

THE
AUSTRALASIAN

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

Radio World

1/-

VOL. 13 NO. 9

FEBRUARY 15, 1949

Commercial V.T. Walbechart

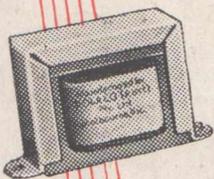
FILTER

V.T. Walbechart

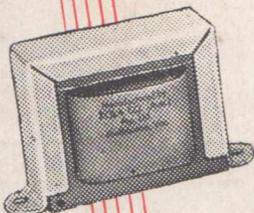
OUT THAT HUM

WITH

ROLA FILTER CHOKES



Type 6/60. Inductance 6
henries at 60 mA D.C. with
10 volts 100 cycles A.C.
superimposed.



Type 14/60. Inductance 14
henries at 60 mA D.C.
with 10 volts 100 cycles
A.C. superimposed.

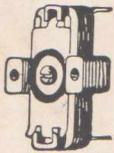
- Rola Filter Chokes have been specially designed to solve filtration problems in all modern receivers in which Permanent Magnet type loudspeakers are used.
- They have been soundly engineered and conform fully to their rated specifications.
- Their design is so compact that they may be fitted into midget receivers; their low d.c. resistance simplifies power supply design; and their inductance is high enough to provide adequate filtration under all normal conditions.

You can't go wrong with

ROLA FILTER CHOKES

Rola Company (Aust.) Pty. Ltd., The Boulevard, Richmond, Vic., and 116 Clarence St., Sydney

DEMAND CROWN COMPONENTS



P.12. STANDARD 5-PLATE PADDER CONDENSER

455 Kc. using Polystyrene base. For use in conjunction with H. gang condenser. Price 2/6.

D.C. 2A TUNING UNIT

(13 to 42 metres), 1600 to 550 Kc/s, for use with H gang condenser. Suitable for compact chassis construction. Price, 36/-.

CROWN PERMATUNE F.M. DISCRIMINATOR TRANSFORMER

PT45. Price, 17/6.
Freq. 10.7 meg.
Cap. 50 mmf.
Wound and tropic treated same as PT44.

NEW COILS CROWN PERMATUNE



PC63 Aerial, PC64 R.F., PC65 Oscillator. These are our latest production and are wound on trolital formers and moisture proofed for tropical conditions with high impedance primary in the Aerial and R.F. Coils. Secondary wound with 7/41 litz for High Q.

PRICE, 7/6

455 K.C. NEW I.F. TRANSFORMERS

New PT141-42-43 Series I.F. transformers are of revolutionary design, using silver mica condenser moulded in the trolital base, making them absolutely moisture proof. I.F. PT42 is required for the 2nd Stage in A.C. sets, this I.F. having 100mmf. condenser, whilst the 1st I.F. has 70mmf.

PT41 1st stage } 13/- each
PT42 2nd stage }
PT43 Low Gain }

IRON CORED SHORT WAVE COILS



I.C. 62 aerial,
I.C. 63 R.F.,
I.C. 64 oscillator,
13 to 42 metres, for use on standard H. gang. Price 4/9.

M.E.B. TRIMMER CONDENSERS

2 to 35 mmfd. on Polystyrene base. Price, 1/1.



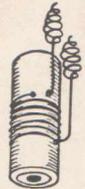
R.F. CHOKE

Standard general purpose honey-comb winding, will carry up to 50 M/a. Price, 1/10.



AIR CORE S/W COILS

13 to 42 metres, Z.C.59 aerial, ZC.60 R.F. ZC61 oscillator, for use with H gang. Price, 2/10 Each.



D.P. 3A Tuning Unit: 3 Stage, range 13 to 42 metres, 1,600 to 550 Kc/s. Price, £4/17/-.

B.F.O. 455 Kc/s. Oscillator Coils. Price, 13/-.

R.F. Coil with reaction in aluminium can. Price, 9/10.

Reinartz Coil in aluminium can. Price, 7/6.

IF YOUR LOCAL DEALER CANNOT SUPPLY, WRITE DIRECT TO

Crown
RADIO PRODUCTS PTY. LTD.

51-53 MURRAY ST.
PYRMONT, SYDNEY. TELEPHONE: MW 2628

THE AUSTRALASIAN RADIO WORLD

Devoted entirely to Technical Radio

and incorporating
ALL-WAVE ALL-WORLD DX NEWS

PUBLISHED BY THE PROPRIETOR—
A. G. HULL,
Balcombe St., Mornington, Vic.
Phone M'ton 344.

Technical Editor—
PAUL STEVENS
21 Fletcher's Av., Bondi, N.S.W.
Phone FW 6157.

Short-wave Editor—
L. J. KEAST
7 Fitzgerald Rd., Ermington, N.S.W.
Phone WL 1101.

ADVERTISING REPRESENTATIVES—
In N.S.W.: Amalgamated Publications
Pty. Ltd., 83 Pitt St., Sydney. Phone
B 1077.

REPRESENTATIVES
In Queensland: John Bristoe, Box 82,
Maryborough, Q.

In New Zealand: H. Barnes & Co., 4
Boulcott Terrace, Wellington.

S.O.S. Radio Ltd., 283 Queen St.
Auckland

In England: Anglo Overseas Press Ltd.,
168 Regent St., London, W1.

*Distributed throughout the World
by Gordon & Gotch (A/asia) Ltd.*

SUBSCRIPTION RATES—
12 issues 10/6
24 issues £1
To N.Z. and Overseas:
12 issues 12/-
POST FREE

Address for all correspondence—
AUSTRALASIAN RADIO WORLD
Box 13, Mornington, Vic.

Vol. 14

FEBRUARY, 1949

No. 9

CONTENTS

Radio in the News	5
New Type of Fidelity Pick-up	6
More About the Standard	7
New Rola Speaker	10
Simple Galvanometers	11
Among Our Readers	14
Direct-Coupled 807	15
Service Oscillator	17
English Coil Box	19
British Television Exports	20
New Brand of Transformers	21
Medium-Fi	23
Key to the VT Valve Types	26
Shortwave Review	31
Speedy Query Service	34

GUEST EDITORIAL

Perusing this week's "Radio and Electrical Weekly," the writer was most impressed with an interview with Mr. Cliff Gittoes, of Ducon Condenser Co., who has recently returned from America. The part which was of most interest to us was the mention of television kit sets. An extract is as follows:

"He was rather amazed to see the television kit set business in a very healthy condition in U.S.A. Retailers and technicians everywhere were buying these TV kit sets, learning how to assemble them, and then sell the completed job. Several small manufacturers were doing this, and in one particular case, one small manufacturer was doing 25 kit sets a day, using RCA parts and under RCA licence.

The TV kit set was selling for 167 dollars and included a 10-in. cathode-ray tube, 30 valves, the various aligned units, and a chassis, but no cabinet and no antenna. RCA had done a good job in organising this TV kit set business.

Television was demanding a better standard of components, particularly to counteract the service problems that could arise in such complicated equipment if the components were not of good quality."

If a country like America can still sell kit sets, then we can in this country, and I would like to assure you that Aegis Manufacturing Company will be well and truly amongst the originals as far as Television here is concerned.

—JAMES H. MAGRATH.

R. C. S.

**First Again
With The Latest
Development!**



FILAMENT TRANSFORMERS

Type TP55. 6.3 volts, 3 amps, 15 watt at 14/6

AUDIO TRANSFORMERS

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

Size $2\frac{3}{4}$ x $2\frac{3}{4}$ x $1\frac{3}{4}$.

Type TB42. A class single, 3 to 1 ratio 21/-

Type TB43. A class Push Pull, 3 to 1 ratio 22/6

Type TB44. B class Push Pull, $1\frac{1}{2}$ to 1 ratio 21/-



R.C.S. VOLTAGE DIVIDERS

Wound with oxidised nichrome wire on round bakelite formers $3\frac{1}{2}$ in. x $\frac{1}{2}$ in., complete with mounting legs.

VD25. 15,000 ohms, 2 variable clips 5/6

VD28. 25,000 ohms, 2 variable clips 5/6

IF YOU ARE UNABLE TO OBTAIN

from your local dealer, write us and we will arrange for your retailer to receive supplies immediately, or advise you where supplies can be obtained.



NEW POLYSTYRENE FROM OVERSEAS WITH EXTRA HIGH MELTING POINT

By airmail from overseas, R.C.S. has just received a consignment of new improved Polystyrene. As a result of exhaustive research, overseas scientists have developed a Polystyrene whose melting point is above water-boiling point.

This is another stride ahead for the famous R.C.S. Coils, which already possess the most up-to-date features in moisture-proofing, climate-proofing, and High Q.

Here's the Kit!

Identical Coil Kit for the Universal Five consisting of aerial, oscillator, 2 I.F.'s and a padder (Kit type No. K121) Retail £2/3/6

POTENTIOMETERS & RHEOSTATS



7/6 Retail

PT40	6 ohm 25 amp
PT38	10 ohm 25 amp
PT39	20 ohm 25 amp
PT34	30 ohm 25 amp
PT46	400 ohm 50 M/A
PT47	1,000 ohm 35 M/A
PT49	2,500 ohm 30 M/A
PT51	5,000 ohm 30 M/A
PT52	10,000 ohm 30 M/A

The R.C.S. volume control is constructed so as to cut off all volume; the main fittings are made from high-grade nickel silver, and they are so manufactured as to be completely noiseless.



LINE FILTER

Wound to P.M.G. Specifications

The R.C.S. Line Filter is specially designed and constructed to eliminate all noises which occur by reason of feedback from power mains—electric motors—refrigerators—elevators—sub-stations—high-tension wire—irons—and jugs. Easy to install—it connects between the radio and power point.

LF20 27/-

COILS and I.F.'s

FM 10.7 Meg. Intermediate	each	13/-
FM 10.7 Meg. Discriminator Transformer	each	17/6
FM 88-110 Aerial, Oscillator, Coupling Coil	each	2/6
E 356 Aerial	each	7/6
E 357 R.F.	each	7/6
E 358 Oscillator	each	7/6
175 K.C. Intermediates	each	13/9
455 K.C. Standard Intermediates	each	13/-

R. C. S. RADIO PTY. LTD.

174 CANTERBURY ROAD, CANTERBURY

RADIO IN THE NEWS

Interesting Paragraphs from the Daily Papers

There have been quite a few interesting paragraphs about radio matters in the daily press lately.

Smart Pupil

From New York came the tale of a smart pupil. According to the paragraph published in the Melbourne "Herald"—"The ancient scholar's art of cribbing was given a modern twist by a Nuremberg high-school student, says the Hanover newspaper Der Spiegel.

During a graduation test the youth reeled off a flawless translation of a difficult Latin text. Then somebody tripped and the proctors found a home-made radio set, which the student had installed under his seat. In a bandaged hand he was holding a miniature earphone. The transmission was done by a friend in a neighboring house.

The board of examiners gravely considered the case, and then passed the youth anyway—on account of his technical proficiency."

Wire Recorder

Another paragraph, this time in the Melbourne "Sun" told of an application of the electronic art to the school-teaching profession. According to this par—"A wire recorder had been purchased by the Methodist Ladies' College, Hawthorn, to show pupils their speech defects, the principal (Rev. Dr. Harold Wood) said at the school's speech night at the Melbourne Town Hall.

Reproduction of girls' voices helped considerably in enforcing the teaching they received, he said. Speech training had proved so popular that a waiting list had been necessary this year.

Amateur Television

Another par in the "Herald," this time a front-page story, tells of the worries of a prominent experimenter, VK3LN, who wants to do some television transmitting. According to this story—

Lack of a valve costing 30 dollars (£9/6/6) is preventing Mr. Len Moncur, of Union Road, Ascot Vale, from operating what he claims to be the first television set in Victoria.

Mr. Moncur is a tailor. He has been experimenting with television since 1935, and for two years he has been trying to import an American iconoscope valve—he described it as the "microphone of television."

The Customs Department will not give him a licence to land it.

"Everything is ready to plug in the valve," Mr. Moncur said today. "If I got that valve tomorrow, by the week-end I could televise something in Ascot Vale, and it could be seen in Geelong.

"I am in radio contact with friends in America nearly every night, and a number of them have offered to give me a valve. But the Department refuses to allow me to accept it, as officials claim I could not sign a declaration that it was an unsolicited gift."

The import restriction regulations bar gifts from the United States unless they are proved to be unsolicited.

Mr. Moncur said he had also been unable to obtain a licence from the PMG's Department to put television on the air.

STATION FREQUENCIES

On the subject of frequency allocations to broadcasting stations the P.M.G.'s. Department appreciates the concern which has been expressed by many manufacturers in connection with delays in transferring a limited number of stations to the channels they were to occupy as from the 1st September, 1948. The following explanation of the difficulties encountered and of the Department's future intentions may help to clarify the position.

In the case of 2NA Newcastle and 7ZR Hobart, unexpected difficulties arose in raising the power of these stations to 10,000 watts within the limited time available. This increase becomes necessary to compensate for the coverage area following the transfer of the stations to channels on which con-

ditions would be less favourable. It was therefore decided as an exceptional measure to delay the changeover to the channels originally allocated until the power increase could be effected.

Somewhat similar considerations prevailed in the case of 2DU Dubbo and 7BU Burnie which led to the decision to use 810 kc/s until such time as this channel might be required for a higher powered National station, in about two years time.

In all four cases, however, it will be apparent that there has been no real departure from the Department's original intentions but only a desire to smooth over temporary difficulties and preserve the interests of a majority of the listeners likely to be affected by the temporary change in plan.

New Type of Fidelity Pick-Up

Some Details of the new "Brierley" Design

IN England at a recent joint meeting of the City and Guilds Radio Society and Imperial College Musical Society, J. H. Brierley gave a demonstration of reproduction from commercial gramophone recorders, using one of his latest designs of ribbon pick-up.

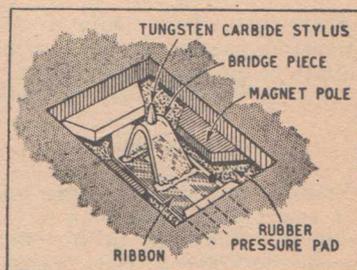
Construction Details

Essentially this pick-up consists of a U-shaped foil strip folded so that the plane of the foil lies parallel to the magnetic field. A bridge-piece of light plastic material is attached to both limbs of the ribbon and carries a tung-

sten carbide stylus which is cemented in position. A special grade of carbide, which does not flake, has been chosen and is stated to have a hardness six times greater than sapphire. The mass of the moving parts is about 1/25th of that of a standard needle so that record and stylus wear is very small. The top resonance has been measured by harmonic methods and is stated to be in the region of 40 kc/s.

Performance

Demonstrations given with the full frequency response were remarkable for the excellent trans-



Ribbon and stylus assembly in the Brierley pickup.

ient response and attack, but surface noise on standard commercial pressings was also faithfully reproduced. With a low-pass filter cutting off at 8,000 c/s the difference in quality of reproduction was easily discernible, but there was less scratch. Musical critics in the audience called for the 8,000 filter at the beginning of the recital, but after hearing recording with and without the filter, preferred the improvement in quality resulting from an extended H.F. response and agreed to tolerate the surface noise.

The electrical output from the pick-up is small and care is necessary in the design of the amplifier if mains hum is to be avoided. The Brierley amplifier equipment showed no trace of hum pick-up when demonstrated in conjunction with a wide-range loudspeaker reproducing down to at least 40 c/s.

Representatives in Australia for the Brierley pick-up are Kelman Industries, Box 40, Hawthorn, Vic.

BABY SETS WITH BABY VALVES?

Enthusiasts who like the idea of making up vest-pocket sets and other extremely small receivers will be interested to know that sub-miniature valves are now coming on the market. They open up vast scope for experiment in this direction.

As will be seen from the following list of Philips valves of this

type, there are three types which can be used in a simple type of t.r.f. or regenerative receiver.

So far there is no frequency changer listed for superhet work, but doubtless if it is found that these hearing aid valves are being used in radio sets the manufacturers will eventually develop types to meet the demands.

