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IN AUSTRALIA
& NEW ZEALAND

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Radiotorial

The Wireless Age

IF a treacherous memory relents for a moment and allows us to look back through the long years with a clear and certain eye until we can see the more or less happy days in which cane and trigonometry played the greatest and most fearsome parts, we think we can remember being told that there was first on this earth of ours that which is known as the Ice Age, when all was white and glittering, and no thing stirred. And after that, still with one eye on our back-stabbing friend, we have a hazy idea, came the Stone Age, the Bronze Age, the Steam Age, the Electrical Age, and any other Ages that a now thoroughly irate sense of recollection can bamboozle us into omitting.

THERE is one Age, though, the present, the Wireless Age, against which all its cunning schemes and deceptive plots are as naught. It is too much with us, and, although with the evolution of the flint arrow-head, the steel sword, the bronze battle-axe, the steam-engine and the telegraph, Man each time has said in the fatuity of his new enlightenment: "Surely this is the end, the

ultimate object, there can be nothing beyond this," he who says it in respect of the Wireless Age might rightly claim indulgence. How can one see the end of it, little alone the next wonder, when one has but barely entered upon the beginning of this one?

AND again, when radio locomotion, movies, light, writing, vision, heat, have come into general use, it is well-nigh impossible to realise what greater power Providence could have in store. Even if the components of the Atom were isolated it would appear that no greater power could be unleashed.

IT is difficult to realise now that there will come a day when we will be able to send our car unattended to the grocer's in the next block with a note ordering a packet of bird-seed with as much trouble as it takes to fill a glass with water at the tap. There seems an air of finality about being able to perform such a wonder as that, doesn't there? One couldn't do much more and remain mortal!

The Real Radio Pioneers

WHEN the history of radio is written—it is being made to-day—by those who come after us, it will not altogether be a description of that dazzling vanguard in which the names Lodge, Marconi, Fleming, De Forest, Maxwell, Hertz, figure so brilliantly. It will also be a story of those who, metaphorically speaking, made their sets from their sister's hairpins, old pieces of floor planking and a couple of yards of fencing wire—the great un-sung, the unknown and, until they found out things for themselves and gave them to the world for the mere pleasure of giving, the unknowing.

FAR into the night they slaved, trying, chancing, guessing, experimenting—all for the love of it, with no thought of favour—the amateurs and radio "fans," the pioneers of wireless progress.

MAXWELL and Hertz may have discovered the principle of communication by radio, and Fleming invented the valve, but the credit in making this scientific wonder what it is to-day must be laid at the door of the experimental amateurs.

WITH their crude sets they worked and tested and experimented, knowing little of mechanics or electrical technique. Now and then, by their own unaided efforts they got away from the beaten track and, exploring some new and hitherto unknown side-path, succeeded in stumbling upon or working out many features which are the very foundation stones of wireless used to-day.

ALL hail to them!

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Trans-Pacific Tests Begin

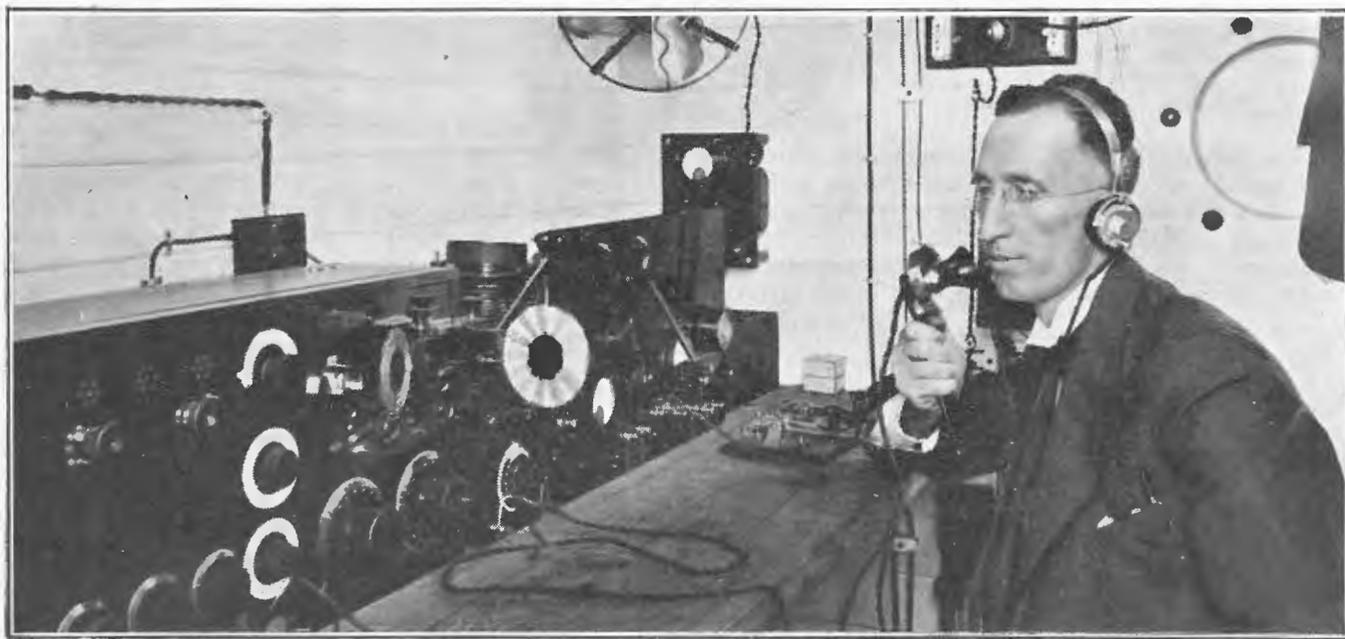
Maclurcan and Davis en Route

Objects of the Trip

AT a few minutes after 11 a.m., on Thursday, February 28, 1924, the trans-Pacific Wireless tests to be carried out by Mr. Charles D. Maclurcan and Mr. Jack Davis virtually began, the above detailed date being the occasion of the departure of the R.M.S. *Tahiti* from Sydney, bound for San Francisco, and the commencement of the series of gen-

to hold streamers with the N.S.W. President of the Wireless Institute and his companion, were Messrs. E. B. Crocker, Vice-President; Phil Renshaw, Hon. Sec.; O. F. Mingay, Hon. Treasurer; W. E. Wilson, President of the Kuringai Radio Club; S. E. Tatham, Vice-President of the Neutral Bay Radio Club and editor of *Radio*, the official organ of the Insti-

months, has achieved with great success signal transmission on low power. Jack Davis, although a comparative boy, has a knowledge of and has put up performances with wireless that would entitle a man twice his age to considerable credit. It was only last year in connection with the Amateur Radio Tests, held between Australia and New Zealand, that he secured



Mr. Charles D. Maclurcan at 2CDM, the Wireless Station which has been specially erected on the poop deck aboard the Royal Mail Steamer "Tahiti." There is a great possibility that Wireless History will be made in this tiny cabin.

eral radio investigations which are to be made by Mr. Maclurcan and his assistant between Australia and the United States.

Despite unfavourable weather conditions, the sky being a surly grey and rain having fallen earlier in the morning with promise of more to come, a great many people gathered at the wharf to bid the two experimenters and other passengers aboard, *bon voyage* and good luck.

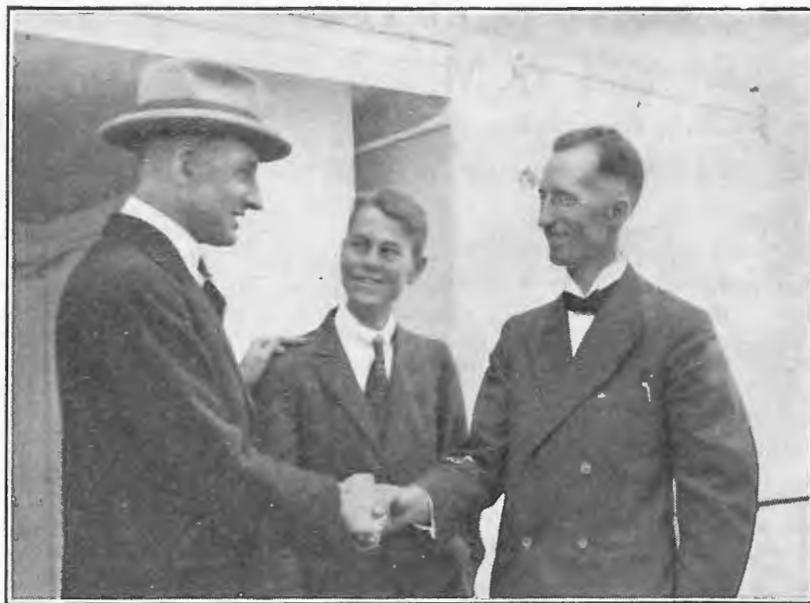
Among those who came especially

tute; N. H. Thompson, associate editor of *Radio*; Miss Wallace, of the Royal Arcade, Sydney; Malcolm Perry, and a host of experimenters and other friends.

As is well-known, Mr. Maclurcan is one of the pioneers who have made Australian wireless history, having carried out much valuable work in regard to reception and transmission both in the direction of wireless telephony and telegraphy, and as a radio enthusiast who, during the last few

first prize for the best all-round effective station (2DS). Besides working on lowest power, he also succeeded in maintaining the best receiving log, missing signals from New Zealand on only one night out of 15.

Briefly, the objects of the trip are these. Hitherto many long-distance tests have been carried out by experimenters between Australia and New Zealand and America in utilising the transmission and reception of continuous wave signals on low power. A



The Editor of "Radio," Mr. S. E. Tatham, bidding Good-bye and good luck to Mr. Maclurcan and Jack Davis on the morning of their departure for San Francisco.

great number of American amateur transmitting stations have been heard on this side, but the reception of our signals by Yankee operators has been negligible. This mystifying state of affairs has given cause for a great deal of discussion, and many theories have been put forward in explanation. It has been suggested that the Australian wireless experimenter, being so far away from other wireless centres, has been compelled to specialize so thoroughly in radio reception that he is a great deal in advance in this respect of his American cousin, who, through his position, is right in the centre of a great deal of wireless traffic, and with his ease of reception has consequently given a good deal less attention to its features. Others again have held that atmospheric conditions have been the cause of many Americans failing to hear us. As to what actually is the cause of these conditions, Mr. Maclurcan and Jack Davis intend to try and find out.

