The Queensland RADIO NEWS

A MAGAZINE *for the* SET CONSTRUCTOR & BROADCAST LISTENER

6D

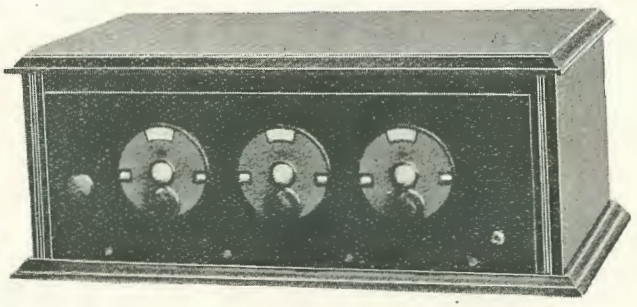
NOVEMBER 1st 1928

VOL. IV No. 10

Registered at the G.P.O., Brisbane, for transmission by Post as a Newspaper.

At Last!

A Standard Set for City or Country that cuts clean through Local Stations at ½-mile range



The Pontynen Three

Listening at half-a-mile range of 4QG's aerial, it is impossible to distinguish 4QG from 3LO, 2FC, 2BL—so great is the volume.

Hearing is believing. Arrange a demonstration at your convenience. No obligation incurred. Sold under a **MONEY BACK** Guarantee of satisfaction.

SELECTIVITY of a Six!

VOLUME of a Five!

SIMPLICITY of a Crystal Set!

Made in Three, Four and Five Valve Models

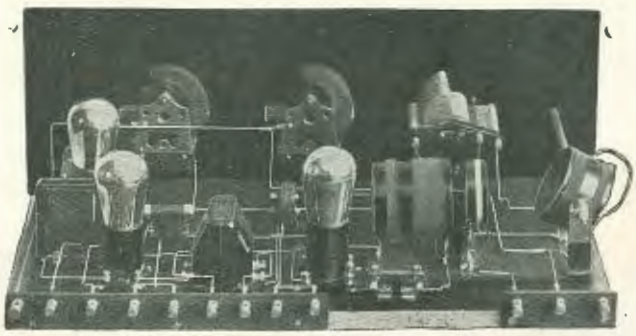
Interstate "A" and "B" class stations received with tremendous volume without a trace of interference from 4QG.

The Pontynen circuit is a marvellous advance. It incorporates the patented Pontynen Filter and the best components procurable.

Save Dealers' Discounts **£22/10/0** **Buy Direct from the Manufacturers**

Sold complete with everything excepting loudspeaker—which may be selected at will.

Let us quote you for remodelling your set to the Pontynen Circuit



Complete Pontynen Filter Unit and Coils for home Constructors

Price £3

The Pontynen Radio Manufacturing Coy.

Regent St., South Brisbane

(off O'Keefe Street),

(Alight from tramcar at Stone's Corner Bridge).

Phone: J-3370.

ALFRED T. BARTLETT
Editor

LEIGHTON GIBSON
Technical Editor

The QUEENSLAND RADIO NEWS

THURSDAY, NOVEMBER 1st, 1928.

Now That Man Has Wings

A GIANT Zeppelin drones its way over the Atlantic, carrying passengers and mail to America . . . . A tiny silver bird hops from England to Australia in sixteen days . . . A winged machine circles the lifeless ice-fields of the North Pole . . . . A mighty monoplane spans the vast waters of the Pacific . . . . Flocks of 'planes dart upward from a thousand air-ports on errands of mercy, of commerce, or mere pleasure . . . . This is the world of to-day !

Now that man has wings, he will open up new pathways across the skies. He will look down with disdain upon all vehicles that move upon the face of the earth. He is conqueror of the air—and no power in the world can hold him back.

Do not let the sensational failures of the air blind us to the steady progress of commercial flying. At Le Bourget, in France, twenty-seven passenger 'planes leave daily on fixed schedules. At Templehof, in Germany, flights are guided by traffic police. The 'planes that fly from Croydon, in England, have a wonderful record for dependability and safety that has brought insurance rates to Paris down to one-third less than by land and sea. A hundred American manufacturers are turning out aeroplanes to meet a steadily increasing demand, while close to one thousand air-ports are established in the U.S.A. to care for the huge fleet of 'planes that carry passengers and mail from coast to coast.

All this sounds intensely prophetic of the future, and causes those of us who are interested in the sister-science of radio to wonder to what extent radio will be utilised in the development of aviation. To date, radio has not played a very great role in the conquering of the air. True, some spectacular flights have been made with its aid, and yet some equally wonderful flights have been accomplished without its assistance. It is, however, a significant fact that practically all passenger service 'planes are wireless equipped as a safeguard against approaching bad weather and as an aid to safe landing in fogs or where visibility is bad.

The giant passenger air liners of to-morrow will utilise radio as extensively as do the ocean liners of to-day, not for reasons of safety alone, but for commercial radiograms and for the entertainment of those who travel a mile or more above the earth's surface.

Now that man has wings and has learnt to fly, he must rely on radio communication to keep him in touch with the planet he has temporarily chosen to leave. Much may be expected of the two great sciences of the air, and although we stand and dream but at the water's edge, we are even now enjoying a glimpse of some of the great advances future generations will surely see realised.

This month, we have departed from our usual custom of featuring some new receiver. Instead, the Technical Editor contributes an article prepared especially for those of our readers who possess out-of-date receivers

Follow This Easy Method of—

MODERNISING Your Old Receiver—

THE radio industry, like the automotive industry, progresses with extreme rapidity, with the natural result that the "up-to-date" receiver of one period meets the sad fate of becoming more or less obsolete in a few years' time. Particularly has this proved to be the case with one type of receiver—the once-popular five valve "tuned-anode" arrangement. Three years ago this set was practically a standard type in Australia, and it rendered yeoman service before the days of high-power broadcasting stations. The chief reason for its abnormal popularity—for it has but few merits—undoubtedly was the fact that it could easily be adapted, by means of plug-in inductances, to cover the immoderately wide wavelength range then used by Australian broadcasters.

It must be admitted that this erstwhile popular receiver had many sins—both of omission and commission—to its credit (or discredit). Unless the two radio-frequency amplifier stages were biased positively (by means of the much-over-worked potentiometer), the set was entirely uncontrollable, perhaps howled fiendishly, and made life miserable for any nearby listener-in. Its greatest fault, however—considering it in the light of present-day requirements—is its entire lack of selectivity, which places it quite out of the running for modern receiving conditions. The factor of adaptability as regards wavelength range is wholly unimportant nowadays, as the Australian and New Zealand broadcasting stations, with one exception—6WF Perth—now operate in the 250 to 550 metre "broadcast" channel, and can be tuned-in quite comfortably with only one set of coils.

Thus it happens that the old tuned-anode five-valver is off the market by this, and will never return. It has been replaced by the modern tuned-radio-frequency receiver having, as a rule, two stages of neutralised or otherwise controlled radio-frequency amplification, operating at high efficiency, and attaining, in many cases, quite a high order of selectivity.

Unfortunately, however, we encounter here another parallel with the motor-car industry. It is a melancholy fact that not all of us are in the happy position of being able to discard our old set and purchase a new up-to-date receiver outright, just as it falls to the lot of comparatively few to scrap an old car in favour of a new model. At this point, though, our analogy shows signs of failing us, for whereas a two-years-old car usually brings perhaps half of the price originally paid for it, no one seems to be particularly anxious to acquire a second-hand radio receiver. As a natural result, we find that, in spite of it being generally conceded that the tuned-anode set as a type has outlived its usefulness, there are quite a large number still in use; in many cases the set is simply lying idle and radio as a means of entertainment has been suspended for the time being.

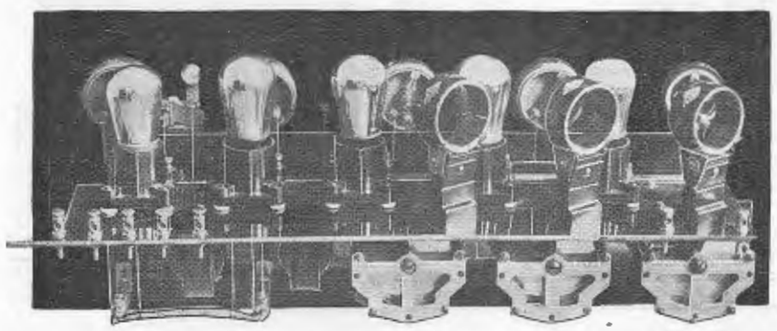


FIG. 2.—(back view of old set)—Here is the familiar old "tuned-anode" receiver. Note the three plug-in coils, which enabled a wide band of wavelengths to be covered.

As a general rule, it will be found that these "old-timers" contain a number of good quality parts—parts such as variable condensers, rheostats, sockets and dials which have not changed appreciably during the last few years. It is always a matter for regret to see good material lying idle, but that is what is happening in many cases that have come under our notice.

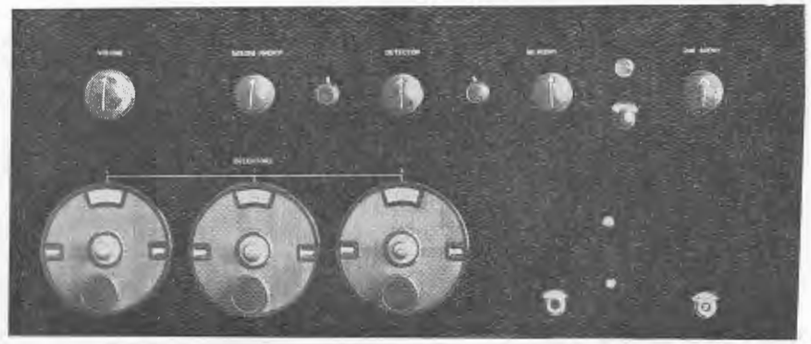


FIG. 1.—(front view of panel)—The exterior appearance remains unaltered. Although there is such a multiplicity of knobs, in reality the tuning is simple, only the three large dials being the actual tuning controls.

Realising that many owners of such receivers would readily attempt the job of remodelling and modernising them if they were assured that it could be done easily, cheaply and successfully, we recently obtained a representative type of five-valve tuned-anode receiver and set out to re-construct it so that it would give results approaching those obtainable from a modern five-valve tuned-radio-frequency set. At first we intended to rebuild the set entirely, using a new panel and fresh layout, but it occurred to us that an article of this nature would be of better service to readers if the method of re-modelling described could be such that a minimum amount of labour and money would need to be expended in attaining the desired result.

Accordingly, the set illustrated in Figs. 1 and 2 was converted into a standard Neutrodyne receiver without disturbing anything more than was absolutely necessary; no regard was paid to appearances, as good looks in a radio set (as in many other things!) are expensive, and to spend money on securing a nice-looking panel would defeat our whole object.

In the list of parts at the end of this article, we have tabulated all the components necessary for a receiver of this type. However, some tuned-anode sets have a few more refinements than others; for that reason, we have listed separately the **extra** components that had to be purchased in this case. It will be seen that they are remarkably few in number, and the total cost is very low considering the splendid results obtained from the finished receiver.

Alterations Needed.

In starting to re-construct a tuned-anode set, the first thing to be done is to remove the three coil-holders arranged along the back edge of the sub-panel; these are of no further use. If the set is more than two years old, it probably will be advisable to replace the audio transformers in order to obtain the high quality of audio reproduction possible with modern transformers. Should the set be fitted with variable grid leaks (as this one was) these should be removed, as they are almost certain to be unsatisfactory, and are unnecessary, anyway. You will be quite safe in removing any parts that do not appear in the pictorial wiring diagram (Fig. 6), but those mentioned constitute practically all that have to be dispensed with.

Now the Neutrodyne coil kit (L1, L2, and L3) is to be mounted on the back edge of the sub-panel as shown, the coil having "A" (aerial) and "E" (earth) terminals being placed at the right-hand end, looking from the back. These coils should be spaced at least six inches apart—that is, six inches between the mounting holes; in this set, we managed to get them 6½ inches apart, which is all to the good. The two small neutralising condensers (C4 and C5) supplied with the "Wetless" coil kit, were mounted on the front panel in the holes lately occupied by the variable grid leaks; they need not be mounted on the panel, however, as once set they have not again to be touched—they do not form tuning controls. The potentiometer was simply disconnected, but not detached from the panel, as by so doing an unsightly mark would have been left. A Wetless .00025-mfd. grid condenser with grid-leak clips (C6) was used in the detector circuit, with a fixed 2-meg. grid-leak (R). The two old-style audio transformers were removed from the under-side of the sub-panel, and two Philips transformers (T1 and T2) were secured by means of one bolt each to the back of the main panel. In order to make room for the right-hand coil (L1), it was necessary to alter the position of the earth terminal, and one more terminal was added to the row of battery terminals so as to provide for the use of a "C" battery.

The remainder is merely a matter of wiring. Much of the old wiring—notably the filament circuits—stands untouched, the new parts being wired into the circuit in the manner shown by the pictorial diagram. For the sake of clarity, the pictorial diagram indicates the front panel as being in two separate pieces, with the sub-panel in between. Actually, of course, this is not the case—the sub-panel occupies its original position about 5 inches below the top edge of the main panel.

Operation.

This particular set was equipped with Radiotron 201A valves, and it was found that, in spite of their age and the lengthy service they had already rendered, these valves were in perfect condition, and it was un-

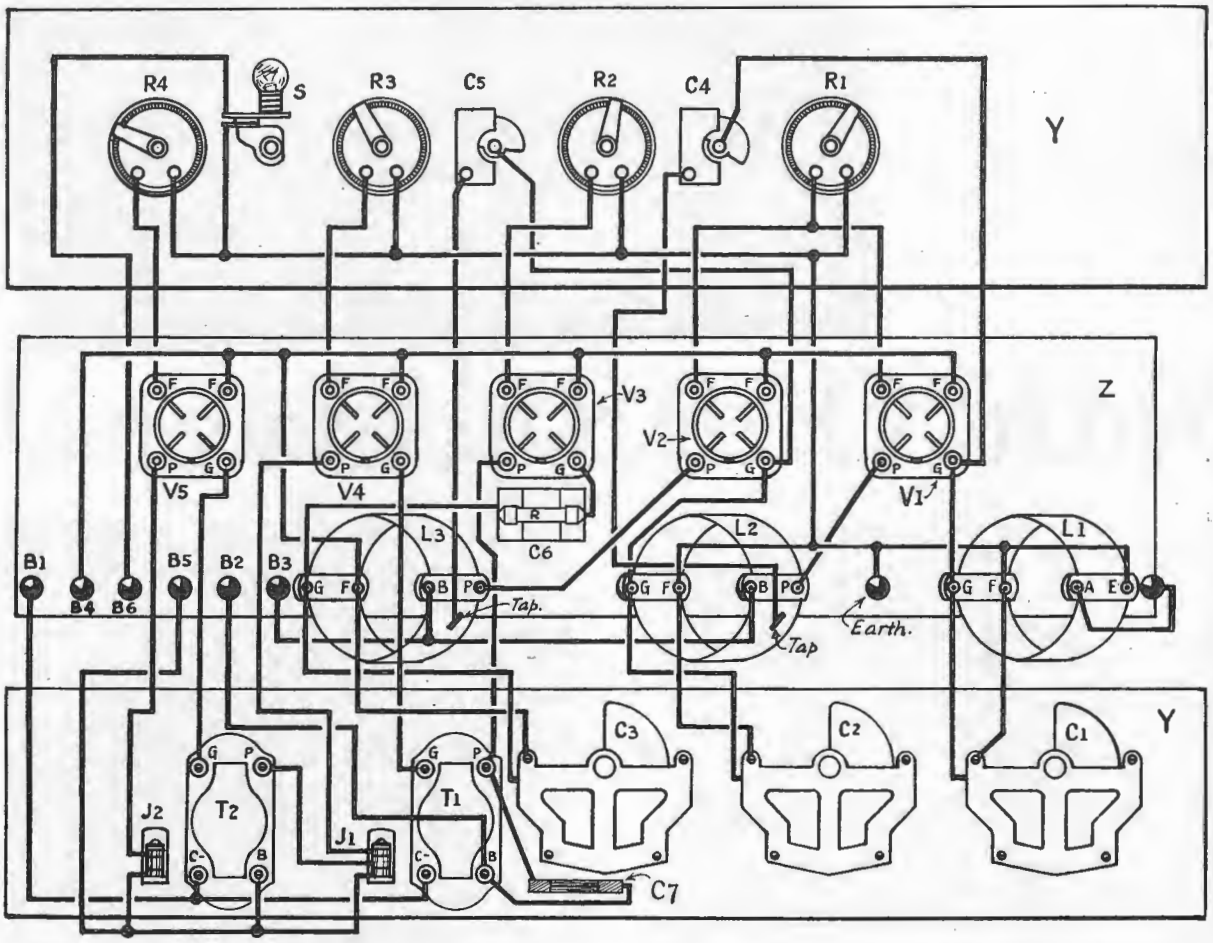


FIG. 5.—The Pictorial Wiring Diagram, showing every component and all wiring. Identify the parts by the indicating symbols. The panel has been shown in two parts (both marked "Y") for the sake of clearness.

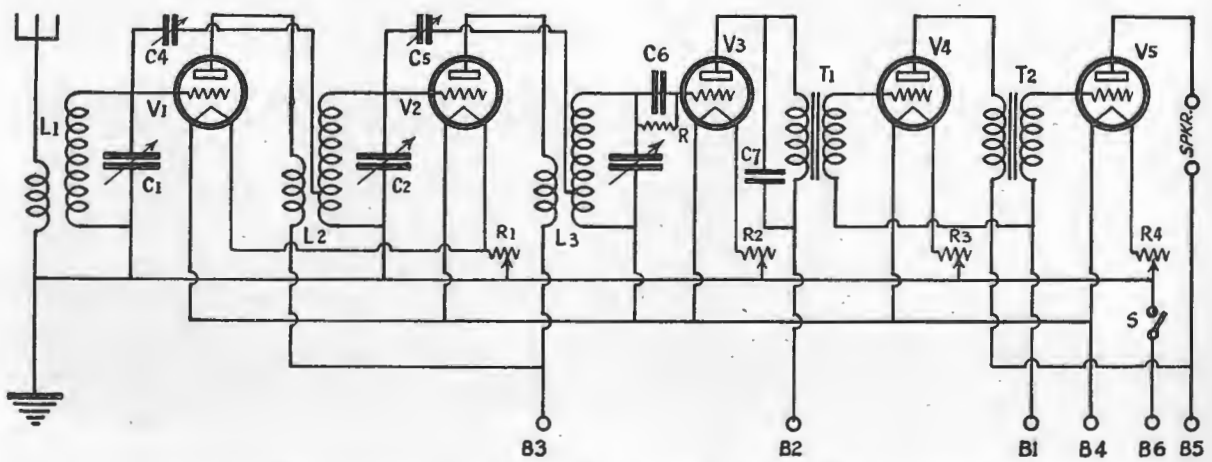


FIG. 6.—The standard five-valve Neutrodyne Circuit used in the re-modelled set. Two stages of tuned-radio-frequency, detector, and two audio stages are provided.

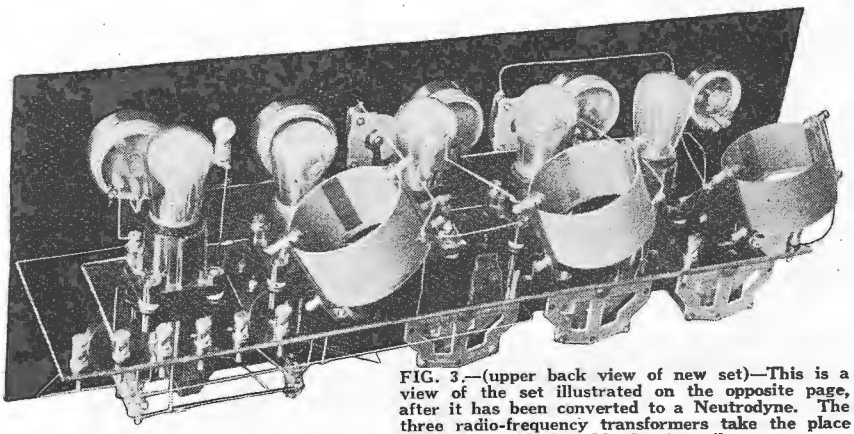


FIG. 3.—(upper back view of new set)—This is a view of the set illustrated on the opposite page, after it has been converted to a Neutrodyne. The three radio-frequency transformers take the place of the old plug-in coils.

necessary to replace them. The batteries are connected as follows:

The 6-volt accumulator is connected to terminals B4 and B6, positive (+) and negative (—), respectively. Negative "B" battery is joined to B6 also. B2 goes to the 22½-volt point on the "B" battery, B3 to the 45 or the 67-volt point, and B5 to the 90-volt point. The positive terminal of a 4½-volt "C" battery is connected to B6, while the 4½-volt point goes to B1. Should any other makes of valve be used, the "C" battery voltage will be governed by the makers' instructions.

After inserting the valves in their sockets and connecting aerial and earth and loudspeaker to their proper terminals, the next thing is to balance the radio-frequency stages so that self-oscillation is subdued. This is a very easy matter with the coil kit mentioned, and takes but a very few moments. Set both the neutralising condensers (C4 and C5) to minimum capacity (plates all out), and turn all the rheostats nearly full on. With the speaker plugged into the right-hand jack, looking from the front, switch the set on. If the wiring has been carried out correctly, the receiver will give the soft hissing sound which indicates a "live" circuit.

Now tune in a station—a distant one—in the ordinary way, except that the dial readings will not be the same as they were with the old tuned-anode circuit. It will be found that the centre and right-hand dials tune practically in synchronism, but the left-hand dial reading will be slightly different for best reception of a given station. If the set is to operate as a true Neutrodyne, the neutralising condensers and the R.F. filament rheostat (R1) should be adjusted until there are no squeals or howls at any point of the dials. However, it is usually preferable to adjust the neutralising condensers in such a way that, by varying rheostat R1, it is possible to make the set oscillate if desired. Once a station is coming in well, the remaining rheostats should be adjusted for best results and thereafter ignored. Rheostat R1 serves as a very effective volume control, both on distant and local stations.

We found that, using the coil kit specified, the selectivity of this Neutrodyne was very good indeed, but in some cases it may be necessary to utilise a wavetrap in order to secure complete freedom from interference. It is, of course, simply connected between the aerial wire and the aerial terminal of the set in the usual way.

This method of re-modelling an old receiver yields very pleasing results, and we place the foregoing particulars before readers who own such sets with our full assurance that the small amount of time and money spent in the direction indicated will be well repaid by the results obtained.

COMPLETE LIST OF MATERIAL USED IN THE NEUTRODYNE.

Original Parts Used.

7 Phone terminals (B2, B3, B4, B5, B6, Aerial, Earth).
3 Variable condensers, .0005-mfd. (C1, C2, C3).
1 Wetless type B .00025-mfd. fixed condenser (C7).
1 Double-circuit jack (J1).
1 Single-circuit jack (J2).
4 Advance 30-ohm rheostats (R1, R2, R3, R4).
1 Yaxley battery switch (S).
5 H. & H. bakelite valve sockets (V1, V2, V3, V4, V5.).
1 Bakelite panel, 24 x 9 x 3/16th inches (Y).
1 Bakelite sub-panel, 22 x 5 x 3/16th inches (Z).

New Parts.

1 Wetless Neutrodyne coil kit (L1, L2, L3), including 2 Wetless neutralising condensers (C4, C5).
1 Wetless type B .00025-mfd. grid condenser with clips (C6)
1 Electrad 2-meg. leak (R).
1 Phone terminal (B1).
2 Philips audio transformers (T1, T2).
Wire and bolts.

Accessories.

5 Valves.
1 "A" battery.
2 45-volt "B" batteries.
1 4½-volt "C" battery.
Loudspeaker with plug.

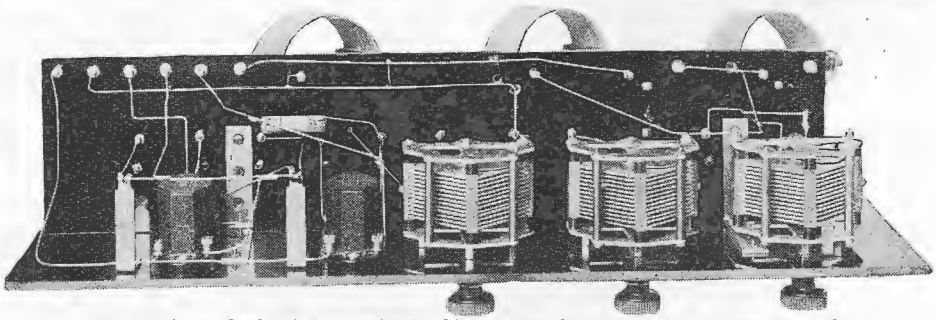


FIG. 4.—(lower back of new set)—In this view of the re-modelled set are seen the two modern high-quality audio transformers which replace the older type. Good reproduction is thus assured.

Programme Features for November

FROM 4QG, 2FC AND 2BL

THURSDAY, NOVEMBER 1st.

4QG—Varied programme arranged by Mr. Erich John.
2FC—Prologue and incidental music from the Capitol Theatre.
2BL—"Brunette" Vocal Trio.

FRIDAY, NOVEMBER 2nd.

4QG—A programme relayed from the Grand Hotel, Southport.
2FC—The Congress Band.
2BL—First appearance of the Manly Intermediate High School Juvenile Military Band (conducted by J. Pheloung), from the Dungowan, Manly.

SATURDAY, NOVEMBER 3rd.

4QG—Orchestral music from the Savoy Theatre; descriptions of the boxing contests. Speedway broadcasts and dance music from Lennon's Ballroom.
2FC—"Round the Camp Fire"—the story told by Upton Brown.
2BL—Jack Cannot (comedian).

SUNDAY, NOVEMBER 4th.

4QG—Complete morning and evening services from All Saints' Church of England; afternoon and evening band music.
2FC—Mischa Dobrinski (violinist).
2BL—Manly Band.

MONDAY, NOVEMBER 5th.

4QG—An Australian play—"Dead Timber"; an old-time programme.
2FC—Foster and Finlay in "Musical Memories."
2BL—Welsh Choral Society.

TUESDAY, NOVEMBER 6th.

4QG—The Studio Instrumental Quartette; Brisbane Apollo Club.
2FC—Charles Renton (comedian).
2BL—"The Four Kellys" (child instrumentalists).

