(Ross A. Hull, Technical Editor: Ray Allsop Associate Technical Editor.)

Wireless Weekly

3D

INCORPORATING "RADIO IN AUSTRALIA & NEW ZEALAND"

VOL. 14. NO. 3

FRIDAY, JULY 12, 1929

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

The PERMAGNETIC MOVING COIL SPEAKER

Requires no battery or external power.

PHILIPS

Making Your Own BAFFLE-BOARD SPEAKER

A CHEAP UNIT WHICH GIVES SPLENDID RESULTS

THE FIRST OF THE NEW A.B.C. PROGRAMMES

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Stromberg-Carlson

TREASURE CHEST RECEIVERS

STROMBERG-CARLSON Treasure Chest Receivers are entirely "Australian-made," designed by Australian Radio Engineers and are backed by the Stromberg-Carlson Laboratories, Rochester, New York, which are of International renown. They embody to the greatest possible extent the many quality features, so well known and associated with the name —"Stromberg-Carlson."

They represent the first completely chassis designed Radio Receiver produced in Australia, and are the last word in scientific radio design and construction. The choice of models is very wide, and the range of prices makes it possible for purchasers of average means to acquire a Quality Radio Receiver that will give entire satisfaction.

Stromberg-Carlson Receivers are specially designed to suit Australian conditions, and are pre-eminent in range and tonal quality.

All of our Receivers fit into the handsome wooden Console illustrated. Into the bottom compartment can be fitted the Batteries or a Dynamic Speaker.

PRICE - - - - £11/15/-

(Cabinet only.)

All Models Illustrated are mounted on steel Chassis, and are housed in handsome Steel Cabinets, finished two-tone Brown, with Golden High-lights. They are equipped with Beautiful Old Gold escutcheons, and are all essentially "one-dial control" machines.

Stromberg-Carlson Treasure Chest
BATTERY 3.

Gives a rare opportunity to people of slender means to own a quality Receiver, housed in a handsome steel cabinet, which is of the same design and finish as our dearest model.

Price (Receiver with Valves) £10/13/6

(Batteries and speaker extra.)

Stromberg-Carlson Treasure Chest
ALL-ELECTRIC 6.

(*7 *Valves in all—see footnote.*)

No Batteries—you simply plug into your electric light socket. Specially developed for 1929-30 trade. Similar in design to our "Battery Six," and giving equally gratifying results. It is the Commonwealth's leading all-electric six.

Price (Receiver with Valves) £44/10/6

(Speaker extra.)

*IMPORTANT. All Electric sets require an additional valve for purely current rectifying purposes. Take notice that some manufacturers advertise "Electric Six" with only six valves in all or the "Electric Seven" with only seven valves in all, the former is really only a 5 valve receiver and the latter a 6.

Stromberg Carlson Receivers are Sold Only Through Authorised Stromberg-Carlson Dealers in City & Country.

Stromberg-Carlson Treasure Chest
ALL ELECTRIC 3.

(*4 *Valves in all—see footnote.*)

No Batteries needed—simply plug into your electric light socket. Noted for its selectivity and volume.

Price (Receiver with Valves) £27/5/-

(Speaker extra.)

*IMPORTANT.—All electric sets require an additional valve for purely current rectifying purposes. Take notice that some manufacturers advertise "Electric three" with only 3 valves in all or the "Electric four" with only 4 valves in all, the former is really only a 2 valve receiver and the latter a 3.

Stromberg-Carlson Treasure Chest
BATTERY 6.

Specially designed for 1929-30. It is a super-power receiver, meeting the Australian country demands for Daylight-Reception, and low battery consumption. It is replete with filtering devices, making for unsurpassed clarity of tone. Fitted with Jewell voltmeter panel.

Price (Receiver with Valves) £32/8/6

(Batteries, speaker and voltmeter extra.)

STROMBERG-CARLSON (A/SIA), LTD. 72-76 WILLIAM STREET, SYDNEY. 'Phone, FL 4184.

FACTORIES: 76 WILLIAM ST. and 86 CROWN ST., SYDNEY.

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1929.

Wireless Weekly

Incorporating Radio in Australia & New Zealand

Address
Box
3366 PP.
G.P.O.,
Sydney.

N.S.W. PERSONNEL FOR A.B.C.

Mr. Oswald Anderson, Manager for N.S.W.

Mr. H. P. Williams, Assistant Manager.
—Howard Harris.

Mr. A. S. Cochrane, Announcer and Children's Session.
—Howard Harris.

Mr. Basil Kirke, Organiser of Talks & Children's Session.
—Howard Harris.

Mr. A. C. C. Stevens, Announcer.
—Howard Harris.

Mr. Laurence Halbert, Announcer and Rehearsal Manager.
—Howard Harris.

Mr. Vern Barnett, Accompanist and Auditions.
—May Moore.

Mr. Ewart Chappie, Accompanist and Auditions.
—Howard Harris.

Mr. Horace Keats, Conductor.

Miss Kathleen Roe, Assistant Accompanist.

Mme. Evelyn Grieg, Advisor to Artists.

Mr. M. A. Ferry, Racing Commissioner.

IT is announced that Mr. Basil Kirke has been appointed to the duties of studio manager and announcer for 2BL, and organiser of talks and lectures for the A.B.C. in New South Wales.

Mr. Laurence Halbert has been given charge of all studio productions and rehearsals for 2FC and 2BL. In the past Mr. Halbert has combined with his duties of night announcer at 2FC the care of supervising and controlling the effects end of all studio presentations, a task for which his experience of the stage has well fitted him. In his new position Mr. Halbert will carry out the new policy of the A.B.C., to see that every item which goes over the air is rehearsed beforehand. Every artist will rehearse before Mr. Halbert before he or she performs over the air, and Mr. Halbert will make sure that every detail of the performance is perfect. He will also supervise the company's projected dramatic presentations.

Mr. Stevens will be transferred from 2BL to 2FC, where he will resume his duties as announcer.

Mr. Cochrane will remain at 2FC in his capacity as announcer, and will continue his children's hour as the "Hello Man."

The people who will be responsible for the arrangement of future programmes are all old friends, and need no introduction to listeners.

A new announcer is to be appointed to 2BL, but as we go to press no decision has been made.

Madame Evelyn Grieg has been appointed to a newly-created position as advisor to artists. The idea is that artists unacquainted with broadcasting conditions and the requirements of the public may consult Madame Evelyn Grieg, who will help them to choose their items, and will help them to suit their performances to studio conditions. Madame Grieg will hear them through their preliminary rehearsals, and advise them in all matters pertaining to broadcasting repertoire. Madame Grieg's advice should be worth a great deal to young performers; she has a great knowledge of classical music, and for many years was prominently associated with a big music firm in Sydney.

Miss Enid Baumberg has been given charge of New South Wales publicity. Already we have met Miss Baumberg, and are deeply impressed. What Miss Baumberg does not know about publicity wouldn't make a news story even in a Sydney newspaper. We have noticed that Miss Baumberg calls her staff, when she wants them to do anything, by the name of dear, and we hope the habit may extend.

Mr. Vern Barnett and Mr. Ewart Chappie will retain their positions as accompanists to the New South Wales stations, and will preside, as before, at all auditions of artists.

Mr. Horace Keats has been appointed conductor of all the A.B.C.'s New South Wales instrumental combinations. Mr. Keats says he is delighted to be back with the Dinner Quartet, which will be Miss Dulcie Blair, Mr. Vincent Aspey, and Miss Muriel Lang ('cello). Mr. Keats' position will involve the preparation of fifty-five sessions, using three hundred numbers, every week, which ought to keep him busy. He has been associated with broadcasting since its inception—nearly five and a half years—and was 2FC's first pianist.

BETWEEN YOU AND ME AND THE MICROPHONE.

We Attempt to Improve the Programmes

THE National Broadcasting Service, supplied by the Australian Broadcasting Company, is hunting for artists all over Australia, with application forms neatly printed in black on a white background. It seems that a new era in broadcasting is begun, and the Company has decided that a few decent artists may help it on its way, some way or other.

We have a warm spot in our heart for the new Company, and, noticing its call to all professional and semi-professional vocal or instrumental artists also included Other Artists, we decided to offer Mr. Doyle and his associates the benefit of our services, in our capacity as Other Artists.

For it has always been a matter for regret with us that our vocal abilities have never found favor in other than smoking room assemblies; and that our only instrumental accomplishment is with the bottle—we mean the ink bottle. But we felt we should shine as stars of great magnitude as Other Artists; moreover, we felt that here, at last, was a call to our sense of national responsibility; and that we should not be able to look ourselves in the face if we didn't respond to it.

Thereupon we filled in our name (James Jeames James, in confidence) and our address (M'Elhone Street, Woolloomooloo), and gave WIRELESS WEEKLY'S 'phone number; then we gave consideration to our professional name.

Now, there is such a thing as Tack in this world, and we DO know our onions; so we put down our suggested professional name as follows: Albert Benjamin John D'Oil. You see? No matter which one of the amiable gentlemen in projected control of broadcasting might consider our application, he would be certain to see in our professional name a promise of the perpetuation of his own, in honorable circumstances, throughout the history of the new era in Australian broadcasting.

Then we considered what class of work we could perform best, as Other Artists. As we have explained, we couldn't be classed as vocal artists or instrumental artists; so we wrote down, "Prepared to perform as Worn-out Soprano, Uncertain Bass, Tired Tenor, or Crook Contralto. Also can give imitations of bagpipes on the violin, crosscut saw on bass viol, and excellent renderings of Rachmaninoff's Prelude on the electric piano. Moreover, are prepared to imitate a Wurlitzer with ten whistles and a heart throb, and will guarantee humorous sketches which will make the public cry. Our course of lectures on the Home and Domestic Cookery will make an outdoor nation of Australia in three months." We marked this statement "(a)" for future reference.

After "Particulars of broadcasting experience (if any)" we wrote the encouraging monosyllable, "Unnecessary."

We took a stern view of fees for broadcast desired, considering that our art might have only a limited appeal, and that demands on our services, although regular, might be restricted. We therefore demanded three thousand pounds per appearance, as this, on a close estimate, seemed about as much as our life was worth.

We said we would be available for audition any time between midnight and dawn, as at these times we generally expected a cessation of our activities on WIRELESS WEEKLY'S staff; and we said we would be available only for inter-State work, as free travel always did appeal to our wandering instincts.

On a special sheet of notepaper we wrote: "(a) The class of work we have chosen may seem novel; but we feel sure it will prove as satisfying to Australian audiences in the future as it has always done in the past. Let us add that, if selected to work for you, we shall strive with might and main to please you. We recognise we have three sets of conditions to meet: Firstly, we must please Mr. Doyle; secondly, Mr. Albert; and thirdly, Sir Benjamin, or in case he gets measles, Mr. John Fuller. We feel convinced that we shall be able to satisfy all three. We should like to begin with a gala week, introducing all our novelties on the one night."

We are still awaiting the answer of the Australian Broadcasting Company. *They also serve who only stand and wait, the difference being one of fee only.*

James

Listeners We All Know.—No. 6

THE CHILDREN'S HOURITES

MR. COCHRANE tunes up the jolly old bells, and sends his pretty melodies over the air from 2FC, as the evening waddles on. In the manner which has become more and more habitual with the passing of five years, During this session Mr. Cochrane summons up the ghosts of his dead childhood, and lives again in the atmosphere of careless, stately Romanticism which veils the crudity of supposed Reality from the minds of children.

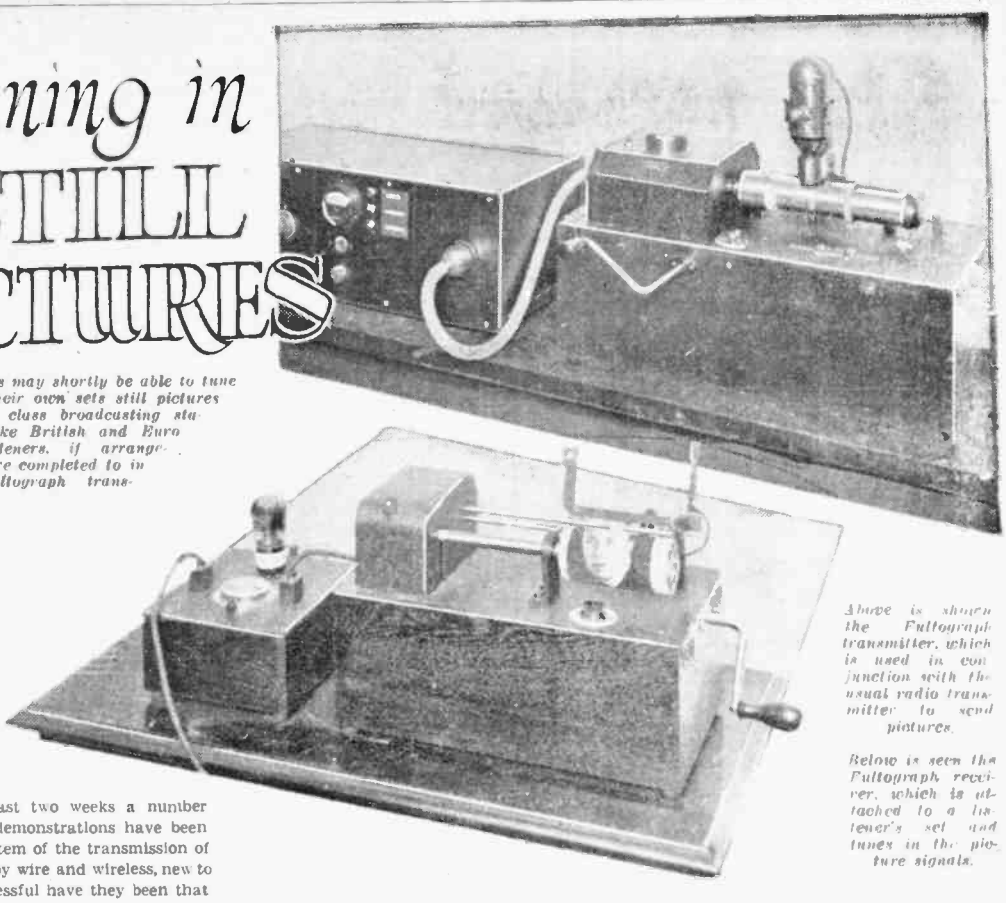
Mrs. M'Jones sits calmly in her chair, and knits while the session progresses. Mr. M'Jones, if he is home at the time, pretends to read the final edition of the "Sun." Now and then, Mrs. M'Jones smiles slightly, looks up, and catches Mr. M'Jones watching her. Quickly she resumes her knitting. They are "getting on in life"; and their children are all married.

The session ends. Mrs. M'Jones goes out to see how the potatoes are going. Mr. M'Jones sighs, and returns to the financial columns of the "Sun."

Thousands of Mrs. M'Joneses.
Hundreds of Mr. M'Joneses.

Tuning in STILL PICTURES

Listeners may shortly be able to tune in on their own sets still pictures from A class broadcasting stations, like British and European listeners, if arrangements are completed to install Fultograph transmitters.



Above is shown the Fultograph transmitter, which is used in conjunction with the usual radio transmitter to send pictures.

Below is seen the Fultograph receiver, which is attached to a listener's set and tunes in the picture signals.

DURING the last two weeks a number of successful demonstrations have been given of a system of the transmission of still pictures by wire and wireless, new to Australia. So successful have they been that it is possible that regular picture transmission sessions may shortly be broadcast from our A class stations and picture receivers placed on the market.

The Fultograph system of picture transmission, as this method is known, was developed some years ago, and has enjoyed a considerable amount of popularity in Europe.

Three English stations, 2LO London, 5XX Daventry, and the British Government station at Rugby are now using the Fultograph system, the two former for sending pictures to their listeners, and the latter for transmitting news in type script to ships at sea. The decision also of the German broadcasting authorities to transmit Fultograph pictures as a regular part of their evening programmes brings us a great deal nearer the time when the illustrated news bulletin will be a regular feature of broadcasting. That such a thing is possible has been clearly proved in England by the transmission of photographs of the last boat race very shortly after Cambridge had passed the winning post. Photographs of the final football cup tie were also transmitted from London and Daventry, and it can only be imagined how enthusiastically these would be received. Since then arrangements have been made for pictures to form part of programmes from Prague, Budapest, Brussels, Rome, Madrid, Barcelona, Hilversum, and Radio-Paris, and most of these services have already commenced.

The Fultograph has been brought to Australia by Mr. William Blogg, who is handling the device through Amalgamated Wireless. Negotiations are now taking place for the broadcasting of Fultograph pictures in Australia and New Zealand, and it is confidently hoped that regular services will soon be in operation.

On the commercial side Fultograph is also being extensively used in Europe by leading newspapers, one of the services adopted being the equipment of a motor van with photographic apparatus and a portable transmitting outfit. This van is taken out to sports, race meetings, etc., the necessary photographs are taken, films prepared, and transmitted over post office telephone lines direct to newspaper offices throughout the country. Excellent pictures of the Grand National Steeplechase, the departure of the Graf Zeppelin airship from its hangar at Friedrichshafen, and the May Day riots in Berlin appeared in London newspapers within an hour and a half of the incidents happening. So clear was the Fultogram of the airship that the "Daily Chronicle" was able to enlarge it to nearly four times its original size, making a block measuring 8¾in. x 7¼in.

From the results already attained it is reasonable to assume that in the very near future photo-telegraphy will become the normal method of transmitting news pictures.

The Fultograph is designed to be operated in conjunction with any standard radio receiver capable of medium L.S. strength. To transmit a picture, photo., print, etc., it is necessary to obtain same in the form of a film negative. This is then wrapped around a glass cylinder, inside of, which a photo-electric cell is placed. The general principles of the photo-electric cell are known to most of our readers, but to the few who may not understand it we would mention that the cell consists of an anode and cathode as with a valve. The anode is prepared with a special chemical, and when a potential is placed between the anode and cathode current will flow, but the amount of current is dependent on the intensity of light playing on the anode, a diminution of light causing an increase in the resistance, and therefore a corresponding decrease in the current flow.

A special lamp is fitted on the transmitter, so adjusted to permit of a fine pencil of light being concentrated on the film. It will therefore be realised that with the cylinder rotating the amount of light playing on the photo-electric cell is governed by the degree of density of the film, and electrical impulses are set up in the circuit in direct proportion.

As these impulses are uni-directional, it is obvious that some method must be employed to transmit them via the usual radio transmitting channels; at the same time it is of paramount importance that the actual impulse current is not altered, even in a slight degree, during the process. (In the transmission and receptance of radio speech and music a slight latitude may be allowed, as a limited variation in the characteristic is not easily discernible to the average ear, but in the case of photographic reproduction any variation would be readily detected.) Therefore oscillatory circuit is employed with a frequency of 1000 cycles (this frequency having been found as the most suitable to audio frequency amplification), and is modulated in exactly the same way as if a note of a 1000 cycles was set up in front of the microphone. The electrical impulses are superimposed on to the waves set up by the oscillator.

We will now turn our attention to the Fultograph receiver, which, as previously mentioned, is coupled to an ordinary radio

receiver and for that matter is connected across the L.S. terminals in parallel with the loud speaker. The receiver consists of a clockwork motor, which indirectly rotates a metal cylinder, upon which the specially-prepared paper is placed.

Mr. William Blogg, who has brought the Fultograph to Australia.

A stylus bar is fitted and arranged to move along the cylinder in a horizontal direction, the stylus being in contact with the paper and in the direct electrical plate circuit of a valve in the receiver. The standard method of rectifying is effected by the rectifying valve of the radio set, but, as we still have one half of the wave, which comprises part of the results set up by the oscillator, in addition to the impulse effect from the photo-electric cell, a further stage of rectification is necessary to eliminate the effects of the former. This is carried into effect by the aid of the valve in the Fultograph receiver equipment; a suitable grid bias precludes current from flowing in the stylus circuit until the incoming rectified energy is superimposed on the grid.

When the electrical impulses, which have now been finally rectified, pass from the plate they go via the stylus, and where the stylus is in contact with the paper a chemical action is set up, causing a brown mark to appear. The density of this mark is proportionate to the current, which in turn is proportionate to the current passing from the photo-electric cell transmitter, and therefore the correct degree of light and shade appears on the paper.

In a later article the Fultograph method of synchronisation, which is automatically effected from the transmitter, will be described.

FIRST NIGHT FEATURES FROM 2FC

THE programmes for 2FC for the first two nights under A.B.C. management have been prepared deliberately to show the public what broadcasting can be when expense is no consideration.

Almost every item may be termed a main feature, but dominating the whole arrangement will be Brailowsky, the Russian pianist, who has been engaged at the highest fee yet paid in Australia for a studio performance, to give a recital over the air before he returns to London. Brailowsky has been engaged to make another appearance from 3LO on its opening night, July 22. He sails for England on July 23.

Keith Grant, New Zealand's leading baritone, will make his first appearance in Australia.

The Big Four, a well-known and popular male quartette, will give its first studio performance.

A full orchestra, which will in future be known as the National Broadcasting Orchestra, and which will become a permanent studio feature, will play for the first time, under the conductorship of Mr. Horace Keats, who is now busily proceeding with its organisation and rehearsals.

The Prime Minister, Mr. Bruce, and the Postmaster-General, Mr. Gibson, will speak from Canberra, giving their blessing, or something similar, to the A.B.C.'s first night. They will be introduced by Mr. Stuart Doyle.

And a twelve-piece dance band, said to be the largest studio combination yet introduced into Australia, will commence business. There will be other features, but these are the more outstanding.

On the night of July 18 Jim Gerald will make his first appearance as a broadcasting artist. Jim Gerald is a popular comedian and manager of revues, who has succeeded very well with Fullers' Vaudeville.

On the same night the Metropolitan Grand Opera Stars, who have lately toured Australia, Alfred Cunningham, Rene Maxwell, Madame Lilian Gibson, and Charles Nicis will give their first combined studio performance.

The company is organising, and will present at regular intervals a permanent company of wirelesss singers. This combination of picked voices will be used in the future as a foundation for studio operatic productions. The company is also arranging the first appearance in Australia of Lazlo Schwartz, a well-known Hungarian violinist and of Dawn Asscheton, the English soprano, who have been touring the world, broadcasting and giving concerts for the past four years. Of these things we will speak more fully later on.

On pages 50 and 54 will be found complete details of the first programmes of the Australian Broadcasting Company, for Wednesday and Thursday next. The opening programme will be transmitted on dual wave lengths.

Whether it will be possible to keep up the first-night form is problematical, as 2FC's future programmes will be supplied on a basis of less per license fee than is now being received; nevertheless, Mr. Stuart Doyle has said that his main intention is to double license figures, and in this event the A.B.C. may actually be in a position to broadcast such programmes regularly.

Sunday Night

Sunday night musical sessions will be a feature of the new programmes.

These will occupy two hours, from 8 until 10 p.m.

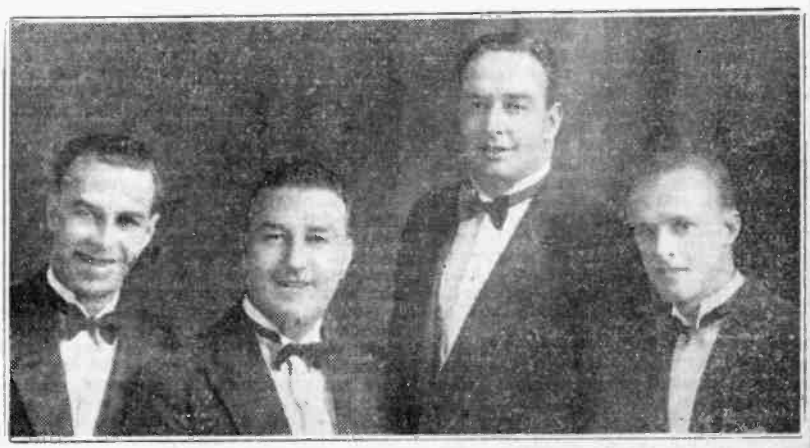
On each alternate Sunday the programmes from 2FC will be provided by Ted Henkel's Capitolians, a musical combination consisting of the best of Mr. Henkel's Capitol orchestra, together with various concert artists, introduced into a musical entertainment, which will become a great feature of Sunday night programmes.

On other Sundays Will Prior will give a general musical entertainment lasting two hours, and these two conductors, who have had wide experience in broadcasting in the United States, will bring all their ability to bear upon providing unique, novel, and entertaining programmes to the listening public.

It is hoped to arrange for these programmes to be relayed to 3AR. Similarly, in Melbourne, Bob M'Questen's Melodians and Stan Porter's Symphony Orchestra, with assisting artists, will supply Sunday night's entertainments from 3LO, which will be relayed probably to 2BL. The company expects that those various organisations, bringing to bear an entirely different and separate set of ideas on broadcasting, will be able to provide entertainment of a unique nature on Sunday night.

Associated with Will Prior will be Price Dunlavy on the Wurlitzer organ at the State Theatre, and Fred Scholl will also be regularly heard on the Capitol organ.

In addition to the above, from time to time, big musical programmes from other sources will also be provided.



The Big Four, one of Australia's most popular quartettes, who will be heard in the early programmes from 2FC.

An "All-electric" Ship

Something new in ocean-going ships—the Brunswick electric driven, loaded, and guided.

"ALL-ELECTRIC" radio receivers, trains, irons, and a hundred domestic applications have become familiar to everyone, but the "all-electric" ship is something just a little newer than these. One—the Brunswick—sailed into Sydney Harbour last week.

Not very handsome this, the latest development in sea-going vessels, for she lies long and low in the water, and is designed for the sole purpose of carrying motor spirit for the Atlantic Union Oil Company, but is efficient and clean nevertheless. She brought four million gallons of motor spirit to Australia, which was discharged in approximately 24 hours through cargo pumps, each capable of discharging 81,000 gallons an hour. The vessel has ten pairs of main and summer tanks, and these and all the piping in connection therewith have been specially arranged for the carriage of light oils.

When you go aboard and look down from the bridge on to the long grey deck and see the oil drums being unloaded you miss the puffing of the old steam winches. All deck machinery is electrically driven—windlass, capstan, and winches—and there is only one hold—away up in the bow; the rest of the deck is a maze of piping, wheel-controls, and electric motor pumps.

Accommodation for officers and crew, engines, and steering gear occupy the after-part of the ship. You go up a series of steps to the bridge, and look interestedly at the steering gear, in which is included the gyro compass equipment.

We print the photograph of the Sperry two-unit type of gyro pilot, which is situated on the bridge. This, however, is only the complement of the Sperry gyro compass, which is situated behind, in the chart room. The gyro compass is a common enough fitting, seen on many ships, but the two-unit gyro pilot is unusual. The first factor, then, is the gyro compass, which points the way. The second factor is the gyro pilot, which steers the ship.

So let us explain how the gyro compass points the way. The main part of the gyro compass is a steel wheel, about a foot across, revolving so fast that you'd hardly believe it. Now it is the peculiar property of steel wheels revolving rapidly on suspended and freely moving axes that you can't move them one way or the other. They stay put, like women who have made up their minds on new spring hats.

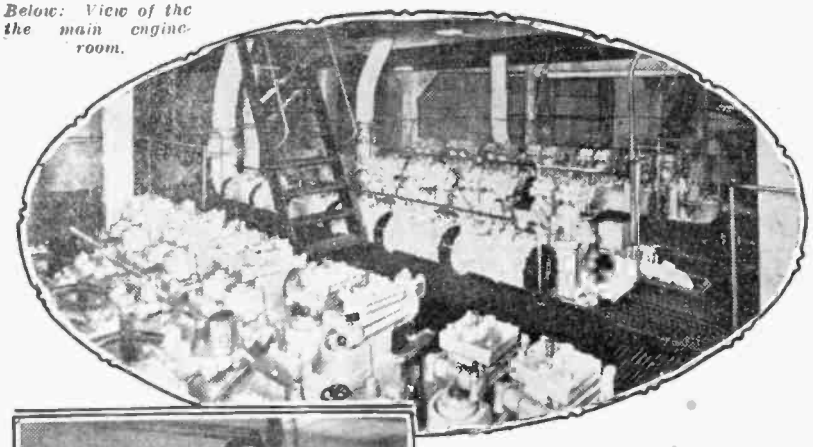
So when the modern mariner wants to set his course he points this steel wheel in the direction he wants the ship to go, and turns on the juice. No matter how the ship turns in its course, rocks, shakes, or shivers, that steel wheel will continue to revolve on its axes, pointing always in the direction in which it was first set by the modern mariner. You can try to push it round, if you like, but you generally can't move it. If you can, it comes back again afterwards.

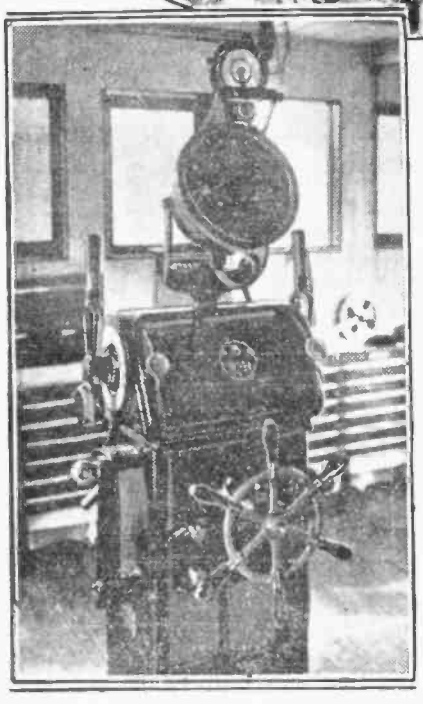
Now, when the ship moves a third of a degree from the set course contact is made with a small motor, which transmits an electrical impulse through to the gyro pilot on the bridge, which makes a note of the fact and transmits another impulse to the machinery which operates the steering gear, which operates the rudder, which turns in the required direction, and pulls the ship back on its course. As soon as the correct course is reached the revolving steel wheel of the compass comes once more into line with the direction of the ship; contact with the exciting motor is broken, and the rudder comes back to normal, and everything is well again, until the slight swing of the ship, caused by the action of the rudder, brings her over one-third of a degree the opposite side. Thus steering is a constant see-saw of thirds of degrees; and the compass indicator swings from side to side all day and all night.

If you look very closely at the photograph of the gyro pilot unit, which we have been at such pains to reproduce, you will see that it divides itself into three parts. The lower part holds the wheel of the ship, and the lever at the side acts as a kind of switch, by which one can disengage the helm from the gyro compass and make steering a human job. The case, marked B.T-H in a circle, has a lever on each side, which controls—actually controls—the engines; thus making it possible to control all the ship's movements from the bridge. A one-man job. And the round circle affair on top is a half-enclosed dial, which reproduces the movements of the gyro compass in the chart room. On the wall you can see a set of meters, which indicate the amounts of electric energy in circulation. Out of sight, on the left hand—we can't trust ourselves with port or starboard—wall, a chart of the ship's course draws itself automatically as the voyage progresses.

The steering gear, manufactured by Messrs John Hastie and Co., Ltd., of Greenock, comprises a Hele-Shaw motor-driven pump operating in conjunction with a pair of opposed hydraulic rams. The control of the gear from the bridge is electrical, and can be operated either by a small hand-wheel on the main motor bridge controller, or automatically by the gyro pilot. In addition, mechanical control is fitted on the upper deck, just above the gear, and powerful hand gear is arranged near to this position, thus

Below: View of the the main engine-room.





Left: The Sperrygyro compass.

providing against a total breakdown of the power gear.

No cold forecastles for the crew. In fact, they live like princes, in comparison with old-time crews. Effective steam-heating arrangements have been installed in the accommodation, so as to cope with the extremes of temperature met with when the vessel is on service, and for the preservation of their provisions a refrigerating plant of the ammonia type is fitted on the main deck over the engine-room. This machinery operates in conjunction with two cold-storage rooms and a common handling room, arranged on the deck above. An ice-making tank is also installed.

The engine-room looks something like a cathedral, and sounds like nothing on earth. And when we went over it only one of the four Diesel engines was running. These engines are set in column of fours, parallel with the sides of the ship, and when they are working they look like a lot of jumping yellow bull-frogs. That, of course, is only our impression. The truth about them is that the four Diesel engines, which are directly coupled to the B.T.H. main generators, are of the Carels-Ingersoll-Rand type built under license in Belgium by Messrs. Carels Freres, of Ghent.

Each operates a 600 kilowatt erectric generator, which supplies continuous current for propelling purposes, at 250 volts. Each engine also drives an auxiliary 75-kilowatt, 250-volt generator. The main generators are combined to drive the main propelling motor, which does very well with ninety-five revolutions a minute from the propeller shaft. This drives the ship at about eleven knots an hour.

The main generators are electrically coupled in series; and, although all four are in operation at full power, three, two, or only one set may be used for reduced power, the combined voltages being 1000, 750, 500, and 250, according to the number of sets on the propelling circuits.

The main propelling motor is rated at 2800 S.H.P. at 95 r.p.m. It comprises two units, each complete, with a separate magnet frame, armature, and commutator, the two armatures being electrically connected in series and mounted on a common shaft, which is supported between two pedestal bearings. As the propelling motor consists virtually of two motors in series, it is possible to develop power for about three-quarter speed with only one-half of the motor in commission. All the propelling generator and motor fields are separately excited from one of the auxiliary generators. Starting, stopping, and reversing of the propelling motor are effected entirely by varying the excitation of the main generators or generator, as the case may be.

The main switchboard, from which all the engines are controlled, goes from side to side of the ship, and has an overall length of thirty feet. It has eleven panels. All the engine room auxiliaries, like the deck machinery, are electrically driven.

The chief, who showed us round and demonstrated the R.C.A. "E.T. 36—265" wireless set, a sister of which is installed on the Atlantic liner, Leviathan, told us the Brunswick could be operated by twelve men, and they could even cut that number down. He expects to see wireless-operated ships in ten years' time. We could say, "What are we coming to next, or where will it all end?" but we disdain such exclamations. They disturb our air of aristocratic repose. We leave them to the Seamen's Union of ten years hence.

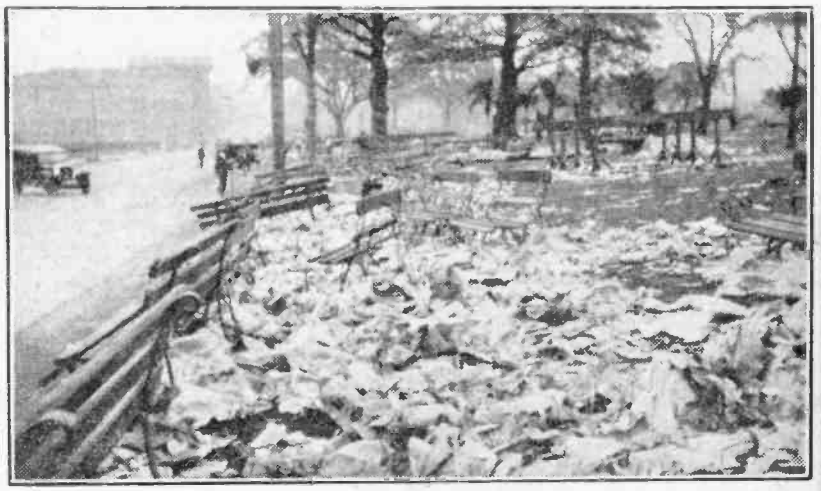
As we were leaving we paid a surprise visit to the galley. And there—what do you think?—the cook was cooking over a coal fire!

Is "Five o'Clock Girl" Last of 3LO Theatre Broadcasts?

THE broadcasting by 3AR of "The Five o'Clock Girl" on Wednesday night, July 10, was probably one of the last transmissions from His Majesty's Theatre or any of the J. C. Williamson Theatres, from 3LO or 3AR. After the successful theatre broadcasts during the last five years, including every production of importance, listeners will miss these popular features in 3LO's programmes, especially when grand opera and such successful plays as the "Desert Song" and "Rose Marie" are being produced. However, it is the new order of things, and listeners will, no doubt, get instead productions from Fullers' Theatres.

COMMUNITY SINGING

Listeners are reminded that they need not fear the discontinuance of the Monday and Thursday community singing gatherings which have been conducted by 3LO for so long that they have become quite an institution, so to speak. When the change in broadcasting control takes place, the popular "Herald" station, 3DB, will broadcast the bi-weekly community singing, which will be conducted by Mr. G. J. Mackay, and at which the usual novelty items will still be featured.



The above photograph illustrates one of Mr. G. Cooper's own personal "gardening" problems, which he will mention over the air from 2BL on Saturday next. Hyde Park at 6 a.m. after a holiday crowd. It is part of Mr. Cooper's responsibility to have this cleared up by the time people begin to come to the city.

Statement of the POLICY *of the A.B.C.*

WILL PRIOR, PRICE DUNLAVY, and TED HENKEL, whose programmes will be heard regularly from 2FC and 2BL.

Many changes are foreshadowed in the Australian Broadcasting Company's first statement of definite policy, given below. Rosters of programmes for the new era of broadcasting are published overleaf. A statement of the main personnel which will operate the two New South Wales stations, is made on page 3.

MR. STUART F. DOYLE, chairman of directors of the Australian Broadcasting Company, Ltd., after a careful survey of the whole position with his fellow directors, Sir Benjamin Fuller and Mr. Frank Albert, made the following statement last week:—

"We have decided upon a new roster of hours, which has been approved by the Government, to operate from 2BL and 2FC.

LONGER HOURS.

"Under the conditions of contract, our company is permitted to reduce the transmission hours of the Sydney stations by 2841 per year, but instead of this we propose to increase their hours by 286 per annum. In this we have the hearty co-operation of Mr. H. P. Brown, Director-General of Posts and Telegraphs, who has agreed to supply technical transmissions for such longer hours as we mutually agree to be expedient.

"We feel that to give the best service possible to the listening public, and to make full use of the talent available for broadcasting, the call is upon us to extend rather than reduce hours. It is our intention to canvass every avenue open to the utility side of broadcasting, and it is hoped to offer features both from the musical an entertainment points of view, which will provide for all tastes in the community.

MUSIC UNINTERRUPTED

"Our first definite principle has been to establish, as far as possible, a continuous programme of music from either one station or the other right throughout the broadcasting hours. The second principle we are insisting on is the elimination of duplication which has occurred so frequently hitherto in the transmission of market reports, news services, mails, shipping, racing, and the children's sessions. Where any repetition of a feature must occur in future, it will be in a progressive form, bringing the information given right up to the moment. It is felt that too much time was being occupied in the children's hour by birthday calls, and it has been decided to have these taken out of the early evening session and placed at a more suitable time in the early morning transmissions from one station. This will allow the children's evenings to be devoted more to entertainment and matters of an acceptable, educational nature.

EDUCATIONAL

"We have turned our attention towards making a greater feature of popular and musical education. We know we will secure the co-operation of the University, the Department of Education, and the Conservatorium, also men and women prominent in the community who are interested in the development of this side of the National Service have offered their whole-hearted assistance.

"Women's interests are to have special attention. Domestic science, hobbies, and problems, which come into the daily lives of our womenfolk, will be broadcast in this session, arranged for those engaged in home duties.

INSTRUMENTAL MUSIC.

"No fewer than three permanent instrumental combinations are to be established in the studios, and will perform in the morning, afternoon, and night sessions. We also intend to develop public taste for symphony orchestral performances by a series of reciprocal relays of programmes, in which the leading orchestras of Sydney and Melbourne will be featured. As the result of the invitation issued by our company through the press we have received a large number of applications from artists who have not hitherto taken part in broadcasting, and from these and the material which is already available to us our executives are now preparing what we anticipate will be very bright programmes.

TRADE RECITALS.

"We are definitely improving the sessions throughout the day, and intend to raise the standard of the evening performances in proportion to the general improvement in the other parts of our service. Particular attention has been paid in compiling our routine to the interests of traders for demonstration purposes. Punctually from 7 in the morning until 11.30 p.m., with one or two small breaks when the stations are closed down, the trader will have at his disposal the right class of music for him to show that those intending to secure sets and take out licenses will be able at all hours of the day to tune into our musical programmes.

NO ADVERTISING.

"Care has also been taken in securing the best sources of reliable information in regard to market information, and we intend to see that those resident in the hinterland of these great States will have a service in full keeping with their important industries.

"No advertising, direct or indirect, will be broadcast from either of these stations under the new regime.

MORNING ORCHESTRA.

"In New South Wales and Victoria, where two 'A' grade stations in association are operated by the new company, programmes will be so arranged that music will practically always be available on one station or the other, and whenever talks or oral subjects are being broadcast on one station it will always be announced what is on the other station, and vice versa.

"A feature will be made of a morning orchestra, to operate on all occasions to enable actual studio music of the highest possible quality to be broadcast in the morning.

LUNCHEON MUSIC.

"Another feature will be luncheon music, between 1 and 2 p.m. It is hoped that every restaurant and cafe will install a set, and thus be enabled always to have lunch-time music for their customers. This will be specially prepared and broadcast from the main station in each State. This will not be interrupted by any reports that will disturb the sequence of the lunch-time music, and to all intents and purposes, it will be the same as if the cafe or restaurant had its own orchestra.

CHILDREN'S SESSION.