Nor will their activities end there. The other, and perhaps the main reason for the trans-Pacific trip, is to find out just what can be done with wireless transmissions on short wavelengths with low power.

En route to San Francisco the station (2CDM) which Mr. Maclurcan has had specially installed aboard the *Tahiti* will keep in constant touch

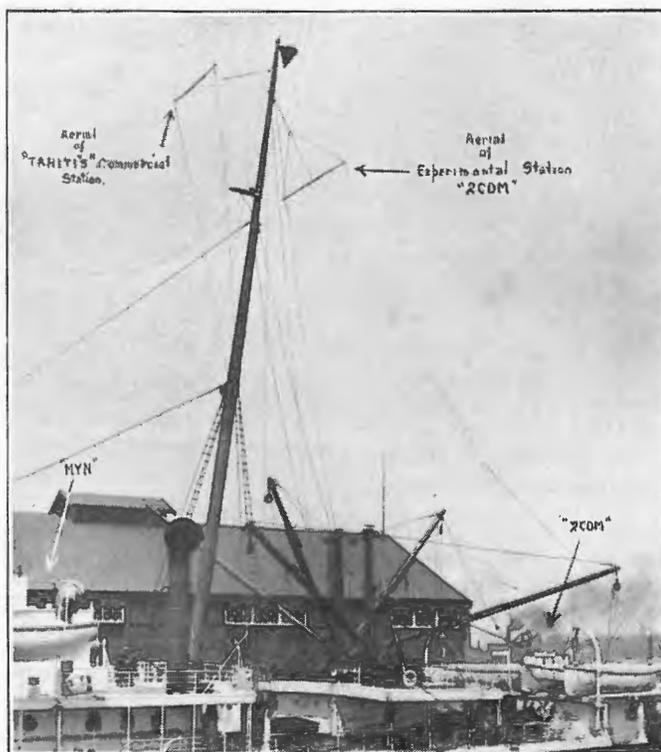
with his own station at Strathfield (2CM), and this will be worked by Mr. F. Basil Cooke, F.R.A.S., and Mr. Ben Gow. All owners of experimental stations may call up Mr. Maclurcan and he intends to keep a complete record of their transmission and to also supply them with a full report as to their signal audibility.

The following list of times when experimenters can call 2CDM will prove useful to those who desire to keep in touch with Mr. Maclurcan:—

SCHEDULE FOR AUSTRALIAN EXPERIMENTERS TO CALL 2CDM, S.S. "TAHITI."

- Papeete—Frisco and back to Papeete.
- March 19.—April 8: 8—9 p.m.; 9.30—10.30 p.m.
- April 9—18: 10.30—11.30 p.m.
- April 18—24: 9—10.30 p.m.

Note.—During these times Mr. Maclurcan will be listening-in, and any experimenter may call 2CDM. Any calls heard will be logged together with the strength of signals. From March 19 to April 9 the higher powered transmitters only should call.



The above is a photograph of the after portion of the "Tahiti," in which may be seen the experimental wireless cabin (2CDM), its aerial and portion of that of the commercial station (MYN).

Experimental Tests at Sea

2CDM and 2CM

Exclusively written for "Radio" by F. BASIL COOKE, F.R.A.S. (in charge 2CM).

THE first period of one of the most interesting experiments ever conducted in Australia has been successfully terminated. Mr. Charles Maclurcan is probably the leading authority on low power, short wave-length transmission in Australian amateur circles. For the past two years he has been carrying out some remarkable low-power, long-distance transmissions in both speech and code. To ascertain the distance these signals could be satisfactorily heard and also with a view to gathering full data on all matters relative to low-power work, he arranged with Mr. E. T. Fisk, Managing Director, Amalgamated Wireless (A/sia), Limited, to instal a duplicate of his own station on the s.s. *Tahiti*.

Mr. Fisk, realising the valuable nature of the experiments, readily consented and showed such whole-hearted interest in the undertaking, that two days before the *Tahiti* sailed, everything was in readiness to carry on. A description of the apparatus and ship's arrangements has already appeared in this journal. Suffice it to say, therefore, that the success so far attained shows the foresight and thoroughness of all those connected with this experiment.

The Australian end of the tests has been left in the hands of the writer, assisted by Mr. Ben Gow. Special schedules were arranged for the Australian amateurs to call Mr. Maclurcan (2CDM), while the outside public were very generous in offering whatever assistance was necessary.

On Wednesday evening, February 27, which was the night before departure, final adjustments were made both on ship and at 2CM. Communication was established and all readings noted for future reference.

Soon after 11 a.m. on Thursday, at 2CM (Strathfield) was received the following message:—

"*Tahiti*' pulling out from wharf, keep in touch until 1 p.m."

The great experiment had commenced! At 12.12 p.m., 2CDM reported being outside the heads and that:—"Counterpoise not yet erected, please call every half hour until 4 p.m." At 3.30, 2CDM reported having heard this station loud, and clear, while music was excellent. They

was probably due to the movements of the ship. This we reported to the ship and Mr. Maclurcan promised to arrange a compensating circuit such as he used at 2CM. Successful daylight communication was carried out all day.

At 7.30 p.m. we settled down to hard work all night. Everything sent from this station was received by the vessel, but we experienced great difficulty in reading 2CDM on account of excessive jamming from amateurs.

Transmitters would start up on our wave-length while we were in the middle of a message, and completely drown us. We called C.Q., and asked everyone on our wave-length to close down, and in most cases they did so, but a few oscillating valves in Strathfield district persisted in interfering with our work. Finally, we told 2CDM to wait until midnight before sending traffic to us. This had the desired effect, and we worked well until the early hours of the morning.

Throughout the night 2CDM's note was steady and clear, due to their having fixed up a compensating circuit. Static was intermittent, and did not hinder us to any extent. Mr. Maclurcan reported having heard the following amateurs:—

28th: 2YI, 2RA, 2UW, 2JM, 2ZN, 2DK.

29th: 2BB, 2JM, 2AP, 3BY, 3ER, 2ZN, 3BN, 3JH.

All the above were heard clearly and distinctly.

SATURDAY, MARCH 1.

Carried out our daily schedule but did not hear 2CDM. At 7.30 p.m., we opened for the night and immediately established communication. 2CDM reported our signals clear and strong, and acknowledged the daylight messages. His note was very strong, clear and steady. Being Saturday night, every amateur in Australia



Mr. Basil Cooke, F.R.A.S., Vice-President of the Wireless Institute of Australia, N.S.W. Division.

reported Mr. Marsden's (2JM) signals clear and strong. At 5 p.m. a message received from the ship read:—

"*'Expanse,'* Sydney. Counterpoise connected, all working well, radiation increased 25 per cent.—Maclurcan."

All that evening two-way conversation was carried out until 9 p.m. when we closed down, after having received the *Tahiti's* position.

FRIDAY, FEBRUARY 29.

At 9 a.m. communication was established. The note from 2CDM was very unsteady, which we thought

seemed to be busy!! Jamming was fierce, and, in spite of repeated requests to give us a chance, they persisted in blocking us. Finally, we told 2CDM to delay all messages to us until after midnight. It is a great shame that there are so many selfish amateurs who will persist in spoiling these experiments. Doubtless it is due to ignorance rather than deliberation. They could not hear 2CDM and prevented us from doing so. When it is remembered that for two years Mr. Maclurcan, at great inconvenience to himself, entertained these experimenters every Sunday evening before broadcasting commenced, it is certainly very hard that they will not give him a chance to do some work on his own account. However, patience was eventually rewarded, and at midnight, the bulk of the trouble ceased, and we got through to each other by Morse and speech. The speech was loud and clear, and much better than the previous night, in spite of his being 300-odd miles further away. The amateurs heard this night were:—

2JM, 3AF, 3JU, 2AM, 3JF, 2IJ, 3AR
(or 2AR, doubtful), 2YI, 2RA, 2ZN,
and 3JH.

These were reported Q.S.A. (strong and clear).

We were reported to be fading, although very strong. We were then asked for Sydney time, which was given. We closed down early Sunday morning.

9 A.M. SUNDAY, MARCH 2.

We carried out our schedule but heard nothing all day. During the evening, however, at 7.30 p.m., we easily established communication. In fact, for some unaccountable reason the ship was stronger than hitherto. Jamming was very bad, and Mr. Renshaw, who was out here in the early evening, called on experimenters to get off our wave-length. This had a certain amount of effect but still Bedlam was about our ears. Mr. Marsden fortunately came to our assistance and announced he was going to give a concert. This had the desired effect, and our whistling friends all left us. It was very amusing in its effectiveness. During a lull period we tuned to 2JM and heard all our annoying friends whistling and screeching, whereas before they were

round us like a lot of sparrows. Mr. Marsden is to be sincerely thanked for his ingenuity.

2CDM told us to close down during Monday, as the ship would be in Wellington. At 11.15 we recognised Jack Davis's voice quite clearly.

During the 10.30 to 11 period, we sent eight messages anticipating every question we could imagine so that

thing had gone wrong on board. At 12.15 we called, saying we would not wait any longer and that we thought probably his generator had broken down. We asked him to cable us from New Zealand. Our surmise proved correct, for at 10.30 this morning (Monday), we received the following cable from Wellington:—
"Generator broken. Carry on schedule.—Maclurcan."



Here we have Miss Gladys Moncrieff and Mr. Robert Chisholm as they appear in a moment of mutual admiration in "Sybil." Those who have listened-in say that the voices of Miss Moncrieff and Mr. Chisholm come over the ether beautifully when Broadcasted.

we could clear traffic early in the next period. 2CDM acknowledged them all O.K., and commenced to give us the answers. Nos. 1 and 2 were received when suddenly—silence. We waited about 15 minutes, thinking that probably the main set on the ship was working, but finally we came to the conclusion that some-

Thus concluded the first schedule from Sydney to New Zealand.

Through the clearness of the signals heard prior to the break-down of the generator, we anticipate hearing the ship several days more yet. This is, of course, if the generator can be fixed up in New Zealand.

Highlights of Radio Broadcasting

Feeding Receivers

By ALFRED N. GOLDSMITH, B.S., Phd., Fellow I.R.E.,
Director of Research, Radio Corporation of America

(Special to "Radio.")

