

RADIO

IN AUSTRALIA & NEW ZEALAND

VOL. I. JANUARY 23, 1924 No. 22

BROADCASTING PROGRAMME

8-15 ANIMAL IMPERSONATIONS

9-5 CONCERT

9-30

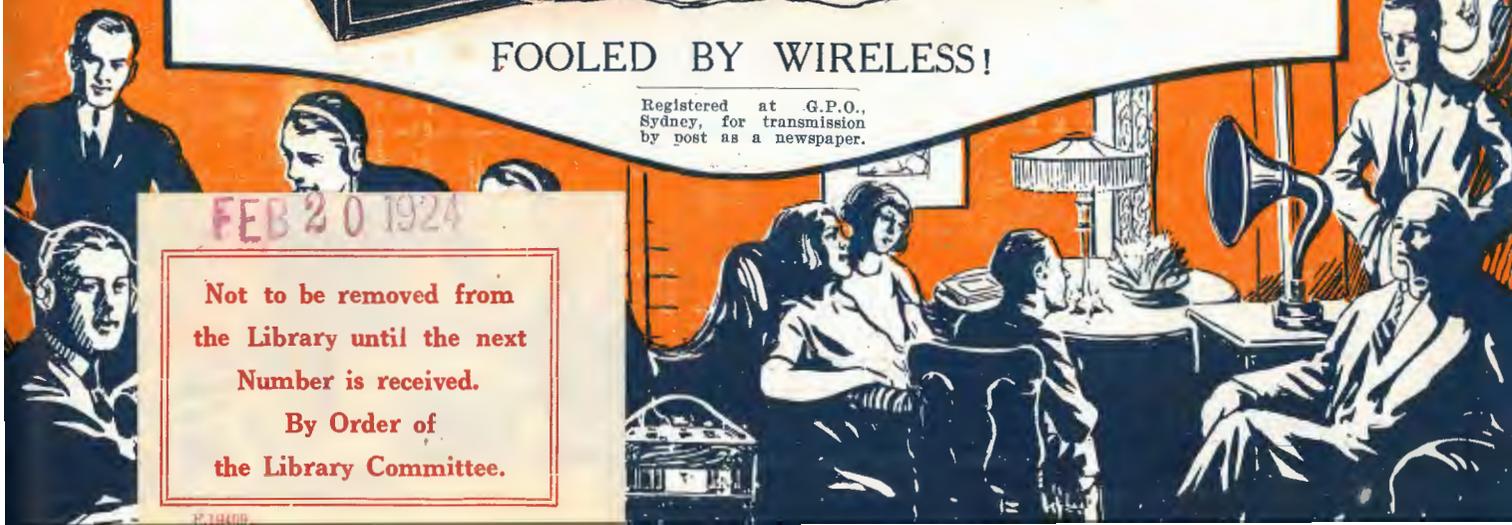
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CONTENTS

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Volume I.	JANUARY 23, 1924	Number 22
		PAGE.
Radiatorial		
Wireless and the Man in the Street		531
Highlights of Radio Broadcasting		532
2FC on the Air		534
At Nukualofa, Tonga		535
Broadcasting and Listening-in		537
Building 2FC		538
Hearing Across Australia		540
Wireless in New Zealand		541
International Break Sign		542
Broadcasting in Melbourne		543
The Experimenters' Corner		544
Australian Broadcasting Stations		545
Waverley Radio Club		546
Movements of Wireless Officers		548
Coastal Radio Service		548
News from W.A.		549
Queries Answered		550

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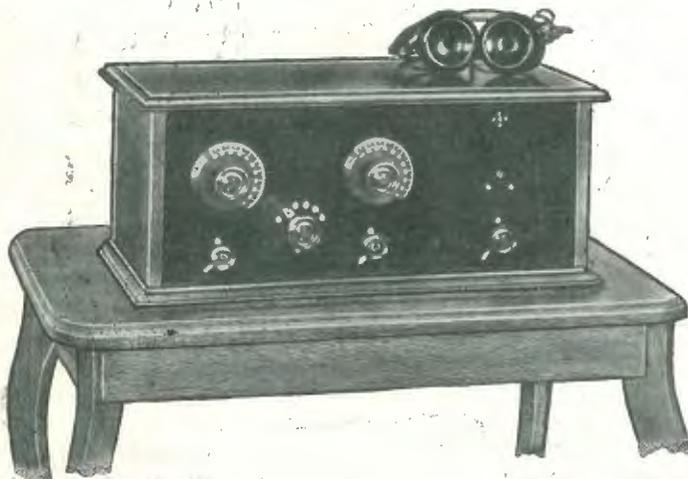


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Wireless and the Man in the Street

WHEN Kipling coined the phrase "The Man in the Street," he meant exactly what he said. He meant the man who labours in the City, the man who catches trams, trains and ferries to his office or the scene of his daily work for bread. The man who works his brain or his body for eight or more hours a day and then goes home, tired out, to rest in order to prepare himself for the same struggle the next day; he meant Man with his weaknesses and strengths, sorrows and joys, sins and virtues; he meant the Nation; he meant, to quote him further, "Duke's son, cook's son, son of a belted Earl," he meant, in a word, US.

WE are, we have been told, a nation of shopkeepers and as such, slow to adopt changes, hard to convince of innovations, dubious of startling enterprise and loth to exhibit undue enthusiasm concerning That Which Was Not Before. In the past, in some instances, we have had to wait for other nations to show the way. In many cases we have caught them, and in still more we have not only caught them, but passed them and left them far behind. The cases where we have not caught them need no reference here, it is only necessary that we remember them now and benefit by that recollection.

TO-DAY, with Radio and all that it implies, we have That Which Was Not Before. We have, so to speak, the ball of opportunity in the shape of Wireless, the possibilities of which we are only beginning to realise, great though they have already proved to be, at our feet. Furthermore, we have money, the greatest electrical geniuses of the age at our disposal, and the greatest and largest Empire the world has ever seen in which to exploit it.

WITH Radio there is no end, it is infinite. Its possibilities are legion and its disciples are innumerable. All that now is wanted is general intelligent interest by the public—by "The Man in the Street."

AT the moment, "The Man in the Street," in a large number of cases, has not that interest. He knows that "this wireless, or Radio business, or whatever they call it, is very wonderful," and that "they can actually send coloured photographs by wireless now," but he cannot yet focus this marvel of the age in the true perspective to himself. He has but a tolerant curiosity and that is not enough. He cannot see what Radio would

mean to him if he took it up, or what it will mean some near day when economical conditions will force him to adopt it.

CURIOSITY is passive; interest is active. One transforms that idle curiosity to wide-awake interest and the battle is all but won—Australia will take her place in the vanguard of the world as the Wireless Nation.

IT is the aim of *Radio* to help to instil that all-conquering interest, but this paper cannot do that alone. It must have help, and those to whom it calls are those who are already connected with wireless in any shape or form.

TO the wireless operators at sea; the operators on lonely islands tucked away in odd corners of the Seven Seas; "listening in" enthusiasts, amateurs, experts, in fact, any man, woman or child who intelligently understands and delights in the fascinating charm of That Which Was Not Before. All should make it their business henceforth to enlighten one "uninitiated" a day on all its wonders.

IT will be found that this activity will be more than a labour of love. Those who know little will learn more in the mere act of teaching others, while those who plentifully mingle their speech with such words as "wave-length," "aerial" and other, to the unknowing, incomprehensible jargon, will widen their already deep knowledge. Wireless can never be popularised by amateurs and experts staying at home every night and carrying on experiments by themselves. No general good can come of hoarding the fruits of exploration and discovery to oneself. One must get out and talk about it.

RADIO enthusiasts must remember that the future of Wireless lies with "The Man in the Street." Obtain his interest and co-operation and Radio's future will be assured and look after itself. All will benefit by it, so it is up to all to lend a hand.

TO-MORROW we may open our paper and find that Wireless has scored one more victory. Once more the seemingly impossible will have been achieved. That is the Radio enthusiasts' opportunity. "The Man in the Street" will turn to his companion. "Now, tell me," he will ask, "you know all about wireless; how is it done?"

TELL him.

Highlights of Radio Broadcasting

Picking up Broadcast Music

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

(Special to "Radio.")

THE human ear is a truly marvellous instrument. Few people recognize all the amazing feats which the ear and brain in combination can perform, and therefore how difficult is the task of the broadcast device which aims to hear and pick-up for the listening radio audience exactly what is happening in a concert hall or studio.

To begin with, the ear hears a tremendous range of differently pitched sounds from the lowest notes to the highest. The deep boom of an organ pipe lies at one end of the gamut of notes which the listener prefers to have reproduced. At the other end of the long range lie the overtones of the violin and piccolo in all their interesting and tart shrillness, and the high-pitched overtones which alone make the spoken consonants "s" and "f" sound natural. Actually the necessary frequencies range all the way from the ponderous tone of about 30 vibrations in a second to the piercing sound of 10,000 or more vibrations per second. If the lower frequencies are not correctly picked up, the piano sounds "tinny," the baritone voice becomes a tenor, and the speaking voice, while understandable, sounds thin and unnatural. On the other hand, if the high frequencies are left out or partly lost, the violin sounds like a flute, orchestras give a jumbled and incomplete impression, and the voice, particularly of the feminine speaker, sounds muffled and indistinct.

The ear is also capable of hearing and appreciating a wide range of loudness in a sound. One can hear and understand a faint whisper and also an almost deafening shout. In broadcasting, so extreme a range of loudness is hardly required, yet it is necessary that the expression of a piece of music be preserved by subduing appropriately the softer parts, and accentuating fully the more forceful portions. It is not easy to find a suitable telephone transmitter and vacuum tube amplifier that

will preserve the relative loudness of tones accurately. It becomes necessary to use vacuum tubes in somewhat extravagant fashion, most of the time working them far below the output they will give in other service in order to avoid distortion when really loud notes are to be correctly reproduced.

Another characteristic of the human ear, or it may be, of the brain,



Colonel Roosevelt, Assistant Secretary, U.S. Navy, and Major-General John L. Hines, U.S. Army, before the Pick-up Transmitter at WRC, Washington.

is the ability to concentrate on a strain of melody or a particular part of a musical composition. This is particularly noticeable in connection with orchestral compositions. It is well known that the ear and mind can pick up and follow the melody played by the violins of an orchestra, although the remainder of the orchestra is also contributing its full quota to the total of sound. To some extent

this can be imitated in broadcasting by properly placing the transmitter so that the instrument carrying the melody is nearest to the transmitter and thus is accentuated in the resulting broadcast music. This, however, is always done at the risk of exaggerating this instrument unduly, or of suppressing other important instruments, and thus doing what is known as "throwing the orchestra out of balance." In fact, a good musical critic is a necessary element in every broadcasting station that has any pretensions to sending out really artistic productions.

