The signals received at the Chicago Tribune are audible some distance from the receivers and can be recorded on a dictaphone if desired. The radio transmission beats the cable route by anywhere from one to six hours.

The aerial is of a loop design, measuring seventy by forty feet, and consists of twenty wires. The loop is supported by steel supports, which are fastened direct to the steel girders of the new building. The lead-ins run down through large insulators that were installed before the building was completed.

The loop is right in line with the Bordeaux station and is exceptionally directional, boats in the harbor just below and NUR only a quarter of a mile

distant causing no interference. The receiving apparatus consists of a special constructed long wave receiver with three steps of amplification. The wireless room is entirely shielded and grounded. Construction and installation was done by the Chicago Radio Laboratory.

The operators must copy the press direct with a typewriter and they sure do have to hop along when LY is hitting around twenty-five and makes no repeats. At times he will send almost continuously for three or four hours. A continual watch is kept, as press is received from some other stations, and they start at most any time of the day or night. There being no sending apparatus, the operator has to be on the job every minute and get it all correctly the first time. At the time Argentina quit the League of Nations the set had been just installed and the Tribune's correspondent, Lloyd Gibbons, put this news through by radio, resulting in a clear beat. Not one of the other papers knew a thing about it, which only goes to show the practical viewpoint of radio news service.

Four well known amateurs constitute the present staff, being Jimmy Crowds, late of St. Louis; J. F. Scholtes, C. H. Zeller and P. S. Pfeifer of Chicago.

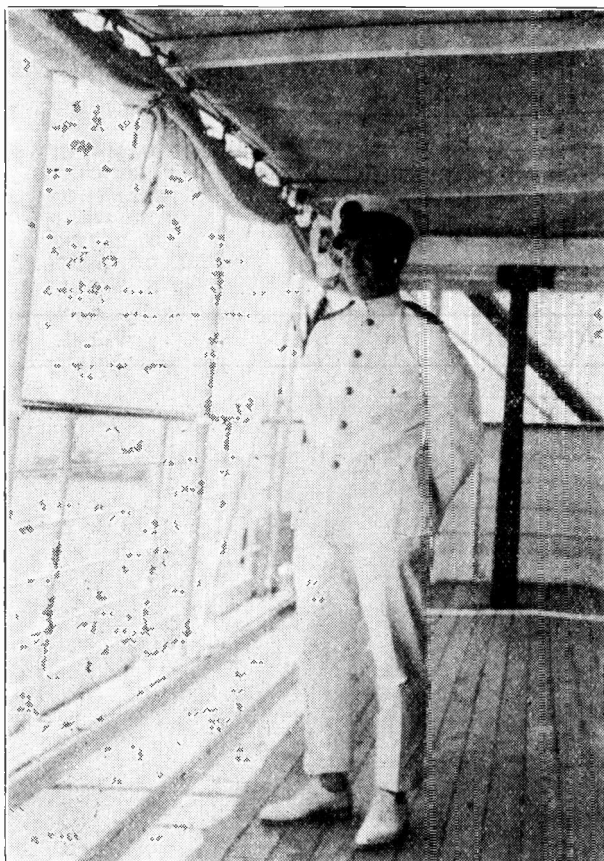
On December 18, last year, Rear Admiral Thomas P. Magruder, naval attache to the American embassy in

Paris, delivered to the French government this station at Bordeaux, which, by the way, was built by the American navy department at Croix d'Hins during the war to provide better communication with the United States, and presented by the United States to France.

This rather new commercial phase of the game should present an opportunity to both commercial and amateur manufacturers in the larger cities, who are well enough versed on long wave reception to make the necessary installation for such newspapers as they are able to sell on the idea.

It will be remembered, however, that it is almost impossible to hear any of the foreign stations during the summer season, which, of course, is somewhat of a drawback from a commercial standpoint, although the fact that a newspaper can get the foreign news from two to ten hours sooner for say eight months of the year should in many instances make it well worth the cost of installation and maintenance.

There awaits the ambitious radio-man many opportunities to turn his knowledge into dollars by merely applying it to the commercial necessities of the present day. Radio is no longer in the experimental state, and the radio telephone as well as telegraph is coming into commercial use more and more every day.



THE AUTHOR ABOARD THE S.S. MAYRO

## My Experiences *as* Radio Operator Aboard *a* Limy

The first trip of an American operator and 'ham'  
aboard an English sea-wagon

Story and Photos by FRED L. SCHOENWOLF

HAVING had that desire that all amateur radio enthusiasts are inspired with at some time or other to be a commercial operator on some boat, I started out by working on the pleasure boats plying between the ports on Lake Michigan during the summer vacation months. After a few summers of this, during which I must say that I had some very splendid times, I decided that I would like to try the ocean.

According I filed application with the Radio Corporation, and on February 13, 1919, I was assigned the berth of second operator on the S. S. Mayro. I was introduced to the first operator, Mr. A. Darlington, a man of wide and varied experience, who proved a most pleasant and interesting companion, and we soon became fast friends.

Having a natural curiosity as to how a sea-going vessel looked, I at once decided to give it the once-over. It proved to be a British passenger ship of about 6,000 tons, with passenger accommodations for about sixty first class and fifty second class travelers. Due to an unusual snowstorm, we were unable to obtain all of our cargo and were delayed in leaving some four days, during which time I became acquainted with all of the ship's officers, who turned out to be very interesting and enjoyable company.

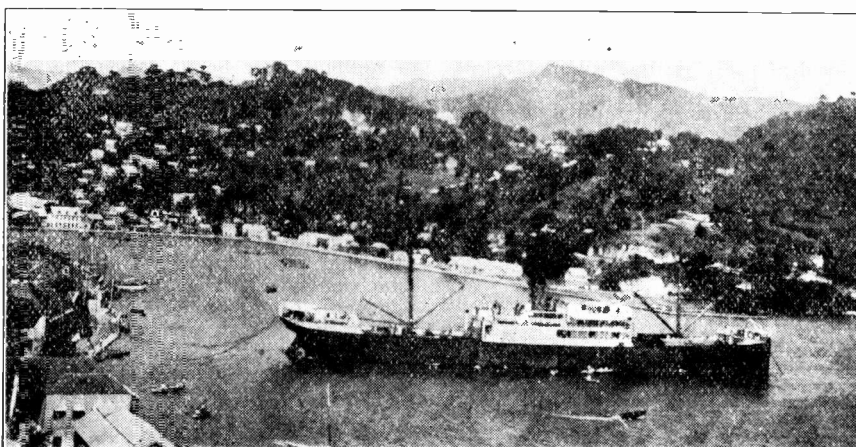
The radio apparatus was naturally of that peculiar design that is characteristic of the English Marconi Company. The transmitter was located in the usual British sound-proof room and consisted of a 1-½ KW transformer, oil

immersed condenser, synchronous rotary spark gap, block inductance and the necessary meters. The transformer drew about 35 amperes, resulting in an antenna radiation of some 5 amperes. There was also a 10-inch spark coil for auxiliary purposes. The receptor consisted of a British Marconi multiple tuner and magnetic detectors. The multiple tuner worked favorably and had a range of from 80 to 3,000 meters, with the wave lengths calibrated on the dials. The set was located in a very fine cabin on the boat deck. We were assigned to call MFR.

We left New York at noon a few days later, and everyone was glad to be under way, as the weather was get-

ting very cold. Tugs took the ship out of her berth, after which we proceeded down New York Bay under our own steam. We cleared the Narrows and then dropped our pilot at Ambrose Light Ship.

I then began my first watch, and believe me, I got the surprise of my life. Talk about your signals. Why, it sounded like the combined local jamming of New York and St. Louis amateurs. There were signals of every description, and calls of every nation on almost any wave-length. NAH, which is used by Brooklyn, Fire Island, New York City, New York Herald, Montauk Point, Sea Gate, Rockaway Beach, Sandy Hook and



We arrived at Grenada (BWI) the following dawn and drifted into the volcanic crater harbor

Montoloking, was heard continually, as were numerous other nearby stations. There were signals of every description and meaning from radio compass bearings to hydrographic reports. Greatly amazed, I spent my first evening listening to this maddening howl of signals.

The next night we started to take messages, and for the first time in my life I learned the cable count, so that I could really understand it myself. The following afternoon signals were audible through QRM from Cape Hatteras (NDW) and Virginia Beach (N(Z). Later in the evening it was possible to copy NGE through the angry mob.

During the next few nights various stations would come banging in as we came abreast, but soon died out as we proceeded, all with the exception of Miami (NGE). This station would come rolling in so loud that I at first thought that we were only about a hundred miles distant, but I found that even when we were directly abreast with Miami we were some 820 miles off shore. Just south of this point there seems to be a sort of dead spot, and while traveling through this zone very little work can be done. It is rather a strange feeling that comes over you for the first time when you call some nearby ship and ask for QSR and you find everybody QSN. This sensation, however, soon wears off.

A day or so later we came within range of San Juan, Porto Rico (NAU), Saint Thomas (NBB) and St. Croix (NNI) of Virgin Island. After six days we sighted Sombrero Light and our course was changed to SWS.

From then on we saw numerous small islands of volcanic origin, many of which were inhabited. One of these, known as Saba, is quite interesting, having a population of over one thousand. They practically govern themselves, as no one seems to want the job. At one time it was owned by Holland, then by France, and finally, as usual, by Great Britain.