"The children's session will commence earlier and will only appear on 2FC programmes. Strong efforts will be made greatly to improve the service between 6 and 8 p.m. It is recognised that during this period there are thousands of listeners who go out for their entertainment a little before eight o'clock. It will be so arranged that music will always be available to them during this period.

CHURCH SERVICES.

"Church services will be continued. There will be two church services on Sunday morning, one from each station, but on Sunday night there will be only one church service from 2BL in New South Wales. 2FC and 3LO will concentrate on a big musical programme for Sunday night from 7.30 until 10 o'clock. This will probably be the biggest programme of the week, as it is thought by the directors that on this night more people are interested listeners than on any other night in the week.

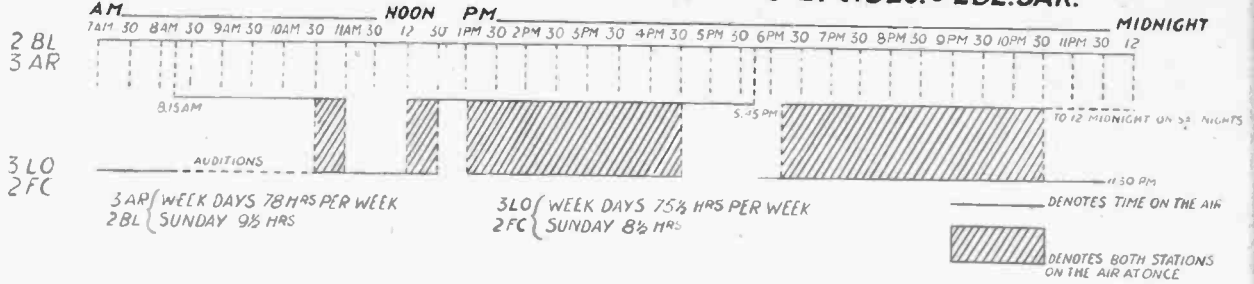
"Church services generally, will be re-organised on a basis that will continue the transmissions from the particular denominations previously broadcast, but at the same time, the services by arrangement with the churches will be prepared specially for listeners. The sermons will be of religious, educational, and national interest, whilst recognised broadcast artists will sing sacred music during the services, so that good reproduction may be received on the sets of those who listen.

SPORTING.

"In the sporting services, we intend to retain those features that have been so popular in the past, and have made arrangements for considerable improvements in several directions.

"We offer these new rosters covering extended hours as the first gesture from the company of its intention to provide bigger and better programmes."

NEW ROSTER OF HOURS FOR STATIONS 2FC. 3LO. & 2BL. 3AR.



2FC

ROSTER OF HOURS AS FROM JULY 17, 1929.

MONDAY TO SATURDAY.

EARLY SESSION—7 A.M. TO 8.15 A.M.

7.0: "Big Ben" and weather forecast.
7.5: Early-rising music.
7.40: Breakfast news.
7.45: Mails and shipping.
7.45: What's on to-day?
7.50: Birthday calls.
8.0: Music from the studio.
8.15: Close.

MORNING SESSION—10.30 A.M. TO 12.30 P.M.

10.30: Announcements.
10.32: Sporting—Monday, Racing Observer; Tuesday, Racing Observer; Wednesday, general sporting talk; Thursday, Racing Observer; Friday, to-morrow's sporting events; Saturday, Racing Observer.
10.45: Organ recital.
11.0: Household helps—Monday, cooking; Tuesday, hints to housewives; Wednesday cooking; Thursday, domestic notes; Friday, cooking; Saturday, week-end suggestions.
11.10: Light orchestra.
12.0: "Big Ben" and Stock Exchange.
12.5: Monday, fiction talk; Tuesday, literary talk; Wednesday, a "Dickens" story; Thursday, with the poets; Friday, a new story; Saturday, what to read for the week-end.
12.20: Midday market reports.
12.30: Close.

THE LUNCH HOUR—1 P.M. TO 2.30 P.M.

1.0: Lunch to music with the Station Orchestra.
2.0: Stock Exchange, second call.
2.2: Popular Education—Monday, talk arranged by a Sydney University lecturer; Tuesday, broadcast English; Wednesday, a lecturer from the Department of Education; Thursday, Nature's wonders; Friday, talk on music, with illustrations; Saturday, what to do in the garden.

THE RADIO MATINEE—2.30 P.M. TO 4.30 P.M.

2.30: Station Orchestra, afternoon recitals, functions, and artists in the studio.
4.28: Stock Exchange, final call.
4.30: Close.

Note: On Wednesday and Saturday afternoons (race days) the station closes at 5 p.m.

EARLY EVENING—5.45 TO 7.55 P.M.

5.45: Kiddies' "Goodnight" stories—Monday, Uncle Bas, Aunt Willa; Tuesday, "Hello Man," Aunt Elly; Wednesday, Uncle Bas, Aunt Willa, and Marjorie; Thursday, "Hello Man," Uncle Ted, and "Sandy"; Friday, Uncle Bas, Aunt Willa; Saturday, "Hello Man."
6.45: The Dinner Orchestra.
7.30: Sporting news and views.
7.45: Organ recital.

EVENING PROGRAMME—8 P.M. TO 11.30 P.M.

8.0: Concert presentation.

NEW HOURS—NEW SOUTH WALES

2FC.

MONDAY TO SATURDAY.—7 a.m. to 8.15 a.m.; 10.30 a.m. to 12.30 p.m.; 1 p.m. to 4.30 p.m.; 5.45 p.m. to 11.30 p.m.
SUNDAY.—10 a.m. to 12.30 p.m.; 3 p.m. to 4.30 p.m.; 6 p.m. to 10.30 p.m.
On Wednesdays and Saturdays (Race days), 1 p.m. to 5 p.m.

Total	84 hours.
Against	82½ hours.
Increase, per week	1½ hours.

2BL

MONDAY TO SATURDAY.—8.15 a.m. to 11.0 a.m.; 12 noon to 5.45 p.m.; 6.15 p.m. to 10.30 p.m.
SUNDAY.—11 a.m. to 3 p.m.; 4.30 p.m. to 10 p.m.
On Saturday to 12 midnight, for dance music.

Total	87½ hours.
Against	83½ hours.
Increase, per week	4 hours.
Total increase per annum, 286 hours.	

10.15: To-morrow's programme and announcements.
10.20: Dance music.
11.30: Close.

SUNDAY PROGRAMME

THE CHURCH HOUR—10 A.M. TO 12.30 P.M.

10.0: Announcements.
10.5: Studio music.
10.30: This morning's news.
10.45: Music, leading to—
11.0: Church service.
12.15: Music.
12.30: Close.

AFTERNOON CONCERT—3 P.M. TO 4.30 P.M.

3.0: Concerts from outside sources, pleasant Sunday afternoons, band and organ recitals, and studio items.
4.30: Close.

EVENING PROGRAMME—6 P.M. TO 10.30 P.M.

6.0: A programme of instrumental music from the studio.
6.40: Address suitable to the day by a clergyman, professor, or prominent man.
7.0: Orchestral music.
7.30: Grand concert programme.
10.0: Meditation music.
10.30: Close.

2BL

ROSTER OF HOURS AS FROM 27th JULY, 1929.

MONDAY TO SATURDAY

OPENING SESSION—8.15 a.m. to 11 a.m.

8.15: Music for every mood.
8.45: "Interest Item" on outstanding events of the day.
9.0: MONDAY: Light music and songs.
TUESDAY: A Bunch of Ballads.
WEDNESDAY: An Old Folks' Programme.
THURSDAY: A Melange of Mirth and Melody.
FRIDAY: Songs and Choruses.
SATURDAY: A Musical Pot Pourri.
9.30: British official wireless news.
9.40: New music.
10.10: The Ladies' Club hour (Monday to Friday). Saturday, Gardening talk.
10.30: Studio Light Orchestra.
11.0: Close.

MIDDAY SESSION—12 NOON to 2.30 P.M.

12.0: Station Orchestra.
1.0: A glance at the afternoon papers.
1.15: Women's "Interest Talk" (Monday to Friday). Saturday: Music.
1.30: Traders "Selling the Set" Music (Monday to Friday). Saturday, Music.
2.0: At the Console.

AFTERNOON ENTERTAINMENT—2.30 P.M. to 5.45 P.M.

2.30: Business Efficiency talks.
2.45: The Magic Carpet—Travel and Adventure.
3.0: Musical programme.
3.30: Dance Band. With artists, sport, news, and announcements.
4.45: "The Trade Hour" (Demonstration music).
5.45: Close.

Note: On Saturday afternoons, sporting descriptions at 3 p.m., with a resume at 5 p.m. to 5.15 p.m.

THE DINNER HOUR—6.15 P.M. to 7.55 P.M.

6.15: The Dinner Orchestra.
6.45: THE YOUNGER SETS—
MONDAY: Boy Scouts.
TUESDAY: Girl Guides.
WEDNESDAY: Bigger Boys.
THURSDAY: Bigger Girls.
FRIDAY: Girls' and Boys' Athletics.
SATURDAY: Tales of Adventure.
7.5: Markets.
7.20: News.
7.30: Dinner quartet.
7.55: What's on the air to-night?

TO-NIGHT'S PRESENTATION

8.0: Concert programme.
10.30: Close.

Every Saturday night the Station will give Dance music from 8.30 p.m. till midnight.

SUNDAY PROGRAMME

MIDDAY SESSION—10.55 A.M. to 3 P.M.

10.55: Announcements.
11.0: Church service.
12.15: Studio presentation of a specially-arranged programme of music.
2.15: The "Cheer-Up Society."
2.30: Half an hour's music from the Great Masters.
3.0: Close.

LATE AFTERNOON SESSION—4.30 P.M. TO 6 P.M.

4.30: Organ and Band Recitals and studio programmes.

EVENING SESSION—6 P.M. TO 10 P.M.

6.0: For children in the hospital.
6.40: Studio music.
7.0: Church service.
8.30: Night programme of studio concert, Band recital, Relay from Melbourne, etc.
10.0: Close.

PLANNING a RECEIVER

By ROSS A. HULL

The problem of planning a receiver to give a worth-while performance when the number of valves is limited.

WAY back in the dark ages, when "wireless" and "radio" were two things apart, the business of planning a receiver consisted of the getting together of an enormous variety of knobs, dials, switch-points, condensers, coils, and other apparatus, and the placing of them, in the most formidable possible splather, across and behind a large slab of wood and a larger slice of ebonite. If funds permitted the purchase of four valves, five dials, and seven knobs, the result would be a fair four valver. If, however, it were possible to augment the dials by six and the knobs by nine, then the receiver would be considered to have far greater possibilities. There was then much better opportunity, for instance, for display of great skill in twiddling deftly with one knob after the other, up and down the panel, in the process of attaining an effective adjustment. If the circuit was a "putriflx," or a "super-chloridyne," wondrous results could be expected of it. The results never seemed to eventuate, however, and enthusiasts were prone to arrange the coils and knobs in the most imposing manner possible, then trusting to their Maker to allow the thing to work.

Present practice in the design and planning of receivers is quite a different game. In countries where the radio science has made greater strides than it has in Australia one sees the existence of a series of basic considerations on which a sound design procedure is founded. In America, for instance, there is the selectivity factor, which must always be given first attention in the planning of a receiver. If the outfit, when completed, cannot separate fifty or a hundred strong signals that are likely to be spread across the band at any one moment, it is not worth planning. Then, the relative cheapness and availability of apparatus in that country make possible, as the second considerations, those of performance and ease of handling. Almost without regard to the number of valves used, the receiver is planned to permit the brilliant reproduction of music from a great variety of stations with the turning of one knob as the only major control.

In England quite a different set of conditions exist. There the interference problem is not nearly as serious, and the distances over which reception must be had are much less. Apparatus, on the other hand, is much more expensive, the net result being that reasonable cost with satisfactory selectivity go hand in hand as the considerations of greatest consequence. The design problem then is "by what sort of planning can we get enough sensitivity and selectivity to bring in the stations across the Channel with the least possible apparatus?" The number of controls and the appearance of the outfit appear to be beside the point.

The enthusiast who builds his own receiver is very greatly handicapped if he has no conception of the whys and wherefores of receiver planning. This article is intended as a sort of prelude to next week's story on "The Standard 4C Four"—a receiver in which an attempt has been made to attain a modern standard of performance with two valves less than are ordinarily considered necessary in other parts of the world. An understanding of the constructional article on the receiver will be greatly facilitated by a study of this article.

Australia has yet another set of conditions, and with them a different procedure in planning a suitable receiver. The relatively large prices asked for apparatus, together with the limit on the number of the stations (and the resulting possibility of freedom from interference troubles), has resulted in the number of valves becoming the one great consideration on which all planning is based. "The thing we need most of all today," one manufacturer of receivers said to us recently, "is a three-valve circuit that really will bring in 'inter-State' on the speaker." "Can you give me a two-valve circuit that will bring in Japan?" is the plea of wild-eyed enthusiasts visiting the office. "How can I cut out 2GB with three valves?" is, perhaps, the planning problem of others.

On all sides one finds receivers classified according to the number of valves, in addition, of course, to the type of circuit. There are few good, bad, or indifferent receivers—there are merely "four valvers," "three valvers," or "marvel ones." "Aw, yes, he ought to get good results—look at the number of valves he uses," is a common expression, in which there is invariably a gentle insinuation that he should be ashamed of himself, using so many valves to get those results.

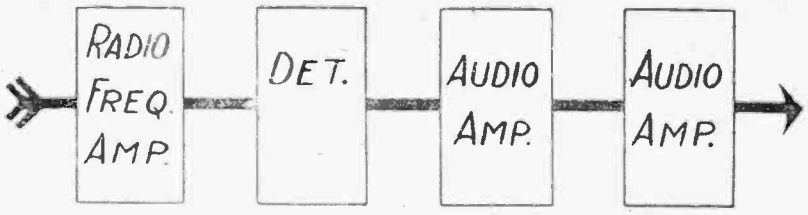
All of which makes rather futile discussion since there appears to be little hope that good valves and their associate equipment will drop in price overnight to the extent of making it possible for us to consider performance first and the number of valves last. We suppose we will always have to be content to describe "wretched twos" and "mediocre threes," when we know all the time that a couple of extra valves would change the receiver from an infernal nuisance to a joy forever.

Let us get down to brass tacks, however, and see just what it would be like planning a receiver for Australian conditions. We will assume that the number of valves is definitely limited to four; that the receiver is to be capable of operation from the A.C. mains; and that it is to have a single major tuning control. In this way, even if it only has four valves, we will be likely to arrive at an outfit which is reasonably modern in its operation.

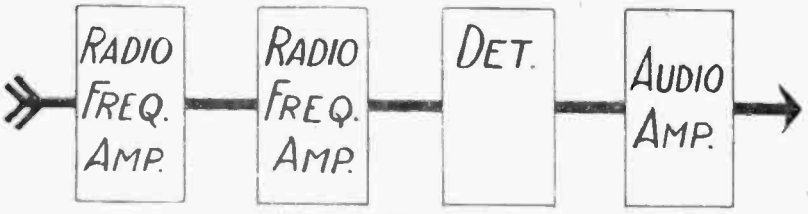
The first problem will be to decide upon the distribution of the valves throughout the receiver. Are we to have three audio frequency amplifiers and a detector, two radio frequency amplifiers and one audio valve, one radio frequency amplifier and two

FIGURING ON PAPER THE BEST WAY

"Planning a receiver," says the writer of this article, "is the setting up of an enormous display of alternatives and the selection from them in accordance with dictations of performance requirements, operating conditions, funds at hand and the apparatus available."



A



B

audios, or a detector and three audios? We know for a start that a detector without a tuned radio frequency amplifier ahead of it is not likely to provide sufficient selectivity for anything but local reception in cities like Melbourne or Sydney. We know also that three audio frequency amplifiers in the receiver are almost certain to mean a sacrifice in musical quality. We have the alternatives, then, of one or two radio frequency amplifiers, with two or one audio amplifiers.

In studying this point, we find that the output from the detector valve does not vary directly with the signal voltage on its grid but that it is proportional to the square of grid voltage. Also, we must know that the output of the audio frequency amplifiers varies in the same manner. From these facts we see that any gain or amplification in the radio frequency side is going to be squared twice on its way through the detector and the audio stage.

If we take a receiver with one radio and one audio amplifier, and add the fourth valve first as a radio, and then as an audio amplifier, we can see clearly what the difference in result would be. Assuming that the radio frequency amplifiers employ screen-grid valves, with an effective amplification of, say, 50, and that the additional audio amplifier would be of the usual type with an effective gain (over the transformer and valve) of 20, we can find by computation that the fourth valve used as an audio amplifier would increase the power into the loud speaker, on a given signal, by 400 times. With the fourth valve used as a radio frequency amplifier, however, the power into the speaker would be increased by just 6,250,000 times—a very worth-while sort of number! Even if the additional audio frequency amplifier provided an amplification of 50—the same as the radio amplifier—the power output would still be 6,257,000 times greater when the fourth valve was operating as a radio frequency amplifier.

It must be said, of course, that this gain of six million in the power output would not result in the signals becoming six million times louder. An output power increase of about a million times is required to change a very weak signal to one of loud volume. The increased output in practice, though, undoubtedly would permit loud speaker reception of signals that were inaudible without it. Clearly there is not much difficulty in choosing between the use of the fourth valve as a radio or audio amplifier! That is, providing the radio amplifier is to employ a screen-grid valve and that the cost of its associate apparatus is not to be too much greater than the cost of the valve operating at the audio end.

It must be very clearly understood that this tremendous superiority of the radio amplifier over the audio amplifier depends entirely upon the possibility of obtaining a high amplification in the radio tube. Our planning would be entirely upset if the additional amplifier in the radio end gave an amplification of, say, five times (as might be the case when an ordinary three-element valve is used). Under these conditions the difference between the power uptput on a given signal with the valve operating as a radio and then as an audio amplifier would be only about 200 times—a difference which would hardly be detectable.

The problem now is "how may we operate two radio frequency amplifiers with a single tuning control, while maintaining the amplification of both of them at a figure of, say, 50?" Immediately we get into deep water.

The first consideration will be the method of coupling the aerial to the grid circuit of the first radio frequency amplifier. In Fig 1 are shown four of the possible schemes. The methods marked "A" and "B" employ a resistance and a radio frequency choke in series with the aerial-ground lead, the first valve operating from the voltage developed across these units. In schemes "C" and "D" the aerial is coupled by means of a few turns to a tuned circuit across which the signal voltages are built up. These schemes, of course, are very much more effective than the other two. Not only does the tuned circuit assist in improving the selectivity of the receiver, but it, in conjuncton wth the voltage step-up action between the two coils, results in a voltage gain of perhaps 15 over that obtained with methods "A" and "B."

At the same time, we find that the tuned circuit methods are to complicate our attainment of single control since the electrical differences between this tuned circuit and those used to couple the valves are so great that its tuning condenser cannot be gauged effectively and operated from the same shaft that controls the others. It is, therefore, apparent that we must sacrifice the possible aerial coupling voltage gain and increased selectivity, made possible by a tuned circuit, if we are to obtain practical single control operation. Obviously the sacrifice will not always be justified by the advantage of single control—not when the addition of a second major control could result in an increase in the power output of the receiver of about 3000 times. Let us stick to the single control for the moment, however, and use the untuned aerial coupling arrangement.

The next problem involves a decision as to the method of coupling between the radio frequency valves. Four of the possible methods are shown in Fig. 2. At "A" is shown the "tuned anode" method; at "B" is indicated the "auto-transformer," or "tapped tuned-anode" arrangement; in schemes "C" and "D" a transformer is used, first with an untuned and then with a tuned primary. The considerations involved in the selection from these methods are quite complex. Though we cannot possibly outline them all, we can say that the plate impedance of the radio frequency valves is the most important factor of all. Since we are to use screen-grid valves (and A.C. valves at that), with a plate impedance of about 830,000 ohms, we find, after involved computations, that none of the schemes are to permit the valve to operate at high efficiency. We do decide, however, that the method "D," in which both the primary and secondary of the transformer are tuned, is to give higher amplification and more desirable selectivity than any of the others. At the same time, we come to realise that the complications of the two tuned circuits may or may not be justified by the improvement in effectiveness made possible. In this case, as in connection with scores of other details in the receiver, a definite decison is made possible only by consideration of the many governing factors. The apparatus available, the cost limitation, the performance requirements, and the operating conditions all enter into the question.

Still farther along in the receiver we meet the problem of the detector. Are we to use a grid-leak detection or plate detection? In either case, is a power detector necessary, and if so, how much power? In this case again we get into deep water—water so deep that leading radio engineers throughout the world are still swimming around in it and splashing in each other's faces. Grid detec-

OF COMBINING FOUR RADIO VALVES

"We suppose we will have to be content to describe 'wretched twos' and 'mediocre threes' when we know all the time that a couple of extra valves would change the receivers from an infernal nuisance to a joy forever," says Mr. Hull

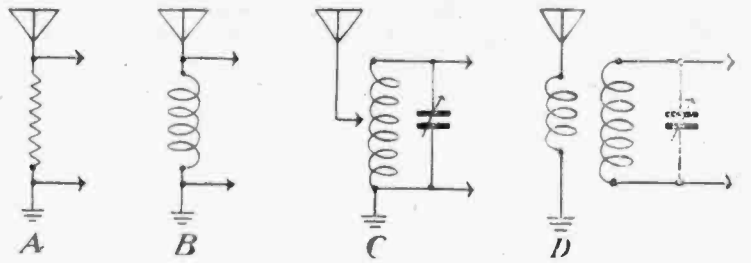


FIG 1.

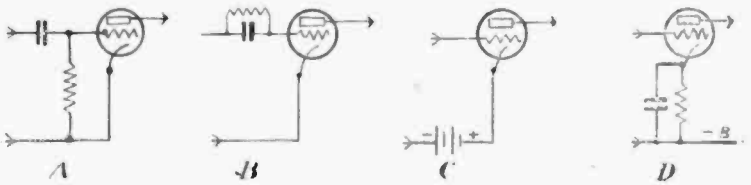


FIG 3.

tion is the sort of detection that we have used in our receivers since the earliest days. Plate detection is another method, just as old as the grid detection, but not as widely used. Engineers, in recent years, have revived the plate detection method in the endeavor to overcome distortion in the detector valve. Other engineers, however, have come forward to claim that plate detection should have been left to sleep—that even at its best it is greatly inferior to the grid detection scheme.

In Figure 3 are shown four possible arrangements for the detector valve. At "A" and "B" the ordinary grid detection is shown, the grid-leak in one case being connected between the grid and filament directly and across the grid condenser in the other. These methods have the advantage of high sensitivity, but they have the disadvantage of permitting grid current (which destroys to some extent the selectivity of the tuned circuit preceding the detector), and, in power detection, a high plate current which is likely to upset the effectiveness of the audio amplifier succeeding it. The plate detection circuits shown at "C" and "D" have the advantages of low grid and plate currents, but they suffer greatly on account of poor sensitivity. Once again the decision becomes a very delicate one influenced by a great many factors.

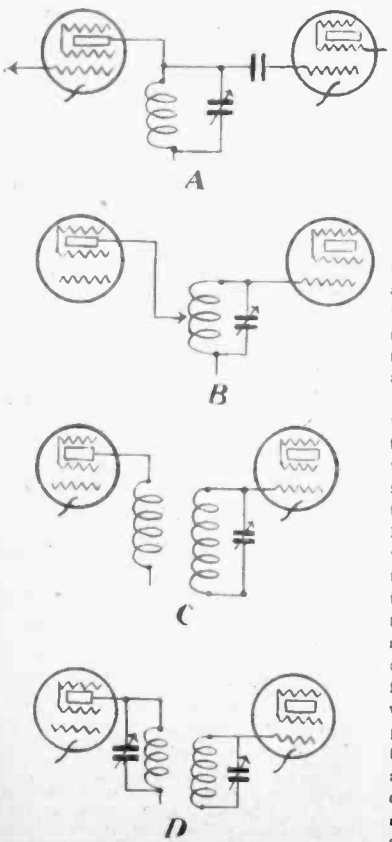


FIG 2.

Without much difficulty we could cogitate on this point to the extent of about five of these dreary articles, and even then we would have to make many assumptions which would not necessarily hold good in all cases. At this time we will merely have to state that, in our opinion, in the case of this four-valve receiver, a medium power grid detector would be desirable—that is, a grid detector with about 90 volts on its plate and grid leak and condenser values to suit.

Getting still nearer to the output end of the receiver and the speaker we can talk of the audio-frequency amplifier. Since it is to be a single stage only, in which we will require all the distortionless gain possible, the decision in this instance is not difficult. Resistance or plain choke coupling clearly would unnecessarily handicap the amplification in this case, since we know that a single transformer coupled stage is not cursed by the same distortion troubles as a multi-valve amplifier. About the best we can do, evidently, is to use the best possible transformer feeding the same suitable power output valve. But here again we strike a formidable problem—what sort of valve are we to use to feed the speaker? Well-founded data available tells us that we will need a valve capable of an undistorted power output of at least half a watt if the receiver is to be capable of a musical performance. Is, then, this valve to be an ordinary three-element power valve or a pentode? At about this stage we get into deep water full of sharks. We are hardly prepared even to hint an opinion lest we be swallowed by engineers and the representatives of tube interests.

Just as soon as we have decided upon the fundamental electrical arrangement of the receiver we come to the business of selecting apparatus for it. At first thought this would not appear to be a difficult problem in Australia, where components from England, the Continent, and America are available. After careful investigation, however, it becomes evident that the acquisition of gear for a worth-while receiver is not by any means all beer and skittles. When the apparatus is to be incorporated in a receiver planned for description in WIRELESS WEEKLY—to be duplicated, possibly, by enthusiasts throughout the country, it is not only necessary to locate components of technical merit and suitable mechanical proportions, but it is also essential to find stuff that is obtainable in sufficient quantities to make its incorporation practical. A few weeks of experience in apparatus selection has convinced us that Australia has not the brilliant array of apparatus we thought it had.

With the components collected it now remains to decide upon the mechanical layout. Influencing factors in this case, again, are legion, and it is impossible, at this stage, to churn out a few more thousand words in consideration of them.

During the last few weeks we have been interested in the planning of a receiver—that is, we have been setting up an enormous display of alternatives and selecting from them in accordance with possible dictations of performance requirements, operating conditions, funds at hand and apparatus available. The completed receiver, to be described in the near future, is just one of a few thousand possible combinations of the alternatives. We feel that the writing of this screed will have been justified if even two or three of our readers have been made to understand just why this is so.

People in the Programmes

BRAILOWSKY

the Great Exponent of Chopin

and

KEITH GRANT, N.Z. TENOR

Alexander Brailowsky.

ALEXANDER BRAILOWSKY was born thirty-three years ago at Kiev, in Russia. His father was a noted pianist, and instructed him from his childhood, when he showed great musical ability. At thirteen he was sent to Vienna, where he studied under Leschetizky; then he studied under Busoni, Moskowski, and Francois Plante, the last a famous Parisian master. He didn't appear before the public until he was twenty-three; and thus it was an extremely well-polished product which made its debut in Paris in 1919. From the first he was a marked success. He toured through Belgium, Scandanavia, Holland, Spain, Portugal, Switzerland, and Poland, and was praised by critics everywhere. He took London by storm, and toured in South America, where he has since made three more visits. In 1924 he went to America, and has given recitals there every year since then.

Under the E. J. Carroll management he came to Australia this year, and has proved practically the top note in our 1929 season. Everywhere critics have praised him; not, as has been the tendency in latter years, so much for his superb technique, but for the great humanity of his renderings of all composers, and his illuminating interpretations of all compositions.

Brailowsky is the great exponent of Chopin, whose moods he re-creates in astonishing vividity and color and harmony and melody. But he will turn from a delicate study of Chopin or a pastoral of Scarlatti to play the tremendous "Tannhauser" overture or the Appassionata or the Moonlight Sonata, or perhaps something from the Scriabines or Stravinskys, with just the same sureness and completeness. And his renderings of Wagner and Beethoven are quite as powerful as his renderings of Chopin are delicate.

People have said wonderful things about him. One said he was the greatest pianist we have had here for many years. The other said he was the greatest we have ever heard. Not because he is a planist, but because he is a man and a poet.

Keith Grant

ONE of the star performers on the initial programme of Australian Broadcasting Co., Ltd., to be broadcast from 2FC on July 17 will be Keith D. Grant, probably the finest baritone New Zealand possesses. Mr. Grant, however, claims kinship with New South Wales, having been born in Sydney, but left here when only two years of age. He has broadcast from all New Zealand stations, and has given numerous recitals throughout the Dominion, in conjunction with Mr. Hubert Carter.

Mr. Grant professes a weakness for amateur theatricals, and has taken a leading part in various New Zealand musical societies' productions of favorite musical plays. He specialises mainly in operatic numbers, and thinks that Massenet's almost unknown opera, "Herodiade" (King Herod), is one of the most beautiful operas ever written, and which gives ample scope for a baritone.

Keith Grant.

How Broadcasting Advertises Australia

EVERYONE knows the advertising value of broadcasting. The new medium of publicity and propaganda has an appeal and a contact with all sorts and conditions of people that is not equalled even by the newspapers.

Advertising may take on many forms, and one of them is national publicity or propaganda. Whether it be for political or commercial purposes wireless publicity is recognised as a valuable medium. Since the Great War this has become increasingly evident; America, France, Germany, and Italy led the way, to be followed by England in utilising wireless stations for spreading news and views of a national character with the object of informing, if not actually influencing, other nations. Thus the Foreign Office wireless news bulletin, sent out twice a day from the huge station at Rugby, England, is an example. Other countries have somewhat similar stations; some of them contenting themselves by sending occasional messages by short-wave stations. An example of this type of publicity is the now well-known station PCJ at Eindhoven, Holland, whose transmissions are picked up in Australia, as well as in other countries.

The Dominion Broadcasting Company, controlling 3LO Melbourne, saw the value of such publicity, and determined to get the voice of Australia on the air in other countries, as well as in Australia. Short-wave transmissions were arranged, at first spasmodically and experimentally, about two years ago. The results were so encouraging—so many reports of reception had been received from distant countries—that it was decided to make the transmissions a regular feature.

Extending over several months, the programmes were transmitted each week, and the letters of appreciation and indicating reception in other countries came to 3LO. Literally those letters covered territory from Beersheba to Dan, and from China to Peru. Many letters in quaintly expressed English of foreign countries, as well as those from almost every part of the British Empire, came along reporting satisfactory reception. Some reported confidently reception of various programmes, while others indicated some uncertainty as to the transmitting station, and asked 3LO to check up.

In that way broadcasting has helped to tell the world something about Australia, and in a manner interesting and arresting. Under the changed conditions of the control of broadcasting in Australia, however, the Dominion Broadcasting Company, which is relinquishing the field of broadcasting programmes from 3LO and 3AR, has abandoned these short-wave transmissions, and the world will in consequence be deprived of this important link between its peoples, and the development of the science of radio will be considerably retarded. This is unfortunate, but it is the unavoidable result of the changed policy of the Commonwealth Government in connection with wireless control.

Professor Bernard Heinze, Director-General of Music.

William James, Assistant Musical Director.

Percy Code, Conductor of Orchestra.

Eric Welch, Sporting Commissioner.

MELBOURNE BROADCAST ROSTER

and A.B.C. Appointments

THE Australian Broadcasting Company takes over 3LO on July 22 and 3AR on Aug. 7. Many innovations and changes in the programmes are promised, one of the most important of which will be the re-arrangement of the periods of daily broadcasting from 3LO and 3AR, in which the hours of transmission will be increased.

Under the new scheme 3LO and 3AR will be on the air as follows:

3LO.

Week Days.	Hrs.
7.0 a.m. to 8.15 a.m.	1¼
10.30 a.m. to 12.30 p.m.	2
1.0 p.m. to 4.30 p.m.	3½
5.45 p.m. to 11.30 p.m.	5¾
Total	12½
Saturday.	
7.0 a.m. to 8.15 a.m.	1¼
10.30 a.m. to 11.20 a.m.	2
1.0 p.m. to 5.0 p.m.	4
5.45 p.m. to 11.30 p.m.	5¾
Total	13
Sunday.	
10.0 a.m. to 12.30 p.m.	2½
3.0 p.m. to 4.30 p.m.	1½
6.0 p.m. to 10.30 p.m.	4½
Total	8½

3AR.

Week Days.	Hrs.
8.15 a.m. to 11.0 a.m.	2¾
12.0 to 5.45 p.m.	5¾
6.15 p.m. to 10.30 p.m.	4¼
Total	12¾
Saturday.	
8.15 a.m. to 11.0 a.m.	2¾
12.0 to 5.45 p.m.	5¾
6.15 p.m. to 12.0 p.m.	5¾
Total	14¼
Sunday.	
11.0 a.m. to 3.0 p.m.	4
4.30 p.m. to 10.0 p.m.	5½
Total	9½

IMPORTANT APPOINTMENTS.

Last week the appointments of Professor Bernard Heinze, director of the Melbourne University Conservatorium, and conductor of the Conservatorium Symphony Orchestra, and the Philharmonic Society, as Director-General of Music for 3LO and 3AR, with William G. James, the celebrated composer-pianist, as assistant musical director, and Percy Code as conductor of orchestras, was announced. These appointments are very popular, and have created widespread satisfaction among listeners, all classes of whom will be adequately catered for.

LECTURES AND TALKS.

A new scheme of organising lectures and talks is to be established, and a director of lectures will be appointed, whose duties will include the organisation of and the writing or editing of the talks, together with the coaching of those talkers and lecturers who have had no microphone experience, so that voice production and presentation will comply with a set standard.

DANCE MUSIC.

Listeners will not be limited to one dance band only, but a selection of the best available will be broadcast. Provision will be made when dance music is being broadcast from either 3LO or 3AR during the regular sessions for other classes of music and entertainment to be broadcast from the other station. All classes of listeners will thereby have ample entertainment to tune in to at all times.

SPORTING.

Eric Welch will act as sporting commissioner to the new company, and every class of sport will be included in the programme, but there will always be an alternative programme for non-sporting listeners.

MANY NEW STUDIOS.

Special studios are being constructed at all the theatres under the control of the new programme contractors. These studios, although not as large as the 3LO studio, will be complete in every detail with their own control rooms and amplifiers. In other words, they are small model studios, where theatrical artists, whilst awaiting their call on the stage or during intervals may broadcast in the actual atmosphere of the theatre. Musical productions and other theatrical plays and sketches will be broadcast from these studios.

Other important appointments to the personnel of the 3LO and 3AR are pending.

MUSICAL ARRANGEMENTS

THE directors of the Australian Broadcasting Company had a lengthy conference last week with Dr. Arundel Orchard, Director of the State Conservatorium, and Mr. F. Hutchens, registrar.

Mr. Hutchens states that definite arrangements have not yet been made, as the State Conservatorium is a branch of the Department of Education, and any arrangements with broadcasting companies involved questions of policy, which must be considered by the Minister for Education.

However, the Australian Broadcasting Company expects full co-operation from the Conservatorium, and is planning a series of big popular concerts at the Sydney Town Hall, in which many well-known concert artists will assist, for the purpose of broadcasting the whole entertainment.

The Australian Broadcasting Company announces that it has approached Messrs J. C. Williamson, Ltd., who have been interested, during the last four years, in the supplying of broadcasting programmes, with a view to arranging from time to time to broadcast their various musical theatrical entertainments, and negotiations are now in progress. The directors of the Australian Broadcasting Company state that they hope that a satisfactory arrangement will be made, to enable, at the same intervals as previously, certain of the Williamson shows to go on the air through the national broadcasting service.

We understand that the A.B.C.'s first letter to J. C. Williamson, Ltd., has been answered by a request for details of its requirements; and that the A.B.C. has replied, seeking information concerning the cost, including copyright and royalties, of broadcasting excerpts not exceeding 75 minutes nightly, of productions in Sydney and Melbourne, and including the right to relay them to other States.

Interviewed last week on this question, Mr. E. J. Tait said that he had received the A.B.C.'s letter; but that nothing definite could be done in the matter until it had been brought up before a full board meeting. "We have been approached by both 'A' class stations and 'B' class stations with the same question," said Mr. Tait; "but nothing can be decided until the board considers it. Certainly we have been used to broadcasting our shows in the past; but the fact that another company has come into control of the broadcasting stations will not influence our decision in the slightest. We shall consider the Australian Broadcasting Company's overtures purely as a business proposition. The board meeting will be held later in the month."

Wireless Weekly

Incorporating "Radio in Australia and New Zealand."

FRIDAY, JULY 12, 1929.

What of the B Stations?

ALTHOUGH we have heard a great deal about the Government's attitude towards A class license holders, singularly little has been said about the B stations. Certainly the business in connection with the A stations has been the more urgent, but the dilatoriness of the Government in making a statement of policy in regard to the B stations is not excusable on this ground alone.

Apparently there has been no alteration in the Government's attitude in regard to B licenses. Those granted some years ago are still retained, regardless of the manner in which the programmes are conducted, while many people still await permission to operate stations. The policy of granting an unlimited number of B licenses would, of course, merely result in chaos; but there is no reason why a further limited number of B licenses should not be granted. The possible interference from B stations (such as has been reported in the past) is a mechanical matter, and can be corrected by strict regulation. This trouble eliminated, new B stations would be welcomed by listeners as additional sources of enjoyable entertainment.

Much has been made of the Government's proposed local advisory committees which are to control the activities of the national programme purveyors; but what kind of supervision are we to have over the programmes of the B stations if they continue as at present? So long as the B stations do not offend the P.M.G.'s regulations, it seems that they may broadcast as they like; nothing is said of them offending listeners' tastes. Because the B stations' time is their own to sell, it should not follow that they can abuse the air inconsiderately. All broadcast time is primarily the listeners' time.

In America, upon whose broadcasting plan our B stations are modelled, and where there is also a waiting list for licenses, a station must respect the listeners before all else. If a station offends with objectionable direct advertising, its license is immediately forfeited, and goes to the next on the waiting list.

A similar condition here, sensibly operated, would raise the standard of the B stations considerably, and give prospective license holders an opportunity of showing their worth.

How Broadcasting Impressed a Countryman

THE correspondence of a broadcasting company is a voluminous affair, the number and character of the letters provide means for the management to feel the pulse of listeners, as it were, and consequently the work involved is not regarded as an objectionable load. On the contrary, it is much valued and carefully studied.

Among recent letters is one from a farmer in the Mallee district, who spent a few weeks in Melbourne. While in the city he called in at the offices of the Dominion Broadcasting Company, and asked to be shown around, so that he could appreciate what the service meant more clearly on his return. His letter reads:—

"Having returned from the metropolis, I naturally think a lot about the time I had there. I find myself dwelling on one of my most pleasant recollections. I mean the time your people gave me and the information I got about how the broadcasting is done. I suppose there are many like myself who have not the faintest idea how the music came through the air and how it was I was able to sit here and listen to the bands and the talks and the community singing, which was so far from where I am here. That was before I called at your station. I have a better idea of it all now, and, although I am not going to set myself up as a wireless expert, I can tell my neighbors things that will help them to understand what happens.

"The young man who was told off to show me around at Melbourne Place evidently knows all about his business, and more, is able to make the mysteries appear simple to a stranger. I could not help feeling that we are a bit unreasonable in expecting so much, and in blaming the broadcasters for a lot that happens that they cannot help. The statics and other noises which we have up here I used to think were due to something wrong in the broadcasting. It was made clear to me that I was wrong in that. And the amount of work that must be done, and the hundreds of items that have to be fixed up every month was a surprise.

"I would like to say, sir, that it is a pity that more of us country visitors do not see the inner workings of the broadcasting. There would be more understanding of the difficulties, and not so much rushing to blame without thinking.

"I am writing to tell you I appreciated the courtesy shown to me and the information that was given to me."

A significant letter, and only one of many thousands received by the Dominion Broadcasting Company Pty., Ltd.

R.A.A.F. Reserve Stations

IT is anticipated among amateurs that the Royal Australian Air Force Reserve scheme for amateur stations will provide some very interesting work. In New South Wales the stations allocated by the R.A.A.F. for this work are as follow: VK2KB (section guard station), VK2NO, VK2KB, VK2CH, VK2KW, VK2NS, VK2WP, VK2GQ will be handling R.A.A.F. reserve work for the Federal Commonwealth Territory in Canberra. These stations are all well versed in operating procedure, and, as VK2RF, VK2GQ, and VK2NO are ex-airmen, the atmosphere lends itself appropriately. Australian and New Zealand "hams" will, in the near future, often hear the call, "CQR de VK——." This will indicate that a reserve station is calling for contact with another R.A.A.F.R. station for some particular reason, and stations outside the net should not answer the "CQR" call unless the matter is urgent.

THAT FIRST SET - - - - - No. 3

THE SAFETY VALVE

Readers are urged to express their opinions on matters pertaining to broadcasting. If you have some grievance, if you have some constructive criticism to offer, here is your chance for expression—your safety valve. The editor assumes no responsibility for statements made by readers and published on this page, as opinions of correspondents do not necessarily represent our editorial policies. Annonymous letters are not considered.

Old Time Nights

Dear Sir,—Allow me to draw the attention of listeners in the Commonwealth to what I would term a big knock-back to at least 90 per cent. of the listening-in public.