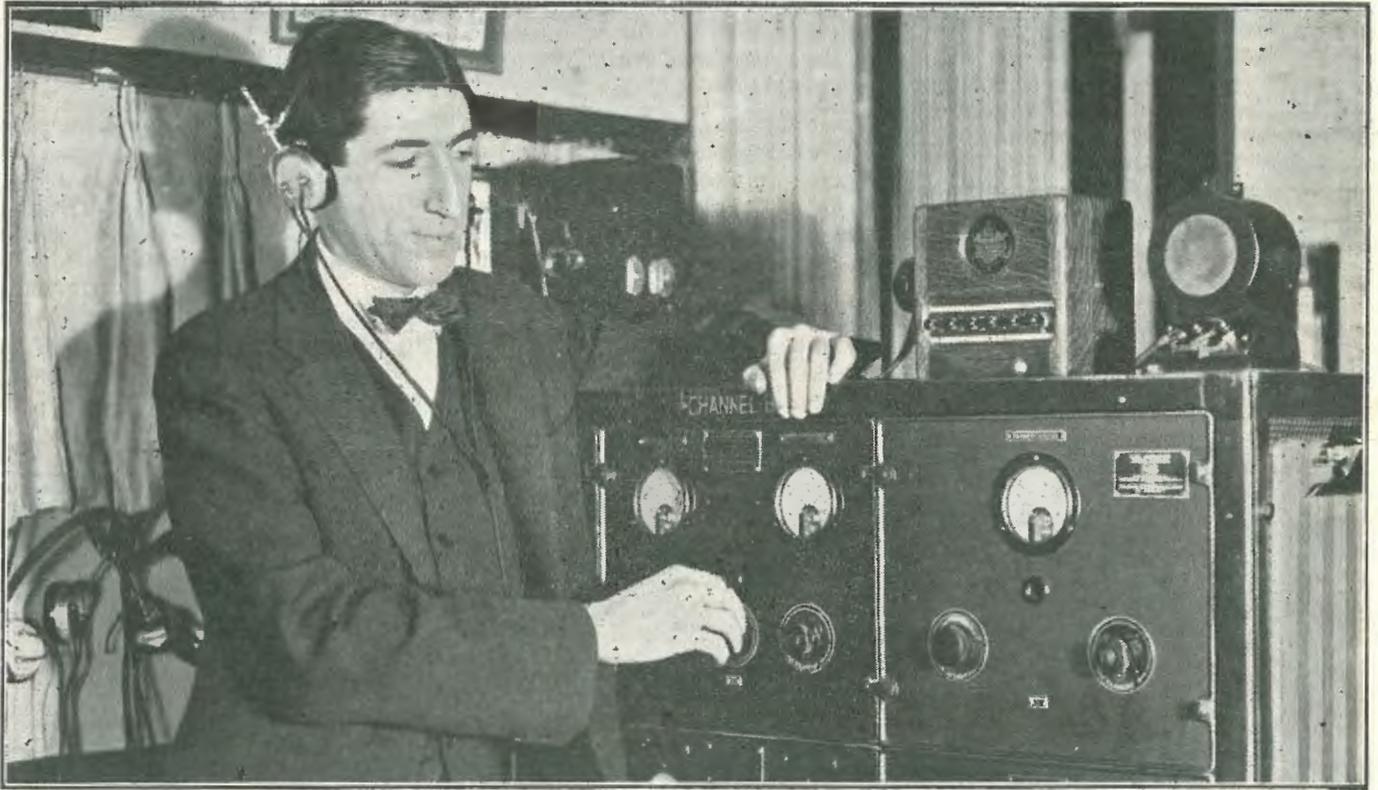
Having mentioned the problems in picking up music for broadcasting, it may be desirable to give some of the various solutions for them which have been found. "The telephone transmitter which is used must be a very different device from the ordinary transmitter used on the usual telephone system." While the ordinary transmitter suffices for speech under comparatively uncritical conditions, it would not do at all for broadcasting. In the first place, it would be far too noisy. That is, "the average transmitter produces a certain amount of hiss and crackle, which would be intolerable in high-grade broadcasting." So that, when carbon grain transmitters are used, they have to employ a special grade of carbon and to use very small currents so that they will produce a minimum of such objectionable noise. Otherwise the desired velvety silence when the artists are not singing will be missing, and the audience will be distracted and annoyed by the hiss of the transmitter.

A second objection to ordinary telephone transmitters is that they exaggerate certain frequencies of the voice or music very markedly because the vibrating diaphragm or sheet of the telephone transmitter responds most vigorously, or "resonates," to certain frequencies or pitches. This is not acceptable in sending out music. Particularly dangerous would be the effect of such partiality for

certain notes if the transmitters were used for sending out an orchestral selection. Some instruments would be partly suppressed and others exaggerated, thus spoiling the effect. So that it becomes necessary to use a telephone transmitter, which has a diaphragm which responds as evenly as possibly to notes of all pitches. One way of doing this is to use a thin and powerfully stretched diaphragm of steel or some other strong material which will respond equally to all usual tones. Another way is to use the so-called "glow microphone," which has been recently described,

ers as "The Voice of the Capital." Standing before it is Assistant Secretary of the U.S. Navy, Colonel Theodore Roosevelt and Major-General John L. Hines, U.S. Army. The transmitters (for there are two inside the casing) are enclosed in a casing which carries a design that is highly symbolic of broadcasting. It shows the harp—the emblem of music from earliest times, and the spark—which has always remained our classical symbol for radio. Although the spark is really not used in radio telephone stations, yet the harp-and-spark design is an appropriate symbol for

these requirements are very difficult to meet. Either resistance-coupled amplifiers have to be used, or else the greatest care has to be taken in the design of the special transformers used in a transformer-coupled amplifier for this work. Ordinary amplifiers would not serve at all, as is sometimes evident when listening to the "music" emanating from a badly designed broadcasting station. A good idea of the elaborate nature of a suitably designed amplifier is obtained from the second photograph of this article, which shows the control room amplifier of Broadcast Central,



Control Room Amplifier at WJZ, Aeolian Hall, New York. Controlling the quality of Station WJZ, New York, at the Control Room Amplifier.

where the vibrating element is a small column of glowing gas through which a small electric current is passing. Yet other methods are available, but most of them not particularly simple.

The telephone transmitter used for pick-up in the studio has to be suitably mounted and wired up to the rest of the equipment. The first photograph accompanying this article is the pick-up transmitter at station "WRC" of the Radio Corporation of America, located at Washington, D.C., and familiarly known to listen-

"music carried by radio." This particular design is due to Mr. Edward Field Sanford, Jr., one of America's leading sculptors and also, incidentally, a most ardent broadcast listener.

The amount of power which it is possible to get from these high-grade telephone transmitters is nearly always very small, and it becomes necessary to amplify it by means of a powerful amplifier. This amplifier must also be free from noise-producing tendencies, and must amplify notes of all pitches equally. Both

Stations WJY and WJZ of the Radio Corporation of America at Aeolian Hall, New York City. This amplifier is really two amplifiers, one at the top of the case, and the other at the bottom. Special relays permit either amplifier to be used at will so that there is always a spare amplifier available in case a tube burns out or some other defect develops in one of the amplifiers, while the control room engineering attendant at these amplifiers is perforce chained to his post during the entire performance.

(To be continued.)

2FC on the Air

Musical Comedy Broadcasted

Australian Triumph

ON the evening of January 10 last, Farmer's broadcasting service was officially opened.

No ceremonial marked the inception, but the opening programme, through the courtesy of J. C. Williamson Ltd. and Messrs. J. and N. Tait, took the form of a complete transmission of "The Southern Maid," the musical comedy then playing at Her Majesty's Theatre, Sydney. As the transmission of the play by wireless was effected it constituted an Australian record and a distinct triumph for Australian wireless engineers.

For some time the suitable placing of microphones upon the stage had been occupying the exclusive atten-

tion of those responsible and a few days before the official opening, a test was made under practical working conditions. Expectations were exceeded, with the result that preparations were hurried through so that the first programme was given a few evenings later.

Upon the stage, at certain tested spots, were placed the microphones and these were connected with an amplifying panel placed in the theatre's basement. From there transformed into electric currents and stepped up, the "sound" was carried by line to Farmer's studio situated on the roof garden, of their city building, passed through another panel and again taken by land line to the station at

Willoughby. From there it was transmitted by wireless.

Reports from all parts of N.S.W., showed that the programme was easily heard and many expressed themselves charmed and delighted with the musical fare provided.

Just before the curtain went up at the theatre, the announcer at 2FC gave a general call which was followed by a melodious peal of chimes rung on tubular bells. This was to give "listeners-in" a chance to tune in accurately. At the conclusion of this, the plot of the musical comedy was briefly outlined and thereupon, as the curtain rose, the studio was through to the microphones at the theatre and the play was then successfully broadcasted from 2FC.



One of the studios at "2FC," Farmer's Broadcasting Station, Sydney, the most up-to-date broadcasting station south of the line.

At Nukualofa, Tonga Building a Wireless Station

Most people—and wireless enthusiasts not the least of these—know there is an important radio station situated at Nukualofa, Tongan Islands, but few of these, perhaps, know the interesting inside story of its erection. However, the interesting tale has come into the hands of "Radio" and we take pleasure in setting it before our readers, with the conviction that it will prove of as much interest to them as it did to us.

By D. CAMPBELL, Equipment Manager, Amalgamated Wireless (A/sia.), Ltd.

ONE day in September, 1919, while resting from my several duties of Father Confessor and Consulting Surgeon to the Personnel and Material of the fleet of Australian steamers carrying the apparatus of Amalgamated Wireless (Australia) Ltd., I received an urgent summons from Mr. E. T. Fisk, the Managing Director of that company, who informed me a wireless station was to be erected at short notice at Nukualofa, in Tonga, and that the High Commissioner wanted it in working order by December. Mr. Fisk further informed me I was to proceed to Tonga with the necessary equipment and erect the station.

Then ensued a nightmare two days in which a supply of apparatus, information of this far off and little-known isle nestling away in a corner of the Pacific, and a hundred and one other things had to be got together, checked, re-checked and arranged. However, as a result of a telegram from the High Commissioner requesting a member of the company to catch the next steamer and collaborate with the Telegraph Superintendent of Fiji to select a site, Mr. G. Robertson, now N.Z. manager of the company, was aboard and had sailed in eight hours!

By October 25, exactly a month and a day from the word "Go!" the whole outfit had been collected, tested, checked, packed and delivered to the wharf. On Thursday, October 30, we slipped down the harbour with the s.s. *Atua* throbbing beneath our feet.

We arrived at Suva on a Friday, after 24 hours' quarantine, and after a short stay here sailed again and steamed through the reef at Nukualofa on the Monday.

