WIRELESS WEEKLY

THE HUNDRED PER CENT AUSTRALIAN RADIO JOURNAL

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Oct. 5th 1923

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SPECIAL FEATURE THIS WEEK: **Trans-Pacific Tests**

THE WIRELESS WEEKLY

A Journal Devoted to the Interests of Wireless Enthusiasts both Amateur and Professional

OFFICIAL ORGAN OF THE AUSTRALASIAN RADIO RELAY LEAGUE.

Vol. 2. October 5, 1923. No. 40

TRANS-PACIFIC TESTS.

The 2nd Trans-Pacific Test will commence on October 15th, when the American amateurs will commence transmitting messages to Australia. These transmissions will commence each evening at 5.45 p.m., and continue till 8.45 p.m. (Melbourne standard time). On November 4th, Australian stations will transmit each day for 10 days.

These tests are open to all experimenters in Australia, and it is hoped that all will enter.

The test is the biggest that has ever been attempted either by amateur or professional, and after the results obtained last May this test —which is open to all—should astound the world.

We have no doubt that two-way communication will be established between America and Australia, within the next few weeks. American amateurs certainly have the advantage over us in regard to transmission. Their regulations allow for high power, which is only allowed here in exceptional cases. This, to our mind, is not a disadvantage to us, as low power has made it necessary for Australian experimenters to devote their time to perfecting their receiving instruments. This will, we feel certain, make it self-manifest when the tests are over.

Australian amateurs enter now for this test and show the world that you are equal, if not in advance, in the great science of wireless.

Roster for Week ending 10th October, 1923

	7.30 to 8.0	8.0 to 8.30	8.30 to 9.0	9.0 to 9.30	9.30 to 10
Thur, Oct. 4..	2 RA 220	2 JM 236	2 CI 256	2 GR 390	
Friday, 5.....	2 ER (190)	2 JM 236	2 GR 390		
Saturday, 6....	2 RA 220	2 DS 237	2 CI 256		
Sunday, 7.....		7 to 7.45 2 GR 390	7.45 to 9.15 2 CM 246	9.15 to 10 2JM 236	
Mon., 8.....	2 GR 390	2 RA 220	2 ER 190		
Tuesday, 9....	2 GR 390	2 JM 236	2 CI (256)		
Wednes., 10...	2 GR 390	2 RA 220	2 UW 238		2 ER (190)

Transmitters are requested to ring Redfern 732 (during day) and North 226 (at night) to book Roster Times, or call 2 H.P. (330) by Radio Phone return 7 p.m. and 7.30 p.m. daily.

The figures shown beside call sign denote wave length

Rotten Rectifiers.

By "The Old Man," in "Q.S.T."

While waiting for ten-thirty to come around, and another Quiet Hour to pass down into history, I will take the opportunity to pass a few polite comments upon that wonderful and fearful bit of electrical machinery known to scienee as the "Chemical Rectifier." To those who have come down from early days in Amateur Radio, there is a condition of affairs recognised as "Rotten Construction." In the course of my long and dusty career, I have seen much of this type of construction. I have beheld annunciator wire carrying fifteen amperes, and frying out the fat and dripping it around and smoking up the place so that it smelled like a soap-rendering establishment; and I have seen the house wiring designed and installed to carry a load of four sixteen-candle-power incandescent lamps which had to be fused with 25 ampere fuses; I have seen high-tension wiring pinned up with pins and propped up with bits of wood so that a deep-drawn sigh was sufficient to jar something loose and set off the entire works in a blinding flash.

And now enters the scene the new tempter—The Chemical Rectifier. It was borne of the desire to get from an A.C. supply something that at least had relationship to D.C. The vacuum tube hankered for a D.C. supply. QST had inspired us all to go down cellar and build a chemical rectifier and quit this bum A.C.-on-the-plate business.

When an amateur starts to build something, it is one of the prerequisites that it shall be completed in approximately seventy-five minutes elapsed time. Thirty minutes is better, but things are becoming complicated these days and more time has been recognised as necessary. Cases have been known where as much as an hour and fifty minutes have been consumed in the building of a single unit of an amateur transmitting station. This is very exceptional, however, and arouses suspicion.

In the construction of a chemical rectifier, as with other amateur apparatus, the raw materials are limited to those that may be found in the usual well regulated kitchen, pantry, or garret. QST advised that it was healthful to limit the voltage per cell to around fifty. 2000 volts A.C. from a plate transformer figured out as requiring forty cells. But it so happens that mother usually sports something like eighteen jelly jars that are not working. So the number of jars in the rectifier becomes eighteen. When it came to the aluminum, QST warns us that it must be absolutely double distilled and chemically pure stuff. The material that came from the old automobile body down at the garage must be chemically pure or it would not have been used in an automobile. So this constitutes the material for the aluminum electrodes except in the cases where the aluminum turned out to be zinc (note, aluminium can't be made of zinc), in which event some aluminium wire is borrowed or otherwise acquired.

The authorities are united on the subject of distilled water. But this type of water costs money and takes time to procure; so the stuff that comes out of the tap and looks pretty good and tastes pretty fair is adopted. The authorities also are said to have joined hands on the subject of borax, but mother usually has what seems to be a satisfactory quantity of the Twenty Mult Team brand upon the top shelf, and if it would kill ants in the pantry, it ought certainly to kill the reverse phase of the kind of A.C. current the electric light company dispenses. And so on, with the assistance of an old bit of lead pipe which had been flattened out, and sliced up, a chemical rectifier comes into being, and is hooped up to the business end of a plate transformer.

I have seen quite a few of these rectifiers in operation in various amateur stations. The jelly jar is the favourite type. We frequently meet the milk bottle type, however. The latter is rather attractive when the bottles are clean and shiny and arranged in a wooden box. I am not partial, however, to the construction which consists of a five-foot board balanced upon a chair, and anywhere from twenty to forty jelly jars strung out on the board. One has to be too precise in one's movements, and one cannot permit cats, dogs, or children to lean upon the far end of the board. Neither am I partial to miscellaneous bits of lead which have seen better days, being twisted about an aluminum wire. The contact seems too vicarious, if this term is permissible in amateur radio literature. My soul yearns for something tight in such cases.

When it comes to insuring the separation at all times and under all circumstances of the lead electrodes and the aluminum electrodes, I am also impressed by the sublime confidence exhibited by many of us. Simply hanging two bits of metal down into a jelly jar three-quarters full of borax solution, and asking some thirty or forty of these jars to co-operate with each other and also with the owner of the station, strikes an old crab like me as tending toward the haphazard. Again, I like to see things battened down tight where they will stay even though somebody does move suddenly. Of course, I know that the argument is that if two electrodes get together, it only means cutting out that one jar, or giving the fellow the dit-dah-dit-dit-dit signal and reaching down and fixing the rebellious electrodes. The trouble, however, is that in reaching down to fix one thing in such a station, one is very apt to unfix about fifteen other things. Frequently all of the fifteen are not known to the operator, who only fixes a dozen or so of them, with the result that when he presses the key the next time a conflagration breaks out.

I took a crack at this chemical rectifier business myself after some ten months deliberating over the subject, and although I made every effort to build things right I had a lot of trouble. I happened to meet Fred Schnell about the time I was making up my mind, and I had a long talk with him. He stood out solid for everything QST had said about chemically pure aluminum, voltage per cell, and distilled water, and so alarmed me that I stuck religiously to all three. I went over

to the dairy company and aroused the deep suspicion of the manager by buying forty-eight pint milk jars. He watched me out of sight as I drove away with them. I had some honest-to-goodness aluminum in the cellar, and I bought some one-eighth inch sheet lead. I also bought a half keg of real borax and ten gallons of distilled water. I wanted to have enough. I suppose it took ten hours of high priced time to transform this collection of material into a real business- like rectifier, all nicely assembled in a magogany box.

Consulting QST on rectifiers again, I decided the thing needed a charge, so I put it on all night at what I thought was a low rate. Here was mistake No. 1. Something got hot during the night, and when I went down in the morning, my fine rectifier looked as though it had been used as a garbage receptacle for several months. Dirty borax salt encrusted everything from end to end, and about half an inch of a vile looking liquid reposed in the bottom of each bottle. All the aluminum had about a quarter of an inch of nasty borax salt baked on hard. A cold chisel and a hammer had little effect upon it.

What happened during the night to run the current up, I do not know, but the lesson I do know. It is, forget the forming business altogether. Simply make the rectifier and put it to work.

After easing off my emotions with a copious flow of good old sea-faring English, I rebuilt my rectifier, putting in new aluminum electrodes and swabbing things up generally. Cutting out the forming, I connected it right into the set and went to work. For the time being, I left out the filter.

After a few nights working DX, I made the discovery that certain jars sparkled pretty well. Taking down that old April, 1922, QST again I noted that this was a bad sign. Not wanting to risk anything that would require building the thing over again for the third time, I began cutting out the sparklers and putting in new solution and new aluminum. I kept cutting out and putting in new, until the job got to be the big thing in my daily life. After a while it began to dawn upon me that I had just about rebuilt the rectifier all over for the third time and yet the sparkling was steadily gaining upon me. Then I tumbled. It was evident that I was busily engaged in cutting out the good cells and keeping in the poor ones. Poor cells did not rectify, and hence they did not sparkle. Good cells did rectify and, being over-loaded, they sparkled.

