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EXPERIMENTAL RADIO & BROADCAST NEWS

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Official Organ of The Wireless Institute
(Federal Convention) of Australia (Victorian Division)

EXPERIMENTAL

RADIO AND BROADCAST NEWS

NOVEMBER 1, 1924 — VOL. 1, No. 4.

A Journal Published on the First of each month. Devoted to the promulgation of Experimental Work, to the Theory and Technique of Wireless Telegraphy and to the interests of the Broadcast Listener.

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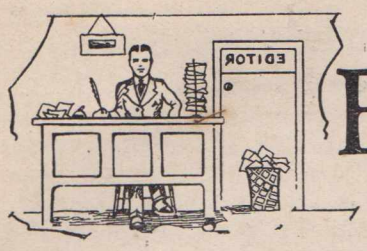
CONTENTS :



EDITORIAL

Another addition has been made to the Australian Broadcasting System by the inauguration of the Victorian station, 3LO. It has taken a long time for Radio to get a grip in Australia, but now that all States are near having a good service, the Broadcast-listening public should be well catered for. From observation, it has been noted that a considerable amount of inefficient and unsatisfactory gear has been thrust on a starved market to be snapped up eagerly by eager purchasers. The public should take warning that gear should be purchased under advice from someone with a knowledge of the requirements to suit conditions. The Cheap Jack in the Radio field will not last long.

Regeneration.

It appears that there are still many advocates for the circuit which is known to radiate energy. The "joeys," as we know them, are daily becoming more persistent, and how any right-thinking person can say there is no harm in regeneration improperly used is beyond conception. Some listeners cannot resist the temptation to twist dials, and do so in utter disregard for the comfort for their neighbour. Cases have frequently been observed of persons deliberately twisting their dials back and forth at a rapid rate. This, in the case of a regenerative receiver, causes a most objectionable sweep! sweep! which causes all the bother to one receiving music from a Broadcast station. All listeners should be taught to realise that, once an adjustment of the receiver is made, it should be left, as far as possible, and not played with thoughtlessly and needlessly. We will all be a good deal happier if this is observed.

The Experimental Field.

Now that Broadcasting is getting well established in all States, those who never were, and never will be, experimenters will stay at home to hear the local music, and will not be present at meetings of the W.I.A. in such large numbers. In Victoria, the effect of the starting of 3LO has already been noticed at suburban section meetings. At the last Council meeting of the Victorian Division, a grading scheme was made law. Under this scheme every member, associate member or student will be required to pass a certain standard before he can be admitted to the ranks of the W.I.A. One of the prime clauses will be that the applicant will have to produce evidence of actual scientific or experimental work before he can be admitted to senior membership.

This is a move in the right direction.

The Test Committees of the various Divisions would do well to get busy at this stage and start some real earnest work. There is plenty to be done.

We note that the President of the South Australian Division is appealing for support to consolidate the Institute in that State. It is hoped that his efforts will be successful.

We are anxious to hear of a movement in Queensland next. **Wake up, Fours!**

THE EDITOR.

The Whole Truth About Broadcasting

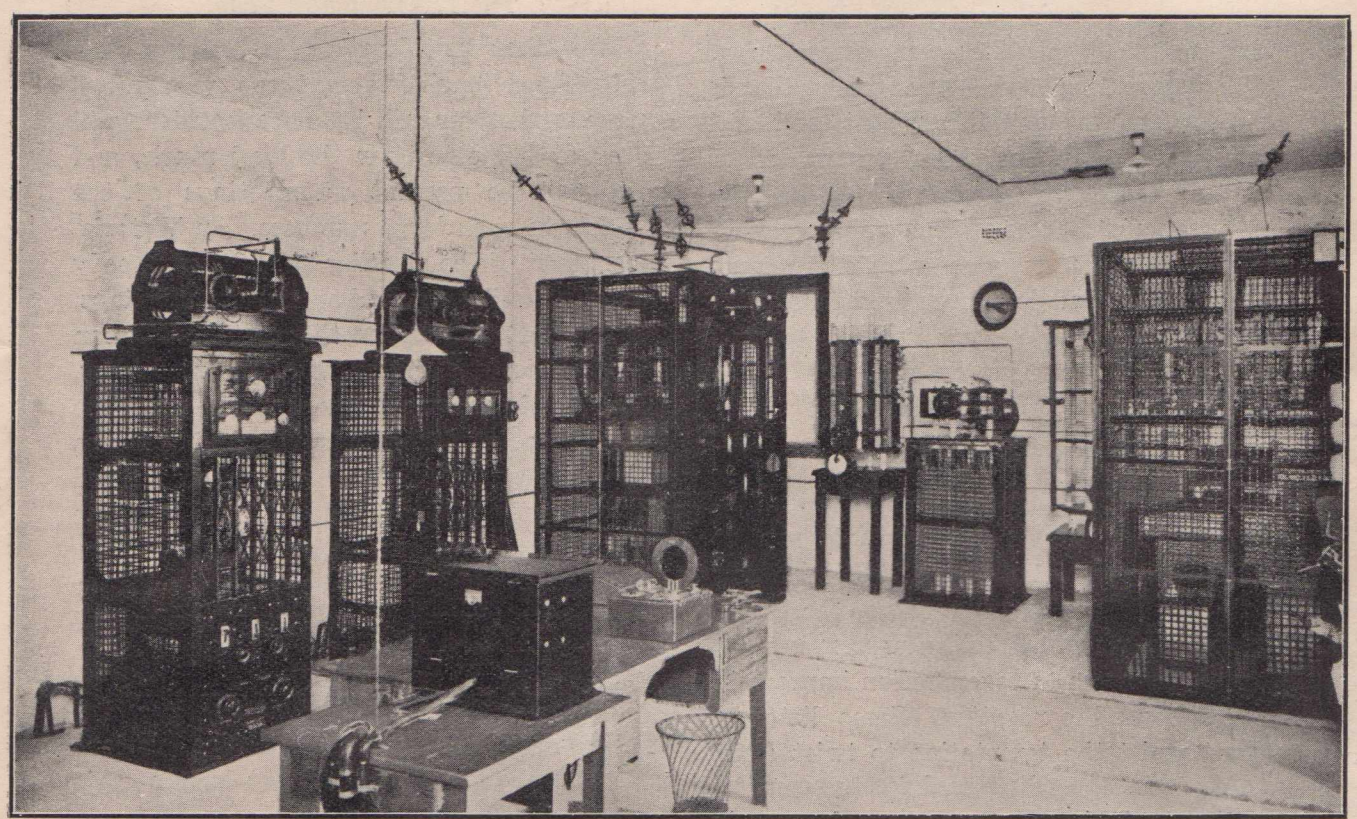
No phonograph ever built compares with the reproduction of music from a first-class broadcasting station received on a carefully-designed receiver.

The difficulties which have to be overcome at the transmitting end are numerous, and so far there is no station running in Australia which has completely mastered the science of perfect transmission of all kinds of music.

As Australian broadcasting is very young, it is not intended to imply that all the faults at present evident will not be quickly improved.

Looking at the subject from the broadcast listener's side, it is essential that he purchase a perfect receiver—the transmission will be rectified by time and experiment alone; then, if the receiver is a good one, nothing remains but to enjoy the wonderful variety and excellence of wireless music.

Then there is our old enemy, STATIC. Atmospheric interference is, of course, most serious on long-distance reception, and, therefore, will annoy the country listener most.



In case you don't know, this isn't little Willie's Crystal Outfit --- it's Victoria's new Broadcasting Station 3LO. From left to right can be seen, the Master oscillator panel, modulator panel, 6KW amplifier, tuning gear and high voltage supply panel, containing the transformers, rectifier valves and smoother.

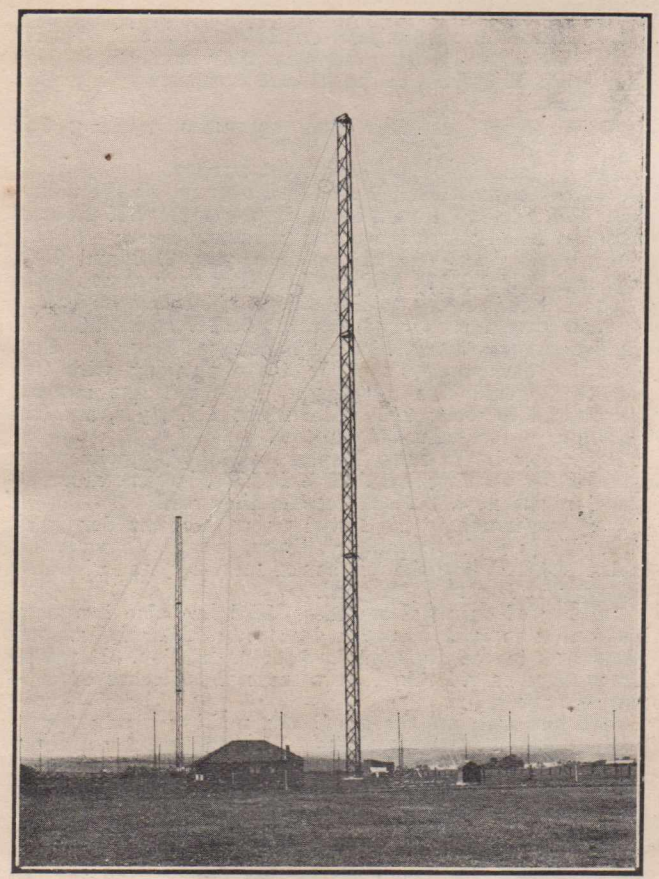
Lots of people who have listened to broadcast on a really first-class receiver have been very disappointed indeed with the receiver, when, as a matter of fact, the whole of the fault has been at the transmitting end; no receiver, however good, can make good of bad music.

On the other hand, perfect transmission can be absolutely mutilated by a poor receiver.

Australia suffers from a unfortunate geographical disadvantage in that her mountains and population are round the coast. This fact has of course, influenced the placing of broadcasting stations in the capital cities—Sydney, Melbourne, Adelaide and Perth. This unfortunate circumstance robs the broadcasting station of a tremendous amount of its "punch" for the country

man. The further back the listener is situated, the weaker the signals and the more the static bugbear will upset him, while half the punch of the broadcast station is being wasted out to sea.

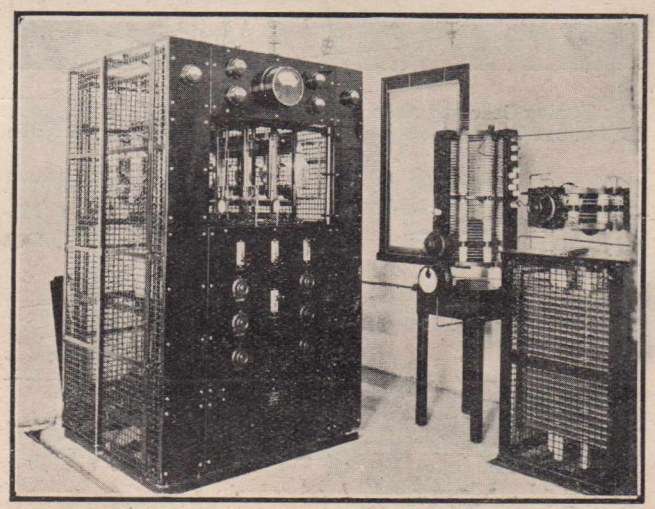
It is quite obvious that it was not possible to build the stations in the centre of Victoria, New South Wales and South Australia, but there is no getting round the fact that if broadcasting is to give the maximum service, the approximate centre of each State is the correct situation for the broadcast station.



The 200ft. Towers at 3LO, The station house can be seen between them.

This is, of course, a disadvantage forced upon us by geographical conditions, and for the present they have to be taken as read. The only satisfactory solution will be relay broadcast, and it is not considered that anything along these lines will be attempted for many years yet.

The Victorian station, 3LO, has made a start. We think most people are quite a little disappointed; the quality is not yet up to standard, but we must be fair. There are a great number of difficulties, and Rome wasn't built in a day, although it did cost a lot of money. We understand that the microphone used at the studio at 3LO is mounted on a wooden stand fixed to the floor; if this be correct, it will largely account for the very marked mechanical vibration on the low notes. Doubtless at a future date the microphone will be suspended in rubber as in 2LO, London. Some of the recent transmissions from 3LO have been very good indeed, and when received and reproduced properly, afforded excellent entertainment.

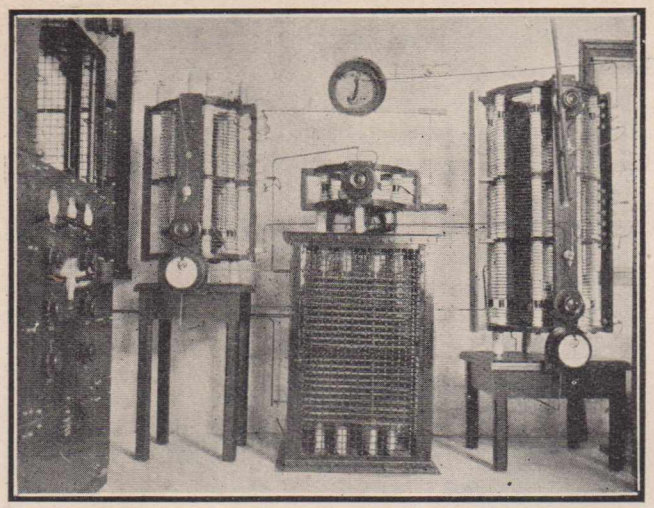


The 6KW Amplifier panel at 3LO to which the modulated oscillatory energy is supplied from the "Drive"

We know the 3LO people mean business and will cater for the demand in a first-class style, and we wish them every success.

Station 2FC, as heard in Victoria (when conditions will allow), is very good indeed; they appear to have largely overcome the initial difficulties which beset a new transmitting station. It frequently happens, however, that distance lends enchantment to wireless music. We hope to have some information in regard to the close up observance on 2FC next month.

Very many listeners in Melbourne are at present experiencing difficulty in getting satisfactory results from 3LO. This is largely due to the fact that those who have been used to receiving 2FC (Farmer's, Sydney) with anything from 3 to 7 valves, have tried to do the same with Braybrook. It will be as well to use no more than three valves



The Tuning Gear and closed circuit condenser at 3LO. The aerial lead-in can be seen at the top centre, the 6KW Amplifier panel being on the left.

without any earth at all, and the circuit de-tuned quite a lot, the quality will be considerably enhanced if the plate voltage on all the valves is reduced.

In order to get best results, a study must be made of your receiver.

H. K. LOVE.

DX NOTES AND OTHER THINGS

By Chas. Maclurean.

The question of the month is: "Is it? or are we?" No, the answer is not, "I don't suppose so—so they tell me," nor is the answer "a lemon."

What prompts this question is the latest record put over by Frank Bell Z4AA. Oh, no! Nothing much; just worked a couple of hams in England whilst waiting for Sister Bell to ring the bell for tea. And, like the man who took on the bet that he could drink a bucket of beer, first drinking one bucket on the quiet just to see if he could do it, Frank repeated the dose next night, just to see if it could be done. I understand that Frank then put the other N.Z. ether-busters on to "London, where the King lives," and that several others (I think ZAC and 4AG) also clicked.