Formalities being complied with, we landed at last, and found the preliminary excavation and concreting

well advanced, but immediately came up against one of our greatest stumbling blocks—native labour. An instance:—

By almost unheard-of luck, we secured seven "boys" to work for us. They were Veni, Afo, Finau, "Trousers" (the only one so equipped),



Mr. D. Campbell.

"Polisi" (employed in a weak moment as a policeman for a limited time), "Noah" and "Walker" (so-called on account of his habit of walking away at critical moments when his presence was required). This was Monday. Tuesday found Noah A.W.L.—probably looking for the Ark. "Walker" had lived up to his name, and "Trousers" had apparently lost his and was too modest to appear without them. On Wednesday Afo was not to be found, while Finau took

up loading copra, and "Polisi" said he was sick (of work?), which left us with our sheet anchor Veni. However, things righted themselves eventually and we began the business in hand.

Within a week of arrival a temporary aerial was erected between two trees in order to hear some news of the outer world and it was a very curious throng that gathered to read Nukualofa's first wireless bulletin!

In the meantime, work, despite innumerable set-backs progressed fast and passing rapidly through the first stages of concrete mixing, the first mast was laid out and assembled. Then followed the laying of concrete floors in the engine and battery rooms, and the placing of the dynamo, engine and alternator was successfully effected. Soon all was ready for the erection of the first of the 120 feet masts and the populace turned up in full strength to see it done. Many were the scoffers! Great was their disappointment! In four minutes from the time of "taking the strain" on the ropes, "Stop!" came the signal and the job, from the spectacular point of view, was done. Reluctantly the natives dispersed. Disappointed? Perhaps!

Some days later—two months from the date of embarkation—Nukualofa Radio, VSB, proclaimed itself a fully forged link in the world's radio service!

The station itself consists of the company's standard and type C4 set, $1\frac{1}{2}$ K.W., with disc discharger. Additions have since been embodied to permit of wave-lengths other than the usual commercial 300 and 600 metres to be used. Power is supplied from a $3\frac{3}{4}$ h.p. "Whitton" dynamo driven by a 7 h.p. kerosene engine. The receiver is of the 103 valve type,

and has proved most satisfactory. The masts are of the box type "C" pattern, 120 feet high, each being stayed to heavy concrete anchorages by 24 steel wires, and divided by two heavy porcelain insulators. Two of these masts are used carrying a flat top "T" aerial of four wires, five feet apart, roof 180 feet long and down leads 150 feet long.

Actually, the station is situated at the shore end of the wharf, about 50 yards from high water mark, on practically flat ground, with a sub-soil of three to six feet on coral and sand. The masts being 240 feet apart, rope jumpers were necessary at one end of the aerial. Main aerial, N.T.P., 470 metres; small, N.T.P., 195 metres.

The main aerial already partially described was suspended on standard ship type spreaders 15 feet long, with four bands on each. Space forbids the detailing of the construction of the 300 metre aerial.

The station is arranged to work on 300, 600, 800, 1,200 and 1,500 metres, and the receiver is of the usual 103 type and gives excellent results on long and short waves. Being wired throughout with L.C. cables well grounded, the station is remarkably free from induction. The ground system consists of an arrangement of galvanised iron plates joined together in groups of eight, with a separate earth of six plates in the best position for continuous submersion below water level. The remaining plates were used to make connecting straps between plates and the wires duplicated in every case, the 7-16 cables being brought from the apparatus to solid brass plates, one on each side of the verandah. Each plate has five studs, $\frac{1}{2}$ inch in diameter, with lock nuts, the earth cable coming out to the centre stud of each plate and earth wires being distributed on remaining studs. I might add that signals were received strongly on the temporary aerial with an earth consisting of two pieces of conduit, five feet long, driven into the ground.

Although the station was by now in proper working order, several things yet remained to be done to widen the scope of it. After some attempts, Suva (390 miles) and Apia, about the same distance, were worked, but to reach Awanui required an extra loading coil before experiments carried out at night under the worst

possible conditions were successful, as stations of much higher power were, at that time, experiencing difficulties in working.

For the rest of our stay on the island we spent our time in sight seeing. The tombs, or Langi, are most interesting, being huge, rectangular stone structures, some of which are repeated by inner lines rising like steps to the inner square, in the centre of which is the tomb. How they were built is, and is likely to remain, a

laga and a Paradise-like island known as Motu Tabu.

The natives themselves are of fine physique, pleasing appearance and manners, but more serious in demeanour than the Samoans. Intensely fond of a joke, kind to their children, and of a forebearing and peaceful disposition, they will always hold a warm spot in my heart.

One morning, "Navua arrives 2 p.m. on Friday" appeared on the Customs House notice board, and a



CELEBRATING THEIR 70TH WEDDING ANNIVERSARY IN THE 20TH CENTURY MANNER.

Mr. and Mrs. Charles D. Parker, of River Falls, Wisconsin, U.S.A., 96 and 93 respectively, celebrate their 70th wedding anniversary in the 20th century manner. Mr. Parker served 12 years in both branches of the Wisconsin Legislature and was Lieutenant-Governor of the State for four years. He also was regent of the University of Wisconsin.

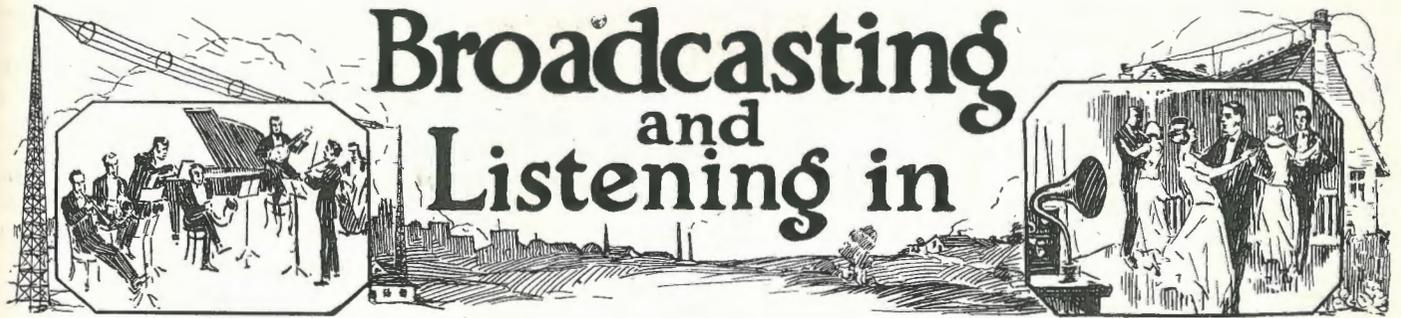
mystery, some of the blocks weighing over 20 tons. Mua was the ancient capital of Tonga and the residence of Tui Tonga, the temporal and spiritual leader of the Tongan nation. At the entrance to the large lagoon stands the town and it was here on one occasion that Captain Cook berthed. Other interesting places include the blow-holes at Homa, the Haumonga, or trelithium stones and caves at Ko-

day or so after that, we regretfully shook the dust of Nukualofa from our shoes.

As Mr. Robertson and I stood aft above the log line and watched that patch of green which had given us so many happy days fade away into the dusk I could not refrain from murmuring the island's beautiful farewell: "Ofa atu! Tonga ma Tonga . . . nofa a . . . aloha!"

PLACE YOUR HOME ON THE AIRLINE.

Instal a broadcast receiving set, and a high-class programme of music, news and information will be available each day and evening for a whole year — and as long after as you wish. You owe it to yourself and family to help in the grand ideal of having "A Receiving Set in every Home."



The different radio broadcasting activities of J. C. Williamson Ltd. and J. and N. Tait follow one hot upon the other. Now South Australia is to have a broadcasting station. Arrangements have been definitely completed between these firms and the Millswood Auto and Radio Co., Ltd., for operating a broadcasting station in South Australia. The station will cover all South Australia, Victoria, and New South Wales, in addition to parts of West Australia and Queensland. The usual items will be broadcasted and, in addition to the ordinary facilities afforded subscribers, selections from the best programmes of operatic and theatrical performances will be given.

On July 29, the late President Warren G. Harding announced that he would address the American People from the Civic Auditorium in San Francisco, California, on July 31st (which speech unfortunately was not made on account of his sudden illness and his subsequent lamentable early death). It was announced in the *New York Herald*, that no less than five million people would hear his speech instantaneously through simultaneously Scientific Radio Broadcasting.

The music of the world-famous Carillon at Malines Cathedral in Belgium is now being broadcasted through Belgium and the surrounding countries from a radio outfit installed in the belfry.

The Radio Broadcasting Station "SPE" at Rio de Janeiro, Brazil, has been heard in Honolulu, a distance of 8,000 miles—a truly remarkable performance.

If you have ever sat on a jury you will remember that the Judge admonished you not to read anything in

2FC	
BROADCASTING TIMES.	
P.M.	
12.55	Chimes.
1.00	Time Signals; News Items; Weather Reports; Stock Exchange News; and Produce News.
to	
1.30	
2.55	Chimes.
3.00	General News and Orchestral Items.
to	
4.00	
6.25	Chimes.
6.30	Children's Bed-time Stories; Late News; Stock Exchange Reports; Late Sporting & Market Reports.
to	
7.15	
7.55	Chimes.
8.00	Entertainment.
to	
8.45	
9.05	Entertainment.
to	
10.00	

the newspapers concerning the case with which you were to deal. Now that broadcasting is entering so much into our daily life, it will probably not be long before the judicial warning will take a similar form to this:—"... and so, gentlemen, in order that you may regard impartially the evidence for and against in this case, I must order you not only to abstain from perusing any reference to the case in the daily press, but also not to attend, or 'listen-in' to any broadcasting service where the news of the day is disseminated!" Decidedly sitting on a jury will soon no longer be the game of high remuneration and chaired ease it has been hitherto!

The will of James J. O'Heir, of New York, when recently probated contained, among the others, a bequest of "radio sets and tools, valued at £100" to William Watson.

This is believed to be the first instance where a radio receiving set has been specified in a will.

The other day an aeroplane was flying near Dingee (N.S.W.) when the pilot began to indulge in a little stunting, and looped the loop. Unfortunately, a parcel of new boots dropped out and fell at the feet of an old lady who was crossing a paddock far below. The package burst open and out rolled the boots, much to her astonishment. However, she gathered them up and hurried home. "'Ere you are, dad!" she called to the husband. "Them boots you ordered 'ave come. What a wunnerful thing this wireless is! I *thought* I 'eard the buzz of 'em comin' through the air."

WTAM, the Willard Storage Battery Company's broadcasting station at Cleveland, Ohio, was recently disseminating its nightly concert when listeners-in were intrigued by the announcer suddenly chipping in and asking radio enthusiasts in the southern states to look out for a certain business man who was touring there-about en route for Florida. The man was wanted home immediately, the announcer stated, as his father had just died suddenly.