ONE OF THE BIGGEST COILS IN THE WORLD.

Here is shown one of the great tuning inductances used at the large central radio station at Rocky-Point, Long Island. Compare the size of the coil with height of the men standing in the foreground. If this coil were not efficient there would be enormous losses in the power surging back and forth in the huge transmitting antenna. Although your coil is tiny, if it is not properly designed the losses in it may be just as large—relatively.

This called for some more old English, causing Kitty to hastily seek other scenes and the little wife to expostulate a bit above average. Some of the pile of cast-off aluminum electrodes were recalled to the colours, and a voltmeter made use of to determine the dud cells. The ones which did not sparkle were gradually replaced and each time one of these was turned into a sparkler, the general sparkling became lessened.

Things now went forward apace, and in a short time I had a rectifier that gently glowed the prescribed QST blue-glow all over on twenty-five hundred volts. It was a good rectifier, just as old Betsy was a good spark gap, and I believe it will

Questions on the Regulations.

EXPERIMENTING—BROADCASTING—TRADING.

Since Statutory Rules 97, of 1923, were issued on the 1st August, many and varied have been the queries regarding the respective liberties and restrictions on the EXPERIMENTER, the BROADCASTER (Transmitter and Receiver), and the TRADER.

"Wireless Weekly" now offers to its readers the correct answers to any reasonable questions on or concerning Statutory Rules 97, of 1923.

Answers will appear in these columns each week.

Address: "Questions," Box 378, G.P.O., Sydney.

The name and address must be forwarded, but will not be published unless desired.

Questions received up to noon, Friday, of each week, will be answered in the following week's issue.

stay with me for a long time to come.

Then it became necessary to consider the filter business. Some elephantine inductances were obtained and what seemed like a king's ransom was laid out for a carload, more or less, of those one Mike paper condensers that come in the square tin cans. These were supposed to stand 1500 volts. In order to hold my 2500 volts it meant two of these condensers in series in order to get even a half Mike capacity. In order to get some real he-capacity, I found that it took quite a little working capital. But we found the capital, and put in the condensers. My thermo-ammeter jumped up over half an ampere when I put this big capacity across the line.

My sixty-cycle hum still persisted in nearby receivers, and at this date I am figuring on one of Goldberg's filters as shown in April, 1923, QST. If I can make it work, there will be at least one amateur station in this country with a non-interfering D.C. plate supply that comes out of a chemical rectifier. You other ginks will have to show me that it is not the only one in the world.

The next thing on the programme is some kind of an electrical sponge which will soak up the pulses made by a key when it makes and breaks. If that can be fixed, then I am going to ask somebody something pertinent about this Quiet Hour stuff. What's the necessity of making me quit transmitting if my transmitter is inaudible on all wave lengths but my own?

Even as things stand to-day, I am inaudible in 19.9999999 per cent. of the country. It is only in those few stations that are within a few rods of my house that my transmitter can be held even with those single circuit things they call tuners. What kind of a think-tank must the guy have who wants to impose compulsory quiet hours, anyway? I wonder if he ever had a pair of phones on his poor bean. Doesn't he know that a lot of broadcasting only begins at eleven p.m., and that the big doings are mostly after midnight? Of what use is it to the Night Hawks, the Boiled Owls, the Hoot Owls, and all the other late sitters to have amateur radio quiet between seven and eleven? Not one bit. I say, let them leave it to our A.R.R.L. voluntary lid. Then we will have amateur co-operation instead of amateur boot-legging. Then let us amateurs get busy and find how to make our C.W. quiet on all waves but our own, and there will not have to be any quiet hours, and the good old days will have come back.

Well, son, its long past ten-thirty, and here goes for some DX.

CUAGN OM 73 GN.

A STREAM OF WATER AS AN ANTENNA.

Experimenters were conducted by the Bureau of Radio Research of the French Navy using streams of salt water pumped up from the sea and shot in a column into the air, which proved that transmisson could be accomplished when employing this medium as an antenna. The regular transmitting apparatus was connected to the stream and communication was carried on over a distance of eight miles.

The use of sea water as an antenna if far less efficient than the regular metallic ship's antenna, but it would be found useful in case of an emergency in war time if the regular antenna were shot away during an encounter.

THE RADIO BUG BEGINS TO BITE ITALY.

The prospect of initiating a broadcasting service in Italy appears to be somewhat more encouraging than it has been as "the wall of opposition which thwarted every radio plan has been demolished by the Fascist Government," according to "The Tribune," New York. One company has agreed to pay a specified tax to the government in return for authority to start a broadcasting service; it proposed to tax its subscribers, but just how funds will be raised from this source is not revealed.

The proposed government tax on amateur transmitting sets will vary according to the power of the apparatus.

SENDING RADIO WAVES TO THE CENTRE OF THE EARTH.

Scientists now propose to study earthquakes by radio. The way in which the shock from an earthquake is transmitted through the central part of the earth possesses some mysterious features which none of the present scientific theories can explain. To study these earthquake waves directly is difficult because the earthquakes cannot be induced to happen exactly according to schedule, when the scientists are all gathered round in the laboratory and ready to observe them. So it is proposed to explore the nature of the inside of the earth by radio waves instead. Beams of the waves can be directed, the experts think, downwards into the ground and from the way these beams are bent or reflected inside the earth much can be learned about what really exists a thousand miles or so down under our feet.

THE PASSING OF AN OLD RADIO ETHER MARK.

Seagoing radio operators, many skippers and landsmen who listen in will note a change in the 'voice' of NAA at Arlington. The peculiar tone of the old Fessenden spark will no longer carry the time signals, weather reports and information of interest to mariners; this famous spark set (installed in December, 1912), was replaced recently by a new tube transmitter.

Operating on the same wave length, 2,560 meters, the new set will carry all the governmental broadcasting that was formerly done on the spark. Although its power is not quite as great, the range of the tube set by tests has proven a little greater than the old 100 K.W. spark. After eleven years of almost constant operation, the Fessenden set is to be retired from active service; it is understood that it may be presented to the National Museum, where many radio experts believe it should have the honour accorded to the early locomotive of Baldwin and the Morse telegraph key.

RADIO MUSIC AS A CURATIVE.

One by one the things we think are new turn out to be old. Music received by radio has been found soothing and beneficial, the doctors have been saying, especially to patients in the convalescent wards of the hospitals. Now comes Miss Frances Densmore, who has been studying native music of the Indians for the United States Bureau of Enthnology, and report that the ancient medicine men have been using musical rhythms, drum beats and rattles and the like, for many generations for exactly this same purpose. The rhythmic spells chanted by the Indian "doctors" over their patients may have had considerable curative value after all.

BROADCASTERS' CORRESPONDENCE.

Since the inauguration of broadcasting by WGY, some sixteen months ago, the General Electric Company has received 65,000 letters from listeners scattered over the United States and from points as widely apart as Hilo, Hawaii and London (England), Vancouver, Canada and Valparaiso (Chile).

MAKE YOUR OWN

Choke Coils.

BY W. JAMES.

Iron-cored choke coils are often employed in wireless apparatus, and one should be able to estimate the dimensions necessary to produce a choke coil with a given inductance. It is ordinarily not possible to calculate with any degree of accuracy the exact inductance on account of the effect of the iron used. One is generally not in possession of the magnetic properties of the iron, and in most wireless receivers or transmitters the choke coil carries a steady current as well as a fluctuating current. The fluctuating current will, in general, not have the shape of a sine wave.

The formula generally used, when the iron circuit is closed, is as follows:

$$L = \frac{1.257 \times u \times A \times N \times 10^{-8}}{l}$$

Where

L equals inductance in henries.

u equals permeability (varies from perhaps 1000 to 2000).

A equals effective area of iron cross section in sq. cms.

N equals number of turns.

l equals length of magnetic path in cms.

The reader will notice the inductance depends upon the square of the number of turns, the area and permeability of the iron and inversely as the length of the magnetic circuit The qualities are set out in Fig. 76. In reckoning the area of cross section, allowance should be made for the space occupied by the insulation of the laminations, and it will be reasonable to represent the effective area as 90 per cent. of the total area.

Clearly the inductance will vary with the current passing through the coil because the factor u is directly affected. To provide a choke with a more nearly constant inductance value it is usual to split the core so that the magnetic circuit includes an air gap. The core may be simply cut through as shown dotted in Fig. 76. The air gap is also beneficial in that the distortion of the wave form due to magnetic hysteresis is reduced. The inductance formula should now be modified as follows:

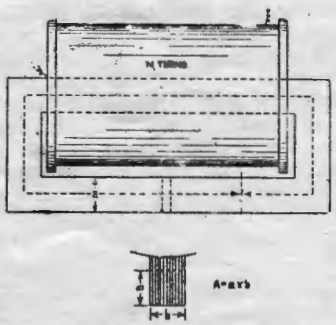


Fig. 76. A useful form of choke. The coil has N turns, and the cross sectional area of the iron A = a × b. If the core is 1¼" by 1¼", and the bobbin is 3" in diameter and 4½" long wound with 5,500 turns of No. 26 D.S.C., the inductance will be approximately 6 henries and the resistance 115 ohms.

$$L = \frac{1.257 \times I \times N \times A \times 10^{-8}}{l}$$

when

L equals inductance in henries.