We arrived at Grenada (BWI) the following dawn. Drifting into the volcanic crater harbor with all flags to the breeze, British Union Jack on the foregaff, British mercantile flag on the aftergaff, house flag on the main mast and U. S. M. and quarantine flags on the signal halyards, it is indeed a beautiful and thrilling sight, which I will

long remember. As we come to an anchorage, numerous native boats come alongside at the gangway to take one ashore. For this they charge sixpence. The passengers pay, but the boat officers don't (after the first time).

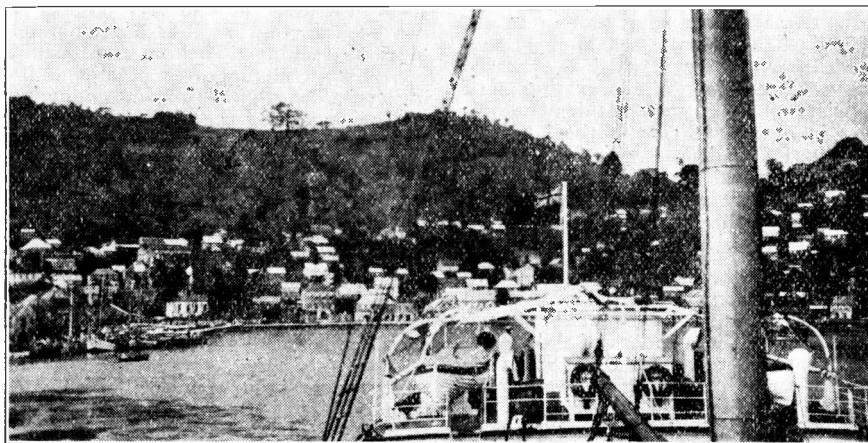
In company with a couple of companions I proceeded to do a little sight-seeing, with one of the native boys showing us the points of interest. The chap that we picked proved quite amusing and for our benefit he shinned up a tree fully seventy-five feet high and threw down green coconuts to us. These coconuts are not the ones we are familiar with in the States, as they have green husks which covers the shell and make them very large. We also bought a large bunch of bananas for a shilling (about a quarter) and had the boy cart them on board for us. We took a carriage ride through some of the various coconut plantations and were glad to return to the ship. At sunset we hauled anchor and proceeded on our way to Port of Spain, Trinidad, ninety-three miles distant. We again reviewed the impressive sights of the Windward Islands, but for some reason were glad to be on our way to the Island of Trinidad.

Early in the morning, before sunrise, we sighted Trinidad light, which guides us to the Bocus of Columbus fame. The Bocus is a narrow channel cutting through the mountains. On one side is the Island of Trinidad and to the right is Venezuela. After passing through the Bocus, the City of Port of Spain is plainly visible and is only a matter of a short run. The usual doctor and pilot come aboard again, as this is another colony and a paratique is necessary. The harbor of Trinidad is very picturesque and incidentally well protected. The harbor here is very shallow, making it necessary for us to anchor about two miles out. After the doctor has examined the passengers, the company's tug takes them ashore. The usual herd of washwomen and longshoremen then come on board. The washwomen are fairly reasonable, doing up a suit of whites for a shilling. The work is generally satisfactory, even though they occasionally rip a shirt to pieces. Their methods differ somewhat from the American laundry, as they beat the clothes with sticks on rocks and then allow them to bleach in the sun. A white uniform lasts just about four rounds.

As soon as we anchor the discharging of cargo commences, and as this will take some four days to accomplish, we have ample time for sight-seeing and amusements. Port of Spain is at the foot of high mountains, but even from the ship towers of the radio station VPL are plainly visible.

We went ashore in one of the company's launches, and after passing through a warehouse away from the jetty, we came upon a pretty parkway which extends through the entire length of the city. Within 300 feet of the jetty the radio station is located, the spark of which can be heard for a block. The station shack is surrounded with barbed wire fence and is guarded by armed soldiers. After going through the usual red tape, we were permitted to enter and view the apparatus. We were first taken to the transmitting room. At the time we entered he was calling Barbados (VPO), and believe me, his spark sounded like a cannon. They do not believe in spark muffling down there. The transmitter consisted of a five-kilowatt synchronous composite set discharging in open air. The oil condensers and oscillation transformers were about six feet high. We were then shown the engine room. Here a large gasoline engine drove a ten kilowatt dynamo, generating power for storage batteries. The transmitter was operated direct from these batteries, which almost entirely filled a room twenty by thirty feet. I believe that there were 300 cells in glass carboys in use at the time. The auxiliary was a duplicate of the one we had on board the ship. Lastly we were shown the sound-proof operating room, which housed the receiving set and necessary transmitting meters, switches and circuit breakers. The receiver was of a late design and carried an arrangement which was supposed to eliminate static. I guess that they honestly thought that it worked, too. A vacuum tube was used as a detector in conjunction with a seven-stage amplifier. The set worked exceptionally well. The bulbs were about one-half inch in diameter and about three inches long, placed in a socket affair similar to a cartridge fuse. They used eight volt "A" batteries and thirty-two volts "B" battery. The well known Brown phones were in use. The traffic at this station is very heavy, as they handle all cable telegraph traffic from British Guiana via BZL and relaying to FKQ then via the French cable to United States. Before leaving the station the chief operator told us that it would not be of much use to stand watches after midnight, as his operators worked so hard throughout the day that they usually rest at night. The station is owned by the Trinidad and Tobago Wireless Telegraph Company, but is controlled indirectly by the British government.

Leaving the station we continued our sight-seeing and took a carriage to visit some of the plantations on the outskirts of the town. A guide took us to various places and explained the different growths. We saw a number of caoutchouc trees, from which rubber is obtained. I am not sure whether these are the trees from which they make the well known rubber contacts



At sunset we hauled anchor and proceeded on our way to Port of Spain, Trinidad

or not. There is an abundance of bamboo, which grows in bush style and is thirty to forty feet high. Bananas are also very common down here. Banana trees grow from ten to twenty feet high and, contrary to the general belief, the banana bunches hang from the trees with the stems hanging down and the bananas pointing up.

We made a number of interesting trips to the mountains and made short trips to the nearby bays. Trinidad boasts of a few large stores and hotels. The stores are of a chain system established throughout the entire British West Indies and are known as Stephen's Ltd. stores.

The Harbor of Trinidad is very pretty and is comparatively cool. There are ships at anchor of every type and representing almost every nation. On the particular night that we were there, an American Shipping Board vessel, the only American boat then in the harbor, caught fire. This boat, the SS. Balabac (KEGD), had just come down from New Orleans with a million and a half square feet of lumber and intended to discharge here at Trinidad. The ill-fated ship had three fires in the bunkers, ran short of coal near Barbados, ran aground at Bocus Reef, sprung a leak that could not be located and then finally ended the voyage by burning to the water's edge. At the time the fire broke out there was no steam and consequently no light and, further, no water at the pumps. And besides all this, there were only four men on board. These men fought the fire until all hopes were gone and then were rescued by a launch in the harbor. When all chances of ever extinguishing the flames was gone, the Balabac was beached, where she burned steadily for two days.

None of the officers or crew of the lost ship had any clothing left except the scant garments they wore at the time of the disaster. Some of the officers were placed aboard our ship to come back to New York with us, and in spite of the fact my boat was a British vessel with an English crew, who have little use for Americans, our bunch got together warm clothes and a collection of money besides.

Some days later we left Trinidad bound for Georgetown, Demerara, B. G., a distance of 365 miles through rough and shallow water. Two hours previous to our departure the Royal Mail steam packet ship Chignecto left, also bound for Demerara. I had quite a "ham-fest" with their operator on the way down. They were a bit slower than we were and we sighted them just abeam about 5 the next morning. By 9 o'clock we had passed them and were leaving them far astern. I asked their operator if he wanted a tow line, and he came back with "NO" at about forty words per. We got in about two hours sooner than they did. The next morning we went over to visit them and they proved to be good sports, as we had a bottle of real English brew to settle the argument.

We stayed in Demerara only two days, as there was a longshoremen's strike on, with no settlement in view, so we soon turned back. Arriving, however, we docked on the Demerara River in the heart of the city. The

#### THE VAMPIRE

A fool there was and he went to sea,  
Even as you and I.  
And he choose a life of misery;  
Though the poets call it brave and free.  
Yet a fool he was and a fool he'll be,  
For only a fool will follow the sea;  
Even as you and I.

The life we spend has a bitter taste  
When we turn again to the land,  
And the land rejects we derelicts with  
our withered minds  
As mental wrecks with a cold disdain-  
ful hand.  
Oh, the joy we lost and the love we lost  
And the light of the home we planned  
Was won by the man who stayed  
ashore,  
Who had brains and sense and a whole  
lot more  
Of the things we never could under-  
stand.

A fool there was and his life he spent  
in a vile life that was never meant  
For a thing that God his image lent.  
But he goes to sea with his own con-  
sent;  
For only a fool knows a fool's content,  
Even as you and I.

All that he owns is his foolish hide,  
That is carefully placed or flung aside  
To sink or float on that deep sea tide,  
Where some of him has lived, but most  
of him died.

country here is exceedingly hot, and at noonday it is impossible to walk about. A nice cool night is about 98 degrees. The shore line here is protected by a massive concrete wall and extends as far as the eye can see. This is made into a parkway, and has numerous benches where one may lounge around and enjoy the cool breezes and so forth.

