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SIXPENCE

RADIO

IN AUSTRALIA & NEW ZEALAND

Incorporating "Sea Land and Air"

VOL. I. APRIL 18, 1923 No. 2

DANCING TO RADIO MUSIC. [Underwood Photo.]

Registered at G.P.O., Sydney, for transmission by post as a newspaper.

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

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

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Volume I. APRIL 18, 1923 Number 2

Published by
THE WIRELESS PRESS
422-24 Lt. Collins St. Melbourne
97 CLARENCE ST. SYDNEY
Australasia Chambers Wellington, N.Z.

PRICE, 6d. per Copy
Subscription Rate, 10/- per annum (26 issues) throughout Australia and New Zealand; Foreign Rate, 12/6 (26 issues)

OVERSEAS REPRESENTATIVES:
Canada and United States of America: The Wireless Press Inc. 326 Broadway New York City
Great Britain: The Wireless Press Ltd. 12-13 Henrietta St. London, W.C. 2

SENATORE GUGLIELMO MARCONI, G.C.V.O., LL.D., D.Sc., M.I.E.E.

RADIOTORIAL

Broadcasting in Australia

THE decision of the Postmaster-General to hold a conference of all parties interested in radio broadcasting in Australia is a commendable one. In some quarters dissatisfaction has been expressed at the delay which has occurred in defining the position of those who wish to undertake the broadcasting of concerts, etc., in the Commonwealth. A little calm consideration will convince those people that a matter of this kind requires much careful consideration in order that the best possible results may be achieved. At all costs Australia must avoid the chaos which characterized the commencement of broadcasting in America. At the outset there it was anybody's business to transmit broadcast items, and the consequence was that those who should have benefited through the inauguration of broadcasting reaped a whirlwind of confusion. True to tradition, England was more conservative in making a beginning, and as a result was able to profit by the mistakes revealed in America's haphazard methods. It is only in recent months that broadcasting has been undertaken to any great extent in England, but that it has been attended by highly successful results is beyond question. Therefore, no apprenhension need be felt that Australia is likely to suffer any serious consequences through the delay that has occurred. On the contrary, there is good ground for believing that when broadcasting does commence here it will be carried out in a more up-to-date and orderly manner than in any other country in the world. It is obvious that the regulations will be framed with that object in view, and as improvements in radio apparatus are constantly being designed the delay may easily prove to be a blessing in disguise.

He would be a brave man who would undertake to prophesy, with any pretensions to accuracy, just how far radio is going to revolutionize the means of communication in Australia in the next ten years. The future is practically at the mercy of this distance-annihilating agency, and what we regard as an accomplishment to enthuse over to-day will very probably be an ordinary incident a few years hence.

The result of the deliberations of the Melbourne Conference, when put into effect, may be expected to satisfy even the most exacting in the matter of broadcasting in Australia. With the general public educated to understand the benefits that are to be derived from the installation of home receiving sets, it may be confidently asserted that radio circles in Australia will experience the boom which has followed the commencement of broadcasting in overseas countries.

Radio in the Country

THE Wingham Municipal Council (N.S.W.) is to be commended on its enterprise in seeking information as to how far radio telephony will benefit the people of isolated districts of Australia. It is a healthy sign when public bodies evince interest in such up-to-date matters as the installation of radio receiving and transmitting sets in order that people who are doing valuable pioneering work in the country might enjoy some of the pleasures available to those who live in the big centres of population. There is nothing more depressing than the deadly montony which settles upon those who are out of touch with the daily news of the world. The extension of mail services and telephone facilities, while of considerable value to country dwellers, can never render the same service as radio telephony. Too often have country people been accused of harbouring out-of-date ideas, but the step taken by the Wingham Council effectively destroys the foundation on which such a charge could be built.

Those interested in the commercial aspect of radio in Australia are essentially men of progress, and may be relied upon to place the full benefit of their experience at the disposal of any public body that desires to exploit the possibilities of radio for the common good. Rural settlement is going to receive a tremendous impetus in the near future when would-be settlers realize that country life does not mean the severing of intercourse with the outside world, as it did a few years ago, and as it still does to a more or less extent to-day.

It is infinitely better that the progress of radio in linking up isolated portions of the country with the big cities should be slow and sure rather than hasty and unsatisfactory. The moral effect of the latter would be the reverse of what is required to encourage the general public to place absolute faith in the value of wireless as a means of communication. The time is not far distant when all who desire to do so will be able to participate in the benefits of radio broadcasting. In the meantime it will be a good thing for Australia if many more public bodies follow the action of the Wingham Council in seeking information as to how far wireless telephony will benefit the people who live in isolated localities.

The Spark of Life

How Wireless Saved "Mindini's" Passengers and Crew

Operator's Graphic Story

ONE needs to hear the story of the *Mindini* disaster first-hand to appreciate the heroism of all who participated therein—a heroism born largely of the knowledge that within a few minutes of the happening the radio call for help had been picked up and broadcasted to all ships and coast stations within a wide range.

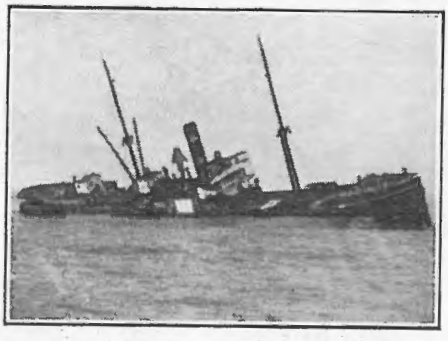
Wireless Officer's Story.

The story told by Mr. R. Jordan, Wireless Officer of the *Mindini*, is a graphic one.

He went off watch at 2 a.m. on the morning of March 8, and was soon wrapped in sound slumber. At a few minutes to 4 o'clock he was awakened by a severe bump. Wireless men are accustomed to thrills, and the ability to size up a situation quickly is almost second nature to them. Consequently it was but the space of seconds till Mr. Jordan had realized that the *Mindini* was ashore on Mellish Reef. At the same instant he was summoned to the bridge, where he was informed of the ship's position, and given orders to broadcast the S.O.S. call.

S.O.S. Call Goes Out.

Back in the wireless room the operator nerved himself for the task of transmitting the call on which the safety of all on board depended. For the space of three minutes the magic spark hissed through space, and hardly had the calls ceased when Townsville Radio Station—distant 540 miles—responded. To use Mr. Jordan's own words: "The signals from Townsville indicating that our message had been picked up was sweet music in my ears, and imbued me with feelings of confidence in our chance of speedy rescue." The atmospheric conditions were exceedingly unfavourable for radio reception at the time, and prior to Townsville's response there was some doubt as to whether the calls would be heard by the coast stations.



The Wrecked Steamer "Mindini" on Mellish Reef.

Once communication was established a request was made to Townsville to broadcast the call to other stations. This was immediately complied with, and Sydney, Melbourne and Thursday Island all received and passed on the tidings that the *Mindini* needed help.

Mr. R. Jordan, Wireless Operator of the "Mindini."

After the wireless officer had satisfied himself that the ship's perilous position was being broadcasted to vessels along the coast, he concentrated his attention on picking up any ships that might happen to be within easy range. It was felt that if this could be accomplished the chance of being towed off within a short time was exceedingly bright.

Japanese Ship Responds.

At five minute intervals the S.O.S. call was sent out, and at 9 a.m.—five hours after the ship struck—the *Tohoko Maru*, bound from Sydney to Hong Kong, answered the call. She was then about 95 miles off, and advised that she was coming to render assistance. An hour later the *Nauru Chief*, on the trip from Sydney to Nauru, signalled that she was 170 miles off.

To the request of the *Mindini's* operator that she should alter her course to bring her to Mellish Reef, she immediately responded.

Coast Stations Busy.

Meanwhile the Australion coast stations had been busy, and the *Montoro*, approaching Townsville, and the *Morinda*, bound from Rabaul to Samarai, both signalled that they had picked up word of the *Mindini's* plight, and were racing to her assistance.

Those on board the stranded vessel had by this time realized that it was only a matter of hours before help arrived. They were imbued with a quiet confidence from the very moment that Captain Voy advised them that the radio call had been heard and help was coming.

Landing on Mellish Reef.

It was necessary, however, to make their position secure, and hence preparations were made for landing on the island. These preparations were

in charge of the Chief Officer (Mr. McLean), who exhibited great skill and coolness in piloting the boats over the 10 or 12 miles of open sea to the lee-side of the island. The vessel lay only about a mile off the island, but it was impossible to proceed there direct owing to the dangerous reef which intervened. While these preparations were proceeding the *Tohoko Maru*, the *Nauru Chief* and Townsville station were kept in continuous wireless call. Late in the afternoon the first-named vessel was advised by the *Mindini* to proceed direct on her voyage, as it was impossible for her to reach the stranded ship before nightfall. When night fell the *Mindini* was broadside on to the reef, and the water was pouring into the holds and engine room. At 9 p.m. the dynamos showed signs of weakening, despite the efforts of the engineers.

Emergency Gear Used.

At midnight they were both submerged, but communication was kept up by means of the emergency gear, which had a good range and was in splendid working order. In the early hours of the morning the ship was at an angle of about 50 degrees, and those on board experienced some anxious moments.

Sleep was impossible, and the time was occupied in recounting sea stories and other incidents.

"Nauru Chief" Arrives.

With dawn came the rescue ship, *Nauru Chief*. Words fail to describe the feelings of relief and thankfulness with which those on board watched her steam to within close range. As one passenger declared: "It was the most inspiring sight he had ever witnessed."

After exchanging messages regarding details of rescue work, the wireless officer closed down his station, and went on deck. The work of transferring passengers, crew and baggage to the *Nauru Chief* occupied some time, but at 11 a.m. Captain Voy left the stranded vessel.

