ISSUED EVERY — — SECOND WEDNESDAY

SIXPENCE

RADIO

IN AUSTRALIA & NEW ZEALAND

Incorporating "Sea, Land and Air"

VOL. I. SEPTEMBER 19, 1923 No. 13

Lila Lee, Paramount leading lady, "tunes in" on a radio receiving set.

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RADIO
IN AUSTRALIA & NEW ZEALAND
Incorporating "Sea, Land and Air"

Managing Editor: S. E. TATHAM. Associate Editor: M. DIXON.

CONTENTS

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Wireless Has Triumphed

FEW people out of the countless millions the world over who read of the terrible catastrophe which overwhelmed Japan are aware of the wonderful service rendered by the Japanese radio station at Tomioka, on the west coast of Japan, 144 miles north of Tokio, in supplying news of the disaster.

AFTER the first devastating shock on September 1, the only link with the outside world was the lonely radio station at Tomioka, whose transmitting masts tower to a height of 660 feet. How well the operator there did his work was evidenced by the prompt and complete reports published all over the world.

THE Sydney "Sun," in an editorial emphasising the outstanding value of wireless in broadcasting the news of the disaster, said:—

> **"Had it not been for the existence of wireless the world would have still been ignorant of the terrible catastrophe which has overwhelmed Japan.**
>
> **"All the news that we have received has been via wireless; the cables, as was under the circumstances inevitable, became useless.**
>
> **"The delay in informing the world of this sensational news was not the important point; it would not have mattered much if the full story had not come for days. The real value of wireless was its speed in bringing food and rescue vessels to the starving and stricken inhabitants of that isolated country.**
>
> **"Wireless has triumphed."**

IT invariably happens that every great disaster reveals some hitherto unsuspected quality in human courage or material appliances which has a comforting, if not a compensating effect on the morale of mankind.

WIRELESS was the bright spot in the recent dreadful disaster in the East—the all-powerful voice which spread news of the direful plight of countless millions to the other nations of the world and brought food and help to the stricken people.

WIRELESS has indeed triumphed!

A Worthy Example

THE Toombul Show Society in Queensland has created a noteworthy precedent by providing prizes for radio equipment and arranging a demonstration of wireless telephony at its forthcoming exhibition.

THE example is one that might well be followed by the hundreds of other Show Societies throughout Australia.

PUBLIC recognition of the value of radio in the everyday affairs of life is what is needed to awaken people to a sense of its full utility.

THERE is probably no better way of doing this than by drawing attention to it in the manner proposed by the Toombul Show Committee.

IN the comparatively brief period since radio passed from the experimental to the practical stage, it has established a reputation for service to mankind unique amongst scientific discoveries of ancient or modern times.

MARCONI'S modest but historic achievement in getting the first wireless signals across the English Channel was the beginning of a long list of notable successes in radio research which, it is doubtful, if even the famous inventor himself visualised at the time.

THE past couple of years have witnessed great progress in the application of wireless telephony throughout the whole world, and Australia has not lagged behind in her use and appreciation of this distance-annihilating agent.

SEVERAL big undertakings are on the eve of being launched, notably the erection of a high-power commercial wireless station to communicate direct with England, and a broadcasting service which will carry news and entertainment into thousands of homes throughout Australia.

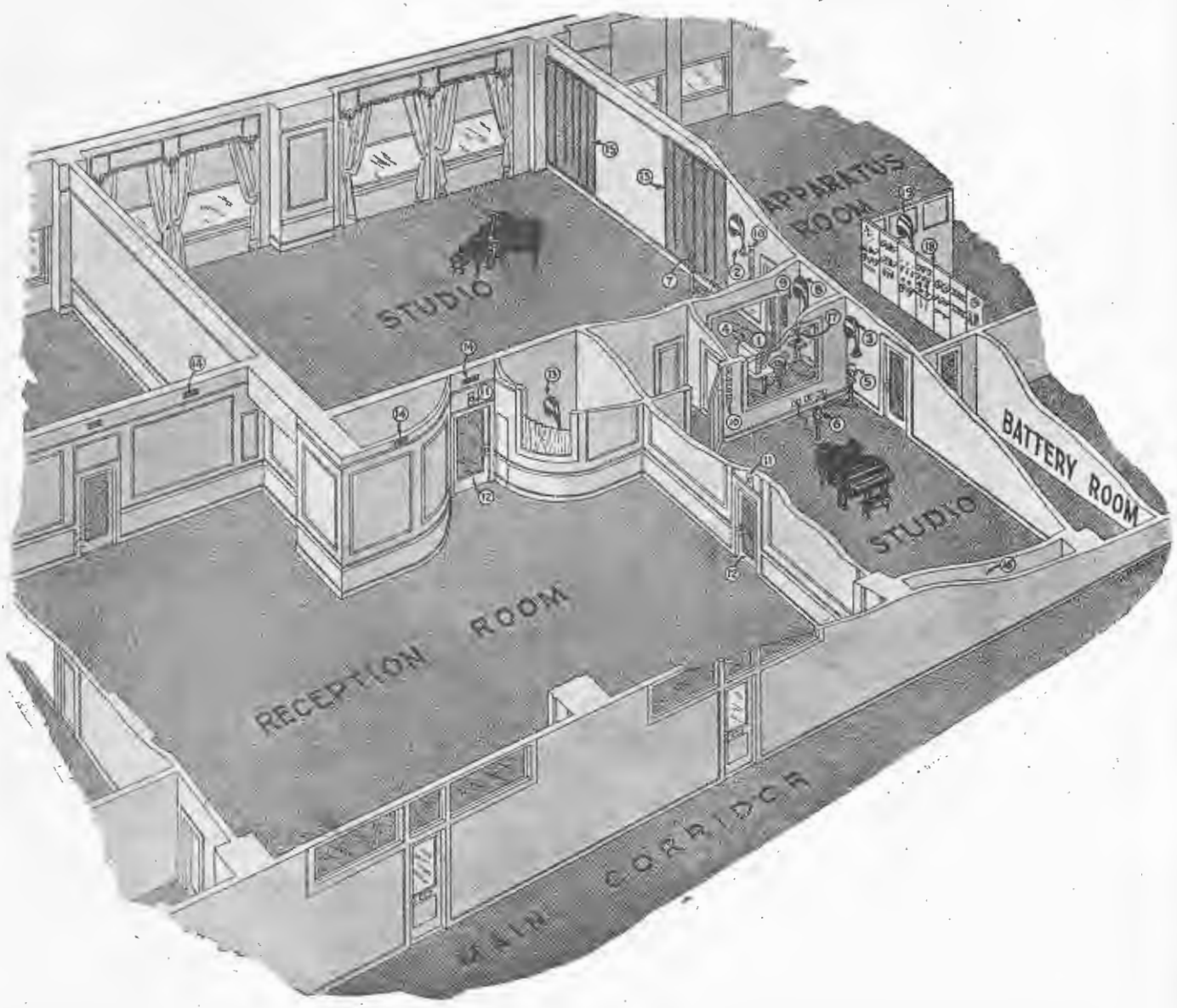
IF public bodies in the Commonwealth can be induced to follow the example of the Toombul Show Society and bring wireless under the notice of the man in the street by the simple and effective method of encouraging and featuring it on every possible occasion it will be an excellent thing for Australia and the science generally.

Broadcasting Station and Studio

In New York City

THE American Telephone & Telegraph Company recently placed in operation at 195 Broadway, New York, a new dual Broadcasting Station. The actual broadcasting transmitter was situated at 24 Walker Street, New York. The studio is connected with the transmitter by means of special land lines. This new studio—of which a schematic diagram is shown herewith—was specially designed to eliminate delays between the various items on the programme, and also special methods have been introduced to make possible the perfect balance and placement of artists for the best radio reproduction. So efficiently has the studio been designed that the speech and music transmitted by this new station heard on good radio receiving sets is equal in musical quality to that heard in theatres and concert halls.

Two studios are used to eliminate the delays between items. While the artists in one studio are preparing to transmit, the artists in the other studio are "on the air," so that immediately one item is completed the



This schematic diagram shows the arrangement of the American Telephone and Telegraph Company's new broadcasting studios in New York City.

artists in the other studio are ready to be switched on.

In the diagram shown the announcer is enclosed in a sound-proof booth (1) which gives a clear view of both studios. A loud speaker is fitted in the booth and thus gives the announcer a reproduction of the actual performance in the studios as it is heard in the ether. Consequently, the announcer can place the artist about the microphone, so that the best possible radio reproduction results are obtained.

The call letters assigned to this new station are WEAF, and it operates an exclusive wave-length of 492 metres.

Referring to the schematic diagram, the announcer's microphone (1) is located in a sound-proof announcing booth having double plate glass windows and giving clear vision to both sudios. Special walls render the booth practically impervious to sounds from the studios. The loud speakers (2 and 3) in the studios repeat the announcer's introduction of artists and also enable him to give directions regarding placement of instruments and singers while the studio is idle. Switches on the announcer's control panel (4) enable him to switch in his own announcing microphone on those in large and small studio (5, 6 and 7). There are two microphones in each studio, one regular and one emergency. The announcer's loud speaker (8) enables him to hear the performance as heard by the radio audience, so that his directions are given from the audience's point of view. The signal lights (9 and 10), indicated by coloured lights, whether or not the studio is on the air, the carrier wave is being sent out, the microphones are switched in or studio director or announcer are wanted on the telephone. Each door to the studios has a red signal light (11) which indicates that the studio is "on the air." If any one disregards this signal and opens the door when transmission is taking place, the loud speakers are automatically disconnected. As a further precaution the doors (12) are equipped with special knobs which can be opened only by some one familiar with them. A loud speaker (13) concealed in a horn closet, reproduces the broadcast entertainment for the reception room. A ventilation system through ducts (14) keep the studios and reception room cool and comfortable under all conditions even though all windows are closed. Adjustable deadening curtains (15) are readily adapted to suit the music being transmitted. A double wall with dead air space (16) prevents radiation of hall and elevator noises from the main corridor to the studio. The announcer, who is the key to the whole situation, is in direct communication with the engineers through desk telephone (17). The equipment panels (18) are mounted with all the necessary apparatus for controlling the microphone amplifiers and input currents to the special cables connecting the studio with the broadcasting station, as well as controlling and adjusting remote control telephone lines which operate the station from outside points. Special equipment for equalising lines to correct attenuation, as well as instruments for measuring the gain of any amplifier and group of amplifiers, is provided. Behind the panels is a large loud speaker (19) which provides the monitoring engineers with either the studio output or with the output of a loop radio receiver.