The radio station here at Demarara belongs to the British government and is quite a large outfit. The antenna system consists of three large tubular masts in line, supporting two cage aeriels. The spark transmitter is a five kilowatt composite set similar to the one at VPL. This station works on different wave lengths anywhere from 600 to 1,800 meters. The receiving set is of the British naval type and contains the usual string of bulbs. In addition to their spark set, they have a ten kilowatt CW set, which is operated on 9,000 meters. The operating staff consists of fifteen men besides the officers in charge. Prior to the late war this station had two calls, BZL being used for naval traffic and VPA for commercial traffic. Now, however, the call BZL is the only one used.

After leaving Demarara we returned to Trinidad, but instead of going to Port of Spain as we previously had done, we went to La Brea. The pitch lakes, one of the wonders of the world, are located here at La Brea, and it is indeed most interesting to watch the loading of pitch for shipment. We stayed here about three days taking on two thousand tons. These pitch lakes, although owned by the British, are

now leased for ninety-nine years to an American concern.

Leaving La Brea we return to Port of Spain and spend three days here taking on a miscellaneous cargo of cocoanuts, coffee, nuts, chicle, spices, hides and a few other things. We are now ready for the return trip.

After leaving Trinidad we return to Grenada for a few hours, and then start back for New York. There is a whole week ahead of us, and I spent most of my time getting acquainted with the passengers and indulging in various pastimes. A favorite sport aboard was to bet on the total mileage traveled each day. Every noon a position report was posted stating the latitude, longitude, miles per day and the total mileage. The passengers would bet on the last number of the miles per day. Being a dollar a chance, it was quite interesting.

About two days from New York the passengers begin to bring up their messages, and then the fun begins. They have in most cases only English money, and we had to turn in American money to the company. Naturally, we charged them the additional fee for the difference in rate of exchange. Then you should have heard them raise a howl. Probably the way I figured the rate of exchange they had some good reasons for kicking. I played a safe game, you see. I sure had some job convincing some of them that I had the right dope. The rate changed about every twelve hours, so I had to do some neat figuring in order that I should be nothing out when I changed my receipts back into American money. However, I don't recall that I ever got the worst of it. Then I would often have some bright nut come up and file a code or cipher message. As a rule he didn't know what he wanted, and I had to continually be on the lookout so as not to get stuck on any traffic charges.

Approaching New York the first thing to come in sight is the famous Ambrose Light Ship and then the still more famous pilot ship, Sandy Hook. The pilot, upon coming aboard, gives us the latest news of the States, and we, or rather I, begin to feel at home. The pilot conducts the ship through the Narrows, where we stand by for quarantine, immigration and custom inspection. We then proceed down New York Bay. In the distance, on the New York skyline, looms the thrilling Statue of Liberty. And you can be assured that it is a grand and glorious feeling to behold once again your own United States. After visiting for a length the foreign countries and being among the lower element of the tropical lands, it is indeed the greatest of thrills to return to such a wonderful country as ours.

After this it is only a matter of a half an hour of excitement before we dock. Friends rush aboard to welcome home the arrivals . . . but no such happy welcome awaits us, no greetings, no cheers. But it's only for a moment, and it's all in the game.

I, in concluding, should say that I, an American radio operator, have made numerous trips aboard a British "Limy Wagon," and I will never regret these eventful trips. The worldly experience gained is well worth while.



# Radio Telephone and Telegraph Transmitting Apparatus

**R**ECENT progress in the development of the oscillion or vacuum tube type of radio telephone equipment has been most marked since the war. The requirements have increased so that at the present day it is necessary to manufacture many different types to meet the demand. This is greatly due to the fact that the radio amateur has taken up radio telephony seriously, so that continuous wave equipment is rapidly replacing the old-fashioned spark apparatus. It is also because commercial organizations requiring communication facilities to operate their business have at last been convinced that the radio telephone has been developed to a commercial stage and is no longer experimental.

By DR. LEE DE FOREST

This is the first of a series of articles to be written for us by the well known Dr. Lee De Forest.

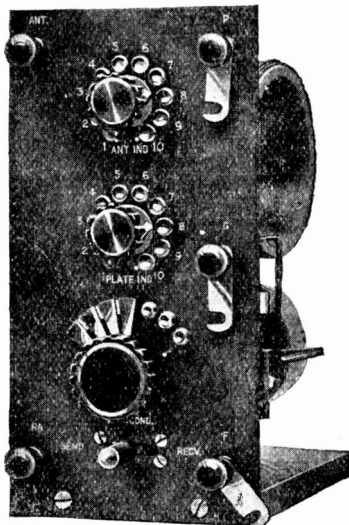
Because of the increasing number of bulb transmitters, it is hoped that this article will be of some benefit to those interested in CW.

Dr. De Forest will very shortly give us an article on station 2XX and also some information on the more recent developments of the radio telephone.

The type OT-10 "Radiophone" is a 30-watt set, well known in the amateur field. This equipment, together with the type O alternating current radiophone, has been on the market now for some time, and it is rare that an amateur listens at his station of an evening now without hearing at least one of these types at work. The illustration shows how the four oscillator tubes are mounted on the face of the panel. The control button for the relay transfer switch is near the bottom at the left, with the control rheostats for the filaments of the tubes above it. Meters are provided for registering the filament plate and Antenna currents, and tuning is done by means of the grid condenser and Antenna series condenser with control knobs on the face of the panel. The helix, modulation

transferring the aerial from the receiver to the transmitter, as is the case with all types of transmitting equipment manufactured by the De Forest Company, with the exception of the very largest sets.

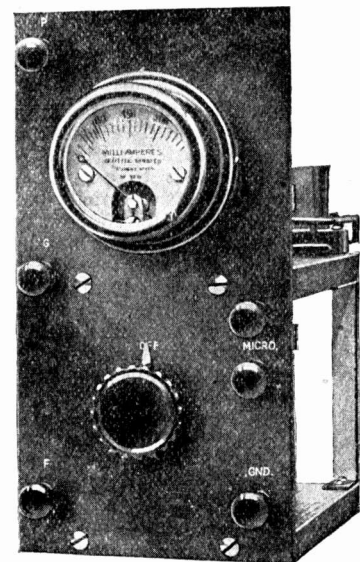
The latest addition to the De Forest family of transmitting apparatus is the type OT-3 "Midget Radiophone." This little outfit illustrated herewith is mounted on a panel only 9 inches square and is capable of producing remarkable speech over distances up to fifty miles. This 3-tube equipment is complete in every detail, even to the transfer switch, and may be connected to any power supply designed for the tubes that are used. This equipment has an advantage over other types of De Forest equipment in that the tuning is accomplished by means of tap switches on the face of the panel, so that a very sharp resonance point may be easily obtained with correspondingly increased efficiency. The "Midget Radiophone" is made up of two separate panels, each 4½ by 9 inches in size, which are linked together by means of the connecting straps. This innovation in design allows the experimenter, if he so desires, to purchase only the tuned aerial circuit panel to be used with tube receptacles, rheostats, etc., that he may have on hand, with the idea of purchasing the tube unit at a later date to complete the equipment.



"A"—Panel No. 1, Type OT-3

The De Forest Company at present is manufacturing transmitting sets ranging from 5 watt input to an input of 4 KW. These equipments have telephone ranges of from 1 mile to 500 miles and telegraph ranges up to 2,000 miles.

The smallest set manufactured is known as the type OT-5 "Buzzer Radiophone." This consists of a small panel containing two rectifier tubes and an oscillator tube of the VT type. The power supply for this set is obtained from two 6-volt storage batteries. One battery takes care of the filament supply for the tubes and the other provides a source of power to operate a double vibrator buzzer of the spark coil type or direct current transformer. This buzzer delivers a potential of 1,000 volts at the terminals of the secondary coils, which is an alternating current of pulsating type. This current is automatically put through the rectifier tubes to deliver a fairly constant pulsating D. C. to the oscillator tube. The transmitter is provided with a relay control switch for

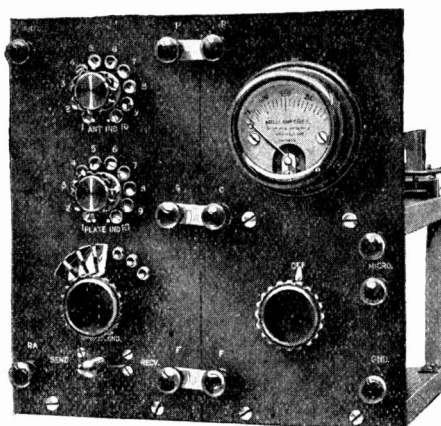


"C"—Panel No. 2—Type OT-3

transformer, grid leak, filter coils and condensers are mounted in the rear.

The type O "Radiophone" is identical with the OT-10, except that the panel is longer, as it contains in addition two rectifying tubes. A transformer for supplying the power is mounted on the base in the rear. This type of "Radiophone" is to be discontinued shortly in favor of the OT-10 with a rectifier cabinet, designed to be placed directly beneath the former. There will be no difference as far as the operation of the set is concerned, except that a new filter system has been worked out for the rectifier cabinet, which is an improvement over the filter in the present type O, in that it reduces the A. C. hum to practically a negligible quantity.

The De Forest Company also makes a type OT-20 "Radiophone," which is identical with the type OT-10, except that it employs eight oscillator tubes



"B"—"Midget Radiophone" Type OT-3

(Continued on page 16)

# Elementary Electrical Principles

Learn them well, apply what you learn and you will be a better radioman  
and have a more efficient station

**I**N last month's issue of RADIO TOPICS the writer attempted to impress on the radio enthusiasts the great necessity of studying the science of radio telegraphy in a systematic manner. Unless the amateurs use this method of procedure no gains will ever be made and the underlying principles will be misunderstood, simply because of neglect.