The next task was to pick up the passengers and members of the crew who had been landed on the small, low, coral island, which was practically devoid of vegetation. Their feelings of thankfulness at being taken off were easier to imagine than describe. No shelter of any sort was available, but the women had been accommodated for the night in a tent, which was erected for the purpose. The only life on the island was thousands of birds, which the passengers say were infested with lice. This, combined with the objectionable odour arising from thousands of decaying eggs had a most distressing effect on those who were compelled to spend the night there. Had there been no radio installation on the *Mindini* to summon assistance a stay of at least a fortnight or three weeks on this unsavoury spot was practically inevitable.

A Link with the Past.

An interesting discovery touching an incident which happened many years ago was made by one of the passengers during the afternoon. Noticing a bottle standing erect on an

Mr. E. S. Bailes, Wireless Operator of the Rescue Ship "Nauru Chief."

elevated spot on the island, he commenced scratching away the earth, and just beneath the surface a human skeleton was unearthed. A member of the *Mindini's* crew, on learning of the discovery, recalled that many years before a death occurred on a sailing vessel while in the vicinity of Mellish Reef. A boat conveyed the corpse ashore, and it was interred in that lonely spot, with only the screeching of the wild birds and the subdued roar of the waves breaking on the wide coral reef to lull the restless spirit to sleep.

Friends in Need.

Immediately the shipwrecked passengers and crew boarded the *Nauru Chief* they were treated with the utmost courtesy and attention. The cabins were at once made available to the womenfolk, and despite the overtaxed condition of the ship, the three days which were spent on board prior to reaching Samarai were crowded full of pleasant incidents, so much so that all hands were sorry when the time for parting arrived.

From Samarai the party proceeded by the *Morinda* to Cairns, where they boarded the *Marella* en route for Sydney.

Radio Helps all Through.

In addition to the actual work of transmitting the distress signals and other messages incidental to the rescue, wireless was employed to complete the whole of the arrangements for the transhipment of the passengers and crew at the various ports. In response to a request by radio, the *Morinda* was ready to receive her guests on their arrival at Samarai, and similarly when she landed them at Cairns the *Marella,* which had been detained for that purpose, took them on board for Sydney.

Those Who Helped.

It would be unfair to close the story of such excellent rescue work as that performed in the *Mindini* disaster without paying a due tribute to the valuable and sustained work carried out by the various wireless officers, both at coast stations and on board ships.

The chief figure, of course, was Mr. Jordan, Wireless Officer of the *Mindini*. He was singularly unconscious of the valuable work he performed, but not so the passengers and crew of the ill-fated steamer. They paid glowing tributes to the value of wireless in saving the lives of all on board, and every mention made of the happening was coupled with the name of Mr. Jordan.

The staff of the Coastal Radio Station at Townsville also performed splendid service, and a similar tribute must be paid to the staffs of the Sydney, Melbourne and Thursday Island stations.

At sea the determination of the wireless officers on the *Nauru Chief* and *Morinda* to render assistance if it were humanly possible to do so was exemplified by the fact that the former, Mr. E. S. Bailes, remanied on duty continuously for 29 hours. Mr. Haddock, of the *Morinda*, also kept up a sustained watch of over 22 hours.

Romance of Radio

Twenty Years of Progress

Marconi Tells the Story

IT is always interesting to glance back over the years marking the early history of any great invention or discovery. When that discovery happens to be radio, and the gentleman in a reminiscent mood Senatore Marconi, one can rest assured that something of more than ordinary interest will be revealed.

Quite recently Marconi lectured before a joint meeting of the American Institute of Electrical Engineers and the Institute of Radio Engineers in New York, in the course of which he said:

The first occasion on which I had the honour of speaking before the members of the American Institute of Electrical Engineers was of a very festive nature.

It is more than twenty years ago—to be exact, on January 13, 1902 (there was not then any Radio Institute in existence)—and on that date, memorable for me, I was entertained by more than 300 members of your Institute at a dinner at the Waldorf-Astoria in this city. I was offered that dinner following my announcement of the fact that I had succeeded in getting the first radio signal across the Atlantic Ocean.

The function was one I shall never forget, and what has left the greatest impression on my mind during all the long twenty years that have passed is the fact that you believed in me and in what I told you about having got the simple letter "S" for the first time across the ocean from England to Newfoundland without the aid of cables or conductors.

It gives me now the greatest possible satisfaction to say that, in some measure, perhaps, your confidence in my statement was not misplaced, for those first feeble signals which I received at St. John's, Newfoundland, on the 12th of December, 1901, had proved once and for all that electric waves could be transmitted and received across the ocean, and that long distance radio telegraphy, about which so many doubts were then entertained, was really going to become an established fact.

A very great impulse has been given to radio telegraphy and telephony by the discovery and utilisation of the oscillating electron tube or triode valve based on the observations and discoveries of Edison and Fleming, of those of De Forest and of those of Messiner in Germany, Langmuir and Armstrong in America, and H. W. Round in England, who have also brought it to a practical form as a most reliable generator of continuous electric waves.

The Vacuum Tube.

As the electron tube, or triode valve, or valve, as it is now generally called in England, is able, not only to act as a detector, but also to generate oscillations, it has supplied us with an arrangement which is fundamentally similar for both transmitter and receiver, providing us also by a simple and practical method with the means for obtaining beat reception and an almost unlimited magnification of the strength of signals.

A result of the introduction of the triode valve has been that the basic inventions which made long distance radio telegraphy possible have become more and more valuable.

It has been so far our practice to use a plurality of tubes in parallel at our long-distance stations. High power has been obtained in practice up to 100 kilowatts in the antenna by means of a number of glass tubes in parallel, and for the present we are standardising units capable of supplying four kilowatts to the antenna, in the numbers required and sufficient for each particular case.

Some difficulty was at first experienced in paralleling large tubes in considerable numbers, but no difficulties now occur with groups of 60 bulbs working on voltages of 12,000 on the plate.

I am told that no insurmountable difficulty would be encountered if it were desired to supply 500 kilowatts to the antenna from a number of these bulbs. The life of the bulbs has been very materially increased, and the 4-kilowatt units are expected to have a life, which, based on a great number of tests carried out both in the laboratory and at our Clifton station, should be well in excess of 5,000 hours.

The development of single unit tubes of considerable power is also progressing. We have lately concentrated on the production of high-power tubes made of quartz, and two sizes of each bulb are now being made, one for 25 kilowatts to the aerial and another for 75 kilowatts, but it is not expected that the efficiency of the high-power single units will be as good as that of the multiple units, and the work on the large tubes is being considered so far as experimental.

Very careful investigations have been carried out by Mr. H. W. Round of all the losses in the loading coils and other parts of the tube circuits, and actual measurements on considerable power have shown that an over-all efficiency from the input power on the plates of the tubes to the aerial of 70 per cent. is possible with a complete avoidance of harmonics, that is, an efficiency from the power input to the plates of the tubes to actual radiation into space of about 35 per cent.

On shorter wave stations it is quite practicable still further to increase this efficiency, although possibly it is hardly worth the extra expense involved. We have at present one station in England working on a 3,000-metre wave-length with a height of mast of 100 metres, which has an efficiency from plates to radiation into space of 40 per cent.

In high-speed transmission we are maintaining public services at 100 words per minute to two places in

Europe, namely, Paris and Berne, using a single aerial transmitter with two wave-lengths on the same aerial, and although the operation of utilising a single aerial for two wave-lengths is not an advisable one for high-power work, it has certain points to recommend it in medium-power work, where the consequent loss of efficiency can be made up for by a slight increase of power.

These two waves are working duplex to both Paris and Berne, and practically all traffic is taken on printing machinery, although there are occasions when, because of static, reception has to be done on undulator tape, and, in some rare cases, on the telephones, by sound.

The reception at these shorter distance stations is carried out by means of a cascade arrangement of high and low frequency tuned amplifier circuits attached to the directional aerial system of the Bellini type, arranged for unidirectional reception when necessary.

Where Static Comes From.

During my present journey across the Atlantic on board the yacht *Elettra* we noticed that up to about half-way across (apart from the effects of local storms) static interference appeared to be coming from the European and African continents, while at more than half-way across they were coming from westerly directions, that is, from the American continent.

The changing over of the direction of origin of these disturbances has also been noted under similar circumstances by Mr. Tremellen in crossing the Pacific.

The protection of receivers against the troubles of atmospherics or static can only be, and is likely to continue to be, a relative matter, as it is quite obvious that a static eliminator under certain conditions will cease to be effective, where the static arrives with much greater intensity than had been anticipated, and will also frequently fail when, in consequence of the weakness of the received signals, application has to be increased to any considerable extent.

Receiving Developments.

In 1920, howver, an important step was made by Mr. G. Mathieu as to the path to be followed out in order to obtain a practical solution of the problem. This consisted in the design of a new type of air-core tuned inter-valve transformer arranged in such a manner as to possess only an extremely electrostatic capacity between the windings, and having its effective primary impedance about equal to the effective internal plate to filament resistance of the tube in use when the secondary circuit was brought into resonance with the frequency of the oscillations to be amplified.

The results to be achieved during the first tests of these new transformers appeared to be quite amazing, the amplification factor for one tube having passed suddenly from

PLAYS PRODUCED BY RADIO. —"*Wide World*" *Photo.*

A scene from "The Travelling Salesman," which was recently produced from the General Electric Co.'s Broadcasting Station at Schenectady, New York. This particular scene is laid in a small railway station, and this accounts for the telegraph instrument which can be seen. To keep check on how the programme is going out, the director is equipped with a pair of padded headphones, and is able to hear the play as it is broadcasted. By cards the director can inform the players if they are speaking in proper tones. When the wireless transmission of photographs is perfected people will be able to see and hear plays without leaving their house.

five to about fifteen for the particular tube tested, whilst the stability proved incomparably better than what had been obtained previously, even when the grid of the tube was kept to a negative potential of one or two volts.

The Importance of Short Waves.

The study of short waves dates from the time of the discovery of electric waves themselves, that is from the time of the classical experiments of Hertz and his contemporaries, for Hertz used short electric waves in all his experiments, and also made use of reflectors to prove their characteristics, and to show among many other things that the waves, which he had discovered, obeyed the ordinary optical laws of reflection.