While listening-in on 24/6/'29 to old-time dance music and songs from 3LO I heard the announcer say that possibly that would be their last old-time night, as all stations are being taken over by the Government this month.

As a lover of old-time music, I appeal to all listeners who are interested to get busy and request the management of the Broadcasting Company to carry on the good old-time dance music and songs from 3LO by the same M.C. and Hoffman's Dance Band, at least once a month. I consider that we, as listeners, paying license fees and financing the broadcasting companies, should be granted the privilege of stating what we require.

Yours, etc.,

OLD TIMER.

Tarana.

Human Birds!

Dear Sir,—Listening recently to the "Pilot's" description of the various attempts that have been made at flying brought to mind an idea that occurred to me many years ago, based on the belief that as far as flying is concerned human beings could be birds if they could only develop the necessary muscular power to flap wings sufficiently large to support their own weight, the manufacture of suitable wings and attachment to arms being only minor considerations compared with the difficulties involved in developing the necessary muscular power.

It seems to me, if this be at all possible it could only be attained by special training, carried on persistently from earliest childhood, and might be effected by providing the child with a broad body belt connected by a swivel at the back to a pulley which would run on a rope, stretched sufficiently taut to be clear of the ground, between two supports, say trees (see sketch), the ends at A and B being at equal heights above the ground. The would-be bird placed in the belt near one tree, as at A, would be trained to flap his arms as if they were wings, and meanwhile, in obedience to the law of gravitation, he would roll towards B, where, coming to rest for a moment like a pendulum at one end of its swing, he would turn round by means of the swivel, and, facing A, a slight kick-off from the tree trunk at B would cause him to roll back to A, where, kicking off again, he would return to B, and so on backwards and forwards, pendulum fashion.

After a few days' practice and exercise flapping his rudimentary featherless wings (his arms) he would be provided with small artificial wings attached to his arms. These from time to time, as muscular power was developed, would be increased in size, and later be proportioned to the weight of his body until, if all went as expected, they would be made large enough to support him independent of the rope, which all the time would be a factor of safety against accident, and at the same time permit of motion in many directions.

The ultimate success achieved would depend very much on the desire and intelligence of the trainee, and equally so on the trainer's knowledge of bird-flight motion, and his ability to impart that knowledge to his pupil. Who will say that a child regularly so trained would not be able to fly long before reaching manhood, or that a bird, say an eagle, captured while a fledgling, its wings confined by an elastic band so that, while not interfering with natural growth, it would not permit of any movement of the wings until the bird was fully grown, on the band being removed, would be able to fly? I think not; and possibly, owing to its weight, could not then develop the muscular power that would have been its had that power and wing growth been allowed to develop naturally together.

Perhaps some of the "Pilot's" listeners who have "Olive Branches" might feel disposed to so teach and train them in the art of flying. As for myself, unfortunately—or perhaps I should say fortunately, I don't know which—having never had any of my own, my idea never reached even the experimental stage. Had that been possible, I feel quite sure they would all be flying now, but whether in this world or the next I'm not altogether sure.

Yours, etc.,

W. M'E.

Rosewood.

N.B.—Further with reference to my recent letter on the possibility of training a child to fly, I might have added that when muscular power had been developed to a certain extent and some efficiency in the use of that power had been attained, it might be advantageous to change the rope from the horizontal to a vertical position—a pendulum of which the child would be the "bob." This would give liberty of motion in a circular direction and the greater the speed attained the wider the orbit, but with this advantage, that as the rope (as radius) approached the horizontal it would be liable to interfere with wing motion.—W. M'E.

2UW Transmission

Dear Sir,—In your issue of June 21 I notice a remark re 2UW, and modulation of that station, written by W. Hearn.

In justice to other stations, both A and B, I must contradict his words. As I am out in the far north-west plains, 2UW is by proof one of the worst stations to receive, no matter what set you have, and I have seven of them—all makes, the Udisco 6 leading for tone, distance, and selectivity. I doubt if Mr. W. Hearn understands the word "production." He also considers 2UW station's programmes the best. Then his taste is poor, as he states there is no variety. What are all listeners clamoring for? Variety for all times. Give us the same thing over and over again and we get tired of it. Give Mr. Hearn bread and butter for every meal for a week or two and see the plea for a little variety, no matter how good the bread and butter may be. I have the greatest respect for all broadcasting stations, as they all try to give us their best. We have at our A stations (and B stations, too), some of the cleverest engineers, who have forgotten more about modulation than Mr. Hearn will ever learn—be he who he may. Now, in conclusion, if Mr. Hearn wants modulation, try tuning-in 2UE.

Yours, etc.,

73's.

Walgett

"Hats off to 4QG"

Dear Sir,—Re the "growls" about 4QG from a Queenslander. I can hardly believe he listens to 2FC or 2BL for any length of time, for if he did he would not growl about the northern State's "A" class station so much.

I am probably lucky in being able to pick up every inter-State station, including two New Zealand and two Japanese stations, so have a wide choice of programmes, but should I be compelled to listen to either of the Sydney "A" class stations I would throw away my receiver. Yet there are people who rave about 4QG; compared with either 2BL or 2FC their programme after 8 p.m. is wonderful. These last few weeks, what the latter have "put over" the air has been a disgrace. Heaven help us if every station was alike! Personally, I say "Hats off to 4QG."—Yours, etc.,

DISGUSTED.

Quirindi.

Making Your Own BAFFLE BOARD Speaker

By "BOSCO"

Constructional details of an excellent loudspeaker of modern design, which can be built for less than £3.

JUST as we were about to put the finishing touches on the speaker illustrated above (the wooden one) a workman engaged in the building put his head through the doorway to pass a few comments in admiration of our work. "Oh so you're buildin' a movin' coil speaker," he excla med. "One of them dynamics." he added; "they say they're pretty good—what do you think?" "No," we suggested. "We're not building a moving coil speaker, though it does happen to be as dynamic as any other." "But it has a baffle," he threw back at us.

All of which was rather a representative conversation on speakers. A speaker with a baffle, it would seem, is quite generally considered to be nothing more or less than a "dynamic," while a "dynamic" is, at the same t.me, a speaker with a moving coil. The actual fact, of course, is that any old speaker is dynamic in its action, and for that reason could be termed a "dynamic." The moving coil is just one type of dynamic speaker in the same way that the so-called "magnetic" speaker is. Further, a baffle is not exclusively a feature of the moving-coil speaker It is a most useful affair when used with speakers of many other types.

The floating edge cone which is used in the moving-coil speaker and in some types of "magnetic" speaker functions, on the low frequencies particularly, as a sort of plunger. In its vibration back and forth, the cone sets up pressure waves in front of it and behind it. These waves are 180 degrees out of phase—that is, a period of high pressure in front is one of low pressure at the back. Hence, if there is no baffle around the edge of the cone the high pressures in front merely push the air around the edge of the cone to the back. This effect, of particular importance on the low frequencies, results in a drastic loss of sound. The baffle is, in effect, a fence put up to prevent the pressures generated in front of the speaker from interfering with those generated behind it. Its use is of the greatest importance when it is desirable, as it always should be, to reproduce the lower notes in the music being received.

The distance from the centre of the front of the baffle to the centre of the back should be equal to one-quarter wave-length of the lowest frequency desired. Thus, for a frequency of 110 cycles (which has a wave-length of 10 feet), the distance from front to back should be 2.5 feet. The baffle used in the speaker illustrated is 3 feet square. Its front to back distance is therefore 3 feet, and the lowest frequency for which it is effective about 93 cycles.

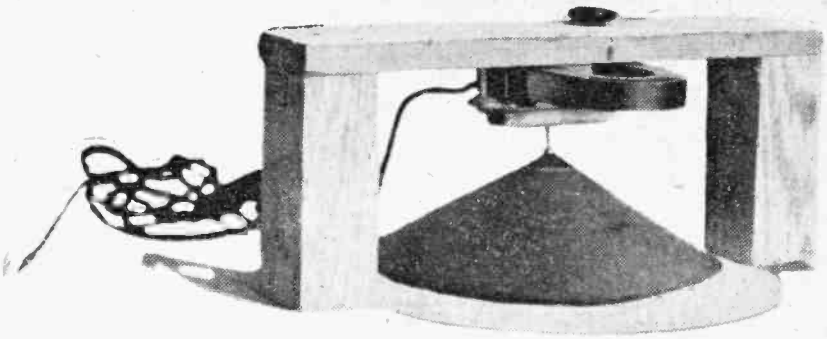
After this preliminary discussion of baffles and their purpose we are able to state that the speaker shown was built up to illustrate the application of the baffle to the ordinary "magnetic" speaker. Since we cannot demonstrate the thing to our readers, we will just have to ask them to believe us when we say that it also illustrates the way in which a splendid speaker can be assembled at very little cost.

The baffle itself, an excellent affair of five-ply wood, was built for us by the Prima Donna Radio and Cabinet Co. of Woollahra. The speaker unit, styled "The Blue Spot Power Unit," was a sample supplied us by H. Hecht and Co. The wholesale distributors for it are Fox and MacGillycuddy, Ltd. The cone paper, to complete the list of purchases, was of the "Six-Sixty" type obtained from S. Segal and Co. Other necessities were a square foot of some thin fabric, such as silk or muslin, a tube of "Durofix," or some other good fixative, and a few chunks of wood for the units supports.

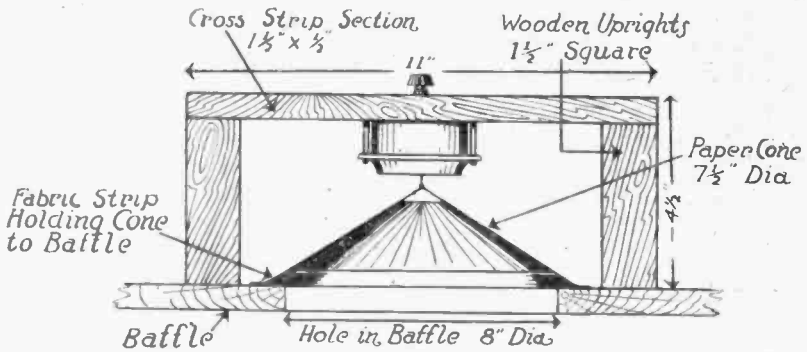
The first work is to cut out the cone paper according to the instructions accompanying it, then glueing it into its conical form. When the glue is quite dry the cone is trimmed down until its mouth is just a little smaller in diameter than the hole in the baffle. The next step is to cut out a ring of the fabric with an outside diameter just a little larger than the hole in the baffle, and an inside diameter a little smaller than the mouth of the cone. This is then glued to the edge of the cone, permitting not more than about one quarter inch of it to extend over the

"The Standard A.C. Four"

No, it's not a "Toodleflex" circuit, a "Chlorodyne," nor, for that matter, a "Chloroform"—it is just a standard sort of wiring arrangement varied in its details only to suit the particular apparatus used. It is, however, essentially a modern arrangement in which provision is made for complete AC operation, single control tuning, and a standard of musical reproduction which is limited only by the quality of the transmission being received. The outfit we're talking about is the new receiver developed for the benefit of WIRELESS WEEKLY readers. The description of it is to appear next week.



The unit, with cone arranged ready for attachment to the baffle.



cone paper. With the glue on this ring of fabric dry, the cone is placed mouth down over the hole in the baffle, while the outer edge of the fabric ring is glued to the surface of the baffle board. The idea of the fabric ring is to hold the cone in position and to prevent an air leak around its edge, but not to impede the motion of the cone in a backward and forward direction. Hence the fabric should not be stretched like a drum, but left with a reasonable amount of "slack." With the cone in place the height of its apex above the surface of the board should be measured and two uprights prepared with which to support the cross piece for the unit. The size of the uprights and the cross-piece is not of any great importance, providing they make a solid mounting for the unit. At this time the unit can be secured to the cross-piece with the screws provided on the unit, and the whole assembly mounted on the uprights in such a manner that the driving pin of the unit runs directly through the hole in the apex of the cone. The pin is now secured to the cone by means of the metal washers and nuts provided. At about this time we have in our possession a very excellent speaker—and, oh, for such very little money.

The windings of the speaker unit appear to be of about the normal impedance for speakers of the "magnetic" type, and it can be used, therefore, directly in the plate circuit of a very low powered output tube. We definitely recommend, however, that the speaker be used only with a 1 to 1 ratio transformer (if a three element output valve is used), and then only with a power valve capable of providing an undistorted output of about half a watt. The valve people will willingly tell you which of their valves fulfills this requirement. Of course, the speaker will operate with the "any old power valve" that is used in the majority of present-day Australian receivers. It cannot be expected to "perform" under those conditions, however.

Grand National Steeplechase

ERIC WELCH will describe for broadcasting by 3LO the Grand National Steeplechase to be run at Flemington Racecourse on Saturday, July 13.

* * *

Mildred and Connie

FROM the Tivoli circuit Mildred and Connie Harris are coming to 3LO with their harp and violin and "winsomeness," to broadcast during the coming week. They will also be heard from 3AR.

* * *

Senia Chostiakoff

FAMOUS as the tenor soloist of the Don Cossacks Choir, Senia Chostiakoff has added to his laurels with a chain of triumphs since he left that great choir to settle in Melbourne. He is to be heard from 3LO and 3AR during the coming week.

* * *

"Norma"

On Tuesday evening, July 17, Bellini's beautiful opera, "Norma," will be broadcast by 3LO, under the direction of Madame Elsie Davies. The following is the cast:—

Norma	Elsie D.
Adalgisa	Ina Lillycrap
Clotilde	Isabel Burrows
Pollioni	John D. Sullivar
Flavio	Fredk. Earp
Oroveso	Chas. Evans

Pianiste: Ada Adams.

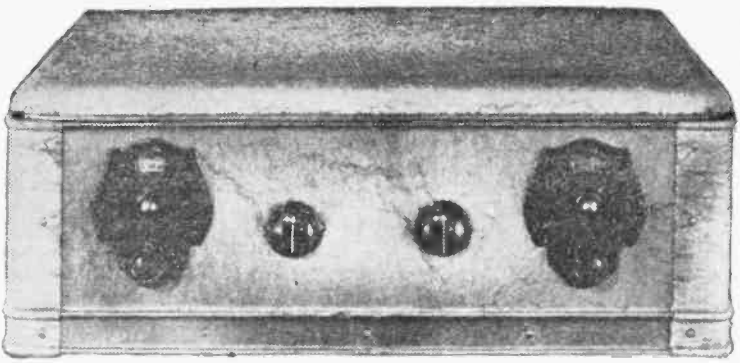
* * *

Cossor Distributors for N.S.W.

Messrs. Jones and Joseph, Princeton House, Clarence Street, Sydney, are the wholesale distributors for Cossor Valves and the famous Cossor Melody-Maker receiver in this State.

RADIOKES "AC 3-33"

—OFFICIAL FOUNDATION KIT—



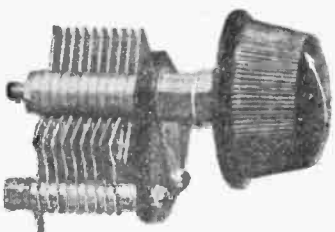
Radiokes Steel Containing Cabinet, all drilled, and beautifully finished in latest two-tone bronze ripple, supplied in knockdown form.

has been chosen as the best for use in construction of this truly remarkable receiver.

The practical solution of the A.C. Set problem.

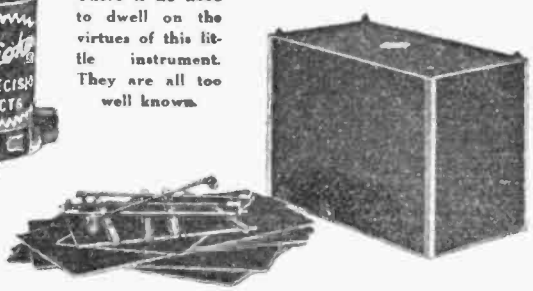
This Kit allows the Home Constructor to build a full electric receiver with the appearance and performance of a high-grade factory product.

Your electrical and mechanical problems for A.C. Set construction have been solved in the "big" laboratories, and this Kit puts the results of these long and patient researches at your disposal for quite a moderate figure.



Two of these excellent little Radiokes Midgets are included in this famous Kit. They are precisely manufactured, excellently designed, and beautifully finished.

There is no need to dwell on the virtues of this little instrument. They are all too well known.



A special collapsible box shield is put up for this particular Kit. Drilled for the necessary instrument mountings, and finished in crystalline laquer.

A 3-33 Coil Kit is incorporated, consisting of special circloid antenna coupler and a R.F. Band Pass filler. Highly efficient, ruggedly constructed, easily mounted, and beautifully finished.

The Radiokes A.C. and D.C. 3-33 Kits comprise the following parts:—

	A.C. 3-33	D.C. 3-33
Steel Containing Cabinet	£2 2 6	£2 0 0
Radiokes Box Shield	1 3 0	1 2 0
Radiokes 3-33 Coil Kit	1 12 6	1 12 6
Radiokes 23 Plate Midget Cond.	8 6	8 6
Radiokes 5 Plate Midget Cond.	4 9	4 9
Radiokes R.F. Choke	8 6	8 6
Special Finished Baseboard	5 0	5 0
Special Horizontal Socket and Mounting	6 0	6 0
Radiokes Grid Leak Holder		1 6
Radiokes Special Terminal Strip	4 6	4 6
	£6 15 3	£6 13 3

These Complete Kits Boxed for Easy Handling.
A.C. 3-33, £6/7/6 per Kit.
D.C. 3-33, £6/5/ per Kit.

OBTAINABLE FROM ALL HIGH-CLASS DEALERS,
or direct from Metropolitan Electric Co., Ltd., 126 SUSSEX STREET, SYDNEY.

AERODYNAMICS OF FLYING MODEL AEROPLANES

By W. E. SCHWEITZER

WITH the increasing interest in model aeroplane construction and flying in Australia, it is our desire to give a basis for model aeroplane design. The construction has been developed beyond the experimental stage, and model aeroplanes are a distinct branch of aeronautics. Designed with the same degree of care as are the commercial 'planes, they obey the same laws in flight as do the large ships. In addition they must have inherent stability.

Model aeroplanes, as the name implies, are miniature aeroplanes. There are many different types, the scale model, power driven models, and the rubber driven flying model. The second type may be considered to include those models propelled by other than rubber strand motors.

Scale models are exact duplicates of large aeroplanes. They are mainly constructed for wind tunnel experiments. Mounted on delicate instruments in the wind tunnel it is possible to determine their lift, drag, etc. They are rarely equipped with a motive power.

If supplied with rubber strand motors, stretched the length of the fuselage of the scale model, the difference in the centre of gravity (C.G.) between the rubber strand motors and engine, for which the large 'plane has been designed, makes the scale model, of the large 'plane, unbalanced for free flight.

Power driven models are larger in size than the rubber driven models, because of the additional weight they must carry with this motive power. They may be propelled with compressed air motors, gunpowder motors, gasoline engines, or steam engines. Of all these methods of propulsion, the steam engine can be built smaller, simpler, and more efficient. Most of the engines used consist of two cylinders, twin opposed, with a 7-8in. bore and a 1in. stroke. A small gear driven water pump forces the water from the supply tank to the boiler, which consists of steel tubing wound in helical form. A small gasoline blow torch supplies the heat. With this arrangement water is easily evaporated to steam and superheated. Complete descriptions can be found in the English published journal, "Model Engineer and Electrician," of 1913.

THE FLYING MODEL.

The flying model is really a skeleton 'plane Because of its motive power, rubber strands, its structure only embodies those members which are necessary for this type of power. Without the enclosed fuselage, required by the large 'plane to house the motor, pilot, etc., its appearance varies decidedly from the 'plane we are accustomed to see. Another difference in the rubber driven flying model is the location of the wings. The weight of a gasoline engine is concentrated in a unit located at the front of the 'plane. With the rubber motor, the rubber is stretched along the entire length of the fuselage to get as long a span as possible. With the motive power so distributed, the centre of gravity is near the centre of the fuselage, and the wings must be shifted accordingly.

If the first models flew a hundred feet, it was considered a record. As improvements were made, the distances that the models would fly kept increasing, one hundred, five hundred, a thousand, five thousand feet, and their duration in the air kept mounting, ten seconds, twenty-five, a minute, five, ten, and so on. Occasionally the 'planes flew into rising air currents, and flights were greatly lengthened. In some of these flights, the actual duration is unknown, as the models flew beyond the flying field, and as it was impossible to follow the 'planes, they were usually lost. These cases are rather rare, however, and properly designed model 'planes are benefited only so much more in this freak condition of the atmosphere.

William E. Schweitzer is well qualified to write on the subject of model aeroplanes. In 1912 he saw an exhibition of an aeroplane stunting. He went home and built a small model. Having had an early interest in flying kites, this model 'plane was a new type of kite to him. During 1915 and 1916 the Aero Club of America conducted national model aeroplane competitions. Mr. Schweitzer won third prize at Cicero Flying Field in October, 1915. In the 1916 competitions, held at Ashburn Flying Field, he won two firsts, one second, and one third prize. Competitions were renewed after the war in 1919. In the two contests, hand launched and the rise off ground, Mr. Schweitzer won first place in each.

At Chicago, in 1923, contests were held for duration, power-driven 'planes and speed 'planes. Mr. Schweitzer won all the prizes in all classes; two silver cups, a typewriter, and two aeroplane rides. At the first national contest for model aeroplanes during the National Air Races at St. Louis, 1924, Mr. Schweitzer's model was a prize-winner, and again at Dayton the following year. His 'plane held the record for the hand-launched model, and his rise off ground record of 4029 feet still stands.

To the radio amateur, 9AAW means "Bill" Schweitzer. Entering this field in 1919, Mr. Schweitzer has constantly progressed in his amateur activities until he now owns and operates one of the outstanding American amateur stations, which is located at his home in Chicago.

—HIRAM PERCY MAXIM.
President of the American Radio Relay League.

RUBBER.

Because of its high elasticity rubber is a very desirable material for model aeroplane motive power. By twisting the strands a large inch-ounce force can be stored up in a small unit weight of the material. Only the purest rubber obtainable is used, as it is essential that a maximum force be secured with minimum weight. A convenient size of strand measures 3-16in. by 1-32in., but strands of other widths and thicknesses have been found equally satisfactory. The actual diameter of the total number of strands is the factor which determines the torque received from any rubber strand motor with a given tension.

An important factor to keep in mind, when winding the strands, is not to keep the strands wound to their elastic limit for a longer period than is absolutely necessary. The rubber fatigues very easily even when not wound to the elastic limit, and should it be kept tightly wound for a period of a few minutes much of the power obtainable is lost with the fatiguing of the material.

The ideal condition of a rubber strand motor delivering a torque to a propeller would be to have a uniform delivery of power for the entire length of the run of the propeller. This, however, is not the case and the propeller has a higher R.P.M. at the start, gradually decreasing in revolutions until the motor is entirely unwound. This condition can be partly overcome by stretching the rubber motor four or five times its original length while twisting the strands. By employing a geared winder to wind the rubber this can be done very nicely. When winding the strands in this manner it is advisable gradually to reduce the length of stretch as the strands are twisted so that when the strands are fully wound the length of the rubber motor is back to its original length.

The amount of rubber for each motor should be as much as the motor-base will stand. By increasing the number of strands greater torque is available, and by increasing the size of the propellers the R.P.M. can be reduced, so that the length of the propeller run is actually longer. It is very essential to load the model with as much rubber motor as possible. The model will have more power and the actual weight of the model, less the weight of the rubber, will remain the same. This is very important, and we will roughly express it in the following equation.

$$\text{Duration of flight possible:} \quad \frac{\text{Total weight of rubber}}{\text{Weight of the model.}}$$

The total number of winds it is possible to put into a rubber strand motor are:—

$$\text{Winds} = 4.75 \frac{L^{3/2}}{W^{1/2}}$$

Where L length of the rubber strand motor in inches.
W, weight of each motor in ounces.

The above formula was derived by experiment using the purest rubber obtainable.

MODEL AEROPLANE MATERIALS.

The seven materials which go to make a model aeroplane are: Wood, bamboo, paper, thread, piano wire, cellaero, and glue. Some wood is very porous and fibrous, and varies greatly in density. The strength increases with the density, but the lightest density material is suggested for the following reasons. In the formula for horizontal shear,

$$S_s = \frac{V}{16} \bar{v} A \quad \text{or} \quad I = \frac{V}{S_s 6} \bar{v} A$$

Where
V equals total vertical shear.
I equals moment of inertia.
b equals thickness of section.
d equals distance from shearing plane to C.G. of section.
A equals area of section.

If we use a spar of the lighter material and increase its size so that it will have the weight of the heavier material, the difference in the moment of inertia will give an actually stronger section.

Because wood varies in strength and density it is impossible to specify just what size material to use for any given stress or strain. In the formula.

$$A = \frac{P}{S}$$

Where A equals area of the material in sq. in.
P equals load in pounds.
S equals safe stress in pounds per sq. in.

we can easily see that if S is variable the A required is necessarily also variable. This, of course, is true in both the compressive and tensile stresses.

Because we are trying to save every hundredth of an ounce in the weight of the model, even with the lightest wood, it is advisable to use irregular sections, such as I, channel, hollow rectangular, etc., wherever any one of these would best apply.

Even with the most carefully designed model 'plane the deciding factor is often the craftness and experience of the model builder.

It is best when selecting bamboo to choose pieces with the greatest distance between joints. If it is necessary to use long pieces, it is better to splice them, than to include the knots. The knots make an irregular edge, and if they are cut down, a weakened section is the result. The bamboo can be cut into very small slivers. In the bamboo cross bracings of the motor-base stream lining is an advantage. When it is necessary to have several units of bamboo with the same curve, as for wing tips or wing ribs, a wide piece of bamboo can be warped to the required shape over the flame of a candle or bunsen burner, and this wide strip split into many smaller pieces. On heating the bamboo over the flame care must be taken not to burn it. This method of bending bamboo is quite simple and very effective.

The paper for the covering of the model aeroplane wings must be carefully selected. It must be light in weight, extremely strong, and of a solid texture. The fibres making up the paper should be long and tough. The necessity for the long fibred paper becomes evident when the model in flying strikes some obstacle or makes a rough landing. The light members making up the wind bend easily, and the paper is subjected to strong sheering stresses. Without the long fibred paper the paper tears badly, and patching never leaves it with as smooth a surface. The paper can be made fast with shellac. Shellac is water proof and if skilfully applied makes a satisfactory adhesive.

Silk thread is quite strong and light. When binding the various joints it should be used sparingly, and each binding carefully glued.

The gauge of the piano wire to use is determined by the power of the rubber motors. For ordinary five or six-strand motors size No. 13 is strong enough. When more, or less, strands are used in the rubber motors, a larger, or finer gauge piano wire is more adaptable. The wire is easily bent into the proper shape, and it is used for the propeller shafts, rubber strand hooks, etc.

As the models often land in the moist grass, ordinary glue, after a time, permits the threads to loosen. Properly glued parts are usually stronger than the unglued section. Care in gluing is very essential.

The wings are doped with a celluloid solution to shrink the paper tight. Nothing should be added which will increase the total weight without some good reason for adding it. If there is any spare room for weight, first consideration should be toward increasing the motive power—the rubber strand motor.

THEORY OF DESIGN.

Throughout the article we have been stressing the necessity of reducing weight. In the full size aeroplane it is possible to increase the horse power of the engine and also decrease its weight, for as the engines have been improved they have developed more H.P. per pound. With rubber strands as a motive power the H.P. per pound of material is a fixed quantity. It would be very fine if we could make the rubber more elastic, and reduce its weight. Our only possibility, then, is to reduce the weight of the model 'plane. This is our aim. If it were possible to construct an aeroplane of zero weight and still have it carry a power supply, the energy could be expanded so slowly that we could approach a limit of infinite duration. Although we can never reach this condition we should strive towards this goal.

The weight of the model is equal to the sum of the weights of all its parts. These include the propellers, wings, motor-base, and, if the model is equipped with floats as on the hydro-aeroplane, the weights of the floats, etc., must be included also. The weight of the motive power is the total weight of the rubber. The accurate formula for the duration as developed by E. C. Cook is:—

NEXT MODEL 'PLANE.

The construction of the indoor endurance tractor, announced in our last issue, has been deferred until a later issue at the request of a number of listeners who are still building their R.O.G.'s and Pushers!
Do not forget to tune in to the "Pilot's" aviation session from 2BL next Wednesday at 6.20 p.m.

$$D = \frac{K_y^{3/2} S^{1/2} F E W_r}{(K_x + .0243\frac{s}{S})W^{3/2}}$$

Where D equals duration in seconds.
E equals propeller efficiency.
F equals ft. oz. of force in one ounce of rubber.
Ky equals lift co-efficient.
Kx equals drag co-efficient.
S equals lifting surface in sq. ft.
s equals equivalent dead-head head resistance.
Wr equals weight of the rubber in oz.
W equals weight of the model in oz.

As it is difficult to accurately determine Kx, Ky, and the propeller efficiency, the simpler approximate formula is used.

$$D = K\frac{W_r G}{WV}$$

Where D equals duration in seconds.
K equals a constant derived from tests equals 600.
Wr equals weight of the rubber in oz.
G equals glide with model loaded with rubber motors, but without propellers.
W equals weight of the model in oz.
V equals velocity in feet per second, or V equals 8 times sq. root of loading.

To obtain a maximum duration of flight, the glide should be as great as possible, Wr as much as it is possible to crowd on to the motor-base, W small, and the V low. The constant K was derived from experiments. The glide of a machine is the horizontal distance travelled in feet, per foot drop in elevation, i.e.: If a machine flying in the air without motive power, flies a horizontal distance of one hundred feet with a vertical drop in altitude of ten feet, the glide is said to be ten to one. The glide of an aeroplane can be improved by cutting down the head resistance, using an efficient wing section, and decreasing the loading.

We have mentioned the desirability of carrying a large rubber supply. Let us say again, supply the model with every possible fraction of an ounce of rubber the machine will stand. It will give a larger Wr in the top part of the equation.

We have stressed the value of reducing the weight of the model 'plane. This factor being in the denominator of the duration equation, its reduction will very apparently increase the result.

The V, or velocity, or speed of flight is a function of the wing surface and the weight. The loading of a 'plane is expressed in pounds per square foot or ounces per square foot of wing surface. The larger the wing surface and the less the weight, the smaller will be the loading. No heavier than air machine can remain suspended in a stationary position in the atmosphere. It must move in a horizontal plane, or it will, from the force of gravity, move in a vertical plane. Only because air has weight can anything remain in its medium. The velocity required for an aeroplane to remain in the air depends upon its loading and lift co-efficient. It is, therefore, evident that there are two methods of decreasing the speed of an aeroplane, either increase the lift co-efficient, or reduce the loading per square foot of wing surface. In our duration model aeroplanes there is present both a light loading and high lift co-efficient in the wings which together produce a low velocity. Less power is required to produce the velocity and the available power in the twisted strands can be dissipated at a slower rate, which in turn will produce a longer flight.

PROPELLER DESIGN.

Because of the variable R.P.S. delivered from the untwisted rubber bands, rather poor efficiency is obtained from the propellers. When the strands are fully wound the R.P.S. is at the maximum. The power is gradually dissipated until at the end the strands are unwound and the power is zero. An average R.P.S. of the entire run, is the R.P.S. used in the propeller design. From our duration formula we have determined the possible length of flight. From our wind formula we have determined the amound of twists we can put into the rubber motor. The R.P.S. of the propellers should then be:

$$R.P.S. = \frac{Winds}{Duration}$$

The diameter of the propeller is

$$Diameter = K\frac{\sqrt{T}}{V}$$

Where K equals 200.
T equals thrust in oz.
V equals velocity in ft. per sec.

The pitch of the propeller should be:—

$$Pitch = \frac{V}{(efficiency)(R.P.S.)}$$

Where V—Velocity in ft./sec.
eff. 70 per cent.

It is quite simple to specify what R.P.S. is required, but in practice it is difficult to obtain. The only concrete method of determining the exact R.P.S. is to build a propeller, or pair of propellers if they are for a

twin-push type model, fly the model, and with a known number of winds in the rubber, and time the length of propeller run, while the model is in the air.

The R.P.S. will not be the same if the model is held stationary on the ground and the propellers allowed to run. If the R.P.S. is too slow it is an easy matter to trim the propeller blades down to narrower width. If the R.P.S. is too great it will necessitate another set of propellers. With a little experience it becomes quite simple to fairly accurately gauge the required width of propeller blade.

Propellers on the twin-push model should revolve in opposite directions. Their spacing between hubs should be slightly less than the diameter of the propeller blade, giving a slight overlap.

When laying out a propeller blank from which the propeller is carved, the following formula may be followed.

$$W = \frac{\pi TL}{P}$$

Where W equals the width of the blank in inches.
T equals the assumed thickness of the blank in inches.
L equals The length of the propeller in inches.
L equals the pitch desired.

If a wide blade is desired use a larger T and vice versa. The hole in the propeller, through which the propeller shaft of piano wire is connected, is made by sharpening the piano wire shaft in the form of a wedge and this used as a drill. The hole produced will be the exact diameter required. If small steel drills are used in place of the piano wire drill, care must be taken that they are the exact diameter of the piano wire and that they do not break off in the wood. From practice, the piano wire drill has been found most satisfactory.

WINGS

In order that we may better understand something of the action of the air on aeroplane wings, as they pass through the medium of air, it may be well that we dwell a little on the subject. Following the example of a bird, and in accordance with the results obtained by experiments, the wings of an aeroplane should have an aspect ratio, or spread divided by the chord, of six. Fast, speedy 'planes usually have a low aspect ratio, slow travelling machines have a high aspect ratio. High aspect ratios are generally more efficient because the losses at the wing tips are lower in proportion to the total area of the wing. With aspect ratios higher than six, little advantage is obtained by reducing wing losses, but an added stability is secured. In the model aeroplanes, aspect ratios of seven or more are advisable.

As a wing passes horizontally through the air a very certain lift, and drag, is produced on the wing depending upon the wing section and angle of incidence. By drag is meant the head-resistance produced on the wing along with the lift.

The angle of incidence of a wing is the number of degrees the chord of a wing makes with the line of flight.

In the twin-push and single-push models the angle of incidence is formed in the small forward wing. The angle is made by placing a larger dihedral angle in the front entering edge than the rear trailing edge. With tractor type models, when the wing is mounted under the motor base, the angle of incidence is made by placing a longer clip, with which the wing is attached to the motor base, at the rear of the wing, than the clip at the front edge of the wing. Elevator 'planes should have a wing area of one-sixth the area of the main wing.

WING SECTIONS.

Because efficient wing sections are so very essential great care should be used in selecting a wing section which has the proper characteristics. To ascertain which wing sections are best suited for duration model aeroplanes the climb factor is plotted as

$$\left(\left[\frac{L}{D}\right]^2 \times C_L\right)$$

against the test factor.

SUNDAY MORNING TALKS

A SERIES of talks by Miss Mary Rivett, M.A., and Mr. Victor E. Cromer, dealing with "the scientific and the religious aspects, respectively, of work in proof of the reality of certain finer forces with the nature and modes of whose operations upon mankind we are becoming more and more familiar," are now being given from 2GB on Sunday mornings. The interest of the talks is not purely academic or speculative, since the research and healing work in which Miss Rivett and Mr. Cromer are engaged is of very practical sort, a fact amply proven by the immense interest which it is arousing in Sydney and farther afield.

SCOUT CLUB

IT is not as well known, perhaps, as it should be, that at State headquarters there is a "Scout Club." The club consists of a well-appointed dining-room, capable of holding fifty or sixty people, an up-to-date kitchen, and a spacious lounge room. Country and inter-State visitors have found the club a boon and a blessing.

An Aeronautical Dictionary

The fourth of the series of aviation definitions

Trailing Edge: The rearmost edge of an airfoil or propeller blade. The trailing edge is almost knife sharp, so that the moving wing or blade will not create a hindering vacuum behind it.

Propeller: A device consisting of a central hub with two, three, or four radiating blades, symmetrically placed and twisted so that each forms a part of a screw-like structure which draws or pushes the hub forward as it revolves. This may seem hard to understand, but when a propeller is thought of as "screwing" its way through the air it isn't quite so difficult.

Chord: The straight line running between the leading (foremost) edge of an airfoil and the trailing (rearmost) edge is known as the chord. In giving the size of a wing, aeronautical engineers speak of the chord and the wingspan.

Wingspan: The lateral dimension or width of an airfoil, considering the chord as the length. The span is perpendicular—or nearly perpendicular—to the chord, and runs from wingtip to wingtip.

Dihedral Angle: The acute angle formed between the transverse reference line and the lateral axis of the airplane. In a single surface wing it would be the angle between the spar and the lateral axis, which is parallel to a line drawn from wingtip to wingtip. When the wing of an airplane is bisected along the chord in its centre and the two halves are placed together at an angle, they form a dihedral angle. A wing so constructed gives added stability, since it tends to overcome side-slipping.

Aileron: A hinged or pivoted movable auxiliary surface of an aeroplane, usually part of the trailing edge of a wing, designed to give a rolling motion to the aeroplane. An aeroplane may have ailerons on all its wings, if it is a multiplane, or on only one. Stated briefly, the ailerons tip the 'plane so that it can be turned in a short radius. Otherwise it would slide sideways on the turns.

Washin: Permanent warping of the wing results in an increase of the angle of attack near the tip. You get washin by bending up the leading edge of the wing near one tip.

Washout: Permanent warping of the wing, which results in a decrease of the angle of attack near the tip. In models, which are not equipped with ailerons, washin and washout are used as aids to controlling the direction of the 'plane. Washin on the right wing, with washout on the left wing to help, are used to make models fly in a circle.

Wing Spar: The main crosswise, or transverse structural member of the wing assembly of an aeroplane.

Flying Wire (lift wire): A wire or cable which carries the lift on the outer part of the wing of aeroplane towards the fuselage. Usually this wire runs from the top of a strut between the wings of a biplane to the bottom of a strut nearer the fuselage. Running diagonally between the wings, it usually crosses the landing wire.

Landing Wire: A wire meant chiefly to resist forces opposed to the normal direction of the lift, and to oppose the flying wire and so prevent distortion of the structure, which might result from over-tightening. Sometimes this wire is called an "anti-lift" wire. It runs from the top of a strut near the fuselage to the bottom of a strut further out.

Cabane: A framework for supporting the wings at the fuselage. The work is also applied to the system of trussing used to support overhand (that part of an upper wing which projects beyond a lower wing) in a wing.

A compression member of a truss frame. The vertical or upright members of a wing truss of a biplane, for example, which are called the interplane struts, are designed to keep the wings from being pushed together by the force of the air.

Wing Truss: The framing by which the wing loads of an aeroplane are transmitted to the fuselage. Struts, wires, cables, tie rods, and spars all go to make up the truss.

Wing Rib: A fore-and-aft member of the wing structure of an aeroplane, used to give the wing section its form and to to transmit the load from the fabric to the spars. It differs in function from the.

False Rib: An incomplete rib, often only a strip of wood leading from the leading edge to the front spar, meant chiefly to help in maintaining the form of the wing where the curve of the airfoil is sharpest.

Drag Wire: Any wire or cable meant principally to resist drag forces, which operate opposite to the direction of flight. They may be either internal or external wires. Those that are called internal are placed inside the wing, while external drag wires are outside the wing. There are also anti-drag wires.

Nacelle: An inclosed shelter for passengers or for a power plant. It is usually shorter than a fuselage, and does not carry the tail unit. The fuselage, defined before, is the body of an aeroplane to which the wings and tail surfaces are attached.

SESSIONAL NEWS

MR. COOPER'S SESSION

NEXT Saturday morning Mr. Cooper will talk from 2BL on South African daisies, botanically known as "Gerbera Jamiesoni." During his talks from 2BL many letters have been received asking what is the matter with the South African daisies. It was pointed out that after purchasing the best plants procurable from seed shops in the city and carrying them home and giving them a special place in the garden only some of the plants grew properly, while most of them became sickly and died. After spending a great deal of money and time on these daisies many amateurs have given up trying to grow them. Next Saturday Mr. Cooper will show these weary amateurs that path to efficient South African daisy production. He will try to convince them that they have probably been cultivating their plants wrongly. His session begins at 11.40 a.m.

MR NORMAN'S SESSION

MR. NORMAN'S Sunday excursion to the Atlantic Union Oil Company's works proved very interesting to his 350 companions. The company's representatives were very kind, and showed the boys over the large distributing depot, giving each boy a typed statement of the contents of every shed visited and a description of all machinery used. It was unfortunate that the Brunswick could not be inspected, as the smallpox scare kept her in quarantine longer than was expected. However, the boys enjoyed themselves very much, also the refreshments kindly supplied by the Atlantic Union Oil Co., and the journey there and back in the ferry, also specially chartered by the company.

We are pleased to hear that Mr. Norman will continue his sessions under the Australian Broadcasting Company. He will probably speak three nights a week. First night bigger boys, second night scouts, third night Aero Club. We shall say more about this next week.

