THE AUSTRALASIAN

Radio World

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VOL. 5 . . . . . NO. 3 AUGUST 1940

AMERICAN STYLE COMMUNICATIONS NINE

EXPERIMENTS WITH DIRECT-COUPLED CIRCUITS

THE A.B.C. OF MULTI-RANGE METER DESIGN

SHORT-WAVE STATIONS LISTED IN THEIR FREQUEN[illegible] ORDER

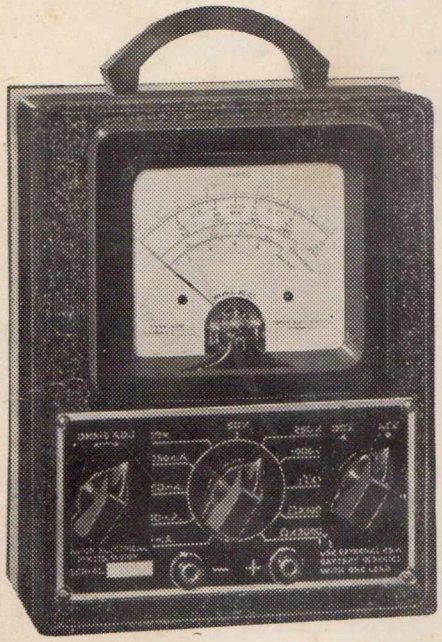
Air Test of Latest Breville Receiver.—See page 19

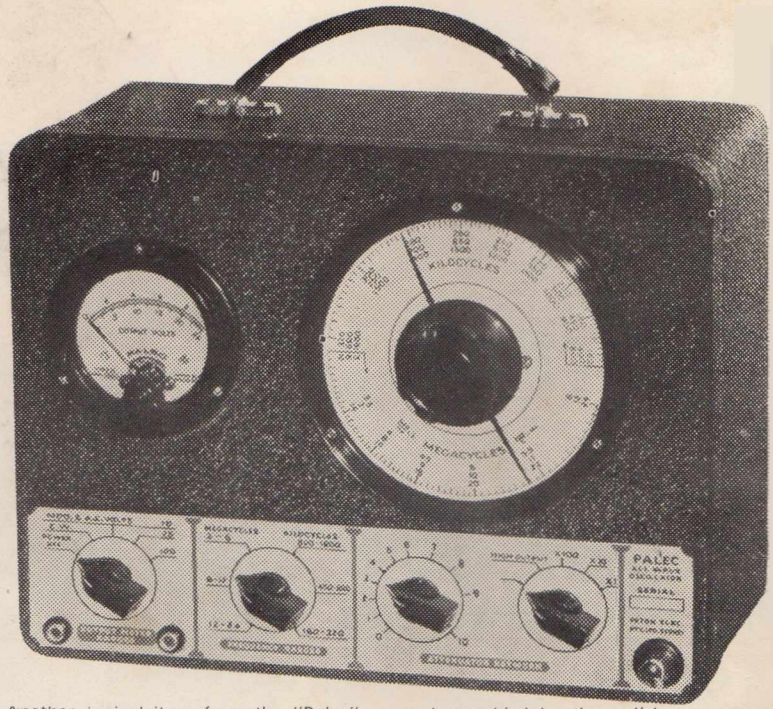
The quality of service a radio technician may render to the public is determined largely by the accuracy and reliability of the equipment he uses. Palec's policy has always been "Service for the Serviceman," and in furtherance of this policy, an unsurpassed range of precision testing equipment is available.

SERVING THE RADIO SERVICEMAN

A typical item from the range of "Palec" service equipment is shown below — the "M" series multimeter. This is a compact and durable volt-ohm-milliammeter designed especially for workshop and field service. Housed in a cast aluminium case measuring only 8" x 6" x 2½," this instrument is provided with a robust, rectangular-case, "K" type meter which has a scale length of 3½ inches. Four voltage and current ranges (10-50-250-1,000 v., and 1-10-50-250 mA.) and three resistance ranges, giving readings from 0.25 ohm to 1.5 megohms, are provided. Two sensitivities are available and prices are as follow:—

Model MCD (1,000 o/v), D.C. only	£4 15 0
Model MCA (1,000 o/v), A.C. and D.C. volts	£6 17 0
Model MXD (10,000 o/v), D.C. only	£6 15 0
Model MXA (10,000 o/v), A.C. and D.C. volts	£8 17 0
Leatherette-covered case available at	15/- extra





Another typical item from the "Palec" range is provided by the well-known group of precision-built "Palec" "G" series All-Wave Oscillators, which are available in three basic types, each with or without a built-in output meter, as required, thus making six types in all, as under:—

Model GA ..... AC operated	£12 5 0
Model GAO ... AC operated with built-in Output Meter	£16 10 0
Model GAV ... AC-Vibrator, dual operation from A.C. mains or 6v. accumulator	£14 7 6
Model GAVO .. AC-Vibrator with built-in Output Meter	£18 12 6
Model GB ..... Battery operated	£12 5 0
Model GBO .. Battery operated with built-in Output Meter	£16 10 0

These two items from the "Palec" range of testing instruments provide an excellent indication of the type of equipment "Palec" has to offer the radio-electric industries. Also available are a variety of multi-testers, portable and counter type valve testers, meters of all kinds, cathode-ray oscillographs, decade boxes, beat-frequency oscillators — in fact, testing and measuring equipment for every conceivable purpose. All of this equipment is built to meet the highest standards of accuracy efficiency and reliability and is priced to ensure its availability to the average user.

- ALL PRICES SUBJECT TO ALTERATION WITHOUT NOTICE

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The Australasian

RADIO WORLD

Incorporating the

ALL-WAVE ALL-WORLD DX NEWS

Vol. 5. AUGUST, 1940. No. 3.

CONTENTS:

The "Australasian Radio World" is published monthly by A. G. Hull. Editorial Offices: 117 Reservoir Street, Sydney, N.S.W. Telephone FL 2842.

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. PERSONAL .

As you open up this month's issue, you will notice that there has been a drastic change in the make-up of the pages. The actual size of each page has been cut down quite a bit.

We doubt if it is in any way an improvement, but it is made necessary by the need for conserving stocks of paper, thereby indirectly saving the dollar exchange, thus to allow the purchase of American aeroplanes for the War effort.

Regulations have been introduced with a view to cutting down the amount of paper used by about 35%. From a glance at the regulations, it is not clear whether the actual number of pages has to be cut down or whether the saving can be made by any other method which will allow the best possible production to be made without using more than 65% of the paper used previously.

We have gone into the matter carefully and we feel sure that the best possible way we could cut would be to cut down the margins, spaces between columns and so on, thereby allowing us to continue to give as much technical information as possible.

And so we have this new style, which may not be artistic, but we feel sure that our readers will appreciate that the paper saving is being made and yet the editorial content is being retained, together with the good quality paper which allows the circuits to be reproduced clearly and the photographs to be printed in a way which makes it possible for the experimenter to see just how the original sets were built.

Even if the way we have made the saving does not fulfill the requirements of the regulations to the letter, we have an easy conscience, as we feel that we have "done our bit" in making the saving.

We also feel fairly safe in the thought that the authorities must surely recognize that a technical journal, devoted to improving the public's knowledge of radio communication, is a little different to a magazine devoted to the publication of doubtful jokes, or love stories.

Actually the regulations do not come into force until the next issue, but if the saving of paper is so important we felt that we should start immediately.

Before the next issue is brought out there may be alterations or amendments to the regulations, but readers can rest assured that, even if we have to save paper, we will maintain our editorial policy to the best of our ability.

A. G. HULL.

American Style

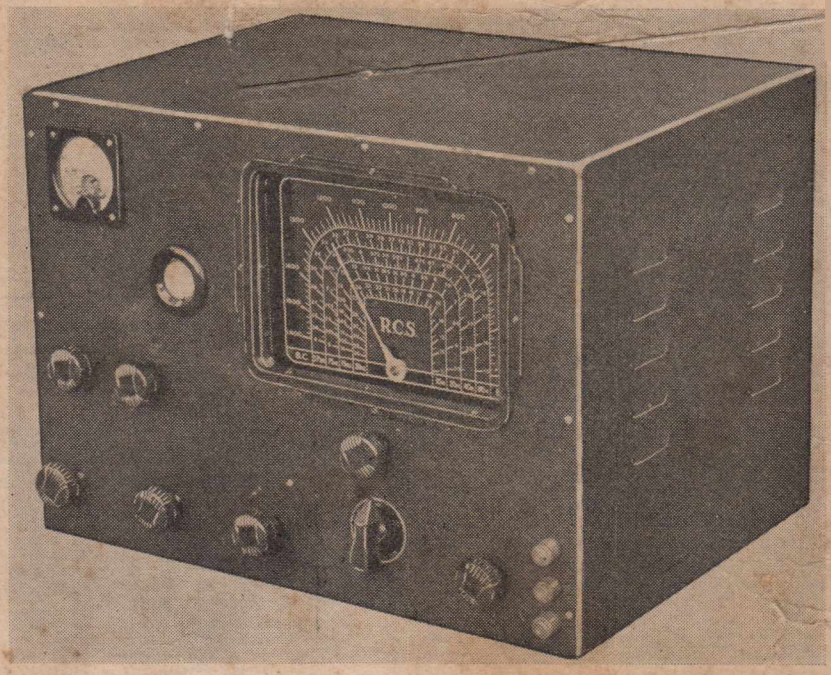
COMMUNICATIONS NINE

★

A receiver you will be proud to own.

Well within the reach of all set-builders.

★

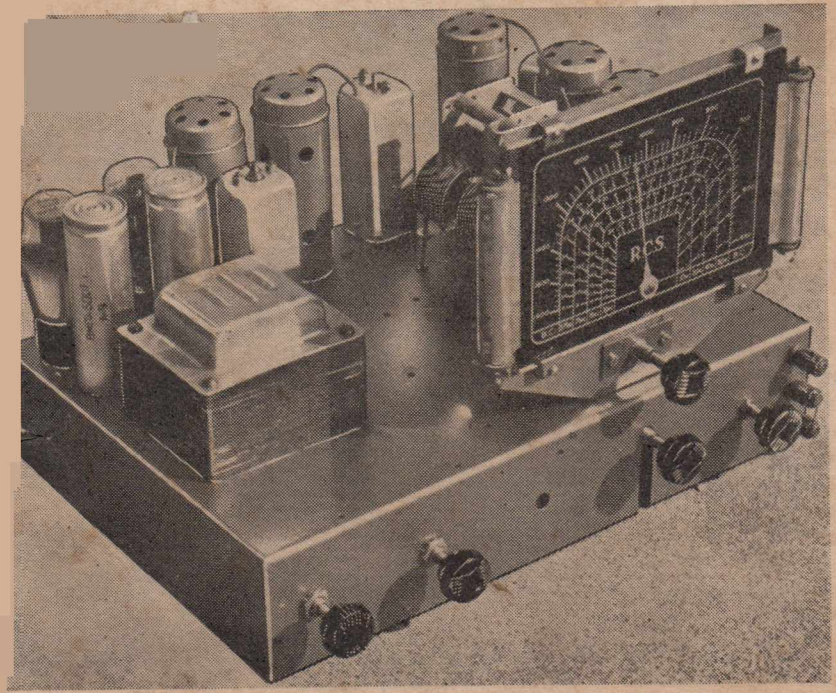


Photograph of completed receiver in special shielded metal cabinet.

FOR some years past every really keen radio enthusiast who has read American radio magazines has been impressed with the grand Communications-type receivers available in that country. Although listing at reasonable enough prices in America, it has not been a proposition to import them.

Perhaps distance has lent enchantment, but the fact remains that many mouths have watered when looking over the specifications and photographs of these wonderful receivers.

Strange indeed has been the slowness of the local factories to attempt manufacture receivers of this type. The only receiver on this market which has really attempted to give similar performance is one imported from New Zealand.



Of course, one or two individuals and smaller assemblers have offered communications-type receivers, but mostly at extremely high prices, and not always with the performance anticipated by those who buy them.

The Five-band Unit

A big step in the direction of remedying the position, however, was taken by the R.C.S. people when they introduced a five-band tuning unit last February. This was used in the "World Cruiser Eight," detailed in our February issue. This receiver proved to be a wonderful performer, and a number were built by our readers. Considering the cost of a kit of parts it was remarkably popular, and indicated only too surely that a good receiver of this type has a definite place in the scheme of things.

Left: Simple layout of foundation chassis can be seen from this photograph.

Circuit Diagram.

But it was also revealed very clearly that, although many tackled the job, still more were scared when they glanced over the rather impres-

(Continued on page 6)

UNICATIONS NINE

(continued)

sive circuit diagram and the diagram of the wiring. Being fitted with every refinement and with resistors and condensers added in various positions to make quite certain of stability, the design became complicated.