Now, 'it is" due to the position of New Zealand? "Is it" due to the extra 1½ hours darkness they have, "Is it" due to absence of Q.R.N., or "is it" due to the way they part their hair.

"Or are we" Aussies dud operators working dud stations?

Now, a gum-drop for the correct answer.

We know they certainly have it all over us on the reception side, for, as I mentioned in my last "DX Notes," 2DS and I had "been there and 'ad sum."

But what about our transmitters, you, 3BD and 3BQ, 2LO and "lil" 2CM? We are told that we put out quite a signal, but it seems to me it must get a relapse before travelling too far. Only last night 6CGW called 2CM. I replied straight away, like a "puffick gentleman." But, alas! he did not get me. Is there anybody with five bob that would like a splendid little wireless station, guaranteed to work 100 miles night time, yes, and an audibility meter chucked in too?

The silent hours agreed upon by N.S.W. exerimenters seem to be working well. The B.C.L's. haven't much to growl about now, but, of course, they will.

3BQ has increased his signal strength tremendously of late. He is a bit unstable at times, though. He says it is due to increasing the number of rectifier jars in his set. Anyway, it is all to the good.

Talking of chemical rectifiers, 2DS has also increased his radiation and strength by using electrolytics and Kenotrons in the diamond form of connection. It raised his voltage considerably, as witness the decease of a 5-watter soon after.

2BK has been off the air lately, making a new transmitter, using spider-web coils. Worked him for a short while on Sunday morning, and his phone seems very good.

"Wireless Weekly" transmitting tests have just been concluded, and results are not yet to hand. These tests lasted a week, and the following stations took part in them:—2CM, 2JM, 2DS, 2BF, 2YI, 2BB, 2DK, 2CS, 2DE.

Starting at 10 p.m. each station transmitted for 10 minutes, sending C.W., I.C.W. and phone. Listeners in the country had been supplied with log sheets to make full notes of all reception, and some interesting results are expected.

A2YI has had a try with the shorter waves. He worked 3BQ in daylight on about 140 metres, and is highly delighted.

2LO has been off the air for some time. I believe he is away from home.

2DE, Phil. Renshaw, has just returned from Brisbane, where he has been pouring oil (dinkum) on institute troubled waters. 2DE has a new transmitter and two perfectly good 60 feet masts, so it is no wonder he started off by working S.A. and 4AN Queensland.

2ED and 2CI have been off the air for some time now, so also has 2ZG.

2JM perks up as usual, and is getting fine results.

Now, folks, here are some audibilities and notes. You want to notice particularly the dates and times, so that you may refer to your log and see why.

AUDIBILITIES AT 2CM.

Date.	Time.	Call.	W/L	Audibility.	NOTES.
Sunday, Sept. 28	8.50 p.m.	Z4AA	122	250	
Sunday, Sept. 28		Z1AO			
Tuesday, Sept. 31	7.5 p.m.	Z4AG		94	
	7.15 p.m.	Z4AA		64	
Thurs., Oct. 2	6.30 p.m.	Z4AA		120	
Friday, Oct. 3	9.15 p.m.	Z3AD		22	
Friday, Oct. 3		Z1AO		58	
Saturday, Oct. 4	6.10 p.m.	Z4AG		64	
	6.10 p.m.	Z2AG		58	
	7.10 p.m.	A3BD		650	
		3AL		18	
Sunday, Oct. 5	5.50 p.m.	Z4AA		22	
		Z4AK	96	46	
	6.20 p.m.	A3BD	125	94	Has reduced W/L, not as good as before. Note higher, but has bad ripple, and is confused with a second note.
Sunday, Oct. 5	6.30 p.m.	A3BQ	112	300	High, clear note, but wavery and unstable.
		A3XF		7	Note like a duck quacking.
	7.20 p.m.	Z4AK	95	36	Calls CQ too long before signing.
		Z4AG		150	Note rough and slightly unstable.
	7.35 p.m.	Z2AC		36	
	8.30 p.m.	Z2AG		250	
	9.10 p.m.	A3BQ		500–1500	Very unstable and fading strength without Aerial 94. Strength without Aerial or Earth 22.
	10.40 p.m.	A3BD			On 200 fone very good and clear.
Thurs., Oct. 9	5.35 p.m.	Z4AG			Note improved. Now like 4AA's.
Friday, Oct. 10	8.10 p.m.	2AC		300	
Saturday, Oct. 11	5.30 p.m.	Z4AA		29	Note bad.
	7.35 p.m.	3JH		46	He called CQ. I answered, but N.D.
Monday, Oct. 13		Z2AC	80	94	Nicely readable, without Aerial.
		Z4AK	94	74	
	7.30 p.m.	Z4AG	97	400	Str. 7 without Aerial. Note very good. Best from 4AG.
Friday, Oct. 17	9.40 p.m.	Z4AG		150	Note bad again.
Sunday, Oct. 19	9.45 p.m.	Z4AA	100	500	Note good now.
		Z2AC		300	Very unsteady to-night.

A New Zealander's Point of View

(By R. J. Patty, Z2AE.)

Mr. R. J. Patty, Z2AE, who has spent the last few weeks in Melbourne, favours us with some of his impressions.

I have had many pleasant visits to Victorian stations since my arrival in Australia, and I must congratulate the hams here on their very first-grade stations. A visit to 3BD (Mr. Cox) was quite an eye-opener, and I derived much pleasure there by waggling his key to an old friend of mine, Percy Collier, of 2AP, Wellington, N.Z. I spent another interesting evening with 3JU (Mr. Hull), and must say I should like to get loose in his den for about ten minutes by myself. Result, sure, 2AE would have a lot better station. Hi! Have had several visits now to 3BQ (Mr. Max Howden), and am greatly indebted to him, as, per way of his splendid station, I have been able to work home to my own town to 2AG (Ivan O'Meara) every night on schedule. Strengths of New Zealand stations in Victoria are very poor compared to the strengths of Victorian chaps in New Zealand. Candidly speaking, and no reflection on other stations, I would say that the loudest Australians in New Zealand a month ago were 2LO, of the second district, and 3BQ, of the third. The difference in punch between the Aussie and New Zealand sigs. is hard to realise, and the reason, I think, is chiefly the better receiving conditions all round in New Zealand. Very little work is done over there with radio frequency amplification, the majority of us favouring the good low-loss tuner, with detector, and one audio for quick and selective working. In Gisborne, 2AC, 2AD and myself live within a mile of each other, and can work within 10 metres of one another and cause no qrm. The three of us use motor generators for plate power, and until we hooked up the low-loss tuners there used to be a very hearty round of complimentary remarks about qrm. and qrt.

A few remarks, in passing, about our stations may be useful or otherwise, so herewith abide with me. 2AC, as most of you know, uses one 50-watt Cunningham (input, 200 watts hi hi), with 1000-volt Esco M.G. to plate. Circuit is a loose-coupled Meissner, using series condensers in both aerial and counterpoise. Aerial is 70 feet overall; twin four-wire cages, 5-inch diameter; inverted L, 70 feet high at mast and 30 feet high at lead-in. Counterpoise is flat top, 50 feet x 40 feet, 7 feet high, and 35 wires. His receiver is a low-loss detector and one audio to zones and three audio to loud squeaker.

2AD (Percy Stevens) is more of a B.C. man; he uses most of his time running broadcaster 2YM. His key outfit, however, sure makes a howl, being three 5-watt 'trous in a Colpitt's circuit. Plates are fed from an 800-volt (own made) generator, which is some kicker, delivering 500 watts, if necessary, at 1200 revolutions. I would not like to fall on it when it is moving at 3600 revolutions. Having no A.C. in Gisborne, we are all forced to use batteries for the filaments, and they take some juice, believe me. The aerial and counterpoise system at 2AD et 2YM is, sure, a young "POZ." An 89 feet mast supports twin five-wire cages of 6-inch diameter, slanting down to 45 feet mast at transmitter end. The aerial, including lead-in, is 180 feet overall, and is screened from earth by a network of wires, covering the whole section under and about the two masts. 2AD is a good old "op.," and hams working him do not need to repeat anything. He also uses the low-loss receiver, which brings him in some hefty sigs. Another thing that may interest hams is that we all use plate-glass insulators throughout the aerials and counterpoises. The insulators are 18 inches long, 2 inches wide and three-eighths of an inch thick, and are drilled nicely with quarter-inch holes at each end. None have carried away with us yet, and for price, well, you cannot beat them.

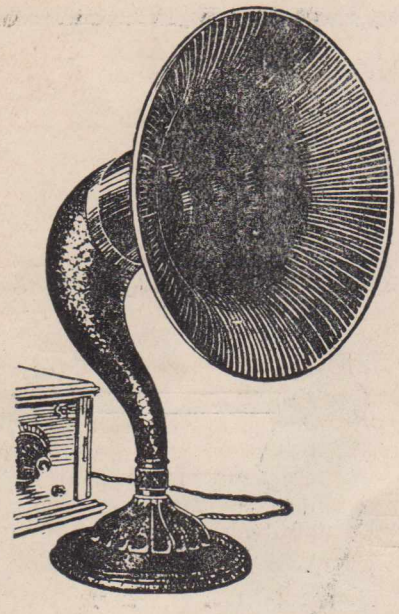
My own station, 2AE, is somewhat of a nightmare, especially to Mrs. 2AE, who says to any visitors that it looks like the after-effects of a bad fire. Hi hi! I use mostly twin 5-watt 'trous in a loose-coupled Hartley, with series condensers, in both aerial and earth. The plate juice is dragged from a 600-volt generator (home made), which, by the way, was swiped off 2AD, who is living in hopes of getting it back some day. The radiating system includes a 75 feet mast, holding up a three-wire, flat-top spread of 15 feet. The lead-in end is supported 40 feet in the air by a long guy from the house, overall length of aerial being 120 feet. The earth screen is 100 feet long, 30 feet wide and 8 feet high, and consists of nine wires in parallel. Radiation at 2AE is very low, being generally about .4 on 140 metres with 40 mils. input. The receiver is a low-loss hay-wire outfit, using 201 A's as detector and one audio to zones.

Through the kindness of our chief radio man of New Zealand, Mr. A. E. Shrimpton (of widely-known 2XA), and the chief manager of Telegraphs and Wireless in Melbourne, Mr. Malone, I have been granted permission to operate 2AE on the way home to New Zealand, via Newcastle, leaving here about the end of October. I shall be very pleased to chat with any Aussies who pick up my squeak on about 120 metres, and give them reports on their sigs. at varied distances. Operat-

ing hours will be after 10 p.m. (Melbourne time), and power used will be 50 watts, straight C.W.

A word about Australian Broadcast in passing. 2BL and 2FG, of Sydney, are QSA in New Zealand at most times, and will give good loud speaker volume on detector and two audio any time after 10 p.m. (New Zealand time). The wave of 2FG, we think, is ideal for Broadcast, principally because of the difficulty of "joeys"—hi hi (Aussie term)—have of making any big noise on that high wave. What with Braybrook (3LO), I think B.C.L. chaps are well catered for as regards Broadcast now in Australia. Broadcasting in New Zealand, to date, has been left mostly to private enthusiasts on limited power, with no cost to listeners, but a scheme similar to Australia is now receiving serious consideration. Have had a good eyefull of Braybrook and its pick-up central, through the courtesy of those in charge, and must say that Victorians have something to be proud of in that little old ether buster, 3LO.

Closing down, I wish to tender my sincere thanks to those Melbourne hams I have visited, and would wish all Aussies best 73's from the New Zealand gang. To "Experimental Radio and Broadcast News," I say good luck and every success to your splendid efforts in the furtherance of Radio.



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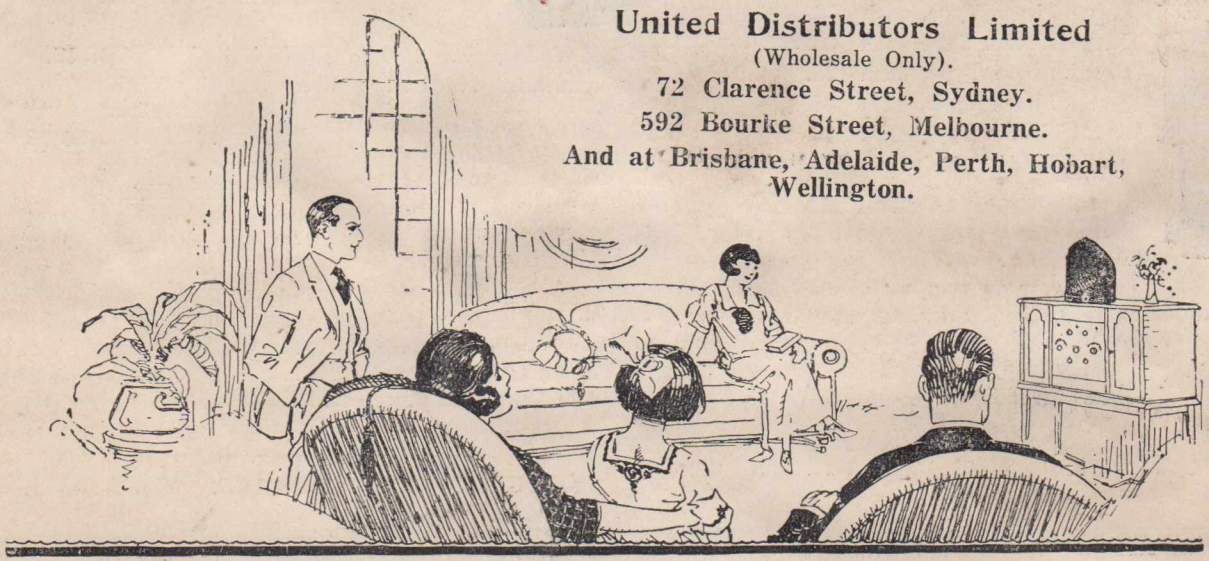


South Australian Notes

(From Our Special Correspondent.)

With the advent of summer, hams here have been hard put to it to keep in communication with America, but from many quarters reports are still coming to hand indicating clear reception of K.GO. Los Angeles has also been heard, and an enthusiastic listener at Nairne, up in the hills, has been busy trying to identify sigs. and music which he believes to emanate from New York. So far, it does not appear certain that the sounds come from the Atlantic seaboard, but sooner or later it is expected a voice from the Broadway will float in.

Meanwhile, amateurs have plenty to interest them in picking up the Australian Class A stations. There has been a noticeable increase in the power of 2FC, daytime reception of which is now fairly general. On Thursday night, October 14, Farmer's broadcasted concert items from Sydney Town Hall by Toti Dal Monte and Dino Borgioli, of the Melba Opera Company, and there was quite a rush to hear them. Unfortunately, static was fierce in some districts, but in other parts the reception was excellent. The enterprise of Farmer's is greatly appreciated in this State. There is no doubt that good quality stuff sent out by the broadcasters will go a long way towards popularising radio, which, in South Australia, at any rate, has suffered severely owing to the great volume of canned music that is put on the air. Even the local Class A broadcaster is guilty of circulating talking-machine music, but it must be remembered that we are not very strong on artists over here, and it is not easy to maintain an entirely original programme.