A blind digger has given Mr. Norman a gold medal and two silver medals, to be presented to the winners in an essay competition. The essays will be, in the case of scouts, "What is a Scout?" and in the case of cubs, "What is a Cub?" The gold medal will be presented for the best attempt, whether of scout or cub. The age of competitors will be taken into account; therefore all competitors will be either of scout age or cub age. The larger silver medal will be given to the next best scout attempt. The smaller medal will be given to the next best cub attempt.

All essays will be addressed:—Mr. Norman, 2BL, Bligh Street, Sydney; and the envelope will be marked "Scout Essay" or "Cub Essay." The competition closes at 4 o'clock, Wednesday, July 31. The adjudicators will be an officer of the Boy Scouts' Association, a head teacher, to be selected by the Education Department, and Mr. Norman.

Mr. Norman has given us the following definitions of horse-power, which have been requested from time to time:—

ENGINE FORMULA.

I.H.P. (Indicated Horse Power).

The power developed in the cylinders—determined by the formula.

$$\text{I.H.P. equals } \frac{\text{PLAN}}{33{,}000}$$

Where P equals mean effective pressure.
L equals length of stroke in ft.
A equals area of piston in sq. ins.
N equals number of working strokes per minute.

B.H.P. (Brake Horse Power).

The actual power developed at the crankshaft and determined by the formula

$$\text{B.H.P. equals } \frac{D\ N\ (\text{squared})}{2.5}$$

In which B.H.P. equals brake horse-power at C. shaft.

D equals diameter of bore of cylinders.

N equals number of cylinders.

No account is taken of the length of the stroke in this formula. The factors "mean effective pressure" and "piston speed" are arbitrary. The former is the mean of the pressures exerted on the piston throughout the cycle of operation, and is somewhere about 85lb. per sq. inch. The latter is reckoned on a speed of 1000ft. per minute.

READING SESSIONS

TO-DAY, Friday, Captain Stevens will talk on "Queer Native Customs in Africa." This talk will include references to trial by ordeal, ordeal by flogging, smelling out witches, etc.

On Saturday the captain will talk on "Getting Rid of Fear." No one, explains the captain, will hurt you if you are true to yourself—a somewhat sinister statement.

The Woodbine Willie sermon will be about "Lies and the Bible." There will be a reproduction of a military church parade on the same Sunday.

MISS VARLEY'S SESSION

NEEDLECRAFT classes have proved a very popular innovation with the 2BL Women's Sports Association.

Every Friday afternoon, in the club room at 11 Rowe Street, a group of twenty to thirty women ply their needles, creating beautiful creations under the direction of Mrs. L. C. Norton, who has blushed unseen hitherto under the gentle shadows of "Priscilla."

Afternoon, tea time often brings extra visitors, who have been invited by Miss Varley over the air to drop in for a cup of tea while in town on Friday afternoon's shopping. It is a happy, and for the most part industrious, little band.

Mrs. Norton gives her services entirely free, and is loved by all her pupils.

An invitation to join the group is extended to all women who have the time to spare, and who wish to know something about needlecraft. The more, says Miss Varley, the merrier. An apt application of the principle of ratios, which becomes invalid only in such things as trams, 'buses, trains, and garden seats during dances.

NATIONAL BROADCASTING STATIONS

THE term "National" is applied fairly freely nowadays, and we are shortly to have National broadcasting stations. Those will be the stations operated by the Government under its new scheme. Some of them, all of them, in fact, for a while will be the stations we are familiar with. They will be regarded as National, because the Government will own them. But are they not just as national to-day, when they are not owned by the Government? The service given by 2FC or 3LO, for instance, is now and always has been as national as it could be.

It is reasonable to say a station or service is National in its purpose and scope if it spreads its transmissions throughout the Nation. And surely it must be admitted, that the premier Melbourne service is known and regularly listened to in every State of the Commonwealth. It is not a Victorian station in the sense of serving Victorian listeners only; a broadcasting service knows no arbitrary boundaries of States or districts, and thus we find listeners in Queensland, South Australia, and even in West Australia, looking to 2FC or 3LO to give them a service—a service which necessarily varies in its efficiency according to the distance between Melbourne and the listeners.

The Royal Commission on wireless, which visited every station and every State in 1927, paid a very high compliment to 3LO, in saying it was the most popular station in all the States.

There are physical limitations to the efficiency of the service which a station can give at a distance. The science of radio transmission is understood sufficiently to enable engineers to ascertain what is happening, and to determine the causes of faulty transmission. One of those causes is a peculiar phenomenon called "fading," which causes the transmission—the signals as they are technically called—to fade out annoyingly and regularly in certain localities. But the engineers and scientists do not know how to overcome that serious drawback, in this or any other country. Also, there is very little known as to the causes and means of preventing the noises known as "atmospherics."

Those two main limitations to the efficiency of all-Australian reception at any time of the year, are the only objections that can be raised to the claim that 2FC and 3LO are National stations in Australia.

PROVING RADIO No. 29

This week we treat inductance, both in series and parallel. The next article commences the A.O.P.C. course in preparation for which "Proving Radio" has built up a background of useful knowledge which will enable the student to overcome many little technical problems with which he is liable to meet. Almost anybody can obtain the A.O.P.C., but the man who operates a transmitter and knows what is happening will have a greater status than he who merely presses the key and does not understand why electrons rush to the plate of his transmitting valve!

THERE is one very important subject which enters into calculations when one is dealing with coils. This is called "inductance." When a current is passed through a coil of wire magnetic lines of force are set up in exactly the same ways as was explained in the electro-magnet experiment, and the galvanometer experiment. You will remember (in connection with the latter experiment) that the lines of force produced were in a different direction to the flow of current in the primary circuit.

Now the strength of the magnetic field or flux varies as the current varies. If a field of varying strength passes through a coil, an e.m.f. is induced in the coil. If an e.m.f. is passed through the coils lines of force are present. Conversely, if a magnet is placed inside a coil, lines of force will cause a voltage to be induced in that coil. The number of the lines of force and the speed at which they are cut, and the number of turns in the coil determines the value of the induced voltage.

Imagine that you have a very strong permanent magnet with the two poles opposite one another as shown in Fig. 1. Note that the magnetic lines of force are very strong at the poles. Now imagine a coil to be so placed that it can rotate in between the two poles so as to collect energy. It will be obvious that if the two ends are connected to some meter giving very low readings a voltage will be shown to be present. If the coil be wound as in Fig. 2, the magnetic lines of force will cause a greater voltage to be induced in the coil when it is almost wholly in the path of the magnetic field. When, however, the coil is so placed that only part of it will be affected by the magnetic field only a small voltage will be induced.

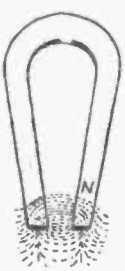


Fig. 1.

Further, as the coil rotates, the direction of the turns with relation to the magnetic lines of force will be reversed a certain number of times, depending on the speed of the coil. If the coil rotates sixty times per second we have a 60-cycle alternating current. If you imagine the coil to be turning in one direction, and follow it round mentally, you will see that at one moment the voltage will be positive in one side of the coil and negative in the other. As the coil turns, the direction of flow will gradually reverse. Here then is the principle of the alternator—and, in fact, the transformer.

In the transformer, the parts are stationary, but the flux is alternating in value and direction. All coils have that property known as "self inductance" (sometimes called "electrical inertia"). The direction of the induced voltage in a coil tends to prevent the change of current which makes the induced voltage. When changing flux density is passed on to other coils near a primary or other coil in which a varying current flows, a voltage will be set up in each coil, the value, of course, depending on the rate of change of the flux linking each coil, and also on the number of turns in each coil. The induction between coils is known as "mutual induction."

Inductance is measured in "Henries." This property of a coil depends on the number of turns, the diameter of the coil, and on the permeability of the material of the core. Permeability of a material is merely its ability to assist magnetc lines of force. From this will be gathered the fact that iron has a relatively high permeability, because it is known to be a splendid conductor of magnetic lines of force. A Henry is the inductance of a coil in which a pressure of one volt is induced by a current changing at the rate of one ampere per second.

In the Ohm's Law calculations, you will remember that electrical circuits were treated thus: I equals E over R. In the magnetic circuit (just as the resistance of the wire in the electrical circuit determines what current will flow) so the reluctance (treated previously) of the magnetic circuit, depending on length, area, and materials acts similarly in the magnetic circuit. It will be seen then, that the formula for a magnetic circuit becomes flux equals magneto motive force over reluctance.

A slight knowledge of these principles will be found to be extremely useful to the student interested in the construction of transformers, "B" eliminators, chokes, and so forth.

Inductance coils may be connected in series or in parallel. When in series, the net inductance is the sum of the separate inductances (as is the case with resistances), providing there is no coupling between the coils. This means that there must be no mutual inductance between the two coils, or that their magnetic fields do not interlink.

When calculating inductance we use the symbol L. Thus the formula for finding the inductance of two coils in series is L equals L1 plus L2.

The net inductance of coils in parallel is found in the same way as resistances in parallel, i.e., in the case of two inductances, L equals L1 by L2 over L1 plus L2. In the case of more than two inductances the formula becomes L equals 1 over the reciprocal of L1 plus L2, plus L3, etc., or, in other words, L equals 1 over (1 over L1) plus 1 over L2 plus 1 over L3. A more complete explanation of these formulas will be gained by re-reading my notes on the calculation of resistance in series and in parallel.

Though we use the symbol L for a fixed self-inductance, it is usual to use symbol M for mutual inductance.

When the fields of two concentric coils are at right angles the mutual inductance is zero, and the inductance of the two coils in series will form what is commonly known as a variometer. In this component, one coil is made variable relative to the other, and, as a result, the total L can be varied by moving one coil inside the other in such a manner that in one position the lines of force induced will be great, whilst in another position, i.e., with the coils at right angles, the induction will be small.

In 25 and 60 cycle work an iron path is usually provided for the flux, as the permeability of iron is greater than that of air at these frequencies. All iron and steel shows a magnetic "lag." The flux in the iron lags somewhat behind the current producing it. This phenomenon is known as "magnetic hysteris."

To pass back to the Henry. You will remember that when treating capacity and resistance we were told that the units were the farad and the ohm respectively. You have been told in this lesson that the unit of inductance is the Henry. As in capacity and resistance, we are able to use greater and smaller definitions of their units, so is the case with the Henry.

These quantities are decided by the prefix used before the unit. In condensers, for instance, a microfarad is a millionth of a farad. In resistances, a megohm is a million ohms. Note the difference—the prefix mega represents a million, whilst micro represents one-millionth part.

In dealing with inductances the same procedure is followed. Thus, if we desire to express a one-millionth part of a Henry, we should say "one microhenry."

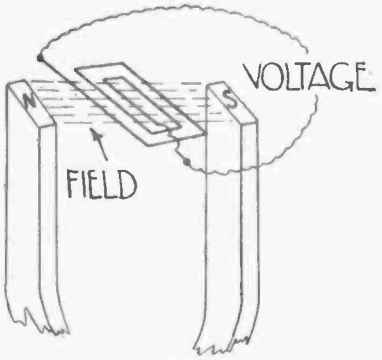


Fig. 2.

One microhenry equals 1000 centimeters. One Henry is the same as 1000 millihenries, or 1,000,000 microhenries.

So you will see that it is a simple matter to express any fraction of a unit by means of the metric system. The prefixes generally used in radio are as follow:—

One millionth, micro; one thousandth, milli; one hundredth, centi; one tenth, deci; one, uni; ten, deka; one hundred hekto; one thousand, kilo; ten thousand, myria; one million, mega.

Take a glance at the above list, then write down on a slip of paper the answers to the following questions, and then check up your answers:—

What is a: Centimetre; kilometre; megohm; millihenry; micro-microfarad?

With regard to the latter, the reader should remember that the first prefix will be used in conjunction with the second. Thus centi-centimetre will be one-tenth of a tenth of a metre, which is one-hundredth of a metre.

This article concludes the series of background lessons. Those who have followed the articles from their commencement will find that they will now be able to understand quite a number of the more technical handbooks which were before too intricate. Now that a fairly thorough footing has been laid, we shall commence next week with the A.O.P.C. course; taking for our text books (as mentioned in Part 1, "Proving Radio" (the A.R.R.L. Handbook, 1929 edition, and the Admiralty Handbook of Wireless (last published 1925). Readers who have difficulty in procuring this book might try Angus and Robertson and Turner and Henderson.

:: Servicing a Radio Set ::

This week our contributor further deals with aerials and gives some hints on soldering

An aerial that is very long picks up the output of a great number of stations far and near, and sometimes it is nearly impossible to separate them. This can be partly overcome by sticking a small .00025 fixed condenser in series with the aerial.

Aerial insulators should be of first-class glazed surface, otherwise they will absorb moisture on wet days and ground out to the guy wires. Electric wiring cleats as substitutes are wrong.

A short wire run up to the moulding or on the floor often works wonders on loop sets when fastened to one side of the loop. A good ground or an aerial plug in place of the above works, but, when using a ground or an aerial plug, it is sometimes necessary to short out two or three turns of the loop to keep the set selective.

When a radio sounds very weak, and things seem normal in the set, it may be that the aerial is shorted out, or there is an open splice in the lead-in, etc. You can find out easily enough by unhooking the aerial from the binding post of set, and placing your finger on the set post. If the volume increases, using your body only, your trouble is in the aerial.

If it is not in the aerial, replace the lead-in wire, and unhook the ground wire from its binding post, keeping your fingers away from both ground wire copper and the set binding post. If the radio nearly stops working, the ground is O.K., but, if the radio goes on the same as it did with the ground wire on the post, you know immediately there is something the matter with the ground. Clump a spring wire around gas pipe or water pipe for testing. Use this clump, and run a wire from it to the radio. If the radio now works well, there is nothing to do but trace the ground trouble.

A loop antenna is the same as the secondary winding of an antenna coupler coil, and is tuned by a condenser shunted across it. The secondary winding of any small antenna coupler can pick up modulated waves if close enough to a broadcast station, but to get enough waves or electrons to work the grid from a more distant station requires a greater surface, hence the size of a loop.

A loop set can be changed into an antenna, ground set, by either replacing the loop with a 200-600 meter band secondary coil (see coil windings), coupled to a primary winding, in series with an antenna and ground, or a few turns of wire can be wound around the loop in the same direction and placed in series with the antenna and ground. This is a good service stunt for people who are not satisfied with their loop results.

Generally, an inside short aerial and a good ground suffice to make a set designed for loop step out and get the stations. The directional properties are lost.

When any AC power unit or AC tubes or AC is used, and there is a hum you cannot locate, be sure it is not the AC leads from the socket going along with the aerial lead-in and inductively coupling to it. I have found this trouble.

A service man's viewpoint of an aerial should be that one weak spot is ruining the whole works, and he is going to fix that weak spot, or know the reason why. Don't leave a job half done when you know you could better it by fixing that little something a foot or two out of your reach. Move the phonograph out, and stand on it, if necessary.

WAVE TRAPS AND WAVE METER
XXXI.

One of the handiest things around radio sets is a wave trap and wave meter, and in service work it can be made to produce good, hard cash.

A wave trap is used to trap out undesired frequencies or sharpen and bring them in according to how it is hooked up. The wave trap can be used to demonstrate to customers the advisability of using one on their sets, and the construction to supply them after demonstration is simple (see table of coils, later issue.)

A wave meter, once it is calibrated, will always tell you what frequency any station is on and many uses desired in the shop.

SOLDERING
XXXII.

The writer has used a storage battery soldering pencil for many years, and found it to be of greatest convenience. However, the use of the carbon soldering pencil, due to extreme heat at the arc, requires extreme care and experience, which is one reason an electric soldering iron forms part of the equipment of the service man rather than a carbon pencil.

The construction of a pencil is simple, being a wire, with clip on one end to fasten to storage battery, running to a small wooden handle, into which a brass pipe nipple is screwed. At the other end of the brass pipe a piece of round carbon protrudes. Another wire, with clip on each end, completes the pencil. The extra wire is clipped to the storage battery and some part of the metal or wire to be soldered. The carbon pencil wire, being clipped to the other storage battery terminal, creates an arc when it is touched to the object to be soldered.

You can make one easily by using the carbon from an old flashlight cell and mounting it in the end of a six-inch piece of 1-¼-inch brass pipe. A file handle is used, drilling a hole in the end to admit a wire. Then solder the wire to the brass pipe and force the pipe into file handle.

The arc is created away from the spot to be soldered, the heat being conducted to the joint upon which some resin core solder is melted. As soon as enough solder melts on the joint the carbon is touched on the other side of the joint, drawing the solder that way with the heat and a good run joint evolves.

Very fine wire can be soldered by conducting the heat to it through another piece of metal, such as bus-bar. This other metal is tinned at its point and a drop of solder deposited upon it. This point is then held to the fine wire, and an arc created far back on the piece of bus-bar. When the heat become sufficient, the solder runs off on the fine wire. The fine wire must be scraped and prepared for soldering.

To make a joint by soldering, a cold iron (that is, one not up to its capacity heat, if electric) will not make a running joint; in fact, it will not make a joint even if it does melt off a piece of plastic solder.

Wipe the end of the iron with a rag or wad of paper. If it shows a nice, bright, liquid finish, the iron is ready for use.

Do not create a habit of dipping an iron in acid to shine the tinned point; by all means, not in radio work. Wipe it off as mentioned above. If the iron needs tinning, file it with a rough file, deposit a touch of resin core solder, and wipe immediately with the rag. This is the quickest and best way to tin.

Place the soldering-iron first on the joint to be made. When the joint is hot, deposit solder at the junction of iron and joint, holding it steady until the flux or resin vaporises and the solder is noticed to run. Do not slide a soldering-iron back and forth on a joint, as this crystallises the solder.

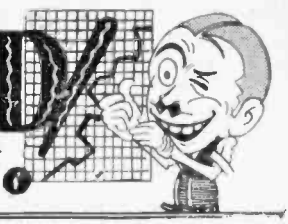
A soldering-iron will conduct heat quickly if it has some free-running solder on the tip. A dry iron takes a long time to conduct heat.

The less solder you use on a joint the less chance there is of unvaporised flux remaining and a non-conductive film between the parts of a joint. Just because two wires are mechanically held together by solder does not mean there is not a film of flux non-conducting the high frequency of radio. When you see a free-running joint made, you know pretty well it is an electrical joint.

Care must be taken to have a wet iron when soldering to fixed condensers, so a quick joint can be made.

Manufacturers make a great mistake in nickel-plating lugs and parts to be soldered. The nickel-plating should be scratched off or scraped off before soldering, as nine times out of ten a film of flux remains between the solder and nickel-plating unless extreme heat is used.

CURVES AHEAD



The Experimenter's Department of Technical Progress
Conducted by Ross A. Hull M.I.R.E.

Developments in Receiver Design

IF there is anything new to be incorporated in a radio receiver the best place to find it is not in the factory-built outfits put out by the big manufacturers overseas. Their chief idea seems to be to keep one eye on technical development and the other (usually the better of the two) on the commercial side. As a result, the technical development in the big corporations invariably is very far ahead of the commercial applications of the same. The screen-grid tube in America provides a typical illustration of this. In the big laboratories the development of this valve had been carried along very thoroughly long before it appeared on the market. And even then the valve was commercialised long before it was originally intended. Had it not been that a minor firm developed the screen-grid tube and marketed it with a rush, the big corporation undoubtedly would have held the development in the laboratory until such time as its appearance was deemed desirable from a commercial point of view.

The same sort of thing applies to the complete receiver produced by the big concerns. Invariably the new models are changed in mechanical construction or in external appearance, but for some little time they have shown no very drastic technical development. In contrast to this, one finds that the American firms marketing receivers in "kit" form usually can be depended upon to come out with any dizzy development that they can lay their hands on. As a result the technical descriptions of them usually are of particular interest. At least, we think so.

Firms like Silver-Marshall, Mammarlund-Roberts, and the National people often turn out stuff that is well worth study. (No, that is not sponsored advertising!) The recent receivers of these firms, for instance, all make excellent use of the A.C. screen-grid tube and many minor electrical and mechanical gimmiks that have not so far been seen in the better "ready-built" receivers of the big manufacturers.

One of the most recent Hammarlund-Roberts kits, for example, makes use of the double-tuned radio frequency transformers as couplings for the two screen-grid stages used. These circuits, together with the tuned input, call for five variable condensers. As might be expected, the input condenser is not ganged with the others, but is run from a separate drum. Complete by-passing is to be found from the screens and plate circuits to ground, and radio frequency chokes are used in the screen-grid and detector valve plate leads. The volume control, as in many other such receivers is obtained by variation of the screen-grid potential.

One of the recent Silver-Marshall designs provides for the use of three screen-grid stages, coupled by means of untuned-primary transformers. In this instance, again, the antenna coupling transformer secondary is tuned by its own condenser and drum. Grid detection is used as in the Hammarlund-Roberts, but the detector is followed by the unconventional "Clough" choke and resistance audio coupling units.

The new receiver designed by Glenn Browning and made up in "kit" form by National is still more unusual. In it four screen-grid stages are used, the input circuit being untuned, and the output being fed into a "plate" detector. A feature of the by-passing arrangement is that the plate by-pass condensers run directly to the valve cathodes, and not to ground and back through the bias resistor by-pass, as is usually the case. Combination radio-frequency chokes and by-pass condensers in one unit have been designed for this outfit—a very worth-while contribution.

The new Silver-Marshall receiver, which has recently been put on the American market in completed form, as might be expected, differs very greatly from the conventional factory-built job. In that receiver, three screen-grid radio-frequency stages are used, feeding a screen-grid "plate" detector. The input circuit is untuned, the first coupling unit double-tuned, and the others provided with an untuned primary—altogether a very interesting combination. On the audio side the first valve is fed from the screen-grid detector through a resistance rig, while the second stage contains a pair of UX-245's in push-pull. Volume control is again obtained by variation of the screen-grid voltage.

Important High-frequency Tests

MANY short-wave experimenters throughout the world are at the moment interested in the schedule of very high frequency transmissions being conducted by the General Electric Company from one of the experimental high frequency transmitters of Schenectady, in New York State. The transmissions have been planned to make possible further observations on frequencies between 20,000 and 40,000 kilocycles—that is, between about 15 and 7.5 metres.

Prominent engineers in various parts of the world who have studied the performance of high-frequency radio waves, have voiced their belief that frequencies above about 26,000 kilocycles will never be of use in communication between two points on this earth. Already, however, these estimates are being found at variance with actual results obtained by experimenters in practice, and there seems to be a definite probability that frequencies much higher than the limit mentioned may yet be of value. Very great interest undoubtedly will be shown in engineering circles in the results of present General Electric tests, since it would appear highly probable that they will permit the revision of existing ideas on high frequency propagation.

Knowing the difficulties to be faced in obtaining satisfactory operation of a receiver on frequencies of the order of 30,000 k.c. we cannot suggest that listeners unfamiliar with very high frequency work should rig up receivers in the attempt to make useful observations. It is altogether too probable that, in such cases the reports of no signals would be harmfully interpreted as meaning that the signals were not arriving, when, in reality it would be the result of incorrect operation and tuning of the receiver.

Since, in tests of this nature, the absence of signals is just as important an effect as their presence, it is very necessary that the receivers employed for observation work should be of known effectiveness.

At the same time, we do hope that experienced experimenters in high frequency work, who are not already familiar with the test schedule, will make every effort to put in some sessions of sincere observation.

We print herewith, in part, the statement of the General Electric Co.'s engineer's concerning the test:—

The transmitter utilised at Schenectady will have its frequency crystal controlled and a normal power output of approximately 2 k.w. The antenna will be a simple non-directive structure. The call letters utilised will be W2XAW.

The material transmitted will consist entirely of C.W. (continuous wave) transmission. At few-minute intervals the station call, the frequency on which the station is operating, and the frequency which will be used during the subsequent transmission, will be given.

Transmissions will be run continuously for 30 hours, and will occur semi-weekly. The frequency of each transmission will be 2000 k.c. higher than that of the preceding frequency.

The transmission schedule follows:—

Date and Time (G.M.T.)						Transmission Frequency
1600 July	9	to	2200 July	10	.....	24,000
.. ..	12	.. ..	..	13	.....	26,000
.. ..	16	.. ..	..	17	.....	28,000
.. ..	19	.. ..	..	20	.....	30,000
.. ..	23	.. ..	..	24	.....	32,000
.. ..	26	.. ..	..	27	.....	34,000
.. ..	30	.. ..	..	31	.....	36,000
.. Aug.	2	.. ..	Aug.	3	.....	38,000
.. ..	6	.. ..	..	7	.....	40,000

Since comparatively few observers are being asked to observe during the test it is very desirable that those selected cover as much of each 30-hour transmission as possible. In this connection we wish to point out that at certain periods of the day the signal will very likely be inaudible; therefore, reports stating that the signal was listened for, but not heard, may be just as valuable as those which give the characteristics of a received signal.

Correspondence in connection with this test may be sent to either of the following addresses:—

General Electric Co., Radio Engineering Dept., 1 River Road, Schenectady, N.Y., U.S.A.; or Australian General Electric Co., Ltd., P.O. Box 538F, Melbourne, C.1.

Local Programmes, Friday, July 12

2FC

EARLY MORNING SESSION.

Announcer: A. S. Cochrane.

7.0: "Big Ben" and announcements. 7.2: Official weather forecast, rainfall, river reports, temperatures, astronomical memoranda. 7.7: "Sydney Morning Herald" news service. 7.12: Shipping intelligence; mail services. 7.15: Studio music. 7.25: Investment market; mining sharemarkets; metal quotations; wool sales; breadstuffs markets; inter-State markets; produce markets. 7.40: Studio music. 8.0: "Big Ben." Close.

MORNING SESSION.

Announcer A. S. Cochrane.

10.0: "Big Ben" and announcements. 10.2: Pianoforte reproduction. 10.10: "Sydney Morning Herald" news service. 10.25: Studio music. 10.45: A talk on "Home Cooking and Recipes" by Miss Ruth Furst. 11.0: "Big Ben." A.P.A. and Reuter's cable services. 11.5: Close.

MIDDAY SESSION.

Announcer: A. S. Cochrane.

12.0: "Big Ben." Summary of news, "Sydney Morning Herald." 12.4: Rugby Wireless news. 12.7: Stock Exchange, first call. 12.10: Synopsis of weather. 12.11: A reading. 12.30: Studio music. 1.0: "Big Ben." Weather intelligence. 1.3: "Evening News" midday news service. Producers' Distributing Society's report. 1.20: Studio music. 1.28: Stock Exchange, second call. 1.30: Popular studio music. 2.0: "Big Ben." Close.

AFTERNOON SESSION.

Announcers: Eric Bessemer and Laurence Halbert.

Accompanist: Ewart Chapple.

2.30: Programme announcements. 2.32: A record recital. 3.0: "Big Ben." Studio music. 3.23: Dorothy Charlston, contralto—(a) "Silent Night" (Rachmaninoff), (b) "The Old Flagged Path" (Arundale), (c) "The Star and the Flower" (d'Hardelot). 3.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 3.40: Phyllis Broadbent, soprano—(a) "I Think" (d'Hardelot), (b) "Advice" (Carew). 3.46: A reading. 4.10: Bernice Arthur, pianist—"Ballade, G Minor" (Chopin). 4.20: Dorothy Charlston, contralto—(a) "Amber and Amethyst" (Carse), (b) "O Lovely Night" (Ronald), (c) "I Love You Truly" (Jacobs-Bond). 4.27: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 4.37: Phyllis Broadbent, soprano—(a) "Spring" (Tosti), (b) "Butterfly Wings" (Phillips). 4.45: Stock Exchange, third call. 4.47: Bernice Arthur, pianist—(a) "Hexentanz" (M'Dowell), (b) "Etude in C Flat" (Chopin). 4.57: A musical item. 5.0: "Big Ben." Close.

EARLY EVENING SESSION.

Announcer: A. S. Cochrane.

5.30: The chimes of 2FC. 5.35: The Children's Session, conducted by the "Hello Man." Letters and stories. Music and entertainment. 6.10: The Farmyard Five from Kookaburra Gully. 6.30: Dalgety's market reports (wool, wheat, and stock). 6.40: Fruit and vegetable markets. 6.43: Stock Exchange information. 6.48: Weather and shipping news. 6.50: Rugby Wireless news. 6.55: Late sporting news, by the 2FC Racing Commissioner. 7.0: "Big Ben." Late news service. 7.10: From Farmer's Restaurant: Items by the Dance Band.

EVENING SESSION.

Announcer: Laurence Halbert.

Accompanist: Ewart Chapple.

7.45: Programme announcements.

7.48: Studio music.

8.0: "Big Ben." From Farmer's Restaurant: Cec. Morrison's Dance Band.

8.10: Jack Lumsdaine and Dorothy Stevens, popular duets.

8.20: Carlos Fakola, Novelty Pianist.

8.27: Studio Dance Band, conducted by Cec. Morrison.

8.39: Jack Lumsdaine and Dorothy Stevens, popular duets.

8.50: Carlos Fakola, Novelty Pianist.

9.0: "Big Ben." Weather report.

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To Local Programmes

To Interstate Programmes

9.5: Foreword. By arrangement with J. C. Williamson, Ltd., a theatrical transmission will be arranged.

9.45: From the Studio: Studio Dance Band, conducted by Cec. Morrison.

9.57: Late "Evening News" service.

10.7: Studio Dance Band, conducted by Cec. Morrison.

10.28: Late weather and to-morrow's programme.

10.30: National Anthem. Close.

2BL

MORNING SESSION.

Announcer: A. C. C. Stevens.

8 a.m.: G.P.O. chimes. Metropolitan weather report; State weather report. 8.3: Studio music. 8.15: News and information service from the "Daily Telegraph Pictorial." 8.45: Studio music. 9.30: G.P.O. chimes. Half an hour with silent friends. 10.0: G.P.O. chimes. Close down.

MIDDAY SESSION.

Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes. 2BL Women's Sports Association session, conducted by Miss Gwen Varley. 11.30: Advertising hints. 11.40: Women's session, conducted by Mrs. Cranfield. Talk on "Infant Welfare," by Nurse May. 12.0: G.P.O. chimes. Special ocean forecast and weather report. 12.3: Pianoforte reproduction. 12.30: Shipping and mails. 12.35: Market reports. 12.48: "Sun" midday news service. 1.0: Studio music. 1.30: Talk to children and special entertainment for children in hospital, by Uncle Steve. 2.0: G.P.O. chimes. Close down.

AFTERNOON SESSION.

Announcer: A. C. C. Stevens.

Accompanist: Kathleen Roe.

3.45: G.P.O. chimes. Popular music. 4.0: Edith Harrison, pianist—(a) "Waltz in D Flat" (Chopin), (b) "Nocturne in B Major" (Chopin), (c) "Waltz in C Sharp Minor" (Chopin). 4.10: Captain A. C. C. Stevens will speak on "The Most Dangerous Animal Hunt." 4.25: Dorothy Benbow, contralto—(a) "Poor Man's Garden" (Russell), (b) "Slave Song" (Del Riego). 4.32: Annie Hughes, in a sketch—"On Board" (Hughes). 4.47: Edith Harrison, pianist—(a) "Musical Snuff Box" (Liadow), (b) "Barcarolle" (Grodzky), (c) "Sous Bois" (Staub). 4.57: Dorothy Benbow, contralto—(a) "The Auld House" (Strathcarn), (b) "The Valley by the Sea" (Adams). 5.4: Popular music. 5.24: Producers' Distributing Society's poultry report. 5.27: Features of the evening's programme.

EARLY EVENING SESSION.

Announcer: Basil Kirke.

5.30: Children's session, conducted by Uncle Bas. Music and entertainment. Letters and stories. 6.30: "Sun" news and late sporting. 6.40: The Instrumental Trio. 7.7: Australian Mercantile Land and Finance Co.'s report. Weather report and forecast, by courtesy of Govt. Meteorologist. Producers' Distributing Society's fruit and vegetable market report. Grain and fodder report ("Sun"). Dairy produce report ("Sun"). 7.25: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An ad. special. 7.55: Programme and other announcements.

EVENING SESSION.

Announcer: Basil Kirke.

Accompanist: G. Vern Barnett.

8.0: Studio Orchestra, conducted by Horace Keats—

Overture, "Euryanthe."

"The Merry Widow" (Lehar).

8.20: Maisie Barnett, contralto—

(a) "The Dove" (Ronald).

(b) "When Thy Blue Eyes" (Lassen).

8.27: Studio Orchestra, conducted by Horace Keats—

(a) "Reminiscences of Grieg" (arr. Godfrey).

(b) "Der Meistersingers" (Wagner).

8.47: Laurel Mather, popular vocalist—

(a) "When the Right One Comes Along" (Wayne).

(b) "In a Little Town Called Home, Sweet Home" (Donaldson).

8.54: Studio Orchestra, conducted by Horace Keats—

Ballet Suite—"The Shoe" (Ansell).

9.9: Maisie Barnett, contralto—

(a) "I Dare Not, Cannot Believe It" (Schumann).

(b) "Delft Ware" (Arundale).

9.16: Studio Orchestra, conducted by Horace Keats—

"A Virginian Rhapsody" (Wood).

9.30: C. R. Dexter will give last-minute sporting information.

9.45: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

9.55: From the studio, Laurel Mather, popular vocalist—

(a) "Ah! Sweet Mystery of Life" (Young).

(b) "A Bungalow, a Radio, and You" (Dempsey and Leibert).

10.2: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

10.14: From the studio, late "Evening News" service.

10.28: Weather report.

10.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

10.57: From the studio, to-morrow's programme.

10.59: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

11.30: National Anthem. Close.

2GB

10.0: Music. 10.10: Happiness talk by A. E. Bennett. 10.20: Music. 11.45: Close down. 2.0: Music. 2.5: Women's radio service by Mrs. Dorothy Jordan. 3.0: Music. 3.30: Close down. 5.30: Children's session by Uncle George. 7.0: Music. 8.0: Miss Florence Gordon, contralto. 8.7: Instrumental Trio. 8.15: Mr. Clement Hosking, baritone. 8.22: Symphony Orchestra. 8.30: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 8.35: Miss Noel Palfreyman, soprano. 8.45: Address. 9.0: Weather report. 9.3: Instrumental trio. 9.13: Miss Florence Gordon, contralto. 9.23: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 9.28: Symphony orchestra. 9.38: Mr. Clement Hosking, baritone. 9.48: Organ music. 9.53: Miss Noel Palfreyman, soprano. 10.3: Instrumental music. 10.30: Close down.

2UW

MIDDAY SESSION

12.30: Request numbers. 1.0: G.P.O. clock and chimes; music. 1.15: Talk on "Homecraft" by Pandora. 1.40: Music and request numbers. 2.30: Close down. 4.30: Musical programme.

EVENING SESSION

5.30: Children's Hour, conducted by Uncle Jack. 6.30: Close down. 7.0: G.P.O. clock and chimes; request numbers. 8.0: Music. 9.0: G.P.O. clock and chimes; comments on "Foreign Affairs," by Mr. J. M. Prentice. 9.10: Music and request numbers. 10.30: Close down.

Interstate Programmes, Friday, July 12

3LO

EARLY MORNING SESSION

7.15: Morning melodies. 7.20: Exercises to music. 7.30: Stock reports; Stock Exchange information; market reports; general news; shipping and sporting information. 8 0: Time signal. 8.1: Melodies. 8.15: Close down.

MORNING SESSION

11.0: 3LO's Supper Specialties: Cheese Eggs. 11.5: Miss I. V. Crawford will continue her series of talks on "Practical Psychology." 11.25: "Au Fait" will speak on "Fashions." 11.45: Under the auspices of the Department of Health, Dr. Featonby will speak on: "Milk as a Food."

MID-DAY NEWS SESSION

12.0: Time signal. 12.1: News session. 12.15: Newmarket stock sales; entries for the market for Tuesday, Wednesday, and Thursday. 12.20: The Station Orchestra. 12.31: Mildred and Connie, harp and violin. 12.38: Stock Exchange information. 12.45: The Station Orchestra. 1.0: Meteorological information; weather forecast for Victoria, New South Wales, South Australia, and Tasmania, ocean forecast, river reports; rainfall. 1.5: The Station Orchestra. 1.18: Mildred and Connie, harp and violin. 1.25: The Station Orchestra. 1.35: Mollie Warden, soprano. 1.42: The Station Orchestra. 1.45: Mollie Warden, soprano. 1.52: Close down.

AFTERNOON SESSION

2.15: The Station Orchestra. 2.27: Ernest Wilson, bass-baritone. 2.34: The Station Orchestra. 2.41: Jean Sinclair, contralto. 2.48: Description of Public Schools football, Scotch College v. Melbourne Grammar School, by S. G. Harris. 3.0: A programme of 17th Century Music. Lesbia Dobson. Ten minutes piano and five minutes explanation. Italy: (a) "Tempo di Ballo" (Domenico), (Scarlatti). Germany: (b) "Prelude and Fugue" (P. E. Bach), "Solfegietio in G Minor" (J. S. Bach). France: (c) "Les Derricedes Mysteriouses" (Couperin), "Le Coucou" (Louis Duquin). 3.15: Ernest Wilson, bass-baritone. 3.22: Description of Public Schools football, Scotch College v. Melbourne Grammar School, by S. G. Harris. 3.32: The Station Orchestra. 3.37: The James Girls. 3.52: The Station Orchestra. 4.0: Description of Public Schools football, "Scotch College v. Melbourne Grammar School, by S. G. Harris. 4.15: Jean Sinclair. 4.22: The Station Orchestra. 4.30: Arthur Douglas. 4.37: Description of Public Schools football, Scotch College v. Melbourne Grammar School, by S. G. Harris. 4.45: The Station Orchestra. 4.55: News session. 5.5: Close down. 6.0: Stories and entertainment for the children. 6.15: Captain Donald MacLean: Adventure stories for the boys. 6.30: A special children's programme by the students of Freda Northcote. Duet: "Tell Me Where do Fairies Dwell," Gladys Phillips and Lizzie Matthews. Solo "Little Sunbonnet of Blue," Pearl Phillips. Solo "Yo San," Hilda Brooks. Humorous recitation Irene Trewaskis. Duet: "I Don't Want to Play in Your Yard," Malvie Cassidy and Mavis Kruger. Solo "A Lullaby," Norma Lambert. Solo: "Sonny Boy," Alf. Brooks. Recit.: "The London School Girl," Eileen O'Leary. Solo "A Fat Lil' Feller," Mavis Kruger. Solo "Husheen," Hazel Dolreen. Finale "Let a Smile be Your Umbrella," Eileen O'Leafy and Premier Singers.

EVENING SESSION

7.5: Stock Exchange information. 7.15: Market reports. 7.30: News session. 7.43: Birthday greetings. 7.46: Cecil H. J. Williams will speak on "Tomorrow night's events at the Stadium."

NIGHT SESSION

8.0: Collingwood Citizens' Band—
Overture, "Barber of Seville."
8.10: Victor Baxter, Tenor—
"The Star" (Rogers).
"Mighty Lak a Rose" (Nevin).
8.17: The Jedal Trio—
The Trio.
"Walther's Prize Song" (Wagner).
"Rondo alla Turca" (Mozart).
"Berceuse" (Per Winge).
Violin.
"Ballet Musik" (Schubert-Kreisler).
The Trio.
"Ave Maria" (Schubert).
"Marche Miniature" (Kreisler).
8.42: Rosina Down, Soprano—
"If There Were Dreams to Sell" (Ireland).
"Open Thy Blue Eyes" (Massenet).
8.50: The Collingwood Citizens' Band—
Gems of operatic music.
9.0: Vassili Ilster, Piano—
"Andante Melodique" (Danda).
"Vivace" (Goddard).
"Tango" (Albeniz).
Edna Haltenbach, 'cello.
"Softly Awakes My Heart" (Saint Saens).
The Jedal Trio.
"By the Brook" (Boisdeffre).
"Flower Waltz" (Tschaikowsky).
9.25: Rosina Down, Soprano—
"Serenade" (Bemberg).
Selected.
9.32: Collingwood Citizens' Band—
Waltz, "Angela Mio."
Trombone solo, "Ave Maria" (Schubert).
Soloist: A. Thorne.
9.42: Eric Welch will speak on to-morrow's Epsom Turf Club races.
9.52: Collingwood Citizens' Band—
Trombone Trio, "Comrades in Arms."
"Hopetoun Gavotte" (Ada B. A. Rutherford).
10.0: News service; British official wireless news from Rugby; meteorological information; announcements; progress scores in billiard match, Walter Lindrum v. Willie Smith.
10.10: Victor Baxter, Tenor—
"Have You Seen but a White Lily Grow?" (Old English).
"Star Vicino" (Rosa).
10.17: Collingwood Citizens' Band—
Selection, "The Merry Widow" (Lehar).
10.27: The James Girls—
A Special Request Programme.
10.42: Ern. Hall's Radio Revellers, with Hugh Huxham—
"Honey" (Simons).
"Flower of Love" (Simons).
"When the Right One Comes Along" (Gilbert).
"Wear a Hat With a Silver Lining" (Sherman).
"My Mother's Eyes" (Baer).
"One Alone" (Romberg).
"Just Give the Southland to Me" (Sissel).
"Stay at Home Girl" (O'Hagen).
"The Desert Song" (Romberg).
"A Room with a View" (Coward).
11.30: God Save the King.