PHILIPS SUB-MINIATURE VALVES FOR HEARING AIDS

Preliminary Technical Data:

	Type DF70 Voltage Amplifier Pentode	Type DL71 Output Pentode	Type DL72 Output Pentode
Filament Voltage	0.625 V.	1.25 V.	1.25 V.
Filament Current	0.025 A.	0.025 A.	0.025 A.
Plate Voltage	30 V.	45 V.	45 V.
Plate Current	0.15 mA.	0.6 mA.	1.25 mA.
Screen Grid Voltage	30 V.	45 V.	45 V.
Screen Grid Current	0.05 mA.	0.15 mA.	0.4 mA.
Control Grid Voltage	0 V.	-1.25 V.	-4.5 V.
Mutual Conductance	175 umhos.	550 umhos.	500 umhos.
Plate Load Resistor or Impedance	1 meg.	0.1 meg.	0.03 meg.
Screen Grid Resistor	3 meg.	—	—
Voltage Gain	35	—	—
Power Output	—	6 mW.	23 mW.
Max. Plate Voltage	45 V.	45 V.	45 V.
Max. Screen Grid Voltage	45 V.	45 V.	45 V.
Bulb Diameter (max.)	10.1 m.m.	10.1 m.m.	10.1 m.m.
Bulb Length (max.)	29.5 m.m.	38 m.m.	38 m.m.
Lead Length (min.)	32 m.m.	32 m.m.	32 m.m.

ONE GOOD TURN—

If you would like bigger and better issues, make a point of supporting those firms who advertise with us.

MORE ABOUT THE STANDARD

Designed to give much better tone and greater power than normal, yet with little increase in the cost of a kit of parts, the 1949 World Standard has already aroused a lot of interest and reports indicate that a number of our readers are on the job of building up one of these receivers. We are long past the stage when we can claim anything in the way of magic or supernatural power for a new receiver design, but we can again repeat that this job offers exceptional value in the matter of performance for cost.

IN the last issue we announced the 1949 Standard and made some promises about further details in this issue. Well, here are the picture diagrams and a few more details about the job, its proper adjustment and so on. But, quite frankly, we haven't done much further work with this job, or gone ahead very far with the other versions. As an explanation we can only blame too much Christmas pudding.

The Circuit

In the circuit which was given in the January issue there was a slight omission, the values of the condenser and resistor in the cathode circuit of the first valve being left out. Fortunately, there was nothing unusual about these and the normal values are well known. A condenser of .1 mfd. and a resistor of 250 ohms should be about right. The value is not critical, however, and some people prefer to get a little extra gain by using a 200 ohm resistor. On the other hand, there may be cases where instability is encountered, probably due to the layout of the wiring and the arrangement of the components. In which case it will be found helpful to cut down the gain a bit by using a resistor of 300, 350, 500 or even 1,000 ohms. If a still higher value is required to get stability it is best to look around for the cause of the trouble in other parts of the set, rather than cut back the gain still further.

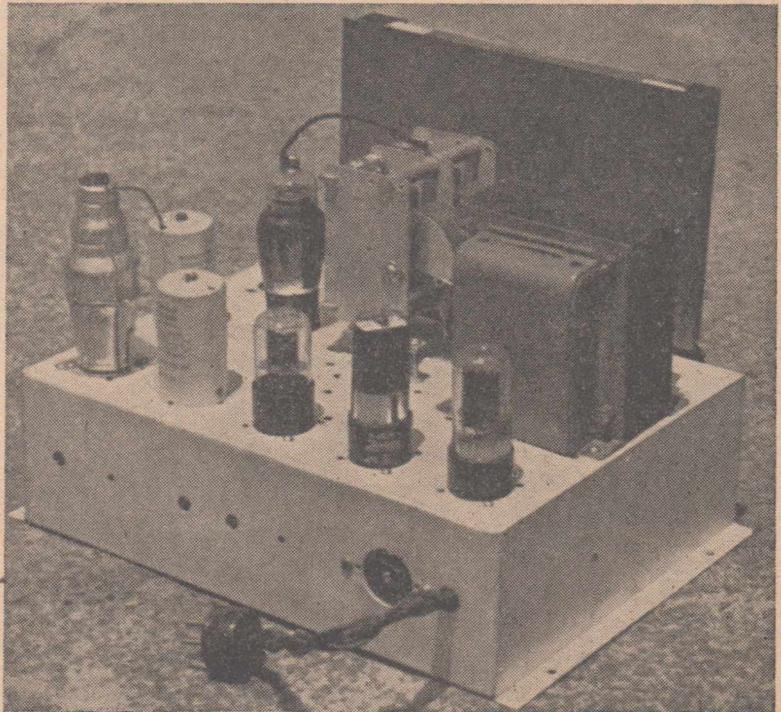
Parasitic Stoppers.

Some slight confusion may arise in the minds of those who check

the circuit schematic against the picture diagram when it comes to the grid, screen and plate circuits of the output power valves, the 6V6's. This is because there is considerable tolerance permissible, or experimenting desirable in regard to parasitic stoppers. In the good old days it was quite normal for push-pull beam power valves to operate without any stoppers; the connections to the various valve elements were simple and straightforward. But as time goes

by it is discovered that many amplifiers do not give power and quality up to expectations. And so it is revealed that high-gain valve arrangements, both single-ended and push-pull, sometimes develop their own parasitics. These effects rob the valve of its ability to handle power properly, and cause overloading and other troubles. Sometimes the quickest and most effective solution to the

(Continued on next page)



Rear view of the Standard Chassis

STANDARD

(Continued)

problem is to fit 10,000 ohm carbon-type resistors in series with the grid leads, mounted right at the socket and with a short lead soldered to the socket. In other cases it may be found that resistors of 100 ohms, fitted at the screen terminals will do the trick. They also have the advantage of dropping the screen voltage a volt or two, thereby bringing it closer to the plate voltage, which is dropped by the resistance of the primary winding of the speaker transformer.

In the original set we fitted the grid stoppers when doing the wiring job, and accordingly we drew them into the circuit diagram. But when working on the job later we took them out and, after trying several ideas such as triodes in the output, we put the 6V6's back and fitted screen suppressors, consisting of a 75 ohm centre tapped resistor which happened to be lying about. Actually we did not have any trouble with parasitics either way, but the precautions are a safety measure which does not detract from performance, costs only a few pence, and might be a big help under certain circumstances. Those in doubt, however, can follow either the circuit or the pic-

ture diagram, and then add the stoppers later if they are found necessary.

Feedback

As will be noticed, we have not shown the feedback resistor in the picture diagram either. In fact, further experimenting seems to indicate that only a small percentage of listeners will appreciate the improved tonal quality which is obtained by using feedback. Others will prefer the full

sensitivity which is obtained without the feedback being applied. Either way, it is such a simple job to fit and remove the feedback that a little experimenting is the quickest and surest way of making a decision. Another thought would be to fit the feedback, but with a switch in circuit as well, so that the feedback can be switched in or out as desired. It has quite a big effect upon the range of the set, noticed especially on short-wave.

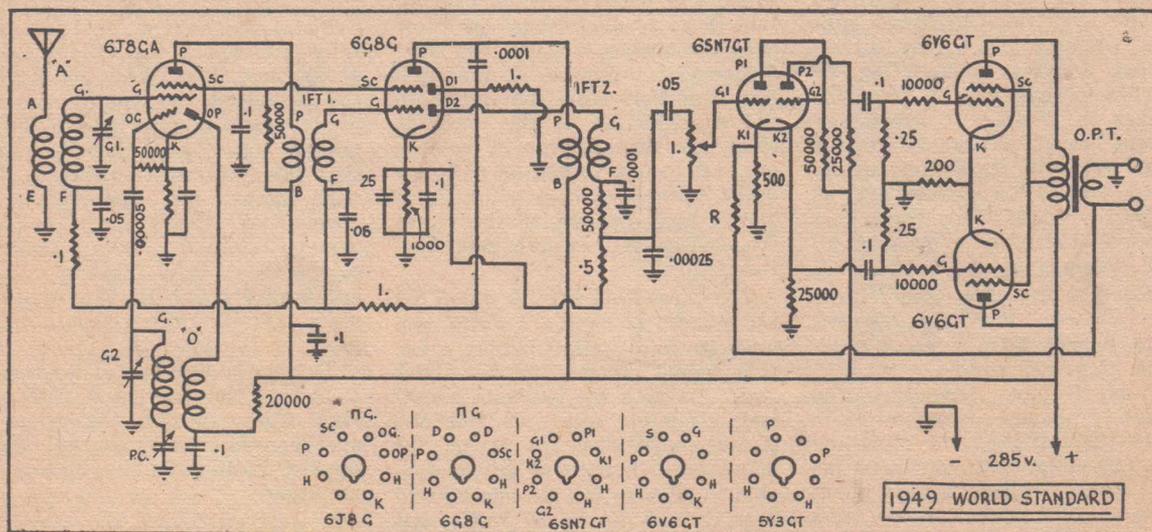
WARNING ABOUT PHASE-CHANGERS

The phase-changer circuit used in the "World Standard" is sure-fire, foolproof and completely reliable. It has been brought to our notice, however, that there are other types of phase-changer circuits being exploited in overseas magazines now reaching Australia. Some of these use the 6SN7GT and appear somewhat similar to the one used in the "Standard," but on inspection are found to embody much dangerous practice, such as running the grids to h.t., and putting electrolytic condensers across high-resistance voltage divider networks, thereby linking the actual bias with the internal resistance of the particular condenser which is used.

We have been checking some of these circuits in our laboratory. The first one destroyed the 6SN7GT in a few minutes, the next gave nothing but intense distortion, although doubly checked to make sure that it was wired according to the published circuit.

Further work is being carried out on the subject and a full report should be ready for publication in next month's issue.

In the meantime, our advice is to stick to the tried and proven circuits.



NEW ROLA SPEAKER

A pleasant surprise is in store for those fidelity enthusiasts who appreciate high-quality reproduction.

In the recently-released Rola catalogue mention was made of the new "O" type speakers, but many who scanned the pages of this catalogue failed to fully appreciate the significance of the remarks about the "O". The cata-

By
A. G. HULL

logue claimed it as having frequency range greater than that covered by standard recordings or broadcast by the best of broadcasting stations, and its transient response as such as to give "full brilliance and tonal realism." But these sort of claims have appeared so often in catalogues that they don't register on the mind of the man who is a technical cynic. But after putting in quite a spare bit of time over the Christmas holidays, working on a big direct-coupled amplifier and fixing up switches to swing across from one speaker to another, I would say without hesitation that, as regards reproduction of an output of up to ten watts, this new speaker is easily the best thing that Rola have ever turned out, including all their previous models of G12's.

After the first few tests it was quite obvious that the speaker would handle all the frequencies which come off ordinary records, but, as I have stressed often enough, frequency response alone is not the full story of reproduction. Listening tests convinced me that what I had heard about absence of peaks was true. Although the lows come through

cleanly with tremendous thump, the hum level is much lower than with other speakers tried, proving that those speakers must have low note resonances close to the hum frequencies. Likewise, at the high end, it is noticeable that although the reproduction of the highs is clear, the reproduction of scratch was not nearly so bad as with another speaker which must have had a peak at one of the worst frequencies for scratch reproduction.

The new Rola "O" is rated by the makers to handle 7 watts, and since its total weight is only 5 lbs. this would appear to be about right, judging by previous standards. But on test we fed our sample with over 10 watts, for hours on end, without any noticeable ill-effects. We did our best to bust it with up to 20 watts, but it took it all in its stride. My first

tests of the Rola "O" were done with the 1949 Standard receiver, but as this set had only push-pull 6V6's in the final stage I did not fully appreciate the performance of the new Rola. When used with the Standard the quality of reproduction was fine indeed, but I realize now that I had in mind that this was entirely due to the wide range, low distortion and absence of phase shift in the Standard circuit. After making comparative tests against other speakers I recognise that quite a share of the praise should have gone to the speaker.

To get the best out of a speaker it is essential to feed it with the right stuff. In fact the better a speaker, the clearer it will show up the faults of the receiver or amplifier.

(Continued on page 22)



SIMPLE GALVANOMETERS

THE simplest form of galvanometer consists merely of a straight length of wire passing close by a compass needle suitably pivoted. On current being passed through the wire, the needle is set in motion. Even this crude form of instrument is surprisingly sensitive and is capable of detecting a fraction of a volt. For emergency use, however, and even for more permanent employment, one of the following simple arrangements can form a useful and efficient instrument. Moreover, such an in-

BY

G. W. Butterfield, A.M.I.R.E.

"The Broadcaster"

Perth, W.A.

strument will possess the very decided advantage of costing practically nothing.

The first of these galvanometers is made by simply winding a number of turns of enamelled or cotton-insulated wire on an old cotton reel. The wire can be No. 22 gauge or thicker. Wind from half a dozen to a dozen and a half turns of wire on the reel, securing the ends of the winding with sealing wax. The reel is now placed horizontally on the work bench and made to remain in that position by sticking with plasticine, or any other method you care to use. On the top of the reel, a cheap magnetic compass is placed. This may also be fixed in position and prevented from sliding by the same means. The galvanometer is now complete. On passing a current through the coil the compass needle will be set in motion, its direction of movement depending

A sensitive galvanometer has many uses. Such an instrument can be easily constructed by any amateur for practically nothing.

upon the direction of the current through the coil. The slightest current will produce a movement of the needle, provided always that the latter is properly pivoted and does not tend to stick.

Another simple method is to remove the inner section of an ordinary match box and fix a small compass in it, then place a dozen or so turns of wire around the drawer. On passing a current through this winding the compass needle will be set in violent motion. So sensitive is this arrangement that the vigorous movement set up by even small current is sufficient to up-set the

needle off its pivot. The turns of wire should be spaced just above the compass dial so that the needle may be observed.

Suspended Needle

Another type of home-made galvanometer comprises ten or fifteen turns of insulated wire, the turns being about three inches in diameter. They are not wound upon anything, but are tied together at the top and bottom to form a hank. This coil or hank is placed in a vertical position on the work bench, being secured to the latter by any convenient method. Suspended from the top of the coil by means of a small piece of silk or cotton is a magnetised sewing needle. It will not be found difficult to balance the needle so that it swings in a perfectly horizontal plane. Like the steel strip in the compass just described, the magnetic needle will point to the magnetic north. When, however, the slightest current flows through the coil, the needle will indicate its presence in

(Continued on page 12)

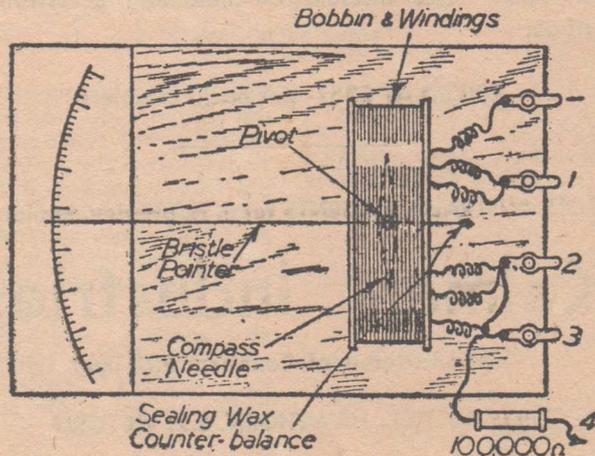


Fig. 1

Presenting . . .

J. H. BRIERLEY PICK-UPS

- ★ Frequency response, 20 c/s to 17,000 c/s, 20 c/s 0db, from 40 to 12 Kc/s 0db, falling to —2db at 17 kc/s.
- ★ Tracking weight: $\frac{1}{8}$ th ozs.
- ★ Voltage output: 15 m/volts, 1 volt (type A).

These units are not damaged by accidental dropping onto the record, and feature the sealed beam type of needle. This needle, six times harder than sapphire, is ground to .0002" radius.

- ★ They are the finest unit available today and are of the tuned ribbon (R) or moving iron type of construction.