Forty-five minutes after the broadcasting of the original request by the Cleveland station the Atlanta station cut in with the news that the man wanted had been located and that he was leaving for home on the midnight train.

The power of 2FC is only one-tenth at present of what it will eventually be. Some idea can be gleaned from this fact of the station's enormous possibilities.

Building 2FC

Details of Construction

Engineer's Colossal Task

THE whole of the apparatus employed at the transmitting station of 2FC at Willoughby was designed by Australians and the apparatus manufactured in an Australian factory, which, judging by the results obtained, refutes the idea that Australians are behind in the matter of broadcasting. In fact, people who have heard both 2LO (the famous London broadcasting station) and 2FC (the premier Australian Broadcasting station) have voiced the opinion that the later is at least equal in modulation to the former.

As is well-known, the construction of the station was entrusted by Farmer and Company Limited to Amalgamated Wireless (Australasia) Limited, whose experience in the wireless field is foremost in Australia, and to the Engineering Department of this latter Company is due all credit with respect to the conversion of speech, song and music into wireless energy, which is transmitted to and received in the four corners of this great island continent.

This Department is under the able guidance of Mr. A. S. McDonald, M.I.R.E., who is probably one of the best known personalities in the commercial wireless world of Australia, and who certainly knows more of this continent than most people suspect, due to the journeys which his official position have forced him to take across and around it. With him are associated Mr. D. Campbell, Construction Engineer, and Mr. J. G. Reed, Assistant Engineer, both of whom are also well-known personalities.

Situated on one of the highest positions in Willoughby, the two masts which form the supports for the aerial are visible for many miles around and certainly form a very conspicuous landmark.

These masts each 200 ft. high have a dead weight of six tons and



Mr. A. S. McDonald, M.I.R.E., Chief of the Engineering Department, Amalgamated Wireless, Ltd.

are stayed in three directions by three sets of guys, but to the casual observer the enormous stresses to which these structures are subjected would never be appreciated.

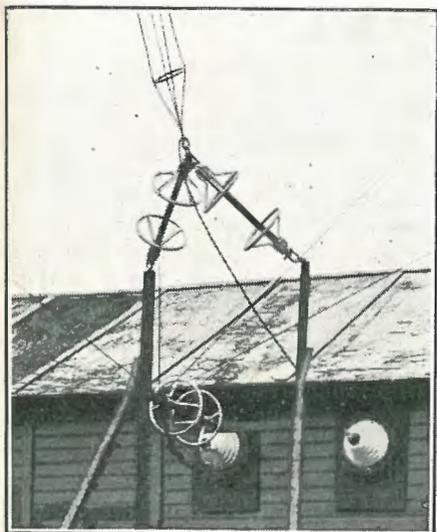
The aerial itself executes a pull on the head of each mast of approximately one ton; which in the mast (as a downward stress) and in the guy immediately behind it (as a tensional stress) means 2.5 and two tons respectively. This would be, of course, quite a small load for such structures were it not for the fact that wind is a much more important factor to consider than the actual aerial. For instance, the pressure exerted on one side of one of these masts by a wind with a velocity of 100 miles per hour (which is by no means uncommon in Sydney) would represent a push of 11 tons and under such a condition the force tending to push the mast

through its foundation would approximate 18 tons, while at the same time the strain on the guys tending to pull each of the anchors out of the ground would average six tons.

If we were to take, say, a vertical length of five feet, which is about the length of the greatest unsupported section in the mast it would support a vertical load of 45 tons before breaking. Between this figure and the one mentioned above as being the force tending to force the mast through its foundation there is a large difference, but this is accounted for by necessary allowances for safety factors and various other forms of loading. Again, if we were to take a length of the guy rope and load it up to breaking point we would find that this load would be 22 tons. There is, of course, the same discrepancy between this latter figure and the one given above as the average strain, but it is accounted for in the same way as in the case of the mast.

The method of erecting one of these masts may be of interest. The sections are all batted together on the ground and a Jury mast attached to its base, which is pivoted to the concrete foundations. From the top of this jury mast steel ropes, known as Banjo ropes, are taken down to various points on the mast and firmly affixed, but in such a manner that they each take their proper proportion of stress when the lifting winch exerts its pull on the head of the Jury mast through blocks and tackle having six falls. This tackle forms an angle to ground level of about 35 degrees (i.e., before the raising of the mast is commenced) and is firmly secured to an anchor buried at a suitable depth. It is interesting here also to obtain an insight into the stresses exerted in the various members while lifting. The height of jury mast was 40 feet; the resultant stress in the banjo ropes is 14 tons, the stress in each of the six

falls of the tackle 2½ tons or a total of 15 tons, while the force tending to drive the jury mast through its pivot is 12 tons. For the initial lift the



Aerial and earth-screen lead-ins at 2FC, Willoughby, N.S.W.

services of six men were required on the handles of the lifting winch.

The two aerials suspended between the masts are approximately 570 feet apart. The larger one of the two is the Famous 2FC, while the other is 2ME. The latter employs the usual earth connection, while the former employs a modern conception of Sir Oliver Lodge's counterpoise and is termed the screen, due to the fact that it screens the earth from the action of conductive currents which would otherwise circulate in it and give rise to a large loss of energy. It consists of eight wires about 20 feet apart, each running from the "lead in" to the Western extremity of the site under the aerial. Each wire is supported at a height of about 15 feet by three poles, one at each end and the other in the centre. The underlying principles, however, of the action of a screen is a decidedly involved matter, and is quite outside the scope of this article, but in passing it is sufficient to say that its use so increases the efficiency of a station that its cost is greatly outweighed by the advantages gained.

The transmitter employs what is termed a coupled circuit and energises the aerial through a very weak coupling, thereby eliminating the transmission of harmonics, which unfortunately is the case with many

stations in use to-day. As is well-known, these harmonics do not interfere with people listening-in to that particular service, but to others who are listening-in on wave lengths corresponding or close to harmonics of the offending station.

Precautions have been taken in the design of the set to make it as robust and durable as possible, and all the tender parts have been closed to protect them against damage and no stone has been left unturned in attempting to reach the success which it has proved to be.

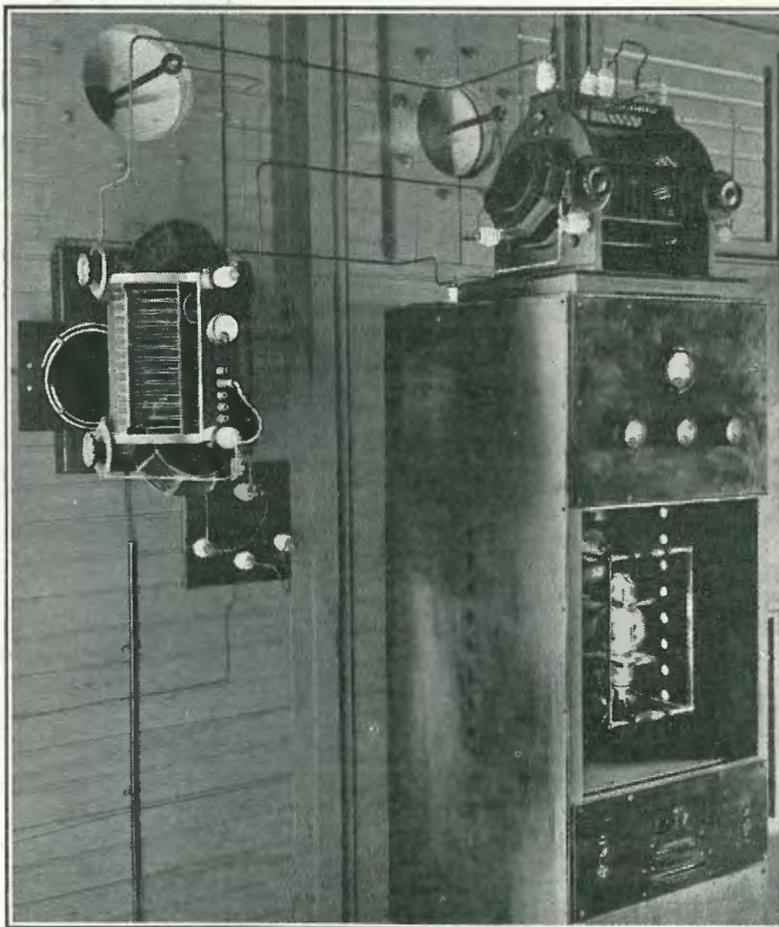
Indicating instruments have been provided in the aerial, coupled and generating circuits so that the attendants can make sure that everything is functioning correctly. An electrostatic voltmeter is provided to indicate the voltage across the high ten-

sion supply which, in this case, varies between 1,500 and 2,500 volts. An ammeter is also included in this circuit to indicate the feed current. A low reading voltmeter is connected permanently across the filament of the valve, so that the correct temperature can be maintained.

The high tension current for plate supply is generated directly by a direct current machine, which has only one commutation from which the 2,000 or so volts are collected. This generator is driven by a three-phase, 415 volt. A.C. motor, which obtains its supply from the municipal mains.

Two pairs of lines connect the transmitting station through different routes with the studio, which is situated in Farmer & Company's build-

(Continued on page 552.)



This photograph shows the main portion of the transmitting equipment at 2FC (Farmer's Broadcasting Station) at Willoughby, N.S.W. At extreme left is the Aerial Tuning Inductance, at extreme right is the Broadcast Transmitting Panel, on top of which is the Coupled or Tank Circuit Inductance with reaction coil and variometer for tuning purposes. The aerial and earth-screen lead-in insulators are seen at top left and right of photo.

Hearing Across Australia

From Sydney to Korbel (W.A.)

A Farmer's Interesting Letter

ALL the long, weary way from the Backblocks comes the following letter. Mr. J. C. Forster, of "Jesmond," Korbel, Western Australia, is a well-known and enterprising experimenter of his State and a sterling example of the Radio enthusiast, who, rather than be discouraged by lack of proper material and the additional drawback of long and tedious transport facilities, turns to and by his ingenuity alone makes that which he requires solely out of the materials at hand.

In the course of his long and interesting letter, Mr. Forster says:—

I believe that experimenters all over Australia will be interested in my station, because not only can I claim to be one of the most constant experimenters in this State, but I am also a farmer and a resident of the "backblocks," so I work under somewhat different conditions to the town experimenter.

I also believe that I am the only experimenter in W.A. who has, up to the present, heard wireless telephony from Sydney experimenters. I have listened on several occasions to Mr. C. D. Maclurean's Sunday night concerts. I have also heard other Eastern States amateurs transmitting, but as they are much weaker than 2CM, I have not been able to distinguish them. If they sent their call letters several times before and after transmissions in slow C.W., I would probably get them O.K. However, I am now looking forward to hearing Farmer & Co. broadcasting, as I should have no difficulty in hearing them with the apparatus I use.