5AB (the South Australian Broadcasting Company), which holds the "A" licence, has been handicapped by non-arrival of machinery, but, in spite of this, it is now sending out on good strength. Things have been speeded up since the company went to registration. It has a strong business directorate, and plans for increasing the installation are now engaging attention. Mr. Gooding, who, I understand, comes from Melbourne, is a live wire with this company, and transmission has improved wonderfully since he took the operating in hand.

5DN (E. J. Hume, Parkside), has erected a magnificent station a few miles from the city. He has been heard all over Australia, and reports concerning volume and modulation are very flattering indeed. They ought to be good, for Mr. Hume has spared no expense, and he has as his advisers and operators three of our best amateurs (Messrs. L. C. Jones, Harry Kauper and Fred L. Williamson). These three take it in turn to send out the programmes, which cover a very wide range for a private show. The station is more than a hobby to Mr. Hume. He sees an immense future before wireless as an educator, and is making arrangements to force the pace. Large additions to his plant are proposed, and the transmission of lectures by University professors is a big feature of the scheme. On the face of it, these might be regarded as dry and uninteresting, but, despite their learning, the teaching staff at the University have red blood in their veins, and the first of the series proved one of the best entertainments heard in South Australia. Every word came through as clear as a bell at full loudspeaker strength, and the information was so racily imparted that there was an immediate clamour for more. Mr. Hume cannot go wrong if he works on such lines.

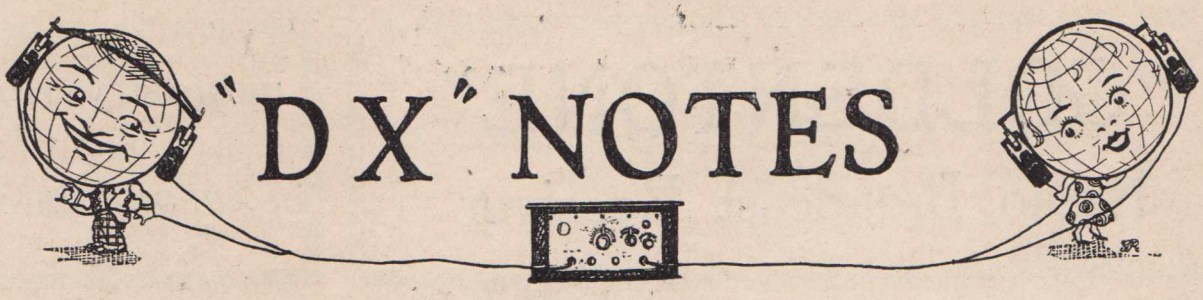
His aerial is the sort that amateurs dream about. The masts are 65 feet high and 100 feet apart, full ship rigged, and guyed with enormous steel cables. Mr. Hume superintended this himself, and the result is a tribute to his mechanical skill.

On Thursday, October 16, the local branch of the Wireless Institute chartered a special train for an evening run to Hallett's Cove, about 15 miles from the city, for the purpose of conducting experiments. Reception from moving trains is common enough. We understand they have been quite successful in your own State, but to us it is quite new. At the time of writing, the results were not to hand, but with Mr. R. B. Caldwell (President of the Institute), Tom A. Bagshaw, Professor Kerr Grant and others in control, the success of the undertaking was assured. No attempt was to be made to pick up Interstaters, the programmes being provided by top-notch local amateurs. Provision was made to entertain 300 visitors, which shows that the Institute here is doing something to push radio along. President Caldwell, at the annual meeting a few weeks back, pointed out that, with wireless clubs springing up everywhere, it might prove difficult to keep the Institute together, and he appealed for greater support, especially as the Institute might

prove a sheet anchor in the near future, when the full application of the regulations may adversely affect amateurs. In a joking way—but, nevertheless, with a strain of warning in it—he remarked that he foresaw the time when amateurs would be restricted to five watts between 2 a.m. and 4 a.m. by special permission of a J.P.

3LO has been heard all over the State when testing, and the general impression is that the big Melbourne station is going to be good. It is likely to be very popular in our south-eastern districts, which look upon Melbourne as their capital rather than Adelaide. October 13 was said to be the official opening of the company, but it was a bad night for radio in South Australia, and reports of reception are few and far between. There is no reason to fear, however, that 3LO is going to be difficult to pick up. Its preliminary spins suggest that there is something good coming to them from Melbourne, and there is all-round satisfaction at the knowledge that the new station is, at last, on the air.

If a local station is too loud on two steps and not loud enough on one step, leave the jack in the second step and control the volume by slightly tuning out the signal. This gives better reproduction than turning down the rheostats.



"DX" NOTES

The Observations of "The Owl."

Last month I chronicled in no small spirit of amazement the fact that Z4AA had been successful in working U6CGW and a number of other Yanks in circumstances which appeared almost impossible, and had we not been in a sense prepared for it by the remarkable results achieved by the Bell-O'Meara-Orbell combination during the first part of the outward voyage of the "Port Curtis," on which it will be remembered Jack Orbell, of Z1AX-3AA, had installed a 50-watt set operated under the call X3AA, we would scarcely have been inclined to credit it. I remember once having seen a very good likeness of Z4AA in QST in a sketch, incidental to a paragraph chronicling the unheard-of fact that he had refused to accept the authenticity of cards which did not check with his transmitting log, and the Yanks promptly gave him a pedestal beside the celebrated Washington, so anything we get from 4AA can be regarded as accurate to the last degree. Wonderful as these results were, they have been entirely overshadowed by a feat which I venture to say just one month ago would have been thought impossible, and which I believe is the greatest achievement in wireless practice yet accomplished. Using a power of only 150 watts, Bell has been able to exchange messages with several amateur stations in England at a time when one would least expect the attempt to be successful, namely, at about five o'clock in the evening, New Zealand time.

The full story is this: On October 16 one of the English gang—I understand he was a second district station, though I have no very definite information—hear Z4AG, and cabled a report which so surprised Slade that I understand he required medical treatment when he had finished reading it. Slade found that the information in the cable agreed in detail with his log, and told the gang. The next night, Friday, the 17th, Frank Bell stood by with his receiver on about 100 metres, and received G2OD quite well, and, he says, strongly. Apparently the English stations, which would be working just about dawn over there, were engaged in working the east coast Yanks and a number of eastern district Yanks were also heard by a number of N.Z. hams. Next night, October 18th, Z4AA commenced to listen-in about 5 p.m., N.Z. time, corresponding to about 3.30 p.m. Melbourne time, and called GCQ on about 98 metres. He also called G2OD, and on changing over, heard G2SZ coming back to him. Replying, he promptly connected, and each station sent two complete messages, the messages from 4AA being one for the Prime Minister of New Zealand (Mr. Massey) to the Agent-General in London (Sir James Allen), and one sent to the Radio Society of Great Britain. He held 2OD for about an hour, and the reception both ways was entirely satisfactory during the whole of that time. Next night, that is October 19th, he called G2SZ again at the same time, and heard G2OD, G2NM and G5LF come back to him. He connected with G2SZ, who also came in and worked several messages, receiving a reply to his message to the Radio Society of Great Britain. Communication was maintained for a considerable time.

The same evening Z4AG got on the job, and worked G5LF and G2NM, and later U6CTO. Z4AK tried hard to connect with G5LF, but just failed. He succeeded in hearing F8AB working on short wave-lengths during the evening.

The wave-lengths used by the English stations were all less than 100 metres, and appear to be all greater than 90 metres. The same band is being used by the New Zealand stations. Z4AA uses a Yankee tube, driven by his 1000-volt generator from the farm lighting plant, his input being about 150 watts. On 98 metres his radiation is just 1.1 amps., the same radiation as he used on the first occasion he clicked with the States, though in that case the wave was 125 metres, and the power only about 100 watts. Substantially the same waves were used by the other New Zealand station. So far as is known, the power of the English stations is in the neighbourhood of 200 watts, and that of Z4AG and Z4AK rather higher. A 250-watt Philips tube is used in the transmitter at each of these stations.

A survey of the receivers used is interesting. Bell used a low loss tuner of the conventional 3-coil type without radio frequency amplification,

and similar receivers were used by 4AG and 4AK. No particulars are so far available regarding the type of receivers used by the Englishmen. Strangely enough, a hard detector tube, a UV-201A was used at 4AA, and I believe that both the others used Philips valves. Measured across the Pacific and Atlantic, the time difference between England and New Zealand is about 12½ hours, and the space distance is in the neighbourhood of 13,000 miles, as 3BQ says, "further than it is possible to send a message." The distance round the other way, that is, across the Indian Ocean and Europe, would have been less than 1,200 miles. So that if we want to beat Bell's record we must get on the job about five o'clock in the afternoon here. Get to it, gang! A peculiarity of the path of the waves from Bell's and the other stations is the fact that it is almost entirely over water, and the total overland distance is certainly less than 500 miles. An examination of the map shows that the path of the waves will cross America at the Panama Isthmus, very close to the narrowest part. This, in part, may explain the results obtained.

The work done with Orbell on the "Port Curtis" is no less interesting or creditable. 4AA maintained constant communication with X3AA right to the Cape, lost him for several days, and then picked him up again in Monte Video Harbour. 2AC also found X3AA at Monte Video, and worked him and the Argentine stations. CB8 and BV2 were also worked by 2AC and 4AG. In working with the Yanks, 2AC has been doing some excellent work, and has been in communication with several stations on the east coast of the Continent. 4AA has kept consistently at the Yanks, and in addition to several stations on the mainland, has got in communication with one station in Honolulu.

It is rather strange that none of the Australians have clicked with the States yet, and it certainly is not for want of trying. Cabled schedules have been fixed, but weather conditions have been adverse, and whenever we do get a good night, the valves are so bad that little can be done. It is quite obvious that little or nothing can be done on any wave of more than 120 metres here, and best reception of the Yanks seems to be in the region of 140 to 160 metres. That is if 3XF is not engaged in one of his many excursions up and down that wave band. His strength is very good, and his note is also clear, and if he would only reduce his wave he would undoubtedly have an excellent chance of getting across. It is, however, only necessary to listen to the rattly Yank notes on the wave on which he is now working to realise that his hopes are nil where he now is. 2CM, 2DS, 3BD and 3BC have been working consistently to the Yanks in the early evenings, but so far nothing in the way of two-way communication has been accomplished, though most of these stations can radiate nearly 2 amps. on 120 metres. 3BQ has lately increased his plate tension to 1,800 volts, and puts up to 2½ amps. on the short waves. His input at times approaches ½ k.w. 3BD has replaced his series feed circuit with a shunt feed system, and effected waves. He has done some tentative experiments an improvement in signal strength, and 2DS is going to greatly increase his power on short in work on 80 metres. Arrangements are proceeding for a test to England, 4AA having undertaken to make the necessary schedule for the Australian stations.

In the way of local DX, things are rather slackening off. Two principal factors appear to have contributed to this distressing state of affairs, the increase in the strength of static (and this has been very bad lately) and the advent of broadcasting. As was generally expected, the effect of broadcasting on the ham gang has not been encouraging. No doubt many of them like to stand by when their favourite bishop is giving a radio sermon. I don't know whether this is because they are such religious and moral youths or whether it is because the feeling that you can't be stung when the plate goes round, is a very pleasant one, but from a searching examination of my own conscience, I am rather inclined to favour the latter theory. But the real trouble about broadcasting is that those to whom listening-in becomes a frenzy, are no less selfish than they are incompetent to operate receivers without experiencing interference, and on all wave-lengths they experience the fiercest QRM from experimental stations, which have been pronounced by experts to be perfectly tuned. The result is that many of the gang have shut up during BC hours, and this has undoubtedly contributed largely to the failure of the Australians to click with the Yanks. At present there is a conspiracy on in Melbourne to invent a "radio anæsthetic" which will entirely absorb everything in the way of the questionable music which is the salt of life of an ever-growing section of the community. Then the dyed-in-the-wool ham will be able to pound his key undisturbed by imperious rings on the telephone, from deeply-grieved "experts," still struggling with the dials of their first single valves, will doubtless be a much more companionable person to his family.

The desire to maintain 24-hour communication with other States is growing, and the time seems ripe to make the attempt. A few days ago 2CM and 3BD had a daylight test, and 2CM's sigs. were received extremely well in Melbourne, though 2CM failed to get 3BD in Sydney. Apparently the afternoon will be better for this work than the morning, as interstate signals begin to appear quite loudly early in the afternoon, though fading takes place quite rapidly with sunrise.

One of the latest stations on the air locally is 3EN, at Drouin, and he comes in in Melbourne very well. He is using a B battery for transmission, and therefore has a good note. There is a slight inclination to swing, however. The interference from VIM has been greatly reduced lately, though his many harmonics are as strong or stronger than before. 3AP has reduced his wave to about 115 metres, and seems to have plenty of punch. On the short waves 3BQ has been doing a good deal of trans-Tasman work, but comparatively little interstate tests. 3BM is still on about 200 metres, but proposes to come down shortly. As he was adjusting the aerial on his 100-footer the other day, he let the halyard go, and the result was that the mast had to come down. 3LM has been getting some exceptionally good reports, and is now working most of the States. He is still using the lone 5-watter and radiating up to 1.5 amps. with it. 3JU has not yet had the new set on the air, but has been inquiring darkly for transformer data and similar particulars. On 200 metres, 3EF is using S tubes for rectification, and finds them satisfactory. He has been engaged in a good deal of fone work lately, and 3XO has also been on the fone a lot. 3BC is working intermittently, and at times comes in well. He proposes to erect a 150-foot mast, so look out for some DX.

In New South Wales, 2ZN has come back on to the air with a new set, and a new and elaborate card. His strength is not up to the majority of the Sydney stations, but his note is very clear, and his fone comes through at good loud-speaker strength. 2YT continues to be the loudest of the 200-metre stations, but I heard him a few nights ago on about 135 metres, disappointingly weak. Probably he was working on a junk set or something. I believe 2BK has been making occasional excursions to about 130 with much more success, but he is still at his best on about 203 metres. 2RJ, who indignantly denies that his output is more than 50 watts, continues to broadcast copious gramophone records, and is always very loud here. Unfortunately the single-valvers generally drown him completely. 5BG, who has recently started up again, is louder than ever, and in Melbourne is undoubtedly both louder and clearer than 2FC. 5AI, a South Australian, new to DX, was heard a few nights ago very well on fone and with a smooth CW note. 5DA has been working at intervals, and some of the others have been coming in at intervals. 5BQ will shortly open with 300 watts on fone under the call 5DN, and would like reports. The only Tasmanian stations which have been working very much are 7BK and 7AB, the latter station on about 165 metres. Nothing more has been heard from the West, but 6AM is on 200 metres, and would like to work some of the eastern gang.

Things have not changed greatly in New Zealand lately, except in so far as the strength of the principal stations is concerned. At present there are only two stations outside Melbourne who are heard louder than 4AA, and they are A2CM and A2LO. When on 120 metres, it was a simple matter to read 4AA up to 150 feet from a loud speaker in the open air on three tubes, a radio frequency amplifier, a detector, and an audio amplifier, and his strength on his new wave below 100 metres is at least as great. 3AP is frequently also very loud, and 4AG simply rocks in. Strangely enough 2AC is never very loud in Melbourne, and cannot be compared in strength to such stations as 4AD and 3AF, though 2CM told me he is much stronger than 4AA in Sydney, and 4AK and one or two others are also stronger than Bell over there. So far nothing has been heard of 2XA on the new set which he is building, but when he does get going he should not be easily missed.

