THE AUSTRALASIAN

Radio World

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VOL. 7 ...... NO. 6 NOVEMBER 15 1942

★ **Super-quality dual-wave receiver circuit for set builders**

★ **Details of little-known industrial equipment using radio valves**

★ **Simple feedback design has wide application for amplifiers**

★ **Where and when to listen for overseas S.W. stations**

Price 1/-

THE AUSTRALASIAN
RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

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EDITORIAL

Is television just around the corner? Again the question is raised, this time dug out of the past by the announcement that the British Government has sent along a Major Osborne, who has recently arrived in Australia to pave the way for television services to start as soon as the war is finished.

Already there have appeared statements in the press and in broadcasting journals which have apparently emanated from Major Osborne. These give the impression that television is wonderfully easy, quite cheap and capable of supplying people with something they want and need.

Similar statements have appeared fairly regularly over the past fifteen years, but the progress of television has been quite slow, and anything but steady.

Doubtless television will eventually become an interesting side-line to radio broadcasting, and also provide a fertile field for experimenting; but we still stick to the belief we have held for many years—that television will not displace radio broadcasting with a sudden rush. We still feel that our advice to readers not to invest their savings in television companies was quite sound. We would even go further and say that the same recommendation holds good for to-day and for the immediate (post-war) future.

The fact that Major Osborne is with us, however, makes it fairly evident that someone is still thinking about television and that we have something to which to look forward.

New Circuits Need New Components . . .

• You may find it difficult to get genuine R.C.S. Trolitul coils and R.C.S. components for your new circuit, because Government requirements come first, and our staff is engaged in the manufacture of precision equipment for the defence forces. However, if you **can** get R.C.S. parts, snap them up quickly. Featuring the exclusive TROLITUL method of construction and other R.C.S. features, they are preferred by keen amateurs and professional set manufacturers alike for their improved efficiency, dependability and outstanding value.

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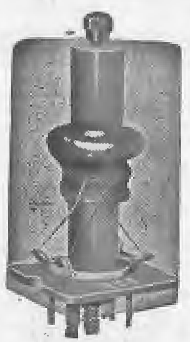

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T89	R.F.	6/6
T87	R.F. with reaction	6/6
T81	Reinartz	6/6

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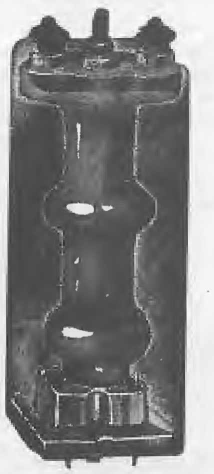

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IF164	2nd	13/9
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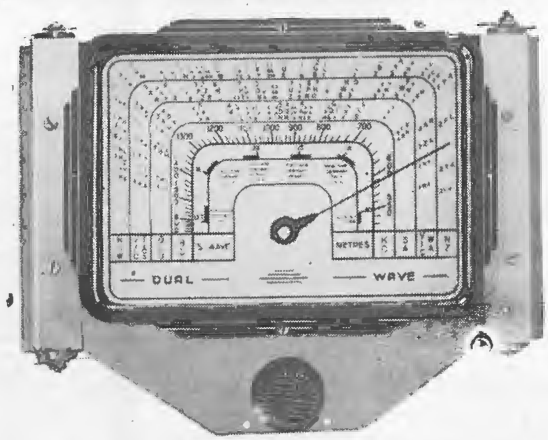
1E69	2nd	7/6

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., D.W. AND BROADCAST 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."

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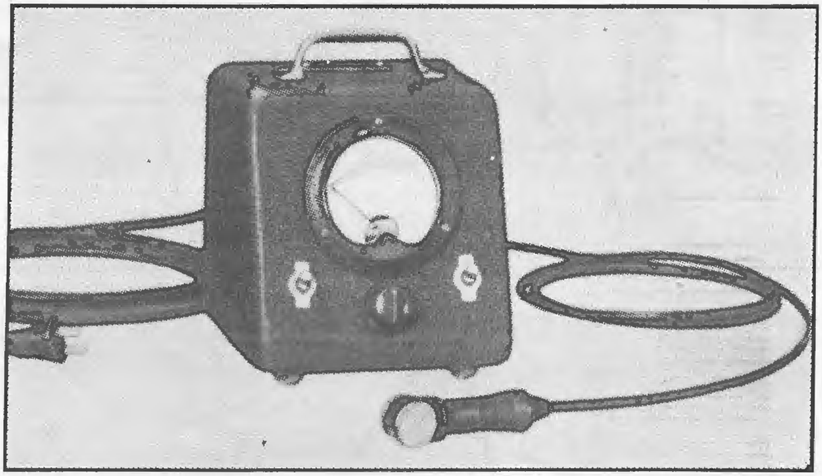
Little Known Industrial Equipment

INTERESTING APPLICATIONS OF THE MODEST RADIO VALVE



The electrical gauge which is infintely more accurate than the micrometer.

Scarce at the moment, but well known to all our readers are the little glass bulbs known as radio valves, or if you are Americanised, toobs.

But although mostly known as radio valves, they are actually electronic devices which find many other applications. We found considerable interest in a recent catalogue from the United States which listed out a few of the special types of equipment which are marketed for special purposes. All of them use the modest little radio valve in one way or another.

To Measure Colour

The first bit of equipment listed was a Recording Spectrophotometer, an instrument for measuring and recording any colour, or tint, which the human eye can perceive. You can imagine its many profitable applications in textile, paper, chemical and paint factories.

Measuring Light

Then there is the instrument which measures the intensity of light so as to give the correct exposure for photographic purposes. A deeper application of it is for photo-engraving, lithographing aand blue-printing, where it can be set to give the correct exposure of up to twenty minutes, taking into account any fluctuations in the light intensity and correcting the exposure according.

Testing Milk

Primarily designed for measuring the transmission of blue-coloured solution obtained in phosphatase test to determine the degree of pasteurisation of milk, is another little instrument which uses radio valves and a photoelectric cell.

Pin-Hole Detector

Another application of the photoelectric cell in conjunction with the radio valve is found in the pin-hole detector, which is used by sheet-metal factories to inspect sheets before they are tinned. It automatically marks the defective sheets which are passed through it at a fast rate of speed.

Measurement Gauges.

Micrometers are used for measuring lengths and diameters, but the mechanical micrometers is only roughly accurate for approximately a tenth of thousandth of an inch. But the electrical gauge, well, to put it mildly, can measure minute distances with accuracy.

An adaption of the electrical gauge is the strain gauge, which can be used to see how much a building moves in a wind, to measure how much a pavement sinks under the weight of a pedestrian, or how much stretch there is in the drawbar of a locomotive.

The Thickness of Paint

Still another electronic gauge is one which tells the thickness of a coating of paint, without, of course, scraping or marking the paint in any way. It can also measure the thickness of the plating on any plated article, or the thickness of emulsion on a photographic film.

Dew-Point Potentiometer

An interesting little bit of equipment is the dew-point potentiometer, which tells you the moisture content in any gas. It is widely used in steel mills, gas works and chemical plants, not to mention munitions factories.

Dynamometer

And so there are dozens upon dozens of other such electronic devices, little known at the moment, but providing a most fertile field for work for the thousands of radio engineers at present being trained.

Last, but not least, is the mighty dynamometer, which tests the power, torque, and revolutions of the big aircraft engines. Although not actually using the radio valve, it is an electrical device and closely associated with radio theory.

AIR RAID ALARM

An alert signal unit of small dimensions and designed for installation in any type radio receiver without altering the circuit, is now being marketed by the National Union Radio Corporation of New York.

Known as Model AR-101, the air raid alarm has but four connections to be made. When installed, and the receiver is tuned to any desired local station, the unit gives out a loud siren-like tone at the instant the station carrier goes off the air—an indication of an impending raid.

Since the siren tone is generated in the alarm unit, the receiver to which it is attached may be left on during the night with the volume control turned all the way down. When the alarm sounds, it may be turned off by means of a toggle switch provided for that purpose.

Whilst it has not been revealed just whose brains are behind this remarkable air-raid siren, it is assumed that no one but National Union's J. H. Robinson could have such a fertile imagination.

Robinson has a world-wide reputation for ingenious devices, especially practical jokes.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From an infant beginning facing giant competition . . . these tubes have paved the way for many of the great improvements in radio . . . gained the confidence of the leading engineers through their superior performance capabilities, their in-built stability and stamina, their dependability and economy in operation . . . today they occupy an important niche in the industry. The only tube unconditionally guaranteed against premature failures caused by gas released internally.
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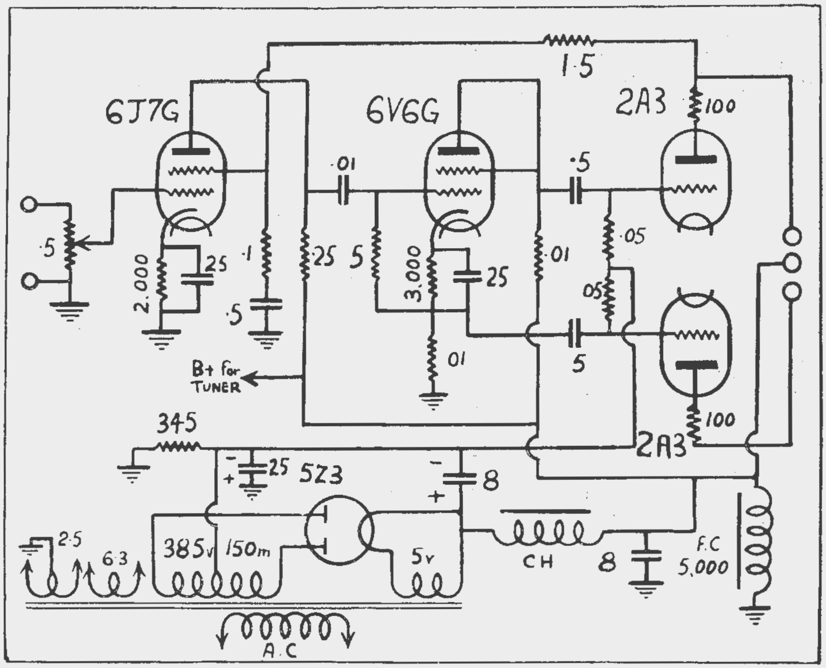
SUPER - QUALITY DUAL - WAVE DESIGN

IN the design of an amplifier the writer was swayed by certain considerations, the main one being that the amplifier should be suitable for home use, being in fact the audio end of a radiogram of ample power and the best possible reproduction consistent with practicability.

On starting out on the job designing the set, the first step was to make a thorough study of recent technical magazines. The perusal of available literature indicated that most cabinets were incapable of adequately baffling the speaker system used. In fact, we met such phrases as "to do justice to to this set such and such a baffling system should be used." Also appearing in the journals were described many different types of elaborate balfling systems, which fact further emphasised that a good baffle was highly desirable. Hence a cabinet was built of very substantial construction. It was noticed that most of the recommended baffling systems could be accommodated in a space of approximately three feet by two feet by one foot six. Therefore the cabinet was made big enough to be able to house any one of these baffles.



The Amplifier

Now for the actual amplifier circuit. Here again was one outstanding fact emphasised both in literature and in the result of competition work, that the output valves, naturally push-pull is used, must be triodes. We notice that when beam tetrodes are discussed they are almost invariably fitted with inverse feedback, yet quoted in comparisons with triodes not fitted with feedback. We notice such remarks as "but when the check up were made upon the frequency response of the tetrode amplifier the results were not so encouraging."