As I have already stated, short electric waves were also the first with which I experimented in the very early stages of wireless history, and I might perhaps recall the fact that when, more than 26 years ago, I first went to England, I was able to show to the late Sir Wm. Preece, then Engineer in Chief of the British Post Office, the transmission and reception of intelligible signals over a distance of $1\frac{3}{4}$ miles by means of short waves and reflectors, whilst, curiously enough, by means of the antenna or elevated wire system, I could only get at that time signals over a distance of half a mile.

The progress made with the long wave or antenna system was so rapid, so comparatively easy, and so spectacular that it distracted from the short waves, and this, I think, was regrettable, for there are very many problems that can be solved, and numerous most useful results to be obtained by, and only by, the use of the short wave system.

Directional Transmission.

At that lecture I showed how it was possible, by means of short waves and reflectors, to project the rays in a beam in one direction only, instead of allowing them to spread all around, in such a way that they could not affect any receiver which happened to be out of the angle of propagation of the beam.

I also described tests carried out in transmitting a beam of reflected waves across country over Salisbury Plain, in England, and pointed out the possible utility of such a system if applied to lighthouses and lightships, so as to enable vessels in foggy weather to locate dangerous points around the coasts.

I also showed results obtained by a reflected beam of waves projected across the lecture rooms, and how a receiver could be actuated and a bell rung only when the aperture of the sending reflector was directed toward the receiver.

Since these tests of more than twenty years ago practically no research work was carried out or published in regard to short waves, so far as I can ascertain, for a very long period of years.

Most of the facts and results which I propose to bring to your notice are taken from Mr. Franklin's paper.

The waves used had a length of two metres and three metres. With these waves disturbances caused by static can be said to be almost non-existent, and the only interference experienced came from the ignition apparatus of automobiles and motor boats.

The receiver at first used was a crystal receiver, whilst the reflectors employed were made of a number of strips of wires tuned to the wave used, arranged on a cylindrical parabolic curve, with the aerial in the focal line.

The tests were continued in England at Carnarvon during 1917. With an improved compressed air spark gap transmitter, a three-metre wave, and a reflector having an aperture of two wave-lengths and a height of 1.5 wave-length, a range of more than twenty miles was readily obtained with a receiver used without a reflector.

In 1919 further experiments were commenced by Mr. Franklin at Carnarvon, for which electron tubes or valves were used to generate these very short waves, the object being to evolve a directional radio telephonic system.

A 15-metre wave was chosen, which could quite easily be generated by the type of electron tube employed.

As a result of the success of these experiments it was decided to carry out further tests over land across a distance of 97 miles between Hendon (London) and Birmingham.

The power supplied to the tubes employed is usually 700 watts. The aerial is rather longer than half a wave-length, and has a radiation distance which is exceedingly high. The efficiency input to the tubes to aerial power is between 50 and 60 per cent., and about 300 watts are actually radiated into space.

With the reflectors in use at both ends, speech is usually strong enough to be just audible with a $\frac{1}{4}$ to $\frac{1}{2}$ ohm shunt across a 60-ohm telephone.

With both reflectors down and out of use, speech is only just audible with no shunt.

By means of suitable electron tubes or valves it is now quite practicable to produce waves from about 12 metres and upward, utilizing a power of several kilowatts, and it is also practicable to utilise valves in parallel.

Reflectors, besides giving directional working, and economising power, are showing another unexpected advantage, which is probably common to all sharply directional systems. It has been noted that practically no distortion of speech takes place, such as is often noticed with non-directional transmitters and receivers, even when using short waves.

It has thus been shown for the first time that electric waves of the order of 15 to 20 meters in length are quite capable of providing a good and reliable point to point directional service over quite considerable ranges.

I have brought these results and ideas to your notice as I feel—and perhaps you will agree with me—that the study of short eletric waves, although sadly neglected practically all through the history of wireless, is still likely to develop in many unexpected directions, and open up new fields of profitable research.

Broadcasting.

No remarks from me or from anyone else are required to tell you what has already been done with radio in America as a means of broadcatsing human speech and other kinds of sound which may also be entertaining if not always instructive.

In thousands of homes in this country there are radio-telephonic receivers, and intelligent people, young and old, well able to use them—often able to make them—and in many instances contributing valuable information to the general body of knowledge concerning the problems, great and small, of radio telegraphy and radio telephony.

Victorian Experimenter at Work

Up-to-Date Station at Caulfield

Mr. Fall's Good Work

THE interest and enthusiasm of the radio experimenter is almost invariably revealed in the efficiency of the station which he has erected to follow up his hobby. Of course it sometimes happens that an intensely enthusiastic amateur is prevented, by financial considerations, from equipping his set as he would like. Such a drawback, however, is invariably only temporary, and most experimenters sooner or later contrive to get together the set they require. To accept anything less is contrary to the spirit which in the first instance impelled them to undertake radio research.

A visit to the up-to-date station erected by Mr. L. Fall at Ormond (Victoria) will unquestionably prove an eye-opener to those not fully acquainted with the progress made in recent years by Australian experimenters.

Mr. Fall obtained a close insight into radio communication work while he was on active service in France, and on his return to Australia devoted himself whole heartedly to extending his knowledge of the science.

The result is to-day strikingly apparent to the visitor in search of information who drops in at Mr. Fall's home any evening.

The operation of establishing communication with the outside world is a simple one.

The headphones are adjusted, a few dial indicators turned, the valve detector glows and mystic voices come floating in sharp and clear. Melbourne radio station is heard calling up some ship within range, perhaps to despatch a message of farewell to some friend or relative on an outward voyage; a moment later a deep voice is heard calling the police patrol car to say that there is nothing

Mr. L. Fall, of Caulfield, a well-known Victorian experimenter.

to report; and then a shrill whistling note indicates that Sydney has something to say. And so it goes on. In the space of half an hour one is able to realize in a small measure the myriad activities of the busy radio world. After a brief lull the listener hears a voice announcing that the Melbourne Office of Amalgamated Wireless is broadcasting the usual Monday night concert. A moment later the strains of music come floating in, and the listener is able to appreciate the feelings of rapture with which dwellers outback will embrace the opportunity of receiving broadcast concerts when that long-looked-for innovation commences in Australia.

By way of showing the capacity of his set for receiving messages from high-power stations overseas, Mr. Fall introduced a large coil of wire, estimated at 4½ miles long. A few moments devoted to "tuning," and signals from France and America came in quite audibly.

The following is a description of Mr. Fall's set:

The aerial is of the inverted L shape, and consists of two poles 45 feet high and 93 feet apart, with four wires. The earth consists of a water pipe 4 feet 6 inches from the set.

On left-hand top corner is a crystal receiver, consisting of two variable condensers (primary and secondary), two honeycomb coils, two detectors, so arranged to switch from one or the other. Fixed condenser and aerial, earth and telephone terminals.

At the right-hand top corner is the long wave coil, with Jackson's plugs arranged so that any wave length from 2,000 to 30,000 metres can be obtained by plugging in to the respective coils.

Bottom right-hand side is the short wave set, which

Mr. Fall's Experimental Station.

(*Continued on Page 47.*)

Trans-Pacific Tests

Ideas for Competitors

By J. G. REED

SOME time ago the writer promised readers of *Sea, Land and Air* further information regarding amplifiers suitable for the reception of signals from long-distance, short-wave stations. Since then many important experiments have been carried out while getting a suitable receiver ready for the trans-Pacific tests in May this year. The distance over which the signals will travel between California and the East Coast of Australia is in the neighbourhood of 7,000 miles, and as a consequence they will arrive in a very feeble condition after their long journey. Amplification by at least

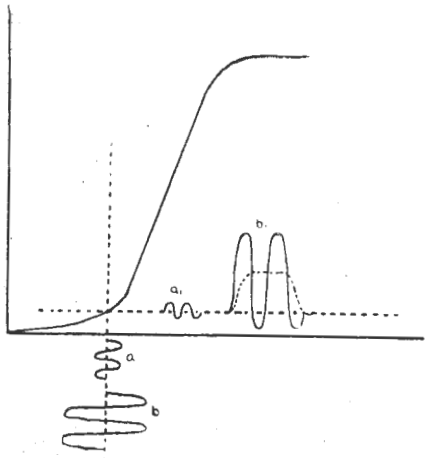


Figure 1.

one valve at radio frequency must be made before the signals are handed along to the detector.

The valve as a detector alone is not a very sensitive device, as will be seen after studying Figure 1, which shows the variation of plate current with respect to grid potential. For operation as a detector the valve is adjusted so that it functions at either the top or bottom bend of its characteristic curve. The energy consumption both in the grid and the plate circuits is least when the valve is operated on the lower portion; that is, when a negative potential is impressed upon the grid either by a potentiometer or leaky grid condenser. Variation of the grid potential positive and negative to normal is shown along the vertical line marked grid voltage. If the amplitude of the impressed oscillations is very small, as in case "a," the portion of the plate current curve over which it has influence will be sensibly equal to a straight line, and the change in plate current will be merely a magnified duplicate, whose effect upon the telephone receivers will be zero as the variations swing equally to each side of the normal value of the current. If the amplitude is increased by means of preliminary amplification to that shown in case "b," much better results will be obtained, for advantage can now be taken of the non-linear property of the curve.