Some Points for Purchasers

We have noticed that Messrs. O. H. O'Brien are holding some very good agencies for wireless apparatus. Among the main lines we noticed the Trimm Dependable Head Set. This firm claims to have sold 24,000 during the last four months. The Trimm Professional Head Set has a very nice appearance, and is quite justified in being 10/- dearer than the Dependable. We also noticed the Trimm Grand and Standard Loud Speakers and the Giant Phonograph attachment. All Trimm products have a life time guarantee.

On going further through this firm's store, we noticed that they had a good stock of Bakelite Dilecto. Bakelite Dilecto is known throughout the world, and is recognised as the best insulation for wireless panels. It is a higher insulator than Ebonite and is mechanically stronger. It can be cut, turned or milled, and will take a high polish. It does not crack, warp nor discolour with age, and it is used by the leading manufacturers in Sydney and Melbourne.

At last we come to the All American Transformers, which are made in ratios of 3 to 1, 5 to 1 and 10 to 1, and the famous push-pull circuit. The maker of these transformers claims to have the largest sale in the world, and at the present time, the agent in Australia is months behind in his deliveries, as there has been a terrific demand here during this last twelve months. This transformer has a one year guarantee.

One thing that has struck us, is the popularity of this firm's products, which are known right throughout Australia.

* * *

STERLING RADIO GOODS AND PHILIP'S VALVES.

A most pleasing task is the inspection of radio goods handled by The Lawrence and Hanson Electrical Co. Ltd., 398 Post Office Place, Melbourne. They are specialising in Sterling products and Philip's Radio Valves.

Philip's Valves are so well known in connection with radio that we feel it is hardly necessary to mention them, but we must not pass without commenting on the high grade standard which is maintained in all types of their manufacture, and the marked uniformity of the valves in their particular classes.

Sterling Radio Products, two months ago, were unknown on this market; to-day they are recognised by all radio dealers as standards for comparison. Their high grade appearance truly represents the care, skill, knowledge and engineering ability expended in conceiving, designing and manufacturing Sterling products. We are informed that sales have been phenomenal, and we advise all radio dealers to place their orders well ahead, to ensure having at least some Sterling products to meet the Christmas rush which must follow the boom that has already set in.

* * * * *

Gresham Street,
E. Brisbane, Queensland.
18th September, 1924.

To the Western Electric Co. (Aust.) Ltd., Sydney.

Dear Sirs,—I am only an ordinary experimenter, as the usual run of amateurs go, but being in possession of one of your Wecovalves which I purchased here at Tonks Ltd. for 37/6, I feel it up to me to let you know what wonderful results I have had with this little marvel. I have a roughly constructed (very rough) vario coupler wound with 2 enamel on the primary former, and ten taps of ten unsweated, the motor being wound with the gauge.

I have experimented with even the bedstead for an aerial, and alternatively used the bed for an earth, and the ordinary 75 ft. 3.20 twin. I am situated in a hollow and good and properly screened, still the little tube stands on her dignity and I receive 2BL, 2GE, 2FC and a host of other N.S.W. and Queensland stations with good volume.

But here is where the miracle occurs—perhaps you can help me. I am using only one Ever Ready pocket torch battery for the plate circuit, and a disused one volt Columbia dry cell for the filament. I really cannot boost up this tube too much. Many have seen, heard, and marvelling, went and got one, and they also swear by Wecovalves. I can, without fear or favor, say the valve is not yet made to give results half the equal (I know).

I am only a working man, and £1/17/6 is a big nip for me to spare. I honestly say it's worth its weight ten times over in purest platinum.

You may use this letter in any way you see fit, as merit will always overcome obstacles.

Yours faithfully,
(Signed) M. J. KENNEDY,

P.S.—I have on one occasion bought out all available Wecovalves at Tonks through my demonstrations, proving to numerous inquisitive scoffers the value of Wecovalves.

TO THE EDITOR

"Kama,"
Chilcote Avenue,
Malvern.

The Editor of "Experimental Radio and Broadcast News,

Dear Sir,—It may interest your readers to know that on the last two Sundays, I have heard KGO Oaklands, California, on two valves detector and audio. The circuit used was a simple reaction circuit, with the plate coil coupled directly to the aerial coil. The tuning was fairly fine, but I was able to receive KGO over a range of five degrees of a vernier condenser. A 50-turn spider coil was used as A.T.I. and a 75-turn coil as tickler. The valves used were, Philip's D detector and a Marconi R as amplifier. I used 20 volts on the detector and 60 on the amplifier. Brunet phones and audio transformer were used. When tuning it was easy to tell if one were on 312 metres, by the host of Joeys thriving thereabouts. Really, the tuning was simple compared with the trouble in straining him through the Joeys. The speech was quite readable and all announcements were heard. My aerial is not anything special, just 100 feet single wire, 35 feet high. I think this reception is something of a record.

I am,
Yours, etc.,
GEORGE D. MARKS.

(Very good reception O.M., but not a record.—Ed.)

CORRECTION.

In the article, "Coils and Radiation," in last month's issue, the condensers for plate and grid circuits should have read: .0005 mf and not .005 as printed. The radiation on 25 watts input was 1.45 amps, while 65 watts input gave 2 amps.

CALLS HEARD

Lists for inclusion in this column should reach our office not later than the 15th of the month, and should include only the calls heard during the previous month.

Calls should be grouped in their respective districts, should be arranged in alphabetical order, and must on no account be included in the text of any letter.

Stations worked should be bracketted.

The following calls have been logged at 2CM during the last fortnight:—

H. W. B. Bowers, 153 Derby-street, Kew, Victoria.

'Phone stations heard on two valves. Stations in heavy print heard in daylight:—

2HM, 2ED, 2RA, 2RJ, 2YI, 2ED, 2JM.
2ZN.
5DN, 5BD, 5AB, 5BQ, 5AI.
KGO.

Calls heard at A3XW (C. A. Cullinan, Junr.), September 8-October 14, 1924 (single valve):—

A—2BK, 2CL, 2CM, 2CX, 2DN, 2DS, 2GQ.
2IJ, 2OI, 2VM, 2YI.
5BG, 5BM.
Z—2AC, 2AP.
3AL.
4AA, 4AD, 4AG.
U—6CGU.
Also DB2.

S. Baker, 234 Clarendon-street, South Melbourne.

Received on two-valve "Reflex" receiver:—
2AY, 2BB, 2BK, 2CL, 2CM, 2CR, 2CX, 2DS, 2ED, 2GR, 2GQ, 2IJ, 2HM, 2HT, 2JM, 2JS, 2KC, 2LO, 2RA, 2RJ, 2YI, 2ZN, 2ZZ.
5AC, 5AD, 5BG, 5BN, 5DN, 5DO, 5DA, 4AN.

New Zealand:—1AA, 1AO, 1AC, 2AC, 2AM, 2AW, 2AQ, 2AP, 3AL, 3AD, X3AA, 4AA, 4AD, 4AP, 4AG.

U.S.A.—6CGW, 6CTO, 6KD, 7UN, 5AC, KGO.

Without Aerial.—2DS, 2CM, 2LO, 2AY, 2YI, 2BK, Z4AA, Z2AC, Z4AG.

3EM—C. Doudney, Dickens-street, St. Kilda.

2BA, 2AC, 2BG, 2HM, 2BU, 2LJ, 2JM, (2YI), 2CI, 2XA, (2RJ), 2RK, 2GG, 2CG, 2GO, 2LY, 2OS, 2BK, 2CS, (5AI), 3BB, (5BO), 5BG, 5BM, 5EF, 4DO.

MANIPULATING SMALL NUTS.

Flatten the end of a pen-holder or similar piece of wood or metal, and melt on the end of a drop of the compound used by dentists for repairing plaster models, and called "sticky wax." If the warmed nut is gently pressed into this and allowed a moment to cool, it can be carried to any required position and held there while the screw is entered and started. Resin, or even chewing gum, might be used in an emergency. E.F.G.

A C.W. Transmitter

I.

LAYOUT AND CONSTRUCTION.

(By H. K. Love).

By the time an experimenter has got over most of his receiving worries and turned his attention to transmitters, he has advanced far enough not to require constructional details which will show him where to place every screw and wire.

In this article an endeavor is being made to describe a simple and efficient C.W. transmitter which has been tested, and **works.**

The first unit of the transmitter to construct is the inductance, as shown in the photographs Figs. 2 and 3. These are made in the form of a 3-coil tuner. L1, the aerial inductance, consists of 16 turns of No. 4 gauge copper wire, wound on and fixed with brass bolts and small ebonite strips. At one end, on a wooden or ebonite ball, is wound the plate coil, L2, consisting of ten turns of No. 14 gauge wire, D.C.C.

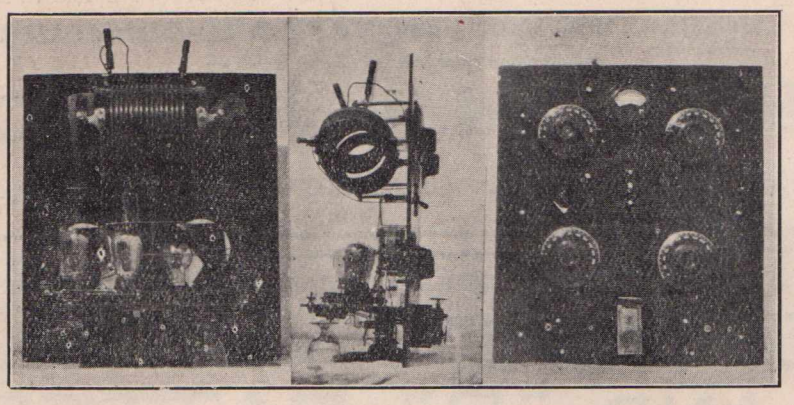


Fig. 2. Fig. 3. Fig. 1.

The size of the panel and placing of the parts are not factors which are vital, and are therefore left largely to the discretion of the builder. The photographs give a good idea of the layout, and the sketch in Fig. 4 shows the wiring and values.

The idea behind the writer's mind when designing the transmitter was to keep the whole oscillating panel as compact and portable as possible. All the high-tension gear and smoothers are in a separate box. The transmitter is fitted with 6 terminals only—1, aerial; 2, counterpoise, or earth; 3 and 4, L.T. supply; 5 and 6, H.T.

Should the unit be moved to any station, it is quite complete, except that the abovementioned terminals need connecting, and away she should go.

If the reader will turn his attention to Fig. 1, we will proceed to build the unit.

First secure a piece of ebonite or something better if available, such as Bakelite and other compositions. This will form the panel as shown in photographs.

At the other end, on a wooden ball, are wound 12 turns of No. 16 D.C.C. for L3, the grid coil.

The former, to hold the aerial coil, may be of cardboard, suitably treated, or of ebonite. These three coils are mounted as shown in the photograph, the balls at each end, being fixed by a spindle, car thus be rotated from the front of the panel, and in this manner the coupling between the aerial and the grid coil or aerial and plate coil can be varied at will.

It will be noted from the wiring sketch that each moving coil (grid and plate) is shunted by a variable condenser.

In the transmitter shown in the photographs two 5-watt tubes are used as oscillators and a 5-watt Phillips as modulator. The modulator valve is wired into the circuit, as shown in Figure Four The system of modulation is not recommended, except as an experiment, as no extended work has

been carried out with it. It is considered, however, that it is capable of a good deal of development by the addition of grid bias and other refinements.

The foregoing brief outline will serve the intending transmitting experimenter towards the initial stages of this branch of experimental work. In a further article I will deal with the actual operation of a transmitter, the type of aerial, and high-tension supply to be used.

(To be continued).

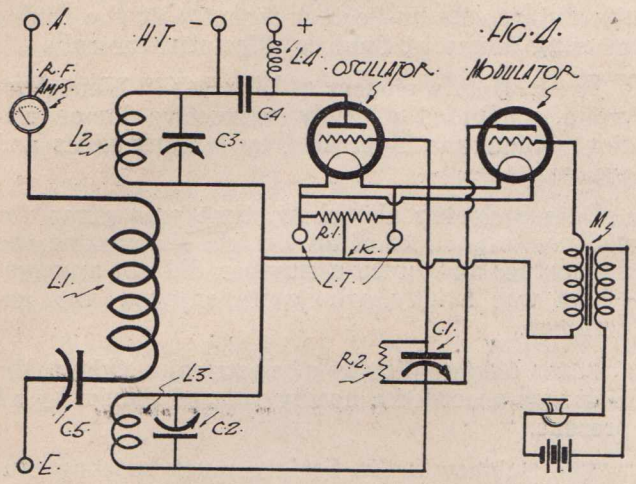


FIG. 4.

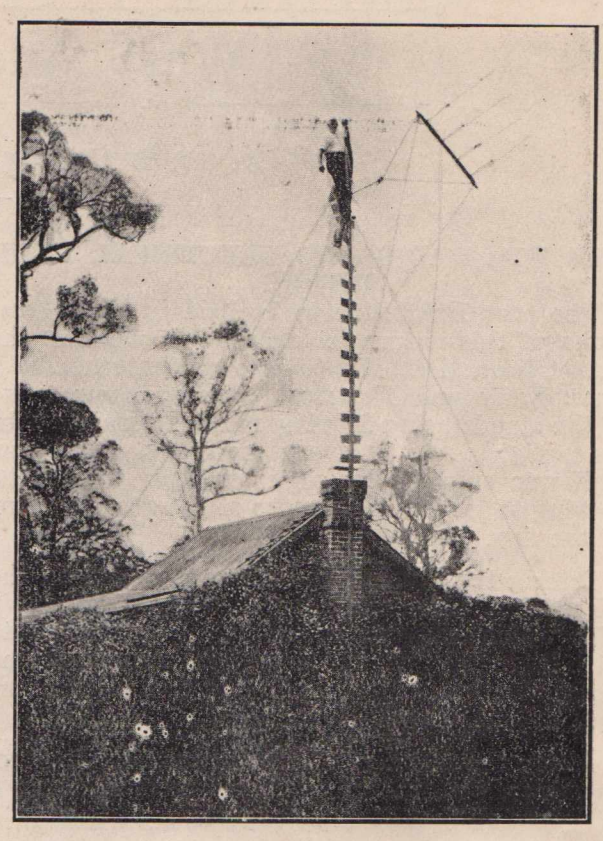
Values in Fig. 4.

M.A.—Milliamp. Meter, 0-2.
L1.—Aerial Ind., 16 turns.
C5.—Aerial Cond., .001 MF.
L2.—Plate Coil, 12 turns.
L3.—Grid Coil.
C2 and 3.—Plate and Grid Tuning Condensers, .0005.
C4.—Bipass Cond. Mica Dialect, about ½ M.F.
L4.—H.F. Choke, 200 turns on 3in. form.
C1.—Grid Cond., .0005 M.F.
R1.—Centre Tap Resistance.
R.C.—Grid Leak, 5000 to 12,000 ohms.
K.—Key to C.W.
M.—Modulation Transformer.
A. and E.—Aerial and Lambipoise Terminus.

Generally speaking, a selective receiver (one that tunes sharply) is a good one, because this is evidence that there are few losses in the set itself.