We read carefully the remarks about triodes versus tetrodes in the "Radio World," Volume 6, Number 11, on page 13.

By

H. W. L. HUNT

MONT ALBERT, VIC.

Then in the Radiotron Designer's Handbook we found the statement "Push-pull Class A1 triode operation is regarded as providing the highest standard of quality."

So, on account of these and many other similar statements it was decided to use 2A3 type triodes in push-pull.

The Coupling Arrangement

Next consideration was the matter of coupling. As it was decided to use resistance-capacity coupling in preference to transformer, a search of the literature revealed two main systems of obtaining push-pull operation. One was the inverter system of phase splitting, with equal load resistors in plate and cathode circuits, the other the paraphrase system, using a twin-triode driver. We decided for the phase-splitter, as it seemed less complicated and could be readily driven by an audio pentode in the first stage. The writer is keen on the pentode as a voltage amplifier when feeding into a resistive load, especially as it was also decided to use negative feedback.

The pentode is desirable since: (1) there is less shunting of the feedback voltage due to the high plate resistance of this valve; (2) a pentode may be used with almost any value of load resistance without serious distortion. On the other hand, a triode valve can give serious distortion when the load resistance is decreased much below the plate resistance; (3) the gain of the pentode is inherently higher, so verse feedback will still leave a reasonable stage gain, whereas with that appreciable gain reduction by in-triodes an additional stage might be required.

Eventually it was decided to use the Radiotron A504 circuit as a foundation, but fitted with an inverse feedback circuit similar to the one used in Radiotron circuit A504. This system of inverse feedback takes the signal from the plate circuit of one of the output valves and feeds a portion of it back to the screen of the pentode valve used as the first audio stage.

Full details of the tuner portion of this set, together with photographs, are scheduled to appear in next month's issue.

A 6J7G is used for this first valve, which drives a 6V6G, or similar valve, with plate and screen tied to make it into a triode phase-splitter, driving a pair of 2A3 in the output stage.

Input Required

By making the feedback network

(Continued on page 26)

The Supply Of Valves

Radiotron valves have been, and are being, used in very large quantities for the Fighting Services and the output of the factory at Ashfield has been sufficient not only to meet these and other essential requirements, but also to give a surplus for civilian distribution. Releases of valves for civilian services are given from time to time by the Directorate of Radio and Signal Supplies and these valves are distributed to the trade in accordance with a scheme approved by the Directorate.

At a time when imported valves have ceased to be available for civilian purposes it is, indeed, fortunate that the Australian radio trade can obtain reasonable quantities of valves for the maintenance of broadcast receivers from local production. The quantities made available of certain valve types have been approximately equal to the demand, so that no serious shortage of these types exists. In the case of most other types it is anticipated that the shortage will be alleviated during the next few months.

It is unlikely, however, that the total supply of valves for civilian purposes will equal the demand, so that emphasis shoud be laid upon the necessity for using those valves which become available to the greatest possible advantage. Radio mechanics are urged not to replace valves in receivers unless the replacement is necessary to maintain the set in operation. Dealers are urged to endeavour to ensure that valves are purchased only against real need and not to form a reserve stock against possible future failure.

There is no necessity for anyone to hoard valves at the present time, since all Australian-made Radiotron types are continuing in production, and should be available when required.

The public is urged not merely to order a particular valve from a particular dealer but to make enquiries from other dealers who may have stocks of the type wanted. A dealer carrying a fair stock of one type and none of a second type in heavy demand, is urged to endeavour to exchange part of his stock of the first type for a similar number of valves of the second type from another dealer who is prepared to make the exchange. If this procedure is carried out on an extensive scale it will mean that dealers would have a reasonable range of types instead of compelling the client to go from shop to shop until he can find the valve he wants.

THE WEAK LINKS IN REPRODUCTION

What are the weak links in the chain between the gramophone record and its reproduction in sound?

By

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

7 Adeline Street, Preston, Vic.

THE reproduction of music from discs is, to-day, a more complicated, though better controlled process than that of years ago. Formerly, in the 'acoustic' gramophone, the vibrations of a needle in the groove were mechanically converted to vibrations of a mica or duralumin diaphragm, which was coupled to the exterior air by means of a rather poorly designed horn.

To-day the vibrations of the needle are converted, either electro-magnetically, or piezo-electrically, to a minute alternating current, which is amplified electronically and then supplied to a loudspeaker.

The amplifier and loudspeaker combination is far less efficient in that it requires more power to give the same volume of sound, but the greater amount of power is supplied from the mains and the amount supplied by the rotating record is much less than before.

What are the links in the chain? The needle, pick-up, volume and tone controls, amplifier, loudspeaker and baffle, or horn. Each link must not only be satisfactory by itself, but must be able to work correctly with the preceding and succeeding links.

Types of Distortion

Objectionable distortion usually consists of three types which are listed below, in usual order of distastefulness:

1. Harmonic Distortion.
2. Frequency Distortion.
3. Added noise, such as hum.

Each of these types can be reduced by using inverse or negative feedback.

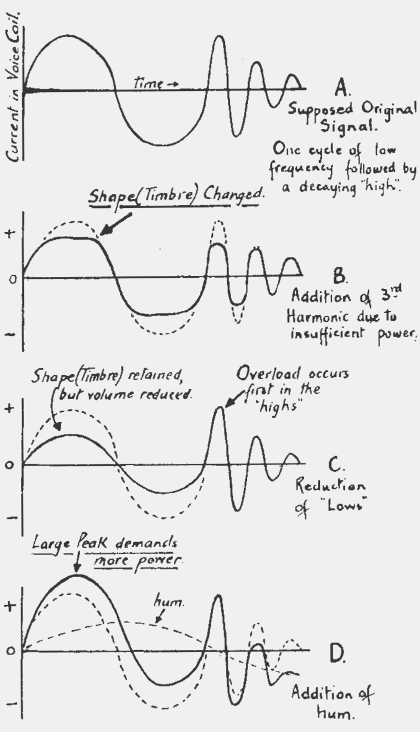
Harmonic distortion, or amplitude distortion as it is sometimes called, is the addition of spurious harmonics to the original notes. It is not the harmonics themselves but the combination tones they produce that is the real objection. This type of distortion occurs mainly at full volume and an amplifier should be designed so that very little harmonic is produced at the normal maximum level. Otherwise the peaks in the music will sound very harsh and "have an edge on them."

Frequency Distortion

If a radio or an amplifier sounds too mellow, too thin or "like a barrel," it is probable that some notes(some frequencies) are being reproduced more strongly than others. A lack of "highs" produces the mellow effect, which is usually more popular with female than male listeners. A lack of bass and middle frequencies gives the "thin" effect, while if both the extreme highs and lows are cut and some one note in the middle range emphasized, we get the barrel sound.

Generally, for low level reproduction, we require a slight emphasis on the bass with at least a full rendering of the ultra-highs.

For high-level reproduction, as in a very large room or small dance hall the frequency range needs to be restricted slightly as the extreme lows and highs become more noticeable at high volume, especially the highs. That does not mean to say that they should be cut off entirely — a little of each (say 5 per cent) shoud be left, or the reproduction, though "smooth" is not realistic. However, frequency response definitely comes second to the reduction of harmonic distortion. A frequency range of from 150 to 3,000 hertz (6 d.b. down at each end) with 2 per cent third harmonic is infinitely more enjoyable than a range of from 50 to 10,000 hertz with 7 per cent third harmonic. (That is, for music.)



Added Noise

In this classification, come hum and needle hiss.

Hum, if at 50 hertz, due to pick-up from filament wiring, is almost inaudible if pure and undistorted and is quite tolerable except at full volume, when it detracts from the available power, thus causing harmonics, and also modulating the sound. Hum can usually be minimised by careful lay-out of component, shielding all valves except the output and rectifier, generous decoupling, avoiding transformer coupling, and by earthing one side of the filaments or connecting it to about 50 volts B+.

Needle hiss (and that doesn't mean the scratchy noise from worn records) is a very high-pitched continuous sound and is often unnoticed. If the speaker is one that reproduces the highs very fully, it may be necessary to attenuate the high frequency response of the amplifier. An alternative is to use fibre or thorn needles, which do not fully transmit the high-frequency vibrations to the pick-ups.

Record Scratch

This is quite different and is of three kinds: noise in the record due to a faulty, or chattering cutter; noise from places on the record where the groove has been distorted by resonances in the pick-up; and noise from distortion of the groove due to wear. The first is usually low frequency, the second is of a fixed freqnency, the third is mainly high frequency.

To each the only answer is: Restrict the frequency response. This may make the reproduction less realistic, but at the same time it makes it more tolerable.

Scratch that is noticeable only at low volumes can be made slighly less objectionable by using automatic volume expansion, whilst scratch or distortion that appears only at high levels can be reduced in effect by using automatic volume compression. If both occur in the one record, you drop

(Continued on next page)

WEAK LINKS
(Continued)

it, and buy another. Records wear out faster than most people think, especially loud recordings. The loud patches go first because it is in these passages that the groove wears most from its mean position.

Always use the same pick-up on the same records as the pick-up wears the record most at its resonant frequencies and the frequency response becomes more uinform in that the peaks are flattened out.

Harmonic Distortion

Back again to this one. It cannot have too much emphasis n it. There is only one royal road to success and that is to use plenty of power. Even if you use ten times what you think is necessary you won't find it too much. You can't get high fidelity from "pea-lamps in push-pull."

Harmonic distortion, occurring as it does at full volume, emphasises the pick-up resonances because these overload the amplifier. The speaker should be well-baffled, or fitted with an exponential horn (not too long, say 2 ft. 6in. or 3 ft.). If of the electro-dynamic type, it should have plenty of wire in the field (say, 2 or 3 lbs.) and plenty of energisation also (12 to 14 watts), otherwise the bass notes will suffer. The writer uses a pair of 6L6G's in class A B, (with inverse feedback) and an Amplion 12P64 permag. The latter has a 64 oz. magnet. The 6L6G's have 300 volts on both screen and anode and a common bias resistor of 300 ohms. The plate to plate load is 7,000 ohms, though 6,000 or 5,800 would have been better. Excellent results have been obtained from a pair of 6B5 tubes in push-pull and using a Rola 10/42, but these components are not obtainable at present.

Harmonic distortion is additive as regards its effects. You may cancel out harmonics produced in one stage of an amplifier by producing others, out of phase in another stage, but the distasteful combination tones produced, do not cancel out; they are increased. A fact not well known is that a **short** exponential horn improves transient response.

Summarising and Emphasising

Use fibre or thorn needles to eliminate needle "hiss," otherwise use steel or "Tungstyle" needles.

The pick-up should be as free as possible from resonances as these wear the record and spoil the reproduction.

The amplifier should be reasonably free from hum, especially high-pitched hum.

Each stage in the amplifier should produce as little harmonic distortion as possible.

Use plenty of power (at least 10 watts, and an efficient speaker to save running everything "flat out."

Inverse feedback reduces distortion of all types.

Volume expansion reduces the noticeability of low-level hiss and scratch.

Use a large baffle board (at least 4 feet square) or an exponential horn.

Don't buy records with very loud peaks.

Have separate tone-controls for the high and low ends of the frequency range, or else use a switching type of tone control together with a fidelity control.

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HANDY FEEDBACK SYSTEM

ONE of the biggest advances in radio technique over the past four or five years is the wide application of various forms of inverse feedback.