Resonance occurs at 5 c/s and 40 c/s, thus in conjunction with their perfect response will reproduce all frequencies on the record. And it is for this reason that their use should be confined to true high fidelity equipment.

- ★ Type R will play the same record one thousand times without causing increased surface noise.

Orders are now being accepted for delivery early in the New Year. Price includes all necessary accessories and postage.

PRICED AT 235/- per each, complete

SOLE AUSTRALIAN AGENTS for J. H. Brierley, England

Kelman Industries

(Manufacturers of Conniseur Pick-ups)

BOX 40, P.O., HAWTHORN, E.2, VICTORIA

GALVANOMETERS

(Continued)

a very decided manner. The drawback with this instrument is that the needle takes a long time to come to rest, and also it is liable to be distributed by the smallest vibration or current of air. Apart from these objections, however, this instrument can be made exceedingly sensitive.

Another method of balancing the needle is to stick a pillar on the bottom of the coil with a gramophone needle embedded in the top with the point up-right. A small disc should be cemented to the centre of the needle, but before doing so a sharp depression should be made in the centre. The magnetised needle can then be balanced on the top of the gramophone needle by resting it on the centre of the disc. As a matter of interest, this method may be used instead of a compass in the previous arrangements I have described. I might also add that a magnetised strip or needle may be made by simply rubbing the latter a few times in one direction on one of the poles of a per-magnet.

Calibrated Galvanometer

All the methods of making a galvanometer so far explained are very crude and, although sensitive, they can only be considered as experimental arrangements. Those desiring a more permanent and useful instrument will find that the extra care and time required to build the galvanometer now to be described will be well worth while.

This consists of a coil and compass needle or magnetised steel strip with a pointed depression in the centre just the same as the simpler instrument just explained. But instead of the reading being taken direct from the balanced strip, a thin, very light bristle is fixed to the centre of the latter to act as an indicator or pointer. This can be seen in the illustration (fig. 1). The compass needle or strip is balanced on a pivot in the centre of the coil, which can be made by

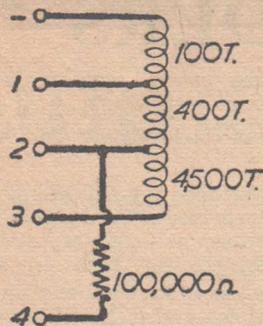


Fig. 2

fixing a gramophone needle, point upright, in a small block of wood. Another block or strip of wood should be placed just above the compass needle (but not touching) to stop it from falling off the pivot when the instrument is moved from its horizontal position. The bottom of the pointer should protrude for about a fifth of its length below the centre of the compass needle so that a blob of sealing wax can be attached to act as a counter balance. The whole unit can be set up on a flat baseboard and a scale marked at the top, as shown.

Apart from the mechanical arrangement, which is really very simple, all that is now required is a suitable coil. This will require more care in winding than the previous experimental models, as 5,000 turns of enamelled copper wire will be necessary if you wish to duplicate the original instrument. In the latter, 40-gauge was used to keep the coil within small dimensions, but it will be much easier to use a thicker gauge, even if it means making the coil larger. The D.C. resistance will also be kept to a minimum, which is all to the good, so in the following description of the coil former this should be borne in mind and extra size allowed to suit the gauge wire you use.

The original coil former was made by cementing two ends on a $\frac{3}{4}$ in. section of the outside cover of a match box to form a spool with a winding depth of half an inch. This was wound in three sections consisting of 100, 400, and 4,500 turns. All windings were in the same direction and the ends

were brought through small holes in the coil-former and connected in series to four terminals, as shown in fig. 1. However, the winding could be made in the form of one continuous coil with tapings made and brought out to the terminals at the number of turns indicated. The tapings can be made simply by forming a loop at these points and twisting it so that it forms a two or three inch length which can be threaded through the spool and connected to the terminals as shown. Which ever way you do it, care should be taken to see that there is no possibility of these leads shorting across other turns. The completed coil should be given a coat of insulating varnish and covered with a layer or so of tape or brown paper for protection, and it is then ready for fixing into position, as shown. This completes the instrument, except for a protective cover which can be made in the form of a shallow box with a window in the top to view the scale.

It should be impossible for me to give you the exact sensitivity to be expected, but a rough idea can be obtained from the original which had a range of 0.1

milliampere when the full winding was used, that was between the ends marked negative and 3 in fig. 2. Using the section between negative and 2 decreased the sensitivity to 1 ma and the smallest section between negative and 1 decreased it to 10 ma. Thus it could be used as a highly sensitive milliammeter by calibrating the scale. If you do this of course, you will require another milliammeter of known accuracy.

The same instrument could be used as a voltmeter. With a series resistor of 0.5 meg., a scale reading of 50 volts could be obtained on the 0.1 ma. scale. In other words, the sensitivity could be described as 10,000 ohms per volt on this scale, which is ideal for many delicate measurements in which the lower resistance of an ordinary voltmeter would be unsuitable. For more robust work, tapings 1 or 2 could be used. No. 2 requires a series resistance of 100,000 ohms for 100-volt scale (1,000 ohms per volt) and No. 1, 10,000 ohms for 100-volt scale (100 ohms per volt). The methods of tapping the coil and using the resistances are shown in fig. 2. In this instance, tap 2 is shown used as a voltmeter with its associated series resistor.

RELEASE OF LATEST RADIOTRONS

NEW AC/DC SERIES

A complete new series of valves for a.c./d.c. and d.c. receivers has recently been added to the Radiotron range. They all have a heater current of 0.16 ampere and are suitable for supply voltages from 200 to 260 volts when used with a barratter or dropping resistors, or from 117 volts when connected straight across the mains. The range includes:— X76M—triode hexode converter, W76—remote cut-off pentode, DH76—duplex diode triode, KT71—power output tetrode, U76—half-wave rectifier, 161—barretter.

All valves (other than the barretter) fit standard octal sockets. Useful information regarding their application is to be found in Radiotronics No. 134.

U.S.S.R. TELEVISION

After an interval of eight years the Leningrad television station has resumed transmissions.

AMONG OUR READERS

News and Notes from Subscribers about their Activities

"The completion of this year means for me, I hope, the end of my school days, as I sat for my Leaving last month. If I succeed in passing I hope to go into A.W.A. or some other firm. I have had radio as a hobby since 1945. With the help of another lad we formed a Radio Club at school. To me, radio has a big future, and so my interest in it has been maintained over the few years that it has provided me with both a very interesting and profitable hobby. I first became interested in your magazine about three years ago, when I secured one of your old copies with the "Wonder One" set in it. I was just at the one-valve stage at the time. I was extremely

pleased with the results of this little set. It certainly had some punch and at nights would work a speaker with ease on some of the Melbourne stations. A map will give you an indication of the distance."—Russell Heath, "Yarran-dabbie," via Walla Walla, N.S.W.

I am an electrical fitter, employed by the tramways. I have been interested in radio as a hobby since the days of crystal sets, when 3LO and 3AR were the only stations on the air. I have just made the R4841 as described in the October issue, and it certainly is an excellent set. Now I am mak-

ing a portable for Christmas and will incorporate a Power-port in it later for use at home. My own set is similar to the 1933 Standard, it having been re-built and altered a few times and it is still as good as ever." G. Smith, 2 Leicester Street, Preston, Victoria.

"As regards myself, I am just a working man, with an interest in radio experimenting. My particular interest is in battery sets as my job takes me into the back-blocks quite a bit. I have vague ideas of becoming a ham sometime in the future, but it looks a long way off at present. Concerning Radio World, well, my only complaint is the usual one; it doesn't come out often enough to suit me."—A. Hill, 262 Hindley Street, Adelaide, S.A.

"I am a motor mechanic, so a pen is an awkward tool for me. Radio and electricity are my hobbies. I have managed to pass the examinations for two years at the S.A. School of Mines, so can consider myself as knowing a little about radio. At present I only do repair work in my spare time, with a bit of set building thrown in, mostly for my friends. I find it most interesting and hope one day to get into the game in a bigger way. I enjoy and look forward to Radio World every month." C.R. Robjant, 46 Sixth Avenue, Ascot Park, S.A.

"Enclosed please find postal notes being my subscription renewal of the good old paper, Radio World. As long as you pop in a few circuits now and again for radio sets and amplifiers, and what goes to making a good line-up, I shall be contented. I don't think I can find any fault with the R.W. if I tried."—R. Smallpage, Gordon Street, Wodonga, Victoria.

SAVE MONEY
WITH A
SUBSCRIPTION



Order Yours To-Day

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

IT SAVES YOU MONEY!
IT SAVES YOU TIME!

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

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

NAME
STREET and NUMBER
CITY..... STATE.....

AUSTRALASIAN RADIO WORLD

Balcombe Street
Morningside
Victoria

RATES
★ 12 issues 10/6
★ 24 issues 20/-
POST FREE
To N.Z. & Overseas:
12 issues 12/-

DIRECT-COUPLED 807

This amplifier circuit has been tested in our own laboratory, a sample having been built up by us to use the new Rola type "O" speaker. No trouble was experienced in getting it operating correctly. In fact, tests were made to prove that the values of components are not critical, and good performance can be had with wide variations in operating voltages.

The amplifier was found to be so stable that it was then decided to see what would happen if an amplifier was built up with two 807's in push-pull, with direct-coupling on the lines of the above design. This was found to be completely stable, too. The story of these experiments is quite interesting. It is planned to tell it in next month's issue.

—EDITOR.

Recent experiments which I have conducted have proved that a single 807 is capable of fine quality indeed, when used with direct coupling between this valve and its driver.

While not possessing similar academic advantages to the triode, the 807 with correct application and a stiff quantity of negative feed-back applied, is capable of a full 7 watts of audio, with less than 1.75% total harmonic distortion.

By the use of a large amount of feed-back, our 807 acquires similar desired characteristics peculiar to a triode, but with twice

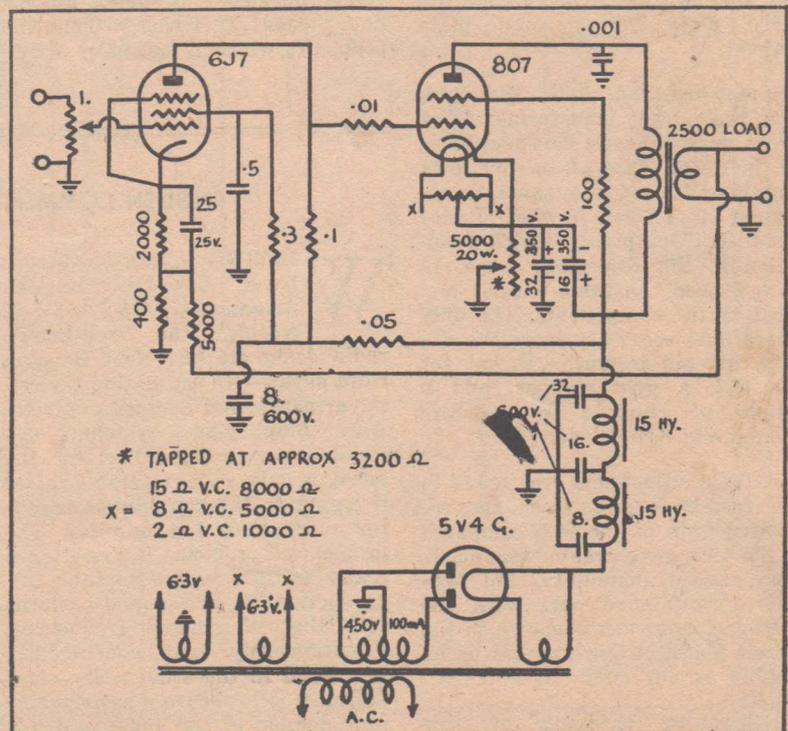
that if high-quality components are used in any direct-coupled circuit and the valves are reliable, it will need no more attention than its inferior brother, resistance coupling. I have had a direct-coupled 6A3 (as described in the

November 1948 issue) operating for a number of years without any trouble. I have built quite a large number of direct-coupled receivers and can state quite honestly that not one of them has

(Continued on next page)

By
Wm. DARRAGH
129 Empress Avenue
West Footscray, Vic.

the power output and less distortion than a straight triode without feed-back. Even direct-coupled triodes are regarded by some as tricky and unreliable; subject to drifting, thus necessitating constant adjustment to the circuit values. Therefore, for me to suggest direct coupling for an 807 may cause a howl of solid disapproval from some theorists. I maintain



"D.C." 807

(Continued)

ever given bother, apart from one case of replacing an open 6A3.

The 807 is a little more critical regarding bias, than a triode, but only a little extra care has to be taken. No difficulty should be encountered, especially if a meter is available. All that is required is a meter capable of reading to 500 volts, d.c., and 100ma., d.c. The adjustments take less than five minutes to complete.

Adjustment

The amplifier is switched on, the cathode resistor of the 807 is then adjusted until the cathode current is at its rated 80 milliamps, this being the total of plate and screen currents taken by this valve. Plate voltage, measured between cathode and plate should be exactly 250 volts. Slight differences in the maximum high tension voltage available from individual power supplies may vary a little, but the aim should be to get plate voltage and plate current the 807 operating within its rated plate voltage and plate current.

I may mention, at this juncture, that the output transformer is of great importance in this amplifier, as in most others. In my own amplifier I used the same transformer as I used in the "Junior Feed-back" amplifier, which I detailed in the November issue. In fact, I used the same chassis and most of the components. The only alterations necessary were the use of a five-pin isolantite socket for the 807, a grid stopper, and a couple of changes in resistors around the 6J7 driver.

A little adjustment was made to the feed-back circuit, as the increased gain of the 807, compared to the 6A3, gave greater feed-back. This caused instability, but was soon straightened out. With the valves of components shown in the circuit diagram there should be no trouble at all.

Laboratory checking of this amplifier revealed a total of less

than 1.75% distortion, and an output of 7 watts, measured across the primary of the output transformer. The actual output across the eighth-ohm voice coil was measured and found to be slightly over 5½ watts. The frequency response was splendid. Whilst not quite up to the same high standard as with the "Junior Feed-back" amplifier, the difference should be far too little to be ever detected by ear. Actual figures were as follows:—Flat within plus or minus 1½ db. from 150 to 13,000 cycles per second. From 150 down to 25 c.p.s. there was a slight rise, reaching a maximum of 4.5 db. at 25 c.p.s., then falling off steeply. At the top end the response also fell off fairly steeply after 13,000, being down 9 db. at 15,000 c.p.s.

The required signal input for full output is one volt to the grid of the 6J7. This can be obtained comfortably from most crystal pick-ups and the original amplifier was used mostly with a Conniseur model T10. With this pick-up and the amplifier feeding into a Rola G12 permagnetic speaker, in a vented enclosure; it sounds mighty fine, indeed! This was without the 6 db. lift which is normally speci-

PERSONAL TELEVISION

It is announced by the Pilot Radio Corp. of America that it is producing a small television set with a three-inch C.R.T. To be known as the "Candid T-V", it is tunable over the complete thirteen television bands (from 44 to 216 Mc/s), includes a built-in aerial, weighs only 15 lb. and costs 99 dollars 50 cents. The aluminium cabinet measures 14-in. x 13½-in. x 9-in.

fied for use with straight-line pick-ups and amplifiers. Audio output is terrific at full volume; surely enough for even the rowdiest amplifier enthusiasts, and more than enough for all normal domestic purposes.

This amplifier should be a splendid proposition for the man who wants highest quality with medium to high power output.

ENGLISH COMMENT ON DIRECT COUPLING

WRITING in the November issue of the English magazine "Wireless World," the well-known radio designer, Mr. Noel Bonavia Hunt says:—"In estimating the relative merits and demerits of rival A.F. amplifying systems one should bear in mind how far the aural results are tolerable after listening to the reproduced sounds for more than ten minutes. The problem of problems is to obtain a really faithful and acceptable reproduction of the sound-patterns consisting of massed frequencies simultaneously and concurrently generated in the studio. The chief difficulty is to secure a satisfactory reproduction of the 1,000 to 4,300-cycle band in such circumstances.