WEDNESDAY, NOVEMBER 7th.

4QG—The Federal Band; Alf. Featherstone and his Orchestra.
2FC—St. Quintin Downer (pianist).
2BL—Address by the Prime Minister (Mr. Bruce) from the Sydney Town Hall.

THURSDAY, NOVEMBER 8th.

4QG—Musical comedy, "Tangles."
2FC—Lionel Lawson (violinist).
2BL—Charles Lawrence (entertainer).

FRIDAY, NOVEMBER 9th.

4QG—A programme arranged by Mr. Sydney May.
2FC—Second act of "The Patsy" (by permission J. C. Williamson Ltd.)
2BL—Carlton and Shaw—vocal and instrumental.

SATURDAY, NOVEMBER 10th.

4QG—The Metro Male Quartette; Speedway broadcasts; and dance music from Lennon's Ballroom.
2FC—Concert from Newcastle featuring Ernest Archer, Chas. Lawrence, Carlton Fay and Maggie Foster.
2BL—Graham and Manning (sketches).

SUNDAY, NOVEMBER 11th.

4QG—Complete morning and evening services from St. Paul's Presbyterian Church; afternoon and evening band music.
2FC—Open-air band concert from Newcastle.
2BL—Manly Band. We hope to relay Celebration of Armistice Day Memorial at Cenotaph, London, if reception is favourable.

MONDAY, NOVEMBER 12th.

4QG.—A recital by Gladys Frost (piano) and Lena Hammond (contralto), followed by a studio programme.
2FC—From Maccabean Hall, D'Hurst Jewish War Memorial Conversazione.
2BL—"The Four Bright Spirits" (entertainers).

TUESDAY, NOVEMBER 13th.

4QG—Programme by Mr. Arthur Sharman's party.
2FC—Cec. Morrison's Dance Band.
2BL—Classical hour: recital by Vladimir Elin (Russian baritone), from Conservatorium Hall.

WEDNESDAY, NOVEMBER 14th.

4QG—A dance night by Alf. Featherstone and his Orchestra.
2FC—Studio production of "Katinka" by Mosman Musical Society, conducted by Leo Packer.
2BL—"Mr. Pim Passes By" played by H. W. Varna Company.

THURSDAY, NOVEMBER 15th.

4QG—Programme by Mr. Erich John's party.
2FC—Cyril Monk (violinist) in special Spanish programme.
2BL—Dagmar Roberts (piano recital).

FRIDAY, NOVEMBER 16th.

4QG—Cadenza Plectral Club; studio programme.
2FC—Carlton Fay (pianist).
2BL—Ivy Saxton (songs at the piano).

SATURDAY, NOVEMBER 17th.

4QG—Results of the Federal elections, interspersed with orchestral music from the Savoy Theatre.
2FC—The Saxophone Sextet.
2BL—Descriptions from Speedway Royal.

SUNDAY, NOVEMBER 18th.

4QG—Complete morning and evening services from St. Stephen's Roman Catholic Cathedral; usual band concerts; afternoon and evening.
2FC—Ernest Frank (lecture-recital).
2BL—Norman Janson (baritone).

MONDAY, NOVEMBER 19th.

4QG—The Federal Band; studio programme and orchestral items from the Tivoli Theatre.
2FC—"Tales Retold" by C. H. Bertie (Librarian, Sydney Municipal Library).
2BL—Schubert Evening—British Musical Society Quartette.

TUESDAY, NOVEMBER 20th.

4QG—A classical hour arranged by Mr. Archie Day; Anglo Male Quartette Party.
2FC—Sydney Madrigal Society Concert, from Conservatorium (second half).
2BL—Sydney Madrigal Society Concert (first half).

WEDNESDAY, NOVEMBER 21st.

4QG—A dance night by Alf. Featherstone and his Orchestra.
2FC—"If Winter Comes"—played by H. W. Varna Company.
2BL—Harry Graham Revue.

THURSDAY, NOVEMBER 22nd.

4QG—Studio programme.
2FC—Prologue and incidental music from Capitol Theatre. ..
2BL—Vinia de Loitte (musical competitions).

FRIDAY, NOVEMBER 23rd.

4QG—Concert programme relayed from the Acacia Garden.
2FC—Gladys Evans (soprano).
2BL—Gerald Walenn (violinist).

SATURDAY, NOVEMBER 24th.

4QG—The Metro Male Party; Speedway broadcasts; and dance music from Lennon's Ballroom.
2FC—Sydney Male Voice Choir.
2BL—Ixy Saxton (songs at the piano).

SUNDAY, NOVEMBER 25th.

4QG—Complete morning and evening services from St. Andrew's Church of England; afternoon and evening band music.
2FC—Alfred Cunningham (baritone).
2BL—From King's Cross Theatre: Joseph Wayne at the Wurlitzer organ.

MONDAY, NOVEMBER 26th.

4QG—The Federal Band; mystery programme.
2FC—Alexander Sverjensky (pianist).
2BL—Sketches by Muriel Perrottet and Bonnie Farrar.

TUESDAY, NOVEMBER 27th.

4QG—Brisbane Municipal Concert Band programme from the band room.
2FC—Lilian Frost and Esther Kahn (organ and piano recital)
2BL—Vocal recital by Signor Cacialli (from Conservatorium).

WEDNESDAY, NOVEMBER 28th.

4QG—A dance programme.
2FC—Hilda Sutton and Lila Jobb (instrumentalists).
2BL—Charles Lawrence's Revue.

THURSDAY, NOVEMBER 29th.

4QG—John Bunyan celebrations.
2FC—Pianoforte recital by Frank Hutchens from the Conservatorium).
2BL—Concert by British Music Society.

FRIDAY, NOVEMBER 30th.

4QG—Mr. Sydney May's party.
2FC—Foster and Finlay in "Musical Memories."
2BL—May Matthews (mezzo).

We are shown through

"PENNANT HILLS"

Australia's Great Radio Centre

An exclusive article describing one of the most up-to-date radio installations in existence

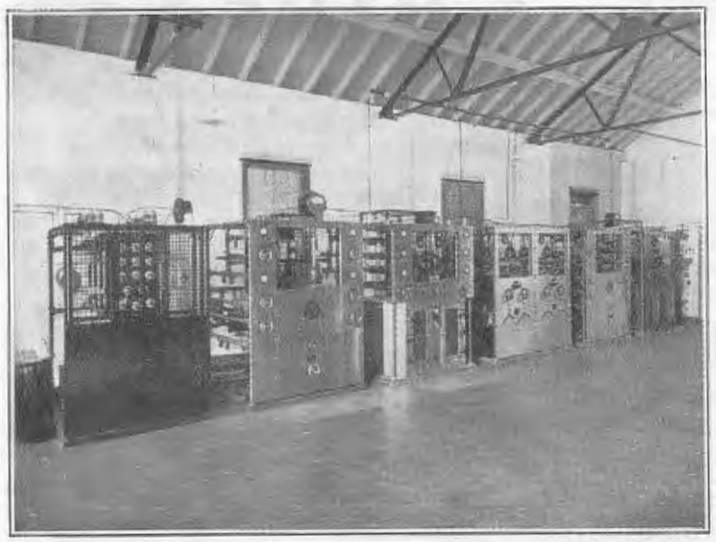
"Through moonlit glades, where gentle zephyrs blow"

ONE cannot help reflecting upon the appropriateness of this charming line as the picturesque road leading from Beecroft railway station is traversed, and the lofty tower of the great Pennant Hills Radio Centre comes into view through an avenue of overhanging branches. Situated about fourteen miles from Sydney, the group of stations comprising Radio Centre forms the largest and most powerful transmitting installation in the Commonwealth—one of the finest, indeed, in the Southern Hemisphere—and makes it possible for Australia to be heard in every quarter of the globe.

While on a recent visit to Sydney, a representative of this journal was afforded an opportunity of inspecting the Radio Centre through the courtesy of our old friend "Harry" Coffey, well known in Queensland radio circles as, until recently, Officer-in-charge of VIB, Brisbane Radio. The station is very difficult to reach unless one has the foresight to go by motor-car. It is a full two miles' walk from the railway station, although the tree-flanked road already referred to makes the walk a very pleasant one indeed.

The main aerial tower is a landmark for many miles around, Standing 410 feet high in the middle of a 50-acre field, it presents a majestic spectacle and looks every pound of its 80 tons' weight. The foot of the lattice steel tower is brought to a point, which rests on substantial glass insulators. Concrete pillars are built about twelve inches below the four corners of the mast, so that jacks may be inserted in order to lift the mast bodily while replacing the glass insulators, when necessary.

It is interesting to note that the original station buildings and tower were erected by the Telefunken Company of Germany, and no doubt that company little realised what an important part the station was later to play in connection with the Great War. In the main building the various transmitting plants are installed round the four sides, while the centre of the building is occupied by the Technicians' desk and auxiliary keying circuits.



THE 5-K.W. DUPLICATED BEAM FEEDER.

2FC Sydney.

The first installation visited was the huge transmitter of 2FC, the famous 10 kilowatt station of the New South Wales Broadcasting Company, operating on 442 metres. Originating in the Company's studios situated in the heart of Sydney, the speech-frequency currents are fed by land-line, through a five-valve line amplifier, thence to the modulating, drive, rectifying, oscillating and tuning panels that comprise the transmitter, finally being placed on the air to serve thousands of listeners in all parts of Australia and New Zealand. So large is this 2FC transmitter that it occupies the whole of one side of the main building.

Next is the Trawler Radiophone Transmitter (2ME), operating on 540 metres with a power of 2 kilowatts. This radiotelephony transmitter is controlled from the La Perouse receiving station, and is utilised for transmitting useful information to the trawler fishing fleet operating off the coast, ten of these trawlers being fitted with radiophone transmitting and receiving apparatus. Messages from the trawlers are received at La Parouse and distributed to the various interested firms, who can then send their instructions to the fleet from La Perouse, via land-line to Pennant Hills transmitting station. By this means, the trawlers and the interested companies are enabled to keep in close touch with one another—a very valuable consideration in the trawling industry.

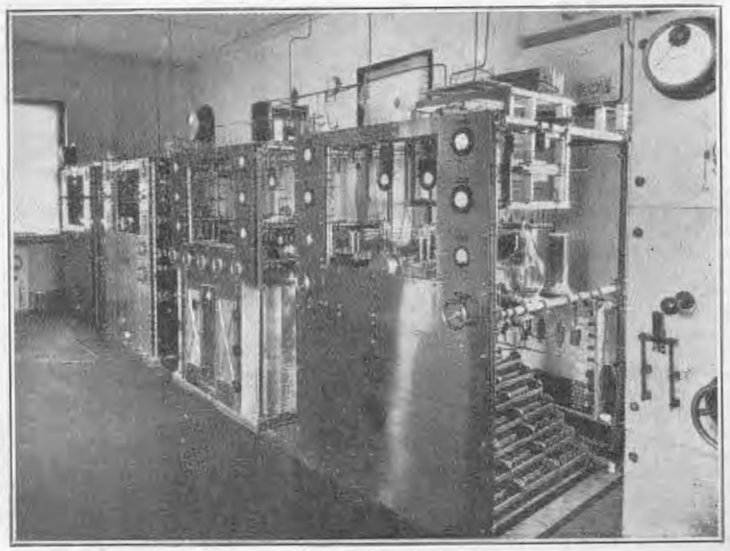
The Police Transmitter.

Another interesting installation is the Police Transmitter, working on 730 metres with 3 kilowatts of power. By a system of remote control, this set is operated directly from Police Headquarters in Philip Street, Sydney, transmitting both telegraph and telephony. Two high-powered police motor-cars, fitted with transmitting and receiving apparatus, leave Headquarters every night at ten o'clock and patrol the city and suburbs. Immediately information is received at Headquarters of any crime that has been committed, the particulars and instructions are transmitted to these cars, which proceed to the scene of the crime within a very few minutes. The system has proved itself to be invaluable in aiding the police in their arduous task of keeping a great city as free from crime as possible—just another instance of the many and varied uses to which the ever-adaptable radio can be put in rendering service to mankind.

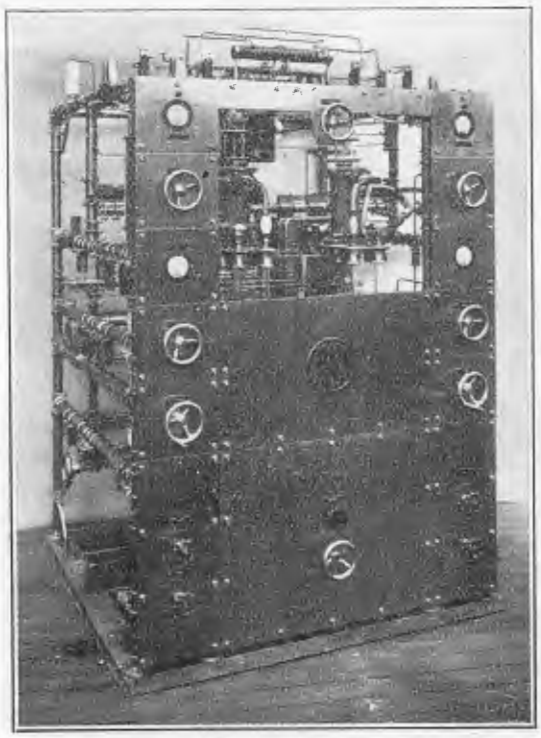
Now we come to the Beam Feeder. Because of the extreme importance of the work handled, this transmitter is duplicated so that, in the event of a breakdown, no interruption of traffic need result. The messages intended for "via beam" transmission to other parts of the world are despatched from the receiving office at the Company's headquarters in York Street, through the Pennant Hills transmitter, thence to the beam receiving station at Rockbank, Victoria which, in its turn, transmits through the beam transmitter to the various beam receiving station in other parts of the world. The human element enters very little into the operation of the beam service, the messages being sent (in morse code) automatically at a sped of approximately 200 words a minute—many times faster than could be sent by hand. Working on a wavelength of 43 metres, the power of this transmitter is rated at 5 kilowatts.

Two Coastal Radio Service short-wave transmitters are also in operation on 20 and 51 metres, these being used for handling traffic with ships in the Pacific Ocean. In passing, it is worthy of note that it was with one of these sets that a long-distance record was established some time ago by communicating with the s.s. "Jervis Bay," while that vessel was lying at Tilbury Docks, London.

The last installation in this part of the building is that comprising the famous VIS (Sydney Radio). This is a 5 kilowatt telegraphy transmitter working on various wavelengths—600, 740, 800, 1800, 2100 and 2400 metres—and handles commercial and Press mes-



20-K.W. A.W.A. SHORT-WAVE TELEGRAPH AND TELEPHONE TRANSMITTER AT SYDNEY. From left to right: (1) 20-k.w. oil-cooled Magnifier Unit. (2) No. 1 Magnifier Unit. (3) Drive No. 2 Magnifier and Modulator. (4) 20-k.w. Absorber Unit.



Front view of 20-k.w. Magnifier Unit for use in connection with either telegraphy or telephony, showing the oil-coiled valves.

sages for the various ships and land stations throughout the world.

20-K.W. Short-Wave Transmitter.

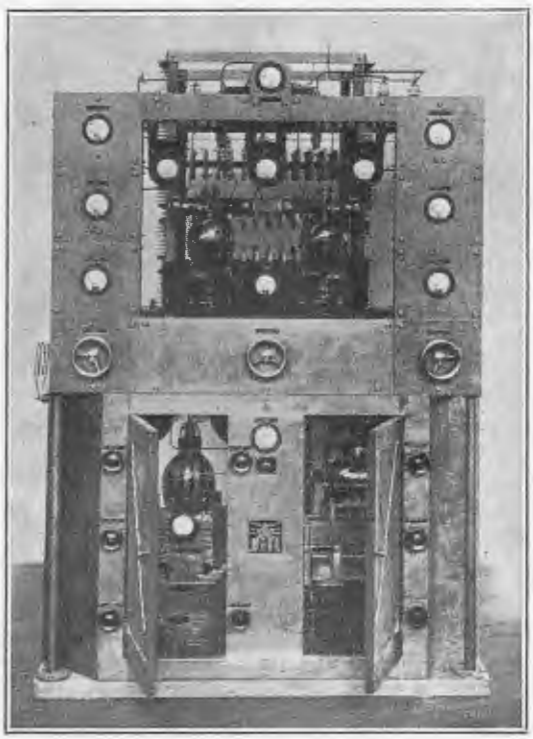
Proceeding to the other building, we come to the pride of the Australian radio world—the huge 20 kilowatt short-wave transmitter which is used for international telegraphy and telephony. This wonderful set is the latest addition to the station and occupies a whole room. No fewer than seven panels comprise this transmitter—modulating, two rectifying, key absorbing, drive, and Nos. 1 and 2 magnifying panels. The huge transmitting valves are of the latest oil-cooled type, a constant stream of cool oil being circulated by means of a rotary pump. These valves, used in the modulator panel, dissipate a power of 3 kilowatts each, while the main oil-cooled tubes in No. 2 Magnifier can dissipate powers as high as 10 or 12 kilowatts each for indefinite periods. This transmittier operates under the call 2ME on a wavelength of 28.8 metres. As far as telephony transmission is concerned, it was first used for the international broadcasting of the Eucharistic Congress recently held in Sydney, excellent reports of reception being received from various parts of the world. Similar to 5SW, the huge short-wave station of the British Broadcasting Corporation, it should prove of great value to Australia, as it will be the means of enabling broadcasts of important functions to be heard in all the countries of the world. We raise our hats to the engineers of Amalgamated Wireless (A.'sia.) Ltd., who are responsible for the design and construction of this magnificent piece of apparatus.

Control of Radio Centre.

All of the sets at Radio Centre are operated by remote control in the following system: 2FC is operated by a pair of lines from the 2FC studio in Sydney. In addition to the broadcasting lines, there are six pairs, constituting twelve channels. The Beam Feeder transmitters are operated by high-speed instruments at the beam office in York Street, Sydney. All other transmitters, with the solitary exception of the Police set, are operated by remote control from the "Receiving Centre" at La Perouse, some 25 miles distant. The Police transmitter is controlled from Police Headquarters, Phillip Street, Sydney. In the event of failure of any line, a change-over can instantly be effected on the test board at the beam office. As an added precaution against failure, should it happen that all the lines go out of action, any or all sets can be immediately operated from the Radio Centre itself, each transmitter being equipped with auxiliary keying circuits for local operation, all of them grouped at the technicians' control desk. Thus it will be seen that the chances of complete failure are very remote, and the service is enabled to maintain a very high state of reliability.

The Power House.

Actually, the power house is the heart of the whole station, for here are located the various machines for supplying the different transmitters and auxiliary equipment. Alternating current (25-cycle) at 6600 volts potential is supplied direct from the N.S.W. Government Railways power house, and transformed to 415-volt, 25-cycle energy. There are two large alter-



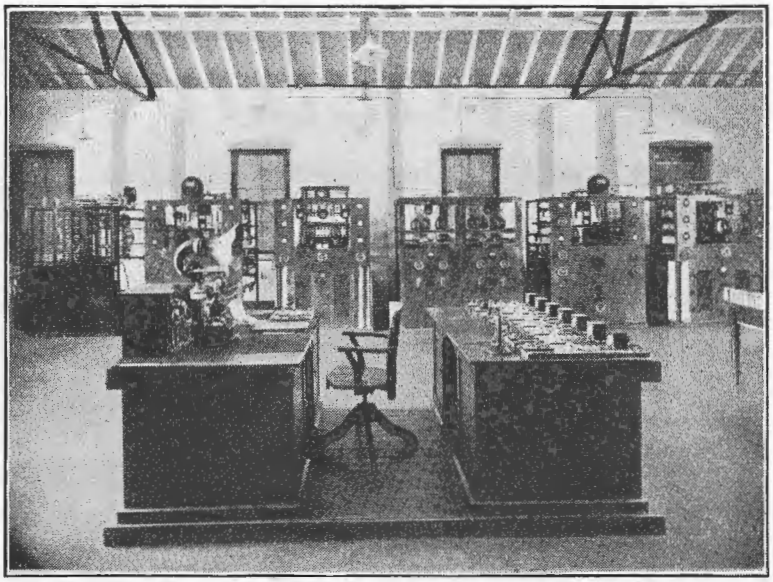
5-K.W. SHORT-WAVE TRANSMITTER.
Front view of drive, (bottom right) No. 2 Magnifier (bottom left). Absorber top unit.

nators, each delivering current at 415 volts, 50 cycles, in addition to an auxiliary battery charger, a 110-volt bias generator, and generators for supplying the Police and Coastal short-wave sets. The original 75 h.p. Gardner internal-combustion engine is still capable of rendering good service in an emergency. The enormous switchboard necessary for controlling the various units of the power-supply equipment covers one side of the power house, and consists of twelve large panels, In the battery room there are three complete banks of 500 ampere-hour batteries.

Aerial System.

The aerial system of the station occupies almost all of the extensive grounds, all of them—with the exception of that of 2FC—being designed on the Lecher principle. In this system, the aerial and ground wires are carried on small posts close to the ground to a distant portion of the field, and after passing through an ammeter, the aerial lead then is taken straight to the tower. Briefly, this system ensures the absence of inter-acting effects between the various aerials, and provides a means of placing the aerials well out in the open where their efficiency as radiators will be unimpaired by absorption losses. By means of a telescope, it is possible for the engineers to check the readings of the ammeters just referred to without leaving the station building.

As can be imagined, this veritable network of aerials and counterpoises spread over the whole field certainly does not make it a safe place wherein to enjoy a walk—especially as most of them are "live," and cannot be touched without decidedly unpleasant consequences. Trespassers, beware !



Showing Technicians Desk and Auxiliary Keying Circuit for local operation.

Executive.

Pennant Hills Radio Centre is under the exceedingly capable control of Chief Engineer A. S. McDonald, the staff consisting of the O.I.C. (Mr. Cookson), five technicians, one mechanic and one rigger. The staff is housed in comfortable quarters at one end of the field.

As far as the "Radio News" man was concerned, the visit was a memorable one, leaving the impression that Australia well in the van of the world's progress in the science of radio communication. To Messrs. Amalgamated Wireless (A.'sia.) Ltd., and especially to our old friend, Mr. Coffey, we desire to express our sincere appreciation for their courtesy in making the visit possible.

A Mains Tip

Here is a little tip for users of A.C. mains units. Occasionally such units will give slight noises (not the hum due to insufficient smoothing). Try reversing the plug in the electric-light socket and you will generally find that one way is better than the other.

Several cases have been instanced where faults in a wireless receiver have been traced to the fact that the builder has endeavoured to solder a wire on the metal end-plug of a little tubular grid leak. This is always a dangerous proceeding, and requires great skill in order that no injury may be done to the leak itself. The main trouble which arises when one endeavours to solder to the end cap is that the interior connection breaks away. This is because in many makes of grid leak the interior resistance element terminates in two fine wires, one at each end. The metal end-caps are each drilled with a small hole, and when the leak is assembled one end-wire is pushed through the hole in one end-cap and held in position with a spot of solder.

Avoid Soldering.

The other cap is then put on, the wire brought out through the middle, soldered with the touch of a hot iron, and the wire cut off. You can see how this is done if you examine the ends of some grid leaks. If now a hot iron is applied to the end of a grid leak in order that another wire may be soldered to it, there is a very big chance that the original spot of solder will melt, and the interior wire become disconnected. In any case, grid-leak clips are very cheap, or can even be improvised from a piece of tin or brass, in a few moments.

"BALL FOR BALL" CRICKET DESCRIPTIONS.

Cricket enthusiasts will be glad to learn that 3AR has completed arrangements to broadcast a "Ball for Ball" description of the match between England and Victoria, which will be played on the 1st, 2nd and 5th of November. Rod McGregor will be before the "mike," and his usual graphic description will be greatly enjoyed by devotees of the game who are unable to be present in person.

Noctovision!

NOCTOVISION ! A new word has been added to the language by John L. Baird, the young Scottish inventor.

While conducting experiments in connection with Television, Baird accidentally stumbled on Noctovision—the isolation, by means of a special filter, of all rays from, say, a searchlight, visible to the human eye, but permitting rays of infra red light, NOT VISIBLE, to be focussed upon whatever object it is desired to see in the dark or through fog or smoke. In short, the object of observation, to the naked eye, is apparently in total obscurity, but is actually bathed in these shafts of infra red light and is clearly visible to those controlling the Noctovisor. The effect of this astounding discovery, it is said, will revolutionise navigation during foggy weather, air manoevres and field tactics during war, since heavy fog banks, smoke screen or total darkness are as nothing to the all-seeing eye of the Noctovisor, where a powerful searchlight would be practically useless.

The reliance which was placed on "Ever-ready" Batteries used in Baird's experiments and demonstrations in connection with Noctovision is forcibly summed up in his own words.

"Ever-ready" High Capacity Dry Batteries are excellent, and were used solely at the Leeds demonstration of Noctovision.

If you have never tried an "Ever-Ready" Battery for your radio, wire one in today. You'll be pleased with the added purity and volume of your reception. Write for the Free Booklet about these Batteries, containing economy hints and interesting information.

Wholesale Distributors

EDISON SWAN ELECTRIC CO., LTD.

156 Creek St., BRISBANE

EVER-READY

RADIO BATTERIES

SAFETY FIRST — UTILITY ALWAYS

LOOK FOR THE TRADE MARK

The First Test will be played upon the Brisbane Exhibition Grounds, from whence 4QG will broadcast descriptions throughout the play Our photograph shows a match in progress, upon the occasion of the English team's last visit to Brisbane.

Broadcasting Big Cricket

THE coming Test matches between England and Australia are keenly awaited by all sport-loving Australians, and to keep listeners closely in touch with the developments of each of the Tests, the Australian broadcasting stations are making elaborate arrangements for the broadcasting of descriptions and progress of the scores from each of the matches.

Added interest will be given to the Test matches this season, by reason of the fact that England now holds the much-coveted Ashes. The team is bringing the Ashes to Australia, and quite naturally each man will strain every nerve to retain them, whilst, of course, the Australian team are stern in their determination to win back the honour for the sake of their country.

MR. STAN. PHILLIPS.
who will broadcast description of the play at the First Test Match in Brisbane, commencing on 30th November, 1928.