Theoretically, feedback not only helps to eliminate harmonic distortion, but also flattens out the frequency response curve. It tends to cut down the overall gain of the amplifier, but this is not at all serious in these days of high-gain pentodes and sensitive beam power output valves. With triodes, too, the matter of gain is not an important factor, as modern pick-ups of the crystal type have a couple of volts output, so that high gain is unnecessary,

In practice, the use of feedback bears out all that can be expected of it from a theoretical point of view and accordingly it is easy to understand why it has received such wide acceptance from set designers and builders of power amplifiers of every kind.

There are times, however, when inverse feedback circuits fail to come up to expectations and, in such cases, the cause is almost certain to be due to parasitic oscillation introduced by the coupling of input and output circuits. Often enough it is found desirable to pay keen attention to lay-out of the wiring, with the use of ample preventatives in the way of small by-pass condensers and resistors fitted in grid and plate circuits as stoppers. Steps must be taken to make quite sure that no R.F. is present in the audio amplifier in the case of a receiver using feedback.

A Simple Circuit

The more complex the feedback circuit the better chance there is of trouble being encountered, and it is for this reason that we show a simple inverse feedback circuit recently sent to us by one of our readers, Stanley Nicholls, of Devonport, Tasmania, who says:

"The feedback system I use, so far I have not seen in any Australian paper. I got it out of the English "Wireless World" some years ago, and it works well. It runs rings round the system known as series feedback which, from my experience, seems to be nearly a wash-out.

"I give you the method; it is very simple and the voltage feedback is easily adjusted by varying the resistor R. The feedback does not cover the speaker transformer, so that it will suit any brand of speaker with various moving coil impedances.

"Resistor R, and the cathode resistor, constitute a voltage divider from the output valve plate to earth, so that the voltage feedback is easily calculated. The screen by-pass condenser is returned to 6J7G cathode, and may have to be .5 mfd. to prevent motor-boating if there is a tendency. Condenser .05 blocks D.C."

In Practice

Having a moment to spare recently, we put the time to good purpose by carrying out some practical experiments with this circuit and soon found that it can be applied to triodes with excellent results. Instead of the pentode and beam power valve, as suggested by Mr. Nicholls, we used a 6J7G connected to form a triode and a 6A3 output valve. Using this combination with a crystal pick-up we found that it made a most effective amplifier for record reproduction, with excellent tonal quality and power output, and just an amount of gain sufficient to allow the volume control to be fully extended, thereby avoiding any loading peculiarities which are sometimes encountered in amplifiers having so much gain that the volume control has to be heavily retarded.

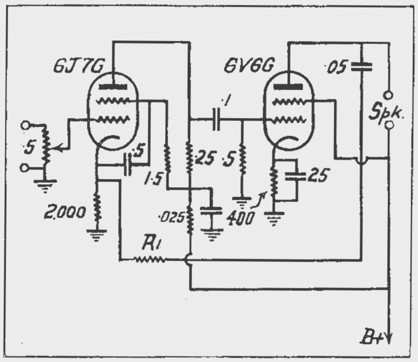

Figure 1

Tone Control

The circuit lends itself to tone compensation, as the capacity of the condenser in the feedback circuit and its relation to the effective impedance of the output transformer will have a definite bearing on the frequency range over which the feedback will be most effective. In some cases it may be found desirable to restrict the feedback to the higher frequencies, in which case a smaller condenser will give the desired effect.

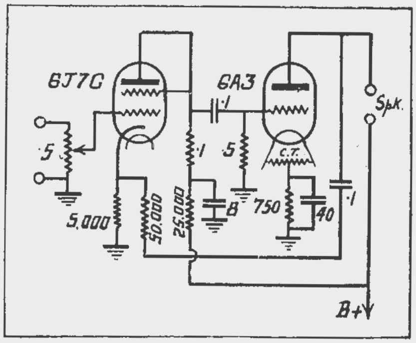

Figure 2

For Radio Use

The circuit is not so adaptable when it comes to radio work, as the fact that the cathode circuit is not by-passed will mean that there may be trouble where a circuit calls for a diode load to return to the cathode. There are, however, quite a few ways of dodging this difficulty.

TELEVISION AROUND CORNER

Lent to Australia by the British Government to carry out a special scientific work here, the well known television expert, Major W. E. Osborne, firmly believes that television services should be well established with two years after the war.

He accused the Commonwealth Government and Australian private enterprise of lack of vision in that nothing had been accomplished in the television field in Australia before the outbreak of war.

Major Osborne declared that the Australian licence fee of 20/- per year — just double the British licence fee—should provide ample funds for the national service to introduce television. He believed that the scope of advertising in this country should make television a commercial proposition.

The first cheap set, he believes, would cost about 50 guineas, largely because television amplification involves the use of a minimum of 12 valves. The special aerial would be two short copper rods, each about 5 feet 6 inches. On such a set it would be possible to have images flashed on a screen about 12 inches by 10 inches.

BETTER DETECTION FOR THE T.R.F.

SETS using tuned radio frequency are coming back into strong favour with many of our readers. Difficulty in obtaining converter valves was originally the cause of the swing towards t.r.f., but those who have experimented with sets of this type using modern coils, soon find that the broad tuning and high fidelity possibilities give the t.r.f. set a charm of its own.

The biggest problem with the t.r.f. set, however, is the detector circuit,

By

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as there are several fundamental differences here, and it is not possible to use the simple diode detector circuits which have proved so popular with superhets.

In the September issue of "Radio World" was described a five tube t.r.f. receiver that was built from parts that are readily available. Possibly the weakest point of the receiver was its detector — a 6J7G acting as an anode detector or "brassed grid" detector. This is particularly unfortunate because the rest of the receiver is on high fidelity, or "wide range" lines, and harmonic distortion from the detector is readily noticed. In this article, two possible modifications of the circuit are shown — each modification has its own particular merits.

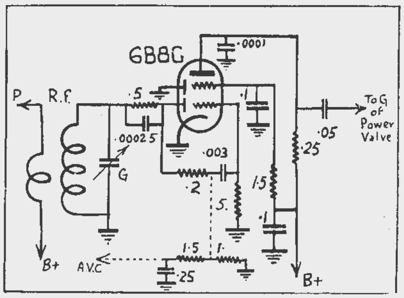
A.V.C. Available

The first circuit uses a 6B8G as a diode detector together with an audio frequency amplifier. The low frequency component is fed from the diode end of the diode load resistor through a resistor and a condenser to the control grid, which is connected at the top of the tube. From the same circuit an A.V.C. voltage can be obtained (this is shown as a broken line in the diagram) and this A.V.C. voltage can be applied to the R.F. valves to even out the levels of different stations.

There is one snag, however: to prevent excessive hum, the grid lead of the 6B8G must be shielded and the capacity between the grid lead and the earthed shield acts (with the diode condenser and condenser-effect in the resistor in series) as a small condenser in parallel with the third gang of the tuning condenser. If the coils are a little on the large size, there may be a spot of bother in lining up the gang. This can usually be overcome by removing the third trimmer entirely and keeping the 6B8G grid lead as short as possible. A 6B6G valve can be used in place of the 6B8G, but the gain is less and hum is more likely. For really high fidelity the .5 meg diode load could be decreased to .25 meg. and the .2 meg. isolating resistor increased to 1 meg., leaving the other values as they are. This results in a slight loss of gain.

Degeneration Applied

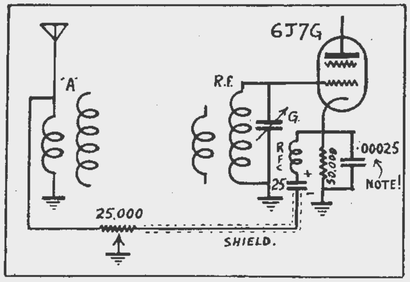
The second circuit attacks the problem of fidelity from a different angle and does not require a 6B8G, which may be difficult to obtain at present. The 6J7G remains as a plate detector but as the volume is reduced, degeneration is applied to the detector, reducing the gain and the distortion simultaneously. This idea of controlling the gain by an amount of inverse feedback is quite a good one and is often used in a different form for high fidelity amplifiers.



Diode-pentode detection for a t.r.f. set, giving low distortion and providing automatic volume control.

If the R.F. stages are carefully aligned and not too well shielded, there will be plenty of gain on local stations, so that there can be a good reduction in distortion.

In this circuit there is no way of obtaining A.V.C., although a sort of "over-load preventing" bias voltage can be obtained. This voltage is applied to the R.F. tubes in the same way as an A.V.C. voltage, but is not so effective It is obtained by putting a .5 megohm resistor in parallel with a .02 to .01 microfarad condenser in series with the "earth" or "filament" end of the secondary of the third R.F. transformer.



A simple arrangement for a t.r.f. detector to make use of degeneration.

Hum at Low Volume

Poor lay-out may result in hum at low volume when the cathode is no longer by-passed by the 25 r.f. condenser. Hum can be reduced in many cases by connecting one side of the filament to a high-tension voltage of about 30 (experimenting is sometimes necessary) and by by-passing both sides of the filament to earth with .5 mfd. condensers. The R.F. choke is not really necessary, but is there just in case one of the R.F. plate leads is a bit too long. If instability and oscillation are present, try turning this choke around for 90 or 180 degrees.

Inverse Feedback

A still further decrease in distortion (when using either one of the two detection methods) can be obtained by adding audio inverse feedback in one of the usual ways, the simplest and probably the most effective being to connect the anodes (plates) of the 6J7G (or 6B8G) and 6F6G with a 1 to 2 megohm resistor.

The second method of controlling volume (and fidelity) when using an anode detector lends itself to a novel form of tone control which gives not only the usual "high-cut" at one end but also a "high-boost" at the other. This tone-control will be described in a coming issue of "Radio World."

These circuits can also be applied to the "Simplest Five-Valver" described in the September, 1941 issue, and to practically every style of t.r.f. set.

FURTHER CIRCUIT SUGGESTIONS

Another of a popular series of articles dealing with novelties and refinements of circuit design. In this issue are: Positive feedback to boost the highs, higher sensitivity for output pentodes, oscillator for electron-music and a reflex circuit.

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7 Adeline Street, Preston, Vic.**

Positive Feedback

Although positive feedback tends to cause increased distortion, this may not always be the case (see Parry's article on Compensated Acoustics in the February, 1941 issue of "Radio World.") Positive feedback should not be applied to the middle of the frequencies, but only to the extreme lows and/or extreme highs, otherwise overloading may be produced. The amount of positive feedback should be small or oscillation will result. In the circuit shown in Fig 6A, positive feedback is used to boost the extreme highs. The anode of the output tube is connected via a small capacity condenser to the input or control grid of the preceding tube. the capacity of the condenser

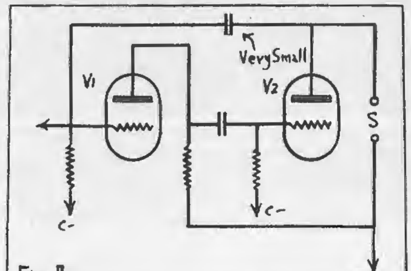


Fig. A.

controls, the amount of feedback, and should be very small. It may consist of a length of insulated wire, one end being twisted two or three times around the output lead and the other end twisted once around around the grid lead. If the two tubes have a high gain, even that may be too much and the capacity can be obtained merely by having the grid and anode leads close together. Remember that over-doing the positive feedback will produce horrible distortion of the highs, if not a continuous whistle. Before using positive feedback it is well to see that a good speaker with plenty of field excitation is used. Negative feedbacks to **reduce** the highs can be obtained by coupling the grid and anode of the same tube by a small condenser (say, .001 up).