Experiments conducted for a period of twenty years have convinced me that the introduction of the blocking condenser in the inter-stage couplings of an A.F. amplifier constitutes an insuperable obstacle to the achievement of the highest standard of upper audio-frequency reproduction. Whatever the snags associated with direct coupling they are quite insignificant compared with this major problem which resistance-capacity coupling is unable to solve. Those who have achieved success by means of a recently developed method of direct coupling will not lightly abandon it for any other method till a better has been found."

SERVICE OSCILLATOR

Using the Negative-Resistance System

FOR a valve to oscillate it is essential that the energy fed back from the plate circuit, into the grid circuit, be in phase with the voltage of the grid circuit. To achieve this in phase relation with a single winding, a valve must be employed that has a negative resistance characteristic. The 6A8 adapts itself nicely to meet with this requirement as the mutual conductance between its signal grid and oscillator anode grid is negative.

As this negative resistance is

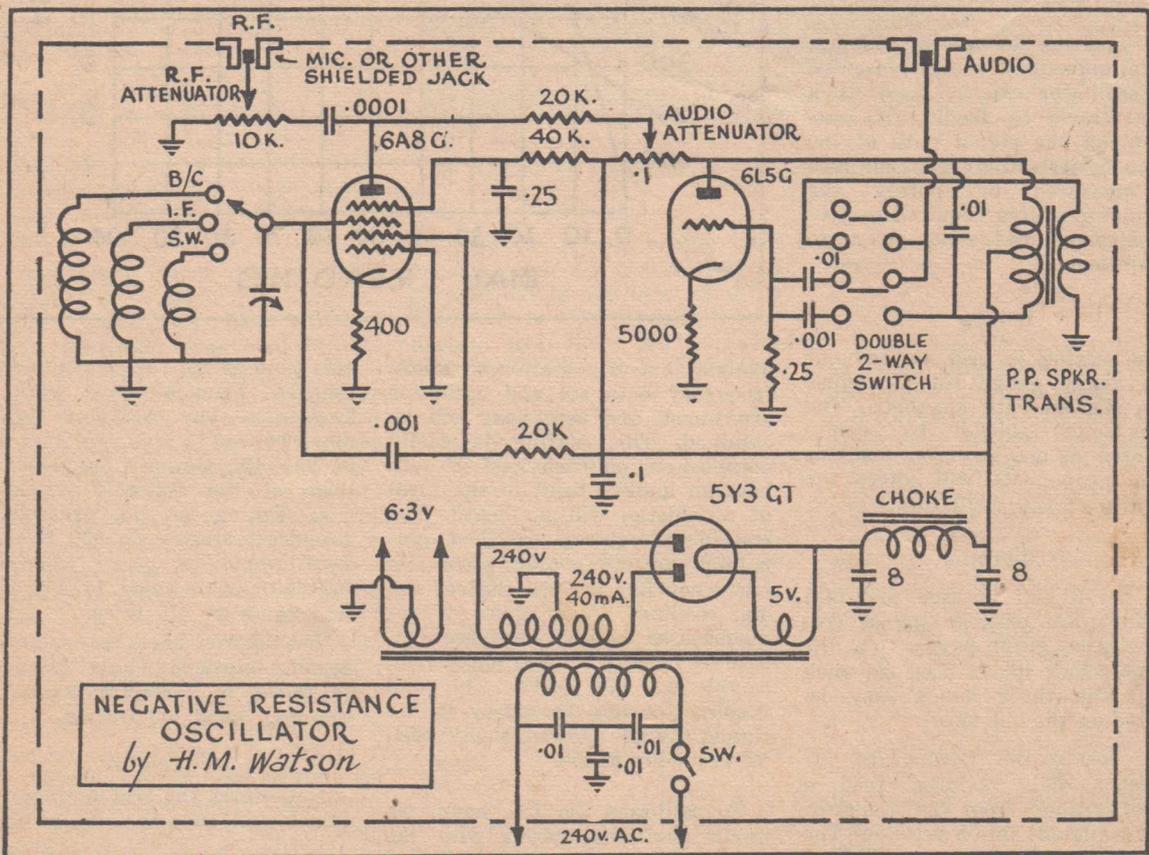
By
H. M. WATSON

89 Botting Street,
Albert Park, S.A.

greater than the dynamic resistance, the effective resistance will also be negative. When connected in series with a tuned circuit it will produce oscillations at the resonant frequency of such a tuned circuit.

The advantages of the negative-resistance oscillator are that as only single windings are used for each band, band switching can be carried out with a simple single, bank three-position switch. The coils used are of commercial make, and the secondaries only are used. Other advantages are good frequency stability and the output may be kept at low levels, thus preventing excessive harmonic generations.

(Continued on next page)



(Continued)

Audio Amplifier

The audio amplifier uses the Hartley circuit and has provision for switching from output to input. When switched into the output position, the output from the 6L5 modulates the R.F. output from the 6A8. Audio may be fed from the audio jack to test audio amplifiers. When the switch is in the input position a pick-up or electronic musical instrument can be used to supply the modulation by plugging it into the same jack. If a short piece of wire, to act as an aerial, is attached to the R.F. output jack, modulation signals will be transmitted, which may be picked up on a radio across the room. Both the set and the oscillator should be tuned between station frequencies and care should be exercised to see that the radiation does not cause trouble to neighbours.

In addition to its normal use for alignment of tuned circuits, the oscillator can be used as a signal tracer by feeding its output along the signal path of the set under test. Stage gain can also be measured by noting the attenuator setting required to give a reference level reading on an output meter.

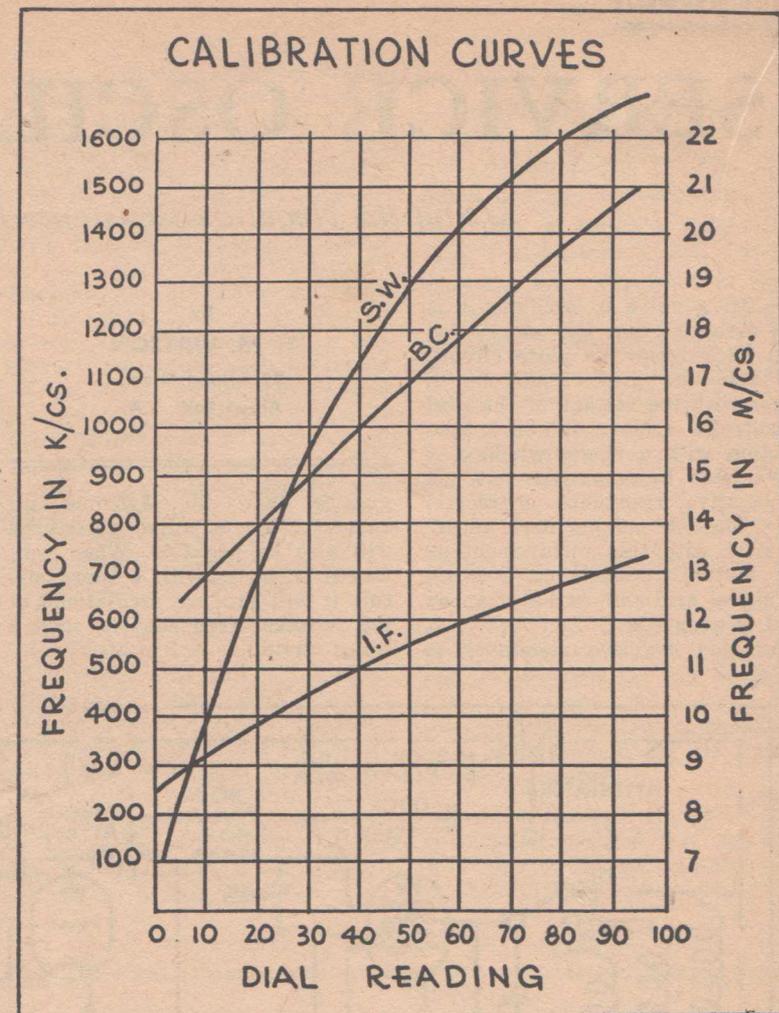
Wiring

The wiring is best carried out with heavy gauge tinned copper wire, sleeved with spaghetti. The components should be firmly mounted, as any swinging leads or loose components will affect the stability of the oscillator.

Calibration

A 0-100 dial is used and dial readings are plotted against frequencies on graph paper. If a different colour ink is used for each band, the three bands may be plotted on the one sheet.

To locate the frequencies for different dial readings, feed a signal voltage from the oscillator (unmodulated) into a receiver. The output from the oscillator will beat



against that of a station to whose frequency both set and oscillator are tuned, and zero beat will be obtained. This setting is easily obtained as on each side of zero beat an audible beat, in the form of a whistle, will be heard. The station's frequency is then pinpointed on the graph, where its frequency line crosses that of the dial reading. When as many frequencies as possible have been recorded, link up all the pin points, completing the curve. The dial reading for any frequency in the tuning range is then easily read off from the graph.

To calibrate the I.F. band, we again beat the output with the signals of various stations but

this time as the I.F. lies outside of the B.C. band we must work on harmonics. The oscillator signals now required to give zero beat will be half the station's frequency, a third of the station's frequency etc. Taking as an example, a broadcast station on 900 K/cs. A beat would be heard when our oscillator was tuned to 450 K/cs. and again at 275 K/cs.

The S/W. band is calibrated against stations whose frequency is known in a similar manner to the B.C. band calibration.

Alignment

1. Connect the test oscillator to Mixer grid, tune the test oscillator

(Continued on page 22)

ENGLISH COIL BOX

Switch, Condensers and all Wiring Pressed at one Blow

The new improved methods of radio receiver manufacture to which attention has recently been drawn have envisaged mostly systems for the complete manufacture, or entirely automatic wiring, of a conventional set.

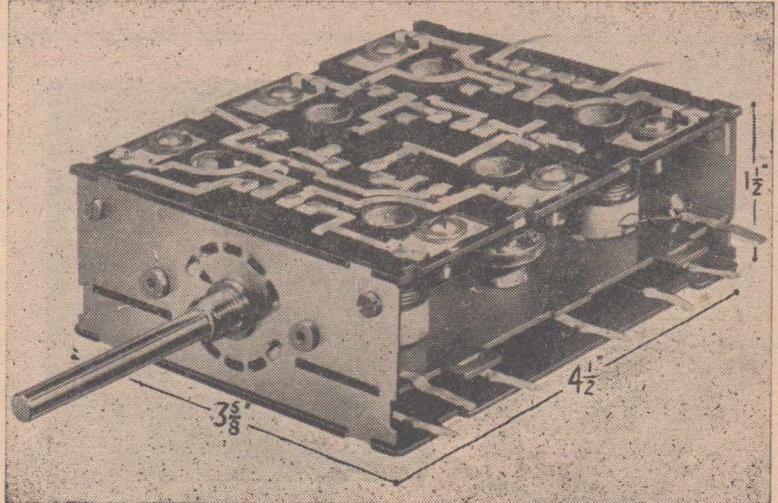
Such methods appear to have grave disadvantages, not the least of which is lack of flexibility.

It appears that a solution of the problem of retaining flexibility of design whilst improving greatly the methods and costs of production lies in grouping components for pre-fabrication prior to assembly into a receiver.

Several "natural" groups will be readily called to mind e.g. valve holders and their associated capacitors and resistors; loud-speakers and output transformers; coils, switching, padders and trimmers.

The last group is that to which Wright & Weaire Ltd., English coil manufacturers, have directed their attention. The conventional coil assembly consisting of three ranges of aerial and oscillator coils, switch for wave-change and gramophone change-over, padders and trimmers, constitutes a combination difficult to wire in its confined space and needing approximately 90 soldered joints for its completion. Such an assembly embraces components, each in their own way a finished product of a specialised manufacturer e.g. the wave-change switch and trimmer condensers.

In order to lower the production cost of a coil pack it is necessary to reduce the material content as well as manufacturing time. Both of these objects have been achieved in the new "Wearite" unit



An example of modern British methods of manufacture, this coil box has strip wiring.

whereby the switch, trimmer condensers and all the wiring are pressed out in one blow of a tool. As well as the saving in production cost, there are the added advantages that,

- (1) Dry-joints are non-existent.
- (2) Each pack is truly identical to the next.
- (3) Provision has been made for connections to either side of the assembly.
- (4) Gramophone Switching is incorporated;
- (5) Wave-change alternatives are:— (a) 12-35, 30-100 and 200-550, (b) 16-50, 200-550 and 800-2000 metres.
- (6) By virtue of its construction the pack is totally enclosed and

thereby rendered comparatively dustproof.

(7) Size $4\frac{1}{2}'' \times 4'' \times 1\frac{1}{2}''$

It is possible that restrictions on importation prevent certain countries from importing coils and coil products complete, and in such cases it is possible to supply the mechanical parts of the coil pack, leaving the manufacturer to wind and assemble his own coils in accordance with his requirements. Such a process should enable manufacturers abroad to take advantage of the work carried out by Wright & Weaire Ltd., in this latest approach to production-cost-saving by means of the pressed-wire system.

Representatives in Australia for the English firm of Wright and Weaire Ltd., are British Merchandising Pty. Ltd., of 183 Pitt St., Sydney

British Television Exports

BRITAIN is about to embark on a new, spectacular, and what may prove to be an all-important export trade, involving the expenditure of millions of pounds and likely to reap a reward in millions of dollars.

British television is to be used

in Canada. The Dominion's example is likely to be followed in other parts of the British Commonwealth, as well as in foreign countries.

Sir Ernest Fisk, the managing director of Electric and Musical Industries and vice-president of

the Royal Empire Society, has been in negotiation with leading Canadian officials at Ottawa during the last weeks and success has crowned his efforts.

Against him have been opposed Canadian broadcasting interests and American television companies. Earlier this year Canada was allotted 12 clear television channels by international agreement, to which 102 television stations have been assigned. It is believed that the first television station will be in Toronto, the second in Hamilton and the third in Montreal.

Ten Years Ahead

It is estimated that Canada can absorb as many as 200,000 television sets, which will provide an important field for British manufacturers.

It is on the transmission side of the business, however, that Britain is supreme. British television is acknowledged in world radio circles to be ten years ahead of any other country, and American visitors to the recent Olympic Games were amazed at the quality of reception provided by the British system.

**WANT
MORE
MONEY?**



**LEARN
RADIO**

IN YOUR SPARE TIME

*... COSTS LESS THAN
THE AVERAGE MAN
SPENDS ON TOBACCO.*

BIG OPPORTUNITIES: Here's your opportunity to make big money in radio! Right now, openings in radio are greater than the number of men available to fill them. It's a wonderful chance for you to rapidly qualify for a good pay radio job or start a business of your own. **AND YOU CAN EARN WHILE YOU LEARN!**

COURSE HAS HELPED THOUSANDS: The Australian Radio College offers ambitious men a complete and proven course in radio engineering. Thousands of students owe their present success to this famous course. You, too, can prepare for a grand future helped by the College. You don't need a previous knowledge of radio—we teach you all you need in a simple manner that makes learning easy.

EARN IN SPARE TIME: We show you, too, how you can earn extra money almost from the start. Many students make up to £8 weekly in their spare time while studying.

COSTS LITTLE: And yet the course costs surprisingly little. For a few pence a day—actually less than many men spend on tobacco—you can train for a profitable job in radio.

Prepare **NOW** for your career in this fast-growing industry. Take the first step by mailing the coupon for our interesting free book, "Careers in Radio and Television." It's a book you **CANNOT AFFORD** to miss!

**AUSTRALIAN RADIO
COLLEGE PTY., LTD.**

206 BROADWAY, SYDNEY, N.S.W.

Please send your free book, without obligation on my part.