South Australian Notes

AN instructive evening was spent on Wednesday, August 29, by members of the Electric Supply Workers' Educational Association, when Mr. J. M. Honner, A.S.A., S.M., Vice-President of the South Australian Division of the Wireless Institute of Australia, gave a lecture and demonstration on Wireless Telegraphy and Telephony.

The lecturer in a lucid address explained how wireless waves were transmitted and received, and gave a detailed description of how certain crystals had certain properties for receiving wireless signals.

He also explained the use of the Professor Fleming valve and the Le de Forest 3 electrode valve, showing how the circuits of a valve and the complete receiving circuits of a valve receiving set were operated.

During the evening several items of music, speech and Morse signals were received from Mr. W. L. Austin's (5BN) station at Norwood.

On the motion of Mr. T. E. Murrie, seconded by Mr. F. Scanlon, a hearty vote of thanks was accorded the lecturer, who, in responding, thanked the various firms and friends for the use of instruments to aid him in his lecture.

The demonstration was given by special permission of the Chief Manager Telegraphs and Wireless.

Mr. H. C. Richards, M.P., who has just returned from a trip abroad, was much impressed with the progress of wireless in America and England. "I really think that we are on the eve of a wireless boom in Australia," Mr. Richards said.

Mr. L. C. Jones, a local enthusiast, has just returned from Melbourne and Sydney. Discussing wireless activities in the Eastern States, Mr. Jones said he was much impressed with the progress that was being made. While in Sydney he had the privilege of listening to the first official broadcasting concert under the regulations.

Mr. Jones met most of the prominent wireless authorities of Australia and New Zealand, and gained much information which will be valuable to those interested in the movement in this State. He considers that while much experimental broadcasting is being done in Melbourne and Sydney, it is most desirable that South Australia should be up to the minute. "There are more things necessary than the actual technique of broadcasting music and speech to make this venture a success," said Mr. Jones. "When the difficulties which beset broadcasting companies in America and England are considered, it is apparent that careful and systematic organising is needed to avoid a similar state of affairs here. Australia may be a little slow, but she is sure, and that is what counts most in the broadcasting business."

Radio Club Holds Social Evening

Prizewinners in N.S.W.–N.Z. Test Entertained

PROBABLY the most successful social function yet held in radio circles in N.S.W. was that staged by the Metropolitan Radio Club at Miss Bishop's George Street establishment on Monday evening, September 10.

The occasion was a social evening and dance to provide a suitable setting for the presentation of prizes to the successful competitors in the recent N.S.W.-New Zealand test.

There was an excellent attendance including Mr. W. T. S. Crawford, N.S.W. Radio Inspector; Mr. C. D. Maclurcan, President of the N.S.W. Division of the W.I.A.; Mr. Armstrong, of the State Radio Inspectors' Department, and representatives of fifteen other radio bodies in N.S.W.

The presence of a large number of charming young ladies helped materially to add an air of social distinction to the gathering and placed the hallmark of approval of the fair sex on the radio movement in N.S.W.

The arrangements worked splendidly, and great credit is due to Mr. R. C. Marsden, who as president of the Metropolitan Radio Club, filled the post of chairman with an ease and distinction which quite confirmed the impression held by all who have heard 2JM over the radiophone, viz., that he is a delightful personality.

In opening the proceedings Mr. Marsden referred to the active part his club has always taken in furthering the radio movement in N.S.W.

In 1922 a highly successful exhibition was held in Sydney, and this year the club decided to have a test. That it has been a success was proved by the really remarkable results achieved by at least two of the competitors, Master Jack Davis and Mr. C. W. Slade, the former of Vaucluse and the latter of Croydon.

After recounting various incidents in connection with the test Mr. Marsden paid a tribute to the organising ability of Mr. D. G. McIntyre, who filled the post of organising secretary to the test with conspicuous ability.

Mr. C. D. Maclurcan in congratulating Jack Davis on his meritorious win described his log as "remarkable." His performance was a wonderful inspiration to all experimenters.

In his opinion Jack Davis is the only man in N.S.W. who is regularly and consistently doing real radio experimental work.

Mr. Maclurcan also paid a tribute to the excellent log recorded by Mr. Slade and mentioned that, although he himself was a competitor in the test, he could achieve nothing like the results recorded by the two successful competitors.

Mr. M. Perry in wishing success to the amateur radio movement in N.S.W. traced the remarkable influence it has had on the present day position of wireless.

Mr. C. W. Mann, in responding, said he felt sure the good name of wireless would always be safe in the keeping of experimenters.

Mr. D. G. McIntyre before reading the official report of the tests paid a tribute to the practical assistance afforded the committee by Miss F. V. Wallace and Mr. C. Maclurcan, both of whom had contributed to the prize fund.

After the reading of the report the chairman called on Mr. W. T. S. Crawford, State Radio Inspector to present the prizes.

In handing a cheque and club certificate each to Master Jack Davis and Mr. C. W. Slade (first and second prize winners respectively), Mr. Crawford said the results they had achieved were phenomenal. Personally, he could not sufficiently express the admiration he felt for the good work they had done.

Mr. Crawford also referred to the "howling valve" nuisance and counselled determined action on the part of all concerned to eliminate it.

Master Jack Davis and Mr. Slade suitably responded. The latter supplied some interesting details regarding his set and mentioned that at one stage signals from N.Z. came in loud enough to operate a "loud speaker."

At the conclusion of the speeches refreshments were served, and afterwards dancing was indulged in.

Excellent musical items were supplied throughout the evening by an orchestra from the Leichhardt and District Radio Club, and Mr. Prince, a radio enthusiast from Bondi, entertained the gathering with some mystifying sleight-of-hand performances.

Radio wishes to add its sincerest congratulations to Jack Davis and Mr. Slade on their meritorious performances, and also to the Metropolitan Radio Club for its successful organisation and conduct of the test.

The official report supplied by the organising secretary follows:—

ORGANISING SECRETARY'S REPORT
—on—
Amateur Radio Tests held between N.S.W and New Zealand between August 4 and 18, 1923.

Although entries were rather disappointing, the tests appear to have been very satisfactory. Several stations carried out excellent work and the success of the tests lies entirely with the entrants.

These tests were not as wondefrul as the recent tests with America, but they have shown what our experimenters can do in the way of transmitting as well as receiving.

The most outstanding feature of the tests was the transmission of CW signals using only .8 watts by 2DS. These signals were successfully received by 4AA (Mr. Bell, Otago, N.Z.), the distance being over 1,000 miles, air line.

The Winners.

Best all-round station.—2DS (Jack Davis), Vaucluse.

This station did excellent work throughout the tests. Besides working N.Z. on the lowest power, he also has the credit of the best receiving log, having missed signals from N.Z. on one night only out of 15.

Best receiving station.—2SX (Mr. C. W. Slade), Croydon.

This station also did very good work, using only one valve.

Other Satisfactory Logs.

Satisfactory logs were also received from:—2CM, 2FF, 2NH, 2CT, 2AR, and 2DF.

Transmitters Reported in N.Z.

The following transmitters were reported in N.Z.:—2DS, 2JM, 2KC, 2CM, 2AR, 2ER, 2BB.

N.Z. transmitters who took part and the power they used:—3AA, 10 watts; 4AA, 10 to 40 watts; 2AK, 15 watts; 3AC, 15 watts; 1AA, 5 watts; 3AB, 10 watts.

(*Continued on next page.*)

Victorian Notes

(*By Our Special Correspondent.*)

UNDER the guidance of Mr. G. W. Steane (3UX), a brilliant wireless entertainment was given at the Recreation Hall, Kew, on August 24 and 25, in aid of the St. George's Hospital.

Ten minute sessions were given and a minimum charge made for admission.

Using a 6-valve amplifier, a Brown's loud speaker, and other modern equipment interesting demonstrations were also given of the latest developments in wireless. Mr. N. Culliver (3DP), on his 5-watt tube provided the musical end of the programme.

The whole of the apparatus was kindly loaned by Myers, Bourke Street.

Following on the success of the above venture came requests from other bodies for similar demonstrations in the cause of charity.

Mr. Steane and Mr. Culliver were persuaded to stage their previously successful production at the Golden Thousand Fair, St. Mark's Church, Fitzroy, on the following Thursday, Friday and Saturday. The request was received at 5 p.m. on Thursday, but despite the large amount of work involved everything was in working order for the demonstration at 8 p.m.

Mr. Steane enrolled the church workers, hoisted and guyed an aerial in a strong wind, and at 7.45 3DP was connected by wireless to St. Mark's Church. At 8 p.m. the fund for the renovations was being enthusiastically swelled per medium of radio. Both these demonstrations were held by permission of the Controller of Wireless.

The erection of an experimenters' transmitting station for the purpose of replying to American amateurs at the 2nd Trans-Pacific Test in October is now well on the way. The location is at Mr. W. F. Howden's residence, Box Hill, one of the highest peaks around Melbourne. Mr. Howden (3BQ) contemplates having everything ready in a fortnight's time.

According to correspondence received in Melbourne American experimenters are eager for the opening test next month. Great as was their enthusiasm at the last trial they are now doubly keen to reach Australia in greater numbers. Comments in "Q.S.T." and other journals show how appreciative and astounded American radio enthusiasts were over the result of the 1st Trans-Pacific Test. Experimenters all over Australia will have ample material to work on when this big trial opens on October 1. On the American side Radio Journal is organising the Western States and the Radio Relay League has undertaken the Eastern States. Mr. H. K. Love (3BM) is the chief organiser for Australia, and just now is a busy man.

On Sunday, August 26, an interesting test with Armidale, N.S.W., was conducted by Mr. N. Culliver (3DP). Using his 5-watt tube and showing a bare amp at the meter a company from Hugh J. Ward's "Rockets" was transmitted successfully over the distance. As usual experimenters took a rest from their labours at 8 o'clock, but the prevelance of howling valves somewhat marred the entertainment as far as a number of local experimenters were concerned. In consequence of this, inspectors are now out to eliminate the "howlers."