It is the purpose of this article, which we will call lesson 1, to introduce the most fundamental ideas dealing with the electric circuit. If the student who is about to enter into wireless will read and study each succeeding article in a thorough fashion, he will soon find himself well equipped with sufficient training to advance from the simple to the complex.

The first thing we should devote our attention to is the basic laws governing the flow of electricity in power circuits. We assume that electricity is something which is always present, which is around about us at all times in what may be called a stationary form. Now, the most important thing which is necessary is to create some method of making this electricity move. We may liken electricity to a mass of water in a lake. The water is there, but if we wish to make it move in order to obtain from it power, we must apply some pressure to bring about this movement. Take, for example, the water in your river or your well. How are you going to get this water from the river or the well up to your house, which is located several miles distant? It must be admitted that pressure is necessary, so in the case of water we must apply a pump to force that water through the pipe. So is this true with this great big reservoir of electricity, and then if we provide a suitable channel through which it may be conducted, current will flow. This we will call the electric current. The pump which is used in pushing electricity through this channel is called the electric generator. The generator will drive the current through the wire just as the water pump drives the water through the pipe. This electric pressure apparatus may be a dynamo, or it may be a battery. We will confine our attention at present to the former and allow the battery to be taken up in another lesson. In the case of water the pressure is reckoned in terms of pounds; that is, so many pounds of pressure. In the case of the dynamo we reckon the pressure in terms of VOLTS. It is obvious that if we have 100 volts applied to electricity that the current will flow 100 times as fast as it would if we only applied 1 volt (provided we use the same size conductor and retain the same length). If 100 volts will not pass the necessary current through the conductor, then we will have to increase the voltage or pressure up to the proper point when the required current value will be reached. In cases where trans-

By HARVEY MITCHELL ANTHONY

Here, fellows, is a wonderful opportunity to learn something of value. Mr. Harvey M. Anthony, a consulting electrical engineer and expert radioman, has written a series of six lessons, one for each month. At the end of each lesson will be ten questions that you are to answer after studying the article. Answer each one carefully and neatly and mail at once to Mr. H. M. Anthony, Muncie, Ind. He will mark your paper, and the next month we will publish a list of those that passed. Then, at the end of the six lessons, those that have been above grade every month will receive a beautiful certificate, certifying your knowledge, and signed by H. M. Anthony, E. E., and our engineer.

It don't cost you a cent; there is no red tape. Go to it and win a certificate.

formers are used for wireless sending sets, the city voltage is usually applied, and the ordinary pressure under these conditions is approximately 110 volts, this being the common house lighting voltage in most cities.

Now, assuming that we apply this 110 volts pressure to an electric circuit, a current will flow. However, we must be able to regulate this current, for too much of it will burn out our apparatus. Voltage is only one of the considerations which determine the current strength. Probably the most important is electrical resistance. Resistance is without doubt the most general property of all power circuits and should be carefully studied by the student. In the case of water flowing through a pipe, the water must actually move from point to point, from the pump to the receiving end, where it is to be used. Wherever the body of water moves the channel through which the flow takes place offers more or less opposition to the flow. That is, the water pipe has certain properties which will regulate the flow to a large extent. It is plain to be seen that if the pipe is small in diameter the flow will not be as easy as it would were the pipe of large cross-section. The pipe also has an inside surface upon which the water rubs when flowing, and this inside surface will offer more or less opposition. If the pipe is twice as long (and of the same area) it will offer twice the resistance. Hence we find in the flow of water this important factor of opposition offered to the flow. In electricity we find exactly the same thing. The unit of electrical resistance is the OHM. In electricity we deal with wires just as in water we deal with pipes. Wires have certain properties and the laws governing electrical

resistance in these wires will be explained briefly as follows:

(1) The electric current is conducted through a wire and not along its surface. Thus a wire having twice the cross-sectional area will carry twice the current. The larger the wire the less will be the resistance offered to the current flow. The smaller the wire then the greater will be the resistance. Wire sizes are rated in circular mils. The circular mil is the area of a wire whose diameter is one mil (one-thousandth of an inch). A number 14 Brown & Sharp wire is one having a cross-sectional area of 4107 C. M. A number 6 B. & S. wire has a cross-sectional area of 26250 C. M. Thus we can plainly see that the No. 6 has over six times the area of the No. 14, consequently the resistance of the No. 6 will be about one-sixth that of the No. 14. By increasing the size of a wire we can reduce the resistance. This factor of resistance is very important in radio circuits, and unless we watch it pretty carefully trouble will arise and our circuits will be inefficient. The advice is to make the resistance as low as possible by using wire of the proper size.

(2) The resistance of a conductor is directly proportional to its length. A wire, say a No. 14, has a resistance of 2.5 ohms for every 1,000 feet of length. If the line is made 2,000 feet long, then the resistance will be doubled and the actual resistance will be 5 ohms. On the other hand, if only 100 feet of this wire is used, the resistance will be one-tenth of the thousand foot resistance value, which will be one-tenth of 2.5 ohms, or 0.25. It is my advice to the wireless man to make his power leads as short as possible, thereby reducing his resistance.

(3) The resistance of a conductor depends largely upon the material with which the conductor is made. A silver wire would really be the best conductor we could use, but unfortunately the cost of silver prevents us using it in our radio circuits. The next best conducting material is copper. Copper is what we employ in our electric lines. A pure element is, as a rule, a better conductor than an alloy. Silver is the best, copper next, aluminum next, iron next and German silver last. These are materials out of which conductors might be made. Iron has about six times the resistance of copper and German silver has about twelve times the resistance of copper. For this reason iron and German silver are both used for making resistance coils, for they offer considerable opposition to the passage of electric current. Resistance, being so important in radio work, deserves a lesson in itself, and such a lesson will be considered later.

(4) The resistance of a conductor depends largely upon the temperature of the wire when the current is flowing. As a wire becomes warmer its re-

(Continued on page 15)

# Editorial Expressions and Timely Comments

## Everybody's University

HERE are radio amateurs in this country who talk interestingly and wisely and there are others who talk dully and stupidly.

There are fellows who know what is going on in the radio game and intelligent enough to speculate about the reasons for it.

There are fellows who take a live interest in radio and radio organizations who think wisely and act wisely.

These are the interesting fellows that you like. They are interesting because they know what is going on. And they know what is going on because they read the radio magazines.

The magazines are everybody's university. No one need be uneducated if he will read the magazines carefully and intelligently.

They present to you periodically the latest developments and happenings with comment on them, if you care for comment.

They give you the biographies of all men who have accomplished things. They tell you of all the inventions that are made in the field, of all progress in radio science and education.

The man who reads the magazines and thinks about what he reads will soon be an educated man. He will talk intelligently because he will think intelligently. A radio education consists to a large extent of a knowledge of the daily happenings, and there is no way in which this knowledge can be gained so easily as by discovery of what is going on and why.

All able statesmen, all interesting writers and all experts in any line are careful students of the publications covering their individual field. And it is the magazines which are the recorders of events wherein you should study.

When a fellow tells you that he merely looks at the pictures and skims through a magazine and is wearied with the mass of details published, you can well set him down as a stupid person. When you hear someone talk wisely about the latest radio developments and affairs, set him down as a careful reader of the radio publications.

The magazine that scours the country for the latest material and events that you may know all is a better university and a greater source of knowledge than anything else you are likely to ever find. Make use of it and you will have no excuse for continuing in ignorance.

It seems almost incredible in these days that there should exist any business houses who are not thoroughly convinced of the inestimable value of publicity.

## The Upward Trend

In radio, just as in any other technical art, progress and improvement is exceptionally rapid, and with such progress goes the modification or elimination of past and present methods and equipment. The advent of CW transmission as a practical factor in the amateur field is beginning to make itself felt as an actual feature of relay communication. We do not believe that CW will supersede spark transmission any more than the invention of the telephone and its present stage of development has affected the telegraph. Each has its proper sphere of usefulness and each must function in co-operation with the other. Our A. R. R. L. relay routes have heretofore been formed almost altogether of spark transmitting stations only. Spark communication is at its worst in summer weather and under daylight conditions. CW seems to overcome these difficulties, partially, at least. CW, however, has the disadvantage of being so sharp as to make calling without pre-arranged schedule futile.

The ideal combination is that of spark for calling and ordinary work, and CW for transmission through static or spark interference, or under abnormal conditions under which spark transmission is difficult. As more and more of our better long distance stations add CW transmitters to their equipment our already established routes approach this ideal condition. These combination routes are already in practical operation from the north to the south and from the east to the west boundaries of our Central Division.

Messages are being handled consistently over two well-defined routes of this type, the first being from Minneapolis to St. Louis via 9XI-9XM-9ZN-9PQ-9XZ-9ZB, etc. The first five stations on this route have both spark and CW equipment. The east and west route runs from Minneapolis to Salem, Ohio, from which Pittsburgh and New York connections are made. This route runs via 9XI-9XM-9ZN-8ZG, all of which are dual-equipped. These routes have functioned properly on daylight tests and handle traffic with exceptional ease under normal conditions. Our League Traffic Manager is endeavoring to establish chains of this type throughout the country, and we look forward with much interest to the time when "QSY-CW" will become universal.

Our Service Department has studied this question at considerable detail and can advise you as to the design and construction of apparatus whereby your station may become dual-equipped and may participate in the present rapid advance in the radio art.

## An Open Letter From the New 9th District Radio Inspector

The new radio inspector of the ninth district has been in office in Chicago but a short time but he has already strung an aerial and installed a calibrated receiving set at which he has been spending quite a bit of his time lately and which accounts for the fact that he is very much put out over the way some of the amateurs are disregarding the government regulations. Quite a number have been heard using unofficial call letters and others who do not use the entire call.