Variations of the grid potential in a positive direction will cause a greater increase in plate current than takes place in the opposite direction when a negative potential is applied. The plate current is no longer symmetrical in its variation relative to normal, with the result that rectified pulses of current as shown in the dotted line flow through the telephones. The above explanation is applicable to "hard" valves, or those which have been exhausted to a fairly high degree of vacuum, but in those containing slight traces of gas, such as Expanse "B" or Radiotron "UV200," a slightly different action takes place. When the electrons emitted by the filament reach a certain critical velocity they are able to strike the residual molecules of gas in the tube with such force that the latter are broken up and become ionized, causing an abnormal change in the plate current. If the filament current and plate voltage are regulated slightly below this point remarkably efficient rectification takes place. In the experiments being carried out by the writer a soft valve is used as a detector, and particular attention is paid to close variation of the filament current and plate potential. If no vernier filament resistance is available, one can be easily constructed as follows:

Obtain a piece of hard rubber rod one inch in diameter and four inches long, which must be placed in a lathe and a light thread of about twenty to the inch put on. In this groove is wound a spiral of Eureka resistance wire of No. 24 gauge. If this size is not available use either No. 22 or 26. Into the end of the hard rubber is screwed a piece of ¼" brass rod 4" long, to which the resistance wire is soldered after the end has been made fast to the former so that it will not unwind. Mount the outfit according to Figure 2. A sliding contact is furnished by Clip "C," and if a small centre punch mark is made on one

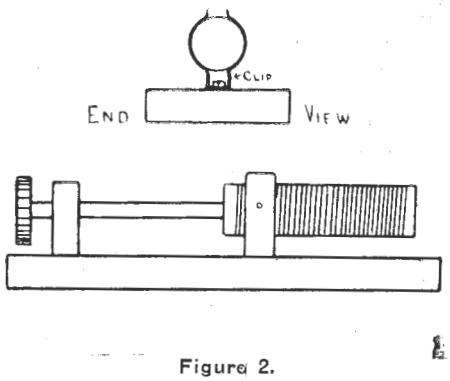


Figure 2.

side of it a fine variation of current can be obtained by turning the resistance unit around by the knob "H," when the wire in the groove will engage with the impression on the contact clip, and by its screw action a gradual advance will be made. Rough adjustment of resistance can be obtained by sliding the rod up and down in the clip. To ensure smooth action when this takes place, round off the edges of the contact clip with a file, because it is likely to catch against the resistance wire. For the plate supply of the detector valve a separate high tension battery is recommended, which should work in conjunction with an "A" battery potentiometer to obtain the close control over the plate potential required for best results. The two microfarad condenser connected between the posi-

tive terminal of the high tension battery and the negative of the filament battery provides a path of low impedance for the high frequency currents, otherwise, owing to the internal resistance of the plate battery and the potentiometer being common to all valves, self-oscillation is likely to be set up because of its auto-coupling effect. The grid condenser for the detector valve should be in the neighbourhood of 250 cms. (0.0003

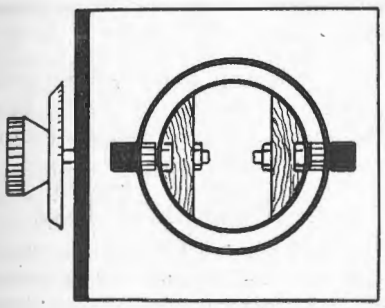


Figure 3.

microfarads), with a high resistance leak of two to three megohms between the grid and the filament terminal which gives best results.

Adjusting the most critical soft valve will be considered an easy task after experimenting for a while with a short-wave multi-valve amplifier. The peculiar effects caused by the small internal capacities of the valves and other parts of the apparatus when attempting to receive signals below 400 metres would almost discourage even a "dyed in the wool" experimenter. Here is the way in which the writer attacked the problem, and if the procedure is followed by those interested in this subject much valuable time and temper will be saved.

Commence with one valve as an amplifier, and understand its peculiarities before attempting a more ambitious programme. Two efficient methods of coupling are, available *viz.*, tuned impedance and tuned transformer. The former is to be preferred owing to its simplicity and slightly higher efficiency on the lower wave lengths. For the inter-valve chokes use small variometers with four inch tubes for stators and three inch tubes for rotors. Each tube is wound with 30 turns of No. 24 D.C.C. wire. Details of the construction of these variometers appeared in a previous issue of *Sea, Land and Air*, but for those who may have missed this article the sketch in Figure 3 will make the assembly clear.

Figure 4 gives the diagram of connections for a receiver employing three valves as radio frequency amplifiers, and one as detector. The valves used for the amplifiers should possess the smallest possible inter-electrode capacity, and in this respect the V24, QX and Q types are very suitable, owing to their very short lead in wires to the grid and plate elements.

The switches marked "S" are used to connect up the different stages of amplification as required. When one amplifier and detector are switched into circuit it will be noticed that as soon as the plate circuit of the amplifier valve is tuned to resonance with the input circuit, it breaks into oscillation and acts as an autodyne receiver, producing beats with the incoming wave train. These oscillations are caused by the electrostatic coupling which exists between the plate and the grid of the valve, and can be stopped by either increasing the decrement of the grid circuit, due to a slight positive potential applied by means of a potentiometer, or increasing the effective resistance of the plate oscillatory circuit to such an extent that the extra energy caused by this regeneration is just used up in overcoming the ohmic losses. With only one valve acting as a radio frequency amplifier it is an easy matter to apply the positive potential direct to the grid, as there is a connection of low resistance all the way; but when two or more are used and an attempt is made to impress this potential through the grid leaks, the high resistance of the latter path, combined with the fact that a small current flows when the grid is made positive, keeps the effective voltage much lower than that supplied by the potentiometer, and as all the amplifier grids are generally worked from the same potentiometer, the input circuit which connects direct is liable to have too high a potential impressed in the endeavour to control the other valves, with the result that the losses are so high as to seriously affect the strength of the incoming oscillations.

Referring to Figure 4 it will be seen that the inductance of the variometer V and the capacity between the plate and filament from the tuned coupling circuit for the next valve. If the resistance of this circuit exceeds a certain value the voltage generated across the internal capacity of the valve will not be sufficient to give rise to sustained oscillations. This at once affords an excellent means of controlling the regenerative property of the valve. Between the variometer and the plate connection insert a variable non-inductive resistance of about 200 to 300 ohms. An "Expanse" rotary potentiometer makes an excellent unit variable up to 250 ohms. The exact value of this resistance which will stop oscillations depends largely upon the ratio of inductance and capacity in the circuit, but for all ordinary valves, such as the V24 and QX, it will be found quite sufficient. If a fixed inductance shunted with a small variable condenser is used to tune the plate circuit to resonance, the location of this resistance will have to be altered slightly. The tuning condenser may be considered as being in parallel with the capacity between the plate and filament; therefore, to get the resist-

(*Continued on Page* 40)

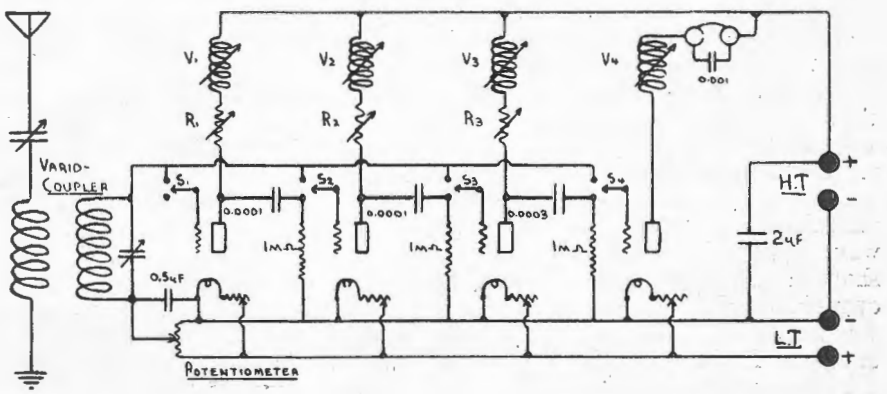
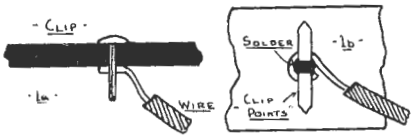


Figure 4.

Economical Switch Contacts.

DURING week-end experiments, when experimental supply houses are closed, it is very often found that a multipoint switch is needed. To guard against this annoying situation invest in a packet of split pin paper fasteners, and keep them handy amongst those little odds and ends which collect in the tool box.

Holes should be drilled in the panel just a shade smaller than the width of the paper fasteners, and the latter forced through, as in Figure 1a. Loop the connecting wire around the points and then spread them out flat



with a small tack hammer. A drop of solder placed where shown in Figure 1b prevents the clip from loosening, and secures a good connection for the wire.

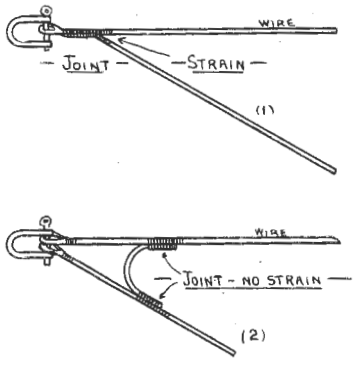
A New Use for Phonograph Records.

An excellent inductance former of great rigidity and high insulation can be made from the cylindrical wax records used in the old style Edison phonographs. These can be bought very cheaply from almost any musical instrument store.

In addition to being used as inductance formers, they can be cut lengthways with a hack saw, and after a short immersion in warm water be opened out flat, and used as panels for mounting apparatus. To make one tube fit into another for use as a loose coupler, cut out a strip the necessary width to reduce the circumference to the desired value, and after immersion in warm water to make it soft and pliable, form it around a wooden cylinder or small tin. As soon as it sets hard run a hot soldering iron along the join to melt the material together and close up the saw cut. Sandpaper the joint and the remainer of the tube smooth before winding on the wire.

A Lead-in Suggeston.

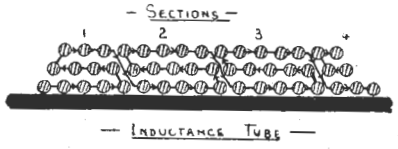
The usnal method employed by experimenters for attaching the lead-in wires to the flat top of an antenna is illustrated in Figure 1. When a strain is placed upon the wires, either by the wind or tensioning to prevent excessive swaying, the wire is liable to break at the point of connection, owing to the sharp angle formed. This strain can be relieved by connecting the wires as shown in Figure 2. Small galvanized iron thimbles should be fitted to the ends of the wires, which are shackled together by means of a "D" bolt. Solder the



connecting piece well to avoid a "dry" joint in the wire. The best way to do this is to cover the joint with a layer of "Fluxite," and dip it into a small tin containing molten solder. It is well worth while paying attention to the above small items, as the aerial is considerably strengthened thereby.