Realising the tremendous public interest that will be created in the Tests, the broadcasting stations of Brisbane, Melbourne and Sydney are making elaborate arrangements for individual and co-operative broadcasts from the grounds upon which the Tests will be played.

The first Test (played in Brisbane), will commence on November 30th, continuing until December 6th. During this match, 4QG's sporting announcer, Mr. Stan. Phillips, will relay descriptions of the progress of the match from the Exhibition Grounds.

Programme of Matches—English Team's Australian Tour, 1928-1929

England v. South Australia—
At Adelaide, October 26-30, 1928.
New South Wales v. Queensland—
At Bris., Oct. 27, Nov. 1, 1928.
England v. Victoria—
At Melbourne, Nov. 2-6, 1928.
England v. New South Wales—
At Sydney, Nov. 9-13, 1928.
England v. An Australian XI.—
At Sydney, Nov. 16-20, 1928.
England v. Queensland—
At Brisbane, Nov. 24-28, 1928.
First Test—
At Brisbane, Nov. 30, Dec. 6, 1928.
Second Test Match—
At Sydney, Dec. 14-20, 1928.
New South Wales v. Victoria—
At Melbourne, Dec. 22-27, 1928.
New South Wales 2 v. Victoria 2—
At Sydney, Dec. 26-28, 1928 (probable)
Third Test—
At Melbourne, Dec. 29, 1929.
New South Wales v. Queensland—
At Sydney, Dec. 31, Jan. 4, 1929.
New South Wales v. Sth. Australia—
At Adelaide, Jan. 11-16, 1928.
New South Wales v. Victoria—
At Sydney, Jan. 24-29, 1929.
England v. South Australia—
At Adelaide Jan. 25-29, 1929.
Fourth Test—
At Adelaide, Feb. 1-7, 1929.
England v. New South Wales—
At Sydney, Feb. 15-19, 1929.
England v. Victoria—
At Melbourne, Mar. 1-5, 1929.
New South Wales v. Sth. Australia—
At Sydney, Mar. 2-7, 1929.
Fifth Test—
At Melbourne, Mar. 8-14, 1929.

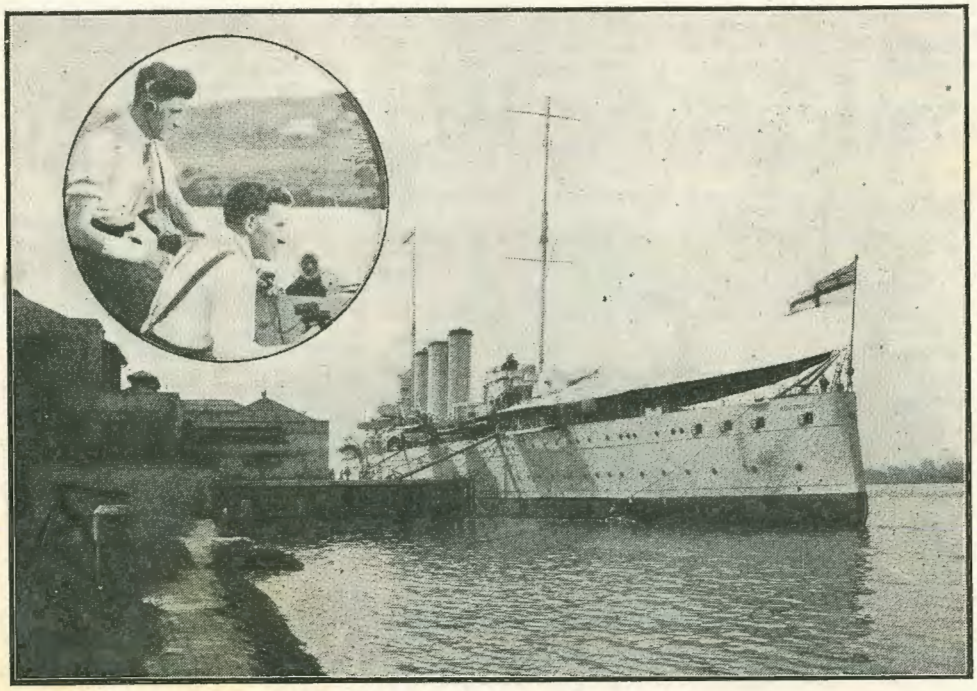
Relays of Test Matches Through Southern Stations.

Although at the time of writing, details for relaying some of the remaining tests from Southern Capitals had not been finalised, it is thought at least a portion of these broadcasts will be relayed by 4QG. The difficulty lies in securing a landline from the P.M.G.'s Department at the time of the day when traffic on the lines is busiest.

At the second Test does not open in Sydney until December 14th, more complete details conshould be available for publication in our next issue.

The English Players

A. P. F. Chapman (Kent), Capt.
J. C. White (Somerset)
D. R. Jardine (Surrey)
J. B. Hobbs (Surrey)
H. Sutcliffe (Yorkshire)
W. R. Hammond (Gloucestershire)
M. W. Tate (Sussex)
H. Larwood (Notts.)
E. Hendren (Middlesex)
E. Tyldesley (Lancashire)
A. P. Freeman (Kent)
C. P. Mead (Hampshire)
M. Leyland (Yorkshire)
S. J. Staples (Notts.)
G. Duckworth (Lancashire)
L. Ames (Kent)
G. Geary (Leicestershire)



Broadcasting the Arrival of the Commonwealth New Flagship H.M.A.S. "Australia"

The inset shows Chief-engineer Stevens (of 4QG), at the microphone with operator, on the roof of the Hamilton Cold Stores, from which point of vantage he described the arrival and berthing of the new flagship "Australia," at the Hamilton wharves.

Our Xmas Number

The Editors' are planning to make the December issue of "Q.R.N." something special. The constructional feature will be "A Holiday Three"—a wonderful little portable receiver that yields "big set" results. Other constructional and instructional features will be included, added to which there will be special Xmas articles and stories.

Order Your Copy Now

Or send **6/6** for a years subscription to Box 1095N, G.P.O., Brisbane.

The Builders of Australia's Biggest Broadcasting Stations

Build RADIOLA

The ready response to our offer of RADIOLA representation to radio dealers in the previous issue of this magazine proved beyond doubt that dealers are quick to realise how easy it is to sell RADIOLAS

RADIOLAS sell themselves. They posses every desirable feature in radio—outstanding performance, pure tone, simplicity and beauty. They are built by the pioneers of wireless and the builders of all Australia's Biggest Broadcasting Stations.

There are still some towns and districts where authorised RADIOLA DEALERS have not yet been appointed. Do you want this representation? Write us at once, telling us all abour your business and enclosing the usual references. We will write to you promptly, telling you the plans we have for your district.

Become a RADIOLA Dealer

RADIOLA

Amalgamated Wireless (Australasia) Ltd.

Queensland Distributors:

J. B. CHANDLER & CO.

Queensland's Largest Radio Store

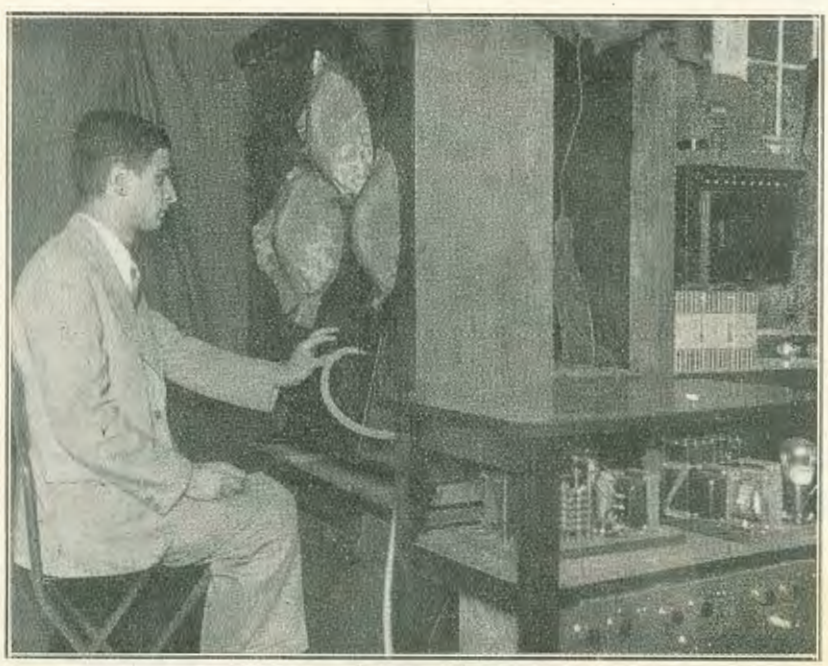
45 Adelaide Street — — — — BRISBANE

TELEVISION Successfully Demonstrated

From our American representative comes news of what is claimed to be the first successful demonstration of television, carried out recently in New York City by Station WRNY on a wavelength of 326 metres. The following article outlines the system of transmission and reception employed.

TELEVISION broadcasting on the regular broadcast band was successfully demonstrated on August 21st, 1928, for the first time in New York, when the images of living people were put on the air through the transmitter of Station WRNY, located at Coytesville, N.J., and received in Philosophy Hall, of New York University, at University Avenue, and 181st Street, the Bronx, before a group of newspaper men, scientists, and members of the radio trade. The images as viewed in the television receiver were about 1⅞ inches square, and comprised the heads and faces of various individuals. The images received resembled rough newspaper half-tones, and were clear enough to enable the observers to distinguish the winking of a man's eyes, the opening and closing of his mouth, and the movement of his head from side to side.

An outstanding feature of the broadcasting was the confinement of the television impulses within the 5000-cycle modulation channel, to which all broadcast station are limited by law. All of the television systems demonstrated so far required bands from 15,000 to 60,000 cycles wide, and were used exclusively on the short waves (below 100 metres) with expensive and specially constructed transmitting and receiving apparatus which could be operated only by skilled engineers. The television transmissions from WRNY were conducted on the station's regular 326-metre broadcast channel, and the receiving was done with a standard broadcast radio receiver to which had been added merely a flat metal disc, a small motor, and a device known as a "neon tube." Listeners who had their sets tuned to WRNY during the periods of the experiments took place, heard the television impulses as a fluctuating squeal.



A general view of the Television Transmitter. The arc light is at the extreme right, facing the scanning disc and the person being televised. The edge of the disc is just visible beyond the wooden framework. The three round affairs are the photo-electric cells, covered with copper gauze, for shielding. The whole inside of the cell box is lined with thick sheet copper. In the right foreground, part of the cell amplifiers is shown. This temporary rig was photographed in the Pilot laboratories just before it was dismantled for shipment to WRNY. Robt Hertzberg, managing editor of "Radio News" Magazine, is seated in the chair.

The development of the transmitting and receiving appartus used is credited to the Pilot Electric Manufacturing Company of Brooklyn. The equipment was designed by John Geloso, chief engineer of the company, who operated the receiver during the demonstration. He was assisted by I. Goldberg, President of the Pilot Company, and Hugo Gernsback, President of WRNY and publisher of "Radio News" (New York). Just before the second demonstration, Mr. Gernsback delivered a general talk on the history and present—as well as future—possibilities of television; this address was broadcast through WRNY.

WRNY's demonstration marked the inauguration of what is claimed to be the first regular television broadcasting service in the world. Television transmission has been undertaken by a few scattered stations, it is said, but only on a limited and irregular

John Geloso, who designed the machine, is here shown adjusting the complete television receiver, and is observing a picture through the square opening in the cabinet.

basis and almost entirely on the very short wavelengths, which cannot be tuned in with a broadcast receiver. For the benefit of television experimenters, the Pilot televisor will, in future, be "on the air" through WRNY for five minutes on the hour, every hour during the time the station broadcasts. The images of living persons, animated dolls and other objects will be televised, not only through WRNY on its regular 326-metre wave, but also through its associated short-wave station, 2XAL, operating on 30.91 metres. The signals of the latter station are heard with great regularity in Europe, South America, Africa and Australia, so it is quite likely that radio listeners in these countries will be able to reproduce the images with the proper receiving apparatus. As the television transmitter is now located in the transmitter house of WRNY, at Coytesville, N.J., at present, it will not be possible to broadcast the images of artists performing in the studios in the Hotel Roosevelt, New York City.

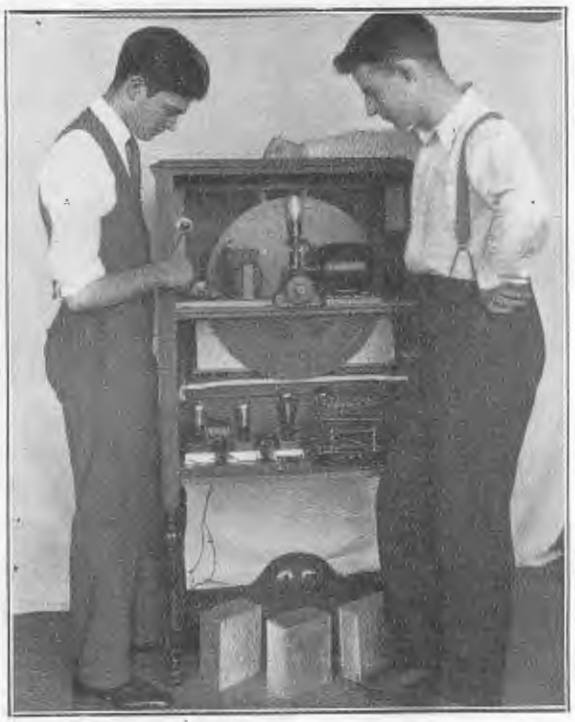
Technical Data.

The operation of the Pilot television system is explained by Mr. Geloso as follows:

The person to be televised sits in a booth facing three large photo-electric cells, arranged in a triangle in a wooden frame, through the centre of which is an opening about six inches square. On the other side of this frame is a "scanning" disc 24 inches in diameter, cut with a spiral of 44 tiny holes. This revolves at the rate of 450 revolutions per minute in front of a powerful electric arc, the light of which passes through the holes and fall on the face of the subject. These rays of light are reflected into the photo-electric cells, which produce electrical currents corresponding in intensity to the light and dark portions of the skin and hair. This action may be compared to that of the microphone in translating the tones of the voice into electrical vibrations. The impulses generated by the cells are amplified by a series of specially shielded resistance-coupled amplifiers, which, in turn, feed the broadcast transmitter. The latter sends out a signal which is plainly audible in any ordinary broadcast receiver tuned to 326 metres.

At the receiving end the signals are tuned-in in the normal manner, but instead of being made to operate a loudspeaker, are led to a neon gas glow tube which is fixed behind a scanning disc similar in construction to the one employed at the transmitter. The disc used in the demonstration receiver was 20 inches in diameter, had 44 holes, and revolved at a speed of about 450 revolutions per minute. The neon tube produces a pinkish glow which varies in accordance with the impulses fed it, just as a loudspeaker produces sound in accordance with the variations of the current flowing in its windings. At the scanning disc revolves, it builds up a series of images, line by line, with a rapidity sufficient to create the illusion of "moving images." The receiver used was housed in a standard console cabinet, and the images were viewed through a square opening above the radio tuner.

Mr. Geloso claims he has solved the important problem of synchronising the transmitting and receiving discs by a system which involves the transmission of one synchronising impulse at the end of



What the inside of the complete Radio Broadcast and Television Receiver looks like. The receiver proper occupies the lower section of the cabinet, the television apparatus the upper.

each rotation of the spiral of tiny holes in the scanning disc. In the receiving disc this impulse operates a small relay, which in turn causes a magnetic device to either accelerate or retard the receiver's scanning disc. This arrangement holds the images in the receiver steady, and prevents them from slowly wandering out of "frame" when the speeds of the transmitting and receiving motors vary slightly. An auxiliary manual control is provided on the receiver to enable the operator to "frame" the images at the beginning of a period of reception.

Any radio experimenter owning a radio receiver with a resistance coupled amplifier can readily reproduce the television images broadcast from WRNY, according to Mr. Geloso. The only additional apparatus he needs is a scanning disc, a small motor, and a neon tube. The standard 48-hole discs which were placed on the American market recently in anticipation of regular television broadcasting, will work satisfactorily, he stated. In fact, during some of the preliminary tests, two radio experimenters in Queens-Boyd Phelps and s.s. Bruno—reported that they had actually been able to see the WRNY broadcast images after they had accidentally slowed their receiving motors down to the proper speed. Mr. Geloso warns experimenters not to expect too perfect images, but they will be readily recognisable.

Why WRNY Broadcasts Television.

Mr. Hugo Gernsback was asked the following questions: "Why has WRNY become the first station in the metropolitan area to broadcast television? Why have not the powerful stations operated by the large radio interests attempted heretofore to broadcast television?" In answer, he issued the following statement:—

"When KDKA, the Westinghouse station in East Pittsburgh, Pennsylvania, started to broadcast musical programmes in 1921, it started a radio boom that caught radio manufacturers totally unprepared to take advantage of it. For a long time they were unable to speed up the production of even the simplest crystal sets to meet the demand, with the result that many thousands of people built their own receivers and receivers for their friends. In buying huge quantities of parts, these home experimenters and constructors maintained the industry for several years, but the really big radio business now lies in the sale of complete sets.

"The big radio interests do not want to be caught unawares to-day with television, as they were with broadcasting seven years ago. They are not in business to sell parts. They want to sell complete television sets, and for these the time is not yet ripe. The powerful broadcast stations they own and operate all over the country could readily have started television programmes as early as April of this year, but they are delaying because of the commercial considerations.

"However, Station WRNY, owned and operated by the publishers of "Radio News" (New York), which caters exclusively to the experimenter and "fan," has no such commercial interests. They admit that television to-day is only for the experimenter, who will assembled his own apparatus, and for the parts manufacturers, who will sell the necessary components. Complete, fool-proof television sets will not be ready for some time to come, but this is no reason to retard the progress of an important art. In the meanwhile, the experimenters will be gaining valuable experience and will be contributing important improvements, as they did during the early stages of broadcasting.

"Please also distinguish the true **television** work we are doing from the "radio movies" demonstrated recently by the Westinghouse company. That was not television, but animated radio telephotography. The pictures on a roll of cinema film were transmitted, **not the image of a live person.** C. Francis Jenkins performed this same feat some time ago."

John Geloso.

John Geloso, the chief engineer of the Pilot Electric Manufacturing Company, and the man responsible for the design, construction and successful operation of the pilot television apparatus, is only twenty-eight years old, and has been in the United States only four years. He was born in South America, but lived most of his life in Italy, where he was educated. He is a graduate of the University of Genoa, where he studied electrical, mechanical and naval engineering. Before coming to the United States he was employed in Italy as a naval engineer. Mr. Geloso has been with the Pilot company for the past three years. Less than three months ago he was assigned to the staggering task of designing a practicable television transmitter that would stay within 5000 cycles. Within five days of the time he obtained suitable photo-electric cells, he had a complete transmitter and test receiver working in the Pilot laboratory in Brooklyn. The first time he turned the apparatus on, a crude but recognisable image appeared in the receiver. Since the middle of June he has done nothing but work on the apparatus, stealing only five or six hours a night (some nights) for sleep.

With a regular television service now under way at WRNY, Mr. Geloso will seek to perfect the numerous details of the system, such as the automatic synchronisation feature, proper modulation of the neon tube, the design of a small and quiet motor for revolving the disc, the use of socket-power devices, etc.

ELECTRON WIRE
BRITAIN'S BEST AERIAL!

ELECTRON WIRE and SUPERIAL (Electron's Super Aerial)—hold premier postions among Aerial Wires. They are perfected after exhaustive tests. Millions are in use in all parts of the world. Where Electron or Superial are used, the volume of reception is greatly increased, the quality is purer, the selectivity is more sensitive, and the long distance stations are brought in more clearly. Electron Wire and Superial are simple to fix—masts and lead-in tubes are unnecessary.

ELECTRON WIRE
THE PERFECT AERIAL

ELECTRON WIRE can be suspended round the picture rail, even behind the pictures—it gives excellent results as an indoor aerial in every conceivable position. As an outdoor aerial, simply tie one end to a tree, attaching the other end to the set (lead-in in one continuous length) no separate lead-in required.

COIL of 100ft. 2/6

SUPERIAL
THE KING OF AERIALS

SUPERIAL is Electron's Super Aerial—ideal for long-distance reception. The extra heavy vulcanised rubber insulation is a perfect protection against leakage, and therefore there can be no loss of incoming signals. **100 feet Coil, complete with wooden spool to facilitate unwinding** 4/6

SIMPLE TO FIX ~ WILL LAST FOR YEARS

If you have any difficulty in obtaining, write to the Sole Agents (as given below), or to the Proprietors, who will supply direct. State name of Wireless Dealer when writing and enclose remittance.

Sole Distributors for Queensland:

CANADA CYCLE & MOTOR AGENCY LTD.

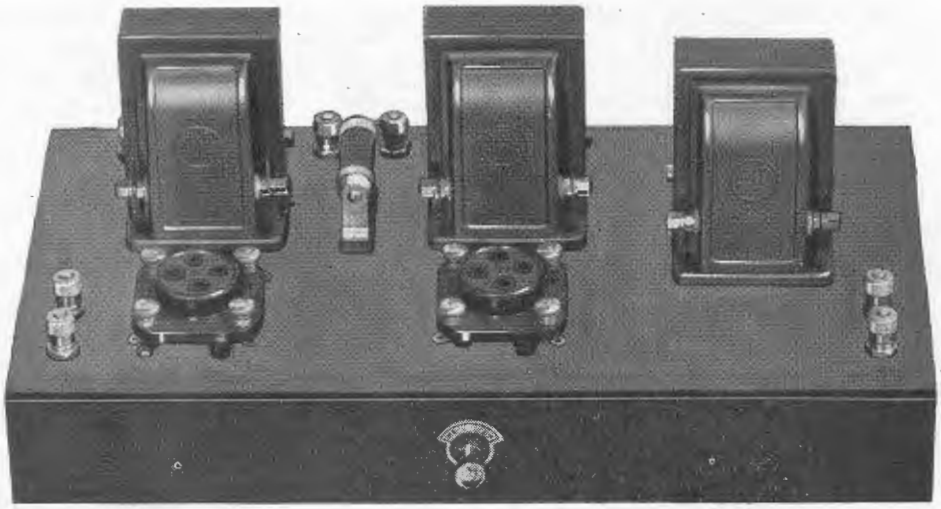
Cr. Creek and Adelaide Streets, BRISBANE

Sole Manufacturers:

The NEW LONDON ELECTRON WORKS LIMITED

EAST HAM, LONDON, ENGLAND

BUY BRITISH GOODS **THEY ARE THE BEST**



A Modern Transformer-Coupled Audio Amplifier

This article is the first of a series dealing with the design and construction of modern high-quality audio-frequency amplifiers of various types. The amplifiers will be described as complete units, capable of being incorporated in newly-constructed receivers or of being added to any existing type of set, including the crystal receiver. Quite apart from this, the information furnished will be of value to those who are interested in the latest developments in this important branch of the science.

By the TECHNICAL EDITOR.

OF all the numerous systems that have been developed, it is doubtful whether any form of audio-frequency amplification will ever attain the popularity and almost universal use of the two-stage transformer-coupled type. The ease with which this type of amplifier can be built, the non-critical characteristics of the plate and grid biassing batteries required, and its adaptability for use with either "B" batteries or "B" eliminators, has done much to make it the most popular system of audio-frequency amplification that radio has known.

The amplifier described in this article is ideal for use with any of the new radio-frequency circuits, but it can be employed just as effectively with any other type of receiver, including the popular crystal set. It may be used to replace the audio amplifier unit of older receivers in order to bring the quality of reproduction up to the standard required by present-day designers, or it may be used as an amplifier for the reproduction of phonograph records by the modern electrical method. Even an old-style phonograph can be made to give the life-like reproduction of the up-to-date electric machine by means of an electrical pick-up device used in conjunction with this amplifier unit and a good loudspeaker.

The audio transformers utilised in the amplifier are generally recognised as being of the highest laboratory grade; they are largely responsible for the excellent tone quality because they are capable of providing practically uniform amplification at all tone frequencies, neither over-stressing nor under-stressing the extreme ends of the normal audio range. Within the last year or so some remarkable improvements have been made in the design of audio amplifying transformers, and the products of some of the leading manufacturers reach a standard of performance that was not remotely approached by many of the older instruments.

But good transformers cannot alone assure flawless reproduction; the valves used play a very important part in the operation of an amplifier, and must be selected with care if the best results are to be obtained. In this amplifier, provision has been made for the use of many different combinations of valves, for the Australian radio market is unique, inasmuch as the number of competitive valve manufacturers represented is so large. There are many good valves available to-day, all of them capable of yielding excellent results if correctly used, and each one having some claim to the attention of the set-constructor. For this reason, we have not specified any particular types

of valves, but have published instead a table listing suitable combinations of various makes.

It is becoming standard practise nowadays to include an output filter in the assembly of any good amplifier, and this consideration has not been neglected in the case of the unit under consideration. The output filter has an important duty to perform—it must completely isolate the loudspeaker windings from the passage of the direct plate-current flowing from the "B" battery, protecting the delicate windings, and obviating a form of distortion that is often caused through the loudspeaker magnets becoming saturated with an excessively heavy current. Considering its comparative cheapness, the factor of safety afforded by the use of an output filter is well worth while, so we have built-in an output transformer having a turns ratio of 1-1. An alternative method is to utilise a 25-henry iron-core choke in conjunction with a 2 to 4-mfd. fixed condenser; in practise, there appears to be nothing to choose between the two systems, but the transformer solves the problem with a minimum of expense and trouble.

Electric Pick-Up.

Should it be desired to use an electric phonograph pick-up in connection with this amplifier, the leads from the pick-up are connected to the two input terminals, "B1" and "B2." The amplifier is particularly suitable for this purpose, and, with a good pick-up and the new electric records, the results obtained are remarkable. It is, of course, essential that the loudspeaker be of the highest grade, as only an exceptionally good speaker can do justice to the unusual degree of perfection which the amplifier attains. A good cone speaker is recommended—one of the latest electro-dynamic types for preference.

As the filament temperature of the modern valve —especially when it is used as an amplifier—is not in any degree critical, an automatical filament control or "ballast resistor" maintains the filament voltage at the correct value. As long as the proper type of resistor is selected for the valves used, the job of maintaining the filaments at a correct temperature may safely be left in its charge. The type of ballast resistor specified is available in a value to suit every valve or combination of valves at present on the market, and appropriate values for various combinations are given in the list at the end of this article.