Up to the present (19/11/23) my activities have been chiefly confined to "receiving," owing to the lack of a suitable power supply for transmitting purposes. Recently, however, some interesting tests in transmitting were carried out between this station and other experimenters in Perth (150 miles away). The transmitting

outfit used here consisted of two 5-watt Radiotron valves, while the plate voltage for the same was supplied by a hand-driven generator, and the filaments from my motor car battery, which I always use for working my receiving valves. Signals transmitted from here were successfully "received" in Perth, but one cannot expect an experimenter, no matter

working with experimenters in the Eastern States, and will thus prove an important link in the Australian relay scheme, as low power experimenters in Perth and elsewhere will be able to relay their messages through me to the East. I am well away from all commercial and broadcasting stations, so I will be allowed extra power, while I have excellent facilities for aerials, etc.

My "receiving set" has been gradually made like a patchwork quilt—bit by bit. I started with a crystal set, and then it became a single valve set, which gave me excellent results, while now I have a three-valve set which I consider ideal for my conditions. It consists of one stage of H.F. amplification which can be cut out if desired, detector, and one stage of L.F. amplification. With this set, spark stations such as Broome, Adelaide and Perth can be heard all over the room with the 'phones on the tables. Sydney and Singapore also come in very clearly and distinctly.

I had the set constructed on the unit system as you will see by the photo. This enables me to try out different circuits without much trouble, as all the essential parts such as valves, rheostats, etc., which are always required in all experiments, are contained in the units and thus kept properly connected up at all times.

I have two aerials. One is a single wire T 400 feet long with an average height of 40 feet, while the other is a two wire inverted L 200 feet long. I might mention also that I have been a member of the Wireless Institute for several years, and an old reader of "Sea, Land and Air."

In conclusion, I desire to state my appreciation and gratitude for all the assistance and advice so kindly given to me by West Australia's leading wireless experimenter and pioneer, Mr. W. E. Coxon, of Perth.



Mr. J. C. Forster (6Cl), of Korbel, W.A.

how enthusiastic, to turn a 500-volt generator with one hand and operate a sending key with the other for any length of time, so further transmitting tests have been deferred until early next winter. By that time I hope to have an electric generating plant installed, which, in addition to supplying light and power for various uses on the farm, will be used to work the motor-generator set of a powerful transmitter.

The transmitter will be specially constructed by me for the purpose of

Wireless in New Zealand

(By Our Special Correspondent.)

THE broadcasting scheme which is at present under consideration in the Dominion was advanced a further step when a request was made to the Postmaster-General to give his sanction to the establishment of one company to control all broadcasting in New Zealand, and to raise sufficient funds to work all the stations.

Mr. A. R. Christian headed the deputation and asked the Minister to approve the resolution passed at the recent broadcasting conference, particulars of which have already appeared in *Radio*. In answer to a question as to how many licenses it was hoped to issue, Mr. Christian said that for the first year they had taken licenses for 4000 sets. It was extremely difficult to calculate the figures, but in the second year they had calculated on 12,000 licenses.

The question of the effective radius of simple and possibly imperfect instruments was discussed. It was pointed out that in England 30 miles would be regarded as the limit within which such instruments would receive effectively, but against this it was stated that there were only eight broadcasting stations in England, and that with the greater absence of interference in New Zealand, the effective distance here might possibly be 60 miles for such instruments, although the majority of farmers, especially those in the back-blocks, had, as a rule, purchased three-valve instruments. The Minister said that every precaution would be taken to see that the people in isolated districts were safeguarded in this respect. He gave the deputation an assurance that they could be sure of an income from the licenses. There were, he said, many points that wanted working out by experts, and his officers would look into the matter and place a working proposal before him. His object was to avoid the pitfalls of other countries, give the public something of value, and not make broadcasting unpopular by reason of the many failures and drawbacks experienced by other countries.

A wireless concert was responsible for blocking the traffic in Queen

Street, Auckland, recently, with the result that a charge of obstructing the footpath was preferred against Radio Ltd., Company. The police reported that between eight and nine o'clock in the evening there was a crowd of many hundreds outside the premises of Radio Limited, listening to music which was coming from the building. Counsel for the defendant said that wireless was a very novel thing in this country, and it was necessary for the business that they should demonstrate the volume of sound that came from what was known as the Loud Speak-

The defendant was ordered to pay costs amounting to eleven shillings.

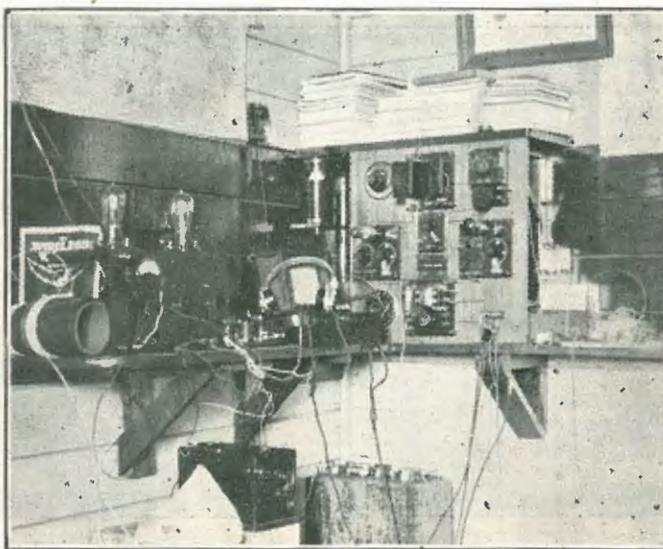
A broadcasting station has been established at Gisborne, making the following in operation in New Zealand:—

Auckland Radio Services: IYA, 260 metres, 200 watts.

C. H. Pearson, La Gloria Gramophones, Limited, Auckland: 1YB, 260 metres, 90 watts.

Gisborne Radio Co.: 2YM, 335 metres, 500 watts.

Wellington Broadcasters, Ltd.: 2YB, 275 metres, 15 watts.



Wireless Experimental Station 6CI, owned by J. C. Forster, "Jesmond," Korbil, West Australia.

ing device. The public, he said, were not invited to the concert. They had gathered purely out of curiosity attracted by the sound of the music.

Asked if he saw a policeman trying to move on the crowd, defendant amused the Court by replying "Yes, and he was jolly well enjoying the concert."

Senior Sergeant Rowle looked upon the affair as a conspiracy of advertising and defendant admitted that he personally would have risked breaking the by-law for the sake of the advertisement he would get.

The Magistrate said that the by-law was a necessity in a street like Queen Street. Music or concerts that attracted a crowd could not be allowed.

Dominion Radio Co., Wellington: 2YK, 276 metres, 15 watts.

British, Electrical and Engineering Co., Dunedin: 4YA, 310 metres, 500 watts.

To show the extent to which wireless activities are carried on in New Zealand, the following advertisement from one of the daily papers may be quoted: "Wireless operator wanted for seaside resort; must have certificate. Apply Box 506, Auckland."

Recently, Wellington Broadcasters Limited successfully sent out the whole of the play "The Cat and the Canary," which was picked up in many quarters.

International Break Sign

New Arrangements Complete

(Special to "Radio")

SOME few months ago the question of the international break sign for use by amateurs in all lands was discussed and the American Radio Relay League drew up a scheme and submitted it to amateurs in all parts of the world.

Briefly the scheme is this. If Australian station 2CM calls New Zealand station 3YA, instead of using the usual interval sign "DE" the letters "ZA" would be substituted and the procedure would be this: "3YA, 3YA, 3YA, ZA, 2CM, 2CM, 2CM K."

G Great Britain
I Italy
M Mexico
N Netherlands
O South Africa (the exception)
P Portugal
Q Cuba (phonetic)
R Argentine (phonetic)
S Spain
U United States
Z New Zealand

This leaves twelve letters still unassigned for future developments,

The one exception is in the case of British amateurs; their government has unfortunately raised technical objections, stating the only acceptable plan would be for them to prefix their assigned call letters with the initial of their country, retaining the "de" as at present. For example, in calling British amateurs, the first plan will hold, but the British amateur answering, will prefix both calls with the country's initial, instead of using the initials as the intermediate sign. For example, if British 2SH calls French 8AB, he would send "F8AB, F8AB, F8AB, de G2SH, G2SH, G2SH k." As this is the only exception to the general plan, it is hoped the British Post Office may be induced to change at a later date.

Amateurs reading of this plan for the first time will probably light on several objections, and therefore, to forestall doubt or dissatisfaction where it may exist, they will be answered before asked.

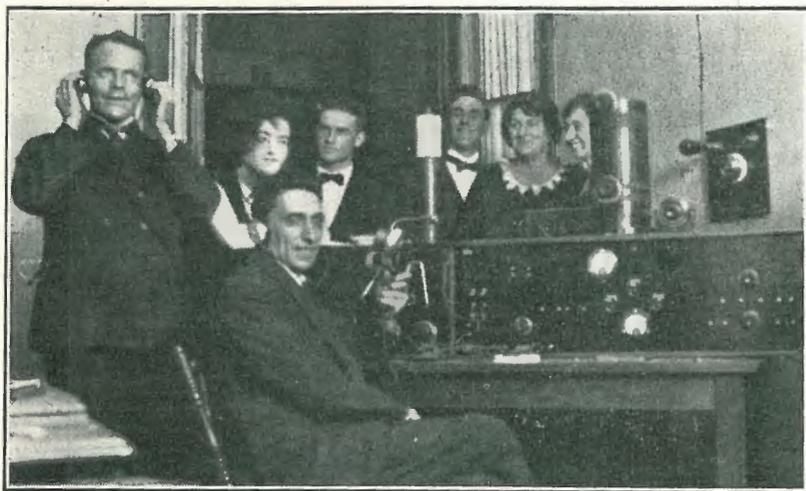
(1) Some countries will have same initial. As explained previously in case of such conflict, an arbitrary initial will have to be assigned but every effort will be made to do so phonetically.

(2) Not enough initials for all countries in the world. Quite true but neither does every country boast an amateur and with twelve initials left the supply will last for five years or so, before which the International Radiotelegraphic Convention will have met, and probably considered the international assignment of amateurs calls itself.

(3) Incorrect logging of the intermediate initials may result from QRZ or QRM signals. Yes, but when calling foreign amateurs or those over long distances, the call sequence will be repeated more than usual, giving the receiver several chances.

A word about the plan that ran second to this and its objections. Several endorsements of the plan to be used by the British amateurs were received, but careful analysis brought out the following disadvantages:—

(a) The prefixing of a call with an initial (F8AB), G2SH) would not be



Mr. J. S. Marks and some friends conducting experimental tests from 2GR.

The Z indicating New Zealand and A Australia.

If 3YA called 2CM the ZA would be reversed to AZ indicating that 2CM is an Australian station and 3YA New Zealand.