TO many broadcast listeners, their nightly concert seems to arrive like rain from heaven, and there is little inquiry into its source. The actual origin of the evening's entertainment is, however, in a most interesting electrical masterpiece, namely, the broadcast transmitter. It may truly be said that a more carefully designed and precisely functioning piece of electrical equipment than the broadcast transmitter would be almost impossible to find. The actual wiring and circuits of the transmit-

ter are very complicated, but the main parts and their various functions are readily understood and worth at least casual acquaintance. A broadcast transmitter must send out a continuous stream of radio waves of proper frequency, so controlled that they carry the desired speech or music accurately to the receiving station, and with sufficient power to give acceptable signals at reasonable distances.

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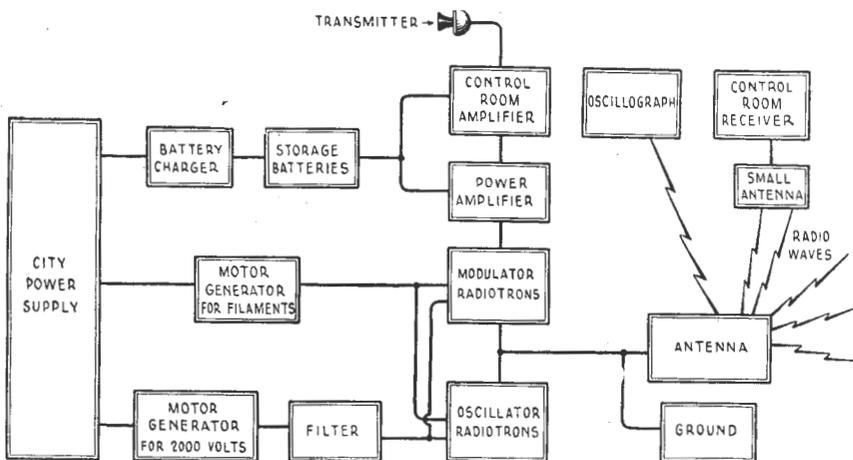
There must be an electrical power supply for the transmitting station, and this is usually the supply of the

local power company. But the customary 110-volts of the city power supply is not suitable for most of the electrical equipment of the transmitter, and therefore more equipment must be provided to produce electricity at the desired voltages, or electrical pressures, to operate the various radiotrons in the transmitter. Accordingly, there is frequently a storage battery charger, consisting of a motor which drives a generator, the generator in turn charging such storage batteries as are required for

receiving set. The grid bias voltage is readily obtained from dry battery units or from a small generator, being about forty or sixty volts. The plate voltage is much higher, and it is necessary to supply several kilowatts of power at two thousand volts for the largest radiotrons in the stations. A large motor drives a powerful generator which furnishes the necessary 2000-volt supply. Such high voltages are dangerous to life, and the circuits have to be carefully guarded against accidental contact. Accordingly, the transmitters are generally enclosed to a large extent by panels and grills.

In order that the current furnished to the transmitter radiotrons shall be perfectly steady and free from any variations or ripple which would cause unpleasant sounds in the receiving set, special circuits called "special filters" are arranged through which the currents pass to be smoothed out before they get to the transmitter. These are expensive devices, but on their efficiency depends the quietness of the receiver when no music is being sent out. If they are incorrectly designed, an annoying hum will be heard continuously in the receiving set.

The large radiotrons of the transmitter are generally four in number in the Class B station half-kilowatt transmitters. Two of the radiotrons are called oscillators, and two are termed modulators. The oscillators produce a continual series of electrical vibrations of very high frequency and considerable power. They are, in fact, devices for converting the high voltage direct current which is supplied to them into an alternating or "vibrating" current of very high frequency, and the ease, regularity, and smoothness with which they accomplish this is very remarkable. The



The above Diagram shows how a Broadcast Transmitter works.

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There must be an electrical power supply for the transmitting station, and this is usually the supply of the

the station. The battery charger unit is much like the small lighting plants now so widely used for farm purposes, except that it is driven by an electric motor instead of a gasoline engine. Suitable storage batteries, usually supplying low voltages around ten or twenty volts, are provided, and these generally light the filaments of the large radiotrons or vacuum tubes which are necessary for the transmission.

These radiotrons also require grid bias voltage and plate voltage, just as do the radiotrons in the listener's

modulator radiotrons have a different purpose. They control the alternating current produced by the oscillators in such a way that the speech or music being sent from the station is literally impressed on the output of the oscillators. It is as if the oscillators produced a steady stream of energy, and the modulators controlled this flow in accordance with the sound waves originating in the broadcast station studio. Otherwise stated, in the form of a rough analogy, the oscillators produce a flow of energy which the modulators control and work into a signature of the

music going out of the station. The oscillators act like an electrical pump producing smooth and steady power, which is like a blank page, however, and which produces no sound in the receiving set. The modulators are a sort of controlling hand at the throttle of the valve through which the oscillator power flows, and they impress on this flow the music which is heard by the listener. Either set of tubes alone would be useless; it is only in combination that they can produce the controlled electric waves which carry the entertainment.

Of course, all this production of al-

ternating currents by the oscillator radiotrons and the control of such currents by the modulators requires a great deal of electrical apparatus to be connected to these tubes, and accordingly the rear of a broadcast station transmitter is a complicated mass of electrical devices, all of which have to be thoroughly tested to ensure reliable operation of the station. In the case of the transmitter shown in the accompanying photograph, which is the type used in stations WJY, WJZ, and WRC of the Radio Corporation of America at New York and Washington, "tank circuits," so-called, are provided to make sure that the waves sent out by the station are entirely of one frequency, so that they will not cause interference at other frequencies and thus disturb other communications.

The actual radiation or "throwing-off" of the radio waves is accomplished by an aerial-wire system, called the antenna, and a ground connection. The antenna and ground wires are electrically connected to the combination of oscillator and modulator tubes and are fed by them. That is, the oscillators and modulators in combination supply the electrical power in appropriate form to the antenna and ground from which this power is then sent out as radio waves which travel outward in all directions.

While the power is being sent out, a small sample of it is taken in these stations and sent to the control room of the station where it is caused to operate an oscillograph. This piece of apparatus shows the control of the



Front and back of Transmitter and Filter Unit at Stations WJY, WJZ and WRC.

(Continued on page 648.)

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How it was Done

A Story of the Man who Knew

(By "Norson.")

OVER the interior of the theatre hangs a deep silence. In the pit, where the jazz orchestra has for the last hour been making as much musical noise, or, shall it be said, noisy music, as two side drums, numerous whistles, hooters, cymbals, etc., etc., etc., could turn out at high pressure, all is noiseless as a tomb.

An odour of grease-paint, powder, cigarette smoke and dust hangs in the air. Away up above, near the roof, fitfully gleams a handful of electric bulbs. Round the borders of the dress circle, like a diadem of fire-flies, gleam others. All eyes are on the stage.

From the flies to the boards and from wings to wings hang heavy scarlet tapestries of velvet. At their foot they become a piled and jumbled heap of red—all red. In the centre of the stage, so that the black wood and the black dress stand out like night on day, sits a woman at a big sable grand piano. She is blind-folded, her hands clasped loosely together in her lap.

At the side of the proscenium stands a man, garbed in faultless dress clothes. He is speaking to the audience. With the assistance of many mutilated "H's," much talking with a pair of long, white hands, and a good deal of shrugging of shoulders, it is borne upon the "house" that he is a foreigner. It is impossible to hear what he says—we are too far back. Occasionally, though, a word catches our ear. . .

"Ladies and gentlemen, I 'ave mooch . . . Mademoiselle . . . ze . . . medium . . . world . . . the . . . g-r-r-reatest mental telepathic medium . . . world 'as evaire seen. . ."

His voice is lost again in the murmur of interest that has suddenly arisen.

After a moment he concludes, and with a deep bow to left, right and centre, turns towards "ze g-r-r-reatest mental telepathic medium in ze world." Fixing a glittering eye upon her, he makes slow passes with those white hands before her bandaged eyes. Within 40 seconds she is "gombletly under my influence!" Then, leaving her still sitting at the instrument, he flies like a long black moth down some steps into the stalls.

Bending here a moment, turning there, he whispers to some member of the house, and then turns towards

the stage. As he does so, the woman begins to play—it is an excerpt from a Bach concerto. Then he hurries to the next—another "piece" is called for, and the concerto drifts into "A Wandering Minstrel," in turn to become "Hearts and Flowers," the overture from "Tosca," "Lolita," "Abe, My Boy," "Yes, We Have No Bananas," the inevitable Rachmaninoff prelude, Beethoven's 5th sonata, the "Destiny" waltz; in fact, the name of any piece of music that has ever been printed is but whispered to the black moth, and immediately the strains of a late Victorian waltz may change to those of the latest music-hall "hit."

The "turn" comes to a triumphant end, and with it the programme. We make our way to the exits. I turn to my friend Brown, who is one of the coming wireless experimenters, but who knows absolutely nothing of stage trickery.

"Very clever, the way they do that sort of thing," I murmur off-hand.

Brown keeps silent.

"Code, merely code," I proceed. "Just imagine the amount of study that girl has had to put in to know all those pieces. You see when he turns to her and says——"

Then Brown turned round. "But, my dear chap, if you will remember, the fellow who came down amongst us never said a word to the woman. It would have been impossible for her to hear what he said when talking to the audience. What have you got to say to that? Your "code" theory won't work."

Abashed, I bowed to Brown's superior logic.

As we stood waiting at the corner for a tram, Brown turned to me again.

"As a matter of fact, I know how that chap did it. You see, I helped him."

"You?"

"Yes; it's like this. The whole thing was worked with the means of a

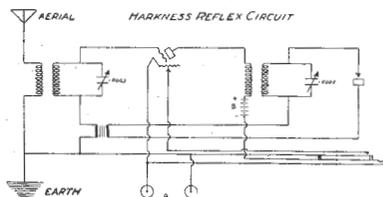
Seek the advice of

Mr. F. BASIL COOKE, F.R.A.S.,

on the

"HARKNESS"

REFLEX CIRCUIT.