In response to demands, therefore, we have simplified the circuit and redesigned the job to make it easier to build.

At the same time we have taken steps to improve the appearance of the job and make it look a little more business-like.

Instalments.

Fundamentally the circuit remains the same, and for those who are prepared to stand the cost and tackle the job we give a full circuit, which is the original one with only a slight amendment in the matter of the output valve, the 6V6G being a more sensitive valve than the 6F6G in the "World Cruiser."

But here is the point.

Those who do not want to make such a large layout of money, but who want a really effective communications receiver can start by building up a greatly simplified "foundation" chassis.

When this job is completed, and it is not any harder than building an ordinary broadcast receiver, the chassis can be put into operation immediately and used until such time as the builder "recovers his wind," or "raises the wind," as the case may be.

Same Circuit.

By dividing the job up into instalments in this way nothing is lost and all the components used in the foundation chassis are utilised in the completed receiver.

The actual work, however, is greatly simplified, chance of error is greatly minimised and then it is easy to get the chassis into operation. The use of a gain control on the intermediate amplifiers makes it impos-

FOUNDATION CHASSIS

PARTS LIST

Basic Chassis for Communications Receiver
1—Steel chassis, 15" x 10¾" x 3."
1—5-band coil unit (R.C.S., Radiokes).
3—Intermediate transformers (R.C.S., Radiokes).
1—"H" type 3-gang Condenser (Stromberg-Carlson).
1—Dial to suit (R.C.S., Radiokes).
1—Power transformer (385v., 100ma., 6.3v., etc.).

CONDENSERS:
2—8 mfd. 500v. electrolytic condensers.
1—25 mfd. 25v. electrolytic by-pass condenser.
7—.1 mfd. 400v. tubular by-pass condensers.
1—.01 mfd. mica condenser (T.C.C.).
1—.004 mfd. mica condenser (T.C.C.).
1—.0005 mfd. mica condenser (T.C.C.).
1—.00005 mfd. mica condenser (T.C.C.).

RESISTORS:
1—250 ohm 3-watt resistor (I.R.C.).
2—400 ohm 3-watt resistors (I.R.C.).
1—1 megohm 1-watt resistor (I.R.C.).
1—.5 meg. 1-watt resistor (I.R.C.).
1—.25 meg. 1-watt resistor (I.R.C.).
1—.1 meg. 1-watt resistor (I.R.C.).
1—.05 meg. 1-watt resistor (I.R.C.).
1—5,000 ohm potentiometer (R.C.S., Radiokes).
2—500,000 ohm volume controls (I.R.C.).
1—15,000 ohm voltage divider (R.C.S., Radiokes).

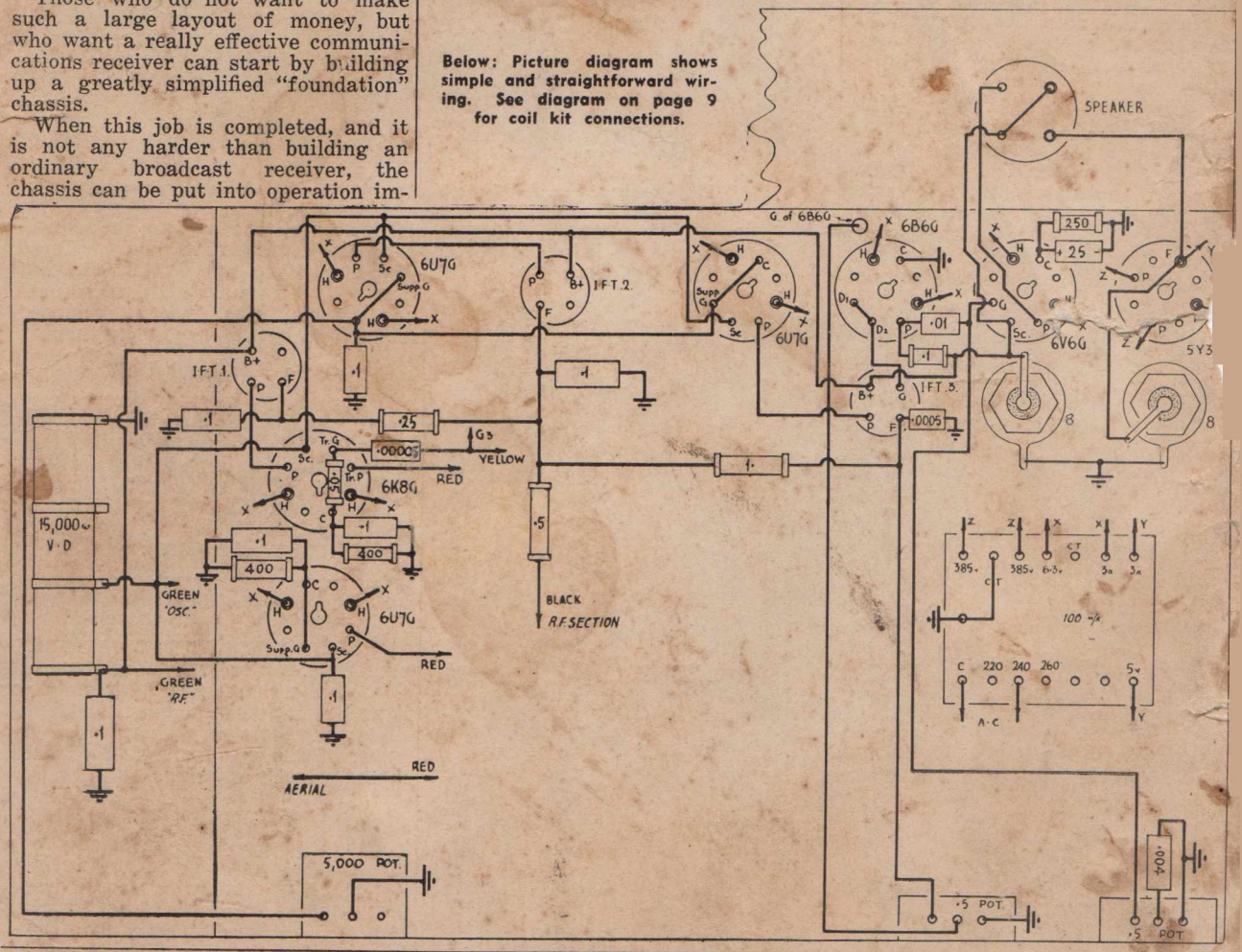
SOCKETS:
8—Valve sockets (7 octal. 1 UX).
5—Valve cans.

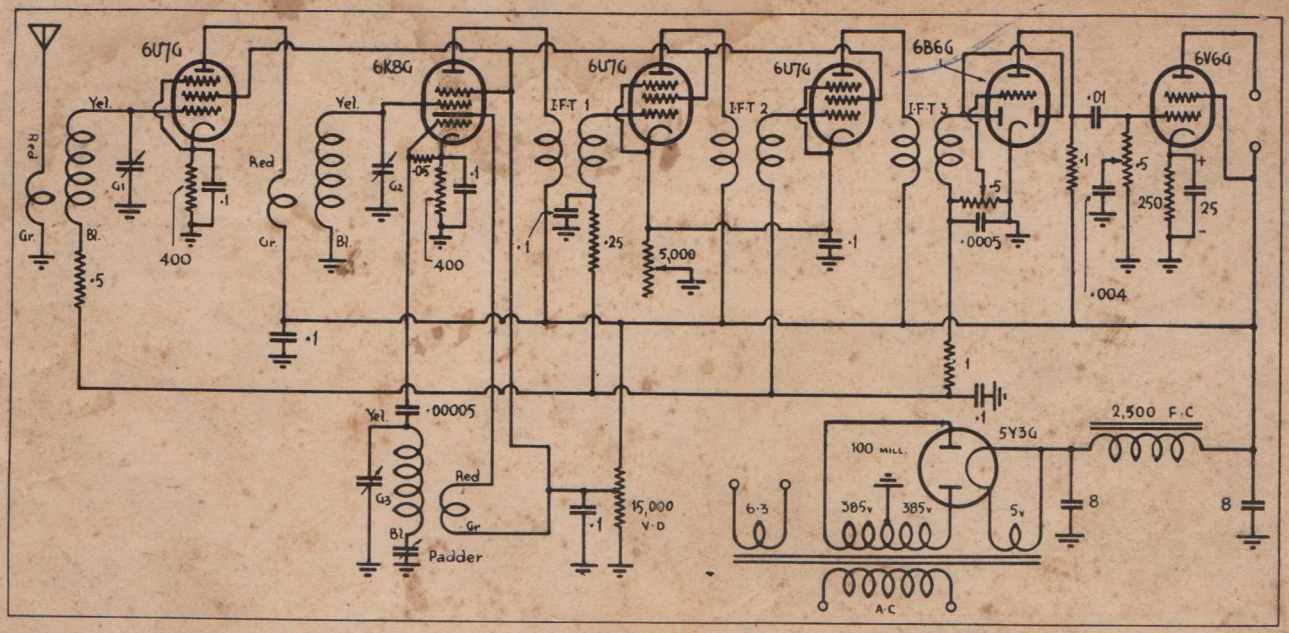
VALVES:
3—6U7G, 1—6K8G, 1—6B6G, 1—6V6G, 1—5Y3.

SPEAKER:
1—2,000-2,500 ohm field, 5,000 ohm loa (Amplion, Rola).

SUNDRY HARDWARE, including four 1/8 screws, 3 terminals, power flex, screws and nuts, solder, solder lugs, earthing wire, hook-up wire, etc.

Below: Picture diagram shows simple and straightforward wiring. See diagram on page 9 for coil kit connections.





Simplified circuit of the "Communications Nine."

sible to run into trouble with instability.

Once the foundation chassis is in operation it becomes interesting and instructive work to experiment with it and obtain maximum efficiency. Then, when running to perfection and perfectly stabilised when operating at "full bore," the magic eye, tuning meter, beat frequency oscillator and other gadgets can be added and the whole job fitted up in a metal screening case of the type shown in our photograph.

Circuit Changes

Our modification of the circuit is mainly in the direction of simplifying it, this foundation circuit presenting about the simplest possible way of attaining the type of performance required.

Original Circuit.

Taking the original circuit and running from left to right, here are some of the amendments made. Bias resistors for the r.f. and converter valves have been increased in value from 300 to 450 ohms, with a view to making quite certain of stability.

Voltages for the plate and screen of the converter valve have been taken from the screen tapping on a voltage divider, saving a resistor and a by-pass condenser, and not affecting performance to any appreciable extent.

The intermediate amplifier section has been simplified a little and a few minor components saved.

The second detector has been changed to the simplest possible ar-

(Continued on page 9)

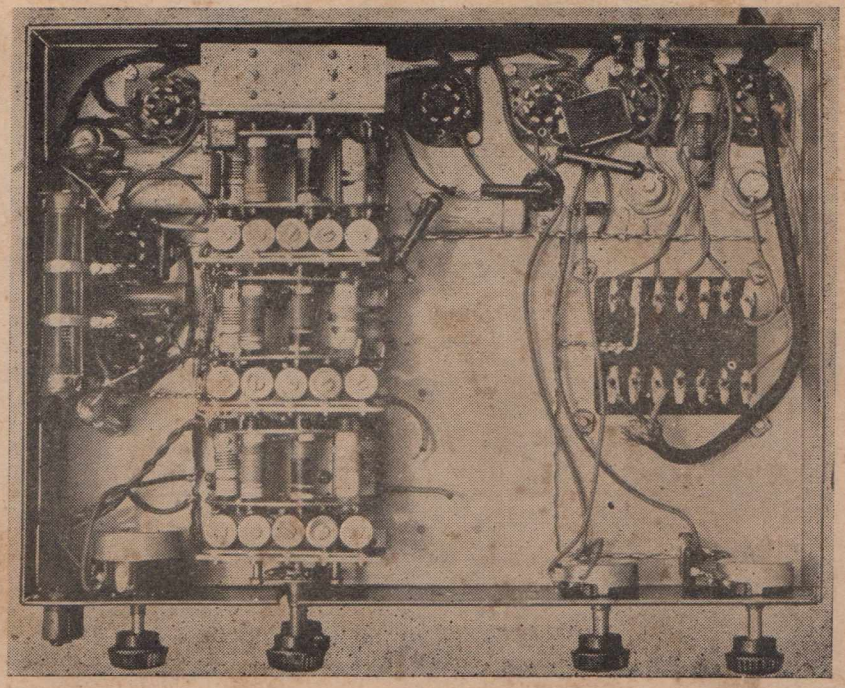
DEFINITIONS

There is considerable confusion as to the proper definition of a Communications - type Receiver. So far as we know, there is no standard. Unfortunately, some of the so-called "popular" radio journals have seized upon the name as a high-sounding one, and applied it to even such things as a four-valve t.r.f. set!