I equals current in amperes.

N equals number of turns.

A equals effective area of air gap in sq. cms.

l equals length of air gap in cms.

The formula assumes the whole of the reluctance is concentrated at the air gap or gap. When the choke coil is to be used in a circuit which carries a normal steady current, an air gap should always be provided.

Probably it is best for those who experiment to construct a variable inductance. The wire should be chosen so that it will properly carry the current without heating, and the turns and the whole winding should be insulated carefully. A suitable choke is shown in Fig. 77. The maximum inductance is in the neighbourhood of 50 henries.

The coils should each consist of about 6,500 turns of No. 22 D.C.C. Bring out four or five tappings from each coil. The core may have a cross section of 4 square ins., or say 2 ins. by 2 ins. Each coil will occupy a space of 5 ins. by 3 ins., so that the core should be 5 ins., long, and the distance between the cores 6 ins. The top limb of the core is mounted so that it may be moved up or down by adjusting the nuts.

Another form of choke coil which will safely carry a current of 400 milliamperes is shown in Fig. 78. The winding consists of about 6000 turns of No. 30 D.S.C., and the inductance is close to 2 henries. The core consists of a bundle of iron wires which are forced into the central hole of the former. Another choke coil which has given satisfactory service is as follows: Inductance 2 henries, resistance 3000w, bobbin 3½ in. long and 1-3/8 in. diameter. Iron core ½ in. diameter of iron wires wound with No. 42 D.S.C.

It is as well to remember that the inductance of the primary of an ordinary intervalve transformer is of the order of 10 henries and the secondary may be as high as 100 henries. The transformer may be used as an inductance, either using one of the windings by itself or by connecting them in series so that the inductances add, i.e., the two windings may be connected so that the turns follow in the same direction. The current passed through the windings must, of course, be limited to a few milliamperes.

The usual method of representing a choke is shown in Fig. 79.

Low Frequency Transformers

Suppose we find a second winding over the winding of the choke coil as in Fig. 80. When an alternating pressure is connected to the choke, the alternating flux which is set up around the coil interlinks with the second winding. Consequently a pressure is generated in this winding. The arrangement is

called a transformer. The winding to which we apply the power is called the primary. The other winding is the secondary.

Naturally if there are the same number of turns in the secondary winding and the primary, and all the flux which is generated cuts both windings, the pressure induced will be the same in each winding. The voltage is given by wLI, where L is the inductance of the winding.

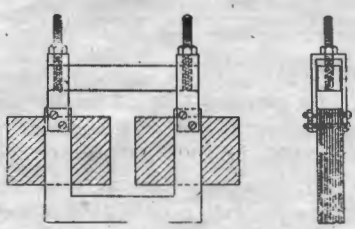


Fig. 77. A choke suitable for the experimenter. The inductance may be varied over a wide range by moving the top limb of the core which is mounted so that it may be moved between the brass end pieces

If the primary winding has no resistance and there are no losses, the induced pressure in the primary and secondary windings is equal in magnitude to the applied pressure. Note that the addition of the second winding has not altered in any way the operation of the choke coil. The operation is, of course, modified when we connect a load to the secondary.

Let

Np equal the number of turns in the primary winding.

Ns equal the number of turns in the secondary winding.

A equal the area of the core cross section in sq. ins.

B equals the maximum flux density.

f equal the frequency of the applied pressure.

E equal the induced pressure in volts.

During one cycle the maximum value of the flux changes by 2B, and the time taken for each change is 1/2f seconds, since there are two alternations for each cycle.

The pressure induced has, then, the average value of 4BANf x 10-8 volts. The effective or root mean square (RMS, see sect. 18) will be this quantity multiplied by 1.11 assuming a sine wave of pressure. We then have as the fundamental equation for the transformer

E equals 4.44 BANf x 10-8 volts.

Instead of BA we may write F for the maximum value of the flux. Then E equals 4.44 FNf x 10-8 volts. We may substitute for N either Np or Ns to obtain the voltage induced in the primary or secondary windings. The voltage induced in the primary is equal to the applied voltage if we assume there are no transformer losses. Considering phase relationship; the transformer with the secondary winding on open circuit, i.e., not connected to a load, is behaving exactly as a choking coil. The back primary pressure generated is directly opposing the applied pressure as shown in Fig. 81 while the small current which flows to magnetise the core is 90 degrees behind the applied pressure. In the vector diagram Ep represents the applied pressure and E(back) the back pressure. The magnetising current is shown as Ip. The flux is, of course, in phase with the current. With the secondary circuit not connected to a load, the secondary pressure is as shown at Es. Es and E (back) will be equal when the primary and secondary turns are equal. We assume the transformer has no losses. Es is then equal to Ep. It is important to note the secondary pressure and the pressure applied to the primary are 180 degrees out of phase. It is clear that the secondary pressure and primary back pressure have the same phase since they are both in-

terlinked with the same flux at the same time. Since the primary circuit has a large inductance the primary current is very small indeed.

(1) The Voltage Ratio.

If we call the number of primary turns Np and the number of secondary turns Ns, we have the simple relationship

$$\frac{N}{N} = \frac{\text{Primary Voltage}}{\text{Secondary Voltage}} = \frac{E}{E}$$

or

$$E = \frac{N}{N} \times E \text{ volts}$$

Thus, if we wish to use a voltage which is lower than that available, it is simply necessary to use fewer turns in the secondary than are used in the primary. If, say, the supply is 500 volts, and we wish to use 20 volts, and the transformer

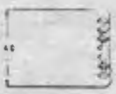


Fig. 79. Usual method of representing a choke in a circuit

primary has 250 turns, the number of secondary turns required is

$$N = \frac{E}{E} \times N \therefore N = \frac{20}{500} \times 250$$

equals 10 turns

The ratio of the turns is thus 10 to 250 or 1 to 25, i.e., the primary has 25 times the number of secondary turns. It is clear the turn ratio is equal to the voltage ratio. Suppose we require a high voltage, say 2,000, and we have only 250 volts availabe .

$$\frac{2{,}000}{250} = 8$$

The secondary winding will therefore require to consist of 8 times as many turns as the primary.

(2) Effect of Loading the Secondary

Let us suppose we still have our ideal transformer, and we connect a resistance across the secondary terminals. Current of course flows in the secondary circuit, and the secondary voltage and current are in phase. The current is equal to E/R amperes. Now it is perfectly plain we cannot load up the secondary without taking a load from the source which is supplying the primary, and further, the primary load and secondary load balance each other. That is, if we take a large load from the secondary, the primary must also take a large load.

Let us ignore the primary winding for a moment, and consider secondary circuit only. When secondary current flows, a magnetic field is set up due to the current and the se-

condary turns. The core is therefore magnetised. But now, with the primary connected, there is a flux due to the primary. The two fluxes react on each other. The value of the magnetising current and the resultant flux must, however, remain unaltered if the transformer is to work properly. The

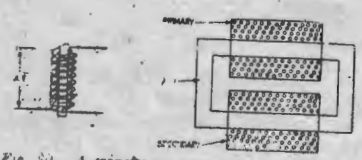


Fig 83 A transformer consists of a core with a primary and secondary winding.

value of F in the above formula must not vary if the voltage induced is to remain the same. Therefore a current flows in the primary winding so that the flux which this current produces neutralises the flux due to the secondary. We have now two components of the primary current—one component which magnetises the transformer and induces the back pressure in the primary, and the pressure in the secondary; and the second component which is termed the load current, which tends to produce a flux which just neutralises the action of the secondary.

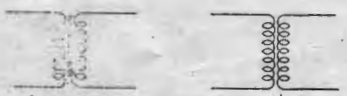
Looking at the action a little more closely and referring to Fig. 82, the primary pressure Ep is at right angles to the magnetising current I2. The secondary pressure Es is at right angles to the magnetising current, and the load current Is is in phase with Es. The combined effect of I2 and Is is to increase the flux, but the phase of the flux with respect to the primary pressure is changed. Therefore, a load current will flow in the primary circuit of such magnitude and phase so that the effect of the secondary is neutralised. The primary magnetising current and load current I1 are now 90 degrees out of phase, and their resultant is given by Ip. The effect of loading the secondary is therefore to load the primary.

(3) The Current Ratio.

If the efficiency of the transformer is 100 per cent. the primary input, and the secondary load are equal.

$$E\,I = E\,I \text{ or } \frac{E}{E} = \frac{I}{I}$$

That is, if the voltage is stepped up, the current is stepped down in the same proportion. If the secondary voltage is 10 times the primary, the secondary current can only be 1/10th the primary current.



[illegible] of showing an iron core transformer, and a [illegible] former without an iron core. The first is usually termed a low frequency transformer, and the second a high frequency transformer

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The difficulties in finding the sensitive points of a crystal detector with a single cat-whisker may be obviated by using a "brush" made from steel wool such as is sold for domestic use in cleaning pots and pans. Steel wool consists of a bunch of very fine wires which may be straightened and bound together in a small brush wrapped with heavier wire. The ends are clipped evenly with a pair of shears.