All connection terminals of the amplifier are placed at the edges of the sub-panel, permitting easy access for connection to the receiver and batteries. The design is such that the complete amplifier, as a unit, may be placed behind the panel of a receiver if desired, with the battery switch projecting through the main panel of the receiving set. The illustrations provide most of the data required to assemble and wire the unit. The sub-panel is attached to the small front panel by means of two Benjamin sub-panel brackets, these forming supports for the whole unit.

It will be seen that all of the instruments are mounted on the top side of the sub-panel, with the exception of the battery switch, and practically all of the wiring is below on the under side of the sub-panel. This style of layout make it possible to wire the unit without using more than three feet of wire, the connecting leads being simply dropped through small holes drilled adjacent to the various socket and transformer terminals.

The Proper Operating Voltages.

For best results with any type of modern amplifying and reproducing system, the first requirement is an adequate plate supply voltage. While quite good results may be obtained with only 90 volts of "B" battery, it is only when the value is increased to 135 volts or more that an amplifier using present-day valves really begins to justify its existence. This statement is applicable not only to this particular amplifier; it is a fact that high-grade reproduction can only be secured by the use of comparatively high values of plate voltage, particularly with regard to the final, or pre-speaker, stage. For this reason, a separate terminal is provided for the "B" supply to the last valve, so that even the largest "power-valves" may be employed in conjunction with a "B" battery eliminator delivering a sufficiently high voltage for correct operation.

To connect the amplifier to a crystal receiver, it is only necessary to join the output or phone terminals to the "B1" and "B2" terminals on the amplifier, the loudspeaker to "B10" and "B11," and the batteries to the remaining terminals. The markings on the battery terminals are practically self-explanatory, and the diagram (Fig. 4) will serve as a basis for connecting up "A," "B" and "C" batteries to give various voltages. In the table given below, the best values of "B" and "C" voltage are tabulated for the valves specified, so that there is no room for doubt on this score. It will be a good idea to keep this table, as it will prove of considerable value to the set constructor, con-

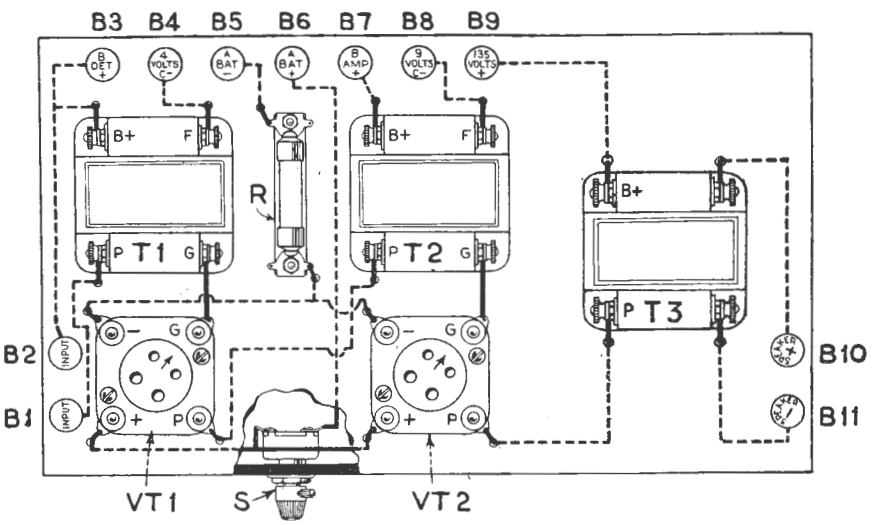


FIG. 1.—Tbis Pictorial Diagram shows all the wiring, most of it below the sub-panel (indicated by the dotted lines). The sub-panel is shown cut away to reveal the battery switch.

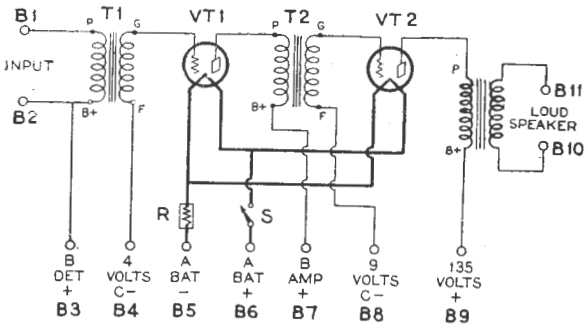


FIG. 2.—The Circuit, in diagramatic form.

densing, as it does, a very large amount of information into a small space. With one exception, 135 volts is specified on the plate of the last valve, but, should only 90 volts be available, the "C" voltage should be regulated in accordance with the valve-manufacturer's instructions. Wherever possible, though, the higher voltage should be used, for the reason mentioned previously. Correctly used, this audio amplifier will give you an amazingly lifelike reproduction of the original broadcast item, and high plate voltage is the first requirement in order to attain this end. The next amplifier to be described in this series will be a three-stage resistance-coupled amplifier using the latest Philips coupling units.

Parts for the Amplifier.

11 Terminals, B1 to B11 (inclusive).
1 Cyldon Tempryte (for value see table), R.
1 Emmco battery switch, S.
2 A.W.A. Ideal 3½-1 audio transformers, T1, T2.
1 A.W.A. 1-1 output transformer, T3.
2 A.W.A. non-microphonic sockets, VT1, VT2.
1 Pair Benjamin sub-panel brackets.
1 Bakelite sub-panel, 14 x 7 x 3/16 inches.
1 Bakelite panel, 14 x 2 x 3/16 inches.
1 Coil Chromax radio assembly wire.
25 Nickelled round-head brass bolts,(½ x ⅛-in.) with nuts.
Valves and batteries.

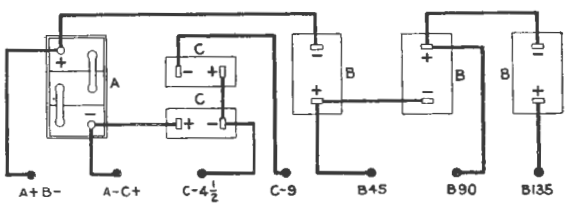


FIG. 3.—Showing the method of connecting "A," "B," and "C" batteries together.

VALVE COMBINATION TABLE FOR TWO-STAGE TRANSFORMER-COUPLED AUDIO AMPLIFIER.

FOR USE WITH 6-VOLT "A" BATTERY.

FIRST STAGE:				SECOND STAGE:				
Valve		"B"	"C"	Valve		"B"	"C"	Tempryte
Radiotron	UX-201A	90	—4½	Radiotron	UX-201A	135	—9	2
	UX-201A	90	—4½		UX-112	135	—9	1.5
	UX-201A	90	—4½		UX-171	180	—40½	1.5
Mullard	PM-5X	90	—3	Mullard	PM-6	135	—9	3
	PM-5X	90	—3		PM-256	135	—18	1
Marconi	DEL-610	90	—4½	Marconi	DEP-610	135	—9	2
Philips	A-615	90	—1½	Philips	B-605	135	—15	3
	A-609	90	—3		B-605	135	—15	4
	B-605	90	—6		B-605	135	—15	2
Cossor	610-LF	90	—3	Cossor	610-P	135	—12	2

FOR USE WITH 4-VOLT "A" BATTERY.

FIRST STAGE:				SECOND STAGE:				
Valve		"B"	"C"	Valve		"B"	"C"	Tempryte
Radiotron	UX-199	90	—4½	Radiotron	UX-120	135	—22½	5
Mullard	PM-3	90	—3	Mullard	PM-4	135	—9	1.5
	PM-3	90	—3		PM-254	135	—18	0.75
Marconi	DEL-410	90	—4½	Marconi	DEP-410	135	—9	2
Philips	A-415	90	—1½	Philips	B-405	135	—15	1.5
	A-415	90	—1½		B-406	135	—9	2
	A-415	90	—1½		B-409	135	—7½	2
	A-415	90	—1½		B-403	135	—22½	1.5
	A-415	90	—1½		B-443*	135	—12	1.5
	A-409	90	—4½		B-405	135	—15	1.5
	A-409	90	—4½		B-406	135	—9	2
	A-409	90	—4½		B-409	135	—7½	2
	A-409	90	—4½		B-403	135	—22½	1.5
	A-409	90	—4½		B-443*	135	—12	1.5
Cossor	410-LF	90	—3	Cossor	410-P	135	—12	2

* This is a five-element valve, or Penthode, having an auxiliary grid connection, which is connected to the 135-volt terminal.

The Best Recommendation for "Radio News" Receivers is—

What Readers Write

The joys of a Radio Editor's existence are greatly increased by appreciative letters from readers, and we always make it a point to write a line in reply. Below we print extracts from a few letters, selected at random from the bundle that has reached us during the last six months. Their tone indicates a very healthy interest in radio, to say the least.

". . . Yesterday I finished building 'A Good Three for £5,' as featured in the July 'Radio News,' and am writing to let you know the results. The following stations were tuned in at loudspeaker strength last night: 2FC, 2BL, 2KY, 3LO, 3AR, 4QG, 5CL—the last one rather weak and with a background of 4QG. On phones, good strength, 2UE, 2GB, 2YA (New Zealand). Can anyone grumble at the list on such an inexpensive three?" ("G.G.," Brooklands, via Nanango.)

". . . Re the 'Q.R.N. Wavetrap,' I am writing to you of **my** success. I am only a novice, and dabble in wireless only as a novice can. After reading the article (August 'Radio News'), I duly purchased the necessary material, and set on to the construction. The job kept me busy for about forty minutes ,including attaching to the set. 4QG was tuned in full volume on my three-valve Reinartz (home-made), and the trap declared 4QG black and showed an extreme liking for 2FC. The next evening I toyed with my set with renewed enthusiasm, bring in 2FC, 3LO, 2BL and 2UE on the speaker. The volume on 3LO, 2BL and 2UE was clear and distinct, but 2FC was equally as strong as 4QG. After 4QG closed down, I had no trouble to rake in the stations mentioned, but I must say the trap increases volume on those stations, besides efficiently eliminating the local station." ("S.J.S.," Windsor.)

". . . Am happy to say that the Short-wave Adapter is doing overtime, using a two-stage Ferranti audio coupling." ("A.S.," Gladstone.)

". . . I can honestly say that the 'Good Three for £5' is by far the best three-valver I have ever heard. I never use headphones, but regularly listen to the following stations on the speaker: 2BL, 3LO, 4QG, 5CL, 2FC, 3AR, 2YA, 2UE, 2GB, 2KY, 2MK, 3UZ, 3DB, and several others. With the 'Q.R.N. Wavetrap,' which I built not long ago, no interference is experienced from 4QG, with the exception of on 5CL. This is no freak, as I recently built another '£5 Three' for a friend, and it gave equally good results." ("A.A.C.," Graceville.)

". . . I feel I must write and thank you for the 'Flivver Crystal Set,' described in your July number. I was so pleased with the first one I made, that I have since built three more for friends, all of them working splendidly. Would you believe that I can listen to 4QG on a large B.T.H. speaker, using an indoor aerial consisting of a length of Electron wire? Of course, they are not loud, but I consider it good going for a crystal set working on an indoor aerial with no amplifier." ("C.R.," St. Lucia.)

". . . The 'Globe Trotter Screen Grid Four' certainly bears out your claims. On the short waves 5SW (Chelmsford, England), PCJJ (Holland) and 2XAD (Schenectaddy, U.S.A.) all come in on the loudspeaker at great strength, 5SW being audible all over the house. I tried the effect of plugging in honeycomb coils for the broadcast band, and 'Globe Trotter' surpasses any five-valve receiver I have ever listened to." ("F. McK.," Wynnum.)

". . . I find the 1928 Browning-Drake (June issue) even better than the original model, which I made from the description published in the 'Radio News' last year. In my opinion, it is without doubt the finest four-valve set one could wish for." ("L.M.," Rockhampton.)

". . . I have built the 'Improved Solodyne,' as per March 'Radio News,' and am very well satisfied with it. The tone quality, as you say, is beautiful." ("T. McC.," Toowoomba.)

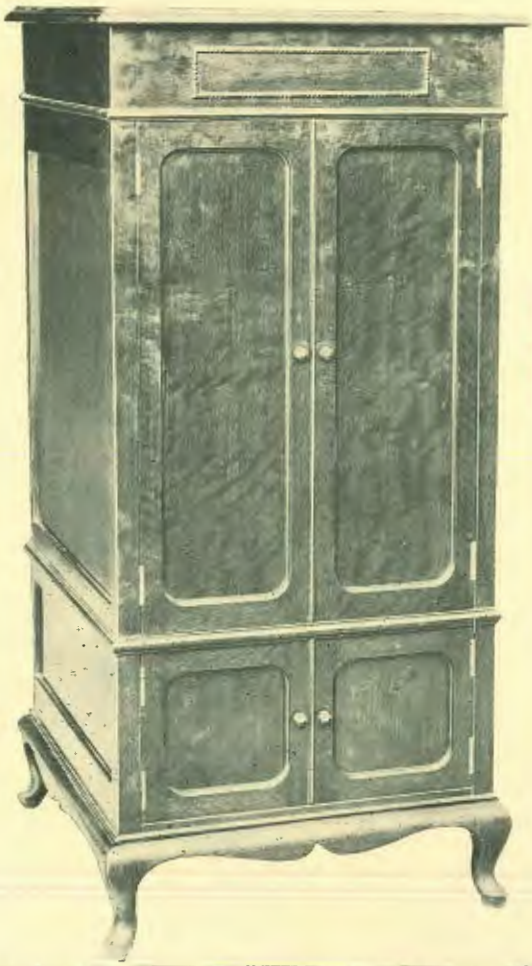
" . . . With the summer coming and static getting rapidly worse, we use our Crystal-Valve Set (June 'Radio News') most of the time, and the big set is neglected. For tone quality, give me the Crystal-Valve every time. I used a 4-mfd. fixed condenser in the output filter instead of the 2-mfd. specified, but the results could not be better." ("AM.U.G.," Wilston.)

". . . I intend making the Screen Grid Solodyne described in your last issue. . . . If it is as great an improvement on the old Solodyne which you published last March, it will be 'some' set. I have had wonderful results with this set, but, of course, like most wireless fanatics, am always after something new and better." ("P. O'H.," Emerald.)

Presenting~~

RCA

GRAMOPHONE RADIO



WONDERFUL news! Now you can buy either the battery or light-socket operated R.C.A. 6 Valve Receivers embodied in handsome cabinets with Gramophone, R.C.A. Pick-up and all! Switch on to the broadcasting station when you feel like it! When your mood calls for your favourite records, play them—and get a new thrill out of the richness of their radio-amplified tones. The price of the handsome light-socket model above is from £105. The upright battery operated model at the left costs from £130. See them, hear them—TO-DAY!

AUSTRALIAN GENERAL ELECTRIC

Australian General Electric Company, Ltd

ATCHERLEY HOUSE, Corner of ADELAIDE and QUEEN STS, PETRIE'S BIGHT, BRISBANE

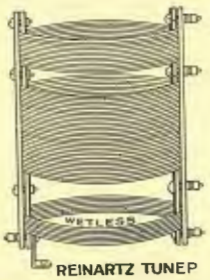
And at FLINDERS ST. EAST, TOWNSVILLE

"WETLESS"

GUARANTEED

RADIO PRODUCTS

High Grade Products selling at a LOWER PRICE than you are asked to pay for other makes



REINARTZ TUNEP

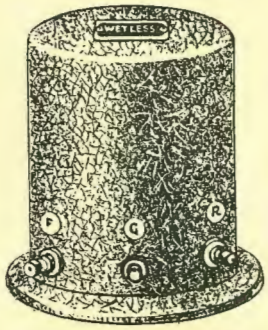
"Wetless" Reinartz Tuner.
Price ..... 10/6 each

NEUT COIL KIT

Neutrodyne Kit

"Wetless" Neut. Kit, with two neutralising condensers.
Price ..... 35/- per kit.

Specified in this issue of "Q.R.N."



SOLODYNE SHIELDED COIL.

"Wetless" Solodyne Kit with two Neutralising Condensers.
Price ..... 65/- per kit

SINGLE ROTOR TUNER

"Wetless" Single Rotor Tuner. Price ..... 13/- ea.

FROM ALL RADIO DEALERS

or from the Distributors

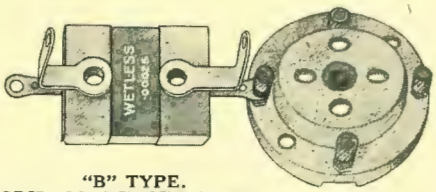
Trackson Bros. Ltd.

157-159 Elizabeth Street, BRISBANE

"Wetless" Radio Frequency Choke, — 5/6 each

DOUBLE ROTOR TUNER

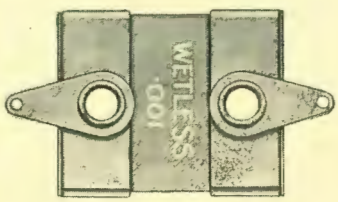
"Wetless" Double Rotor Tuner. Price ..... 18/6 ea.



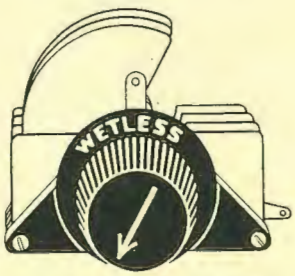
"B" TYPE.
GRID CONDENSER is specially made for attaching directly to valve socket terminal.

BROWNING DRAKE

"Wetless" Browning-Drake Kit with Neutralising Condenser.
Price ..... 35/ per kit



"B" TYPE.



MIDGET CONDENSER

"Wetless" Midget Condensers, 3-plate, 4/3; 5-plate, 4/9; 7-plate, 5/3; 9-plate, 5/6; 11-plate, 5/9; 13-plate, 6/6; 15-plate, 7/-; 17-plate, 8/-; 19-plate, 8/6.

"WETLESS" MICA CONDENSERS

"A" Type, 1/6 Each

.0001
.00015
.0002
.00025
.0003
.0004
.0005
.001
.002

.00025 (with clips), 1/9 each.

"B" Type

.003	... ...	2/6
.004	... ...	2/6
.005	... ...	3/-
.006	... ...	3/6
.0075	... ...	3/9
.01	... ...	5/-
.02	... ...	5/6

"A" Type, 2/- Each

.0001
.00015
.0002
.00025
.0003
.0004
.0005
.001
.002

.00025 (with clips), 2/6 each.

Manufactured by **J. WETLESS, 28 King St., Rockdale, Sydney**

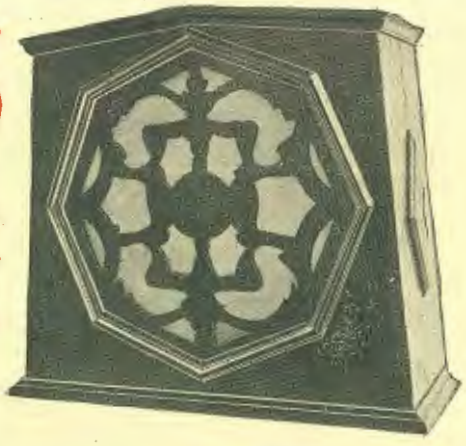
The AMPLION range of CONE SPEAKERS

The listening test of Radio is clear, natural tone. All Amplian Speakers have it. Models vary, Prices vary. Music, voices — when heard through Amplion Speakers—are always true to life.

No. AC 9.

"Chippendale Mahogany" Senior Model. A remarkably beautiful cabinet model worthy of a place in the most tastefully furnished room and affording the Amplion Cone standard of reproduction. It will appeal equally to the listener of taste and the advocate o Radio Realism.

PRICE ..... £9/10/ (C)



No. AC 5.

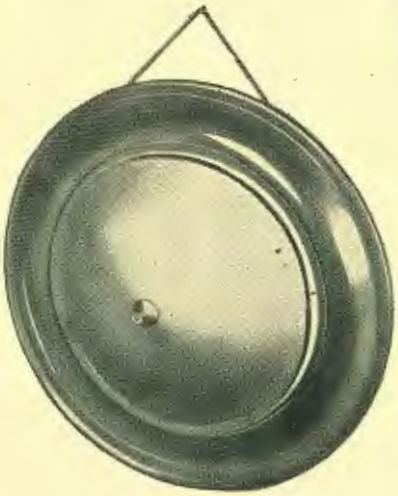
"Dark Oak" Senior Model. The absence of ornamentation and the strong lines of its design make it harmonise admirably with modern oak furniture. The cone is finished in an "old gold" shade which forms a pleasing contrast to the dark cabinet.

PRICE ..... £7/10/ (C)

No. AC 1.

Junior "Open Type." This model will stand as illustrated or can be hung from a picture rail. The rim is finished in oxidised copper, and the cone itself is copper colour.

PRICE ..... £4/10/ (C)



No. AC 2.

Junior "Hanging Type." This model is fitted with a patent adjuster nipple. The cone is tinted to match the chocolate tinted moulded rim.

PRICE £3/5/

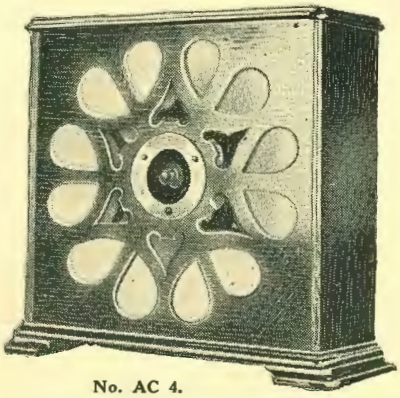
No. AC 3.

"Open Type" Senior Model. The outer rim is finished in oxidised silver, and the silvered cone harmonises with the metal work. The whole appearance is such as to make it attractive in any surroundings. The angle of the cone with relation to the base is adjustable from the vertical to the horizontal.

PRICE ..... £6 (C)

"Jacobean Oak" Senior Model. A cabinet in the popular Jacobean style. It will appeal to those requiring an oak model less severe in style than the AC9.

PRICE ..... (C) £7/15/



No. AC 4.

"Junior" Cabint." This model meets the demand for a low-priced cabinet model possessing the characteristic "natural tone" of the other Amplion Cones.

PRICE: AC 4O Oak ... £5/5/ (C)

AC 4M, Mahogany ... £5/10/ (C)

Germany's Super Spy

A Thrilling Tale of German Intrique and Cunning

by

ROBERT WARE

(Conclusion)

Synopsis of Opening Chapters:

Lieutenant Ivan Vorensky arrives in London bearing letters from the Russian Premier (Count Poltich). He has with him a mysterious black box which proves to be an "F" ray machine.

Vorensky and Robert Hilton (Chief of the Naval Intelligence Department) accompany the British Prime Minister (Lord X) to the latter's magnificent country home to test the Russian's invention. These tests prove the machine to be completely successful in exploding ammunition by means of a wireless wave. Vorensky informs Lord X that, because of German intrigue in St. Petersburg, Poltich desires Britain to purchase the invention from Russia and manufacture "F" ray machines for the Allies. The purchase price is twenty millions sterling and the rebuilding of the Russian Baltic Fleet—which has been almost swept out of existence by German submarines.

Vorensky stipulates that before the British give their answer three important officials must witness an "open sea" test of his machine, when he will use a moving "target."

Lord X is so impressed with the tremendous value of the "F" ray machine that he mentally decides to acquire it for Britain at all costs. He therefore tells Vorensky that the British Government will buy his machine—and carry out the conditions of purchase—without any further tests.

Vorensky, however, insists upon the "open-sea" test being carried out at some lonely island, explaining to his Lordship that Count Poltich's orders must be implicitly obeyed in this respect. Lord X thereon decides to return to London immediately and consult his Cabinet.

Fair Island is chosen as the scene of the final test, and Vorensky, Hilton and Captain Chisholm of the War Office, set out for the North of Scotland in the requisitioned yacht "Sapphire." On the way up the coast the "Sapphire" is attacked by an enemy submarine. Hilton endeavours to get Vorensky to use his machine, but the Russian becomes panic-stricken and faints. The British submarine K.2 torpedoes the German vessel.

Just before reaching Fair Island, the "Sapphire" picks up the crew of the "Olaf"—the captain of which tells a harrowing story of German barbarity.

Vorensky, Hilton, Chisholm and Svalson (the skipper of the "Olaf" survivors) carry the "F" ray machine ashore.

As the test is about to commence, the island is shaken by a terrific explosion, and Vorensky announces that a German submarine has just torpedoed the "Sapphire" and Hilton and Chisholm are his prisoners.

Hilton produces a compressed-air pistol and tells Vorensky—who is now known to be Von Hagen, Germany's remarkable spy—that, on the contrary, he must consider himself a prisoner.

A second explosion rocks the island, and Hilton calmly informs Von Hagen that the German submarine has been blown up by the British submarine K.2—which followed the "Sappbire" all the way from London.

The Germans are surrounded by a Naval Patrol which Hilton had planted on Fair Island, and the party return to the shore and embark on the K.2.

Explanations follow—and Von Hagen bargains with Hilton that if he is treated as a prisoner of war and sent to Castle Donnington instead of the Tower, he (Von Hagen) will tell Hilton where the "F" ray machine really is.

Hilton practically agrees, but on following Von Hagen's instructions, finds that the "F" ray machine has disappeared altogether.

Orwood—one of Hilton's listening-in stations—detects enemy messages on a very short wave—10.5 metres—but cannot get the signals strong enough to obtain a bearing by means of the direction finder. Deciding to hunt the station by air, Hilton flys from Croydon aerodome in a "Bristol" Fighter, which is piloted by a young Australian—Lieutenant Curtis.

Hilton locates the enemy station on the Blackwater Estuary, and proves that it is using a narrow beam wave. Following the direction of his wireless bearings, Hilton sights an old house with a jetty in front of it. At the end of the jetty is a German submarine, and, ordering Curtis to dive nearer, Hilton sees that someone is carrying Vorensky's "F" ray machine aboard the submarine.

Now read the conclusion of this thrilling episode of the Great War:—

XVII.

Suddenly, Hilton saw that a wicked-looking machine-gun in the conning tower of the submarine was trained upon them, and before he recovered from his astonishment, a devastating fire swept full across the cockpit of "Bristol" as it raced towards the enemy craft. Curtis gave a suddening whistling gasp and jumped from his seat—his head flung back, his hands gripping the controls with superhuman strength. With a rending tear, the engine slowly broke away from the long nose of the machine, and with a splintering crash fell from the aeroplane like a plummet on the water-worn, rickety jetty and, with a deafening thud, plunged through the rotton planking into the estuary bed.