3AR

MORNING NEWS SESSION.

10.0: Chimes. 10.1: Market reports: farm and station produce, fruit, fish and vegetables. 10.25: Shipping reports; ocean forecasts. 10.30: Mail notices; express train information. 10.35: News service. 10.59: Weather forecast.

MORNING MUSICAL SESSION.

11.0: Recordings. 12.20: British official wireless news from Rugby; announcements. 12.30: Close down.

AFTERNOON SESSION.

3.0: Recordings. 3.30: Vassili Ilster, piano recital—
"Ballade G Minor" (Grieg), "Mountain" (Greig).
"Cracovienne Fantastique (Paderewski). 4.30: Close down.

EVENING SESSION.

6.0: Recordings. 7.10: News session; announcements. 7.30: Recordings.

NIGHT SESSION.

8.30: Community singing, transmitted from the Collingwood Town Hall.
The Radio Revellers, with Hugh Huxham, assisted by Arthur Douglas, a braw Scot, and Mildred and Connie, with their harp and violin.
10.20: News session: announcements.
10.30: God Save the King.

4QG

EARLY MORNING SESSION

7.43: Time signals. 7.45: News service. 8.0: Records. 8.15: News service. 8.30: Close down.

MORNING SESSION

11.0: Music. 11.5: Social news. 11.15: Lecturette: A cookery and household talk, by "The Etiquette Girl." 11.30: Music. 12 (noon): Close down.

MIDDAY SESSION

1.0: Market reports and weather information. 1.20: Lunch-hour music. 2.0: Close down.

AFTERNOON SESSION

3.0: The Studio Orchestra, overture, "Le Chevalier Breton" (Herman); valse, "Lucille Love" (Olman); dance intermezzo, "Laughing Eyes" (Finck); caprice "In the Starlight" (Huerter); rag step, "Live Wires" (Shepherd). 3.30: Organ recital by Mr. Geo. Sampson, F.R.C.O., City Organist. 4.0: Studio Orchestra, entr'acte, "A Voice in the Wilderness" (Russell); march, "The Glencoe" (Hayes). 4.10: Records. 4.15: News. 4.30: Close down.

NIGHT SESSION

8.0: The Studio Orchestra—
Overture, "Emperor" (Riesler).
8.8: The Silkstone Apollo Club—
"Soldiers' Songs."
8.13: Messrs. Griffin, Jones, Hegarty, and Wathan, Vocal quartet, "Land of the Long Ago."
8.18: Vic. Morris, Baritone—
"Shipmates of Mine" (Sanderson).
8.22: The Studio Orchestra—
Novelty fox trot, "Chasing the Fox" (Wenrich).
8.27: The Silkstone Apollo Club—
Choruses, "Nelly Gray."
"Newquay Fisherman."
"Down in You Summer Vale."
8.38: Thelma Marsh, Pianiste—
Selected.
8.43: T. Westwood, Tenor—
"Waft her Angels."
8.50: The Studio Orchestra—
Nautical Humoresque, "Heave Ho" (Copping).
March, "King of the Deep."
9.0: Metropolitan weather forecast.
9.1: The Silkstone Apollo Club—
Chorus, "To the Death."
9.6: J. K. Thompson, Baritone—
"Dare Devil Dan."
9.10: The Silkstone Apollo Club—
Choruses, "Out of the Deep."
"Boy in Blue."
9.20: The Studio Orchestra—
Melody, "Reflection of Autumn" (Lowell).
9.26: D. Owens, Elocutionist—
"Mary called him Mister."
9.31: The Silkstone Apollo Club—
Chorus, "All Among the Barley."
9.36: Vic. Morris, Bass—
Selected.
9.41: The Studio Orchestra—
Intermezzo, "Souvenir of the Ball" (Bocealaro).
9.46: The Silkstone Apollo Club—
Choruses, "Destruction of Gaza."
"Good Night."
9.55: The Studio Orchestra—
Valse, "Vienna Beauties" (Zieherer).
10.0: News; weather news; close down.

5CL

MORNING SESSION

11.30: Chimes. 11.31: Recordings. 11.45: Kitchen craft and menu talk. 12.1: Recordings. 12.15: General news service. 12.52: Railway, Stock Exchange, and meteorological information. 1.1: Community singing from Adelaide Town Hall. 2.1: Close down.

AFTERNOON SESSION

3.0: Chimes. 3.1: Programme review and announcements. 3.10: Recordings. 4.10: An educational talk on World Wool Production, 1928. 4.25: Stock Exchange. 4.30: Close down.

EVENING SESSION

6.0: Chimes. 6.1: Birthday greetings, correspondence, songs and stories by "Miss Wireless." 6.30: Records. 6.45: Sporting service. 7.0: Chimes. 7.1: Senior Birthday League greetings. 7.2: Stock Exchange. 7.6: General market reports. 7.10: Rev. E. S. Kiek. 7.25: Mr. J. R. Willoughby on "Soccer Activities." 7.40: Mr. A. Grenfell Price on "Pioneers of Australia—William Dampier."

NIGHT SESSION

8.0: Chimes.
8.10: A Special Concert transmitted from the Malvern Methodist Church.
Fred. Pilgrim, Organist—
"Impromptu" (Coleridge-Taylor).
"Evensong" (Martin).
"Capriccio" (Lemaigre).
Phyllis Webb, Soprano—
"With Verdure Clad" (Haydn).
Mrs. Charles Chinner, Violiniste—
Selected.
Lindsay Jessop, Tenor—
"How Lovely are Thy Dwellings" (Liddle).
Mrs. Charles Chinner, Violiniste—
"Kol Nidrei" (Max Bruch).
Harold Tidemann, Baritone—
"Thou art risen, my Beloved" (Coleridge-Taylor).
Phyllis Webb and Lindsay Jessop, Vocal Duettists—
"Love Divine" (Stainer).
Fred. Pilgrim, Organist—
"Meditation" (d'Evry).
"Fantasia on Plain Song Melody" (Willan).
Harold Tidemann, Baritone—
"God that Madest Earth" (Sanderson).
Mrs. Charles Chinner, Violiniste—
Selected.
Lindsay Jessop, Tenor—
"The Blind Ploughman" (Clarke).
Mrs. Charles Chinner, Violiniste—
"Air on G String" (Matheson).
Phyllis Webb, Soprano—
"Come Unto Him" (Handel).
Fred. Pilgrim, Organist—
"Vesper Song" (Meale).
Finale (Rink).
FROM 5CL STUDIO.
10.15: General news service; British official wireless news, meteorological information; announcements.
10.20: 5CL's sporting service, including special late review of the Grand National Steeplechase and other races at Flemington and Eudunda to-morrow.
10.30: Close down.

6WF

10.0: Tune in: gramophone and phonograph records. 11.0: Close down. 12.30: Tune in. 12.35: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 1.3: Music by the Radio Trio. 2.0: Close down. 3.30: Tune in. 3.35: Musical programme relayed from the Primrose Cafe de Luxe; items by the Misses Marshall and Chapman. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories by Uncle Duffy. 7.5: Light music by the Radio Trio. 7.30: Commercial and general information. 7.45: Talk on sport. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Vocal and instrumental music from the studio. 8.50: Late news items; station announcements; ships within range announcement: late weather bulletin. 8.58: "Gardening" talk by Mr. James Conarty. 10.30: Close down.

10.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

AFTERNOON SESSION

3.0: Chimes. 3.1: Recordings. 3.4: Weather. 4.15: Readings. 4.30: Close down.

EARLY EVENING SESSION

5.15: Recordings. 6.30: "The Storey Lady." 7.0: "Uncle David" and "The Story Lady." 7.10: News session. 7.15: Sid. Jones will speak on "Football."

EVENING SESSION

7.30: A Studio concert. Daisy Walters, soprano. "Annie Laurie" (Lehmann). "The Blackbirds" (Elliott). 7.37: Ed. Brooker, Aeola solo, "Norwegian Cradle Song" (Morel). 7.43: Fred. Heraud, baritone, "Wher'er you walk" (Handel), "Trees." 7.50: Toscha Siedel, violin solo, "Humoresque" (Dvorak). 7.53: Rene Dyer, contralto, "Our Little Home" (Coates), "Beyond the Dawn" (Sanderson). 8.1: Ed. Brooker, Aeola solo, "For you alone" (Geehl). 8.6: Daisy Walters, soprano, "Pale Moon" (Logan), "Cuckoo Calls" (Brahe). 8.14: International Concert Orchestra, "The Skaters" (Waldteufel). 8.18: Fred. Heraud, baritone," So fair a flower," "Passing By" (Purcell). 8.25: Ed. Brooker, Aeola solo, Church chimes. 8.30: Rene Dyer, contralto, "Afton Water" (Hume), "Lackaday" (Crampton). 8.37: Ed. Booker, Aeola solo, "I hear you calling" (Marshall). 8.42: J. Isaacs, piano solo, "Waltz in D Flat." 8.45: J. M. Counsel. 9.45: News session. 10.1: Close down.

Local Programmes, Sat., July 13

2FC

EARLY MORNING SESSION.
Announcer: Laurence Halbert.

7.0: "Big Ben" and announcements. 7.2: Official weather forecast; rainfall; river reports; temperatures; astronomical memoranda. 7.7: "Sydney Morning Herald" summary. 7.12: Shipping intelligence; mail services. 7.15: Studio music. 7.25: Investment market; mining sharemarkets; metal quotations; wool sales; breadstuffs markets; inter-State markets; produce markets. 7.40: Studio music. 8.0: "Big Ben." Close.

MORNING SESSION.
Announcer: Eric Bessemer.

10.0: "Big Ben" and announcements. 10.2: Pianoforte reproduction. 10.10: "Sydney Morning Herald" news service. 10.25: Studio music. 10.30: Last-minute sporting information, by the 2FC Racing Commissioner. 10.40: Studio music. 10.45: A talk on "Gardening," by J. G. Lockley ("Redgum"). 11.0: "Big Ben." A.P.A. and Reuter's cable services. 11.5: Close down.

MIDDAY AND AFTERNOON SESSIONS.
Announcers: Ewart Chapple, Laurence Halbert.

12.0: "Big Ben." Summary of news. "Sydney Morning Herald." 12.4: Rugby wireless news. 12.7: Stock Exchange, first call. 12.10: Synopsis of weather. 12.11: Studio music. 12.50: From Moorefield, description of the races in the running. From the studio during intervals musical items by the Happy Trio. At approximately 3.15, from Melbourne, description of the Grand National Steeplechase. 4.45: From the studio, complete sporting and racing resume. 5.0: "Big Ben." Close.

EARLY EVENING SESSION.
Announcer: A. S. Cochrane.

5.30: The chimes of 2FC. 5.35: The children's session, conducted by the "Hello Man." Letters and stories. Music and entertainment. 6.40: Stock Exchange information. 6.45: Weather and shipping news. 6.47: Rugby wireless news. 6.52: Late sporting news. 7.0: "Big Ben." Late news service. 7.10: The 2FC Dinner Quartette, conducted by Horace Keats—(a) "Rose Marie Waltz" (Friml), (b) "Rusticanella" (Cortopassi), (c) "The Dance of the Hours" (Ponchielli), (d) "Softly Awakes My Heart" (Saint-Saens). (e) "Romance" (Sibelius).

EVENING SESSION.
Announcer: Laurence Halbert.
Accompanist: Ewart Chapple.

7.40: Popular music.
7.45: Popular music.
7.48: A record recital.
8.0: Dance night. Assisting artists, Rae Foster, Wally Baynes, Max Carrington and Nell Crane, Robert Gilbert.
10.28: Late weather report.
10.30: Studio Dance Band, conducted by Cec. Morrison.
10.57: To-morrow's programme.
10.59: Studio Dance Band, conducted by Cec. Morrison.
11.30: National Anthem. Close.

2BL

MORNING SESSION.
Announcer: A. C. C. Stevens.

8.0: G.P.O. chimes. Weather report—State and metropolitan. 8.3: Studio music. 9.15: G.P.O. chimes. News and information service from the "Daily Telegraph Pictorial." 9.45: Studio music. 9.30: G.P.O. chimes. Half an hour with silent friends. 10.0: G.P.O. chimes. Close down.

MIDDAY SESSION.
Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes. Women's session, conducted by Mrs. Cranfield. What's on at the pictures and theatres. 11.30: Advertising hints. 11.40: Talk on "Gardening," by Mr Cooper, Park Superintendent, City Council. 12.0: G.P.O. chimes. Special ocean forecast and weather report. 12.6: Studio music. 12.30: "Sun" midday news service. 12.40: Studio music. 1.0: "Sun" news service. 1.10: Studio music. 1.40: "Sun" news service. 1.50: Studio music. 2.0: G.P.O. chimes. Close down. Note:—Race results from Moorefield and Ascot will be broadcast, by arrangement with "Sun" Newspapers, Ltd.

AFTERNOON SESSION.
Announcer: Eric Bessemer.

3.0: From the Sports Ground, description of the football match. 4.0: From the studio, studio music; race results. 4.10: From the Sports Ground, description of the football match. 5.0: From the studio, complete racing resume. 5.10: Close down.

EARLY EVENING SESSION.
Announcer: Basil Kirke.

5.40: Children's session, conducted by Uncle Bas. Music and entertainment. Letters and stories. 6.30: "Sun" news service. 6.40: 2BL Dinner Quartette—(a) "Pickin' Cotton" (Henderson), (b) "My Angeline" (Wayne), (c) "Spring Song" (Mendelssohn), (d) "The Fortune Teller" (Herbert), (e) "Songs My Mother Taught Me" (Dvorak). (f) "I Faw Down" (Stevens). 7.7: Complete sporting and racing resume. 7.30: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An ad. special. 7.55: Programme and other announcements.

EVENING SESSION.
Announcer: Basil Kirke.
Accompanist: G. Vern Barnett.

8.0: G.P.O. chimes. The Troubadours.
8.10: Les. Coney, comedian—
(a) "The Pom Pom Parade" (Lee).
(b) "Publicity" (Stanley).
8.17: Heather Harding, contralto.
8.24: Harrison White, banjo solos.
8.31: Jack Kinson, basso—
(a) "Devonshire Cream and Cider" (Sanderson).
(b) "Limehouse" (Walford Hyden).
8.38: The Troubadours.
8.48: Harrison White, banjo solos.
8.55: Heather Harding, contralto.
9.2: Weather report.
9.3: Les. Coney, comedian—
(a) "The Hussas" (Westen and Lee).
(b) "Skitalogues" (Squires).
9.12: Jack Kinson, basso—
(a) "Thy Sentinel Am I" (Elliott).
(b) "The Lute Player" (Allitsen).
9.19: The Troubadours.
9.29: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
9.40: From the studio, an impression of to-night's fight at the Stadium, by an eye-witness.
9.55: Nea Hallett, popular vocalist.
10.2: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
10.28: From the studio, weather report.
10.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
10.57: From the studio, to-morrow's programme.
10.59: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
11.30: National Anthem. Close.

2GB

3.0: Musical session. 5.30: Children's session by Uncle George. 7.0: Request hour. 8.0: Dance and instrumental programme. 10.30: Close down.

2UW

5.30: Children's Hour, conducted by Uncle Jack. 6.30: Close down. 7.0: Request numbers. 10.30: Close down.

Interstate Programmes, Saturday, July 13

3LO

EARLY MORNING SESSION

7.15 to 8.15: See Friday.

MORNING SESSION

10.50: Eric Welch will speak on to-day's races at Flemington. 11.0: The Strad Trio. 11.18: Gertrude Hutton. 11.25: Cecil Parkes, violin. 11.35: Gertrude Hutton. 11.42: Myra Montague, piano. 11.46: The Strad Trio.

MID-DAY NEWS SESSION

12.0: Melbourne Observatory time signal. 12.1: British official wireless news from Rugby; Reuter's and the Australian Press Association cables; news service. 12.20: The Radio Revellers. 12.29: Arthur Douglas. 12.36: Stock Exchange information. 12.42: The James Girls. 12.58: Description by Eric Welsh of Lawn Handicap, six furlongs, V.R.C. races at Flemington. 1.5: Weather. 1.10: The Radio Revellers. 1.19: Arthur Douglas. 1.26: The Radio Revellers.

AFTERNOON SESSION

1.45: Description of baseball match, Carlton v. Footscray, at Carlton C.G., by Percy Steel. 2.33: Description of Trial Hurdle Race, 2 miles, V.R.C., Flemington. 2.45, 3.27, 4.2, 4.35, 4.55: Description of football match, Carlton v. Footscray, at Carlton, by Rod M'Gregor. 2.55: Description of football match No. 2, Richmond v. St. Kilda, at Richmond C.G., by Mel Morris. 3.5, 3.40, 4.15, 4.45: Description of Grand National Steeplechase, 3 miles 1 furlong, V.R.C. races, at Flemington, by Eric Welch. 3.25: Quarter time football scores. 3.53: Description of Footscray Steeplechase, 2 miles ½ furlong, V.R.C. races, at Flemington. 4.0: Half time football scores. 4.28: Description of July Handicap, one mile, V.R.C. races, at Flemington.

NEWS SESSION

5.15: News service; Stock Exchange information, progress scores billiard match, Walter Lindrum v. Willie Smith. 5.30: Final scores. 5.45: All sporting results. 6.0: Stories and entertainment for the children. 6.15: Captain Donald MacLean will continue his adventure stories. 6.30: Dinner music, Vassili Ilster, piano, half-an-hour with Russian composers.

EVENING SESSION

6.55: Market reports. 7.10: News session. Final scores of football matches. 7.20: Birthday greetings. 7.25: Under the auspices of the Tasmanian Government Tourist Department, L. S. Bruce will speak on "Some Quiet Spots in Tasmania." 7.41: Dr. J. A. Leach, B.Sc., will speak on "Wood Swallows." 7.56: Programme announcements.

NIGHT SESSION

8.0: The Station Orchestra—
Overture, "Maid of Artois" (Balfe).
8.8: Senia Orostiakoff, Tenor—
"Russian Gipsy Song" (Korniloff).
Serenade, "Night of Love" (Abt).
8.15: The Station Orchestra—
"Balome Dance" (Tobani).
8.19: The James Girls—
"Songs of the Orient."
8.34: The Station Orchestra—
Suite, "Joyous Youth" (Coates).
8.44: The Melody Makers in their Most Popular Items, also request numbers.
9.25: Eric Welsh will describe the night's events at the Stadium.
9.40: The Record Feature of the Week.
9.44: The Station Orchestra—
"Reve Angelique" (Rubinstein).
9.50: Senia Chostiakoff, Tenor—
"I Pitch my Lonely Caravan at Night" (Coates).
Selected.
9.57: Mildred and Connie, harp and violin—
Selections from their repertoire.
10.11: Late sporting.
10.15: The Station Orchestra—
"Omar" (Hall).
"A La Hongroise" (Scharwenka).
10.25: Arthur Douglas, Scottish comedian—
"I'm Glad I'm Marrit Tae the Wife."
10.32: The Station Orchestra—
Selection, "Lido Lady" (Rogers).
"Dream Melody" (Herbert).
10.42: Arthur Douglas, Scottish comedian—
Scottish song and story.
10.51: Ern. Hall's Radio Revellers, with Hugh Huxham—
"What a Girl" (Sanders).
"Dynamite" (Henderson).
"My Mother's Eyes" (Baer).
"Stay at Home Girl" (O'Hagen).
"The Dance of the Blue Danube" (Fisher).
"Rosetime" (Hall).
"Me and the Man in the Moon" (Monaco).
"When You Said Good Night" (Donaldson).
11.30: God Save the King.

3AR

MORNING NEWS SESSION.

10.0 to 10.59: See Friday.

MORNING MUSICAL SESSION.

11.0: Recordings. 11.50: British official wireless news; announcements; rates of exchange, supplied by Thomas Cook and Sons. 12.0: Close down.

AFTERNOON SESSION.

3.0: Station Orchestra—"Ballet Russe" (Luigini). "Nocturne" (Rubenstein). 3.10: Jean Sinclair, contralto—"A Sapphic Ode" (Brahms), "In Summer Fields" (Brahms). 3.17: The Station Orchestra—"Myrtles of Damascus" (Finden). 3.32: Mildred and Connie, harp and violin—Selections from their repertoire. 3.47: The Station Orchestra—"Enchanted Lake Melodie" (Tschaikowsky). 3.57: Syd. Exton, tenor—"Nirvana (Adams), "A Red Rosebud" (Gibbs). 4.4: The Station Orchestra—"La Forza del Destina" (Verdi). 4.14: Jean Sinclair, contralto—"One Fleeting Hour" (Lee), "Soul of Mine" (Barns). 4.21: The Station Orchestra—Overture, "Maid of Artois" (Balfe), "Twilight" (Sesak). 4.36: Syd. Exton, tenor—"Songs of Araby" (Clay), "Two Eyes of Grey" (M'Geoch). 4.43: The Station Orchestra—Selection, "Catherine" (Tschaikowsky). 5.0: Close down.

EVENING SESSION.

6.0: Recordings. 7.10: News session: announcements. 7.20: Recordings.

NIGHT SESSION.

8.0: All sporting results.
8.30: The Prahran City Band—
March, "Indomitable" (Rimmer).
"The Piper's Wedding" (Thayne).
8.40: The Sundowners (Tom Semple, tenor, Herbert Sanderson, baritone, Robert Gillard, bass, Robert Allen, alto).
Tom Semple, tenor—
"The Plague of Love" (Arne).
Quartette—"Kentucky Babe" (Geibel).
8.47: Prahan City Band—
Selection, "Classic Gems" (Rimmer).
"Marche Militaire" (Schubert).
9.2: Robert Allen, alto, and Robert Gillard, bass—
"I Know the Place where We will Rest" (Vannagh).
Robert Gillard, bass—
"The Wanderer" (Schubert).
9.9: Vassili Ilster, piano—
"Sonata E Minor" (Beethoven).
"Gavotte" (Brahms-Gluck).
"Brilliante Variationen" (Chopin).
9.39: The Sundowners—
"Chloe" (Moret).
"She Hasn't Told Me."
9.46: Prahran City Band—
Valse, "Will o' the Wisp" (Raynor).
Selection, "Boccacio" (Suppe).
10.1: The Sundowners—
Herbert Sanderson, baritone,
"Loving Smile of Sister Kind" (Gounod).
Quartette, "The More We are Apart" (Holt).
10.8: Prahran City Band—
March, "Duntroon" (Code).
Overture, "La Gazza Ladra" (Rossini).
10.20: News service: announcements.
10.30: God Save the King.

4QG

EARLY MORNING SESSION

7.43 to 8.30: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EARLY EVENING SESSION

6.15: "Queenslander" bi-weekly news service for distant listeners. 6.30: Bedtime stories, conducted by "Uncle Ben." 7.0: To-day's races in detail. 7.20: General sporting notes. 7.0: Sailing notes by Mr. Fred. Smith.

NIGHT SESSION

8.0: From the Savoy Theatre—
Overture by the Savoy Orchestra.
8.10: From the Studio—
Harry Collins and Tom Muller—A comedy turn.
8.25: Ernest Harper, Baritone—
"The Friar of Orders Grey" (Reeve).
"The Bay of Biscay" (Davy).
8.34: Frank Warbrick, Pianist—
A short Recital, including—
"Nocturne in E Minor" (Chopin).
"Powder and Patches" (Ford).
"A Musical Box" (de Severac).
8.49: Patricia McOnigley, Soprano—
"Home, Little Maori, Home" (Alfred Hill).
"The Net Mender" (Clarke).
9.0: Metropolitan weather forecast.
9.1: From Lennon's Ballroom, Dance Music.
10.0: From the Studio, News; weather. Close down.

WAVELENGTHS

	Metres.	Watts.
New South Wales.		
2FC.—N.S.W. Broadcasting Co., Ltd., Market St., Sydney. 0700-2230	442	5000
2BL.—N.S.W. Broadcasting Co., Ltd., Market St., Sydney. 0800-2330	353	5000
2GB.—Theosophical Broadcasting Station, 29 Bligh St., Sydney. 1000-2200	316	3000
2KY.—Trades and Labor Council, Goulburn St., Sydney. 990-2200	280	1500
2UW.—Radio Broadcasting, Ltd., Paling's Building, Ash St., Sydney. 1230-2230	267	500
2UE.—Electrical Utilities, Ltd., 619 George St., Sydney. 0730-2330	293	250
Victoria.		
3LO.—Dominions Broadcasting Co., 120A Russell St., Melbourne. 0715-2340	371	5000
3AR.—Dominions Broadcasting Co., 120A Russell St., Melbourne. 1000-2200	484	5000
3UZ.—O. J. Nilson and Co., 45 Bourke St., Melbourne	319	500
3DB.—Broadcasting Station, Capitol House, Swanston St., Melb.	255	500
Queensland.		
4QG.—Queensland Government Radio Service, Brisbane. 0800-2200	385	5000
4GR.—Gold Radio Service, Ruthven St., Toowoomba	294	100
South Australia.		
5CL.—Central Broadcasters, Ltd., 114 Hindmarsh Square, Adelaide. 1100-2310	409	5000
5DN.—5DN Propty., Ltd., 2-4 Montpeller St., Parkside	313	500
5KA.—National Musical Federation, Ltd., 81 Flinders St., Adelaide	250	2500
West Australia.		
6WF.—Commonwealth Government Broadcasting Station, Perth. 1230-2230	1250 100	6000
Tasmania.		
7ZL.—Tasmanian Broadcasters Pty., 95 Elizabeth St., Hobart. 1130-2204	516	3000
NEW ZEALAND.		
1YA.—Radio Broadcasting Co. of New Zealand, 419 Queen St., Auckland. 1500-2203 (silent day Monday)	333	500
2YA.—Radio Broadcasting Co. of New Zealand, Wellington. 1500-2200 (silent day, Wednesday)	420	5000
3YA.—Radio Broadcasting Co. of New Zealand, Christchurch. 1500-2103 (silent day, Tuesday)	306	500
4YA.—Radio Broadcasting Co. of New Zealand, Dunedin. 1700-2206 (silent days, Monday and Thursday)	463	750

5CL

MIDDAY SESSION

12.0: Chimes. 12.1: Special late selections for Flemington races by Mr. Eric Welch, 3LO's special sporting commissioner. 12.3: Probable starters and selections for races at Eudunda to-day. 12.15: General news. 12.30: Running description of Lawn Handicap (Flemington). 12.35: General news service. 12.40: Railway information. 12.44: Recordings. 1.10: Running description of Doutta Galla Hurdle Race by Mr. Eric Welch (Flemington). 1.15: Close down.

AFTERNOON SESSION

2.0: Chimes. 2.1: Resume of previous race results. 2.5: Running description of Trial Hurdle. 2.45: Running description of Grand National Steeplechase. 2.50: Description of League football. 3.1: Resume of previous race results. 3.3: League football. 3.25: Footscray Steeplechase. 3.30: League football. 4.1: Description of July Handicap. 4.8: League football. 4.40: League football. 5.5: Resume of race results; final football scores; close down.

EVENING SESSION

6.0: Chimes, and resume of Flemington and Eudunda race results. 6.1: Birthday greetings. 6.30: Recordings. 7.0: Chimes. 7.1: Senior Birthday League greetings. 7.2: Stock Exchange. 7.6: Announcements. 7.10: Rev. G. E. Hale, B.A. 7.25: Mr. O. G. Riley. 7.40: 5CL's sporting service.

NIGHT SESSION

8.0: Chimes.
8.10: A special programme from 3LO, Melbourne.
10.20: 5CL's sporting service.
10.30: Close down.

6WF

10.0: Tune in: gramophone and phonograph records from the studio. 11.0: Close down. 12.0: Tune in. 12.5: Racing anticipations. 12.7: Pianoforte solos. 12.44: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 1.2: Close down. 3.30: Tune in. 3.35: Sporting session, race results from the Canning Park racecourse and quarter-time football scores; musical items from the studio. 5.30 (approx.): Close down. 6.45: Tune in. 6.48: Bedtime stories by Aunty Amy. 7.12: Sports results. 7.30: Commercial and general information. 7.45: Music. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Vocal and elocutionary artists from the studio. 8.50: Late news items; station announcements; ships within range announcement: late weather bulletin. 9.5: Programme continued from the studio. 10.30: Close down.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

MIDDAY SESSION

11.30 to 1.30: See Friday. 1.40: Description of Doutta Galla Hurdle Race, 2 miles, Flemington, Victoria. 2.35: Description of Trial Hurdle Race, 2 miles, Flemington. 2.40: Close down.

AFTERNOON SESSION

2.45: Football, Cananore v. North Hobart, described by Sid. Jones. 3.15: Description of Grand National Steeplechase, 3 miles 1 furlong, Flemington. 3.30: Cananore v. North Hobart. 3.55: Description of Footscray Steeplechase, 3 miles 1 furlong, Flemington. 4.0: Cananore v. North Hobart. 4.30: Description of July Handicap, 1 mile, Flemington. 4.35: Cananore v. North Hobart. 4.30: All sporting results to hand. 6.0: All sporting results to hand.

EARLY EVENING SESSION

6.15: Recordings. 6.30: "Uncle David." 7.0: Answers to letters and birthday greetings. 7.15: News service.

EVENING SESSION

7.30: Roy Johnson will speak on "Manual Training." 7.45: J. M. Counsel will speak on "European Affairs." 8.6: A Special Studio Concert. 9.30: News session. 9.45: Studio concert continued. 10.20: Close down.

Local Programmes, Sunday, July 14

2FC

MORNING SESSION.

Announcer: A. S. Cochrane.

10.0: "Big Ben" and announcements.
10.2: News service.
10.20: The Captain to his Comradios.
10.35: The Comradios' Bookshelf.
10.40: Studio music.
11.0: From St. Mark's Church of England, Darling Point, morning service, conducted by Rev. Canon E. Howard Lea.
12.15 (approx.): Close down.

AFTERNOON SESSION.

Announcer: C. R. Hall.

2.30: Programme announcements.
2.32: The Cheer Up Society, conducted by Uncle Frank.
3.0: From the Lyceum Hall, Pitt Street—programme arranged by the Central Methodist Mission.
4.30: From the studio—musical items.
5.0: "Big Ben"; close.

EVENING SESSION.

Announcer: Laurence Halbert.

Accompanist: Kathleen Roe.

6.0: "Big Ben" and programme announcements.
6.2: A talk, by Mr. F. Kay.
6.20: From the Pitt Street Congregational Church—organ recital by Lilian Frost.
7.0: Evening service conducted by Rev. T. E. Ruth.
8.30: From the Arcadia Theatre, Chatswood—Nicholas Robins at the Wurlitzer organ.
8.50: From the studio—Stanley Catlett, tenor.
8.57: From the Arcadia Theatre, Chatswood—an organ recital by Nicholas Robins.
9.17: Mary Hosking, contralto—
(a) "Hindoo Song" (Bemberg).
(b) "Music, When Soft Voices Die" (Besly).
(c) "Fathoms Deep May Drift the Snow" (Allitsen).
9.34: From the Arcadia Theatre, Chatswood—an organ recital by Nicholas Robins.
9.44: From the studio—Stanley Catlett, tenor.
9.51: Mary Hosking, contralto—
(a) "Do Not Go, My Love" (Hageman).
(b) "Virgin's Slumber Song" (Reger).
(c) "The Peach Flower" (Bantock).
9.58: Slumber music.
10.28: From the studio—late weather and to-morrow's programme.
10.30: National Anthem; close.

2BL

MORNING SESSION.

Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes.
From Randwick Presbyterian Church: Morning service, conducted by Rev. W. J. Grant. Choirmaster, Mr. Geo. W. Sherring. Organist, Mr. R. Stenton.
Hymn.
Brief Invocatory Prayer.
Anthem by Choir.
First Scripture Lesson.
Prayer and Lord's Prayer.
Hymn.
Second Scripture Lesson.
Solo.
Address to Children.
Children's Hymn.
Anouncements and Offertory.
Anthem by Choir.
Prayer.
Psalm.
Sermon.
Hymn.
Benediction.
12.15: Approx. From the studio. "S news service.
12.30: Studio music.
2.0: G.P.O. chimes. Close down.

AFTERNOON SESSION.

Announcer: Basil Kirke.

3.0: G.P.O. chimes. An organ recital.
4.0: From the studio, musical items.
5.0: "Big Ben." Close.

EVENING SESSION.

Announcers: Basil Kirke and G. Vern Barnett.

Accompanist: G. Vern Barnett.

6.0: Children's session, conducted by Uncle Bas.
6.30: Studio items.
7.0: From Petersham Baptist Church, evening service, conducted by Rev. G. A. Craike.
8.30: From the Trades Hall, Lithgow, concert arranged by the Lithgow Municipal Band.
10.0: National Anthem, Close.

2GB

9.0: Address by Mary Rivett, M.A., "Conscious and Unconscious Factors in Strength." 9.30: Address by Victor E. Cromer, "How to Be Strong." 10.15: Organ music from St. Alban's Church, Regent Street, Sydney. 10.30: Morning service from St. Alban's Church. 12: Music from studio. 12.30: Close down. 3.0: Musical session. 5.30: Children's session, by Uncle George. 7.0: Lecture from Adyar House. 8.0. Music from the Studio. 8.15: Sacred concert by Messrs. Winkworth and Sons. 8.23: Miss Mary Neal, contralto. 8.30: Mr. Willie Krasnik, violinist. 8.38: Mr. Cecil Chaseling, baritone. 8.45: Miss Gladys Aubin, soprano. 8.52: Rosenkranz piano solo. 9.0: Weather report. 9.1: Miss Mary Neal, contralto. 9.8: Mr. Willie Krasnik, violinist. 9.16: Mr. Cecil Chaseling, baritone. 9.23: Rosenkranz player piano. 9.28: Miss Gladys Aubin, soprano. 9.35: Close down.

2UW

10.30 a.m.: Music and request numbers. 1.0 p.m.: Close down. 5.30: Children's Hour, conducted by Uncle Jack. 6.30: Close down. 7.0. Musical programme. 10.30: Close down.

Interstate Programmes, Sun., July 14

3LO

MORNING SESSION

10.30: Bells from St. Paul's Cathedral. 10.45: Express train information; British official wireless news from Rugby; news from yesterday's papers. 11.0: Morning service from St. Paul's Cathedral, Melbourne. 12.15: Close down.

AFTERNOON SESSION

2.0: Sonora Recital of the world's most famous records from Wesley Church Central Mission. 3.0: Pleasant Sunday afternoon. Chairman, Rev. J. H. Cain. 4.30: Close down. 5.45: Shipping information. 5.47: Answers to letters and birthday greetings. 6.25: "Brother Bill." 6.45: Adult birthday greetings and programme announcements 6.47: Bells from St. Paul's Cathedral.

EVENING SESSION

7.0: Service, Dr. F. W. Boreham.

NIGHT SESSION

8.30 Cecil Parkes, violin; Kingsley Parkes, violin; Eunice Gregory, viola; Frank Johnstone, 'cello. "String Quartet Op. 18 No. 6 B Flat" (Beethoven), 1st Movement only.
8.36 Mary Mack, Contralto—
"But the Lord is Mindful" (Mendelssohn).
"Abide With Me" (Liddle).
8.43 Cecil Parkes, violin; Kingsley Parkes, violin; Eunice Gregory, viola; Frank Johnstone, 'cello; Myra Montague, piano.
"Quintet Op. 44 E Flat" (Schumann).
Allegro Brilliante.
In Modo d'un marcia.
Scherzo.
Finale.
9.8 Wesley Church Choir. Organist and conductor, Wm. G. James.
"By Babylon's Wave" (Gounod).
"Saviour Thy Children Keep" (Sullivan).
"Glory to God" (Noble).
"O, Gladsome Light" (Sullivan).
"Light of the World" (Elgar).
9.28 Cecil Parkes, Violin—
"Ave Maria" (Schubert).
"La Campanella" (Paganini).
9.36 Mary Mack Contralto—
"Break, Break, Break" (Ernest E. Mitchell).
"The Early Morning" (Graham Peel).
9.43 Cecil Parkes, violin; Myra Montague, piano; Frank Johnstone, 'cello—
"Prayer" (Schubert).
"Menuett" (Beethoven).
"Rondo all Turca" (Mozart)
9.53 News service; announcements.
10.0 God Save the King.

3AR

MORNING SESSION

11.0 Morning service from Scots Church (preacher, Rev. W. Borland). 12.15: Close down.

AFTERNOON SESSION

3.0: The Salvation Army Staff Band. 4.30: Close down.

EVENING SESSION

5.0: Stories for the children. 5.30: Close down.

NIGHT SESSION

7.0: Recordings.
8.0: The Malvern Tramways Band.
Grand selection, "Les Huguenots" (Meyebeer).
8.15: E. Mason Wood, baritone.
"Wayfarer's Night Song" (Martin).
"The Trumpeter" (Dix).
8.22: Malvern Tramways Band.
March, "The Scindian" (Rimmer).
Selection, "Nights of Gladness" (Rosas).
8.32: An hour with Eddie Fitch and the Wurlitzer, in popular numbers. Transmission from the Regent Theatre, Collins Street, Melbourne.
9.32: E. Mason Wood, baritone.
"Carillon" (Martin).
"Nightfall at Sea" (Phillips).
9.40: The Malvern Tramways Band.
March, "Three Bolts and Bars" (Urbach).
Selected.
9.50 News session. Announcements.
10.0. God Save the King.

4QG

MORNING SESSION.

CITY BAPTIST TABERNACLE.

11.0: The complete morning service will be relayed from the City Baptist Tabernacle.
12.30: Close down.

AFTERNOON SESSION.

3.15: The concert provided by the Brisbane Citizens' Band will be relayed from the Botanic Gardens.
4.30: Close down.

EARLY EVENING SESSION.

6.0: Greetings to little listeners and replies to letters.

NIGHT SESSION.

CITY BAPTIST TABERNACLE.

7.0: The complete evening service will be relayed from the City Baptist Tabernacle. At the conclusion of the church service, the concert by the Brisbane Municipal Concert Band will be relayed from Wickham Park.
9.30: Close down.

6WF

10.25: Tune in. 10.30: Special half-hour for the enthusiastic listener. 11.0: Morning service. 12.15: Close down. 3.30: Tune in. 3.35: A relay of Sunday school service. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories for the kiddies. 7.15: Music from the studio. 7.30: A relay of the evening service from St. Andrew's Church. 8.45: Band concert relayed from the Queen's Hall; items by the Perth City Band, conducted by Mr. Les. M. Price. 10.5: Close down.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

MORNING SESSION

11.0: Transmission from St. David's Cathedral, Murray Street, Hobart. 12.30: Close down.

AFTERNOON SESSION

3.30: An Instrumental Recital by the Derwent Concert Band, conducted by Tom Hopkins. 4.30: Close down.

CHILDREN'S HOUR

6.15: Chorus Singing (conductor, Trevor Morris). 6.45: Bertha Southey Brammall will tell a Tasmanian fairy tale to the wee folk: "The People of the Garden." 7.0: Transmission from Memorial Congregational Church, Brisbane Street, Hobart. 8.25: A programme of sacred music arranged by James Counsel. 9.45: News session. 9.50: Close down.

5CL

MORNING SESSION.

10.45: Carillon of bells from Adelaide Town Hall. 11.1: Service from St. Bartholomew's Church of England. 12.10: News. 12.15: Close down.

AFTERNOON SESSION.

3.0: Chimes. 3.1: A Pleasant Sunday Afternoon Service from Maughan Church, Franklin Stret. 4.0: Close down.

EVENING SESSION.

6.0: Chimes. 6.1: Birthday greetings. 6.15: "The Bird Lady" and "The Sunshine Songsters." 7.1: Service from Parkside Baptist Church.

NIGHT SESSION.

8.20: Announcement.
8.30: Carys Davies Denton, mezzo-soprano.
Accompanied by Alice Meegan.
"Cloths of Heaven" (T. Dunhill).
"By a Bier Side" (Armstrong Gibbs).
"At the Well" (Richard Hageman).
8.37: Hilda Reimann, violiniste—
"Romance" from 2nd Concerto (Wieniawski).
"Gavotte" (Gossec).
8.45: Carys Davies Denton and Harold Denton, Accompanied by Alice Meegan.
"Deep River" (arranged by H. T. Burleigh).
"Heav'n, Heav'n" (arr. by H. T. Burleigh).
8.50: A short pianoforte recital by Alice Meegan—
"Concert Etude in D Flat" (Liszt).
"La fille aux cheveux de lin" (Debussy).
"Nigger Dance" (Cyril Scott).
9.3: Harold Denton, baritone.
Accompanied by Alice Meegan.
"Come Away, Death!"
"Oh, Mistress Mine."
"Blow, Blow, thou Winter Wind."
(Three Shakespearean songs by Roger Quilter).
9.10: Hilda Reimann, violiniste—
"Chanson Louis XIII. et Pavene"
(Couperin-Kreisler).
"Schon Rosmarin" (Kreisler).
9.17: Carys Davies Denton and Harold Denton, Accompanied by Alice Meegan.
In a group of 16th Century Duets.
"Whither Runneth my Sweetheart" (John Bartlet).
"Sweet Nymph, Come to thy Lover" (Thomas Morley).
"I Go before my Darling" (T. Morley).
"Sweet Kate" (Robert Jones).
9.25: To-day being the anniversary of French National Day we present a stirring drama of the French Revolutionary Period.
The Story by Beryl Alford.
The Songs by Marcelle Berardi.
9.45: Hilda Reimann, violiniste—
"Adagio" (Ries).
9.50: News service.
10.0: Close down.