It requires little effort to remember, since in almost every case the initials indicate the country of origin except where two countries of the same initial have amateurs; in this case, it has been necessary to assign an arbitrary initial to one but it will be noticed that with one exception these arbitrary initials are phonetically suggestive of the country, which makes it that much easier. They are as follows:—

A Australia
C Canada
F France

and as the call arises they will be allotted and the proper publicity given.

When calling an amateur of your own country use the initials of that country, *once only*. The last International Radiotelegraphic Convention, known as the London Convention, did not provide for amateurs. The plan is not strictly according to regulations, nevertheless it has been unofficially in operation in modified form between Canadian and United States amateurs for several years without government protest and since it would amount to an agreement between amateurs only, for the betterment of their operating conditions without in the least affecting commercial, military or broadcast interests or causing confusion in calling, objectors' calls itself.

Broadcasting in Melbourne

SOON after Sydney, Melbourne has fallen into line, and it is expected that the southern capital will shortly witness the commencement of two comprehensive broadcasting services.

The first service will be controlled by the Australian Broadcasting Co., Ltd., with which Messrs. Farmer and Co., Sydney, are associated, while the latter, which proposes to commence operations by January 26, will be inaugurated by the Associated Radio Co. of Australia. Each company has a capital of £100,000.

Steps have already been taken by the Australian Broadcasting Co. for arrangement with Amalgamated Wireless, Ltd., to build in Melbourne a broadcasting station that will be one of the most powerful in the world. The plant will be exactly the same as the one erected by the company for Farmer and Co., Ltd., at Northbridge (N.S.W.). The arrangement entered into between 2FC and Messrs. J. C. Williamson, Ltd., J. and N. Tait and others in Sydney for the dissemination of musical attractions will be duplicated by the Victorian

company, as also will a news service from the leading morning and evening papers.

An important feature in connection with the Melbourne company's activities will be that of two services—a senior, for which an annual fee of three guineas will be charged, and a junior, for which the subscription will be only 10/-. In addition to the Government license fee of 10/-. The Company, by arrangement with the Postmaster-General, will be authorised to issue such licenses and appoint agents for this purpose. Shortly, the Company will be in a position to sell radio sets and accept subscriptions.

As already stated, the broadcasting station, a site for which has been obtained, will be one of the largest, most powerful and modern in the Southern Hemisphere. It will consist of two steel lattice towers, each 200 feet high, to support the aerial system, while the distance between the two towers will be 575 feet.

Similar broadcasting stations and services are to be erected and operated by the same company in Perth, Brisbane, Adelaide and Tasmania.

Besides the activities of the Australian Broadcasting Co., arrangements to promote a Victorian service are those of the Associated Radio Company of Australia and it is claimed by the managing director (Mr. A. L. Brown) that this service will be in full operation by January 26 at the latest. Premises in a Beckett Street have been secured and there a temporary 300-watt broadcasting station will be installed.

Giving further particulars of the company's plans, Mr. Brown stated that the stations to be built in Melbourne and Perth would commence

(Continued on page 552.)

International Break Sign

permitted by several governments, as the calls are assigned originally by the government and no charge thereto may be made by the amateur.

(b) Some government services have already been assigned calls commencing with a letter, followed by a numeral and one or more letters, so that conflict would certainly result, should the amateurs use this system generally.

(c) It increases the length of call unduly. Twenty-five per cent. in the case of three letter calls, 33 1-3 per cent. with two letter calls.

(d) Unless calls are sent very carefully and received quite clearly the prefixed initial may be transposed by the logger as constituting the last letter of the call. (F8AB may be lodged 8ABF).

The first plan is not absolutely watertight, but it was the one which received the united support of international amateurs over the other plans, and the main need right now is to get started—quickly.

CQ CALLS.
Mr. Charles MacLurcan, the well-known Australian experimenter suggests that when an amateur station calls "CQ" that the number of the State required be added to the call. For instance, if an Adelaide amateur station wants to give a general call to all Victorian or N.S.W., amateur stations the call should be made: CQ3 in the case of wanting a Victorian station or CQ2 for N.S.W. and so on.

If 2CM wants to call up some station in Queensland actually the procedure would be—"CQ4, CQ4, CQ4, A 2CM, 2CM, 2CM K."

It will be seen that "CQ4" indicates General call to all Queensland stations and the interval sign "A" indicates both the called and calling stations are Australian.

Every genuine experimenter should adopt these new methods of calling immediately as we believe that much will be accomplished in long distance low power amateur transmission during 1924.

DAVID JONES' RADIO SECTION.

Directed by
Mr. F. Basil Cooke, F.R.A.S.

Consequent upon the demand for high-grade Wireless Apparatus, David Jones' have installed a special section for the sale of these goods. This presents an opportunity for all interested in wireless to avail themselves of ideal purchasing conditions. Licenses will be issued upon payment of required fee.

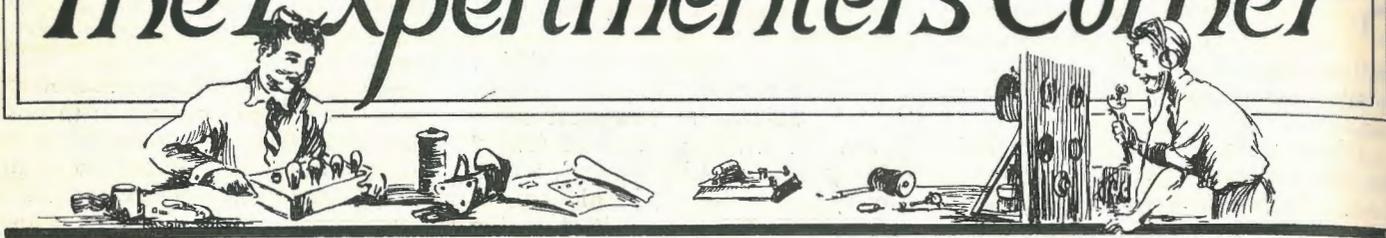
Of interest to experimenters — David Jones' have made a special feature of providing all wireless accessories, including the following:—

Accumulators, 2-volt units, priced at	21/- 33/- 40/- and 50/-
Valves, all standard makes, including Cunningham type "300."	
Price	35/-
Type "301A."	Price 42/6
Type "299."	Price 42/6
Marconi R Valves.	Price 25/-
Phillip's Detectors or Amplifiers,	
Price	22/6
All gauges of Winding Wire kept in stock.	
Silver and Nickel-plated Terminals.	
Price	Each 6d.
Silver and Nickel-plated Switch Studs.	Price Dozen 1/6
Transformers, Jefferson type, 45.	
Price	55/-
Transformers, Jefferson type, 41.	
Price	37/6
Transformers, Jefferson Star type.	
Price	37/6

DAVID JONES'

Radio Department,
22 York Street,
SYDNEY.

The Experimenters' Corner



IMPROVED REFLEX CIRCUITS.

IN the issue of *Radio*, No. 13, two circuits were given which employed the principle of reflex amplification using both valves and crystal detector. Since then considerable experimentation has been carried out in this direction with greatly improved results as regards stability and sharpness of tuning.

Referring to Fig. 1, which gives

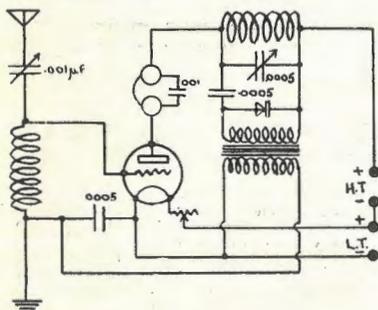


Fig. 1.

the connections for a crystal reflex amplifier, several improvements upon the original circuit will be noted. Previously the crystal detector and audio transformer were connected as a series circuit across the plate re-action

coil with a radio by-pass condenser in parallel with the transformer primary. This connection greatly increases the decrement of the circuit, and for spark and modulated wave-signals the tuning is made fairly broad. An improvement of several hundred per cent. can be made by connecting the detector and transformer combination as shown in Fig. 1. The crystal detector and transformer are connected in parallel and between them and the tuned circuit in the plate lead of the valve is placed a small fixed condenser. The smaller this condenser the sharper will be the tuning, although if it is made too small it will reduce the strength of the signals. Practical experience points to a value of approximately 0.00025 microfarads, as the limit for good signal strength. When connecting up the circuit care should be taken to place this condenser exactly as shown. It must be in the lead which comes from the high potential side of the radio frequency plate reaction coil. This point can be found experimentally, as it is that end of the coil which, when touched with the

finger, produces the greatest detuning of the circuit. Instead of using the small fixed condensers obtainable commercially, the best procedure is to clamp two pieces of thin brass foil and mica between two small ebonite or bakelite sheets and adjust the amount of overlap until the best results are obtained.

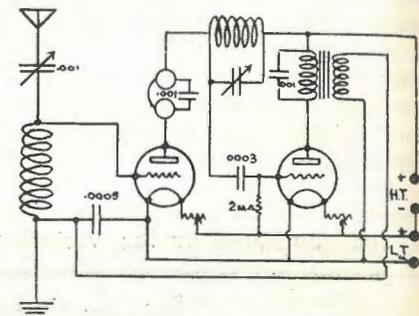


Fig. 2.

When using sensitive crystals which require a light surface contact, there is a tendency for the circuit to generate oscillations at an audio frequency which produce a loud squealing in the telephone receivers. The

(Continued on page 551.)

"Burginphone" Broadcast Receivers

MANUFACTURED IN AUSTRALIA TO SUIT SPECIAL CONDITIONS.

These Receivers have passed the Government test.

KELLOGG PARTS USED IN ALL OUR BROADCAST RECEIVERS.

This material is the cream of Radio Equipment.

Experimenters and Constructors can have all their requirements met with at our Sales Rooms, where all advice will be given gratis.

We Specialise in Experimental Receivers and Transmitters of all Designs.

DEMONSTRATIONS DAILY.

SEND OR CALL FOR PRICE LIST.

BURGIN ELECTRIC COY.

Wireless Engineers, Manufacturers and Suppliers,

1st FLOOR, 391 GEORGE STREET, SYDNEY.

Australian Broadcasting Stations

Licenses Issued

We are advised by the Chief Manager of Telegraphs and Wireless of the broadcasting stations and particulars of licenses issued in Australia under the new regulations up to December 31, 1923. The following is the list:—

Licence No. 1.—Farmer & Company, Sydney. Wave-length 1,100 metres, power 5,000 watts; call letters, 2LO. Financial guarantee £1,000—bank surety: Subscription to be charged.

Licence No. 2—Millswood Auto and Radio Ltd., Adelaide. Wave-length, 850 metres; Power, 3,000 watts; Call Letters, 5MA. Financial guarantee, £1,000—bank surety: Subscription to be charged.