Our idea of the proper standard for a Communications receiver is that it should be capable of greater sensitivity and selectivity than even the best of dual-wavers; should cover all the major short-wave and broadcast bands; tune at least from 10 metres to 550; and also be capable of receiving c.w. signals.

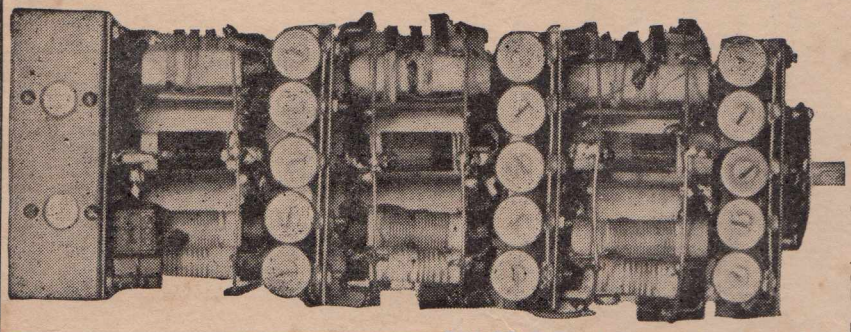
Judged on this standard, our receiver can truly be termed a real Communications receiver.

Below: Photograph from below the foundation chassis. Note position of the coil kit.



Specify R.C.S. TROLITUL COILS and R.C.S. DIALS - - -

THEY TRACK PERFECTLY!



DW-30 5-Band Communications Unit

R.C.S. KITSET FOR THE COMMUNICATIONS NINE

R.C.S. are the first in Australia to produce commercially a communications coil unit; and IT IS A SUCCESS! The results you will obtain will thrill you. Order the Complete Matched Foundation Kit, Code K124.

9.8 to 550 Metres

Foundation kit comprises:

1	DA-2 5-band dial	22/6
2	IF131 Permeability I.F.'s	27/6
1	IF132 Permeability I.F.'s	13/9
1	DW30 5-band coil unit	£10/10/-

Complete matched kit— Type K124 ..... £13/13/9

Other R.C.S. components for this set are—

R.C.S. Trolitul Beat Frequency Osc. Coil. Code F96. Price 11/9

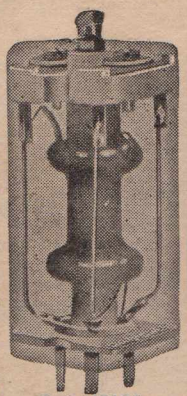
R.C.S. 2-plate Midget Condenser, Code CV34 ..... 3/9

R.C.S. 25mfd. Double-spaced Midget Condensers, to gang for band spread. Code CV49 ..... 10/3

R.C.S. TROLITUL INTERMEDIATE TRANSFORMERS

The new R.C.S. Trolitul I.F.'s are extremely stable, due to new methods of construction made possible by the use of Trolitul formers and base. No loose wires to shift and alter frequency. Positively the best I.F.'s yet produced.

Code	Price
Air Core, 465 k.c.	
IF107. 1st I.F.	7/6
IF108. 2nd I.F.	7/6
Iron Core, 465 k.c.	
IF109. 1st I.F.	11/-
IF110. 2nd I.F.	11/-
Air Core, 175 k.c.	
IE68. 1st I.F.	7/6
IE69. 2nd I.F.	7/6



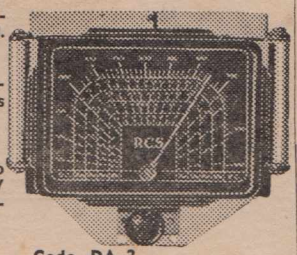
Code IF107

NEW R.C.S. DIALS

DA-1. Standard D/W Dial. Price, 22/6.

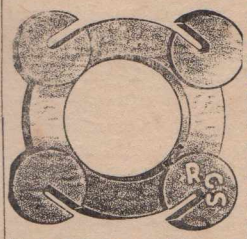
DA-2. Communications Dial. Price, 22/6.

DA-3. 13.7 to 50 metre D/W Dial "H" Condenser. Price, 22/6.



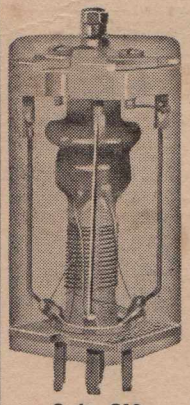
Code DA-2

R.C.S. TROLITUL TRANSPOSITION BLOCKS



For transposing the feeders of doublet aerials. For fullest efficiency, your receiver should have a doublet aerial with transposed feeders. Noise pick-up is reduced to a minimum, and efficiency on short-wave is increased. Material used is high dielectric trolitul of light weight, not affected by weather changes. Made in one standard size.

Code	Price
AF12—Transposition Block, set of 8	5/6



Code G19

R.C.S. TROLITUL DUAL WAVE COILS

These coils have the B/C and S/W Trimmers incorporated. The Oscillator coil also contains the S/W Padder. S/W 16 to 50 metres, B/C 1500 to 550 k.c.

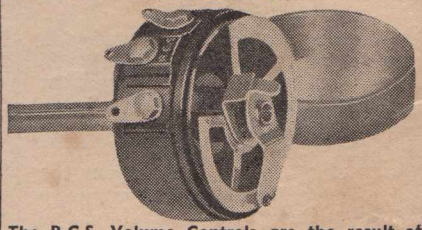
Code	Price
G19. Aerial Air Core	14/-
G20. R.F. Air Core	14/-
G21. Osc. Air Core	14/-

For some time we have felt that we should provide dials for use with coils of our manufacture, thus assuring perfect tracking. Both types are single glass Dual Wave, the type DA-2 having been designed especially for use with our Five Band Communications Receiver coil kit, and the "H" type condenser. Code DA-1 is a standard Dual Wave dial for use with R.C.S. Coils and the "F" type condenser.

JUST RELEASED!

New Circular Dual-wave Dial for Portables, etc. Face 3 in. diam., finished in green and gold, stations clearly marked, metal parts plated. Moulded Trolitul drum, no friction. Range: B.C. and 13.7 to 50 metres. Code DA-4. Price 8/-

R.C.S. POTENTIOMETERS AND RHEOSTATS



The R.C.S. Volume Controls are the result of improved and new methods of manufacture, together with alterations in design and final testing. Noiseless, they are constructed so as to cut off all volume.

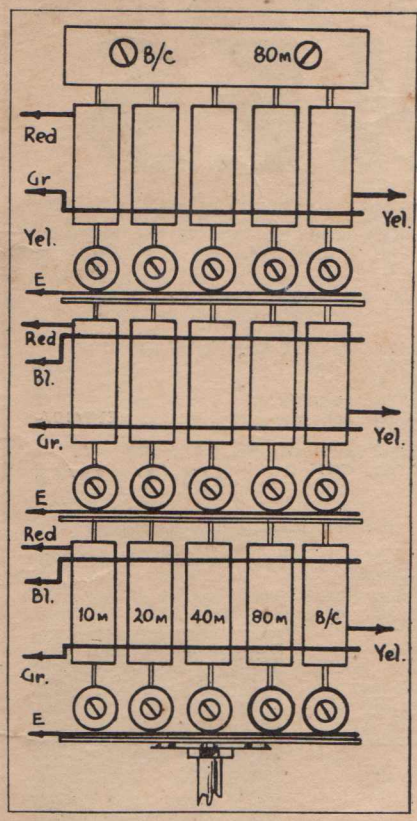
					Code	Price
6 ohm		Rheostat	.25	Amp.	PT40	5/-
10	"	"	.25	Amp.	PT38	5/-
20	"	"	.25	Amp.	PT39	5/-
30	"	"	.25	Amp.	PT34	5/-
400	"	Potentiom.	50	M/A	PT46	5/-
1000	"	"	35	M/A	PT47	5/-
2500	"	"	30	M/A	PT49	5/-
5000	"	"	30	M/A	PT51	5/-
10000	"	"	20	M/A	PT52	5/-
15000	"	"	20	M/A	PT53	6/6
20000	"	"	15	M/A	PT54	6/9

Obtainable from your local dealer

R.C.S. RADIO PTY. LTD.

50 GLEBE ST., GLEBE. 'Phone MW 2405

R.C.S. "H" TYPE COILS WILL TRACK ONLY WITH R.C.S. "H" TYPE DIALS — NO OTHER MAKE



Above: Diagram showing colour-coding of the coil unit. See photograph at right.

rangement for providing detection and a.v.c. This is known as diode-biassing, as the bias for the triode portion of the 6B6G is obtained from the voltage drop caused by the flow of the rectified r.f. in the diode load resistor. Normally, with a high-gain triode section, this type of detection is not used because it overloads and chokes up before full power output is obtained. With a Communications-type receiver in the hands of an operator not accustomed to handle it, however, it is not a bad scheme. Coming across a high-speed morse station on short-waves, the detector blocks, saving the neighbours from headaches!

At a Later Date.

At a later date, after some practice has been had, it is simple enough to change over the circuit, add the three or four extra components required, and then you can have the normal circuit, and full output.

In the meantime, operating the set with the diode-biassed detector makes it necessary to handle the controls intelligently. If you set the volume control and stability controls both "flat out" and then swing the dial, you will simply choke up the set and get nothing out of it.

The correct procedure is to turn the stability (i.f. gain) control right back to minimum, then set the volume control not more than half advanced and proceed to tune in. When a station is heard, it is then brought up to required strength; first with the volume control, and if still greater gain is required, then the stability control can be advanced.

Assembly

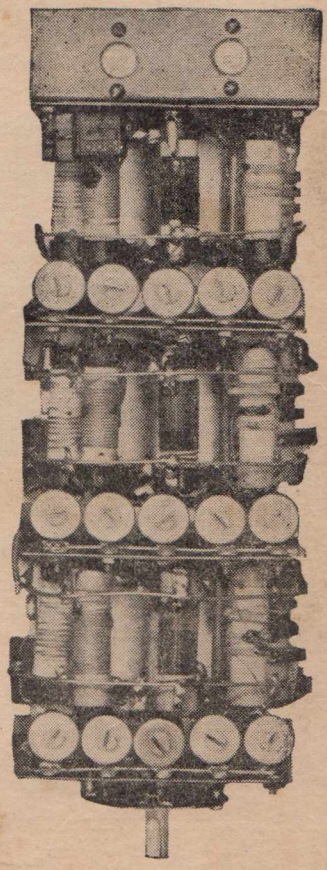
Assembly presents no problem, as ready-drilled bases are available from any of our advertisers, a template of the original base having been supplied to the Arcadian base factory.

Two brands of five-band coil units are available, but both adhere to the same standard color code and also mounting holes, so that there is no chance of any difficulty in this respect.

In passing, we might mention that we consider this collaboration on a standard a commendable action on the part of the two coil factories concerned.

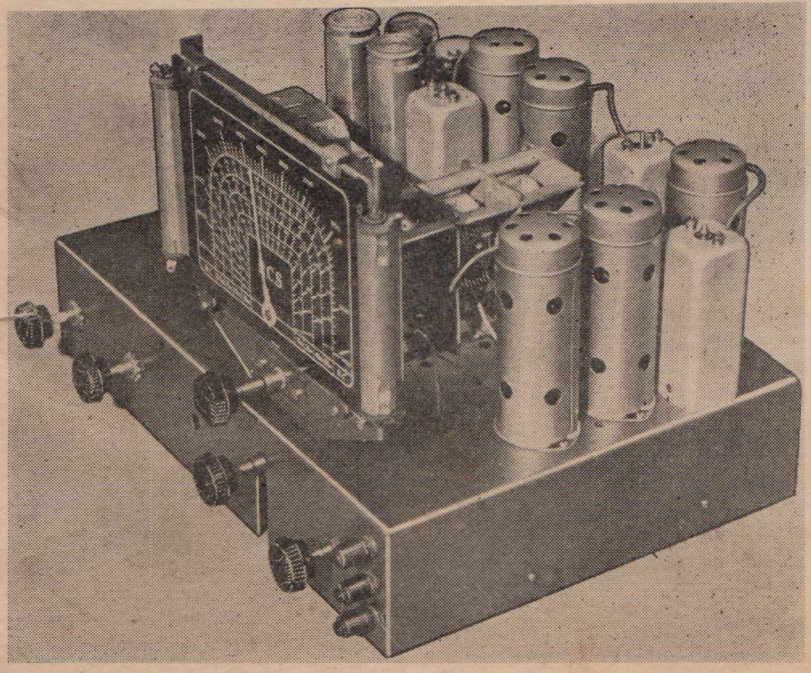
Although the actual size of the chassis is much smaller than the size specified for the original "World Cruiser" in the February issue, there has been no crowding and there is no need for any double-banked wiring.

