THE AUSTRALASIAN

Radio World

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

VOL. 7 ..... NO. 7 DECEMBER 15 1942

High-quality tuner circuit features intermediate switching.

Reflex arrangement suitable for almost every battery set.

Dictionary of radio terms explains away many problems.

Loggings and reception notes are keys to short-wave results.

Price 1/-

CROWN Radio PRODUCTS

This is an era of slogans and catch phrases and we at Crown Radio are rather proud of our particular slogan.

"KEEP 'EM LISTENING"

It sums up the whole function of radio, a most important service at any time — doubly so in war time. Radio is an Essential Service and should be utilised to the fullest extent by those who emphasise the need for an all-out war effort. We at Crown Radio are doing our best under great difficulties to help the Radio Serviceman by keeping a constant supply of component parts on our distributors' shelves.

CROWN RADIO COMPONENTS INCLUDE:

B/C coils "Permatune" or Air Core. S/W coils "Permatune" or Air Core. I.F. Transformers "Permatune" or Air Core,

Tuning Units (with and without R.F. Stage). Dials (Edglit and Celluloid). Trimmers. Padders. Voltage Dividers. W.W. Resistors.

If you have any service problems write to us at Crown Radio enclosing a stamped addressed envelope and we shall be most happy to give you every assistance, or if more convenient, contact one of our Authorised Distributors who likewise be most helpful.

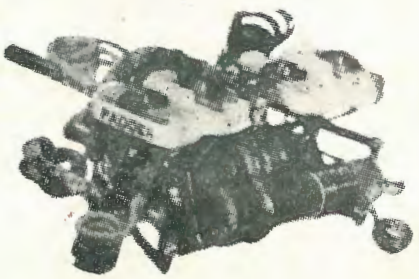
It is only by close co-operation that we—Crown Radio, our Authorised Distributors and you, Mr. Serviceman, can assist our country by

"KEEP 'EM LISTENING"

Crown Edglit Dial, friction driven. Price, 24/-

As the festive season draws near, with its traditional sentiments of Goodwill, we would like to take this opportunity of expressing our grateful thanks to all our good friends who have supported us during the last twelve months, and to hope that the coming year will be the commencement of a new era in which Peace and Prosperity will go hand in hand.

All the Best!



Crown Dual Wave Unit, frequency range 1600-550 K.C. and 13-42 Metres. Price, 29/6

The Reliable Line — Obtainable from all Authorised Distributors.

Crown RADIO PRODUCTS PTY. LTD.

51-53 MURRAY STREET
PYRMONT — SYDNEY

Telephone MW 2628 (2 Lines)

Use Crown Components in all "Radio World" Circuits.

THE AUSTRALASIAN RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

★ Proprietor —

★ Publisher —

★ Editor —

A. G. HULL

★ Editorial Offices —

117 Reservoir Street, Sydney

Phones: M 4078 - M 4079

★ Office Hours —

Week-days: 9 a.m. - 5 p.m.

Not open Saturday morning

★ Subscription Rates —

6 issues 5/3

12 issues 10/6

24 issues £1

Post free to any address

★ Service Departments —

Back Numbers, 6d. ea., post free

Reply-by-mail Queries, 1/- each

Laboratory Service, 2/6 per set

Vol. 7 DECEMBER, 1942 No. 7

CONTENTS

EDITORIAL

It is indeed sad that there should be those amongst us who, instead of helping the war effort, are wrangling and wire-pulling with a view to gaining for themselves a monopoly of the radio repair business.

We refer, of course, to the proposed scheme to allow component parts to be sold only to registered radio repairmen.

Now is the time for every radio man, whether professional technician or boy novice, to do everything possible to keep radio sets in good operating condition.

If the radio repair men like to get together to form a trade union, the move will be welcome. If the lofty ideals usually mentioned at the time of application for registration of such a union are kept in mind the radio repairmen will have ample scope for organisation without attempting to arrange a ban on the sale of components, or in any other way interfere with the freedom of any individual to repair his own set if he happens to have the necessary technical knowledge.

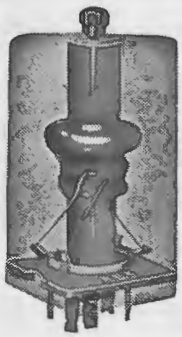
It is not a heck of a long time since there wasn't a radio repairman in the whole of Australia. Anybody who wanted to have a radio set in those days had to build themselves a crystal set. Since then thousands of amateurs have built their own sets. These thousands are still with us, and only a small percentage are actively employed as radio repairmen. They have the knowledge necessary to put their spare time to "keep 'em listening".

It is ridiculous to suggest that they be denied the necessary parts.

R.C.S PARTS may be hard to get— *but they make construction easy!*

• Accurately built coils and components — because they ensure perfect test set results every time—make construction easy. That's why you'll find it worthwhile going to a little extra trouble to get genuine R.C.S. Trolitul coils and components for the set circuit given in this issue. Precision-built to extreme limits, they measure up to the most exacting standards.

R.C.S. TROLITUL BROADCAST COILS



These coils are available in both Air Core and Permeability tuned types. The latter are adjusted to ensure maximum efficiency in our laboratories.

AIR CORE "H" GANG

E342	Aerial	6/6
E343	R.F.	6/6
E344	Osc.	6/6

PERM. TUNED "H" GANG

E345	Aerial	8/6
E346	R.F.	8/6
E347	Osc.	8/6

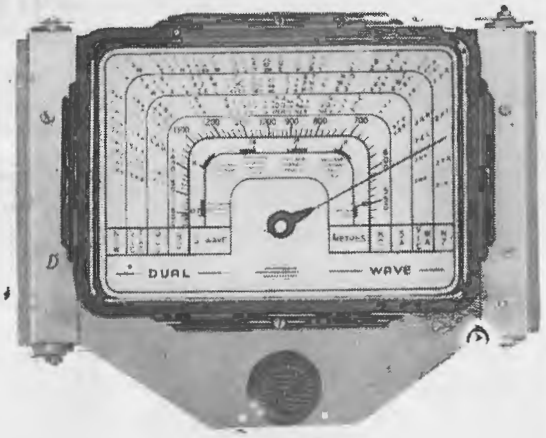
T.R.F. TYPE-AIR CORE

T88	Aerial	6/6
T89	R.F.	6/6
T87	R.F. with reaction	6/6
T81	Reinartz	6/6

R.C.S. AUDIO TRANSFORMERS

Long experience in the production of highly efficient transformers, combined with extensive research into raw materials and design, has resulted in the production of an audio transformer of excellent performance and complete reliability.

Cat. No.		Retail Price
TA1	Audio Choke, bakelite case	18/6
TM1	Modulation Transformer — power	35/-
TB4	Single Input "A" Class, bakelite	20/-
TB5	Push-pull "A" Class, bakelite case	21/-
TB6	—"B" Class	
TB6	Input "B" Class, bakelite case	18/6
TB35	"A" Class High Fidelity, steel case	67/7
TB36	"B" Class Input High Fidelity, steel case	67/6
TB37	"AB" Class, bakelite	28/6



R.C.S. DIALS

Types DA1 and DA2 are single glass dual-wave, the type DA2 having been designed especially for use with the Five-Band Communications Coil Kit and "H" type condenser. Type DA1 is a standard dual-wave dial for use with R.C.S. coils and "F" type condenser. The DA-5 dial is for use on the 1600 to 550 k.c. and 13.7 to 40 metre bands, with "H" type condenser. All this series is edge-lit and wedge-driven. Aperture for the escutcheon is approximately 7" x 4-7/8."

DA1—Standard D/W Dial, "F" condenser	22/6
DA2—Communications Dial	22/6
DA-5—13.7 to 40 metres D/W condenser	22/6
DA-6 Mantel Set Dial, D/W "H" gang	18/9
DA-7 Portable Kit Dial D/W "H" gang	9/-
DA-8 Same as DA-7 but ready assembled	13/6

R.C.S. COILS FEATURE THE UNIQUE TROLITUL METHOD OF CONSTRUCTION

R.C.S. PERM. TUNED I.F.'s

The new R.C.S. permeability tuned I.F.'s are wound on special Trolitul formers into which are inserted the adjustable iron cores. These R.C.S. permeability-tuned I.F.'s are the most dependable and efficient I.F.'s it it possible to produce. They should be used wenever the optimum in results is required.

When three I.F.'s are used:

IF164 1st	13/9
IF164 2nd	13/9
IF163 3rd	13/9
465 K.C. I.F.'s	
IF166 1st	7/6
IF167 2nd	7/6
Air Core 175 K.C.	
1E68 1st	7/6
1E69 2nd	7/6
IF162	
465 K.C. I.F.'s	

When two I.F.'s are used:

IF162 1st	13/9
IF163 2nd	13/9

R.C.S, Products Are Obtainable Only Through These Distributors:

SYDNEY: Bloch & Gerber — Martin de Launay — Fox & MacGillycuddy — Lawrence & Hanson Electrical — John Martin — Radio Equipment — Radio House — United Radio Distributors — Homecrafts Ltd.
ADELAIDE: Gerard & Goodman — A. G. Healing—Newton, McLaren Ltd.
BRISBANE: Chandler's — Trackson's — Homecrafts.
TASMANIA: W. & G. Genders, Launceston — W. & G. Genders, Hobart — W. & G. Genders, Burnie.
MELBOURNE: A. J. Vealls—Homecrafts — Hartley's.
WEST AUSTRALIA: Carlyle & Co., Perth

DO NOT WRITE DIRECT TO —

R.C.S. RADIO PTY. LTD., *SYDNEY N.S.W.*

INTER. SWITCH FOR FIDELITY

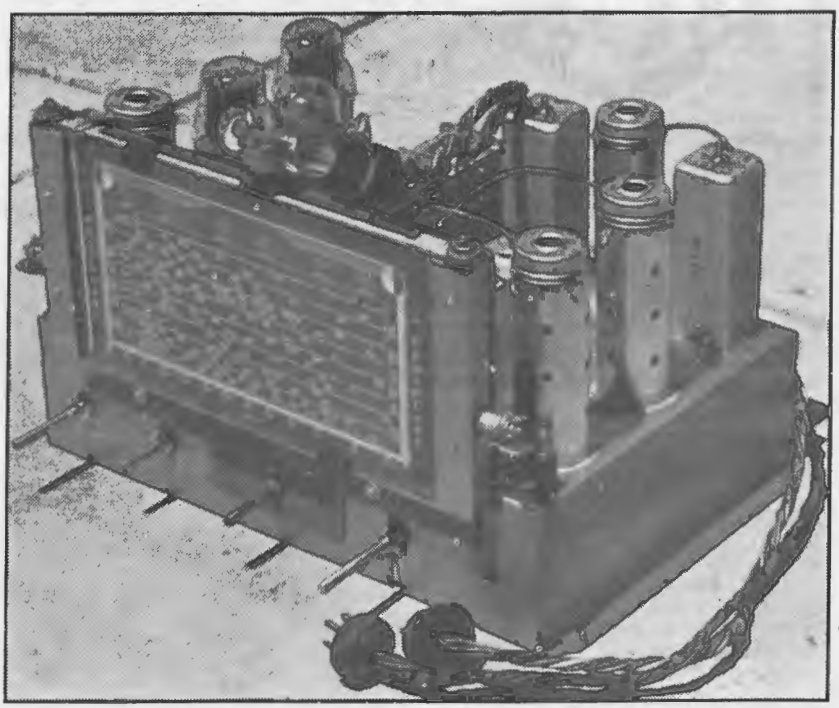
FURTHER DETAILS OF A SUPER-QUALITY DUAL-WAVE DESIGN

IN last month's issue we gave details of the audio end of a particularly fine receiver design, which we came across recently in Melbourne

Designed by a prominent dentist, whose hobby is the scientific study of radio, this receiver embodies a happy combination of the orthodox and the novel.

As promised, we now offer the circuit of the tuner end of this receiver together with photographs to reveal the layout and general arrangement.

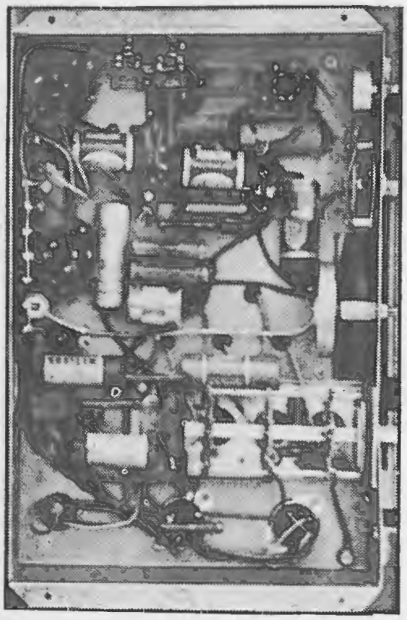
At the moment there is a shortage of certain components, but we do not think that the fact will in any way detract from the interest in this article, as a great many of the components required are to be found in existing sets, meaning that with a bit of work and only a few extra components it will become possible to convert an ordinary set into a really hot-stuff one like this job.



A photograph of the tuner and amplifier. The power unit is built on to the speaker base as shown in the October issue.

The Amplifier.

As detailed in last month's issue, the audio end of the set has been designed by a man who has devoted a lot of time to the pursuit of realism in record reproduction. The tuner has been added to give the set greater scope and has been designed so that the fullest benefit of high gain can be obtained for the reception of overseas short-wave stations, yet by the throw of a switch the intermediate stage is eliminated, the selectivity broadened and reception from the local stations becomes well-nigh ideal.



A view of the underside, showing the wiring.

The main feature of the amplifier is the use of a resistance-coupled push-pull arrangement with inverse feedback.

Normally inverse feedback is used only with beam power valves to try and do something about cutting down the harmonic distortion which would otherwise make itself objectionable. In this amplifier inverse feedback is fitted, although by no means essential. Normally an amplifier of this type would be considered near enough to perfect without the use of feedback. It has been fitted so that the last fraction of harmonic distortion is removed, and at the same time the frequency response is flattened to a perfect characteristic.

The addition of the inverse feedback means that the overall gain of the audio end is cut back a bit, but this is not a factor worth worrying about, as there is still ample audio gain left for all practical purposes. On radio there is sufficient gain for effective short-wave reception and on pick-up there is sufficient to allow the full power capabilities of the amplifier to be rendered from the normal output of the average gramophone pick-up.

However, so much for the amplifier. Those who want to read the full details of the design and the reasons for the particular choice of valve types can read the designer's story in last month's issue. Now for the tuner.

Receiver Design by

H. W. L. HUNT,

Mont Albert, Vic.

The Tuner

In the words of the designer: "The tuning portion consists of dual-wave kit with an r.f. stage. The circuit is quite orthodox and any of the popular types of coil units are suitable. An R.C.S. unit was fitted in the original, but the circuit arrangement is quite suitable for other brands of units, such as the Crown, Radiokes and Brittanic lines. Although there may be some

(Continued on next page)

DUAL-WAVE SET

(Continued from page 5)

difficulty in buying coil kits of this type at the moment there must be hundreds of them about in good condition.

