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SIXPENCE

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"THE CHILDREN'S HOUR"

RADIO

IN AUSTRALIA & NEW ZEALAND

Incorporating "Sea, Land and Air"

Managing Editor: S. E. TATHAM.

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The Howling Valve

NO little prominence has been given to the discussion of methods and of nullifying the "howling valve" nuisance in this number of *Radio* and, it might be said in passing, we have allocated such space gladly, both in the case of paid articles and those we have been requested to insert out of the goodness of our heart and a desire to assist in the making of the large army of Australasian experimenters and broadcast listeners as happy and friendly a family as possible.

UNDER the wireless regulations which control Australian conditions, both experimenters and listeners-in have been given a free hand as far as the un-restricted use of regenerative sets—i.e., those whose aerials oscillate—and as longer distance and louder signals may be obtained with these than with the un-regenerative circuits it is not to be wondered at that they are far more popular but, as all experimenters know, if they are used carelessly, there is no more aggravating thing in the world to experience when listening to an aerial concert or straining breathlessly for some super-DX station than to hear "Whe-e-e-e-e-e-e-e-e!" with the result that every sound and signal goes completely by the board.

WE do not suggest that those listeners or experimenters who offend do so deliberately but, unfortunately, even murder can be done accidentally and it is none the less reprehensible for that.

THE whole situation boils down to this: do unto others as you would they do unto you. With a little thought, a little consideration and a little care, the whole trouble could be remedied and all on the ether would be as it should.

GENERALLY those users of regenerative sets who cause their sets to howl to the "amusement and pleasure" of others do so through ignorance—for which there is no excuse. Particularly as it is a well-known fact that there never was a wireless enthusiast yet who would not willingly and with the greatest eagerness help and advise his brother "fan" on any little-understood point or technical obstruction.

PUTTING it personally—if you are an offender—and we do not actually suggest that you are, although you may be without knowing it, ask somebody who is in a position to tell you and show you how not to do it.

FOR the benefit of the curious it may be said that there is no advantage in making one's set oscillate; it does not improve signals, distance—or the temper of the next-door experimenter or listener.

THEREFORE let your eleventh commandment be, "Thou shalt not oscillate"—and keep it!

THANKS, MR. ROBINSON!

A Chatswood reader, Mr. J. A. Robinson, writes us a letter. He says:—

"I have been a reader of this fine magazine since its first number, and have noted with interest its great improvement. I had the first volume bound and indexed, which makes a very fine addition to my library.

"I constructed my first Crystal set as described in "RADIO," No. 18, of last year. I must say I was surprised at the results.

"I then constructed an amplifier from directions given in "RADIO," then a P1 regenerative with audio, which I now use. From this receiver I am getting excellent results, and in your last issue you have the very three-valve circuit I have been looking for."

The Use of a "C" Battery in a Two-Valve Receiver

THE accompanying diagrams show clearly the connections of a two-valve receiver using UV199 or AWA33 valves. At a casual glance the diagrams appear to be those of the circuit for the P1 and a stage of audio frequency amplification as previously published in these columns, but on closer examination it will be noticed that there are several alterations; one important difference being that the connection of the grid return of the second valve is to the negative pole of a three-volt bias battery instead of to the negative of the filament. An additional lead from the positive terminal of the grid bias battery is taken to the *negative terminal* of the "A" battery. As the makers of the above valves recommend the use of a grid bias battery, the same is included in the circuits herewith. It will be noticed that, unlike the connections of many other circuits, the *positive* of the "A" battery is earthed with the negative of the "B" battery. This is shown in Fig. 2, but was omitted in Fig. 1.

In Fig. 1, the aerial tuning condenser is shown connected in parallel, but for changing from long waves to short it is advisable to place in circuit a series parallel switch to facilitate the change. A switch for this purpose is shown, with full detail as to how it should be connected.

For selective tuning a variable secondary condenser is shown in Fig. 2, the capacity of which is .0003 mfd., and if one is available, it should be made use of.

A grid bias battery need not be an expensive item, as any ordinary torchlight battery (the usual price of which is about 1/-) will suffice.

Although good loud-speaker results have been experienced with this circuit when near local broadcasting stations, we do not recommend it for that purpose.

The following is a list of components necessary for the above circuit:—

1 Aerial tuning condenser (variable), .001 mfd.

1 Secondary tuning condenser (variable), .0003 mfd. (optional).

1 Grid condenser .0003 fixed.

Set honeycomb coils.

1 Audio frequency transformer, ratio 1 to 4.

2 Valves; UV199 or AWA33.

2 Valve holders.

2 Filament rheostats, 30 ohms.

1 A Battery (dry cells, 4½ volts)

1 B Battery (60 volts).

1 C Battery (3 volts torchlight)

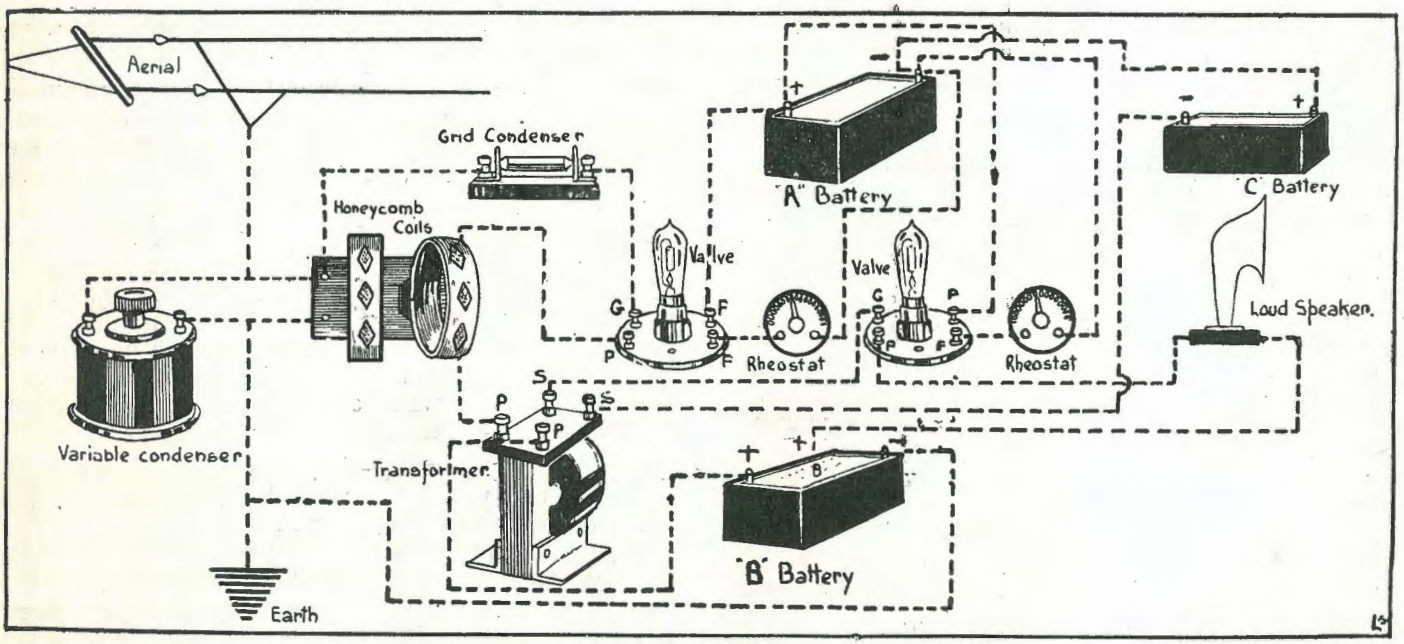


FIG. 1.
Showing a two-valve receiver, detector and one stage of audio frequency amplification, with grid bias battery. The dotted lines denote the wiring connections, but it should be borne in mind that the earth lead from the positive of the "A" battery is not shown.

ADVANTAGES OF A "C" BATTERY

The use of a negative "C" battery on the grids of audio frequency amplifying valves is necessary if distortion is to be avoided. Figs. 3 and 4 show the reason. The curves represent the grid voltage-plate current characteristic curve of a modern valve.

When speech voltage is applied to the grid of a valve the alternations swing equal distances on either side of the average grid voltage. If a straight line represented the characteristics the plate current would also vary uniformly.

The characteristics are faithfully represented by a curve, however, and in the neighbourhood of a zero grid volts the bend is accentuated.

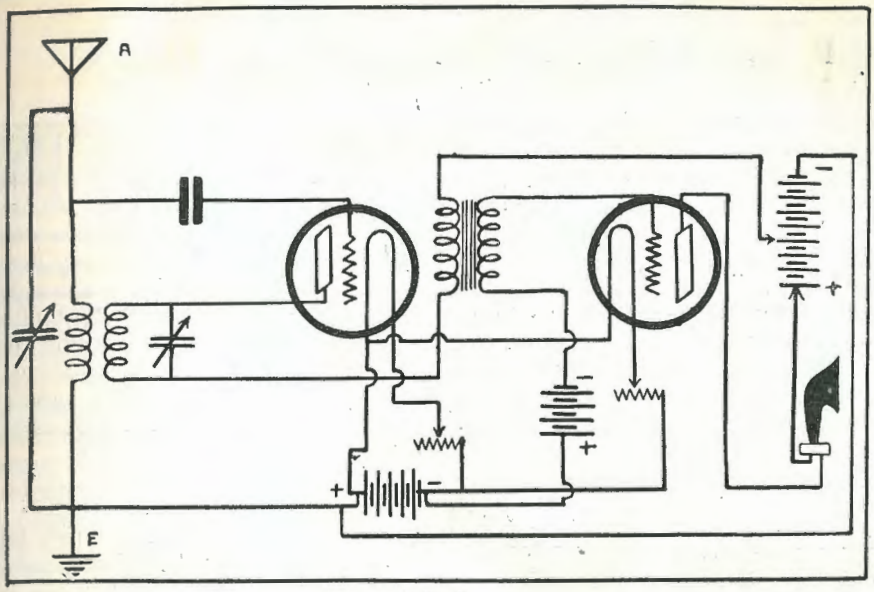


FIG. 2.
Schematic diagram of connections.

If no voltage is applied to the grid the valve will operate on the position A B of the curve, a non-uniform variation of the plate current will result, and received signals will be distorted. If, on the other hand, a negative grid potential of three volts is applied, as in Fig. 4, the valve will operate on the straight line A B; the plate current will vary uniformly and with great amplitude.

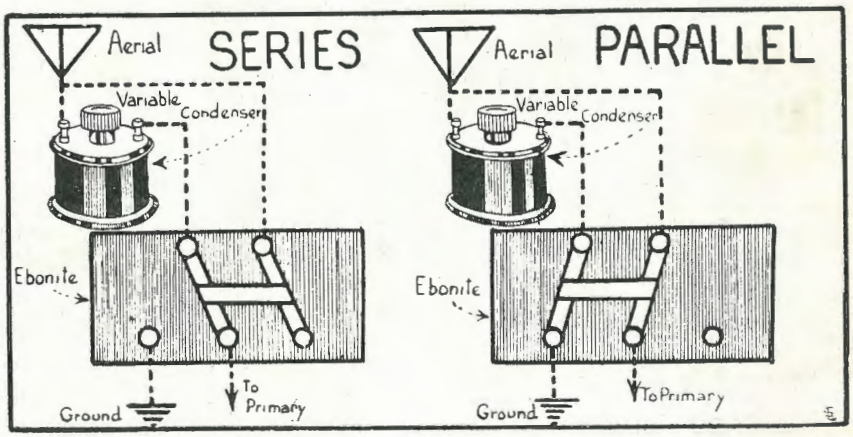
This is obviously the most efficient part of the curve on which the valve may operate. With these conditions we get good amplification without distortion.

There is yet another advantage to be gained by using a negative voltage on the grid. Reference to Fig. 3 will show that 3½ milliamps are drawn from the plate battery when no grid bias is used. Fig. 4 shows that only 2.5 milliamps are used with three-volt negative bias on the grid.

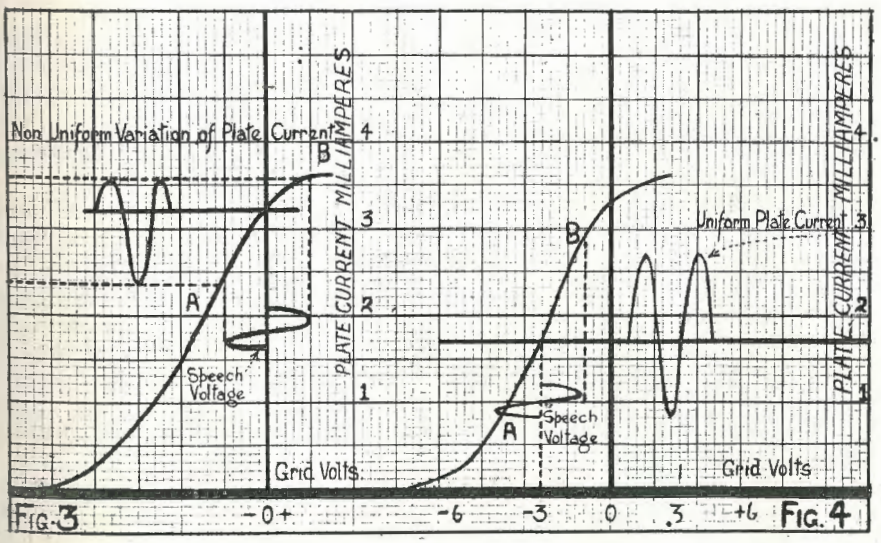
Hence the "B" battery will have considerably longer life when correct grid potential is used.

2RJ NOT 2HS.

IN the list of Call Signals published in *Radio*, No. 40, on page 364, the experimental station of Mr. R. J. Fagan, "Sunny Ridge," Mandurama, N.S.W., was shown as 2HS, but we are now advised that these call letters have been changed to 2RJ.



Here are seen the connections of the aerial tuning condenser in Series and Parallel.



In Figs. 3 and 4 the curves represent the grid voltage plate-current characteristic curve of a modern valve with variable grid potentials.

PERSONAL.

WITH the publication of this issue of *Radio*, Mr. S. E. Tatham, Manager of The Wireless Press and the Managing-Editor of *Radio*, relinquishes his position, and takes this opportunity of expressing cordial thanks to both advertisers and the wide circle of readers of *Radio* for the able assistance and unstinted support given to him since he published the first issue of *Radio* more than eighteen months ago.

Mr. Tatham has resigned to enter into business in Sydney on his own behalf.

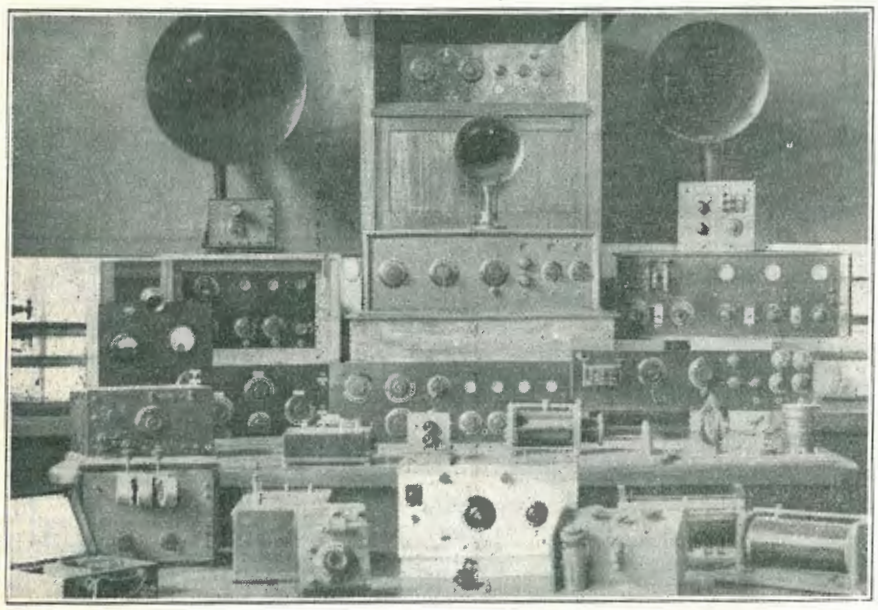
Our London Letter

(From Our Special Correspondent.)