A great deal of interest is now being taken in the famous "Harkness" Circuit. It is simple to operate and very effective, combining the purity of crystal reception with the loudness of the Valve. Mr. Cooke's advice about this Circuit is at your disposal.

The following material is required:—

2 $\frac{5}{8}$ Tubing	Each	9d.
No. 26 Covered Wire, 4-oz. Spools		1/3
2 .0005 m.f. Variable Condensers Gilfillian . .	Each	26/-
Argentite Crystals, 2/-, 3/-, 3/6		
Standard A.F. Transformer		25/-
90-Volt B Battery		25/-
Filament Control Jack		6/-
1 Valve Socket		6/6

DAVID JONES'

RADIO DEPARTMENT,
22 YORK STREET, SYDNEY.

concealed radio transmitter and receiver. The transmitting apparatus was carried by the man; the aerial and counterpoise were concealed in his coat-lining, and the lamps and batteries about his different pockets.

"I see," I said; but I didn't quite.

"Nestling behind his shirt front, which you admired so much," proceeded Brown, rubbing it in a little, "was the microphone, so that when a person spoke to him and gave the name of the piece they wanted played, their mouth was just on a line with it. Hidden in the piano was the receiver, so placed that the pianiste could hear the name of the selection spoken by any member of the audience to whom her companion was talking."

"But how do you know all this?" I persisted, determined not to give up the "code" explanation till the last ditch.

"Well, you see, it's like this," smiled Brown, "I made 'em."

And then we caught the tram.

Radio Station for Noumea

A NEW wireless station is to be erected at Noumea. Headed by M. Trejean, five engineering experts recently arrived in Melbourne by the s.s. *Cephee*, from Marseilles. According to the party's leader, the station will be very powerful, and when completed will have such a range as will enable it to directly communicate with the Paris Eiffel Tower.

Listeners Say "Thank You!"

Studio's Big Mail

DURING the sixteen months in which WGY, the broadcasting station of the General Electric Company, situated at Schenectady, U.S.A., was in operation, sixty-five thousands letters were received from enthusiastic radio "fans." They came from "listeners-in" scattered all over North America and from such wide-apart points as Hilo, Hawaii, London, Vancouver, Canada, Valparaiso and Chile.

Some were typewritten and from the offices of big business and professional men, while others were pencilled on scraps of paper from forest rangers and woodsmen.

Until WGY began broadcasting, the General Electric Company's daily mail was of the usual business type, but once aerial programmes commenced to be disseminated, a veritable deluge of warm, personal missives started to flow in, and in the cases of many letters, all the most intimate facts relating to the family life of the writer were revealed.

One elderly woman wrote: "Accept my thanks for the two sermons yesterday. I am a poor, hopeless invalid and they are most comforting. I shall be waiting for the Sabbath, for you have brought something into my life I had never expected to enjoy again."

Another invalid wrote: "I have been an invalid for over twelve years and confined to my wheel-chair or

couch nearly all that time. It is indeed a great privilege to hear the dear old hymns which I love so well and the word of God so helps me to forget my suffering, for I am a great sufferer. It is little I can do to help carry the burdens of the world, but at least I can keep sweet and WGY helps me to do it."

A mother wrote of how her children enjoyed the concerts, telling how even her eighteen-months-old infant was comforted when the 'phones were placed over its head.

After a minstrel show which was broadcasted, fourteen hundred letters were received by the station in 24 hours, while within a week over two thousands communications referring to that particular concert arrived.

Personal

Mr. G. Robertson, New Zealand manager of Amalgamated Wireless (A/sia), Limited, was recently married in Wellington, N.Z. While the Company's Managing Director, Mr. E. T. Fisk, was in Wellington, he entertained Mr. and Mrs. Robertson at dinner, and on behalf of the whole staff of Amalgamated Wireless Mr. Fisk handed over to Mr. and Mrs. Robertson a wedding presentation, comprising $\frac{1}{2}$ doz. pairs Fish Eaters (knives and forks), 1 pair Carvers (beef), 1 Toast Rack, 1 Bread Fork.



STROMBERG-CARLSON

SUPER No. 2-A Radio Headset SENSITIVE

£2/5/-.

Why buy a cheap inferior set when you can obtain a high efficiency No. 2-A at half the cost of an equal set? It is built by Telephone Manufacturers of 30 years' standing. DURABLE, COMFORTABLE, ACCURATELY REPRODUCES VOICE and MUSIC. Permanent adjustment, unaffected, by climatic and temperature changes. Also RADIO PLUGS and JACKS; MICROPHONES. all types.

Ask your dealer or write us direct.

Aust. **L. P. R. BEAN & CO. LTD., 229 Castlereagh St., Sydney Reps.**

Interstate:—BRISBANE: S. H. Smith, Radio House. ADELAIDE: Chas. Atkins & Co.
PERTH: T. Muir & Co., 99 William Street. MELBOURNE: Homecrafts, 211 Swanston Street.

Mention "Radio" when communicating with advertisers.



The French Chamber of Deputies has been requested to install wireless broadcasting apparatus.

* * * *

The manager of a certain Melbourne cafe has applied for a permit to erect an aerial. His wireless set is ready, and if permission is granted radio concerts will be given for the benefit of patrons. It is claimed that this will be the first cafe in Australia to institute such a form of public entertainment.

* * * *

Reviewing radio progress in Great Britain the London *Daily Express* states that more than 12,200 miles of aerial wire have been erected during the last twelve months. There are now 650,000 official licenses for broadcasting receiving sets, besides innumerable un-licensed ones. During the last year the entertainment industry has drawn more than £100,000 in royalties, copyright and fees and the salaries for wireless concerts lasting 17,500 hours of transmission. It is estimated that there were three "listeners-in" to each receiving set. Therefore, including "pirates," more than 2,000,000 people were entertained daily at a cost of half a farthing a head.

* * * *

Negotiations are in progress by a London broadcasting company for the installation of a wireless transmitter at Wembley (England). Consideration is being given to the suggestion of broadcasting the opening of the exhibition and other events to the Dominions. At present, however, many technical difficulties exist and these are being given close attention by qualified experts, who point out that it would be easier to broadcast north and south than east and west.

Anton Lang, the famous Passion Player of Oberammergau, was recently broadcasted through station WJZ from his room in the Waldorf-Astoria Hotel, New York. It is said that since the war the tiny village where the Play has been performed for so long

as far away as Stettin, about 600 miles. We are at present at Cadiz, Spain, about 1,000 miles from England, and I can hear Bournemouth, and also London when they send their simultaneous broadcast, music being exceptionally clear."

* * * *

Venezuela, South America, is planning the complete re-organization of its Government-controlled wireless system. The most modern equipment will be installed at all stations in order to improve communication throughout the territory and with foreign countries.

* * * *

Another experiment in broadcasting from public halls was recently carried out by Farmer and Co., Ltd., Sydney. The occasion was that when an organ recital was given by Mr. Ernest Truman at the Sydney Town Hall and transmitted by radio from 2FC. Despite the fact of the microphone only being placed in front of the huge instrument the recital was clearly heard at many points. Further experiments will be carried out at an early date to ascertain the most satisfactory placing of the microphone so that a clear "balance" may be maintained.

* * * *

The latest broadcasting feat: a concert in New York was relayed from London and was plainly heard in Calcutta for over half an hour.

* * * *

By a survey made by the Department of Marine it has been ascertained that there are over one hundred thousand wireless receivers in Canada. Broadcasting stations number thirty-eight, while it is calculated that over two million dollars (approx. £400,000) is invested in receiving sets, the manufacture of which has developed into a thriving industry.

2FC	
BROADCASTING TIMES.	
Sydney Mean Time.	
P.M.	
12.55	Chimes.
1.00	Time Signals; News Items; Weather Reports; Stock Exchange News; and Produce News.
to 1.45	
3.00	Chimes.
3.05	General News and Orchestral Items.
to 4.00	
6.30	Chimes.
6.33	Children's Bed-time Stories; Late News; Stock Exchange Reports; Late Sporting & Market Reports.
to 7.15	
7.15	
7.55	Chimes.
8.00	Entertainment.
to 8.45	
9.05	Entertainment.
to 10.00	

has been in a bad way and so, rather than let the Story of the Passion, as presented by the players, die out, the leading actors agreed to visit the States and exhibit their handicrafts.

* * * *

The chief wireless operator of the s.s. *Monica Steel*, which receives on a crystal, writes: "When trading to Hamburg, I was able to hear the broadcasting from London, Newcastle, Glasgow, and distances to 400 miles; I have also heard Newcastle

French Radio Rules

FOR the purposes of encouraging broadcasting and the use of radio outfits by enthusiasts, the French Government has issued a special set of regulations.

It is stated that anyone may possess a receiving set as long as he is a citizen of France and will sign a declaration stating the type of apparatus used and that no part shall be taken in the sending of private correspondence. In the cases where foreigners have sets, or desire to receive private correspondence, special permission must be obtained.

Transmitting sets are to be classified as:—Those intended for establishing confidential communication; public broadcast sets; sets suitable for technical experiments; portable sets and amateurs' sets.

The Under Secretary of the French Postal Service will regulate all claims with regard to the right to work transmitting sets on the recommendations of a permanent commission upon which representatives of the public service, manufacturers and amateurs will sit.

Wireless in the Levant

CHINA is quite a confirmed radio addict. The Hongkong Radio Society numbers 100, and, according to the last reports, there were 500 listeners-in. Hongkong has two broadcasting stations. One is a Canadian set, and the other is a 100-watt American, sending out phonograph music every evening and operated by the telephone company. A 1-KW set is to be installed at Kowloon for the purposes of sending out news and music over South China.

"Thanks!" Wire Installed

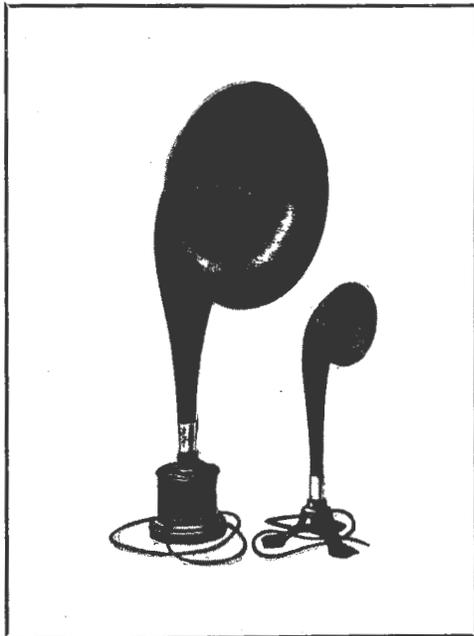
BROADCASTING enthusiasts have been so prolific in wiring their appreciation to the various artists who have performed for them at station WBAP, Fort Worth, Texas, that the local office of the Western Union Telegraph Company has agreed to instal at no cost a special wire in the studio for receiving "Thank you!" telegrams.