Increased Sensitivity

The sensitivity of output pentodes and tetrodes may be increased by in-

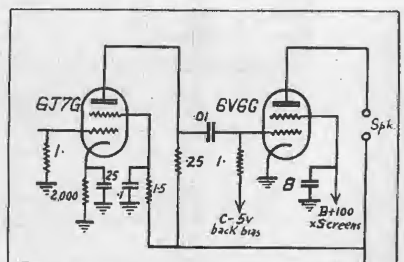


Fig. B.

creasing the load, reducing the bias and reducing the screen voltage. The last does not increase the sensitivity, but is necessary on account of the former.

The lower screen voltage allows a higher value of grid resistor and this again increases the gain by increasing the effective anode load on the driver valve.

One disadvantage of this reduced screen voltage is the reduction in power output, but this is not as serious as it sounds. Most tetrodes and pentodes have an output that is much greater than is required and quite recently some mantel sets have had power outputs of less than half a watt. Even that is much greater than the output of a battery set.

Another disadvantage which is more apparent than real is that the reduced screen voltage may require a dropping resistor and by-pass condenser. This, however, may be overcome by using the same voltage for the output screen grid as for the R.F. and/or I.F. screen grid. The by-pass condenser must be a little larger than usual. In the circuit shown, the overall sensitivity for the two tubes is 41 mv. peak per watt, while for a conventional circuit (using .25 meg anode load for the 6J7) the overall sensitivity is 74 mv. per watt, so that by careful design it is possible to get a gain of a least 1¾ times the usual.

A.F. Oscillator

Music from electronic sources is becoming more and more popular. No large dance band is complete without two or three "electric" instruments, and it looks as if electronic devices are going to be used, not only for amplification and reproduction, but also for actually producing the sound.

In an experimental "music-box" a very stable oscillator was required so that it would keep in tune with other instruments. Furthermore the oscillator had to have a large number of notes, be compact and have

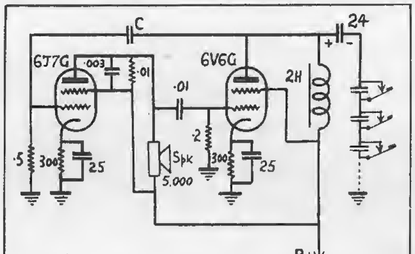


Fig. C

a fair power output (say, 2 watts).

A 2-stage oscillator was built up, using positive feedback to maintain oscillation. The frequency depends on one tuned circuit only, and this was

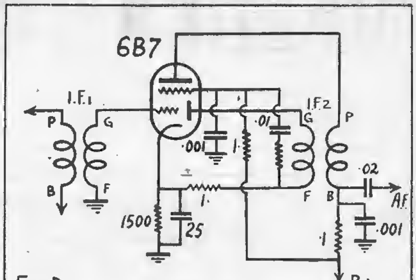


Fig. D.

altered as the "box" was played by varying the capacity. A number of condensers in series were shorted by switches when not in use. Pressing a key opened a switch and the corresponding condenser tuned the circuit. When no key was pressed the inductance was shorted and no audible oscillation was produced. The speaker was shunted by a fixed resistor so that it had not appreciable resonant effect, otherwise the frequency of oscillation might depend on the speaker. The tubes used were a pair of 6V6 tetrodes. Other types of oscillators

(Continued on page 24)

TOLERANCES IN SET DESIGN

ACCURACY is always comparative, and with many wireless components it does not closely approach the absolute. And yet, in other components inaccuracy of two or three per cent might be sufficient to render a receiver completely unsatisfactory. It is clear from this that it would be worth while to study the question more closely with a view to finding approximately what degree of accuracy is required in the values of different components.

As most readers are no doubt aware, fixed condensers and fixed resistors of good quality are generally accurate to within plus or minus 10 to 15 per cent. That is, the makers do not guarantee a fixed condenser with a nominal value of .001 mfd. to be exactly that value, but they do guarantee that its exact capacitance will lie between .0009 and .0011 mfd,, if the "tolerance" is given in the catalogue as "±10 per cent." In the same way, a fixed resistor with a rated value of 100,000 ohms will have a resistance of not less than 85,000 ohms nor more than 115,000 ohms, if the tolerance is plus or minus 15 per cent.

To Special Order

Of course, if for any reason a greater degree of accuracy than this were required, most of the well-known makers would supply the part on special request, but a slight extra charge would be made. The component would probably not have to be made specially, but the tester would have to choose it from the thousands passing through his or her hands.

From this it might appear to the casual observer that radio must be a very inaccurate science, but that is by no means the case. For example, if you were to buy a high-grade, all-wave tuning unit, the sections would probably be matched to an extremely high degree of accuracy; they must be if the unit is to be efficient over the full range of wavelengths covered. Valves, on the other hand, are looked upon as extremely delicate and accurate assemblies. They are to a certain extent, but if the principal characteristics are within 10 per cent of the published figures the user would rarely detect any difference between two valves with the maximum permitted variation in characteristics.

Useless Super-accuracy

Let us consider a typical superhet circuit. As long as trimmers were provided on the two-gang tuning condensers, the coils and condenser sections need not, initially, be balanced to a degree of accuracy finer than about 10 per cent; in fact, in most cases any greater degree of accuracy would confer no advantage. That is because the matching of the two tuned circuits could be upset to a fairly considerable extent by the use of long leads, especially if some of these were shielded by means of earth connected screened braiding. But if the coils and condenser sections were made to tolerance limits of 10 per cent or thereabouts, quite small trimmers would be adequate to ensure almost perfect balance.

By-pass Condensers

Among the fixed condensers there is a large number whose purpose is merely to provide an easy by-pass for H.F. and L.F. currents. Provided that their impedance is low in relation to their corresponding resistors at the average frequency of the currents in their circuits, it is unnecessary that their capacitances should be within at least 50 per cent of the average values. That explains why you so often see values carrying from .01mfd. to 1 mfd. for the condenser connected between the screening grid of a pentagrid or H.F. pentode and earth. Taking an average frequency of 1,000 kc/s (300 metres), the impedance of a non-inductive condenser of .01 mfd. is about 16 ohms. This is considerably lower than the value of resistor generally used in the lower arm of the fixed screening-grid potentiometer.

At 10,000 kc/s (30 metres) the impedance (strictly speaking, the reactance, which is almost the same for most practical purposes), would be only 1.6 ohms, and therefore the value of .01 mfd. would be adequate. In the same way, increasing the value to .1 mfd. would be equivalent to dividing the effective impedance by ten, which means that a 1 mfd. condenser has an impedance of only 1.6 ohms at 300 metres, or 16 ohms at 3,000 metres. Generally speaking, therefore, it will be seen that the lower of the two values mentioned would be perfectly suitable in a short wave set, whereas .01 mfd. would be better on the medium-wave band, and 1 mfd. might be better on long waves. We can thus say that .1 mfd. would be suitable for use in most all-wave receivers.

Unwanted Inductive Reactance

It might be thought that it would be better to be on the "safe side" by using the largest of the the three condensers. But it must be remembered that even a so-called non-inductive condenser of normal type has a certain amount of inductance. As inductance produces increased impedance, and as its value varies in direct proportion to the rated capacity, it is best to use the lowest capacity that gives a reasonably low impedance.

Similar rules apply to the H.F. by-pass condenser between the bottom of the oscillator anode winding and earth, although in this case the impedance should be considered in relation to the voltage-dropping resistor between the coil and H.T.+. If the value of resistor is not less than 25,000 ohms, a .1 mfd. by-pass condenser is suitable; if the value exceeds 50,000 ohms it would be possible to use a condenser of lower value.

Grid-coupling Condensers

Now let us consider the coupling condensers. One is the grid condenser for the detector, a second is the oscillator grid condenser, and the other is in the grid circuit of the L.F. valve. The two first could have a value of .0001 mfd., but the latter should not be less than about .01 mfd. The reason is that the detector grid condenser is dealing only with high-frequency currents, the frequency of which would be about 500 kc/s in a modern superhet. At that frequency a .0001 mfd. condenser has a reactance of just over 3,000 ohms, which is low in comparison with the almost infinite impedance of the secondary circuit of the I.F. transformer and with the grid-leak resistance of about 2,000,000 ohms.

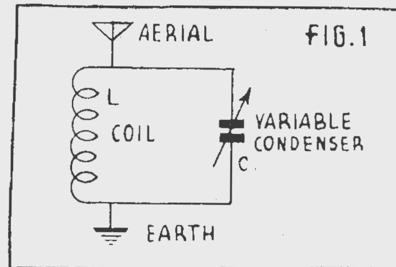
The L.F. condenser, however, has to handle low frequencies from about 50 cycles up to 5,000 cycles. If we take the average as 500 cycles we say that the average impedance of a .01 mfd. condenser is just over 30,000 ohms; this is low in comparison with the impedance of the two resistors in the detector anode circuit. In consequence, the L.F. currents will pass into the L.F. transformer far more easily than they can "leak" through the H.T. circuit to earth.

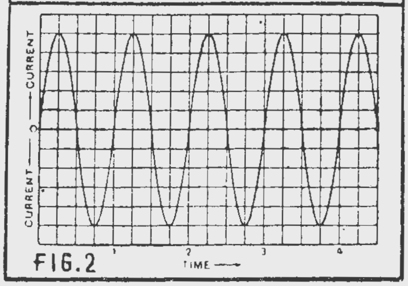
Among the other by-pass condensers we have those for by-passing the decoupling resistors for the anodes of the first three valves and that for the auxiliary grid of the output pentode. To prevent the building-up of audio voltages in the H.T.-supply circuit these should offer far less im-

(Continued on page 24)

More About The Tuned Circuit

In this instalment the way in which the signal is broadcast by the transmitter and intercepted by the receiving aerial is explained.





NOW that we know the simple mechanics of the tuned circuit, the way in which it works when actually used in a receiver will next be considered.

In a previous article it was shown that there are different kinds of alternating currents, differing in character according to their frequency of alternation. Change of direction may be relatively infrequent, as in A.C. power main (of the order of 50 cycles per second), fairly rapid as in the case of speech currents (from 50 to about 15,000 cycles per second), or very rapid as in currents of radio frequency, varying from 50,000 to 30,000,000 cycles per second and even higher. It is these last-mentioned currents that we are considering in reference to tuned circuits.

From last month's article we know that if a current of high or radio frequency is applied to an oscillatory circuit as shown in Fig. 1, and the variable condenser adjusted so that the natural frequency of the circuit coincides with that of the signal, resonance takes place, and the voltages across the coil-condenser combination are at maximum.

This is exactly what happens when the signal from the aerial is applied to the first tuned circuit of any receiver. In Fig. 1 the aerial is denoted by the arrow-shaped symbol joined to the top of the coil winding "L," with the tuning condenser "C" in parallel with it. The symbol composed of parallel lines, also arrow-shaped, at the foot of the diagram denotes an earth connection.

How the Signal is Radiated

Now, before going any further, we will consider just how the signal is generated, and how the aerial intercepts it and passes it on to the receiver.

The basis of the signal sent out by the transmitting station is a continuous -valve-generated radio frequency oscillation, consisting of nothing more or less than a continual surging to and fro of current in a circuit similar to that shown in Fig. 1.

This alternating current can be graphically represented by what is known as a sine curve (see Fig. 2). A good idea f the tremendous rapidity of oscillation can be gained from the fact that if the wavelength of the oscillation shown is 300 metres (i.e., a frequency of 1,000 k.c. per second, or 1,000,000 cycles per second), then the figures one to four along the time scale represent milliionths of a second.