London, August, 1924.

HIGH-POWER BROADCASTING.

THE event of the month here has been the opening of the new high-power broadcasting station at Chelmsford, which, judging from reports at the time of writing, has been an unqualified success. The object of the station is to provide broadcasting of a power—not less than 15 kilowatts—which will enable crystal-set users within 100 to 150 miles to listen to broadcasting. At present, the British Broadcasting Company has eight main broadcasting stations dotted about the country, working on 1½ kilowatts, and five smaller relay stations, working on considerably less power than the main station but intended solely to cater for the local crystal users who are out of range of the main stations. From the main stations as they at present stand, good crystal reception cannot be guaranteed at a range of more than twenty-five miles, and it is these crystal users who are out of range of their local broadcasting station who will benefit from Chelmsford. The station is still purely in its experimental stage and, in fact, its continuance depends on the success of its experiments, about which, at the moment of writing, extremely promising reports have been received from all over the country. Crystal users up to 100 miles seem to have had no difficulty in getting good results from this high-power station and many reports have come from distances of 150 miles and more. Reports have been received from Aberdeen, in the north of Scotland and from Spain, so that as far as range is concerned, the new station seems quite satisfactory. Several users of crystal sets in London have sent in complaints that they are unable to hear Chelmsford satisfactorily, but this is probably due to the large amount of "screening" which exists in London, as is the trouble in all big cities, in the form of the network of electric and telephone cables which abound over and under the ground everywhere. But as London is also very well served by its own broadcasting station, the poor reception from Chelmsford (30 miles) is not of great importance. It is the crystal users in the depths of the country who will find Chelmsford their great boon. At present the station is working on a power of 15 kilowatts with a wave-length of 1,600 metres and the hours of transmission are provisionally fixed at 11.30 to 12.30 (mid-day), 4.0 to 5.0 p.m. and 7.30 to 8.30 p.m. (British summer time). During the experiments which are now being carried out the morning and afternoon programmes consist principally of speech, but music is played during the evening performances. Reception in most parts of Europe should be easily possible, perhaps in some cases even on crystal sets.



Some amateur exhibits seen at the recently held Auckland Wireless Exhibition.

BROADCASTING IN IRELAND.

While the rest of the British Isles is adequately served by broadcasting stations, Ireland has been left out, but that is now on the way to being remedied and before many months have passed should be satisfactorily settled. A broadcasting station is proposed for Belfast, in Northern Ireland, and will be opened shortly, whilst in the Irish Free State the Radio Association of Ireland made application for a broadcasting license and questions in the "Dail" elicited the information from the Minister of Posts and Telegraphs that the whole question of the conditions under which such licenses could be granted was under consideration and that a decision in the matter would be arrived at very soon. So that it seems as if, in due course, Ireland will have broadcasting of its own.

RECEPTION WITHOUT HIGH TENSION BATTERY.

A great deal of interest was taken recently in the publication by a British wireless weekly paper of details of a new circuit which needs no high tension battery. Broadly speaking, the principal of the new circuit is that four electrode valves are used, and, although there is no separate high tension battery it is obvious that a certain amount of electric potential must be applied to the plate of the valve and this, in the case of the new circuit, is supplied by the filament-heating accumulator. The new circuit certainly introduces a novel idea and results are claimed equally as good as on sets using orthodox high tension circuits, but whether the wireless set of the future will be one without high tension batteries remains to be seen.

Amateur Interference with Broadcast Reception

(By CHAS. D. MACLURCAN.)

MANY broadcast listeners are complaining of the interference caused by amateur transmitters during their reception of broadcast programmes. Some of these complaints are justified—many are not.

The object of this article is to look into the cause of this interference, suggest methods of overcoming it and to appeal to both experimenters and "broadcatchers" to be a little more tolerant of each other. Both sides undoubtedly have certain rights which the other side should endeavour to respect.

With this object in view the matter was fully discussed at a recent meeting of the Wireless Institute (N.S.W. Division), and it was decided to circularise all experimental transmitting stations and ask them to agree not to transmit music, speech or buzzer between the hours of 8 p.m. and 10 p.m. For CW telegraphy on a wave-length that does not cause interference, there is, of course, no necessity to observe silent hours. There were 16 owners of transmitting sets present, and these all agreed to the proposal; no doubt most of the others will agree also.

There is sure to be a number of "broadcatchers" who will not be satisfied even with this concession on the part of the experimenters. These are the ones who would object to a ship sending an S.O.S. call if it should cut into a bedtime story. They would probably want the experimenter, with his hundreds of pounds' worth of scientific apparatus to remain silent the whole afternoon and night—except after 10 p.m., when broadcasting closes down—then these same folks rush to the telephone to ask the amateur to "put on a few records now, like a good chap."

Now the fault, unquestionably, lies in the "broadcatcher's" receiving set. The majority of these sets are designed for simplicity and cheapness, rather than for selectivity. They mostly, employ single slide tuners or

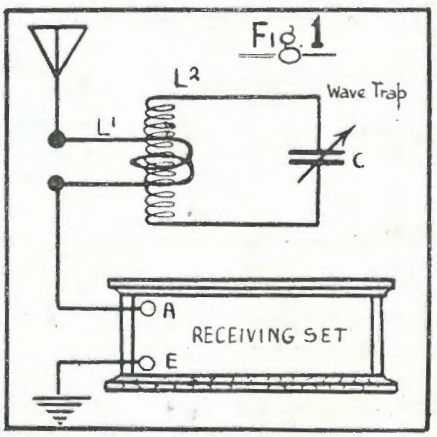


Diagram of the Wave-trap.

single coil valve circuits that tune very broadly.

The experimenter, with his selective receiving set has no difficulty in hearing faint signals from the other side of the world, while broadcasting is going on. It would not be reasonable, however, to expect the "broadcatcher," with his limited knowledge of the subject to manipulate such a receiver as this, to say nothing of the extra cost of such a set.

What, then, can he do to cut out the amateur whose signals interfere? It is usually only one particular transmitter near-by who causes most of the trouble.

The remedy is simple. Instal a "wave trap." This instrument consists of an inductance and condenser, and is very easily made and operated.

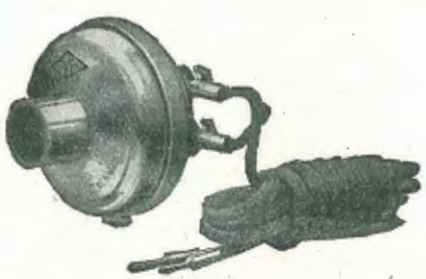
Figure 1 shows the circuit of the wave trap. The winding L2 consists of 80 turns of No. 24 gauge D.C.C. wound on a cardboard tube 1½in. diameter. L1 is 12 turns of No. 18 gauge D.C.C. wire wound over L2 with a layer of waxed paper or empire cloth between the two windings. The condenser C should be about .0005 m.f. capacity. The whole can be mounted on a small panel or put in a box with the condenser dial and two terminals for L1 on the outside. These windings will cover a range of about 110-500 metres.

The terminals of coil L1 are inserted in the aerial lead before going to the receiving set, as shown in Fig. 1. The trap can then always remain in the circuit. When an unwanted signal interferes, merely turn the condenser dial on the "wave trap" till it (the signal—not the dial) disappears. Leave the trap thus adjusted and then tune in the broadcasting on the receiver in the usual way.

In conclusion, it may be said that if the experimenter voluntarily foregoes his rights and refrains from tranmitting between the hours of 8 p.m. and 10 p.m., then it is up to the "broadcatcher" to instal a "wave trap," if he wishes to be immune from interference at other times.

Cico Loud-Speaker Unit

ONE of the latest developments in Radio is an instrument made by the Connecticut Instrument Co., and marketed under the name of the Cico Gramophone Loud-speaker Unit. As its names implies, it is a Radio loud-speaker unit, made to attach to the tone arm of the gramophone, in place of the usual gramophone speaker. It is then connected by the flexible cord supplied to a valve receiving set. This instrument makes use of the horn of the gramophone for its loud-speaker effect, and this saves the purchase of a large speaker. The salient feature of the Cico Unit is the use of a mica diaphragm, which gives a fine tonal quality to broadcasted music and speech. The price is quite moderate. This valuable Radio accessory is obtainable from Radio House, 619 George Street, Sydney, which firm are agents for the product in New South Wales. They will be pleased to demonstrate the advantages of the loud-speaker unit to anyone interested.



The Cico Unit.

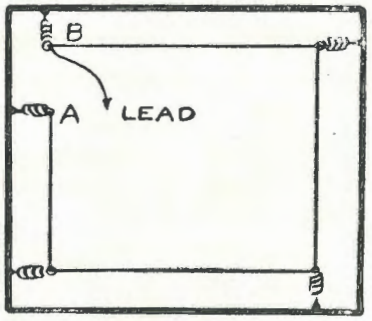
Indoor Aerials

AS the summer goes on, you have discovered that a large outdoor aerial picks up a lot of disturbances that you did not get during the winter. It is nothing more than atmospherics and the more sensitive your receiving set is, the more you hear of it.

How am I to get rid of it? Is the oft-repeated sentence. You can't do it and still use the big aerial. If you must use an outdoor aerial, make it a single wire and short. It will cut down the volume somewhat, but not in the same proportion that it will the interference that has been bothering you.

A better scheme is to use an indoor aerial. The best type being that running straight through several rooms away from the receiving set. If you only have one or two rooms, the best type is that run around the moulding. This is shown in the drawing. It is a top view looking down from the ceiling. A is the beginning of the wire and B is the end that goes to the aerial binding post of the receiving set. Insulators fastened to picture hooks will keep the wire away from the wall and pick up more energy from the broadcasting station. As most houses are good and dry, you need not go to the expense of insulators and picture hooks but place the wire directly on the moulding and good results will be obtained.

Any metallic substance will collect radio waves and if not grounded will act as an aerial. This can be a tin



roof, water spouting, window screen, iron beds or bedsprings. Any of the above types will work on local stations and, in some cases (depending on the type of receiving set you have), reach out and bring in a large number of distant stations with surprising volume.

If you are going to use window screens for your aerial, they should all be connected in series, so as to gather more energy. If you decide on a bedspring type of indoor aerial, the wire leading from the aerial binding post should be soldered to the bedspring. Of course, if you haven't soldering tools handy, the wire may be firmly wrapped around some portion of the spring.

Where you have three or four rooms straightaway, the best type of indoor aerial is one running straight through each room and as high from the floor as possible. At best, an indoor aerial being small, will not collect as much energy as an outdoor one and the longer you can make the indoor type, the better results you are bound to get.

The so-called lamp socket aerial utilises a special attachment that prevents the lighting current from getting to your receiving set but allows the radio frequency energy to pass to it after being collected by the house wiring. In some cases this type of aerial gives excellent results but on others it is not so good. Whether it is good or bad will depend on the location and the way your house or apartment is wired.

Long Distance Reception with a Crystal Detector

THE Marconi International Marine Communication Co., Ltd. have received a report from one of their sea-going staff that when the ship was at Algiers the 2LO concerts were received clearly and with good strength, on a standard type 31 ship receiver, which uses a carborundum crystal. The distance between the two points is approximately 966 miles. This reception is extraordinarily good when one considers that the output from the Marconi House transmitter is less than 1½ Kw., and in addition that the waves have to pass, to a large extent, over land, and are, therefore, subject to attenuation more so than if they traversed an all-sea route.

Another report of crystal reception, but this time of the high-powered station at the Marconi works at Chelmsford, was received from Denmark. Here again the receiver was the standard type 31 crystal, and the Chelmsford broadcasting was clearly received at a distance of roughly 550 statute miles in daylight.

The Marconi crystal receiver supplied to ships is a coupled circuit receiver which has a wave range of 300 to 2,800 metres. An inductance, a part of which is variable, is placed in series in the aerial circuit, and a part of this inductance is inductively coupled to a secondary coil which is tuned by means of a condenser in parallel. The carborundum crystal is in series with a pair of telephones across the secondary circuit. It is necessary, of course, with a carborundum crystal, to apply a potential by means of a potentiometer, and an extremely sensitive adjustment can be obtained in consequence, making the apparatus a very efficient receiver under varying conditions such as arise more on shipboard than in any other place.

Telephone Connections

BROADCAST listeners are often confronted with the problem of wanting to listen in with more than one pair of telephones, and do not know whether it is best to connect the telephones in parallel or in series.

Whether it is series or parallel depends on the type of set you are

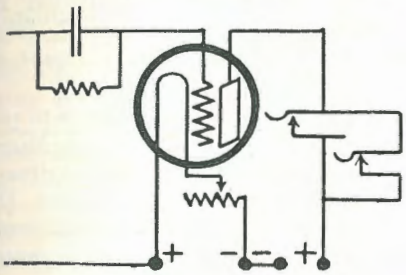


Fig. 1.

using. If you are using a crystal detector without amplification, it will be found that the parallel connection is best, but if you are using a valve detector, the series connections will be the correct one.

When the telephones are connected in series with a valve detector, it is not necessary to have the resistance of the telephones the same, that is, you can use telephones of 1000, 2000 or 3000 ohms resistance, and the individual telephone will give as loud a signal as if it were used by itself. The added resistance of the telephones in series does not make it difficult to force the current through them because it is not nearly as high as the "filament-plate" resistance.

Where more than one telephone is to be used, whether in series or parallel, it is advisable to use jacks and plugs. In this way telephones may be cut in or out of circuit as desired, and a pair of telephones could be worn while tuning in a station for loud-speaker operation. When parallel connection is to be used an open circuit jack is needed while for the series connection a closed circuit jack is required. Figures 1 and 2 show parallel and series connections for jacks.

It will be found that you will enjoy radio programmes much better in the summer time listening to them with telephones than you will over a loud speaker. However, some people cannot stand the telephones pressing against their ears, but this is only objectionable for a short time, and if it should continue, you can procure soft rubber pads that fit over the ear pieces of the telephones and which do not hurt your ears at all. When you wear them, it pushes the telephone diaphragm just that much farther from your ear and the signal will be a trifle weaker.

When telephones are worn for receiving it will be found that one stage of audio frequency amplification is all that will be necessary to give a very strong signal in the telephones. As a rule, two stages give too much volume, both for the telephones and your ears.

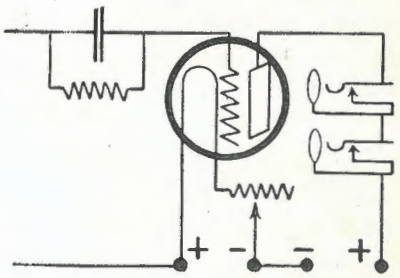


Fig. 2.

Another good feature of telephones for receiving purposes is they can be used without a very strong signal being necessary. For example: A signal that will not operate a loud-speaker satisfactorily will operate several pairs of telephones without any trouble. The telephones may be connected to a common line that runs to various rooms of the house and those of the household that care to plug in a pair of telephones may do so without bothering the rest of the family.

The Howling Valve Nuisance

MR. NORMAN D. HALE on behalf of the Laboratories, writes that the possibilities of tracing the source of howling valves has been the centre of interest of the Mosman Radio Research and Experimental Laboratories for some time past, and although many difficulties have been encountered during that time, the continual perseverance and co-operation of the Laboratories has been justly rewarded.

On a recent Sunday evening at 6.30 the first Direction-finding Patrol started out with apparatus mounted on a car and for five hours observations were taken of many of the known stations in the district and, altogether, the evening's work proved a huge success.

The Laboratories intend to leave no stone unturned to rid at least one district of the infernal bug-bear, the howling valve, and this body holds it the duty of all persons possessing a regenerative receiver and who are not quite familiar with the correct method of tuning the same to approach the Laboratories. We are, continues Mr. Hales, willing to offer any help in this direction without any obligation whatever.

To this particular person, be he a broadcast subscriber or a junior experimenter, every assistance is offered. But to the other fellow who is neither a subscriber nor a genuine experimenter—well, all he need do is to get a license and be very careful when tuning his apparatus or there will be trouble!