One spot, however, needs a little care. This is in regard to the leads



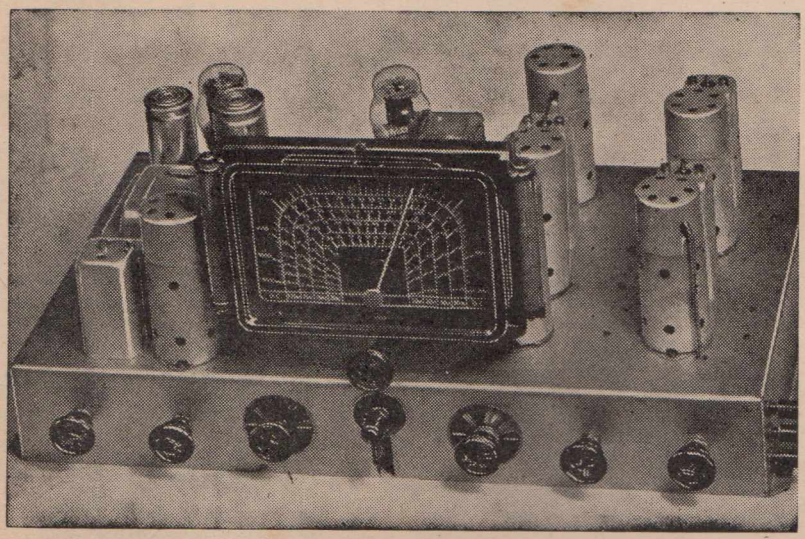
from the second intermediate transformers, which should be soldered to the lugs of this unit and wired into the job BEFORE the tuning unit is fitted. **(Continued on page 11)**

Below: Another view of chassis from the "tuning" end. The three terminals are for doublet aerial and earth.



The Greatest "Communications" of All . . .

RADIOKES



Perfectly matched and tested before dispatch, and well up to the standard associated with "The Name to Know in Radio"— you can't do better than specify RADIOKES for the "COMMUNICATIONS."

FOUNDATION KIT COMPRISES —

1 DWD-2 5-band dial	22/6
2 IFP Permeability I.F.'s	27/6
1 IFP Permeability I.F.	13/9
1 5-band coil unit	£10/10/-

Radiokes Foundation Kit, 9.8 to 550 metres, CK1010 .... £13/13/9

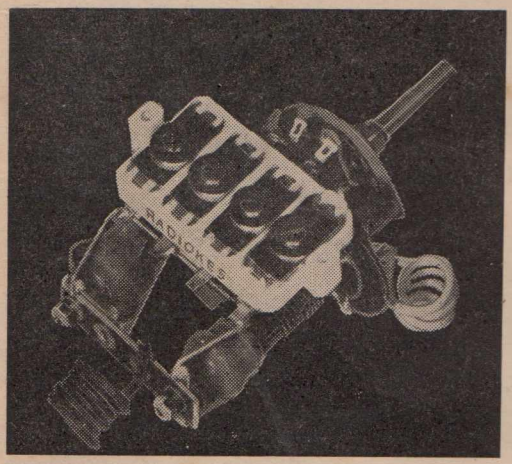
★

SPECIFY ALSO THESE RADIOKES COMPONENTS —

Radiokes Trolitul Beat Frequency Oscill. Coil, Type BFO 11/9

Radiokes 25mfd. Double-spaced Midget Condensers, for ganging. Type MCTD-25 10/3

Radiokes two-plate Midget Condenser. Type MCT-10, 3/9



RADIOKES "H" TYPE COILS WILL TRACK WITH RADIOKES "H" TYPE DIALS ONLY

RADIOKES 13.7 to 50 metres DUAL-WAVE UNIT

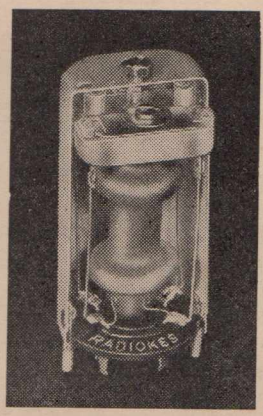
Highly selective unit with exceptionally wide range. To match "H" type gang condenser; incorporates 4-in-1 padder. Solidly mounted with coils.

Type DWU-1

List Price 27/6

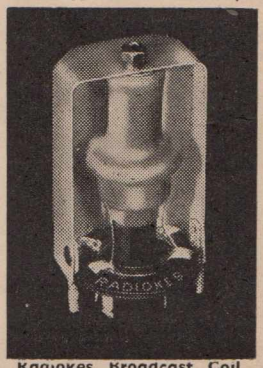
★

Radiokes Intermediate Transformer



One-piece mechanically sound Trolitul formers and base — the highest standard I.F.'s available. A special feature is the round base suitable for round or square cans.

Type	List Price
A.I.F. (Air Core)	7/6
I.I.F. (Iron Core)	11/-
P.I.F. (Perm.)	13/9



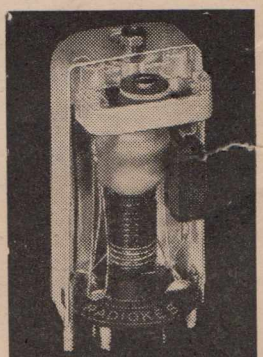
Radiokes Broadcast Coil

Trolitul rigid construction, available in air core and permeability types.

Type B.A.C. Aer., R.F. or Osc. ..... List Price 6/6

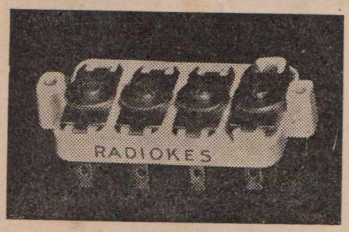
★

Radiokes Dual-Wave Coil



Litz-wound windings, lugs already tinned, short-wave range 16 to 50 metres, B.C. range 1500 to 550 k.c.

Type D.W.C. List price, 14/-



RADIOKES 4-IN-1 PADDER

Supersedes 4 single padders. Trolitul construction featuring non-warping bridge.

Type D.T.T. ..... List Price 5/-

RADIO SUPPLIERS PTY. LTD.,
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COMMUNICATIONS NINE *(continued)*

They can be fitted after, but it is rather a ticklish job unless a long-nosed soldering iron is used. Even at the best, care is needed when soldering to lugs mounted in trolitul, as the trolitul will melt if too much heat is applied. It doesn't do any harm and soon sets hard again if the lug is held steady, but the nicest way is to use just the proper amount of heat and then all is well.

How It Worked Out.

When we were building the actual set shown in the photographs, we took a note of the procedure, and this was how it worked out.

First we mounted the power transformer and the sockets and completed the heater wiring. Next we mounted the electrolytic condensers and the speaker socket and wired up the whole of the power supply section.

Then we put in the intermediate transformers and wired them, leaving long leads from the B plus terminals. Next we fitted the volume, tone and stability controls and wired them.

Mounting the Tuning Unit

The tuning unit was then put in position, a set of three yellow leads being taken through to the top of the base for the gang, and the other set of yellow leads being taken across under the unit, but left hanging.

In the finished job these are connected to the three band spread condensers, but these are not used in the foundation chassis.

Mounting the Gang

The tuning gang, which must be an "H" type Stromberg-Carlson unit without trimmers, is mounted up on four ⅛ in. dia. screws, each about two inches long, and with three nuts. One nut holds the screw into the chassis, head down, while the gang mounts are clamped between the other two nuts on each screw. This allows an adjustable mounting which simplifies dial mounting.

Earth the Gang

Great care must be taken to ensure that a thoroughly efficient earthing is provided, this being a most important factor in obtaining stability in a high-gain receiver.

The earthing of the gang is vital, and leads should be taken down from the wiper terminal strips on the gang, direct to the braided copper earthing strips which are provided on the five-band tuning unit.

All of these earthing strips should be connected to a main earth wire of fairly heavy copper wire, running right along the coil unit and then down to the electrolytic condensers.

If no heavy bare copper wire is available, a couple of strands of bare copper wire, preferably tinned, should be twisted together.

All the earthing strips from the coil unit should be carefully soldered to this earth bar, also the earth pigtails of all by-pass condensers and the

(Continued on page 12)

ADVANCED CHASSIS PARTS LIST

1—5-band 9.8 to 550-metre coil unit, type DW30, with band indicator (R.C.S., Radiokes).
3—permeability tuned iron-cored i.f. transformers, 2 type IF131, 1 type IF132 (R.C.S., Radiokes).
1—beat frequency oscillator coil unit, type F96 (R.C.S., Radiokes).
1—5-band directly calibrated dial and escutcheon, type DA2 (R.C.S., Radiokes).
1—3-gang condenser (Stromberg-Carlson type H).
7—octal, 1 5-pin, 1 4-pin valve sockets.
6—valve shields.
1—chassis and case.
3—terminals (2 red, 1 black).
3—35 mmfd. double spaced midget variables for ganging (R.C.S., Raymart).
1—2-plate midget variable (R.C.S., Raymart).
1—power transformer, 385 volts, centre tap, 385v.; 100 mills., 5v. 3c., 6.3v. 3a., 6.3v. 2a. (Radiokes).
1—5,000 ohm potentiometer (R.C.S., Radiokes).
2—.5 megohm potentiometers (I.R.C.).
1—rotary type on/off switch.
2—2" 0-100 degree indicator plates (Raymart).

FIXED CONDENSERS:

1—.00006 mfd. mica (T.C.C.).
1—.00005 mfd. mica (T.C.C.).
1—.00025 mfd. mica (T.C.C.).
1—.0001 mfd. mica (T.C.C.).
2—.004 mfd. mica (T.C.C.).
2—.01 mfd. tubular (Ducon).
2—.05 mfd. tubular (Ducon).
10—.1 mfd. tubular (Ducon).
1—.5 mfd. tubular (Ducon).
2—25 mfd. dry electrolytics, 25v. working (T.C.C., Ducon).
1—8 mfd. wet electrolytic, 500v. working (T.C.C., Ducon).
1—16 mfd. wet electrolytic, 500v. working (T.C.C., Ducon).

FIXED RESISTORS:

1—200 ohm 1-watt carbon (I.R.C.).
2—300 ohm 1-watt carbon (I.R.C.).
1—250 ohm 1-watt carbon (I.R.C.).
1—3,000 ohm 1-watt carbon (I.R.C.).
1—10,000 ohm 1-watt carbon (I.R.C.).
1—25,000 ohm 1-watt carbon (I.R.C.).
5—50,000 ohm 1-watt carbon (I.R.C.).
3—100,000 ohm 1-watt carbon (I.R.C.)
2—.25 megohm 1-watt carbon (I.R.C.).
2—.5 megohm 1-watt carbon (I.R.C.).
1—1 megohm 1-watt carbon (I.R.C.).

VALVES:

3—6U7G, 1—6K8G, 1—6B6G, 1—76, 1—6V6G, 1—5Y3G.

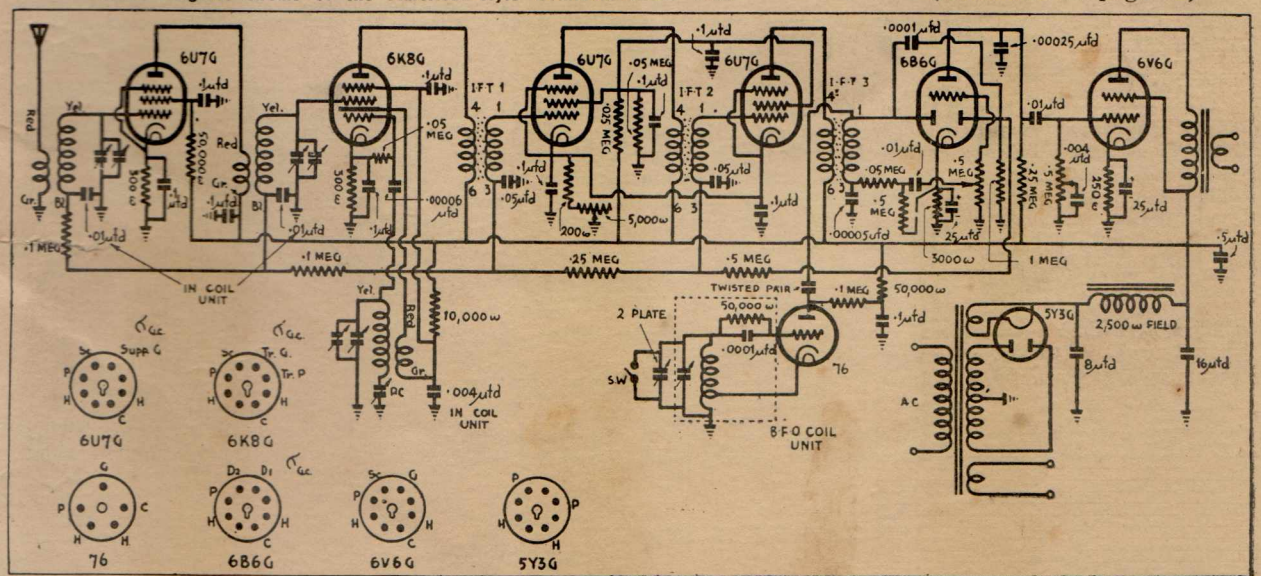
SPEAKER:

1—8," 10" or 12" speaker, 2,000 ohm field, input transformer to match single 6V6G (Rola, Amplion).