* * *

Don't be discouraged if the primary circuit does not tune sharply. It is due to the high resistance of the antenna circuit, and beyond making sure that you have a good ground connection, there is little that can be done about it.



Scores of aerials will be seen at week end cottages this Summer now that Broadcasting is at last in full swing.

This excellent example is the work of J. E. Dane Esq. who can be seen admiring the surrounding country from it's dizzy heights.

If you cannot make the tickler work, it may be due to a partially exhausted "B" battery. One bad cell in the whole block will sometimes cause a loud squeal that is hard to find.

* * *

Broad tuning and weak signals are often the result of moisture collecting in the insulation of the tuning coils. They may not feel moist to the hands, but the dampness is there just the same. You will be surprised at the improvement that follows a good drying out in the sunlight or by placing the apparatus near the stove.

* * *

For summer work, a short antenna cuts down the static. The signal may also be somewhat weaker, but it does not fall off as much as the static, and the result over-all will be more pleasing reception.

West Australian Notes

By Our Special Correspondent.

THE W.A. RADIO AND ELECTRICAL EXHIBITION.

The first Exhibition to be held in West Australia of this nature took place last week in the Perth Town Hall. Up-to-date apparatus in both lines, Radio and Electrical, were on show, some of the stands being fitted up most elaborately with fancy lights, etc. Every night the Exhibition Hall was crowded by eager citizens who were seeking to know a little more of the great wonder of the day.

During the evening music was provided by the Westralian Farmers' Broadcasting Station, 6 WF, which had one of its "Mulgaphone" sets with large "Magnavox" Loud Speaker, and frame aerial attachment installed. This was in constant use.

Above the whirr of the numerous electric fans, machines, etc., the programmes received from 6 WF were all that could be expected.

Expert cooks were manipulating the Electric Cookers and turning out excellent cakes, scones, etc.—"while you wait kind of style."

Wireless Sections were very popular and very fine ranges of all wireless merchandise were on show.

On the whole, the Exhibition proved very successful in every detail; the nett proceeds were in aid of the Perth Public Hospital.

WIRELESS PRACTICABLE EVERYWHERE.

The practicability of Wireless for entertainment was demonstrated the other day in rather a novel manner. On looking over the camp of the 44th Battalion, which was held recently at Karrakatta, in Western Australia, the writer noticed a Wireless aerial strung from one of the tents of the Signalling Platoon to a large tree on the camp grounds. On making further enquiries it was found that the tent dweller had installed a crystal set in his tent, with which he could listen to 6 WF's programme. On the first night when commencing to operate his set, the operator was practically crowded out of his tent by enthusiastic campers, who seemed very anxious to know what was doing. When this hobby is added to the daily routine of camp life, it makes quite a difference.

DEMONSTRATION OF HIGH FREQUENCY APPARATUS.

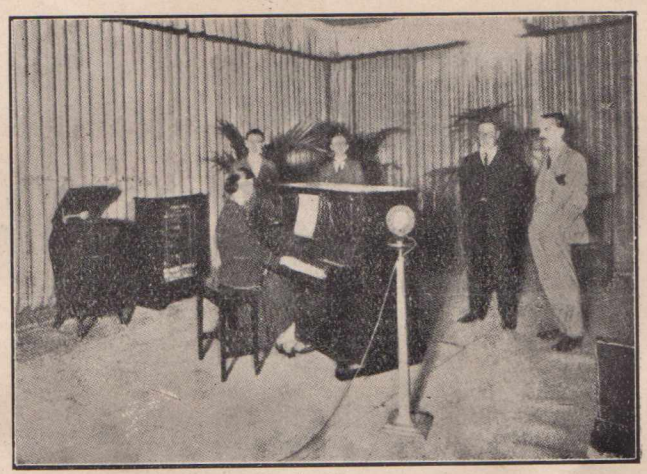
A most interesting demonstration was given by the Subiaco Radio Society recently at the Club's meeting rooms, at Subiaco, Western Australia.

Mr. B. Holt, a pioneer of Wireless in West Australia, conducted a highly instructive demonstration, which was illustrated by lantern slides and apparatus.

Before closing the show, time was given for visitors to partake of an electric shock from the apparatus, and quite a number did so, amongst whom was a lady, who quite enjoyed the experience.

After his fine display of electrical wonders, Mr. Holt was accorded a hearty vote of thanks by all present.

The Subiaco Radio Society must be congratulated on still another successful venture.



The Studio at 6WF the station of Westralian Farmers.

BROADCASTING.

Excitement has been keen here. The Westralian Farmers' Broadcasting Station has just recently increased its power. This increase in power should enable the listeners in the Eastern States to pick up 6WF more easily.

Western Australian listeners are getting excellent results as far as 2FC is concerned, being

able to hear the Sydney station transmitting on two valves, and sometimes even on one, mostly depending on atmospheric conditions with regard to the latter.

Western Australian amateurs state that they have heard Victorian experimenters very successfully, their transmissions on C.W. coming in very well here.

SUBIACO RADIO SOCIETY.

The Subiaco Radio Society is the largest Society in W.A. Its membership number is over the 100 mark. As a result of this the Club has very fine meetings, and is doing good work for the welfare of the experimenters.

This society has two sets, in all seven valves. The sets were constructed on the Unit principle, and are used for the edification of the junior members. Buzzer practice is another valuable feature of the Club meetings.

The society has a fine library, in which are an elaborate selection of Wireless Books and Journals. This proves very useful to the members.

6WF PROGRAMMES.

The following will serve to give a rough idea of the class of concerts given by the W.A. Farmers' Broadcasting Station.

SUNDAY NIGHT.—Sacred concert by Mr. H. C. Goff's Choir.

MONDAY TO FRIDAY.—Daily programmes are somewhat similar, being: 12.30, tune in to Gramaphone, then Market Reports, Weather Reports, News Service and Time Signal. 3.5 to 4.0: Talks, Gramaphone and Pianola Recital. 7 to 7.45: Bedtime Tales. 7.45 to 8.0: Market Reports and Weather Reports. 8.0: Time Signal. 8.2 to 8.10: News Cables. 8.10 to 10 o'clock: Usually Professional Concerts, Lectures, etc.

SATURDAY NIGHT.—To 8.10 as usual. From then on, Special Dance Programme given by the Wesfarmers' Studio Jazz Orchestra, under the direction of Mr. Lawrence. This evening's programme continues until 10.30.

Experimental Radio 2BK

By Frank N. Leverrier.

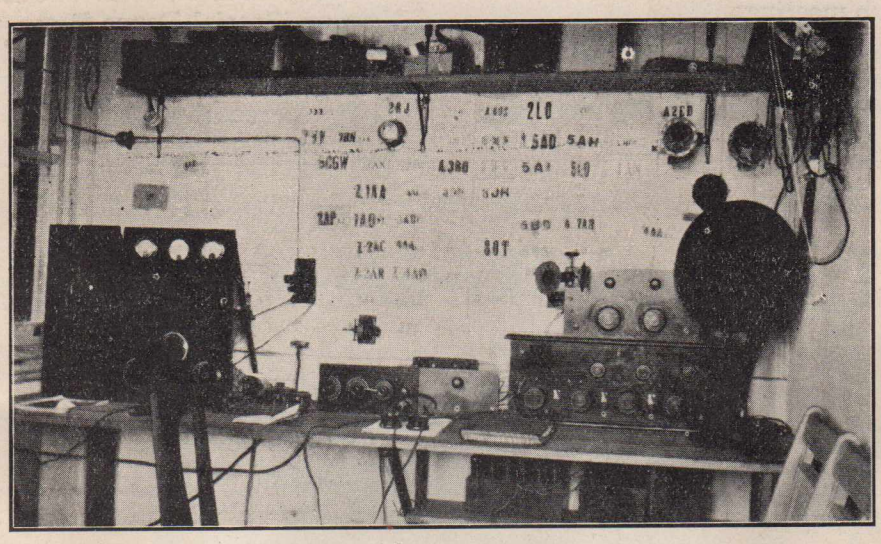
This station is located at "Lorette," Wentworth-road, Vaucluse, Sydney, N.S.W., and consists mainly of an aerial system, transmitter, three receivers and a wavemeter.

The aerial is supported by two masts of 110 and 70ft. high respectively, and consists of a 4-wire cage on 21-inch hoops "T" type, 60ft. long. The higher end is 107ft. high, the lead in being 95ft. long.

Directly underneath this aerial and extending 12ft. at each end is the counterpoise, which consists of 7 wires 10ft. above the ground.

by coils of pancake type. The transmitting keys for CW and ICW can be seen below the D.P.D.T. switch for changing from "transmit" to "receive."

The receiver next to the transmitter is a "low loss" tuner with detector and two stage low frequency amplifier. This set tunes from, roughly, 40 to 270 metres and is always used for DX work. It is very effective for logging "Yanks," of whom a considerable number have been heard, especially 6VGW, who has been heard at about 50ft. from the loud speaker.



Showing 2BK

The whole system is now insulated with 12-inch porcelain insulators. The transmitter, which can be seen on the left hand side of the photo, consists of two panels; the one on the extreme left contains the H.T. and L.T. transformers, Kenotron rectifiers, and filter chokes and condensers. The next panel contains the transmitter itself, which is used for CW, ICW and fone. The Meissner 3-coil circuit is used with three Radiotron UV202 tubes as oscillators.

On the front of the panel can be seen the three meters for reading; plate milliamps, plate volts and radiation. The filament rheostats and tuning controls can be seen below the meters. At the present time the inductances are wound on ebonite tubes, but these will be very soon replaced

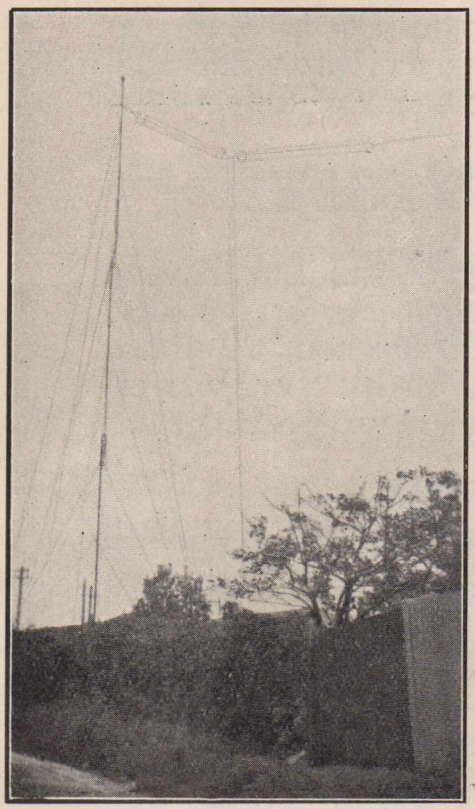
The next receiver is a five-tube neutrodyne, which is seldom used now, except for very loud fone signals and for bringing in KGO, who has been heard on the loud speaker.

The receiver on top of the neutrodyne is a three-tube set, using one step of tuned H.F. detector and one step of L.F. amplification. This receiver is sometimes used for D.X., but generally for broadcasting during the "quiet" hours from 8 until 10 p.m., and is connected by wires to a loud speaker in the house.

Beneath the receivers can be seen the "Willard" H.T. battery of 100 volts for the receivers. Edison accumulators are used for filament lighting.

The natural wave length of the aerial is about 185 metres, and the resistance at 200 metres is, very roughly, 10 ohms.

The normal radiation with this aerial is about 1.3 T.C.A., although it is sometimes up to 1.7 T.C.A. With the old aerial, which was 40ft. high, a radiation as high as 2.8 T.C.A. has been obtained.



2BK's Sky Wire would hardly be mistaken for an earth lead anyhow!

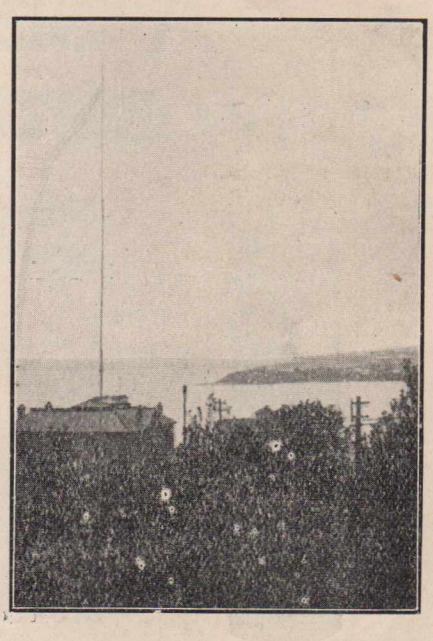
Very little short-wave transmitting has been done, although when working on 140 metres with radiation of about .8 T.C.A. the N.Z. stations report the sigs. as stronger than on the higher wave. As soon as the new transmitting coils are in, the transmitter will be nearly always working around 120 metres.

This station, as far as DX goes, has been heard in all States in Australia, Tasmania and New Zealand, and has been reported (but unconfirmed so far) from Honolulu.

On fone 2BK has been heard in N.Z., and all Australian States except W.A.

Cards are always appreciated and QSL'd.

A peculiar effect is noticed when a series condenser is inserted in the aerial circuit.



The longer of 2BK's two poles. For the benefit of readers whose education has been neglected, we would draw attention to "Our Arbour" in the background.

At 200 metres without a series condenser, the C.W. note has been reported as pure D.C., but as soon as the series condenser is used the note loses its liquid quality and sounds like raw A.C., or very nearly so. Does any "ham" know how to smooth out the note when using a series condenser? If so, any information on this point will be received with thanks.

This station is proud of the fact that it has never transmitted a gramaphone record or any so-called music yet, unlike most of the other Sydney "gang" who cause sad to relate, more QRM than all the spark stations in the world. That's where Melbourne is "putting it all over us." Nevertheless you "hams" down there could without any regrets try a few smoothers.

A gradual change in the location of the best point on the dial for a station that you hear often is sometimes due to a change in capacity of the set, caused by the drying out of the wood of the cabinet. This is particularly true if the cabinet fits closely against the tuning coils or condensers and if the wood is new and green.

The Beginner's Friend

Conducted by 3-LM.

Following the progressive policy of this publication, the Editors have decided to establish this column for the help of those uninitiated into the mysteries of this fascinating science known as Radio. In a genuine endeavour to help all to a full understanding of the construction and working of a receiver, all inquiries, no matter how elementary, will be answered through these columns.

Aerials.

A single-wire, "flat-top" or "inverted L" aerial, well erected, will be found to be much more efficient than a twin or multi-wire aerial on which no care has been taken in the design or erection, and in all cases will be found to give very good results in the reception of broadcast transmissions.

Keep the lead-in as near, or greater than, a right angle with the flat top of the aerial, and, as far as possible, keep it from running parallel or adjacent to long stretches of walling.

The effective height of an aerial is governed by the distance from the wires of the aerial to any body growing, or sunk, in the ground; therefore, as far as possible, keep the aerial well clear of all trees and buildings.

If possible, do not have any joins in the aerial wire from the free end to the point of attachment to the receiver, but if joints are necessary, see that the two wires are well twisted round each other and well soldered.

A rough way of finding the fundamental wave length of an aerial is to take the total length of the aerial and earth (from the free end to the point where the earth lead enters the ground), and multiply this length by 1.4, and the result will be the wave length in metres.

Earths.