Ruby Norton and Clarence Leena entertain an army of "listeners-in" from the experimental station of Mr. H. S. Beattie (3DV), Box Hill, Victoria.

CALLS HEARD.

3BQ has heard on telephony 2CM, 2GR, 2BS, New Zealand, 3AA, 4AA, C.W., 3AC.

3ZI has heard on telephony 2DS, 2GR, 2CM.

3BY has heard 2AD calling 3II.

3BH has heard on telephony 2FA.

Radio Club Holds Social Evening

(*Continued from previous page.*)

Two-Way CW Working.

Successful two-way CW communication was accomplished on thirteen nights during the tests.

'Phone Work.

Satisfactory 'phone work was carried out on several occasions. The most successful reception took place on Thursday, August 16, when 4AA's music and speech were very clearly heard in Sydney.

Fading.

Fading was very noticeable on several nights during the tests. The worst being on Tuesday, August 14, when 3AA was sending. On this night there was a storm in N.Z. Fading was also reported from New Zealand.

Interference From Howling Valves.

Interference from this source was very strong throughout the tests.

Interference was also caused by VIS and by harmonics from local transmitters.

(Signed) DANIEL G. McINTYRE,
Organising Secretary,
N.S.W.-N.Z. Amateur Radio Tests.
R. C. MARSDEN,
President Metropolitan Radio Club.
10/9/23.

A Series-Parallel Switch

By F. C. SWINBURNE

THE parallel-series switch used in the antenna circuit is now regarded as an essential part of every well-designed receiver, but it is remarkable that very little improvement has been made in the design of this exceedingly simple piece of apparatus.

The types employed up to the present have usually consisted of some form of double pole, two-way switch mounted on the front of the panel. These types, unless carefully constructed and fitted, frequently give trouble, due to the switch arms making imperfect contact or sticking between adjacent contact studs.

Apart from these purely mechanical failings, the practice of mounting such switches on the front of a panel is, in the writer's opinon, fundamentally wrong, for the following reasons: firstly, the switch mechanism is exposed to mechanical injury (a point which is of paramount importance in the case of portable apparatus); secondly, the switch tends to collect dust, and is very difficult to clean, thereby preventing good electrical contact.

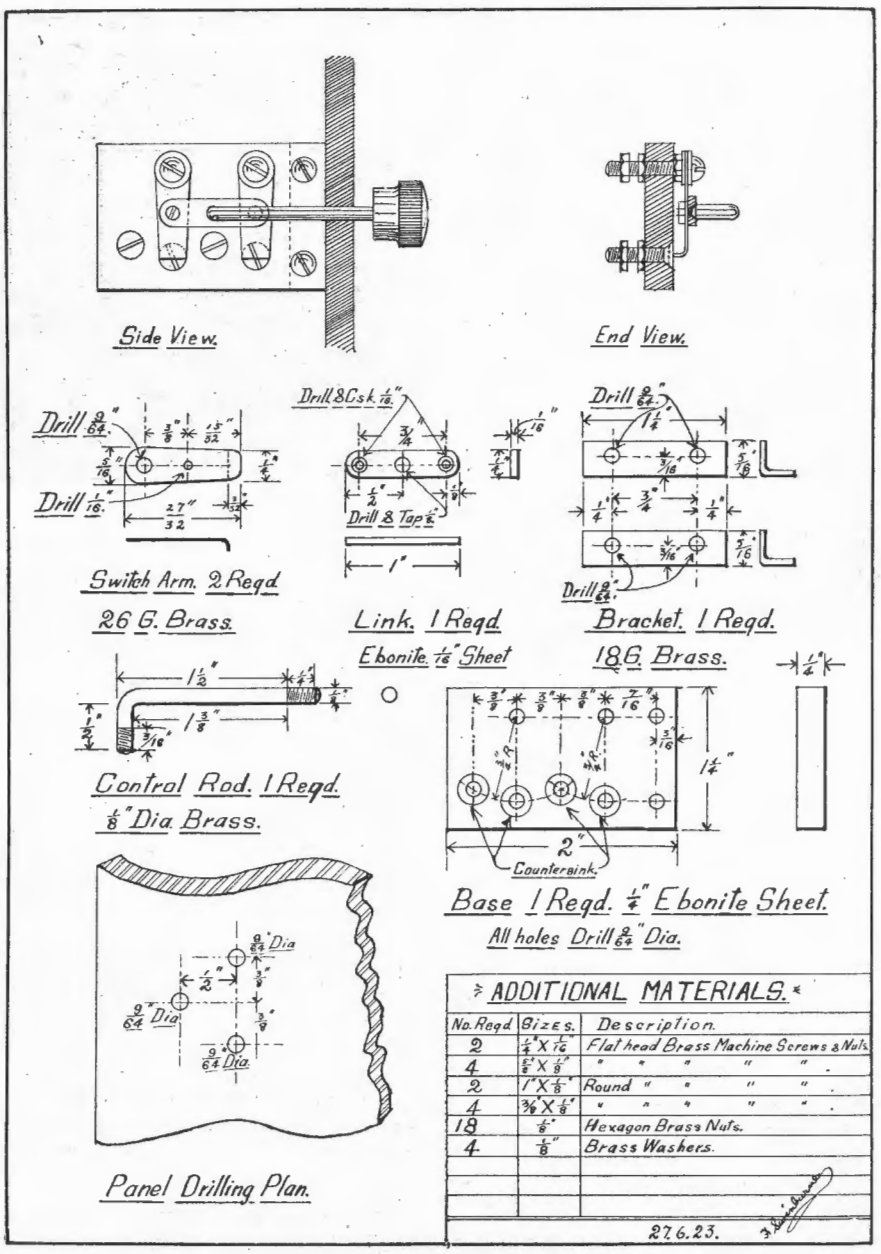
Other objections are the high cost and large amount of panel space required. The appearance of a panel may be affected by the use of the older type switches, alongside the black dials and knobs now generally employed, thus giving the panel a patchy, unbalanced appearance.

It was the consideration of these points that led the writer, some time ago, to design the switch shown in the accompanying diagram. Several of these switches have since been constructed, and have given complete satisfaction in every case.

Detail drawings are given of all except standard parts. The design was specially arranged to use as many of the latter as possible, but the sizes may be altered to suit individual requirements. The drawing shows that the switch consists of the usual double pole two-way switch, mounted on a base at right angles to the panel and controlled by means of a rod and

The switch arms are pivoted on knob passing to the front of the panel. two 1 inch by $\frac{1}{8}$ inch round-head machine screws, and clamped between two standard brass washers by means of a lock-nut. In order to obtain good contact at this point, it is advisable to slightly bend one of the washers before assembly, so that when the lock-nut is tightened up the bent washer acts somewhat in the manner of a spring washer, thus keeping a firm pressure on the switch arm and at the same time leaving it freely movable.

The ebonite link which connects the switch arms may conveniently be constructed from portion of a disused gramophone record. This link is fastened to the switch arms by means of two $\frac{1}{4}$ inch by $\frac{1}{16}$ inch countersunk machine screws, and as a



certain amount of looseness is essential in these joints, to allow the switch arms to be moved easily, the nuts on these screws should not be screwed up very tightly. To prevent the screws working loose, a little solder should be run on to the ends of the screws, after the nuts have been screwed up.

If any difficulty is experienced in obtaining Whitworth screws of the above size, one of the smaller B.A. sizes will serve the purpose quite as well.

Countersunk head machine screws are used in place of the usual contact studs, as it has been found that if the heads are properly countersunk there is less chance of the switch arms sticking, but care must be taken when assembling to see that the slot in the screw heads is turned in such a direction that the switch arm swings across the slot, otherwise the switch arm may stick and fail to make proper contact.

A suitable knob for the switch may be obtained by using the upper part of a bakelite covered terminal, in which case the end of the control rod must be threaded to suit, or alternatively the knob may be re-tapped to suit the rod. The short end of the control rod is screwed into the tapped hole in the ebonite link, and locked in position with a nut. The exact amount that the rod must be screwed in can only be found by trial, but when properly adjusted the rod should move freely through the panel. The length of the control rod must be such that when the knob is screwed tightly on and pushed in against the panel the switch arms should make contact with the pair of contact studs furthest from the panel.

The next and last operation consists of fitting a stop on the control rod so that the knob cannot be pulled too far out. A few turns of fairly stout copper wire, say, 16 or 18 gauge, are twisted tightly around the control rod behind the panel, and the ends cut off flush. The wire should then be in the form of a collar round the control rod. The knob should now be pushed in against the front of the panel and the wire slid along the control rod until it touches the back of the panel. The knob should now be pulled out until the switch arms make contact with the pair of contact screws nearest to the panel, as shown in the assembly drawing, this action will cause the coiled wire to be moved along the control rod by the panel until it reaches its correct position.

A touch with the soldering iron will then permanently fix it in this position on the control rod.

The switch is then completed. All connections should be made in the usual way, with the ends of the screws projecting from the base.

The scheme of connections employed with this type of switch is exactly the same as in other types.

When first using this type of switch one is liable to forget which position the switch should be in for a given connection to assist in overcoming this difficulty. The writer usually connects the switch so that when the knob is in against the panel the condenser is in series; then remembering "Pull—Parallel; Shove—Series," one is less likely to make a mistake.

Queensland Notes

(By Our Special Correspondent.)

WITH the revised regulations now generally understood, amateurs in Brisbane and throughout the State have entered upon a new era of increased activity. Brisbane is to have a new broadcasting station (the Y.M.C.A. Club); the Queensland Wireless Institute has secured the use of the tower room in Fire Brigade headquarters for experimental work on six nights a week; another club has been formed in New Farm; and the officials of the Toombul Show Society have provided a section in their catalogue at the show to be held on September 28 and 29, for wireless amateurs.

The Wireless Institute inaugurated their new programme last week, when a successful two-way telephony experiment was carried out between Mr. C. M. Isles, of Hamilton, and Mr. Elliott, of Preston House.

The offer of the Toombul Show committee is unique, in that they have provided prizes for valve and crystal sets, and also for the best assortment of home-made wireless accessories. They have also been granted permission for telephonic experiments to be conducted during the show. The example they have set might well be followed by the various show societies throughout the State and Commonwealth.