Bank Winding Made Easy.

For long wave work the honeycomb coil has come into almost nniversal use, but for intermediate wave lengths a bank winding of several lays cannot be beaten. Many experimenters become discouraged when they attempt this style of winding owing to the time and trouble necessary to bank wind each turn. This objection can be overcome almost entirely by wind-



ing the wire on in sections five to ten turns wide. The diagram herewith will make this plain for the case of a three-layer coil. In the case of variometers or variocouplers intended for work on waves between 1,000 and and 4,000 metres this winding will be found very suitable, owing to the limited winding space available, which would otherwise necessitate the use of very fine wire and consequent reduced signal strength. It can be wound much faster than the single-turn bank winding, and as a number of turns can be wound on without stopping, a lathe can be employed without inconvenience. By making all the cross-overs from section to section on the same side of the winding, the coil assumes a smooth and even appearance. Its distributed capacity is very low, making it well suited for the reception of telephony and continuous wave signals.

Will Randwick See This?

Horse Racing by Radio

At the Cook County Fair, in Chicago, U.S.A., recently, a new use for radiophoning was demonstrated: giving orders to a race horse as he passed around the track jockeyless. The horse's name was "Radio," and he had been trained to circle the track at full speed without a jockey, but carrying a light radio receiving set attached to the harness. The owner or trainer of the horse, seated in the grandstand, sent his orders to the horse via radiophone. As the horse came into the home stretch, the trainer yelled in his radiophone transmitter in the grandstand: "Come on, Radio! Come on, Radio!" whereupon the horse responded nobly, just as if the trainer had been sitting on his back, and was urging him on toward the finish line.

Shortly, perhaps, we will be treated to a distinct novelty in the form of a radio horse race, in which all of the animals participating will race around the track jockeyless, each horse being fitted with a radiophone receiving set, and either a loud-speaker horn or else a head set of phones strapped over his ears.

The radiophone receiving set with which the horse is accoutred, requires at least one stage of radio frequency, detector and three stages of audio frequency amplification, and the form of aerial employed may be a small loop of the pan-cake or other type, or again the aerial may comprise a wire system combined with a harness. When the loop aerial or its equivalent is employed, no ground is required. There is, of course, no danger of an electric shock being received by the horse, and the only difficulty, if such it might be called, lies in the jarring of the delicate instruments, owing to the motion of the horse as he runs along. A special circuit arrangement is also required in connection with a loop or other type of antenna for this horse racing outfit, so that it will not be too critcal, with respect to the position in which the aerial points, as if this was the case the strength of signals would vary from zero to maximum and intermediate degrees, depending upon the position of the horse as he travelled around the curving race track. As aforementioned, this difficulty can be overcome by proper design of the circuit and antenna system. It is possible that in the future we may see farm horses dragging plows across fields, all the animals being directed by radiophone orders transmitted by the farmer or his hired man from a central spot. It is also possible to direct gasoline engine tractors in the same way, employing sensitive relays connected up to the radio receiving set.

FREAK CIRCUITS

While "listening-in" to the music being broadcasted by Dr. McDowall, of Preston House, Brisbane, one night recently, Mr. A. Mackenzie (Electrician of the Central Fire Station in Brisbane) had a peculiar experience. While removing the leads connecting the receivers to the terminals they fell to the floor, but despite the fact that the connection was thus severed the music continued to come through quite distinctly. It was then observed that Mr. Mackenzie had his hand on one of the terminals, and this afforded the only possible explanation of the freak transmission. Later the VIS signal from Sydney was heard distinctly through the same agency. It was found that when the hand was placed on both terminals the music was heard much more distinctly. Similar tests were made a few nights later, when the Queensland Wireless Institute was broadcasting its regular concert. It was found that when the terminals were released and the leads held the signals were still received, although much more faintly. A similar thing happened when the man with his hand on the terminals touched another person.

This is not the first time such unusual incidents have been recorded, but at the same time they are worthy of note. In radio circles they are known as "freak circuits."

In Radio Land

Radio Telephone Demonstrations in Melbourne.

At least two highly successful demonstrations of radio telephony have been given in Melbourne recently, and on each occasion those present were both surprised and delighted at the results.

The first was at a luncheon of the Rotary Club, at which Mr. L. A. Hooke (Melbourne Manager of Amalgamated Wireless, Ltd.) was the guest of honour. In the course of a brief address Mr. Hooke outlined the history of radio during the past 25 years.

Subsequently a number of musical selections, news items, stock and share reports and weather forecasts were received on a small set equipped with a loop aerial 30 inches square. The speech was magnified by a "loud speaker," and all in the room were able to enjoy the various items without leaving their seats. That the demonstration was an eye-opener to many men who had previously only a very hazy idea of what radio telephony could accomplish, was evidenced by the expressions of surprise and pleasure heard on all sides at the conclusion of the luncheon.

The second demonstration was given at Collins House, Melbourne, at which a number of gentlemen interested in Northern Territory holdings were present.

Conversations were carried on with ease between Mr. Durack, M.L.A., of Western Australia, Mr. Massey Greene and Mr. Conacher, of Vesty's, Ltd., Darwin, at "Collins House," and Messrs. Miller and White at the Radio Station, Domain Road, South Yarra.

It was the first time any of those mentioned had ever operated a radio, set, but as evidence of the extreme simplicity of doing so it might be mentioned that not one of them experienced the slightest difficulty, and the results were all that could have been wished for.

Marriage by Radio.

An American couple anxious to win the distinction of being the first to have their marriage ceremony celebrated by radio, received a rude shock recently when the Governor of one of the States declared that such a union would not be legal. It was necessary, he contended, for all parties to be present at the one time, and carry out the contract in the old-fashoned way before the law was prepared to place the seal of approval on the union.

Considering the tremendous possibilities which "marriage by radio" opens up it is somewhat surprising to find an American governor so conservative (for an American) as to blight the hopes of those ambitious couples who were anxious to try the new method of "tying the knot."

Radio deserves better at the hands of Uncle Sam. It has helped him to make dollars, and he should reciprocate by allow it complete marriage contracts. It eannot be said that marriage has been an entire success as carried out by the old process, so what harm would there be in giving the new method a fair spin? It remains to be seen what the authorities in Australia will say when some love-sick couple here want to have the ceremony carried out by wireless. *Radio* is seriously considering offering a handsome wedding present to the first couple game to tackle it. It is any odds that the "powers that be" in Australia will tell them to "go right ahead."

Hotels May Not "Listen In."

Quite recently an animated newspaper discussion took place in Sydney on the wisdom of granting more hotel licenses in mining towns. One prominent cleric argued that more hotels meant less drinking, and adduced logical reasons to support his contention.

It is presumed that the hotelkeepers in Nottingham (England) will argue similarly against the refusal of the authorities there to grant them licenses to instal receiving sets for the purpose of "listening in" to the broadcast concerts. The reason for this refusal is that it is feared more people will frequent the hotels, and in addition to enjoying the music may take a little strong refreshment—"under the lap," of course.

This fear may prove to be groundless. It is quite reasonable to assume that so far from inducing more drinking the strains of music floating through the drawing-room of the hotel will raise the thoughts of all within earshot above such sordid, material things as the quaffing of strong drink. It may even penetrate the armour of the hardened drinker who visits the hotel for one purpose alone, and induce him to transfer his worship from the shrine of Bacchus to the altar of radio. It would be an experiment, of course, but then practically everything has been achieved by that means.

Why He Stayed Away.

Radio operators are frequently brought into touch with humorous situations, and if they were permitted to talk freely could tell many amusing stories. Occasionaly one leaks out, as instance the following:

A man whose position and personality enabled him to win the smi

of the fair sex at all times, found himself involved in no less than three love affairs simultaneously. It so happened that in each case the object of his affection had made arrangements to travel to New Zealand by the same boat. What else could the gallant gentleman do but promise each one, unknown to the others, to be on the wharf to bid farewell. In the solitude of his flat he realized that a painful exposure, and at least three painful scenes would result if he kept his promise. He, therefore, kept well away from the ship at sailing time, and some hours afterwards proceeded to the post office and lodged three radiograms—one to each of the disappointed young ladies. The excuse for non-attendance at the leave-taking was the same in each case, and even if it did not soothe injured feelings it cleared the sender's conscience.

The wireless officer's chuckle as he received and typed out the messages was easy to understand. He was used to that sort of thing—perhaps he had once been guilty of it himself. It was, therefore, no function of his to disillusion love-sick young ladies as to the genuineness of Reggie's excuse that a thief had stolen his motor car, and so prevented him reaching the wharf in time to say good-bye. He figured, quite correctly, that they would never ask themselves why he hadn't jumped on a tram.

These wireless men are tactful, alright!

"RADIO" RECEIVES WARM WELCOME

Judging by the enthusiastic reception accorded the first issue of *Radio*, we were right in assuming that we could produce the class of magazine that wireless men wanted. Our first issue was sold out within a week of publication, despite the fact that sufficient copies were printed, as we thought, to supply the heaviest demand that could possibly be expected. To those agents who sent to us for extra supplies we express our regret at being unable to fill their orders. We have, however, taken care that such a happening shall not be repeated, and the extra large number of copies of this issue which have been printed should enable everyone who desires to purchase a copy to do so.

We are grateful to the wireless enthusiasts of Australia and New Zealand for the support they have accorded us. It is our intention to go on improving each issue of *Radio* until it stands second to none in any part of the world.

Exhibit of Amalgamated Wireless (Australasia), Ltd., at the recent A.N.A. Exhibition held in Melbourne for four weeks, when over 250,000 people paid for admission.

(*Continued from Page* 35.)

ance in series with this combination and the inductance, it must be connected as shown in Figure 5. The chances are—as in the writer's case—that all available potentiometers have been pressed into service for controlling the input and detector plate circuits, and cannot be spared for use as series resistance. This difficulty was overcome in the following manner.