The earth lead should be as heavy, or heavier, than the total gauge of the aerial wires, and should be kept as short as possible. All joints in the earth system should be well soldered, but if an attempt is made to solder it to a water pipe, using a blow lamp, see that all the taps are open and running, otherwise there is likely to be an explosion.

Where the earth is very dry, and there is no water pipe available, a very good earth can be made of sheets of iron (buried edge on), old copper vessels, or even kerosene tins. These should be buried as deep as possible under the line of the aerial, and connected together with heavy bare copper wire, well soldered on. Surround and cover them with ashes, charcoal or even garden rubbish, and insert a tube from the buried plates to the surface of the ground, down which water can be poured during the hot dry weather. This tube can be an old piece of galvanised down pipe, or can be built up of old pieces of timber.

Wave Length.

Many people, new to Radio, believe that the wave length of a transmitted signal is the distance such signal will travel. This is a very mistaken idea. Wave length is the distance from the apex of one wave to the apex of the adjacent wave, it being generally understood that the impulses from a transmitting station assume somewhat the form of a wave in the ether, similar to the waves formed on the surface of a pond of water if a stone is thrown into it.

Electromagnetic impulses, or radio waves, regardless of their length, travel 300,000,000 metres in one second unit. During this period a series, or train, of waves may be sent out from the transmitting station. If only one complete wave per second leaves the aerial, it will travel, or be stretched over 300,000,000 metres. If two waves per second are dispatched, the first wave will travel 150,000,000 metres before it is terminated by the commencement of the following wave. If the frequency is three complete waves per second, the length of each wave will be 100,000,000 metres, and so on down to 1,500,000 complete waves per second, which is the frequency of 200-metre waves. It will be noted that frequency varies inversely with the wave length, and is almost incredible when one thinks of very small wave lengths.

Either the frequency or length of any wave train can easily be found when the alternate one is known from the equation. M equals V over N, then M equals wave length. N equals frequency and V equals velocity of radio waves in metres per second, which will give the wave length the frequency being known. In the same way, if the wave length is known, the frequency can be found from the equation. N equals V over M.

(This article will be continued in December issue on "Coils" of all descriptions).

The Design and Construction of a High Voltage Transformer

By M. S. Israel, 3ZN.

We very much doubt whether we have ever come across such a comprehensive article as this. The high voltage transformer is one of the most important, and perhaps most neglected of all instruments in the experimental station, and the information and data contained in this outline should be of particular value.

No discussion has been entered on as to the relative merits of the rectangular core or shell types, for whilst admitting that the latter may be more efficient, it is not considered that the additional constructional troubles are warranted in the smaller sizes.

The purpose of this article is not to discuss theory only, but to give some clear data and instructions to enable the experimenter to build his own transformers. Nevertheless, it will be necessary to touch on the main principles involved so that the constructor may be enabled to vary the data to adapt it to his individual needs.

The conditions to be aimed at in designing a transformer for high-tension supply may be summarised as follows:—

1. The transformer must have good regulation.

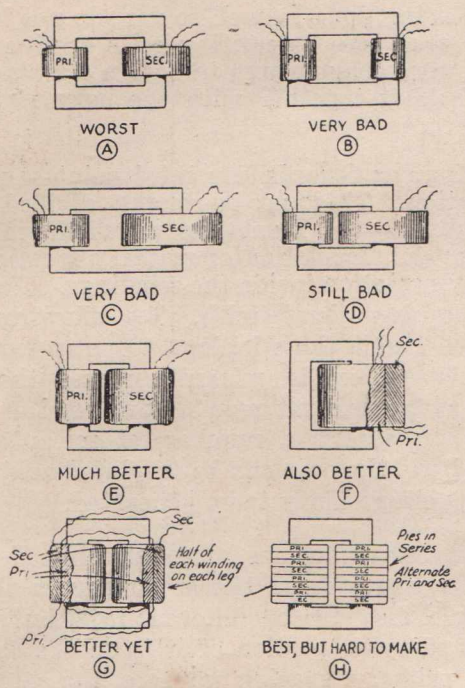
2. It must be able to stand up to fairly prolonged overloading without dangerous overheating.

3. It must be sufficiently insulated to stand suddenly open circuiting when giving full output at peak voltage.

The above three requirements cover a wide ground, as will be found when they are gone into in detail, and a transformer which will fully comply with them will prove capable of standing up to any work which may be required of it by the operator of a C.W. station. By **regulation** is meant the ability of a transformer to maintain the voltage across the secondary constant irrespective of the current which may be taken from it. In practical work it is an impossibility to maintain this voltage absolutely constant, and there will always be a drop in the secondary voltage when the load is applied; this is particularly noticeable when the load is highly non-inductive, which is the case when a transformer is used to supply current to a C.W. transmitter, in which case both filament and plate circuits are practically non-inductive. This drop, considered as a percentage of the open circuit voltage, is called percentage regulation of the transformer. It is important that this drop be as small as it can possibly be made (this is especially desirable in filament transformers). The only time when a big voltage drop can be considered of any value is when the possibility arises of the transformer secondary becoming short-circuited, either accidentally or in normal operation, as in a spark transmitter when the spark gap momentarily short-circuited the transformer. In this case the voltage dropping to a very low value is a safeguard actually preventing the transformer from burning out. It may be observed in this respect that a small open core transformer, such as a Ford ignition coil, can have the secondary completely short-circuited by a heavy wire for some considerable period without being damaged—though such a procedure is not advisable—the regulation of this type of transformer being, of course, very poor.

The precautions to be observed in order to keep the regulations good are: Correct size and shape of core; correct width and depth of windings; their position on the core, and wire sufficiently heavy not to cause appreciable voltage drop due to resistance. Gauge of wire may be disregarded for the time being, as it will be dealt with later under condition 2 above. The correct thickness of core is dependent on the power and the magnetic permeability of the iron, it being considered that an average of 40,000 to 50,000 lines

per square inch should be allowed, though this number may be exceeded in the case of a good iron such as stalloy. Without going too deeply into the subject, it can safely be taken that with average transformer iron the designer should allow a cross sectional area of $2\frac{1}{4}$ square inches for every 100 watts. Remember, that the core must be of sufficient thickness as to be not quite saturated at full load, but if it is made very much larger than necessary, the losses will increase to such an extent as to render the overall efficiency of the transformer very low.



HOW THE ARRANGEMENT OF THE CORE AND WINDINGS AFFECTS THE VOLTAGE REGULATION OF CORE TYPE TRANSFORMERS

Fig 1.

Then we come to the question of the length and width of the core. Combined with the length and width of the windings, these dimensions are most important. In an article in May, 1924 "Q.S.T.," are drawings showing various proportions of length to width of core and winding, which are here reproduced (Fig. 1), and it will be seen from them that on the whole what looks good is good. Make the core just big enough to enable the windings to go on comfortably, allowing plenty of room for insulation. The outer turns must not be too far from the leg on which they are wound, as in C. in Fig 1, but long thin windings with a big space in between them, as at B, are worse. Aim at making the magnetic circuit short, while keeping the windings as compact as possible. All this tends to reduce magnetic leakage.

Another important point in ensuring good regulation is that all joins in the core must be good. Butt joins, even of the best, are not good enough. The laminations must always be lapped at the corners. Of this, more anon.

Having considered the main requirements essential to obtain good regulation, we can turn to the second main point, viz., the transformer must not heat up. The transformer has not yet been built which does not warm up when in use, but there is a vast difference between a gentle warm up and the stage just prior to "going up in smoke." Man has never yet, and never will, manage to effect a transfer of energy without losing a portion of it, and so our transformer will be only efficient to a certain percentage, i.e., if we put 100 watts into the transformer we will get out only 90 or 95 watts. In this case the transformer is said to be 95 per cent. efficient. Now, although we don't get those other 5 watts out via the secondary terminals, nevertheless, they haven't disappeared into thin air, and are going to manifest themselves in some other form of energy—in this case mainly heat (I say **mainly**, because in most amateur-built transformers a lot of the lost energy appears as noise). This heat is generated in both windings and core, and is known as copper loss and iron loss. I am not going to mention the loss due to leakage through the insulation, as if reasonable care is taken, and the winding is not done out in the rain, this leakage should be infinitesimal. If it's not, it's a good plan to place the transformer in a boat, row five miles out to sea and carefully dump it overboard.

The copper loss is entirely due to the ohmic resistance of the windings, and can be kept within reasonable bounds by using sufficiently heavy wire in both primary and secondary.

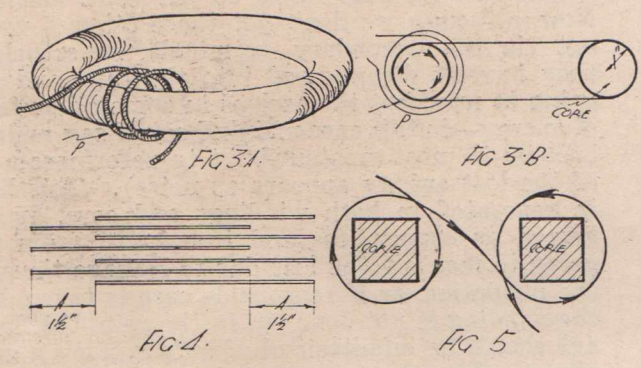
In transformers for intermittent work, such as morse or short telephone conversations like "How is my modulation now, Bill?' (no call sign) it may generally be taken that one circular mil per milliamp is sufficient, but to be on the safe side in case a gramaphone record should follow the perfecting of the modulation, a minimum of 1.5 circular mils should be used. A circular mil is a unit of area, and is the area of a wire 1/1000 inch in diameter, i.e., 1-6 square inches in area, so that a wire to carry 100 milliamps should have an area of $100 \times 1.5 — 1{,}000{,}000 = .00015$ square inch, i.e., diam.$=.0136=$ 29 S.W.G.

The calculation for the size of the primary may be made similarly. If these figures are adhered to, no fear need be entertained that the voltage drop will be sufficient to affect the regulation to any great extent.

The iron losses which reappear as heat in the core are due mainly to magnetic reluctance, hysteresis and eddy currents. By reluctance is meant the resistance of the core to the magnetis-

ing force, and the hysteresis is really the inertia of the iron, i.e., having been magnetised in spite of its reluctance, it objects to being then demagnetised and then magnetised again in the opposite direction, especially as it is expected to put up with this 100 times per second. (My secretary, who is writing this down, says no wonder it gets hysterical). The distinction between these terms may be better understood if it is realised that the reluctance would be the same no matter how slowly the iron were magnetised; but the hysteresis becomes greater, the greater the frequency. The only way to keep these losses low is to use the very best transformer iron obtainable for building the core.

The cause of eddy currents is not always fully understood, but in reality is very simple.



In Figure 3A is shown a sketch of an annular core. Suppose this to be made of solid iron of fairly good conductivity. On it is placed a primary winding P (we may disregard the secondary). In 3B this is shown in section. If the core has a thickness of two inches, it is obvious that it will act as a conductor of a single twin in the same plane as the primary turns. The thickness of the conductor is the radius, i.e., one inch, and its width, the distance round the core; while the length of this conductor, i.e., the distance the current has to travel, is approximately half the circumference, as shown by the dotted line. Now this is going to act as a short-circuited secondary, and although the voltage induced in it will be small still, due to the extremely low resistance of such a short, thick and broad conductor, the current flowing in it will be very considerable, and will evolve much heat.

The means to be adopted to avoid this are to build up the core of a number of laminations insulated from each other, and to make it of a fairly high resistance material, such as Silicon steel. Even this does not entirely stop eddy currents, for now each lamination, having a finite thickness, has currents induced in it; but being comparatively thin the resistance is high, and also the inner laminations are to a large extent shielded. In the case of very small transformers, it is not necessary to go to any great trouble to insulate the laminations; the high resistance of the surface oxide and dirt being sufficient, but in larger transformers, having fewer turns on the primary, the voltage induced round the core becomes greater. In fact, in a transformer having the number of primary turns equal to the primary voltage, there would be a pressure of one volt round the core. In this case the laminations should be insulated by a thin coat of varnish on one side of each.

Having done so well so far, do not let us spoil the good core by putting bolts or rivets through it. It is easy enough to design a frame or clamp to hold it together with the bolts right outside the core.

Now, as regards our third point—sufficient insulation. This may be roughly divided into three headings—(a) Insulation of windings from the core; (b) Insulation of primary from secondary; (c) Insulation inside the windings. The first can be quickly dealt with. By allowing sufficient space inside the windings to wrap two or three turns of flexible micanite round the core and allowing sufficient room at each end of the winding to insert a number of micanite or mica washers, the core can be insulated against almost any voltage likely to be generated.

These precautions have automatically insulated the primary from the secondary in those cases where they are on different legs, but where the secondary or portion of it is on the same leg as the primary, spacing washers, the same as those placed at the ends of the windings, will do the trick.

In the case where one winding is on top of the other, the problem is not so easy, but is best solved by making a tube of flexible micanite (at least two turns with the beginning and end not coming together). But I do not advise the amateur to build his transformer this way, as very little is gained by doing so.

The insulation inside the winding is taken care of by winding the primary in layers inserting a sheet of paper between each layer if enamelled wire is used, and by winding the secondary in a number of separate sections or pies. The number of these is dependent on the voltage, and if the winding is divided into a number of sections such that the peak voltage will not be greater than 300 volts across each section, no special precautions need be taken other than winding approxi-

mately in layers and placing a layer of paper in when about half-way through the winding. Then, with each section taped and separated by two micanite washers, there should be no insulation troubles.

When considering voltage for insulation purposes, always take the peak voltage. This is approximately 144 volts for every 100 RMS volts.

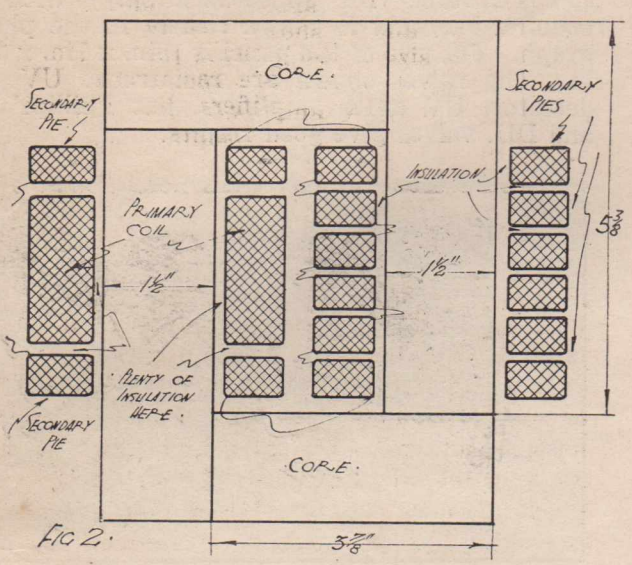


FIG 2.

Alternating potentials and currents are generally measued in RMS volts and amps. This means the average value of the current, but at the peak of the curves the voltage and current are higher in the proportion shown above. Thus the peak voltage of the 200 volt H.C. mains is actually over 288 volts.