At the North Pole

DURING the trans-Atlantic tests, so much excitement reigned that few knew that a message from President Coolidge was relayed to Captain Mac-Millan on his ship a few miles from the North Pole. Chiefly responsible for getting the message across were the American radio amateurs, although the R.C.A. and the Western Union collaborated in carrying it across the dead spots.

W. O.'s Good Work

At 11.28 a.m. on February 14, the s.s. *Kadina* exchanged traffic with the radio station at Thursday Island on its emergency type F transmitter, at a distance of 400 miles. Signals were easily readable on both sets, Thursday Island clearing traffic on Telmar coil, single sending. This may be considered remarkably good working during the prevalence of the nor'-west static season, and taking into consideration the small aerial on the *Kadina*, Mr. Hayes, the wireless officer, is to be complimented on the efficiency of his set.



CLEAR AND TRUE *Western Electric* LOUD SPEAKERS

When used with a correctly designed and adjusted radio receiving set, Western Electric Loud Speakers give a clear and true reproduction of speech and music over the entire musical range, including the low bass notes of a pipe organ and the high tremolo notes of a violin.

Western Electric Radio Equipment can be obtained direct and also from Radio dealers in town & country. We are at all times pleased to give expert advice and help regarding Radio installations and equipment.

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A Voice from the Past

When Marconi was a Student

WRITTEN some twenty years ago the following report taken from a file of the London "Daily Mail," is of unique interest. Dealing as it does with a period in Signor Marconi's endeavours when success was about to crown his efforts in the field of wireless pioneer work, and also containing a description of his apparatus—how crude it seems beside the beautiful examples that are turned out to-day at so little cost!—it is of peculiar interest to read the forecasts, almost half-fearfully made, it seems, of the stupendous future of this invention of the age.

The article reads as follows:—

"In a few weeks Mr. Guglielmo Marconi, a young Italian student of twenty-three years of age, proceeds to Cardiff to establish electrical communication with Weston-super-Mare across the Bristol Channel, by means of the new telegraphy without wires, of which he is the inventor.

"Twelve months ago this electrical genius came to England with his discovery, and gave a practical exhibition of its possibilities at Salisbury, Wilts, by holding a conversation between two points seven miles apart without a wire. The electrical waves that are utilised to transmit the signals require no wires, cables, nor metallic strips as a conducting path, and brook the restraint of no intervening obstacles. Through walls of stone, and steel, past hills and houses, they pursue a direct course from leaving the transmitter until reaching the receiver, and by means of the ordinary Morse telegraphic alphabet tell the message they bear.

"In the opinion of experts Mr. Marconi has made a discovery worthy of this great century—the age of invention—and wrested from nature a priceless secret.

"A 'Daily Mail' representative has been privileged to see at St. Martin's-le-Grand, a demonstration of this telegraphy without wires by means of a common telegraphic 'sounder'—from which operators take messages by the sound of the clicking armature—worked by electrical waves directed from a transmitter, and passing through two solid walls eighteen inches in thickness. From Mr. Marconi he received an explanation of the theoretical and the practical parts of the new telegraphy.

"The transmitting portion of this new signalling system consists of an accumulator battery, cells charged with electricity as a watchspring is wound up; a telegraph key, for sending 'dots' and 'dashes'; an 'induction coil' giving an 8 in., more or less spark: and the wires connecting the three

together. The 'induction coil' is half wound with thick wire, the two ends of which are connected to the key and battery, and half wound with thin wire, the two ends of which are soldered to separate metal rods, each with a large brass sphere or ball at its extremity. If the key be closed for a short or long time a current passes from the accumulators during a corresponding period through the thick wire of the coil, and induces a current in the thin wire wound over it. The induced current rushes to the brass spheres, and in the form of bluish-tinted sparks, leaps the air space that intervenes. In the air space is hung an ebonite vessel filled with oil and having a brass sphere stuck in each side opposite and in a direct line with the two spheres previously mentioned. In shape it is not unlike a big

telegraphic 'sounder' instrument are intervened in the wire hoop, so that the current from this battery will run round the hoop and through the 'sounder.' But the hoop is broken, and as this current is not vigorous enough to jump the gap, the electrical circuit is not complete, and no current will flow until it is. The waves sent by the transmitter arrive at the copper arms, flow down them, and, being of vigorous electricity, they easily jump from one broken hoop end to the other. Each time the waves jump the gap the electrical circuit of the hoop is completed, and the battery current is enabled to cross the break and work the 'sounder.' Thus it is the short and long waves allow of short and long local currents actuating the 'sounder,' and producing 'dots' and 'dashes,' from which the message is interpreted. The waves are prevented from going round the hoop by a 'resistance coil' near each of the broken ends. This is the whole of Mr. Marconi's system that is expected by experts to revolutionise the science of telegraphy.

"The Admiralty are much impressed by the advantages it offers for an admiral to call and speak to any ship of his fleet without giving a visible sign to the enemy. There is no cable that can be cut, and communication cannot in that customary way be interrupted. No obstacle can be intervened to stay a command, and as cypher code may be utilised, even if the electrical waves be tapped by a 'receiver' in the hands of the enemy, secrecy is still maintained.

"The War Office recognise the advantages the new telegraphy has over land telegraph and telephone lines, the heliograph, and other signalling systems, and with the echoes from the East of big and little guns in their ears, are making every effort to be the first to acquire this unsurpassable medium of communication in the face of the foe. The Duke of Norfolk and the highest scientific experts in the Kingdom have seen Mr. Marconi's invention, and acknowledged its marvellous possibilities. A lighthouse hidden in dense fog on a dangerous coast will radiate its warning waves out to sea—for the waves are directed on the same principle as the rays of light—and a vessel that is going blindly to destruction will be stayed from the certain fate it is rushing to. The bell of the 'receiver' on the captain's bridge will ring out a warning, the lighthouse will be spoken to through miles of fog, or hail, or snow, the course instantly changed, and hundreds of lives saved. Telegraph cables will no longer be necessary between our coast and the islands surrounding it. Enormous economies will be effected, interruptions to signalling communication be unknown, and losses of life and property through shipwreck be considerably reduced."



Senatore G. Marconi, G.C.V.O., LL.D., D.Sc.

drum, with a ball stuck half through each parchment side. It is from this point the electrical waves are sent out in short or long sweeps that overcome all barriers and actuate an instrument miles away. The current having left the transmitter in short and long waves which correspond to the 'dot and dash' of the telegraph alphabet, travels through the air to the distant receiver that is in electrical harmony with the transmitter.

"The 'receiver' may be likened to a wire hoop broken, and separated at the break. At each side of the break a copper strip stands out, and these strips form the receiver's arms for collecting the electrical waves approaching it. A local battery and

To the Ends of the Earth in an Arm-Chair

When Radio Movies Come

"HULLO! Hullo! Hullo This is the Australian branch of the International See-All Broadcasting Company. To-night's programme will enable you to follow, step by step, the excavations that are now being carried out in the vicinity of the North Pole, in an area which has hitherto remained unexplored in the memory of man. However, as has already been published in the *Wireless Daily*, investigations have shown that at a depth of three-quarters of

premature anticipation based on the modern progress of seeing by wireless; and also the plans of the famous French scientist, M. Edouard Belin.

Belin overworked the newspaper wires of the world in 1921 by sending a message of greeting by General Pershing of the U.S. Army, and M. Briand across from France to America. Since then, he has worked on the transmission of photographs by wireless, and now forecasts the sending of motion pictures and ultimately,

speeding up the system. What this speed must be can be gathered from the fact that to make the transmission of a moving figure practicable, 300,000 signals a second must be sent. When the rapidity of transmission has been equalled by that of reception the struggle for aerial pictures will be over—they will be within the reach of all.

For the purposes of the accumulation of the knowledge of the world and its affairs it will be pre-eminent.



This is a portion of the Marylebone Workhouse, London, and it doesn't look half the depressing sort of place we might hitherto have been led to believe. Of course, the Receiving Set has a lot to do with it! Note the beatific expression on the old lady second from the right.

a mile beneath the snow and iron-like earth, an ancient city existed. In ten minutes' time, which will coincide with the moment at which the discoveries will be brought out of the earth and first revealed to the light of day, you are requested to have your instruments as exactly tuned as possible, so that clear and detailed vision will be assured. Thank you, ladies and gentlemen!"

No, reader, this is not a dream! We have merely been indulging in a little

scenes of actual events, by radio. His forecasts in these directions are not to be regarded lightly, as he knows more about this branch of the eighth wonder of the world than any living man.

At the moment, the commercial transmission of pictures is impossible; that is, from a monetary standpoint the cost being prohibitively expensive.

The big obstacle in the path to perfection to-day is to succeed in

Just imagine following at the heels of a Darkest Africa expedition, where no white man ever trod before from the depths of your armchair before a comfortable fire. Or again, watching the unfolding of the mysteries of the deep transmitted to you by a radio-electrically controlled camera which could penetrate to unknown ocean depths.

But let us not look any further into that bottomless well—Radio possibilities! It dizzies one.

Wireless Sets for Policemen

IF the dreams of Police-Superintendent Mills of the Philadelphia guardians of the peace come true, his body will be setting an example that may be later copied by the police forces of the world.