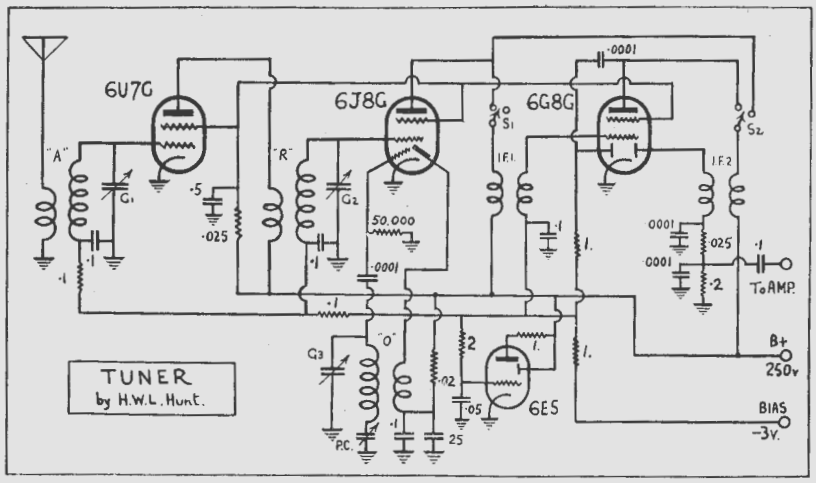
Although orthodox, the circuit embodies one or two refinements which are worthy of comment. A tuning indicator is included in the circuit, and has been arranged with an audio filter in the grid circuit, consisting of a 2 megohm resistor and a capacity of .05 microfarads.

Bias Arrangement

Bias for the r.f. stages and for the proper operation of the delayed automatic volume control system is obtained by picking off a steady bias voltage of three or four volts from the main biassing resistor of the original amplifier. Instead of the 345 ohm resistor shown in the circuit diagram as published, this resistance is made up of two separate resistors, one of 320 ohms and the other 25 ohms. The 25 ohm resistor is fitted on the "earth" side, and a lead taken away from the junction of the two resistors. This provides a steady potential of three or four volts negative, or thereabouts, and it is taken up to the tuner end of the set for the biassing all the valves up there."

The Detector

Since the audio and tuner portions of the set are both designed for super-quality reception it is only reasonable to find that the detector circuit design has received especial attention by Mr. Hunt, who says: "The diode load consists of two resistors with low value by-pass condensers. The 25,000 ohm resistor acts as an r.f. filter, and at the junction with the 200,000 ohm resistor, the audio output is taken and fed to the amplifier through a suitable coupling condenser. The value of the diode load resistors is kept low, so that the a.c. loading of the volume control is approximately five times the value of the load resistances, thereby very considerably lowering the distortion due to the a.c. loading of the diode detector.



Schematic diagram of the tuner portion of the super-quality dual-wave receiver.

Incidentally, the .5 megohm volume control shown for the amplifier in last month's issue should be replaced with one of 1 megohm resistance when the amplifier is used with a diode detector as mentioned above."

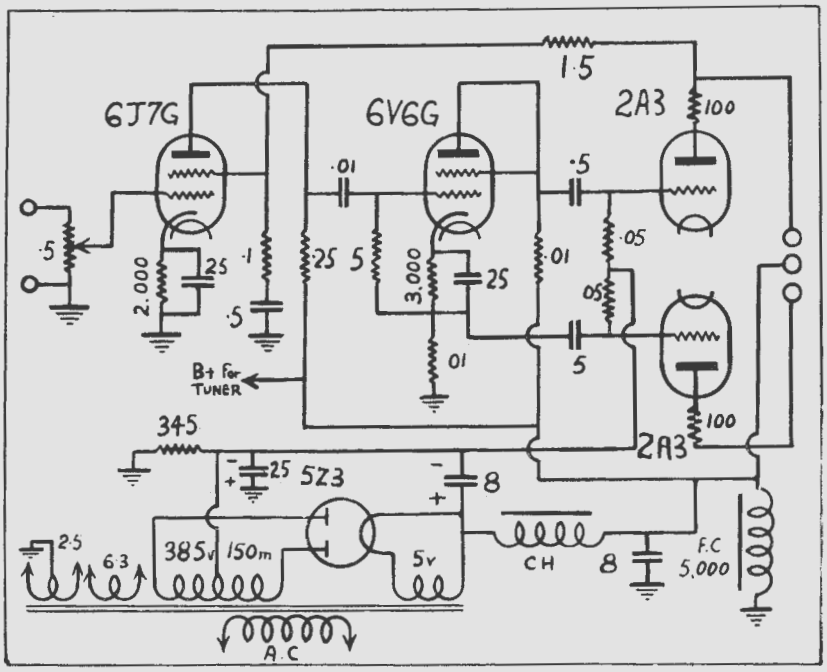
The Local Station Switch

Compared with DX reception of either distant broadcasting stations, or overseas short-wave stations, there are quite different conditions pertaining to the reception of local broadcasting stations, especiallly when super-quality reproduction is to be attained. As Mr. Hunt put it: "The signal strength is much greater so that less amplification is required, yet it is not efficient to over-control the gain of the individual valves. The local stations being well spread across the band, the matter of extreme selectivity is not important, so that we have an opportunity of attempting to obtain a degree of high fidelity according to the hi-fi quality existing in the actual transmission being received, which may or may not be evident by its absence, according to the station being tuned, the particular mike or pick-up they are using, and, of course, the quality of the recording or the artist or orchestra!

Obtaining high fidelity in the tuning is mainly a matter of having the tuning broad enough to ensure that the higher audio frequencies will not be attenuated in the i.f. channel, whether this be due to side-band cutting, as normally accepted, or for reasons "a la Straede."

The point is, however, that by fitting a switching system as shown in the circuit diagram, we achieve a happy solution to all the problems listed above. The gain is cut down nicely, selectivity is broadened to a convenient degree and there seems to be not the slightest reason why the scheme

(Continued on page 26)



Circuit of the audio end and the power supply. Two resistors are required to make up the 345 ohm bias resistor, as detailed in the article.

AUSSIE NEWS FOR U.S. LISTENERS

IN Sydney, to keep U.S, listeners abreast of events in the South-West Pacific:—

Columbia Broadcasting System has William J. Dunn.

Mutual Broadcasting System has Frank J. Cuhel.

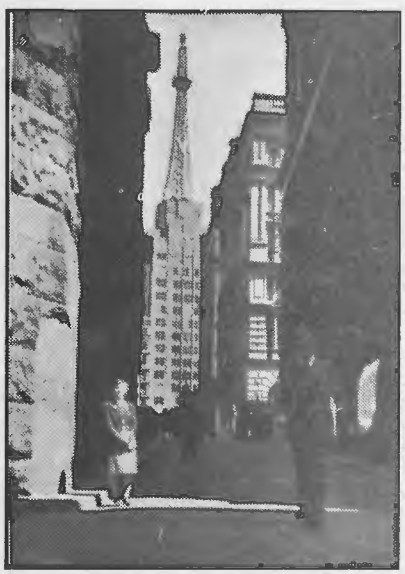
National Broadcasting Company has Sydney Albright and George Folster.

Together they hold their home audiences for 130 minutes a week through the use of the three major networks, which, according to investigation, means that war news from the Anzac Area is taken by 40,000,000 Americans each day, each week.

World Round-up

As part of the world news round-up put on the American air for 15 minutes morning and evening, at the peak listening periods (7.30 p.m. and 7.45 a.m. U.S time), Sydney enters the news spotlight in company with Ankara, London, Honolulu, Wellington, Iceland and points in South America. Three minutes is the usual time allotment to each correspondent. Whether he goes on the air or not depends upon what he has to contribute to knowledge of world events.

The value to Australia of this participation in American radio cannot be assessed yet, for it is making our cousins across the Pacific mindful of Australia as never before. It must influence business men to invest, and settlers to come here as never before —once the Japs have been crushed.



From a little room under that tall lattice-work A.W.A. tower, the Correspondents of America's three chief radio networks keep our trans-Pacific allies abreast of war in the Anzac area.

Directly George Folster hears 'Go ahead' from San Francisco in his earphone, he flicks the switch which opens his microphone into the Columbia-Maine N.B.C. Network.

We can, however, estimate what it would cost Australia in peace-time to sponsor 130 minutes a week on the U.S. air. At current network advertising rates this amounts to £15,000 for time only!

When William Dunn signs on as from Australia, or when Frank Cuhel signs off of as from Australia—that is the finest indirect advertising. The war news is the holding medium which in peace-time presumably would be drama or music, or talks.

Groundwork in Sydney

George Folster, who partners Sydney Albright for N.B.C., prepared the groundwork for his fellow correspondents. The P.M.G.'s Department, and A.W.A., arranged transmitting and studio facilities in Sydney.

The code letters N.B.C for America's great network—National Broadcasting Company—can give the impression to anyone not used to American radio that it possessed a set-up similar to our own A.B.C. This is not the case. All radio stations in the U.S. are privately owned and privately operated. There are no two grades—"A" class and "B" class stations, as here.

Therefore, what is brought over the American air to the Americans is voluntarily offered to their ears as part of a high class service which American commercial stations render their listeners in a high degree of competition and in unending lust to serve.

From a studio under that tall laticework A.W.A. tower, which rises high above Sydney, morning and night, word goes to American listeners. Our engineers have found working smooth, due to the split-second efficiency of the U.S. networks. A week ahead cables convey allocations to correspondents, timed even to a second.

As example:—

"Dunn to C.B.S. September 27, 130125-130344."

This acceptance time by San Francicsco, being sent in G.M.T., was converted to our daylight saving time—thus: "Dunn to C.B.S., September 28, 000125-000344."

Deciphered, it means that Dunn went to the short-wave microphone in Sydney for a newscast to San Francisco at one minute, twentyfive seconds after midnight on Sunday, September 27, and went off the air at three minutes fourty-four seconds on Monday morning, September 28. Nothing slipshod in this system!

Standard Time

Greenwich time is used throughout the world by U.S. stations so as to standardise when far distant microphones are to be opened. Stations convert G.M.T. to local time for home operation, but as radio waves travel at 186,000 miles a second, there is, of course, no allowance for lag. The newscaster prepares his script, by a special stop-clock, which A.W.A. pro-

(Continued on next page)

Supplies are limited
but we will endeavour to supply essential requirements

Eighty-five Per Cent
of our production is now devoted to war needs.

Representations include
the BRITTANIC range of radio parts

Victorian Distributors of
Marquis Moulded Products

I.F's Coils, Kits, in the
Complete AEGIS range

Cabinets, the proved
"Western" make.

Equipment for
UNIVERSITY TESTS
Oscillators, Voltohmeters

Look After the future NOW

INVEST IN WAR SAVINGS CERTIFICATES

J. H. MAGRATH PTY. LTD.

208 LITTLE LONSDALE STREET, MELBOURNE, C.1.

Phones:
Cent. 3688
Cent. 4414

AUSSIE NEWS

(Continued from page 7)

vides to occupy exactly the time allotted. He sits in the studio wearing headphones, through which he hears San Francisco's "go ahead." When that is heard he starts the stop-clock and to speak simultaneously. Watching this towards the end of the period, he adjusts his speed so that he finishes in time to halt the stop-clock to the second when it should. Since 200 stations at a time take news or comments from Sydney, there has to be merciless finality in this cutting off, for overtime is unthinkable on the U.S. air.

From A.W.A. studio the voice goes through the control panel where an operator watches the needles and adjusts the voice to the correct level. At the same time, he listens to the voice, from a loud-speaker beside the panel, and makes further adjustments to bring out the quality.

From A.W.A. a landline takes the product to the P.M.G.'s local test office where it is brought to the right level for transmission. Thence it is again landlined to the transmitter.

When San Francisco receives the voice it is landlined to the transmitters of the coast-to-coast network. In every circuit there is inherent noise and the volume of the signal, such as the human voice, which is imposed. By combining these two factors the U.S. network terminal studio engineers decide the numerical reception scale, which they report, eventually, to A.W.A.

Reception clarity is classified thus:

1 means no reception.

2 means bad reception.

3 means fair reception.

4 means good reception.

5 means excellent reception.

+ means better than the clarity it qualifies.

Thus, 4+ means between good and excellent.

For private radiophone conversations which, of course, is the same technical set-up as the War Correspondents, an ordinary subscriber's telephone set is used. But to develop the clarity and high quality necessary for rebroadcasting in the U.S., A.W.A. has installed a special microphone to enable listeners across the Pacific to obtain maximum results from their correspondents in Australia. The P.M.G.'s Department, being in control of the whole box and dice of International radiophone and short-wave facilities, allocates circuits to correspondents.

INTERESTING IDEAS IN CIRCUITS

Boosting Superhet

Many small superheterodynes,, especially those without an intermediate frequency stage, are somewhat lacking in gain. This means that reception of all local stations may be difficult if the set is used out of the metropolitan area, and if the aerial is on the short side.

To overcome this lack of sensitivity, a small amount of reaction (or positive feedback) may be applied to the converter valve, the I.F. valve (if any) or the second detector,

Reaction on the converter valve is usually very efficient in improving image rejection, but makes alignment more difficult.

The easiest way of applying reaction, if there is an I.F. stage, is to couple the anodes of the converter and I.F. valves by a small capacity condenser, such as a "Gimmick" (an insulated wire with each end wrapped once or twice around each anode lead).

Don't overdo the capacity coupling or you'll have a really nasty whistle on each side of every station. If the gimmick coupling condenser is too large, even with only one turn at each end, twist the middle section of the insulated wire two or three times around an earth wire, thus bypassing part of the feedback signal.

Short-wave enthusiasts may find this tip of great help, but remember not to overdo it. A small amount of realignment may be necessary and after re-aligning, it may be found that the reaction can be reduced somewhat.

Reaction on the second detector (unless a diode) can be obtained in a similar way, although a better result can be obtained by using a special I.F. transformer with a third (reaction) winding of about a dozen turns.

Improved Overload

Almost every amplifier is driven right to the limit on the loud peaks and the performance of the amplifier on these peaks is of the greatest importance. There are several ways of making the distortion on overload more bearable, and these are discussed here.

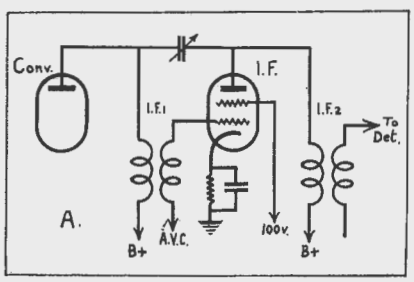
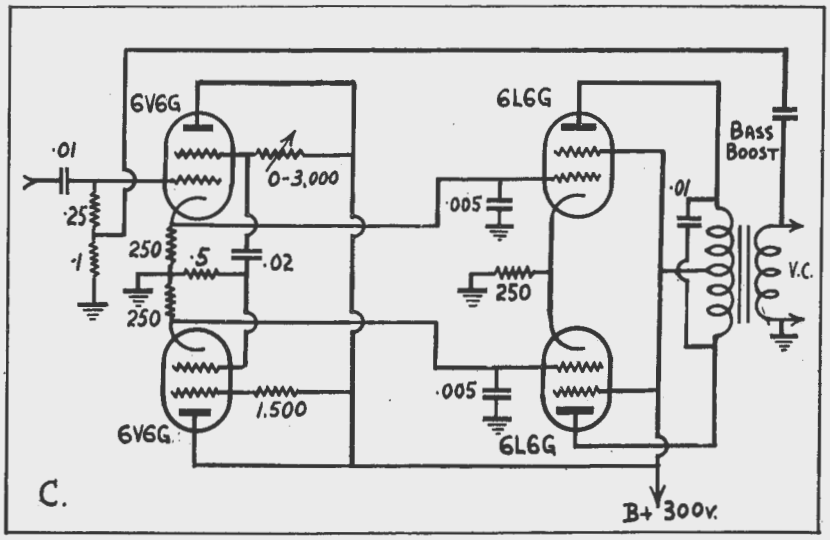


Diagram showing how to increase the range of a superhet by fitting reaction to the intermediate stage.