NAME _____

ADDRESS _____

**THIS
FREE
BOOK
SHOWS
HOW!**



**ACT
NOW!**

10/1271

STRING AERIAL

You've heard this one before: "Heck, I could have worked him with a piece of string for an antenna!" Well, W1IIN has proved that it can be done. Doc took 15 feet of clothesline, soaked it in salt water, and then hauled the "antenna" into the air. The transmitter end was connected to the pi-section antenna coupler in the usual manner and the half-kilowatt 7-m/C rig fired up. Adjustment of the coupler produced an ampere of current and clouds of steam from the "skywire." Putting the lash-up to test, a short call raised W2GB for a solid QSO.

Witnesses to the test were W1JMY, W1NJM, W1QMI and W9BRD/1—but W2GB still thinks he was being kidded.

—QST (U.S.A.).

New Brand of Transformers

Details of the "A & R" Range

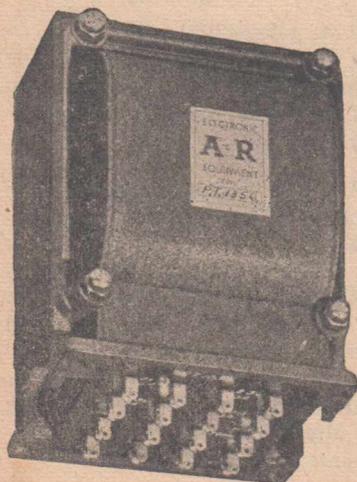
A couple of bright young fellows started up fairly recently with a little factory to build transformers. The firm goes under the title of A & R Electronic Equipment Pty. Ltd., and their products are known as A. & R. brand transformers.

Twelve Groups

There are quite a few different types and sizes of transformers when you come to go into this subject, and A & R transformers are listed out into twelve different classes, including audio and power types.

Output Transformers

In the range of output transformers there are about twenty different types covering just about all requirements for feeding amplifiers into lines or speakers, with power handling ability ranging from 4½ to 55 watts, and prices from 19/- to £5/15/-. In addition to the twenty standard types it is possible to have a

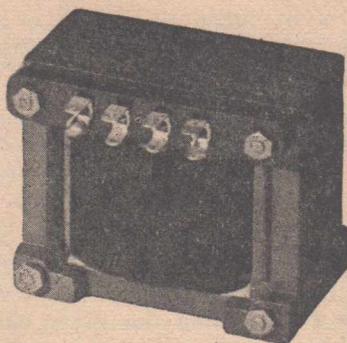


transformer wound to any given specifications at short notice.

Power Transformers

Power transformers are listed by A & R in all the usual types, such as 300 volts aside of a c.t., with three filament windings, up to high tension transformers with 1,500 volts side at 200 milliamps. Retail prices of power transformers run from 19/- to £8/18/6.

Ten standard lines are listed in filter chokes, with current carrying



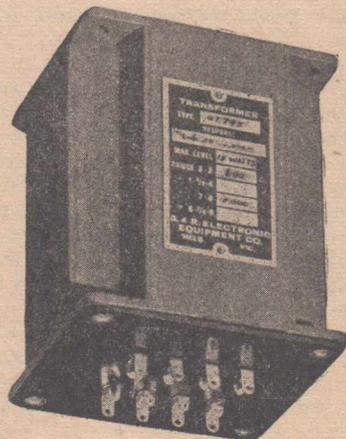
capacities from 50 to 300 milliamps at prices from 19/- to £3/13/-.

Audio Types

Audio transformers for inter-stage connection of drivers to push-pull output valves are available in many different styles and ratios with Radiometal and Mumetal cores at prices around £3/9/- to £3/16/6.

Special Lines

Microphone, mixer, and line-to-grid transformers are offered with Mumetal and silicon steel cores, priced from £3/9/-.



Many other types are also listed as standard in the A. & R. range, such as transformers for "ham" modulators, class B driver transformers, etc. Full details of any of the A & R products can be obtained direct from A & R Electronic Equipment Pty., Ltd., 1 Little Grey Street, St. Kilda, Vic.

TRANSMISSION LINES

It is announced that J. H. Magrath and Co., of 208 Little Lonsdale Street, Melbourne are now agents for parallel twin transmission lines using telcothen insulation. Telcothen is a plastic with a polythene base and has excellent electrical, chemical and mechanical properties. Three types are available at 6d. to 8d. per yard, plus tax. This should be ideal material for aerial feeders for "ham" stations. A free sample and full details can be obtained direct from J. H. Magrath and Co.

MOD. OSC.

(Continued from page 17)

to the I.F. and the receiver to the low frequency end of the B.C. band, adjust the I.F. trimmers for maximum output.

2. Connect the test oscillator to the aerial terminals, tune the test oscillator and receiver to 1400 K/cs., adjust the oscillator and R.F. trimmers for maximum output.

3. Leave the test oscillator connected to the aerial terminals, tune the receiver and test oscillator to 600 K/cs. and adjust the low frequency padder, whilst rocking the gang. The output from the oscillator should be kept as low as practicable, so that no A.V.C. voltage will be developed in the receiver being aligned.

For the alignment of S/W. in dual wave receivers, the same procedure is adapted, only the second and third operation are carried out at 18 and 6 m/cs respectively.

A set of three blueprints giving details of chassis and panel layouts, drawn to actual size is available from the author at 5/- per set.

ROLA

(Continued from page 10)

After my work with the Rola "O", feeding it from a good amplifier, with selected records and a fine pick-up, I am satisfied that it represents a major achievement as a medium-priced, medium-

weight job, yet capable of performance previously expected to be found only in the best of expensive speakers imported from overseas.

The only comment I can add is to express the hope that the Rola engineers responsible for the design of his speaker will follow it up by releasing data for the construction of the most effective baffling system for use with this particular speaker.

F. M. PATENTS

Dr. Edwin Armstrong, the inventor of the F.M. method of transmission, has filed a suit against the Radio Corporation of America and the National Broadcasting Company for alleged infringement of five of his basic F.M. patents.

The World of Radio

H.D. (Annandale) says that a city bookshop told him that the December issue did not come out.

A.—This is quite wrong, and a copy has been posted to you direct, which will prove our point. We have been getting the issues out well before time and in many cases they have been sold out by the 15th of the month. In future, however, it is expected that issues will come out close to the date on the cover. If in doubt at any time be sure to write direct to us.

M.V. (Ballarat) finds that his power transformer gets hot, too hot to hold his hand on it. He asks if this is indicative of a fault.

A.—It is quite in order for a power transformer to get hot. The usual design limits allow for a rise of 40 degrees centigrade about the surrounding atmospheric tempera-

ture. So that on a hot day it is quite to be expected that a power transformer will get too hot for the hand. We would say that it is time to start worrying when the transformer gets so hot that it starts to smell.

P.M. (Edgecliff) asks for a circuit for a battery-operated portable to use reasonably heavy batteries so that they will give satisfactory service.

A.—We cannot do better than recommend the job which was detailed in the June, 1947, issue. It has proved a splendid job in every way. It was described as a kit-set but the circuit is complete and equally suitable for use with any standard components. The kit is easily the better proposition unless you already have a number of components on hand.

FOR

1949

IT IS

A & R

UP & COMING!

That's the A & R brand of transformers, chokes and power equipment. Built well, not down to a price. Giving performance plus—that's A & R.

WATCH FOR FURTHER
DETAILS

Manufactured and engineered by:

**A & R Electronic
Equipment Pty. Ltd.**

1 LITTLE GREY STREET
ST. KILDA, VIC.
Phone: LA 3657

MEDIUM - FI

"Or the Poor Man's Approach to Good Listening"

A FEW years back there was a riddle of sorts going the rounds which asked, "Why is a mouse that spins," the answer being "The higher the fewer." I never did find out what it

By
JACK WEATHERILL

c/o Cleartone Radio Service
Hobart, Tasmania

is prohibitive; and even if you can afford a high powered Hi-Fi job where can you use it? And where can you obtain reasonably priced disks with "Hi-Fi music" on them, or reasonably priced speakers and pick-ups to do justice to them. As K.M. Cocking pointed out in April ARW, you need quite a few watts output to cover a large audio range, and if you can stand more than half a watt output for more than half an hour in the average home, your nerves (and eardrums) are in much better condition than are mine.

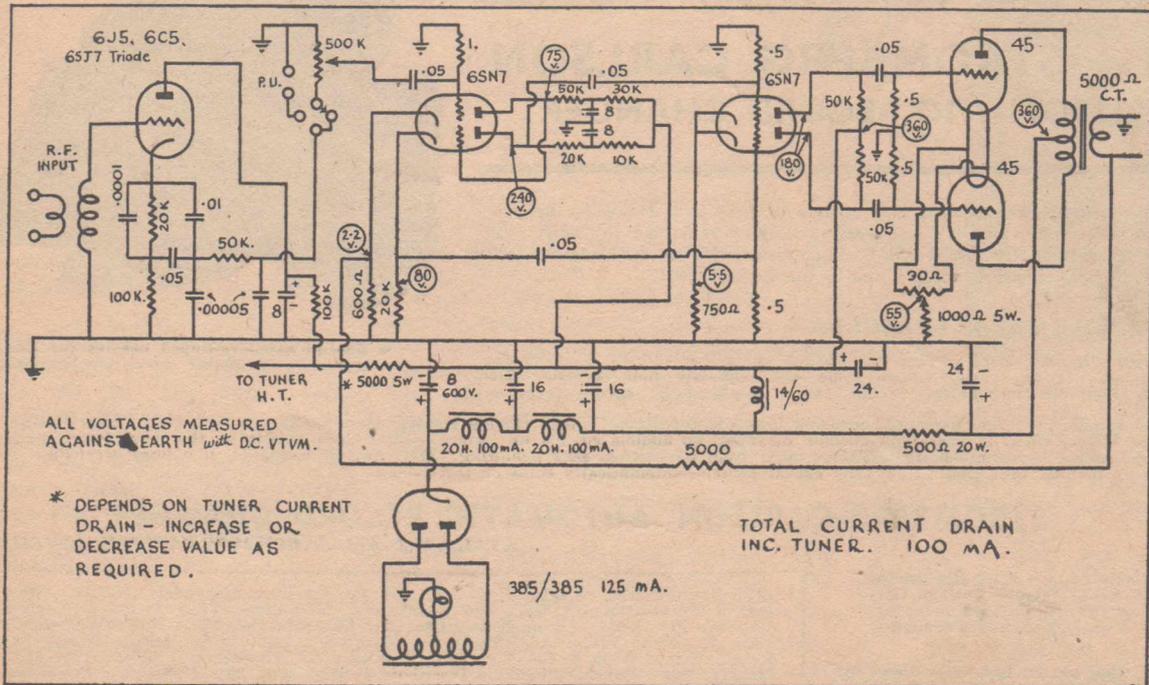
The 807 triode circuit recently featured looks like the answer to a Hi-Fi fans dreams until you start to add up the cost— Power supply transformers chokes and output transformer total £15 and

you couldn't insult such a rig by using anything less than a G12 or Goodmans speaker at about £14 or £15. Total cost so far £30 plus tubes, resistors condensers and a tuner— I didn't bother working it out any further.

So I then took stock of my requirements and assets. The requirements were (a) about three or four watts of audio, reasonably free from distortion (b) as good frequency response as I could get as cheaply as possible (c) triodes in the output, as I am somewhat biased against tetrodes, pentodes and the like. My assets were a well filtered 100 mA power pack and a Rola 12/42 speaker plus a junk box full of various valves resistors and what have you.

(Continued on next page)

all meant, but I do think that the higher we go in the audio spectrum in search of the elusive Hi-Fi, the fewer are the people we'll find up here. Although there is an increasing interest in high quality reproduction the cost in most cases



MEDIUM-FI

(Continued)

Low Current

To satisfy conditions (a) and (c) and still use my 100 mA power pack indicated the use of that sturdy old timer the 45. A pair of 45's in class ABI with 5000 ohm load and 300 volts on the plates, when fully driven, will according to the book deliver 7 watts with 1 per cent 3rd harmonic distortion. To satisfy condition (b) the best I could afford was a Ferguson OP2 15 watt output transformer. It seems to do a good job too.

For the rest of the audio section the front end of the previously mentioned 15 watt Hi-Fi amplifier seemed to be in order.

The R/F end presented a small problem in choice between a Superhet tuner or a TRF job. After consulting the wallet and junk box it was decided to make

it a superhet with tuned circuits well loaded to broaden the selectivity curve and give some highs a fair chance of getting through. As I only listen to the locals anyway, the resultant lack of gain and selectivity wouldn't appear to be any great hardship.

The powerpack uses a 385 a side 125 mA transformer with one of the 6 V windings modified to give 2.5 volts for the 45's. Two 100 mA 20H chokes and a 14/60 choke and filter condensers as shown complete the picture. It may seem a little elaborate but pays dividends as hum from the 12 inch speaker in a bass reflex baffle is inaudible a few inches away from the cone. The 500 ohm 20 watt resistor was used to keep the plate volts on the 45's to about 360 against ground (i.e. 300/310 plate to filament CT). A 1000-ohm 5-watt resistor provides cathode bias and an old 90 ohm reostat across the 45 filaments enabled almost perfect cancellation of hum voltage to be

obtained. I used a CRO across the cathode resistor for this operation, but the adjustment can be carried out fairly satisfactorily by ear.

The push-pull driver and 1st audio phase changer follow the 807 amplifier pattern with minor modifications in the biasing. Checking through with a CRO showed the valves given to be the best for maximum undistorted output.

The detector used is of the infinite impedance type with a cathode network which tends to favour high notes. The RF filter in the detector output was found necessary as without it there was a tendency for the IF to get through with the volume control turned up and cause the amplifier end to take off.

The IF and mixer circuits are conventional except that the primary and secondary transformer

Build your own Player . . .

with a **STROMBERG CARLSON** **AUTOMATIC RECORD CHANGER**

By making your own cabinet unit strictly to your own design—or by purchasing one, you'll find it's less costly and more satisfying to "build your own" using the New Stromberg-Carlson Automatic Record Changer. It's easier to instal, easier to operate, and by far the best unit.

JUST NOTE THESE FEATURES—

Uses all standard discs. Plays ten 12-inch or twelve 10-inch discs at one continuous playing. Fast change cycle—approximately four seconds. The simple foolproof mechanism cannot jam. Feather-light needle pressure.

Record spindle precision machined, ensuring long life for discs. "Glide" change routine cannot chip or crack discs. New heavy duty motor. Motor, silent in operation, cushion mounted, no audible rumble or "wow." Discs drop quietly to the new electro statically flocked heavy pile turntable. Installations made from top—quick, easy mounting. Only two adjustments, liquidates servicing. Automatic or manual operation. New type cut-off switch—automatically stops on last record.

STROMBERG-CARLSON AUTOMATIC RECORD CHANGER

AVAILABLE ALL STROMBERG-CARLSON RETAILERS

Manufactured in Australia under licence from Webster Chicago Corporation—world's largest manufacturers of automatic record changers.

For further particulars write direct to:

Stromberg-Carlson (A'asia) Pty. Ltd., 118 Bourke Rd., Alexandria, N.S.W.; Warburton Franki (Melb.) Ltd., 380 Bourke St., Melbourne, Vic.; Stromberg-Carlson (A'asia) Pty. Ltd., Wilson House, Charlotte St., Brisbane, Qld.; Radio Wholesalers Ltd., 26 James Place, Adelaide, S.A.; Musgrove's Ltd., Lyric House, Murray St., Perth, W.A.; Wills & Co. Pty. Ltd., 7 Quadrant, Launceston; Findlays Pty. Ltd., Hobart, Tas.; Rabco (Wholesale Distributors) Pty. Ltd., 291 Hunter St., Newcastle, N.S.W.



★ Special sapphire-tipped needles for this unit are available upon application.

windings are loaded with 250K resistors, and so no details are given. Actually I also increased the coupling between the IF windings to give a double hump effect before loading them, but unless you have infinite patience, the necessary test equipment and IF's that will stand such tinkering, I wouldn't advise it.

Voice coil feed back was applied via a 5000 ohm resistor to the cathode of the 1st audio tube. A smaller resistor than the above will tend to cause instability at low frequencies. The feedback is sufficient to reduce the power output for a given input by approximately 7db.