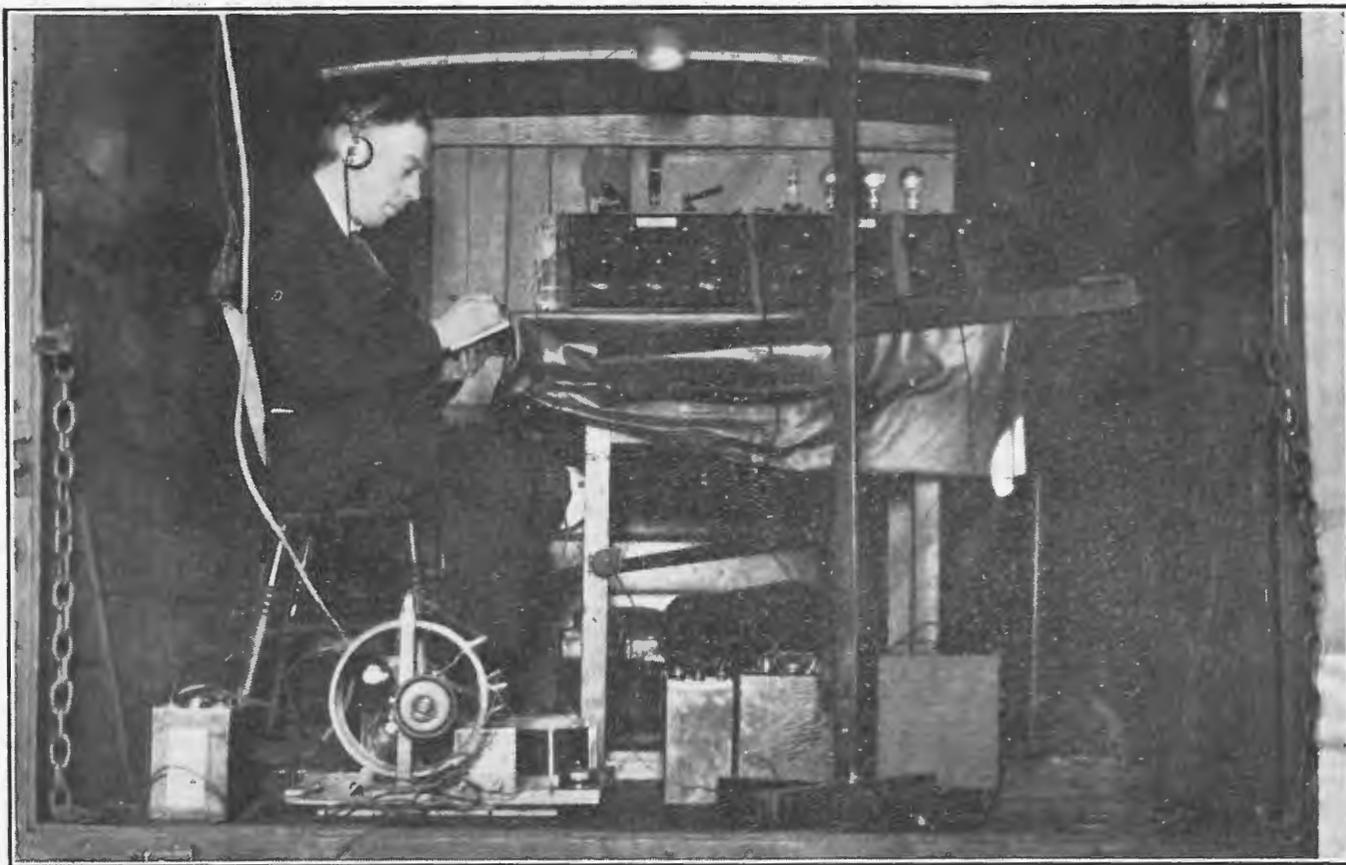
His plan is to equip each constable with a small portable radio receiving set, by which they can constantly keep in touch with headquarters throughout day and night. By means of some signal, such as a siren during the day and a light at night, the central office would be able to notify all men on duty immediately it was necessary to impart any information

or instructions. Such communications would be received by the policeman as easily and clearly as if he were personally conversing with his superior, while there would be the added advantage that all information disseminated would be heard simultaneously by every member of the force so equipped.

In time, the Superintendent hopes to institute an auxiliary body of police composed of radio enthusiasts, who will volunteer their services. In Philadelphia there are at least 200,000 sets.

In the case of thieves representing themselves as telephone testing mechanics and gas inspectors—not an uncommonly adopted ruse by crooks in Australia—who wrongfully gain entrance to private houses for the purpose of robbery, the reception of the description of the criminals by the police bureau could be broadcasted with the request that the auxiliary body, in addition to the regular police, should be on the *qui vive* for them.

If the project is fulfilled, the station will be sufficiently powerful to reach New York, Chicago and the New England States.



TRACKING DOWN HOWLING VALVES.

This photograph shows a motor lorry in England equipped with both Receiving and Transmitting Apparatus, also a Direction Finder, which is used to track down the owners of Radio Receiving and Transmitting Sets which have been interfering with Broadcast Programmes through Howling Valves. It is hoped that the Authorities in Australia will not have to resort to a similar procedure to find those illegally using Apparatus that causes Valves to howl and thus interfere with other people's entertainment.

Radio Research

R ESEARCH is a vital factor in any industry; in the Wireless industry it is absolutely essential.

The utility of patents lies in being able, not only to apply them to the solution of particular problems, but by means of research to improve and extend their application to newer fields of endeavour and enterprise.

Amalgamated Wireless (Australasia) Limited disburses the sum of £7,000 per annum in maintaining a radio engineering research staff constantly engaged in seeking improved and more economic methods for the advancement of Wireless communication. By so doing the Company assists in developing the ingenuity and research talent of Australian engineers in the wider application of the science of radio.

Last year the Company sent abroad four Australian Radio Engineers, members of the Staff, to study the latest developments in all phases of wireless, but more especially trans-ocean communication and radio broadcasting.

Amalgamated  **Wireless**
(Australasia) Ltd.



Progress in Bananaland

THE Queensland Wireless Institute held its general meeting on February 22. Consideration was given to a communication received from Sydney, concerning the Papuan tests, and also to the question of the appointment of delegates to the Federal Council.

From the club rooms every Tuesday evening a system of slow Morse signals has now be inaugurated and should prove a boon to the amateur

license-holder who is learning the code on his own. It has been decided pro tem., that short messages be sent on interrupted C.W. and, after each message, the text be read by radio-telephone.

Mr. A. J. Reynolds, publicity manager for the Valley Theatre, and an experienced amateur wireless operator contemplates the setting up of a 600-watt set for broadcasting throughout the State. Should the project be fulfilled programmes will be sent out nightly from the theatre.

Nundah Radio Club, with a financial membership of 15, and Mr. Waltz acting temporarily as secretary, is the latest addition to Queensland wireless bodies.

Wireless Institute

N.S.W. DIVISION.

The Papers and Publication Committee of this division are to be congratulated on the last two lectures. The topics were exceedingly interesting and those members present were

very fortunate. The lecture arranged for the next meeting, to be held at the Society's Hall on Thursday, March 20, promises to be equally interesting, and all members should reserve the date. On that occasion, Mr. J. W. Robinson will take as his subject, "Modern Broadcasting Methods."

Club Notes

NEUTRAL BAY RADIO CLUB.

A general meeting of this club was held on February 26, at 180 Kurraba Road, Neutral Bay. After general business was dispensed with, the election of new officers resulted:—President, N. S. Gilmour; Vice-Presidents, S. E. Tatham and G. Watkins; Hon. Treasurer, Chas. W. Donne; Hon. Secretary, E. J. T. Moore; Assistant Hon. Sec., G. Watkins; Executive Committee, Owen Perkins, H. Scougall, E. Scholfield, S. R. McGrady and F. E. F. Alderson.

Mr. J. G. Reed, of Amalgamated Wireless Ltd., then delivered a very instructive and entertaining lecture on experimental transmitters, which was greatly appreciated by those present.

Those desiring information regarding this club should address correspondence to the Hon. Secretary, Neutral Bay Radio Club, 180 Kurraba Road, Neutral Bay.

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The Radio Experimenter's Handbook

By Philip R. Coursey, B.Sc., F.Inst. P., A.M.I.E.E.

PART I.

If you desire to design your own set to meet your special requirements, and to plan the whole on a sound scientific basis, this handbook will prove of great assistance to you.

The chief features of such design work are indicated here and can be fully relied upon.

In this part the mathematical formulæ has been practically eliminated, only the General Principles being given.

PART II.

Many experimenting amateurs have requested full mathematical data for design purposes, and this section is devoted to Data and Actual Quantitative Design as well as to a description of many simple high-frequency measurements which can be carried out by the experimenter.

New developments such as the Armstrong Super-Regenerative Receiver are included.

Price, 5/- each, Postage 5/6;

Or, Both Parts, 11/-, Post Free.

Obtainable from all Booksellers, or

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Wireless in the Dominion

WHAT appears to be one more radio record has just been performed by an Auckland man. The other morning, Mr. L. S. Spackman, of Ponsonby, was listening at his set when he intercepted the following:—"G.N. Q.R.U. G5AU." (Good-night, I have nothing more for you. Great Britain amateur station 5AU.) The alternating current ripple was perfectly distinct, and upon looking it up, 5AU was found to be the call-letters of W. H. Goodman, 94 Addison Road, Holland Park, W., London. Local time corresponded to 8.30 p.m. Greenwich time on Sunday, which is the only evening in the week on which English amateurs are allowed to transmit. Mr. Spackman is writing to Mr. Goodman for confirmation.

Mr. E. T. Fisk, managing director of Amalgamated Wireless (Australia), Ltd., recently made a business trip through New Zealand. In several interviews he gave much valuable information to radio enthusiasts, and with regard to broadcasting, he said

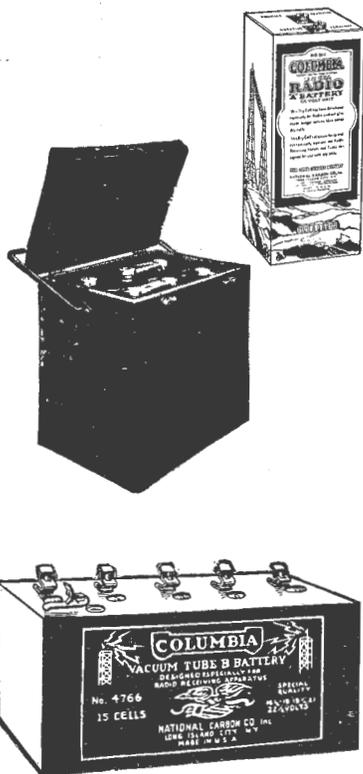
that it had grown remarkably and that apparatus was now installed in all the prominent manufacturing and business premises in Australia. It was in connection with broadcasting that Mr. Fisk made his Dominion trip.