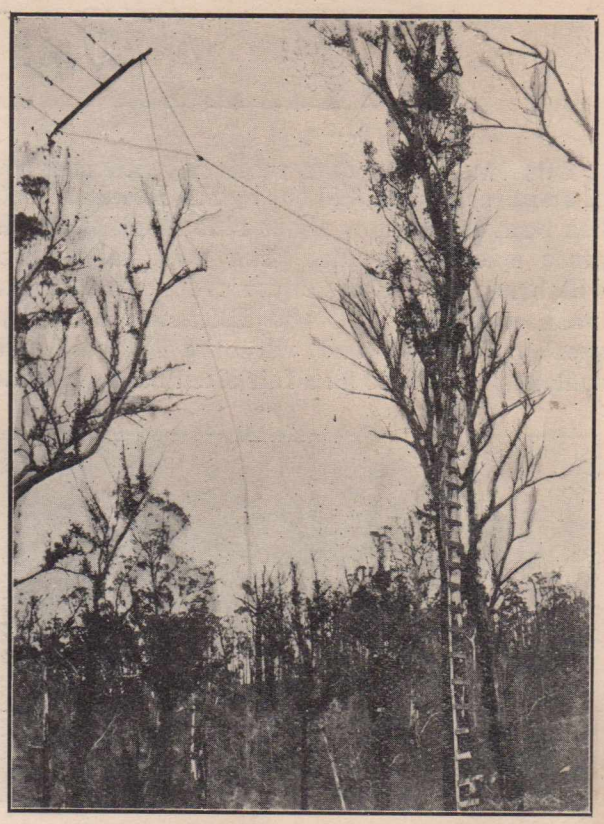
Having dealt at such length with the design considerations, the specific design and construction should be greatly facilitated.

(To be continued).

Crystals used for radio reception never "wear out," but many fans using them notice a diminishing signal strength. This condition is caused by a film of dust or grease coating the surface of the crystal. Never put your fingers on the crystal, for they will leave a thin film of grease that will harden in the air and cause trouble. Clean crystals with alcohol or ether.

* * * * *

Do not twist dials. Tune in the station desired and let dials alone. When they are twisted indiscriminately, everyone is disturbed for miles, due to the fact that the set sends out a squeal. This makes the reception of programmes by others impossible. Always consider and co-operate with the neighbors, and let them enjoy the air, too.



The other end of Mr. Dane's Aerial at his week-end "shack" at Nar-nar-goon. 3JD himself can be seen on the right up where the birds nest.

3AR'S ANNOUNCER.

"Speaking of announcers," writes "Hambug," St. Kilda, "I can never discover why 3AR maintains one.

"Of course, there's no doubt that we were put on this earth to have things to puzzle out, but this one has me completely beaten.

"No one in the wide world, surely, would ever mistake the station for any other one, making it quite unnecessary to say '3AR,' and then no one would ever fail to appreciate just what it is all intended to be, making it so unnecessary to say 'Broadcasting.' So why do they say anything at all?

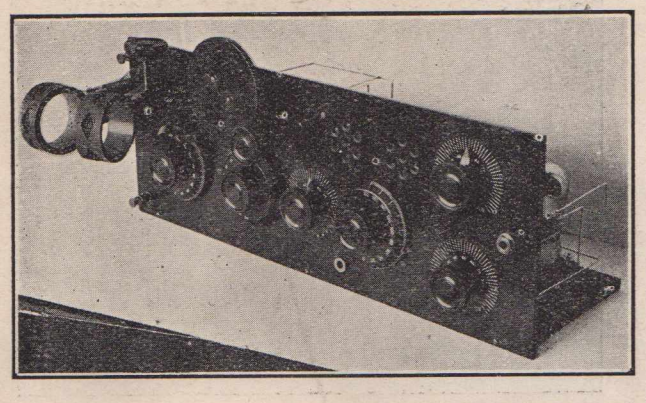
"Of course, this isn't the worst part of it all," continues our correspondent; "the trouble is, they think we're so lacking in musical knowledge and so disbelieving.

"They're quite sure you'll think Madame Throtie Sqwark is a tenor, so the announcer says definitely that she's a contralto, and then, after she has done her little bit, he doesn't think you'll ever believe it was the song he announced; so he tells you quite definitely that it really was Tosti's 'Good-bye' to the piano for violin and orchestra."

A Well Tried Reflex

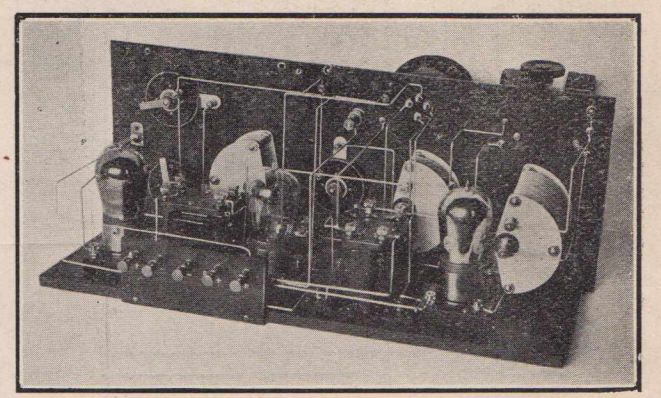
(By J. H. Jackson.)

This two-valve reflex receiver, with one stage of audio, originally laid out by Mr. Howden (3BQ), has been in use now about nine months, and has given splendid results. The two valves alone will bring in the amateurs from all over Australia, and KSC, 2FC and 2BL come in at loud-speaker strength, and, with the stage of audio, sufficient volume to fill a fair-sized hall is obtained.



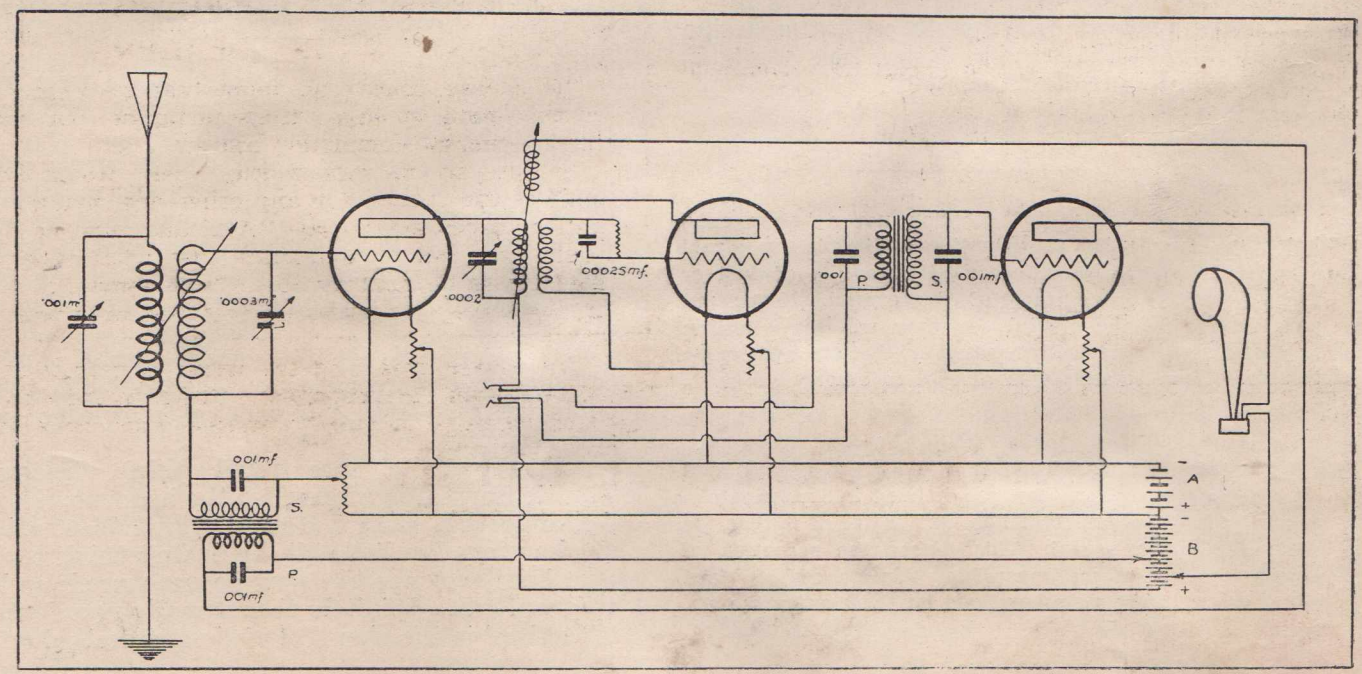
For tuning, a vario-coupler, with 50 turns of No. 22 gauge wire on a 4in. diameter tube, tapped each five turns, for the stator, and a 3½in. diameter ball, wound with 40 turns of No. 22 gauge wire, for the rotor, brings in, to my mind, the amateurs better than honeycomb coils, which are used for the broadcasting wave lengths.

The reaction consists of a spider-web coil, of 50 turns of No. 30 gauge wire on an ebonite former, swinging over the H.F. transformer. This coil is covered (for appearance only) with an ebonite disc, and is shown clearly in the photograph. The size of the panel is 18in. x 7in. x 3-16 in. The valves shown are radiotrons, UV 200 detector, UV 201A amplifiers, but Phillips' DI. and DII. valves give good results.



The description, with the diagram and photographs, should enable anyone to construct this set, which is a reflex really worth while.

I might add that I have tried out dozens of circuits lately, but this one stands alone, and is quite simple to tune.



The wires used to make connections from the storage battery to the receiving set should not be insulated with a cotton covering, as the acid in the battery is apt to attack the insulation and cause a short circuit of the battery. Heavy rubber-covered wire is best suited for this purpose.

The size of wire to be used in the filament battery circuit depends largely upon the number of tubes in the receiver. If storage battery tubes are used, the drain on the "A" battery is rather large, and in order to reduce the losses in the filament battery circuit as much as possible, a large size wire should be used. In most cases, No. 14 gauge wire will answer this requirement admirably.

* * * * *

Loose connections or badly soldered joints are the greatest causes of the exasperating noises you get in your phones.

If there is any corrosion in the joints, a scratchy noise results. If the prongs of the tubes do not fit properly, or they are corroded, it is another cause for scratchy noises.

Loose binding posts cause the same noise. Loose phone connections are another annoyance.

The remedy lies in tightening all binding posts and resoldering all loose joints with the use of as little flux as possible.

* * * * *

There are three main uses for a potentiometer. The first use is in radio-frequency amplifiers, where it is employed to prevent oscillation by controlling the grid voltage of the radio-frequency tubes. The second use is to vary the plate voltage for soft detector tubes. The third use of a potentiometer in a receiving set is to increase the resistance of the aerial, and in that way reduce the radiation from regenerative receivers. When the potentiometer is used for this purpose, it is connected as a rheostat rather than a potentiometer, for the slider of the potentiometer is connected to the aerial, and one side of the resistance is connected to the aerial binding post on the receiver. (Can't see that many hams will take this advice.—Assoc. Ed.)

The Editor will appreciate all DX reports, calls heard and copy by the 15th of the month at the latest—All copy to be addressed: The Editor, 443 Little Collins treet, Melbourne.

A Crystal Set with a 500-Mile 'Phone Range

(By H. J. Lucas.)

In practically all articles on wireless it is stated that the limit of effective reception of speech or music on a crystal set is from 15 to 30 miles, mention being made of freak results sometimes obtained over great distances. On reading the above, the amateur crystal enthusiast is probably considerably discouraged as to results to be obtained on a crystal, and I am therefore giving my own experiences in order to encourage the "crystalites" to fresh endeavours. All that is required is a crystal set and patience.

My set is installed at Minyip (Vic.), which place is, I should say, quite 500 miles from Sydney. Since 20th May last, I have been receiving 2FC's (Farmers' Sydney Broadcasting Station) concerts almost every night. Speech is heard faintly, and not all words can be understood, but singing is quite good, and musical items are received best of all. I have frequently heard the applause of audiences when broadcasting is being done from places of entertainment, and many times have counted the strokes of the clock (probably in studio at 2FC) striking ten p.m. My reception is not the result of re-radiation from a near-by valve set, as no such set was operating in the district until quite recently, when a 4-valve set was installed.

A description of my set is as follows:—

Aerial: Single wire 3-20, inverted L, 80ft. long, average height 30ft. Far end is attached to an old telegraph pole (about 5ft. of which had rotted away, and therefore condemned), the height being increased by bolting on a 12ft. length of 4 x 2 H.W.

Earth: 3ft. x 2ft. sheet gal. iron, buried only 1ft. in ground, lead being about 8ft.

Tuner: Primary, 10in. long by 5in. diameter, wound with 28 DCC wire tappings taken to 29 studs. This has one switch arm.

Secondary: 9in. long by 4in. diameter, wound with 36 DCC wire tappings, taken to 13 studs. This has two switch arms. The secondary is a fixture inside primary. The two switch arms on secondary permitting any portion of the coil to be used, and so altering the degree of coupling.

Aerial condenser is tubular type, being simply two bicycle pump barrels. The inner one covered with insulating tape, and capable of being moved in and out.

Closed circuit condenser is five fixed and four movable sheets of zinc, separated by glass (quarter-plate size photograph negatives will do).

'Phone condenser is seven sheets zinc, separated with waxed paper, the paper being simply that which is used in some packets of tobacco.

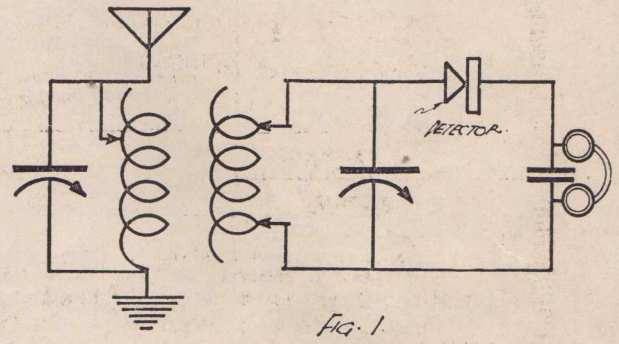


FIG. 1.

Crystal is Midite, with number 36 copper wire cat whisker. I do not use a buzzer to find sensitive spot on crystal, but carefully manipulate the cat whisker until signals are heard.

Best results are obtained when free end of primary and one of the free ends of secondary are earthed. It will be noted that both ends of the secondary are free, as there are two switch arms. I have received Morse from many ships round the coast, and also the following land stations:—VIT, VIB, VIS, VIM, VIH, VIA, VIE, and VIP.

I must mention here that ebonite has NOT been used in this set, the body of the structure being of kauri. It is a home-made set, and was very cheap to make.

The outfit was home-built, and any expenditure on it has been ridiculously low.

Some home-built sets tune to one division on the dial when the hand is resting on it and to another place when the tuning is done with a pencil rubber. In most cases this is due to the fact that the rotary plates of the condenser are connected to the grid circuit, and the capacity of the hand near the shaft changes the tuning. The remedy is to reverse the connections to the condenser, so that the rotary plates are **grounded!**

What Is Your Range?

A Long Distance Receiving Contest in Two Classes

The Plan.

In an endeavour to discover the most efficient receiving station in the whole Commonwealth, we are launching this contest, mentioned in our last issue, in the firm belief that general good will result. Every possible factor will be taken into consideration in judging the reports, and, with the assistance of the great bulk of data collected by the Wireless Institute in the current fading tests, full allowance will be possible in regard to location of the receiver and the marked effects of various types brought about by this factor. We have decided, so as not to bar the enthusiast without a knowledge of Morse, to limit the contest to reception of telephony, and for the benefit of enthusiasts with commercially-built outfits, have made the test in two classes, one for home-built gear and one for professionally-built receivers. These receivers, however, must be of Australian manufacture.