Circuit for Class AB2 operation without the use of a special input transformer.

IN THIS ISSUE:

- (a) **Boosting Superhet by reaction.**
- (b) **Improving overload characteristics**
- (c) **Class AB2 operation without a transformer.**
- (d) **Using Cathode ray tuning indicator.**

Grid current distortion, due to the complexity it introduces into the wave form is probably the worst, and its elimination will be considered first,

There are two way of dealing with it: firstly, the bias can be slightly increased, although this means distortion due to the valve being driven beyond cut-off. However, that is not quite so bad, especially in push-pul. output stages. Secondly: The grid circuit of the output tube can be fitted with a "stopper" of about 100,000 ohms so that any grid current produces a negative grid voltage tending to prevent grid current.

All types of wave form distortion can be reduced by using inverse feedback and by restricting the frequency response.

Inverse feedback means the feeding back from the output to the input, a small fraction of the output signal so as to oppose the input signal. This "inverse" or "negative" feedback reduces the gain, but it reduces the distortion at the same time. Various ways of obtaining inverse feedback have been shown in this series of articles from time to time, so they will not be listed here. In the circuit, there is given a very simple and effective method.

Restricted frequency response allows more effective power output for two reasons—it reduces the load on the output stage by reducing the the amount of work it has to do, i.e., by eliminating some of the almost inaudible lows and some of the highs (which contain much of any distortion produced)—secondly a restricted frequency response reduces the possibilities of combination tones and cross-modulation, which are the real sources of distasteful distortion. The circuit accompanying this article shows how the very very lows and the very very highs have been reduced so that a balanced response is still obtained. This is particularly useful in record reproduction.

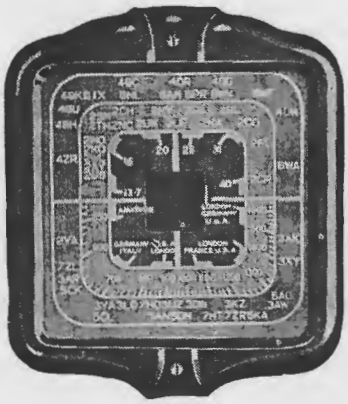
By

J. W. STRAEDE, B.Sc., A.M.I.R.E.

7 Adeline Street, Preston, Vic.

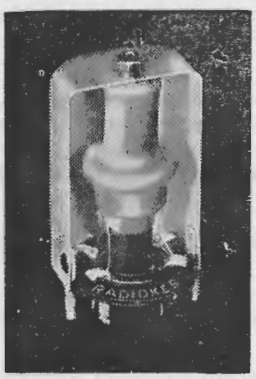
(Continued on next page)

With Radio Components becoming increasingly difficult to secure, it is now more important than ever to select the finest equipment the trade has to offer. And that means RADIOKES COILS and DIALS. Even if your usual retailer cannot supply at once, these precision-built products are well worth waiting for.



Type DWD-9 DIAL 9/-

3" x 3" Walnut Escutcheon



RADIOKES BROADCAST COIL

Radiokes Broadcast Coil, trolitul rigid construction available in air-cored and permeability types. Types A.C.B., Aer., R.F. or Osc.

List Price, 6/6

AVAILABLE FROM ALL LEADING STORES

RADIOKES Pty. Ltd.

P.O. Box 90

BROADWAY - - - SYDNEY

IDEAS IN CIRCUITS

(Continued from page 9)

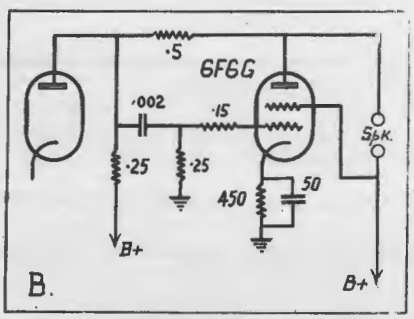
Transformers AB2 Operation

Once upon a time push-pull operation of output valves could only be obtained by using a transformer with a centre-tapped secondary.

The came the use of phase inverter and phase-splitter valves, so that resistance capacity coupling could eb used for valves working in class A1, or ciass AB1,(the numerical suffix indicates that there is no flow of grid current). The replacement of the transformer by a valve led to improved fidelity at lower cost.

However, when AB2 operation was desired (to obtain greater power), the resistance coupling was of no use, as AB2 operation demands a low impedance in the gird circuit. The reason for this is that the flow of grid current across this impedance, or resistance, develops a negative grid voltage changing the grid bias away from the optimum value.

The problem is to obtain push-pull coupling by valves without introducing a high impedance into the circuit and is solved by using a pair of driver valves and cathode coupling them to the output tubes. To save using a further valve as phase-changer, the driver tubes can be tetrodes and one valve can be driven from the screen of the other (this has been discussed in a past issue of "Ideas in Circuits."



Circuit of normal audio end, but with changed component values to give improved overload characteristics.

The grids of the output tubes are positive with respect to the chassis by the voltage at the cathodes of the drivers and this is compensated for by giving the output tube cathodes a positive voltage equal to this voltage together with the correct bias voltage.

Improved balance is obtained by not bypassing the common bias resistor for the output tubes and distortion is decreased by the application of inverse feedback from the voice coil to the first driver valve. With self-bias, the output is limited, but is greater with AB2 than with AB1 operation.

C.R. Tuning Indicator

Sets of high selectivity require accurate tuning for best tonal quality. Slight detuning means a reduction in the bass response and an increase in the harmonic content of the higher notes.

To make accurate tuning possible in selective receivers, it is common to connect a cathode-ray tuning indicator or "magic eye" tube so that the operator knows when the tuning is correct.

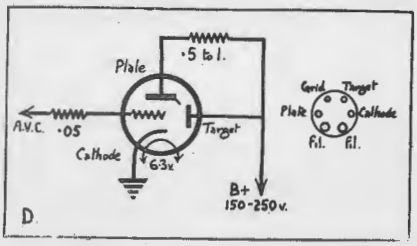


Diagram of the connections for a cathode-ray tuning indicator (magic eye).

Examples of tuning indicator tubes are the 6E5, 6G5 and 6U5. Each consists of a small triode directly coupled to one element of a miniature cathode ray tube in the top of the bulb. The target of the cathode ray tube is positively charged (so that it will attract the negative electrons from the cathode) and is coated with a material that produces a green fluorescence when bombarded by the electrons. The area of the target bombarded is controlled by a small electrode connected to the anode of the triode. This electrode is positive with respect to the cathode, but negative with respect to the anode.

In connecting the tube, the cathode may be earthed, the target connected to the high-tension supply, the triode anode connected to the h.t. supply via a ½-megohm resistor and the input grid connected to the A.V.C. line. The voltage of the latter varies with signal strength. This variation is amplified by the triode and indicated on the target.

The circuit shown is a very simple one—more complex ones are sometimes used, to obtain increased sensitivity.

ADDED RANGE FOR BATTERY SETS

How to embody a simple reflex arrangement to boost the signal strength.

AN interesting little circuit arrangement came to light in the Query Service the other day, being sent in by a reader in Queensland who built it up a couple of years ago and is obtaining splendid results with it.

The idea seems to be applicable to almost any two valve set using a pentode output valve. We know that there must be thousands of these sets amongst our readers and in every case it should be well worth trying this little stunt, as the only extra parts required are a couple of mica condensers and one grid leak. In every case the value is not critical.

The Scheme.

In a nutshell, the idea is to use the output pentode as an amplifier for the original signal as received from the aerial, as well as an audio amplifier in the ordinary way.

The input to the grid of the output pentode from the aerial lead-in is not tuned, but the normal type of tuning circuit gives a certain amount of selectivity.

The output valve, when of the pentode type, makes a fairly good r.f. amplifier, so that the circuit should give a considerably better performance than the normal two-valver.

Operation.

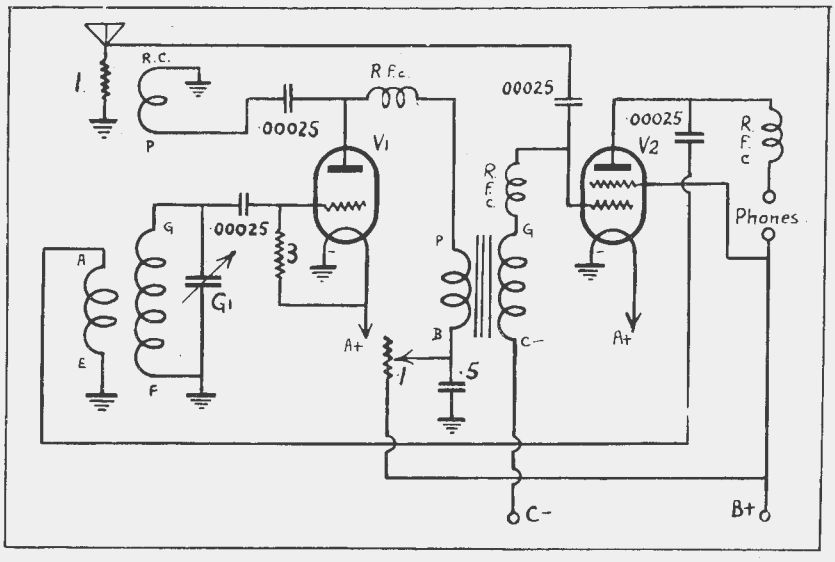
The circuit is easy to get into operation as the first step is to obtain normal results with the circuit arranged in the conventional way with the aerial on to the aerial coil winding. When the set is operating properly the aerial is then switched to the grid of the output valve and the aerial coil winding connected up to the plate through the mica condenser. The r.f. chokes are then inserted in the proper positions to keep the r.f. out of the audio transformer and out of the speaker windings, and divert it back to the detector circuit.

Oscillation

As is to be expected with any high-gain circuit, and especially one with reflexing, there is every possibility of instability being encountered. In a bad case this might mean that the set will burst into a squeal before even normal gain can be obtained. Such troubles, however, should be fairly easy to cure and when the cure has been effected, the improvement in performance should be well worth while. Lay-out can be expected to be a big factor in getting stability. The lead which carries the r.f. back from the plate of the output valve to the coil will need to be kept clear of the aerial lead-in and the audio transformer, in fact, clear of all the wiring associated with the grid circuit.

The r.f. chokes will need to be kept well apart, with a spacing between them of at least three inches.

The audio transformer will need to be kept well clear of the coil and of the r.f. chokes, as otherwise r.f. may be picked up inductively and thereby complete the feedback circuit necessary to spoil performance by making regeneration uncontrollable.



The output pentode of almost any battery set can be used to amplify the signal before it is applied to the aerial coil, as shown in this diagram.

Application.

The idea can be applied to practically any circuit where a pentode output valve is used, in fact it might even be possible to apply it to a big superhet. The thought opens up a wide field for experiments. The whole secret of success with the scheme is to keep the r.f. signal confined to the output valve by using effective r.f. chokes to give the necessary isolation.

The r.f. chokes will need to be effective over a wide range of signal frequencies, since there is no tuning associated with the aerial circuit. Consequently the output pentode will be called up to amplify every signal received by the aerial. It might be expected that this extra work for the output valve might detract from its ability to handle full audio power. This may be so to a certain degree, but the effect is not serious. Even with 90 volts high tension it is to be expected that sufficient power will still be available for satisfactory speaker results.

Performance.

With this circuit operating properly it would be reasonable to expect a considerable gain in sensitivity, thereby giving the set extra range. On the other hand the selectivity would not be improved, in fact it might be even below normal. Therefore the suggestion should appeal mostly to the distant listener whose nearest station is at least twenty miles away.

RADIO ENGINEERS' EXAMINATION

The Institution of Radio Engineers (Australia) will be holding its half-yearly examination for admission to the Associate Member and Graduate grades, and the Radio Service Technicians examination for the Service Division of the Institution, on Saturday, February 6, 1943.

Intending candidates are invited to apply to the Head Office, The Institution of Radio Engineers (Australia) Box 3120, G.P.O., Sydney.


Wireless alone can meet the exacting needs of communication for Mobile Units...
INSTANT ★ CONSTANT CERTAIN
AUSTRALIAN-MADE
RADIOTRON
RADIO VALVES

A DICTIONARY OF RADIO TERMS

A.C.—Alternating Current. An electric current rapidly changing in direction and strength.

ACCUMULATOR.—A device for storing electricity. The most common type consists of a glass or composition contoiner in which is fitted two sets of plates immersed in a dilute sulphuric acid called the electrolyte.

ADAPTER, S.W.—A set designed to receive short wave stations and connect to a broadcast receiver for further audio amplification.

AEO LIGHT.—A lamp used for the recording of sound on motion picture films.

AERIAL—A conductor used for the transmission and reception of wireless waves. The golden rule to follow being to have the aerial as high and as clear of all earthed objects as possibe. An overall length of 70 feet may be considered ample for modern receivers.

AERIAL, INVERTED L—This type of aerial consists of a flat top portion with a vertical lead in from one end.

AERIAL T—This is similar to above, but with the lead in brought down from the centre.

AERIAL UMBRELLA—This type consists of a centre support with wires extending radially from it, thus giving an umbrella-like appearance.

AERIAL LOOP—This consists of one or more turns of wire wound on a frame, which may be rotated, as this type is decidedly directional.

AMMETER—An instrument for measuring in amperes the flow of current in a circuit.

ALTERNATOR—A mochine designed for the production of alternating current.

AMPERE—The standard unit used in measurring of an electric current and is the current which will flow through a resistance of 1 ohm at a pressure of 1 volt.

AMPERE HOUR—This is the quantity of electricity which passes when a current of one ampere flows for one hour. The capacity af an accumulator is generally stated in this unit and is found by multiplying the rate of discharge in amps by the number of hours for which it is delivered.

AMPLIFICATION FACTOR—The ratio between the change in plate voltage to change in grid voltage for a given value of plate current

AMPLIFIER, AUDIO—The stages following the detector in a receiver to enable the audio signal to be amplified sufficiently to operate the speaker.

AMPLIFIER, RADIO FREQUENCY—The stages in a set designed to amplify the incoming R.F. signal before detection.

AMPLIFIER, CLASS A—An amplifier whose plate output waveform is the same as that of the applied grid voltage is termed class A, Tubes used for such work are biased so that the signal voltage is applied to the centre of the flat portion of the tube's characteristic curve, plate current flowing throughout the entire cycle.