Local Programmes, Monday, July 15

2FC

EARLY MORNING SESSION.

Announcer: A. S. Cochrane.

7.0: "Big Ben" and announcements. 7.2: Official weather forecast; rainfall; river reports; temperatures; astronomical memoranda. 7.7: "Sydney Morning Herald" summary. 7.10: Shipping intelligence; mail services. 7.15: Studio music. 7.25: Investment market; mining sharemarkets; metal quotations; wool sales; breadstuffs markets; inter-State markets; produce markets. 7.40: Studio music. 8.0: "Big Ben"; close.

MORNING SESSION.

Announcer: A. S. Cochrane.

10.0: "Big Ben" and announcements. 10.10: "Sydney Morning Herald" news service. 10.25: Studio music. 10.30: The 2FC racing commissioner, late sporting news. 10.45: A talk on "Home Cooking and Recipes," by Miss Ruth Furst. 11.0: "Big Ben"; A.P.A. and Reuter's cable services. 11.5: Close.

MIDDAY SESSION

Announcer: A. S. Cochrane.

12.0: "Big Ben"; summary of news "Sydney Morning Herald." 12.4: Rugby wireless news. 12.7: Stock Exchange, first call. 12.10: Synopsis of weather. 12.11: A reading. 12.30: Studio music. 1.0: "Big Ben"; weather intelligence. 1.3: "Evening News" midday news service. 1.15: From the Aeolian Hall, Pitt Street, lunch-hour chamber music recital by the Sverjensky Instrumental Ensemble. 1.50: From the studio, Producers' Distributing Society's report. 1.53: Stock Exchange, second call. 1.55: Popular studio music. 2.0: "Big Ben"; close.

AFTERNOON SESSION.

Announcers: Eric Bessemer, Laurence Halbert.

Accompanist: Ewart Chapple.

2.30: Programme announcements. 2.32: A record recital. 3.0: "Big Ben"; popular music. 3.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 3.40: From the studio, Margaret Hunt, soprano—(a) "Magdalen at Michael's Gate" (Lehmann), (b) "A Night Idyll" (Loughborough). 3.46: A reading. 4.10: Alice Dyer, mezzo—(a) "Blackbird's Song" (Scott), (b) "The Lamplighter" (Haigh). 4.17: Popular items. 4.22: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 4.32: Margaret Hunt, soprano—(a) "Call of the Maytime" (Brahe), (b) "Where the Bee Sucks" (Sullivan), (c) "The Answer" (Terry). 4.39: Studio items. 4.45: Stock Exchange, third call. 4.47: Alice Dyer, mezzo—(a) "Allah Be with Us" (Finden), (b) "Sing Break Into Song" (Mallinson), (c) "Hanging Out the Clothes" (Oliver). 5.0: "Big Ben"; close.

EARLY EVENING SESSION.

Announcer: A. S. Cochrane.

5.30: The chimes of 2FC. 5.35: The children's session, conducted by the "Hello Man"; letters and stories; music and entertainment. 6.30: Dalgety's market reports (wool, wheat, and stock). 6.40: Fruit and vegetable markets. 6.43: Stock Exchange information. 6.48: Weather and shipping news. 6.50: Rugby wireless news. 6.55: Late sporting news. 7.0: "Big Ben"; late news service. 7.10: The 2FC Dinner Quartette, conducted by Horace Keats—(a) "Prelude in C Sharp Minor" (Rachmaninoff), (b) Meditation "Thais" (Massenet), (c) "The Merry Widow" (Lehar), (d) "Song of the Volga Boatmen" (arr. Lake), (e) "Celebra Serenata" (Toselli).

EVENING SESSION.

Announcer: Laurence Halbert.

Accompanist: Ewart Chapple.

7.40: Popular music.
7.45: Programme announcements.
7.48: A record recital.
8.0: From the Victory Theatre, Kogarah—The Victory Theatre Orchestra, conducted by Fred. Mitchell.
8.20: From the studio, Rowell Bryden, baritone.
8.27: John Boult and Reg Mitchell, in a sketch—
"The Storyteller" (Boult).
8.42: Tom Williams, violinist.
8.49: Charles Lawrence, entertainer.
8.59: Weather report.
9.0: G.P.O. chimes. From the Victory Theatre, Kogarah, Horace Weber at the "Christie" organ.
9.15: From the studio, Amy Firth, mezzo, a successful competitor in the recent Radio Eisteddfod.
9.22: John Boult and Reg. Mitchell, in a bush sketch—
"In the Bush."
9.37: Rowell Bryden, baritone.
9.44: Tom Williams, violinist.
9.51: Amy Firth, mezzo, a competitor in the Radio Eisteddfod.
9.58: Charles Lawrence, entertainer.
10.8: From the Victory Theatre, Kogarah, Horace Weber at the "Christie" organ.
10.28: From the studio, late weather and to-morrow's programme.
10.30: National Anthem; close.

2BL

MORNING SESSION

Announcer: A. C. C. Stevens.

8 a.m.: G.P.O. chimes; weather report—State and metropolitan. 8.3: Studio music. 8.15: News and information service from the "Daily Telegraph Pictorial." 8.45: Studio music. 9.30: G.P.O. chimes; half an hour with silent friends. 10.0: G.P.O. chimes; close down.

MIDDAY SESSION.

Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes; 2BL Women's Sports Association session, conducted by Miss Gwen Varley. 11.30: Advertising hints. 11.40: Women's session, conducted by Mrs. Cranfield; talk on "Infant Welfare, by Nurse May. 12.0: G.P.O. chimes; special ocean forecast and weather report. 12.3: Pianoforte reproduction. 12.30: Shipping and mails. 12.35: Market reports. 12.48: "Sun" midday news service. 1.0: Studio music. 1.30: Talk to children and special entertainment for children in hospital, by Uncle Steve. 2.0: G.P.O. chimes; close down. Note: Race results will be broadcast by arrangement with "Sun" Newspapers, Ltd.

AFTERNOON SESSION.

Announcer: A. C. C. Stevens.

Accompanist: Kathleen Roe.

3.45: G.P.O. chimes; popular music. 4.0: G.P.O. chimes; May Craven, soprano. 4.7: Captain Fred Aarons will speak on "Some Peculiar Myths." 4.22: Florence Bentley, mezzo—(a) "Slave Song" (Del Reigo), (b) "The Blind Ploughman" (Coningsby Clarke). 4.30: Popular music. 4.40: "Sun" news service. 4.45: May Craven, soprano. 4.52: Studio item. 5.0: G.P.O. chimes. Florence Bentley, mezzo—(a) "The Curtain Falls" (d'Hardelot), (b) "An Emblem" (Thompson). 5.7: Pianoforte reproduction. 5.17: Popular music. 5.23: Racing resume. 5.27: Features of evening's programme.

EARLY EVENING SESSION.

Announcer: Basil Kirke.

5.30: Children's session, conducted by Uncle Bas; music and entertainment; letters and stories. 6.30: "Sun" news and late sporting. 6.40: 2BL Dinner Quartette—(a) "March of the Toys" (Herbert), (b) "Nocturne in E Flat" (Chopin), (c) "One Hour" (Longstaff), (d) "The Maid of the Mountains" (Fraser-Simson). (e) "The Swan" (St. Saens), (f) "Serenade" (Drdla). 7.7: Australian Mercantile Land and Finance Co.'s report; weather report and forecast, by courtesy of Government meteorologist; Producers' Distributing Society's fruit and vegetable market report; grain and fodder report ("Sun"); dairy produce report ("Sun") 7.25: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An ad. special. 7.55: Programme and other announcements.

EVENING SESSION.

Announcer: Basil Kirke.

Accompanist: G. Vern Barnett.

8.0: G.P.O. chimes. From Rose Bay Wintergarden Theatre: Orchestra conducted by Lionel Hart.
8.27: From the Studio, Graham and Manning, sketch—
"Two in a Trap."
8.39: Grace Saville, contralto—
(a) "Jeunesse" (Barry).
(b) "Be You A'comin'" (Sanderson).
8.46: From the Rose Bay Wintergarden Theatre: Orchestra conducted by Lionel Hart.
9.0: From the studio, weather report.
"Bringa" will speak on the aborigines.
9.15: Grace Saville, contralto—
(a) "Still as the Night" (Bohm)
(b) "Fleurette" (M'Geoch).
9.22: Graham and Manning—
(a) "Pipes of Pan" (Monckton)—by request.
Dorothy Manning—
(b) Musical sketch—"A Suburban Romance" (Longstaffe).
9.34: Maurice Helsen, tenor—
(a) "The Sailor's Grave" (Sullivan).
(b) "Here in the Quiet Hills" (Carne).
(c) "I Think of You, My Sweet" (Wood).
9.41: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
9.53: From the studio—Billee Cresswell, popular vocalist.
10.0: G.P.O. chimes; Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
10.12: From the studio, Billee Cresswell, popular vocalist.
10.19: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
10.28: From the studio, late weather report.
10.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
10.57: From the studio, to-morrows programme.
10.59: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.
11.30: National Anthem: close.

2GB

10.0: Music. 10.10: Happiness talk, by A. E. Bennett. 10.20: Music. 10.30: Women's session, by Miss Helen J. Beegling. 11.30: Music. 11.45: Close down. 2.0: Music. 2.5: Women's radio service, by Mrs. Dorothy Jordan. 2.50: Movie know all. 3.0: Talk, by Mr. H. Morton. 3.15: Music. 3.30: Close down. 5.30: Children's session, by Uncle George. 7.0: Music. 7.45: Feature story. 8.0: Miss Kathleen Cracknell, contralto. 8.7: Instrumental Quartette. 8.15: Mr. Leon Cavallo, tenor. 8.22: Symphony Orchestra. 8.30: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 8.35: Miss Rita Head, mezzo-soprano. 8.45: Address. 9.0: Weather report. 9.3: Instrumental Quartette. 9.13: Miss Kathleen Cracknell, contralto. 9.23: Mr. Heath Burdock, Shakespeare recital. 9.35: Mr. Leon Cavallo, tenor. 9.45: Symphony Orchestra. 9.50: Miss Rita Head, mezzo-soprano. 10.0: Humorous interlude, by Mr. Jack Win and Mr. Heath Burdock. 10.5: Instrumental music. 10.30: Close down.

2UW

MIDDAY SESSION

12.30: Request numbers. 1.0: G.P.O. clock and chimes; music. 1.15: Talk on "Homecraft" by Pandora. 1.40: Music and request numbers. 2.30: Close down. 4.30: Musical programme.

EVENING SESSION

5.30: Children's Hour, conducted by Uncle Jack. 6.30: Close down. 7.0: G.P.O. clock and chimes; request numbers. 7.45: Radio talk by Mr. E. Homfray. 8.0: Music. 9.0: G.P.O. clock and chimes; comments on "Foreign Affairs," by Mr. J. M. Prentice. 9.10: Music and request numbers. 10.30: Close down.

Interstate Programmes, Monday, July 15

3LO

EARLY MORNING SESSION.

7.15 to 8.15: See Friday.

MORNING SESSION

11.0: 3LO'S Breakfast Recipe. 11.5: Miss Olga Parker. 11.25: Miss Doreen Berry. 11.45: Under the auspices of the National Safety Council of Australia, H. J. Book will speak on "Some Aspects of Safety."

MIDDAY SESSION

12.0: Melbourne Observatory time signal. 12.1: British official wireless news from Rugby; Reuter's and the Australian Press Association cables; news service. 12.15: Newmarket stock sales. Entries for the market for Tuesday, Wednesday, and Thursday, by the Associated Stock and Station Agents, Bourke Street, Melbourne. 12.20: Community Singing, conducted by G. J. Mackay. Ern. Hall's Radio Revellers, James Girls, Mildred and Connie. 12.40: Stock Exchange. 12.43: Community singing. 12.45: Meteorological information: weather forecast for Victorian, New South Wales, South Australia, and Tasmania (clear forecasts; river reports; rainfall. 2.0: Close down.

AFTERNOON SESSION

1.0: The Strad Trio. 2.33: Ray Carney, tenor. 2.40: Cecil Parkes, violin. 2.48: Jessie Shmith, contralto. 2.55: Frank Johnstone, cello. 3.0: The Strad Trio. 3.13: J. Howard King. 3.20: The Station Orchestra. 3.30: Joseph Barrile. 3.35: Ray Carey, tenor. 3.40: The Station Orchestra. 3.50: J. Howard King. 3.57: "The Perfect Butler," by Reginald Arkell. Produced by Winifred Moverley. 4.20: The Station Orchestra. 4.30: Jessie Shmith, contralto. 4.37: The Station Orchestra. 4.50: News service; Stock Exchange information; acceptances and barrier positions for the Geelong races to be held on Wednesday, July 17. 5.0: Close down.

CHILDREN'S SESSION

6.0: Birthday greetings and entertainment for the little ones. 6.15: Captain Donald Maclean: Some further adventure stories.

EVENING SESSION

6.30: The Strad Trio (Cecil Parkes, violin; Myra Montague, piano; Frank Johnstone, 'cello). "Romance" (Hummel). "Flower Waltz" (Tschaikowsky). "Orientale" (Korsakov). "Spanish Dance No. 5" (Koszkowski). Cecil Parkes, violin. "Sonata in G Minor" (Tartini). Frank Johnstone, 'cello: "The Swan" (Saint-Saens). "Polonaise" (Goltermann). 7.5: Stock Exchange. 7.15: Market reports. 7.30: News session. 7.43: Birthday greetings. 7.46: The Station Orchestra: Selection from Gilbert and Sullivan's operas.

NIGHT SESSION

8.1: Programme announcements.
8.3: The Station Orchestra—
Overture, "The Merrymakers" (Coates).
8.10: Victoria Wilson, Soprano—
"Caro Nome" (Verdi).
"My Mother Bids Me Bind My Hair" (Hayden).
8.17: Lindsay Biggins, piano—
"Fantasie in C Minor" (Mozart).
Two Pieces (Amani).
"Autumn" and "Nocturne" (Gretchaninov).
"Two Preludes" (Liadov).
Studio Presentation of "The Cingalee."
A Musical Play by James Tanner.
Lyrics by Adrian Ross and Percy Greenbank.
Music by Lionel Monckton.
Musical Directress, Madame Ethel Ashton.
Assisted by The Station Orchestra. Conductor: Fredk. Hall.
8.42: The Story of a Cingalese Maiden and a Tea Plantation in Ceylon.
Hon. Harry Vereker (a Tea Planter), John Donovan.
Boobhamba (a noble of Kandy), Stuart Olsson.
Sir Peter Loftus (High Commissioner and Judge of Ceylon), Edgar Chapple.
Bobby Warren (a pupil of Vereker), T. James Lloyd.
Chumbhuddy Ram (a Baboo lawyer), Alan Bell.
Nanova (a Cingalese girl), Rose Clayden.
Peggy Sabine, Merle Griffin.
Naitooma, Zelma King.
Sattumbi, Jean Melver.
Mychellah, Maisie Lennox.
Soomio (four tea girls on Vereker's plantation), Angy Loftus (Sir Peter's daughter), Maud Luke.
Lady Patricia Vereker, Ivy Carlile.
9.42: Victoria Wilson, Soprano—
"When Thou Art Far" (Landon Ronald).
"Deep in My Heart's" (Lambert).
9.50: The Station Orchestra—
Paraphrase, "Virginia" (Haydn Wood).
10.0: News service; British official wireless news from Rugby; meteorological information: announcements.
10.10: The Station Orchestra—
Selection, "Rose Marie" (Friml).
10.17: Jack Hocking, "The Sighin' Serenader"—
"Stay at Home Girl."
10.22: The Station Orchestra.
10.30: Jack Hocking, "The Sighin' Serenader"—
"My Mother's Eyes."
Request number (Baer).
10.37: Ern. Hall's Revellers: Vocal refrains by Hugh Huxham.
"Shivering" (Doody).
"Promise Me" (Van Booth).
"Ready for the River" (Moret).
"My Stormy Weather Pal" (Piantadosi).
"What'll You Do?" (Cohn).
"D- You" (Piantadosi).
"F- Old Hat" (Guy).
"Columbo" (Nichols).
11.1: Ern. Hall's Radio Revellers—
"I Fell Head Over Heels in Love" (Thayer).
"Sonny Boy" (Brown).
"Sally of My Dreams" (Kernell).
11.30: God Save the King.

3AR

MORNING NEWS SESSION

10.0 to 10.59: See Friday.

MORNING MUSICAL SESSION

11.0: Recordings. 12.20: British Official Wireless news, from Rugby; announcements. 12.30: Close down.

AFTERNOON SESSION

3.0: Recordings. 3.30: The Jedal Trio. 4.30: Close down.

EVENING SESSION

6.0: Recordings. 7.10: News session; announcements; acceptances and barrier positions for the Geelong races, to be held on Wednesday, July 17. 7.20: Recordings.

NIGHT SESSION

8.1: The Jedal Trio (Alva Hattenbach violin, Edna Hattenbach 'cello, and John Simons piano).
Trio, "Larghetto" (Mozart); "Menuetto" (Mozart).
Cello, "Cantilena" (Goltermann).
Trio, "Song Without Words" (Mendelssohn).
"Rondo Hongroise" (Haydn).
8.30: The Radio Revellers, with Hugh Huxham.
"Dada, Dada" (Dore).
"Oh, Is She Mad at Me?" (Friend).
"High Upon a Hilltop" (Baer).
8.39: The James Girls.
In mirth and melody.
8.42: The Radio Revellers.
"Roll Up the Carpets" (Nixon).
"To-day, To-morrow, For Ever" (Nichols).
"Shinaniki Da" (Carlton).
8.51: Mildred and Connie, and their harp and violin.
Breezy selections.
8.54: The Radio Revellers.
"Who Knows?" (Dixon).
"Lady of the Morning" (Burton).
"I'm Crazy Over You" (Lewis).
9.3: The James Girls, mirth and melody.
9.7: The Radio Revellers.
"Old Man Sunshine" (Dixon).
"Wipin' the Pan" (Baer).
"My Dream Sweetheart" (Hall).
9.16: Mildred and Connie, with their harp and violin.
Selections from their repertoire.
9.19: The Radio Revellers.
"Guess Who's in Town" (Razaif).
"That Stolen Melody" (Fisher).
"Lenora" (Gilbert).
9.28: The James Girls, in a breezy oudget.
9.31: The Radio Revellers.
"Japanese Mammy" (Donaldson).
"There's a Rickety Rackety Shack" (Turk).
"That's What You Mean to Me" (Davis).
9.40: Mildred and Connie, harp and violin.
Selections from their repertoire.
9.43: The Radio Revellers.
"All by Yourself in the Moonlight" (Wallis).
"She's Got a Great Big Army of Friends" (Nelson).
"Querida" (Simon).
9.52: The James Girls.
A little bit of fun.
9.55: The Radio Revellers.
"Falling in Love with You" (Mayne).
"I Love to Dunk a Hunk of Spongecake" (Castell).
"Sweet Sue, Just You" (Harris).
10.4: Mildred and Connie, harp and violin.
Selections from their repertoire.
10.7: The Radio Revellers.
"Roses of Yesterday" (Berlin).
"The Voice of the Southland" (Austin).
"My Heaven is Home" (Collin).
"Pickin' Cotton" (Henderson).
10.20: News service.
10.30: God Save the King.

4QG

7.43 to 4.30: See Friday.

EARLY EVENING SESSION

6.0 to 7.45: The Children's Music Corner, conducted by "The Music Man." 7.45: Lecturette, "The Children's Music Corner," conducted by "The Music Man."

NIGHT SESSION.

8.0: The Studio Orchestra—
Overture, "Cleopatra" (Luscombe).
8.8: Kennedy Allen—
The third of a series of Reviews on Shakespeare's Works, "English Social Life in Shakespeare."
8.19: Ernest Harper (baritone)—
"The Shade of the Palm" (Allitsen).
"Here's Health unto His Majesty" (Saville).
8.28: The Studio Orchestra—
Rag, "The Wiggle-a-Wee" (Arthur).
8.32: Cecile Hayes (soprano)—
"A Black Sea Song" (Lohr).
"Sweet Early Violets" (Sherrington).
8.40: The Aloha Novelty Trio—
Ten minutes Hawaiian music.
8.50: Hugh Olive (tenor)—
"The River of Years."
8.54: The Studio Orchestra—
Valse, "Golden Glow" (Rollinson).
9.0: Metropolitan weather forecast.
9.1: D. Felsman (bass)—
"Eyes that used to Gaze in Mine" (Lohr).
9.4: The Aloha Novelty Trio—
More Hawaiian melodies.
9.14: Peo Todd (elocutionist)—
Monologue, "Aren't Men Funny" (Bertram).
9.18: Mrs. Charles Willey (contralto)—
"Yonder" (Oliver).
9.22: The Studio Orchestra—
March, "Faithful and Bold" (Rust).
9.26: Hugh Olive (tenor)—
"The English Rose" (German).
9.30: Peo Todd (pianiste)—
"Polonaise A Flat, Op. 53" (Chopin).
9.34: D. Felsman (bass)—
"Band of Love Divine" (Wood).
9.38: The Studio Orchestra—
Valse, "Chanson d'avril" (Cons).
9.42: Mrs. Charles Willey (contralto)—
Selected.
9.45: A quarter of an hour's recital of electrically reproduced records.
10.0: News; weather. Close down.

5CL

11.30 to 7.30: See Friday.

NIGHT SESSION.

6.0: Chimes.
6.10: Walter Barratt and his Maison Masters of Melody—
A selection of Nursery Rhymes, cleverely arranged by Somers, with an irresistible rhythm throughout. Part I. and Part II.—
"Happy Humming Bird" (Dixon).
"Where the Shy Little Violets Grow" (Kahn).
6.19: Marcelle Berardi, soprano—
Valse from "Romeo and Juliet" (Gounod).
6.22: Walter Barratt and his Maison Masters of Melody—
"What D' Ya Say" (De Sylva).
"Sweet Sue, Just You" (Harris).
"Ah, Sweet Mystery of Life" (Herbert).
6.32: Beryl Alford, elocutionist—
"Catty Ow."
6.37: Walter Barratt and his Maison Masters of Melody—
"I Knew it Was You" (Murray).
Piano solos by Reg. Hollow—
"Hot Piano" (Paques).
"That's What I Call Keen" (Kahn).
6.47: Marcelle Berardi, soprano—
"Songs my Mother Taught Me" (Dvorak).
6.50: Walter Barratt and his Maison Masters of Melody—
"Don't Keep Me in the Dark, Bright Eyes" (Wendley).
"Just Like a Melody out of the Sky" (Donaldson).
"Yesterday" (Harrison).
9.0: Chimes.
9.1: Meteorological information, including Semaphore tides.
9.2: Overseas grain report.
9.3: A story of the French Revolution.
The Story by Beryl Alford.
The Songs by Marcelle Berardi.
9.22: Walter Barratt and his Maison Masters of Melody—
"Sally of my Dreams" (Kernell).
Trumpet Solo by Frank Waterman.
"Non e' Ver" (Mattei).
"I'm on the Crest of a Wave" (De Sylva).
9.32: Beryl Alford, elocutionist—
"His First Long Trousers."
9.36: Walter Barratt and his Maison Masters of Melody—
"My Mother's Eyes" (Baer).
"Forty-seven Ginger-headed Sailors."
"My Angeline" (Warne).
9.46: Marcelle Berardi, soprano—
"Estrellita," Sapnish song (Pouce).
9.56: Walter Barratt and his Maison Masters of Melody—
"When Sweet Susie goes Steppin' By" (Kaufmann).
"You're Wonderful" (Fields).
"Maybe, I'll Baby You" (Birch).
10.6: Beryl Alford, elocutionist—
"The Clown."
10.10: Walter Barratt and his Maison Masters of Melody—
"All by Yourself in the Moonlight" (Wallis).
"The Savoy Scotch Medley."
10.15: General news service.
British official wireless news.
Meteorological information.
10.30: Close down.

6WF

10.0: Tune in: gramophone and phonograph records from the studio. 11.0: Close down. 12.30: Tune in. 12.35: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 2.0: Close down. 3.30: Tune in. 3.35: Music and songs relayed from the Carlton Cafe. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories by Uncle Duffy. 7.5: Light music by the Perth Piano Trio. 7.30: Commercial and general information. 7.45: Talk by Lieutenant Colonel Le Souef, Director, Zoological Gardens, South Perth. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Musical programme. 8.50: Late news: station announcements; ships within range announcement: late weather bulletin. 9.5: Programme continued from the studio. 10.30: Close down.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

11.30 to 7.15: See Friday.

EVENING SESSION

7.30: Under the auspices of the Tasmanian University Rev. A. C. Nelson will speak on "Literature in the Nursery." 7.45: B. C. Durant, of the Bombay Port Trust, will speak on: "A Pontoon Bridge Across the Derwent." 8.6: Recordings. 8.15: Transmission from the Memorial Congregational Church, Hobart. A concert programme arranged by James Marsh. 9.15: News service. 9.30: Recordings. 10.1: Close down.

Local Programmes, Tuesday, July 16

2FC

EARLY MORNING SESSION.

Announcer: A. S. Cochrane.

7.0: "Big Ben" and announcements. 7.2: Official weather forecast; rainfall; river reports; temperatures; astronomical memoranda. 7.7: "Sydney Morning Herald" summary. 7.12: Shipping intelligence; mail services. 7.15: Studio music. 7.25: Investment markets; mining sharemarkets; metal quotations; wool sales; breadstuffs markets; inter-State markets: produce markets. 7.40: Studio music. 8.0: "Big Ben." Close down.

MORNING SESSION.

Announcer: A. S. Cochrane.

10.0: "Big Ben" and announcements. 10.2: Pianoforte reproduction. 10.10: "Sydney Morning Herald" news service. 10.25: Studio music. 10.30: Last-minute sporting information, by the 2FC Racing Commissioner. 10.40: Studio music. 10.50: Pianoforte reproduction. 11.0: "Big Ben." A.P.A. and Reuter's cable services. 11.5: Close down.

MIDDAY SESSION.

Announcer: A. S. Cochrane.

Note:—Race results from Gosford will be transmited as received. 12.0: "Big Ben" and announcements. 12.2: Stock Exchange, first call. 12.3: Official weather forecast; rainfall. 12.5: Summary of news. "Sydney Morning Herald" 12.10: Rugby wireless news. 12.13: A reading. 12.30: Studio music. 1.0: "Big Ben." Weather intelligence. 1.5: "Evening News" midday news service. Producers' Distributing Society's market report. 1.20: Studio music. 1.28: Stock Exchange, second call. 1.30: Popular music. 2.0: "Big Ben." Close.

AFTERNOON SESSION.

Announcers: Eric Bessemer, Laurence Halbert.

Accompanist: Ewart Chapple.

2.30: Programme announcements. 2.32: A record recital. 3.0: "Big Ben." Popular music. 3.30: Myra O'Neill, soprano, (a) "The Fairy Tales of Ireland" (Coates), (b) "Homeward to You" (Coates). 3.37: Studio music. 3.45: A reading. 4.10: Daisy Sweet, contralto—(a) "Smiles" (Maxwell), (b) "Love's Rhapsody" (d'Hardelot). 4.17: Popular items. 4.23: Myra O'Neill, soprano—(a) "Early in the Morning" (Phillips), (b) "For Remembrance" (Woolmer). 4.30: Studio music. 4.39: Daisy Sweet, contralto—(a) "Song of Thanksgiving" (Allitsen), (b) "Dream of Love" (De Prevval). 4.45: Stock Exchange, third call. 4.47: Popular items. 5.0: "Big Ben." Close.

EARLY EVENING SESSION.

Announcer: A. S. Cochrane.

5.30: The chimes of 2FC. 5.35: The children's session, conducted by the "Hello Man," assisted by Aunt Elly. Letters and stories. Music and entertainment. 6.30: Daleety's market reports (wool, wheat, and stock) 6.40: Fruit and vegetable markets. 6.43: Stock Exchange information. 6.48: Weather and shipping news. 6.50: Rugby wireless news. 6.55: Late sporting news. 7.0: "Big Ben." Late news service. 7.10: The 2FC Dinner Quartette, conducted by Horace Keats—(a) "Prelude in C Sharp Minor" (Rachmaninoff), (b) "Catherine" (Tschaikowsky), (c) "Kashmiri Song" (Woodforde-Finden), (d) "Mauresque" (Coates)

EVENING SESSION.

Announcer: Laurence Halbert.

Accompanist: Ewart Chapple.

7.40: Programme announcements.

7.45: Studio Orchestra, conducted by Horace Keats—
"The Desert Song" (Romberg).

8.0: "Big Ben."

8.1: Studio Orchestra, conducted by Horace Keats—
(a) Overture, "The Men of Prometheus" (Beethoven).
(b) Suite "In Maytime" (Phillips)

8.16: Virginia Bassetti, contralto.

8.24: Ewart Chapple, pianist.

8.32: Charles Lawrence, entertainer.

8.40: Trio—Lindley Evans, Gladstone Bell, and Cyril Monk.

8.47: Madame Emily Marks, soprano.

8.54: Nellie Stewart.

9.0: "Big Ben." Late weather forecast.

9.1: Studio Orchestra, conducted by Horace Keats—
"Finlandia" (Sibelius).

9.10: George Wright, Esq., chairman of the New South Wales Broadcasting Co., Ltd.

9.17: Community singing.

9.22: Canon E. Howard Lea thanks the company.

9.25: Brunton Gibb, on behalf of artists, thanks the company.

9.28: Community singing.

9.32: Sketch, written by Scott Alexander, in which A. S. Cochrane, Laurence Halbert, and Ewart Chapple take part.

9.42: Community singing.

9.45: Studio Dance Band, conducted by Cec. Morrison.

10.0: "Big Ben." Nea Hallett, popular vocalist.

10.7: Studio Dance Band, conducted by Cec. Morrison.

10.20: Wally Baynes, comedian.

10.26: Studio Dance Band, conducted by Cec. Morrison.

10.35: Nea Hallett, popular vocalist.

10.40: Studio Dance Band, conducted by Cec. Morrison.

10.55: Charles Lawrence, entertainer.

11.0: "Big Ben."

11.1: Studio Dance Band, conducted by Cec. Morrison.

11.15: Wally Baynes, comedian.

11.20: Studio Dance Band, conducted by Cec. Morrison.

11.35: Charles Lawrence, entertainer.

11.45: Studio Dance Band, conducted by Cec. Morrison.

12.0: "Auld Lang Syne."
"The King is dead, long live the King."

2BL

MORNING SESSION.

Announcer: A. C. C. Stevens.

8 a.m.: G.P.O. chimes; weather report—State and metropolitan. 8.3: Studio music. 8.15: G.P.O. chimes; news and information service from the "Daily Telegraph Pictorial." 8.45: Studio music. 9.30: G.P.O. chimes; half an hour with silent friends. 10.0: G.P.O. chimes; close down.

MIDDAY SESSION.

Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes; 2BL Women's Sports Association session, conducted by Miss Gwen Varley. 11.30: Advertising hints. 11.40: Women's session, conducted by Mrs. Cranfield; talk on "The Work of the St. John Ambulance Association," by Sister Parry. 12.0: G.P.O. chimes; special ocean forecast and weather report. 12.3: Pianoforte and vocal recital. 12.30: Shipping and mails. 12.35: Market reports. 12.48: "Sun" midday news service. 1.0: Studio music. 1.30: Talk to children and special entertainment for children in hospital, by Uncle Steve. 2.0: G.P.O. chimes; close down. Note: Race results from Menangle will be broadcast by arrangement with the "Sun" Newspapers.

AFTERNOON SESSION.

Announcer: A. C. C. Stevens.

Accompanist: Kathleen Roe.

3.45: G.P.O. chimes; popular music. 4.0: G.P.O. chimes; Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 4.15: From the studio, a talk by Zora Cross. 4.27: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 4.37: From the studio, Leonard Brewer, violinist—(a) "Spanish Dance" (Granados-Kreisler), (b) "Spanish Serenade" (Chaminade-Kreisler), 4.44: Popular music. 4.53: Leonard Brewer, violinist—(a) "Romance" (Weiniawski), (b) "Rondino" (Beethoven-Kreisler). 5.0: G.P.O. chimes; studio items. 5.5: Frederick Todd, basso—a successful competitor in the recent Radio Eisteddfod. 5.12: A popular number. 5.16: Frederick Todd, basso. 5.23: Producers' Distributing Society's poultry report. 5.25: Complete sporting and racing resume. 5.28: Features of the evening's programme.

EARLY EVENING SESSION.

Announcer: Basil Kirke.

5.30: Children's session, conducted by Uncle Bas; music and entertainment; letters and stories. 6.0: Mr. Norman speaks to the "Bigger Boys." 6.45: "Sun" news and late "Marche Militaire" (Schubert), (b) "Melody sporting. 6.55: 2BL Dinner Quartette—(a) in F" (Rubenstein), (c) "Lohengrin" (Wagner), (d) "Prelude in A Flat" (Chopin), (e) "Little Lady of the Moon" (Coates). 7.7: Australian Mercantile Land and Finance Co.'s report; weather report and forecast by courtesy of Government Meteorologist; Producers' Distributing Society's fruit and vegetable market report; grain and fodder report ("Sun"); Dairy produce report ("Sun"). 7.25: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An ad. special. 7.55: Programme and other announcements.

EVENING SESSION.

Announcer: Basil Kirke.

Accompanist: G. Vern Barnett.

8.0: G.P.O. chimes. From the Strathfield Town Hall—Concert programme arranged by the Strathfield Music Club.

Assisting Artists—
Alexander Sverjensky.
Jules Van der Klei.
Lloyd Davies.
Constance Burt.
Accompanist: Enid Connelly.
"Instrumental Trio," 1st Movement (Schubert).
Alexander Sverjensky, Jules Van der Klei, Lloyd Davies.
Soprano solos—Constance Burt—
(a) "Pur Dicesti" (Lotti).
(b) "Ave Maria"—"Otello" (Verdi).
Violin solos—Lloyd Davies.
Piano solos—Alexander Sverjensky.
"Instrumental Trio," 2nd Movement (Schubert)—
Alexander Sverjensky, Jules Van der Klei, Lloyd Davies.
Piano solos—Alexander Sverjensky.
'Cello solos—Jules Van der Klei.
Soprano solos—Constance Burt—
(a) "Un doux lien" (Welbruk).
(b) "Lied" (Franck).
(c) "Aimant la rose le rossignol" (Rimsky-Korsakoff).
(d) "Il Etait un oiseaugris"—1729-1817 (Monsigny).

10.0: From the studio, weather report.
10.2: Recital of Celebrity records.
10.30: National Anthem: close.

2GB

10.0: Music. 10.10: Happiness talk, by A. E. Bennett. 10.20: Music. 10.30: Women's session, by Miss Helen J. Beegling. 11.30: Music. 11.45: Close down. 2.0: Music. 2.5: Women's radio service, by Mrs. Dorothy Jordan. 2.50: Music. 3.0: Movie know all. 3.30: Close down. 5.30: Children's session, by Uncle George. 7.0: Music. 7.30: Talk from the Radio Service Department, by Mr. Stan Crittenden. 7.45: Feature story. 8.0: Miss Heather Kinnaird, contralto. 8.7: Band selections. 8.15: Mr. J. Lou Walters, basso. 8.22: Instrumental Trio. 8.30: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 8.35: Miss Gladys Verona, soprano. 8.45: Symphony Orchestra. 8.50: Miss Heather Kinnaird, contralto. 9.0: Weather report. 9.3: Address. 9.15: Band selections. 9.25: Mr. J. Lou Walters, basso. 9.35: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 9.40: Symphony Orchestra. 9.50: Miss Gladys Verona, soprano. 10.0: Instrumental music. 10.30: Close down.

2UW

See programme for Friday.

Interstate Programmes, Tuesday, July 16

3LO

EARLY MORNING SESSION.

7.15 to 8.15: See Friday.

MORNING SESSION.

11.0: 3LO's Luncheon Dish Recipe, Fricassee Fish. 11.5: Miss E. Noble will speak on "Gas Cookery." 11.45: J. Howlett Ross will speak on "The Influence of Clothes."

MID-DAY NEWS SESSION.

12.0: Melbourne Observatory time signal. 12.1: British official wireless news from Rugby; Reuter's and the Australian Press Association cables; "Argus" news service. 12.15: Newmarket stock sales; official report of the sheep market by the Associated Stock and Station Agents, Bourke Street, Melbourne. 12.20: The Station Orchestra. 12.30: Ettie Coe, contralto. 12.37: Stock Exchange information; price received this day by the Australian Mines and Metals Association from the London Stock Exchange. 12.44: The Station Orchestra. 1.0: Weather. 1.5: The Station Orchestra. 1.10: Ettie Coe, contralto. 1.17: The Jedal Trio, also John Simons, piano. 1.45: Close down.

AFTERNOON SESSION.

2.15: The Radio Revellers. 2.25: Oliver Peacock, baritone. 2.32: The Radio Revellers. 2.42: Mildred and Connie, harp and violin. 2.50: The Radio Revellers. 3.0: Amy Boehm, soprano. 3.7: The Radio Revellers. 3.17: Oliver Peacock, baritone. 3.24: The Radio Revellers. 3.34: Mildred and Connie, harp and violin. 3.41: The Radio Revellers. 3.50: Amy Boehm, soprano. 3.57: The Radio Revellers. 4.10: Tom Masters, tenor. 4.17: The Radio Revellers. 4.30: Tom Masters, tenor. 4.37: The Radio Revellers. 4.50: News session. 5.0: Close down.

CHILDREN'S SESSION.

5.45: Birthday greetings and entertainment for the little ones. 6.15: Captain Donald MacLean. 6.30: The Strad Trio. 7.5: Stock Exchange. 7.15: Market reports. 7.43: Birthday greetings. 7.46: The Station Orchestra.

NIGHT SESSION.

8.0: Programmme announcements.
8.1: John Hobbs, bass-baritone—
"The Three Grenadiers" (Schumann)
"I Will Not Grieve" (Schumann)
8.8: The Prahran City Band—
March, "Heroes of Liberty" (Bedgood)
Humoresque, "The Merry Men" (Rimmer)
8.18: Violet Jackson, soprano—
"Oh, Lovely Night" (Landon Ronald)
"Life" (Curran)
8.25: The Prahran City Band—
Valse, "Senta" (Raymond)
8.33: John Hobbs, bass-baritone—
"On the Road to Mandalay" (Oley Speaks)
"The Volga Boat Song" (Roeneman)
(Both by request).
8.42: The Jedal Trio (Alva Hattenbach, violin; Edna Hattenbach, 'cello; John Simons, piano)
"Lento from 2nd Trio" (Chaminade)
"Serenade" (Pierne).
Alva Hattenbach, violin—
"Variations" (Tartini-Kriesler).
The Trio—
"Lament" (Glinka).
"Spanish Dance" (Moszkowski)
9.15: Violet Jackson, soprano—
"An Eriskay Love Lilt" (Kennedy Fraser)
"Sweet Miss Mary" (Meidlinger)
9.22: The Prahran City Band—
Overture, "La Coquette" (Laurent)
March, "71st Infantry" (Code).

MELBOURNE PHILHARMONIC SOCIETY.

Conductor: Professor Bernard Heinze.

9.30: Transmission from Australian Church, Melbourne Philharmonic Society.
"Unfold, Ye Portals Everlasting" (Gounod).
("The Redemption.")
"For He Shall Give His Angels Charge over Thee" (Mendelssohn).
("The Elijah.")
"The Waltz Song," "Faust" (Gounod).
"O, Gladsome Light" (Sullivan).
("The Golden Legend.")
"God Sent His Messenger" (Sullivan)
("The Golden Legend.")
10.0: The Prahran City Band—
"Prelude" (Rachmaninoff).
10.5: News session.
10.15: The James Girls, Mirth and Melody.
10.30: The Prahran City Band—
Intermezzo, "Amina" (Lincke)
10.35: Rita Hilton, soubrette—
"Dream Kisses."
Selected.
10.42: Ern. Hall's Radio Revellers with Hugh Huxham.
"The Tile Trot" (Pensa).
"Where the Cot-Cot-Cotton Grows" (Klein)
"Stay at Home Girl" (O'Hagen).
10.52: Rita Hilton, soubrette—
"You Went Away Once Too Often."
Selected.
11.1: Ern. Hall's Radio Revellers with Hugh Huxham.
"My Fleurette" (Kimbrough).
"Avalon Town" (Brown).
"Shake that Thing" (Jackson).
"My Mother's Eyes" (Baer).
"Glad Rag Doll" (Ager).
"You Are Wonderful" (Ash).
"The Rose of Flanders" (O'Hagen).
11.30: God Save the King.

3AR

MORNING NEWS SESSION

10.0 to 10.59: See Friday.