Mr. J. L. Davies, a prominent Auckland wireless expert, has acquired a new "Loud Speaker." It is said that it bears a remarkable likeness to its father and the congratulations have been hearty and general. (For the benefit of our Scots readers, we may say that the new "Loud Speaker" is a baby!)

Upon the holding of the meeting convened by the Y.M.C.A. Wireless Club to consider the N.Z. broadcasting scheme, Captain H. Cross said that the main object was to protect the interests of amateurs. The gathering was unanimous in approval of the lines proposed to be taken by the Minister, but suggested several alterations:—That in addition to a central board of control, each of the

four centres should appoint a local wireless body for the detail working of its own station. The suggestion that a licence fee of £1 be paid for every receiving set, 10/- going to the Government for the purposes of defraying costs, was not favoured, and it was resolved that each set-holder be required to contribute £1 annually in support of broadcasting, in addition to the Government license fee. It was further decided to form an amateur association and a committee to draft details for the next meeting was appointed.

Mr. Pearson (IYB) has announced that for one night a month he is willing to place his private broadcasting station at the disposal of any amateur association. They will be allowed to take complete charge of the programme and provide any form of entertainment they desire. Mr. Pearson has received an assurance from the Minister that the introduction of a general broadcasting scheme will not affect the operation of his station.



Columbia "A", "B" and "C" Radio Batteries

The most satisfying and profitable Radio Batteries you can sell

Advertised all over the world.

COLUMBIA Radio Batteries are the result of constant study and experimenting in the largest laboratory of its kind in the world. They have been accepted everywhere as absolutely the best radio batteries made and they will give far more satisfactory results than any others. They will sell quickly and yield a good profit.

COLUMBIA Dry Cell Radio "A" Batteries are made especially for dry cell vacuum tubes and will greatly outlast any other type of ignition battery for this purpose.

COLUMBIA Storage "A" Batteries for vacuum tubes of one-half ampere or over have many characteristics which make them ideal for such use. They are shipped dry and charged as sold, thus always assuring a new, fresh and powerful battery.

COLUMBIA "B" Batteries are made in 22½ and 45-volt sizes. They are powerful and long lasting. Thoroughly insulated and waterproofed and furnished with Fahnestock Spring Clip Connectors.

COLUMBIA "Three" Batteries are suitable for use as an "A," "B" or "C" Battery. They are made of extra large sized cells and last unusually long time.

Write for an illustrated, descriptive circular.

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Wavemeters

By C. W. MANN

Science Master, Canterbury High School

EVERY experimenter should possess a wavemeter. To those who have purchased or constructed a wireless set merely to listen in to concerts there is nothing to say. These remarks apply, rather, to the person who has advanced beyond the "concert" stage; one who has made a serviceable receiving set and perhaps a transmitter and now seeks new experimental world's to conquer. The amateur who has not had sufficient scientific training to enter into the intricacies of radio frequency measurements, with all the attendant corrections will at least find a degree of pleasure in measuring the wavelength of the transmitting station to which he listens. The amateur whose work is not of a high order of accuracy will be able to choose between the buzzer or crystal wavemeter and the heterodyne wavemeter. The former type has a buzzer for its source of power and the consequent damping will result in a broadening of the tuning, and the resonance curves will not be as sharp as in the case of the heterodyne wavemeter which emits continuous waves. Both types have many advantages. For accurate work over a long period the crystal or buzzer type should be used but for the general amateur, the heterodyne will prove more useful. The advanced amateur is in a position to judge for himself. In the construction of all wavemeters there are several points to be observed.

The radio circuit contains Resistance, Inductance and Capacity. It is essential that the Resistance be kept at a minimum. Resistance losses cause damping and a consequent broadening of tuning. Leads should be kept as short as possible and should be soldered. Capacity occurs in the circuit as the distributed or self-capacity of the coil and wiring and also in the intentionally added variable condenser used for tuning purposes. The self-capacity should be kept at a minimum, but provided it is kept constant it will not do a great deal of harm. All wiring should be carried out with stiff copper

or tinned copper wire. The whole set when constructed should be put into a cabinet and screwed down to avoid any movement of the wiring which would possibly occur, if the wavemeter were not encased.

The type of condenser should receive special attention. The experimenter has the choice of air or solid dielectric. The Bureau of Standards, Washington (Bulletin No. 74) pronounces emphatically in favour of air dielectric condensers and condemns the solid dielectric type for the following main reasons:—(i) The capacitance varies with the variation of frequency when a solid dielectric is used. (ii) Power loss due to dielectric absorption causes a phase difference which produces a component of current in phase with the applied E.M.F. (iii) Unnecessary increased resistance is added to the circuit causing an increase in damping and a consequent broadening of tuning. The general disadvantages are produced by dielectric absorption. The capacity of a condenser with a solid dielectric changes with the frequency in an indeterminate manner and thus it is practically impossible to calculate the capacity at high frequencies from that measured at low frequency. Air is very nearly a perfect dielectric, hence a condenser with only air as a dielectric should show no change of capacity with the frequency and thus the capacity at radio-frequency should be the same as for low frequency.

The choice of condensers having been narrowed down to one type—namely, the air dielectric, the following points should be kept in mind, when making or purchasing a wavemeter condenser. The condenser should have: (1) Heavy plates; (2) fair spacing; (3) low minimum capacity; (4) plates which will give a straight line curve for wave-length; (5) no stops—stops are likely to displace the knob and dial of the condenser; (6) Rigid construction. Stray capacity and "body" capacity can be prevented to a large extent by shielding the condenser in a metal case. For

most accurate work a white celluloid scale should be used, the range of the condenser being most accurate between five divisions and 95 divisions, the stray edge capacity being to a certain extent avoided. A convenient value for tuning is 0.0005 microfarads.

The value of the inductance should be chosen so that it will lie within the wave-lengths to be measured. The best coils are single layer solenoid coils wound on a bakelite or ebonite former. For convenience, however, it may be preferable to use honeycomb or duo lateral coils, tapped at the middle, though the self-capacity may be a disadvantage at high frequencies. For use with 0.0005 m.f. condensers the following values may be taken as a guide.

74 turns	Honeycomb.	170-480
		metres.
40 turns	Honeycomb.	300-820
		metres.

As an indication of resonance it is necessary to insert some current measuring device and on account of their cheapness and the fact that every one uses them, 'phones will probably be generally used. Current square metres and milliameters are refinements for the opulent, while small glow lamps with a small battery in-shunt find favour with some experimenters.

Circuits and full particulars of a type of heterodyne wavemeter were published in an issue of *Sea, Land and Air* from the design of Mr. Charles D. Maclurean (2CM) and it is quite unnecessary to add anything to the particulars of construction therein given. To use the wavemeter place it adjacent to the set. Tune the receiving set to the incoming signal and then switch on the wavemeter and adjust the tuning condenser. Resonance will be indicated by maximum signal strength in the case of crystal meters and by a "carrier" wave in the case of heterodyne meters. The reading can then be read off a graph which has been previously made from the calibration with a reliable wavemeter.

Notes from the Western State

AT the moment, the Subiaco Radio Club are feeling rightly proud of themselves. Almost on the first occasion which their recently made three-valve short wave set was used, they succeeded in tuning in with H.M.S. *Hood*, just after the big ship had left Singapore en route for Fremantle.

Mr. B. Flynn, a local experimenter, is to lecture at the next meet-

ing of the Subiaco Society on the construction and maintenance of accumulators. So far, among the clubs, no lecture has yet been delivered on this important subject, and members generally are looking forward with keen interest to the address.

rest Place, Perth, and all applications for licenses should be lodged at the above address.

By enrolling 32 new recruits for the Mount Lawley Radio Club, Mr. C. H. Snowden won the gold medal donated by Mr. C. M. Thompson for the member who secured the most newcomers in three months.

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WHO WAS IT?

MR. C. F. HOBLER, of Barcaldine (Q.), writes that on Tuesday and Wednesday evenings, February 26 and 27, at about 7.30, he was listening-in on his two-valve regenerative set when he suddenly picked up a carrier wave. At the moment, the set was tuned for short-wave reception of 200 to 300 metres, but immediately adjusting to the new length, Mr. Hobler heard faint music and speech. The modulation was good, but he was unable to ascertain from what station the sounds were coming. He thinks that the musical items were gramophone records and says that the titles were announced in a clear voice. On the Wednesday evening, the transmission commenced with a long speech, after which the music was put "on the air."

Mr. Hobler would be pleased if anyone could let him know what station it was he picked up, and would also like to hear from any amateur transmitter who would care to conduct a long-distance test with him.

Mr. Hobler's address is, "Box 49, Post Office, Barcaldine, Queensland."

Judging by the present stage of completion reached, it is expected that the broadcasting station being erected by the Westralian Farmers' Ltd. will be in operation in about two months' time. The studio is also nearing the finished state.

The set of the Subiaco Radio Society on which they logged the *Hood* is constructed on the unit system, as is also the one owned by the Mount Lawley Club. A French R valve is employed for detecting and a Cossar valve on low frequency. Including the 'phones and batteries, the total cost of construction was £14.

The office of the wireless inspector, Mr. G. A. Scott, is now situated on the sixth floor of the new G.P.O., For-

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Queries Answered



F. H. M. (Brown's Plains) asks: (1) Who is 2BO, and what is his address? (2) Has Farmer's 5KW set been working, and on what wave-length?

Answer: (1) No record. (2) No. The wave-length will be 1,100 metres.

G. S. (Greta) asks: (1) What is the correct address for wireless questions to be answered in *Radio*? (2) Would an aerial 25ft. high be satisfactory for receiving VIS? (3) Would a telephone earth be suitable with four wires 15ft. long buried fan-wise? (4) Would an aerial running parallel to A.C. mains and near a sub-station effect reception?

Answer: (1) Address your queries to the Editor, *Radio*. (2) Yes. (3) Yes, but it must be separate from that installed by the P.M.G. Dept. (4) Unless the mains are carrying current at an extra high tension, little trouble will be experienced.