The text books tell us that the losses in a condenser or an inductance caused by a series resistance can be represented by a shunt resistance of high value, bearing the relationship expressed in the following formula: $r = 1/R(2\pi f. C)^2$, where r = the shunt resistance, R = the series resistance, and C = the capacity in the circuit. The correct value to make this resistance can be very quickly arrived at by shunting the variometer or tuned anode circuit with a variable grid leak resistance mounting. The writer made this piece of apparatus from a strip of rubber two inches long, one inch wide and one eighth inch thick, with a terminal at each end. Pencil lines, using an HB drawing pencil, were drawn between the two terminals until the oscillations just ceased. Take care that the space underneath and around the terminals is well rubbed with the pencil before screwing down the former. A tinfoil washer makes sure of the connection, and to prepare the surface of the hard rubber for the pencil lines it should have its surface glaze scraped off by means of a knife or fine sand paper.

To produce the oscillations necessary for the best reception of the received signals a separate heterodyne, as described by Mr. Chas. Maclurcan in the March issue of *Sea, Land and Air*, may be used, or else the detector valve can be made to generate its own oscillations, as in the ordinary regenerative receiver, by tuning the plate circuit with an undamped variometer. If the detector valve will not oscillate with the simple tuning of its plate circuit, a small three-plate vernier condenser connected between its grid and plate terminals will usually get things going.

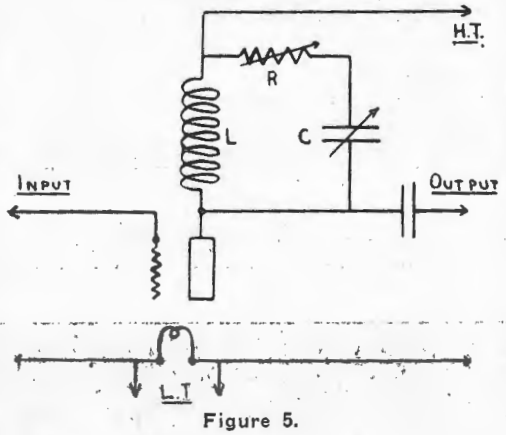


Figure 5.

The stray capacity effects due to the body and hands—which are at earth potential—moving about near the inductances and condensers of the set cause annoying fluctuations in signal strength. To obviate this provide an earth shield on the panel accommodating the tuning apparatus requiring adjustment. Another method is to use extension handles from the control knobs of the variometers and condensers. These should be about twelve inches long, and consist of hard rubber, fibre or other non-conducting material.

When all the apparatus is assembled—preferably on a board about four feet long by one foot broad—commence as follows to tune it through all the stages of amplification. Loosely couple to the earth lead or place several feet away from the tuning apparatus a buzzer operated wavemeter generating waves of the desired frequency. Adjust the tuning of the variocoupler and variometer in the plate circuit of the detector valve, which is connected through to the variocoupler by means of the switch S4, which be on the "up" contact, with all the others down. When loudest signals are obtained with this valve, switch S4 down and S3 up, connecting in one valve as a radio frequency amplifier before the detector. Variometer V3 must now be tuned to resonance, and if any tendency is shown by the set to break into oscillation, adjust the series or shunt damping resistance until this just ceases. Continue this readjustment with three and then four valves in operation. Slight readjustment of the tuning of the variometers and resistances will be found necessary as each extra step of amplification is switched in.

When tuning for a distant station transmitting by means of continuous waves, best results are secured by using a local heterodyne oscillator, which should be varied over a band of wave lengths each side of that desired to be receiver, and when a signal is heard close tuning of the remainder of the circuit should be made.

Readers experimenting with this class of apparatus will receive every assistance with their problems if queries are addressed to the Editor.

Electronic Valve Precautions

Don't handle electronic valves roughly or elements may be injured.

Don't burn electronic valve filaments above rated amperage and voltage.

Don't rely solely on an ammeter for proper current consumption; filaments should be burned at constant voltage rather than constant amperage.

Don't insert electronic valves in socket adaptors unless absolutely certain rheostats are turned off or at the proper setting for normal operation.

Don't make the drastic error of connecting the plate battery to the filament terminals; watch all battery connections.

Don't use more than one standard Diamond Coni Cell (40 volts) on the plate of "Expanse B" Valve.

Don't use more than from 40 to 50 volts on the plates of Marconi V24 Valve—40 volts will be found quite sufficient.

Don't burn out a valve filament through carelessness and expect your dealer to exchange it for another.

Don't use excessive plate voltage on power valves if you want long life.

Don't energize the filaments of all the valves in a cascade circuit at once, unless the circuit has been used before.

Don't take one valve out of a cascade circuit in which the filaments are in parallel—it causes a rise in current in the remaining filaments, and may burn them out. Cut off all the power first.

Don't make any alterations in your wiring while electronic valves are in their adaptors. It is quite a common thing for 40 or 60 volts to become twisted up in the filament circuit as a result of this practice. High voltage for the filament spells disaster for your valve.

Don't expect a continued increase in signal strength as your filament temperature increases beyond normal. You will only reduce the life of your valve. Valves function best at one particular point—when you increase their filament current beyond this point you do the signal no good and the tube great harm.

Don't forget that necessary filament current may frequently be greatly reduced by proper manipulation of the tuner circuits, especially the reaction or regenerative circuit.

Don't expect to have loud speakers operate from a detector valve—you'll be disappointed. At least one stage of audio frequency amplification is generally necessary.

Don't forget that electronic valves cost from twenty to thirty times as much as ordinary incandescent lamps —they deserve a little respect.

Don't expect to get the best results if you use an amplifier valve for a detector or *vice versa.*

Don't be anxious to produce sound with very great volume—it isn't necessary.

Don't expect your loud speaker to work properly if you have a pair of 'phones connected to your detector circuit.

Note on Control of Regeneration

In valve receiving circuits employing regeneration, some means is generally provided for controlling this action. If the circuit is adjusted to a point where its action is too great, telephone signals will be distorted by oscillations set up in the detector valve itself. When this happens it is merely necessary to alter the position of the regeneration control member.

Regeneration, when properly employed, has the effect of amplifying incoming signals many times, and the best results may be obtained by bringing the regenerator control up to a point just before oscillation starts, or by bringing it to an oscillating point and then reducing it slightly. The point of oscillation may be recognized by a peculiar continuous mushy sound in the telephone receivers, and a sharp click may be heard when oscillation starts or stops. Too great a degree of regeneration also has the effect of producing whistling noises.

The regenerative feature in receiving sets when properly employed is of great value, but improperly employed it is not conducive to the best operation. Great care should, therefore, be taken in employing regeneration, otherwise radio telephone speech and music may become distorted.

Call Letters

This is the second list of call letters of Australian and New Zealand ship and land stations. In subsequent issues of "Radio" further lists will appear, all of which should be preserved so that readers will have a complete list of both local and overseas stations.—Ed.