AMPLIFIER CLASS B—An amplifier in which the grid bias is equal to cut-off value so that with no signal applied to the grid the plate current is zero or nearly so, is called class "B". For audio purposes two tubes must be used in push pull, the tubes operating for alternate half-cycles.

AMPLIFIER, CLASS C—An amplifier in which the grid bias is considerably in excess of cut-off value, passibly two to four times. This, however, is useful mainly in transmitting apparatus as it allows the tubes to be aperated very efficiently, but due to the distorted waveform is useless for audio purposes.

ANODE—The plate of a vacuum tube. In a cell the electrode from which the electricity enters the electrolyte.

ANTENNA—See Aerial.

APERIODIC—A non-resonant circuit.

ATMOSPHERICS—Noises heard in the receiver due to electrical discharges in the atmosphere.

ATOM—Smallest particles of chemical elements, believed to consist of a nucleus with a positive electrical charge round which revolves one or more negative electrons.

ATTENUATION—The reduction in power at a wave or a current with increasing distance from the source of transmission.

AUDIO FREQUENCY—A frequency corresponding to a normally audible sound wave. The upper limit ordinarily lies between 10,000 and 20,000 cycles.

AUDIO-FREQUENCY TRANSFORMER — A transformer for use with audio-frequency currents.

AUTODYNE RECEPTION—A system of heterodyne reception through the use of a device which is both an oscillator and a detector.

AUTODYNE—A heterodyne circuit in which one valve acts as both oscillator and mixer.

AUTOMATIC FREQUENCY CONTROL — A device which causes a circuit to be automatically tuned correctly after the manual control has been tuned to approximately the correct frequency.

AUTOMATIC VOLUME CONTROL—A method of automatically biasing the grids of the R.F. stages of a receiver thus tending to keep down strong signals and bring up weak signals to a predetermined level.

AUTOMATIC VOLUME CONTROL—A self-acting device which maintains the output constant within relatively narrow limits while the input voltage varies over a wide range.

A.W.G.—American wire gauge.

BAFFLE—A partition of wood or non-resonant material placed in front of a speaker to prevent the law frequency sound waves from getting to the back of the speaker and causing a loss of low notes.

BARRETTER—A borretter or ballast tube is simply a resistance in the form of a lamp used in certain types af receivers to break down excess voltage.

BAKELITE—An insulating material used for panels, etc., in radio construction.

BAND PASS FILTER—A filter designed to pass a certain band of frequencies and to attenuate all frequencies outside of this band. As far as receivers are concerned, this is used to enhance selectivity as resonance is sharply defined in circuits of this type.

BAND SPREAD TUNING—This method of tuning is used an short wave receivers and generally consists of the normal tuning or in this case band setting condenser across which is connected a much smaller capacity variable condenser. Thus any particular bond may be selected by using the large condenser and then this is spread out by use of the smaller condenser. It will thus been seen that a dozen stations that normally occupy a few degrees of the dial can be spread right round the dial, thus making the tuning much more easy.

BATTERY 'A'—A low-voltage battery usually 1½ to 6 volts, depending on the valves used, which is employed to heat the valve filament.

BATTERY "B" — A high voltage battery which may be anything from about 22½ to 180 volts, depending an the tvpe of set, which is used to supply the plate and screen potentials to the valves.

BATTERY "C"—A battery used for the purpose of supplying a negative potential to the grid of the valve thus ensuring its correct operating condition and keeping the plate current down to its correct value.

BEAT—A complete cycle of pulsations in the phenomenon of beating.

BEAT FREQUENCY—The number of beats per second, This frequency is equal to the difference between the frequencies of the combining waves.

BEAT FREQUENCY — The resultant frequency when one frequency beats with or heterodynes another, the beat frequency being the difference between the two.

BEATING—A phenomenon in which two or more periodic quantities of different frequencies react to produce a resultant having pulsations of amplitude.

BIAS—Potential applied to the control grid of the valve. This may either be battery bias, which was almost universally used a few years ago, or self bias or cathode bias, which is in common use today in electric sets.

BROADCAST BAND—Generally taken to be those bands of frequencies between 550 and 1500 kilocycles.

BROADCASTING — Radio transmission intended for general reception,

BUSBAR—Copper wire used in radio construction

BORNITE—A sulphide of copper and iron, crystals of which are used as detectors.

BUZZER—A device which produces a buzz due to high frequency interruption of current through the coil.

BY-PASS CONDENSER—A condenser used to provide an alternating-current path of comparatively low impedance around some circuit element.

CAPACITY—Measure of the quantity of electricity a condenser will store up, this being determined by the area of the condenser plates, the distance between them and the nature of the dielectric, that is the type of material separating the plates.

CAPACITIVE COUPLING — The association of one circuit with another by means of capacity common or mutual to both.

CAPACITY DISTRIBUTED—The capacity existing between adjacent turns of a coil. At low frequencies this effect need not be considered, however, at high frequencies it may have detrimental effects. It is therefare advisable not to "dope", that is, use ony form of cement to keep the turns of the coil in place as this tends to increase the capacity effect.

CAPACITY HAND—Effect due to closeness of the hand to the tuning condenser affecting the tuning to a considerable degree, due mainly to the earthing of the wrong set of condenser plates, that is the stator instead of the rotor plates.

CAPACITY INTERLECTRODE — Capacity existing between the various elements of a volve due to the closeness of the electrodes.

CARRIER WAVE—High frequency electro magnetic waves radiated from the aerial of a transmitter. In broadcasting, these high frequency waves have the audio signal superimposed an them.

CATHODE—In a radio valve the element which emits electrons.

CATHODE RAY TUBE—A tube with a screen on which it is possible to make visible electrical wave forms. Fundamentally this consists of a fluorescent screen ot the end of the tube, a thin stream of high velocity electrons which strike against the screen causing it to glow at the paint of striking and a means af deflecting the stream af electrons in any direction. Thus by appilying an oscillating voltage to the deflecting electrodes the ray traces a visible pattern on the screen of the tube of the applied electrical voltages.

CIRCUIT BREAKER—A device designed to break a circuit should the current rise above a predetermined level.

CHATTERTON'S COMPOUND—A plastic insulating material consisting of tar, gutta percha and resin.

CHOKE AUDIO—A coil wound usually on an iron core, designed to impede the passage of audio currents.

CHOKE R.F.—A coil wound generally on some non-magnetic material and designed to impede radio frequency currents.

COIL—A number of turns of wire.

COIL HUM BUCKING—An additional coil usually wound over the field of an electrodynamic speaker to neutralise hum effects.

CONDENSER—Fundamentally two or more metal plates separated by an insulator.

CONDENSER, BLOCKING — A condenser, usually fixed designed to pass audio or radio frequency currents but to block the passage of direct current.

CONDENSER, ELECTROLYTIC—A condenser consisting of one plate of aluminium, the electrolyte (usually a borax solution) being the other plate, a thin insulating film which

(Continued on next page)

RADIO DICTIONARY

(Continued from page 13)

is formed in operation being the dielectric. Electrolytic condensers are used extensivly in modern receivers both as filter condensers in the power supply and audio by-pass condensers in cathode biased tubes. Having the advantage of being extremely compact for a given capacity, the wet electrolyitc condensers has also an additional advantage of being self-healing, that is, should the condenser break down due to an overload, the punctured dielectric will heal itself when normal conditions are restored. Dry type electrolytics do not have this advantage and must be replaced should they break down. Care must be taken with this type of condenser to see that it is properly connected as it possesses definite positive and negative terminals. If these connections are reversed the condenser will be damaged. As the condenser is polarised in this way it will be seen that this type of condenser cannot be used in A.C. circuits, but only in D.C. or pulsating D.C. circuits.

CONDENSER BY-PASS—A condenser used to by-pass audio or radio frequency currents, thus tending to keep them out of parts of the circuit where they are not required or cause instability.

CONDENSER, FIXED—Any condenser the capacity of which cannot be varied.

CONDENSERS, GANGED—Variable condensers so arranged that the moving plates or vanes of all may be rotated from one control. In modern receivers 2 and 3 gang condensers are most commonly used. The older type sets of the T.R.F. type using 4 and even 5 gang condensers.

CONDENSER AND LOUD SPEAKER—A loud speaker in which the mechanical forces result from electrostatic reactions.

CONDENSER, NEUTRALISING — A small variable condenser used in the R.F. circuit of certain sets to neutralise or balance out the capacity existing between the elements of the valve and thus helping to make the operation of the set more stable,

CONDENSER, VARIABLE—A condenser the capacity of which may be varied.

CONDUCTANCE—A measure of the ease with which an electric current may flow through a circuit. Unit of conductance is the MHO.

CONDUCTOR—Any material through which current may pass. Silver, copper and gold in that order are the best conductors—owing to its relative cheapness, however, copper is used most extensively.

CONTINUOUS WAVES—Continuous waves ore waves in which successive cycles are identical under steady state conditions.

CONVERSION TRANSCONDUCTANCE is the ratio of the magnitude of a single beat-frequency component (f1 ± f2 or (f1 — f2) of the output current to the magnitude of the input voltage of frequency f1 under the conditions that all direct voltages and the magnitude of the second input alternating voltage f2 must remain constant. As most precisely used, it refers to an infinitesimal magnitude of the voltage of frequency f1.

CONVERTER, S.W.—Generally a single tube receiver the output of which connects to the aerial and earth terminals of broadcast sets. Fundamentally the operation is as follows. The short wove signals are tuned in and mixed with the oscillator frequency to produce an intermediate or beat frequency which falls somewhere in the tuning range of the broadcast receiver, generally about 600 kilocycles.The receiver is left tuned to this frequency and the short wave stations are tuned in on the converter, the signal is changed to 600 kilocycles and fed into the aerial and earth terminals of the broadcast set, which amplifies and makes the signal audible in the same manner as if it were receiving an ordinary broadcast station.

COULOMB—Unit of quantity, being equal to one ampere flowing for one second.

COUPLING, INDUCTIVE—Type of coupling used in R.F. stages of receiver, energy being fed from the primary of a coil to its secondary winding by means of induction. This type of coupling is also used in audio stages, a step-up of audio transformer usually being used. The main advantage being that the gain is decidedly higher and hence fewer stages may be used than with capacitive coupling. Unless expensive transformers are used, however, the frequency response curve is not as flat.

COUPLING, CAPACITIVE OR RESISTANCE—A type of coupling comprising resistors and a condenser by which one stage of a set is coupled to another This type of coupling is used to a large degree in audio stages as by this method the frequency response can be kept fairly flat.

"C" POWER SUPPLY—A power supply device connected in the circuit between the cathode and grid of a vacuum tube so as to apply a grid bias.

CROSS MODULATION—A type of intermodulation due to modulation of the carrier of the desired signal in a radio apparatus by an undesired signal.

CRYSTAL—Mineral ores, possessing property of rectification. Care should be taken with all types of crystals to see that the surface is clean. Should it become necessary to handle it, small tweezers should be used.

CURRENT—A flow of electrons. The unit of electrical current being the ampere.

CURRENT, EDDY—Current set up in nearby conductors by a magnetic field.

CURRENT, ALTERNATING—See A.C.

CURRENT, GRID—Current which flows from the grid to the cathode of a valve.

CURRENT, PLATE—Current which flows from the plate to the cathode of a valve.

CYCLE—One complete set of changes after which the initial condition is restored; that is from zero to maximum positive, to zero to maximum negative, back to zero. A 50 cycle per second note would therefore go through this set of changes 50 times per second. As the frequency increases so the number of times per second this occurs increases.

DAMPING—The gradual decay or reduction in amplitude of oscillation due to resistance.

D.C.C.—Double cotton covered.

DECIBEL—Measure of sound beginning at the threshold of hearing, a change in level of

University

We do our best . . .

This photograph shows "University" instruments undergoing final tests.

To keep in touch with all our clients, but as we are engaged almost entirely on Defence Work and Essential Services, we are only able to supply — at the moment — very little test equipment for civilian use.

Thank you for your support in the past, and we soon hope to resume our usual happy business relations with all our good friends and customers.

RADIO EQUIPMENT PTY. LTD.

E.S. & A. BANK BUILDINGS, BROADWAY, SYDNEY (opp. Grace Bros.)

RE

1 decibel being barely perceptible. This unit is used extensively in sound work as the ear does not respond to sound energies of different values in a linear manner, that is, a sound creating a hundred times more sound energy than another would sound to the ear only twenty times as loud. The use of the decibel enables the power output of different amplifiers to be expressed in a unit which bears relation to their effect on the ear.

DECOUPLING—Method by which "motor-boating" and instability is prevented in a receiver by means of decoupling resistors and by-pass condenser. In resistance-coupled circuits of more than two stages it is generally necessary to decouple one of the stages, a resistor about one-tenth of the plate resistor being connected in series with it and a by-pass condenser connected from the junction of the resistors to earth.

DELAYED A.V.C.—This type of A.V.C. differs from simple A.V.C. in that the A.V.C. bias is not applied to the R.F. stages until a certain signal strength is available. The advantage being that although the more powerful signals are controlled the weak signals are not affected at all.

DEMODULATION—The extraction of the audio signal from the carrier wave. Detection.

DETECTION—The process of changing the received radio frequency oscillations into varying unidirectional current. The act of rectifying.

DETECTION ANODE BEND—This method depends on biasing the tube so that it operates on the lower bend of its characteristic curve, the tube then acts as a rectifier. When the positive half-cycles of the signal are fed to the grid of the valve the plate current increases, however, the negative half-cycles do not cause a corresponding decrease, thus the signal is rectified.

DETECTION DIODE—Method generally used in modern receivers. There is no signal amplification in a diode detection stage but its low degree of distortion is of considerable advantage.

DETECTION, LEAKY GRID—This method employs a condenser connected between the tuned circuit and the grid of the valve and a resistance of fairly high value between the grid and earth. Detection takes place in the grid circuit by this method and the detected signal is amplified by the valve. This particular method is used almost exclusively in one and two valve receivers as it is more sensitive than other types.

DETECTOR—Device for converting high frequency currents into currents capable of affecting telephones or similar instruments.

DIAPHRAGM—Section of a reproducer which makes audible the electrical impulses fed to it. The cone of a speaker.

DIFFUSION VANES—Vanes placed in front of a speaker cone in order to distribute the high frequency sounds more evenly.

DIELECTRIC—The insulating material between the plates of a condenser. The type of insulating material having a definite effect on the condenser capacity.

DIELECTRIC CONSTANT is the specific capacity of a given material. The dielectric constant of air is taken as 1. The ratio of the capacity of a certain sized condenser having a given material as a dielectric to the capacity of the same condenser with air as the dielectric will give the dielectric constant of that material.

DIELECTRIC STRENGTH—The strain or voltage a material of given dimensions will stand without breaking down.

D.C.—Direct current. Current which flows in one direction only.

DIRECTION FINDER—A device employing two loop aerials used to ascertain the exact direction of a transmitting station.

DISTORTION—A change in wave form occurring in a transducer or transmission medium when the output wave form is not a faithful reproduction of the input wave form.

DOUBLE MODULATION—The process of modulation in which a carrier wave of one frequency is first modulated by the signal wave and is then made to modulate a second carrier wave of another frequency.