Just What You Are To Do.

Firstly, it will be advisable for prospective competitors to clear away half of the usual junk obscuring the tuning controls, get a new plate battery, and generally overhaul the gear, for the first-prize winner will have to get down to detail.

On the 15th of November, a beginning will be made and all receivers should start up in an endeavour to receive the greatest number of long-distance stations. A complete log should be kept, showing the approximate wave-length, the time of operation, and at least the name of one item played by the station, in addition to any spoken words, or should music not be played, sufficient speech to identify the station without doubt.

A number of observation stations will be in operation during the period taking an exact log of everything heard, and all competitors' logs will be checked against these logs, so it is of little use employing one's imagination.

The test will be continued for a period of three weeks, and will thus terminate on the 5th December.

All logs must be at this office, 443 Little Collins-street, Melbourne, not later than the 12th of December, and since positively no material will be considered after this date, it is advisable for all competitors to write up any material required before the termination of the test period.

What We Want From You.

The exact requirements, to avoid any errors, are:—

1. A log setting out the information stated above for each station heard.
2. A description of the location, hilly or otherwise, describing the aerial, and its relation to other objects, such as buildings, trees or telephone wires.
3. A complete description of the apparatus, not in excess of about 750 words, with as many photographs and rough explanatory sketches as are deemed necessary to give a clear idea of the apparatus.
4. A photograph of the operator, which will not be published if the contestant does not wish to come before the public eye.

What Our Judges Will Do.

The judges, a committee elected by the Wireless Institute of Australia, Victorian Division, for the purpose, will compare each log with the greatest attention to detail, taking into consideration every possible factor. The total mileage of all the stations heard will be computated, and an average taken for the whole period. In this way, the enthusiast who could only listen for a few evenings will stand just the same chance as anyone else.

The reception of American Broadcasting Station, KGO, will in no instance be included, since this is unfair to the city dweller, who cannot do any work with this station, on account of radiating receivers. Other American broadcasting stations, provided sufficent proof of reception is forthcoming, will be included, however, and will, of course, boost the average to a tremendous extent. (You've got to get the other Yank yet, though.)

Prizes.

In the home-built outfit class, the first prize will be an open order for £6/6/-, and the second prize an open order for £4/4/-.

In the professionally-built outfit class, the first prize will be £3/3/-, and the second £2/2/-, all orders will be made available for any radio store in the Commonwealth.

Now, get at it, fellows. We know that Australian receivers are capable of better work than any others in the whole world, and we want you to make this fact clear to everyone.

An International Language for Radio with some consideration of the claims of Esperanto

Probably the first suggestions regarding the use of an international language for radio communication, were embodied in a circular letter sent by the A.R.R.L. of America, to the leading radio societies of the world. Amongst other suggestions on which the opinion of those circularised was requested, was the selection of the international language to be adopted. It was stated that a number of languages, all of which laid claim to being international, had been examined, and these could be reduced to two, namely "Ido" and "Esperanto," and that the former was favored, as it did not contain the accented letters of the latter. A later communication from the same source stated that the first letter had evoked such a weight of opinion in favor of Esperanto that the suggestion that "Ido should be adopted, would be dropped, though no definite suggestion was made that Esperanto should replace it.

The Radio Society of Great Britain favors the adoption of Esperanto should it be necessary to adopt an international language, but with splendid insularity feels that English is quite sufficient to meet all the needs of international communication. Such being the case, one would hardly expect to hear the large amount of sadly-mutilated French, Italian, etc., that can be picked up almost nightly on the English amateur wavelength band. English is also an extremely difficult language for foreigners to acquire, and it does not need much imagination to picture the amount of jamming that would be caused by an Italian and a Dutchman, exchanging ideas in English, which they had learned merely for the purpose of international communication. On the other hand, international languages are constructed with an easy and straightforward grammar, and every known philological device is used to ensure that they will be capable of being very easily acquired in a short time. However, the need of an international language in radio is not limited to the desire of a number of amateurs to correspond with their confreres in neighboring countries, but enters upon a far larger field of utility. For example, with the opening up of international air routes, the pilots must certainly feel the need of some "Lingua Franca." Before long also, international broadcasting will undoubtedly be an accomplished fact, and a few years hence the radio public will not be content, as we are, to listen in to programmes from one country only, but will demand an international news service, and the best entertainment that the world can provide. Broadcasting, and indeed radio itself, is but an infant in swaddling clothes, and with its growth and development, greater and greater demands will be made upon it, so that I have no hesitation in saying that the next generation will have no appreciation of the wonders of international broadcasting, but will tune in on a world-wide programme, with the same feelings as we to-day would switch on a gramaphone record. If broadcasting is to become international, then an easily acquired international language is necessary as a means of expression, and indeed a movement has already been initiated in this direction, a number of transmissions in Esperanto having been made by various British and Continental broadcasting stations.

Having seen that it is very desirable to an international means of communication, the claims of Esperanto may be examined somewhat more carefully.

Firstly, Esperanto claims a far greater number of adherents than any other artificial language which lays claim to internationality. Further, it has already been officially accepted as an auxilliary language by the Red Cross Association. The French and Italian Associations for the advancement of science, the World Fairs at Ghent, Rio de Janiero, Prague, etc., and various Chambers of Commerce. It has also been approved by the "Preliminary Conference for an International Agreement Wireless Telephony" held at Geneva during April 1924, in the following resolution:— "Realising that wireless telephony carries the human voice across all frontiers and meets the obstacle of the diversity of tongues, considers the auxiliary use of an international language urgently necessary for such broadcasting as is destined for other countries; congratulates the broadcasting stations which have already commenced broadcasting in Esperanto, both in Europe and America, or which have arranged for the transmission of lessons in the language, and

recommends all broadcasting stations that they arrange for regular broadcasting in Esperanto at least once a week at a fixed hour on an agreed day, and so far as possible arrange for the transmission of Esperanto lessons, because the language has been shown to be easy to learn, clearly audible, and has already spread to a considerable extent amongst listeners-in of all countries."

Secondly, since Esperanto is not a national language, it cannot provoke jealousy, or give any one nation an undue advantage, to which may be added the fact that Esperanto is a very great deal simpler, and therefore easier to learn, than any national language could be.

Thirdly, Esperantists have taken the matter up, and there is already quite a fair amount of radio literature printed in their press, also an Internation Radio Society has been formed with Dr. Corret, of Paris, as president. Amongst the publications printing articles in Esperanto which deal with radio, are:—"Radio Servo," an international radio review printed in French, German, and Esperanto; and the "International Language," which publishes articles and special wireless numbers. While tables printed in Esperanto, which give the time and wave-length of all European transmissions of radio telephony, are made available from time to time.

It may be as well to point out that the accented letters used in Esperanto are not the stumbling block that they would at first sight appear to be, since any accented letter may be rendered in full by suffixing it with the letter "H"—a simple and practical solution which entirely disposes of the objection raised in this connection.

It is interesting to note that a translation of the King's speech at the opening of the Empire Exhibition at Wembley was broadcasted in Esperanto from 2LO, and that letters were received from Esperantists in no less than 14 different countries, as far apart as Tunis and Finland, announcing its reception.

In conclusion, I would like to suggest that any reader wishing to investigate the matter further will find the following articles of interest:—

"The Key to World Broadcasting," H. [illegible]cock, "International Language," Januar[illegible] 1924.

"Broadcasting and Languages," A. R. Burrows, "Interna[illegible]nal Language," May, 1924.

"The Report of the Preliminary Conference for an International Agreement on Wireless Telephony, Wireless World, 7/5/24."

"Essais Transatlantiques," Dr. Pierre Corret, Nr2 of "Radio Servo." Obtainable from the British Esperantist Association, 17 Hart St., London.

Are You a Member of the Wireless Institute of Australia?

If not fill in the form below and post to the nearest Secretary whose addresses follow:

Victoria: 443 Little Collins Street, Melbourne
N.S.W.: Box 3120, G.P.O., Sydney
S. Australia: 20 Grange Road, Hindmarsh
W. Australia: 1 Ruth Street, Perth
Queensland: Ann Street, Brisbane
Tasmania: Argyle Street, Hobart

To the Honorary Secretary,

.....Division

Dear Sir,

Will you please forward me full particulars and Application Form for Membership in the W.I.A.

Name,.....

Address,.....

.....

Also please forward similar particulars to

Name,.....

Address,.....

.....

Vacuum Tube and Electrons

Most people are familiar with some of the common facts of electricity. For example, perhaps you have noticed the peculiar behavior of the hair when combed with a hard rubber comb, and have heard, if not seen, the tiny sparks of electricity that pass between the two. This is fundamentally identical with the electricity which heats the filaments in your vacuum tubes. Each is made up of the same kind of electric particles, or electrons, as they are called, and the difference in the two cases is much the same as the difference between a raindrop and a river. Both are made up of the same kind of molecules, but they manifest the energy tied up in them differently. In the same way all electrical phenomena are caused by the movements of electrons, though the different phenomena may appear quite unrelated.

The electron is the smallest unit of electricity. With one exception it is the only thing in nature that cannot be broken up into smaller parts. We do not know absolutely its size and shape, but it is generally assumed to be a sphere of such size that if enough of them were laid in a row to make a line as long as the diameter of one of the hairs of your head, it would require more than seventy thousand million of them—more than seven thousand times the number of people in the United States.

In spite of the minuteness of the electrons, which is really far beyond the limit of human comprehension, the quantity of electricity associated with it has been measured so accurately that the error cannot be greater than about one part in four thousand—less than four hundredths of 1 per cent. This charge of the electron is, like its size, so small that a figure representing its magnitude is quite meaningless. Some idea, however, may be grasped by computing the number of electrons which are equivalent, in quantity of electricity, to that which flows through an ordinary 40-watt lamp in one second. This is found to be about two and a half quintillions—25 with 17 ciphers after it. This number is so enormous that if all the people on the earth—and there are about two billions of them—were put to the task of counting this number, and each man, woman and child counted at the rate of one electron per second for ten hours every day, it would take over seventy-five years to finish the job. This is the number of electrons flowing through the filament of a 40-watt lamp in a single second.

So much for the electron itself. We shall now consider its connections with the filament in a vacuum tube. It is now known that every atom of every element is made up partly of electrons, and that, at least in metals, there are, in addition to the electrons tied up with each atom, other electrons which are free to move about. These "free" electrons, whether in a metal or outside in space, always move toward a positively charged body, and are repelled by a negatively charged one. A current of electricity in a wire is nothing more than the movement of these "free" electrons in the direction of a pos[illegible] charge.

About thirty-four years ago Sir J. J. Thoms[illegible]c ered that, although electrons could not be d[illegible] into space from a cold body by the attractio[illegible]ositive charge, electrons c[illegible]ld be drawn out from [illegible]ent when it was heated. Th[illegible] opened the door to [illegible] interesting field of therm[illegible] the emission of el[illegible]ns from hot bodies, and a grea[illegible]eal of work has si[illegible] been done by other physicists in [illegible]etermining the la[illegible] governing this phenomenon. It has been found tha[illegible]he emission of electrons from heated metals is quit[illegible]nalogous to the emission of vapors from heated liqu[illegible]s. The rate of evaporation from liquids is know to i[illegible]rease very rapidly as the temperature is raised, and the same general law has been found to apply in the case of the "evaporation," if we may call it such, of electrons from hot bodies.

A Glossary of Radio and Electrical Terms

HIGH-FREQUENCY RESISTANCE.—The resistance which a conducting path offers to high-frequency currents. Skin effect renders this higher than the resistance that would be offered by the same path to a continuous or low-frequency current.

HIGH-TENSION (H.T.) BATTERY.—The battery which supplies the current flowing from the plate to the filament in a thermionic valve. Tappings off the same battery may be used to heat the filament if the battery is of ample current capacity.

IMPEDANCE.—The total opposition offered by a circuit, or piece of apparatus, to a varying or alternating current, being made up of the combined effects of resistance and reactance.

INDUCTANCE.—The property of a circuit which operates and retards any change in the value of the current flowing. Inductance has the same effect upon an electric current as inertia or momentum has upon a moving body.

INDUCTION.—The production of an electro-motive force in an electric circuit through the agency of another circuit, without any direct electrical connection between the two. Induction may be brought about by lines of electric force (electro-static induction), or by lines of magnetic force (electro-magnetic induction). Upon the latter depends the working of the transformer and the loose coupler.

INDUCTION COIL.—A piece of apparatus for producing high-voltage of practically speaking unidirectional currents from a low voltage direct current supply. It is largely used for producing the spark discharge on ships' "emergency" transmitting sets and small land spark stations.

INSULATOR.—A substance used to prevent the flow of an electric current. The most common insulating materials are Air, Ebonite, Indiarubber, Mica, Glass, Porcelain, Paraffin Wax, Paper and Oil.

IONISATION.—The liberation of charged particles of a gas known as ions, owing to the liberation of electrons from the atoms of the gas, generally due to collisions between the gas atoms and high-speed electrons.

JAMMING.—Interference in the reception of signals caused by oscillations from other stations, or electrical disturbances in the atmosphere.

KATHODE.—See Cathode.

KILOWATT (K.W.).—The unit used for measuring large amounts of electric power, being equal to 1,000 watts, or 1 1/3 horse power.

LINES OF FORCE.—The paths along which acts the force due to a magnet or electrically-charged body.

MAGNETIC FIELD.—The space surrounding a magnet, extending as far as its magnetic influence is appreciable. Any space pervaded by lines of magnetic force is a magnetic field.

MAGNETIC FLUX.—An imaginary "magnetic current" which is assumed to flow round any magnetic circuit, the value of which is given by the number of lines of force, and depends upon the value of the applied magnetomotive force.

MAGNETIC FLUX DENSITY.—The number of lines of magnetic force per square centimetre, or per square inch of sectional area of a magnetic path.

MAGNETOMOTIVE FORCE (M.M.F.).—The driving force behind magnetic flux. A magnetomotive force is necessary to produce magnetic flux, and the amount of flux produced by a given magnetomotive force depends upon the reluctance of the magnetic circuit, just as the current produced by a given electromotive force depends upon the resistance of the electrical circuit. The magnetomotive force produced by a solenoid is equal to 1.257 times the number of ampere-turns in the coil.

MEGOHM.—The unit used for measuring high resistance, being equal to 1,000,000 ohms.

MICROFARAD.—The practical unit of capacity, equal to one millionth of a farad.

MICROPHONE.—A device forming part of a transmitting telephone, which enables mechanical vibrations of a diaphragm (due to sound waves) to produce corresponding electrical vibrations or oscillations, usually by varying the contact resistance or carbon granules.

MILLI-.—A prefix denoting one-thousandth. Thus, a milliampere is one-thousandth of an ampere, a millivolt is one-thousandth of a volt, and so on. One-thousandth of an inch is called a mil.

NATURAL FREQUENCY.—The natural frequency of a circuit is the frequency with which an electric discharge, as from a condenser, will oscillate when no external electromotive force is applied. Two circuits having the same natural frequency are said to be in tune with one another.

(To be continued.)

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