The enterprise and energy of Mr. W. A. Langford, of River Road, New Farm, has been in no small degree responsible for the banding of about 25 radio enthusiasts in that district into the newly-formed New Farm Radio Club. They have already proved themselves a keen little body, and we should hear frequently from them in the near future. Their programme is ambitious and comprehensive, and concerns the many and varied aspects of the radio world which call for ingenuity and research—and they are innumerable. Good luck to New Farm.

Dr. Val MacDowall (4CM) still provides the broadcasting bill of fare on Sunday nigths as usual.

The new Y.M.C.A. station has not yet decided upon their night, but it may be either Wednesday or Thursday.

They (the Y.M.C.A.) have been subjected to many disappointments since first the broadcasting project was mooted, but at last their trials—or as the experienced operator remarked, some of them, are over, and the set was tried out during the week, with highly gratifying results. At first only a small single-wire aerial was used, but within a few minutes of commencement word was received from an amateur at Red Hill that the modulation was perfect. Subsequently the set was tried out on the club's own twin-wire aerial, and also at 4CC (Mr. C. Isles), with equally satisfactory results. They are at present using only 220 volts on the plate, but radiation is between 450 and 500 milli-amps. The station is known as 4FE.

Radio Installation Rules

Authorised by Fire Underwriters' Association of N.S.W.

The information contained in the following article has been issued by the Fire Underwriters' Association of N.S.W. for the guidance of those who propose installing radio receiving sets.

Holders of Fire Insurance Policies should notify the company concerned immediately a receiving set is installed on the premises.

In setting up Radio Equipment, all wiring pertaining thereto must conform to the Association's "General Rules for Wiring for the Utilization of Electrical Energy," and the following additional Rules:—

FOR RECEIVING STATIONS ONLY.

Antenna.

(*a*) Antennas outside of buildings shall not cross over or under electric light or power wires, nor shall they be so located that a failure of either antenna or of the above-mentioned electric light or power wires can result in a contact between the antenna and such electric light or power wires.

Antennas shall be constructed and installed in a strong and durable manner, and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span, unless made with approved clamps or splicing devices, shall be soldered.

Antennas installed inside of buildings are not covered by the above rules.

NOTE.—Outdoor antennas should be of rugged construction, held securely in place and kept well away from electric light and power wires. It is advisable for the amateur not to make any connections to poles carrying light or power wires. Those unfamiliar with electric wiring will do well to have antennas and other apparatus installed by competent electricians.

The size of the antenna will depend on the span; for the ordinary receiving antenna about 100ft. long, No. 16 gauge soft drawn copper wire may be used, or other wire of equivalent strength. Where the span is long, or where the antenna crosses other wires, it should be larger.

Lead-in Wires.

(*b*) Lead-in wires shall be of copper, approved copper-clad steel, or other approved metal, which will not corrode excessively, and in no case shall they be smaller than No. 16 S.W.G., except that approved copper-clad steel not less than No. 18 (0.044) S.W.G. may be used.

Lead-in wires on the outside of buildings shall not come nearer than twelve (12) inches to electric light and power wires unless separated therefrom by a continuous and firmly fixed non-conductor that will maintain permanent separation. The non-conductor shall be in addition to any insulation on the wire.

Lead-in wires shall enter building through a non-combustible, non-absorptive insulating bushing.

NOTE.—Although desirable from a signalling viewpoint to prevent partial grounding in wet weather, these rules do not require the insulating of lead-in wires, except where they pass through the building wall, where a bushing is specified. This is to protect against possible contact with wires, pipes, or other grounded metal, which may be concealed in walls.

Protective Device.

(*c*) Each lead-in wire shall be provided with an approved protective device properly connected and located (inside or outside the building) as near as practicable to the point where the wire enters the building. The protector shall not be placed in the immediate vicinity of easily ignitable stuff, or where exposed to inflammable gases or dust or flying of combustible materials.

The protective device shall be an approved lightning arrester which will operate at a potential of five hundred (500) volts or less.

The use of an antenna grounding switch is desirable, but does not obviate the necessity for the approved protective device required in this section. The antenna grounding switch if installed shall, in its closed position, form a shunt around the protective device.

NOTE.—The protective device should be approved lightning arrester; the use of cheap home-made devices should be discouraged. Fuses are not required, but if installed should be between the lead-in and the lightning arrester.

Protective Ground Wire.

(*d*) The ground wire may be bare or insulated, and shall be of copper or approved copper-clad steel. If of copper the ground wire shall not be smaller than No. 16, S.W.G., and if of approved copper-clad steel it shall not be smaller than No. 18 (0.044) S.W.G. The ground wire shall be run in as straight a line as possible to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for grounding protective devices. Other permissible grounds are artificial grounds such as driven pipes, plates, cones, etc.

The ground wire shall be protected against mechanical injury. An approved ground clamp shall be used wherever the ground wire is connected to pipes or piping.

NOTE.—The proper connection of the antenna to the ground minimises the lightning hazard. A satisfactory ground and properly-run ground wire are of primary importance.

Wires Inside Buildings.

(*e*) Wires inside buildings shall be securely fastened in a workmanlike manner, and shall not come nearer than two (2) inches to any electric light or power wire unless separated therefrom by some continuous and firmly fixed non-conductor making a permanent separation. This non-conductor shall be in addition to any regular insulation on the wire. Porce-

NOTE.—Copies of these rules can be obtained from the Fire Underwriters' Association of N.S.W., Bridge Street, Sydney.

lain tubing or approved flexible tubing may be used for encasing wires to comply with this rule.

Receiving Equipment Ground Wire.

(*f*) The ground conductor may be bare or insulated, and shall be of copper, approved copper-clad steel, or other approved metal which will not corrode excessively under existing conditions, and in no case shall the ground wire be less than No. 16 S.W.G., except that approved copper-clad steel not less than No. 18 (0.044) S.W.G., may be used.

FOR TRANSMITTING STATIONS.

NOTE.—Transmitting stations are regarded as involving more hazard than stations used only for receiving, and require additional safeguards. In addition to these requirements, all wiring and apparatus supplying power for sending should be installed in accordance with the General Rules for Wiring.

Antenna.

(*g*) Antennas outside of buildings shall not cross over or under electric light or power wires, nor shall it be so located that a failure of either the antenna or of the above-mentioned electric light or power wires can result in a contact between the antenna and such electric light or power wires.

Antennas shall be constructed and installed in a strong and durable manner, and shall be so located as to prevent accidental contact with light and power wires by sagging or swinging.

Splices and joints in the antenna span, shall, unless made with approved clamps or splicing devices, be soldered.

Lead-in Wires.

(*h*) Lead-in wires shall be of copper, approved copper-clad steel, or other metal which will not corrode excessively, and in no case shall they be smaller than No. 16 S.W.G.

Antenna and counterpoise conductors and wires leading therefrom to ground switch, where attached to buildings, must be firmly mounted five (5) inches clear of the surface of the building, on non-absorptive insulating supports such as treated wood pins or brackets equipped with insulators, having not less than five (5) inch creepage and air-gap distance to inflammable or conducting material. Where desired approved suspension insulators may be used.

(*i*) In passing the antenna or counterpoise lead-in into the building a tube or bushing of non-absorptive insulating material shall be used, and shall be installed so as to have a creepage and air-gap distance of at least five (5) inches to any extraneous body. If porcelain or other fragile material is used, it shall be installed so as to be protected from mechanical injury. A drilled window pane may be used in place of bushing provided five (5) inch creepage and air-gap distance is maintained.

NOTE.—Entrance tubes or bushings may be glazed porcelain or composition.

In making these installations, the peculiar characteristics of radio-frequency current should be kept in mind, and all wires should have adequate clearance in order to make sure that the current will stay upon the wires until it has reached its intended destination.

Protective Grounding Switch.

(*j*) A double-throw knife switch having a break distance of four (4) inches and a blade not less than one-eighth ($\frac{1}{8}$) inch by one-half ($\frac{1}{2}$) inch shall be used to join the antenna and counterpoise lead-ins to the ground conductor. The switch may be located inside or outside the building. The base of the switch shall be of non-absorptive insulating material. Slate base switches are not recommended. This switch must be so mounted that its current-carrying parts will be at least five (5) inches clear of the building wall or other conductors and located preferably in the most direct line between the lead-in conductors and the point where ground connection is made. The conductor from grounding switch to ground connection must be securely supported.

NOTE.—Ground switches are required because the ordinary transmitting antenna, of larger size than the receiving antenna, involves a greater lightning hazard, and because of the high voltages used in transmitting. To comply with this rule, a standard 100 ampere single-pole double-throw switch, or a special antenna switch of proper design, may be used.

Protective Ground Wire.

(*k*) Antenna and counterpoise conductors must be effectively and permanently grounded at all times when station is not in actual operation (unattended) by a conductor at least as large as the lead-in conductor, and in no case shall it be smaller than No. 16 S.W.G. copper or approved copper-clad steel. This ground wire need not be insulated or mounted on insulated supports. The ground wire shall be run in as straight a line as possible to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for the ground connection. Other permissible grounds are artificial grounding devices, such as driven pipes, plates, cones, etc. The ground wire shall be protected against mechanical injury. An approved ground clamp shall be used wherever the ground wire is connected to pipes or piping.

Operating Ground Wire.

(*l*) The radio operating ground conductor shall be of copper strip not less than three-eighths ($\frac{3}{8}$) inch wide by one-sixty-fourth (1/64) inch thick, or of copper or approved copper-clad steel having a periphery, or girth (around the outside) of at least three-quarters ($\frac{3}{4}$) inch (for example, a No. 2 S.W.G.) wire), and shall be firmly secured in place throughout its length. The radio operating ground conductor shall be protected and supported similarly to the lead-in conductors.

NOTE.—The rules should be very carefully followed in the installation and use of the operating ground wire, special precaution being taken to keep it at a respectful distance from pipes and other wires.

Operating Ground.

(*m*) The operating ground conductor shall be connected to a good permanent ground. Preference shall be given to water piping. Gas piping shall not be used for ground connections. Other permissible grounds are artificial grounding devices such as driven pipes, plates, cones, etc.