Licence No. 3—Broadcasters (Sydney), Limited, Sydney. Wave-length, 350 metres; Power, 500 watts; Call



Letters, 2SB. Financial guarantee—bank surety, £250, and £750 Bond (having regard to free service). No subscription charged.

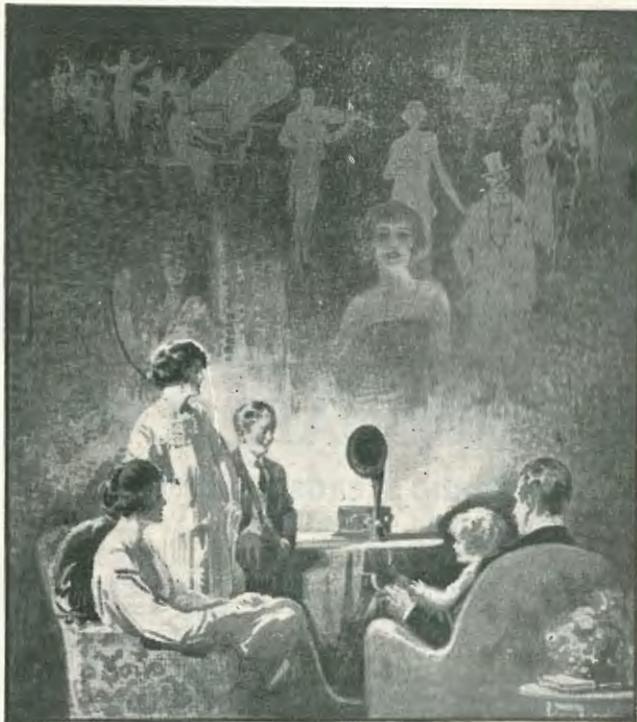
Licence No. 4—Farmer & Company, Limited, Melbourne. Wave-length, 400 metres. Power, 500 watts;

Call Letters, 3FL. Financial guarantee, £1,000—bank surety. Subscription to be charged.

Licence No. 5.—Farmer & Company, Ltd., Melbourne. Wave-length, 1,720 metres; Power, 5,000 watts; Call letters, 3FC. Financial guarantee, £1,000—bank surety. Subscription to be charged.

Licence No. 6.—Farmer & Company, Sydney. Wave-length, 880 metres; Power, 500 watts; Call Letters, 2FL. Financial guarantee, £1,000—bank surety: Subscription to be charged.

Considerable interest and enthusiasm has been created in Capetown by the report that wireless amateurs at Middleburg (Cape Province) and at Camp's Bay, near Capetown, have picked up broadcasted concert items from a London station.



Into the Home a radio set will make you a member of the World's greatest audience.

It places you and your friends in the best seats for "listening-in" to the wonders brought to you through the air on waves which travel with the speed of light.

To enjoy radio to the full your set must be a Western Electric.

There is a complete set to suit your purse.

For expert advice on the use and purchase of Radio apparatus Write or call. (Telephone: City 336, 356.)

Western Electric Company
(Australia) Ltd.

192-194 Castlereagh Street,
SYDNEY.

Wireless days *and* nights—

Waverley Radio Club

By A. BURROWS.

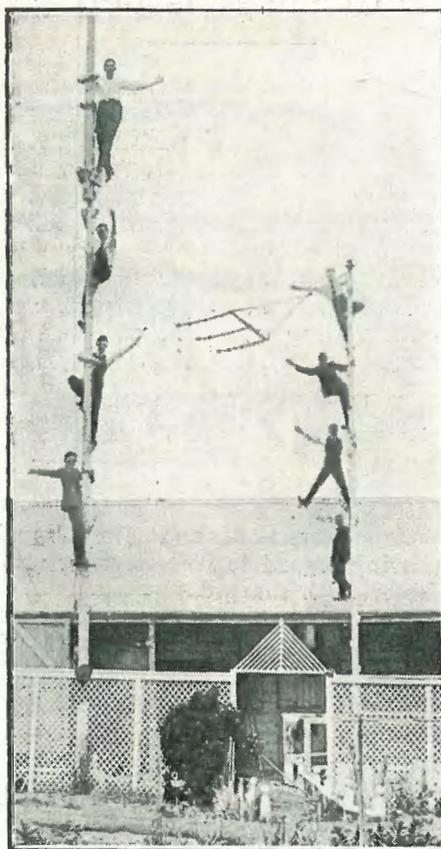
ON the 27th January, 1919, the Waverley Amateur Wireless Club held its first meeting. Since then the club has twice altered its name—first to "Waverley Amateur Radio Club," and more recently to "Waverley Radio Club," by which less impressive name the club is now known.

There is only one wireless organisation in Sydney older than the Waverley Club, that being the Wireless Institute.

The inaugural meeting was held at the residence of Mr. R. D. Charlesworth (now assistant-secretary to the Wireless Institute), who was elected president. Altogether, there were five enthusiastic pioneers present at that meeting.

It was those five, with some others, upon whom the pioneering work fell—pioneering in every sense of the word, for a local radio club was an innovation indeed, and the officers had no precedent or example of any kind to follow. When, later, it seemed that the restrictions of the influenza epidemic would definitely decide the club's fate, it was the tenacity of the early few which pulled it through.

In February, 1922, the club, in common with all radio amateurs, was shocked by the untimely death of Frank Geddes, its popular vice-president. He was a keen experimenter, and was well-known and liked by all who were in the game at the time.



Some of the members at the Waverley Radio Club.

The club's *journal*, which lasted about eighteen months, was considered quite a feature of the club. It consisted of several typewritten pages, and was issued monthly—when

the number of contributions permitted. Ultimately, however, the editor rebelled at being literary, composing and printing staffs, and the journal ceased publication. It has never been revived since.

The settling of the club in its rooms marked its foundation as the leading suburban club of Sydney, a position it has held ever since. In August last the club, with the consent of Sydney's amateurs, was honoured by the Trans-Pacific Test organisation for N.S.W.

A long line of social functions can also be credited to the club. Various wireless dances, concerts and launch excursions conducted by it have been marked with every success.

The first president occupied the chair for two years, after which Mr. T. L. S. Holesgrove was elected to the office. Mr. E. Bowman, now manager of the Sydney Dynamo and Motor Works, followed, occupying the position for about two years. Mr. M. Perry, whose standing in the wireless world needs no mention, is now president. The club has enrolled some of the best known men of the radio community at different times. The present council consists of Messrs. R. Howell, E. Bowman, G. Thomson, J. Marsland, H. Simpson and T. Nott.

Wireless clubs spring up over night now, and some unfortunately die as quickly. A club, however, which has lasted for half a decade is not of the mushroom variety!



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Movements of Wireless Officers

Mr. A. Cuthill signed on s.s. *Morinda*, at Sydney, January 2.

Mr. S. J. McVeigh signed off s.s. *Dilga*, at Sydney, January 2.

Mr. T. V. Tressler signed off s.s. *Era*, at Geelong, December 28, and signed on s.s. *Gilgai* as senior operator at Sydney, January 3.

Mr. W. H. Hill signed on s.s. *Hobart*, at Melbourne, December 28.

Mr. W. H. George relieved Mr. W. Hill on s.s. *Loongana*, at Melbourne, December 28.

Mr. J. A. McIntosh signed on s.s. *Mararoa*, at Wellington, December 21.

Mr. F. N. Davidson relieved Mr. H. B. Monks on s.s. *Dimboola*, at Sydney, January 3.

Mr. A. B. Monks signed on s.s. *Waimo*, at Sydney, January 3.

Messrs. W. L. Myers and S. G. White signed on s.s. *Gilgai* as 3rd operators at Sydney, January 3.

Mr. W. L. Myers signed off s.s. *Taiyuan* as 3rd operator, at Sydney, January 3.

Mr. M. Webb-Watts signed off s.s. *Aeon*, at Melbourne, December 27.

Mr. H. J. Byrne signed off s.s. *Koowarra*, at Melbourne, January 2, and signed on s.s. *Moorabool*, at Geelong, January 3.

Mr. T. M. Alexander signed off s.s. *Koorunga*, at Melbourne, January 3.

Mr. P. C. Gillon was relieved by Mr. A. J. Costa on s.s. *Century*, at Newcastle, January 7, and proceeded on Home Port leave.

Mr. P. Whelan signed off s.s. *Kadina*, at Sydney, January 7, and signed on s.s. *War Spray*, at Newcastle, January 8.

Mr. A. V. Middleton signed on s.s. *Enoggera*, at Sydney, January 9.

Mr. J. R. Gilligan signed on s.s. *Aroona*, at Sydney, January 8.

Messrs. E. I. Hyde, F. Snape and R. W. S. Bailey signed on s.s. *Calulu* as senior and 3rd operators respectively, at Sydney, January 8.

Mr. B. Boni signed off s.s. *Minderoo*, at Fremantle, December 28, and relieved Mr. A. W. Hooper on s.s. *Karoola*, same date.

Mr. A. W. Hooper signed on s.s. *Minderoo*, at Fremantle, December 28.

Mr. J. D. Wood signed off s.s. *Calulu*, at Sydney, January 3, as 3rd op-

erator and signed on s.s. *Niagara* as 2nd operator, same date.

Mr. V. E. Stanley relieved Mr. R. E. Haddock on s.s. *Time*, at Sydney, January 8.

Mr. B. Boni relieved Mr. F. Exon on s.s. *Eastern* as senior operator, at Sydney, January 8.

Mr. E. T. Prentice signed on s.s. *Dilkeria*, at Sydney, January 9.

Mr. G. Tracey signed on s.s. *Barwon*, at Sydney, January 9.

Mr. G. Britcher signed off s.s. *Barambah* as senior operator, and signed on s.s. *Eastern* as 3rd operator, same date.

Mr. R. C. V. Humphery signed off s.s. *Eastern* as 3rd operator, at Sydney, January 9, and relieved Mr. C. Drew on s.s. *Cantara*, at Sydney, same date.

Mr. R. C. V. Humphery signed off s.s. *Eastern* as 3rd operator, at Sydney, January 9, and relieved Mr. C. Drew on s.s. *Cantara*, at Sydney, same date.

Mr. A. C. Jackson signed off s.s. *Barambah* as 3rd operator, at Sydney, January 9, and signed on s.s. *Hobsons Bay*, at Sydney, same date.

Mr. C. L. Dawe terminated service, January 7.

Mr. C. Laurie signed off s.s. *Katoa*, at Wellington, December 29, and signed on s.s. *Waitomo*, same date.

Mr. L. A. Hudson was relieved by Mr. T. H. McWilliams on s.s. *Waihora*, at Auckland, December 31, and proceeded on Home Port leave.

Mr. H. Kirk signed off s.s. *Wahine* and signed on s.s. *Katoa*, at Wellington, January 2.

Mr. F. E. Duggan rejoined s.s. *Wahine*, at Wellington, January 2.