Freed from the weight at its head, the "Bristol" surged upwards—then, deprived of its power, slid backwards into a tail-spin. The next instant the game young Australian sank in a crumpled heap and the Chief of the Naval Intelligence Service recorded another vow of vengeance against the ruthless enemy.

With terrific force the "Bristol" plunged into the Blackwater about a mile from the enemy rendezvous.

Fighting grimly, his senses reeling and blood streaming from a scalp wound, Hilton won his way from the tangled mass of wreckage to the surface of the water. Knowing that Curtis was beyond human aid, Hilton began swimming, weak and semi-conscious, towards the shore. Hilton ordinarily was what could be termed a good swimmer, but, hampered by his leather flying suit, half-stunned by the crash, and weakened by his frantic struggles and loss of blood, his progress was painfully slow. Presently he found himself wondering if destiny had spared him that awful fusilade of machine-gun bullets only to push him out of the scheme of things under the dark waters of the Blackwater. Thoughts of the game and daring young Australian pilot surged through his brain, and he made frantic efforts to gather his fast slipping senses into something like a normal condition.

Slower and slower grew his strokes—his breath

came in short, painful gasps, and finally he turned himself on his back and floated—abandoning himself to thoughts of "Sparkles," the one girl and woman in the world who had been in his heart and mind ever since his childhood.

Suddenly, his happy dreaming was interrupted—something was bumping and throwing him about in a most annoying way, and, half opening his eyes, he saw a big "cloud" overshadowing him. Slowly, the big black "cloud" enveloped him completely and he lost touch with the war, the world, and even "Sparkles.' The black "cloud" was a patrol-boat—one of the M.L.S.—which had seen the "Bristol" plunge tail first into the Blackwater and had sped to the rescue.

By the time the launch had reached Maldon, Hilton had recovered and given a coherent account of his discoveries and issued instructions to recover the machine and its pilot.

XVIII.

Back in his beloved room at the Admiralty once more, Hilton found himself making feverish plans to pursue the Vorensky "F" ray machine into Germany. Although he had telephoned the most minute instructions to Chatham the moment he landed at Maldon, Hilton knew that the German submarine would be sure to get through, for it would hardly court danger with so precious a cargo aboard—yet, not knowing the submarine's number, it was impossible to tell if it was amongst the almost daily victims of the fearless, hawk-eyed patrol-boats.

That evening he was still worrying over the subject of how to come at grips with the enemy regarding the Vorensky machine—his feeling that a way would soon present itself being somewhat dampened by his impatience at the forced loss of time.

As he was restlessly pacing back and forth in front of his desk, the shrill clamour of the telephone brought him back to a realisation that other matters had not been even glanced at since his return. With a muttered imprecation, Hilton strode swiftly to the desk and picked up the offending instrument and, in a few seconds, the Chief was like a terrier scenting the most hated cat in his particular neighbourhood.

"What d'you say his name is, Commander?" he queried sharply.

"And does he strike you as actually being Flight-Lieutenant Nasmyth?" he asked after a pause.

"H'm; keep him there until I arrive. I'll get a move on right away, and you'd better prepare my special B.E. and have her ready to take off," he slowly added as an afterthought.

Once again Hilton "burned the road" on his way to Croydon Aerodrome. The huge flying ground, which was flooded with light from flares and searchlights, presented a scene of almost Satanic activity. Mechanics darted about like myriads of imps, each band running around and to and from the huge bombing craft which they were "tuning up" for a big raid on the Rhineland cities. An unbroken roar rose from the central flying ground, as, one after another, the engines of the giant aeroplanes were "warmed up" for the long flight ahead.

As Hilton stopped his powerful car at the office, Flight-Commander Newton quickly descended from his "spy hole" in the top of the building.

"The B.E.'s ready, Sir, but I really don't think you ought to take the trip on. Damn it all, Sir, yesterday nearly settled you for good, anyway, I'm very much afraid Nasmyth is **really** mad."

"I'm quite alright, Commander, except for a piece of sticking plaster I'm as good as when poor little Curtis helped me into the 'Bristol.' My God!" he swore, "someone's going to pay dearly for that youngster's fate."

"He'd have achieved something extraordinary if he'd been spared, Sir," commented Newton in grave accents. "You've really no idea of his flying sense. We know quite well, of course, that Australians seem to possess this particular balance and touch to greater degree than usual, but Curtis was—even amongst Australians—a born flyer. I believe I described him to you yesterday morning as a natural 'bird-man.'"

"Yes, I believe you did," muttered Hilton in a faraway voice. "Poor kid—anyway, he didn't suffer any pain—the volley got him breast high. If we hadn't been caught in that dive he would, in all probability, been shielded by the nacelle. However," he concluded grimly, "war is hell, anyway, and I'm going to introduce somebody to the law of the acient Medes and Persians before very long."

The two men remained silent as they climbed the stairs to the "spy hole," from which vantage point the whole field looked like a scene from Dante's "Inferno."

Hilton stood by the window, fascinated by the hive of war-like industry which was going on. Each machine was receiving its deadly cargo of bombs. Some of the smaller 'planes, having their carriers full, had been wheeled to the edge of the field, and the onlooker's gaze was focussed upon a leviathan triplane which was being sent on its first bombing mission.

Suddenly, he heard his name called and, swinging round, saw another aviator was conversing with the Commander of the Aerodrome.

"Commander Hilton, this is Flight-Lieutenant Nasmyth, who was brought down by the enemy some months ago and who shammed madness and eventually escaped from Dortmunchen. He says he has special information which he knows will interest you; he will not tell anyone else because he says they will believe him truly insane, but he thinks you will understand."

"That's very interesting," mused Hilton as he looked steadfastly at the burning eyes of Nasmyth. "What's it all about?"

"They've got a contrivance which will blow up anything, Sir,." said Nasmyth in a loud, rapid voice. "It's at Norderney, where they brought me down, and I heard them talking about it. I know where it is located, Sir, and if you will come I will show the building in which it is."

The fierce, almost inarticulate speech of Nasmyth, his frenzied gestures whilst talking, and his feverish, distended eyes indicated that Newton was not far from the mark when he said that he thought Nasmyth really was mad. Hilton stood for a while studying the man who had escaped from Germany by feigning madness.

Apparently satisfied by his scrutiny, he slowly turned to Newton and drew him to one side.

"Commander Newton, this is a most astounding report. Can you vouch for Flight-Lieutenant Nasmyth? Has he identification papers?"

"Yes, Sir, his papers are all in order, and he seems to be the man whom we knew as Lieutenant Nasmyth —making all allowances, of course, for all he's been through."

"H'm," mused Hilton as he gazed thoughtfully at the tall, cadaverous lieutenant who was already arrayed in flying kit as if he were certain that the projected flight had been sanctioned.

"I rather fancy I'll learn something this time," he muttered. "Fix up the compass detector on the B.E., please. Connect it to the foot-switch, but don't let Nasmyth get wind of what has been done."

Turning to Nasmyth, the Chief spoke in a very level voice: "Do you think you are able to stand the strain of flying to Norderney?"

"Yes, Sir."

"Could you recognise the buildings from the air, d'you think?"

"Positive I could, Sir."

"Right-o, then, we'll pull this trip on. Go and get ready now, we'll start after the other machines have gone, Lieutenant. We'd better leave immediately the triplane gets away."

"Very good, Sir," replied Nasmyth with an automatic salue as he turned to leave.

"By the way, Lieutenant," Hilton called as Nasmyth was at the door. "We'll both have parachutes —just in case of emergencies."

"We shan't need parachutes, Sir," replied Nasmyth with a maniacal laugh. "If we come down its case of finish."

XIX.

It was nearly midnight when the B.E. was finally tuned up and Nasmyth clambered into the cockpit. Before ascending to his position behind the half-mad airman, Hilton handed a piece of paper to Newton, who was standing near to him.

"Carry out those instructions to the letter, and if you don't hear from me by this time to-morrow, tell Lord X what has occurred." he commanded.

"Very good, sir," assented Newton with a salute, "but, I must say that I'm filled with forebodings of disaster."

"Rats, man, I'll be alright. Cheerio!" laughed Hilton as he lifted himself into the rear seat.

As he did so the propellor was swung and the powerful engine picked up immediately. Quickly the B.E. ran across the flying ground, gathered speed as the engine was opened up, and, with a deep-throated, yet perfect roar from her engine, gracefully left the ground and commenced her race towards Norderney. On she droned, the engine beating with a perfect rhythmic tune. On over the Thames, winding like a ghostly ribbon beneath them; on over Bulphan, Laindon and Billericay; on past Battlesbridge, Cold Norton and Roundbush, until, pursuing a direct course, they sighted a big stretch of water.

"The Blackwater!" shouted Nasmyth, turning his head so that Hilton could hear.

Memories of the tragic ending to his search for the enemy wireless station the day before came over Hilton like a flood, and he shivered. Did the submarine cross the North Sea safely after bringing down the "Bristol?" he wondered, and, for the next few moments he dreamily speculated on the possible and probable places on the German coast where the Vorensky "F" ray machine would be landed.

In a little while he perceived, with a faint shock, that they were actually passing right over the old farm-house from the front of which projected that rickety, decayed jetty. Yes, there it was, shining white in the moonlight, with the tiny black dot at the end which marked the place where the engine of the "Bristol" had crashed through the rotten timbers.

"And all that happened only yesterday morning,"' muttered the Chief as he tenderly pressed his flying helmet on the spot which covered the broad pieces of adhesive tape.

As he gazed at the quiet, tree-clustered land beneath him, a pin-point of light attracted his attention. Surely it was near to the jetty, and what on earth could be the reason for such a steadfast light in such a place at this hour of the night?

The longer Hilton looked at that unwavering luminous point, the more he felt sure that, in some way, it was linked with the mystery of the desolate house which had sheltered the enemy wireless installation and which had evident been the hiding place of Vorensky's machine.

Acting under his order, the house had been raided immediately after he had landed at Maldon the morning before, and, after careful search and the destruction of the radio set, the doors and windows had been securely locked and battened.

That the police had left a guard over the place was an idea he dismissed immediately, for to the best of everyone's knowledge there was nothing left to guard. No, the Chief's sixth sense was becoming very active and demanding him to investigate the presence of that "beacon," for such it had now become to Hilton's quick imagination. Possibly it was a leading light to enemy raiders, and was lit every night; perhaps it might even be a means of communicating messages to enemy craft as they flew overhead.

"Dammit, I'll **have** to descend and see, for I won't rest until I do find out what it's there for," muttered Hilton with resignation.

The instant this decision was reluctantly accepted, even as Hilton was preparing to lean towards Nasmyth and instruct him to pick out a respectable landing place, a series of broken, staccato barks announced that "engine trouble"—the very bane of an airman's existence, had set in.

"We'll have to descend and fix the engine before leaving the land, Sir!" yelled Nasmyth.

Hilton nodded his head in agreement, for, daring as he was, he had no desire to attempt to double journey across the North Sea to Norderney and back with a "bad-tempered" engine.

The B.E. whirled round in gradually diminishing circles and was beautifully brought to rest on a large strength of smooth meadow which fronted the moonlit waters of the Blackwater Estuary for a length of nearly half-a-mile.

"I must have known about this place, Sir," bellowed Nasmyth with another of his semi-insane laughs. "Makes a damn good landing place, provided you don't run towards the river."

"Yes," assented Hilton in an abstract voice which told of a jumble of inspirations and deductions which he had not yet been able to arrange with any logical conclusion, fumbling the meanwhile for a cigarette which he had just dropped on the floor of the cockpit.

"I'll have a smoke while you're attending to the engine, Nasmyth; I don't think there is any particular need for secrecy in this isolated part of the world."

"Not a bit, Sir. You may as well enjoy a smoke now for it'll be some hours before you can have another."

Hilton grinned at this gracfious condescension on the part of his very much junior officer, but Nasmyth leapt out of the cockpit and made his way to the recalcitrant motor, chuckling with crazy glee.

XX.

"Would you mind handing me a new plug, Sir, there'll be a box of them kicking round somewhere." Nasmyth's voice came booming through the still air of the night, and Hilton realised with a start that he had almost fallen asleep, while mentally debating the wisdom of searching for the "beacon" he had seen from above. The effects of the disastrous trip in the "Bristol," the soporific influence of night-flying, and the languid, dreamy calmness of the scene before him had proved almost a little much for even "The Chief's" iron constitution and stupendous will.

Rousing himself with an effort, Hilton peered towards the nose of the machine and saw Nasmyth sitting almost astride the engine. As this particular 'bus was known at Croydon as "Hilton's Special," the Chief knew quite well where the spares were located, and, in a few seconds, had clambered to the ground with a box of spark plugs. By stretching to his fullest height—with Nasmyth reaching as far down as possible—Hilton just managed to thrust the box into the latter's outstretched hand. Nasmyth did not, however, obtain a secure grip on the box, and, to the accompaniment of a string of epithets, the lid opened and a shower of spark plugs fell on Hilton.

"Sorry, Sir," laughed the pilot from his perch, as the Chief ducked under the rain of a dozen pieces of porcelain and metal.

"Stay where you are," commanded Hilton as he saw that Nasmyth was about to descend, "I'll find the damn things, although it's going to be a bit of a job finding a dozen spark plugs in this long grass."

"Right-o, Sir, just throw one up to me and I can fix it while you're finding the others."

Hilton picked up one of the shining plugs which he found at his feet and skilfully tossed it into Nasmyth's cupped hands. Then he bent down to recover what plugs he could from the bottom of the long, reed-like grass. Suddenly, a colossal weight descended on his bent back, and he was knocked sprawling to the damp earth, stunned and winded. Before he could gather his scattered senses, a powerful vice-like grip had clutched each of his arms and handcuffed his hands behind his back.

This done, the huge burden on his broad shoulders broke into "crazy" laughter and Hilton knew he had been tricked.

Nasmyth rose and turned Hilton over roughly, and the Chief saw with dismay that two other figures had joined his pilot. One of the two strangers detached himself from the group, and stood looking at the recumbent figure with eyes that sparkled with a glitter of fiendish delight.

"So, Commander Robert Hilton, we meet once again."

"Yes, Von Hagen, I quite expected to, y'know," was Hilton's calm retort.

"Indeed! I'm afraid I don't quite follow you," replied the German with sarcasm.

"Merely that I gave instructions to Castle Donnington that you were to be allowed to 'escape,' was the seemingly bored explanation. "In fact, I supplied the man you changed places with!"

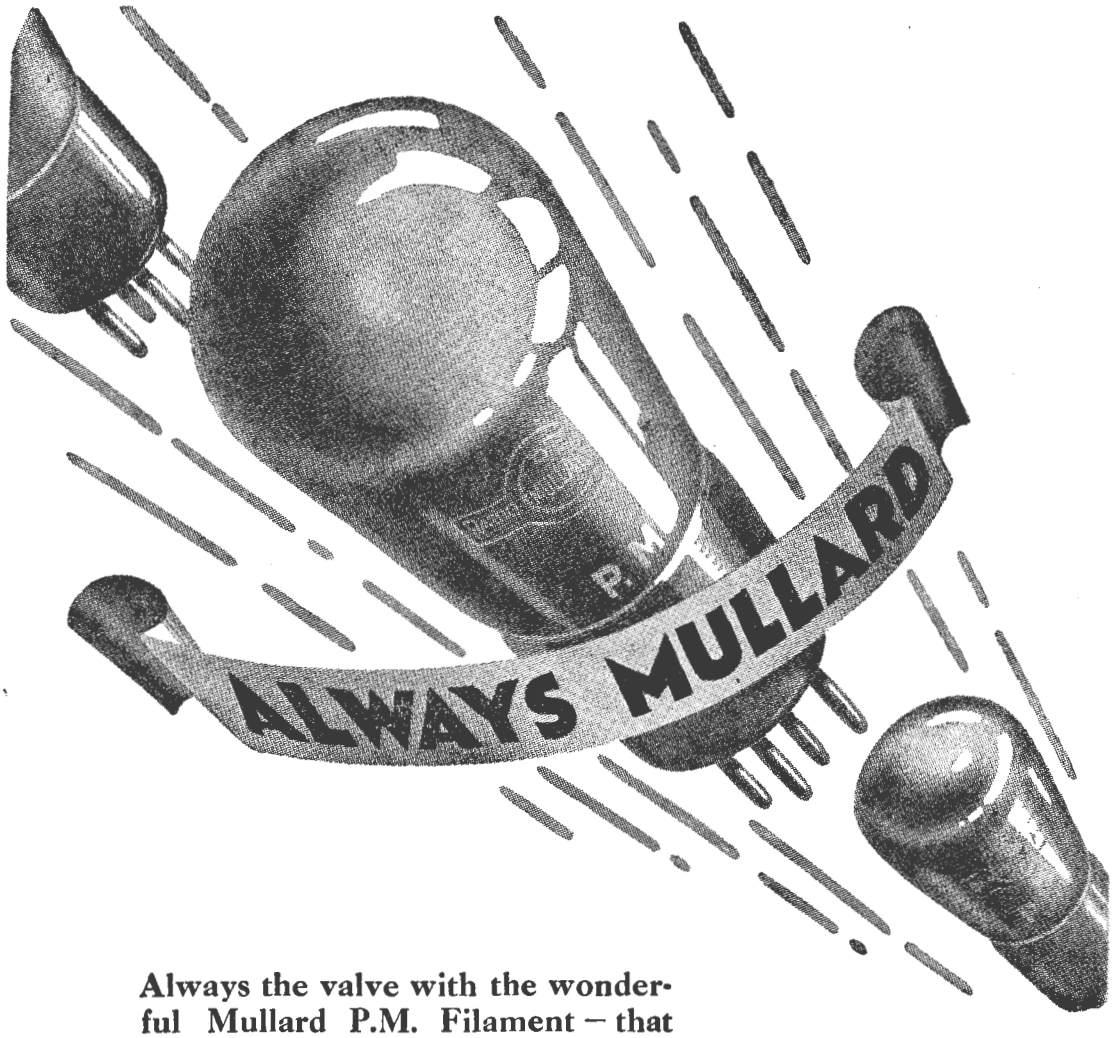
"Well, I'm damned. And what the hell made you do that?" inquired the spy in genuine surprise.

But Hilton vouchsafed no answer.

"You don't like that question, my friend—eh?" Well, shall I answer it for you?"

"Do what the blazes you like," exploded Hilton. "But I would like you to release me from my present position—it's damned uncomfortable."

"Softly, softly," placated Von Hagen with a laugh and a deprecating wave of his hand: "You're too damned slippery to take liberties with, you know,



Always the valve with the wonderful Mullard P.M. Filament — that consumes only 0.075 ampere filament current and that for length of life and purity of reception is unequalled. Always then, the valve for improved radio reception in any receiver. Always Mullard.

Mullard

THE · MASTER · VALVE

I

Commander. But I think, after all, that I have you safely cornered at last. It was a most misguided impulse of generosity on your part to 'allow' me to escape, y'know. So I think I might return it to a small extent, eh? "Franz," he commanded, turning to the figure who had been accepted by the authorities at Croydon as Flight-Lieutenant Nasmyth, "relieve Commander Hilton of any weapons he has, and then release the handcuffs."

This was done, and Hilton staggered to his feet and found himself covered by three menacing revolvers.

"I think it would pay, Von Hagen, to shoot me now, rather than run any more risks. You've certainly got the advantage," he taunted the spy.

"What's that, Hilton, a prophesy, or just a mere invitation?"

"Make what you damn-well please of it. What's our next move? We can't all get in the 'plane, that's one thing," said Hilton as casually as he could, trying to read what was his enemy's intention.

"No, my clever Englishman," cried Von Hagen in derision, "we can't all go—**but you're going.**"

Having delivered his verdict, the spy relapsed into hillarious laughter, and Hilton, knowing now how to play his hand, joined his enemy's good-humour.

"Damn funny, y'know, Von Hagen. Last week you were a prisoner in the Tower of London, through my efforts, and, I suppose, to-morrow you'll put me in Thorn Castle or some equally gay place."

"That will be a question for His Imperial Highness, the Kaiser, to determine, announced Von Hagen arrogantly. "And now I will thank you to follow my good friend, Ober-Lieutenant Franz Wengel into your aeroplane," he continued with a mocking bow.

"But," protested Hilton, "you can't go on just yet —the engine's misfiring badly."

"Not at all, not at all," assured the spy. "The engine only began to 'play up' when Franz had seen and recognised my signal."

"What! that light shining near the old house?" ejaculated Hilton.

"Precisely," replied Von Hagen complacently.

Wengel, erstwhile Nasmyth, had seated himself once more in the machine, and Von Hagen, prodding Hilton in the ribs with his revolver, motioned him to follow.

The third man, who had not yet spoken, nor been addressed, also had Hilton covered. Realising that no good could eventuate from a struggle under these conditions Hilton turned and climbed to the seat behind the pilot, who immediately placed a revolver at the Chief's breast and commanded him to raise his hands above his head. In this strained position Hilton remained until Von Hagen also wedged himself into position in the rear seat.

"That will do, Franz, I will look after our prisoner now," cried Hilton's captor with satisfaction. "Otto," he commanded, "spin the propellor, and when we are away, return home and inform Dr. Vander Koen that I am on my way."

"Very good, your excellency," replied the third man, who hastened to do his superior officer"s bidding.

Soon the B.E. was gliding along the river bank and, with a graceful lift, cleared a clump of trees and headed in the direction of Germany.

"Well, my friend," chided Von Hagen above the roar of the engine, "what violent agitation is going on now in that thick head of yours?"

"I was just marvelling at the most complete manner in which you have organised this pretty little incident," replied Hilton flatteringly.

"Yes," conceded the German with smug satisfaction, "I don't leave many openings for you to turn the tables, but I'm still intrigued to know your real reason for conniving at my escape from Castle Donnington?"

"You know as well as I do," was Hilton's gruff reply.

"Yes, I think so. You went to Fenchurch Street Station and found that the Vorensky "F" ray machine had disappeared. Then you went to Dr. Vander Koen's address and found that he had also disappeared. I must say, though, you nearly found out something when you came flying over this part of your country the other morning. You came just as Vander Koen himself was carrying the model on board the U.C.75."

"The what?" interjected Hilton in a hard, cold voice—the memory of the incident making him very savage.

"The U.C.75," repeated Von Hagen concisely. "Why?"

"Oh, nothing," parried Hilton in a nonchalant tone, "only that is the submarine which brought me down and killed my pilot."

Von Hagen threw back his head and laughed, but never shifted his gun from Hilton's side."

"Yes! you nearly caught it in the neck, didn't you?" he boasted.

Hilton felt the savage instinct for fight rising within him. Why not risk the revolver and pit himself, barehanded, against the callous, inhuman spy?—Wengel couldn't be called upon for much help as he had the machine to pilot. These thoughts demanded the full strength of Hilton's will to resist, and, biting his lip, he remained resolutely silent.

"Really, y'know," vouchsafed Von Hagen, in a burst of confidence, "I should have been most annoyed had you been shot or drowned—I want you kept alive."

"Why?"

"Because I have a wager that I shall deliver you in Berlin as my prisoner, and so that I can show my countrymen that I'm just a bit cleverer than the "cleverest man in the British Navy," replied Von Hagen with a snarl. "Now you know."

"Yes now I know," reiterated Hilton as he again relapsed into silence.

XXI.

Mile after mile the B.E. sped on without any word being spoken, and, at last to Hilton's intense relief, at delight a slight fog was encounted, which, while not obscuring the surface of the sea from the flyers, greatly reduced their horizon.

What on earth is the speed of this old contraption of yours capable of, Hilton?" demanded Von Hagen with insolent irritation, "We ought to be sighting something soon."

"She does sixty," Hilton calmly informed him," and I'm positive you'll get your wish to sight something soon."

"What the hell do you mean, you impudent English swine?" growled the spy.

"Nothing—nothing at all," returned the other. I'm as fed up with this game as you are."

"Then keep your filthy mouth shut.—Remember you are my prisoner."

Suddenly Von Hagen gave a muttered oath, a British destroyer had appeared out of the mist and was heading directly towards the B.E.

"One of your cursed, blasted, sea-lice, Hilton. Attract their attention as we pass" he taunted, "Go on—go on I tell you— my finger's itching to fill you with lead."

The German had worked himself up to such a pitch of frenzy and hatred that Hilton was apprehensive that he would lose control over the finger which rested on the trigger of his revolver.

"They're signalling us to stop," yelled Wengel over his shoulder to Von Hagen, who looked over the edge of the cockpit to see what the vindictively hated British vessel was doing.

This was the one chance that Hilton had been compelled to leave on the knees of the Gods when had laid his own meticulous plans— and he took it. Grabbing Von Hagen's revolver hand in a vice-like grip, he swung a smashing blow at the spy's face. As he did so, Wengel took his left hand from the joy-stick and attempted to draw his gun, but, before he could turn, Hilton had wrenched Von Hagen's revolver out of the dazed spy's hand and dealt the pilot a stunning blow on the temple.

"I hope you'll enjoy the 'crash" of the B.E. 10 you insufferable dog," barked Hilton to Von Hagen as he shook his parachute free and leapt outwards.

XXII.

The B.E. struck the sea with a terrific impact, but the Commander of the British destroyer paid no heed to it until he had picked up the dripping figure which had leaped into the air.

"Jolly close go, Sir," said the young navigator grinning all over his brown, salt-stung face. "I've been doing thirty-five for the last three hours over the given course—thought I'd missed you."

"Yes," panted Hilton, "I begun to be afraid I hadn't put enough false swing on the compass—I had to guess it in the darkness when I 'accidently' dropped my cigarette—and, of course, there was a delay which I didn't in the least anticipate. However, let's pick up those two poor devils out there. I had to knock the pilot on the head to get away with a whole skin, but, the rats, they deserved it—every bit of it—'an eye for an eye' you know sonny."

"Yes, Sir," cheerfully agreed the sunny-faced youngster. "I bet they did deserve it and more."

The destroyer slowly swung round and headed for the tangled mass of wreckage which was all that was to be seen of the B.E.10, but when the destroyer was yet about half-a-mile distant, the tangled mass of fabric, wire and metal slowly sank into the water and disappeared from sight.

When the warship reached the scene of the crash, all that the straining eyes of those on deck could see was a few stray pieces of canvas and one or two fragments of broken wood.