The undistorted output as viewed on a CRO is just under 4.5 watts at 400 cycles. As it is seldom necessary to operate at an average power of more than half a watt in the average lounge room the power reserve is sufficient to handle peaks without overloading.

Although not possessing a BFO, listening tests carried out with a number of enthusiastic musically minded friends indicates that the set will reproduce highs and transients with a "presence" not obtainable from any commercially marketed set I've heard to date (I fix 'em for a living so I've heard plenty). Low note response is adequate and "true," the bass reflex baffle bringing to light quite a few notes I hadn't heard before.

In conclusion, I am quite confident that the amplifier will reproduce anything the tuner section will feed into it, and anything that can be found on a commercial disk (including lots of scratch). As there are sufficient 45's available to supply normal requirements for the next ten years according to AWV, there is no need to pass it up because of possible shortage. Properly handled they give out with some pretty good quality, and I will back them anytime against pentodes or tetrodes for low power amplifiers.

INSTRUCTION BOOKS FOR ARMY SETS

ACCORDING to one of our subscribers, Mr. G. Masters of the picture theatre at Port Moresby, books dealing with circuits, operation and adjustment of the BC series of American receivers are available from the Superintendent of Documents, Government Printing Office, Washington, D.C., U.S.A.

The price of the books varies slightly, but as a rule they cost about 40 to 50 cents each. American currency only is accepted. Details of the books must be sent also the T.M. number. The manual listed as TM11-85ON covers the following receivers;—BC-312-N, BC-312-NX, BC-342N, BC-314-G, BC344D, etc.

Mr. Masters says that he hopes to get full details of all manuals available, and offers to help any

readers who get in touch with him about them.

A list of the VT type valves was also sent along by Mr. Masters, and is published on another page. This list was made up some time ago by P.O./Tel. J. Davies and L./Tel. E. Bible of H.M.A.S. Tarangua, at Finschafen, in conjunction with some unknown Americans. A few of the types were not included, but we have been able to get the data from other sources, and thereby fill the gaps.

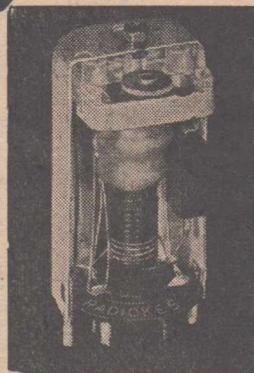
Brazil's first television station, which is to be erected in Rio de Janeiro is being equipped with American gear.

Radiokes

**THE NAME
TO KNOW
IN RADIO!**

Radiokes

RADIOKES D.W. UNITS. Highly selective with exceptional wide range. To match 'H' type gang condenser. Incorporates 4-in-1 padder. Solidly mounted with coils. Ask for type DWO-1



When buying radio parts and components, follow the lead of amateurs and experts alike — specify Radiokes — your guarantee of test-set performance, precision construction and technical excellence.

RADIOKES

PTY. LTD.

P.O. BOX 90

BROADWAY — SYDNEY

R-56

Key to the VT Valve Types

Here is a handy chart to put away in a safe place or paste up on the wall of your workshop. It shows the equivalent commercial type valves for the VT types found in disposals and ex-army equipment.

The VT type numbers were originally used by the armed forces of the U.S.A. and later by some of the other Allied forces, but there are also some VT types of a different series altogether, not American. Our list applies to the American-types valves from American and Allied equipments.

VT-1	WE-203A	VT-49	39/44	VT-87	6L7
VT-2	205B	VT-50	50	VT-87A	6L7G
VT-4B	211	VT-51	841	VT-88	6R7G
VT-4C	211 spec.	VT-52	45 spec.	VT-88A	6R7G
VT-5	215A	VT-53	VT-42A	VT-88B	6R7GT
VT-6	212A	VT-54	34	VT-89	89
VT-7	WX-12	VT-55	865	VT-90	6H6
VT-17	860	VT-56	56	VT-90A	6H6GT
VT-19	861	VT-57	57	VT-91	6J7
VT-22	204A	VT-58	58	VT-91A	6J7G
VT-24	864	VT-60	850	VT-92	6Q7
VT-25	10	VT-62	801, 801A	VT-92A	6Q7G
VT-25A	10 spec.	VT-63	46	VT-93	6B8
VT-26	22	VT-64	800	VT-93A	6B8G
VT-27	30	VT-65	6C5	VT-94	6J5
VT-28	24, 24A	VT-65A	6C5G	VT-94A	6J5G
VT-29	27	VT-66	6F6	VT-94B	6J5 spec.
VT-30	01, 01A	VT-66A	6F6G	VT-94C	6J6G spec.
VT-31	31	VT-67	30 spec.	VT-94D	6J5GT
VT-33	33	VT-68	6B7	VT-95	2A3
VT-34	207	VT-69	6D6	VT-96	6N7
VT-35	35/51	VT-70	6F7	VT-96B	6N7 spec.
VT-36	36	VT-72	842	VT-97	5W4
VT-37	37	VT-73	843	VT-98	6U5/6G5
VT-38	38	VT-74	5Z4	VT-99	6F8G
VT-39A	869A	VT-75	75	VT-100	807
VT-40	40	VT-76	76	VT-100A	807
VT-41	851	VT-77	77	VT-101	837
VT-42A	872A	VT-78	78	VT-103	6SQ7
VT-43	845	VT-80	80	VT-104	12SQ7
VT-44	32	VT-83	83	VT-105	6SC7
VT-45	45	VT-84	84/6Z4	VT-106	803
VT-46A	866A	VT-86	6K7	VT-107	6V6
VT-47	47	VT-86A	6K7G	VT-107A	6V6GT
VT-48	41	VT-86B	6K7GT	VT-107B	6V6G

VT-108	450-TH	VT-161	12SA7	VT-213A	6L5G
VT-109	2051	VT-162	12SJ7	VT-214	12H6
VT-111	5BP4	VT-163	6C8G	VT-215	6E5
VT-112	6AC7/1852	VT-164	1619		
VT-114	5TA	VT-165	1624	VT-216	816
				VT-217	811
VT-115	6L6	VT-166	371A	VT-218	100TH
VT-115A	6L6G	VT-167	6K8	VT-220	250TH
VT-116	6SJ7	VT-167A	6K8G	VT-221	3Q5GT
VT-116A	6SJ7GT	VT-168A	6Y6G		
VT-116B	6SJ7 spec.	VT-169	12C8	VT-222	884
				VT-223	1H5GT
VT-117	6SK7	VT-170	1E5GP	VT-224	RK-34
VT-117A	6SK7GT	VT-171	1R5	VT-225	307A
VT-118	832	VT-172	1S5		3EP1/1806P1
VT-119	2X/879	VT-173	1T4	VT-226	
VT-120	954	VT-174	3S4		
				VT-227	7184
VT-121	955	VT-175	1613	VT-228	8012
VT-123	A5586;	VT-176	6A7/1853	VT-229	6SL7GT
	VT-128	VT-177	ALH4	VT-230	350-A
VT-124	1A5GT	VT-178	ALC6	VT-231	6N7GT
VT-125	1C5GT	VT-179	ALN5		
VT-126	6X5			VT-232	HY-E-1148
		VT-181	7Z4	VT-233	6RS7
VT-126A	6X5G	VT-182	387/1291	VT-234	HY-114-B
VT-126B	6X5GT	VT-183	1R4/1294	VT-235	HY-615
VT-128	1630	VT-184	VR/90/30	VT-236	836
VT-129	304/TL	VT-185	3D6/1299		
VT-130	250/TL			VT-237	957
		VT--187	575A	VT-238	956
VT-131	12SK7	VT-188	7E6	VT-239	1LE3
VT-132	12K spec.	VT-189	7F7	VT-241	7E5/1201
VT-133	12SR7	VT-190	7H7	VT-243	7C4/1203A
VT-134	12A6	VT-191	316A		
VT-135	12J5GT	VT-192	7A4	VT-244	5U4G
		VT-193	7C7	VT-245	2050
VT-135A	12J5	VT-194	7J7	VT-246	918
VT-136	1625	VT-195	CK-1005	VT-247	6AG7
VT-137	1626	VT-196	6W5G	VT-249	CK-1006
VT-138	1629	VT-197A	5Y3GT/G		
VT-139	VR/150/30	VT-198A	6G6G	VT-250	EF-50
		VT-199	6SS7	VT-252	923
VT-143	805	VT-200	VR/LO5/30	VT-254	304-TH
VT-144	813	VT-201	25L6	VT-255	705-A
VT-145	5Z3			VT-259	829
VT-146	1L5GT	VT-201C	25L6GT		
VT-147	1A7GT	VT-202	9002	VT-260	VR-75/30
		VT-203	9003	VT-264	3Q4
VT-148	1D8GT	VT-204	HK24G	VT-266	1616
VT-149	3A8GT	VT-205	6ST7	VT-267	WL-578
VT-150	6SA7			VT-268	12SC7
VT-150A	6SA7GT	VT-206A	5V4G		
VT-151	6A8G	VT-207	12AH7GT	VT-269	717-A
		VT-208	7D8	VT-286	832-A
VT-151B	6A8GT	VT-209	12SG7	VT-287	815
VT-152	6K6GT	VT-210	A64	VT-288	12SH7
VT-152A	6K6G			VT-289	12SL7GT
VT-153	12C8 spec.	VT-211	6SG7		
VT-154	814	VT-212	958		

New Amateur Licences

The Postmaster-General's Department, Wireless Branch, has issued the following list of alterations for amateur transmitting stations:

VK2ALR, B. Hannaford, Flat Rd., Bolwarra, West Maitland, N.S.W.
 VK2FM, F. A. Murray, C/- M. T. Pickard, 2 Wallace Parade, Lindfield, N.S.W.
 VK2AKB, H. B. Brown, 73 Weston Crescent, Gladesville, N.S.W.
 VK2ZO, W. W. Jenvey, 9 Forsyth Street, Willoughby, N.S.W.
 VK2RN, T. H. Russell, Radio 2BS, Bathurst, N.S.W.
 VK2AM, L. D. Cuffe, 30 Bradley's Head Road, Mosman, N.S.W.
 VK2VU, G. D. Partridge, 23 Hunter Street, Singleton, N.S.W.
 VK2ACG, A. Morris-Rees, Kingston Guest House, Kingston, Canberra, A.C.T.

VK2TH, T. R. Heimann, 58 Dunroon Street, Hurlstone Park, N.S.W.
 VK2WW, J. M. Woodward, "Aston," 13 Joseph Street, Blakehurst, N.S.W.
 VK2EA, L. Martin, 36 Brumba Street, Grafton, N.S.W.
 VK2QM, S. C. Broadbent, 32 Bellvue Street, Manly, N.S.W.
 VK2AGZ, 28 Prince Albert St., Mosman, N.S.W.
 VK2UN, R. J. Scott, 49 Brae Street, Inverell, N.S.W.
 VK2YA, R. C. Black, 23 George Street, Liverpool, N.S.W.
 VK2ADH, H. C. Deaman, "Franklin," Fullers Street, Guildford, N.S.W.
 VK2ASF, S. C. Fletcher, Royal Hotel, Kempsey, N.S.W.
 VK2ADC, G. S. McLeod, "Modwena," Stoney Creek Road, Beverly Hills, N.S.W.
 VK2FR, J. H. Howarth, "Milton," Sydney Road, Holbrook, N.S.W.
 VK2WQ, R. T. Wilkins, Thomas Street, South Grafton, N.S.W.
 VK3ALF, A. T. G. Hanson, 4 Henry Street, Hawthorn, Vic.
 VK3SD, C. D. Wordsworth, Calula, via Hillside, Vic.
 VK3ARV, K. G. Henderson, 251 Bouveri Street, Carlton, Vic.
 VK3HU, C. G. Burke, 97 Riversdale Road, Camberwell, Vic.
 VK3BH, C. R. Whitelaw, Box 92, P.O., Dandenong, Vic.
 VK3ARB, R. A. Bouchier, 61 Primrose Street, Essendon, Vic.
 VK3ZF, G. G. Coventry, Warwick Road, Greensborough, Vic.
 VK3XH, C. H. Hyatt, 30 View Street, Alphington, Vic.
 VZ3HI, L. G. Reynolds, 21 Nervana Avenue, East Malvern, Vic.
 VK3BG, R. B. Jones, "Linbray," 25 Panoramic Road, North Balwyn, Vic.
 VK3ARL, O. L. Brown, 32 Ward Street, Ashburton, Vic.
 VK4SD, A. H. Sharland, Boondall, NE6, Brisbane, Qld.
 VK4XE, F. H. Doherty, 3 Oxford Street, Hyde Park, Townsville.
 VK4HF, H. A. L. Fitzalan, Highland Street, Wavell Heights, Qld.

VK5BW, A. W. H. Wright, C/- A. E. Wilson, Meltalie, via Cowell, S.A.
 VK5EZ, L. E. Hauber, 220 Goodwood Road, Colonel Light Gardens, S.A.
 VK5MZ, A. M. Tonkin, 23 Third Street, Salisbury, S.A.
 VK5AZ, H. R. McGrath, C/- Dept. Civil Aviation, Daly Waters, N.T.
 VK5XX, R. de E. Minchin, 14 McGelp Avenue, East Glenelg, S.A.
 VK5RF, P. R. Paramis, 138 Anzac Highway, Glandon, S.A.
 VK5MA, A. J. Martins, C/- Electricity Trust of S.A., Berra, S.A.
 VK6RB, E. F. Robins, 4 Egina Street, Mt. Hawthorn, W.A.
 VK6SR, Radio Society of W.A. Inc., 8 View Street, Subiaco, W.A.
 VK7GC, G. D. P. Clarke, C/- Broadcasting Station 7HO, Hobart, Tas.
 VK7MY, W. H. Morrisby, 48 Central Avenue, Moonah, Tas.
 VK9BP, B. P. O'Connor, Dept. Civil Aviation, Rabaul, New Guinea.
 VK9NR, N. G. Roberts, C/- Dept. Civil Aviation, Norfolk Island.

Cancellations

VK2ABE, A. E. Misdale, Barrenjoey Road, Newport Beach, N.S.W.
 VK7AH, F. W. Medhurst, 9 Beach Road, Lower Sandy Bay, Hobart, Tas.

Loss of life from hurricanes has been cut to one-fortieth of its former magnitude in the past 20 years, thanks to better warning services and preparedness against disaster, states Howard C. Sumner of the U.S. Weather Bureau in "Science News Letter." The Bureau credits organised amateur emergency communications effort for its part in helping to reduce the toll.

Complete Service for the Home Constructor

- COMPREHENSIVE STOCKS OF ALL LEADING BRANDS OF QUALITY RADIO COMPONENTS.
- EFFICIENT MAIL ORDER SERVICE FOR COUNTRY AND INTERSTATE CLIENTS.
- TECHNICAL SERVICE—ADVICE AND GUIDANCE ON ALL YOUR RADIO PROBLEMS BY QUALIFIED TECHNICIANS.
- DESIGN SERVICE—SPECIAL EQUIPMENT CAN BE DESIGNED AND IF NECESSARY CONSTRUCTED & TESTED

No other firm can offer you this service which is the result of 26 years continuous trading with the radio public.

PRICE'S RADIO

5-6 Angel Place
SYDNEY

Both Sides of the Question

THE ANSWER FROM A.W.V.

In reply to the article entitled "The 3S4 Scandal" we make the following comments which you may use as you think fit.

We have received many complaints on the power performance obtained with type 3S4 with 90 volts on the plate and 67.5 volts on the screen. Although this valve is capable of being operated in this manner, it is not the correct valve to use for this purpose. If a 90 volt B battery is available, the correct type to use is type 3V4, which gives the same power output of 270 milliwatts, but with considerably less distortion. We strongly recommend the use of type 3V4 in all receivers except those operating from 67.5 B batteries where type 3S4 must be used and the unavoidable distortion must be tolerated.