MARCONI'S RECENT WORK.

In a statement issued to the press on his arrival at Southampton, on board his yacht, "Electra," recently, Senator Marconi said that during the two months he had been away on his research cruise he has been working all the time on the system of directive wireless telegraphy, by which a message could be sent in one direction only, and he was delighted to say that experiments had proved highly satisfactory. The apparatus with which he had been working was the only installation of its type, but it was likely to come into universal use in the future. The results he had obtained proved that communication could be maintained over long distances. The new system, said the Senator, effectively eliminated atmospheric disturbances, and he might say that he had experienced no trouble of that sort during the whole of his two months' research. The course of the trip was roughly 2200 miles, or the distance from England to Canada.

A Variable High Resistance.

In experimental work a variable resistance of high value which will pass a few milli-amperes is frequently required. Such resistances are required in experimenting with grid-leaks, anode resistances for resistance amplifiers, and so forth. Many simple ways of making fixed

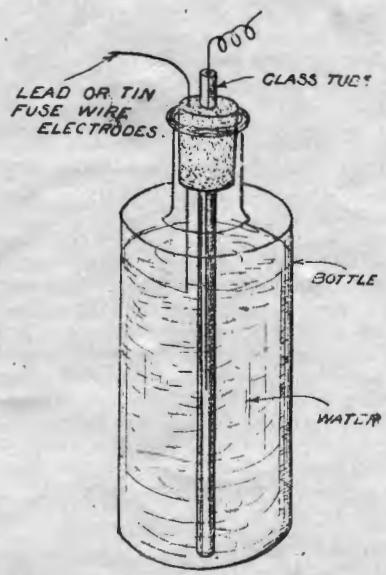


Fig. 8.—The completed resistance.

grid-leaks for reception purposes have been described, but most of them are not adapted to variable adjustment or else will not pass a current greater than a fraction of a milli-ampere without becoming noisy or erratic. The simple resistance here described was evolved by the writer when in need of an adjustable grid leak for a 10 watt transmitter. Leaks of the pencil line type were first tried, but were found to be unsatisfactory, as they sparked along the graphite surface and were very irregular in their action.

The accompanying diagram, Fig. 8, is almost self-explanatory. A bottle is filled with water and a glass tube is introduced which should be long enough to reach the bottom and project about an inch out of the neck. Two wires are introduced so as to make contact with the water, the other passing through the neck of the bottle outside the tube and passing into the tube itself. As most of the resistance lies in the narrow column of water within the glass tube the diameter of this tube is of some importance; the bore should not be too small, as bubbles of gas produced by electrolysis of the water tend to accumulate and increase the resistance unduly. For the same reason the wire should not fit tightly in the tube. A tube of 2 or 3 millimetres bore is convenient. If ordinary tap water is used the wires may be of copper, but it is much better to use lead or tin fuse wire which shows much less tendency to form soluble salts with impurities in the water. Rough adjustment of resistance may be obtained by pushing the wire up or down in its tube, while small final variations may be effected by altering the depth of the wire outside the tube.

Ordinary tap water gives about the right range of resistances for many purposes, but if necessary, the resistance may be reduced by adding a few drops of sulphuric acid or a small quantity of common salt, copper sulphate, or any other metallic salt that happens to be handy.

If, on the other hand, the resistance of the tap water is too low in the first place it may be increased by mixing with methalated spirit. In this way a resistance of anything from a few thousand ohms to several megohms may be obtained in a few moments at an outlay of practically nothing.

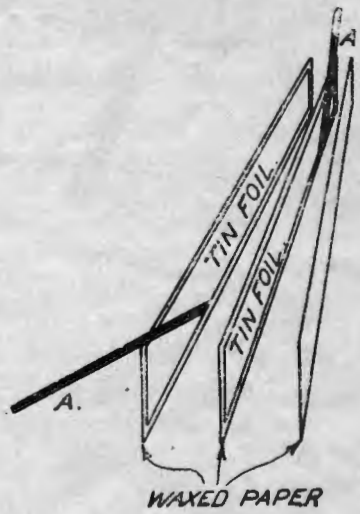
The uses of such simply made variable high resistances are so numerous that their construction is strongly recommended to the serious experimenter.

As variable grid leaks used in conjunction with similar anode resistances they open up a field of research otherwise closed to the experimenter of limited means.

E. H. R.

Blocking Condensers

The usual method of constructing a blocking condenser is rather a fiddling job when making a condenser of fairly large capacity. An easier and quicker method is to



cut the tinfoil into two long strips the size required, and rolling them up together using as the dielectric good quality paper previously soaked in paraffin wax. The strips of paper should be ½ inch larger all round than the sheets of foil. Be-

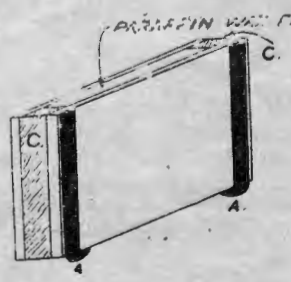
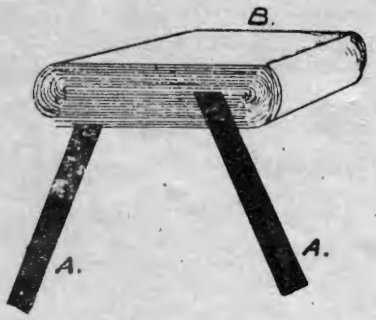


Fig. 10.—Finished condenser.

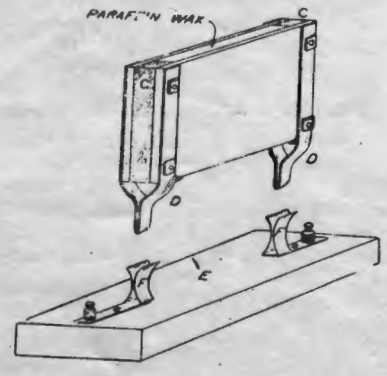
fore rolling the strips of tinfoil and paper together lay a strip of copper foil 1/4 inch wide on each piece of tinfoil for connecting purposes, as shown at A, Fig. 9. When the condenser is rolled up press it with a hot iron. This re-melts the paraffin wax on the paper and binds the whole together as at B (Fig. 11). The condenser should then be put between two 1/8 inch ebonite sheets, turning the copper foil connecting strips up the side of the

ebonite as at A, Fig. 10. A piece of ebonite should be let in at each end to take up the space between the sheets of ebonite as at C. Make two clips of thin sheet brass and



bolt them to each end, firmly clamping the copper foil strips beneath them as shown at D. Melted paraffin wax poured round the edges of the condenser will make it damp proof.

A convenient holder for this con-



denser is shown at E. Fig. 12. The clips F are made from thin sheet brass, and the base is of 3/8 inch ebonite.

This type of condenser and holder is ideal for the experimenter.

A. W. B.

FREQUENCY, GROUP.

In damped wave work, the number of wave trains per second, as distinct from the frequency of the actual wave itself. Usually in the "Audio" Group.

FREQUENCY, HIGH.

Naturally, a comparative term. Used in wireless to define radio frequencies of 10,000 to 1,000,000 or more in contrast with audio frequencies.

[illegible] Aerial Wire?

LITZENDRAHT.

The only stranded wire that has lower resistance than solid wire is the so-called "Litzendraht," made of many strands of fine enamelled or silk-covered wire braided together. Experience shows that at 200 metres these strands must be so fine (at the most No. 38 B. and S.) that it is almost impossible to make up a length without broken or "crossed" strands which will run the resistance away above what is expected. It does not matter, though—"litz" is impracticable stuff to put out of doors, anyway.

BRONZE.

Bronze is stronger than plain copper, and not so much subject to the effects of corrosion as copper. However, I want to call the attention of the reader to the fact that an alloy always has a resistance higher than that of the poorest conductor used in the alloy. The conductivity of the alloy antenna wires is low as compared to copper, one-fifth to one-third as much. In addition the bronzes are very hard to handle and solder.

COPPER, COPPER-CLAD STEEL, AND ALUMINUM.

This brings us down to the solid wires (not stranded) with a choice of copper, either hard or soft drawn, copper-clad steel, and aluminum. Any one of them is preferable to the other wires above.

Copper-clad wire has about the same resistance as solid copper. (This statement does not include the cheap electro-plated "coppered wire."—Editor.)

Aluminum can be compared with copper as follows. For the same direct current resistance aluminum has a cross section of about 1.59 times as great as copper. Because it is well known that high frequency currents travel on and near the surface of the wire and because the aluminum wire has a larger surface, it would appear that it should offer a lower high-frequency resistance than the smaller copper wire. However, the larger skin of the aluminum wire is an aluminum skin and has about 1.59 times as much resistance for the same area, so that in reality the high frequency resistance, like the D.C. resistance, will be nearly the same for a copper and an aluminum wire that has 1.59 times as large a cross section. In other words—for either antenna or direct current work an aluminum wire is equal to a smaller copper one four sizes up in the B. and S. gauge.

WEIGHT AND STRENGTH.