MISCELLANEOUS:

7—knobs; 1 indicator knob; 5 grid clips; 4 6.3v. dial lights; 2 couplers for ganging band spreaders; length of power cable and plug; length of tinned copper braid for shielding; solid and flexible push-back; nuts and bolts; solder tags; spacers; 16ga. tinned copper wire.

Below: Original circuit of the American-style Communications Nine.



COMMUNICATIONS NINE *(continued)*

earthing wires which have been brought down from the gang condenser.

Definitely, and don't forget it, earthing is important. In most cases it is good practice to see that all valve and coil cans are earthed. This can best be achieved by putting a solder lug under each socket and coil mounting screw as it is assembled, and joining up each of these lugs to the earthing bar as the wiring job is being carried out.

The Trimmers

The trimmer condensers which were a feature of the original circuit are also omitted from this foundation chassis, and the yellow leads from the coil unit which would normally run to these condensers are simply left hanging, due precaution being taken, however, to see that they do not short-circuit on to the base, as this would stop the receiver operating.

Aerial

Having terrific sensitivity, this receiver can pick-up any short-wave signals which happen to be available, but it is an axiom that if a signal is weaker than the noise surrounding it, no amount of amplification will make the signal clear and take away the noise.

But, on the other hand, if an efficient aerial is used so that noise is avoided, the weakest signals can be brought up to readable strength.

The best aerial is always the one most suited to the conditions prevailing, but some good suggestions about aerials can be obtained from an article on this subject which appears on another page in this issue.

The five-band tuning unit is fitted with twin aerial terminals for the convenient use of doublet aerials, and, of course, an aerial of this type is strongly recommended for best results.

The Front Panel

The front panel on our original receiver was cut from a piece of quarter-inch thick "Masonite." This material is ideal for the purpose, being very easily worked, cutting readily with a saw and smoothing down with sandpaper. It appears to have insulation and general electrical qualities equal to bakelite, yet is much easier to work, and has the added attraction of being comparatively inexpensive.

We have also given the template

THE COST

In its simplest form, this receiver should cost only a few pounds more than a good dual-waver of similar specifications, this extra cost being the price of the special five-band tuning unit, which is dearer than an ordinary dual-wave tuning unit.

Fitting such extras as the magic eye, tuning meter, beat frequency oscillator and the metal screening cabinet, of course, brings the cost up still further by a couple of pounds, but it should be clearly understood that these extras are unnecessary if the receiver is to be used primarily as a long-range broadcast and short-wave set.

At first glance, the list price of ten guineas seems to be a lot for a tuning unit, but when it is remembered that the unit contains fifteen coils, each of two windings, fifteen trolitul coil formers, a thirty-contact wave-band switch, two padders and several condensers and other components, it is not at all unreasonable.

of the front panel to the makers of the steel cabinet, and so the complete job can be obtained with a steel panel, if so desired, thereby matching up with the attractive black crackle finish.

The Signal Strength Meter

The signal strength meter is a special Palec meter which we discovered was being manufactured by the Paton Company for a special purpose. We prevailed upon Mr. Paton to allow the meter to be made available for general distribution.

WATCH FOR FURTHER DETAILS ABOUT THIS SET IN NEXT MONTH'S ISSUE

•

ORDER YOUR COPY NOW!

It is a dandy little meter with a two-inch square face, and ideally suited for the purpose. Full details of the installation of the meter will be given in next month's issue, which will also contain the necessary circuit additions and instructions for the fitting of a magic eye tuning indicator.

Alignment

The alignment adjustments of the job are not any more difficult than for an ordinary superhet., although there are more of them. Trimmers are fitted to each of the fifteen coils, and there are two padders, one for the broadcast band and the other for the next band down. No padders are required for the short-wave bands.

First step after the receiver has been finished off and the speaker and valves plugged in and the aerial connected, will be to get it into operation on the broadcast band, which is found by turning the wave-change switch fully in a clockwise direction.

The sensitivity control can be fully retarded (anti-clockwise) and the main volume control set not more than half open. Swinging the dial should bring in a local station and then a rough setting of the trimmers on the aerial and r.f. section can be made. We do not, however, advise any alteration of the oscillator trimmer settings.

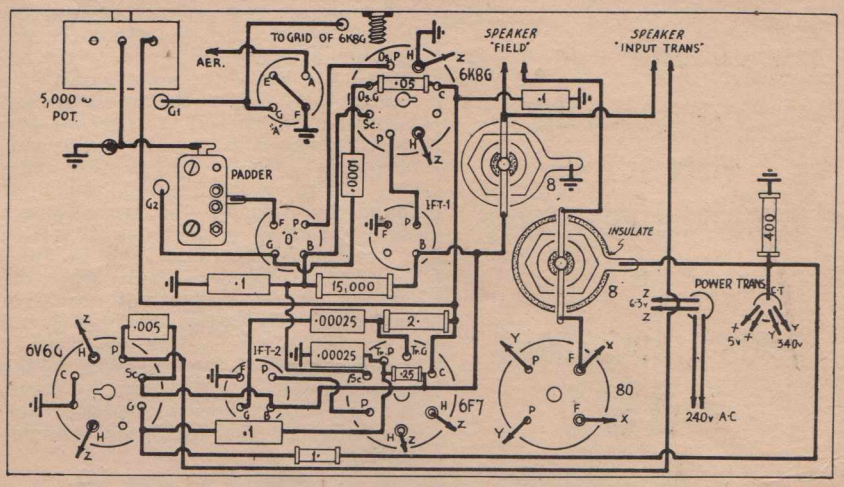
(Continued on page 14)

COMMUNICATIONS NINE *(continued)*

All of the coil units are actually air-tested before they leave the coil factory and if the lengths of grid leads are kept the same, as they will be if the layout is the same as specified in this article, then only the slightest adjustments of trimmers should be required. Once a broadcast station has been tuned and roughly aligned, the set should be turned down to about 2CH or 2SM at the high-frequency end of the broadcast band, and the aerial and r.f. trimmers carefully "peaked."

When you have the set perfectly peaking on a station on the low wavelength end of the dial, you can swing up to 2FC and adjust the broadcast padder, rocking the dial to and fro while adjusting until best results are obtained.

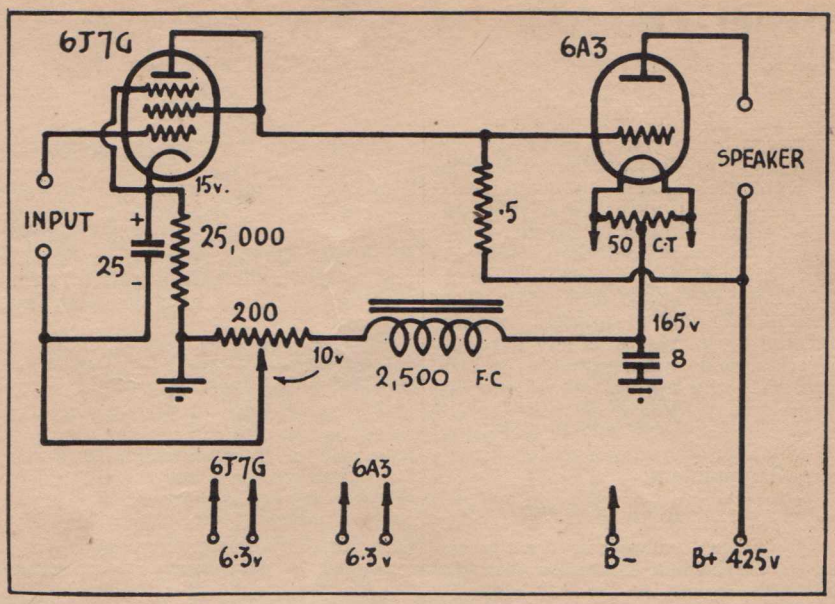
'TIP-TOP' WIRING DIAGRAM



"Tip-Top," that fine little three-four mantel model which was described in last month's issue, has proved a wonderfully popular and successful little set. There was a slight omission in the picture diagram, but fortunately the fact that the two .1 mfd. by-pass condensers were left out was fairly obvious, and so far we have not come across any builders of the set who failed to notice this point and act accordingly.

To make quite sure that none of our readers have any difficulty, however, we have re-drawn the picture diagram, and it is reprinted herewith.

Experiments with DIRECT-COUPLED CIRCUITS



Above: Circuit used for experiments explained in this article.

*

This article deals with the theory and practice of direct-coupled circuits. Interest in this direction has been revived by the success of direct-coupled amplifiers in the Amplifier Contest.

*

THE young radio men of to-day know little of direct-coupled circuits, which may or may not be a decided advantage!

There is no shadow of doubt, however, that we will be hearing more about direct coupling in the immediate future, especially since already two heats of the Amplifier Championship have been won by competitors using these amplifiers.

In one case a single ended amplifier with a 2A3 in the output "put it over" several other competitors using big push-pull amplifiers, with both triodes and beam power valves.

Definition

By direct coupling we refer to the practice of hitching the grid of the output valve directly to the plate of the audio valve, without the use of the usual coupling condenser.

Immediately there is direct connection between the two stages there are removed several possible sources of distortion. We can readily calculate the reactance of a condenser and we can theoretically determine the frequency response of an amplifier using capacity coupling, but there is something more. Perhaps it is the matter of phase distortion, of transient response, we can't be sure, but there is something about direct-coupled amplifiers which makes them sound just a shade different from any other amplifier, no matter how good its theoretical performance.

Already the results of the Amplifier Championship indicate this in a most practical way.

History

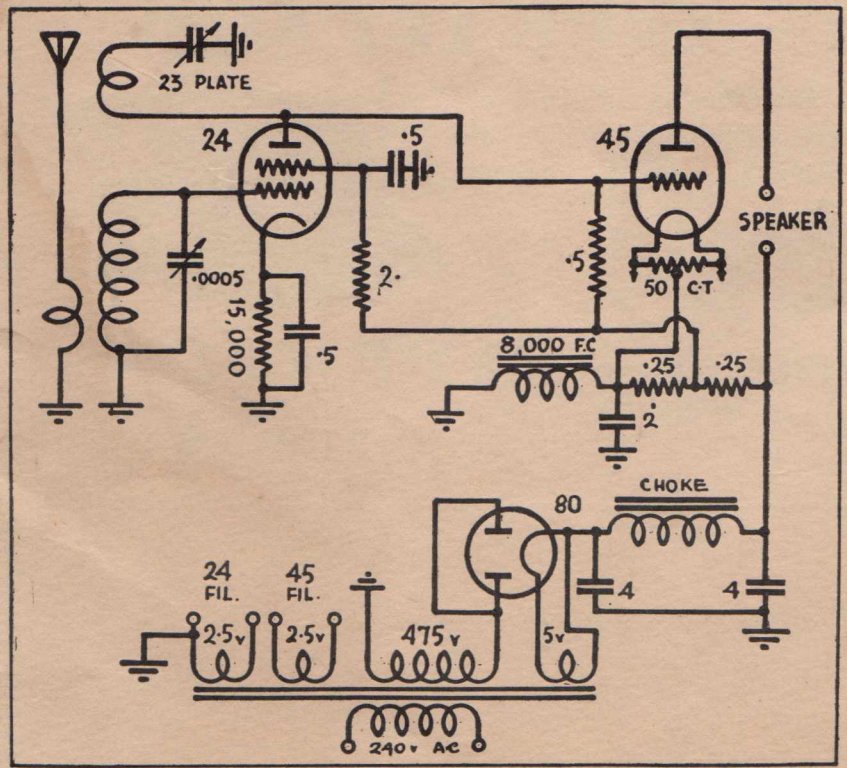
The history of direct-coupling has its points of interest.

There were direct-coupled amplifiers in the very early days of radio, but to all intents and purposes direct coupling really came to notice in the year 1929, when it was launched with a blare of trumpets by the Loftin-White laboratory in the United States.

Always keenly interested in anything new, especially when it was something to improve the fidelity of amplifiers and receivers, the late Ross Hull immediately pounced on the design and introduced it to Australia.

The amazing performance was instantly recognised and thousands (not merely hundreds) rushed together direct-coupled amplifiers, and for

(Continued on page 16)



Left: Circuit of the "Direct-coupled Two," a popular receiver back in 1931.

Direct-Coupled Circuits *(continued)*

many months there was an absolute famine of suitable components.

After a boom lasting about a year, however, some difficulties and failings made themselves felt and soon direct-coupled circuits were just as unpopular as they had been in favour.