Power from Street Mains.

(*n*) When the current supply is obtained directly from street mains the circuit shall be installed in approved metal conduit.

Protection from Surges, etc.

(*o*) In order to protect the supply system from high-potential surges and kick-backs, there must be installed in the supply line as near as possible to each radio-transformer, rotary spark gap, motor in generator sets, and other auxiliary apparatus, one of the following:—

(*Continued on page* 311.)

Consolidating a Continent.

What Wireless Will Do.

By FRANCIS BIRTLES

DESPITE the tremendous advance made by wireless telegraphy and telephony in recent years, and the wide publicity it is now receiving in many sections of the public press there is still a depth of ignorance concerning it in outback Australia, which is as surprising as it is regrettable.

The time has arrived when the people of rural Australia must be told of the wonderful modernising influence of radio. That they are interested, I, as a constant traveller amongst them, know full well.

To-day many big land-holders in the Never-Never of Australia are hungering for some means which will bring them into closer touch with the throbbing world outside.

They have heard of wireless; many of them with a highly developed sense of imagination have visualised a time when it will bridge the gap which now separates them from the big centres of population, but as to its practicability and cost and the means which will be taken to provide them with news and entertainment they know nothing.

If anything I write will assist to bring about a better understanding and closer co-operation between those who want wireless and those who can supply it, I will be more than satisfied.

WHAT RADIO COULD DO.

In the great inland of Australia, sheep and cattle stations would welcome wireless to enable them to keep in touch with the varying weather conditions in other parts of the country. Frequently this information would prevent great inconvenience and loss. The station owner whose holding is scourged by drought or fire has no alternative but to move his stock to other districts, perhaps a couple of thousand miles away. It may be that when he reaches there after months of weary travelling he finds conditions as bad as those he left. Had means of communication been available he could have ascertained this information before starting out, or en route, and so avoided a waste of valuable time and perhaps heavy stock losses.

Again, if stock and market reports were available at regular intervals, sales could frequently be conducted with marked advantage to the seller.

The incalculable value of wireless communication as a means of speedily summoning medical aid must be apparent to the most casual observer.

To one who has first-hand knowledge of the utter loneliness and isolation of life in the sparsely settled districts of Australia it is apparent that any expenditure incurred in furnishing those brave men and women who are carving homes in the heart of our Continent with the means of keeping in touch with world doings must be regarded as a national investment.

ISOLATED MISSION STATIONS.

One can quote numerous instances where wireless communication would be of direct and immediate value to isolated Mission Stations.

Cape Bedford Mission Station is only 35 miles from Cooktown, but is often isolated from that centre for weeks at a time owing to strong S.E. monsoons preventing the launch from leaving. In urgent cases messages must be sent overland, a rough mountain journey through jungle scrubs, impassable in flood time. Other Mission Stations more or less isolated are Bloomfield, Lloyds Bay, Thursday Island, Mapoon, Somerset, and several cattle stations, including State stations on Cape York Peninsula.

The Barclay Tablelands (N.T.) hold several valuable and important cattle stations. There are no railroads, telephones or telegraphs. In the wet season it is impossible to communicate and in drought time the conditions are intensified.

These are just a few of the centres where wireless would prove a Godsend. The people living and toiling in these outback localities are performing work of great national value. The establishment of aerial and wireless telephony services will make a difference to their lives which none but themselves will be able to fully appreciate.

The advent of broadcasting will enable them to receive daily entertainment programmes and news of the world, together with stock and market reports, and it will then be a question of just how much further wireless can be utilised to establish a network of local communications in the localities referred to.

The need is there and it only remains for individuals or firms with sufficient enterprise to demonstrate to those most concerned the utility of wireless to ensure it being generally adopted.

New Broadcasting Company

Broadcasters (Sydney), Limited, was registered on September 3. Capital £1000, in £1 shares. To establish, conduct and maintain a broadcasting station and to broadcast, by means of wireless telepathy or telephony, music, speech reports, lectures, and other matters capable of being broadcasted, and to carry on in all branches every class of business concerning wireless telegraphy or telephony. First directors, W. J. Maclardy, M. C. Fry, S. V. Collville, C. V. Stevenson, and R. Evans. Others subscribing to the memorandum include W. D. Scott, O. H. O'Brien and W. G. King.

West Australian Activities.

(By Our Special Correspondent.)

THE Perth Literary Institute was crowded recently when Mr. W. E. Coxon, a local experimenter, gave a lecture and demonstration relating to recent developments in radio science. The stage was fitted with a wireless receiving set, and the audience enjoyed the novel and interesting entertainment.

Mr. J. Scaddan (Minister for Mines) presided, and in the course of an appreciative address outlined a new terror for inoffensive mankind. "I think it will not be long before the people will hear by wireless what is being said by their representatives in Parliament," he continued, "and they will be able to do it while sitting by their own firesides. I think one of the first developments will be to fit wireless to Parliament House. I am afraid if such a state of affairs does come about, it would not be long before the electors insisted on tenors, baritones, and real comedians offering themselves for Parliament."

West Australian readers of "Radio" will be pleased to hear of the success which has attended the formation of the "Subiaco Radio Society" with the object of encouraging the experimenter in the scientific study of radio telegraphy and telephony, and to advise and assist in the construction of receiving and transmitting apparatus.

The Society has a membership at the present time of 51, and is under the management and control of an executive consisting of Hon. President, W. Richardson, M.L.A.,; President, W. R. Phipps; Vice-Presidents, G. R. Groom, R. Hardman and N. Wilson; Secretary, R. Congdon; Assistant Secretary, A. E. Grey; Treasurer, R. B. Hedley; Auditors, H. Yates and W. Gilwhite, and Technical Adviser, A. E. Stevens.

A very neat medal is provided for each member, and great praise is due to the designer of same. Praise is also due to Mr. W. R. Phipps and R. Congdon, whose strenuous and untiring efforts were responsible for the Society's formation.

The Society holds its meetings every second Tuesday, and conducts instructional classes in Morse telegraphy every week, under the direct supervision of Mr. A. E. Grey, who holds First-class Operator's Proficiency certificates for Marconi, Telefunken, and Poulson Ark systems.

In the Lecture Hall of the Underwood Business College a few nights ago, Mr. P. E. C. Lindsay, R.N.R., formerly instructor at Marconi House, London, delivered an interesting lecture on "Broadcasting" to a mixed audience.

The Mayor (Mr. J. T. Franklin) presided.

The lecturer described in simple language the principles of wireless, especially its more recent development, telephony.

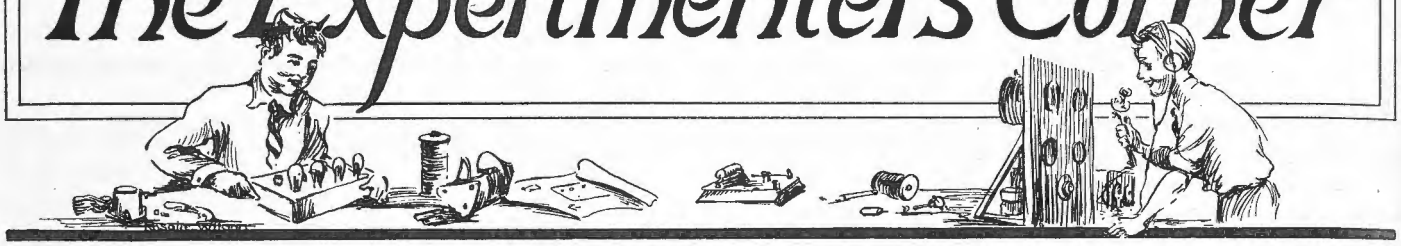
After a descriptive address on "Wave-lengths," the evening concluded with a hearty vote of thanks to the lecturer.

Mr. L. W. Matters, who has returned to Perth after a visit to the Eastern States, where he enquired into every phase of wireless telephony on behalf of the West Radio Broadcastnig Co., Ltd., considers that the keen interest manifested throughout Australia in broadcasting leaves no room for doubt that within a year or two wireless telephones will be installed in every other home, and "listening in," both for news and entertainment, will be as general and as popular as it is in England and the United States.

At the conclusion of a lengthy address to the members of the West Radio Broadcasting Co., Ltd., Mr. Matters remarked that some weeks must still elapse before broadcasting on any extensive scale can be inaugurated in Australia. Everybody has had to wait for the regulations in order to determine what type of apparatus could be manufactured and sold, and the Postmaster-General has yet to issue the broadcasting licenses which will be granted only under the stringent conditions referred to.

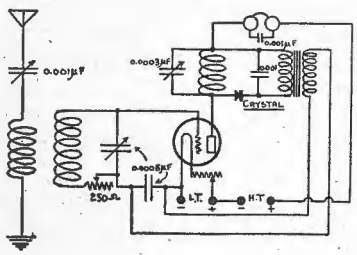
The owner of a large provincial paper in W.A. has made several applications to the authorities for permission to instal a receiving and transmitting set in his office, about 70 miles distant, but permission was refused each time, much to his disappointment.

The Experimenters' Corner



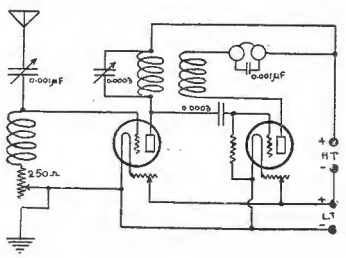
Suitable Valve Receivers For the New Regulations.

ACCORDING to the new Radio Regulations, receivers employing regeneration which are capable of exciting the aerial and radiating energy are practically prohibited. This condition, while causing only a slight inconvenience to the experimenter owning several valves, will give rise to consternation in the vast camp of "single cylinder" receivers. A valve used as a detector alone without regeneration is generally not as sensitive as a good crystal, and as a result an attempt to use it in this capacity is likely to prove disappointing. As an amplifier the valve functions best, and within very wide limits handles currents irrespective of frequency.