Unfortunately there is no one type which is capable of giving high output on 67.5 volts and low distortion on 90 volts, hence the alternatives. Each user is expected to select the one more suited to his particular requirements.

Type 3V4 gives the same power output as type 1Q5-GT and the total harmonic distortion on the data sheet is 7 per cent., as compared with 6 per cent. for the 1Q5-GT, the difference being almost negligible. This has been confirmed by listening tests which proved that the performance of the 3V4 could not be distinguished from the 1Q5-GT when both were correctly operated.

It will be noticed that the load resistance for the 3V4 under these conditions is 10,000 ohms, whereas 8,000 ohms is recommended for type 1Q5-GT. If the correct load impedance is provided, the 3V4 will give results as good as those of type 1Q5-GT. The importance of accurate matching with type 3V4 is

THE "3S4" SCANDAL

Amongst the now outmoded 1.4-volt battery valves of the GT type was one shining star, which can be regarded as one of the best performing portable output valves ever designed: the 1Q5/GT.

Now, to please the few who can afford a running cost of about 6d. per hour on their new toy, the personal portable, we have been blessed with the single ended peanut tubes.

The 1R5 converter and 1S5 diode pentode are definite improvements on their GT equivalents, the former for its better oscillator, the latter for the fact of being a pentode and therefore giving better gain than the 1H4GT diode triode.

But the ultra black sheep of the peanut family is the 3S4 output valve, which is of such terrific distortion, even on medium volume, as to be almost unuseable unless inverse feedback is employed to improve matters. A .002 condenser in series with a 2 Meg resistor between 1S5 and 3S4 plates will put things reasonably right. A .01 condenser between 3S4 plate and chassis in addition will also help. But inverse feedback cuts the gain down considerably and so the initial advantage of having a pentode driver gets more than lost.

The admitted initial distortion of the 3S4 is 12 per cent., against 5 per cent. on the 1Q5. It increases rapidly with output, so that the nominal .27 watts maximum can never be realised in practice.

As this new croaking star on the heaven of modern radio science has ousted the "obsolete" 1Q5 from the manufacturers' list, some big manufacturers are intending to, or already do import 1Q5's from England, so I have been told. Whether this is true or not, an action like this would be quite on the cards.

I do not know what has been going on behind the scenes to make valve designers pocket their pride and present us with such a miscarriage of radio science as the 3S4, as a standard "new equipment type."

Whatever it was, pat them on the back for it—with a sledge hammer.

rather greater than that with type 1Q5-GT, so that care should be exercised in selecting the correct bias voltage and load resistances.

At the present time the great majority of receiver manufacturers are using type 3V4 in receivers operating from 90 volt B batteries, although they are using type 3S4 with 67.5 volt B batteries. In the few cases where unsatisfactory operation was claimed with type 3V4, it was found that it could be cleared up completely by operation under the correct conditions.

We are not aware of a single case where satisfaction has not been achieved with the 3V4.

Yours faithfully,

Amalgamated Wireless Valve
Co. Pty. Limited

F. LANGFORD-SMITH

Chartered Engineer (Aust.)
Application Engineer.

Further provoking articles from Frank Talk, together with replies from those concerned, are scheduled for future issues.—Editor.)

THE "HAMLET" AMPLIFIER

During the holidays a large number of readers called in at our Headquarters at Mornington. Most of these were keen about high-power amplifiers for quality reproduction. Many asked us to say which was the best amplifier we ever handled. Strangely enough, the circuit of this amplifier has not been published previously, so here it is.

By using the same phase-changer as employed in the "World Standard," it becomes possible to have a simple two-stage job which will deliver about 40 watts of fine quality. Operating at about 20 watts it is quite distortionless, has a flat response over a very wide range. As the feedback is applied over only two stages it does not have the phase-displacement trouble which is often encountered

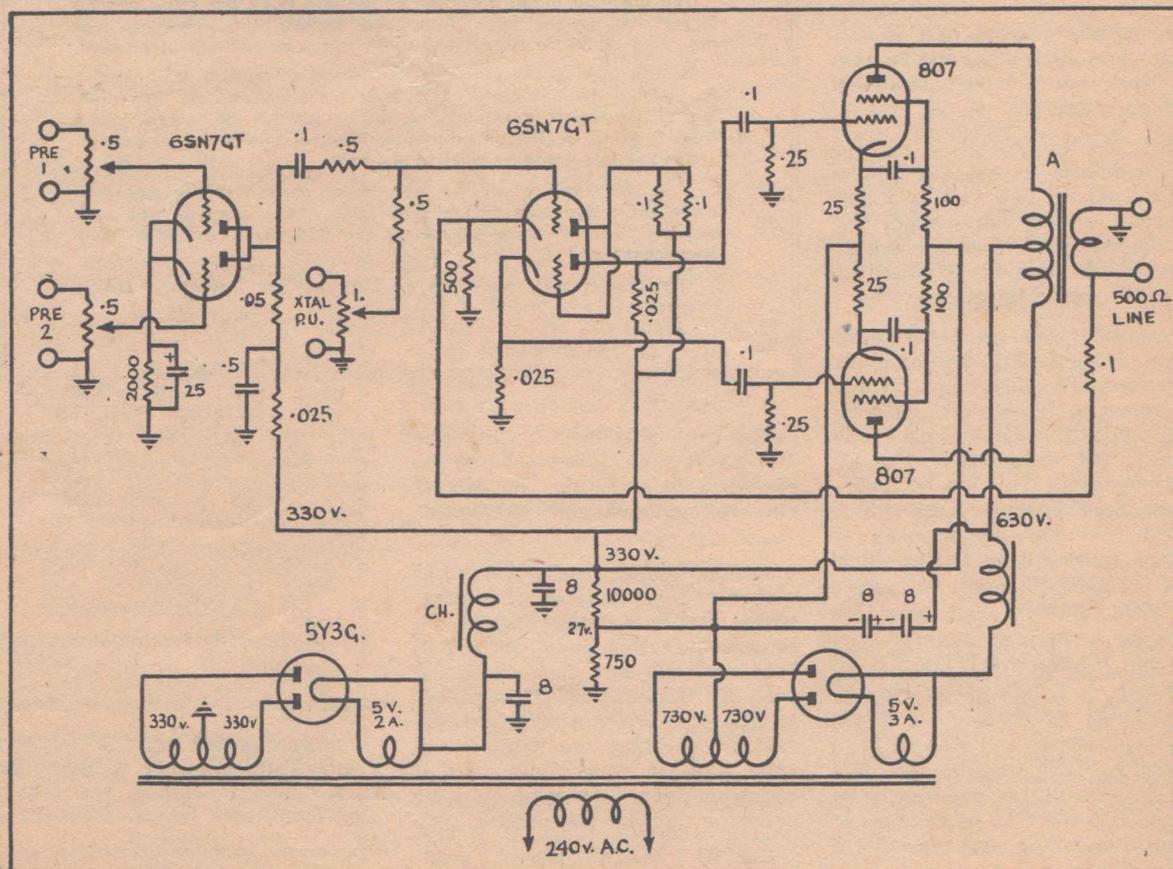
in amplifiers of the "Williamson" type.

Theorists may doubt the ability of the phase-changer to drive the output grids, but we can assure you that this job boiled the voice coil winding off an imported speaker rated to handle 20 watts.

The name? Well, the original amplifier found its way into a country theatre where a new owner wanted to give an impres-

sive re-opening by screening "Hamlet". So this outfit achieved what has long been the aim of many actors—it played Hamlet.

Points to watch: the power supply is from a Red Line transformer type 5176. The output transformer is a Red Line type AW5. Fixed bias on the output stage is set at 27 volts, which should be checked. Other voltages should be checked as indicated.



Shortwave Review

CONDUCTED BY
L. J. KEAST

ON ACCOUNT OF THE SALES OF THIS MAGAZINE IN SO MANY PARTS OF AUSTRALIA, NEW ZEALAND, THE PACIFIC AND OVERSEAS KINDLY NOTE ALL TIMES ARE AUSTRALIAN EASTERN STANDARD TIME.

NOTES FROM MY DIARY

THE CENTURY

So after all it was not Russia but Newfoundland that gave Rex Gillett his 100th verified country. Well, Rex that's fine work, old man, and in eight years is a grand job particularly as a good deal of that time was taken up by war when veries were very far and few between.

CHANGING HORSES IN MID-TRANSMISSION

Listeners to the BBC have become accustomed to the announcement . . . "We would remind listeners that 'such and such' a fre-

quency is now going off the air but . . . is now being brought into use."

The change of this or that wavelength is unavoidable: there is no other way of overcoming the effects of natural phenomena on short-wave transmissions. In other words, the choice of wavelengths for this or that signal path must continue to be governed by the incidence of daylight and darkness, by the behaviour of the sun, and by the seasons of the year. No listener ever deprecated more heartily than the broadcaster the necessity for, so to speak, changing horses in mid-transmission, but were it not done, "Mid-transmission" would become the involuntary close of the transmission.

p.m. although sometimes continues till 4 o'clock.

"Poste de l'isle Maurice," 7.34 mc, 40.8m: This station is being heard daily according to "Sweden Calling" from 1-3.15 a.m. Programmes are announced only in French but now and then they relay recorded BBC programmes in English around 2 o'clock. After a news summary in French, station closes at 3.15 with "God Save the King."

VERIFICATIONS

Arthur Cushen's list:

HC2AK, Guayaquil, Ecuador, 4.65mc: Veri from Casilla 784, the Guayaquil Radio Club, who handle verifications for them.

XLRA, 168 Victory Street, Hankow, China, veri by air-mail letter from L. C. Cheng, Director. Letter says they operate on 11.50mc from 9-10.15 a.m. and 8 p.m. till 1 a.m. "Would appreciate further reports on XLRA from kind listeners like yourself."

XGOA, 17.765mc, veri by air-mail with 3,500,000 dollars in stamps. PCJ, 21.48mc; HH2S, 5.945mc; Radio Alicante, Saigon, 6.19mc; Rome, 15.12mc; HC2AK, 4.65mc; PLA-8; YDB-3; WNRA, 11.77mc; WNRI, 18.08mc.

Mr. Allan W. Beattie has received a few more: Switzerland on 11.865, 11.715, 15.305 and 17.784 mc; YDC, 15.145mc; CHLS, HCJB, 12.45mc; XGOY, 15.17mc; XGOA, 15.105mc; WLKS; ZBW-3, 9.52mc, and 15 Aussies. "I was particularly pleased to receive my air-mail reply from ZBW-3 exactly one month after sending report as, like many others, I was unsuccessful on more than one occasion before the war."

New Stations

VLI-2, Liverpool, 6.09mc, 49.26m: This new outlet for the A.B.C. opened at 7 p.m. on December 22. It is intended for listeners in the outback and carries the A.B.C. interstate programme. Reception at my listening-post is excellent. Schedule at present is: Daily 6-8.45 a.m.; 6.30-11.30 p.m.; Saturdays till M/N; Sundays, 6.45-8.45 a.m.; 6.30-11.30 p.m.

VLI-3, Liverpool, 9.50mc, 31.57m: Commenced on December 23 and carries A.B.C. interstate programme from 9 a.m.-6.15 p.m. daily. Also a splendid signal, and perhaps a little louder than VLQ, 9.66mc.

MONTE CARLO, 9.50mc, 31.57m: Can be heard around 5 a.m.

MONTE CARLO, 11.80mc, 25.42m: The Gamblers' Paradise can be heard testing on this frequency at 6 p.m.

GSY, London, 6.04mc, 49.67m: Relaying "Voice of America" programmes from 5.30-8.30 a.m., this new outlet for the B.B.C. opened on December 12. This information was air-mailed to me by Arthur Cushen.

GSX, London, 6.06mc, 49.49m: Arthur also twigged this one and gives schedule for "Voice of America" relays from 1.45-8.30 a.m.; 2.30-2.45 p.m. Like its sister above, commenced on December 12.

HI2L, Ciudad Trujillo, 9.525mc, 31.49m: This new Dominican Republic station with the slogan "La Voz del Tropico" now signs at 3

SHORTS

Here are some New York transmitters directed to Europe but at times that should permit of reception here:

WCBN, 15.27mc, 19.65m: 2.15-9.15 a.m.

WCBX, 17.83mc, 16.81m: 2-8.30 a.m.

WCRC, 21.57mc, 13.91m: 2-7.45 a.m.; 9.65mc, 31.09m: 8-8.30 a.m.

WNBI, 17.78mc, 16.87m: 12.15-12.30 a.m.; 1.45-7.45 a.m.

WNRA, 21.60mc, 13.88m: 12.15-12.30 a.m.; 2.15-5.15 a.m.; 11.77mc, 25.49m: 5.30-8.30 a.m.

WNRE, 15.28mc, 19.63m: 2-7.45 a.m.; 9.53mc, 31.48m: 8-9.15 a.m.

WNRI, 18.16mc, 16.52m: 2.15-6 a.m.; 9.70mc, 30.93m: 6.30-8.30 a.m.

WNRX, 21.73mc, 13.81m: 2-5 a.m.; 11.89mc, 25.23m: 5.15-8.45 a.m.

WRCA, 15.15mc, 19.80m: 5-8.45 a.m.

WOOC, 15.13mc, 19.83m: 2.15-9.15 a.m.

WOOW, 21.50mc, 13.95m: 1.45-6 a.m.; 11.87mc, 25.27m: 6.30-8.30 a.m.

HOB, Panama City, has moved from 6.17 to 6.20mc and opens with march at 9.30 p.m.

YDC, Batavia, expect about July this year to have increased their power to 100 kw. YDB-3, 7.27 mc, has English from 9-10 p.m. News at 9 and 9.50.

KZOK, Manila, 9.69mc, 30.96 m, which has a 24-hour service, puts on a special session, "Your Show," daily from 1-3 a.m. when DX reports and requests are broadcast. They want reports and suggestions on this programme.

Radio Indonesia, Macassar, 5.03 mc: Very good till 11 p.m.

KJOY, Athens, 8 mc, 37.5m: According to "Sweden Calling Dancers," are not affiliated with the American Forces Network and reports should not be addressed to AFN, Athens, but to Station KJOY, C/- U.S. Corps of Engineers, U.S. Mission to Greece, Athens, Greece. (This station only operates on Saturdays from 4.30-5.30 a.m.)

Forces B/C Service, Cyprus, 7.22 mc, 41.55m, who have been closing at 6.30 a.m., have recently conducted tests on Sundays from 8-10 a.m.

TGWA, Guatemala, 9.76mc, 30.78m: Still going strongly at 6 p.m. on Xmas Day.

HCBJ, Quito, 15.11mc, 19.84m; 12.45mc, 24.11m; and 9.958mc, 30.12m, were all going strong until late in the afternoon on Xmas Day with special Xmas messages.

CXCX, Sackville, Canada, 15.19 mc, 19.75m: Fair around 10 a.m. in programme to the Caribbean.

XEWX, Mexico City, is now impossible to hear in the afternoons with VLI-3 on the same frequency.

WLWS-1, Cincinnati, 17.8mc, 16.87m, is possibly the best of the V. of A. programmes at 11 p.m. They continue till 12.15 directed to W.S. America and come back on 21.65mc, 13.86m, directed to Europe till 7.45 a.m., whilst at 8 o'clock if you are in a good reception area you may hear their programme to Spain till 8.30 on 11.71 mc, 25.62m.

The World Radio University stations at Boston have always been a great favourite of mine at breakfast time. Here are the latest schedules: WRUA, 9.55mc, 31.41 m: 5.30-9.15 a.m. in parallel with WRUS, 11.79mc, 25.45m, WRUL, 15.35mc, 19.54m, and WRUW,

17.75mc, 16.90m, are on from 6-7.30 a.m. and come back again on 15.29mc, 19.62m and 11.73mc, 25.58m respectively, whilst WRUX on 11.74mc, 25.55m, is good from 6-7.30 and fair from 8.25-9 a.m. on 17.755mc, 16.90m.

OIX-4, Lahti, 15.19mc, 19.75 m, is fair at 10.15 p.m. with news.