In a transmitter these r.f. currents are conveyed to the aerial, and are radiated out into space as a electromagnetic wave consisting of electric and magnetic fields that travel outwards with the speed of light (186,000 miles per second).

The Meaning of Modulation

This radiation represents the carrier wave, so named because in itself it does not give us the speech and music we hear, but merely serves to transport it from the transmitting station to our receivers. This transportation is accomplished by means of a process called modulation, and this will now be explained.

The first and one of the most

important units in the radio chain is the microphone. There are many different types, but the basic principle common to them all is that of the microphone used in the ordinary telephone — to transform sound into corresponding electrical impulses.

In the carbon type microphone this is accomplished by making the sound impinge on a thin diaphragm, behind which is a cavity housing carbon granules. Current is passing through these granules all the time, even when no sound is present to actuate the microphone.

When sound waves strike the diaphragm, however, as when a person speaks into the microphone, the varying pressure generated by the sound waves causes varying pressure on the granules. This results in a corresponding variation in the electrical resistance of the granules to the current flowing through them. and so that current must also vary. Hence in this varying current we have an exact electrical replica of the sounds impinging on the diaphragm of the microphone.

To simplify matters, we will assume that, instead of a complex sound a single, pure 1,000-cycle note is played in front of the microphone. This can be represented by the sine curve shown in Fig 3 (b). Fig. 3 (a) can be taken to represent the radio frequency current though to represent it faithfully there should be many more "ups and downs" than are shown.

Now we have the musical note, and the constant radio frequency oscillation. The next step is to mix the two so that when the carrier is radiated it will bear the impress of the audio signal we want to transmit. This process is termed modulation.

Fig. 3 (c) shows what happens when this takes place. It will be noticed that the composite wave consists of the original r.f. oscillation, but that it is no longer constant in amplitude. (This means that whereas a horizontal straight line can be drawn along the peaks of the waves shown in Fig. 3 (a), in Fig. 3 (c) this is no longer possible). Nevertheless, the important point to note is that the frequency of the radio frequency wave remains unaltered. The variations of its amplitude are such that the tips of the modulated wave outline an exact replica of the low or audio frequency modulating current. Its envelope, as it is called, is outlined in Fig. 3 (c) by a dotted line.

After the receiving set has picked up the carrier and it has been passed on to the detector (second detector in the case of superhets), it is no longer needed, and so it is dispensed with and the audio frequency signal made audible by the process of detection or demodulation. This will be explained later In the meantime, the way in which the aerial picks up the signal and passes it on to the set has yet to be considered.

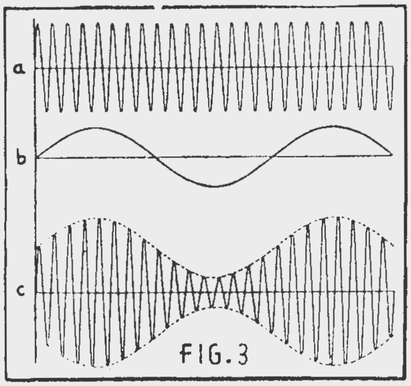


FIG. 3

Picking up the Signal

The vital link between the transmitter and the receiving set is the aerial, which intercepts the signals and hands them on to the set. As the transmitted signal, travelling with the speed of light, crosses the aerial, it induces in the latter an alternating current having a frequency corresponding to that of the transmitter. For example, if the latter operates on 500 metres, or 600 k.c. (metres × kilocycles = 300,000) the frequency of the current induced in the aerial equals 600 × 1,000 = 600,000 cycles per second.

Just like the simple oscillatory circuit discussed last month, every aerial has a natural period of vibration, or a natural resonant frequency. This can be found very approximately by multiplying the total length of wire comprising the aerial and lead-in by 4.5 This gives the natural wavelength of the aerial in feet. To convert this to metres, divided by 3.28, and to obtain the resonant frequency in k.c., divide the result into 300,000.

Thus, with an aerial 100 feet long, the natural wavelength = 100 × 4.5 ÷3.28 = approximately 137 metres. Thus the resonant frequency equals 300,000 ÷ 137= 2,183 kilocycles per second.

From the above, it can be seen that the longer an aerial is, the higher is its natural wavelength or the lower its natural frequency Thus we could actually tune a simple receiver just by altering the length of the aerial for each station required. In practice, though this would be hopelessly inconvenient, and so another method of tuning is used. The main point to remember is that an aerial, although it is usually strung up in one single length of wire, actually possesses an appreciable amount of inductance and capacity, the amount of each depending on the length and height.

The way in which an aerial is tuned so that it can be made to resonate to any wavelength within any given waveband is to add inductance and capacity in the form of a coil and condenser, as shown in Fig. 1. The amount of inductance, or in other words the number of turns of wire required on a given diameter former, and the amount of capacity, can be calculated when the limits of the waveband it is required to cover are known.

The formula is:—

$$f = \frac{1}{2\pi\sqrt{LC}} \times 10^6$$

where "f" is the frequency in k.c., "L" the inductance in microhenries, and "C" the capacity in micromicrofarads.

NAZIS DESERVE ENTERTAINMENT TAX

A blatant fake put over on the German radio after the Dieppe raid caused much amusement to some listeners at the BBC.

An announcement from a German station that its war observer would broadcast in English an account of the Dieppe battle, brought a little band of producers and scriptwriters into a Listening Room. Hoots of laughter greeted the said observer's opening remarks. He alleged that he was standing on the cliffs at Dieppe and giving a running commentary on crashing Spitfires, burning tanks, etc. etc. BBC producers couldn't help being amazed at the Germans' luck in having an English-speaking commentator, complete with recording car, on the cliffs at Dieppe at exactly the right time.

The actual commentary itself was no end amusing. The speaker said, in a perfectly flat, uninterested voice: "Here is a Spitfire crashing." Then came sound effects of a Spitfire which—judging by the noise—crashed not more than three feet from the commentator. Next, without a pause or any change of tone, he went on to describe four tanks being demolished in swift succession, again with suitable 'effects' noises.

This 'eye-witness' — or eye-wash witness — account was thought too good a joke to be kept to a small circle of BBC staff. So a recording of it was put out in a BBC Radio Newsreel in the African Service. Later, 'Combined Operations' accepted the BBC's offer to send discs of the recording to some of the returned Dieppe raiders in a south of England hospital—purely for entertainment value.

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

IN THE GOOD OLD SUMMER TIME

Well, summer is approaching, whether the week-end rains suggest it or not; reason for this statement is because the 13 metre band is coming to life. Mr. Gillett, of Adelaide, writes he has heard them several times during October, and has been able to follow the programme. At my little post I have picked up a carrier and expect any night now to copy same also.

DINNA YE HEAR IT?

Apropos of my reference to the BBC enquiry regarding peculiar noise heard on several frequencies, Roy Hallett tells me, when tuning to some of the European broadcast bands, he heard the same noise, so it looks as though the jamming is of Enemy Origin. Anyhow, they are still about as only this morning (November 2) they were right on top of GSA, London, 6.05 m.c. at 6.30 a.m.

TELEVISION ALMOST HERE

There is no doubt short-wave transmissions are comparable with locals for clarity, and one becomes so accustomed to the overseas announcers that you can, as Mr. Du Faur says, "almost see the gesticulations of the charming French announcer on TPZ, Algiers." He is referring to the session at 6 p.m. on 24.76 metres.

ALL FOR THE BEST

Once again the Americans have made a change and this time for the better reception of KWID. Probably a number of our listeners have noted they close on 31.35 metres at 9 p.m. and open again at 9.15 on 41.49 m. A very fine signal too.

WILLIAM WINTER

Elsewhere in this issue is a reproduction of a fine photo of this great broadcaster, which accompanied a very nice letter received a few days ago.

Am surprised I have not had a reply from KWID, especially as so many have had verifications.

MOSCOW CALLING

Dr. Gaden tells me Radio Centre Moscow on both 19.69 and 19.85 m. at 9.45 a.m. give full schedule of wave-lengths, etc. Our lady friend gives the information, which is followed by an English session. Our Quilpie listener favours 19.85m. for best reception.

Talking of Russia, another Queenslander, Mr. Hugh Perkins, says he has heard Moscow on 30.5 metres at 10.50 p.m. Well, that's probably right, our Russian ally has certainly tried a few bands.

SWITZERLAND

I have a letter from The Consulate General of Switzerland, Sydney, stating that as from October 4 Central Europe time returned from summer to normal. This means broadcasts from Switzerland will be received one hour later in Sydney.

The August issue of "The Globe Circler," received this week, shows a Swiss station I do not think is heard here. This is HER-4, Bern, 9538 kc., 31.46m. Schedule: 7.45 a.m. to 9.10 a.m. and 9.45 a.m. to 12.15 p.m. News at 10 and 11 a.m. I doubt if these times would suit us, but maybe our Queensland and N.Z. friends will try.

MATUTINAL MUSIC

While I dislike the source of supply, I must admit the programmes from Rome at 6.30 a.m. are excellent. I find that as London is so often spoilt by the interfering noise referred to elsewhere, that I am tempted to come down to 47.50 metres and get almost perfect reception, and a most entertaining session. The same programme is generally on 30.77 metres, too, but I prefer the first-mentioned.

AMERICANA

As can be understood, American Radio papers are arriving very much later than before the war, and consequently a number of the schedules shown have been altered since the paper was printed, but in a lot of things they have troubles in common with us. For instance, "Universalite" mentioning BBC stations says, "A fuzziness is noted on GRN just like that on GSA. Is this Nazi jamming?" Readers will remember my friend, Ray Dissinger, Short Wave Editor of "Universalite" (the splendid magazine published by The Universal Radio DX Club, California) who used to send us some fine information re the South Americans, etc. Ray has joined the colours and his place has been taken by William Howe. Mr. Howe sent me some notes that are printed elsewhere in this issue, but one note I think is worthy of mention in this column. In a verification from HER-4, Berne, 9535 kc,, 31.46 m. they said, "We are very grateful for all the kind things you wrote on our dear little country. Let us hope that peaceful Switzerland will be left untouched by the bloody turmoil storming around her small territory, and able to pursue her activity."

And here is a list of the wave lengths which can be used by the Swiss transmitter at Berne in their evening transmission to North America: 49.55 metres; 6055 kc., 19.60 m.; 15,305 kc., 16.87 m.; 17,784 kc., 13.94m.; 21,529 kc.; and 11.70 m.; 25,640 kc. There are, of course, in addition to HER-3, 48.66 m.; HER-4, 31.46 m.; and HER-5, 25.28 m. The new ones, which I do not think have so far been used, are certainly worth watching.

ATHERTON TABLELANDS

Hugh Perkins, of Malanda, Q., recommends listening to the dramatic feature "Attack", presented by the BBC from 10.30 p.m. till 11 on Thursday night. (I found GRD, 19.42 m., gave splendid signal.

He also tells me the U.S.A. feature "Command Performance," is now put over by the BBC at 12.45 a.m. on Monday mornings. GRD for good results.

FROM TUSCALOOSA, ALABAMA

Here are a few notes from my friend William Howe, Short-wave Editor, "Universalite," California.

NEW SAN FRANCISCO SHORT-WAVE STATION

O. F. Walker, radio engineer of the General Electric Company, is now in San Francisco supervising the installation of a 100,000-watt short-wave transmitter, which will be another gun in a kilocyclic battery "shooting" from the United States across the Pacific in the propaganda war with Japan.