For over half-an-hour she cruised round at slow speed, but no sign of the two Germans could be seen.

"War certainly **is** hell, son," said Hilton quietly. "But if you don't get your enemy he'll get you—that's all. By the way, were there any survivors from the submarine you rammed three days ago?"

"The U.C.75, Sir? Not a soul. One of her lifeboats and our dented bows comprise all the evidence we have.

THE END.

Now comes ATWATER-KENT Electric Radio

Atwater-Kent announces two electric models of a dependability, of a beauty, and with a tone quality that have no peer in the whole world.

The Model 42 is a six-valve single-dial electric receiver offering wonderful results at a price that is at once attractive.

The Model 44—a seven-valve electric receiver that has set the whole world talking. Complete reviews and particulars will appear in next months' "Queensland Radio News." In the meantime inspection of the sample models at our showrooms is invited.

The Model 33

6 Valve Receiver

The Model 33 Six-Valve Receivers—battery operated—is one designed for use in remote localities or in a large city. It is extremely selective, remarkably sensitive, and the Acme of engineering design and workmanship.

Easy to Carry

Being compact, they can be carried in a suitable travelling case, which is a big factor should it be necessary to take the set from place to place.

Have You Heard REAL Radio Yet?

Model 33 One Dial Six Valve Receiver

ATWATER KENT

Re-creates Music & Speech

HEAR IT!

Six and Seven Valve ONE Dial Receivers, £25/10/- to £37/10/-, *without* valves or equipment. Radio speakers, £3/15/-, £4/10/- and £8/15/- (New Model E). Complete outfits from £43/10/-, also Console and Writing Desk models.

Satisfaction One of the HEALING Quality Products Guaranteed

SEND FOR FREE LITERATURE

H6

£49/10/0

Price complete with Standard Equipment, including Model H. Speaker.

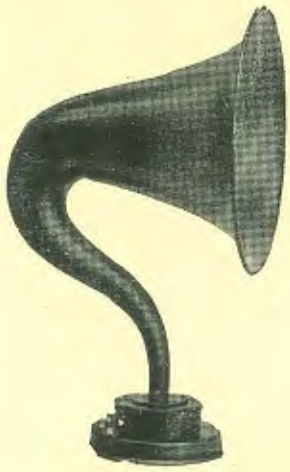
WIRELESS HOUSE LTD.

City Buildings, Edward Street, BRISBANE

To Radio Dealers--

AMPLION

Write us for Particulars of Liberal Discounts



BROWN

This is a List of Wireless Necessaries it will pay you to stock

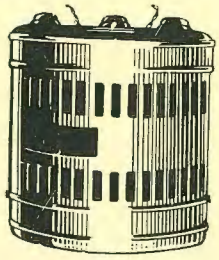
Brown and Amplion Speakers ~ Headphones

Philips Valves, Eliminators, Battery Chargers Etc.

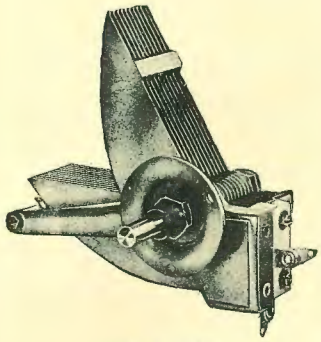
Oldham Accumulators

Columbia Batteries

Igranic & Igranic-Pacent Components



PHILIPS



IGRANIC

Noyes Bros. (Sydney) Ltd.

PERRY HOUSE BRISBANE

If you haven't A GOOD RADIO half the world is passing you by

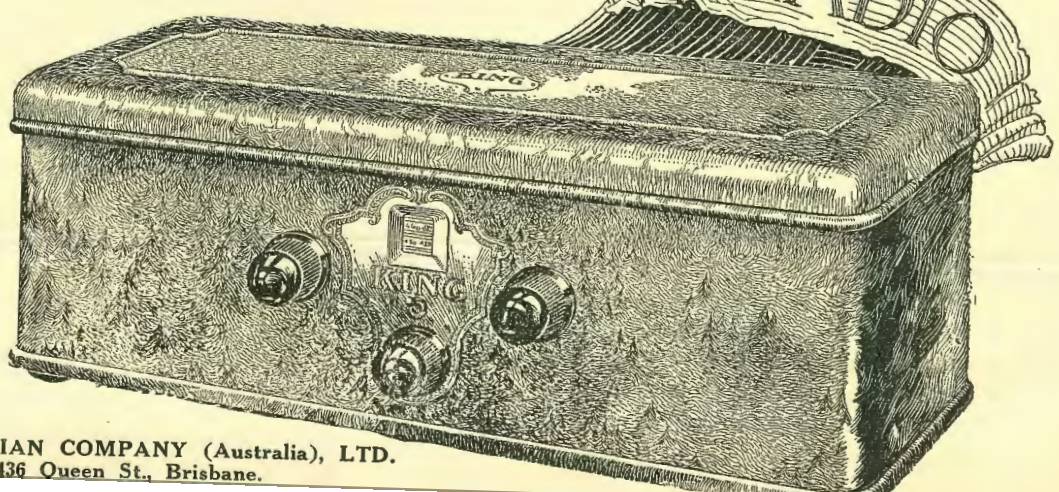
There is a New King Neutrodyne 6-Valve 1929 Model just out—they are marvellous distance-getters and capable of good volume. Fully shielded—the four condensers by the simple tuning of the single dial, give you a new conception of radio—Melbourne, Brisbane, Adelaide, Sydney, Auckland, and a host of others, all boom in, tone perfect unspoilt by "squeals" or "howls."

Model "G" without accessories **£24**

The very latest King Neutrodyne 5-valve is an economical set for home entertainment, giving a high quality of reception. This handsome, compact set is fully shielded. To know positively that you can bring in the distant stations by merely turning the single control, is what the radio user wants—with no guesswork —no experimenting—no "fishing around."

Model "F" without accessories **£19**

AEOLIAN



THE AEOLIAN COMPANY (Australia), LTD.
436 Queen St., Brisbane.

Something About SINGLE CONTROL

Some of the Advantages and Disadvantages of Unified Control—Analysing the Single-Control Receiver—Why Synchronism of Circuits is Complicated

By EDGAR FELIX.

SIMPLIFIED tuning is only one of the important advantages gained by the simultaneous adjustment of circuits by means of a single control. It is a most important advantage to the inexperienced, but even the most skilled dial twirler soon finds desirable qualities in a real one-control receiver. For example, the attainment of true single-control makes it possible to sample all the available programmes throughout the frequency range in a brief time, thereby increasing the entertainment value of the receiver. Furthermore, appearance, in the opinion of many, is improved by the reduced number of controls.

One conspicuous knob plus several small ones, however, does not necessarily make a true single-control set. There are many pseudo-single-control sets, parading as one-dial receivers, which may possess several, but not all, of the advantages of unified control. A true single-control receiver should have only one tuning dial, and this should maintain each tuned radio-frequency stage and the detector circuit in perfect resonance without requiring the use of supplementary vernier adjustment. A compensating aerial circuit adjustment, which requires setting only once when the receiver is installed, does not disqualify a set from the single-control classification. If, however, such an adjustment must be used each time the listener diverts his attention from the lower to the higher wavelengths, or vice versa, the receiver in which it is incorporated is not a genuine single-control receiver, but a two-control receiver.

All single-control receivers employing more than one tuned circuit so far devised, use gang condensers mechanically coupled, a system thoroughly covered and controlled under the Hogan patents. The license fees charged under these patents are so moderate, however, that evasion has been practised only in a few instances, and the development of single-control sets has not been hampered by costly patent litigation.

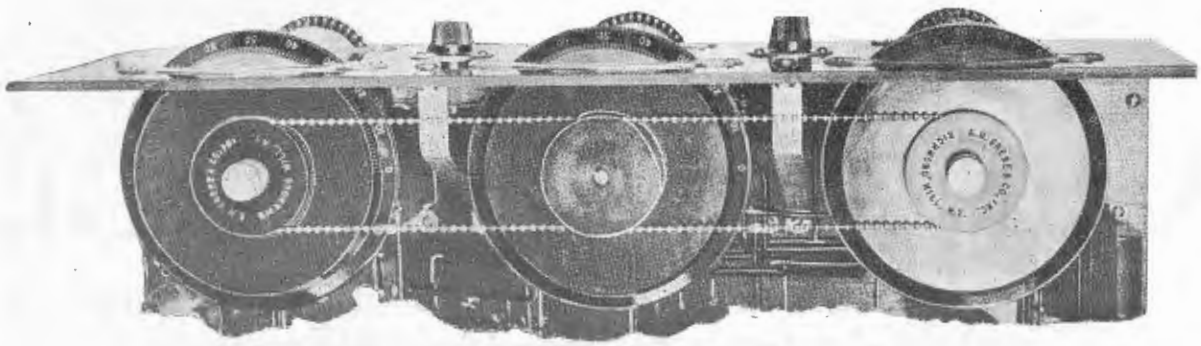
When seeking to judge the desirability of a single-control receiver, the first discrimination to be made is as to whether the set under consideration is really a true single-control set. Auxiliary controls are often concealed or camouflaged in order to give the impression that the receiver is tuned by only one manipulation while, in practise, each of these extra controls may require careful adjustment to tune-in a desired station. Even so, a receiver of such design may possess important advantages over the usual two- or three-dial receiver, provided there is only **one** adjustment of the main tuning dial which brings in each station.

In examining a receiver, therefore, observe every control upon it, no matter how it is labelled. A true single-control set has but two adjustable dials, i.e., the tuning control and the volume control. In addition, there may be an "on-off" switch in the filament circuit. Any additional verniers, "fine tuning" controls, or compensators take the receiver out of the single-control classification.

The use of vernier controls to correct deviations from exact synchronism among several circuits greatly reduces the cost of manufacture, because close accuracy in making inductances and capacities is thereby dispensed with. If simplicity of control is the objective in purchasing a receiver, too great dependence upon vernier adjustments may defeat the buyer's purpose. On the other hand, a well-designed receiver, in spite of verniers, can be a convenience, although their use should be reflected in lower cost of the receiver.

The writer has seen receivers upon which stations may be tuned-in in any position over a span of ten degrees of the main dial by correct manipulation of the verniers, thereby eliminating ease of adjustment, the most desirable quality of the single-control set. On the other hand, other receivers, although requiring vernier adjustments, can be properly tuned to a station at only one certain position of the main tuning control. Such receivers are frequently more convenient to tune than two- or three-dial sets.

Having determined whether the receiver is a true one-control set, or one equipped with verniers but so designed that only one adjustment of the main dial brings in any desired station, the efficiency of the mechanical coupling between the tuning elements should be tested. If there is back-lash, slip, or play in gears, the user can never be certain that his tuning circuits are in complete resonance.



Simultaneous tuning of circuits by means of a chain and pulley system.

To test the efficiency of the mechanical coupling of tuning elements, select a fairly weak station and tune to it accurately. Note the exact setting of the main dial. Turn the control to the opposite end of the scale and then restore it to precisely its original position. If the weak station is again heard to full volume, the mechanical construction is probably satisfactory. On the other hand, if the station is now found two or three degrees above or below the original setting, play and back-lash are likely to introduce tuning complications.

Some receivers depend upon the friction of adjacent knurled knobs, which may be adjusted separately or operated in unison by one hand at will, thereby attaining the single-control ideal. With such a device, the user has choice of complete control over each individual circuit as well as unified control over them all. The convenience of this type depends chiefly upon how closely the circuits are synchronised throughout the scale, once the correct inter-relation between the adjacent knurled knobs has been determined.

The degree of synchronism attained throughout the dial scale with the knurled knob arrangement is easily ascertained. Tune-in a station at the low end of the scale, making fine adjustment of each of the knurled knobs separately. Next tune-in a station preferably of moderate volume at the high end of the scale, by turning the knurled knobs as a group, being careful as you do so not to change the relation between the knurled controls. Having thus tuned-in a station as well as possible, note the volume carefully. Then adjust each circuit separately, noting whether adjustment of the individual circuits is required to secure accurate resonance. If the same relationship between the several knurled knobs which establishes resonance at one end of the dial scale holds for the other, the set is, in effect, a single-control one. On the other hand, if a new relationship between the various knurled knobs is required at different points along the dials, the set may be considered as having as many controls as there are knobs. Then the only gain by the knurled knob over the ordinary dial is in appearance, and in the ease with which it is adjusted by one hand. There are several makes of receivers employing adjacent knurled knobs for control which, when correctly adjusted with respect to each other, can thereafter be operated as a single control. Such receivers represent the last word in convenience and attain simplicity of control without sacrifice in efficiency.

Complications of Single Control.

The relative cost of obtaining exact synchronism of circuits manipulated by a single control depends on the sharpness of tuning attained for each individual circuit. With radio-frequency amplifiers of high gain and good sharpness of tuning, true single control is rather difficult to secure inexpensively without the aid of verniers. It is a question of precision manufacture, engineering tests, and painstaking design, all of which are naturally reflected in the cost of the receiver. If, at any point along the dial scale, one circuit falls slightly out of step, quality is seriously affected unless the set is fairly broad in its tuning.

There are a number of possible compromises involved in the design of a single-control receiver which account for the wide range in their prices. If quality of reproduction is sacrificed, great sensitiveness and selectivity may be secured at relatively low cost. If on the other hand, sharpness of tuning is sacrificed, a high standard of tonal quality without excessive cost is attainable. If high efficiency, high gain, perfect synchronism, and good quality of reproduction are combined without appreciable sacrifice of any of these qualities, such accuracy in design and manufacture requires that the cost of the set be necessarily high.

Eliminating the most expensive types, which have true single control, sensitiveness, selectivity, and good quality, how may we judge and balance all these diverse qualities in order to make the wisest purchase? To repeat: sensitivity, selectivity, or quality must be sacrificed to secure low cost. Obviously the most desirable sacrifice is not quality of reproduction, but sensitiveness or selectivity. By choosing a receiver, admittedly a little broad in tuning, you may have single-control simplicity, good quality, and satisfactory volume from local stations at reasonable cost. If troubled by local interference, changes in the aerial installation often minimise the difficulty. A long aerial brings in considerable energy from nearby stations and therefore broadens tuning. By shortening the aerial selectivity may be increased to a point where interference troubles are minimised. Shortening the aerial reduces sensitiveness as the penalty for improving selectivity.

Another, and probably a more satisfactory method, of attaining selectivity with an inherently broad tuning receiver is to use it in conjunction with some type of wave trap or wave filter. These useful instruments usually are connected in the aerial circuit be-

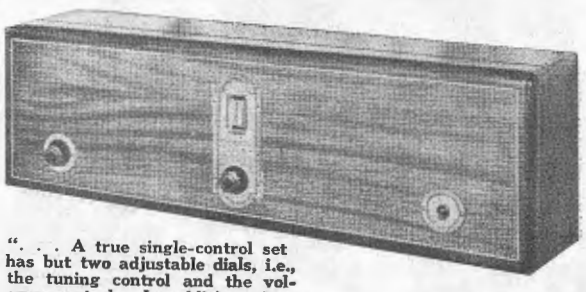
tween the aerial wire and the aerial terminal of the set, their duty being to prohibit the entry of the particular wavelength to which they are tuned. In practise, the receiver is tuned so that the station which it is desired to eliminate is received at moderate volume. The trap is then connected and its dial rotated slowly until the station is eliminated or is at minimum strength. After that, the receiver may be tuned in the usual way to the distant stations, and the trap may be ignored. Provided that only one station is causing interference, a good wavetrap provides a very pleasing solution to the problem of attaining selectivity—or rather, a condition approximating it— at low cost. Best of all, such a system has absolutely no deleterious effect on tone quality, and practically none on volume.

For the long-distance enthusiast who desires single-control simplicity, sensitiveness, and low cost, there are a number of receivers which, in a measure, attain all of these qualities by introducing regeneration in the radio-frequency circuits. Such receivers usually have a volume control, which, when turned towards maximum, sets the receiver into oscillation throughout the tuning scale, or perhaps does so only at the lower wavelengths. These are often radiating receivers of the most pernicious type, feeding oscillations directly into the aerial circuit. Such receivers may be recognised not by the fact that they flop into vigorous oscillation at the low wavelengths, and give a piercing whistle as the dial setting for a station is passed, but also by the fact that stations are often heard at two or three closely adjacent points on the dials. A circuit closely approaching the regeneration point must be tuned with the utmost accuracy, a degree of accuracy almost unattained by any but the most precise of single-controlled receivers. Therefore, with single-control near-regenerative sets, stations are frequently heard at each point that the individual stages are precisely in tune with the incoming signal. Such single-control near-regenerative receivers receive from long distances on the shorter waves, annoy the neighbours for miles around, and give good quality only with high-power local stations.

The better single-control receivers are absolutely non-regenerative. It must be realised that the absence of a tickler or regenerative adjustment is in no wise an indication that the receiver is not regenerative, nor need there be a plate coil feedback inductance or capacity or any other physical evidence of a regenerative circuit. The mere presence of a vacuum valve with elements having electrostatic capacity offers the foundations for a regenerative system. Whether this is avoided by neutralisation or by the introduction of losses through counter-couplings or weak couplings is not obvious from any external inspection. Hence the real proof is an actual test of the receiver, particularly at the low wavelengths, where regenerative effects are most likely to be strongly manifest.

The high-grade, single-control receiver, which is well engineered through effective shielding and correct neutralisation of regenerative effects, tunes sharply at both ends of the scale. The stations fall in and out of resonance like a parade as you go up and down the dial scale, with volume proportionate to their incoming signal strength. Such sets represent the last word in efficiency and simplicity of control —the product of precision manufacture and sound engineering. Many such receivers are equipped with three and even four stages of radio-frequency amplification.

An effective compromise in the attainment of convenient control without excessive cost is by the use of two controls, designed to operate as one, once their relative settings are fixed. Concentric or adjacent knurled knobs coupled by friction are used for this purpose. These are turned naturally as one, unless the user particularly desires to change their relative adjustment. Usually two controls are used in this way with receivers employing a separately tuned aerial circuit and unified control for the remaining stages of the radio-frequency amplifier. In this case, the input stage is made one of high gain, giving the receiver considerably greater sensitiveness. Different aerials have varying inductance, capacity, and resistance, and these factors affect the correct adjustment of the input circuit, making dual tuning necessary.

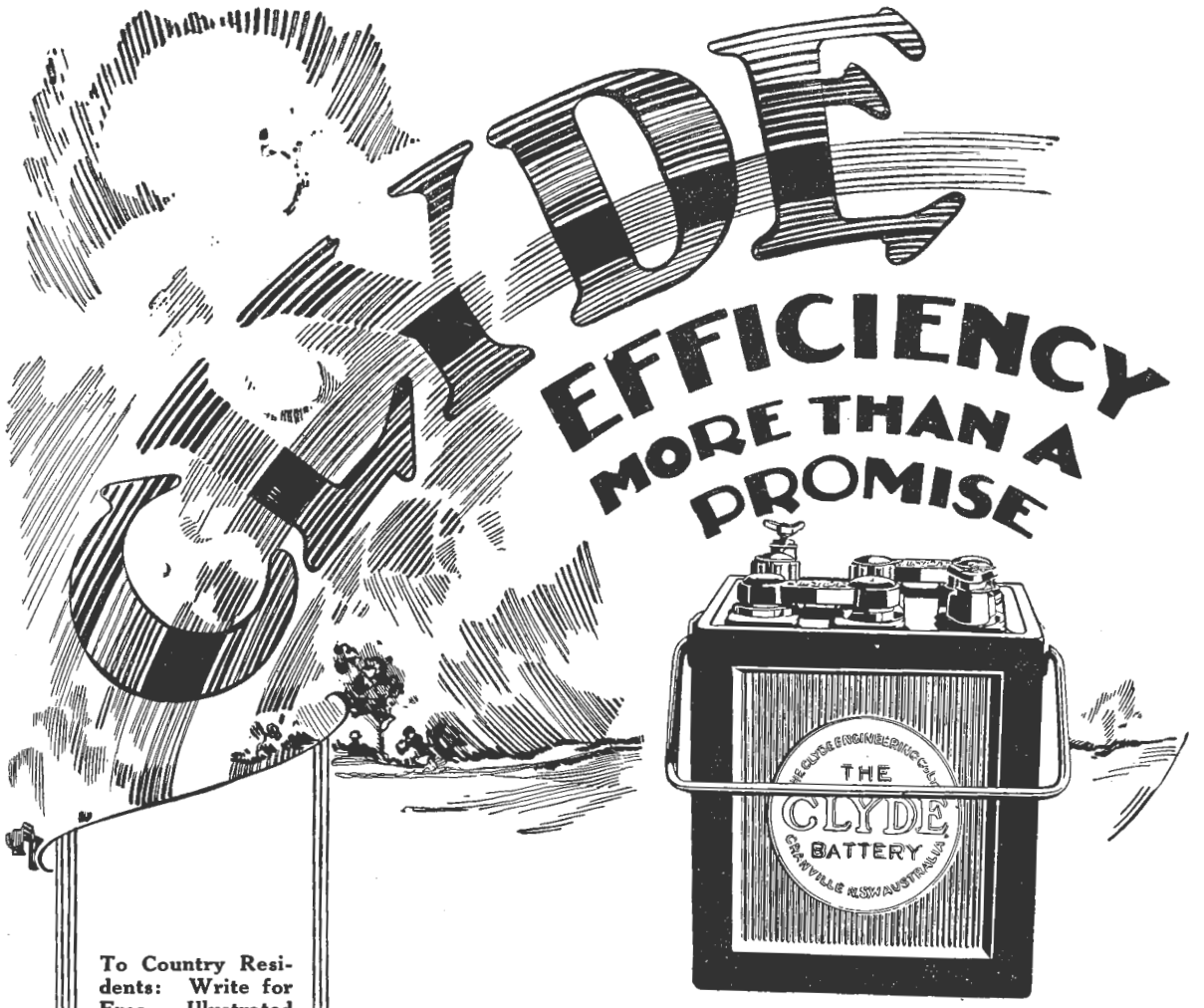


". . . A true single-control set has but two adjustable dials, i.e., the tuning control and the volume control. In addition, there may be an "on-off" switch in the filament circuit."

The difficulties of varying aerial constants may be obviated by using a loop designed as a part of the set, thus making dual control unnecessary. Other sets are designed for use with a very small aerial, or a large aerial in series with a small capacity, and the various circuits accordingly matched to meet such conditions.

Another method of attaining true single control, is to employ the input stage merely as a collector of aerial energy, without causing it to contribute any great amplification. The input stage is then untuned, a resistance or choke being used across the valve, through which the incoming signals are impressed upon its filament and grid. The remaining circuits all being fed from the plate circuit of a preceding valve, are easily synchronised without any great manufacturing difficulties. Although contributing little or no amplification, the first valve introduces its share of valve noises and does not materially improve selectivity, a serious disadvantage if there is an excessively strong nearby signal. Considering the low cost of valves, an inefficient stage is not a great disadvantage from an economy standpoint, particularly as it makes possible single-control simplicity. On the other hand, it brings out the fallacy of rating a receiver's power by the number of valves. The real criterion, by number of valves, is dependent upon the number of stages of high-gain tuned radio-frequency amplification with which the receiver is equipped.

By this time, the reader will appreciate that judging a single-control receiver lends itself to no simple diagnosis. It is better to thrust aside all considerations of design, unless a most detailed study is made, in favour of a few simple observations and performance tests.



To Country Residents: Write for Free Illustrated Booklet describing Clyde Home Lighting Batteries.

Clyde Batteries are made by The Clyde Engineering Co., Ltd., largest Storage Battery manufacturers in Australia. Obtainable at all radio dealers and garages.

That Clyde efficiency is more than a promise is amply demonstrated by the satisfactory results of thousands of Clyde Battery users all over Australia.

Hard rubber, non-leakable cases, extra solid lead plates, and impervious wooden separators are built into every Clyde.

Clyde has just opened a Brisbane Branch at 115 C.E.Y. Buildings, corner Albert and Charlotte Streets. Expert attention to all Clyde Battery requirements.

"More Power to You"

FOR CARS—RADIO & HOME LIGHTING

The Power Buzzer

In our September issue we published a letter from Mr. W. Barber, of Beerburrum, referring to the "Power Buzzer," a type of low-power transmitter used extensively during the Great War. In reply to our request for information on this subject, we have received the following letter from Mr. R. J. Browne (4RB), the well-known transmitting amateur. Mr. Browne describes the Power Buzzer very clearly, and his explanation will, we feel sure, be read with interest by a large number of our readers.—Ed.

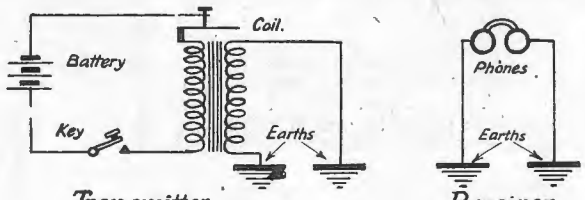
Church St., Toowong, 16th Oct., 1928.

(To the Editor "Q.R.N.").

Dear Sir,—Regarding the signalling instrument, "The Power Buzzer," mentioned by Mr. W. Barber, of Beerburrum, in your September issue, I think I am able to supply a description of this instrument.

The idea, I believe, was originally captured from "Friend Fritz" during the early stages of the war, and was later improved upon and used to some extent by our British Infantry and Artillery.

The original arrangement was very simple, the transmitter consisting of an induction coil with each secondary terminal connected to a separate "earth," the two "earths" being spaced a few feet from each other; and the receiver, a pair of sensitive headphones with each terminal connected, also to separate "earths." The circuit diagram will explain things a little better.



Transmitter. *Receiver.*

The theory of the instrument is that audio-frequency currents set up across the two transmitter earths are radiated over the surface of the ground in much the same manner as radio waves are radiated through the atmosphere but, being at audio-frequency, they are picked up without any tuning or rectifying devices. The two values mentioned by your correspondent were probably audio-amplifiers and the number of earth pegs were only a combination forming two actual "earths," a number being used to make better electrical contact with the ground.