In the following circuit, illustrated in Fig. A the valve acts as a combined high and low frequency amplifier, leaving the function of rectification to a crystal detector. If a honeycomb coil system of inductances is in use, a slight alteration will change the usual primary, secondary, reaction combination into the new arrangement. Remove the plug provided for the reaction coil and mount it some distance away from the other coils so that there will be no magnetic reaction between them. It is possible to leave the plug in its position on the mounting, and always swing it so that the plate coil is at right angles to the others, but this is not a safe thing to do as there is still a slight magnetic inter coupling, and in a weak moment the most law-abiding citizen is liable to severely bend if not break the Regulations by bringing the coupling a little too close and causing the valve to generate oscillations which will energise the aerial system. The primary and secondary coils are of the same value as used in the ordinary receiver, and the coil in the plate circuit must be large enough to allow the wave being received to be tuned in with a condenser of not more than about 300 micro-micro farads. The larger this inductance and the smaller its tuning condenser the sharper will be the tuning, and the louder the signal. Across its terminals is connected a detecting circuit consisting of a crystal rectifier and the primary winding of an intervalve transformer. After retification the signal is fed back into the grid circuit of the valve, where it undergoes a further amplification at audio frequency. In the secondary circuit of the receiver and across the terminals of the reflex winding of the audio transformer is placed a small fixed condenser of not more than 500 micro-micro farads. This provides an easy path for the radio frequency oscillations, but diverts the major portion of the energy at the lower frequency direct to the grid of the valve. The detector should have a crystal which is stable in adjustment, and iron pyrites, radiocite, and QSA crystals are very suitable for this purpose.

When tuning in a signal the preliminary adjustments of the primary and secondary controls are the same as in the ordinary receiver, and when a signal has been located by these means, the third coil in the plate circuit of the valve is tuned to resonance, and the crystal detector adjusted to maximum sensitivity. It may happen when tuning in short waves that the receiver will break into oscillation as soon as the plate coil is tuned to resonance with the secondary circuit. This is due to the inter-electrode capacity within the valve itself, and, although this effect can be neutralised by the employment of Professor Hazeltines Neutrodyne connection, sufficient damping can be introduced into the receiver by means of the non-inductive resistance "R." The eract value of this resistance depends upon the amplification constant of the valve, as well as the



values of the coils and condensers. The higher the capacity and the smaller the inductance the less resistance will be required to damp the circuit sufficiently to prevent oscillation. A suitable resistance unit is a 250 ohm potentiometer used as a plain resistance. It can either be connected in the plate or the grid oscillatory circuit, preferably the latter. The method whereby a positive potential is applied to the grid of the valve to control its oscillating properties should not be used as it introduces serious distortion and loss of signal strength in the reflex audio amplification circuit.

With the inductive coupling to the aerial there is very little chance of energy being radiated, and even if the circuit oscillates, the amount of

energy fed back through the capacity of the valve elements is negligible.

For the reception of continuous wave telegraph signals a separate oscillator will have to be used with the above circuit, but as few experimenters can afford this luxury, the additional valve can be put to better use in the circuit shown in Fig. B. The ordinary three coil mounting can be used again, and to avoid any accidental magnetic coupling to the aerial the primary plug is removed and mounted about twelve inches from the other two. One of the two adjoining coils is shunted with a condenser as in the previous circuit, and its capacity coupled to the detector valve through a condenser of about 250 micro-micro farads fitted with a leak resistance of two to three megohms. In the plate circuit of the second valve is connected an aperiodic coil which is coupled to the previously mentioned coil as shown in the diagram. This coil allows the regenerative property of the detector to be used to its maximum value, and if oscillation occurs its effects are confined to this circuit being effectively trapped by the radio frequency amplifier valve. To guard against the latter oscillating upon its own accord the resistance "R" is used to introduce the necessary damping. If additional amplification is required, the flex connection as used with the valve crystal received described previously and illustrated in Fig. A should be employed. In place of the telephones in the plate circuit of the second valve an intervalve transformer is connected, and the secondary led back to the input circuit of the first valve. The telephones are connected in the plate circuit of the first valve. The telephones are connected in the plate circuit of the first valve to intercept the audio component from the high tension battery.

If additional selectivity is desired an inductively coupled connection to the aerial can be employed.

Wireless and Electrical Exhibition

Full details of the wireless and electrical exhibition to be held under the auspices of the N.S.W. Division

Mr. O. F. Mingay, Hon. Director of the Exhibition.

of the Wireless Institute of Australia in the basement of the Sydney Town Hall from December 3 to 8 are now available.

The sessions will extend from 10 a.m. to 10 p.m. each day and the committee is doing everything possible to make the exhibition the finest wireless and electrical display ever held in Australia.

Mr. Forbes Mackay, General Manger of the City Electrical Light Department has agreed to support the Exhibition and will endeavour to supply current to stallholders at a price not exceeding that now charged for display purposes.

Applications for stands will be received up to September 29, but as the number to be allotted is limited, early application is necessary.

The committee expects that the commencement of broadcasting, which is expected early in December, will rivet public attention on the Exhibition to an extraordinary degree. It will certainly be a happy coincidence if the two undertakings are launched simultaneously.

Application forms for stands, copies of rules and regulations, etc., will be gladly supplied by the official organiser, Mr. Frank H. Daniell, Metropolitan Building, Hunter and Bligh Streets, Sydney.

Mr. F. H. Daniell, Official Organiser.

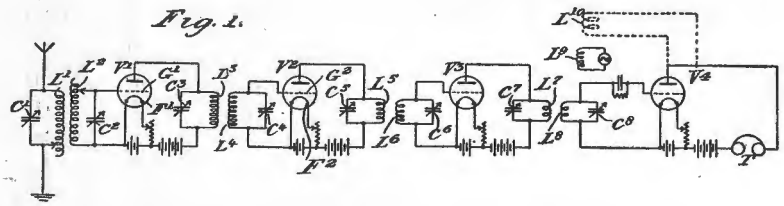
Patents Section

By GEORGE APPERLEY

The following are abridgements of complete specifications of Patents applicable to Wireless Telegraphy and Telephony notified in the Official Journal of Patents as accepted at the Commonwealth Patents Office, Melbourne, during the month of July, 1923.

No. 8429/22, Applicant: J. Scott-Taggart, England, describes a method of selectively receiving wireless signals by raising the frequency of the signal to a higher multiple of the original frequency for the purpose of increasing the difference in frequency between the desired signal and a signal likely to cause interference. For example, continuous wave signals of wave-lengths of 19,500 and 20,000 metres can both be heard on a heterodyne receiver, but if each set of signals is raised in frequency by a multiplication of, say, 50 times the final signals will have frequencies corresponding to 390 and 400 metres and the application of the beat phenomena to these final frequencies will give selective reception of the desired set to the total exclusion of the other.

Fig. 1.



The aerial circuit L1, C1 and the coupled secondary circuit L2 C2, Fig. 1, are each tuned to the incoming continuous wave signals which are applied to grid G1 and filament F1 of the Valve V1, which has in its plate circuit a circuit L3 C3 tuned to a multiple of the frequency of the received signals. The circuit L4 C4 is coupled to and brought into resonance with L3 C3. The valve V1 is adjusted to produce harmonics in its plate circuit one of which is passed through L4 C4 to the grid G2 and filament F2 of the Valve V2, which is also arranged to produce harmonics. The circuit L5 C5 is tuned to one of the harmonics produced by V2 and coupled to L6 C6 also tuned to the same frequency. The Valve V3 is also adjusted to produce harmonics the frequency of the oscillations set up in L7 C7 and L8 C8 being a multiple of the frequency of the circuits L5 C5, L6 C6. The frequency applied to the grid and filament of the detecting valve V4 may, therefore, be a high multiple of the original frequency. A local oscillator L9 may be employed to produce audible beats in the telephone receiver T or the Valve V4 itself made to oscillate for the same purpose by coupling L10 to L8. In a modification the signals are amplified before they are applied to the frequency multiplying circuits. The invention is also applied to the reception of signals of low frequency and and to the reduction of interference produced by atmospherics.

No. 6466/22. Inventors, A. Marr and A. M. Chalmers, England, has reference to vibratory diaphragms of sound-reproducing apparatus such as telephone receivers, etc. A secondary diaphragm is arranged in such relation to a primary diaphragm that the former receives its impulses or vibrations from the latter through the medium of an intervening air cushion the secondary diaphragm being of smaller gauge than the primary. Fig. 2 is a fragmentary section of a telephone receiver embodying one arrangement of the improved secondary diaphragm, in which a primary iron diaphragm 11 is acted upon by the magnet 12 in the usual way. The secondary diaphragm 13 of non-magnetic substance and of lesser thickness than the diaphragm 11 is secured to the binding rib 15 of the cap 16. A protective ring 19 of suitable material is interposed between the rib 15 and the secondary diaphragm to prevent damage to the latter on screwing up the cap. The diaphragms are separated by means of a ring 17, the intervening space 14 forming an air cushion. Various other methods of assembling the diaphragms are described and illustrated.

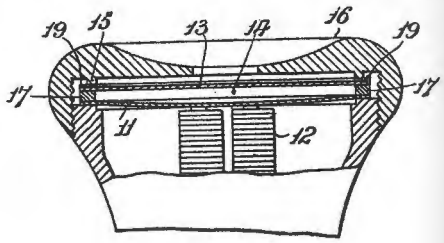


Fig. 2.

Australia's Broadcasting System

Endorsed by Wireless Expert

English Monopoly Criticised

A NOTABLE endorsement of the open competition method of broadcasting rendered possible under Australia's regulations was recently uttered by William Dubilier, the great wireless telephone expert.

"The broadcasting system in England is all wrong," he said, when asked his opinion of the monopoly exercised by the British Broadcasting Co.

"If a broadcasting monopoly is allowed," he continued, "it should be properly supervised and that could only be secured by an association of wireless enthusiasts interested in seeing that programmes are properly organised and the best possible results achieved.

"The idea of control by one broadcasting company is ridiculous. The programmes lack variety and there is an absence of the competitive spirit which is the public's best guarantee of service."

Could any more striking endorsement of the superiority of Australia's broadcasting system over that of England be forthcoming?

Dubilier knows what he is talking about.

He has given many years of his life to wireless, and no less than thirteen years ago, his amateurish efforts to send by radio the sound of his gramophone were so much appreciated that, unknown to him, a showman in an amusement park in Seattle, where he lived, fitted up a listener-in and charged ten cents to people to go in and hear.