C G A s.s. *Australrange*
C G B s.s. *Australplain*
C G C s.s. *St. George*
C G D s.s. *Australglen*
C G E s.s. *Australford*
C G F s.s. *Eurelia*
C G G s.s. *Eudunda*
C G H s.s. *Booral*
C G I Willis Islets Radio
C G L s.s *Toromeo*
C G M s.s. *Cooee*
C G N s.s. *Australbrook*
C G O s.s. *Manurewa*
C G P s.s. *Sumatra*
C G Q s.s. *Kurumba*
C G R s.s. *Biloela*
C G S s.s. *Kowarra*
C G T s.s. *Melusia*
C G V s.s. *Wyola*
C G X s.s. *Macedon*
G A B C H.M.A.S. *Adelaide*
G A B D H.M.A.S. *Anzac*
G A B F H.M.A.S. *Australia*
G A B H H.M.A.S. *Brisbane*
G A B K H.M.A.S. *Encounter*
G A B L H.M.A.S. *Fantome*
G A B M H.M.A.S. *Geranium*
G A B N H.M.A.S. *Huon*
G A B Q H.M.A.S. *Marguerite*
G A B R H.M.A.S. *Melbourne*
G A B S H.M.A.S. *Parramatta*
G A B T H.M.A.S. *Platypus*
G A B V H.M.A.S. *Protector*
G A B W H.M.A.S. *Stalwart*
G A B X H.M.A.S. *Submarine J1*
G A B Y H.M.A.S. *Submarine J2*
G A B Z H.M.A.S. *Submarine J3*
G A C B H.M.A.S. *Submarine J4*
G A C D H.M.A.S. *Submarine J5*
G A C F H.M.A.S. *Submarine J7*
G A C H H.M.A.S. *Success*
G A C J H.M.A.S. *Swan*
G A C K H.M.A.S. *Swordsman*
G A C L H.M.A.S. *Sydney*
G A C M H.M.A.S. *Tasmania*
G A C N H.M.A.S. *Tattoo*
G A C P H.M.A.S. *Torrens*
G A C Q H.M.A.S. *Una*
G A C R H.M.A.S. *Warrego*
G A C S H.M.A.S. *Yarra*
G B E s.s. *Niagara*
G B F V s.s. *Arafura*
G B J s.s. *Benalla*
G B J D s.s. *Waikouaiti*
G B K J s.s. *Marella*
G B K L s.s. *Orcades*
G B L F s.s. *Omar*
G B M P s.s. *Wingatui*
G B N M s.s. *Waitemata*
G B Q s.s. *Nestor*
G B Q P s.s. *Wangaratta*
G B U s.s. *Ulysses*
G B V K s.s. *Talune*
G C B J s.s. *Surrey*
G C D K s.s. *Kawatiri*
G C D Y s.s. *Kaiwarra*
G C F J s.s. *Port Curtis*
G C F K s.s. *Woodarra*
G C J R s.s. *Ormuz*
G C L N s.s. *Otaki*
G C N Q s.s. *Port Kembla*
G C N R s.s. *Port Adelaide*
G C N Y s.s. *Waikawa*
G C P L s.s. *Hymettus*
G C P M s.s. *Katuna*
G C S V s.s. *Diogenes*
G C T Z s.s. *Naldera*
G C V B s.s. *Narkunda*
G D B Q s.s. *Waihemo*
G D F s.s. *Gracchus*
G D J C s.s. *Montoro*
G D K M s.s. *Waiotapu*
G D P V s.s. *Clan MacTaggart*
G D P W s.s. *Clan MacTavish*
G D R s.s. *Cufic*
G D U s.s. *Tropic*
G D V Z s.s. *Moldavia*
G D Z R s.s. *Atua*
G D Z S s.s. *Kurow*
G D Z T s.s. *Maheno*
G D Z V s.s. *Makura*
G D Z W s.s. *Manuka*
G D Z X s.s. *Maori*
G D Z Y s.s. *Marama*
G F B C s.s. *Mooltan*
G F B D s.s. *Maloja*
G F B J s.s. *Mongolia*
G F B L s.s. *Ballarat*
G F B M s.s. *Balranald*
G F B N s.s. *Baradine*
G F B P s.s. *Barrabool*
G F W X s.s. *Sophocles*
G F Y B s.s. *Maunganui*
G F Y C s.s. *Moana*
G F Y D s.s. *Moeraki*
B F Y J s.s. *Mokoia*
G F Y K s.s. *Navua*
G F Y L s.s. *Taviuni*
G F Y M s.s. *Tofua*
G F Y N s.s. *Wahine*
G F Y P s.s. *Waihora*
G F Y Q s.s. *Waitomo*
G F Z M s.s. *Charon*
G F Z P s.s. *Minderoo*
G K L s.s. *Matatua*
G L G s.s. *Pakeha*
G N K s.s. *Waipara*
G Q A s.s. *Ayrshire*
G Q B s.s. *Perthshire*
G Q W s.s. *Australind*
G R Y s.s. *Dorset*
G S B s.s. *Port Macquarie*
G S F s.s. *Shropshire*
G T J s.s. *Argyllshire*
G V B C s.s. *Changsha*
G V B D s.s. *Victoria*
G V B F s.s. *Taiyuan*
G V M s.s. *Banffshire*
G V S s.s. *Clan Macgillivray*
G V U s.s. *Clan Ross*
G V V s.s. *Clan Ogilvy*
G W I s.s. *Port Albany*
J A I s.s. *Aki Maru*
J N L s.s. *Nikko Maru*
J T G s.s. *Tango Maru*
J Y D s.s. *Yawata Maru*
K D B L s.s. *West Camargo*
K D C S s.s. *Hollywood*
K E K B s.s. *East Wind*
K J H s.s. *West Wind*
M B T s.s. *Rimutaka*
M C E s.s. *Khyber*
M C P s.s. *Ceramic*
M F Q s.s. *Borda*
M F U s.s. *Aeneas*
M F V s.s. *Ascanius*
M F W s.s. *Anchises*
M G G s.s. *St. Albans*
M G K s.s. *Demosthenes*
M G M s.s. *Themistocles*
M G Z s.s. *Khiva*
M H G s.s. *Carpentaria*
M H Y s.s. *Paparoa*
M I L s.s. *Palermo*
M J C s.s. *Suevic*
M J Q s.s. *Westmeath*

MOVEMENTS OF WIRELESS OFFICERS

Marine Service.

Mr. A. J. Costa relieved Mr. J. D. Wood (Taiyuan) as Second Operator on March 29 at Sydney.

Mr. W. V. Neill signed on the *Bulla* as Senior Operator at Sydney on April 3.

Mr. R. L. Beatty signed off *Lammeroo* at Sydney on March 23.

Mr. A. R. Smith signed off *Aroona* on March 31 at Sydney.

Messrs. R. C. Christie and F. Barclay, who were appointed to the operating staff on April 3, have signed on *Bulla* as assistants.

Mr. L. H. Jones signed off *Waitomo* at Wellington on March 27.

Mr. G. M. Whiteside transferred from *Kaiapoi* to *Waitomo* at Wellington on March 27.

Mr. E. J. Goff, who was appointed to the operating staff at Wellington on March 27, has joined *Kaiapoi*.

Mr. L. H. Jones relieved Mr. J. G. Henderson on *Kaimanawa* at Auckland on March 28.

COASTAL RADIO SERVICE

Staff Changes.

Mr. D. W. Bowles, Radio Mechanic, Townsville Radio, has been transferred to Brisbane Radio.

Mr. H. W. Hedges, Radio Mechanic, Brisbane Radio, has been granted three months' leave without pay.

Mr. L. J. Thorndike, Radiotelegraphist. Thursday Island Radio, has been transferred to Cooktown Radio.

Mr. J. Ward, Radiotelegraphist, Townsville Radio, has been transferred to Brisbane Radio upon the completion of his term of tropical service.

Mr. P. E. L. Dunne, Radiotelegraphist, Brisbane Radio, has been transferred to Townsville Radio.

Mr. L. C. Cusack, Radiotelegraphist, Sydney Radio, has been transferred to Port Moresby Radio.

Mr. W. C. H. Hodges, Radiotelegraphist, Melbourne Radio, has been transferred to Sydney Radio.

Mr. A. H. Brown, Radiotelegraphist, has been transferred from Port Moresby to Melbourne Radio on completion of his term of tropical service.

Willis Islets.

The relief officers for the coming winter season at Willis Islets Radio Station left Townsville on the 13th instant, per the s.s. *Bopple*.

The party consisted of Mr. K. Lawry as Officer in Charge, and Mr. J. Lalor as caretaker.

The relieved officers, Messrs. A. G. Kempling and F. W. Stevens, are being transferred to Melbourne Radio for duty, and Mr. J. Hogan, Meteorological Observer, will return to his duties at the Meteorological Bureau, Melbourne.

OUR FRONT COVER

The illustration on the front cover of this issue depicts Miss Pauline Chambers, the noted Pacific Coast dancer, ready to give an exhibition dance to wireless music on Ocean Park, California. After the arrangements to give the exhibition had been completed, it was found impossible to place a piano on the sand; but a way out of the difficulty was found by equipping Miss Chambers with a small receiving set, as shown. The music was received quite clearly, and the exhibition was given to the satisfaction of all concerned.

The Wonder Man of Paris

Doctor's Marvellous Home

Life Regulated by Radio

DR. FRANCHETTE has been well described as the "wonder man of Paris." He is an expert in radio telegraphy, engineering, dentistry, photography, clockmaking, and amongst his other attributes is a high standard of skill in printing, painting and sculpture. In spite of all this, he is a modest man, but very proud and very jealous of his wonderful inventions. He is now 65 years of age, and of his chief regrets in life the two most outstanding are, first, that he is growing old, and, second, that he did not cross to America in his young days.

"America is the home of progress," said Dr. Franchette, "and with my inventions I might have furthered the cause of science."

Easily the most interesting of the many wonderful sections of Dr. Franchette's flat in Paris is the wireless chamber. The furniture is simple, and at first glance no one would guess that in this dimly-lighted room is the apparatus which plays such an important part in regulating Franchette's life.

In telling his story the doctor does so with marked simplicity:

"I rise every morning sharp at seven," said the doctor, "and never miss, because I have the best timepiece one could imagine and that timepiece is the Eiffel tower. Every morning the tower sends out the time at seven. By means of a special contrivance all my own and about which I cannot yet say much I "capture" the wave length as sent out from the tower at seven, and by special connections direct it to my clock, which immediately begins to ring. This wakes me.

"After that experiment had proved successful I set out to find to what other purposes I could apply wireless wave lengths. I had to make sure that the short wave length sent out at that time in the morning could be so connected with other apparatus of mine to be of use. I therefore constructed a small circular box with electrical appliances inside it to hold the wave length. I now have several of these boxes."

After having proved that the alarm clock effectively worked without any interference on his part, Franchette then pointed to the window curtains and remarked that at a given moment there would be a "click" while the alarm bell rang. He pointed out that by the use of his "relay" boxes an electrical appliance connected with the curtains was automatically put into motion. Immediately the "click" registered the curtains slowly began to draw apart, and when half way open another "click" could be heard, and the top of an ordinary looking chest near the bed began to slowly rise. Underneath the lid was a small metal saucepan resting on a copper plate, while close at hand was a cup and saucer. Milk in the saucepan began to boil.

He explained that by means of the original wave length he had connected alarm clock, curtains and chest by the use of his "relay" boxes. When the milk had boiled Franchette poured the contents into the cup, lifted it off the chest, pressed a button which shut off the current under the chest and the lid glided back into place.

"And as I like music when I rise in the morning I just press a button in the corner here and listen." As soon as he said this a gramophone, concealed somewhere in the room, bellowed out a lively rag-time.

"Because I sleep very lightly," continued the inventor, "I like to have the time when I wake up, and, as I fear the light would completely wake me, I have invented this." This was a box-like table with what appeared to be a telescope lens protruding. Pressing a button near his bed, Franchette threw the face of a clock on the ceiling, and this gave him the time. In case of a breakdown with this clock the doctor presses another button near him and the clock on the mantel shelf opposite his bed lights up and shows him the time. All these apparatus are operated by wireless waves 'captured" and secreted away in "relay" boxes.

Franchette then went into his "wireless study." Here he has an enormous receiving apparatus which he built himself. It stands fully six feet high, and with a huge square frame a little to the left. The machine has twelve lamps, and when all twelve are working stations hundreds of miles away are distinctly heard. It is with this machine Franchette hears Arlington, Berlin, Manchester, London, Bordeaux and ship at sea.

Radiofun

At considerable expense we have made exclusive arrangements for the publication of "Radio Ralf's" adventures, which will be one of our regular features. Hereunder is one of Ralf's adventures, and in subsequent issues of "Radio" his many thrilling experiences will be recorded, which we believe our readers will enjoy.—Ed.

Use a Wave Trap and Catch 'Em.