MORNING MUSICAL SESSION

11.0: Recordings. 11.30: Recordings, Casals, 'cello, Cortot, pianoforte, and Thibaud, violin, "Trio, B Flat Major, Op. 99" (Schubert). 1.20: British Official Wireless news from Rugby; announcements. 1.30: Close down.

AFTERNOON SESSION

3.0: The Strad Trio. 3.30: Cecil Parkes, violin. 4.0: Myra Montague, piano. 4.18: The Strad Trio. 4.30: Close down.

EVENING SESSION

6.0: Recordings. 7.10: News session. 7.20: Recordings.

NIGHT SESSION

8.1: The Station Orchestra.
"Joyous Youth" (Eric Coates).
"Petite Suite" (Coleridge-Taylor).
8.15: Mary Hotham, mezzo-soprano.
"The Linden Tree" (Schubert).
"Shadows" (Schubert).
8.22: The Station Orchestra.
"Peer Gynt Suite, No. 2" (Grieg).
"Bacchanale" (Saint-Saens).
8.37: The Heidelberg District Musical Society (conductor, Frederick Earp; piano, Louisa Dean).
Choir, "Ye Little Nymphs" (Fritz Hart).
"Chloris" (Fritz Hart).
George Wortley, baritone, "Floral Dance" (Moss).
Ladies' choir "Minuet" (Beethoven), "O, Can Ye Sew Cushions?" (Old Scotch Lullaby).
Quartette, "Banks o' Doon" (Robertson).
Male choir, "The Mulligan Musketeers" (Atkinson).
Mrs. Wright, soprano, selected.
Choir, "Farewell" (Brahms), "The Viking Song" (Coleridge-Taylor).
9.7: The Station Orchestra.
"Ballad Memories" (Baynes).
"From the Countryside" (Coates).
9.23: Mary Hotham, mezzo-soprano.
"Le Nil" (Xavier Leroux).
"Bonjour Suson" (Xavier Leroux).
9.30: The Victory Theatre Orchestra, under the baton of Henri Penn.
10.20: News service; announcements.
10.30: God Save the King.

4QG

EARLY MORNING SESSION.

7.43 to 8.30: See Friday.

MORNING SESSION.

11.0 to 12.0: See Friday.

MIDDAY SESSION.

1.0 to 2.0: See Friday.

AFTERNOON SESSION.

3.0 to 4.30: See Friday.

EARLY EVENING SESSION.

6.5: A law talk, "Criminal Law No. 2—The Purpose of Capital Punishment," by a barrister. 7.45: Lecturette, "Photography," by Mr. F. L. South (manager Kodak Ltd.).

NIGHT SESSION.

8.0: Stefan de Polotynski, the Polish conductor-composer, in pianoforte solos, and Madame de Polotynski (soprano), in character folk songs, including—
Sta. de Polotynski (pianist)—
"Nocturne" (de Polotynski).
"Mazurka" (de Polotynski).
Madame de Polotynski (soprano)—
"Flirt" (Russian folk song).
"Ay, Ay, Ay," (Brazilian serenade).
8.15: The Studio Instrumental Quartette—
Ten minutes' popular music.
8.25: Eileen M'Lennan (soprano)—
"My Life is Love" (Tait).
8.30: Fred C. Smith—
A Boy and a Piano.
8.40: Ella Howie (contralto)—
"Che Faro" (Gluck).
8.45: Sta. de Polotynski (pianist)—
"Prelude" (de Vavelle).
"Storm on the Volga" (Glazounoff-Polotynski).
Madame de Polotynski (soprano)—
"Gipsy Love Song."
"Russian Freebooters' Song."
9.0: Weather.
9.2: From the School of Arts—
The Brisbane Apollo Club, choral numbers—
"The Old Days" (Howard Carr).
"The Martyrs of the Arena" (de Rille).
"Pilgrims' Chorus" ("Tannhauser," Wagner).
"Oft when Eve has Rest Bestowed" (L. de Call).
9.30: From the studio, the Studio Instrumental Quartette—
More popular numbers.
9.40: Eileen M'Lennan (soprano)—
"Farewell" (Simpson).
9.45: Fred C. Smith at the piano.
9.50: Ella Howie (contralto)—
"Love's Old Sweet Song" (Molloy).
9.55: The Studio Instrumental Quartette—
Popular fox trots.
10.0: News; weather. Close down.

5CL

MORNING SESSION

11.30 to 2.0: See Friday.

AFTERNOON SESSION.

3.0 to 4.30: See Friday.

EVENING SESSION.

6.0 to 7.15: See Friday. 7.15: Under the auspices of the Workers' Educational Association, Mr. E. G. Biaggini, B.A., will speak on "The Housewife as Political Economist." 7.30: Mr. R. C. Bald, Ph.D. 7.45: Dr. Herbert Basedow.

NIGHT SESSION

8.0: Chimes.
8.10: A Presentation of the Famous Opera,
"FAUST" (Gounod).
Characters:
Marguerite: Marcelle Berardi.
Faust: Dino Pelardi.
Valentin: Bert Woolley.
Mefistofeles: Fred. Guster.
Siebel: Ann Young.
Wagner: Malcolm Jones.
Explanatory remarks by Horace Perkins, Mus. Bac., A.M.U.A.
Music by the Station Quartet.
10.0: The Poet's Corner.
Mr. P. H. Nicholls and Miss Bessie Francis In a Tennyson Interlude, "Balin and Balan."
10.15: General news service; British official wireless news; meteorological information; announcements; Tattersall's acceptances.
10.30: Close down.

6WF

10.0: Tune in: gramophone records. 11.0: Close down. 12.30: Tune in. 12.35: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 1.3: Luncheon music relayed from the Primrose Cafe de Luxe: vocal items from the studio. 2.0: Close down. 3.30: Tune in. 3.35: Musical programme from the studio. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories by Uncle Duffy. 7.5: Light music by the Perth Piano Trio. 7.30: Commercial and general information. 7.45: Talk by Dr. Battye, B.A., LL.B. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Concert by the Railways and Tramways Orchestra from the studio. 8.50: Late news items; station announcements; ships within range announcement; late weather bulletin. 9.5: Programme continued from the studio. 10.30: Close down.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

MIDDAY SESSION

11.30 to 1.30: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EARLY EVENING SESSION

6.15 to 7.15: See Friday.

EVENING SESSION

7.30: Geo. Lewis, of the Hobart Savings Bank, will speak on "Thrift made easy." 7.45: W. E. Fuller will speak on "Literary Lapses and Library Lists." 8.6: Recordings. 8.15: A programme of dance music and recordings. 9.45: News session. 10.1: Close down.

Local Programmes, Wednesday, July 17

2FC

The Australian Broadcasting Company supplies its First Programme.

EARLY SESSION—7 A.M. TO 8.15 A.M.

7.0: "Big Ben" and meteorological information.
7.5: Early-rising music.
7.40: Breakfast news.
7.45: Mails and shipping.
7.48: What's on to-day.
7.50: Children's birthday calls.
8.0: Music from the Studio.
8.15: Close.

MORNING SESSION—10.30 A.M. TO 12.30 P.M.

10.30: Announcements.
10.32: General sporting talk.
10.45: Organ recital from the State Theatre
11.0: Household Helps Department—
Cooking hints and recipes by Miss Ruth Furst.
11.10: Studio Light Orchestra.
12.0: "Big Ben" and Stock Exchange information.
12.5: A "Dickens" story told by Harry Thomas.
12.20: Midday market reports, supplied by the New South Wales State Marketing Board.
12.30: Close.

THE LUNCH HOUR—1 P.M. TO 2.30 P.M.

1.0: Lunch to music with the Station Orchestra.
2.0: Stock Exchange, second call.
2.2: Popular Education—
Lecturer—Representative from the Department of Education.
2.20: A glance at the afternoon papers.

THE RADIO MATINEE—2.30 TO 4.30 P.M.

2.30: The Station Orchestra—
Daisy Mangan, Soprano.
Brunton Gibb and Partner, in sketches.
Rowell Bryden, Baritone.
4.28: Stock Exchange, final call.
Note.—Race results will be given as received.
5.0: Close.

EARLY EVENING—5.45 TO 7.55 P.M.

5.45: Kiddies' "Good-night" Stories.
The "Hello Man" entertains the children.
6.45: The Dinner Orchestra.
7.30: Sporting news and views
7.40: Late news.
7.45: Organ recital.

OFFICIAL OPENING OF THE NATIONAL BROADCASTING SERVICE OF AUSTRALIA.

A GALA NIGHT, presented by the AUSTRALIAN BROADCASTING COMPANY LIMITED.

FIRST GRAND PROGRAME OF THE NEW ERA IN BROADCASTING.

From STATION 2FC, SYDNEY, on a DUAL WAVE LENGHT of 442 METRES FOR LOCAL RECEPTION, and on SHORT WAVE LENGTH OF 28.5 METRES FOR INTER-STATE and OVERSEAS RELAY

ORDER OF PRESENTATION:

Conductor ..... Horace Keats
Studio Producer . Laurence Halbert
Announcer ..... A. S. Cochrane
Accompanist ..... Ewart Chapple
Organist ..... G. Vern Barnett
Second Piano ..... Kathleen Roe

8.0: The State Theatre Symphony Orchestra, conducted by Mr. Will Prior, in an Overture.

8.10: Mr. Stuart F. Doyle, Chairman of Directors of the Australian Broadcasting Company will introduce the Prime Minister, the Right Hon. S. M. Bruce, and the Hon. W. C. Gibson (Postmaster-General).

8.13: The Right Hon. S. M. Bruce will speak.

8.18: The Hon W. C. Gibson will speak.

8.22: From the National Broadcasting Studios—First Broadcast appearance of the world-famed Russian pianist, Alexander Brailowsky, who will play a group of Chopin numbers.

8.42: First Broadcast appearance in Australia of New Zealand's foremost Baritone—Mr. Keith Grant—in association with Mr. Ernest McKinlay, Tenor, from the Westminster Glee Singers, in the Duet from Verdi's Opera, "The Force of Destiny," accompanied by the National Broadcasting Company Orchestra.

8.47: The New South Wales Conservatorium String Quartet, consisting of—
Mr. Gerald Walenn.
Mr. Alfred Hill.
Mr. Gladstone Bell.
Mr. Lloyd Davies.

8.54: First appearance of a new Australian Soprano—Miss Bessie Blake (with string accompaniment).

8.58: Official weather forecast.

9.0: First Studio appearance of "The Big Four" Male Quartet, in Mirth and Music.

9.12: A Group of "Liszt" numbers by Alexander Brailowsky—
(a) "Campanella"
(b) "Liebestraum"

9.32: A personality singer, Molly O'Dougherty, from the English Revue Company—
"This Year of Grace."

9.39: The National Broadcasting Orchestra in Tschaikowsky's "1812 Overture."

9.53: A group of Australian songs by Mr. Keith Grant, New Zealand Baritone.

10.0: The "Austradio" Symphony Dance Orchestra of 12 pieces, in the latest syncopations.

10.12: Character Study by Miss Annie Hughes, the English actress (first broadcast appearance since her return from London).

10.19: Albert Cazabon, English Solo Violinist, conductor of the Prince Edward Theatre Orchestra.

10.26: A message of greeting to listeners.

10.28: The "Austradio" Symphonic Dance Orchestra.

10.40: Some humor by the English comedian Compton Coutts.

10.48: The "Austradio" Symphonic Dance Orchestra will play dance numbers until the station closes at 11.30 p.m.

11.30: "God Save the King."
Close.

2BL

MORNING SESSION.

Announcer: A. C. C. Stevens.

8.0: G.P.O. chimes. Weather report—State and metropolitan. 8.3: Studio music. 8.15: News and information Service from "Daily Telegraph Pictorial." 8.45: Studio music 9.30: G.P.O. chimes. Half an hour with silent friends. 10.0: G.P.O. chimes. Close down

MIDDAY SESSION.

Announcer: A. C. C. Stevens.

11.0: G.P.O. chimes. 2BL Women's Sports Association Session, conducted by Miss Gwen Varley 11.30: Advertising hints. 11.40: Women's Session, conducted by Mrs. Cranfield. 12.0: G.P.O. chimes. Special ocean forecast and weather report. 12.3: Pianoforte reproduction. 12.30: Shipping and mails. 12.35: Market reports. 12.48: "Sun" midday news service. 1.0: Studio music. 1.30: Talk to children and special entertainment for children in hospital, by Uncle Steve. 2.0: G.P.O. chimes. Close down. Note: Race results from Ascot will be broadcast by arrangement with "Sun" Newspapers, Ltd.

AFTERNOON SESSION

Announcer: A. C. C. Stevens.
Accompanist: Kathleen Roe.

3.45: G.P.O. chimes. Les Busse, Melo Accordeon. 3.52: Stella Collyer, popular vocalist—(a) "When You Said No" (Smithson) (b) "High up on a Hilltop" (Baer and Campbell). 4.0: Basil Kirke will give a talk. 4.15: Bessie Cooke, contralto. 4.22: Les Busse Melo Accordeon. 4.30: Popular music. 4.32: Stella Collyer, popular vocalist—(a) "A Smile—a Kiss" (Nussbaum), (b) "A Heart That's Free" (Robyn). 4.50: Bessie Cooke, contralto. 4.57: "Sun" news service. 5.2: Pianoforte reproduction. 5.17: Popular Music. 5.23: Racing resume. 5.27: Features of the evening programme.

EARLY EVENING SESSION.

Announcer: Basil Kirke.

5.30: Children's Session conducted by Uncle Bas. Music and entertainment. Letters and stories. 5.20: The Aero Club, conducted by Mr. Norman, in association with "Wireless Weekly." 6.30: "Sun" news and late sporting. 6.40: Dinner music. 7.7: Australian Mercantile, Land, and Finance Co.'s report. Weather report and forecast, by courtesy of Government Meteorologist. Producers' Distributing Society's fruit and vegetable market report. Grain and fodder report ("Sun"). Dairy produce report ("Sun"). 7.25: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An Ad. Special. 7.55: Programme and other announcements.

EVENING SESSION.

Announcer: Basil Kirke.
Accompanist: G. Vern Barnett.

8.0: Sydney Operatic Society Revue Co.

9.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

9.42: From the studio, Claude Corbett will speak on General Sporting.

10.0: G.P.O. chimes. Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

10.12: From the Studio: Late "Sun" news service.

10.18: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

10.28: From the Studio: Weather report.

10.30: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

10.57: From the Studio: To-morrow's programme.

10.59: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams.

11.30: National Anthem. Close.

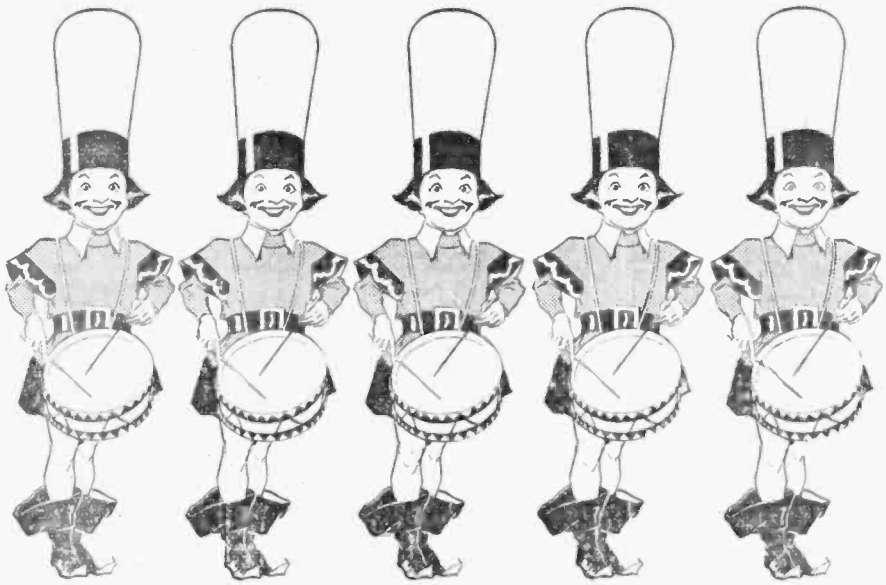
2GB

10.0: Music. 10.10: Happiness talk, by A. E. Bennett. 10.20: Music. 10.30: Women's session, by Miss Helen J. Beegling. 11.30: Music. 11.45: Close down. 2.0: Music. 2.5: Women's radio service, by Mrs. Dorothy Jordan. 2.50: Movie know all. 3.0: Labor-saving demonstration, from Nock and Kirby. 4.0: Close down. 5.30: Children's session, by Uncle George. 7.0: Music. 7.45: Feature story. 8.0: Miss Florence Day, contralto. 8.7: Symphony Orchestra. 8.15: Mr. Clement Hosking, baritone. 8.22: Violin solos. 8.30: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 8.35: Miss Doris Robinson, soprano. 8.45: Address. 9.0: Weather report. 9.3: Symphony Orchestra. 9.13: Miss Florence Day, contralto. 9.23: Humorous interlude by Mr. Jack Win and Mr. Heath Burdock. 9.28: Violin solos. 9.38: Mr. Clement Hosking, baritone. 9.48: Symphony Orchestra. 9.53: Miss Doris Robinson, soprano. 10.3: Instrumental music. 10.30: Close down.

2UW

See programme for Friday.

Uniform Volume



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RCA Radiotron

Interstate Programmes, Wednesday, July 17

3LO

EARLY MORNING SESSION

7.15 to 8.15: See Friday.

MORNING SESSION.

10.50: Eric Welch. 11.0: 3LO's Dinner Recipe. 11.5: Mrs. M. Callaway Mahood will speak on "The Art of Decoration." 11.45: Mrs. Clarence Weber will speak on "Physical Culture for Women." 12.0: Melbourne Observatory time signal. 12.1: British official wireless news from Rugby; Reuter's and the Australian Press Association cables; "Argus" news service. 12.15: Newmarket stock sales; cattle sales reports, bullocks and calves, by the Associated Stock and Station Agents, Bourke Street, Melbourne. 12.20: The Radio Revellers. 12.30: Tom Masters, tenor. 12.37: Stock Exchange information; metal prices received by the Australian Mines and Metals Association from the London Stock Exchange this day. 12.41: The Radio Revellers. 12.50: The James Girls. 1.5: The Radio Revellers. 1.14: Tom Masters, tenor. 1.21: The Radio Revellers. 1.30: Speeches from the Rotary Club luncheon, transmission from the Freemasons' Hall, Collins Street, Melbourne. 2.0: Result of Barwon Hurdle Race, run at 2 o'clock Geelong races. 2.5: Close down.

AFTERNOON SESSION.

2.15: The Station Orchestra. 2.28: Description by Eric Welch of Novice Handicap, six furlongs, Geelong races. 2.35: Ernest W. Wilson, bass-baritone. 2.42: The Station Orchestra. 2.58: Description of Carnival Handicap, 1 mile 2 furlongs 192 yards, Geelong races. 3.5: The Jedal Trio. 3.28: Description of Winter Brush Steeplechase, 2½ miles, Geelong races. 3.35: The Station Orchestra. 3.43: Ernest Wilson, bass-baritone. 3.50: The Station Orchestra. 4.3: Mildred and Connie, harp and violin. 4.15: Description of Juvenile Trial Handicap, five furlongs, Geelong races. 4.25: The Station Orchestra. 4.30: Tasma Tiernan, 'cello. 4.36: The Station Orchestra. 4.43: Description of Corio Handicap, seven furlongs, Geelong races. 4.50: News service. Stock Exchange information. 5.0: Close down.

CHILDREN'S SESSION.

5.45: Birthday greetings and entertainment for the children. 6.20: Captain Donald Maclean in some more exciting adventure stories. 6.35: The Jedal Trio.

EVENING SESSION.

7.5: Stock Exchange information. 7.15: Market reports. 7.30: News session. 7.43: Birthday greetings. 7.46: Under the auspices of the Tasmanian Government Tourist Department L. S. Bruce will speak on "Lake St. Clair Scenic Railway."

NIGHT SESSION.

8.1: Programme announcements.
8.2: The Station Orchestra—
Overture, "Der Bauer" (Dvorak).
8.12: Ray Carey, tenor—
"Sunday" (Brahms).
"The Tryst" (Sibelius).
"Sound an Alarm" (Handel).
8.27: The Station Orchestra—
"Slavonic Rhapsody" (Friedman).
8.40: H. Howlett Ross will tell a ghost story.
8.47: Under the direction of Madame Elsie Davies Melbourne's Grand Opera Quartette and Company will present "Norma."

Norma	Elsie Davies
Adalgisa	Ina Lillyerap
Clotilde	Isabel Burroughs
Pollioni	John D. Sullivan
Flavio	Fredk. Earp
Oroveso	Charles Evans

Chorus of Druids, Priestesses, and Warriors.
Pianist, Ada Adams.

10.0: News service. British official wireless news from Rugby; meteorological information; announcements.
10.10: The Station Orchestra—
Selection, "Dorothy" (Cellier).
The James Girls in a Jazzy Jingle.
10.25: The Station Orchestra—
Selection, "The Desert Song" (Romberg).
10.56: Ken. Hall's Radio Revellers with Hugh Huxham—
"Honey" (Simons).
"Flower of Love."
"When the Right One Comes Along" (Gilbert).
"Wear a Hat with a Silver Lining" (Sherman).
"Just Give the Southland to Me" (Sissel).
"A Room with a View" (Coward).
"What a Girl" (Saunders).
"Dynamite" (Henderson).
11.30: God Save the King.

3AR

MORNING NEWS SESSION

10.0 to 10.59: See Friday.

MORNING MUSICAL SESSION

11.0: Recordings. 12.20: News. 12.30: Close down.

AFTERNOON SESSION

3.0: Recordings. 3.30: Sir George Henschel and the Royal Philharmonic Orchestra, "Symphony No. 1, in C Major, Op. 21" (Beethoven). 4.30: Close down.

EVENING SESSION

6.0: Recordings. 7.10: News. 7.20: Recordings.

NIGHT SESSION

8.1: Transmission of the "Five O'Clock Girl," musical comedy, from His Majesty's Theatre.
10.25: News.
10.35: God Save the King.

4QG

EARLY MORNING SESSION

8.15 to 8.30: See Friday.

MORNING SESSION

11.0 to 12.0: See Friday.

MIDDAY SESSION

1.0 to 2.0: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EARLY EVENING SESSION

7.45: A Lecturette by Professor J. K. Murray (Queensland Agricultural High School and College).

NIGHT SESSION

8.0: Alf. Featherstone and his Orchestra—
Fox trots, "I'm on the Crest of a Wave" (de Sylva).
"Pickin' Cotton" (de Sylva).
8.10: Francis' Hawaiians—
"Coral Sands."
"Hawaiian Echoes."
8.20: Alf. Featherstone and his Orchestra—
Fox trots, "Sweet Sue, Just You" (Harris).
"Roses of Yesterday" (Berlin).
8.30: Mrs. Ferrier, Contralto—
"Provence" (Carne).
"Melisande in the Wood" (Goetz).
8.40: Alf. Featherstone and his Orchestra—
Jazz Waltz, "I Love You" (Hargreaves).
8.45: Mrs. Corrigan, Harpiste—
Selected.
8.50: Alf. Featherstone and his Orchestra—
Fox trots, "If you Want the Rainbow" (Rose).
"Happy Days and Lonely Nights" (Fisher).
9.0: Weather forecast; movements of lighthouse steamers.
9.4: J. P. Cornwell, Bass—
"Youth" (Allitsen).
"The Lover Hills" (Drummond).
9.10: Alf. Featherstone and his Orchestra—
"Sadly of My Dreams" (Kurnell).
"Sonny Boy" (Jolson).
9.20: Billy Maloney—
Ten minutes Mirth.
9.30: Mrs. Corrigan, Harpiste—
Selected melodies.
9.35: Francis' Hawaiians—
"Kalua Moon."
"Silver Threads Among the Gold."
9.45: J. P. Cornwell, Bass—
"Come to the Fair" (Martin).
9.50: Alf. Featherstone and his Orchestra—
Old-time waltz, "Love Notes" (Herson).
10.0: Weather, news.
10.15: Alf. Featherstone and his Orchestra—
Three-quarters of an hour's Dance Music.
11.0: Close down.

5CL

MORNING SESSION

11.30 to 2.0: See Friday.

AFTERNOON SESSION.

3.0 to 4.30: See Friday.

EVENING SESSION.

6.0 to 7.15: See Friday. 7.15: Rev. E. S. Kiek, M.A., B.D. 7.30: An address to Boy Scouts. 7.40: 5CL Bluebird Girls' Club.

NIGHT SESSION

8.0: Chimes.
8.10: Allan's Mouth Organ Band.
Conducted by R. Dutton.
"Winning Fight March" (Holzmann).
"Minuet in G" (Beethoven).
"Mary Lou" (with vocal chorus) (Russell).
8.20: Enid Besanko, Soprano—
"String of Pearls" (H. Lyall Phillips).
Selected.
8.27: Harold Clayton, Xylophonist—
"Invercargill March."
Four Hammer Novelty, "Home, Sweet Home."
8.33: Will Runge, Comedian.
Will entertain you.
8.45: Ewart Lock, Bass-baritone—
"My Friend" (Behrend).
"Indian Love Lyrics" (Amy Woodforde-Finden).
8.50: Stanley Stevens and his Musical Saw—
"When clouds have vanished and skies are blue."
"Rainbow" (Stanley Stevens).
8.56: Gwen Collett, Contralto—
"The Enchantress" (Hatton).
9.3: Meteorological information, including Semaphore tides.
9.4: Overseas grain report.
9.5: Announcements.
9.7: Allan's Mouth Organ Band—
"Jeannine I Dream of Lilac Time" (Shilkret).
"Humoreske" (Dvorak).
"Hi-ho the Merrio" (Conrad).
9.16: Enid Besanko, Soprano—
"Elegie" (Massenet).
"Honing" (Teresa Del Riego).
9.23: Harold Clayton (14 years of age), Xylophonist—
"Annie Laurie."
"Pepper Up March."
9.30: Will Runge, Comedian—
More Humorosities.
9.40: Ewart Lock, Bass-baritone—
"From Oberon in Fairyland."
"Thy Heart's Rest" (Bevan).
9.47: Stanley Stevens and his Musical Saw—
"In an Old-fashioned Town."
"Sing me to sleep" (Green).
9.53: Gwen Collett, Contralto—
"Mate o' Mine" (Elliott).
"Melisande in the Wood" (Goetz).
10.0: Allan's Mouth Organ Band—
"Bridget O'Flynn" (Robert King).
"Climax March" (Hall).
Medley of Popular Songs.
10.15: News service.
10.30: Close down.

6WF

10.0: Tune in; gramophone records. 11.0: Close down. 12.30: Tune in. 12.35: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 1.3: Talk. 1.20: Music. 1.30: Close down. 3.30: Tune in. 3.35: Musical programme from the Primrose Cafe de Luxe; football scores. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories by Uncle Duffy. 7.5: Light music by the Perth Piano Trio. 7.30: Commercial and general information. 7.45: Talk. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Musical and elocutionary items from the studio. 8.50: Late news items; station announcements; late weather bulletin; ships within range announcement. 9.5: Programme continued from the studio. 10.30: Close down.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

MIDDAY SESSION

11.30 to 1.30: See Friday.

AFTERNOON SESSION

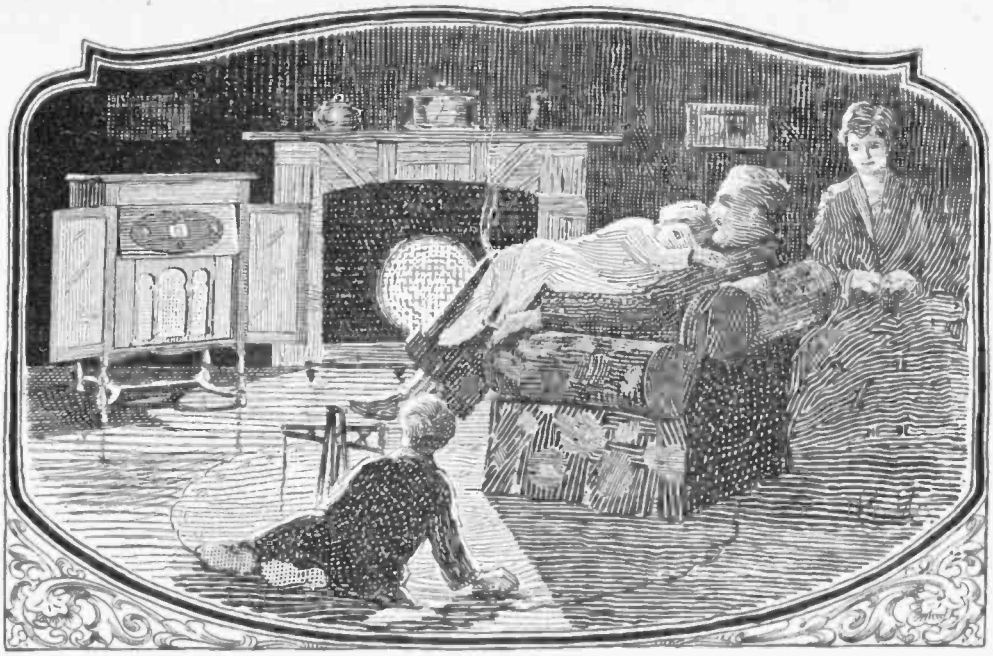
3.0: Description of Carnival Handicap, 1 mile 2 furlongs, Geelong, Victoria. 3.5: Weather. 3.28: Description of Steeplechase, 2½ miles, Geelong. 4.20: Description of Juvenile Handicap, 5 furlongs, Geelong. 4.25: Readings. 4.45: Description of Corio Handicap, 7 furlongs, Geelong. 4.50: Geelong race results. 5.0: Close down.

EARLY EVENING SESSION

6.0: All sporting results to hand. 6.15: Transmission from the Hobart Beaumaris Zoo. Mr. Read will speak on "Monkeys." 6.45: Bertha Southey Brammall. 7.0: Answers to letters and birthday greetings. 7.15: News session.

EVENING SESSION

7.30: "Regulo" will speak on "Gas Cookery." 7.45: E. T. Emmett, of the Tasmanian Government Tourist Bureau, will answer questions on "The Cradle Mountain." 8.6: Record recital, including latest releases. 9.30: News session. 9.45: Recital. 10.1: Close down.



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Local Programmes, Thursday, July 18

2FC

EARLY SESSION—7 A.M. TO 8.15 A.M.

7.0: "Big Ben" and meteorological information.
7.5: Early-rising music.
7.40: Breakfast news.
7.45: Mails and shipping.
7.48: What's on to-day?
7.50: Children's birthday calls.
8.0: Music from the Studio.
8.15: Close.

MORNING SESSION—10.30 A.M. TO 12.30 P.M.

10.30: Announcements.
10.32: The Racing Observer.
10.45: Organ recital from the State Theatre
11.0: Household Helps Department—
Topical domestic notes.
11.10: Studio Light Orchestra.
12.0: "Big Ben" and Stock Exchange.
12.5: With the Poets—Eleanor Ross.
12.20: Midday market reports supplied by the New South Wales State Marketing Board.
12.30: Close.

THE LUNCH HOUR—1 P.M. TO 2.30 P.M.

1.0: Lunch to music with the Station Orchestra, conducted by Horace Keats.
2.0: Stock Exchange, second call.
2.2: Popular Education—
Nature's Wonders, by a Museum authority.
2.20: A glance at the afternoon papers

THE RADIO MATINEE—2.30 TO 4.30 P.M.

2.30: The Station Orchestra—
Robert Gilbert, Baritone.
Molly Dougherty, in Monologues.
Dulcie Blair, Violinist.
4.28: Stock Exchange, final call.
4.30: Close.

EARLY EVENING—5.45 TO 7.55 P.M.

5.45: Kiddies' "Good-night" Stories.
Uncle Ted and "Sandy."
6.45: The Dinner Orchestra, in popular music.
7.30: Sporting news and views.
7.40: Late news.
7.45: Organ recital.

EVENING PROGRAMME—8 TO 11.30 P.M.

8.0: The New South Wales Police Band.
8.20: The Metropolitan Grand Opera star in excerpts from the Operas—
Rene Maxwell, Soprano.
Lillian Gibson, Contralto.
Charles Nicls, Tenor.
Alfred Cunningham, Baritone
(with Orchestral accompaniment).
8.32: Fred. Bluett—
"Australia's Own Comedian."
8.42: Florent Hoogstoel, Violinist, from the N.S.W. State Conservatorium of Music.
8.52: From Fullers' Theatre—
Jim Gerald and his Revue Company in 20 minutes of Mirth and Music
9.12: Official weather forecast.
9.13: Roy Agnew, Australian pianist-composer.
9.25: Vocal duet—Rene Maxwell, Soprano, Charles Nicls, Tenor.
9.30: "The Spanish Serenaders"—
Novelty instrumentalists.
9.37: Vocal duet—Lilian Gibson, Contralto; Alfred Cunningham, Baritone.
9.42: From the Hotel Australia Ballroom—
A group of dance numbers.
9.52: Steele Rudd, the inimitable story-teller.
10.4: "The Wireless Singers"—a chorus of specially trained voices.
10.15: A group of dance numbers—The Hotel Australia Dance Band.
10.25: "The Melody Three."
10.30: The Hotel Australia Dance Band.
10.40: "The Melody Three."
10.45: The Hotel Australia Dance Band.
11.0: "Big Ben." To-morrow's programme, features and announcements.
11.5: The Hotel Australia Dance Band.
11.5: "God Save the King."
Close.

2BL

MORNING SESSION.

Announcer: A. C. C. Stevens.

8.0: G.P.O. chimes. Weather report—State and metropolitan. 8.3: Studio music. 8.15: News and information service from the "Daily Telegraph Pictorial." 8.45: Studio music. 9.30: G.P.O. chimes. Half an hour with silent friends. 10.0: G.P.O. chimes. Close down.

MIDDAY SESSION.

11.0: G.P.O. chimes. 2BL Women's Sports Association Session, conducted by Miss Gwen Varley. 11.30: Advertising hints. 11.40: Women's Session, conducted by Mrs. Cranfield. 12.0: G.P.O. chimes. Special ocean forecast and weather report. 12.3: Pianoforte and vocal recital. 12.30: Shipping and mails. 12.35: Market reports. 12.48: "Sun" midday news service. 1.0: Studio music. 1.30: Talk to children and special entertainment for children in hospital, by Uncle Steve. 2.0: G.P.O. chimes. Close down.

AFTERNOON SESSION.

Announcer: A. C. C. Stevens.
Accompanist: Kathleen Roe.

3.45: G.P.O. chimes. Popular music. 4.15: Margaret Hunt, soprano—(a) "La Serenata" (Braga), (b) "Oh, Lovely Night" (Ronald). 4.22: A studio item. 4.25: Romano's Cafe Dance Orchestra, conducted by Bennie Abrahams. 4.35: Florence Bentley, mezzo—(a) "My Dear Soul" (Sanderson), (b) "Jeunesse" (Barry). 4.42: "Sun" news service. 4.47: Studio music. 4.53: Margaret Hunt, soprano—(a) "Everywhere I look" (Carew), (b) "The Sands of Dee" (Clay). 5.0: G.P.O. chimes. Popular music. 5.7: Florence Bentley, mezzo—(a) "Till I Wake" (Woodforde-Finden), (b) "The String of Pearls" (Phillips). 5.14: Popular music. 5.27: Features of the evening programme.

EARLY EVENING SESSION.

Announcer: Basil Kirke.

5.30: Children's Session conducted by Uncle Bas. Music and entertainment. Letters and stories. 6.30: "Sun" news and late sporting. 6.40: Dinner music. 7.7: Australian Mercantile, Land, and Finance Co.'s report, Weather report and forecast, by courtesy of Government Meteorologist. Producers' Distributing Society's fruit and vegetable market report. Grain and fodder report ("Sun"). Dairy produce report ("Sun"). Weekly traffic bulletin. 7.25: Mr. Pim and Miss Pam in advertising talks, handy hints, and nonsense. 7.53: An Ad. Special. 7.55: Programme and other announcements.

EVENING SESSION.

Announcer: Basil Kirke.
Accompanist: G. Vern Barnett.

8.0: G.P.O. chimes. From the Victory Theatre, Kogarah. The Victory Theatre Orchestra, conducted by Fred Mitchell.
8.20: From the Studio—Raymond Beatty basso—
(a) "Dedication" (Tschaikowsky).
(b) "Don Juan's Serenade" (Tschaikowsky).
8.27: The Marrickville Silver Band.
8.42: Will Carter, in a Sketch—
"The Concertina Man" (Carter).
8.52: Enid D'Arcy, soprano—
(a) "Villanette" (Acqua).
(b) "Chinese Flower" (Bowers).
8.59: Weather report.
9.0: G.P.O. chimes. From the Victory Theatre, Kogarah: The Victory Theatre Orchestra, conducted by Fred Mitchell.
9.16: From the Studio: The Marrickville Silver Band.
9.30: Raymond Beatty, basso—
(a) "Prospice" (Stanford).
(b) "Life and Death" (Coleridge-Taylor).
9.37: Will Carter, in Bush Cameos—
"The Home Light" (Carter).
"At the Hut" (Carter).
"Bingle's Bad Luck" (Carter).
9.47: The Marrickville Silver Band.
10.0: G.P.O. chimes. Enid D'Arcy, soprano—
(a) "Sing Low Sweet Chariot" (Burleigh) by request.
(b) "Homeward to You" (Coates).
10.7: The Marrickville Silver Band.
10.17: Late "Sun" news service.
10.28: To-morrow's programme and late weather.
10.30: National Anthem. Close.

2GB

10.0: Music. 10.10: Happiness talk, by A. E. Bennett. 10.20: Music. 10.30: Women's session, by Miss Helen J. Beegling. 11.30: Music. 11.45: Close down. 2.0: Music. 2.5: Women's radio service, by Mrs. Dorothy Jordan. 2.50: Movie know all. 3.0: Address by Mr. H. Morton. 3.30: Close down. 5.30: Children's session, by Uncle George. 7.0: Music. 7.45: Feature story. 8.0: Mr. Clement Q. Williams, baritone. 8.7: Symphony Orchestra. 8.15: Madame Betts-Vincent in an illustrated talk on the making of music. 8.30: Instrumental Trio. 8.35: Mr. Jack Win and Miss Nora Windle in a dramatic sketch. 8.45: Miss Gwen Selva, soprano. 8.55: Symphony Orchestra. 9.0: Weather report. 9.3: Address. 9.15: Miss Gwen Selva and Mr. Clement Williams. 9.25: Instrumental Trio. 9.30: Mr. Clement Q. Williams, baritone. 9.40: Mr. Jack Win and Miss Nora Windle in a humorous sketch. 9.50: Miss Gwen Selva, soprano. 10.0: Instrumental music. 10.30: Close down.

2UW

MIDDAY SESSION

12.30: Request numbers. 1.0: G.P.O. clock and chimes; music. 1.15: Talk on "Homecraft" by Pandora. 1.40: Music and request numbers. 2.30: Close down. 4.30: Musical programme.

EVENING SESSION

5.30: Children's Hour, conducted by Uncle Jack. 6.30: Close down. 7.0: G.P.O. clock and chimes; request numbers. 8.0: Music. 8.15: Garden talk by Mr. S. H. Hunt. 8.30: Music. 9.0: G.P.O. clock and chimes; comments on "Foreign Affairs" by Mr. J. M. Prentice. 9.10: Music and request numbers. 10.30: Close down.

Interstate Programmes, Thursday, July 18

3LO

EARLY MORNING SESSION

7.15 to 8.15: See Friday.

MORNING SESSION

11.0: 3LO's Afternoon Tea Recipe: Good sponge cake. 11.5: Captain Donald MacLean will continue his series of talks on "Famous Women of History." 11.25: Miss B. Macaulay will continue her talks on Astrology—a new factor in education. "Were you born between May 21 and June 20?" 11.45: Sister Purcell will speak on "Infant Welfare."

MIDDAY NEWS SESSION

12.0: Melbourne Observatory time signal. 12.1: British official wireless news from Rugby. 12.15: Newmarket stock sales; entries for the market for Tuesday, Wednesday, and Thursday, by the Associated Stock and Station Agents, Bourke Street, Melbourne. 12.20: Community singing, old-time choruses; Ern. Halls' Radio Revellers; The James Girls; Mildred and Connie. 12.40: Stock Exchange, etc. 12.45: Community singing resumed. 1.45: Weather, ocean forecast. 2.0: Close down.

AFTERNOON SESSION

2.15: The Station Orchestra. 2.22: E. Mason Wood, baritone. 2.29: Guildford Bishop, violin. 2.35: Madoline Knight, contralto. 2.42: The Station Orchestra. 2.54: The Jedal Trio. 3.26: E. Mason Wood, baritone. 3.33: A. Anderson, clarinet. 3.37: Madoline Knight, contralto. 3.44: The Station Orchestra. 3.50: J. Howlett Ross. 4.5: The Station Orchestra. 4.15: Gwen Hart, soprano. 4.25: The Station Orchestra. 4.35: news service; Stock Exchange information, results of coursing, Waterloo Cup, at Geelong. 4.45: Evensong, transmitted from St. Paul's Cathedral. 5.30: Acceptances and barrier positions for the V.A.T.C. races to be held at Caulfield on Saturday. 5.35: Close down.