Aluminum has (for the same conductivity) about 1.3 times the strength and a little less than half the weight of copper wire. Consequently the strain on the towers is less, although part of this is made up for by the greater effect of the wind on the larger aluminum wire.

Copper-clad wire is quite a lot stronger than either aluminum or hard-drawn copper, and hard-drawn copper is somewhat better than soft-drawn copper.

Bronze is the strongest of all, but the reasons for throwing it out have already been mentioned.

PLIABILITY.

Soft drawn copper is the most pliable of all and stays so, but it is not very strong. Hard drawn copper, hard-drawn aluminum, and copper-clad steel are all only moderately pliable and must not be kinked. Hard drawn copper becomes brittle with age; aluminum does not do this because after the first coating of oxide, it does not corrode further. (This seems a bit doubtful. Copper and aluminum both become quite brittle when not subject to corrosion, perhaps for the same reason that "vibration fatigue" causes machine and bridge parts to crystalise and break.—Editor.)

CORROSION.

Copper, copper-clad, and bronze wires soon acquire a green or black coating that serves as a protection against further corrosion and does not increase the high frequency resistance very much. Aluminum is

...ot attacked after the first thin film is formed, hence maintains its conductivity.

All rules fail where there are chemical or soft-coal fumes; corrosion will then go deeper, probably less in the aluminum than with other materials.

Enamelled copper does not corrode until the enamel comes off. (Several stations in soft-coal regions are getting good results with No. 12 enamelled copper wire. Both the Belden Mfg. Co. and the Acme Wire Co. make enamelled antenna wires.)

WIRED WIRELESS.

Wired wireless, or the application of radio telegraphy and telephony to the power wires and other continuous conductors to form a "guided" system of radio communication as distinguished from the usual "unguided" system, is about to receive a practical test in broadcasting operations. There has been formed an organisation for the purpose of broadcasting talks, news, musical numbers and other features over the lighting lines of a power company in the vicinity of New York. The plan is to charge a nominal fee to the electric light consumer for the privilege of listening to the wired wireless programmes. The company undertakes to supply a receiving set which may be plugged into any socket or receptacle. A simple receiving set with crystal detector and a pair of ear-phones is supplied at the lowest fee; a single-tube set is supplied for a higher fee; and a three-tube, loud-speaker set, complete, giving the same service as a phonograph, is supplied at the highest fee. The tubes are supplied with filament current directly off the lighting current, from the same plug connection that receives the radio energy. Plate batteries or "B" batteries are still employed, since it would require too elaborate an arrangement to do away with them, and the current consumption for the plate circuit is such that "B" batteries last for long periods. The wired wireless programmes are to be of a high order, and are to cover a period of some eighteen hours out of the twenty-four. On occasion, the broadcasting station plans to pick up programmes from other broadcasting stations and to retransmit them over the power lines.

Form 7

Commonwealth of Australia

Postmaster-General's Department

Wireless Telegraphy Act, 1905—1919.

EXPERIMENTAL LICENSE

(Transmitting and Receiving)

IN PURSUANCE and exercise of the powers and authority conferred upon the Postermaster-General by Section 5 of the Wireless Telegraphy Act, 1905-1919, and by the Wireless Telegraphy Regulations a license is granted to M.....

.....

to erect an Experimental Wireless Station at .....

..... and to operate the said Station for a period of twelve calendar months from the date hereof. The erection and operation of the said Station shall be carried out in accordance with the provisions of the said Regulations, as amended from time to time during the currency of this license, and shall be subject to such further restrictions and conditions as are from time to time notified by the Postmaster-General or by any officer thereto authorised in writing by the Postmaster-General.

By Direction of the Posmaster-General,

.....

Chief Manager, Telegraphs and Wireless.

Date .....

SCHEDULE OF THE AUTHORISED STATION.

1. No. of License..... Expires.....
2. Name of Licensee .....
3. Location of Station .....
4. Type of Receiver .....
5. Type of Transmitter ..... power.....watts
6. Operating wave-length ..... call sign .....

Signature of Licensee.....

Date.....

C14022.

The above forms are now being issued to Experimenters.

PROPOSED BROADCASTING IN INDIA.

According to recent despatches, it was announced at the broadcasting conference held in Delhi that the Indian Government did not intend to permit broadcasting in India by individual firms, but, under reasonable control—as in the United Kingdom—by a single licensed company for the whole of India. It is planned that this company shall consist both of British and Indian firms, and that no non-British subjects will be allowed to take part in it. The proposal of the Government regarding terms of the agreement required of the broadcasting company were embodied in a draft form of license placed before the conference. Opinions upon this form will be obtained from the Provincial Governments and Chambers of Commerce. It is understood that the manufacture of receiving sets is to be undertaken in India as soon as practicable by the new broadcasting company. This will probably at first consist of importation of some parts, the local manufacture of others, and assembling of complete sets.

LOUD-SPEAKER VOICE FOR DRILL SERGEANT.

If 250 lusty-lunged sergeants of the regular army should get together and shout "Fall In," in their best drill-ground style, the effect would scarcely equal that of the voice amplifier recently purchased by the Signal Corps and installed in mobile form on a motor truck. The new equipment can be used to handle large bodies of troops, to make speeches and music audible to assemble or to supply entertainment received by radio. The apparatus is technically known as a public address system. Sounds are picked up by a high-grade transmitter placed a few feet from the speaker, or near the bandmaster's stand, if music is to be handled. The electrical output, of this transmitter is increased about a half million times, using a four-stage vacuum-tube amplifier. Then the current goes into a group of six horns, mounted on a folding tripod. Under ordinary quiet conditions, a compact crowd of 750,000 people could hear a man through the use of this system.

Learning the Code

By H. F. Mason in "Q.S.T."

In order to become a proficient player in any game—for instance amateur radio — it is imperative that you devote a large amount of time to practice and training. Once the training is over, however you are happy because of the infinite degree of personal satisfaction there is in knowing how to play a game and play it well. We'll admit that there is a certain amount of drudgery in learning the code, despite all "learn it quick" methods, but this should not prevent you from partaking of the immense enjoyment which is in store for you, once it is learned.

THE PRACTICE SET.

It is, of course, only natural for a person enthusiastic over amateur radio to want to learn the code in the quickest and easiest way. For this purpose every beginner should obtain a "buzzer practice set." This consists of a buzzer, a dry cell, and a telegraph key connected together so that when the key is pressed the buzzer will operate, thus imitating a radio signal. The buzzer can best be a "nickel plated watch case buzzer" obtainable at most any radio store for about one dollar. One that, when connected as shown in the diagram, will emit a rather high pitched clear note is a great advantage, as will be learned later, in reading the signals.

Care should be taken in the choice of the transmitting key. The quality of your sending, no matter how much practice you have, will depend upon your using a key that has a good action and is well balanced. As you can use this same key in your transmitting set, after you have learned the code and secured a license, it may be worth your while to buy a good key at the outset. If you are in doubt as to your ability to select a good radio key, the next best thing to do would be to purchase a standard telegraph key. This type, though used on many radio sets, has the objection for radio work that it is too "light." This will be explained later.

In order that the signals from the practice set will simulate the real radio signals as nearly as pos-

sible it is well to connect a pair of head phones in the circuit. This may be done as shown in the diagram, connecting the telephones across the buzzer binding posts with a small fixed condenser in series with them. The capacity of the condenser should be around .001 microfarads. Its capacity governs the strength of the signals in the telephones; if the signals are too loud the condenser should be made smaller, and conversely a larger condenser should be used if stronger signals are desired.

GETTING STARTED.

Granting that a copy of the International Morse Code, known also as Continental Code, is at hand, we are ready, with the aid of the practice set, to begin. Although, strictly speaking, learning how to send and how to receive are two different things, they will need to be more or less combined in the early stages of your schooling.

The telegraphic code is built up around two units, the dot and the dash. Combinations of these units represent the different letters in the alphabet, and so it can be seen that the correct interpretation or decoding of the signals at the receiving end lies almost wholly on the skill of the sending operator in making the dots and dashes of their proper relatve length and spacing; making the signals understandable, in other words. It is very important, then, that the following correct relations be preserved. A dash is equal in length to three dots, the space between parts of the same letter is equal to one dot, the space between two letters is equal to a dash or three dots, and the space between two words is equal to five dots.

The first step in learning the code is to memorise the dot and dash combinations representing the letters. They must not be visualised as dots and dashes, however, but rather should be "auralised" as sounds. There is no such word as auralised but if there were it would express the correct method of grasping the code. The sound dit-dah (meaning a dot followed by a dash) in the head phones must impress your mind directly as being the letter A, for instance, without causing black dots and dashes to float before your eyes for an instant—that way madness lies. This is a point that always troubles beginners, but if you learn from the first to recognise the sounds as letters immediately, without reverting to dots and dashes, you will make much better progress. It is very interesting, even the learning, if taken in the right way.

Do not try to learn all of the letters at once; take only three or four a day, and practice on them until your ear is trained to instantly convert the dah's and dit's into letters. Then add a few more letters the next day, and so on until yau have learned them all.