Small Boy: "Mother, I want a set."

Mother: "I've had hard enough time getting rid of cockroaches in this house, and I'm not going to have any of those radio bugs running around."

High diddle, diddle,
A tube in the middle,
A rheostat below,
A switch on a board,
Some phones on a cord
And the thing's a radio.

Many a man has saved himself a lot of trouble and worry by not hooking up his radio set in the way all his friends have advised him to.

But He Can Turn Off the Set!

If these radio telephones keep on, a man's wife can talk to him no matter where he goes.

The Modern Wedding Band.

In days of old, a band of gold
Bound many a pair together;
The latest thing, in place of ring,
A double headset two together.

RADIO RALF---

By Jack Wilson

Some Sets Need the Wires, All Right.

Sezzhe: "What are all those wires on there for?"

Sezzeye: "Oh, they hold the instruments together."

Here's a new way to acquire a sunburn: Go down to the beach to measure wave lengths.

Human Regeneration.

In the Canary Islands the inhabitants convey signals and bits of news by a system of whistling. The system dates back hundreds of years. When radio takes hold the islanders will not know whether their apparatus is out of tune or some inhabitant is trying to whistle a message.

A Radio Widow.

I've been a poker widow,
Alone night after night.
I'm oft a baseball widow—
The game is man's delight!

I was a poor golf widow,
At clubs friend husband stayed.
But now another widow
Of me radio has made!

Club Notes & News

WIRELESS INSTITUTE OF AUSTRALIA

West Australian Division.

The most interesting item of business at the March Meeting of the above Division of the Institute was a lecture on low-power transmitters, by Mr. W. E. Coxon.

The lecturer dealt with his subject in a thorough manner, and detailed the result of various experiments carried out by himself in the reception of signals from Java. These signals were received on a portion of the aerial, and made loud enough to be connected to the wireless telephone transmitter that was transmitting on another part of the aerial. The fact that it is possible to do this opens up tremendous possibilities.

Mr. Coxon was accorded a hearty vote of thanks at the conclusion of his lecture.

The social side of the Institute has received considerable attention of late, and members can look forward to a very progressive programme in the near future.

Manly and District Radio Club.

An interesting display of valve and crystal receiving sets was made at the second meeting of the above Club. Quite a number of prominent citizens of Manly attended, and displayed the keenest possible interest in the simple explanations of the various types of sets exhibited.

Messrs. Swinburne, Clark and Symes described the various points of interest in the sets, and explained in simple language, how signals are received.

The task of building two portable receiving sets for Club use is to be put in hand at an early date. When these are complete it is intended to arrange for two parties of members to proceed in different directions, and carry out transmitting and receiving practice. In this way it is hoped to accomplish much useful work. Judging by the enthusiasm of the members of the buzzer class, Manly can count on having a large number of highly efficient wireless men in the near future.

Naremburn School Club.

Twenty seven members enrolled at the inaugural meeting of the Club formed at the Naremburn Evening Continuation School on March 26.

The following officers were elected: Chairman, Mr. J. Broome (Headmaster); Governing Committee, N. Hunt, Mr. Lamb (Science Master), N. Toyer, J. Barret; Honorary Secretary, J. M'Farlane; Honorary Treasurer, R. Doohan.

The Secretary will be glad to furnish full particulars to anyone desiring to join the Club, and letters addressed to him at the School will receive immediate attention.

Drummoyne Radio Club.

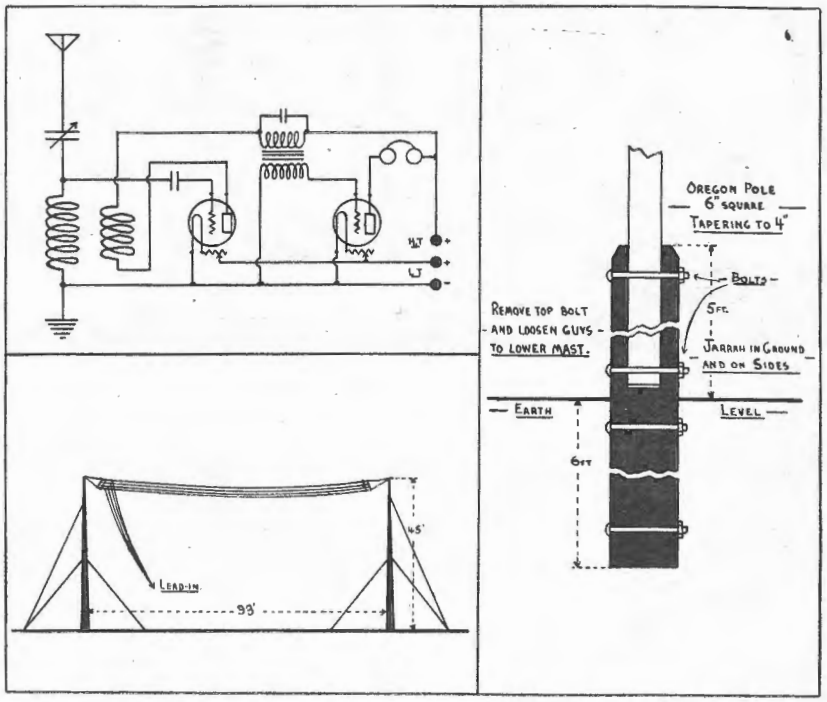
The uniformly good attendance at the General Meetings of the above Club speak eloquently of the interest and enthusiasm of the radio experimenters in the Drummoyne district.

Buzzer classes are held regularly, and a lecture on some feature of general interest is almost invariably a part of the business at every general meeting. The Honorary Secretary (Mr. H. G. Lucas, "Colombo," Tavistock Street, Drummoyne, will be pleased to hear from those anxious to join the Club.

Radio Exhibition in Sydney.

An organizing committee, consisting of Messrs. C. P. Bartholomew, Crocker, F. Basil-Cooke, C. D. Maclurcan and O. F. Mingay, has been appointed on behalf of the New South Wales Division of the Wireless Institute of Australia to arrange a wireless and electrical exhibition in the Sydney Town Hall during the last week in June. The object of the exhibition will be to educate the general public to a realization of the tremendous strides made in constructing radio apparatus during the past few years.

Many new and interesting displays will be featured, and at various times during the day and evening demonstrations of radio telephony will be given. The exhibition will last for a week, and the interest which is being taken in it even at this early stage presages a highly successful display.



The top left hand diagram shows the circuit used by Mr. Fall, the lower left a sketch of his aerial arrangement, and the right hand sketch shows method used in erecting masts.

(*Continued from Page* 33.)

is placed in a cabinet. The top row on the ebonite slab shows the grid condensers (variable), long and short wave condensers, variable high tension switch and amplifying valve. Second row: aerial tuning condenser (variable), filament resistance, detecting valve and second filament resistance. Bottom row: high tension switch, double-pole switch for placing aerial tuning condenser in series or parallel and low tension switch. In front of the switches is a pair of Baldwin telephones. Standing upright on the left-hand side is a Brown's loud speaker; beside it on the right is the telephone transformer. Behind the speaker is a step-down transformer.

The results obtained from this set are very satisfactory. Such stations as Stavanger (Norway), Bordeaux (France), Tachoosh (America), New York Radio Central and other American stations being readable. The telephony concerts broadcasted by the Amalgamated Wireless, Ltd., are readable at 40 feet from the phones. Telephony also has been received from Raratonga, New Zealand.

Duties on Wireless Apparatus.

In view of the importation of considerable quantities of wireless apparatus to meet the demands of amateurs and others, the Customs Department has issued a series of tariff decisions relating to these duties. It has been decided that both fixed and variable condensers, crystal and electrolytic detectors, rheostats, inductance coils (honeycomb and coupled coils), intervalve transformers, valve sockets and complete tuning sets shall be charged 27½ per cent. under the British preferential tariff, 35 per cent. under the intermediate tariff, and 40 per cent. under the general tariff. Valves or vacuum tubes as they are often termed, will be admitted free under the British preferential tariff, but duties of 5 per cent. under the intermediate tariff and 15 per cent. under the general tariff will be applied to them.

Question (L.R.M., Cremorne): Am using one valve receiver, but while receiving am interfered with by noises in telephones. Notice this especially when I disconnect aerial and earth. Can you suggest a remedy?

Answer: Most probably interference is due to induction from power mains close by, and if this is so, it is extremely difficult to remove it. If possible, use a counterpoise in place of the earth connection. Try wrapping phone leads with soft iron wire and connecting with earth.

Question (H.K.B., Newtown): What is a practical test to determine whether the set is oscillating? Am using two valve receiver.

Answer: A practical test of oscillation is to touch the grid condenser of the first valve while listening with phones. If the circuit is oscillating, a loud click will be heard in phones when the connection is touched, and also when finger is removed. To stop the oscillations, the filament rheostat and H.T. potential should be adjusted, and if the set persistently oscillates, the reaction coil should be reversed.

J.A.C.: The aerial tuning inductance may be 5" in diameter and 8" long, wound with No. 28 D.C. wire, and 16 tappings taken at equal intervals. For the secondary circuit make a former 4" by 10", and wind full of No. 32 D.C.C., and take ten tappings. Thoroughly dry the former before winding, and after winding apply a little shellac to keep out moisture. Certainly a valve set is more efficient, but we would not advise the circuit you enclosed. The book you should have for your requirements is "Practical Amateur Wireless Stations."

Question (B.B.A., Bondi): Is a potentiometer necessary to give the grid of the valve a suitable potential?

Answer: When more than one valve is used there is an advantage in using a potentiometer, although it is not absolutely necessary. When using only one valve there is no particular advantage.

Question (M.M.J., Botany): Is it possible to charge accumulators from A.C. mains?

Answer: Yes, provided you use apparatus for converting alternating current to direct current. You could, of course, use a motor generator, but as we presume you refer to a small installation, a very good rectifier is the Homcharger, which operates very simply.

Question (Home Made, Epping): Is a water pipe earth good?

Answer: Yes, provided you are careful to make good connection.