To the broadcast subscriber, he continues, we make an earnest and respectful appeal to exercise every care in tuning apparatus at all times, especially after 10 p.m., on wave-lengths below 300 metres, as all the traffic in progress at that time is amateur experimental work carried out by men who are spending the greater part of their time in scientific research. These men are directly responsible for that splendid programme you have just been listening to and for the betterment of same; therefore, they are, without a doubt, entitled to the least possible interference, and Heaven knows. static is bad enough without a continual chorus of howls from badly handled receivers.

DX Notes—and Other Things

(By Chas. Maclurcan, 2CM.)

THE most interesting event of the past month is friend Orbell's trip on the s.s. *Port Curtis*.

We are all anxious to have particulars of his set—where it is placed and whether he is using the ship's aerial, etc.

Certain it is that he is doing great work. According to Frank Bell, 4AA, he (Orbell, X3AA) is using 50 watts only, and at the time of writing is still QSA N.Z. However, he is not QSA Sydney now. I heard him faintly last night (his distance would be then about 5,000 miles from Sydney) but could not read him with 1RF and 1AF. But most marvellous of all, Jack Davis, 2DS, worked him the night before at 7,000 miles. At 5,000 miles, 3AA reported 2DS as still QSA—F.B., Jack! Some going for 20 watts!

Talking about reception in Sydney—there seems to be no doubt that conditions are not good here. New Zealanders frequently write and ask us to "take our fingers out of our ears." To these I would say—"bring your sets over and have a try yourself." I've been in New Zealand waters and I know what a paradise it is for DX work. One valve will bring in as many Yanks as one can unscramble.

Not so in Sydney—and I don't think it is much better in Melbourne. Yank logging is rather the exception than the rule. Lately I had some transmission tests with U.S.A. and, after a special effort, with a low loss tuner and one step, my log only shows six Yank calls.

Talking about these transmission tests. Particulars of these appeared in August *Q.S.T.* They were made to appear there as though they were to be general tests. Not so, however, this was a personal affair. I wrote to *Q.S.T.* and said I would be transmitting on those dates and "would they please ask some of their more enthusiastic members to listen-in for me and try and work two-way."

Two-day working b'gosh! I'm fed up with a capital "Fuf." 2CM's signals have definitely been heard by six Yanks — including 6CGW — but, though I've called nightly for the last ten nights, could not raise a single one. Old 6CGW simply roars in here and he has frequently called "G.C. Aust." and "2CM," but he doesn't wait for us to reply—just goes on working other Yanks.

Many of our stations must be getting over now. 3BD has been heard and

Mr. C. D. Maclurcan.

checked up with at least two and 4AA has also checked upon more than one reception. These I know of, and probably there are others. 2AC and 4AC must make a large noise over there, as their signals here are terrific. Then 3BQ's signals have a kick like a horse, but heaven knows when we will accomplish two-way work.

Just at present the way to get Sydney transmitters mad is to make a noise like a B.C.L. Most of us have been threatened with all sorts of horrible things for causing interference to their broadcasting. The matter was brought up and discussed at the general meeting of the W.I.E. held September 17. It was agreed that the Institute write to all transmitters asking them if they would be willing not to transmit either "fone" or I.C.W. from 8 p.m. to 10 p.m. C.W. working should go on provided no interference is caused either from hum or key clicks. I think most of us will readily agree to this.

Looks as though we will have to put in a little time at study and Morse practice in preparation for the dreaded "show cause" notice from the Radio Inspector. If 2CM is suddenly off the air next month you'll know what has happened, people.

New Zealand signals percolate over splendidly now—good chaps these Maoris—always on the job. Old 4AA shoots two sets, and one is apt to get a bit mixed at times. His small set comes in strength 18 at 2CM (by meter). The note of his big set is not liquid but like a locust buzzing—if locusts buzz. Why is this, when he uses a generator for his H.T.? I have noticed that most notes lose their high liquid quality when working on low waves. I'm told that 2CM's 100 watter sounds like raw AC. Actually it is Kenotron rectified and smoothed with 50 Henry choke and 4MF condensers.

Here are some audibilities that should interest their owners Z2AP 11 (locust note); 32AC 120 (semi-liquid note); 3AL 14 (semi-liquid); 4AA, small set, 18 (semi-liquid), 1RF, 90 (liquid note almost water but bubbly, and "plomps" up and down as though adjusted to absolute peak radiation and is unstable.) 3BD, 150 (note like duck quacking and not too stable), 3TM (rough note, dots occasionally missed altogether).

Say folks, why will some of you try to send too fast? We all know you can do your thirty per. with ears back, but we'd sooner read fifteen without accidents than twenty tangled up with the key. If your spacing is not too good, then slow down a bit. It's easy to read 20 per if the key pusher knows his job, but its jolly hard to get 12 from a mug.

Had a nice, long chat with 3BD 'tother night. Tried to get his "fone" on 205—but VIS' harmonic decreed otherwise.

Young Frank Leverrier, 2BK, has pushed his mast up a bit. I think it is now 220 ft. or perhaps 120 ft. high. His sigs. are getting out alright, though he is very busy just now looking for low loss condensers.

2YI is wondering how to sharpen up his "fone" tuning. He hates the sound of a B.C.L.

Amongst the many new transmitting stations recently on the air is 2DE, Phil Renshaw; 2BF, Forsythe (doing good work, too), and 2CX, Harry Stowe.

Len Shultz, 2LO, put over some good sigs. the other night when he worked Coxon in Perth—that's the stuff to give 'em, Len. 2BB has just come back to life again after a busted grid leak. 2HM and 2RJ in the interior can often be heard on "fone."

The following calls have been logged at 2CM during the last fortnight: N.Z.: 4AR, 2AP (2AC), 3JH, 4AG, 4AK, 3AA, 3AL (4AA), 2AR, 1AO, 3AF, 2AB, 1AA, 1FF. V.: 3ZS (3BD), 3BQ, 3TM, 3XO, 3LM. Q.: 4AW. N.S.W.: (2HM), (2BQ), 2CR, 2RJ, 2CB (spark), 2HJ (spark). Other countries: X3AA, POZ (Nauen on 104 metres). U.S.A.: 6BCP, 7AB, 6CGW, 5ZA, 4PK, 8BRF, 8BNH, 6AVJ, 6CAC.

Now won't some enthusiast make and instal an audibility meter in each of the States and New Zealand? It would be such a help to us. We will look after your signal strengths—so how about doing the same for us?

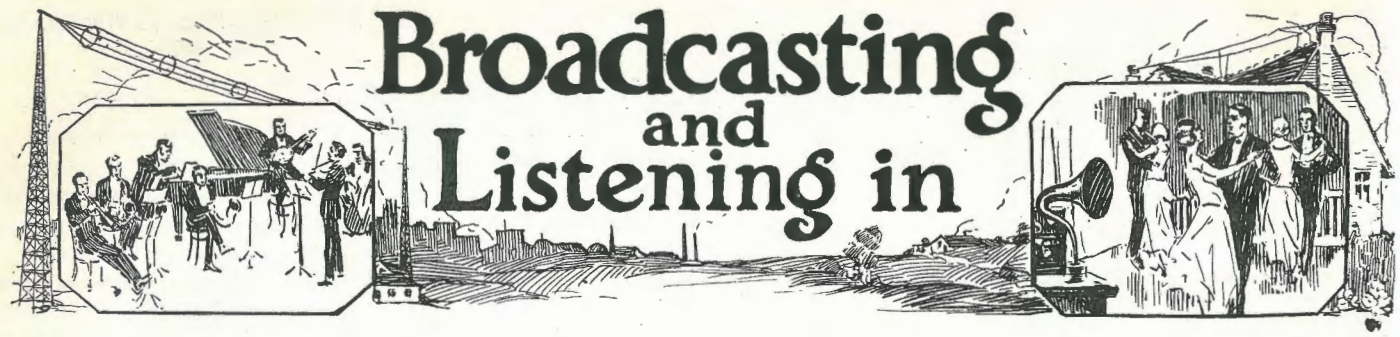
While I was writing the foregoing—lo and behold! U.S.A. has been worked by New Zealand.

One Sunday night (September 21) Frank Bell Z4AA worked both 6BCP and 6CGW. I followed the whole business and heard both sides of the argument. They exchanged complete messages, so it was all "dinkum." Congratulations to both sides. Another milestone passed.

Later that night I think every N.Z. and Aussie station of any note roared at 6CGW, but I am not aware of any others actually connecting up. Bad luck that our QRN season is just coming on.

N.Z. POSTMASTER-GENERAL'S REPORT.

THE annual report of the Postmaster-General presented to Parliament states that the radio regulations for amateur experimental and broadcasting stations gazetted in January, 1923, have proved an effective means of regulating the operation of private stations. Already upwards of 3,000 amateur receiving station licenses have been issued. The report deals at some length with the matter of the reduction of mutual interference between listeners-in, due to reaction effects causing radiation from the receiving antennæ, which presented considerable difficulties, of which judging by reports received New Zealand possesses no monopoly. During the year several broadcasting stations of comparatively small power have been erected and operated by private enterprise with a considerable measure of success, but through lack of funds and other causes the development of this class of station had been retarded.



SIR EDWARD MARSHALL HALL relates a curious story in connection with his dog and radio waves. His canine friend, which is one of exceptional intelligence, was placed in the same room as a gramophone which was reproducing a man's voice. To this the dog was quite unaffected but when the radio receiving set was substituted for the talking machine quite a miraculous change came over the gentleman who never changes his collar and dotes on biscuits as thick as your wrist and twice as tough. As soon as he heard the broadcasted voice he became immediately as though distraught and searched every nook and corner of the room for the person from whence the voice came. Nor did its excitement end here, for all night the dog wandered through the house sniffing and whining on its hopeless quest.

THE prominent English critic of the drama, Mr. Archibald Haddon states in his latest book: "Wireless dramatic art has been born and has come to stay. I foresee an imminent evolution of an entirely new form of dramatic art in the shape of the radio play. Radio-drama must be the drama of sound, as distinct from the drama of action . . . . it may become a great art, evolving its own Barrie, perhaps it own Shakespeare, even its own Bernard Shaw."

IT has been officially announced that in order to enable ships voyaging to Australia to be within range during the greater part of the trip, the power at Durban, South Africa, radio station is to be more than doubled.

TO provide quickly by wireless the results and descriptions of sporting events, a company has been formed in Melbourne. It is said to be the first of its kind in Australia.

THE hornless loud-speaker has come; it has just been placed on the American market. The device consists of two large flat coils of wire mounted close to each other in a frame which holds a thin aluminium diaphragm between them. These coils carry direct current which produces a radial field in the space occupied by the diaphragm and carry the amplified voice currents and induce in the diaphragm corresponding currents which, by their inter-action with the radial magnetic field, cause the diaphragm to vibrate and throw off sound-waves.

THE world's largest direct current high-voltage generator has been developed by the General Electric Company in Schenectady, New York, and it is expected to make clearer the programmes broadcast long distances by radio, while it is claimed that by the use of this machine for electric railroad work sub-stations now required will be cut down by one-half.

2FC

BROADCASTING TIMES.

Sydney Mean Time.
Wave Length: 1100 metres.

Midday Session:
12.55 Tune in to the Studio Chimes.
12.58 Time Signals from Farmer's Master Clock (Sydney Observatory Time), Stock Exchange Intelligence, Weather News, "Sydney Morning Herald" news and cable service, "Evening News" midday news bulletin.
1.15 Close down.

Afternoon Session:
3.30 Studio Chimes.
3.33 Musical programme by Farmer's Orchestra broadcast direct from Farmer's Oak Luncheon Hall. Numbers will be played at intervals to 4.45.
4.45 Stock Exchange, weather, afternoon news.
5.0 Close down.

Early Evening Session:
6.30 Studio Chimes.
6.33 Children's Hour.
7.0 Daigety's Market Reports, Fruit and Vegetable Markets, Stock Exchange, Shipping News, Sussex Street Markets, Late News.
Late News.
7.15 Close down.

Night Session:
8.0 to 10.0 — Entertainment. See list hereunder.

EVENING ENTERTAINMENT.

As far as possible the following schedule is adhered to:—

Monday:	Theatre Night.
Tuesday:	Popular Concert
Wednesday:	Studio Concert.
Thursday:	Studio Concert.
Friday:	Classical Night.
Saturday:	Jazz Night.
Sunday:	Semi-Sacred Concert (7.30 to 9.30 p.m.).

6WF

BROADCASTING TIMES.

Perth Mean Time.
Wave Length: 1250 metres.

Midday Session:
12.30 Tune in to Sonora.
12.35 Market Reports of The Westralian Farmers, Limited.
12.42 News Service.
12.55 Weather Report.
1.0 Time Signal.
1.1 to 1.30 — Sonora and Pianola.
1.31 Close down.

Afternoon Session:
3.0 Tune in to Piano Player (Duo-Art).
3.5 to 4.0 — Special programme, comprising talks, Sonora and Pianola.
4.1 Close down.

Early Evening Session:
7.0 Tune in to Sonora.
7.5 Bedtime Stories.
7.45 Market Reports.
7.55 Weather Reports.
8.0 Time Signal.
8.2 News Cables.

Night Sessions:

NIGHT SESSIONS.

Monday:	8.10, A Lecture; 8.45, Music. Pianolo and Sonora.
Tuesday:	8.10, Professional Concert.
Wednesday:	8.10, Concert Evening.
Thursday:	8.10, Professional Concert.
Friday:	8.10, Talk on Wireless to Amateurs by a Representative of the Affiliated Radio Society; 8.45, Concert Evening.
Saturday:	No Saturday afternoon, only from 12 to 1, and again at 7.0. 8.10, The Wesfarmers Studio Cabaret Jazz Orchestra, under the direction of Irwin Lawrence.
Sunday:	7.30, Mr. C. H. Coff's Choir. Close down at 9 p.m.

With the exception of Saturday, when the station closes down at 10.30 p.m., all other evening sessions conclude at 10 p.m.

What Kind of Wire Shall I Use?

FROM the large number of inquiries regarding what kind of wire to use for the aerial, ground, primary coil, secondary coil, variometer and the like, it appears that the radio broadcast listener is "up a tree" regarding this subject.

First of all, set your mind at ease because at most any wire between 18 and 30 may be used and you will have a hard time, when listening in, to tell which is which, if you are comparing sets wound with various sized wire. According to ohms law, the smaller the wire (when made of the same material) the higher resistance and therefore the less the resistance we offer to the flow of current the better will be the signal. However, the resistance of the wire contained in a broadcast receiving set is so low that it does not have to be given serious consideration unless very small wire is used.

You can therefore cease to worry when an article calls for number 24 wire, and you only have number 28. Use it, the writer of the article has to state a certain size of wire, and rather than have you guess whether to use a fine or heavy wire he gave you an approximate size, but it does not mean that size and no other can be used.

For a long time most writers, including myself, suggested seven strands of number 18 silicon, or phosphor bronze wire be used for the aerial, figuring that if it is good for the commercial companies to use for ship use it ought to be good for amateur use. It is, but experimenters have shown that most any kind of wire at all will do for a receiving aerial. Contrary to public opinion, insulated wire is better than bare wire. When you have bare wire, the chemical properties of the elements act on it and oxidization sets in. This cannot happen with good insulated wire. Enamel covered has been found to hold up better than other types of insulation. I have also found that small wire collects about as much energy as large wire or even strip copper or brass. One of the disadvantages of using small wire is that it stretches and then sags and leaves an unsightly aerial.

The wire used for the lightning switch or arrester should not be less than number 14.

The wire used for winding the various coils can be anything from 18 or 20 to 30. The larger wire (smallest number) is harder to handle and requires more space for the same number of turns and there is no advantage in using a larger wire than number 20 for winding coils in a receiving set.

The primary, secondary and tickler coils can all be made with the same size wire and good results will be obtained. It was formerly the custom to wind the primary with a heavier wire and the secondary with a fine wire, but this has been discontinued on most sets. Summing things up: do not worry about the size of the wire you have on hand, but go ahead and use it.

The Construction and Erection of Aerial Masts

(By "Rigger.")