Let us digress for a few moments and set ourselves clear on the correct manipulation of the transmitting key. The key should be located with the centre of the knob between sixteen and eighteen inches from the edge of the table, on a line with the operator's right shoulder. It is difficult to send well if the radio table is not of the proper height. The standard height of 30 inches should be adhered to as it will materially help your sending. The back adjustment screw on the key should be adjusted so that the knob will have a vertical travel of about one-sixteenth of an inch when the key is pressed. The spring tension is a thing that varies with the choice of the operator, but the beginner will do well to use a fairly heavy spring at the start.

The key must be held correctly as this spells the difference between good and poor sending. With the elbow resting on the table, the key knob should be held as shown in the sketch. The forefinger and middle finger should rest lightly but firmly on top of the key knob while the thumb and third, or ring, fingers rest very lightly on the sides of the knob. Above all things the wrist must be held up off the table, the higher the better, but at least high enough so that the top of the hand and the forearm will be in a straight line. The grasp of the key should not be tight or strained, as jerky sending will invariably result. Hold the key with the same light but firm grasp that you would use in holding a pen when writing. Generally speaking, the rules we used to observe in school when learning penmanship apply perfectly to the correct way of learning how to handle a telegraph key. By the same token that a good penman always holds his pen correctly, an operator whose sending is clear and even holds his key correctly. After all, the easiest way is the correct way—once you have mastered it.

When operating the key none of the muscles of the arm or wrist should be tense, but at the same time the action of the hand in forming the letters should be under perfect control. The stronger muscles in the forearm should do most of the work; the less capable muscles of the fingers only contributing the fine touches. The fingers should never leave the key knob, and the motion should be straight up and down, not sideways.

It will take quite a bit of practice before you will be able to send the letters correctly without a definite effort. All the while you should be careful to make the dots and dashes and spaces of their proper length. Almost always the beginner will make a C as if it were two N's, and a Y as if it were an N followed by an M. It will be a great help to you at this stage of the game if you can enlist the assistance of someone who knows the code to point out your mistakes and give you practice in receiving by sending to you on the buzzer. When copying someone's sending always have him send to you just a little faster than you can easily receive. If you are able to copy every letter, you are learning nothing, but if the sending is fast enough so that you only get two letters out of every three, your mind will be quickened and an effort will be made to get that other letter. Diligent practice at the rate of about an hour each day will enable you to acquire a fairly good knowledge of the code in a surprisingly short time.

GAINING SPEED.
(Transmitting)

The worst thing an amateur can do is to try and ignite the air while still at a tender age. Until you are very sure that your hand is becoming accustomed to the correct method of sending, do not try to exceed ten words per minute, and come up to that speed gradually. If you disregard the above you stand a good chance of being cursed with a jerky, non-uniform style of sending that will be very hard for to you to rid yourself of; or you may develop a "glass-arm," which, as its name implies, may cause you to have to change to some other recreation than amateur radio.

At this point it would be well to say a few words about the side-swiper, fishtail, cootie, hacksaw blade, or double action keys that have found their way into some of

our best stations. To the unsophisticated beginner, my advice is to leave them alone, brother; they'll do you more harm than good. After you've learned the code on a good old-fashioned straight key and you think you can do better on a "cootie," go to it, but be careful that the quality of your sending does not go down in the process.

The vibroplex, which has a definite field in wire telephony has one characteristic that prevents its more general use in rado. This is unavoidable, however, as it is caused by the inherent difference between the two systems. In radio the key must actually be depressed the whole time a signal is made. In wire telegraph, on the other hand, the spring on the sounder raises the lever and completes the character after the current is broken at the contacts of the key. For this reason, when a vibroplex is used on a radio set, there is a tendency to make the dots relatively too short. This can be corrected to a certain extent, however, by proper adjustment of the key.

As many of our junior operators were telegraph operators at one time or another, radio operating is interesting in comparison. In a wire circuit the action is positive, that is to say, each dot and dash that the transmitting operator sends will be faithfully reproduced at the receiving end. This allows constant sending at a good speed still retaining clearness. In radio, however, many times it is necessary to put the signals through static, interference, and fading or they do not reach the receiving operator at all. Therefore, a heavier and even more clear and distinct style of sending is necessary over radio. This is usually taken care of automatically if a transmitting key of more rugged and heavier construction than the ordinary telegraph key is employed.

Then there are what is known as "swings" wth myriads of variations thereof. The only advice here is to stay on the narrow path and make your sending as near perfect as possible. Do not worry about cultivating an individuality to your sending. That will come with time and an operator who is noted for his clear and even method of transmission is much more respected by the amateur fraternity than one who owes his fame to the "sloppy way in which he dishes out the code"—and we wonder that some of it can be identified at all.

Do not hesitate to ask other operators for criticism of your sending. Only they are in a position to judge. Send to a person for a few minutes, have him copy on paper, and he can soon tell you exactly wherein you can improve your transmission. If you find you are making mistakes, slow down. After all, if you have an important message to put through, it is not the time it takes to send the message that is wasted, but the time lost by making mistakes.

The best test there is for an operator's sending is for you to sit down to a practice set and send straight reading matter at a speed of from twenty to twenty-five words per minute, continuing for an hour or an hour and a half. If you have cultivated that clear, easy and correct style of sending that is so desirable, it will take about ten minutes to get your "fist" limbered up, and from then on you can send for a long period of time without experiencing the slightest discomfort. On the other hand, if you have not learned the fundamental principles of correct key manipulation, you will "blow up" after the first fifteen minutes with a hand too jerky, and a wrist too sore to proceed. Try this sometime and see how you make out.

GAINING SPEED.

(Receiving)

Gaining speed in receiving is more a matter of practice than anything else. In this connection it will probably repay you hook up a simple long wave receiver and tune in on the long wave C.W. stations. These stations are transmitting throughout the day, and their steady sending gives one a fine chance for practice in receiving. Some of the stations send very slow and some much faster, thus giving the beginner a wide choice.

When you are able to make a

good clean copy with pencil and paper, try without the aid of the pencil to understand what is being sent. Copy it in your head, so to speak. Then combine the two methods by copying a word, or a group of words before putting anything down on paper. A good operator seldom starts wrting a word until the transmission of that word is finished. In this way he can make a much better looking copy and capitalise the proper names as he comes to them. In addition, it is a good thing to know how to copy a station on the "mill" (typewriter) even though this method is rarely used in amateur work.

Learning to copy a weak station through static and interference, and fading is an art in itself, and to master it takes no small amount of experience. This taxes the skill of the operator to the utmost, as it is often necessary to retune the receiver and go back and fill in missing letters in the copy without actually losing a word of the signal that can barely be read.

In conclusion, do not make hard work of learning the code. Be optimistic and you will make much better progress. It is true that it takes many hours of concentrated study to acquire perfection, but practice makes perfect. If there is anything that causes downright joy in an amateur's heart it is the pleasure of communicating with an operator who really knows how to send and who knows how to receive. Be one of these.

A FUSE.

Procure a piece of glass tubing, about 1 inch long, and make a mounting for it with four pieces of sheet brass, as shown in sketch. The brass pieces are shaped and fastened to a wood base (or panel) so that their upper ends form a clamp to hold the tube. A very thin piece of tinfoil, about 1½ inches long, is cut 1/8 inch or less in width, the size depending on current which is to pass (found by experiment with ammeter). This is placed in the glass tube and the ends are bent over the edge. A piece of tinfoil is then wrapped round each end, over the ends of the enclosed piece, and pasted to the tube. The fuse thus made is pushed into the spring clamps of the block which are connected in the circuit.

2ED.

LEICHHARDT AND DISTRICT RADIO SOCIETY.

Several important matters were discussed at the 49th general meeting of the members of the Leichhardt and District Radio Society held at the club-room, 176 Johnston St., Annandale, on Tuesday, September 25th. Amongst other things the questions of the establishment of a library, and the draughting of a new syllabus were considered, and these important matters will be finalised at the First Annual General Meeting, to be held on Monday next, October 8th, at 8 p.m.

As this is the most important meeting in the year, a good roll up of members is anticipated, especially as the first year's activities of the Society will be reviewed and, it is expected, a splendid record of steady progress revealed. In addition to members of the society,

all others interested in the development of radio work are welcome to attend the meeting, as the society is anxious for non-members to know the excellent work that has been done in this direction.

Although the society has one of the largest, if not the largest membership of all the numerous clubs and societies now in existence there is still ample room for expansion, and all interested are invited to communicate with the Hon. Secretary, Mr. W. J. Zech, 145 Booth St., Annandale, who will be pleased to reply to any inquiries relative to the activities of the Society.

THE CROYDON RADIO CLUB.

The above club held its usual weekly meeting on Saturday, September 22nd at the club rooms, "Rockleigh," Lang Street, Croydon at 7.30 p.m., when there was an exceptionally good attendance.

On Tuesday last the club members were the guests of the North Sydney Radio Club, where they were entertained by music transmitted from 2GR. Mr. C. W. Slade, winner of the receiving section of the New Zealand tests gave a short lecture upon the circuit he used for receiving N.Z. All communications should be addressed to the Hon. Sec., G. Maxwell Cutts, "Carwell," Highbury Street, Croydon.

ILLAWARRA RADIO CLUB.