The powerful transmitter, built by General Electric and operated previously at its Schenectady station WGEO for short-wave broadcasts to Europe, and Latin America, will be operated in San Francisco under call letters KWID. Operators of the station will be Associated Broadcasters, Inc., operators of long-wave station KSFO. General Electric is completing another 100,000-watt transmitter for WGEO at Schenectady and meanwhile is on the air there with two other short-wave transmitters, WGEO and WGEA.

KWID, which will have studios and offices at the Hotel Mark Hopkins, will render additional short-wave service to that now being given by General Electric's 50,000-watt San Francisco station KGEI, with studios and offices at the Fairmount Hotel. KGEI has been broadcasting to Latin America, Asia, the Antipodes, and Africa for more than three years, and is at present the only United States short-wave broadcasting station west of the Mississippi.

(Times are Australian Daylight Saving Time).

Wehrmacht Sender Nord (Norway Freedom Station) 10,050kc. 29.79m. Music and talks in German. Irregular, but heard around 7.30 and 9.15 a.m.

Gustav Siegfried Eins, 9485kc, 31.65m. Mystery German. Leaves the air at 8 a.m.

OFD, Helsinki, 9495kc., 31.60m. Heard 8.05 a.m. with lady announcer. Interference from XEWW.

Radio Debunk, anti-American pro-Nazi station no longer heard on 7200kc.; now being heard on 10,350kc., 28.99m. with nowhere nearly as good a signal as previously. Schedule: 11 to 11.30 a.m. (note slight difference in frequency to Mr. Cushen's 10,340, mentioned in October issue.—Ed.).

LRS, Beunos Aires, 9300kc, 32.26 m. Relays LR-4 Emisora Splendid. 4 note ascending chime. 11 a.m. to 1 p.m. (Think this is nearer 9320kc., 32.19m.—Ed.).

COCQ, Cuba, 9520kc., 31.50m. Being heard on this new frequency now.

PJC-1, Willemsted, Curacao, 7250 kc., 41.38m. New frequency, tremendous signals. 11 a.m. to 12.30 p.m.

ZPA-2, Teleco, Paraguay, 11,720kc., 25.60m. Best chance for you in Australia to hear Radio Teleco is around 10 a.m. to noon.

Radio Eirann, Athlone, 9595kc., 31.27m. Now on the air from 8.10 to 8.30 a.m.

YV3RN, Caracas, Venezuela, 6120 kc., 49.02m. This is a new frequency heard from 11 a.m. to 1 p.m. Relays YV3RA La Voz de Barquisimeto. 4 note chime. Also relays NBC's Latin American programmes.

YV4RO, Valencia, Venezuela, 6130 kc., 48.94 m. This is a new frequency. Heard relaying YV4RA La Voz de Carabobo, 11 a.m. to 1 p.m.

Radio Commercial de Quito Ecuador, 7270kc., 41.27m. This is a new station heard from 10.30 a.m.

YSY, San Salvador, 7255kc., 41.55 m. Another new station giving good signal from 11.30 a.m. till 2.30 p.m.

(Well, times may not suit all our localities, but it's a mighty fine list. —Ed.).

Dr. GADEN LISTENS IN

A last minute air mail from Quilpie, Queensland, shows that KWID, 'Frisco, on new wave length of 41.49 metres, is coming through with tremendous signals in news at 10.15 p.m. but the doctor says KES-2, 33.59m., is no good at all. Dr. Gaden has not heard WJT on 34 metres in English at 9.30 a.m.

The 13 metre band is coming good at 10 p.m. but not as strong yet, as the 16 or 19 band; but, of course, free from noise.

Our Queensland friend recommends trying Radio Saigon at 2.30 p.m. and CB 1180 at the same hour. Signal is not too loud, but worth tuning in.

Dr. Gaden thinks there must have been some further sun-spot trouble, as VLR, Melbourne, at 7 p.m. on October 28, could not be heard, and VLG-3 was poor, but by 7.30 p.m. all O.K.

On the same morning at 9.45, after excellent reception, suddenly all over the band a horrible din, even on broadcast,

On both occasions Dr. Gaden conferred with three locals after trying out his two receivers, and they found conditions just the same as our friend.

(Of course, this may have been local interference, but I found conditions somewhat similar on several occasions, towards end of October, but just put it down to unusual weather conditions.—Ed.)

AT LONG LAST

My verification of report on 15,290 k.c., dated May 8, has arrived. Very nice white card with printing in red, blue and brown, giving address, etc. The Associated Broadcasters Inc., International Broadcast Station, Broadcasting House, Nob Hill, San Francisco, California, U.S.A.

THE BRAIN TRUST

May be the session in which questions are answered by the Brain Trust can be heard at a more convenient hour, but at 6.30 a.m. on Wednesdays, through the BBC on 49.50 metres, I find it good listening and strangely enough, the jamming noise is not apparent during this programme.

AIR MAIL FROM MALANDA

Mr. Perkins sends down some loggings, unfortunately received too late for classification.

He reports hearing a South African on approximately 50.32 metres at 6.50 a.m. with a relay from ZRH, Johannesburg, 49.95 metres. Closed at 7 a.m. with African National Anthem, and "God Save the King."

(I don't know an African on 50.32, but ZNB, Mafeking, 5890 k.c., 50.90 metres is heard at 6.50 a.m., and I think in the same programme as ZRH.

However, Hugh is a very keen observer, so this may be a new station, or a changed frequency.—Ed.).

Our Malanda friend reports hearing VLG-4, Melbourne, 25.33 metres on October 30, at 9.33 p.m. in a test transmission to Chungking; signal was R6.

Mr. Perkins also noted that KWID changes to 41.49 metres at 9.15 p.m. and at 1.20 am. heard a talk to the people of India. At 1.30 a.m. station announcements followed by swing session till 2 a.m. when news was read.

Our reporter says from 1.30 a.m. till 2 a.m. the station seemed to be deliberately jammed.

Hugh states FK8AA, Noumea has an R7 signal at 7.10 p.m. and closes with "March Lorraine," only.

Concluding his letter, Mr. Perkins says on October 22 he tuned in a new London transmitter on approximately 16.93 metres at 2.42 a.m. with an R5 signal in Eastern service.

C.B.S.

Dr Gaden has received a verification of his report of July 5 to WCDA. It shows same as WCDA-4. 10 transmitters are listed, but only 3 call signs viz., WCRC, WCBX and WCDA, so the "4" is a matter for conjecture at present.

FROM THE GOLDEN WEST

Just a short note on short waves from Mr. Overhen of Donnybrook, W.A., who classes KWID, 31.35 metres the best station in the afternoon with KGEI a good second.

NEW STATIONS

DXV, Berlin, 17,820kc., 16.83m.: This new Nazi outlet first mentioned by Mr. Perkins, generally carries same programme around 9.30 p.m., as DJH. (This was referred to in October issue and Mr. Perkins has since heard call sign.—Ed.).

WCP, New York, 15,565kc., 19.27m.: 7 to 8 a.m. carrying same programme as WCW.

KWID, San Francisco, 7230kc., 41.49m.: A new frequency for this international S.W. station opens at 9.15 p.m. and closes at 12.45 a.m. News every hour from 10 p.m.
Quite a nice signal when opening, and draws attention to KES-2, 33.59, joining them at this hour.

WGO, New York, 14,492kc., 20.7m.: Mr. Perkins, of Malanda, reports hearing this station with news at 12.12 a.m. R3-4 signal.

Radio Shanghai, 11,970kc., 25.05m.: Mr. Hanson, of Merrylands, told me of this Jap station heard giving news in English at midnight. Closes at 12.15 a.m. Opens again at 12.30 a.m. and talks to Indian Independence League in English till 1 a.m.

Roy Hallett writes he is hearing Indian Independence station at 3 a.m. with Prisoner of War news.

(I am just inclined to believe this station is being confused with Radio Singapore (Shonan) first mentioned in August issue.—Ed.)

The MONTH'S LOGGINGS

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.

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

AUSTRALIA

VLG-6, Melbourne 15,230kc, 19.69m
8.30 to 9 p.m. for South West Pacific.

VLG-7, Melbourne 15,160kc, 19.79m
National Programme from 6.30 a.m. to 8.10 a.m., 12 noon to 1.15 p.m.; 7 p.m. to 7.18 p.m. news. On Sundays: 6.45 a.m. to 8 a.m.; noon to 2 p.m.; 7 to 7.18 p.m.

VLR-3, Melbourne 11,880kc, 25.25m
Nat. Prog., noon to 6.15 p.m. daily. 12.50 p.m. to 6.15 p.m., Sundays. Special reading of news for U.S.A Forces in Australia at 5.20 p.m.' daily, but at 5.25 p.m. Thursdays. R6 signal in afternoon in New Zealand (Gandy).

VLQ-2, Sydney 11,870kc, 25.27m
9.40 p.m. to 10.15 p.m. for North-east Asia.

VLG-4, Melbourne .... 11,840 kc., 25.34m
Mr. Du Faur reports hearing this station at 9.15 p.m. on October 17, announcer said, "You are listening to the news in a test transmission from Australian to China." This transmission was directed to Chungking, signed off with Chinese National Anthem and Australian National Anthem

VLW-3, Wannerao 11,830kc, 25.36m
Heard daily from 8 a.m. to 11.45 a.m. Heard church service just after 1 p.m. Noisy (Du Faur).

VLR-8, Melbourne 11,760kc, 25.51m
Nat. Prog., 6.30 a.m. to 10.15 a.m. daily. 6.45 a.m. to 12.45 a.m. Sundays.

VLG-3, Melbourne 11,710kc., 25.62m
1.25 to 2.10 p.m. and 3.25 to 4.10 p.m. for Western Coastal region of Nth. America; 4.55 p.m. to 5.40 p.m. for Tahiti (in French). 6.30 to 6.45 p.m. for New Guinea (in Japanese).
5.55 to 6.25 p.m. for the British Isles.
Mr. Du Faur heard station open again with news in English and concluding at 8.50 p.m. Music followed and station closed down at 9 p.m. (This programme was for Australian forces in the SW. Pacific.)

VLW-6, Perth 9680kc, 30.98m
Heard nightly 9 p.m. to 11.15 p.m. in W.A. ABC programme, but as usual in summertime, not so good (Gaden). Programme for South East Asia (in Dutch, Malay, French and English). from 12.15 a.m. to 1.55 a.m.

VLQ-5, Sydney 9680kc, 30.98m
1.25 to 2.10 p.m. and 3.25 to 4.10 p.m. for Western Coastal region of Nth America. 5.55 to 6.25 p.m. for British Isles.

VLR, Melbourne 9580kc, 31.32m
Nat. prog. 6.45 p.m. to 11.30 p.m. Now in summer form at 7 p.m. (Gaden). But nearly 10 p.m. before good in N.Z. (Gandy).

VLG-2, Melbourne 9540kc, 31.45m
10.25 p.m. to 11.30 p.m. for Eastern States of North America. 12.15 a.m. to 1.55 a.m. for South East Asia in Dutch, Malay, French and English). 2 a.m. to 2.45 a.m. for Western States of Nth America.

VLQ-4, Sydney 7220kc, 41.55m
7.25 to 8.25 p.m. for New Caledonia and French Oceania (in French). Good signal in N.Z. (Gandy).

AFRICA

Algeria:

TPZ, Algiers 12,120kc, 24.76m
"Radia Algier" (pronounced Radio Alzhay). Broadcasts Vichy-French programme from 6 to 9 a.m. and 5.45 p.m. to 6.15 p.m.