GENERALLY, the average amateur spends a lot of time and skill in the construction of his instruments, but gives little attention to the mast or pole. This is often due to anxiety to receive signals as soon as possible but with experience the experimenter will find that a well and conveniently set up pole is almost as important as the instruments.

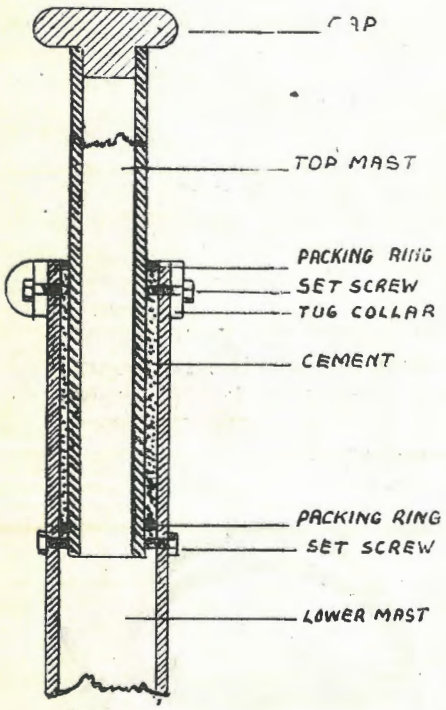


FIG. 1

On looking round the metropolis, one sees many unsightly, ill-designed, and dangerous overhead structures. These appliances are costly, and in a lot of cases, represent money badly spent, owing to the lack of a little simple practical knowledge. Therefore, I have decided to help, if possible, to establish a better-looking and more stable exterior set of appurtenances.

In fixing the position for the pole or poles, one has to avoid having the aerial running parallel to any telephone or power conveying wires, and keep clear of any tall structures which may tend to screen the aerial. The position must allow for solid anchorage of the guy wires, and the space must be sufficient for raising the pole to a vertical position.

Assuming that the experimenter will not require a pole greater in height than 70 feet, a very neat, slim, and strong one, may be made from light steel tube properly jointed, or a steel tube, lower section, with wooden top mast. This composite pole makes a very satisfactory engineering job, or, the structure may be made entirely of wood. Wooden masts I do not recommend, on account of the deterioration due to rot, attacks by white ants, and splitting caused by the elements.

For the purpose of this article I am assuming the experimenter has decided to erect a pole sixty feet high.

Obtain three lengths of steel tube 22 feet long. One 4in., one 3in., and the top mast 2in. in diameter, or the pole may be made in four shorter lengths, which is perhaps more convenient.

Remove all burrs and roughness from the ends, and insert the 3in. tube into the end of the 4in. about 2ft., having first drilled the 4in. tube with ⅜in. tapped holes, see Fig. 1, and placed about 18in. below the top of the lower section. Now insert short-pointed steel set screws, and centre the inner tube, then tighten up hard all set screws. The annular space should be filled with molten lead poured in, or neat Portland Cement, finishing off by driving a wire ring tightly between the tubes, see Fig. 1 (width of joint exaggerated). Treat all the other sections in a similar manner, capping the top with a suitable wooden plug overlapping the pipe edge.

You will now have a stiff, neat, slender pole.

If convenient, the top edges of the lower sections can be welded to the inner tubes by means of the Electric Arc Process, or Oxy-acetylene, but great care must be exercised, if this is done, to prevent weakening at the weld, caused by the upsetting of the physical state of the molecules, or deep pitting, at the weld.

As steel tube can be obtained up to 40 feet lengths (Mannesman tube), a neat and strong pole can be made by obtaining a lower tube section 3in.

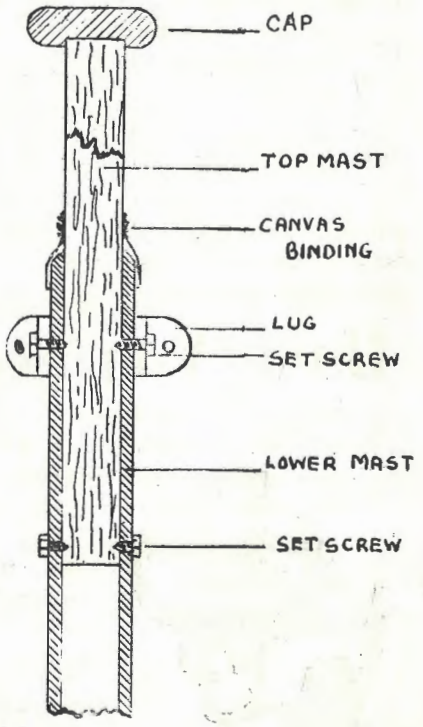


FIG. 2

internal diameter about 35 feet long. Strip off all the bituminous coverings and cover with protective paint.

For the top section, obtain a selected spar of straight grained timber, free from all knots, 25ft. long, 3ins. square at base, and tapered to 2½ins. at the top. The sawyer will do this at a very low cost. With a keen plane (an ordinary German Jack), round off the spar, making the lower end a neat fit in the steel lower section.

Drill and tap the top of the steel tube about 2 ft. from the end to

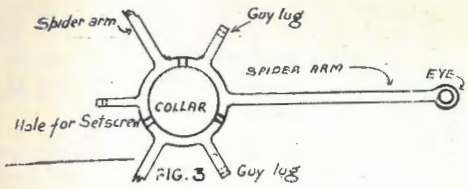
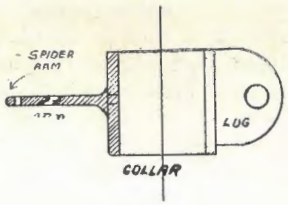


FIG. 3



take three ⅜ set screws (see Fig. 2) and at 4in. from the end drill three ⅜ clearance holes.

Insert the wooden top mast about three feet into the top of the steel tube, and screw home hard the three set screws. These are to tighten the wooden pole and prevent it sliding down when the pole is placed upright.

Now place the lug collar (described later) over the tube and tighten up the set screws in this collar. The screws should pass through the clearance holes and tighten on to the wooden section in the tube.

In order to prevent moisture, etc., finding its way down the interior of the tube, which would cause corrosion and rot, a piece of strong canvas about six inches wide should be soaked in paint, and bound round the joint. The canvas should overlap the steel tube about 3ins. and will throw off any water that may run down the top mast.

The jointed pole should now be given at least three coats of good white lead-linseed oil paint, and allowed to thoroughly dry.

For the purpose of attaching guy wires, halliards, etc., collars made from ¼in. plate bent to the diameter of the pole, must be fitted. These can be made up (see Fig. 3) and welded by any oxy-acetylene welder. In order to preserve these fittings it is advisable to have them heavily galvanised.

A simple method of supporting the top mast against lateral strains, is to truss the pole by forming a centre spider and lug collar combined. (See Fig. 3.) In addition to the lugs, have three ⅜ round, mild steel rods welded on to the collar. These rods should be about 30 inches long, and have an eye formed in the outer end for the purpose of threading the truss wires through. This method of construction saves a multiplicity of guy wires and tends to produce a very neat-looking pole.

An all-wood pole will find favour with a great number, owing to ease with which it may be constructed; but all wood has the disadvantage of decaying at the joints, and is subject to the attacks of white ants and borers.

One of the simplest and most effective methods of jointing the various sections is by means of U-shaped bolts and clip straps using a key between the two clips to prevent any slipping. (See Fig. 4.) Avoid all nailing, screwing, and kicking of the timber; because this has a tendency to start decay and is a weak point in the structure. Other methods of jointing will be found in any good book on rigging but I do not consider a better and more simple method than the above will be found.

Providing sufficient spread for the guy wires can be obtained, three guy wires will be ample, and if one cares to calculate the problem, it will be

(*Continued on page* 392.)

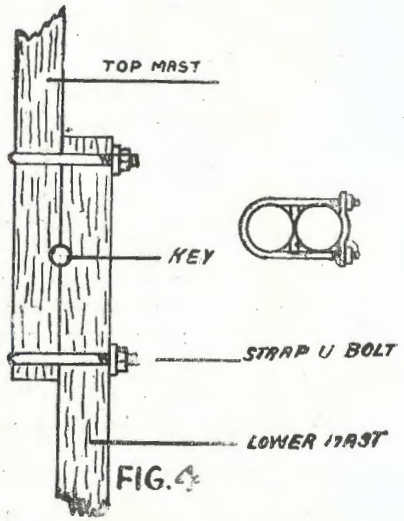


FIG. 4

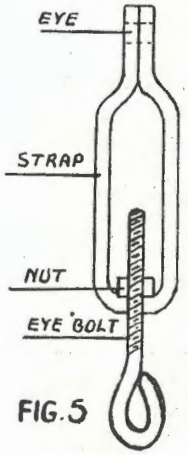


FIG. 5

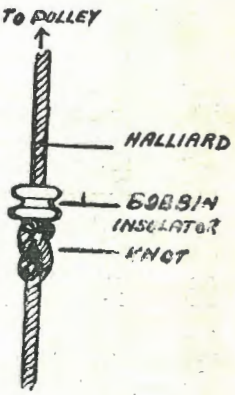


FIG. 6

found that three wires are as good as four. The wires in all cases should be made from heavily galvanised stranded steel wire, not light, flexible, but heavy, stranded wire such as is used for clothes lines. If a trussed pole is made it is advisable to use a single or double top guy to take the pull of the aerial. Any insulators inserted in the guys or trusses should be of such a pattern, that in the case of a broken insulator, the guy wires will lock at the point of breakage, and so save the pole from a fall.

Halliards should be made with stranded galvanised wire, and should be made continuous. If single, and any accident takes place to the aeral, great difficulty will be experienced in securing the stray end, seeing that it is 50 or 60 feet up the pole, whereas with the continuous halliard, the end is never lost unless the halliard breaks. Galvanised iron pulleys of ample diameter should be used, care being taken to see that there are no sharp edges to cut the halliard. Very simple rigging or tension screws can be formed by bending a piece of one and a quarter by five sixteen iron to shape shown in Fig. 5, which is self explanatory.

A very satisfactory method of attaching the aerial to the halliard is to thread a bobbin insulator on the halliard just above the joint in the halliard. This serves as an insulator and swivel, allowing the aerial freedom when hosting. Any twisting or "snarling" that takes place when the halliard is passing through the pulley, is not communicated to the aerial attachments. It also allows the aerial to ascend to a greater height. See Fig. 6. Ground anchors for guy wires must be well secured, and may be iron bars set in solid soil or concrete.

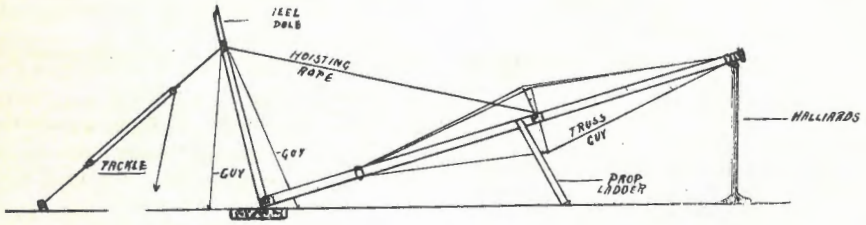
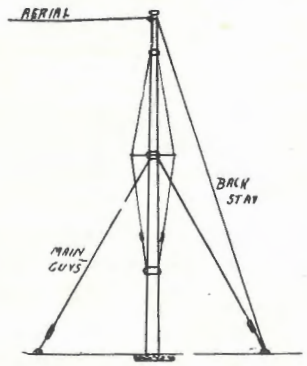


FIG. 7.

Do not insert the foot of the pole in the ground under any circumstances, if you do, rot will be set up. Before erecting the mast, all gear should be correctly assembled, tightened up, all joints made good, and the whole fabrication given a final coat of good protective paint.

A simple method of erecting the pole is by the use of a heel pole shown in Fig. 7. The heel pole should be about one-third the length of the main pole, and is lashed at an angle of about 80 degrees to the foot of the main pole. To the head of the heel pole attach two light guy ropes and a main lifting rope, one end leading to the lifting tackle and the other attached to the main pole by means of a slip knot. From the slip knot lead a trigger line of sufficient length to reach the ground when the mast is in a vertical position.

When everything is secure, prop up the main pole by means of a ladder or trestle, first putting the head of the ladder under the mast and pushing the foot inwards, at the same time gradually hauling on the hoisting rope or tackle. In this manner the pole will be slowly raised to the vertical position, care being taken to see that all gear is clear, that the guys are well spread, and secure at all times in order to prevent any side movement. When the vertical position has been reached secure all guys to the anchors, remove the heel pole and gear, then see that the lifting rope is clear, pull the trigger line, in order to undo the slip knot, and so free the main lifting rope, this should fall clear, and now your work is completed.



The Completed Aerial Mast.

Jacks Now Have Radion Spacers

AN example of the improvement of radio apparatus being undertaken by forward-looking manufacturers during the summer months may be found in the application of radion insulation to 'phone jacks as spacers between the spring contacts. Fibre and other compounds which not only absorb moisture and cause leakage of "B" battery current in that way, but also take up any soldering flux which may get on the springs, have been largely used for jack insulation in the past. It is this type of insulation which is so often to blame for the sputtering and crackling noises caused by unsteady leakage current through the spacers from spring to spring.

The introduction of radion for jack spacing is of distinct advantage when it comes to the question of dust collection on the spacers' surfaces. Even though the surfaces of an unpolished composition spacer be carefully wiped with a cloth, the tiny pockets hold dust, soldering flux, perhaps, and moisture. There are no pores, however, in the highly finished surface of radion to catch foreign matter. With the wider use of 'phone jacks, not only for plate circuit control, but for filament lighting and for plug contact to loop antennæ, it becomes of increasing importance to select jacks with just as careful attention to the insulation used for the spacers as to the action of the springs and contacts. Radion insulated jacks will give the best results as radion is by far the best and most perfect radio insulation.

Something About the Super-Heterodyne

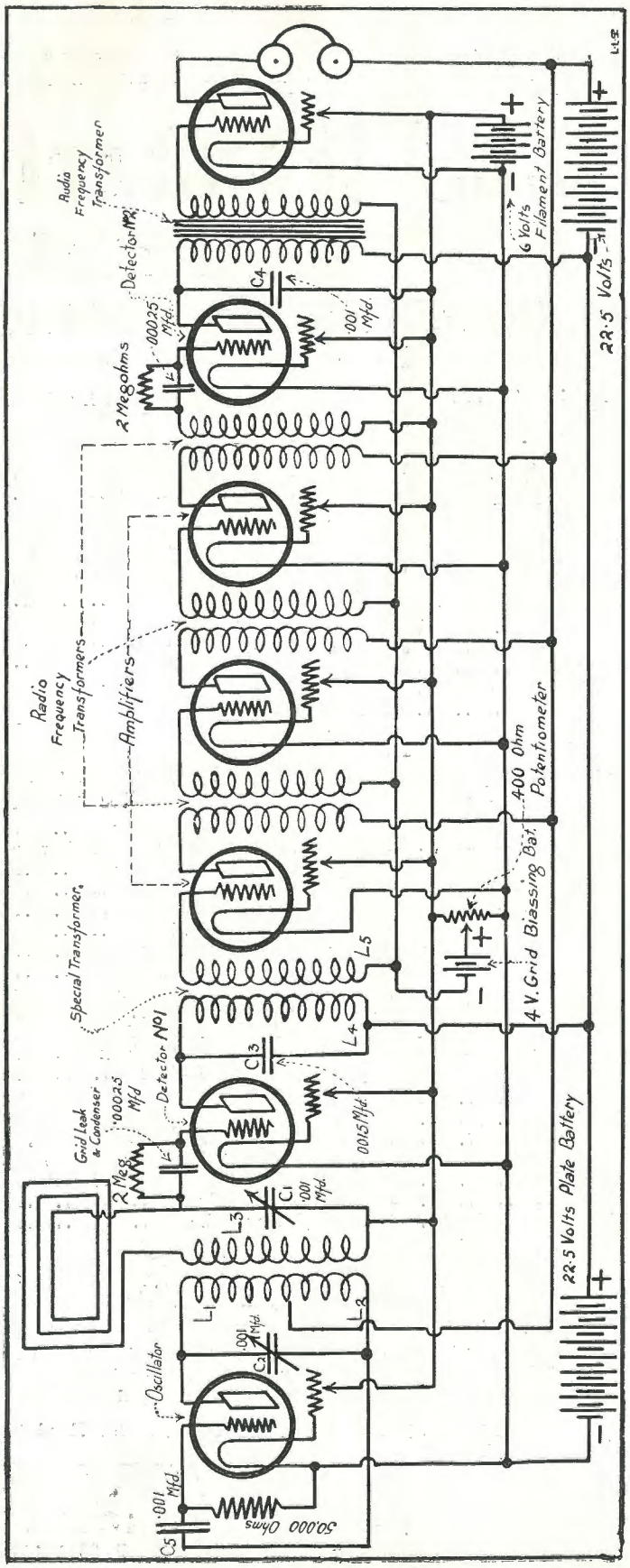
READERS have written and asked why we have not published an article on the Super-heterodyne, so that they could construct it. The principal reason is that we do not think it is a set anyone should try and build unless they have had a great deal of experience in Radio. You have no doubt read articles telling how easy it was to build one, etc., but where one gets excellent results, dozens fail or merely get mediocre results, and you can do as well as that with any radio frequency set.