This must be corrected and all stations should sign fully at least once for it can be appreciated that there may arise a time when it would be of vital importance to get into wire communication with a station which would be impossible unless it could be identified through its call.

There can now be no excuse for not following this rule and the Council as well as the inspector will find it necessary to prosecute any future violators.

DEPARTMENT OF COMMERCE  
Navigation Service

Office of Radio Inspector 629 Federal Bldg.,  
Chicago, Ill.

February 18, 1921.

Editor Radio Topics, Chicago, Ill.

Sir: It has come to my attention that a great many amateurs are violating a very important Radio Law which carries a very heavy penalty.

This law, which every amateur should know, is given below. Any violations of it that come to my attention will be dealt with accordingly.

"Sec. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars (\$2,500.00) or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense."

Any amateur who signs any call other than his own call is violating the above law whether he is licensed or not and a few examples will be made of those who are caught.

Respectfully,  
L. R. SCHMITT,  
U. S. Radio Inspector.

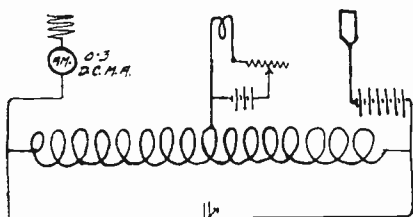
LRS/S

# The Heterodyne for Beat Reception and C W Transmission

Some very helpful information on the construction and operation of a heterodyne generator

**W**HILE the recent World War left a trail of woe and destruction, still it also benefited humanity in many ways. One of the departments of human endeavor to be a great gainer was mechanics, which includes, of course, "radio." Under the stress of the war, the French government conceived the idea of the "Heterodyne" for beat reception and C. W. transmission. This apparatus, upon America's entry into the war, was used by the Signal Corps of the A. E. F. in the absence of their regular equipment. The distinct advantage of the Heterodyne is that, with the same hook-up, it will function as well for Beat reception, when placed alongside of your receiving apparatus, as for straight C. W. transmission when connected to your aerial and ground.

On this side of the water, my curiosity to experiment with the Heterodyne was aroused when, during a visit to a friend, I noted that he was experimenting with the Heterodyne for



Heterodyne Circuit

the production of beats for undamped reception. At this time he was using, if I am correct, an Audiotron tube and 80 volts on the plate.

When using this circuit for local oscillator in your radio room, an 0 to 5 milammeter of any known make can be inserted in series with the grid and inductance to indicate whether or not there is a flow of oscillations. Usually about 1 to 3 milamperes are sufficient.

Some amateurs may want to know if their tube or tubes are generating. This may be ascertained by watching the needle of the milammeter, as this is a factor of paramount importance in this type of apparatus. If your meter does not register, it is evident that no transfer of energy (oscillations) can be had to the receiving apparatus. This may be remedied as follows:

1. By replacing your tube or tubes (if more than one are used, as in the French Heterodyne two tubes were used). Your tubes may have proven to be very soft. This will be indicated by a blue glow.
2. By replacing your tube or tubes, which have proven very poor oscillators.

By J. J. NOVAK, A. M. I. R. E.

These will have to be replaced until dependable ones are found.

3. See that all four prongs make good contacts with their respective points on the socket.

4. Make certain that all your connections are soldered well, and that heavy wire is used for them.

By experimenting with the following tubes, it was noted that those having a high vacuum were very easy oscillators. While those with an internal gas were not, each carrying the stated amount of milamperes on the grid:

Type of Tube	Milamperes carried on grid	Plate Voltage	Shunt Condenser
V. T. 1 Moorhead	3-5	145	.0005
V. T. 2 Moorhead	6-8	145	.0005
V. T. 1 West Elec.	15-18	145	.0005
V. T. 2 West Elec.	20-25	145	.001
U. V. 201 Radiotron	4-4.5	145	.0005
Audiotrons	(Non-oscillators—too soft)		
Electron Relays	"	"	"
U. V. 200 Radiotron	"	"	"

Description of component parts which are necessary in the construction of the Heterodyne.

**Inductance**—Was wound with 28 turns of No. 18 code stranded fixture wire (green silk covered), upon a bakelite tube, with an outside diameter of 5 3/16 in. having a 3-16 in. wall and 2 3/4 in. wide. The inductance was tapped in the center and ends. Further tapping of inductance is at the discretion of the constructor.

**Condenser**—A C. V. 500-90 degree De Forest type of condenser was found upon experimentation to be best suited for this class of construction as a .0012 mfd. Chelsea would permit the electrostatic electricity, which accumulated thereon, to jump across.

**Socket**—The "Ace" v. t. socket was used, as it easily dismantled. The base from same was used as a template for the drilling of the new holes for panel mounting.

**Rheostat**—A General Radio rheostat was used, due to its easy working when mounted on panel.

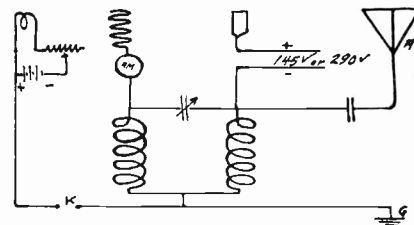
This concludes the description of apparatus needed for the construction of the Heterodyne. Although the diagram above shows all tubes being worked with 145 volts on the plate, 80 volts will suffice for any of the average tubes that are available for the amateur's purchase on the open market.

**Operation**—First, connecting both "A" and "B" batteries to their respective binding posts, as these are all the external connections that are necessary. Second, bringing up the brilliancy of your filament with the rheostat. Third, the tube when prop-

erly heated will start a flow of oscillations within, and this in turn will make the milammeter to indicate the amount. Fourth, to confirm this, simply by touching any of the metallic parts of the shunt condenser, grid or plate contacts, will cause the meter reading to drop. This is stated, that in turn that anyone experimenting with any of the "soft tubes" will get them to oscillate, but upon touching the metal parts the tube will stop oscillating and the meter reading will drop. Then the process will have to be started over again.

### Straight C. W. Transmission

A whole chapter could be devoted to the principles of the Heterodyne and beat production, but this much can be said, that when you are receiving from a station whose frequency is in the neighborhood of 500,000 cycles, and in order to receive this, our Heterodyne would have to generate in the vicinity of 499,000 or 501,000 cycles. By varying your condenser any note pleasing to the ear can be had. Changing of condenser changes your



Transmitting Circuit

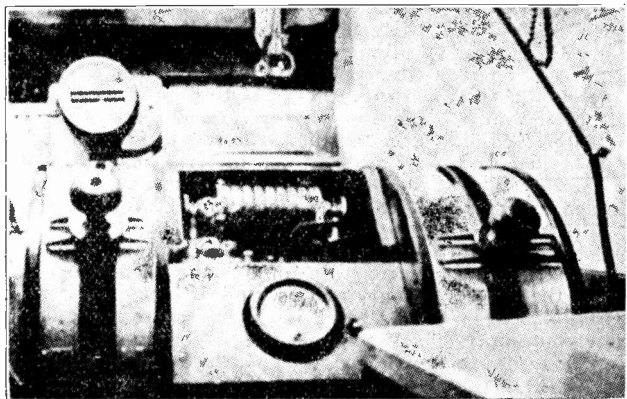
wavelength, and this in turn controls the flow of oscillations for that particular wavelength, as each wavelength has its own frequency.

Without the use of the Heterodyne you would not hear any of these particular frequencies, as they are above audibility.

A lot has been said about the Heterodyne, the amount of apparatus it requires for its construction, but anybody who constructs one of these "little mystery boxes" will naturally care to take up the transmission of signals with the same circuit.

The writer has constructed a two-tube transmitter, employing 145 volts on the plate and has covered 30 miles without the least trouble from QRM. In fact several of those parties who have had the fortune of conversing with the writer have had the same results. On one case, especially, it can be enumerated; at this particular station there was in use a 1/2 k.w. non-synchronous spark set. These signals could not be heard fifteen miles away. On the other hand, signals from a single tube C.W. set employing 90 volts on the plate, carried thru without the least exertion, and were reported very QSA. The writer himself, can

(Continued on page 17)



Guess what this is and you win the oil-immersed spark gap

**T**HE photograph here above probably looks to you like a thousand things that it isn't, and we would feel perfectly safe in offering one of the latest oil-immersed spark gaps as a prize to anyone that could tell what it was. However, as we do not care to be bothered with running a picture puzzle contest, we are going to let you in on it right away.

Here's the dope. It's one of the more recent radio sets developed by the Germans and employed on their submarines. The photo was taken by our friend, Jimmy Crowdus, late of St. Louis, and more lately operator at the Chicago Tribune station. We don't quite recall how he explained obtaining the picture, but believe it was something to the effect that he had captured this German submarine one day during the late war with the aid of a newly designed direction finder. We didn't follow the details of his explanation very closely, as we don't believe it either. We do know, however, that he has the outfit with the exception of the transformer at his home, as we saw it when visiting there during the St. Louis convention.

Those handles on either side are not control or change-over switches, as you supposed. They are simple wave changers, the one on the left being the primary of the oscillation transformer and the one on the right the secondary. By moving these the amount of inductance is varied and any wave length can quickly be obtained as a calibrated scale is mounted alongside. The transformer, not visible in the picture, is rated at 2 KW and is operated at five hundred cycles, which, in conjunction with the quenched gap shown, gives a wonderful tone. Just below the gap is a hot wire ammeter. And you should see the key. It must have been made for some great big Hun to hammer with his foot.