TPZ-2, Algiers 8960kc, 33.48m
Vichy-French programme from 7.05 a.m. to 9 a.m., and 5.45 p.m. to 6.15 p.m. Very strong signal in mornings (Du Faur).

Bechuanaland:

ZNB, Mafeking 5895kc, 50.90m
Not reported this month, but was being heard around 7 a.m.

Belgian Congo:

OPM, Leopoldville 10,140kc, 29.59m
Being heard weakly. Asking for reports. closes at 6.45 a.m. with Belgian National Anthem.

William Winter who talks to Australia from San Francisco, U.S.A., by radio telephone every Saturday.
His talk is recorded by the Australian Broadcasting Commission and broadcast over National Stations at 7.23 p.m. on Saturdays and again on Sundays at 1 p.m.
The above reproduction is from a photograph sent by Mr. Winter to Mr. L. J. Keast, our Short Wave Editor

Cape of Good Hope:

ZRK, Capetown 6097kc, 49.20m
No reports.

Egypt:

SUX, Cairo 7865kc, 38.15m
Musical programme spoilt at 7.07 a.m. by whistling and morse (Du Faur).

SUP-2, Cairo 6320kc, 47.47m
Awkward hour but good signal at 3.30 a.m.

Radio Cairo, Cairo 6075kc, 49.4m
News at 6 a.m., then in French.

Ethiopia:

——, Addis Ababa 9625kc, 31.17m
No reports. Perhaps 2.30 a.m. is awkward hour.

French Equatorial Africa:

FZI, Brazzaville 11,965kc, 25.06m
Schedule: Transmits Free French programmes 5 p.m. to 5.30 p.m. Good signal (Du Faur).

Kenya Colony:

VQ7LO, Nairobi 6060kc, 49.5m
3.15 to 6.15 a.m. News 3.30 and 5 a.m.

Madagascar:

Radio Tananarive, Tananarive 6063kc, 49.48m
Heard from 12.30 a.m. till 3 a.m. Heard at 12.30 a.m. (Gaden). Good at 2 a.m. and 2.30 a.m. (Hallett).

Morocco:

CNR, Rabat 8035kc, 37.34m
5 a.m. to 11 a.m. Fairly good at 7.21 a.m. News read by lady in French (Du Faur).

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.)

Portuguese East Africa:
Mozambique:
CR7BE, Lourenco Marques 9840kc, 30.48m
News at 7 a.m. Closes 8.20 a.m. News weak at 7 a.m. (Du Faur).
Portuguese West Africa:
CR6RA, Luanda Angolo 9470kc, 31.68m
Monday, Tuesday, Wednesday and Thursday, 6 to 8 am.
CR7BD,Lourenco Marques ... 15,245kc, 19.68m
8 to 9 a.m. and 12.30 p.m. to 3 p.m.
Senegal:
FGR, Dakar 9410kc, 31.88m
Opens at 6.15 a.m. Announces "Allo allo ici Radio Dakar." French talks and operatic music. Signs off with "Marsellaise." Not reported this month.
Transvaal:
ZRH, Johannesburg 6007kc, 49.95m
Schedule: 2.30 a.m. to 8 a.m. News 6.30 a.m. Afrikaans until 7.45 a.m. Then relays BBC News. Bad morse interference (Du Faur).
Southern Rhodesia:
Post Office Station, Salisbury .. 7317kc, 41m
No reports for a long while.

AMERICA

Costa Rica:
TI4NRH, Heredia 9740kc, 30.80m
Heard with an excellent signal 3 p.m. Sundays, Wednesdays and Fridays.—Ed. Heard well in N.Z. on Sunday afternoons (Gandy).
TIPG, San Jose 9620kc, 31.19m
Schedule: 11 p.m. to 1 a.m. Signal sometimes spoilt by XGOY 31.17m.
Guatemala:
TGWA, Guatemala City 9685kc, 30.98m
Heard best from 3 p.m. to 3.45 p.m.
Nicaragua:
YNRS, Managua 8585kc, 34.95m
"Radio Nicaraguense." Heard about 11 p.m.
Panama:
HP5G, Panama City 11,780kc 25.47m
Being heard around midnight.
HP5A, Panama City 11,700kc, 25.64m
Best around 3 to 4 p.m.
HP5J, Panama City .... 9670kc, 31.23m.
Heard from 11 to 11.30 p.m.
TGWA, ... 15,170kc, 19.78m
Invariably heard at 8.30 a.m. on Mondays.
North:
WCDA, New York 17,830kc, 16.83m
This 10 k.w. station is beamed to Europe from 5.30 to 6.45 a.m., and from 7 to 9.45 a.m. directed to Central America. Said also to be heard at midnight.
WCW, New York 15,850kc, 18.93m
This Press Wireless station heard from 8 to 10 a.m. English news on the hour, German, quarter past; French, half past; Italian at the third quarter.
KGEI, San Francisco
15,330kc, 19.57m. Schedule: 10 a.m. to 3 p.m., but after noon before pleasantly audible in Sydney. Spanish at 12.30 p.m.
WCP, New York 15,565kc, 19.27m
7 to 8 a.m. Same programme as WCW, 18.93m.
WRUW, Boston 15,350kc, 19.54m
7 a.m. to 9.25 a.m. News 8.30 a.m.
KWU, San Francisco 15,350kc, 19.53m
7.30 to 9.15 a.m. News 7.35, 8.15 and 9 am. 10.45 a.m. to 12.30 p.m. News 10.50 and noon.
KGEI, San Francisco 15,330kc, 19.57m
10 a.m. to 3 p.m. News 10.5 a.m., noon and 2 p.m.
WGEA, Schenectady 15,330kc, 19.57m
Midnight to 9.30 a.m. News midnight and 9 a.m.
KWID, San Francisco 15,290kc, 19.62m
Schedule: 9 a.m. to 1 p.m. News 9.5, 10.5, 11.15 a.m. and 12.50 p.m. 1.30 p.m. to 5.35 p.m. News every hour at half past the hour.
WLWO, Cincinnati ...: 15,250kc, 19.67m
9.30 a.m. to 10.45 a.m.; good at 10 a.m. (Gaden). 12.30 a.m. to 5 a.m.
WBOS, Boston . 15,210kc, 19.72m
Midnight till 4 a.m. News at 1 a.m.
WRCA, New York 15,145kc, 19.81m
Midnight to 10.45 a.m. News 1 a.m.
WGO, New York 20.7m
Heard in news at 12.12 a.m. (Perkins).
KKQ, Bolinas 11,950kc, 25.11m
Good on Sunday afternoons in "Lucky Strike" programme.

(Continued on page 25)

TOLERANCES IN SET DESIGN

(Continued from page 17)

pedance than the decoupling resistors. That is why a value of about 1 mfd. is generally suitable, such a capacity offering an impedance of about 160 ohms to frequencies of 1,000 cycles. It will be quite clear, however, that the condensers would still be reasonably effective if their impedance were doubled. In other words, their precise value is not very important.

Bias By-pass

Other by-pass condensers are those across the bias resistors of the first two and fourth valves. In the case of the first two valves the condensers have to by-pass H.F. currents, so that a value of .1 mfd. is ample. But the last-mentioned condenser is in the L.F. circuit besides being in parallel with a resistor having a value of, say, 250 ohms. Thus its value must be higher, and as slight inductance has little effect on low frequencies it has become customary to use an electrolytic condensers of about 25 mfd. This might appear unduly high when it is remembered that its impedance to curents of 1,000 cycles is only about 6 ohms, but it should not be overlooked that there might also be present a mains frequency of 50 or 100 cycles—and that the impedance to 50 cycles is over 120 ohms! An appreciable "hum" voltage could be developed across a condenser of lower capacity, and in some cases, particularly when the set is operated from 25-cycle mains supplies, it is desirable to inincrease the capacity to 50 mfd. to avoid mains hum.

Smoothing the H.T.

The two other principal condensers in the circuit are those used for smoothing the H.T. supply. That adjacent to the rectifier should be of fairly critical capacity, since it influences the output voltage obtained by the rectifier. Most valve manufacturers advise 4 mfd. electrolytic, but for some valves 8 mfd. is suggested. The other smoothing condenser could have any value, and the higher it was the greater would be the degree of smoothing. In practice, however, a capacity of 8 mfd. is nearly always the best compromise.

Turning now to resistors, the values of those marked R are determined entirely by the voltage which it is required to drop, and calculation is dependent on the well-known Ohm's Law. The detector anode resistance however, should have a value related to the impedance of the detector valve, the value being roughly twice that of the valve impedance. The values of the bias resistors are generally critical, especially in the case of the output valve If the resistance is too high the valve is over-biased, which means that it cannot operate at maximum efficiency and, in the case of the L.F. valve, that distortion will probably be caused. If the value is too low the H.F. valves will become unstable, while the L.F. valve will pass too high an anode current and its life will be shortened. It is important that the bias resistor used should be of the value recommended by the valve-maker for the particular type of valve in use,

Accurate Voltage

It is not always realised that the mains transformer should have a degree of accuracy greater than that of many of the other components in the set. Thus, for example, if the voltage supplied to the valve heaters is too high, the heaters will be run at too high a temperature and will therefore have a shorter life than they should. What is not always as obvious is that if the voltage is too low the valves might be still more seriously affected. The reason is that if the heater is not raised to the correct temperature, the "sucking" of the electron stream from it causes gradual disintegration. This is, of course, most pronounced in the case of large-power output valves and rectifiers, the anode current of which is comparatively heavy. It is very easy to ruin a high-efficiency output valve taking a high anode voltage by under-running the filament or heater. It is still more easy to cause the early demise of a cathode-ray tube by the same means, for the H.T. voltage in that case runs into thousands of volts.

—Practical Wireless (Eng.)

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

CIRCUIT SUGGESTIONS

(Continued from page 15)

that could be used include negative conductance valves such as dynatrons, tetrodes, pentodes and pentagrids, and conventional oscillators of the Hartley, Colpitts, Meissner types.

Reflex Circuit

The reflex circuit, once popular in 1926 to 1928 times, was revived in 1935 to 1937 and was used with a duo-diode pentode such as 6B7, so that one tube gave amplification at the intermediate frequency, rectification (detection) and amplification at audio frequencies.

Unfortunately, the 6B7 valve has a short grid base, i.e., it is easily overloaded and so the 6G8G, or 6B75, was used. The latter is less liable to overload, but introduces distortion on account of the curvature in the grid characteristics.

To retain the 6B7 and yet prevent overload, the audio-frequency signal can be fed in via the screen grid. This idea is quite practical so long as the screen is by-passed for I.F. by a small condenser. A resistor isolates the screen grid from I.F. in the diode circuit.

Like most reflex circuits this one suffers from a minimum volume effect if the volume control is within the reflex circuit. The most suitable type of volume control is a variable shunt from aerial to earth, a variable cathode resistor for the converter, or a combination of both.

Queries

Questions relating to the above articles only, will be answered by post is a stamped addressed envelope is enclosed. Queries will **not** be answered by telephone.

LOGGINGS

Continued from page 23

WBOS, Boston 11,870kc, 25.27m
7 a.m. till 4.10 p.m. News 10, 10.45 a.m. and 2 p.m.

WCBX, New York 11,830kc, 25.36m
7 a.m. to 10 a.m. News 7.30.

WCRC, New York 11,830kc, 25.36m
Opens at 9 p.m., News at 9.30 p.m. Closes at 11 p.m.