The super-heterodyne set is known as the most sensitive set we have today, but do not get the idea into your head that any old super-het. is going to deliver the goods, for it won't. The big factors in the success of the selectivity of the super-het. is the tuner and the intermediate amplifier. It is very desirable to have an amplifying circuit that will respond to long wavelengths because radio frequency amplification is much greater on the long long waves than on the short. We should not get up too high, however, for then we get into the audible frequencies and the amplifier will also amplify stray noises.

We have the resistance coupled amplifier and the transformer coupled, and experiments are being conducted with the tuned transformer type, but the latter make the set even more complicated. If you have the fever and plenty of money the transformer type of coupling is recommended. Such transformers will respond to wave-lengths between 5,000 and 25,000 meters.

The drawing shows the hookup of a super-heterodyne set, but if you are seriously considering the building of such a high-priced set it is suggested that large blue prints and working diagrams be purchased and all the material for the set be bought. Do not try and save a little here and there by trying to build the various parts yourself. Right here is where the greatest trouble occurs. Do not buy cheap parts. You may think you are saving money at first but after

(*Continued on page* 403.)



Some idea of what it means to build a Super-Heterodyne may be gained from this wiring diagram.

A Tried and Efficient Receiving Circuit

Secures Long Distance with Ease of Control

(By FRANK A. NOAR.)

WITH the present multitude of various and diversified circuits in popular use, amateur constructors and beginners are doubtless frequently at a loss to determine which will best suit their purpose and give maximum efficiency over long distances with minimum parts and expense.

The single tube regenerative circuit is certainly hard to beat for efficient work, despite its interference but without regeneration the single tube is little or no better than a good piece of crystal carefully adjusted, therefore other methods have necessarily to be adopted.

In Armstrong's original regenerative patents he utilizes both tuned plate and feed back amplification, and in view of the highly sensitive results of this double feature, it is surprising that we don't find it in more general use. The writer has made exhaustive experiments with the majority of modern circuits, but the one herein to be described was found to exceed all others for long distance efficiency and ease of control. The circuit has recently been developed in America and is a combination of several former circuits. It comprises one stage of resistance coupled R.F. amplification with tuned anode and regenerative detector.

Any apprehensions as to the use of regeneration can be dispelled as the stage of R.F. amplification confines oscillations to the detector circuit, in consequence, the aerial does not oscillate and so will not interfere with one's neighbours.

The circuit is so sensitive that on a recent test in Adelaide with a short outside aerial, one stage of AF amplification added was all that was necessary to work a magnavox loudspeaker and bring in music and speech from Sydney with ample volume for drawing-room purposes. In fact, some slight interference was experienced from the spark station at Amboina Island to the north of Australia, which, as most professional operators know, is a flatly tuned station and hard to eliminate.

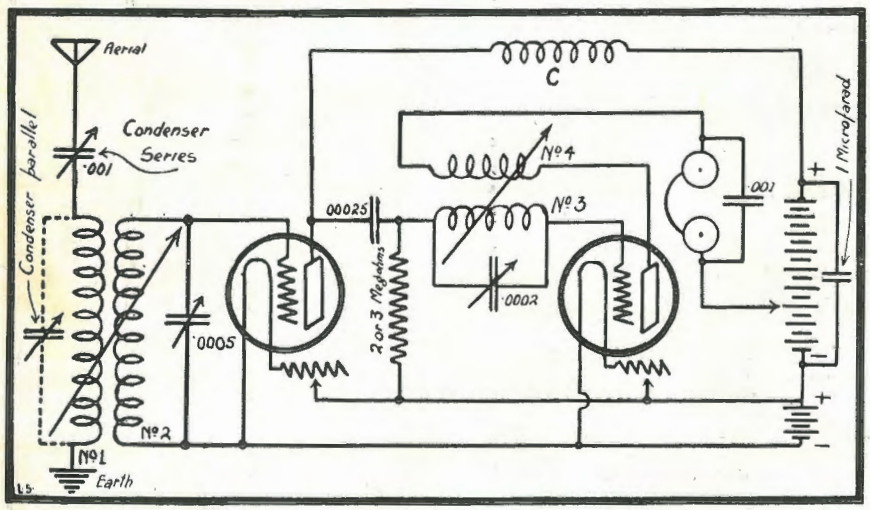


FIG. 1.

Fig. 1 shows the general outlay of the circuit. The inductances 1, 2, 3, and 4 are honeycomb coils in two coupled pairs, 1 and 2 being spaced as far as possible from 3 and 4. This arrangement prevents oscillations occurring in the aerial. The circuit cannot be said to be highly selective, but the coupled aerial permits a wide range of selectivity and tends to eliminate a large amount of parasitic static. For best results a low internal capacity tube should be used in the first socket. The writer uses a Marconi V24 which, with 50 volts on the plate, is hard to beat. Potentiometer control of the grid is not necessary. It is more of an impediment than an advantage. Any good soft tube can be used in the detector socket. Expanse B, Auditron and Radiotron UV200 have each been tested with good results and at present the UV200 is in use.

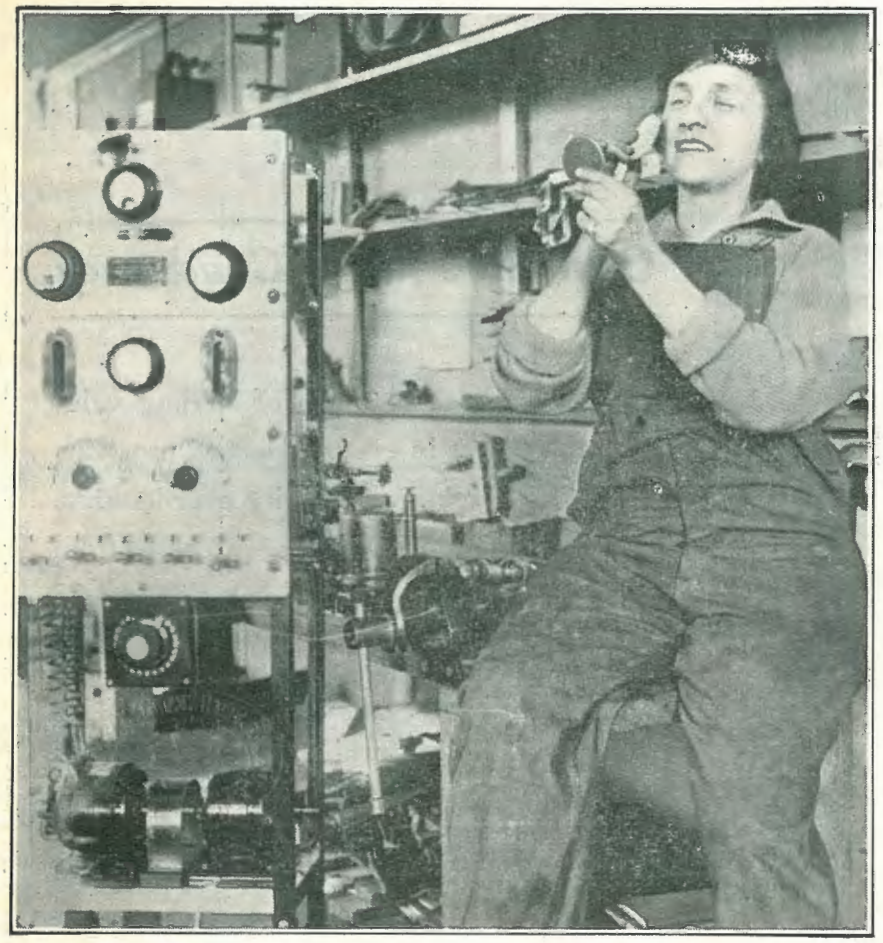
Experience has shown that the circuit works much better if the inductances used are as large as possible for the wave-length to be received, using only a few degrees of condenser capacity for sharpening accurately. It has also been found that loose coupling gives best results, for this reason it is desirable to keep the grid condenser to a low value, although even smaller could be used. A .00025 is at present giving excellent results.

Another feature is coil No. 3, which tunes the anode of No. 1 valve, being in series with the small grid condenser, which has its wave-length considerably reduced. Consequently, a much larger coil than would be expected has to be used. A very good combination for 600 metres with an average aerial is No. 1, 40 turns, with condenser .001 in series. No. 2, 100 turns, No. 3, 175 turns, and No. 4, about 100 turns which, however, is best determined by experiment. Too large a coil gives a damping effect and this same result is also brought about if the leads are crossed or on the wrong terminals. For the shorter wave-lengths from amateur stations consistently smaller coils are used.

The next consideration is the choke coil C. This coil is necessary to allow the HT current to the plate of R.F. amplifier but prevents, or, as the

(*Continued on page* 400.)

term applies, chokes the R.F. currents from surging back to the detector circuit. The secondary of a small induction coil with primary winding and core removed is suitable for this purpose. A Ford spark ignition coil serves admirably. The wooden casing



Miss Mary Texan Loomis, of Gollad, Texas, U.S.A, who, it is claimed, is the first woman in the world to own and operate her own radio school. Everyone will please note, however, that, despite the overalls, Miss Loomis still remains "a regular girl."

is removed and the covering wax carefully chipped off, so as not to injure the fine secondary winding. With careful persuasion the primary and core will easily slide out from the wooden bobbin. The hole is then plugged with wood to facilitate mounting from the end centres. If the leads are brought to terminals on the mounting and the coil covered with empire paper or fibre protection, a very neat unit will result.

The resistance leak which is an ordinary variable grid leak has a best value of two or three megohms. Fig. 1 shows it connected to the positive side of L.T. battery, which is apparently inconsistent with the negative grid theory. However, it gives best results, but would doubtless vary with other classes of detector tubes. This is also a matter for experiment after wiring up.

When wiring up, care should be taken to keep all leads spaced as far apart and as short as possible, especially with regard to the R.F. amplifier connections, as capacity between leads has a marked damping effect.

For the benefit of those who have already installed variometers or variocouplers, it is quite possible to utilize these in this circuit, although they have not been tested out by the writer, but honeycomb coils are greatly to be desired, as any size coils can be used embracing all wavelengths, and not confined within the limits of variometers. If a piece of three-inch tube is wound with 100 turns of 22 D.C.C. wire and clamped on to the left-hand side of a variometer, tappings can be taken from it to switch points on the panel. This coil with a .0002 variable condenser in parallel will then serve as coil No. 3. The variometer windings are then placed in series with the plate. A variocoupler will serve very well as coils No. 1 and 2.

This circuit is well adapted for use with short aerials and lends itself favourably to loop reception by dispensing with the coupled aerial and secondary condenser. Coil No. 2 then serves as the tuning unit. The large fixed condenser across the H.T. battery is not essential, but is employed to some advantage in respect to clarity of tone.

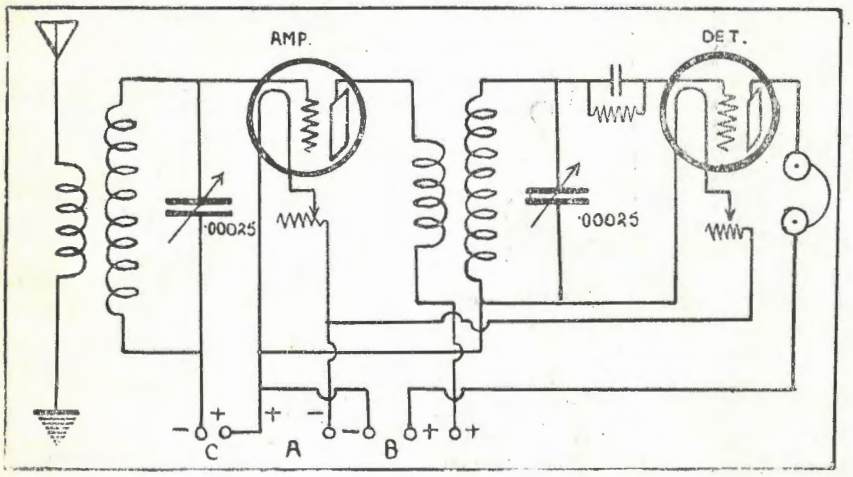
A marked feature of this circuit which is instantly apparent is the almost entire lack of the many howls and squeals common to single regenerative circuits. In making adjustments, it will be found that if a control dial is advanced to a point where a sharp click is heard, a number of local noises will result but no signals heard. In this condition the set cannot be tuned until the control involved is brought to a point lower than where the click occurred. If it is necessary, for wave-length purposes, that the control be advanced such can be accomplished by a compensating variation of some other control directly concerned. When a point is reached where maximum reception is obtained the signals or voice will remain quite stable.

In conclusion, I would greatly recommend this circuit to all beginners to whom distance is usually the chief objective, and to all others who require a good, all-round set of maximum efficiency.

WE have pleasure in adding the name of Mr. C. J. Williamson, of Yass, N.S.W., to our long list of readers who have logged KGO. This experimenter has heard KGO six times out of the six in which he attempted to do so, and he states that he is convinced that KGO is as easy to log as 2BL. The first occasion on which he heard them they were audible on a loud-speaker. It is interesting to note that at the time of writing Mr. Williamson had only had his set a fortnight and already had received 2BL, 2FC, 2HM, 2OM, 2GQ, 3AR, 5OB (or AB), and 5AL. The set this amateur uses is a three-valve Western Electric. He is more than pleased with it, he states.

A Two-Valve Fixed Coupler Set

A SET employing one stage of radio frequency and an audion detector, with two fixed couplers is shown in the drawing, the first coupler being the tuner and the second one being a stage of radio frequency amplification, the only tuning controls being the variable condensers.



Winding diagram of a two-step amplifier.

This set was developed by M. B. Sleeper to get away from regenerative sets and a radio frequency set that would not oscillate easily on the broadcast wave-lengths. As stated in other articles, 9 out of 10 sets radiate energy if they are regenerative or radio frequency, exceptions being those in which the grid-plate capacity is balanced. It is a mistaken idea to suppose that just because your set has a stage or two of radio frequency that you are not interfering with your neighbours enjoying the programmes each night.

The drawing shows an untuned primary consisting of six turns of number 22 copper wire and the secondary 45 turns of the same wire. This coupler can be made up on a three-inch tube, the 45 turns wound on, and both ends secured, then a space of about ¼in. skipped and the primary of six turns wound on. The end of the primary farthest from the secondary is connected to the aerial and the other terminal to the earth connection. The secondary of the first coupler is connected as follows: The end farthest from the primary goes to the grid of the tube, the other going to the filament. The second coupler is connected as follows: The end nearest the secondary goes to the positive B battery and the other end to the plate, the secondary winding being connected similar to the first coupler.

Another coupler may be made up and used for a second stage of radio frequency similar to the neutrodyne sets, or these parts may be used for reflex sets or just straight radio and audio frequency amplification. These fixed couplers can also be purchased and due to their better construction, will naturally give better results.

You may ask, but will the fixed coupler give as good results as a vario-coupler will? The best answer to that is, when you are using a loose coupler, you invariably set it at a point found best and leave it there for all of the stations. If you do change it you must alter the setting of the variable condenser. That is, if you loosen the coupling you use less value of the secondary condenser and this sharpens the tuning of any set.