Mr. J. H. Hawkins signed off s.s. *Manuka* and signed on s.s. *Maheno*, at Wellington, January 2.

Coastal Radio Service

Mr. S. Trim, Officer-in-Charge, Perth Radio Station, has been transferred to the Engineering Department, Amalgamated Wireless Ltd., Sydney.

Mr. M. G. Pope, Officer-in-Charge, Adelaide Radio Station, has been transferred to Perth Radio as Officer-in-Charge.

Mr. H. Selfe, Radiotelegraphist, Broome Radio, has been transferred to Perth Radio on completion of his terms of tropical service.

Mr. J. F. Christie, Radiotelegraphist, Geraldton Radio, has been transferred to Broome Radio.

Mr. H. E. Oates, has been appointed Radiotelegraphist at Adelaide Radio Station.

Mr. R. Simons, Radiotelegraphist, has returned to his headquarters, Melbourne Radio, after relief duties at Hobart.

Mr. J. H. Chesterfield, Radiotelegraphist, Adelaide Radio Station, has been transferred to the Broadcasting Department and is stationed at Adelaide.

Mr. A. R. Finch, Rigger, has returned to his headquarters, Melbourne, on completion of overhaul of masts and aerials at the Northern Stations.

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News from W.A.

AT the last monthly meeting of the Wireless Institute of Australia, W.A. Division, Mr. A. E. Stephens, Secretary, delivered a very interesting and instructive lecture on "Valve Amplification." The speaker demonstrated with diagrams several circuits of high and low frequency amplification.

The Institute intends holding a wireless exhibition and demonstration in conjunction with the Wireless Traders of this State, and it promises to be the greatest of its kind ever held in West Australia.

It has been decided to alter the General Meeting night of the Mount Lawley Radio Club to every alternate Thursday. This alteration has been brought about on account of numbers of the Club's members desiring to "listen-in" to Mr. Coxon's Friday night entertainments. Therefore, the meetings of the Club will be conducted as follow:—Every Tuesday night at 7.30 p.m., buzzer practice; every alternate Thursday at 7.30 p.m., buzzer practice; and every alternate Thursday at 8 p.m., General Meeting and lecture.

Owing to the resignation from the Club, on account of unforeseen circumstances, of Mr. J. A. Wishaw, of the Wireless Supplies Co., Technical Adviser and Vice-President, Mr. Craige, of Craige and Co. (perhaps the most flourishing Radio Emporium in the West) has been unanimously elected to fill the vacancy.

At the conclusion of the meeting held in the University last Monday, the form in which the recognition of the services given by Mr. W. E. Coxon towards Westralian amateurs would be taken was discussed and it was decided that the Secretaries of the Institute, Development Association, and the various clubs and societies form themselves into a working committee and arrange the necessary details.

The first concert to be broadcasted in W.A. was recently held at the Lyceum Theatre, Mount Lawley, and proved a great success. Organised for the purpose of raising funds to purchase a set for their Club, the Mount Lawley amateurs are to be complimented on their efforts. The audience at the theatre was both large and appreciative.



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Queries Answered



H. W. T. (Portland) asks for diagram and particulars for constructing a receiving set to receive broadcasting and other stations within a radius of 150 miles.

Answer: Your best plan would be to instal a crystal-valve reflex, as described in this issue.

H. L. G. (St. Kilda) submits particulars of receiver and asks: (1) Wave-length of Victorian broadcasting stations; (2) how to obtain reactive effect on short wave-lengths; (3) could Farmer's Sydney broadcasting station be received on a single valve?

Answer: (1) No information regarding wave-lengths has been made public; (2) use the regenerative reflex circuit as described in this issue. (3) Yes, when full power is used.

A. J. P. (Yass) submits particulars of loose coupler and asks: (1) Wave-length. (2) What effect would a .001 variable condenser have if placed in series or in parallel? (3) Is wave-length altered if a valve is used in place of a crystal detector?

Answer: (1) Assuming an aerial capacity of 0.003 m.f. your tuner should cover a range of 300 to 1,500 metres with 0.001 m.f. condensers in primary and secondary circuits. (2),

Placing a condenser in series will reduce your wave-length slightly, parallel connection will increase it. (3) Yes, if a soft valve or regenerative circuit is used.

J. C. M. (Gretna) asks: (1) Wave-length of Victorian and Tasmanian broadcasting stations, and when they commence operations. (2) Would two valves coupled by non-inductive resistance be satisfactory on short wave-lengths? (3) What would be best resistance for Expanse A and UV 200, also percentage of voltage increase on first valve over ordinary voltage used on the plate?

Answer: (1) This information has not yet been made public. (2), (3) and (4) Resistance coupling is very poor on short wave-lengths, but for waves in excess of 1,000 metres use resistance of 100,000 ohms and double the original H.T. battery. Why not use Radio transformers, as described in issue *Radio*, No. 5.

E. T. M. (Walcha) submits particulars of aerial and asks: (1) Approximate natural wave-length. (2) Wave-length of coil (particulars submitted)? (3) Would Marconi "R" valves be suitable with circuit (diagram submitted)? (4) What value

condensers should be used in aerial and grid circuits?

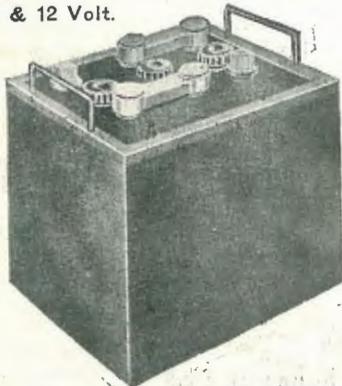
Answer: (1) About 150 metres. (2) In conjunction with the above aerial your coil will tune from 300 to 900 metres. (3) Yes, but if you have difficulty in getting storage batteries charged use D E R or U V.199 valves. (4) Grid condenser 0.0005 fixed, aerial condenser 0.001 variable.

L. C. (Casino) submits particulars of aerial and receiver and asks: (1) Wave-length of honeycomb coils? (2) Could Farmer's Concerts on high power be received on a single valve heterodyne receiver? (3) Does the list of wave-lengths published on page 330 issue *Radio*, No. 15, include any aerial?

Answer: (1) 500—1,000 metres. (2) Yes. (3) This list is for a coil in the secondary circuit. Add 25 per cent. to the wave-length for use in the aerial.

E. S. (Mincha West) submits diagram and particulars of telephone transmitter and asks: (1) Is this circuit efficient? (2) If so, what is its approximate range, using four-wire 3/20 aerial 50ft. long and 40ft. high? (3) Would Marconi-Osram "R" Valve be suitable for transmitting a distance of 25 miles, using 100 volts

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on the plate? (4) Why is there no battery across the microphone? (5) Which is the most suitable make of microphone? (6) Size of coils for 240 metre work, using above-mentioned aerial?

Answer: (1) The efficiency of this circuit is very low. (2) and (3) Not more than five miles. (4) The transmitter works by absorption modulation through inductance L3. (5) Stromberg Carlson six-volt magneto 'phone type, as sold by L. P. R. Bean & Co., of Castle-reagh Street, Sydney. (6) Use 35 and 50 turn honeycombs.

Reflex Circuits*(Continued from page 544.)*

solution is to use those crystals which are more robust in their operation, and to change the position of the telephone receivers or telephone transformers from their usual position immediately after the high tension battery to a point between the reaction coil and the plate of the valve.

Referring to the two-valve combination shown in Fig. 2, which employs a tuned choke coupling between the amplifier and detector valve the main alteration is use of a reflex circuit and the change of the position of the telephone receivers. If the output circuit is connected between the high tension battery and the point where the detector grid condenser couples to the plate circuit of the amplifier, there will exist an audio frequency coupling effect which, under certain conditions, will give rise to sustained oscillations within the audible range. This tendency can be reduced by making the capacity of the grid condenser smaller, but if the amplification factor of the valves is high and the audio reflex transformer is efficient, the capacity may have to be made so small that it will interfere with the transfer of the radio currents on longer wave-lengths. By transferring the output circuit to a position between the anode choke and plate of the amplifier valve, and connecting the detector grid condenser lead between the telephones and the choke coil the audio coupling circuit is removed, and only radio oscillations can be passed through to the detector.

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(Continued from page 539.)

ing in the city, approximately six miles distant by air line and considerably further by the route the connecting lines take. These lines are used only for the conveying of microphone currents and switching arrangements are provided at both ends to switch in either of them in case the other becomes defective. Ordinary communication can be maintained through other lines or through the one not in use for programmes. These various channels of communication are necessary to ensure continuity of service which is so essential in any modern broadcasting undertaking.

In the construction of the studio, Farmer's have spared no expense and the absence of distortion due to echoes in the programmes broadcasted bear ample witness of their effectiveness. The floors float on felt pads, the walls and ceiling are padded inside and out with an effective damping substance and the doors and observation window are effectively doubled, so that it is almost impossible for any sound emanating from an outside source to disturb the microphone. This latter piece of apparatus is probably the most effective "variable resistance" type in the world to-day. Its currents, which vary with the disturbing sound

are amplified in the instrument room, stepped down for line transmission (the reverse to power transmission) and stepped up at the station before being passed on to the transmitting set. From the instrument room at the studio further lines extend out to theatres and halls and by a simple switching device any of them can be switched on to the transmitter, thus enabling a programme to be collected at any of these several points.

After having read the foregoing lines the reader will readily understand the difficulties which have been encountered and overcome in broadcasting say "The Southern Maid" or "Farmer's Instrumental Trio," and how each link in the long chain is absolutely dependent on all others and how the faulty design of one part will mar transmission, although all others are 100 per cent. correct. Further, what a wonderful thing the transmitter is where a direct current is converted into an alternating current of 273,000 cycles per second (1,100 metres), where the microphone currents collected in the studio are superimposed without distortion on this alternating current, and where this composite alternating current is passed on to the aerial which latter radiates it as wireless energy enabling the listener-in to receive music and song in his home exactly as it was produced in the studio not one-hundredth of a second before!

Broadcasting in Melbourne

(Continued from page 543.)

activities first; Sydney, Hobart, Brisbane and Adelaide following later.

"It is proposed," continued Mr. Brown, "to erect a station of ten times this power somewhere in the eastern suburbs shortly. The plans for this station have been prepared, and it will cover an area of about three acres of land. Two masts, each 200ft. high, will be erected. When this station is completed the Melbourne service will be conducted from it, and the station in a Beckett Street will be taken to Hobart and a service commenced there. The first services in Melbourne will consist of transmissions from 8 to 10 o'clock each night except Sunday, and transmissions during the day will also be held. Later the service will be extended, and transmissions will be commenced at 9 o'clock in the morning, and will be continued until late at night, and services will also be provided on Sundays."

It would cost about £5,000 to erect each station and it was proposed to spend £40,000 per annum on the provision of suitable programmes. To this expenditure would have to be added cost of operating.

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