WRUL, Boston 11,790kc, 25.45m
7 a.m. to 9.25 a.m. News 8.30 a.m.

KGEI, San Francisco 11,730kc, 25.58m
News 3.20 and 5 p.m. 3.15 p.m. to 6 p.m.

WRUL, Boston 11,730kc, 25.58m
9.30 a.m. to 2.30 p.m. News 9.45 a.m.

WLWO, Cincinnati 11,710kc, 25.62m
5.15 a.m. to 9 a.m. News 8.15 a.m. 11 a.m. to 3 p.m. News 11.30 a.m. Heard foreign language at 11.15 a.m. (Du Faur). Back to their old form (Gillett, Gaden).

KWV, Frisco 10,840kc, 27.67m
6.30 p.m. to 10.05 p.m. News every hour. "Hi, Neighbour," at 7.15 p.m. (Du Faur).

KES-3, Bolinas 10,620kc, 28.25m
Heard from about 6 p.m. Talk in Asiatic language at 6 p.m. (Du Faur).

WOK, New York 10.555kc, 28.42m
Heard in Spanish at 10.27 a.m. (Perkins).

KES, Bolinas 10,410kc, 28.82m
2 p.m. to 12.15 a.m.
News hourly at half past hour.
Heard in parallel with KWID from 4 to 7 p.m. News bulletins at 4.30, 5.30 and 6.30 p.m. Joins KGEI after 7 p.m., but since KWID moved to 31.35 metres after 5 p.m. stays with them.

WJQ, New York 10,010kc, 29.97m
"The Voice of America." New schedule is: 3 p.m. to 7 p.m. in English, German, French and Italian. (First fifteen minutes of each hour is English.)

WGL, New York 9750kc, 30.76m
From 6.45 p.m. till 9 p.m. News at 8 p.m.

WRUW, Boston 9700kc, 30.93m
9.30 a.m. to 2.30 p.m. News 9.45 a.m.
News at 8.45 a.m., but signal poor now.

WRCA, New York 9670kc, 31.02m
11 a.m. to 7.45 p.m. News 2 and 5 p.m. 8 a.m. to 7 p.m. News 1 p.m., 4 p.m. and 6.45 p.m. Heard well after 1.30 p.m. French at 6 p.m., Spanish 6.15 p.m.

WGEO, Schenectady 9630kc, 31.08m
8 a.m. to 11 p.m.
News from home at 8 p.m. News 9 p.m. and 10.45 p.m. Special feature on Thursdays is "Anzacs Calling Australia," following news from home at 8.30 p.m.
Heard very good fight at 9.30 p.m. one night. At end of rounds 1, 4 and 7, advertisement for Blue Gillette Razor Blades (Gaden).
(That's rubbing it in — does anyone know where razor blades can be bought?—Ed.)

WCBA, New York 9590kc, 31.28m
9 p.m. to 11 p.m. News 9.30 p.m.

KWID, San Francisco 9370kc, 31.35m
6 p.m. to 9 p.m. News, 6, 7, 8 and 8.45 p.m. Opens again at 9.15 on 41.49m. (Condon).

KGEI, San Francisco 9550kc, 31.41m
6.30 p.m. to 3 a.m. News 7, 8 and 9 p.m. 10.30, 11.30 p.m., 1.30 a.m. and 2.45 p.m.

WGEA, Schenectady 9,550kc, 31.41m
10 p.m. to 4 p.m. News 11.15 a.m.

WGEO, Schenectady 9530kc, 31.48m
7.55 a.m. to 4 p.m. News 9 and 11.15 a.m.

WCBX, New York 9480kc, 31.65m
Heard a few mornings at 11 a.m. in programme directed to South America (Condon).

(To be Continued.)

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

B.R.L. (Camperdown) asks about DX Club Badges.

A.—Sorry, but owing to conservation of materials we are unable to have badges made, and so they are not now available. In the meantime, you can join the Club and obtain your Membership Certificate, and wait till after the war for the badge. It shouldn't be long now!

* * *

R.T. (Traralgon, Vic.) enquires about modern methods of teaching the morse code.

A.—Yes, it is generally accepted that it is useless to teach people the dot-dash code. Best of all appears to be to have every letter sent at the full speed, but with a spacing between each letter. By this method it soon becomes possible for the pupil to recognise each letter by its sound as a whole, and not by its individual dots and dashes.

* * *

D.O. (Culcairn) enquires about superhet alignment.

A.—It is usual to align the second intermediate transformer first, then do the first intermediate, using the oscillator, of course. It would be possible to align the first intermediate first, but we like the other way round and find that it helps locate trouble as we soon get a general idea of whether the audio end is up to scratch as soon as the first adjustments are done.

* * *

F.K.S. (Hornsby) enquires about re-centering a speaker which is in trouble.

A.—It is against our policy to recommend readers to attempt their own speaker repairs. Generally, if the voice coil fouls the pole piece it is more than a mere matter of being out of centre. The centering is likely to be correct, but the actual voice coil former warped so that it fouls. As it happens we just came across a suggestion for cone centering in an English magazine ("Practical Wireless") and so, for your benefit and for others who may be interested, here is a reprint of it:—

"Many readers will doubtless be interested in the following dodge for the rapid centring of moving-coil speaker cones, which I have successfully used over a period of years. All that is required is a mains transformer with a filament winding, and a screwdriver, the method being as follows: Slacken off the centre fixing screw and then apply an A.C. current to the speech coil. Due to the opposing magnetic field between the speech coil and the field magnet, the coil will then automatically centre itself in the gap. While the current is still switched on, carefully tighten the centre screw. Make sure that there is a washer under the head of the screw, as this will prevent the action of tightening the screw from throwing the coil off centre. For the ordinary low resistance coil, an A.C. voltage of 2 volts is ample. This system also has the advantage that the coil is centred while actually vibrating, i.e., under working conditions.

* * *

H.L.P. (Drummoyne) asks whether there is any formula for calculating the spacing and number of turns on a reaction winding

A.—No, it is simply a matter of getting the right amount of coupling to give you the desired feedback. It will depend on the actual gain in the valve and on the value of the capacity of the reaction condenser, on the distributed capacity in the associated wiring and a dozen other more or less minor factors. It would be possible to have a greater number of turns and a wider spacing between the reaction winding and the grid winding. On the other hand you could have fewer turns and closer spacing. It is not a bad idea to have the spacing fairly close so as to introduce a small amount of capacity coupling as well as inductive coupling. This will tend to even up the reaction over the band.

* * *

A.T. (Arncliffe) has a speaker with a 2,000 ohm field, but is building a circuit in which a field of 2,500 ohms is specified.

A.—Although theoretically wrong, we would advise you to go ahead and use the speaker exactly as it is and hope for the best. At the worst all that is likely to occur is that the valves will get an extra volt or two, and on this account will draw slightly higher current. This higher high tension current through the field will tend to give a greater voltage drop, and thereby even up things. We feel sure you would be quite safe to use the field without any additional resistors, but if you want to fit one and be sure, you will need an extra heavy duty 500 ohm resistor in series with the field.

* * *

W.W. (Carlingford) is a keen amplifier enthusiast and brings up some interesting points about recordings.

A.—Yes, we recall only too well how it was expected that broadcast programmes would mean the exit of the gramophone. Yet recent reports from America state that gramophone record sales are reaching top figures, something like 110 million per annum. We haven't any figures about local sales, but from what we see we should imagine that a similar position exists here in Australia to-day.

SUPER-QUALITY DUAL-WAVE DESIGN

(Continued from page 7)

consist of a divider consisting of a 1.5 megohm resistor, and one of 100,000 ohms, a suitable percentage of feedback is obtained. The overall gain is cut back so that an input voltage of about one volt is required to fully load the output valves. This is a handy signal voltage, readily available from a suitable detector, or from a crystal pick-up. It is also an amount of signal which can be readily accepted by the 6J7G without running into danger of introducing distortion by exceeding the grid swing.

Power Supply

A separate power supply unit on hand was able to provide the heavy current drain required for the amplifier, the dual-wave tuning unit and the energising of the field of the high-fidelity speaker. A semi-fixed bias voltage for the output valves is taken from the resistor placed in the negative high tension return. With this fixed bias and the plate voltage used, the 2A3's in push-pull are capable of handling between ten and fifteen watts of audio power with very low distortion. This is ample to fully load the twelve-inch speaker used.

The Tuner

A full description of the tuner used, together with photographs and diagrams, is due for publication in next month's issue.

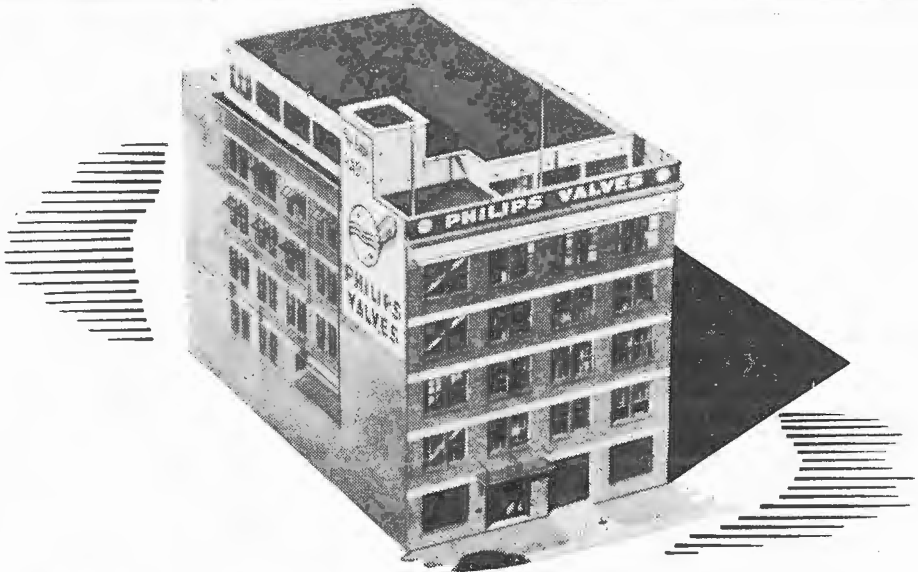
L.R. (Wollongong) has invented a scheme for tuning short-wave sets by a mechanical means of altering the spacing between turns on the coil; in other words, by compressing it like a spring.

A.—The scheme seems quite sound to us and we cannot see any particular snag about it. Doubtless, however, you will find that the scheme is by no means new, and has probably been the subject of many a patent already.

* * *

P.R. (Chatswood) sends in a terrific bunch of queries.

A.—Sorry, but we cannot hope to handle queries in such numbers or at such lengths as would be necessary to cover all the generalities concerned. Time is precious these days. Haven't you heard about the war and the shortage of man-power?



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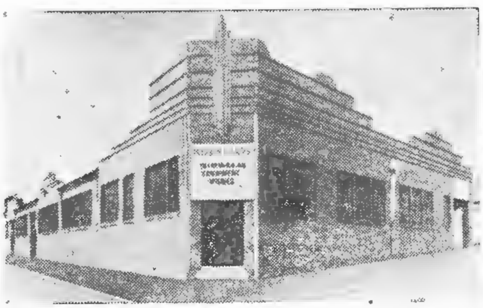

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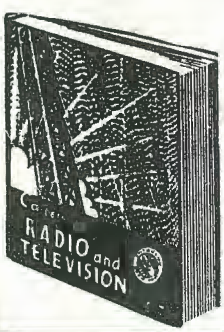

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