The photo was taken and the apparatus "salvaged" while Crowdus was in the navy. No, this is not the set he used while signing 9ZV.

A technical lecture is delivered every Friday night at 8 p. m. by radio telephone from NSF. It is sometimes repeated at 10 o'clock. The lectures are very well delivered and contain some valuable material. Get your set oscillating on 375 meters and copy him if you can write shorthand.

### Second District Radio Show and Convention

The Executive Radio Council of the Second District will hold an immense radio show and convention at the Hotel Pennsylvania, New York City, March 16, 17, 18 and 19, 1921. There will be plenty of lectures and actual demonstrations of every kind of equipment. The roof garden of the hotel will be used for the manufacturers' exhibits and the adjoining Butterfly room as the lecture hall.

The first three days will be devoted to business and the last day to general sociability. The big banquet will be held the night of the 19th, and reservations may be had at \$3 per plate. The convention will be open to everybody from 2 p. m. to 10:30 p. m. daily.

This convention is being held under the auspices of the Second District Council and Mr. J. O. Smith will preside as chairman. It is non-partisan and non-sectarian, with everybody welcome. Those desiring banquet tickets or exhibition space are requested to write the council at 6 Warren street, New York.

The CW fad has at last struck Chicago. What next?

Have you made arrangements with your boss to have a week of your vacation at the time of the First National Radio Convention at Chicago August 30, 31 and September 1, 2 and 3, 1921? If not, better do it now, for with all this time to plan you can have no good excuse, and further, you surely would not want to miss the first national assemblage and show ever held. If you attended the Chicago convention last year you have some idea as to what you can expect; if you weren't there you will just have to take our word for its splendor and good times.

We understand that Boettcher, 9KN, has a daylight schedule with NSF. Better use the mail service, KN, at least that has the advantage of getting there some time.

Wouldn't you like to have a certificate indicating that you knew the principles of electricity as applied to radio, signed by a well known consulting engineer, as well as the magazine staff engineers? Then why not enter in the instructive course being given by Mr. Harvey M. Anthony. Turn back to it on page 10.

# Topics of the Day

### Ohio Radio Conference March 5th

A conference of all Ohio radio men will be held at Columbus, Ohio, on March 5, 1921, under the auspices of the Columbus Radio Club.

A large majority of the Ohio fellows will be present and invitation is extended to all of the Central Division men. Reservations should be made immediately with Mr. R. C. Higgy, 92 East Frambes avenue, Columbus Ohio.

### Quenched Gap Squad to the Front

In an effort to prove the possibility of reducing QRM by the more extensive use of quenched gaps and lower power, the American Radio and Research Corporation is offering free during the month of March one Amard ¼ K.W. quenched gap with the purchase of every induction coil.

In addition, on every Wednesday and Saturday during March the various stations using these quenched gaps will send out a broadcast to prove their working ability. The stations which will send out the QST messages are listed below, together with the time.

	Eastern time.
1XE .....	4:30 p. m.
1GY .....	9:00 p. m.
1OJ .....	9:10 p. m.
1AK .....	9:20 p. m.
1FW .....	9:30 p. m.
2CX .....	9:40 p. m.
2PL .....	9:50 p. m.
8A1W .....	9:10 p. m.
	Central time.
8ZZ .....	9:15 p. m.
5XG .....	9:30 p. m.
8HG .....	9:45 p. m.
9ZH .....	9:50 p. m.
	Pacific time.
6HI .....	9:30 p. m.

### Here's Your Chance to be a Radio Detective

A broadcast furnished by the Dallas police department will be sent out from 5 ZC each evening at 7 and 10 p. m. This broadcast will contain information of value to the various police officers within 150 miles of Dallas, Texas. Amateurs within this territory are requested to copy and deliver this information to their local police department. The advantage of reaching a large number of officers with a single transmission is of great value, providing all those that can possibly do will co-operate.

**"KDKF" Is Call for Doctor at Sea**

Medical advice by radio, designed to save life in event of sickness or accident at sea by applying proper treatment until personal service of a physician or surgeon can be obtained, is now possible.

A new emergency call, the letters "KDKF," has been established which will rank in importance with the distress signal, for it means that individual life is in danger and assistance is being requested.

A recent arrangement between the Seaman's Church Institute of New York and the navy department established a school of medical instruction for officers and seamen. Mariners trained in this school, if called upon to treat a serious illness or accident case at sea, can communicate by radio to the physician at the institute and receive from him instructions to be followed until the ship reaches a harbor and secures assistance. The medical officer in New York is "on watch" from 2 to 10 p. m. for this service.

The company formerly known as Young & McCombs is now dealing as the Karlowa Radio Corporation, Rock Island, Illinois.

The Everyday Engineering Magazine has been indefinitely suspended and their radio editor, Mr. M. B. Sleeper, is now president of the General Apparatus Company.

**ARE YOU DOING IT?**

- Boost RADIO TOPICS, boost your friend;
- Boost the club that you attend;
- Boost the street on which you're dwelling;
- Boost the goods that you are selling.
- Boost the people round about you.
- They can get along without you;
- But success will quicker find them
- If they know that you're behind them.
- Boost every forward movement,
- Boost for every new improvement,
- Boost for the man for whom you labor,
- Boost the stranger and the neighbor.
- Cease to be a chronic knocker,
- Cease to be a progress blocker;
- If you'd make RADIO TOPICS better,
- Boost it to the final letter.

**Whoever Brung Him in Brung Him Out**

Deer Eddy: Ay yust now got das dam CW crase und bye yimany it sure drive me nuts. First I sell my spark maker und bye das bulbs und hard robber pannel und also I bye me das onedam generatum. I bain connect das onedam yunk to gedder already ten times und das goshding yunk still vont vork. Von't you plesse give me das connect up in das next monts Radio Topics. A couple ov guys yust hear und tell me dat by generator iss burnt out. I know dat und vat difference duz dot make? Ven das next guy says to me "CW" he vill go to das undertaker und get das wodden sute. So hoping you are das same.

Guud bye,  
Axel Svede.

The Dallas Automobile Club is also offering a \$50 reward for the arrest and conviction of auto thieves. There is a chance for you to get in on this reward. Local police within 150 miles of Dallas who might be interested in this are asked to write to Police and Fire Commissioner L. E. McGee, Dallas, Texas, who has endorsed this plan.

RADIO TOPICS is trying to give you the best radio material that there is; what is your contribution? The least you can do is to show your appreciation through a subscription. Turn over to page 18 and mail in the blank right now.

There is something of importance on page ten. Better read it over.

Good will flows from mutual respect and friendship of clubs crystallizes around the opinions of their members, who come into closer radio contact with each other through the medium of this magazine.

# Stop!

And before you do  
another thing  
Sign the  
Subscription Blank  
on Page 18  
Surely it's worth  
One Dollar a Year

Yes indeed, Luke, it sure keeps a fellow busy these days traveling from one radio convention to the next.

**Read 'Em and Weep**

In the golden chain of friendship there is many a missing link.

A fellow finds it easy enough to get along once he gets started downhill.

A woman speaks volumes with her eyes and whole libraries with her tongue.

It is a waste of time to find fault with yourself. Plenty of people will do it for you.

No, Luke, family jars do not come under the head of bric-a-brac.

Cupid is a wise little chap. He leads the couple to the altar, then quits the game.

It is a good deal easier to wean a calf than to wean the United States Senate from the consideration of weird radio bills.

**Little "Kick-Backs" with a Moral**

Be dependable. If you make a promise keep it and be fair to the other fellow in the air. Courtesies are more pleasing when wholly unexpected; don't argue with the traffic manager. Fellows on 300 meters are like moonshiners—flirting with trouble.

It is the worst kind of luck to have too little wit to talk well and not enough judgment to know when to keep still; some hams seems to have plenty of this kind of luck.

"I Will" is the switch that regulates self-control—watch your sending.

There are no prizes for those afraid to dream; nor for those who lack the energy to wake from their dreams and work.

As we have no classified advertising space and as the following is of considerable importance to the welfare of a fellow radio man, we are publishing this ad under this column. Radio men having sisters that they think would meet with approval are requested to send in photograph with full details.

**Wanted**

A pretty, blue-eyed, bobbed hair blonde, about five feet four, neat and attractive, residing at or within motoring distance of Chicago. Further particulars can be obtained by writing "ZN, WO," care of Radio Topics.

We wish to take this opportunity to thank our many new subscribers for their kind letters of congratulation and wishes of success. It is indeed gratifying to know that the first issue met with such splendid approval, and we regret that we were unable to acknowledge all of the splendid correspondence with personal letters, but everyone is assured of our hearty appreciation.

A good many of the fellows seem to be of the opinion that CW is not getting through, but we think that this idea has become prevalent because of the fact that very few ever allow their receiving outfits to oscillate. We have heard of cases where the fellows had thought that the resonant "click" that they heard just before the oscillating point was caused by a short circuit in their set and they would immediately detune. You will be somewhat surprised at the number of CW sets that are in the air these fine nights.

Everyone knows of the fact that CW is extremely sharp because it has no decrement and because of this communication has been quite difficult. However, RADIO TOPICS' engineers have devised a simple scheme to broaden a continuous wave and still not give it any decrement. Sounds funny, we know, but it's so, just the same. It is being experimented with at the present time and full particulars will be published at a later date.

An organization should be formed called the W. V. U. (Wave Violators' Union). Not a bad idea, is it, 8UX?