CHILDREN'S SESSION

5.45: Birthday greetings and stories for the children. 6.15: Captain Donald MacLean will tell some more adventure stories. 6.30: The Jedal Trio.

EVENING SESSION

7.0: Stock Exchange information. 7.10: Market reports. 7.25: News session. 7.40: Birthday greetings. 7.46: A dressingroom talk will be given by permission Tivoli Theatres, Ltd.

NIGHT SESSION

8.0: Programme announcements.
8.1: Rod M'Gregor will speak on "Football."
8.15: Ern. Hall's Radio Revellers—
"Stay at Home Girl" (O'Hagen)
"High Upon a Hilltop" (Baer).
"When Love Comes Stealing" (Rapee).
8.24: Jack Hocking, The Sighing Serenader—
"Think of me thinking of you" (Marven)
8.27: The Radio Revellers—
"Roll up the Carpets" (Nixon)
"To-day, to-morrow, for ever" (Nichols).
"Shinaniki Da" (Carlton).
8.36: Mildred and Connie, Harp and Violin—
Selections from their repertoire.
8.39: The Radio Revellers—
"Who Knows" (Dixon).
"Lady of the Morning" (Burton)
"I'm Crazy over You" (Lewis)
8.48: Anne Middleton, Soprano—
"Cuckoo Song" (Quilter).
8.51: The Radio Revellers—
"Old Man Sunshine" (Dixon)
"Wipin' the Pan" (Baer)
"Guess who's in Town" (Razaf)
9.0: Jack Hocking, The Sighing Serenader—
"Caroline Moon" (Davis)
9.3: The Radio Revellers—
"That Stolen Melody" (Fisher).
"Lenora" (Gilbert).
"Japanese Mammy" (Donaldson)
9.12: Mildred and Connie, Harp and Violin—
Selections from their repertoire.
9.15: The Radio Revellers—
"There's a Rickety Rackety Shack" (Turk).
"That's what you mean to Me" (Davis).
"All by Yourself in the Moonlight" (Wallis).
9.24: Anne Middleton, Soprano—
"Fairy Lullaby" (Quilter).
9.27: The Radio Revellers—
"She's got a Great Big Army of Friends" (Nelson).
"Querida" (Simon).
"Falling in Love with You" (Mayne).
9.36: Jack Hocking, The Sighing Serenader—
"Love's Dream."
9.39: The Radio Revellers—
"Sweet Sue, Just You" (Harris).
"Roses of Yesterday" (Berlin).
"The Voice of the Southland" (Austin).
9.48: Mildred and Connie, Harp and Violin—
Selections from their Repertoire.
9.51: The Radio Revellers—
"My Heaven is Home" (Collin).
"Pickin' Cotton" (Henderson).
"I'm on the Crest of a Wave" (Henderson).
10.0: News service; meteorological information; British official wireless news from Rugby; announcements.
10.15: The Radio Revellers—
"Mother, I still have You" (Jolson)
"Out of the Dawn" (Donaldson).
"Paradise and You" (Pacay).
10.24: Anne Middleton, Soprano—
"Wood Pigeon" (Liza Lehmann).
10.27: The Radio Revellers—
"Sincerely I do" (Davis).
"Sally Rose" (Friend).
"My Mother's Eyes" (Baer).
10.36: Jack Hocking, The Sighing Serenader—
"Old Fashioned Rose" (Prior).
10.39: The Radio Revellers—
"It all comes out in the Wash" (Trent).
"Rio Rita" (Tierney).
"The Kink-a-Jou" (Tierney).
10.48: Mildred and Connie, Harp and Violin—
Selections from their repertoire.
10.51: The Radio Revellers—
"Anywhere is Heaven" (Brady).
"Down where the Sun goes Down" (Jones).
"Can you blame me" (Goodwin).
11.1: The Radio Revellers—
"I want to be alone with Mary Brown" (Leslie)
"Ya comin' up to-night, Huh" (Lewis).
"Forty-seven Ginger Headed Sailors" (Sarony).
"High Tension" (Bee).
"A Bungalow, a Radio, and You" (Dempey).
"Give your Baby Lots of Lovin'" (Burke).
"When You Know Me" (Baden).
"I'm Thirsty for Kisses" (Davis).
"I'm Sorry, Sally" (Kahn).
"My Blackbirds are Bluebirds now" (Friend).
"Casablanca" (Evans).
11.30: God Save the King.

3AR

MORNING NEWS SESSION

10.0 to 10.59: See Friday.

MORNING MUSICAL SESSION

11.0: Recordings. 12.20: News. 12.30: Close down.

AFTERNOON SESSION

3.0: Recordings. 3.30: Sir Thomas Beecham, conducting the London Symphony Orchestra, "Symphony in D, No. 2" (Beethoven). 4.30: Close down.

EVENING SESSION

6.0: Recordings. 7.10: News. 7.20: More rhythms.

NIGHT SESSION

8.0: The Station Orchestra.
"Virginia" (Haydn Wood).
8.15: Harold Webb, baritone.
Selected.
"Sea Fever" (Ireland).
"Cargoes" (Clarke).
8.22: The Station Orchestra.
"Ballad Memories" (Baynes).
8.37: Cairns Memorial Church Choir, transmission from the Cairns Memorial Church, East Melbourne.
(Organist, Miss P. F. Thurman; conductor, R. J. Oehr).
The Choir
Anthem, "29th Psalm" (Elgar).
Louise Thornton, soprano, and chorus.
"La Carita" (Rossini).
Choir, anthem, "O Love Divine" (arr. Mendelssohn).
Louise Thornton, soprano; Mrs. Abery, contralto; A. J. Etheridge, tenor; Frank R. Thomas, baritone).
Quartette, "Plead Thou My Cause" (Mozart).
9.10: One-act play, "Mother o' Pearl," produced by Dulcie Hall. Mother o' Pearl, Dulcie Hall; Lizzie, Leonie Levy; Ted, George Howard. Scene: A seat in a park in the East End of London.
9.30: The James Girls, in song and story.
9.45: The Station Orchestra.
"Suite Pastorale" (Ansell).
9.55: Harold Webb, baritone.
"Three" (Aylward).
"Daffodil Gold" (Hodgson).
10.2: The Station Orchestra.
"Fantasie" (Godard).
10.20: News session; announcement.
10.30: God Save the King.

4QG

EARLY MORNING SESSION

7.43 to 8.30: See Friday.

MORNING SESSION

11.0 to 12.0: See Friday.

MIDDAY SESSION

1.0 to 2.0: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EARLY EVENING SESSION

6.0 to 7.45: Lecturette, "Farming in the Good Old Days," by Mr. J. F. F. Reid, editor Queensland Agricultural Journal.

NIGHT SESSION

THE RICHMOND PARTY.

8.0: A Classic programme by the Richmond Party—
Jack Ellis, Pianist—
"Hexentanz" (Macdowell).
Mrs. W. F. Hamilton, Mezzo-Soprano—
"My Heart is Weary," from "Nadeschda" (Goring Thomas).
Ottilie Cloake, 'Cellist—
"Menuett" (Burmester-Moffat).
Hilda Cooper, Contralto—
Selected.
Jack Ellis, Pianist—
"Etude" (Kopylow).
Mrs. W. F. Hamilton and Hilda Cooper—
Vocal duet, "Hear Me, Norma" (from "Norma," Bellini).
Ottilie Cloake, 'Cellist—
"In a Monastery Garden" (Ketelby).
Mrs. W. F. Hamilton, Mezzo-Soprano—
"Dame Durden" (Old English), (Liza Lehmann).
Hilda Cooper, Contralto—
"Golden Lilies" (Leoni).
Jack Ellis, Pianist—
"Ragamuffin" (John Ireland).
Mrs. W. F. Hamilton and Hilda Cooper—
Vocal duet, selected.
Accompanist: Jack Ellis.
9.0: Metropolitan weather forecast.
9.1: Movements of travelling clinic.
9.3: Douglas Drouyn and His Novelty Trio—
In a Musical Act featuring the Electric Vibra Harp.
9.8: Mary McNeish, Soprano—
"Piper of Love" (Carew).
"I Don't Suppose" (Trotere).
9.16: Douglas Drouyn and his Novelty Trio—
Another Musical Medley.
9.22: D. Felsman, Baritone—
"Duna" (McGill).
"La Paloma" (Yradier).
9.30: An impromptu programme of music by the Citizens' Band (conductor, A. Kaeser).
10.0: Weather; news; close down.

5CL

MORNING SESSION

11.30 to 2.0: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EVENING SESSION

6.0 to 7.30: See Friday.

NIGHT SESSION

8.0: Chimes.
8.10: Unley Orchestra, conducted by Norman Sellick.
"Pomp and Circumstance" (Elgar).
8.18: Stella Sobels, Soprano—
"You in a Gondola" (Clarke).
"The Sleepy Song" (Barry).
8.25: Malcolm Gilham, Trumpeter—
Selected Trumpet Solos.
8.31: Vincent McMurray, Tenor—
"Serenata" (Toselli).
"Who is Sylvia?" (Schubert).
8.38: Unley Orchestra—
"The Mikado" (Gilbert and Sullivan).
8.53: Ellen Elford, Contralto—
"Even as a Lovely Flower" (Bridge).
"To You" (Oley Speaks).
9.0: G.P.O. Chimes.
9.1: Meteorological information, including Semaphore tides.
9.2: Overseas grain report.
9.3: Unley Orchestra—
Waltz, "Dream on the Ocean" (Gung'l).
9.12: Stella Sobels, Soprano—
"A Little Coon's Prayer" (Hope).
"I Love the Moon" (Paul Rubens).
9.19: Arnold Blaylock, Clarionet—
Selected Clarionet Solos.
9.25: Vincent McMurray, Tenor—
"Elegie" (Massenet).
"Maire, My Girl" (Aitken).
9.32: Unley Orchestra—
"Africana Suite" (Thurban).
9.42: Ellen Elford, Contralto—
"Odds and Ends" (Anon).
"The Cuckoo" (Martin Shaw).
RADIO PROBLEMS SOLVED.
9.48: "Atmos" will help you with your Radio troubles.
10.3: Unley Orchestra—
"Emperor's Review" (Ellenberg).
10.15: News service.
10.30: Close down.

6WF

10.0: Tune in: gramophone records. 11.0: Close down. 12.30: Tune in. 12.35: Markets, news, etc. 1.0: Time signal. 1.1: Weather bulletin, supplied by the Meteorological Bureau of West Australia. 1.3: Organ recital. 1.30: Community singing. 1.50: Programme continued from the studio. 2.0: Close down. 3.30: Tune in. 3.35: Music and song relayed from the Carlton Cafe. 4.30: Close down. 6.45: Tune in. 6.48: Bedtime stories by Uncle Duffy. 7.5: Light music by the Perth Piano Trio. 7.30: Commercial and general information. 7.45: Talk by Mr. F. Sinclaire, M.A. 8.0: Time signal. 8.1: First weather bulletin. 8.3: Band concert by the Perth City Band, conducted by Mr. Les. M. Price. 8.50: Late news items: station announcements: ships within range announcement: late weather bulletin. 9.5: Band concert continued from the studio. 9.45: Talk.

104.5 METRE TRANSMISSION.

Simultaneous broadcast on 104.5 metres of programme given on 1250 metres, commencing at 6.45 p.m.

7ZL

MIDDAY SESSION

10.30 to 1.30: See Friday.

AFTERNOON SESSION

3.0 to 4.30: See Friday.

EARLY EVENING SESSION

6.15 to 7.15: See Friday.

EVENING SESSION

7.30: Alderman E. J. Rogers. 7.45: W. H. Cunnine on "Soccer." 8.6: Selections. 8.15: A Studio Concert and Recordings. 9.45: News session. 10.1: Close down.

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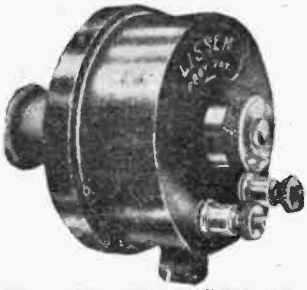

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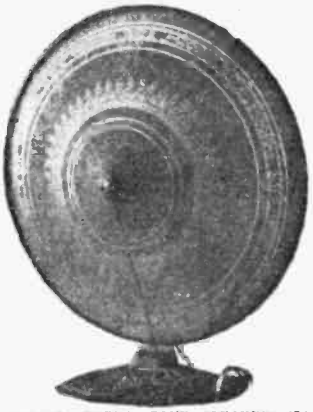

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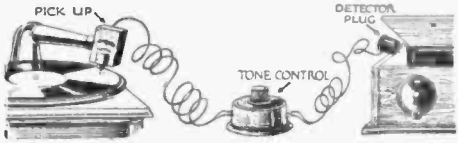

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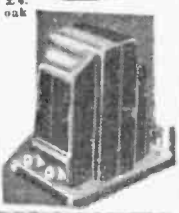

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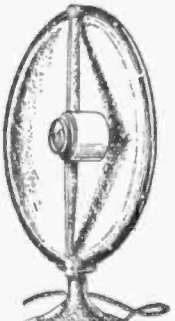

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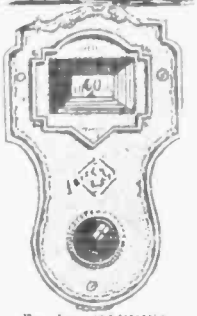

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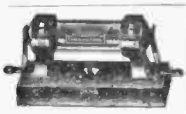

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The WIRELESS WEEKLY RADIO INFORMATION SERVICE

Under the direction of Ross A. Hull

A.E. (Rose Bay).—The "Proving Radio" Morse tests are carried out every Sunday at 8 p.m., on 230 metres. You will be instructed, and called by 'phone. Call sign, VK2HU.

Mr GOGGIN (18 Quinton Road, Manly).—Back copies of "Wireless Weekly," except for numbers dated February 1, 8, 22, and March 1, 8, and 15, can be obtained here. Forward 4d in stamps for each copy required, which will be posted to you. Readers may be able to supply February and March copies.

A.C.C. (Lakemba).—We do not reply by post. See instructions and data on amplifiers, as per "Proving Radio," part 26.

C.N.B. (Braidwood).—Japan is one hour behind N.S.W. time. The Jap. stations are heard usually from about 10 p.m. onwards on Sundays, when local stations close down. It might be possible for you to receive U.S.A. broadcast stations on your five-valver. It has been done, but is an infrequent occurrence, and, as a rule, the transmissions are hard to follow.

J.G.B. (Kilcoy).—Did you test the secondary of the transformer?

W.R. (Wellington).—Sorry, we have no copies. See below.

GENERAL.—Can any reader supply Mr. W. Riach, State Forest Service, Wellington, New Zealand, with copy of September "Radio," containing screen-grid R.F. Midget Four?

J.F.J. (Rose Bay).—Quite O.K. The one or two valve amplifier as per "Proving Radio," part 26, can be used on the Countryman's One Valver. Condenser O.K. Yes, .0001 condenser will probably improve selectivity, but there may also be a loss in volume. A409 valve, 90-volt "B" battery. Detector tap at about 30 volts. 90 volts on amplifier. "Amperite" is a trade name, and refers to a special type fixed resistor, used to break down filament voltage to that required by the valve. Any good type transformer 5-1 for one stage. If two audios are used, first stage should be 5-1 and second stage 3½-1. Instructions for connecting up the amplifier to any existing set will be found in "Proving Radio," Part 26. A battery, 4 volts; B battery, 90 volts (i.e., two 45-volt batteries connected in series); C battery (if one is used), 4½ volts. Additional B voltage is necessary when amplifiers are being used.

GENERAL.—2YB, New Plymouth, New Zealand operated by the North Taranaki Radio Society writes:—"We receive many reports from the Commonwealth, New South Wales, Queensland, Victoria, etc. Hence the following information may be of interest to your readers:—Wave-length, 244 metres. Power, 100 watts (N.Z. rating). Schedule: Monday, 8-10, concert; Wednesday, 8.15-7 children's session. 7-8 sports, news, and information; Saturday, 2.30-5 sports relays, 6.15-7 children's session, 7-8 sports, news, etc.; Sunday, 6.0-6.30, children's church service, 8.15-10 concert. (Times stated are N.Z.M.T.)

A.V.Q. (Orange).—No. The amplifier mentioned will not increase the range of your receiver. Doubt if you will get good speaker volume from either station.

F.W.H. (Sutherland).—Alterations necessary are too numerous to mention here. Suggest you wait a couple of weeks to see the description of Mr. Ross Hull's new all-electric receiver.

GENERAL.—Mr. W. Drewett, c/o L. G. Wragge "Nariga," Eslimo Road, Denliquin, N.S.W., writes:—"I have back numbers of 'Wireless Weekly' in good order, from No. 6, Volume 13, to the present date which any of your readers may have by paying postage."

A.J.M. (Young).—The Marnock Five.

F.T. (Wallsend).—May be treated in a future issue. Working on a receiver like this at present. It will be A.C. S.G. Think you may strike trouble if you used a power socket aerial with an A.C. set. Hum would probably be bad.

G.D. (Glen Innes).—No need to build a special set. Why not a short-wave adaptor to use with your broadcast set? Several have been treated in detail through "Wireless Weekly" since January.

W.E.W. (Peakhurst).—The Harkness is a reflex set. Regret we have no space for circuit at present.

222 (another bad signature) (Toorooka).—A gramo amplifier was published in these columns quite recently.

A.J. (Victoria).—Quite in order.

Lodger (City).—Present filament current consumption is 1.5 amp. Yes, could be reduced by using different valves. Philips, Mullard, Six-sixty, Cossor, etc. You should be able to get New Zealand. Perhaps you are not tuning the receiver correctly. The aerial or earth may not be as efficient as it could be. There may be local screens, in the way of tall build'gs, etc., between you and the stations.

H.B. (Cook's Hill).—Thanks for coupon. Where's query?

A.J.E. (Glen Innes).—Welcome as a country member to the "Proving Radio" Club. Your letter forwarded to country organiser.

GENERAL.—Several readers have been inquiring lately regarding the Radiar Wireless Co. This firm have altered their business address, and are now to be found at St. James Chambers, 114 Castlereagh Street, Sydney. Radiar are on the fifth floor.

C.M. (Wallarobba).—Probably one of the resistances is faulty. Yes, the heat of the soldering iron, unless carefully used, would be liable to damage the fixed condensers. No, it would not hurt the mica inside the condenser, but it would melt the wax that assists in insulating and separating the plates.

C.V.K. (Kurri Kurri).—Circuit is that known as "Old Reliable." Can be improved by using primary coil. Yes, you can do away with the plug-in coils. Wind 15 turns 24-gauge wire on a 3in. diameter former. ¼-inch away wind 50 turns same wire. Connect aerial to first turn of 15-turn coil, and earth to end of coil. Replace variable condenser with one of .0005 mfd.

FIVE-VALVER (Parkside).—No, not necessarily. Marnock Five would be better. Copy of "W.W." containing a s.w. adaptor has been forwarded you.

W.W. (Peakhurst).—Sorry, no copies. In any case, you did not enclose stamps.

W.R. (Wellington).—See above.

T.E.H. (Rozelle).—The B405 is in its wrong place. It should be in the last stage. You must experiment with grid bias. Try an R.F. choke in series with plate of detector valve and plate of transformer. Circuit is being returned, as requested.

C.E. (Botany).—Interaction between grid and plate wiring, or R.F. getting into audio from some other source. Your circuit shows no R.F. choke. Place one in series with plate of valve and plate of transformer. If this does not fix trouble, it will probably be necessary to take particular care with leads mentioned, seeing that they do not run near or parallel each other. Interaction may be through too closely coupled coils. Suggest Marnock Five.

J.W.S. (Newcastle).—You could do better. The Aircraft is really designed for short-wave reception. If you only want four valves, why not the Marco? Yes, Eliminator O.K. Glad you like Information Service and "P.R." You say, "Don't blow me up in queries for writing so long a letter." Righto, but what about that coupon?

H.H. (Hurstville).—Try another rectifier. Make sure eliminator is well away from set (about 2ft. at least).

P.L. (Randwick).—Faulty detector valve. To test valve properly for emission, etc., a milliameter and voltmeter are required.

R.H.B. (Peakhurst).—Do not know set. Wind 50 turns 24-gauge wire on 3in. diameter former. Connect first turn to aerial, and also to fixed plates of .0005 condenser, and last turn to aerial terminal of set and to moving plates of the condenser.

R.F.H. (Fiji).—Approximately .00015 mfd. Re numbers required, your letter has been passed on to Subscribers' department. You will be advised when your sub. expires.

GENERAL.—Mr. A. T. Burt, 109 Kerford Road, Albert Park, Melbourne, urgently requires a copy of "Wireless Weekly" containing the All Empire S.W. receiver. Can any reader oblige, please? Regret we have no copies left, Mr. Burt.

RADIO MUG (Hurstville).—This is not a fault. It is a proof, that the rectifier has formed. It is OK. for the aluminium plate to have a coating after formation. If this coat is very heavy, try using distilled water, and to make sure that the borax is absolutely pure use the type known as "Twenty Mule Team Borax." The aluminium plate should, of course, be perfectly pure and clean. "Strip" it in washing soda solution before forming in order to remove grease.

W.W.R. (Newcastle).—Write to Willard Battery Service, Wentworth Avenue, Sydney, re Willard charger. You will find a good Reinartz arrangement in WIRELESS WEEKLY dated March 22, under the title, "The Renown Special Three."

G.B. (Newcastle).—Try earthing negative filament.

G.T.B. (Pyrmont).—Yes, Countryman's One.

D.K. (Chatswood).—The Kug Crystal Receiver, February 8, 1929.

C.J. (Melbourne).—Coils will remain the same as original article. Copy required has been forwarded.

A.A. (South Australia).—Sorry, cannot advise. The circuit referred to is unknown to us. You should have forwarded a circuit diagram. Copy requested has been forwarded.

J.W.R. (Bega).—KFOX is located at Long Beach, California, wave-length 240 metres, power 1000 watts. RLD is at Dallas, Texas, wave-length 288 metres, power 10,000 watts. KHJ, Los Angeles, California, wave-length 333 metres, power 1000 watts. JEO probably a Japanese station, but we have no record of any such call sign.

HORO (Cowra).—Probably a faulty resistance.

ANXIOUS (Ryde).—You say: "Would an 'A' eliminator give as good results as a Philips' 'B' and 'C'?" Are you confusing an "A" eliminator with a "B" and "C" eliminator? The "A" eliminator supplies current to the filaments of the valves. The "B" and "C" eliminator supplies plate voltage and grid bias. If you mean: "Does an 'A' eliminator function as satisfactorily in its duties as does a 'B' and 'C' eliminator?"—the answer is "Yes, providing the eliminator is of good design and quality." Can be bought at most radio stores. Use the 4-volt globe.

"REGULAR READER" (No Address).—Queer you have been reading paper so long and have not noticed that a coupon is required. However, increase number of turns on primary (which is too small) to fifteen turns if a three-inch former is used, and 23 turns if a two-inch former is used. 24-gauge D.C.C. should be used.

B.G.H. (Rosebery).—Trouble is probably in primary, which is unsuitable to aerial used. When long aerial is used, primary need not be so large. This is the third time your query has been answered within a month.

A.T.W. (Taree).—You could connect condensers tested to double the voltage which they have to stand across the brushes. Capacity should be about 4 mfds. You did not mention the voltage output of the motors, so it is hard to advise you further. May be necessary to build the Interference Eliminator published in these columns recently. As the output is D.C., think you will have a hard time of it. D.C. interference is a big problem. The condenser arrangement would not affect the motors. The cost of the condensers would depend on the voltage which they would have to withstand, and the quality procured, but the approximate price would be 10/ each.

D.H. (Newcastle).—See supplement published recently. Wrong resistance evidently—will not pass enough current. Correct combination of Philips' valves would be as follows: A625, A625, A615, A609, A605.

A.W. (Denman).—An underground aerial will not eradicate static, though it may help. If you have a good amplifier and static is troublesome, you may try it. Unless you have a good amplifier, you will find there is a considerable loss in volume. Ninety feet of 20-gauge copper wire, insulated, and lead covered, should be used. This should be buried two feet below the ground, and the end sealed into a bottle in order to stop moisture from getting in.

N.B. (Gunnedah).—Wind 15 turns on a threeinch diameter former. First turn to aerial, last turn to earth. No need to make any tapping. This tapping is placed on commercial sets so that city listeners may make their receivers more selective.

J.H. (Toongabbie).—Probably primary of first transformer damaged. See below.

GENERAL.—Can any reader please supply Mr. J. Hewlett, Burnett's Road, Toongabbie, with a copy of WIRELESS WEEKLY containing circuit diagram of the "Inexpensive Trickle Charger."

C.C. (Melbourne).—Look for open grid circuit, or reversed tuning condenser.

E.M. McK. (Five Dock).—See list of radio books recently published in these columns.

V.G. (Broken Hill).—You will find a chart in the A.R.R.L. Handbook.

J. McD. (Toowoomba).—"Zero Beat" is a condition in which two frequencies of exactly the same value are "beating" without producing a "beat note." A book published by Swains Is. I think, the latest on "Television," though Andy Robertson have some late books on the subject.

J.B. (Eardwood).—Marco. No; use rheostats. B405 in last stage.

G.E.H. (North Sydney).—Information required appeared in these columns in full detail two or three weeks back.

QUERY COUPON

If you are in difficulties about reception or set-construction, let us know, and we will endeavor to set you right. Make your questions brief to the point, and, where possible, show lay-out and wiring design. Under no circumstances will answers to queries be made by letter or by telephone. All answers will appear in the columns of this department in the order in which they are received.

The Radio Information Service, "WIRELESS WEEKLY," Box 3366PP, G.P.O., Sydney. Please answer the following queries in the Information Service Department, at your earliest convenience. I enclose this coupon in order to indicate that I am a bona-fide reader.

"DALGRAITH."—Yes, Marnock Five. Add 80 stage to Go-Getter, as per Perry Graham's article. The error is yours. I personally tested the receiver at North Sydney, near 2GB, and found it very selective. Also you have probably seen many reports in these columns on the sharpness in tuning of this receiver. It is not necessary entirely to revolve the smaller coil. If it will turn round approximately 180 degrees, this is all you want. No room for circuits at present. Cannot understand some of your writing, please write again. When you do, reduce length of letter. Reason why diagrams placed as mentioned is so that they will be readily accessible to the reader as he goes through the article. Do not condemn us because you have been unable to make a crystal set so selective as you expected. Remember that the way in which the set is built and the location often makes a great difference. Yes, we DO want candor—and we give it also. A lot of your letters have been answered through these columns recently, and I have mentioned that fact. We do not reply by post.

A.E. (Cremorne).—"A" battery may be flat. Squealing may be caused through using too much plate voltage on detector. Fading may be caused by flat "A" battery, or aerial touching some earthed object.

D.A.D. (Kandos).—Very sorry, but there is no room for circuit diagrams at present, other than those which are of general interest.

K.H.D. (Enfield).—See above. No; the eliminator mentioned is a commercial product.

L.S. (Brisbane).—Your circuit incorrect. See "An Inexpensive 'B' Eliminator" article published in WIRELESS WEEKLY some little time back.

ORANGE (Orange).—The answer is a lemon! Orange is famed for its "dead spot" qualities. You are getting very good reception.

W.S.D. (Townsville).—When a linear oscillator (a Hertz aerial) is excited at its fundamental frequency or one of the harmonic frequencies, voltage and current gradients in the form of waves are set up along the wire. The points of maximum and minimum current (termed current nodes and anti-nodes) are always in the same location along the wire throughout the cycle, and the waves are, therefore, capable of being termed "standing waves."

H.I.R. (Braidwood).—It would be necessary to have the two additional valves built up as a unit. The coil will not assist you in reception of long-distance stations.

C.W.W. (Lismore).—Probably "B" battery requires re-charging.

A.L. (Petersham).—No; 90 volts is too high voltage. Anything from 30 to 50 volts is usually O.K. for the R.F. valves.

C.J.W. (Western Australia).—S.G. Valves O.K. Yes; it would be necessary to screen the H.F. stages separately. You are quite correct. Dead against lengthy letters. More time is taken in reading how Aunt Maria connected the "B" battery to the filaments than some querysts seem to spend writing about the actual trouble. Glad you like "D.R." Sorry to hear you have been unable to obtain the two copies, which should have been mailed you as usual. Will pass this letter on to Circulation Department.

A.D. (Condobolin).—I can see no advantage in doing away with your condenser, but that is up to you to decide. If you have found it will not help you to tune don't use it. Cannot see anything to suggest for aiding DX except to purchase good valves, have a good aerial, and use the proper plate current on the valves. We are returning your sketch as per your request.

F.E.V. (Crow's Nest).—You may place a small condenser in series with the aerial lead. This often sharpens tuning. Perhaps your aerial is too long. Then it would be advisable to shorten it some and see if there is any difference in the selectivity. We do not know the size of the resistance, as you state the receiver was a kit. This would not have anything to do with the tuning of the set or its selectivity.

A.E.P. (Rose Bay).—The size of the condensers may be too large, or your aerial may be too long. Most of the receivers of this type do not seem to tune much lower than 250 metres and still get good results. You can also use the suggestion in answer to question 2. A small condenser in series with the aerial will help here also.

R.T. (Melbourne).—Yes, you can use the high tap with the 171 power valve. It would be necessary to use a C grid bias of 40 volts for the valve then, figuring that the eliminator gives the full 180 volts of B current.

S.E.M. (Hornsby).—Try placing a 25,000 or 50,000 ohm resistance across the secondary of the first stage of audio transformer.

T.A. (Woollahra).—This would not improve it, in fact, might cause broader tuning.

M.T. (Brisbane).—It would be advisable to obtain a polarity reading voltmeter which shows which is positive and negative. If you are doubtful of your own ability, take the charger to a battery service station, where you will quickly find which is the positive and negative lead. Do not attempt to charge with it until you are certain which is the correct lead to go to the battery.

R.N.A. (Chatswood).—The small coils have a smaller external field but are not as efficient as the larger ones.

T.K. (Clovelly).—It would be advisable to use the output transformer as you will have higher voltage than formerly. When using this high voltage the output transformer oftentimes gives better clarity than without it.

M.D. (Braidwood).—The difference between the .0005 and .00035 condenser kits will be that the .0005 set will tune much closer, that is, the stations will be much closer together.

A.L. (Canberra).—If the set works in the other city I don't see why you should be afraid of the speaker, but in order to change to a cone speaker it will be necessary to replace the dynamic magnet of the speaker with a choke coil, and the output transformer of the set will have to be replaced with another one that will match the cone speaker. I think it had better be left alone.

P.R. (Newcastle).—Would advise you to check up the wiring in the receiver. There is something radically wrong. If you recently purchased the receiver, return the set to the agent and claim it is defective. This condition should not be had.

Experiments With Lightning Voltage

RECENT progress in the mastery of lightning problems through combined research in the laboratory and field has been so rapid that it seems important at this time to make a review of the present status of the various phases of the subject. While there is still much to learn, lightning may be said to be now at least on an engineering basis since it is expressed numerically in volts and amperes.

The following accomplishments indicate how rapid the progress has been:—The wave shape of lightning has been pictured by the cathode ray oscillograph; the time required for a cloud to discharge has been measured by the same instrument; the attenuation of lightning waves travelling on a transmission line has been determined; natural lightning waves have been reproduced in the laboratory where their effects on transmission lines, insulators, insulation, transformers, and protective apparatus have been studied at will; a lightning generator producing over 3,600,000 volts has been constructed and waves from this generator have been sent over transmission lines to test full size transformers and other apparatus to determine how to make them highly resistant to lightning; scientific work on the time lag of gaps and insulation has been extended. The above list is not complete, but will serve to indicate how much progress has been made.

A 3,600,000 GENERATOR.

Up to the early part of 1927 laboratory research in lightning work had progressed so far that it seemed important to double the 2,000,000 volts available at that time. This high voltage was desirable so that full-size apparatus could be tested and results obtained without extrapolation. A 3,600,000-volt generator was built and is in satisfactory operation, and an extension is now available so that about 5,000,000 volts is obtainable. Double the directly generated voltages due to reflection have been measured at the ends of transmission lines.

A radically new method was devised by the author to obtain the very high voltages. The effect is that of adding two, three, four, or more of the original generators in series at the proper instant so that all of the respective impulse voltages add together. No rectifiers are used. The A.C. voltage is applied directly to each unit generator. At that instant, on the crest of the wave when each unit is fully charged, gap sparkovers take place that connect the generators in series and the impulse occurs.

WAVE SHAPE OF SURGE.

The maximum sparkover distance possible with such a 3,600,000 voltage depends upon what wave shape of surge the lightning generator is adjusted to give. With a surge of a very short duration, a sparkover of only 9ft. can be secured at 3,600,000 volts crest. Longer distances can be broken down with long waves, as much as 20ft. being possible with a 1000 microsecond front.

With the exception of gaps between electrodes producing a uniform field, the lightning or impulse sparkover voltage is always appreciably higher than the generator's 60-cycle sparkover voltage. The steeper the wave, or the shorter the duration of the transient, the higher the crest sparkover voltage. With an exceedingly steep or short wave there may even be a measurable increase for spheres. The lightning breakdown voltage will thus vary because lightning surges vary. The ratio of the lightning to the

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60-cycle crest sparkover voltage is always greater than unity. Some years ago this was termed the impulse ratio. Under the usual severe lightning conditions in practice, insulator sparkover voltages give an impulse ratio of two. This has been well established by comparing the lightning sparkover voltages of insulators as measured in the field by the surge voltage recorder and the klydonograph with the 60-cycle sparkover voltage. The impulse ratio is thus an indication of the effective duration of the wave.

A gap between spheres has very little time lag if the spacing is not greater than the diameter of the spheres. In general, therefore, the impulse ratio is, practically, unity, and the sphere-gap indicates the voltage at the crest of the wave. However, because it is genrally desirable to know the effective duration of the wave, as well as its crest, in making tests a "time-gap" is necessary. The suspension insulator is a very good gap for this purpose. An example will best illustrate the use of such a gap. Assume that it is desired to compare the lightning sparkover voltage of two entirely different types of bushings, but that it is not possible to do this in the same laboratory with exactly the same waves. A sphere-gap measurement would give the crest of the wave, but equal sparkover voltages would not indicate equivalent bushings unless the shapes of the waves were known. A very good comparison can be obtained by the insulator time-gap, even if the waves differ considerably. This can be done by placing an insulator string in parallel with the bushing, applying impulses, and adding or removing units from the string until 50 per cent. of the sparks occurs on each. The equivalent breakdown strength of the bushing is thus obtained in terms of line insulators. Since the impulse ratio of bushings and insulators vary together up and down over a wide range, with varying wave shapes, the effect of variations due to such differences is eliminated, and a good comparison is obtained. The lightning sparkover voltage of the bushing for any particular wave can then be determined from the lightning sparkover curve of the insulator string. The insulator time-gap also offers a convenient method of comparing the lightning strength of solid insulation. Since the lightning sparkover varies with the length of the string, it is usually best to express it in terms of the 60-cycle sparkover rather than the number of units, whose spacing may vary. It is possible to use other time-gaps, such as spheres with resistance in series, gaps, in oil, etc., but the suspension insulator seems best for practical purposes because it is the time-gap that limits the voltage on lines.

When the maximum voltage of the lightning impulse causing an insulator sparkover is measured by a sphere, surge voltage recorder, or klydonograph, the effective duration of the wave is also obtained. For example, the lightning sparkover of insulator strings measured on the 220-k.v. lines of the Pennsylvania Power and Light Company were found to average about 2000 k.v. For these insulators the 60-cycle sparkover was about 1000 k.v. The usual impulse ratio of natural lightning varies between 1.8 and 2. In a few cases impulse ratios as high as 2.7 were obtained. These impulse ratios show that the effective duration varied from 1 to 20 microseconds, where the effective duration is the time that the voltage is above half voltage, or approximately the time above the 60-cycle sparkover. Such waves were actually measured by the cathode ray oscil-

lograph. Thus a wave giving an impulse ratio between 1.8 and 2 on line insulation represents the average severe field conditions, and the standard laboratory wave, established long before measurements were available, is confirmed as simulating practical conditions. The lightning wave secured on the Pennsylvania Power and Light Company line this last summer had a duration above half voltage of about 20 microseconds.

An important development is the grading shield for insulators. The grading shield bears about the same relation to the insulator string as the ground wire does to the line. An important function of the grading shield is to cause even distribution along the string. This strengthens considerably the path along the insulator surfaces to lightning, and forces the arc to take place between the rings which may be set for a lightning sparkover voltage higher than that of the non-shielded string. Destructive cascading is thus prevented. In this way the gain in voltage may be as much as 10 per cent. to 12 per cent., and can be checked by comparing the lightning sparkover of the non-shielded string with the needle-gap lightning sparkover of the distance between rings. For the 20 microsecond wave this is usually over 10 per cent. For very steep waves it may be more. That there is considerable advantage in voltage for the shielded string is illustrated by a test in which an impulse of 80 microseconds duration above the 60-cycle sparkover voltage is symmetrically applied to the two strings connected in parallel. The flashover occurs on the non-shielded string. The difference in sparkover voltage is not appreciable with longer waves. That shields prevent deterioration of the units in a string through improved distribution of voltage stresses is forcibly illustrated in tests. After a few lightning sparkovers, insulator units fail in the non-shielded strings, while there are no failures in the shielded strings.

In addition to the actual increase in lightning sparkover voltage discussed above, there is also an apparent increase which is probably of more importance. When the energy of the lightning generator is limited, it is necessary to supply a higher voltage to a shielded string to cause sparkover. This apparent increase in sparkover voltage may be of a higher order than the actual increase. The extra voltage must be generated because of the energy dissipated by the "barrel" of corona between the edges of the rings. The gain has been observed when the energy available approximated that in an average span, and should be an approximate measure of the effect in practice since there is one shield for each line per span. This energy dissipating effect by corona has been made use of by purposely designing grading rings of flat strap material in place of smooth surfaced pipes. The results of lightning sparkover tests with the strings excited at normal 60-cycle voltages were not different from tests on non-excited strings.

From the above it can be seen that a successful shield must grade and increase the strength along the string so that sparkover is forced to occur between rings rather than over the surface of the insulators with the shield at the same time maintaining a high 60-cycle flashover voltage; that the design must be such as to dissipate the maximum energy by corona, and thus have the effect of increasing the impulse sparkover voltage; that single sharp points or sudden surface changes are undesirable; that no practical gain results from large rounded surfaces.

From the standpoint of clearing the dynamic arc, complete round or oval rings are highly desirable as a track for the arc when blown by the wind. Anchor points at the ends of a sectionalised shield may cause it to wrap around the string. Horns cannot

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prevent cascading without a serious reduction in voltage, because they do not properly grade the string. They must be adjusted for a lightning sparkover voltage lower than that of the weak non-shielded string.

The insulating value of a wood pole to lightning voltages has been measured up to 3,600,000 volts. The measurements show that the strength of wood poles of such varying degrees of wetness and dryness as might occur in practice range from 100 to 300 k.v. ft. A good average value is 180 k.v. ft. Thus a pole 35ft. high, with a 5ft. crossarm, would have lightning sparkover voltage of 40 x 180, equals 7200 k.v. The insulator would add very little to a pole of this length. However, when the length of wood in series with the insulator is not over 10 feet, from 75 to 100 per cent. of the insulator flashover voltage may be considered as added to that of the wood to comprise the total pole insulation.

Tests made on models in the laboratory show that the bus structures of outdoor stations should be of material assistance in reducing transient voltages. There are several effects that help. The grounded steel work acts as a very effective ground wire system, which may reduce induced voltages very considerably. Tests on line models built to scale often show as low as one-third voltage when bus structures are added. Full effect of this is not obtained in practice, due to the limited physical length of the structures compared to the cloud. A wave travelling to the bus structure would be reduced in voltage due to the reduction in surge impedance. The massed capacity effect of the bus would prevent high voltage reflection. The effects in practice should be quite effective for waves chopped short by insulator arc-overs. Several extra ground wires of a half-mile or more in length, extending out from a station, should, because of reduction in surge impedance, be very effective in reducing the voltage of incoming waves. On the other hand, tests show that the omission or reduction in the ground wires at the station causes a rise in voltage.

Tests on models have been very useful in determining the best arrangement of ground wires, the effect of high towers at river crossings, etc. Tests are also under way to determine the practicability of protecting towers from direct strokes by means of rods.

The new lightning generator has made possible invaluable studies on full size transformers and insulation arrangements. It has long been recognised that the internal insulation of a transformer should be stronger than the bushing, while the bushing in turn should be stronger than the adjacent line insulation. Research on transformers has been made by applying lightning waves over a line insulated in the usual way. The general method is to apply gradually increasing impulses until the insulators spark over. Insulator units are then added until either the bushing sparks over or the internal insulation fails. If failures occur internally, the weak points are then strengthened until the flashovers occur on the bushings. The insulator is ideal as a voltage limiting gap for such tests, because it performs the same function in practice, limiting the surges in duration as well as magnitude.

(To be Concluded.)

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