After seeing a circuit diagram of this instrument in an American science magazine in 1922, I made several tests with an improvised outfit using a medical shocking coil for a transmitter, and establishing a "receiving station" at a garden tap about 100 yards away. Besides the home-made signals being fairly strong, telephone conversation could also be plainly heard, and as the variety of programmes on the air in those days was limited to morse code from spark stations and an occasional concert from the Wireless Institute, one got quite a "kick" out of listening to other people's joys and sorrows and many other conversations which I blush to recall to memory. It was discovered that the cause of the telephone cross-talks breaking into my experiments was due to a defective telephone cable in the conduit under which the water-pipe (to which one terminal of the headphones was connected) ran for some distance. This state of affairs (to my dismay!) was later effectively remedied by the P.M.G.'s Department.

I have never yet seen any reference to this mode of wireless signalling in any other radio magazine, and I think I am also expressing the wishes of the majority of readers when I ask Mr. Barber, or any other late A.I.F. "Sigs." men, if he, or they, could recall sufficient data such as the normal and exceptional range of the "Power Buzzer" and the conditions under which it was worked, etc., so as to make an interesting "write-up."—Yours faithfully,

R. J. BROWNE, 4RB.

Pass the Word Along!

IF you think the "Q.R.N." is worth buying, pass the word along to any of your friends who may not be reading it. Its circulation is increasing, not only in Queensland, but in all Eastern Australian States with great rapidity, mainly through the recommendations of readers to non-readers. Will you do likewise?

THANKS!

The Transmitting License

(By Q.R.N.)

Article No. II.—Continuing a Discussion on the Morse Code, Alphabet, and Punctuation, etc.

MOST of the signals described in last issue have an obvious application and need no explanation. Such however as are not quite plain to the novice will be covered by this and the following articles.

First of the signals requiring explanation is the distress call (...———...). Most people know when the signal is made, but comparatively few know how. The signal, correctly made, is transmitted at the rate of about five words per minute; that is, about eight repetitions of the S.O.S. Similarly, ships responding to such a distress signal also transmit S.O.S. slowly if such signal should form part of their reply. The first S.O.S. call originated from the distressed vessel is transmitted for one minute. The distress call has absolute priority over all other traffic, and all stations within range must immediately suspend transmission on hearing the S.O.S. Unless the calling station mentions any particular ship after sending S.O.S., all vessels within range are bound to render assistance. Mention of any particular ship places the onus on that ship to respond, unless, after a reasonable time, the vessel called does not reply, in which case any other vessel must enter into communication. The responding stations must take every care to avoid jamming of signals. Supplementary regulations approved by the London Radiotelegraph Convention lay down that all ships must stop transmission at 15 and 45 minutes past each hour G.M.T., and listen in for three minutes on the 600-metre wave for distress calls and the danger signal.

The danger signal (———TTT) is transmitted slowly ten times on full power, and is used as a warning that information dealing with the safety of navigation is to be transmitted. The message is transmitted one minute after the last TTT, and is repeated three times at intervals of ten minutes. Such signals usually deal with derelicts, cyclones, change of landmarks, etc. Stations hearing TTT must immediately suspend all communication (except such dealing with messages of distress) to ensure the success reception of the TTT information.

The Admiralty signal (—..—..—..— XIX) is the warning signal used to indicate that a British war vessel or R.A.F. aircraft wishes to pass official traffic through a British coast station. On hearing the call the coast station must cease all traffic (except communication dealing with an S.O.S. call) and take the messages offering from the warship or aeroplane. Similarly all nearby stations must suspend traffic so far as is necessary to ensure the due reception of the messages by the coast station called.

The High Power warning signal (——..——MIM) is used to give notice that the calling station is about to increase its power (eg. to communicate with some station outside its normal range). The signal is sent three times on the station's normal power and the high-powered transmission commences thirty seconds later.

Amongst the other signals, the double dash, or break sign (—...—) is used, as indicated, to separate the various parts of a radiotelegram. The end of transmission signal (.—.—.) indicates the close of one particular message, but not the end of all communication, which is indicated by the end of work signal (...—.—). This latter signal indicates that all traffic between the two stations concerned has been finally dealt with. The preliminary call signal (—.—.—) precedes all transmission and is, in fact, the first signal sent by any station.

Now we shall consider the international abbreviations, known as the Q-signals.

As the name indicates, these signals are abbreciations intended to shorten the traffic between two stations. All of the signals are of three letters, and, with one solitary exception, all commence with the letter Q. In use, each Q-signal is transmitted twice or three times for the sake of definitely certain reception. The length of the list of Q-signals is slowly increasing. Formerly it used to end with QSZ. Nowadays, since the advent of direction finding stations, the list has grown to QTG. Then, too, the radio amateurs of the world have taken the official list of international abbreviations into their own domain, and have added one or two abbreviation of their own to express shades of opinion not exactly given by the official list of signals. The complete list of these abbreviations was printed on pages 56 and 57 of the September issue of "The Queensland Radio News," and in every case the correct official meaning is shown against each signal. Candidates for the A.O.P.C. are warned to learn the meanings exactly as given as, for examination purposes, the correct answer, and not the nearly correct answer, is required. Many radio journals have, from time to time, published a list of these abbreviations, but from considerations of space have not published the exact meanings. For example, QSD has often been published as "What is the time?"—Now look at the correct meaning as shown in the list. To say that QSD means "What is the time?" is to put she matter very loosely. Similarly amateurs working on old lists will find other points of dissimilarity between their copies and the official list given. Let is be once more urged upon intending examinees to thoroughly learn their list. It is not harder to learn anything correctly than incorrectly.

The present list—which, it should be noted, is to be superseded by a new one after the end of this year—contains 53 abbreviations which, after all, are not too many for a keen amateur to tackle. The actual A.O.P.C. examination will only demand such abbreviation as are likely to be used in amateur signalling. Such signals as QTE, PRB, and the like cannot by any stretch of imagination be regarded as falling within this category, but all the same, it is very nearly as easy to learn the whole list as to learn part of it, and once thoroughly learned, it will stick in the memory with the tenacity of seccotine.

Now, let us give further consideration to the various abbreviations. The point may arise in a novice's mind: How is one to know that the question is meant when an abbreviation is transmitted and not the answer? The reply is this: After every abbreviation, if the question is meant, the signal (..——..) IMI (question) is added. Take an example: A transmitting station, signalling QTC IMI, or in another form QTC? is seeking information, that is, is asking another station whether this second station has messages for the first. If the second station has messages for the first it replies QTC, not followed by the sign of interrogation IMI). If there is no traffic to transmit, the second station gives the sign QRU still without the IMI. Now, is that clear? Not? Well, let us imagine a conversation between two amateurs. Say their calls are 2CQ and 4CQ—one being in Sydney and the other in Brisbane. 2CQ may have trouble in hearing 4CQ and so transmits to him the QRZ, meaning "Your signals are weak." Also, 2CQ is being interfered with by some local howler, so, after sending QRZ, he adds QRM, meaning "I am being interfered with." 4CQ, in Brisbane, receives QRZ QRM from 2CQ, and comes back with, possibly, QRK, "I am receiving well." But it is necessary to render some assistance to 2CQ, so 4CQ suggests QSY? 32 which 2CQ will read as an invitation to change his wavelength to the 32-metre band to see if the signals are more satisfactory there. Note that when a question is being asked by means of the Q-signals, the mark of interrogation (..——..) must be signalled after the sign.

The signal PRB takes one back to the times before wireless was in common use, when the only means of inter-ship communication was by means of flags. Various combinations of letters in the flag-alphabet conveyed various phrases. Nowadays messages may still be coded in this international flag code and transmitted over the ether! For such messages the signal PRB is used.

QSJ also needs a little explanation. It is used when a ship or coast station is not familiar with the land line charges of the telegraph system (in the country in which is situated the station, of which the enquiry is being made, such knowledge being, of course, essential in order that a correct charge may be made against the originator of the message. To overcome the difficulty the ship operator asks the local coast station QSJ? which is translated as a request for information as to tariff rates to a certain specified destination. Thus a foreign ship unacquainted with the Australian postal and telegraph regulations may call up VIB (Brisbane Radio) and ask the land line rate per word to Charleville, and so on.

QRL makes use of the signal (...—.) which is, of course, simply the sign for "understood." (See Article I.)

QSN—Note that this is the only abbreviation wherein the answer negatives the question. In all other cases the answer is affirmative of the question, and for this reason QSN is a possible stumbling block for unwary students.

The call QST is also not particularly plain. It simply means, however, that the calling station is asking a second station whtether they have heard the general call (that is, the CQ). Many people seem to think that the QST is a general call in itself. This, however, is not so.

QSZ and QTA. The difference between these two abbreviations should be carefully noted.

As well as the above abbreviations there are two or three other signals recognised by amateurs, and now in fairly constant use. Of these QSS is the first and is usually regarded as meaning "Are my signals fading?" with the usual affirmative answer, "Your signals are fading." Some transmitters in Australia use QSS to denote "swinging" and not "fading," but overseas the acceptance of the term is as shown, while "swinging" is denoted by QSSS.

Another amateur abbreviation is QRLL, meaning "Please stand by for five minutes until I adjust my gear," but as yet this signal is not in general use locally.

A newer signal still is QRAR—a ham signal meaning "Is your call book address correct?" which should serve a good purpose in eliminating much needless reception of QRA calls.

Of course, the other ham abbreviations OM (old man—familiar), YL (young lady), OWOP (owner-operator), 73 (NOT "73's") (kind regards), CUL (see you later— being generally a loose way of saying "will work you later"), CUAGN (see you again), and the like are well known.

Readers who have studied the signs and symbols given in Articles I. and II. have now learned almost all of the signals used in transmitting. All that remains to cover the requirements of the first paper of the Amateur Operators' Proficiency Certificate examination is to learn something of the rules and procedure of transmission. This we shall now deal with.

Priority of Traffic.

Certain types of messages have priority of transmission, chiefly for reasons of their urgency in comparison to other communications. There are five classes of messages ranking for priority in the order shown. They are:—

Firstly: Messages of distress (S.O.S. messages).
Secondly: Admiralty message (XIX messages) or messages of other British Government departments, and communications of other Governments.
Thirdly: Navigation messages—dealing with the safety of ships at sea (TTT messages).
Fourthly: Messages dealing with the conduct of the radiotelegraphic service.
Fifthly: Public and other general messages.

Insofar as messages are not affected by questions of priority, they are transmitted in the order in which they were handed in to the transmitting station.

Control of Traffic.

(a). In the case of ship to shore traffic, the shore station is the controlling station and decides upon the order of transmission, whether messages shall be sent alternately or in series, and all such questions of procedure.
(b) In the case of inter-ship traffic the calling station is the controlling station.

The exception to these rules lies in the fact that in the case of a distress call, the distressed vessel making the SOS controls all traffic within its range of transmission.

Preference to Stations.

If a coast station receives calls from more than one ship, the coast station accepts the traffic of the ship that will, under normal conditions, first pass out of range.

Calling a Station.

The rules set down for calling a station are simple, the first being that the operator of the station intending to make the call should tune his receiving ap-

paratus to the greatest degree of sensitivity, and should listen on the wavelength of the station to be called to ascertain that such station is not engaged in traffic. Having satisfied himself on such point, the operator makes the preliminary call signal (—.—.—), followed by the call-sign of the station being called, three times repeated, in turn followed by DE (from) and the call sign of his own station three times. As an example, take the case of the steamship "Canberra" (call-sign VHO) calling the Brisbane Radiotelegraph Station (call-sign VIB). The complete call would be as follows:

—.—.— VIB VIB VIB —.. . VHO VHO VHO

Replying to a Call.

A station having been called, replies by giving firstly the Preliminary Call Signal (—.—.—) once, followed by the call-sign of the station whence the call originated, repeated thrice, followed by DE and its own station call-sign sent once. Then the signal —.— (invitation to transmit) is sent as an indication that the called station is ready to take any message from the calling station.

Such a reply, using the call-signs given above, would be—

—.—.— VHO VHO VHO —.. . VIB —.—

Position Report.

After having received the "Go Ahead" signal (—.—) from a coast station, the calling station, if a ship, as in the examples already given, may transmit what is known as its TR. This signal TR is used as a prefix to certain information covering the ship's distance from the coast station, its position, next port of call, and the number of messages it has for such coast stations.

The coast station will acknowledge this transmission and, being the controlling station, will decide which station will transmit first and in what manner.

Thus, for example, using the same calls, Brisbane Radio Station having learned that the s.s. Canberra has 15 messages to transmit, and having, itself, say 10 messages for outward transmission, might decide to transmit and receive messages in groups of five, allowing the ship to commence. The signals passed across by Brisbane Radio Station would be as follows: —.—.— VHO —.. . (DE) VIB .—. (R) — .—. (TR) QSG —.— (K).

The R signal is, of course, the received signal described in Article I., and the QSG, on reference to the list of abbreviations already mentioned, is found to mean "the transmission will be in series of five radiotelegrams."

The General Call.

This signal, usually known as the CQ signal (—.— ——.—) is used as a preliminary enquiry signal, when a station wishes to communicate with another station within range, but whose call-sign or name is unknown to the transmitting station. The usual rules for calling a station apply also to the use of the CQ signal; that is, the signal CQ is transmitted three times, followed by DE and the call-sign thrice of the transmitting station .

Communication with the calling station should be established by any station within range hearing the CQ, the reply taking the usual form described earlier.

The Wait Signal.

This signal (.—...) is necessary when a station called is busy with a third station. In such a case the busy station would, in all probability, respond to the first station with the QRW or the QRX, but for the sake of convenience, may simply give the . — ... . signal.

It is usual to add the length of time that the calling station will be required to wait. This waiting time is frequently sent by the employment of the system of short numerals. Thus, "Wait 10 minutes" would be signalled .—... .— —

(See next issue for Article No. III.)

An Accumulator Advantage

Accumulators, when purchased new, require, in most cases, a very long and careful first charge in order to put them into proper condition for use. The life and general functioning of the accumulator depend largely upon the pains taken with this charge, and it is very much better if the user can supervise this himself.

To overcome the main difficulty, several makers are now supplying their accumulators in what is called the "dry charged" state, so that it is only necessary to fill them with acid and allow them to stand for about an hour in order to fit them for immediate use. At the same time, readers should note that the useful first discharge that can be given a battery so treated is much less than its normal discharge, and the battery should not be run for very long before it is charged again in the ordinary way.

If, for example, you buy a 40-ampre-hour (actual) accumulator dry-charged, do not expect it to give a 40-amp-hour discharge in the first instance. You will probably get about half of this figure. The battery should then be charged in the normal way, after which you can take the normal discharge from it. The makers are to be congratulated upon finding means of supplying the user with cells which do not require this tedious first charge, and the user should not grumble if, in the first case, he does not get a full discharge from his cell.

NEW RECEIVERS REVIEWED

In response to many requests from our readers, we have inaugurated this department. It is our intention to test each new receiver at it appears upon the market, and to offer candid criticism upon its performance.

The R.C.A. Radio-Gramophone Combination

The Australian General Electric Co., whose premises are situated in "Atcherley House," Petrie Bight, have in their showroom samples of a new Radio-Gramophone Combination developed by them.

Two models are at present available, an electric and a non-electric combination.

The electric model consists of a handsome floor, grand cabinet of beautifully finished design and workmanship, in Queensland maple, and comprises an R.C.A. Pickup, tone arm and volume control, a G.E. Induction Disc motor, an R.C.A. 6 valve electric set and either an R.C.A. model 100A or Dynamic type speaker.

The non-electric model is housed in a cabinet similar to that of the Electric Model, but in place of the G.E. Induction Disc motor a triple spring, best quality clockwork gramophone motor is substituted. An R.C.A. model 16, 6 valve battery operated set with R.C.A. Pickup and model 100A or Dynamic type speaker completes the equipment.

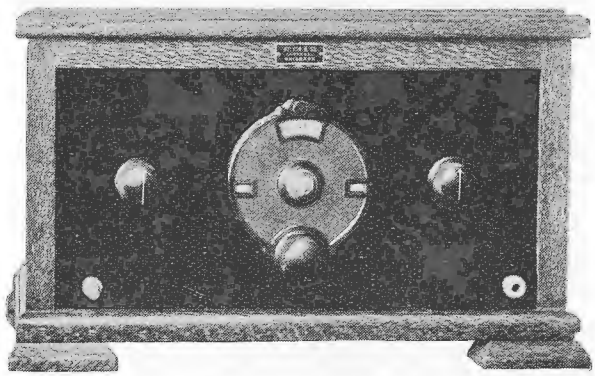
Both instruments are a revelation in tonal qualities both from the point of view of reproduction of gramophone, and broadcast reception, whilst the Electric model will give all the volume required to fill a large sized ballroom or picture theatre.

♣ ♣ ♣ ♣ ♣

The Crammond Three

That it is possible to produce a really good three-valve receiver to sell at a low price has been demonstrated by Messrs. Melton & Co., Queen Street, Brisbane, manufacturers of the Crammond Three. Designed by the firm's technicians, this small receiver incorporates "big set" refinements to a remarkable degree, and certainly reveals a very generous choice of components. Only the best of material has been selected—a point which plays no small part in securing the excellent performance of which the set is capable.

Outstanding features of the Crammond Three are, firstly, its splendid tone quality, and secondly, its great selectivity, the latter being obtained by the use of a carefully designed and balanced circuit and the special filter supplied with the set. Tested under actual working conditions—and extremely unfavourable ones at that—the main Southern stations were easily received on the loudspeaker, and the repro-

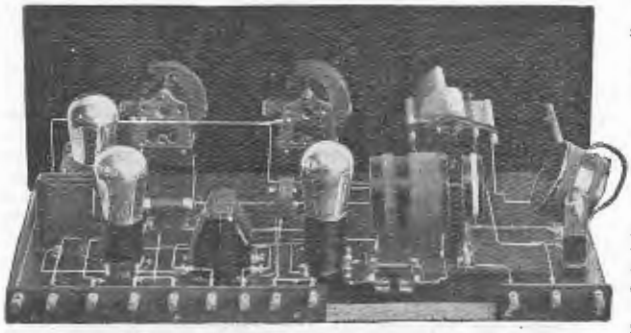


duction left nothing to be desired. With low-priced receivers it is frequently found that the consideration of quality reproduction has been sacrified, but the Crammond Three has been designed with this as the feature of paramount importance, using transformers of high grade, and a correctly selected valve combination. And rightly so, for of what use is a receiver whose reproduction brings one back to the early days of the gramophone?

Tuning the set is simplicity itself; disregarding the filter (which, once adjusted to eliminate local interference, may thereafter be neglected), there is but one tuning dial or station-selector, while the sensitivity and consequently the volume is very smoothly

regulated by the reaction knob. In appearance, the Crammond Three suggests a much more expensive receiver—a polished solid oak cabinet of pleasing design, toned mahogany-surfaced panel, nickelled metal work and polished bakelite controls. It is worth mentioning, too, that the interior of the set reveals just the same high quality of materials and close attention to detail that the exterior appearance bespeaks; one straightway receives the impression that in this receiver, in spite of the modest figure at which it sells, nothing has been "skimped." Altogether, we regard the Crammond Three as a distinct bargain at the price asked for it, and we can thoroughly recommend it.

The Pontynen Three



Recently we were given the opportunity of testing a new and very wonderful receiver—a receiver manufactured in Brisbane, and incorporating a circuit invented by a Brisbane man. Mr. H. Pontynen, of The Pontynen Radio Manufacturing Company, Regent Street, South Brisbane, is the originator of this revolutionary development, and the Company has placed it upon the market after intensive experimental work occupying a period of three years. Mr. Pontynen set himself the formidable task of designing a type of filter circuit that would ensure extreme selectivity, while effecting an actual **improvement** in the operating efficiency of the receiver. After hearing the Pontynen Three—a three-valve set embodying the basic Pontynen principle—we have no doubts as to the success that attended his efforts. As regards external appearance, all one sees is a figured wood panel on which are mounted three vernier dials, two small knobs, and a jack, the whole being set off by a polished cedar cabinet of attractive proportions. In the later models (manufactured since the illustration was made), the vernier dial controlling reaction has been replaced by a knob, which is all that is necessary. Three terminals are provided for aerial, earth and counterpoise, respectively. The counterpoise is essential to correct operation of the receiver, but it need only consist of a thin covered wire tacked to the skirting-board, placed under a carpet, or in any other position where it will not be noticeable.

Now for the results we obtained—they can only be described as remarkable: The tuning is quite simple when one grasps the principle of the set; it is really very similar to that of a Browning-Drake, with the added filter adjustment. Never have we heard a three-valve receiver with such "knife-edged" selectivity; never have we listened to a three-valve receiver that delivered such astounding volume on distant stations; never did we believe that such results were possible with any three. We do not exaggerate in the slightest when we say that the main Southern stations are equally as strong as 4QG, that the volume is such that the receiver usually must be "toned-down" in order to make conversation possible in the same room, and that practically every station —small and large, "B" and "A" class—in Australia and New Zealand is received on the loudspeaker. But the Pontynen Three's greatest triumph is its complete selectivity; at a distance of one mile from 4QG, 3LO was received with absolutely no trace of background, and, on several occasions 5CL was heard at good strength with no serious interference. Add to all this the consideration of very good tone quality and low battery-consumption, and it will be seen that the Pontynen Three undoubtedly represents a very outstanding development in radio receiver design.

We heartily congratulate Mr. Pontynen on the success of this clever invention which, we believe, holds great possibilities and should carry the company far, and we extend out most cordial wishes for its future success.

4GR TOOWOOMBA.

Many of our readers no doubt have listened from time to time to the excellent transmissions from Station 4GR, the "B" class broadcasting station owned and operated by Mr. Edward Gold, of the Gold Radio Electric Service, Margaret Street, Toowoomba. Operating on a wavelength of 294 metres, the station is on the air from 12.30 to 1.0 p.m. daily, except Saturdays; on Thursdays, from 6.45 to 8.0 p.m.; Fridays, 8.0 to 9.30 p.m.; Sundays, 11.0 a.m. to 1.0 p.m., church services and music, and 7.0 to 9.0 p.m. On Fridays, short-wave transmission is carried out from 6.45 to 7.30 p.m. on 31.5 metres. Listeners' reports, which should be addressed to Box 163, Toowoomba, will be welcomed, and will be promptly acknowledged.

RADIO CLUBS OF QUEENSLAND.

AUCHENFLOWER AND DISTRICT—Secretary, L. Gibb, "Frampton," Ridley Street, Auchenflower.
CAIRNS AND DISTRICT.—Secretary, Mr. Tarbit, c/o. Mr. Les. Fritzsimmons, Cairns.
EASTERN SUBURBS.—Secretary, J. Burns, Longland Street, East Brisbane.
GRACEVILLE.—Secretary, H. Carter, Cr. Molonga Terrace and Wylie Streets, Graceville.
IPSWICH.—Secretary, S. J. Aspinall, Brisbane Street, Ipswich.
SOUTH BRISBANE.—Secretary, W. R. Gilbert, Gordan Street, Coorparoo.
TOOMBUL.—Secretary, T. Starkie, Sandgate Road, Nundah.
TOWNSVILLE.—Secretary, E. J. Jefferies, Fletcher Street, West End, Townsville.
WIRELESS INSTITUTE (Queensland Division).—Postal address Box 689K, G.P.O. Brisbane.
WOOLOOWIN.—Secretary, H. A. Jiear, Lisson Grove, Wooloowin.
WYNNUM AND MANLY.—Secretary, P. J. Golden, c/o Trackson Bros., Ltd., Elizabeth Street, Brisbane.

♣ ♣ ♣ ♣ ♣

Wooloowin Radio Club—4WN

During the month, great interest has been taken in a Morse class which is conducted by Mr. Love. Members are taking great pains to master the elusive "code," and all agree that the class is progressing very favourably. The Technical Committee is still very busy with the new transmitter which is now beginning to take definite shape. A complete new aerial system is also being designed, which will be of the cage type and should be quite a conspicuous landmark when erected.

We are very pleased indeed to announce the success of two of our members in recent A.O.P.C. exams. —Gordon Shearer (our country member of Gayndah) and "Bill" Rhode being the lucky two. Gordon tells me that he is busy with other exams at present, so it may be some time before his station is on the air. By the time this appears in print "Ole Bill" will probably have finished, or be finishing his final exams, so very shortly his sigs. will be disturbing the ether in the vicinity of NU and EG. 4FK is also hoping to finish study this year, and is going on a trip North for some months, I think. A portable transmitter is going along and OA's are asked to look out for his sigs. Several of our members are very busy studying for the Junior at present, and in consequence spend Thursday evenings up to their ears in books. Best of luck, OM's, and say, don't follow the old proverb—"If work interferes with your radio, give up work."

Mr. Nolan recently gave a very interesting lecture on the screen-grid valve, and showed his own receiver as an example of this type of receiver. This receiver is made up from aluminium and is a very pretty job. At the conclusion of his talk, Mr. Nolan was awarded a very hearty vote of thanks for his fine lecture, which included the history of this type of tube. Messrs. Nolan and George have drawn up a proposed syllabus for the ensuing three months which, with several minor alterations, was accepted at a recent meeting. The syllabus is a very comprehensive one and should prove very interesting.

Toombul Radio Club

Great interest in radio reception is being shown by members of the club since one member announced his intention of donating a pennant to the club member who receives the greatest number of telephony stations during one month. The competition, which is open to all members of the club, will be judged by a committee who have already been appointed. Everything points to a close contest, and members are very enthusiastic over the respective merits of their individual sets.

On September 30th last several of the club members availed themselves of the opportunity of a trip through the Mount Samson-Clear Mountain districts with the intention (it is understood) of discovering a suitable spot for the establishment of a wireless pole plantation. Everyone reported having a splendid time, but the club very much regrets to learn that Mr. Harold Stephenson (4RG), who accompanied the members, met with a serious and painful accident the same evening. The club extends its sympathy to 4RG and expresses its earnest hope for his speedy recovery.

The operator has constructed a very workmanlike helix for the 200-metre transmitter, and at the present time is understood to be cleaning up the circuit generally with a view to obtaining greater efficiency. The blinking light still illuminates the footpath in front of the club's shack, inviting all interested in radio to drop in and have a chat each meeting night; meetings being held Wednesdays.

Indooroopilly Radio Club

Members of the I.R.C. read with interest 4WN's last report. There was something in it that caused a little wave of exultation to sweep through us. It was the little paragraph at the end which gave us so much pleasure to read. We are glad to know that somebody is very interested in our activities.