(To be continued in next month's issue)

SERVING YOU *Still!*

THE majority of our Male Staff — including the Country Travellers — have been on Military Service for quite a while. *They serve you still* . . . though in a different way. Naturally we cannot now keep as close a personal contact with our clientele, as in the past. You will help the War Effort, help yourself and do us a favour by *mailing* your orders to us. They will receive the usual prompt attention.

MARTIN de LAUNAY PTY. LTD.

SYDNEY:
Cnr. Clarence and Druitt Sts. (next Town Hall)
M2691 (4 lines)

NEWCASTLE:
Cnr. King and Darby Sts. B2244 (2 lines)

NEW PRICES FOR ROLA SPEAKERS AND REPAIRS

New prices have been announced for Rola speakers, which are available for equipment and replacement in fifteen different types, nine of them being electro-dynamic, and the six fitted with permanent magnets. In size they range from five to twelve inches in diameter.

In the electro-dynamic range the prices are:

G12	£9	10	2
K12	2	15	6
F12	2	5	6
K10	2	12	1
F10	2	4	5
K8	1	18	3
F8	1	11	9
F5B	1	11	8
K5	1	7	9

In the permagnetic models the prices are:

12/20	£2	14	6
10/20	2	13	5
8/20	2	11	0
6/12	2	1	5
5/9	1	14	3
5/4	1	8	9

All of the above models are fitted with leads, except the G12. Length of lead is twenty inches for the K12, F12, K10, F10, K8, 12/20, 10/20 and 8/20, whilst with the smaller speakers the F8, F5B, K5, 6/12, 5/9 and 5/4, the length is ten inches.

All speakers are fitted with isocore transformers except G12 and K5, which are fitted with their own special types.

Prices relate to speakers with standard field coils and transformers.

Prices for special specifications will be quoted on request. When ordering state field coil resistance (in the case of electro-dynamic speakers) and impedance of matching transformer. When requesting a transformer to match an output valve or valves, give operating conditions. When permanent magnet speakers are to be used with power operated receivers or amplifiers, please signify.

Repair Service

Rola also offers a comprehensive repair service for all speakers. Repair service is provided at the Melbourne factory and Sydney Service Depot, Speakers for repair should be consigned, freight paid, to either Rola Company (Aust.) Pty. Ltd., The Boulevarde, Richmond E.1., Victoria. (Consign to Burnley Rail Station), or Rola Company (Aust.) Pty, Ltd., 116 Clarence Street, Sydney, N.S.W.

All packages should be plainly marked with the name and address of the consigner and an advice note despatched by the same mail, enclosing remittance and specifying the work to be done. Forwarding instructions for return should be given. If remittance does arrive before despatch of repair, package will be sent by C.O.D. post or rail.

PRICE LIST OF PARTS AND REPAIRS

Model	Dia.	F'ld Coil	F'ld & Dia.	Trans.
G12	42/4	52/7	67/4	16/10
K12	16/4	19/-	27/-	12/3
F12	16/4	13/5	22/5	12/3
K10	12/-	19/-	24/1	12/3
F10	12/-	13/5	17/10	12/3
K8	11/-	13/5	17/4	12/3
F8	11/-	10/8	14/8	11/3
F5B	8/7	10/8	13/11	11/3
K5	6/9	10/2	11/9	10/9
G12 PM	42/4			16/10
12" PM	16/4			16/10
10" PM	12/-			12/3
8" PM	11/-			12/3
6" PM	8/7			11/3
5" PM	6/9			11/3

The above prices are effective immediately and are subject to amendment without further notice.

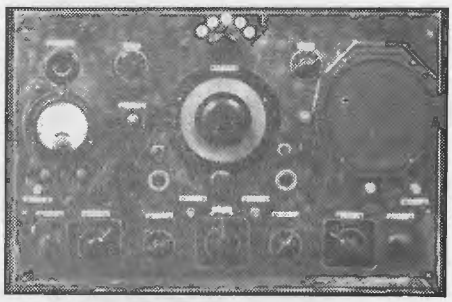
SERVICE

For Those Who

SERVICE!

DENHAM'S have a large staff of practical servicemen who know your problems as well as you know them yourself—

LET DENHAM'S HELP!



The original Signal Tracer as designed and built by John Bristoe of Denham's.

MAIL ORDERS

DENHAM'S Mail Order Department is under the personal supervision of Radio Manager John Bristoe, who designs the Signal Tracers for "Australasian Radio World." You can depend on Denham's to supply all your requirements BY RETURN MAIL.

Unobtainable in most places, but we can supply 1A7GT, 1A5GT, 1P5GT, 2A3, 6A3, 6L77G, 6L6G, 6N7, KT66, EK2P valves, and dozens of other types. Also hard-to-obtain odd type Valves, Transformers, Condensers, Dial Glasses, etc., both new and used.

A full range of all types of new and used Radio Test Equipment, including Oscilloscopes, Oscillators, Multimeters, V.T.V. Meters, Valve Testers, odd Meters, etc. We trade in and buy all types of Test Equipment.

DENHAM'S RADIO SERVICE

Box 145

MARYBOROUGH

Queensland

SPEEDY SPINNING

Rotational speeds beyond comprehension have been obtained experimentally. A 3/32 inch diameter steel ball suspended magnetically in a vacuum has been spun to a speed of 110,000 revolutions per second! The ball was spun by means of a rotating magnetic field produced by four air core driving coils supplied with energy from a high frequency oscillator-amplifier. Many steel balls explode long before reaching this record speed.

Radio In Development Of Air Transport

Although war has temporarily called a halt to the commercial development of overseas air services, it has given a tremendous impetus in several directions to preparation in Australia for post-war resumption of general air transport on a bigger scale.

Increased use of air transport after the war has been plainly indicated by the Minister for Aircraft Production (Senator Cameron), who remarked a few days ago: "I envisage Australia becoming one of the foremost air-minded countries in the world, where people will use 'planes to reach aerodromes close to their work." Government aircraft factories, he said, would be able to build the necessary 'planes just as government workshops built rolling stock for our railway systems.

One direction in which planning has progressed is in the provision of navigational aids.

A Hazardous Journey

In these days, when an aeroplane flying in the Southern Pacific area is rarely out of range of one or other of the chain of Civil Aviation aeradio stations, it is difficult to realise that only five years ago pilots flying the Southern portion of the England-Australia air mail route had only one aeradio station — Palembang (Sumatra) — to guide them on their hazardous journey.

For three years, from the time Qantas Empire Airways Limited opened the Singapore-Brisbane link of the Empire air mail route in 1934, the crews of mail planes had to rely on instruments and their own sense of direction for most of the 4,000 mile journey.

Contact on 500 Kc.

Checking location over Australian territory after leaving Brisbane was quite a business. After leaving the Queensland capital the pilot would make a call on a frequency of 500 kilocycles, and when contact was established with Station VIB, scheduled calls would be made on a frequency of 6540 kilocycles and acknowledged on 500 kilocycles.

As the aircraft approached Roma, approximately 280 miles from Brisbane, the 500 kilocycle signals from the coastal station would fade out, and though half-hourly position reports would be sent out throughout the day, it was not until aafter sunset on the run from Winton to Cloncurry that Station VIB would again be heard.

On the second day's flight, apart from contacts later arranged with the Postmaster-General's station at Camooweal and a private station at Brunette Downs, it was seldom that any station was worked until Darwin became readable in the vicinity of Birdum.

Radio Operators Wanted

It was quite a red-letter day for air mail pilots when, at the Brisbane end of the route, about the middle of 1937, a direction finding bearing was passed to an incoming aircraft from a Civil Aviation aeradio station. But war has rapidly changed the picture. To-day there are scores of Civil Aviation aeradio stations in Australia, all playing a part in ensuring the safety of aircraft and pilots. They provide scope for experienced radio operators to do essential work of prime importance as station personnel and more men are wanted by the Department of Civil Aviation. Applications should be made to the Department, 522 Little Collins Street, Melbourne, C.1.

The aeradio operator of to-morrow will look back with pride on the advancements being made in radio navigational aids in which he will have played an important part.

The Radio Valve At Work

The theory and construction of the valve are dealt with in this instalment, the ninth of a series of articles for beginners.

PERHAPS the most important link in the radio chain is the detector which de-modulates the received r.f. signals and hands them on in the form of varying audio frequency currents that are transformed into sound by the headphones or loudspeaker.

We will assume that we have a simple tuning circuit rigged up as shown in fig. 1 (a). It comprises a coil tuned by a variable condenser to both being of the right proportions to form a resonant circuit for the signal we want to hear. The circuit is connected to an aerial and earth system as shown.

Crystal is Simplest Detector.

The next problem is to make the signal audible, and the simplest way of doing this is to use a crystal detector and a pair of headphones connected across the tuned circuit as shown in fig. 1 (b).

When the tuning circuit is adjusted to resonance there is an oscillating high frequency current surging backwards and forwards in it, but this current will not actuate the 'phones until it is rectified; that is, current flowing only in the one direction is required.

The crystal detector provides this rectification by acting as a valve, in that it passes current readily in one direction and hardly at all in the other. The 'phones are thus provided with uni-directional impulses that rise and fall in strength at audio frequencies.

The .001 mfd. fixed condenser shown in fig. 1 (b) connected across the headphones acts as a reservoir to maintain current through the 'phones during the time between one audio impulse and the next. Both volume and quality are thus improved, Often this component is not included, however, as there is sufficient capacity between the leads in the headphone cord to provide the necessary effect.

Crystal Sets Too Insensitive

With a crystal set, the headphones are actuated solely by the energy radiated by the transmitter and picked up by the receiving aerial, which explains why receivers of this type are so restricted in their range. As well, there are other drawbacks that make a crystal far inferior to a valve as a detector. For this reason the explanation of the process of detection given above has purposely been made brief. It will be expanded considerably when the action of the valve as a detector is being considered.

How The Valve Works.

The most universally-used device in radio is the valve. There are hundreds of different types designed to perform dozens of various operations, but they all work on the same underlying principle.

Generally, the valve is a glass bulb containing two or more elements. Air particles constitute obstacles against the free movement of electrons within the bulb, and so the air is extracted by a vacuum pump. However, as no pump can produce a perfect vacuum, a little magnesium is placed inside the bulb before it is sealed, and the latter is then placed in a concentrated radio frequency field. This ignites the magnesium (known as the "getter") within the bulb, and the combustion absorbs the residue of air still left in the valve. It is this "getter" that can be seen as a silvery deposit inside the glass envelope of many valves.

Cathode is Electron-Emitting Element.

The most important element within the valve is the cathode, which is made of or coated with, material that when heated to its correct operating temperature gives off a copious supply of electrons. There are two common types of cathode. That illustrated in fig. 2 (a) is directly heated, and is generally known as a filament.

The other type is the indirectly-heated cathode shown in fig, 2 (b). The wire within the cylinder is the heater, and it is insulated from the cylindrical cathode surrounding it. Its sole purpose is to supply sufficient

SAVE MONEY WITH A SUBSCRIPTION

Order Yours To-Day

Make sure you get every issue as soon as it is published. Place an order with your newsagent or send direct to us for a subscription.

IT SAVES YOU TIME!
IT SAVES YOU MONEY!

We guarantee that every subscriber has his copy posted the same day it comes off the press.

SPECIAL RATES

★ 6 issues 5/3
★ 12 issues 10/6
★ 24 issues 20/-

POST FREE

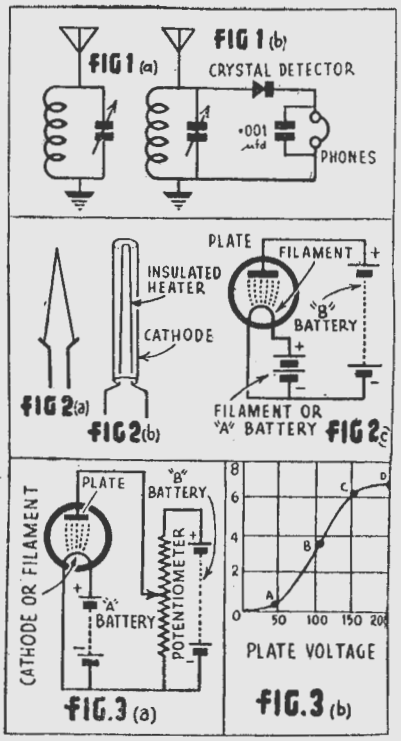
Enclosed please find remittance for 10/6 in payment for an annual subscription to the "Australasian Radio World," commencing with the ..... issue.

NAME .....

STREET and NUMBER .....

CITY ..... **STATE** .....

THE AUSTRALASIAN RADIO WORLD
117 RESERVOIR STREET, SYDNEY



heat to the cathode to bring the latter to its correct operating temperature.

Indirectly-Heated Cathodes Eliminate A.C. Hum.

Valves using filaments (or directly heated cathodes) require comparatively little heating power, and as economy of operation is an essential with receivers powered by batteries, this type of valve is generally used in battery sets. With sets operated from a.c. mains, however, a filament heated directly by 50 cycles a.c., for example, would have 100 current impulses passing through it every second. This continuous variation in the heat supplied to the filament would, unless the latter was of fairly heavy gauge, result in a corresponding pulsation in the supply of electrons emitted. This in turn would give rise to a bad hum.

The indirectly-heated cathode also has other advantages for a.c. operation, and so for this application it is generally used. It is obviously not nearly as economical to run as the filament type, but where power is taken from the mains this is of no importance.

Diode Is Simplest Valve.

The simplest type of valve is the diode, illustrated in fig. 2 (c). It has two electrodes — filament and plate. If an "A" battery is connected across the filament, and another battery, known as the "B" battery, is connected up as shown with its positive terminal taken to the plate and its negative to the negative pole of the filament or "A" battery, electrons will flow from filament to plate. This is because, as explained in an earlier article in the series, electrons are negatively charged, and as unlike charges attract, they will flow towards a nearby positively-charged body, represented by the plate.

This flow of electrons from filament to plate constitutes a current that will flow continuously as long as the plate is positive to the filament. If the "B" battery is connected the other way round, however, so that the plate is negative to the cathode, the electron flow is stopped because of the repulsion there will be between the negative plate and the electrons, which are negative.

How the Diode Rectifies A.C.

Now imagine a source of a.c, connected between plate and filament. On the half cycles when the plate is positive to the filament, current will flow, but there will be no electron flow (no current) when the plate is negative to filament.

Thus the valve is acting as a rectifier in that it has changed an alternating current into a pulsating direct current. This alternating current can be of any frequency, from the 50-cycle variety to the highest radio frequencies. Hence, the diode can be used in a power supply to rectify a 50-cycle current supplied by a.c. mains, or it can act as a detector for radio frequency currents.

Space Charge Between Cathode and Plate.

Not all of the electrons leaving the filament reach the plate. The number that do depends mainly on the potential of the plate in respect to the filament.

Some of the electrons emitted return to the filament, while others remain in the space between filament and plate for a brief period of time to form what is known as a "space charge." As it consists of negative electrons, the space charge has a repelling action on other electrons leaving the filament, and also impedes the progress of those that are on their way to the plate.