M. W. G. (West Maitland) asks for quantity and sizes of wire for step-down transformer, 240 v to 2 v and 6 v suitable for operating Tungar rectifier (small 2 amp output type).

Answer: For a simple transformer to light the filament of your Tungar only, you will need an output of approximately 7 amperes at 2-2.5 volts. The following windings will be found suitable for such a transformer:—Area of core: 1in. x 1in. Outside dimensions: 4½in. x 4½in. Inside dimensions: 2½in. x 2½in. Primary: 1600 turns No. 24 S.S. or enamel evenly wound. Secondary: 16 turns No. 14 D.C.C. If you require data for a complete charging transformer, we will only be too pleased to furnish you with same.

"Oidar" (Cairns) asks: (1) Usual average ratio between the number of turns on the Primary, Secondary and Tickler? (2) Most suitable wire for use on same? (3) Is No. 24 S.W.G. suitable?

Answer: (1) For short wave receivers it is usual to have the Secondary and Reaction coils with equal values of inductance, and as the wave-length is increased, approximately one-half to one-third of the number of turns in the Secondary will be found a suitable value. This refers to long waves, such as 20,000 metres. (2) Use silk-covered wire, owing to its freedom from absorption of moisture. Coils wound with cotton-covered wire should be treated with wax. (3) Yes. 24 S.W.G. is a suitable size for short wave work. Use No. 30 gauge for long wave coils.

Mr. A. E. Wright, of Scarborough (N.S.W.), recently stated in a letter to the daily press that on February 17, at 6.45 p.m., he received messages from California on his wireless receiving set.

H. W. T. (Portland, N.S.W.) referring to article on "Improved Reflex Circuits," published in *Radio*, No. 22, asks: (1) Gauge of wire and number of turns on aerial tuning coil. (2) What make and ratio transformer would be most suitable?

Answer: (1) If you use honeycomb coils, the grid and reaction coils should be 50 and 75 turns respectively for 350 metres, and both 150 turns for 1100 metres. This assumes a coil wound on a 2in. former. The turns will be inversely proportional to the diameter for other size formers.

(2) The audio transformer should have a 3 or 4 to one ratio, such as the Igranic, United, Thordarson or Amertran. Transformers with a high turn ratio often cause distortion, but this can be rectified by using a negative grid bias of 2 to 3 volts.

K. M. (Mascot) asks: What is the most suitable valve for detecting? "Phillips" and "Marconi" valves being found unsatisfactory.

Answer: Excellent reception is being done by those using hard valves as detectors. Make sure that the grid leak connects to the positive terminal of the filament battery as described in last issue of *Radio*. The D.E.R. valve is an excellent rectifier and works best from a two-volt storage battery with a six-ohm variable resistance. The best soft valve at present is the UV200.

G. W. A. (Gilgandra) asks: (1) Number of turns of No. 24 and 28 S.C.C. wire required to wind on former 2¼ inches diameter for tuned anode circuit for wave-length of 1100 and 360 metres. (2) Size of condenser for tuning plate coil.

Answer: (1) For 360 metres, wind 80 turns of No. 24 S.C.C. and for 1100 metres use 300 turns of No. 28. The inductances are respectively 250 and 1560 microhenries. An article will appear shortly giving all calculations, etc., required for experimental work. (2) You should use a condenser of not more than 0.0003 microfarads capacity for tuned anode working. This capacity is approximately that of an eleven plate condenser of usual experimental size.

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FEBRUARY.

Mr. F. Kettlewell relieved Mr. A. B. Sharland on s.s. *Eugowra*, at Sydney, 19th.

Mr. A. B. Sharland signed on s.s. *Boorara*, as Senior Operator, at Sydney, 20th.

Mr. R. B. Lowry signed on s.s. *Changsha* as 3rd Operator, at Sydney, 19th.

Mr. L. Graham signed off s.s. *Mackarra*, at Brisbane, 8th.

Mr. G. I. Duffy relieved Mr. P. C. Gillon on s.s. *Melbourne*, at Sydney, 21st. Mr. Gillon terminated service.

Mr. C. H. A. Kidman relieved Mr. J. F. McGinley on s.s. *Wyreema*, at Sydney, 23rd.

Mr. M. Webb-Watts signed off s.s. *Komura*, at Adelaide, 14th and proceeded on H.P.L.*

Mr. L. Graham signed on s.s. *Komura*, at Adelaide, 15th.

Mr. A. L. Batten relieved Mr. E. W. Windsor as 3rd Operator on s.s. *Montoro*, at Melbourne, 25th.

Mr. A. S. Smith signed off s.s. *Wyandra*, at Sydney, 11th and relieved Mr. N. M. Leeder on s.s. *Dimboola*, at Sydney, 27th. Mr. Leeder proceeded on H.P.L.

Mr. E. S. Bailes signed off s.s. *St. Albans* as 2nd Operator, at Sydney, 25th, and relieved Mr. W. D. Wedgwood on s.s. *Tarcoola*, at Sydney, 27th.

Mr. J. Ridler signed off s.s. *St. Albans*, at Sydney, 25th.

Mr. W. H. Jowett relieved Mr. F. G. Canning on s.s. *Koonda*, at Melbourne, 26th. Mr. Canning terminated service.

Mr. E. W. Windsor signed off s.s. *Montoro* as 3rd Operator, at Melbourne, 25th.

Messrs. E. W. Windsor and L. M. Tongs signed on s.s. *Boorara* as 3rd Operators at Melbourne, 28th.

Mr. F. T. Neal signed off s.s. *Motra*, at Brisbane, 29th and returned to Sydney.

Mr. F. Kettlewell signed off s.s. *Emita*, at Sydney, 18th.

MARCH.

Mr. J. F. McGinley relieved Mr. H. Johnston on s.s. *Kanowna*, at Sydney, 1st.

Mr. F. Basden relieved Mr. L. Graham on s.s. *Komura*, at Sydney, 4th.

Mr. F. T. Neal signed on s.s. *Emita*, at Sydney, 4th.

* Home port leave.

Too Long an Aerial

A fairly common error made by amateurs in the early days of their experiments is having their aerial too high, under the delusion that a longer aerial will give them greater range. As a matter of fact, they are unsympathetic to sharp-tuning and one should not use more than 100 feet of aerial for proper tuning.

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Highlights of Radio Broadcasting

(Continued from page 633.)

outgoing waves by the speech or music in the form of a complicated waving line of light which is observed by the control room engineer to make sure that the control is both sufficient and accurate. This modern method of watching the quality of the outgoing performance is very helpful in the obtaining of consistently satisfactory reception. It is supplemented by having the control room engineers listen to the outgoing material in a suitable receiving set at the transmitting station, so that the station is controlled by both eye and ear in very precise fashion.

In the stations mentioned above, in order to ensure entire reliability and continuity of service, the entire transmitting equipment previously described is provided in duplicate, with electrical relays, whereby one transmitter or the other can be instantaneously thrown "on the air" in case of need. It requires only the touch of a push button or switch to change from a disabled transmitter to the spare transmitter which is always ready to take up the burden. This is another great step towards turning broadcasting into a public service of the most reliable sort.

When it is considered that spare radiotrons, batteries, supplies, and measuring instruments must be supplied for a modern transmitting station, it will be appreciated that the broadcast concert is the result of great expense and constant care, and that broadcast transmission is not lightly to be undertaken.

(To be continued.)

Shenandoah's Radio Equipment

SINCE the plans for the exploration trip to be taken by the U.S. airship "Shenandoah" to the North Pole have reached the closing stages, it has been decided that the aerial equipment is not all that it might be, and so a new transmitting unit, whereby a range of 1,000 miles will be no difficulty, has been evolved.

Should Australian experimenters pick up "NERK" during next July or August, and there is a possibility, they will know that it is ZR1 speaking to one of the far northern wireless ships or shore stations.

ZR1's radio apparatus will include two transmitting sets, two receiving sets, and a wireless compass. The new high-power outfit which super-

sedes the six 50watt tubes, includes two 2-K.W. tubes. With this installation it is expected to reach the northern stations of Alaska, Greenland, Iceland, Russia and Spitzbergen, while with the receiving sets Nauen, Cordova, Annapolis, Lafayette and other big power stations will come within hearing, thus allowing the "Shenandoah" arriving at her position by the radio compass.

The total weight of the equipment is a little over one thousand pounds, thus giving an approximate transmitting range of one mile per pound.

For the wireless shack, the after portion of the control cabin will be used. The position to be occupied by the compass is yet uncertain, as it will be necessary that it be situated in a place where it will operate and yet not hinder the airship or interfere with landings.

Two base ships fitted with mooring master and wireless apparatus are expected to be used, one of these being sent to Point Barrow, 70 degrees N., and the other will, in all probability, drop anchor at Spitzbergen. In addition to these, two portable radio-compass stations will be placed as far north as possible, so that ZR1 will have five wireless compass stations by which she can check her progress and position on any occasion throughout the trip.

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These Headphones are extraordinarily sensitive; they remarkably enhance the clearness and range of the Radio-Receiver. You judge a Radio-Receiver by what you hear. If your receiving set is not equipped with New System "De Luxe" Headphones, you are not doing justice either to yourself or your receiver (2,000 and 4,000 ohms).

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The advantages inherent in these Double Handphones will be readily apparent. Using them, ladies do not disarrange their hair; they are more easily adjusted than Headphones, and in many other respects are a boon to lady "Listeners-in."

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DESCRIPTION:

This model stands alone in high-class receivers with its high efficiency, distinctive appearance and unique features, chief of which is the Loud-Speaker device which is contained in the receiver cabinet. Special terminals are provided for an extra Loud-Speaker and two pairs of Head Telephones without alteration of connecting wires. This set has been designed to comply with the Government Regulations for sealed wave-lengths. It may be adjusted by the manufacturers to receive any one or all the Broadcast stations within reasonable distance. The cabinet is built of well-seasoned, highly finished walnut. All fittings and terminals are of polished brass and lacquered, except at points of electrical contact. Overall dimensions, 10½in. x 10in. x 7½in.

PRICE, £48/10/-.

With built-in Loud-Speaker, which does not include extra Loud-Speaker, and accessories. Carriage extra. No Loud-Speaker need be purchased with this Set, and no extra amplifiers are necessary. It is a complete receiving set, suitable for Broadcast reception up to 400 miles.

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