There was another good attendance of members at the 23rd meeting held on 25th September.

In opening the proceedings the Secretary introduced to the members, Mr. Hamilton, President of the Marrickville Radio Club, and extended to him a cordial welcome on behalf of the club, which was carried by acclamation. Mr. Hamilton in responding said he was grateful for the warm reception accorded him, and would like to have members of this club visit the meetings of the Marrickville Club, and assured them of a hearty welcome at any time.

After formal business, a lecture was given by Messrs. F. H. Kirkby and S. Atkinson on the "Principles of Transmission and Reception." Mr. Kirkby dealt with the propagation of spark signals, explaining the nature of the damped oscillations produced by this system of transmission, and the operation of the transmitting and receiving circuits used in this connection, and the part played by the crystal detector and phones in making the re-

ceived signals audible to the human ear. Mr. S. Atkinson spoke on the arc and valve systems of transmission, and also the action of valve receiving circuits. He gave some interesting details on the arc and the principles of Flemming's two-electrode valve and De Forest's later three-electrode valve and the manner in which they functioned. He also explained the nature of continuous waves and the method of beat reception.

The lecturers then proceeded to give a practical demonstration of transmission and reception by means of two small loop aerials, representing the transmitting and receiving stations. To one loop was attached a valve, battery and transmitting key, and to the other a valve, battery, transformer and a pair of low resistance phones. The loops were placed about 10 feet apart and the first valve was put into a state of oscillation, when the second or receiving circuit was put into action and tuned to resonance with the first, the resultant note in the phones, though weak, could be clearly heard all round the room, and when the key was operated a variation in the tone was noted; the whole representing in effect the transmission and reception of C.W. on a small scale. The directive properties of loops were also clearly illustrated.

The introduction of practical apparatus into the lecture served to make the subject quite clear and understandable to all present (which is not the case with blackboard illustration) and the lecture therefore proved to be most instructive and interesting, and one of the best of a practical nature that the Club has enjoyed to date.

A vote of thanks was accorded the lecturers at the conclusion.

On Saturday, 15th September, the Club had the privilege of visiting the home of Mr. A. B. Hector, Greenwich, and were entertained with a demonstration of his colour music scheme. There was a fair attendance, and all were much impressed with the beauty and harmony of this wonderful combination and the very effective manner in which it was presented. In between items, Mr. Hector gave short talks on energy in its various forms, emphasising the fact that all manifestations of energy were of a common origin—that they were different only in degree but not in kind, all being governed by the same laws. This was particularly applicable to sound and light, because each note of music could be represented by a different colour, as was illustrated in his colour-music and which was the basis of his scheme. Of course to the layman the gorgeous combinations of music and colour and the kaleidoscopic effects produced present to the eye and ear an altogether beautiful picture of the harmony of light and sound, which one would not think possible, and it is only after many performances that one begins to fully appreciate the underlying principles of it all. A thoroughly enjoyable evening was spent, which resulted in much valuable food for thought being gained. At the conclusion a hearty vote of thanks was accorded Mr. Hector.

The next meeting of the Club, to be held at the Club room on Tuesday, 9th October, will take the form of a smoke and social evening. All are invited to attend.

The Secretary (Mr. W. D. Graham, 44 Cameron Street, Rockdale) would be pleased to hear from anyone interested in the club or desirous of becoming a member—particularly from local experimenters.

MARRICKVILLE AND DISTRICT RADIO CLUB.

The usual meeting of this club was held in the School of Arts, Illawarra Road, Marrickville, on Monday, 24th ult., Mr. W. L. Hamilton occupying the chair.

The business of the meeting was quickly disposed of and the chairman with a few well-chosen remarks introduced Mr. Malcolm Perry to the Club.

Mr. Perry lectured on "How to Experiment," and during the evening he opened up new channels for thought. He stated that he was inclined to follow Dr. Steinmetzin, in his theory contrary to ether waves.

The lecturer advanced many facts to support his claim that wireless communication was possible by means of the earth channel and not by means of ether waves.

Mr. Perry advised experimenters to be their own transmitters when testing out various circuits. A buzzer in the next room he said was quite suitable for a transmitter. After being satisfied that the set wll respond to the buzzer then try it on an aerial.

Mr. Perry's lecture was original and was appreciated very much indeed. He suggested that Marrickville Club should meet Waverley Club in a debate, subject to be chosen.

After thanking Mr. Perry the President announced that Mr. J. W. Robinson, the Hon. Radio Inspector would address the Club on the 8th inst., the subject being "How a Ship's Set Operates."

THE WIRELESS INSTITUTE OF AUSTRALIA.

N.S.W. Division.

The Council of the N.S.W. Division of the Wireless Institute of Australia meets on Thursday, 4th October at the Wentworth Hotel at 7.30 p.m.

The next three general meetings will be on the 3rd Thursday of October, November and December.

Mr. Maclurcan's new Q.S.L. cards finish with the figures 73S. This is an A.R.R. League's abbreviation meaning, "Best Regards."

Wirelesses.

Wind and static played havoc with the experimental transmissions of music last week-end. 2CM, 2JM and 2GR all had trouble.

Mr. Marks was very careful to lower his aerial, he has already experienced windy weather.

One experimenter we know ordered quite a lot of timber last week and with the assistance of one or two put up two 60ft masts last Sunday. Eight-Hour Day was spent untangling the terrible mess one of the masts made when it crashed on Sunday night.

A new wireless station is being erected at Willoughby. We presume this is where Amalgamated Wireless Ltd. is installing the 5 K.W. set that is to be used for Farmer's broadcasting.

ADVERTISING BY WIRELESS

A big advertising firm in the city is canvassing for wireless advertisements for a broadcasting concern. Five minutes advertising talks will be given, interspersed with musical items. £3 for each five minutes, we are told will be the charge.

A broadcasting company recently formed in N.S.W. hopes to be operating shortly. An exceedingly fine 12 to 14 hours a day programme will be given.

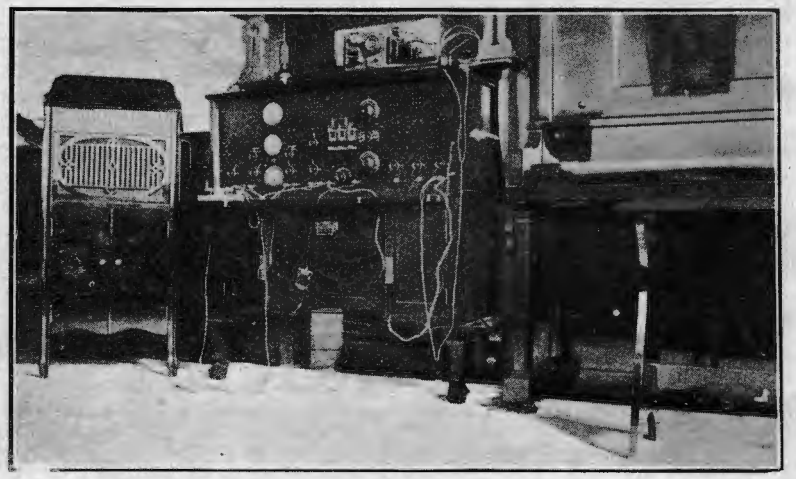
NEWCASTLE AMATEURS.

A recent statement made by a radio official in Sydney, that "Newcastle was about twenty years behind in Wireless" has caused amateurs her to site up and take notice, with the result that they have picked up the twenty years in about two weeks, which was evidenced on Sunday night, when two stations in the district were carrying out "tests" consisting of some high-class musical items.

On Saturday night, Mr. N. P. Olsen commenced at 7.45 p.m., and continued until 10.30, the music being supplied by his Gulbransen Duo-Concerto Player Piano and talking machine. Reports were received from numerous stations within 150 miles radius, and several from stations in Victoria.

On Sunday night the Newcastle District Radio Club made their first test with radiophone transmission, and achieved great success. Great credit is due to the Club as most of the set was made by club members, and their music was received by Mr. Silverthorne at Cockle Creek. The Club which was formed in Newcastle twelve months ago has been steadily progressing with the erection of this set for a few months, the main difficulty being finance, but they have every reason to be pleased with themselves, with the results.

During the evening they carried out successful two-way conversation with Mr. N. P. Olsen, at Waratah.



Mr. A. P. Olsen's very excellent Transmitter and Receiver at Waratah, Newcastle.

Trans-Pacific Tests.

At Mr. Renshaw's request we publish the correspondence regarding the coming Trans-Pacific Tests.

This test will be the largest of its kind in the world, and it behoves all experimenters in Australia to enter for it.

COPY.

WIRELESS INSTITUTE OF AUSTRALIA.
Victorian Division.
443 Little Collins St.,
Melbourne, Victoria.
Circular No. 1.

Dear Sir,

Owing to the great success obtained by Australian experimenters in the Trans-Pacific Tests held in May last, this Divison has opened negotations with the American amateurs for further tests to be held in October next, in which you are cordially invited to take part.

We trust we will be able to furnsh full details of all arrangements made early in September (i.e., terms of transmission, times, etc.) but all local arrangements are to be left entirely in the hands of each State Division.