This set will give very good results with a long aerial. By long is meant one at least 100 feet long; twice that long on some stations. With the addition of an audio frequency transformer you will have a reflex set giving a stage of radio and one of audio. If you use three of these couplers, the dials of the three variable condensers may be mounted on one control and all moved at the same time for the various wave-lengths but each of them may require slight adjustment for maximum volume.

New Zealand Wants a Broadcast Station

THE concerts from 2BL and 2FC, Sydney, continue to be the star attraction of amateurs on the west coast of New Zealand, both stations coming in exceedingly well during the first week of September. It is hoped that before long the various wireless interests in New Zealand will arrive at some mutual agreement that will enable organised broadcasting to be carried out with high power on a similar basis to these two very successful Australian stations. The various broadcasting stations, without a doubt, perform good service in their respective locations, but country amateurs would welcome a really powerful station in New Zealand that would allow the use of a loud-speaker at full volume, without fear of fading or from interference from the local howler nuisance, both causes which frequently spoil the enjoyment of amateurs who rely on weak distant stations for their evening's programme.

A proper start could be made by the erection of a high power station at Wellington, with other stations to follow as the demand arises. At present the small power stations at Wellington are heard extremely well at times in the Wanganui, Taranaki, Marlborough and Nelson districts, and the advent of a 1,000 watt station in the capital city would allow users of crystal sets over a very wide radius to share the enjoyment of the more "aristocratic" amateurs using valve sets.

Something About the Super-Heterodyne

(*Continued from page* 394.)

you try them out and then have to buy good material, you will find that you are out instead of ahead.

Lavish claims have been made for the super het. and what it will accomplish in the line of distance without ground or aerial other than the loop contained in the set itself, but do not be too optimistic or you may be disappointed. The writer has had the pleasure of listening over four different types of super-het. sets and still feels it is the set that only the rich can afford. One being a manufactured affair using seven tubes in the set with a three tube power amplifier and made by the same company, and he was frankly disappointed. So, unless you have more money than you know what to do with, wait before building your super-het.

The distance that any set will cover is dependent on atmospheric conditions and the more sensitive your set is the more atmospherics you are going to encounter. If your present set gives you loud speaker volume on stations 600 miles distant at this time of the year, you are doing about as well as the rest will do regularly.

4AA, N.Z., HEARD IN U.S.A.

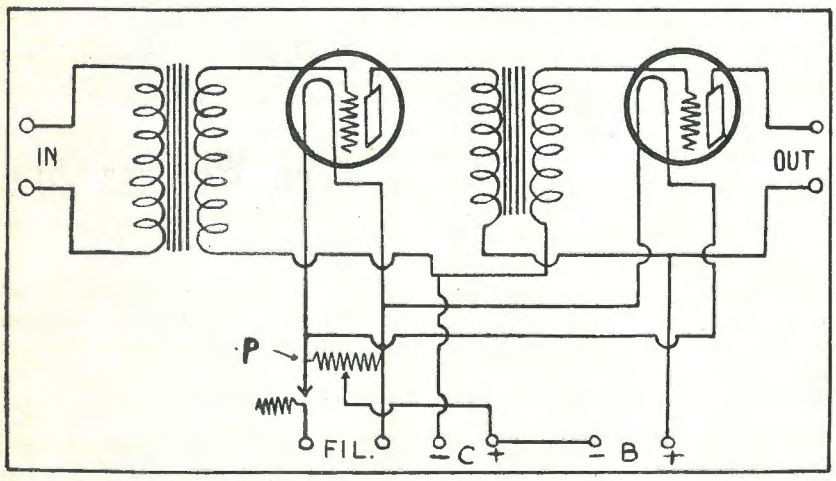
MR. F. D. BELL, 4AA, Otago, has received information from the American Radio Relay League headquarters that his signals have been definitely heard in the United States by Mr. Elmer Gabel, of Philadelphia. Mr. Gabel reports hearing 4AA calling American 6CGW on 120 metres at a time which checks with Mr. Bell's log. The distance from Shag Valley, Otago, to Philadelphia is about 8,500 miles, so Mr. Gabel can easily claim a record for reception of foreign signals by listeners-in in the United States. Mr. Bell is one of New Zealand's leading amateurs, and has received many congratulations on his fine achievement. Following upon Mr. Ivan O'Meara's two-way communication to the Argentine, Mr. Bell's results raise the hope that it will not be long before regular two-way communication between American and Australasian amateurs is established.

Using Alternating Current for Filament Lighting

THERE are a large number of radio fans who started out with a detector set using dry cell for filament lighting and who later, in order to operate a loud-speaker, added two steps of audio frequency amplification to it, using the same type of tubes. They found that except on stations that came in strong on the detector, there wasn't enough volume for loud-speaker work. They then wrote in to their favourite radio editor who told them they should use the larger tubes for best audio frequency amplification and that a storage battery would be necessary for filament. In a great many cases the use of a storage battery was out of the question, either from the first cost or there being no ready method of charging it.

In addition to the parts required for a regular two step amplifier, the following items are required: A 400 ohm potentiometer and a bell-ringing transformer such as used in homes.

The drawing shows the wiring diagram of a two step amplifier, using ordinary house current of 60 cycles, after it has been stepped down to six volts, for filament lighting. The bell-ringing transformer is not shown.



The primary of it is connected to the house wiring, such as a wall socket and the secondary terminals are connected to the binding posts marked filament. Being alternating current it does not make any difference which wire is connected to either binding post.

The negative B battery is connected to the positive C battery which in turn is connected to the centre contact of the potentiometer. In the ordinary two step amplifier, the negative filament is connected direct to the grid return but in this one it is not, the connection being made to the grid return through the potentiometer and C battery.

As is well known, the most of the "hum" heard in our receiving sets is due to induction from alternating current, and when we connect dirctly to this current we are going to get more hum, but by the judicious handling of the potentiometer and not burning the audions too brightly, this alternating current hum will not be objectionable on stations coming in with fair volume.

The slider on the potentiometer should be moved slowly until the hum is at its lowest. It will not disappear entirely, but will not be as bad as the usual hum heard on your set when your aerial happens to pick up this energy. The quietest spot is usually found around the centre of the potentiometer.

While good results have been obtained using an audion detector, best results are had when a crystal detector is used. This amplifier should not be connected to a receiving set using parallel filament connections for both detector and amplifier but if your set is all in one unit, the wires may be cut, thus separating the detector from the amplifier. If a filament control jack is used on the last step of amplification, this tube will not light when the plug is placed in the first step.

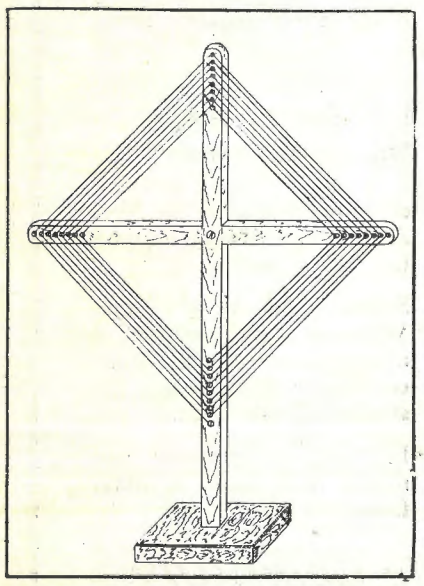
Broadcasting Rights

EXCEPTION is taken by the New Zealand manager of Amalgamated Wireless (A/sia.) Ltd., to the Government's proposal in regard to regulations for wireless broadcasting. It is pointed out that the company holds exclusive rights to the present and future patents in New Zealand of the leading wireless companies of the world, and that in its opinion it is impossible to establish and operate wireless broadcasting stations without using its patent rights. The Minister is asked to advise the company what license fees it is proposed to collect, what proportion of such fees the Government will pay to the broadcasting stations and what number of licenses it anticipates issuing during the first two years of the service. The matter is at present receiving attention. The Government has already notified its intention of erecting four modern broadcasting stations at the main centres to be operated in accordance with suitable regulations. They have entered into an agreement with a broadcasting organisation representative of the listeners-in and the electrical trade, and subject to certain conditions this organisation will be given an exclusive right to erect and operate broadcasting stations as soon as the necessary legislation is enacted. The revenue of the broadcasting organisation will comprise a portion of the license fees paid in respect of private radio receiving stations.

The Loop Antenna

(By R. H. Langley, Radio Engineer, General Electric Co.)

THE loop antenna is a very interesting device. It is quite different in its method of operation from the out-door antenna. The out-door antenna is in effect nothing more or less than a condenser. It is a very large condenser to be sure, so far as its physical dimensions are concerned, but electrically it is a relatively small condenser. The loop on the other hand is an inductance. This fundamental difference between the



two is the reason why it is necessary to use different methods of tuning in the two cases.

Let us examine this special form of inductance, which we call a loop and see why it serves as a pick-up device for radio signals and how it should be made to be effective.

There is a very close parallel between the ordinary direct current generator or dynamo and the loop antenna exposed to passing radio wave In the dynamo a number of coils corresponding to the loop antenna are rotated in a powerful magnetic field. The purpose of rotating them is in order that they may move with respect to the field and thus have a voltage generated in them. The amount of this voltage depends, of course, upon the strength of the field and the speed at which the wires are swept through it.

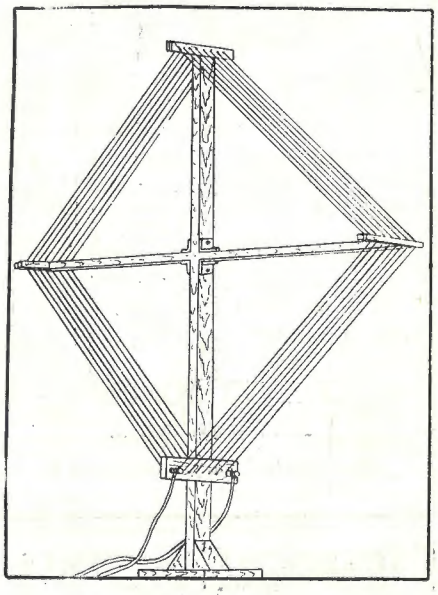
In the radio case, the coil stands still, but the field moves swiftly past the coil, thus accomplishing the same result. The speed at which the field moves cannot, of course, be varied and is always the speed of light, that is, 186,000 miles per second.

Let us see now what form of loop would have the greatest voltage generated in it by a passing radio wave. Let us think of this radio wave as very much like great smooth waves on the ocean, which, of course, also move forward with a very definite velocity. The turns of wire on our loop antenna are necessarily in series with each other, that is to say, they form a continuous winding. If the maximum voltage is to be generated in any one turn of the loop, then the voltage generated in the two sides of this turn should be in opposite direction, so that they may add and not oppose each other. If the voltage generated in both sides of the loop were in the upward direction at any one instance, then these two voltages would cancel each other, but if the voltage on one side of the turn was up and on the other side of turn, it was down, then they would add and if the loop were connected to a receiver, a current would flow around the turns of the loop. This is, of course, exactly what we wish to have happen.

Now, in order to have the voltage generated on one side of the loop in the opposite direction to that generated on the other side of the loop, the loop would have to be one half a wave length long; that is to say, it would have to be long enough in the horizontal direction so that one side was in the crest of the wave when the other side was in the trough of the wave. Since the distance between the crest of the wave is the wave-length itself, then the distance from the crest to the trough is one-half the wave-length.

The higher the sides of the loop are, that is, the longer the vertical wires are, the greater will be the voltage generated, and, of course, the voltage generated in each turn is added to the voltage generated in all the other turns.

But a loop one-half a wave-length is quite out of the question. It would be as long as a steamship and almost as difficult to handle. The loops which we are using every day are of quite



reasonable dimensions. They are only a few thousandths of a wave-length long. How do they function? In order to answer this question let us ask ourselves how we would build a coil of wire in order that absolutely no voltage should be generated in it by the passing wave. The only way in which this could be accomplished would be to so build the coil that the same voltage would be generated in both sides of it and that the voltages generated in the two sides would be opposed to each other. This would give a complete cancellation and no voltage at all at the terminals of the loop or coil. It is obvious that the

(Continued on page 408.)

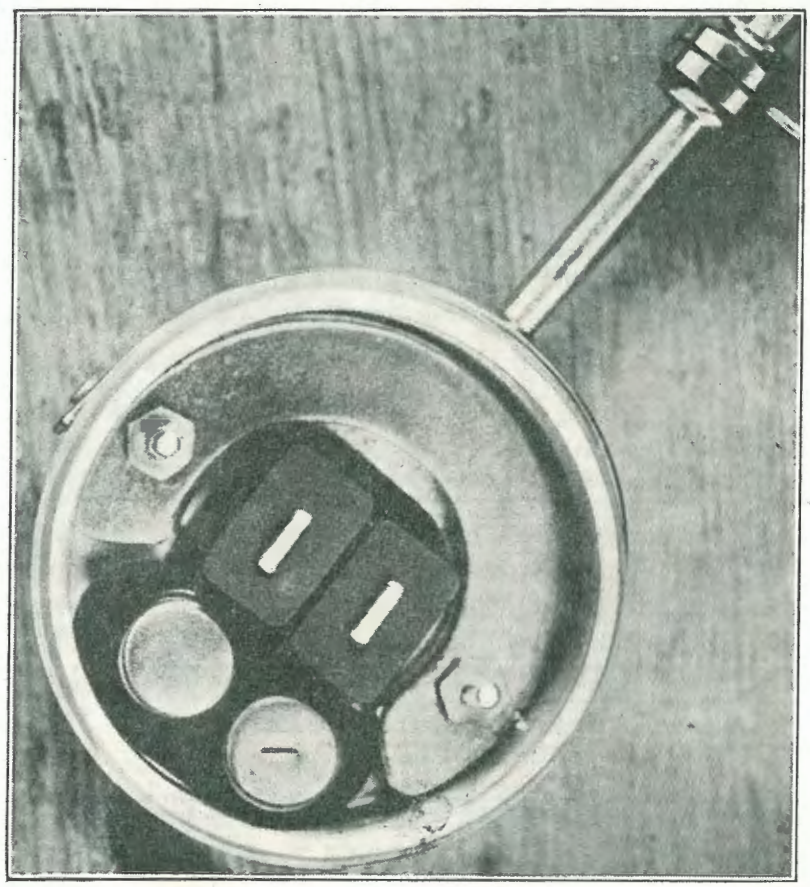
only way in which this could be done would be by so arranging the loop that it had no length at all. That is to say, arranging it so that the two sides were exactly in the same position in space. This would mean that the horizontal wires across the top and and bottom of the loop would cease to exist and the loop would become nothing but a wire laced up and down between pegs on the plain surface of the board.

If there is any distance at all between the two sides of the loop, then there will be some difference not in the amount of voltage generated in the two sides, but in the time at which this voltage is generated and there will consequently be some voltage at the terminals of the loop since complete cancellation of voltages cannot occur.

If the loop is rotated so that its horizontal wires are at right angles to the direction in which the signal is coming, then the loop has no length so far as those signals are concerned. The passing wave strikes both sides of each turn in the loop at exactly the same instant and the voltages generated are, therefore, equal and opposed and there is no terminal voltage. This is, of course, the fact which gives the loop antenna its very useful directional property. It is to be noted, however, that if the loop is turned ever so slightly from this zero position then the voltages no longer cancel and there is a voltage at the terminal. This means that the zero position of the loop is very sharp, but the maximum position is very broad.

In applying the loop antenna to an actual radio receiver, it is necessary that provision be made to tune it to resonance with the desired signal. This is accomplished by means of a variable air condenser and since this condenser has a very definite maximum capacity, the amount of inductance which the loop can have is also limited. This maximum inductance with the maximum capacity of the variable condenser, must give resonance to the longest wave to be received. The specification for the best loop antenna, therefore, is that it shall have just as many turns as possible each turn being just as long as possible and just as high as possible and still have no more than the required maximum inductance. The higher the loop is, the greater will be the voltage generated in each side of each turn and the longer it is, the greater will be the difference in time at which these voltages are generated in the two sides of the loop, and consequently the greater will be the voltage at the terminals, but it must not have an inductance value greater than that required for tuning.