"There are at present, I suppose, 100,000 broadcasting outfits in the London area," he went on. "If each pays 10s .a year, and all this went to the Broadcasting Company, it would mean £50,000 a year, an amount big enough to hire the finest bands and artists that you have. Why you should want theatres to give you anything free I don't know. Nothing need be free.

"Some of the best broadcasting stations in the United States cost only £25,000 a year to maintain, and their programmes are wonderful. If they were as good in London, your broadcasting capacity would easily reach ten times that number.

"If there were really first-class concerts you would soon get £500,000 paid every year, a million sums of ten shillings, and then you could get all the Paderewskis and all the Galli Curcis and all the Paul Whiteman bands in the world to play for you, for you could pay whatever fees they asked. You should think of wireless as a big thing; not as a silly toy."

Statements like the foregoing should encourage those who propose undertaking commercial broadcasting in Australia. A fair field and no favour is the prospect which faces them here, and if present indications count, the wonderful success which Dubilier thinks should be possible in England will become a reality in Australia.

Simple Wavemeter

By "KWAT."

THE following is a description of a wavemeter which any amateur should be able to make, and in view of the country Radio Clubs now springing up its usefulness should be apparent, more especially to clubs remote from the city, where it is not possible to measure sets by comparison.

The following LC data is not absolutely accurate, as correct data can only be obtained by comparing the manufactured article with an officially calibrated wavemeter; also unavoidable errors have occurred in design for the sake of simplicity. For isolated clubs, however, it will serve to keep them sufficiently close to the correct wavelength (probably but a meter or two either way), and also should come in very handy in giving them an idea where to tune for other amateurs working on a prearranged wave length. As an instance one may receive word from a brother enthusiast that communication would be attempted at a prearranged time on 450 meters. What would be required then would be to set your wavemeter radiating on 450 meters, and tune your receiver to it, then listen for the station wanted at about that spot, and if it so happened that he had tuned his transmitter by the same wavemeter, then you should be right on the spot.

Increased wavemeter readings could, of course, be obtained by adding further condensers of known capacity in parallel, and for club practice in Mensuration and Formula time could be spent very profitably in calibrating further scales. In the present calibration the winding formula was $L=(Pi\ Dn)^2\ l$ cms. D= diameter of former in cms. N=number of turns per cm. l=length of coil, under calculation, in cms.

For condenser capacity

$$C=\frac{A \times K}{4\ Pi \times t \times 900{,}000}=\text{capacity in microfarads.}$$

A=effective area in cms. K=dia-electric constant, in this case 3.65, t=thickness of diaelectric in cms.

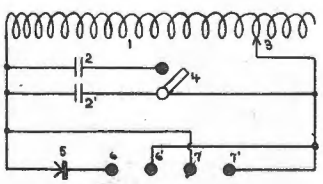
For wave length $59.6 \sqrt{L \times C}$.

The circuit employed is as follows:

1. Tuning Coil.
2. 2′ Block Condensers.
3. Variable Super Slider.
4. Parallel Condenser Connection.
5. Crystal Detector.
6. 6′ Telephone Studs.
7. 7′ Buzzer Studs.

For the tuner use a round former 2″ in diameter by 6″ in length. On this wind 170 turns of No. 20 enamelled wire, which will extend the full length of the former. The sliding contact requires to be one which will show upon which turn it is resting, and should have a pointer or indicator attached which will indicate the wave length reading which must be marked on a gauge board extending along the front of the former.

For the condenser procure 4 pieces



of tinfoil 3½″ by 2″. Both condensers are the one size, the dia-electric is of paraffined paper .01″ thick (2 thicknesses of fine note paper.) The tinfoil is given a 2″ x 3″ lap, thus leaving ½″ for connections. Each condenser consists of but two sheets.

In assembling keep the leads as short as possible, mount on a board about 9″ x 9″, placing the condensers on the under side of the board, the parallel piece 4 may be substituted by a small tumbler switch, leads being brought through the board to it. 1, 5, 6, 6′ and 7′ must necessarily be on top of the board, the crystal being of some reliable variety.

If it is desired to use the set to test the receiver connect the ordinary practising buzzer across, 7, 7′, leave 6, 6′ open, set the wavemeter to the desired wavelength as indicated by the scale, and then tune the receiver until loudest signals are received.

If it is desired to tune the transmitting set, disconnect 7, 7′, and place the telephones across 6, 6′, adjust crystal and move slider 3 until loudest signals are heard; the scale reading will then indicate the transmitted wave length. As regards the tuning of the transmitting set, any reliable textbook will give the correct procedure.

The following is a list of wavelengths, the wave-lengths of the intermediate turns may be estimated. However, great accuracy in tuning may not be possible. If in tuning it is found that signal strength does not vary over several turns it may then be taken that the middle turn of these several turns is the correct reading.

	1 Condr.	2 Condrs.
W/L of 30 turns using	179	254
35	193	273
40	206	293
45	219	310
50	232	328
55	243	342
60	254	358
65	264	373
70	273	387
75	283	400
80	292	413
85	301	426
90	310	438
95	319	450
100	327	461
105	325	473
110	342	484
115	351	495
120	358	506
125	366	517
130	373	527
135	380	537
140	387	547
145	394	556
150	400	566
155	407	575
160	413	585
165	420	595
170	436	604

Club Notes & News

MANLY RADIO CLUB.

At the regular fortnightly meeting on September 3 it was decided to hold weekly meetings, in lieu of fortnightly, in the future.

This operated from September 10 and will undoubtedly do much to stimulate interest in the Club and assist members to more readily gain a working knowledge of wireless.

Another important move decided upon was the formation of a special instruction class to extend over six months for members who desire to gain a good grounding in the technical side of wireless. Twelve members were enrolled at the initial meeting and the lectures, which will be delivered by Mr. F. C. Swinburne, will be given each week.

The fee for the course was fixed at £2/2/-.

The committee was induced to form the class as a result of special representations made by a number of Club members who required a short cut to a working knowledge of radio.

A highly successful and entertaining demonstration of wireless music was given at a special meeting of the Club on Thursday, September 6.

The reception arrangements were in the hands of Mr. R. E. McIntosh (2ZGT) and the music was transmitted from Mr. J. S. Marks' (2GR) experimental station at Rose Bay.

Mr. McIntosh spared no pains to make the demonstration as successful and educational as possible.

An experimental 10-watt transmitting set was fitted up, the power for which was supplied by an Airway motor generator set.

Communication was established with a number of experimental stations around Sydney, and afterwards club members spoke to various "listening-in" pals in different parts of the State.

The receiving apparatus consisted of a 3-valve portable set, using a Western Electric loud speaker and a Magnavox. The whole of the apparatus—with the exception of the Magnavox, which was loaned by Mr. Mason—was generously provided by Mr. McIntosh.

The demonstration was a pronounced success, and Mr. McIntosh received numerous congratulations from members of the large audience which assembled, by invitation, to hear the entertainment.

Credit must also be given to Mr. Marks, whose transmisson, despite the rectifier trouble he had to contend with, was excellent.

The demonstration was held by special permission of the Postmaster-General.

NEUTRAL BAY RADIO CLUB.

A general meeting was held on Tuesday evening, September 4, and after club business had been disposed of, Mr. Joseph G. Reed delivered a most interesting and instructive lecture on Wireless Receivers.

Mr. Reed dealt with the subject in a popular way and gave members a number of very simple formulæs for collecting wave-length, inductance and capacity values.

After describing the necessity and function of each component part of a receiver, Mr. Reed spoke on the action of crystal and valve detectors. He pointed out the wonderful properties of the crystal detector as a receiver and recommended members to experiment with the crystal, as it was one of the most efficient rectifiers that could be used in a receiving set.

After Mr. Reed had answered numerous questions one of the members—Mr. Perkins—proposed that a hearty vote of thanks be accorded Mr. Reed, firstly, for honouring the Club by his visit, and, secondly, for the lucid way in which he dealt with the subject matter of his lecture. The vote was carried by acclamation.

The next two meeting dates of the Club are September 18 and October 2, at "Bellevue," Kurraba Road, Neutral Bay.

Those desiring information regarding this Club should communicate with the hon. secretary at the above address.

ESSENDON RADIO CLUB.

Satisfactory progress is reported by the above Club.

New members are being continually enrolled, and a syllabus providing for a series of instructive lectures has been arranged.

At the August 23 meeting, Mr. H. Kingsley Love, President of the Victorian Division of the Wireless Institute of Australia, devoted an interesting lecture to "Experimental Stations." The interest of members was shown by the number of questions asked at the conclusion of the lecture.

As the result of a lead given by Mr. Love, numbers of experimenters are now turning their attention to long-wave reception. This has been neglected to a great extent in the past, but many members of the Club are now busy winding long-wave coils in an effort to pick up American and European stations.

The Club meets regularly in Regent Street Hall, Ascot Vale, and the secretary, Mr. J. W. Jacobs, of 40 Munro Street, will be pleased to hear from intending members.

Members of St. Joseph's College (N.S.W.) Radio Club.

WAVERLEY RADIO CLUB.

At the September 6 meeting of the above Club, £3 was voted towards a three-valve set. The committee consisting of Messrs. Bowman and Thomson, will begin construction immediately. The committee working on the receiving set, Messrs. Howell and Bowman, reported progress, but were in doubt as to the best circuit, in view of the prohibition of regenerative circuits.

Communications were received from the Australasian Relay League and the State Radio Inspector.

It was decided to inquire if the Club could join the Relay League as a body, an action which the Chairman (Mr. Perry) emphasised would be highly advantageous to the Club. Two communications were received from Mr. Crawford, one was in connection with the restriction of regenerative circuits, and the other asking the Club to choose a wave-length within the limit of 250 metres. It was stated by a member that the wave-length of 250 metres would be more suitable for relay work, and on Mr. Howell's motion it was decided that this be applied for, with 218 metres as an alternative in the event of the other being refused.

Mr. Bowman stated that the Manly Club was anxious to meet the Waverley Club in a debate, and after discussion it was decided to ask the Manly Club to issue a challenge, thereby giving them the choice of subject.

Marconi's Forecast

AUSTRALIA MAY 'PHONE BRITAIN.

Senatore Marconi recently sounded an optimistic note regarding future wireless communication between Australia and England.