Yet every now and then some enthusiast from the "good old days" feels that even the best of modern circuits are not completely satisfying, and so he starts to run over the direct-coupled arrangements in the hope that the application of modern technique and present components will solve the problems which were responsible for the downfall of direct-coupled amplifiers.

Revival

One of the strongest revivals occurred in 1931, when the writer described a "Direct-coupled Two" (plus rectifier), which was the most popular set of that year. It was particularly simple and effective with the usual splendid tonal quality associated with any properly-adjusted direct-coupled circuit.

It reigned for a couple of years and only became obsolete with the introduction of more sensitive power valves, such as the 47 type pentode, and with the opening up of several extra broadcasting stations, which made selectivity a problem.

Theory

Let us run over the fundamentals of direct-coupling.

We have two valves, and in each case we want to have the plate voltage a couple of hundred volts positive in respect to the filament or cathode and we want the grid negative in respect to the same by a suitable bias voltage.

With a coupling condenser it becomes simple enough to apply high tension to the plate of the first valve and keep the grid of the output valve at earth potential by the use of a grid leak resistor through which no current flows, and consequently through which there is no voltage drop.

The cathode or filament being kept at a positive voltage to ground by the voltage drop in a bias resistor carrying the plate current of the valve, we get the cathode positive in respect to the grid. This is equivalent to keeping the grid negative in respect to the cathode, which is what we want.

Now let us consider a direct-coupled amplifier.

We want to keep the valves at their normal static operating conditions, yet we want to keep the plate of the first valve and the grid of the second at the same potential, for they are actually tied together by the direct coupled lead.

So we keep the first valve at its normal operating conditions, with, say, 150 volts on its plate, and of course this makes the grid of the output valve also 150 volts positive in respect to earth. So in order to give it, say, 50 volts bias, we keep the filament of the output valve at 200 volts in respect to earth, which means that the grid is 50 volts negative in respect to the filament.

In order to get a plate voltage of, say, 250, for the output valve, this voltage being in respect to the filament, we then apply an actual high tension of 450 volts in respect to earth, and this gives us our normal operating conditions for the output valve, i.e., plate voltage of 250 and bias of 50 volts negative.

The method of maintaining the filament of the output valve at 200 volts above earth is achieved in the same way as normal practice, by the voltage drop of the plate current of the valve flowing through a resistance. In practice this resistance, or portion of it, is made up with a field coil of an electro-dynamic speaker. Of course the drop is considerably greater than normal, greater by an amount equal to the plate voltage necessary for the first valve.

The Original Circuit

The original circuits which emanated from the Loftin-White laboratory were considerably more complicated than might be expected from our few words about the fundamentals.

The grid of the first valve was not kept at earth potential, but was returned to a point up the main resistor network in order to get a positive voltage, although of course one not so positive as the cathode. This scheme was said to be necessary in order to stop the whole amplifier becoming completely upset if overloaded by a heavy signal. In practice we could never substantiate this, and we found that simple bias on the first valve was quite satisfactory.

As a detector

One of the strange features of direct-coupled amplifiers, and one which we have never seen adequately explained, is that the first valve can be operating under ideal conditions as an amplifier, and yet, when fed with r.f. signals from a tuner, it will operate equally well as a detector valve.

Faults

There were several difficulties, faults and imagined faults which led to the Loftin-White circuits being dropped, especially by set manufacturers.

To give an idea of some of these we might mention the matter of the warming up of the amplifier.

The first valve was indirectly heated, and in those days valves took lots longer to warm up than do the modern quick-heating types.

While the first valve was warming up, there was no plate current flowing in that valve, consequently no voltage drop in the half-meg. plate feed resistor, which was also the grid leak for the output valve. Therefore, for the first minute or so after switching on, the grid of the output valve received a potential equal to the full high tension, or equal to a big proportion of it in the cases where the grid resistor returned to a pair of resistors across from high tension to the centre tap of the filaments.

So it will be seen that for a short period the output valve not only received a greater plate voltage than the normal rating, but also a positive bias on the grid. This caused an exceptionally heavy plate current to flow through this valve for the short period, usually somewhere about a hundred milliamperes or more. This current flowed through the field coil and the main resistors, resulting in them being considerably overloaded if designed only for normal use.

Overload Not Destructive

Strange as it may seem, the overloading was not as destructive as might be imagined, and the original "1930 Three," built in 1929, is still in operation at the old home in St. Kilda, Victoria, with the original 45 type output valve in service. When tested about eighteen months ago it showed normal emission!

Another cause of much distress in the early days of direct-coupling was the comparatively high voltages employed. Up till that time most sets used a couple of 27 type triodes transformer coupled to a 171A output valve, or at the heaviest a single 45, taking 250 volts high tension.

Most power transformers were rated at 275 or 300 volts. When the special power transformers were made available for direct-coupled circuits they were half-wave affairs, said to be 475 volt. It was not so clearly understood in those days that nominal a.c. voltages can be misleading, and in many cases when the amplifiers

(Continued on page 18)

Direct-Coupled Circuits *(continued)*

were in operation the actual high tension was anything up to 600 volts.

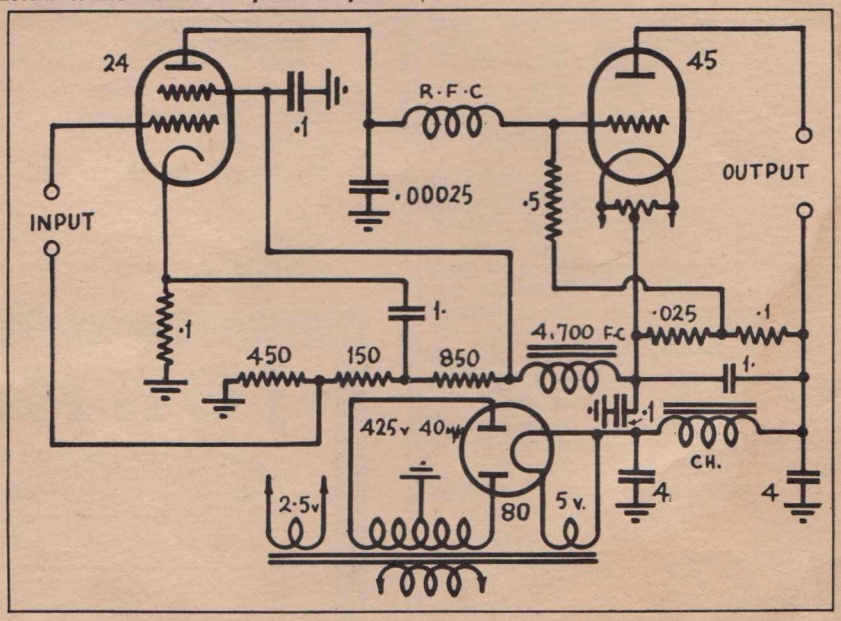
The total high tension current drain of a direct-coupled amplifier is equal to the normal plate current of the output valve, plus a milliamp or two in the resistor network, for example in the original Loftin-White circuit the normal current drain was 33 milliamps. At this low current drain there was a considerable voltage rise in the rectifier circuit.

Using a modern 385 volt 100 milliamp transformer for recent experiments we have noticed that even at 60 milliamps the effective high tension is usually around 450 volts, with an 80 type rectifier, and much higher with an 83 or 5Z3.

High voltages are in themselves not difficult to handle if you have the right equipment. But in those days it was simply a matter of putting about 500 volts on to a paper filter condenser rated to stand 300 volts working, and the result was a nasty smell in the house as the condenser short-circuited the high tension and burnt out the rectifier and boiled the wax out of the power transformer.

Especially misleading was the fact that it was customary, in those days, for filter condensers to carry a flash voltage test rating, meaning, in some cases, that a condenser marked "1500 volts test," would actually break down on about 350 if an attempt was made to work it on that voltage.

Below: The circuit of the original Loftin-White direct-coupled amplifier.



Tangled Voltages

Probably the biggest source of worry with early direct-coupled circuits were the resistors. Many of them were designed only for use as grid leaks, and if called upon to carry current their resistance varied within wide limits. This would not be a serious matter with a conventional circuit, but in a Loftin-White it could mean almost anything.

Excessive plate current in the output valve could be caused by incorrect resistance in the cathode circuit of the first valve. Both valves were completely linked together, their operating characteristics were too closely allied to make for simple trouble shooting. Imagine, for example, what happened to the operating conditions of the output valve if the first valve happened to be abnormal in the matter of emission.

With a tuner applied to the front of the amplifier, the matter of trouble finding became even more critical, the setting of the volume control, in some circuits, altering the bias of the output valve and so on.

And so you can readily understand why factory technicians shudder at the mention of direct-coupled circuits and why it is so difficult to make the valve people understand when you want a valve replaced under guarantee and you happen to let drop that you used the "faulty" one in a circuit of this kind!

Yet if you want to do some mighty interesting experimenting, and you want the simplest possible circuit to give exceptional fidelity, we suggest

(Continued on page 22)

AIR TEST of LATEST BREVILLE RECEIVER ★★

By A. G. Hull

IN certain quarters there seems to be an idea that there has been nothing new in receiver design in the past three or four years; that sets to-day are no better than they were at that time; in other words, that technical radio is stagnant.

Nothing is further from the fact than such ideas.

Continual progress is being made and although, perhaps, not so spectacular, the modern developments are well worth-while, and make the latest model receivers the best values ever offered in radio.

As a typical example of one of the latest and most advanced of receiver designs we can take the "Breville" Model 237.

With a view to giving a concrete example to illustrate the improvements in modern receivers, we approached our old friend, Mr. O'Brien, managing director of Breville Radio Pty. Ltd., and asked him if he would let us reproduce the circuit and full technical details of his most advanced design. Mr. O'Brien readily agreed to this and also provided a set on loan for an air test to let us see just how these improvements show up when the set is in actual operation.

A photograph of this receiver is featured on our front cover.

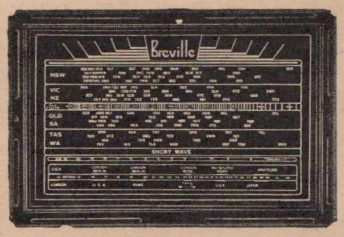
At first glance the specifications of this model seem to indicate just an ordinary five-valve dual-wave receiver, but when we went thoroughly into the subject we found several improvements which might be considered as only details, yet in practice they had a very definite contribution to the overall performance.

No one feature could be taken as being of outstanding importance, but each one helped in its own way to make the receiver a truly effective one, with plenty of sensitivity on the short-wave bands, ample coverage over the short-wave wavelengths, sharp selectivity as required for the separation of distant broadcasting stations, and yet, by a throw of the wave-change switch to the next position, a degree of fidelity of reproduction quite beyond the standard accepted as normal with good commercial receivers.

Specifications.

Make	BREVILLE
Model	237 DUAL-WAVE
Valves	FIVE
Cabinet	CONSOLE
Price	£33/7/-

Features: Zip tuning, true tone control and compensation. Also available in simpler cabinet designs at £31/5/- and £32/6/-.



Attractive Breville Dial

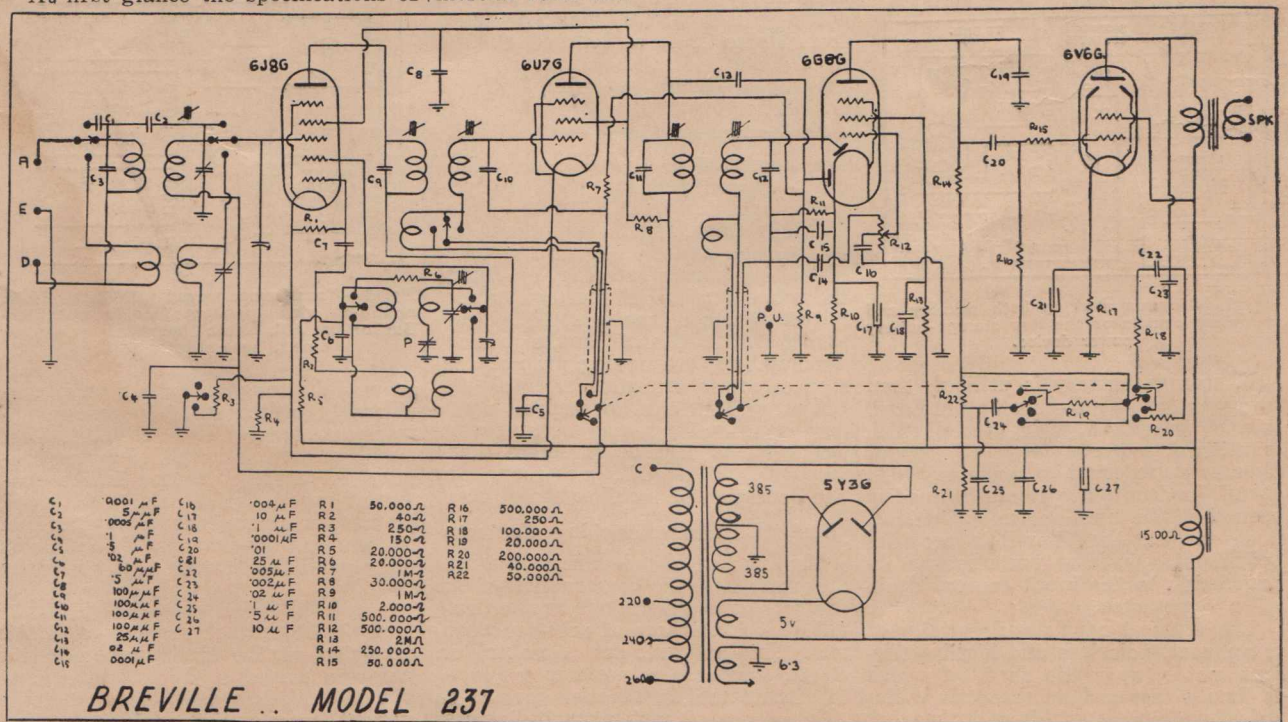
Points of Interest

Let us run over some of the items which go to make this receiver such a vast improvement over its prototypes of a few years ago.