No, Luke, the bird that you hear signing "GB" is not telling all those fellows "good-bye" continually; the "GB" in his case happens to be "Glance Bay."

**NO TICKETS NECESSARY FOR THIS SHOW BY RADIO**

One of the most novel and interesting stunts that has ever been heard of is a contemplated theatrical performance by radio. Mr. R. F. Gowan of the DeForest company is arranging to give a show to the amateurs via the radio telephone at station 2XX, New York. He plans to have the well-known Duncan Sisters, who have made such a hit with their singing in Fred Stone's musical play, Tip Top, now playing in New York, give a song review, and hopes to have a number of comedians and a jazz orchestra complete the performance.

Get this now, fellows. The date is not altogether definite, but it is hoped to hold the show on the night of Sunday, March 13th, 9 o'clock, Eastern time, 10 o'clock Central time. It will be given by Mr. Gowan from station 2XX, radiophone on 400 meters. You are requested to stand by and listen for the performance and report by mail if you hear it. 9ZN, Chicago, may possibly automatically retransmit the affair with his phone set. It's a great stunt, fellows, a real show by radio, and you should not miss it. At 11:30 p. m. each night 9ZN will send out the latest plans on this and give you the definite date if the above should be changed. Stations 2XX, 2ZM and NSF will also broadcast this information.

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1AW, 1BBL, 1DA, 1HAA, 1RAY.  
2AER, (2BB), 2BGH, (2BP), 2CK,  
2DA, 2OA, 2RK, 2TF, 2TS, 2UC,  
2ZM, 2ZN, 3BP, 3DH, 3EN, 3GO,  
3HJ, 3ND, 3PU, 3SW, 3XF, 3ML.  
4AL, 4AU, 4BQ, 5OD, 5DA, 5YE,  
8ADF, 8AJI, 8AJW, 8AHK, 8BC,  
8BP, (8CG), 8DV, 8FD, 8FE, 8FT,  
8GB, 8GI, 8HF, 8HG, 9IH, 8IV, 8JI,  
8JS, (8KM), 8LG, (8MF), 8OJ, (8RQ),  
8SH, (8SP), 8TF, 8WY, 8XE, 8XK,  
8XU, 8YK, 8ZD, 8ZE, 8ZG, 8ZL,  
8ZU, 8ZY, 9AAW, (9AAV), 9AEG,  
9ALA, 9ARG, (9BP), 9CP, (9EQ),  
9ET, 9FN, 9HN, 9HR, (9HT), 9HU,  
(9KB), 9KI, 9KO, 9MC, 9OE, 9OX,  
9SH, 9UI, (9UK), 9UU, 9WU, 9YE,  
9YL, 9XM, 9ZB, (9ZL), (9ZN), 9ZQ,  
9ZV.

**ELEMENTARY ELECTRICAL PRINCIPLES**

(Continued from page 10)

sistance increases. Thus, when you overload a conductor and pass more current through it than it can safely carry, the resistance value rises greatly, according to the temperature reached. In many forms of electrical practice temperature is a very important item and must be safely guarded against or considerable loss of energy will arise.

Therefore, in planning electrical circuits we should be careful to observe the foregoing points; namely, wire size, wire length, kind of wire and heat developed during the flow of the current. A proper consideration of all these items will result in higher efficiency of the complete radio circuit, which will consequently mean greater energy output. Energy output is that which all amateurs are interested in, and the above stated principles will apply in wireless from the source of voltage supply clear through the circuits to the very extreme end of the aerial.

The relationships existing between voltage, current and resistance are shown in the following formula known as Ohm's law. This law is the fundamental law governing the flow of the electric current in conductors, and without the law electrical engineering today would be unable to solve the great problems placed before it. If you as a student are well acquainted with this little bit of mathematics you will begin your first step toward the successful and practical solution of problems in electrical work.

The unit of pressure is the VOLT. The unit of current is the AMPERE. The unit of resistance is the OHM.

$$\text{VOLTS} = \text{AMPERES} \times \text{OHMS}$$

$$E = I \times R$$

Where E is equal to the voltage or electromotive force; I is equal to current intensity (in amperes); R is equal to resistance (in ohms).

It is advisable for the student to learn this formula as quickly as possible and also learn how to apply it to circuits. A good way to learn the formula and remember it is by the following method: Place the E over the I x R thus,  $\frac{E}{I \times R}$ . Now if you wish

to find the current, place your finger over the I in the formula and you have E divided by R. Then solve your problem by using the numerical values for I and R. In the same manner, if wish to find the resistance, place your finger over the R and you have the E divided by I. If you wish to find the E, place your finger over the E and you have I multiplied by R.

The following problems should be worked out by the student. Make practical use of the above formulas:

1. What voltage is necessary to force a current of 5 amperes through a coil of wire which has a resistance of 24 ohms?

2. What current will flow through the filament of an incandescent lamp having a resistance of 58 ohms, when the applied voltage is 116?

3. How much resistance is there in an electric stove if the current registered by the ammeter is 4 amperes and the house voltage is 110?

4. A generator is supplying 220 volts to a lamp which has a resistance of 44 ohms. How much current will the lamp receive? Suppose the resistance remains constant and the voltage is cut down to 110. Then how much current will pass through the lamp?

Answer the following questions:

1. Explain what you mean by electric pressure and give its unit.
2. Explain what you mean by electric current and give its unit.
3. Explain what you mean by electric resistance and give its unit.

4. What effect has the pressure or voltage on the flow of current?

5. What effect has resistance on the flow of current?

6. Name the various factors which determine the resistance of a conductor carrying electricity.

7. Why is it not advisable to use too small wire when installing a line? How would you determine the proper size wire to use?

8. Where in your radio transmitting set must you be careful about wire sizes and what will happen if you overlook this?

9. What is the best material used for wires to carry electric current other than silver. Why use this material?

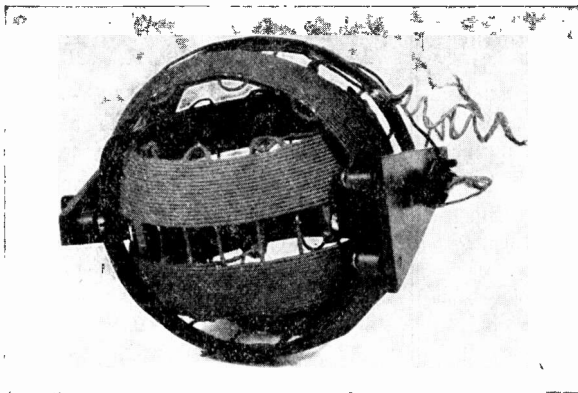
10. What is meant by a circular mil? Where is this term used in electricity?

In the next issue an article will appear taking up a further consideration of the flow of current in conductors. The radio students who are interested in these articles are requested to send in their answers on the above problems and questions to the writer for grading, and those amateurs who study carefully all this work and submit correct answers will receive honorable mention each month in RADIO TOPICS. RADIO TOPICS will also present each amateur with a certificate of proficiency after each six lessons are completed. It is necessary that the students submit their lesson sheets regularly and within one week after the issue of RADIO TOPICS is in their hands after leaving the press.

GET BUSY AND LET'S SEE WHO RECEIVES HONORABLE MENTION IN EACH MONTH'S ISSUE. ADDRESS YOUR ANSWERS TO  
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RADIOELECTRIC SHOP, Dept. "T," 919 Huron Road, Cleveland, O.

## RADIO TELEPHONE AND TELEGRAPH TRANSMITTING APPARATUS

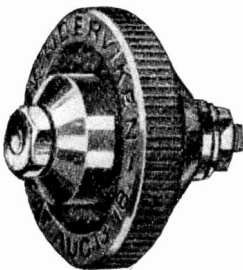
(Continued from page 9)

instead of four, with a correspondingly increased output. Like the OT-10, power is furnished by means of a small dynamotor, delivering 500 volts to the plates of the tubes.

The larger members of the De Forest Radio Telephone family are provided with standard 1/2 Kw. oscillion tubes. These tubes require a plate voltage of 1,500 and a filament current of 9 amperes at 15 volts. This line of high power equipments has been built around these tubes, using one or more as the case requires. The type OT-101, 1/2 Kw. set is identical, for instance, with the type OT-201, 1 Kw. equipment, as pictured herewith, except that one tube instead of two is employed. These equipments consist of a transmitting panel, together with a power panel, the former being mounted in cabinets one above the latter. A 3-unit power plant is provided, consisting of a driving motor directly connected to a generator unit consisting of two generators, one for the plate supply and one for the filament supply. These generators are specially compounded to deliver rated voltage with large load fluctuations and are controlled by means of field regulators and switches on the power panel. The power panel also contains the starting box for the driving motor and meters for indicating the voltages delivered by the generators.

The transmitting panel contains the necessary equipment for emitting radio telephone speech, buzzer modulated telegraph or C. W. telegraph signals on three different wave lengths. The aerial circuit is tuned by means of a step by step series aerial condenser and clip adjustments on the helix, while clip adjustments also take of the grid-plate coupling. The clips are connected by means of leads to a wave length change switch and a coupling switch on the face of the panel, so that any of the three wave lengths may immediately be used for either telephone or telegraph without opening the cabinets and making adjustments on the helix. The aerial transfer switch may be operated manually by means of a lever on the face of the panel or electrically by a push button in the handle of the microphone. It is also operated

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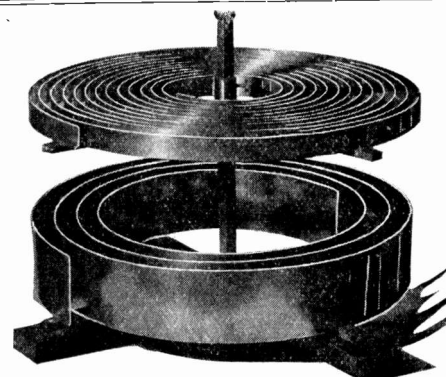
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Our products are all that perfect oscillation transformers should be. Of neat and durable construction, they are designed to meet the present need of a correctly built and easily adjusted transformer even while sending. A feature of importance is the fact that it is impossible for the ribbon to dislodge itself from the mounting.