Fig. 3 (a) shows a scheme for gradually varying the voltage on the plate of diode valve from zero to the maximum given by the "B" battery. As the slider of the potentiometer is rotated slowly from the negative to the positive end, so the voltage on the plate gradually increases. As the plate becomes more and more positive, the number of electrons that succeed in passing through the space charge increases, though above a certain plate voltage any additional increase in voltage has little effect in increasing plate current. The reason for this is that all of the electrons being emitted by the filament are being drawn to the plate. This maximum current is called the saturation current.

The Effect Illustrated.

This effect is simply illustrated in fig. 3 (b), which shows a typical characteristic curve of a diode valve, plate voltage being plotted against plate current in milliamperes.

At low plate voltages, the current is also low, showing that the plate is unable to overcome the repelling effect of the space charge to any appreciable extent. After the point "A" this is largely overcome, and the increase in electron flow with rising voltage soon becomes rapid and even. At "C" the curve starts to flatten out again, showing that the electrons are reaching the plate almost as fast as the filament can emit them. The appreciable increase in voltage from "C" to "D" thus produces very little corresponding increase in plate current.

Next month — "More About the Valve."

Book Review.

HANDBOOK FOR CODE

Designed to fill the need for a guide to the student of radiotelegraph code — a fast-growing need now that many thousands of persons are interesting themselves in dot-dash communication as valuable training in the war effort —a special booklet entitled, "Learning the Radiotelegraph Code," has been issued by the American Radio Relay League, national association of amateur radio operators, and should soon be available here.

The text presents a unique method of learning, based on the aural system of approach. The radiotelegraph code is considered in the light of another language, having its peculiar pronunciation and syllable. Even though an individual cannot secure the constant supervision of an experienced radi code operator, he may feel confident to go ahead and study by himself, under this new method. Fundamental sounds are learned at first—then letter sounds are learned integrally instead of as separate dots and dashes; in fact, those terms are taboo and "dit" and "dah" have replaced them. The booklet includes much material on learning to send well, high speed operation, copying to typewriter, general operating data and code practice equipment, as well as a full set of lessons in learning to send and receive, which are ideal for class instruction.

The booklet is authored by John Huntoon, acting communications manager of ARRL, an amateur and commercial radio operator known for the excellence of his sending "fist", and who holds several championship trophies for his first-place performance in receiving competitions.

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

November

The month of November has been of more than ordinary interest, as apart from the usual improvement in the 13 metre band, there has been several changes in American frequencies all with the object of better reception for Australia, and further U.S.A. stations have opened up. Our own Department of Information have sought a better channel for programmes intended for the Western States of U.S.A., and brought VLG-8 Sydney, 17,800 kc., 16.85m, into use from 2 to 2.45 p.m., as also VLG-9, 11,900kc, 25.21m., and VLN-8, 10.527 kc., 28.5m.

December

I rember when we made a practice of listening to the few American short-wave stations then available at Xmas time just to hear the Yuletide revels made possible by the stations conveniently remaining on the air a little longer than usual. I figure this year we will have a grand array of stations and programmes to choose from and I "guess and calculate" some great items will be put over for the troops.

Our Russian Ally

At 10.40 p.m. the opening announcement from Moscow mentions they are transmitting on 15,745 kc, 19.05m; 15,228kc, 19.70m; 10,445 kc, 28.72m; and 9545kc, 31.43m. Of these, 19.70 and 31.43 are not audible, but one transmitter not mentioned, 30.40m., puts in a fine signal.

At 11 p,m. Australia is called, and at 11.4 p.m. CBS News and NBC News at 11.8 p.m. They leave the air at 11.25 p.m. Just before closing they state next transmission will be at 9.48 a.m. on 19.70, 19.85, 20.461, 30.70 and 42.98 metres. However, they can be heard as early at 8.15, and news is given at 8.25 The stations close at 8.40 a.m.

Musso's Morning Music

I believe the call-sign of the Italian station on 47.6 metres giving such a fine signal and excellent musical programme at 6.30 a.m. is 2RO-23. And talking of Italy, I heard the Vatican city at 6.15 a.m. on November 28 in a talk in English. Unfortunately a very powerful morse signal was right on top, but when they signed off at 6.30, I thought they mentioned they were broadcasting on 50.42 metres. The position on my dial was certainly nearer there than 50.23 metres where they have been heard for some time.

Code School in Recess

According to "The Globe Circler", The Radio Code School of the Air, through WRUL, has been discontinued, at least for the present. Perhaps Dr. Gaden can tell us if this is correct. The hour at which it comes through is just a little late for an outer-suburbanite like me.

KGEI

This General Electric Station has been authorised to add frequency of 15.21m.c., so when listening on 19.72 metres, wait for call sign as our Boston friend, WBOS, is there also. According to A.W.A. Radio Rambles they are on the air from 8 a.m. to 11.45 a.m. I have not heard them, as the hour does not suit me, except on Sundays, and these notes will be in print before the next sabbath. Just at the moment I cannot lay my hand on the note, but I feel certain someone, possibly Dr. Gaden, told me they had heard KGEI on this part of the dial. WBOS on this wave-length, of course, signs at 5.45 a.m., but opens again at 6 a.m. on 25.27 metres, and a jolly fine signal.

The Philippines

KZRH on both 25.86 and 31.12m. is reported regularly, but KZRM does not seem to be on the air these days. Readers will be grieved to learn that poor old Don Bell, the fine journalist of this station several years ago, was tortured to death by the Japs, according to "Life" of March 30.

Radio Ananias

Space does not permit the listing of German stations, or schedules, but several Berlin transmitters are putting in remarkably good signals in strength and clarity to Australia.

DJR, on 19.56m is splendid at 10 p.m., but I am afraid some of their cabaret jokes heard on Saturdays towards midnight are a litte risque. For a good laugh, tune when news is being given, 11 p.m.

The Soft End of the Axis

Italy, too, can certainly send over a fine signal and a smile can be had by listening to their news at 7 a.m. on 31.15, 25.4 and 19.61 or at 7.40 on these stations, and also 29.04, 41.55 and 47.6 metres.

Switzerland

Consulate General of Switzerland, Sydney, advises Swiss broadcasts to Australia and New Zealand through HER-5, Schwarzenburg, on 11,865 kc., 25.28m., on Tuesdays and Saturdays will now be received two (2) hours later, i.e., from 7.45 till 9.15 p.m,

This station, by the way, opens again at midnight with news in German and Italian, Closes 12.30 opening again at 2 a.m.; for fifteen minutes news is given, specially for Swiss in the Orient.

The Brain Trust

The 49 metre band has been very noisy the last week and I have missed one of my favourite sessions — the Brain Trust. However, it is put over again on Sundays at 7.30 p.m. on GSB, 31.55 metres. It is also relayed by the ABC through 2FC, 2NR and 2CY.

Dr. Gaden writes: "Moscow, at 10.40 p.m. states all frequencies and wave lengths, and at that hour say they are on: 19.85m, 19.7m, 28.72m, and 31.43m. They give 9545kc, for 31.43m, but I get them on 30.43m (9860kc) and not far from WTQ and miles away from VLG-2 (31.45m). VLG-2 would swamp a 31.43 if on. But the 30 and 28 are splendid and well worth listening to.

KWID, a great success on 41.49m. and now and then KES-2, 33.59m., is not bad.

YNRS heard fairly well at 11 p.m.

Have listened to a Latin-American around about 30.05m which I do not think is HCJB.

(ZPA-6, Teleco, Paraguay has been testing on 9930kc., 30.21m.—Ed.).

GRD, 19.42m. one of my favourites, delightful at 10 p.m.

GRH, 30.53m. is my choice in Pacific Service from 6 p.m.

KZRH, 25.85m. very good some nights. The 13 metre band is gradually coming good.

Mr. Condon, of Laura, sends another wonderful list of loggings and, as usual, was "there" when the new stations showed up. He heard WGEO on 25.33m., VLN-8, 28.51m. and VLG-9, 25.22m. He is naturally elated by receiving a diploma from Senor Amando Cespedes Marin, owner and operator of Station T14NRH in Heredia, Costa Rica. I am also the proud possessor of a diploma from friend Marin, receiving it in recognition of a report on the occasion of the tenth anniversary of this wonderful lone hand station.

Mr. Condon has also received verifications from FZI, Brazzaville, Radio Levant, Beirut, Syria, HHBM, Haiti and CB-1180 Santiago, Chile. Certainly a nice mail.

Meet Miss Sanderson

Miss Sanderson, of Malvern, Vic-

toria has joined the AWAWDX Club, and the list of loggings forwarded convince one many hours have been spent at the receiver.

Dr. Gaden, in a last minute air mail, tells me he has heard the following Americans around 7 a.m.: WLWO, 25.62m. out on its own, an R9 signal; WCDA, 25.36m next best; (used to be WCRC). WCBX, 19.64m not too good, have to use 'phones. WNBI, 19.81, some time ago seemed to be in some doubt as to call, WNBI or WRCA—is now definitely WNBI and only fair.

WCRC, 16.83m. this seem to be the call and not WCDA. Poor signal, 'phones necessary.

WRCA, 25.23m fair. WCW, 18.93m better than the 19 or 16 metres, but that is not saying much.

KWU, 19.53m gone off a lot,

Near 10 a.m., WLWO, 19.67m. very fine WCBX poor. KWID not a patch on WLWO.

Others heard at this hour, Moscow on 19.85m and 19.7m, both good, former much the louder. JZK 19.79m opened very well at 10 a.m. and was fair on 31.35m.

Mr. Hugh Perkins, of Malanda, Q., is still hearing the new London transmitter on approximately 16.93m., but does not know call sign. The time he gives is 2.42 a.m.

He listens to news from WCDA, New York, at 11,830kc, 25.36m at 7.30 a.m. and also hears WCRC on 16.83m at 7 a.m.

I am surprised that neither Mr. Perkins or Dr. Gaden refer to WBOS, Boston on 25.27m., as I find this splendid at 7.45 a.m. in "part of our French S.W. Session."

Another good Boston station is WRUL, 25.36m in Dutch from 7.45 to 8 a.m. Also on WRUW in 19m. band.

Mr. Perkins has received QSL card from KWID, 'Frisco, and CBFY, Montreal.

"Here is the News" Read by—

Have you ever tried to guess who it is before the name is mentioned I find a great similarity in the voices of Pat Butler, Stephen Miller, Derrick Prentice, Norman Claridge and Robert Harris. The BBC have adopted the American idea of repeating headlines at end of news.

Space will not permit of a detailed list of all reporters, but I am deeply grateful to those who have contributed to the Short Wave Section.

I take this opportunity of thanking them and expressing every good wish for the New Year.

NEW STATIONS

WJP, New York, 8810kc., 34.05m: This is another Press and Wireless Inc., outlet heard from 9 p.m. in parallel with KIWD for one hour. R5, Q-3 signal. Reported by Mr. Perkins, of Malanda, Q.

(We listed in October issue a Press Wireless station, WJT, heard at 10.45 a.m. I think this is same stotion, but call sign is WJP.Ed.).

KGMB, Honolulu, approximately 16.7m.: Dr. Gaden reports having heard this station around 10 a.m. in an armed forces session.

(This is probably a paint-ta-point broadcast, as KGMB is a broadcast station operating an 590kc, and often heard in Sydney after midnight.—Ed.)

WCB, New York, 15,580kc., 19.26m.: This was shawn in October issue as WCP. But believe WCB is correct. This is another of "The Voice of America" series from Hicksville, N.Y. reported by Mr. Gillet, of Adelaide.

WDO, New York 14.470kc, 20.73m: Still another Hicksville station heard around 7.45 a.m. till after 9.30 a.m. Also reported by Mr. Gillett of Adelaide.

WGEO, Schenectady, 11,847kc, 25.33m: This is a new outlet for this General Electric station. Opens at 12.01 a.m. and closes at 11 a.m. News is given hourly.

KGEI, San Francisca, 15,210kc, 19.72m: Another outlet far this popular General Electric station. Schedule is 8 a.m. to 11.45 a.m. and news is given haurly on the hour.

VLG-8, Melbourne, 17,800kc,, 16.85m: This is the frequency allotted to VLQ-8 but now being used by Department of Information from 2 to 2.45 p.m. far North America (Western States).

VLG-9, Melbaurne 11,900 kc, 25.21m Used same time as abave.

VLN-8, Sydney, 10,527kc, 28.5m: A new ane alsa used at 2 p.m. for Nth. America.

——, London, 17,710kc., 16.94m: First reported by Mr. Perkins, af Malanda, (see November issue), naw mentioned by Mr. Gillett, of Adelaide, as heard at 11 p.m. in foreign languages. (I have tuned them at 8.30 p.m. and held them till leaving the air at 8.45 p.m. but have not heard call sign. Excellent strength at this hour.—Ed.).

NOTICE TO DX CLUB MEMBERS

Members of the All-Wave All-World DX Club are advised that they should make a point of replenishing their stock of stationery immediately, as all paper prices have risen, and we expect that it will be necessary to increase prices by at least 25%.

Already it has been found necessary to abandon the log-sheets and club stickers. However, while stocks last, the following stationery is available at the prices shown:—

REPORT FORMS.—Save time and make sure of supplying all the information required by using these official forms, which identify you with an established DX organisation.
Price ..... 2/— for 50, post free

NOTEPAPER.—Headed Club notepaper for members' correspondence is also available.
Price ..... 2/— for 50 sheets, post free

ALL-WAVE ALL-WORLD DX CLUB, 119 Reservoir Street, Sydney

ALL TIMES ARE AUSTRALIAN DAYLIGHT SAVING TIME

Pressure on space only permits of abridged Loggings. (See September issue for South America, the East and Great Britain; October issue for additional Nth. American stations, Europe, Scandinavia, Miscellaneous, Cuba, Haiti and Dominican Republic. November issue for Australia, Africa, and portion of North America.

Please have reports sent to L. J. Keast, 23 Honiton Avenue West, Carlingford, to arrive by 27th of month,

Please note alterations and additions to Australia.

VLG-8, Melbourne 17,800kc, 16.85m
Now being used in transmission for Western States of Nth. America from 2 to 2.45 p.m.

VLG-6, Melbourne 15,230kc, 19.69m
Also used in parallel with VLG-8, 2 to 2.45 p.m.

VLG-9, Melbourne 11,900kc 25.21m
A new transmitter used by Dept. of Information for Nth. America from 2 to 2.45 p.m. (Gillett, Condon).

VLG-3, Melbourne 11,710kc, 25.62m
Time for Western States of Nth America is now 3.25 p.m. to 4 p.m. Also used for New Coledonia (in French) from 7.25 p.m. to 8.25 p.m. instead of VLQ-4, Sydney, 7220kc., 41.55m.

VLN-8, Sydney 10,527kc, 28.5m
Also a new transmitter heard from 2 to 24.5 p.m. in Dept. of Information programme to Nth America. (Gillett, Condon).

VLQ-5, Sydney 9680kc, 30.99m
For Western States of Nth. America 3.25 to 4 p.m.

VLW-6, Wanneroo 9680kc, 30.99m
From 11.40 p.m. to 1.55 a.m.
For South East Asia (in Thai, Malay, Dutch, French and English).