Dealing first with performance on short-waves, we find that the use of a 6J8G, mounted on a special cushion socket, gives frequency stability and avoids any chance of flutter or feedback troubles, even when working "flat out" on the highest frequency tuned (13 metres).

Easy tuning on the short wavelengths is attained by the use of variable-selectivity intermediate transformers, of which more will be said later. On the short-wave setting of the wave-band switch, the intermediates are automatically switched to give maximum gain and broadest

(Continued on page 46)



BREVILLE .. MODEL 237

NOVEL POWER UNIT

By LOUIS GANCHER

Great interest has been shown in the power system mentioned in a recent issue by Amplifier Champion Carter. So far Mr. Carter has not given us full details of his equipment, but we fancy that it is based on the principle revealed in this article.

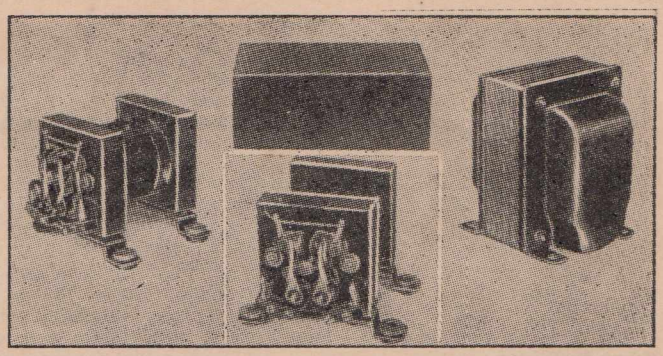


Fig. 2.—The storage-battery power unit and its double sound-proof case.

The production of D.C. voltages of 250, 300, 350, 400, etc., from a storage battery, for the operation of sound truck amplifiers, ordinarily is accomplished by dynamotors. Such devices, while performing admirably, are limited in scope since their output (referring to the most popular types, those averaging $40 list price) does not exceed 36W., as follows: 250V. D.C., 0.145-A. (volts times amperes equals watts); 300V. D.C., 0.12-A.; 350V. D.C., 0.103-A.; 400V. D.C., 0.09-A., etc.

If the power supply requirements exceed 36W., then 2 dynamotors would of necessity have to be employed along with their attendant increased bulk and weight, double cost and double battery drain.

With the battery-operated power supply here described, however, up to 65W. may be produced employing an automobile 6V. storage battery. If a

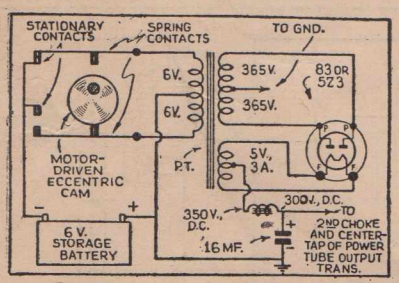


Fig. 1.—Diagram showing both primary and secondary circuits of the new storage-battery power device.

12V. storage battery is utilised, then up to 120 to 130W. may be produced. It consumes 12.4A. when the full 65W. is utilised, whereas the 36W. output dynamotor referred to consumes 10A. at full load output. It can be readily seen that the new device, which has been termed the Stor-Bat. provides considerably greater power output in proportion to the input current drain of a dynamotor.

The stor-bat consists essentially of a compact, noiseless and highly efficient motor, upon the shaft of which is firmly fastened an eccentric cylindrical metal cam. This cam "makes" and "breaks" the 4 contact arms with tungsten "points" welded on. As the motor shaft revolves 2,500 r.p.m., approximately 42 circuit interruptions of each set of contacts are produced per second.

Similar to automobile-radio receiver vibrators, the outside tungsten points

Writing from Adelaide, Mr. Gurr says:—

"Dear Sir,—In the June issue of the 'Radio World' I noticed with interest the description of a novel power supply used by one of the entrants in the Amplifier Championship. On looking through a pile of old magazines this evening I was surprised to come across a description of a storage battery power-supply whose specifications tallied with those given in your magazine. I thought you might be interested in it, if your attention has not already been drawn to it, and you will find the extract, which is taken from 'Radio Craft' of September, 1937. Best wishes for the success of your magazine.—Yours sincerely, C. G. GURR."

are connected to the ends of a 12V. centre-tapped primary of a 40-cycle power transformer, the centre-tap of which is connected in series with the 6V. storage battery and the 2 movable tungsten contacts (see Fig. 1). Due to the "chopping" of the battery current by the 2 sets of contacts, 6V. of pulsating D.C. is present in the primary winding. By employing properly designed power transformers, this 6V. pulsating D.C. can be stepped up to any desired alternating current voltage, even as high as (or more than) 10,000-20,000V. A.C., necessary for the operation of mobile neon signs.

Designs Prevent Sticking Contacts

The method of "vibrating" the contact arms and the construction of the contact arms themselves are entirely different from those of auto-set vibrators. In an auto-set vibrator, an electro-magnetic solenoid is employed to vibrate the light-gauge springs on to the ends of which small-diameter tungsten points are welded, or riveted. Occasionally, such devices tend to "stick," and the vibrator spring (being necessarily highly flexible to permit magnetic attraction of the armature) is not sufficiently powerful to pull them apart. This also happens if the points are operated beyond their maximum rated output.

Overcomes "Sticking"

Now let us see wherein the stor-bat has overcome both the "sticking" and the replacement problem. Even though this new unit employs contact arms equipped with extra-heavy tension springs (to provide perfect surface contact and resulting minimum of contact surface resistance, as well), with this new device the motor and eccentric cam (in place of the solenoid) will break the contacts apart even

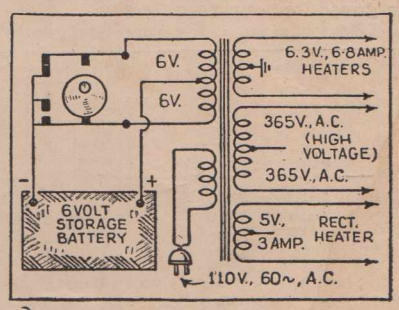


Fig. 3.—Transformer wound with both 110-V. and 6-V. windings; hence usable with Stor-Bat or on A.C. Note that this is only the basic, theoretical circuit.

though the tungsten points were considerably overloaded. Therefore, uninterrupted service is definitely assured; as well as increased power output. A valuable feature is the constructional design of the 2 pairs of contact arms permitting instantaneous replacement at low cost, of any one or all, should the tungsten points wear.

Comparative Efficiency

The motor itself consumes 1.9A., exclusive of the load applied to its tungsten points, if the full rated output of 65W. is applied, then the total current consumption is 10.5 A. (for

the 65W.), plus 1.9A. (for the motor), in all 12.4A. drain from a 6V. storage battery. Therefore, if the power supply requirements in an amplifier call for 300V. at 120 m.a. (36W.), for instance, the total drain on a 6V. storage battery would be 1.9A. plus 6A., in all 7.9A., as compared to 10A. drain required by a dynamotor. When a 12V. unit is employed at its full rated output (130W.), the total battery drain is 11A. (for the 130W.) plus 1.9A. (for the motor), in all 12.9A.

The elimination of sparking at the contacts not only tends to considerably lengthen the life of the tungsten points, but also minimises to a marked degree the interference generally present in high gain amplifiers or radio receivers. To completely eliminate such interference, a filter is available which can be connected externally.

Operating Details.

If this device is to be operated adjacent to a microphone, care must be taken to insulate the drone of the motor as well as the tapping sound produced by the contacts. Models are available ready mounted within double metal cases, each lined with sound-deadening sponge rubber.

When tubes are heated from the car battery, one leg is directly grounded, as no centre-tap winding is employed. For dual-powered operation (i.e.,, 6V. D.C. and 110V. A.C.) provisions must be incorporated to isolate this ground to one leg of the heaters, and to employ instead a grounded centre-tap 6.3V. filament winding.

Referring to Fig. 1, it will be noted that the centre-tap of the 83 filament winding is connected in the usual manner to a filter choke input (condenser-choke input is also permissible). From there on, the rest of the circuit is conventional.

All that is required to enable the operation of an amplifier from both 6V. D.C. and 110V. A.C. is an additional primary designed for 110V. A.C. input and an additional secondary of 6.3V. A.C., 6-8A., for the amplifier tube heaters (see Fig. 2). The balance of the amplifier remains unchanged. Means of course must be provided to switch on and off either the 6V. source, or the 110V. A.C. source, and further means must be provided to ground one leg of the amplifier tube heaters when 6V. battery operation is employed, and then to remove this ground connection when the centre-tap of the 6.3V. filament winding is employed during 110V. A.C. operation.

The stor-bat is unusually compact, the essential unit (minus sound insulation cases) measuring 4" x 4⅜" x 3½" high. (When enclosed in its 2 sound-insulating cases, the overall dimensions are 6½" x 3¾" x 3¾" high).

DIRECT-COUPLED

(continued)

that you play around with some form of circuit which does not introduce condensers or transformers into the coupling.

Our Circuits

With this article we reproduce several direct-coupled circuits, including the original Loftin-White, which was not quite the same as the early circuits introduced into Australia, the "Direct Coupled 2," which was so popular in 1931, and, lastly, a circuit with which we have been playing about during the past couple of weeks since our interest was aroused afresh by the performance of direct-coupled amplifiers in the auditions of the Amplifier Championship.

In this circuit we use a 6J7G (6C6) as a triode, and couple it directly to the grid of a 6A3. The 6A3 appears to be ideal for the purpose, as its grid bias is not nearly as critical as for beam power valves and pentodes. A 6A3 (or the 2A3) will give satisfactory performance at any bias voltage between about 35 and 70 volts. A 6V6G is critical of a variation of 4 volts in bias.

Standard Power Unit

We have been using the Standard power unit, as detailed in a recent issue, and, although rated normally at 385 volts, the effective high tension goes up well beyond 400 volts at the lower load, and it is advisable to use 600 volt electrolytics, or otherwise to keep an ear cocked for the merry little sizzle which comes from an electrolytic just before it breaks down on an overload.

Balancing

With this amplifier it will be noted that we have pressed into service an old 200 ohm potentiometer, which carries the full plate current of the output valve after it has passed through that valve and through the field coil. The grid of the first valve is returned to the rotor arm of this potentiometer, so that the effective bias on the first valve can be varied without altering its bias resistor. In practice this works out fine, especially when a meter is available to indicate the plate current of the output valve.

AMPLIFIER CONTEST GRAND FINAL

Set Down for Hearing on August 18

After many weeks of preliminary auditions the Amplifier Championship for 1940 is now rapidly drawing to a close, the Grand Final being set down for hearing on Sunday night, August 18.

Readers who would like to be present on this occasion should phone (FL 2842) or write for a reservation, as only about a hundred will be accommodated.

The audience will take part in the judging. A rather novel idea has been introduced to make this possible.

The Judging

About ten special technical judges will be present, and their votes will count ten points each. Votes from the audience will count one point each, and the winner will be the competitor who gets a majority of points.

At the preliminary heats it has been found that there is sometimes a decided difference of opinion between the technical judges and the public, but this new method will mean that the winning amplifier will be certain to have universal appeal.

Full details of the
Winning Amplifier
in next month's issue

The Competitors

At the Grand Final there will be between eight and ten competitors, and each will be allowed to play ten minutes of recordings of his own choice, as well as the official test recording, which is Part 2 of the "Nights at the Ballet, No. 2" selection, by a symphony orchestra conducted by William Goehr.

High Standard

The grand final should provide close competition, which has also been a feature of the preliminary heats, there being always more than two or three outstanding amplifiers at every one of the early auditions.