The ribbon is of brass mounted on bakelite strips which in turn are placed on a heavy brass center piece supported by hardwood cross strips. Electrically and mechanically, they are built right.

Our regular Type R oscillation transformer consists of four turns of 2 in. ribbon on the primary and eight turns of 1 in. ribbon on the secondary. The diameter of the ribbon spirals is 18 in. over all. This transformer will improve any station.

Price \$16.00, f. o. b. Chicago.

There are cases where a larger oscillation transformer is required because of higher power or wave-length, and we have therefore designed a special Type S which consists of four turns of 3 inch ribbon on the primary and 12 turns of 1 inch on the secondary. It has been found that by the use of three inch ribbon on the primary, the antenna radiation has been considerably increased over that obtained with a smaller one. We make no guarantee of this fact; however, one of these Type "S" oscillation transformers is now a part of the standard equipment of station 9 ZN. This, indeed, is a splendid piece of apparatus.....\$20.00, f. o. b. Chicago.

1917 WARNER AVENUE

RAVENWOOD RADIO DISTRIBUTING CO., Manufacturers and Distributors

TELEPHONE WELLINGTON 1678

CHICAGO, ILLINOIS



electrically by means of a switch on the key block for telegraphing. The key block contains also a second switch for changing the circuit from C. W. transmission to buzzer modulated transmission.

The 1-Kw. set has a commercial range of 200 miles, and with 200-foot aeriels distances up to 1,500 miles have been covered experimentally. This set is designed to operate on wave lengths between 300 and 1,000 meters on an average antenna and puts out as much as 7 or 8 amperes under favorable conditions.

The 2 and 4-Kw. sets or types OT-401 and OT-801 are built up in two panels similar to the 1-Kw. sets. The radical difference, however, is that the tubes are placed in racks in the rear of the panel and not on the face. The wave length is changed by means of one control knob, which operates simultaneously three independent switches mechanically linked together. The largest or master switch changes the aerial connection, while the other two switches control the grid-plate cabling. These large equipments are made in two types, one for telegraph only and the other for telegraph and telephone. In the latter type a speech amplifier is used to deliver heavier potential changes to the grids of the tubes.

With the entry of manufacturing organizations into the field of radio as consumers rather than producers of radio equipment, it is apparent that the trend in development is for larger and larger stations, capable of covering greater distances. It is apparent from this that a revolutionary change in radio transmission is taking place, and it will be but a short time before the wail of the old-time spark set will disappear from the radio atmosphere.

**THE HETERODYNE FOR BEAT RECEPTION AND CW TRANSMISSION**

(Continued from page 12)

confirm this statement with his own apparatus, as upon initial operation, this same station came back, with all of the conventional abbreviations that could have been thought of.


From the writer's standpoint, the only reason that more C.W. sets are not employed, is because of the sharpness in tuning, and the regenerative hook-up that must be used in order to receive these signals.

The diagram as shown below should be used with this same circuit for C. W. transmission, with a few slight changes.

1. Placing a small condenser (fixed or variable) in series with antenna lead-in. This is to keep your antenna from sapping your tube, as the oscillations generated are very small. Even placing your finger on the antenna lead-in will sap your tube.

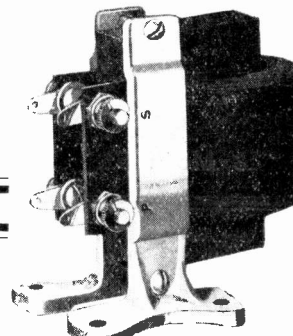
2. Connecting your ground and key as shown in hook-up you are ready for transmission. The condenser again controls your wavelength, and this is the only change that is necessary for QSY'ing to another wavelength. No signals will be heard, and no milamperes will flow (if one is used in the grid) until the key is closed.

A set of 30 No. 703 Eveready Flash-light batteries were used by the writer,



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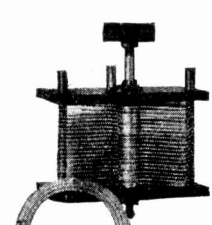
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and these have not shown the least depreciation. It can be said that the drain on the batteries is very small and equal to shelf life of the batteries.

A set similar to this described has been constructed, the only deviation being the substitution of a 0 to 50 millimeter and a C. S. 1000-001 mfd. 180 degree De Forest variable condenser. By setting the condenser at 21 degrees on scale, and using an 80 ft. "T" antenna 27 ft. lead-in and ground a wavelength of 275 meters was obtained. This condenser setting also indicated the maximum flow of oscillations within the tubes.

In testing for a maximum flow of oscillations, aerial and ground disconnected, key closed, and tubes burning, varying the condenser a hump will be passed where a maximum indication will be observed by the millimeter.

In conclusion, if any more information is desired, the writer can be reached by addressing direct to the Editor of Radio Topics.

Our friend, Murphy, 8ML, of Cleveland, writes requesting an article on "How to get the power company to put in a special line for less than \$100." Can anyone oblige us?

He also informs of a very unique way of finding your polarity when charging a storage battery. Connect your line to the battery for charging and then connect a lamp across the battery. If it brightens up when charge is on the polarity is correct. If it dims the polarity is reversed. Quite simple.

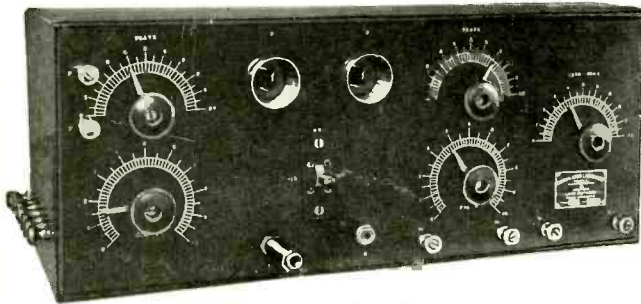
We were unable to publish the proceedings of the Chicago Executive Council, as we had promised, but we assure you of their appearance at a later date. Lack of space also made it impossible to print a couple of other articles that we had intended for this issue.

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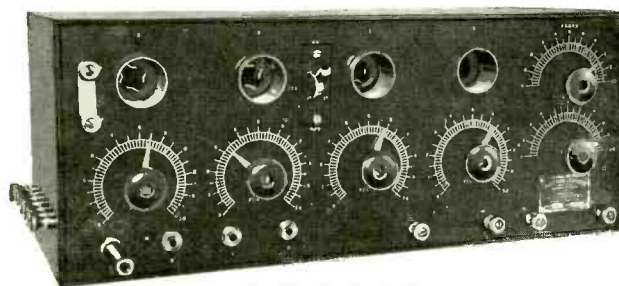
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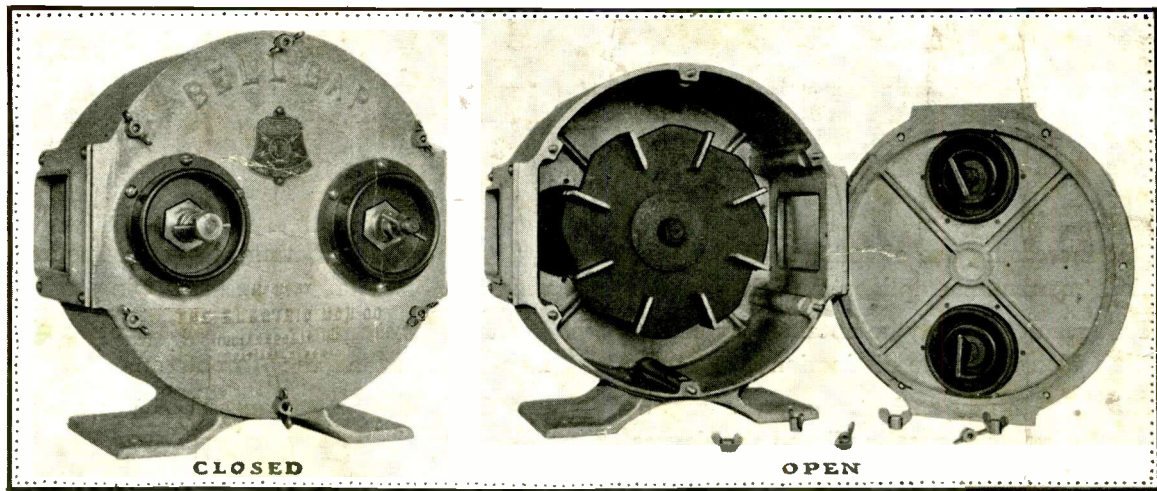
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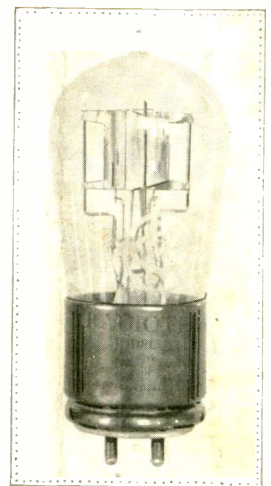
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