Radio Paris, 17.85mc, 16.81m: Very fine around midnight.

KZFM, Manila, 11.84mc, 25.34 m: Gives news at 8 p.m.

SAN FRANCISCO TRANSMITTERS

Here are the present schedules which will probably continue for some time and during most of the time on the air should be heard well in Australia.

KCBA, 6.12mc, 49.02m: 11.15- a.m.-6.30 p.m. (should be O.K. from late afternoon; 7 p.m.-12.30 a.m.

KCBF, 9.65mc, 31.09m: 7 p.m.-12.30 a.m.

KCBR, 6.18mc, 49.54m: 7 p.m.-12.15 a.m.

KGEI, 9.7mc, 30.93m: 3.30-8.30 p.m.; 8.45 p.m.-12.30 a.m.

KGEX, 11.73mc, 25.58m: 3-6.45 p.m.; 7 p.m.-12.15 a.m.

KNBA, 6.06mc, 49.50m: 5.15-6.45 p.m. (not Mondays); 7 p.m.-12.15 a.m.

KNBI, 9.65mc, 31.09m: 5.15-6.45 p.m. (not Mondays); 9.75 mc, 30.77m: 7 p.m.-12.15 a.m.

KNBX, 15.25mc, 19.67m: 2.30-6.30 p.m.; 11.79mc, 25.45m: 7 p.m.-8.45 p.m.; 9 p.m.-12.15 a.m.

KWID, 11.90mc, 25.21m: 3.30-7 p.m.; 9.57mc, 31.35m: 7.15 p.m.-9.30 p.m.; 10 p.m.-12.15 a.m.

KWIX, 11.86mc, 25.30m: 7 p.m.-12.30 a.m.

KRHO, Honolulu, 15.13mc, 19.83m: 5.15-6.45 p.m.; 9.53mc, 31.48m: 7 p.m.-12.15 a.m.

Manila 1, 15.33mc, 19.57m: 5.15-6.45 p.m.; 11.89mc, 25.23m: 7 p.m.-9 p.m.

BBC YEAR BOOK

My copy of the BBC Year Book for 1949 has arrived and as usual it is brimful of interesting information regarding the activities of this great organisation. With excellent articles by notable authorities and profusely illustrated, it is a splendid addition to any radio man's library.

Mr. Max Krumbeck of Campsie sends a nice letter acknowledging the help he has received from these pages during the last two years. He is studying accountancy and consequently is not glued to his receiver, but since 1936 with "on and off" listening he has clocked 153 veries from 32 countries. He encloses a list of his latest loggings:

RADIO FRANCE, Hanoi, 6.19mc: Very good station at 10 p.m.

COBL, Havana, 9.835mc: Fair but bad QRM at 9 p.m.

COBC, Havana, 9.38mc: Very good signal at 10.15 p.m.

XGOA, Nanking, 5.985mc: Fair at 9.45 p.m.

HI2T, Trujillo, 9.73mc: Excellent at 10 p.m.

PHI, Hilversum, 17.77mc: Fair only at 11 p.m.

Singapore, 11.88mc: Just fair at 7.15 p.m.

KZFM, Manila, 11.84mc: Very poor at 8.15 p.m.

WLWS, Ohio: 11.71mc: Good at 8 a.m.

WOOC, New York, 15.13mc: Fair only at 9 a.m.

HCJB, Quito, 12.45mc: Excellent lately at 9.30 p.m. and 3 p.m.

(Thanks for your kind remarks, Mr. Krumbeck, and your list. Will look forward to further loggings. I think why you find PHI on 17.77mc "only poor" at 11 p.m. is because of interference from Melbourne in transmission to Canada.—L.J.K.)

Rex Gillett writes: "Well, I guess best news I can give you is that I have at last verified my 100th country on commercial radio bands (no "hams" for me). I consider No. 100 was one of my best, it being VONH, Newfoundland. (Not a very common QSL in these parts to the best of my knowledge.)

"I have forged along since getting the century and now have 103—100 on shortwave and 3 on BCB (these latter three being Pakistan, Saipan and New Hebrides. Two of the latest countries are GOA (Port India) and Greece.

"I wonder if you know whether 100 countries verified is a common thing in this country? The only other dx-er I know with such a total is Ray Simpson. I have been dx-ing 8 years. However, I would not say it took me this time to verify this number, as it was only in the past couple of years Ern Suffolk and I had a private race, firstly to the 50 (he won narrowly) and the next goal was the century. (Ern still has about 20 to get, I think.)"

(Yes, Rex, I think you are correct; only Ray and yourself have 100 to their credit but, of course, the New Zealand tiger, Arthur Cushen, has a good deal more than that.—L.J.K.)

Rex Gillett's list: VONH, JJOY (not KJOY as is generally believed) first from South Australia, if not Australia. GOA (first from Aust.); ZPA-5, TGLA; "Peer Gynt" (yacht); WLKS; VJPG 6280 (boat); VJPG 6235; HER-G; ZL-4; ZL-3; HCJB, 5.96mc; JWV-2; JWV-4; VUM-2, 9.59mc; Trade Winds (yacht); Radio Hongkong; XGOA, 5.95 and 15.105 mc; VLI-2; VLI-3; KRHO, 15.33mc; PRL-7; PRL-8; Copenhagen, 15.165 and 9.52 mc; Radio International Tangier; LLK; LLG; Johannesburg, 4.80 mc; OIX-4 and VLB-2.

GEORGE BROWN & CO. PTY. LTD.

267 CLARENCE STREET, SYDNEY. Phone: M 2544

DISTRIBUTORS TO THE TRADE FOR

ROLA SPEAKERS ● EVEREADY BATTERIES ● AEGIS

RADIO COMPONENTS ● ULTIMATE RADIOS ● MULLARD

VALVES ● I.R.C. RESISTORS

And All Brand Line Radio Components

★ AEGIS 4 VALVE AND 5 VALVE KIT SETS COMPLETE NOW AVAILABLE

Speedy Query Service

Conducted under the personal supervision of A. G. Hull

F.C. (Tamworth) asks about fitting switches in high tension lead as well as power.

A.—Especially with mercury vapour rectifiers and high-voltage outfits such as transmitters, it is good practice to switch on the heaters first and then apply the high tension. Switching off is not important, both together being O.K. or h.t. first and then the a.c. power if you want to stick to a routine. But with ordinary amplifiers, and even those working up around 600 volts it is seldom necessary. With our old FFR amplifier we used only the power switch and a 5V4 rectifier with 730 volts on it and switched it on and off many hundreds of times over a period of two years and the original rectifier is still in the pink of condition.

* * *

D.G.H. (Castlemaine) is worried about voltage gain in amplifiers.

A.—Yes, it is quite a problem to design an amplifier which will suit all types of input from radio to the newer types of pick-ups. For radio work it is desirable to have detection at a fairly high level, taking two or three volts of audio from the detector to feed the amplifier. Some crystal pick-ups can also give this fairly high voltage, but quite a few will give only a volt or a fraction of a volt, especially when used with sapphire needles. Then there are magnetic and moving iron and moving coil

pick-ups with signal outputs of only millivolts. It is obvious that no one amplifier can suit all types of pick-ups, even apart from the need for bass compensation with some types. It really boils down to selecting your pick-up first, then designing your amplifier to give full output when driven by this pick-up. The lower the gain the less trouble you are likely to run into with hum and distortion.

* * *

M.B. (Camberwell, Vic.) wants to know if it is possible to have push-pull without a phase-changer or transformer by centre-tapping the pick-up.

A.—Yes, this can be done. With some of the low output types of moving iron, moving coil and such types it is possible to have a centre-tapped secondary to the input transformer. With crystal pick-ups it is easy to arrange an artificial centre-tapping by putting a couple of 1 meg-ohm resistors from grid to earth on each of the two sections of the first stage. The pick-up can then be connected across from grid to grid. This works out well with an amplifier designed solely for gramophone work. A twin-triode, such as a 6SN7GT, can be used to drive a pair of 807's, with either resistance-capacity coupling or direct-coupling. Such arrangements are easy to design to have low distortion.

BACK NUMBERS

The following issues are available from our Back Dates Dept. at 1/- each or 10/- per dozen, post free:

- 1940—Only November.
- 1943—Only December.
- 1944—All except Jan., Aug., Sept., Oct., Nov. and Dec.
- 1945—All except Jan., Feb., Mar., Apr. and Nov.
- 1946—All except Jan., Mar., and May.
- 1947—All issues.
- 1948—All issues except Sept., Nov., and Dec.

Please send your remittances in 1½d. stamps or postal notes.

Address:

Australasian Radio World,
Box 13, Mornington, Vic.

BARGAIN CORNER

Advertisements for insertion in this column are accepted free of charge from readers who are direct subscribers or who have a regular order placed with a newsagent. Only one advertisement per issue is allowed to any subscriber. Maximum 16 words. When sending in your advertisement be sure to mention the name of the agent with whom you have your order placed, or your receipt number if you are a direct subscriber.

FOR SALE.—Goodmans speaker £11, AF15 output transformer £4, English Connoisseur pick-up and transf. £4. All guaranteed. Box No. 8494, c/o Radio World, Box 13, Mornington, Vic.

FOR SALE.—Bits of portable set; F.N. two-gang, loop, osc. coil, 2 midget i.f.'s, Rola 3C, A and B batts., 1R5, 1T4, 155, 34, and sockets. £5 the lot. No. 8495, C/o Radio World, Box 13, Mornington, Vic.

FOR SALE.—Rotary converter, 12 volt, 10 amp. input; 500-v. 5ma., and 275-v. 110ma, d.c. output. Brand new, £2. No. 8496, C/o Radio World, Box 13, Mornington, Vic.

WANTED, 6 or 12-v. d.c. to 230-250 a.c. inverters, either rotary or vibratory, 100-200 watt, also similar but 32 volt input. Write, stating condition and price to Devontone Radio and Sound Systems, P.O. Box 20, Yarraville Vic.

WANTED TO BUY, Kingsley AR7 type communications receiver, also coil boxes for this type of receiver, any bands. R. Bell, 17 Elizabeth Avenue, Dulwich Hill, N.S.W.

FOR SALE, the Handy P.A. amplifier described in January issue, less valves, £5/10/-. Power unit, less valve, £3 extra. Apply Radio World, Box 13 Mornington, Vic.

WANTED TO BUY, or borrow, handbook for BC312 receiver, also wanted to buy, type 3 Mk. 2. Particulars to VK5LO, Sgt. Millar, c/o R.A.A.F. Signals, Mallala, South Australia.

SERVICEMEN — STUDENTS — AMATEURS BLUEPRINTS NOW AVAILABLE

Any circuit drawn up from your rough copy or from the wide range on my files. Prints of any circuit from a crystal set to an F.M. or Television Receiver, including all types of test equipment, can be supplied for 3/- per print, post free.

Special circuits based on those odd valves and components in your junk box designed and drawn up for 6/- per print, post free.

R. J. WATSON
89 BOTTING STREET
ALBERT PARK
SOUTH AUSTRALIA

Summer time is PORTABLE TIME

The hits of the season! Aegis-designed Portables which bring you extra fun on your holidays and added interest in assembling! For they're simply designed, complete to the last nut and bolt, and supplied in the famous Aegis sealed carton. Every feature of an Aegis portable kit is a quality feature which means that the finished job will have that professional touch and that reliable performance common to every Aegis product. And don't forget that every Aegis kit is fully protected with A.R.T.S. and P. Licence! Full constructional details included in pack.



AEGIS "PERSONAL"

Weighs only 4½ lbs., yet the Aegis PP4 is a powerful 4-valve battery-operated portable only 4in. x 4½in. x 9in. Features include lightweight leatherette-covered case in choice of colours with pencil-case slide back for easy battery change, self-contained loop aerial, midget 2-Gang by A.W.A., 3in. Rola Speaker, Super-Het Circuit, Minimax Battery, Adjustable Plastic Strap. Note the new low price, which includes batteries, but excludes £12/12/- valves.

AEGIS "VOYAGER"

As illustrated at left, this compact 4-valve battery-operated portable is only 8in. x 6½in. x 7in. Weight assembled is only 12lbs., yet it includes 2 Minimax 45V Batteries, Long Life, Super-Het Circuit, Rola 3" Permug Speaker, Aegis special loop aerial, Aegis J10 I.F.'s, durable leatherette-covered cabinet. Model KP4. Note the new low price which includes batteries but £12/12/- excludes vales.

AEGIS
MANUFACTURING COMPANY
208 Lt. Lonsdale St.,
Melbourne

DISTRIBUTORS IN ALL STATES

MELBOURNE—
Lawrence & Hanson
Electrical Pty. Ltd.
Replacement Parts Pty.
Ltd.
Vells Electrical and
Radio Pty. Ltd.
Homecrafts Pty. Ltd.
J. H. Magrath & Co.

SYDNEY—
John Martin Pty. Ltd.
George Brown & Co.
Pty. Ltd.
Fox & Macgillycuddy
Ltd.
Cook Bros. Pty. Ltd.

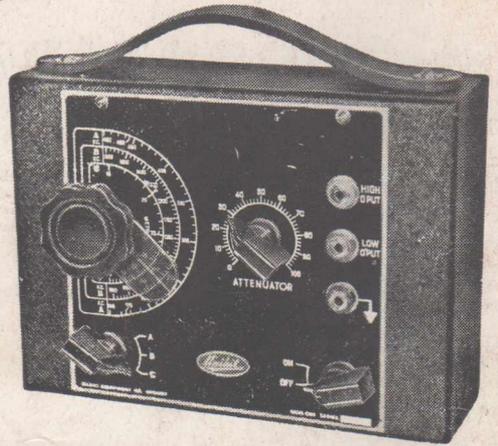
ADELAIDE—
George Proctor (Factory
Representative)
Newton, McLaren Ltd.
A. G. Healing Ltd.
Harris, Scarfe Ltd.
Gerard & Goodman Ltd.
Oliver J. Nilsen & Co.

BRISBANE—
Chandlers Pty. Ltd.
A. E. Harrold Pty. Ltd.
B. Martin Pty. Ltd.
PERTH—
Nicholsons Ltd.

TASMANIA—
Lawrence & Hanson
Electrical Pty. Ltd.
Lawrence & Hanson
Electrical Pty. Ltd.

**BUILD YOUR OWN
TEST GEAR . . .
AND YOUR OWN PORTABLE**

University



**MODEL OK1
OSCILLATOR KIT**

For years of active service, yet simple to build at home with a few ordinary tools! The "University" OK1 Oscillator Kit covers all fundamental frequencies in the average receiver—the dial is specially calibrated. Standard batteries are used and each OK1 Kit is complete with instruction book giving pictures and wiring diagrams and all parts.

PRICE £8 (plus tax).

**MODEL MK1
MULTIMETER KIT**

The "University" Model MK1 is an AC-DC Multimeter Kit you can build yourself. Handy companion to the OK1 and the same neat size—6ins. x 8ins. x 2½ins. Uses popular 4ins. square type meter with clear multi scale. All wiring instructions and constructional details are given with the kit and photographs and circuit diagrams make assembly simple. All parts are prefabricated so that fitting is simple.

PRICE £8 (plus sales tax).



**★ BACK AGAIN — THE PK4
4-VALVE PORTABLE KIT**

The new PK4X Portable is a greatly improved radio incorporating all the latest technical advances. The kit set includes bantam type valves and Mini-max batteries. Genuine, leather covered carrying case is provided, all parts (including 5" Alnico speaker), plans and illustrated instruction book are provided for easy assembly with a few simple tools.



University

RADIO KIT SETS • RADIO & ELECTRICAL TEST EQUIPMENT

MANUFACTURED BY RADIO EQUIPMENT PTY. LTD., 5 NORTH YORK ST., SYDNEY. BU3169 (2 lines)

Printed by the Bridge Printery Pty. Ltd., 117 Reservoir Street, Sydney, N.S.W., for the Proprietor of the "Australasian Radio World," Balcombe Street, Mornington, Victoria.