VLQ-4, Sydney 7220kc, 41.55m
Appears to have been discontinnued.

Oceania:
New Caledonia:

FK, 8AA, Noumea 6160kc 48.7m
One of the best signals around 6.30 p.m. English session conducted by American on some nights. Sign off with "March Lorraine." (Perkins).
Heard with programme in English at 7 p.m. Gave American football scores (Condon).

Nth American stations held over from last issue:

KET, Bolinas 9480kc, 31.65m
3.15 p.m. to 3 a.m. News nearly every hour Fair when in parallel with KWID (41.38) (Condon).

KES-2, Bolinas 8930kc, 33.59m
Heard from 9.15 p.m. in parallel with KWID (41.49) (Condon).

WJT, New York 8810kc, 34-05m
Nice signal at 10 p.m. (Condon).

WDJ, Hicksville (N.Y.) 7565kc, 39.66m
Unreliable signal heard around 6.45 p.m.

KGEI, San Francisco 7250kc, 41.38m
Noon to 7.35 a.m. This transmitter has now replaced 31.41 (Gillett, Condon, Goden).

KWID, San Froncisco 7230kc, 41.49m
9.15 pm. to 12.15 a.m. News every hour from 10 p.m. Very good signal (Gillett). (Condon).

WLWO, Cincinnati 6080kc, 49.5m
Believe schedule is 1.30 p.m. to 3.30 p.m.

WRUS, Boston 6040kc, 49.67m
5 p.m. to 9 p.m.
Fair around 8 p.m. (Gillett). Heard Nov. 8 at 10.30 p.m. (Condon).

Mexico:

XEQQ, Mexico City 9680kc, 30.99m
Fair in afternoons around 4 p.m.

XEWW, Mexico City 9503kc, 31.57m
Good in afternoon from 4 p.m. till 5.15 Very fast speaking announcer (Du Faur). Fair some nights at 1 a.m. (Condon).

XEXA, Mexico City 6170kc, 48.62m
Heard around midnight with fair signal.

See "New Stations" for several more U.S.A. stations.

South America:
Columbia:

HJCX, Bogota 6018kc, 49.85m
R4-5 at 11.30 p.m. Morse very annoying (Perkins).

HJCF, Bogota 6240kc, 48.07m
Mr. Perkins reports an R4-5 signal at 11.30 p.m. (Unlikely to be heard in Sydney at that hour.—Ed.)

Ecuador:

HCJB, Quito 12,460kc, 24.08m
Great strength in news at 9.30 a.m. (Perkins).

HCJB, Quito 9970kc, 30.09m
Heard in parallel with 24.08 at 9.30 a.m. (Perkins).

Peru:

OAX5C, Ica 9540kc, 31.45m
Slogan, "Las ondas di Ica para tod el pois." ("The waves of Ica for all the country.") Best time Sundays at 5 p.m.

OAX4J, Lima 9340kc, 32.12m
Nightly at midnight, Sundays at 3 p.m.

THE EAST

China:

FFZ, Shanghai 12,608kc, 24.86m
Schedule: 7.30 p.m. to 1.05 a.m. News 11 p.m. R6 at 9 p.m. (Perkins).

Singapore Radio 12,000kc, 25m
English at midnight. Excellent signal (Hallett). Have heard at 9 a.m. (Condon).

Radio Shanghai 11,970kc, 25.05m
Every reason to believe this is XIRS at midnight.—Ed.).

XIRS, Shanghai 11,980kc, 25.02m
Schedule: 8.30 p.m. to 1.05 a.m. News 10 p.m. R6 at 8.45 p.m. (Perkins). Fair at 11 p.m. (Condon).

XGOY, Chungking 11,900kc, 25.21m
Schedule: 8.15 a.m. to 9 a.m. News 8.30 a.m. 9 p.m. to 10.30 p.m. News 9 p.m. R6 at 9 p.m. (Gillett, Perkins).

XMHA, Shanghai 11,855kc, 25.3m
7.30 p.m. to 1.30 a.m. News 9.30 p.m. and 12.5 a.m. Fair 8.50 (Condon).

XGRS, Shanghai 11,680kc, 25.68m
Heard at 9.45 a.m. with their first daily news sessicn in English (Perkins).
Do not know morning schedule, but heard at night from 7.30 p.m. to 2.30 a.m. News 9.15, 10.30 and 11.30 p.m.

XGOK, Canton 11,650kc, 25.75m
9 p.m. to 1 a.m. News 11 p.m.

XGOA, Chungking 9720kc, 30.86m
6 a.m. to 8a.m. 11 p.m, to 2 a.m. News at 1 a.m. Very reliable (Gillett).

XGOI, Shanghai 9665kc, 31.04m
10.50 p.m. to 1.30 a.m. News 11.5 p.m. Fair (Condon).

KZRH, Manila 9640kc, 31.12m
Signal much better at 10.30 p.m. (Condon).

XGOY, Chungking 9625kc, 31.17m
10.35 p.m. to 2.30 a.m. News 11.30 p.m., 12.30 a.m., 1 a.m., 1.30 and 2 a.m. Very strong 11.45 p.m (Gillett)

JQHA, Hongkong 9470kc, 31.68m
R8 at 9 pm. (Perkins).

XLMA, — 9370kc, 32.02m
Heard around 11.30 p.m. (Perkins, Gillett).

XPSA, Kweiyang 8465kc, 35.44m
10 p.m. to 2 a.m. Mr. Perkins is hearing an R4-5 signal at 9.30 a.m. Mr. Gillett says excellent.

XGOY, Chungking 5950kc, 50.42m
6 a.m. to 8 a.m.

Portuguese China:

CR8AA, Macao 6250kc, 48.00m
Generally noisy around 10.30 p.m.

French Indo-China:

Radio Saigon, Saigon 11,780kc, 25.47m
News 10.30 p.m. and 2.45 a.m. closes 3 a.m.

Maloya:

Singapore Radio 12,000kc, 25.00m

ALL-WAVE ALL-WORLD DX CLUB

Application for Membership

The Secretary,
All-Wave All-World DX Club,
117 Reservoir Street, Sydney, N.S.W.
Dear Sir,

I am very interested in dxing, and am keen to join your Club.

Name .....

Address .....

(Please print both plainly) .....

.....

My set is a .....

I enclose herewith the Life Membership fee of 2/— (Postal Notes or Money Order), for which I will receive, post free, a Membership Certificate showing my Official Club Number. NOTE—Club Badges are not available.

(Signed) .....

(Readers who do not want to mutilate their copies can write out the details required.)

8 p.m. to 1.30 a.m. Another Jap controlled transmitter.

Dutch East Indies:

PMC, Batavia .... 18,135kc, 16.54m 8.30 a.m. to 10 a.m.; 1 p.m. to 2.30 p.m.; 8 p.m. to 2 a.m. (Japanese controlled). Splendid signal at 9.40 a.m. (Perkins, Gillett). Dr. Gaden hears them closing at 10 a.m. with nice signal. Open again at 1 p.m. with news. News again at 2 p.m. closing at 2.30 p.m. Night session opens at 8. Good at 1 p.m., also heard at 10 p.m. and on some days at 9 a.m. (Condon).

India:

VUD-3, Delhi .... 15,290kc, 19.62m 5.45 p.m. to 8.30 p.m. News 6 p.m. 9.30 to 11.15 p.m. News 11 p.m. Very nice on opening at 9.30 p.m. (Gaden). Heard strongly late afternoons and night (Gillett). Good to 9.30 (Condon).

VUD-4, Delhi .... 11,840kc, 25.34m 11 p.m. to midnight. News 11 p.m.

VUD-6, Delhi .... 11,790kc, 25.45m 9.30 p.m. to midnight, News 11 p.m. We have known this station as VUD-3, but Mr. Gillett says correct call sign is VUD-6.

VUD-2, Delhi .... 9590kc, 31.28m 10 p.m. to 3.30 a.m. News 11 p.m. and 1.50 a.m. Quite good at midnight (Gillett).

VUD-4, Delhi .. .. 7260 kc, 41.32m Midnight to 5 a.m.

VUD-4, Delhi .. .. 6130kc, 48.94m Midnight to 5 a.m.

Philippines:

KZRM, Manila .... 11,600kc, 25.86m 7 p.m. to midnight; News 9.30 p.m., 10.30 p.m. and 11.30 p.m.
Heard irregularly in same prog. as 31.12m But signal not as good.

KZRH, Manila .... 9640kc, 31.12m Heard opening at 8 p.m. with Japanese anthem (Gillett).
Same schedule as on 25.86 m.

Thai:

HSP—, Bangkok .... 6060kc, 49.50m Heard just after 12.30 a.m. But not a good signal (Gaden).

HSP-5, Bangkok .... 11,715kc, 25.61m 10.30 p.m. to 1.30 a.m. News 11 p.m. and 12.15 a.m.

Voice of Thailand, Bangkok 7190kc, 41.72m R6 at 10.22 p.m. but spoilt by morse (Perkins).

GREAT BRITAIN

With the exception of, say, 8 a.m. till 1 p.m., one or more London transmitters can be heard right round the clock.

GSH, ... 21,470kc, 13.97m 9.45 p.m. till 2.15 a.m. Heard well during November (Gillett).

GRQ .... 18,030kc, 16.64m 9.45 p.m. to 2.15 a.m. News 10 p.m., midnight and 2 a.m.

GRP .... 17,890kc, 16.77m Now being heard again at 10 p.m.

GSV .... 17,810kc, 16.84m 5.45 p.m. to 8.45 p.m.; 9.45 p.m. to 2.15 a.m.; 2.30 a.m. to 5.15 a.m.

GSG .... 17,790kc, 16.86m May be heard around 11 p.m. in some localities.

——, ... 17,710kc, 16.94m Heard closing down at 8.45 p.m. Heard again at 11 p.m. in foreign language(Gillett).

GRD .... 15,440kc, 19.42m 6 p.m. to 8.45 p.m.; 9.45 p.m. to 12.30 a.m.

GRE, London ....15,390kc, 19.49m 6 p.m. to 8.45 p.m., 11.15 p.m. to 2 a.m., 2.30 a.m. to 6 a.m.

GSP, ... 15,310kc, 19.6m Pacific service, 4.45 p.m. to 8.45 p.m.; European Service 9 to 9.30 p.m. (Religious service 9.15 p.m.

GSI, ... 15,260kc, 19.66m 9.45 p.m. to 2.15 a.m.; 2.30 a.m. to 7.45 a.m.

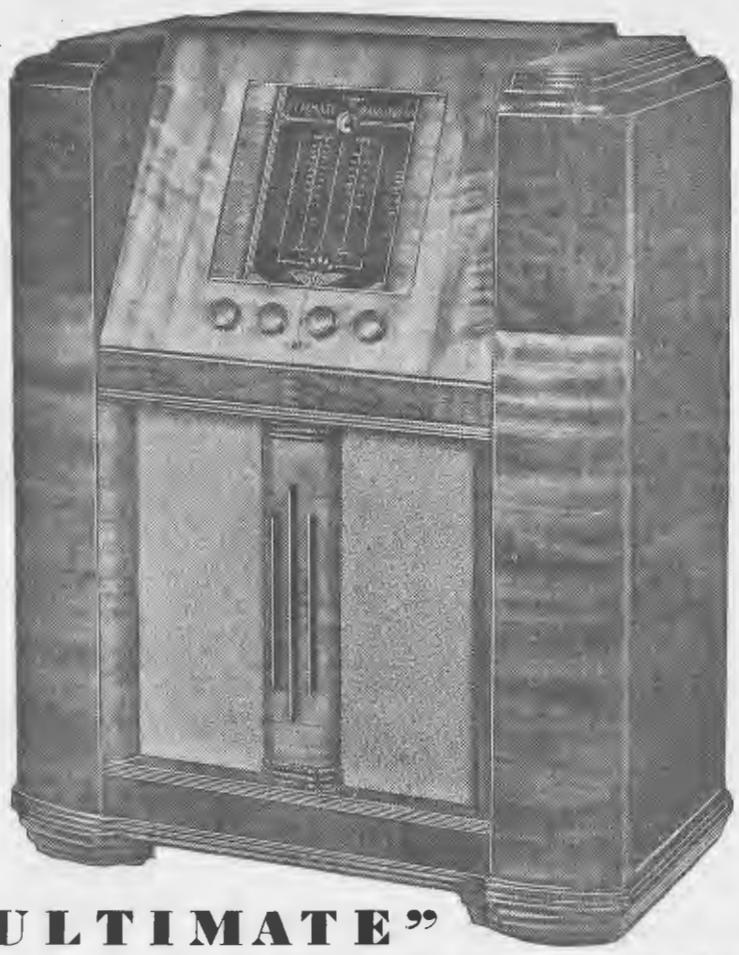
GSF .... 15,140kc, 19.82m 5.30 p.m. to 8.45 p.m.; 9.45 p.m. to 2.15 a.m.; 2.45 a.m. to 4.25 a.m.

GRF .... 12,095kc 24.80m European Service 4.30 p.m. to 9.30 p.m.

GRV .... 12,040kc, 24.92m 4.45 p.m. to 7.45 p.m.

GSE 11,860kc, 25.29m

(Continued on page 25)



"ULTIMATE" features FULL BANDSPREAD

Short-wave stations spread up to sixteen times further apart on the Full Bandspread Dial! Each Short-wave Band located on a separate scale. Divisions marked in megacycles and fractions of a metre. Short-wave stations tuned in as easily as local stations! Placing and re-logging now simplicity itself! The "ULTIMATE" Full Bandspread Short-wave Tuning Dial revolutionises Overseas Tuning and Reception! Investigate the new "ULTIMATE" before you decide on a Radio Set.

Cut out this Coupon and post to-day.

GEORGE BROWN & CO. PTY. LTD., 267 Clarence Street, Sydney.

Please send me particulars of "ULTIMATE" Full Bandspread Receivers as advertised in "Australasian Radio World."

NAME .....

ADDRESS .....R.W

ULTIMATE
Champion Radio

Sole Australian Concessionaires:

GEORGE BROWN & CO. PTY. LTD., 267 Clarence St., Sydney

Victorian Distributors: J. H. MAGRATH PTY. LTD., 208 Little Lonsdale St., Melbourne

J. H. MAGRATH REGRETS - - -

that he is temporarily unable to give his clients the prompt, comprehensive service they are used to from this progressive house. Defence requirements are absorbing the bulk of our restricted supplies, so as to more speedily achieve Victory, and lead to a resumption of our pleasant trading relations with you . . . . . .

BUT KEEP MAGRATH IN MIND

FOR—Marquis Moulded Products.
—Brittanic Radio Parts.
—Aegis Power Trans., Kits, etc.
—University Test Equipment.
—Western Cabinets.

And our address . . .
208 LITTLE LONSDALE STREET, MELBOURNE
Phones: Cent, 3688 and 4414

PHOTOELECTRIC SYSTEM CONTROLS TRAFFIC IN TUNNEL

A photoelectric block-signal system controls the traffic of men and materials which constantly flows in both directions in the 13-mile-long £15,000,000 Continental Divide Tunnel now being drilled between Grand Lake and Estes Park, U.S.A. This tunnel will bring water from the western slope of the Continental Divide to the eastern side, where it will be used for irrigation and the production of electric power.