Not only have the Wooloowin Radio Club bestowed on us their good wishes for the success of the I.R.C., but they have demonstrated their good wishes in a very concrete manner. The "something in the wind" was brought to light last night, when it was known that 4WN had made us a present of an Xmitter tube. The members of the I.R.C. have the greatest pleasure in thanking 4WN members for such a useful gift. May we express the hope that we shall not become rivals, but rather co-operate with each other, encouraging other persons to take an interest in wireless, and to form clubs similar to those already in the field.

In a few months the I.R.C. hope to have an Xmitter. There will be a bombardment in the ether as never took place before, the reason being that, having talked of Xmitters for goodness knows how many moons, some of our members have become overcharged with energy, as it were, and it seems the only way they can dissipate some of it is by direct contact with a morse key. We often wondered by our receiving set objects to such personages. It sets up a wail as if mortally hurt should any one of the abovementioned gang go near it.

We hope in the near future to pay another visit to the club rooms of our friends 4WN and we should also be pleased to meet our friends of 4TC.

Central Technical College Radio Society

The entire operations of the construction of the radio station of the C.T.C. Radio Society have been temporarily suspended for a few weeks. The members, very reluctantly, were obliged to make this pause so that they might devote all their time to the study of the subjects they must take in the approaching examinations.

Word has been received from the P.M.G. Authorities that our license has been endorsed, and a call sign—4RL— has been allotted for our use.

At the present time the construction and installation of the power panel and apparatus under the supervision of Mr. L. Cribb has reached a good stage of advancement. The gear to be installed consists of a motor generator set, high and low tension accumulators, and a switch board.

In the motor generator set a 220-volt 1 h.p. D.C. motor is coupled to a 1500v. 150W. D.C. generator. The set is mounted at the base of the switchboard.

The accumulators consist of an 840-volt high tension, and a 6-volt 150 amp. low tension. The high tension has been arranged in banks of 40 cells so as to use suitable means of charging.

The switchboard is 7ft. 6in. high and comprises four panels each 2 ft. 6in. wide. On the first panel is mounted apparatus for testing. Lamps are connected in series and parallel circuits so as to provide a wide range of current values. Convenient plugs and terminals are provided to simplify connections.

The next panel is utilised for the battery control. Change-over switches for charge and discharge of both batteries are mounted, and connections are provided so as to arrange the 840 volt accumulator in convenient banks, as previously stated, so that they may be charged from the 220-volt mains. An ammeter registers the charging rate.

Switches and a field regulator, to control the generator's supply, are mounted on the third panel. A voltmeter to measure the voltage generated is connected, and suitable switches are provided to control the plate supply to the transmitter.

The motor is operated by switches, fuses and starter on the fourth panel. The whole unit is a really creditable piece of work, and every convenience for various current and voltage supplies has been skilfully provided for.

Mr. J. B. Chandler

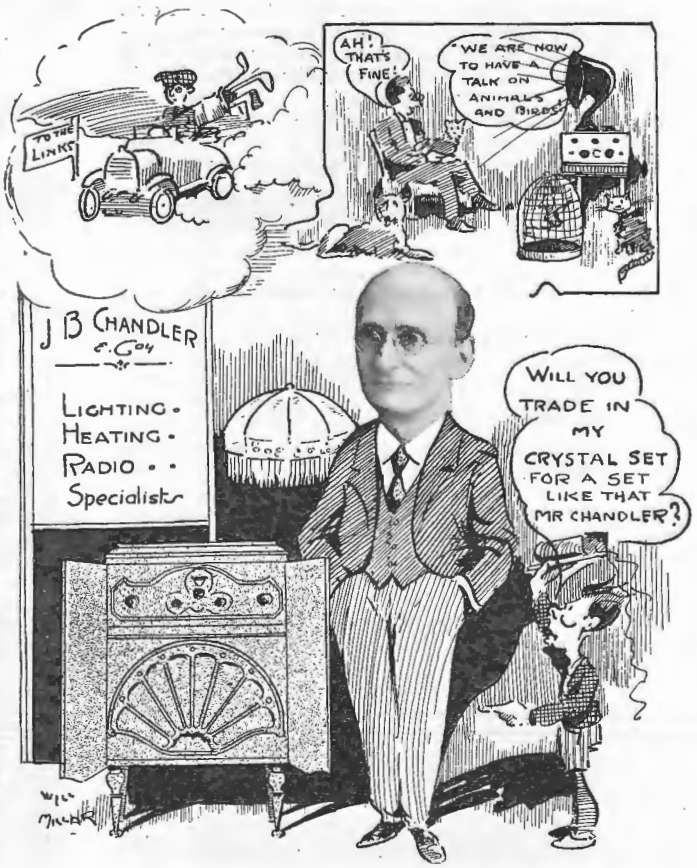
Just 21 years ago a young English immigrant stepped upon Australian soil, and set out to earn his living by hard graft on the canefields of North Queensland, with the ultimate objective of owning a sugar plantation of his own. An accident that required the attention of a Brisbane surgeon brought the young Englishman south, where, attracted by the bright lights of the city, he lingered until he awoke to the realisation that he would have to work if he was to live.

Then Mr. J. B. Chandler—for it was none other than he—decided upon a bold step. He set up in business for himself as an agent. Unknown in Brisbane, with no agencies and a capital of eleven one pound notes, he shared an "office" in Elizabeth Street, and paid a rent of 4/- a week.

His first order called for £20 cash for buying, and so £9 additional capital had to be borrowed to finance the deal. That was in 1913. Success attended the efforts of the young agent and in 1914 the firm of J. B. Chandler & Co. was duly registered, and larger premises were taken in Charlotte Street. The activities of the firm were centred mainly around the marketing of the "Gloria" Lighting System, and it was not until 1916 that the firm branched out into the electrical field, taking still larger premises in Elizabeth Street. Just about this time The Queensland Safety Air Coy. was bought out, and the business grew steadily.

Early in 1913, before broadcasting was established in Australia, Mr. Chandler, visualising the tremendous interest that would be centred around the new science of radio, purchased and remodelled Moon's Buildings in Adelaide Street, and when 4QG began its service, this company was one of the first radio dealers to register in Queensland.

Today, five floors (totalling 10,500 feet of floor space) are found to be none too large in the carrying on of the firm's vast wholesale and retail businesses. The organisation stands as a monument to the pluck, keen foresight and business ability of its founder, and the success it enjoys today has been deservedly won.



TESTED AND RECOMMENDED

A Department of Investigation, conducted for the benefit of our readers. Every piece of material featured on these pages is subjected to a rigorous and searching test before publication. No remuneration is received for the publication of these paragraphs.

The Philips Trickle Charger

Comparatively new to the Australian market is the Philips Trickle Charger, Type 1017. This unit is of the thermionic or valve rectifier type, and is of very small dimensions, standing but 5½ inches high. A special and very valuable feature of the charger is a switch which not only serves to connect and disconnect the trickle charger at the A.C. power supply, but also connects and disconnects the battery eliminator and "A" battery. The switch thus automatically assures that when the receiving set is not operating the accumulator receives a continuous trickle charge. For a 4-volt battery, the charging rate is about 170 milliamps, but it is recommended that a 30-ohm rheostat be inserted in one lead from battery to charger so that the rate can be adjusted to suit the discharge rate imposed by the receiver. When charging a 4-volt storage battery, the rheostat makes it possible to regulate the rate between 85 and 180 milliamps. approximately. The rectifying element is a type 1018 Philips combination valve, which includes a resistance lamp in order to allow proper regulation.

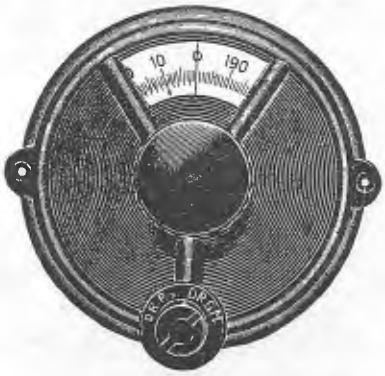
Because of the fact that the battery is always maintained in a fully-charged condition, one of very small capacity is permissible when this trickle charger is used. Constant charging at a low rate is a big factor in securing long and trouble-free life from an accumulator, and it is needless to mention the convenience of such an instrument; a snap of the switch when you start listening, another snap when you are finished—that is the beginning and end of your battery maintenance. As far as upkeep cost is concerned, the current consumption is so minute, that it may be neglected, so it is easily seen that a device such as the Philips Trickle Charger quickly pays for itself, and is a very desirable addition to any valve receiver.

The Philips Trickle Charger is beautifully finished and is provided with a terminal in order to connect the metal case to earth, thereby ensuring perfect safety. After subjecting a sample to lengthy tests, we have no hesitation in recommending it to our readers.

The Fatamic Micro Dial

Many different types of vernier or slow-motion dials have been introduced by radio parts manufacturers, but up to the present there have been very few that have been suitable for both broadcast and short wavelengths. The requirements for an ideal vernier mechanism are that it should provide a means of tuning rapidly, possibly without the aid of the slow-motion device. Ultra-fine adjustment must be obtainable when desired with an entire absence of back-lash or play of any description. It must be easy to mount on any existing condensers, should occupy a minimum of space, and must have an easily-read scale.

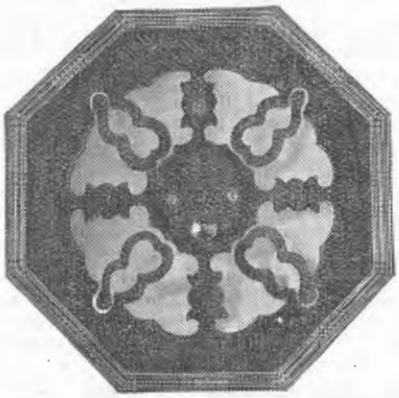
In the "Fatamic Micro Dial," distributed by Messrs Trackson Bros., Ltd. (from whom our samples were obtained), these manifold requirements are met in a



very ingenious manner, the dial embodying all the desirable qualities mentioned, while at the same time, the list price has been kept to a reasonable figure. The slow-motion mechanism is very clever indeed, and, like most clever things, is remarkably simple in design. A 3-inch metal disc is secured to the condenser spindle, this disc having very fine teeth on its face at the outer edge. A large moulded bakelite knob is attached to the disc, this furnishing a means of direct rotation of the tuning unit without any reduction. The smaller vernier knob is attached to a spindle which has a fine spiral thread cut into its lower end. A spring normally maintains the vernier spindle in an elevated position, so that the spiral thread just clears the main toothed disc. When fine adjustment is required, however, the small vernier knob is depressed, the spiral thread engages with the toothed disc, and a reduction of 260 to 1 is obtained, which means, of course, that the vernier knob would have to

be turned 130 complete revolutions in order to rotate the condenser from zero to maximum capacity. To mount the dial, it is merely necessary to secure it to the panel by means of two conveniently located bolts, and to tighten up the set-screw on the spindle. The scale is clearly marked, and an uncommon feature makes it possible to read the setting to a fraction of a degree. Highly finished in either black or maroon bakelite, and measuring but 3¾ inches in diameter, the "Fatamic Micro Dial" will be an acquisition to any receiver—particularly to a set designed for short-wave reception.

The M.P.A. Loudspeaker



From Messrs. T. H. Martin & Son, B. & F. Chambers, Adelaide Street, Brisbane, we have just received a sample of the Plaque Model of the M.P.A. range of cone speakers. Manufactured in England, the M.P.A. loudspeakers were introduced to the Australian market by Mr. Chas. D. Maclurcan, the noted experimenter of Sydney, who recently returned from a tour of England and the Continent with some very fine radio agencies. Incorporating several novel features, the M.P.A. loudspeaker is in some ways a departure from generally-accepted principles. The conical diaphragm is "sprung," resulting in a more even response over the entire musical scale and obviating any tendency to rattle, even at excessive volume. In the construction of the M.P.A., carefully selected symphonic woods have been used in order to obtain the most perfect tone possible, and the reproducer is so adjusted that both speech and music are reproduced with great fidelity to the original.

Our tests supported the claims of the manufacturers as regards naturalness of reproduction and great volume-handling ability, and the M.P.A. loudspeaker undoubtedly will win great popularity when its very real merits become more generally recognised. In addition to its splendid performance, it must be realised that the list price of the speaker is remarkably low for such a high-grade instrument. It is significant to note, also, that Mr. F. J. Simmonds (G-20D), the noted English research worker, described the M.P.A. speaker in a letter to Mr. Maclurcan as "quite the best thing he has handled in cone loudspeakers, considering all the factors." When two radio men of the calibre of Messrs. Maclurcan and Simmonds endorse it so whole-heartedly, one is justified in believing that there is some very good reason for their enthusiasm, and a practical demonstration proves this to be the case.

THE MULLARD PM-4D VALVE.

The Mullard range of valves of the well-appreciated "PM" series has recently been increased by the addition of a super-sensitive detector valve—the Mullard PM4D. This valve has been specially developed for those who demand the utmost efficiency from each stage of their receiving set, and really rounds off the four-volt series of the PM valves. Having an impedance as low as many "power" valves, and yet an amplification factor of over 12, with the remarkably high mutual conductance of over 2 milliamperes per volt, the PM-4D not only amplifies very strongly weak signals, but is also capable of handling heavy volume; in fact, it may be used as L.F. power amplifier for moderate size speakers.

The technical characteristics are as follows:—

Max. Filament Voltage	4.0 volts.
Filament Current	0.1 amp.
Max. Anode Voltage	125 volts.
Anode Impedance	6000 ohms.
Amplification Factor	12.5
Mutual Conductance	2.1 ma/volt.

The PM-4D valve, it should be noted, is recommended to be used as a detector preceding transformer-coupled audio-frequency amplifiers only; where resistance-capacity-coupled amplification is used the correct valve to use in the detector socket is the Mullard PM-5B, a high-impedance, high-amplification valve. This fact is not as well known as it should be among valve users, but is of the utmost importance.

For fuller information on this point readers should secure a copy of "How to Get Better Radio," published by the Mullard Wireless Service Co., Ltd., and available from the Mullard distributors—Messrs. Edgar V. Hudson, and all radio dealers.

This department is conducted for the benefit of our readers. We cannot answer queries by mail, but if a special diagram is required, we will supply it at a cost of 1/-.

Questions Answered

By the TECHNICAL EDITOR

Questions received before the 20th of the month will be answered in the following month's issue. Queries arriving after this date are deferred until the next issue.

"Subscriber," Finch Hatton.—"Please tell me why my 'B' batteries run down so quickly. I imagine that they should last 5 months with 3 hours per day for 6 days per week. My set is a five-valve Neutrodyne, and I have only had eight weeks at the most out of the 'B' batteries, and now they appear to be defunct. Can the batteries discharge while the switch is off? Do dull-emitters eat more juice than bright-smitters? I am using dull emitters with 'C' batteries. I am not sure about the connection on the 'C' batteries, so am enclosing a diagram of the way I have them at present. This makes the set operate O.K., but with what effect on the batteries I don't know. Please give me your opinion. (2) Are accumulators better than dry batteries for "B" service?"

Answer.—Certainly you are not getting anything like the service you are entitled to expect from your 'B' batteries. I cannot tell you if this is the whole trouble, but you have the "C" batteries incorrectly connected. Without knowing what types of valves you are using in the two audio stages, it is impossible to stipulate the proper value of "C" voltage to use. The way you have them connected at present, however, you are using two "C" batteries to give you the voltage which could be supplied by one—that is, 4½ volts. I am sending you a rough diagram showing two alternative methods which you might try. Under the conditions you mention, I should say that a "B" battery life of six months would be a fair thing. If there is no fault in the receiver, it is quite impossible for the batteries to discharge while the switch is open. No, the "B" battery consumption of "dull-emitter" valves is no heavier than that of "bright-emitters." (2) Where it is possible to maintain them in a fully charged state, a good set of accumulators is to be preferred to dry "B" batteries, but if there is likely to be any difficulty about charging, I would discourage their use.

Your letter arrived too late to be answered in the October issue, and it was impossible to send a reply by letter because you omitted to sign your name. The name should always be included; it is never used for publication, only the initials or a nom-de-plume (if requested) being mentioned.

DROP the Technical Editor a line if your set is not "perking" as it should. Be brief and to the point—ten-page epistles strictly prohibited!

"Constant Reader," South Brisbane.—"With reference to the "DX Special Transmitter" described in your October issue, could the wavelength be increased to 250 metres by connecting a .00025-mfd. or any other condenser in circuit; if so, would it have to be insulated from the panel or not? (2) For the two r.f. chokes, will 28 D.C.C. wire do instead of D.S.C., and how many turns to each? (3) How can I make a home-made microphone?"

Answer.—No; it would be necessary to substitute larger coils for L1, L2, and L3; 15 turns each for L1 and L2 and 10 turns for L3 would be about right. (2) Yes; the cotton-covered wire will do equally as well as the silk-covered, and each coil comprises 200 turns. (3) Sorry I cannot help you here. I would not advise you to attempt the construction of a microphone, as the results will be disappointing, and it is not worth while, anyway. Why not visit the Telephone Stores and see if you can pick up an old telephone microphone. You will probably be able to get one for a few shillings, and most of them are quite serviceable.

"E.C.S.," Sarina.—"Could you give me some idea of the approximate cost of the parts necessary for constructing the 'Globe Trotter Screen-Grid Four,' described in the September issue? (2) Would it be possible to attach the detector unit to an ordinary broadcast receiver?"

Answer.—Roughly, the parts for building the set itself, as described, excluding valves, batteries, etc., is in the neighbourhood of £23/10/-. You can work out the cost of the accessories for yourself, allowing 30/- for the Philips A-442 screen-grid valve, 37/6 for the B-443, and 13/6 each for the other two. (2) Yes; the detector stage only, or the r.f. and detector stages could be attached to the audio-amplifier end of your receiver quite simply if desired. Assuming that you intend using the same batteries for both sets, the simplest way is this: Referring to the pictorial wiring diagram (Fig. 5), connect a flexible wire from the top plug on the side of the detector compartment marked "P" to the "P" terminal of your first audio transformer. So that it can be connected and disconnected quickly, the wire should be equipped with a clip, and the detector valve should be removed from the broadcast receiver while the short-wave set is in use.

"H.V.M.," Gargett.—"I have built the improved Solodyne as featured in your March issue. The set worked very well for a while, until one night, when listening to 4QG, the volume faded away to a whisper. Now I can still pick up signals, but very weakly, and Interstate Stations I cannot get at all. There are no loose connections, and the batteries test O.K. When trying to tune now, the set howls with the slightest move of the controls, but with no strength."

Answer.—The most likely trouble is a faulty valve; try replacing each valve (in turn) with a new one—you will only need one new valve for this. Perhaps one or more sections of the three-gang condenser have slipped out of line with one another; try adjusting them. Check your automatic filament controls—one of them may have burnt out; connect a piece of wire across them, one at a time. Possibly you have a burnt-out transformer, though I do not think this is the trouble. It is possible that a fault has developed inside one of the shielded coils, but it is a very remote possibility. I should look first to the valve, and then to the filament controls.

"Interested," Dayboro.—"With reference to the "Screen Grid Booster,' described in the October 'Radio News,' is it possible to use it in conjunction with a crystal and one-valve amplifier set successfully? If so, how is it connected to the above-mentioned set?"

Answer.—You do not supply sufficient information to allow your query to be answered fully. If your crystal set is furnished with a coil tuned by a variable condenser, it will be quite possible to add the Booster, provided you procure another 60-volt "B" battery in order to supply 120 volts to the plate of the screen-grid valve. The Booster is connected to the crystal set by joining its "Output" terminal to the aerial terminal of the crystal set, and the earth terminal of the crystal set to the "E" terminal of the Booster, a connection then being taken to earth in the usual way. The battery connections require no explanation; you can use the same "A" battery, with a 5-ohm Tempryte. This combination should work excellently, and the Booster will greatly increase your already very good range and volume.

"R.S.," Gordonvale.—"Is there any kind of instrument made that will register the frequency of sound waves? (2) Is such an instrument capable of covering a varied scale of frequencies? (3) Is anything incorporated in this instrument to show the amplitude of sound waves? If not, is there any such instrument that will show you the amplitude?"

Answer.—Yes; such an instrument is in existence, but I do not think it is obtainable in Brisbane. (2) Obviously, an instrument that is capable of measuring the frequency of sound waves must be able to cover a wide range of frequencies. (3) An instrument after the style of the Oscillograph will show the amplitude of waves in graphic form. For further information on this subject, I would suggest that you write to the Physics Department of one of the Australian Universities.

"D.," Herbert River.—"I have built the Short-Wave Adapter described in your April number, but cannot get anything through the set. I have a five-valve set, and when I connected the Adapter I burnt out the potentiometer on my set. Tried the Adapter on a three-valve set, but could not get anything, and the coils on the set started to burn. Can you advise me what is wrong?"

Answer.—Unfortunately, an artist's error crept into the pictorial wiring diagram of this set, but this could not be responsible for causing damage to any receiver. . It was simply a matter of reversing the connections to the reaction coil. This would account for the absence of oscillation, but I cannot understand why the potentiometer was burnt out and the coils became warm. It is evident that you have a wrong connection somewhere—apparently in the battery circuit—and I think if you go over the circuit carefully you will find this to be the case. Make sure that you are plugging the Adaptor into the detector socket of your receiver, which will most likely be the middle one in your case. Are you positive that you connected the UX valve-base plug correctly? Possibly that is where the trouble lies.

"LAURIE"

MASTER LAWRENCE MULLER.

During recent bedtime story session from 4QG on Tuesday and Staturday evenings, Uncle Ben has been assisted by a bright little "offsider," known over the air as "Laurie." He is a quaint and lovable little fellow, and his original sayings uttered at the most unexpected moments cause much amusement, both within the studio and among the listeners. He says definitely that he is just six-and-a-quarter years of age. "Laurie" is the son of Mr. Tom Muller, conductor of the Studio Orpheans often hear from 4QG.

Loudspeakers and Reproduction

AMPLIFIER IMPORTANT, TOO.

The Philips "PCJJ" Cone Speaker.

In order to secure the best radio reproduction possible, it is necessary that each and every piece of apparatus, particularly in the audio end, be of the best. Not only this, but they should be "matched," a power valve with ample grid and plate voltages used and a loudspeaker that can reproduce a wide frequency - range without uneven emphasis for either bass or treble.

The modern cone type of speaker five years ago would have been a most unsatisfactory reproducing medium. This seems extraordinary, but is easily explained. Just as the chain is no stronger than its weakest link, so it is with radio—and with the loudspeaker even more so. If a speaker which is capable of perfect reproduction of all audible frequencies is connected to a set which has frequency limits, then distorted re-creation **must** result.

Early in the history of radio it was advantageous to construct speakers without critical qualities so that distortion was glossed over, and, to the average ear, the music appeared to be quite good. With the advance of the times bringing better transformers and new power valves, efficiency has increased, till to-day, a high degree has been obtained. A good modern receiver to which a high-quality speaker such as the Philips is connected will give remarkable reproduction.

At the same time, there are thousands of enthusiasts who have out-of-date and home-made receivers which are mere boxes of congested parts, wrong valve types, and "hay-wiring." Such people wonder why a Philips speaker will not give as good reproduction as even the cheapest speakers yield. The only answer is that the cheaper speakers lend themselves to the poorer quality of reproduction because they are not sensitive enough to show the imperfections. A peculiar part is that the poor set and poor loudspeaker will probably give apparently better results than a good receiver and poor speaker.

The three Philips speaker models work on a special balanced magnet system which operates a full floating parchment cone. In the case of the "PCJJ" and "Junior," a front plate protects the cone, whilst the "Baby Grand" (with a larger cone) has no protection, but may be safely hung on the picture rail out of harm's way if thought necessary. All three speakers are capable of superb reproduction when used with good radio sets. They show to the greatest advantage when Philips audio units—transformers and valves (which are matched)—are utilised in the set, not forgetting ample plate and bias voltage, for the supply of which Philips 3003 "B" and "C" eliminator probably offers the most modern and economical solution.

MAGNAVOX DYNAMIC POWER SPEAKERS

For EVERY SET.

From

£8/10/-

New 1929 Perfected Models, incorporating new patents, delivering TONE and VOLUME hitherto undreamed of.

"BELVEDERE" (Firescreen)

With No. 6 Unit .. £13
With No. 7 Unit .. £14
With No. 8 Unit .. £13
With No. 80 Unit .. £16/16/

"BEVERLEY" CABINET.

With No. 6 Unit .. £13
With No. 7 Unit .. £14
With No. 8 Unit .. £13
With No. 80 Unit .. £16/16/

ARISTOCRAT MODEL.

Beautiful butt hurl walnut cabinet houses Dynamic 6, 7, 8 or 80 unit. List Prices:—
With Dynamic 6 ..... £18/18/
Dynamic 7 ..... £20
Dynamic 8 ..... £18/18/
Dynamic 80 ..... £22/10/

Everybody is talking about the wonderful tone quality of the new Magnavox Dynamic Power Speakers. Music that lives, volume that astounds the listener, yet whether operated at a whisper or a mighty roar there is not a trace of distortion ! !

We are the APPOINTED DISTRIBUTORS of Magnavox Dynamic Speakers.

Have us demonstrate them to you.

Once you hear these wonderful speakers, you will not rest content until you own one. Cold type cannot describe the depth of their tonal beauty.

They are new, there is nothing else like them, and the fact that they are covered by 13 patents protects these instruments against infringements.

Appointed Distributors—

Mick Simmons Ltd.

QUEEN STREET, BRISBANE

AC

DYNAMIC 7.
110 to 220 volts D.C. field current consumption, 45 to 90 milliamperes.

UNIT £9/10/-

DYNAMIC 6.
6 volts D.C. field current consumption, .65 amperes. Operates from A battery, or dry type battery charger.

UNIT £8/10/-

DYNAMIC 8.
6 to 12 volts D.C. field, at 1.1 to 2.2 amps. Operates from dry rectifier or from 1 or 2 6-volt accumulators.

UNIT, £8/10/.

DYNAMIC 80.
240 volts A.C. Has power transformer and dry rectifier. The most popular unit of the new line. Designed to operate with A.C. sets.

UNIT £12

Protected under 13 patents. Infringements will be prosecuted.

DC

Printed and Published by the Proprietors, The Read Press Ltd., Douglas Chambers, Adelaide Street, Brisbane, P.O. Box 1095N.
Wholesale Distributing Agents: Gordon & Gotch (Australasia) Limited, Brisbane, Sydney, Melbourne and elsewhere.