Now the inductance of a coil of wire increases very rapidly as the turns are wound closer together. The maximum inductance is obtained with the minimum number of turns when they are wound just as close to each other as possible. In order to get the maximum number of turns for a given inductance which is what our loop required the turns should be wound just as far apart as possible. Now it is found that this spacing is best accomplished by winding the loop on a frame which has the form of a vertical cylinder. The wire goes up one side of the cylinder, across the top and down the other side and across the bottom and the turns are spaced around the circumference of the cylinder so that the complete winding covers an arc of about 120 degrees on each side of the cylinder.



The latest addition to the "Smallest Set" Controversy. Its inventor claims that it can be used as a reflex with any one-valve set.

USING two valves, one H.F. and Detector, Mr. N. L. McKenzie, of Newfield (V.), has managed to bring in KGO quite clearly. The following is a list of stations he has logged during the last few days:—V.: 3BU, 3FG, 3LM, 3ZL, 3BH. N.S.W.: 2BF, 2HF, 2UW, 2HM, 2GR, 2CR, 2LO, 2RJ, 2JM, 2GQ, 2BS. S.A.: 5BS, 5DS. Q.: 4CK. N.Z.: 1YA, 4YA. Of the N.S.W. amateurs, Mr. McKenzie finds that 2HM and 2RJ come in the best, while 2HM's transmission is excellent, being very steady and clear and, although 800 miles distant comes in at times as loudly as 2BL, and can be heard all over the house. "The N.S.W. amateurs come in here much better than the Victorians," continues Mr. McKenzie. "I do not know whether this district is badly situated for reception from Melbourne or not, but the fact remains that for every one Victorian I can hear four or five N.S.W. transmitters."

Highlights of Radio Broadcasting

What Is Professional Radio?

By Dr. ALFRED N. GOLDSMITH, B.S., Phd., Fellow I.R.E.,
Chief Broadcast Engineer, Radio Corporation of America

(Special to "Radio.")

SOME people think all radio designers are amateurs, and others are under the equally serious delusion that all radio designers are professionals. The reason for this confusion of thought is a simple one. Very few people are quite clear in mind as to what constitutes a radio amateur and what a professional, or at what stage and for what reasons a man passes from one class to the other.

In sport, it is not a particularly difficult question to settle. When a youngster leaves the backyard class and gets a regular paid position on a team which plays before audiences who pay admission fees, there is no doubt that he has passed from amateur to professional. Sport will always have the amateur and professional groups, and will probably draw its skilled players in the professional class from among ex-amateurs.

In medicine, on the other hand, there is (or should be) no amateur class. The old "herb doctor" is of a nearly defunct class, and indeed few people nowadays would be much encouraged if they were informed that their doctor was an amateur. They would feel that his cheery and inquisitive investigation of their ailments and haphazard and experimental method of prescription and treatment was likely to make him considerably happier than his patient. In fact, most countries prohibit the practice of medicine except by fully licensed professionals.

So that, in the field of sports, amateurs and professionals can and should exist peacefully side by side, while in the grave emergencies of life nothing but professionals, and the best of them, can be tolerated. Radio falls between these extremes, and this is one reason for the difficulty in deciding what constitutes a radio professional. There is something of the sport element in radio, since it certainly gives amusement and entertainment of the highest sort. Then, too, the lure of distance has been largely emphasized and has led many persons into using radio almost as a game of chance. In this game, the idea is to see how many stations can be heard in an evening and the total distance from the listener of all the stations together. In this case, the quality of the entertainment is almost a matter of indifference—all that is demanded is supposedly recognisable

The Emblem of the Institute of Radio Engineers.

call letters. For awhile, many people enjoy this sport and some of them get permanent pleasure from it. On the other hand, there is a more serious side to radio. Radio is a tremendous social and political agency, an extremely potent means of education, and a unifying force of unprecedented possibilities. It is a means of cultivating musical and literary taste and of bringing the masterpieces of every form of vocal art to a host of persons who would otherwise be shut off, by the barrier of distance, from enjoyment of the best in this field. Viewed from this aspect, radio must give service of a really consistent sort. Simplicity of operation and certainty of results are required, rather than delicate adjustment and a sporting chance of hearing the station sought. Radio professionals stress reliability as well as range, while, in the nature of things, amateurs generally stress the range element. Even the most evolved amateur organizations handling radio relay traffic do not attempt to guarantee transmission and reception but rather always try to reach out further and further to the very bounds of the attainable range of the station. A large margin of operating safety is not characteristic of experimentation and amateur operation, but it is becoming more common in professional circles.

There are two sources of radio professionals. One group are amateurs who gradually drift into the radio business, either as the result of an apparently advantageous business offer from a person with the necessary capital, or else because they develop some device, such as a receiving set, which seems worthy of being pushed commercially and for which they secure the necessary capital. The sobering influence of the daily problems of design and sales tend to change the attitude of the ex-amateur who has gotten into business. This is by no means universally the case, and indeed it must be remembered that the ideas expressed in this discussion are all general and not free from individual exceptions.

The second, and increasingly usual source of radio professionals, is from the engineering schools and the radio test divisions of the larger concerns in the field. A radio engineer and designer is, according to the entirely correct view of that great engineering society, the Institute of Radio Engineers, an electrical engineer who has specialised in electrical communication and particularly in radio communication. While the Institute and the State legislatures have not approved the idea of a definite degree

(*Continued on page* 412.)

Columbia Radio Batteries Are the Best

COLUMBIA Radio Batteries have proven to be the best batteries for radio receiving sets that money can buy. They are made in different styles suitable for every radio equipment and will give more satisfaction than any other make.

Columbia Dry Cell "A"

COLUMBIA Dry Cell "A" Batteries for vacuum tubes of low amperage are made especially for this work. They will withstand the slow steady drain required and give satisfactory results for a much longer period of time than any other similar type of battery.

Columbia Storage "A"

For vacuum tubes of one-half ampere or over, the COLUMBIA "A" Storage Battery is ideal. It is shipped dry and charged and filled when sold, thus assuring a fresh, powerful battery. It is tightly sealed and contained in an attractive mahogany finished box with handles.

Columbia "B"

COLUMBIA "B" Batteries are made in 22½ and 45-volt sizes. They are equipped with Fahnestock Spring Clip Connectors to insure easy, secure connections. They are thoroughly insulated and waterproofed. They are portable, powerful and long lasting.

Columbia "Three"

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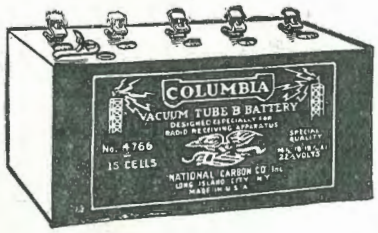

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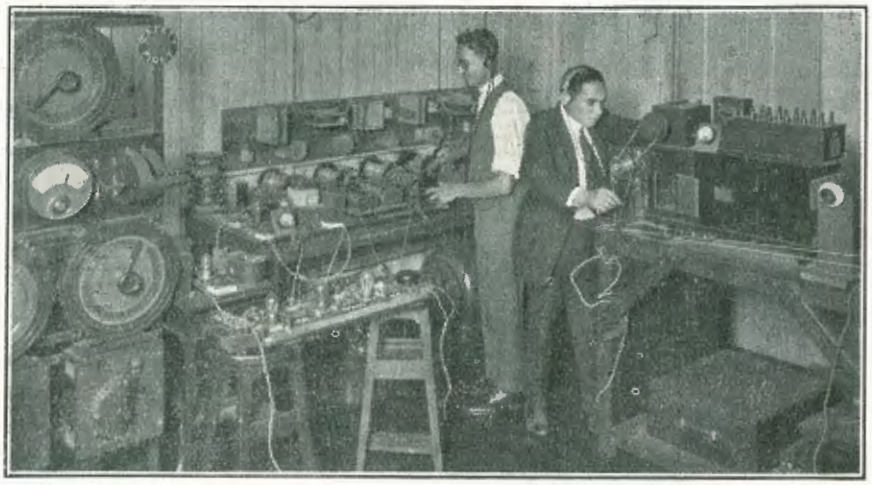
of "Radio Engineer" or R.E., the Institute has indicated the general nature of radio engineering in the above definition. Incidentally, this brings out the point that the degree of "Radio Engineer" is self-conferred in America and without the sanction of recognised engineering organizations, of great universities, or of the State. Membership in the Institute of Radio Engineers, in the appropriate grade granted to the applicant by its Board of Direction on the basis of his training and experience, is a justifiably esteemed honour, and is properly indicated by letters following the holder's name. Thus, persons genuinely interested in radio become Associate Members of the I.R.E., those having very considerable experience become full Members, and engineers of long standing, full responsibility, and eminent achievement in the field, are eligible for the grade of Fellow of the Institute. It may be mentioned that the Institute of Radio Engineers is an entirely non-partisan and scientific society, free from any commercial affiliations or connections whatsoever, and that it numbers among its membership thousands of radio engineers including practically every radio engineer of standing in the United States and abroad. In co-operation with the Department of Commerce, the Bureau of Standards, and the American Institute of Electrical Engineers, and similar organizations, it is most helpful in furthering the scientific and engineering devlopment of the radio field. Full information as to its activities is sent out from its present secretarial headquarters in New York City. Radio workers will be interested in its emblem, which is illustrated in the accompanying drawing. The two arrows, one curled around the other represent in direction and relation the electric and magnetic forces which are present in the radio wave. Since these are the basic forces of radio transmission and reception, their picture is an appropriate symbol for the engineering Institute representing the radio field.

Professional activities in all fields are more expensive than amateur activities, and this is particularly true in the radio field. The equipment necessary for a suitable research and development laboratory where precise measurements, as well as general experiments, are to be carried out is large. The radio equipment of the amateur may run from a few shillings to hundreds of pounds in extreme cases. The equipment for a professional laboratory may be from ten to a thousand times larger than the greater figure mentioned. As the years pass, amateur activities will no doubt continue, and will give real pleasure to the votaries of radio experimentation as a sport and as a form of personal enjoyment. The professional work, while perhaps less romantic, will become increasingly concentrated and effective and will produce for the public a constant succession of more reliable, effective, and successful devices for the reception of entertainment and educational material. To the amateur, radio is a constant source of pleasure, and, subject to the rights of others, his activities are well worth while. To the professional, radio is a grimly serious struggle to extend to the entire public, including the least skilled broadcast listener, the great benefits of modern radio. That it is also a "bread-and-butter problem" in the case of the professional renders him even more worthy of consideration and appreciation. It is increasingly, as the result of his efforts, that radio will come into its own and render its full service to humanity.



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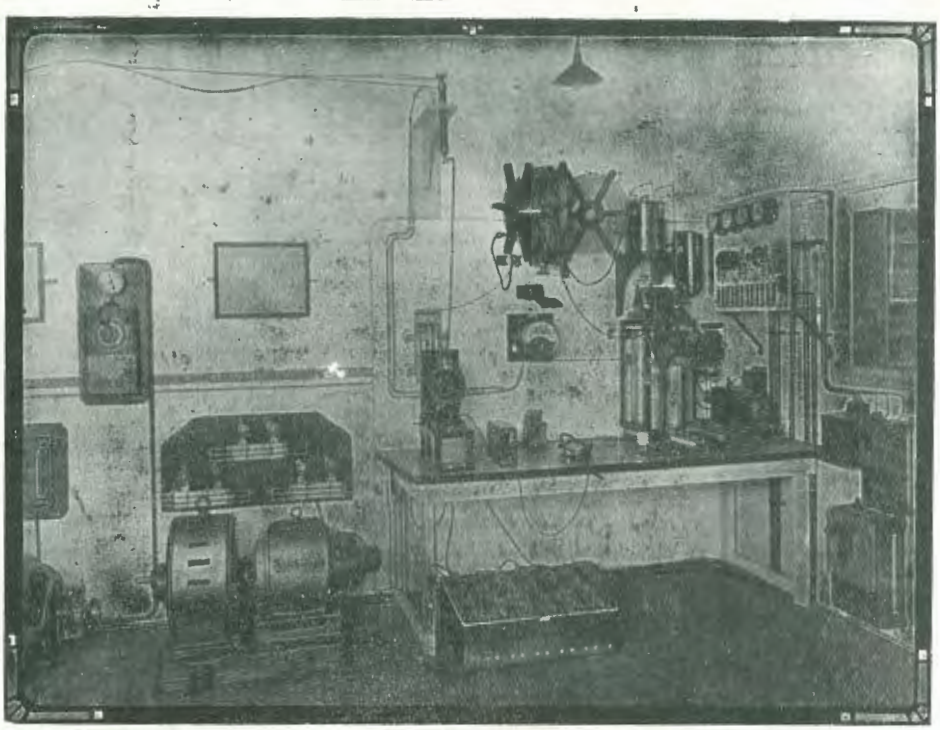

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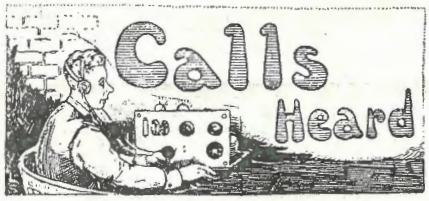
MR. ROBERT J. BROWNE writes that he logged the following stations between August 16 and 31 inclusive. He will QSL any of them upon request:—N.S.W.: 2AY, 2BB, 2BK, 2CL, 2CR, 2DN, 2DS, 2ED, 2GR, 2HF, 2HM, 2IJ, 2JM, 2JS, 2KC, 2LO, 2RU, 2YA, 2YI, 2ZZ. Vic.: 3BD, 3BL, 3CD, 3OB, 3EF, 3JH, 3OT, 3SW, 3TM, 3XF, 3ZL. S.A.: 5AC, 5AD, 5BD. N.Z.: 1AA, 1AO, 1AP, 2AB, 2AE, 2AK, 2AQ, 2AW, 2BC, 3AD, 3AL, 3AM, 4AA, 4AD, 4AE, 4AG, 4AK, 4AR, 1YA, 1YB, 4YA. U.S.A.: 4DY, 4MB, 6BCD, 6CGW, 7NO, 9DOF, 9DMS, KGO.

"THIS district was spoken of as a dead area for the reception of Radio, but the following stations were heard on a Sunday evening recently despite static, which drowned the call numbers of at least five other stations," writes Mr. C. R. Williams, part proprietor of *The Castlemaine Mail* (Vic.). Prior to this occasion, Mr. Williams had never touched a receiving set and knew absolutely nothing about Wireless. The receiver is a four-valve R.F. and Detector and two stages of audio. The aerial is 60 ft. at one end and 50 ft. at the other, consisting of a single wire with a span of 80 ft. Stations heard included:—2RJ, 2BL, 2HM, 2GM, 2CM, 2FC, 3NZ (or S), 3AR, 3NT, 4YA, 5BM. Another South Australian station was telling a bedtime story, but he missed their call number. A West Australian station was also brought in, but static was too strong to receive it, although the words "West Australia" were caught and a choir could undoubtedly be heard singing. "2RJ and 5BM are exceptionally good," continues Mr. Williams; "they are quite as strong as Farmer's." This experimenter has not yet been successful in getting KGO, but on the night of their first special transmission he got on to a carrier, only to be crowded out by 2BL, and when this latter station closed down it was too late. "However, I will get them yet, if I have to walk," writes Mr. Williams.