The Marconi Company, he said, will guarantee the Australian Government a daily direct commercial service with the station to be erected in Australia.

Experiments lasting over a year have demonstrated that communication with Australia is possible at all times of the day. Experimental messages have been sent from the Carnarvon station, which was designed for the trans-Atlantic service, and had only a quarter of the power of the station for Australia.

Wireless developments and improvements were following one another with such rapidity that he had every reason to anticipate the early commercial use of the trans-oceanic wireless telephone.

There was a strong possibility, he said, of establishing a wireless telephone service to Australia soon after the new station opened.

The only comment we have to offer on the above statement is that *if any man knows it should be Marconi.*

New Zealand Affairs

(By our Special Correspondent.)

COMPLAINTS have been made throughout the Dominion in regard to the laxity shown by the Government Department concerning the issue of licenses for wireless reception. The fault centres chiefly in the fact that district Radio Inspectors in the various centres are, as a rule, members of the Telegraph Department and have many other duties to attend to. They are frequently obliged to be satisfied with the fees forwarded to them. Many people make a practice of forwarding their license fee in order to avoid the risk of a heavy fine, but outside these there are thousands who "listen in" and make no payment at all.

The first demonstration of radio telephony in conjunction with the "movies" was given at the Strand Theatre recently and was a pronounced success. It was given in conjunction with the screening of "Via Radio," a technical film illustrating the wonders and uses of wireless. The experiment, which was the first of its kind in New Zealand, revealed wonderful possibilities. The broadcasting music was sent out from Scots Hall, Symonds Street, Auckland.

An interesting lecture on the historic development of the telephone was given by Mr. A. M. Cross, A.M.I.E.E., at the Y.M.C.A. Wireless Club recently. The speaker showed how different improvements had been effected in transmission and calling devices, and gave a full description of the working of the modern telephone exchange.

The Auckland Wireless Society entertained a goodly party at their first Radio Dance held a little over a week ago. 1YA broadcasted a varied programme of dance music, and many others besides those present at the Club Rooms had the pleasure of tripping the light fantastic to the music in their own homes.

Several Auckland amateurs are putting forth rival claims to long distance reception of wireless telephony. One "listening-in" on 600 metres recently was surprised to hear someone calling VPD, the wireless station at Suva. He afterwards received the signal NISM, which is the call of the United States cruiser *Milwaukee*. The set employed for reception was a three-valve one and the *Milwaukee* was 1,400 miles away travelling south towards Suva. This feat is made little of by Mr. Frank C. Reardon, of Auckland, who claims that a one-valve set is capable of receiving wireless telegraphy over distances up to, and often exceeding, 4,000 miles. He has been putting up distance records for the last three months on an ordinary crystal set, frequently hearing Apia, Samoa, VMG; Suva, Fiji, VPD; Sydney VIS, and other stations at greater distances. He has also heard Townsville, Melbourne, s.s. *Niagara* when leaving Sydney, H.M.S. *Laburnam* when 2,100 miles out, and U.S.S. *Ontario*, 2,500 miles out. He is prepared to make an affidavit on the matter, and invites anyone to furnish better records.

In connection with the Marine Department's report on the Three Kings it is interesting to note that with the assistance of the Post and Telegraph Department, experiments have been carried out with radio beacon apparatus on the Great King with a view of ascertaining whether there would be undue interference with wireless waves by reason of the shape or constitution of the ground. The results were quite satisfactory, but in view of the high cost it is proposed to go further into the question of providing a radio beacon at the lighthouse on Cape Maria. Before deciding what aid or aids to navigation are necessary at the Three Kings, the question of automatic light will also be considered.

A. E. R. (Coorparoo): To use this apparatus for general reception you must qualify for an experimenter's licence.

H. E. R. (Warren) asks why he has difficulty in receiving telephony from amateur stations, although no trouble is experienced in receiving spark stations?

Answer: Your trouble appears to be due to a negative charge accumulating on the grid of the detector at short waves due to excessive reaction. Try connecting up grid leaks of various values across the grid condenser of the detector valve.

L. C. S. (Richmond) referring to circuit published in *Popular Wireless Weekly*, asks: (1) What is H and how is it connected to ATI? (2) Are "N" and "M" transformers? If so, which is high frequency and which is low frequency? (3) To which side of the crystal circuit are they connected?

Answer: (1) The coil "H" is the Secondary of the loose coupler which is inductively coupled to the ATI. (2) Yes. Transformer "N" is for audio frequency and "M" for radio requency. (3) The incoming signal is amplified at radio frequency and impressed on the crystal through transformer "M," where it is rectified and then fed back to the valve at audio frequency through transformer "N," where it undergoes a further amplification. See issue "Radio," May 30, for full practical details regarding the construction of transformers "N" and "M" for all wave-lengths.

A. T. (Penhurst) submits diagram and particulars of transmitting circuit and asks: (1) Best coils to use for a wave-length of 200 metres, using a 100ft. twin wire aerial. (2) The ratio of the modulation transformer. (3) Where should counterpoise be connected? (4) How should coils be placed in relation to each other? (5) Would Morse key connected in series with the earth be satisfactory for C.W. transmission?

Answer: (1) See articles dealing with a spark coil-valve transmitter in a recent issue of "Radio," giving details of coils for 200 metre work, the modulation transformer being connected in series with the grid leak. (2) The ratio of turns should be approximately 50 to 1 with 300 turns of No. 26 D.S.C. on the primary, and 15,000 turns of No. 44 enamel on the secondary. (3) Connect the counterpoise to the earth lead and tune it to resonance with this circuit by means of a series inductance. (4) Place "B" in the centre with "A" and "C" on either side. (5) Yes, but it should preferably be connected in series with high tension supply.

J. S. G. W. (Corrimal) referring to application form "CW16", asks method of determining natural wave-length of aerial.

Answer: For a single elevated wire the approximate wave-length is 4.5 times the length of the conductor in metres, but in the case of flat top aerials with single wires increase this factor to five. The affect of additional wires is to increase the wave-length, but as so much depends on spacing, etc., no definite information can be given.

A wave-meter can be used by connecting the aerial and earth across the vibrator contacts of an unshunted buzzer, and with the latter in operation place the wave-meter coil close to the earth lead and tune in the radiated wave.

Radio Installation Rules

(*Continued from page* 299.)

1. Two condensers [each of not less than one-half (½) microfarad capacity and capable of withstanding a six hundred (600) volt test] in series across the line and mid-point between condensers grounded; across (in parallel with) each of these condensers shall be connected a shunting fixed spark-gap capable of no more than one-thirty-second (1/32) inch separation.

2. Two vacuum tube type protectors in series across the line with the mid-point grounded.

3. Non-inductivity wound resisters connected across the line with mid-point grounded.

4. Electrolytic lightning arresters such as the aluminium cell type.

In no case shall the ground wire of surge and kick-back protective devices be run in parallel with the operating ground wire when within a distance of thirty (30) feet. The

(*Continued on next page.*)

Radio Installation Rules

(*Continued from page* 311.)

ground wire of the surge and kick-back protective devices shall not be connected to the operating ground or ground wire.

NOTE.—Many of the amateur installations have been placed without giving much thought as to what the effect of the radio power devices will have upon the balance of the system and supply authorities may require these stations to take current from a separate transformer, and in addition to place all of the wiring in conduit, also to have it protected at each radio-transformer, rotary spark-gap, motor in generator sets and other auxiliary apparatus. This precaution tends to preserve the quality of the light and power service in the neighbourhood and obviates fire hazards.

Attention is called to the fact that the use of non-inductively wound resisters across the line to prevent kick-backs, etc., necessarily brings about a slight flow of power current, and where used on a two-wire power system with one side grounded there is a circulation of power current between the ground on the power system and the ground at the mid-point of the wound resisters. The amount of current which circulates can be reduced to a minimum by increasing the ohmic resistance which does not in any way reduce the efficiency of the resisters to carry radio-frequency current to ground in case surges develop.

Suitable Devices.

(*p*) Transformers, voltage reducers, keys, and other devices employed shall be of types suitable for radio operation.

Movements of Wireless Officers

Mr. L. F. O'Donnell signed on s.s. *Werribee,* at Melbourne, on August 16.

Mr. A. T. Parry, who was relieved by Mr. T. V. Tressler on s.s. *Era,* at Sydney, on August 20, terminates service on September 23.

Mr. J. W. McKay rejoined s.s. *Macedon,* at Newcastle, on July 13.

Messrs. V. J. Foreman and W. J. Croft signed on s.s. *Booral'* as 3rd Operators, at Melbourne, on August 22.

Mr. H. M. Lamb relieved Mr. T. J. O'Leary on s.s. *Woolgar,* at Adelaide, on August 21.

Mr. E. Furness was relieved by Mr. C. Laurie on s.s. *Wanaka,* at Wellington, on August 14, and terminated service.

Mr. G. B. Fullwood signed off s.s. *Iron Chief,* at Sydney, on August 21, and signed on s.s. *Echuca,* at Sydney, on August 30.

Mr. K. L. Simpson relieved Mr. C. W. Drew on s.s. *Yankalilla,* at Sydney, on August 27.

Mr. W. J. Washbourne relieved Mr. T. Bannister on s.s. *St. Albans,* at Sydney, on August 28.

Mr. E. W. Coldwell, 2nd Operator, signed off s.s. *Niagara,* at Sydney, on August 28, and proceeded on Home Port leave.

Mr. F. L. Scott signed on s.s. *Arawatta, at Brisbane,* on August 30.

Mr. R. T. Stephen signed on s.s. *Iron Monarch,* at Sydney, on August 30.

Mr. A. V. Middleton signed on s.s. *Dilkera,* at Sydney, on August 30.

Mr. E. C. Morris signed on s.s. *Maheno,* at Sydney, on August 30.

Mr. L. Graham was relieved by Mr. T. Bannister on s.s. *Hexham,* at Newcastle, on August 31, and proceeded on leave.

Mr. T. J. O'Leary relieved Mr. R. J. Inglis on s.s. *Wear,* at Melbourne, on August 29.

Mr. C. C. Ullman signed on s.s. *Saros,* at Sydney, on August 3.

Mr. G. I. Betteridge relieved Mr. A. W. Hooper on s.s. *Marsina,* at Sydney, on September 4.