The trains in the tunnel travel on a 24-inch gauge single track with passing tracks at convenient intervals. The signal system indicates to train crews the presence of a train in the next section of the tunnel. This prevents accidents and reduces waiting time at passing tracks.

Because the accumulation of water and dirt around switches connected to the rails would impair the efficiency of the signal system and thus cause added expense and delay, and because electric currents in the rails might cause premature ignition of blasting charges, a signal system without mechanical or electrical switches connected to the rails was required. The track, therefore, was divided into blocks of about 6,000 feet, each block ending wherever a turnout occurs for passing. At the beginning and end of each block were placed two photoelectric relays spaced about 30 feet apart, which control the operation of red and green signals lights in that block. Each relay has two light sources located across the track and spaced about 15 feet apart, so that only a locomotive or train can operate the lights.

All green lights are on when the track in a block is clear. When a train or locomotive enters the block and interrupts the light beams directed on the first relay, there is no reaction, since this relay controls the already lighted green lights When the light beams directed on the second relay are interrupted, however, the green lights are extinguished, and the red lights turned on. The reverse happens when the train emerges from the other end of the block.

This is said to be longest tunnel in the world protected by photoelectric block signals. The signal system was designed by the General Electric Company

LOGGINGS

(Continued)

2.30 a.m. to 8 a.m. Very good signal at breakfast time.

GSN, ... 11,820kc, 25.38m
11.30 p.m. to 2.30 a.m. (European service) 6 a.m. to 7.45 a.m.

GSD 11,750kc, 25.53m
4.45 p.m. to 5.45 p.m.; 9.45 p.m. to 11 p.m.; 2.30 a.m. to 7.45 a.m.

GRG, ... 11,680kc, 25.68m
4.45 p.m. to 8.45 p.m.; 6 a.m. to 7.45 a.m.; 8.15 a.m. to 3.45 p.m.

GRY 9600kc, 31.25m
4.45 p.m. to 5.30 p.m.; 5.30 a.m. to 7.45 a.m.; 3 a.m. to 9 a.m.

GRX 9690kc, 30.96m
4.30 p.m. to 9.30 p.m.; 11.30 p.m. to 2.30 p.m. (fades quickly after 8.30.)

GRH 9825kc, 30.53m
4.45 p.m. to 7.45 p.m.; 8.15 a.m. to 3.45 a.m.; 8 a.m. to 9.45 a.m.

GSC 9580kc, 31.32m
European service 3a.m. to 9 a.m. (foreign languages); 8.15 a.m. to 3.45 p.m.

GSB 9510kc, 31.55m
4.45 p.m. to 8.45 p.m.; 9.45 p.m. to 11 p.m.; 12.30 a.m. to 2.15 a.m. 2.30 a.m. to 8 a.m.

GRU 9450kc, 31.75m
4.30 p.m. to 9.30 p.m.

GRI 9515kc, 31.86m
Don't think in use at present.

GRJ 7320kc, 40.98m
2.30 a.m. to 9.45 a.m. in European service) 3 a.m. to 9a.m. in foreign languages.

GSU 7260kc, 41.32m
Heard around 3 a.m in Polish.

GSW 7,230kc, 41.49m
European service 3 a.m. to 9a.m.

GRK 7185kc, 41.75m
Home service, but often audible here early mornings and again late afternoon. (Perkins).

GRT, ... 7150kc, 41.96m
4.30 p.m. to 9.30 p.m.

GRM 7125kc, 42.11m
1.45 p.m. to 3.45 p.m.

GRS, ... 7065kc, 42.46m
4.45 p.m. to 7.45 p.m.; 2 p.m. to 3.45 p.m.

GRN 6194kc, 48.43m
European service 4.30 p.m. to 9.30 p.m.; 8.15. a.m. to 3.45 p.m. (U.S.A.).

GRO 6180kc, 48.54m
Do not think in use at present.

GRW 6140kc, 48.86m
Do not think in use at present.

GSL, ... 6110kc, 49.10m
European Service: 4.30 p.m. to 9.30 p.m. and 3 a.m. to 9 a.m. North America: 9.45 a.m. to 3.45 p.m.

GRR 6080kc, 49.34m
Home service: 4.30 p.m. to 9 p.m.; 3 a.m. to 7 a.m.

GSA 6050kc, 49.59m
European service: 4.30 p.m. to 9.30 p.m.; 3 a.m. to 9 a.m. (foreign languages)

Mullard Mullard Mullard Mullard Mullard Mullard

FOR BEST RESULTS

—SENSITIVITY

—SELECTIVITY—

RELIABILITY—

USE ONLY MULLARD

THE CHOICE OF BRITAIN'S
BETTER RADIO MANUFACTURERS!

AND AUSTRALIA'S TOO!

Mullard THE MASTER **RADIOVALVE**

Mullard-Australia Pty. Ltd., 367-371 Kent Street, Sydney, N.S.W. - - - - - - Telephone: MJ 4688

Mullard Mullard Mullard Mullard Mullard Mullard

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

J.H.L. (Gulgong) is troubled with interference noise from a petrol driven engine.

A.—It is easiest to deal with the trouble at the origin rather than to do anything with the set. Apart from keeping the aerial as far away from the engine as possible there is little you can do at the receiving end. At the engine itself, however, you can put a resistor in the spark plug lead (50,000 ohms, or so), which should not affect the performance of the engine; olso a condenser across the points. Perhaps most effective of oll is to shield the engine with metal or build a tin shed right around it. Wire gauze is effective as a shield, so you may be able to construct a sort of "meot safe" box to go right around it, earthing the wire mesh effectively.

* * *

R.W.O. (Camden) enquires about prospects of obtaining a licence for a transmitter to experiment with radio-controlled boats.

A.—We doubt if you will receive any encouragement, but the only sure woy to find out would be to see the Radio Inspector at the G.P.O.

The field opens up plenty of scope for experimenting, but we hove an ideo that plenty of thought has alreody gone into the matter from reseorch workers with ample opportunities for experimenting.

John W. Straede

B.Sc., A.M.I.R.E. (Aust.)
RADIO ENGINEER

★

For advice on Electronics, Sound System Engineering, and Radio Receiver Design Available by appointment only.

★

7 Adeline Street, Preston, Vic.

Phone: JU1814

Problems will **not** be discussed over the 'phone.

P.L.K. (King's Cross) asks whether it would be possible to get a receiver to give guaranteed results from New Zealand stations during the afternoon.

A.—No, we don't think you have a chance of getting anyone to make such a promise, It might be possible on certain days, and in regard to certain stations, but only a test in the actual receiving location could give you facts about results. Modern sets are so sensitive that it is seldom the fault of the set which limits the range; more the atmospheric conditions, the level of local noise, and the actual strength of the signal which you are attempting to receive. If this signal strength is much below the strength of the general noise level, no amount of overall amplification is going to bring it out into the clear.

* * *

F.K. (Collingwood, Vic.) queries whether it is possible to buy a morse code tape machine for teaching the code.

A.—No; so far as we know these are not available in Australia, although, as you say, they appear to sell in thousands in the United States. We agree that it is surprising that no one has done onything about putting them on the market here, as they must be a fairly simple sort of thing to make.

* * *

A.N. (Lindfield) enquires as to recommended equipment for radio testing and service.

A.—There is no limit to the laborotory equipment you could use; but most good men can get by with just a multi-meter and a service oscillator. We once heard a world-famous scientist remark that most radio men seem to use their brains in inverse proportion to the amount of laboratory gear on hand, That was at the Philips factory in Holland, where they had plenty of gear, too! However, there is nothing like a little extra gear to take an interest in, and the usuol way is for a man to start with the above couple of instruments and then proceed to devote his spare time to building up a universal speaker panel, o complete volve tester, signal tracer equipment, and so on as time goes by, until eventually he has everything he can want.

* * *

G.K. (Kerang) asks whether the type 59 valve is difficult to obtain.

A.—Like all imported types of valves the 59 is not easy to obtain at the moment, although not quite as difficult as some. There were a great many type 59 imported a few years ago and they were not particularly popular with set manufacturers, so there should be a few still around. The difficulty will be to find them.

DUAL-WAVE SET

(Continued from page 6)

should not be far more popular in its application to circuits of all types.

Owing to the loading effect of the diode on the secondary of the second i.f. transformer, the selectivity of this unit is not high, but if a still greater degree of high-fidelity is required it is a simple matter to arrange to switch in a resistor of 50,000 ohms to shunt the secondary of the r.f. transformer, not interfering with the a.v.c. arrangements in any way. There is no need to broaden the tuning of the aerial stage as this is already loaded by the aerial itself."

Further Details

Anyone wanting further details of this set should make an appointment to have their teeth extracted by Mr. Hunt at his surgery. Doubtless he will be pleased to explain minor points between injections!

T.G. (Bathurst) enquires about back numbers.

A.—Yes, we have a fairly comprehensive stock of back numbers available at 6d. each, post free, or 5/- per dozen. A few of the 1936 and 1937 issues are not now available, but most of the others you mention can be supplied. The issue of July, 1940, is another which is out of stock.

* * *

H.R. (Bronte) has a broken-down rodio set to fix.

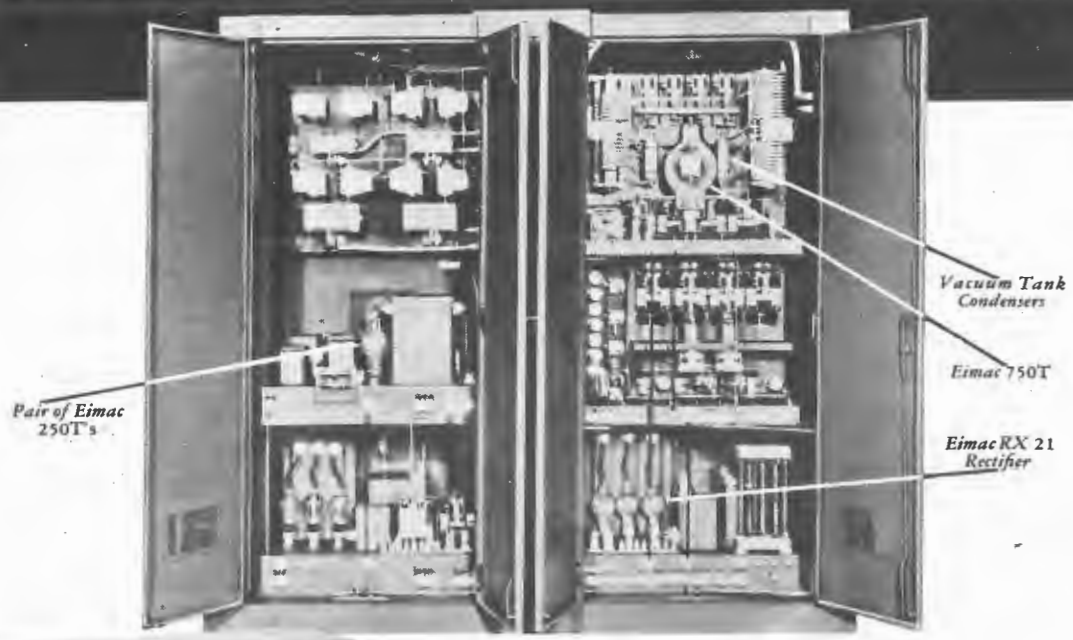
A.—It would be quite impossible to give you full details of how to proceed with the problem. Since about 90 per cent. of our breokdowns are due to valves, we suggest that the first step is to have these items tested.

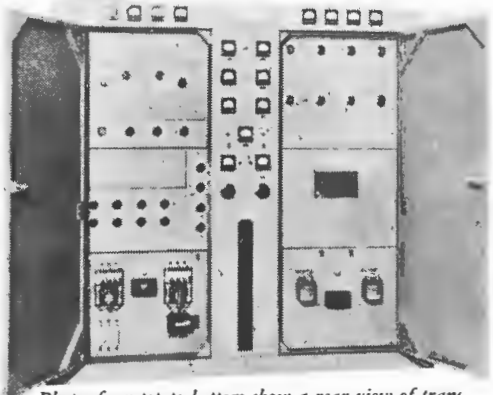
* * *

J.A. (East St. Kilda) wants to build or buy a "Communication 9", or other receiver with exceptional performance in the matter af reception of overseas broodcasts.

A.—We don't think that you have the slightest hope of being able to buy a suitable coil kit for this receiver, and as the kits are not available it is unlikely that you will be able to find anyone prepared to build up this receiver for you. Likewise, other communications-type receivers with exceptional performance are hard to find. You might advertise for a second-hand model of the "Communications 9", but we con't imagine that there are likely to be any of them available. Perhaps your best bet would be to advertise for a good second hand "Ultimote" receiver. These sets have a particularly effective short-wave band. Thousands of them are in service, and so it should not be difficult to find one available.

EIMAC EQUIPPED BRAZILIAN ARMY STATION





Photos from top to bottom show a rear view of transmitter, the remote control and a front view of the transmitter constructed by Maya Rebello & Comp. of Rio de Janeiro for the Brazilian army

With a single 750T in the final stage and a pair of 250T's as modulators this station puts 1200 watts on the antenna. Operated by remote control on four frequencies using phone, CW and ICW.

The transmitter was constructed by Maya Rebello & Comp. of Rio de Janeiro and employs Eimac RX 21 rectifier tubes as well as Eimac vacuum tank condensers in the final circuit. The design and construction does credit to its makers and the use of Eimac Tubes in the most important sockets is convincing evidence of their superiority and position in the world of radio.

Follow the Leaders to **Eimac TUBES**

Export Agents:

FRAZAR & CO., LTD.
301 Clay St., San Francisco, California, U.S.A. • Cable "Frazar"

Export Agents: Frazar & Co., Ltd., 301 Clay Street, San Francisco, California, U. S. A.

Nq 621.38405 AUS

Radio wants You!

Radio is calling for ambitious men with some Radio training. There's a radio job waiting for you in industry or the fighting forces. It's a man-sized job which will enoble you to serve your country now, and offers you a career when the war is over.

You can quickly fit yourself to take up radio engineering work. No previous knowledge is required—you learn at home or in the modern A.R.C, workshops. It costs little (less than the average fellow spends on tobacco each week)—you start immediately, ond only ordinory education is required.

Get the latest information on this amazing course af training. Send the passport below for free A.R.C. book "Careers in Radio and Television." Read all about the important jobs YOU con fill, once you are trained.

AUSTRALIAN RADIO COLLEGE PTY. LTD.

E. S. & A. Bank Buildings, Broadway, Sydney.
'Phones:
M 6391 and M 6392

MAIL PASSPORT NOW!

PASSPORT TO PROSPERITY FOR ONE

To L. B. GRAHAM,
Principal of Australian Radio College,
Dear Sir,—

Please send me, without obligation on my part, the free book, "Careers in Radio and Television."

NAME.....

ADDRESS.....

NATIONAL LIBRARY OF AUSTRALIA
22 SEP 2010

Printed by the Bridge Printery, 117 Reservoir St., Sydney, N.S.W., for the proprietor of the "Australasian Radio World," 117 Reservoir St., Sydney.