The excitement in America over these projected tests in October is intense and if your Division is willing to co-operate will you kindly reply by letter at your earliest convenience. All we ask is, that reports of all calls and messages received from America during the test period should be forwarded to this Division without delay for early transmission to America.

We have completed arrangements for one and probably two transmiting stations capable of sending messages back to America so feel sure that if the late tests startled the world the next test swill paralyse it, therefore, we trust you will be willing to co-operate with us, and we will forward you full schedules, etc.

With cordial greetings from this Division,

Believe me,

Yours truly,

(Signed) B. Jermyn Masters
Honorary General Organising Secretary.

COPY.

WIRELESS INSTITUTE OF AUSTRALIA.
Victorian Division.
443 Little Collins St.
Melbourne,
September 15th, 1923.
Circular No. 4.

Dear Sir,

Following my Circular No. 1 in connection with the Trans-Pacific Tests to be carried out next month I herewith beg to advise you of the following particulars which have been agreed to by America.

The American stations will transmit each evening from the 15th October to 3rd November inclusive, from 5.45 p.m. to 8.45 p.m. Melbourne, and the Australian stations will transmit from the 4th November to 13th November inclusive at the same times.

If you have any stations capable of reaching America will you please advise us as soon as possible, giving the location, input, and call letters, so that provision can be made for them on the Roster now being prepared for our transmitting period.

Yours truly,

(Signed) B. Jermyn Masters
Hon. General Organising Secretary.

COPY.

19th September, 1923.

B. J. Masters, Esq.,
Hon. General Org. Secretary,
Wireless Institute of Australia,
Victorian Division,
443 Little Collins St.,
Melbourne.

Dear Sir,

I am in receipt of your Circular No. 4 following on your Circular No. 1, and in reply have to advise you that all our members are being notified of the arrangements and I ame taking steps to have same published in the local wireless magazines in the next issues. I will advise you as soon as entries are received.

Do you want any further particulars from receiving stations only as you do not indicate other than call letters and location?

Regarding the matter of wave length—I take it that this is being kept secret and will only be indicated to entrants; at any rate, I am stating such in the publicity locally and if incorrect I would be glad if you would give me particulars at your earliest convenience.

With kind regards,

Yours faithfully,

(Signed) P.R.
Hon. Secretary.

COPY.

443 Little Collins St.,
Melbourne, Vic.,
24th September, 1923.

Dear Sir,

Your letter of 19th inst., re Trans-Pacific Tests. I think the enclosed (Circular No. 7) will furnish you with full particulars of the details this Division requires from the other State Divisions. If you thought of giving the wave length only to those of your members who officially enter for the tests, I am afraid I have unintentionally spoilt your designs as I have already given same to the Technical Press for their next issues.

It is our intention in Victoria to try and get every experimenter to try and receive the American stations, at the same time endeavouring to educate them to the idea that oscillating sets will not get any messages.

With best wishes for some splendid results from N.S.W.

Believe me,

Yours truly,

(Signed) B. Jermyn Masters
Hon. General Organising Secretary,
Victorian Divison.
Phil Renshaw, Esq.

COPY.

WIRELESS INSTITUTE OF AUSTRALIA.

Victorian Division.
443 Little Collins St.,
Melbourne, Vic.,
25th September, 1923.

Circular No. 7.

Dear Sir,

Following my Circulars Nos. 1 and 4, in connection with the Trans-Pacific Tests to be carried out next month my Council wish me to state that, for the period from the 15th October to 3rd November when the American Stations will be transmitting, all local arrangements are to be left in the hands of each respective State Division.

In this State we have decided to have a "free for all" and are giving the greatest publicity to the tests, asking no entrance fee and giving no prizes.

All we ask from the other State Divisions is that all reports of all calls and messages received from America should be immediately forwarded to our official station—3BM (H. K. Love, Esq., Ferncroft Av., East Malvern), for the purpose of sifting and compiling a full report for early transmission to America. It is highly probable that the President of the U.S.A., congressmen and members of the Senate will be asked to send messages to Australia and any station picking up these messages is asked to forward same to our General Secretary, Mr. G. W. Steane, Earle Street, Mont Albert, Vic.) in order that they may be forwarded to the Government through the General Manager of Wireless.

For the period from November 5th to the 13th, in order to prevent overlapping and consequent jambing we are preparing a roster for the transmitters and would ask any experimenter who intends to transmit to America during this period that he should immediately forward us full particulars of his station for inclusion on this roster.

Yours faithfully,

(Signed) B. Jermyn Masters
Hon. General Organising Secretary,
Victorian Division.

Published by W. J. Maclardy, of 58 Murdoch St., Cremorne, for the Proprietors, at the offices of Publicity Press Ltd., 33/37 Regent St., Sydney.

Amateur Stations

VICTORIA.

The following licences for experimental purposes have been issued:—

Nature of Licence.	Name.	Address.
C	Klix, A. H.	Watt Street, Sunshine. R.
V	Cumming, W. & Co.	222 Swanston Street, Melbourne. R.
C	Martin, C. G.	63 Livingstone Street, Ivanhoe. R.
C	Ebenreuter, C.	4 Hart's Parade, Auburn. R.
C	Watson, V. G.	60 Arnold SCtreet, North Carlton. R.
C	Wilde, R.	1017 Punt Road, East Melbourne. R.
C.	Owen, C.	22 Kendall Street, South St. Kilda. R.
C	Gibson, G. E.	740 Malvern Road, Armadale. R.
C	Gore, J. T.	32 Harper Street, Northcote. R.
C	Chrimes, E. K.	Gerang Gerand, via Dimboola. R.
C	Murray, R. M.	78 Buckingham Street, Richmond. R.
C	Holt, O. P. B.	12 Lyons Street, Footscray. R.
V	Spencer, C. J.	Centre Dandenong Road, Cheltenham. R.
V	Ray, L. L.	332 Danks Street, Middle Park. R.
C	Strickland, L. J.	29 Bertram Street, Gardonvale. R.
V	Johnson, E. H.	105 Moorabool Street, Geelong. R.
V	Lewis, C. B.	60 Seymour Road, Elsternwick. R.
C	Healy, M. J.	23 Chapel Street, St. Kilda. R.
V	Hodson, L. J.	4Scott Street, Kew. R.
C	Heggie, A. J.	170 Mills Street, Albert Park. R.
V	Harvie, M. D.	19 Stanhope Street, Malvern. R.
C	Wallace, H. D. J.	28 Warburton Road, Canterbury. R.
C	Bellion, L. C.	118 Beavers Road, Northcote. R.
V	Jenkins, Alan.	Bridgewater on Loddon. R.
C	Simpson, G. L.	19 Turner Street, East Malvern. R.
C	Solomon, L.	22 Murphy Street, South Yarra. R.
C	Dunstan, T. C.	Scotch College, East Melbourne. R.
V	Selby, G. N.	Glenbrook Avenue, Melbourne. R.
V	Cave, J. D. (Aust. Gen. Electric)	Queen Street, Melbourne. R.
V	Lee, A. L.	130 Page Street, Middle Park. R.
V	Grove, H. E.	35 Logan Street, Canterbury. R.
V	Ridoutt, R. D.	124 Marshall Street, Ivanhoe. R.
C	Cavanagh, Wm.	Wattle Cafe, Main Street, Warburton. R.
C	Knights, W. D. P.	82 Harold Street, Middle Park. R.
C	Fysh, E. S.	24 Empress Road, Surrey Hills. R.
V	Falconer, C. I.	13 Norris Street, Canterbury. R.
C	Dixon, K. W.	72 Downshire Road, Elsternwick. R.
V	Carrington, K. A.	226a Burwood Road, Hawthorn. R.
C	Robinson, S. G.	257a Domain Road, South Yarra. R.
V	Kay, T. D.	29 Domain Road, South Yarra. R.
C	Biggs, A.	30 Simpson Street, Yarraville. R.
C	Littie, W. R.	"El Nido," Wattletree Road, East Malvern. R.
C	Dick, W. W.	21 Ferguson Street, Williamstown. R.
V	Horwood, J. F. Jnr	9 Scott Street, Canterbury. R.
C	Pitthouse, A. J.	91 Ferguson Street, North Williamstown. R.
V	Brown, A. A.	Hillside Parade, South Camberwell. R.
V	Turner, F. J.	211 Inkerman Street, East St. Kilda. R.
V	Barnes, V.	3 Horne Street, Brunswick. R.
V	Plant, R. R.	111 The Avenue, Coburg. R.
C	Bennett, C. J.	371 Victoria Parade, East Melbourne. R.
V	Woodburn, T. C.	3 Westbrook Street, East Kew. R.
C	Elmslie, J. B.	312 Beaconsfield Parade, Middle Park. R.
V	Davenport, W. K.	159 High Street, St. Kilda. R.
C	Pilkington, P. E.	86 Bent Street, Northcote. R.
V	Nicholls, W. V.	10 Nelson Street, Sandringham. R.
C	Reynolds, J.	1 off Arthur Street, Montague. R.
V	Lawford, V. W.	Renison Street, Mordialloc. R.
V	Scott, L.	111 Armstrong Street, Middle Park. R.
C	Westley, A. W.	St. James' Vicarage, Collins Street, Drysdaye. R.