USING a single-valve set with an aerial 130 ft. long by 35 ft. high, consisting of a single wire, and water-pipe earth, Mr. Lawrence E. Deane, of Lindfield, Sydney, writes that he can pick up KGO any time it is on the air. This reception is clear but not very strong. On one occasion when Z2AF was heard his input was so low as to be un-readable on a hot wire milliammeter. The following is a list of the latest stations logged by him:—N.S.W.: 2HM, 2RJ, 2GQ, 2SO, 2YA, 2CR. V.: 3AP, 3CB, 3BD, 3BL, 3BM, 3BQ, 3BU, 3DB, 3GB, 3JH, 3BH, 3RY, 3XF, 3LM, 3OT, 3HL, 3TM, 3LS, 3EF, 3XO. Q.: 4AN, 4CM. S.A.: 5AD, 5DA, 5LO, 5WJ, 5DO, 5BF. Tas.: 7AA, 7AB, 7BK. N.Z.: 1AA, 1AO, 1FF, 2AF, 2AQ, 2BC, 2AW, 3AA, 3AD, 3AF, 3AL, 4AA, 4AD, 4AG, 4AP, 2AP. U.S.A.: KGO. The aerial used is a single wire, inverted L, 125 feet long, erected between a 40 feet tree and 30 feet chimney and there is a water-pipe "earth." The whole of the antenna system, Mr. Deane explains, is badly shielded in a valley. The circuit used is the famous P1 and very efficient control of regeneration is secured by the use of a .0005 variable grid condenser and the secondary of a United L.F. transformer in place of the usual grid



leak. The aerial tuning condenser is a .001 and the secondary tuning condenser is a .0005 vernier. For short wave work Giblen Remler coils are used—primary 20 turns and tickler 25. The valve is an Ediswan AR with 70 volts on the plate. "I should be pleased," concludes Mr. Deane, "if you would allow me to express through your columns my gratitude to the many transmitting 'hams' who have forwarded cards and letters to me."

MR. JOHN KILLEN, of South Singleton (N.S.W.), has given us particulars of the windings he uses with his crystal set, with which he has achieved such splendid results, and in the hope that they may prove useful to other experimenters we are publishing them herewith. All his stators and rotors are four inches and three inches in diameter. For amateurs to 600 metres stations the stator has five taps on 10, 14, 17, 19, 20 turns of No. 28 D.S.C. The rotor has 100 turns No. 36 D.S.C. For Farmer's exactly 60 turns of No. 28 D.S.C. on the stator are used, with no taps. The rotor has 152 turns of No. 36 D.S.C.

THE following is the latest DX list of Mr. W. F. Sievers (3CB), East Richmond (V.):—V.: 3FM, 3JP, 3OT, 3TM, 3SU ('phone), 3DX, 3JH, 3BL, 3BQ, 3LD, 3XO, 3XN, 3BC, 3SS, 3RG, 3ZR, 3ZN, 3EF ('phone). N.S.W.: 2MX, 2YA, 2MG, 2CR, 2RJ ('phone) Q.S.A., 2YI, 2GQ, 2LO, 2KC, 2AC, 2HM ('phone), 2JM, 2BK, 2GR, 2AY (very QSA), 2VM. S.A.: 5AC, 5DO, 5LF, 5DA. Tas.: 7AA. Ship and Land Stations: VHO, VHN, GFDX, CGW, VJA, VJH, VXX, GJG, VLN, VNU, VHY, VKO, VIM, VIS, VIC, VIL, VID, VIO VIN, VIP, VIE, VIA, VKT, VLW, VLA, VIH, VIK. 2FC and 2BL, the latter being stronger than the former, are all received on one valve. "Please give my thanks to those who sent me reports on my CW," concludes Mr. Sievers, "especially Mr. Lawrence, Lindfield, and Mr. Anthony, Auburn. *Radio* is the book for me, and I anxiously wait for the fortnightly copy with the DX work of other amateurs."

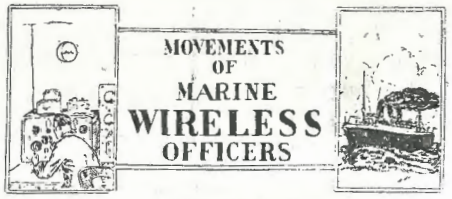
WE have received an interesting letter from Mr. R. H. Adamson, of Yakabindie Station, via Lawless, W.A. A year ago he bought a four-valve Federal receiving set and installed it at his home, which is situated in nearly central W.A., about 600 miles from Perth, and 300 miles from Kalgoorlie. After trying for some months, he was very much disappointed in failing to pick up 2FC, but by reason of perseverance he eventually succeeded in logging this station. Since then he has been able to hear Farmer's any evening he desired. Since 6WF has been on the air he has also received their programme, "and," he continues, "as we are about 2,300 miles from Sydney and 500 miles air-line from Perth, we are very pleased indeed with what Radio broadcasting can do for those people who are at the 'back o' beyond.' I still do not know anything about wireless, and for this reason alone I think it shows that there is no reason why everyone situated as we are should not be able to receive their daily news as soon as the man in town."

WITHOUT earth connection, and using an indoor aerial 15 ft. high and 15 ft. long, Mr. C. A. Cullinan, Jnr., has received the following stations lately. He uses a single valve with variable regenerative circuits. A.: 2AY, 2BK, 2CF, 2CL, 2CM, 2DS, 2IJ, 2RJ (F), 2YI, 2ZZ, 5BG (F), 5BM (F), 7BK. U.: 6CGW. X.: 3AA. Z.: 1FF, 2AP, 3AD, 3AL, 4AA, 4AG.

USING a one-valve set, Mr. W. Culmsee, of Warragul (V.), writes that KGO came in on it on the night of September 16 quite clearly, and of about the same strength as 2HM. About a month ago Mr. Culmsee picked up WJAZ, Chicago, whose programme was heard by other members of the family. The receiver used was of a regenerative type, using a Phillips D1 as Detector with 30 volts on the plate, and the aerial is 60 ft. high at the one end and descending to 40 ft. at the lead-in. This experimenter receives 2FC and 2BL regularly and also 2RA and 2HM. The first two come in at very great strength, and 2FC's "carrier" can be heard two feet from the 'phones on suitable evenings.

THE apparatus of Mr. J. W. Newell, of "Karoona," Urana (N.S.W.) is of four valves, using 1R.F. (UV201A), 1 Det. (UV200), and 2R.F. (Cunningham 301A). With it, a short while back, he logged KGO and since then he has been able to hear them nearly every evening between 5 and 7 but he finds that the best results are secured on Sunday and Wednesday evenings. With 'phones off three valves he finds the station comes in very clearly and distinctly, while the modulation is perfect, every word of the announcer being plainly heard, as well as the applause of the audiences. On four valves this station can be heard all over the house, while speech can be plainly heard on the loud speaker. Stations lately logged by Mr. Newell follow below and most of them operate a loud-speaker with four valves:—N.S.W.: 2CR, 2RJ, 2JM, 2HM, 2GR, 2YA, 2ZE, 2SO, 2RA, 2AR, 2WV. V.: 3UX, 3VS, 3ZM, 3AR, 3BH, 3BQ. S.A.: 5BQ, 5BG, 5BN. Q.: 4CK, 4GE. W.A.: 6AK. N.Z.: 1YA, 4YA. T.: 7BK. If any experimenter would care to correspond with Mr. Newell he would be glad to hear from him.

HAVING received KGO so often on the outside aerial, Mr. C. J. Williamson, of Yass (N.S.W.), decided to try them on an indoor one, using about 90 feet of 22 D.C.C. wire. He ran the wire round the picture frames with an insulator at one end. Trying them on the outside aerial first, and they coming in well, he then switched over to inside and was surprised to hear KGO nearly as loud and just as clear and picked up the final announcement with which this station closes down its transmissions. On a later evening, using the same interior aerial he heard 3BQ very clearly at about 10.30.



SEPTEMBER.

MR. C. BRITCHER relieved Mr. C. L. Coley, on s.s. *Waimarino* at Newcastle, 12th.

Mr. A. H. Jeremy relieved Mr. T. V. Tressler on s.s. *Cooma* at Sydney, 15th.

Mr. D. N. Quinn relieved Mr. A. H. Jeremy on s.s. *Riverina* at Sydney, 15th.

Mr. T. V. Tressler signed on s.s. *Iron Monarch* at Newcastle, 15th.

Mr. O. S. Kelly relieved Mr. A. W. Hodge on s.s. *Wonganella* at Port Kembla, 16th.

Messrs. A. E. Jackson and J. Thompson signed off s.s. *Eastern* at Sydney, 18th.

Mr. W. J. Martin relieved Mr. H. R. Allen on s.s. *Hobsons Bay* as Senior Operator, at Sydney, 19th.

Mr. G. W. Steane signed off s.s. *Cooee* at Melbourne, 17th.

Mr. H. R. Allen relieved Mr. F. Kettlewell on s.s. *Goulburn* at Sydney, 22nd.

Mr. V. M. Brooker signed off s.s. *Kekerangu* at Port Pirie, 16th, and signed on s.s. *Aeon* at Port Pirie, same date.

Mr. A. C. Jackson relieved Mr. V. M. Brooker on s.s. *Aeon* at Sydney, 23rd.

Mr. F. G. Lewis signed off s.s. *Aeon* at Port Pirie, 16th, and signed on s.s. *Kekerangue* at Port Pirie, same date.

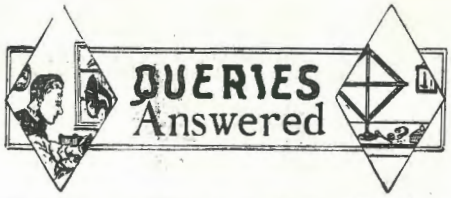
Mr. G. M. Power signed on s.s. *Waihora* at Port Chalmers, 8th.

Mr. T. M. Alexander signed off s.s. *Iron Master* at Newcastle, 24th, and relieved Mr. F. Exon on s.s. *Burwah* at Sydney, 25th.

QUERIES ANSWERED. COUPON.

"RADIO in Australia & New Zealand."

(October 15, 1924.)



E. *C. T.* (Ashfield). Q.: What are the wave-lengths of the various broadcasting stations operating in V., S.A., and W.A.? A.: Other than 2FC and 2BL the following stations are at present operating:—Associated Radio, Melbourne (3AR), on 450 metres; Westralian Farmers, Perth (6WF), on 1,250 metres. Another station in Melbourne will shortly be operating on 1,720 metres. Q.: Are these stations regularly heard in Sydney by many amateurs? A.: Yes. See reports of "Calls Heard" published regularly. Q.: How can induction from A.C. mains be overcome? A.: Try a tuned counterpoise and, if possible, erect aerial at right angles to the mains.

E. P. (Rochester). Q.: What size honeycomb coils should be used to pick up KGO, using P1 circuit? A.: Use Grid Coil 35 turn honeycomb with similar size for Reaction or 50 turn coil for the latter us to give an estimate of range. We might mention reports have been received from amateurs using this circuit stating they had picked up KGO.

H. W. T. (Portland). Q.: How can reaction be introduced in the two-valve reflex circuit published in *Radio*, No. 22? A.: Reaction can be obtained by coupling the plate and grid coils magnetically, or by connecting a small variable condenser of three or five plate size directly between the grid and plate of the radio valve.

Readers, Kindly Note!

QUERY LETTERS WHICH ARE ACCOMPANIED BY OUR COUPON AND COMPLY WITH THE FOLLOWING DIRECTIONS WILL RECEIVE FIRST PREFERENCE. MAKE YOUR LETTER AS BRIEF AS POSSIBLE AND WRITE YOUR QUESTIONS ONE UNDERNEATH THE OTHER. ALL LETTERS MUST BE SIGNED IN FULL, TOGETHER WITH THE ADDRESS OF THE SENDER. FOR PUBLICATION, THE WRITER'S INITIALS WILL BE USED OR A NOM-DE-PLUME, IF DESIRED, BUT ON NO ACCOUNT WILL ANY CONSIDERATION BE GIVEN TO ANONYMOUS COMMUNICATIONS.

IF REQUESTED, ANSWERS WILL BE FORWARDED BY POST, PROVIDING THE LETTER OF ENQUIRY CONTAINS THE COUPON TO BE FOUND ELSEWHERE IN THIS ISSUE.

IT SHOULD BE NOTED THAT IT IS IMPOSSIBLE FOR US TO ANSWER QUESTIONS REGARDING THE APPROXIMATE RANGE OF EXPERIMENTERS' SETS.

should difficulty be experienced in getting receiver to oscillate.

T. M. (Granville). Q.: Can you recommend a simple receiver to overcome interference from VIS? A.: Use a loose coupler with a condenser to tune the secondary. This will enable you to reduce interference from VIS to a minimum.

F. S. (Sefton Park). Q.: What ratio should the transformer be in the one-valve amplifier published in *Radio* No. 37? A.: Usually, 3 or 4 to 1. Q.: What should be the voltage of the "A" and "B" batteries? A.: This depends upon the particular valve you use. We would refer you to the article on "Characteristics of Valves" published in *Radio* No. 28 giving filament and plate voltages for various types. If you will advise us of the particular valve you intend to use we will be pleased to supply you with the information required.

C. L. H. (Kyneton). Q.: Can you advise the cost, and how far the single valve set described in *Radio*, No. 36, will receive? A.: To purchase this set assembled would cost you approximately £10; purchasing the parts separately about £8. Owing to the many factors involved it is impossible for

I. G. (Uralla) submits two circuits and asks which is the better for reception of 2FC? A.: Use the circuit with one valve detector and two audio. Q.: Are WD12 valves satisfactory for loud-speaker work? A.: Yes.

Tungar (Rockdale). We regret we have been unable to obtain the information you require but would suggest you communicate with the local agents, the Australian General Electric Company.

N. C. (Lakemba) asks cause of trouble experienced with the P1 receiver. A.: Without a personal inspection it is impossible for us to state the cause of your trouble. Possibly the grid leak is at fault; try one of different value. We would also suggest you try a different valve. We note you are not using the coils specified for 2FC, i.e. 150 and 100.

A. S. (Lidcombe). Q.: What would be the range of a crystal valve set? A.: We would refer you to notice at head of these columns regarding range. Q.: Does a variable condenser make signals any stronger? A.: A condenser for valve circuits is essential for fine tuning thereby making your receiver more selective than it would be if a condenser were not used.

P. H. P. (Waterfall). Q.: What filament and plate voltage is required for German Telefunken valve for use with variocoupler circuit published in *Radio* No. 36, also, why is it signals cannot be received unless one hand is kept on 'phone head piece, and the other hand on variable grid leak, and then very weak? A: The valve you mention is not suitable for a detector, its specific function being amplification at high frequencies. This will account for the poor results you are getting. Q.: Are connections of series-parallel switch correct (sketch submitted)? A.: We are unable to follow the arrangements of your switch, as you have not shown to which studs the switch arms connect. Let us have the full mechanical details of the switch, and we will advise as to the correct connection.

E. R. W. (Pymble). Q.: Is apparatus (list submitted) suitable, and how much wire would be required, to construct an amplifying panel to use in conjunction with a one valve set? A.: Yes. About six feet of wire should be ample Q.: Would this amplifier work a loud-speaker? A.: Yes. Q.: Using a Marconi DER Valve, would extra A and B batteries be required? A.: Not unless you use a different type of valve for amplifiers.

A. S. (Marrickville). Q.: Are basket coils suitable for a regenerative set; if so, how many turns are necessary to receive 2FC and 2BL? A.: Using large spiderweb formers you will need 150 and 40 turns respectively for the grid coil, with a series variable condenser, and two similar sized coils for the reaction. Q.: What constitutes a turn on a basket coil? A: This can be determined by counting the revolutions of the former while winding. Q.: Would wire (sample submitted) be suitable for winding these coils? A: The wire submitted is No. 26 single silk and is suitable for winding both spiderweb and basket coils.

L. A. J. D. (Coburg). Q.: What alterations are necessary to make circuit (submitted, into a telephony transmitter (grid modulations)? A.: You can convert the coil-valve transmitter for telephone working by using three 60-volt high tension batteries in place of the secondary of the spark coil, and taking the grid leak direct from the grid through the secondary of the spark coil which will now come in useful for a microphone transformer. In place of the telegraph key in the primary circuit use a low voltage microphone.

C. R. (Dulwich Hill). Q.: Would converting the P1 circuit into a three-coil circuit be an advantage for long distance reception? A: The conversion of your P1 receiver to include a separate tuned aerial circuit will give greater selectivity and thereby help long distance reception by reducing interference. Q.: What condensers and valves would you recommend for this receiver? A.: When selecting a variable condenser for your receiver with the object of employing it for long distance reception see that it has a flexible connection to the rotary plates, and well-fitting bearings. Use DER or UV201A Valves.

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