In fact, it might be said that about 75% of the amplifiers heard so far have been really remarkable performers.

There is no doubt whatever that the finalists will be representative of the best in amplifier design and the winning amplifier will be worthy of widespread recognition.

ROLA SPEAKERS DO WELL

Results of Preliminary Heats

An interesting heat of the preliminary auditions for the Amplifier Championship was held at the Australian Radio College on Tuesday night, July 30.

Four particularly good amplifiers were heard and the difference between them was extremely difficult to tell. No. 1 was a big dual-channel job, with a pair of 2A3 triodes in push-pull for the main amplifier, with transformer coupling, and a single 6V6G as a special high note amplifier. The 6V6G was driven by a 6C5 with a special inverse feedback arrangement to allow best possible high note response. The speaker system was a most elaborate horn, with six separate openings, one for the special high-note speaker, another for the front of the main speaker, a Rola G12, and a four-mouth opening of the special horn used to load the rear of this speaker. The pick-up used was a Telefunken unit.

No. 2 amplifier was a more or less straightforward resistance-coupled push-pull 2A3 job, with 6C5 phase-changer, a big "Tru-Tan" crystal pick-up, and a five-foot square baffle board of celotex, with a Rola G12 to handle the main output, and a Rola tweeter to handle the highs.

No. 3 was a single 6V6G valve, with an Astatic crystal pick-up feeding straight into its grid. The speaker was mounted in a neat-looking three-foot square baffle box, made up from a walnut table-top. Quite a good idea.

Naturally this job did not have the same power as its bigger rivals, but it put up a great showing, and one which seems certain to make it the winner of the special award for a small amplifier.

No. 4 was an interesting example of

(Continued on page 26)

ROLA IS FIRST AGAIN!"

FIRST to abolish troublesome voice coil centering devices by permanently aligning the voice coil. The words, "Permacentric Construction," are synonymous with continuous trouble-free operation.

FIRST to dustproof both permanent magnet and electrodynamic speakers of all sizes.

FIRST to introduce a new idea which renders transformers immune to electrolysis. Isocore transformers are still bywords of reliability.

FIRST with highly efficient permanent magnet speaker to suit battery valves of low output.

FIRST with high quality permanent magnet speakers comparable with electrodynamics in efficiency.

FIRST speaker manufacturer to provide extra compact units for ultra compact receivers.

FIRST to provide special speakers for car radio designed to withstand vibration and dust.

ONLY manufacturer to release Australian-made permanent magnet and electrodynamic speakers which conform to the R.M.A. standard for high fidelity reproducers — G12 p.m. and G12.

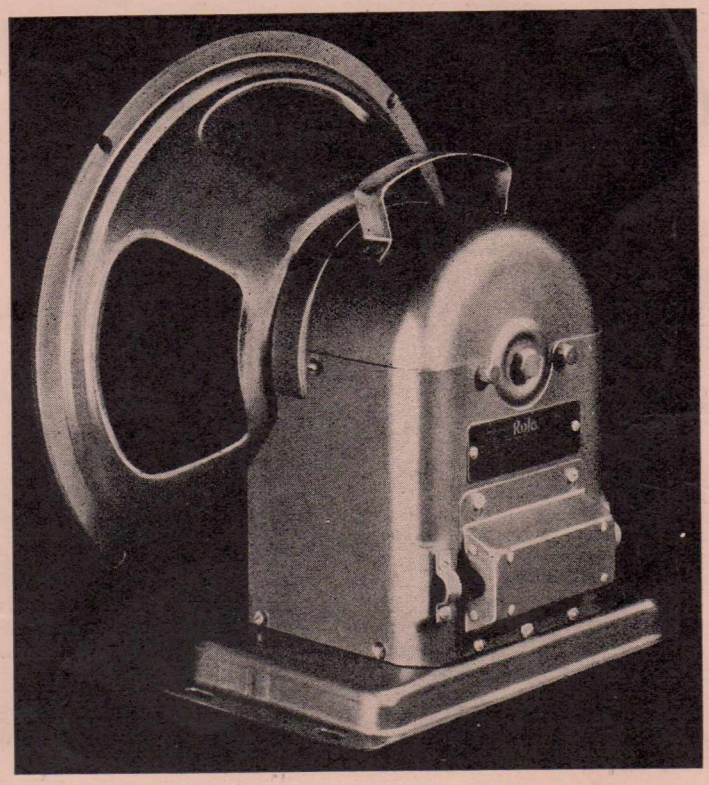
Australia looks to ROLA for genuin

You will find convincing proof of this in the fact that the very speaker you need for your set, whether it be a compact midget or a prize-winning amplifier, is to be found in Rola's extensive range.

FIRST: Employing new, low mass material, Permaflex Spiders were developed by Rola and are used exclusively by them. These new spiders largely contribute to the amazing overall improvements recently made by Rola.

FIRST: By introducing "Kappa" Cones, fabricated from a lighter and tougher material, Rola provides highly efficient speakers, capable of handling very big power outputs.

FIRST: Radical improvements to the magnetic circuit have lifted Rola speakers on to a new high level of efficiency, another important development in speaker design introduced by Rola.



☆

ROLA G12

The Finest of all Loud Speakers

ne leadership in Loud Speaker design

You are invited to see the new Rola releases at your distributors. Arrange for an actual test and hear for yourself what Rola's leadership means to you.

NEW ROLA G12 SPEAKER

Although the record of the Rola Co. (Aust.) Pty. Ltd. has been punctuated by a series of improvements to their product and production facilities, this organisation never appears to be satisfied, and each season sees another improvement which may be classed as a definite contribution to the electro-acoustic side of the radio industry. In previous years, we have seen developments such as alloy magnets, new cone structures, "isocore" transformers, and "permacentric" cone suspension introduced by Rola until the product reached such a high state of development that further improvement did not seem possible unless radical changes were made in loudspeaker technique.

Higher Efficiency

Now we learn that this year is no exception to the rule, because the entire range of Rola reproducers has been re-designed to give higher efficiency, better response and greater power-handling capacity. These improvements in performance are, however, the result of no single change — instead, they have entailed the use of a new cone material, a new "spider," and a radical re-design of the magnetic circuit.

Details of Improvements

Details of these improvements were given in last month's issue, dealing with the general range of speakers.

We did not, however, deal specifically with the big Rola G12, high-fidelity speaker, which has been doing so well in our Amplifier Championship heats.

It is very evident that a big section of our readers are keenly interested in the bigger speakers, those capable of handling the terrific power output of modern amplifiers, and at the same time handle this power at the very low and very high frequencies which are so important to the man in search of true fidelity of reproduction.

High Fidelity Reproduction

The new Model G12 Rola has been designed to meet the requirements for high fidelity reproduction, with great power handling ability and high efficiency.

The G12 is emphatically a quality unit, and is ideally suited for use with all types of radio equipment, electro musical instruments, theatres and public address systems.

	Type No.	Overall diameter	Voicecoil diameter	Voicecoil impedance	Normal field excitation	Maximum weight of field coil	Prices
ELECTRO-DYNAMIC	G-12	12⅛ in.	1¾ in.	8 ohms	18 watts	3½ lbs.	£8/12/–
	K-12	12⅛ in.	1in.	2.3 ,,	9 ,,	2 ,,	50/–
	F-12	12⅛ in.	1in.	2.3 ,,	8 ,,	1½ ,,	41/–
	K-10	9¾ in.	1in.	2.3 ,,	9 ,,	2 ,,	47/–
	F-10	9¾ in.	1in.	2.3 ,,	8 ,,	1½ ,,	40/–
	K-8	8⅛ in.	1in.	2.3 ,,	8 ,,	1½ ,,	34/6
	F-8	8⅛ in.	¾ in.	3.7 ,,	6 ,,	¾ ,,	29/6
	F-5B	6¾ in.	¾ in.	3.7 ,,	6 ,,	¾ ,,	28/6
	K-5*	5in.	⅝ in.	3.7 ,,	3.5 ,,	¼ ,,	25/–
PERMANENT MAGNET	G-12	12⅛ in.	1¾ in.	8 ,,	—	—	£11
	12-42	12⅛ in.	1in.	2.3 ,,	—	—	78/–
	12-21	12⅛ in.	1in.	2.3 ,,	—	—	56/6
	12-20	12⅛ in.	1in.	2.3 ,,	—	—	49/–
	10-42	9¾ in.	1in.	2.3 ,,	—	—	74/6
	10-21	9¾ in.	1in.	2.3 ,,	—	—	55/–
	10-20	9¾ in.	1in.	2.3 ,,	—	—	48/–
	8-42	8⅛ in.	1in.	2.3 ,,	—	—	72/6
	8-21	8⅛ in.	1in.	2.3 ,,	—	—	52/–
	8-20	8⅛ in.	1in.	2.3 ,,	—	—	46/–
	8-14	8⅛ in.	1in.	2.3 ,,	—	—	39/–
	6-15	6¾ in.	¾ in.	3.7 ,,	—	—	40/–
	6-11	6¾ in.	¾ in.	3.7 ,,	—	—	35/–
	6-8	6¾ in.	¾ in.	3.7 ,,	—	—	31/–
	5-15	5in.	¾ in.	3.7 ,,	—	—	40/–
	5-11	5in.	¾ in.	3.7 ,,	—	—	35/–
	5-8	5in.	¾ in.	3.7 ,,	—	—	31/–
	5-4†	5in.	⅝ in.	3.7 ,,	—	—	26/–

Cumulative Improvements

The manufacturers of the G12 Rola explain its design as being the product of ten years of cumulative improvements.

The new G12 is available in both electro-dynamic and permagnetic models. The electro-dynamic model is designed for operation from direct current or from conventional field supply from radio set, amplifier, etc.

The field resistance supplied as standard is 3500 ohms.

The maximum field capacity is 3½ pounds. A hum neutralising coil is included as standard equipment.

The speaker is supplied with input transformer or with input direct to the 8-ohm voice coil.

Power Handling Capacity

The power handling capacity is rated at 15 watts under continuous operation, and 20 watts for intermittent reproduction, using normal field excitation.

ROLA SPEAKERS DO WELL *(continued)*

design, amounting to two separate resistance-coupled amplifiers, working in a sort of back to back arrangement, with the input of the Astatic pick-up between both grids. The speaker system was a Rola K12 and Rola tweeter, both mounted fairly close together on a large celotex baffle board.

Performance

And so these four amplifiers "strutted their stuff" as usual with one side of the official recording and then ten minutes of their own choice.

It was fairly evident that the little single valve job was not going to be in the running, but the other three gave sterling performances, and the result of the voting was eagerly awaited.

As was anticipated, the result of the audience ballot was very close, No. 2 winning by a single vote from No. 1, with No. 4 only another vote away in third place. This was easily the closest voting of any audition yet heard.

Even closer, however, was the voting of the team of special judges, and they completely failed to reach a verdict. No. 1 and No. 2 amplifiers were brought back for a second hearing, each playing the reverse side of the official record, and with No. 2 playing first.

Still the judges failed to reach a verdict, and, rather than have an all-in fight, it was decided to allow both amplifiers to go through to the final. It is very obvious that the final will be an extremely close contest, and it should be the most interesting amplifier event ever staged.

If you want to be there, see the arrangements listed on page 23.

TRADE PARADE . . .

BARGAINS FROM INVINCIBLE RADIO

Some outstanding bargains in broadcast and dual-wave battery receivers are included in a line of reconditioned radios available from Invincible Radio, of Clarence Street, Sydney.

According to Manager Norm Cohen, every receiver is of modern design, the range including many leading makes. Every set has been thoroughly overhauled from aerial terminal to loudspeaker, many being fitted with new valves throughout. The prices quoted, ranging from £5 and upwards, include new "A," "B" and "C" batteries.

As there are only 20 models available, readers interested are invited to write immediately for full details, sent post free by return mail.

VEALLS 1940 CATALOGUE

Elaborate Catalogue Offered Free

We have just received from A. J. Veall Pty. Ltd., of Melbourne, a copy of their 1940 Radio and Electrical Catalogue. The cover is printed in three colours and the interior is fully illustrated with every conceivable item in the radio and electrical fields.

By means of an elaborate price list, supplementary to the catalogue, customers living far from Melbourne can make their selection of goods as though they were personally in Veall's store.

In addition to Radio, the catalogue covers the complete range of electric servants: home lighting, fans, electric fencers, radiators, etc., etc.

Don't delay. Radio World readers can obtain a copy of this publication FREE by simply filling in the coupon on page 41 of this issue and posting it to A. J. Veall Pty. Ltd., Box 2135, G.P.O., Melbourne, C1.

★ ★

RADIO SUPPLIERS

New Service to Distributors

Mr. R. K. Stokes, Managing Director of Radio Suppliers Pty. Ltd., has announced that additional premises have been obtained to ensure that a complete range of Radiokes components will always be available for instant delivery to manufacturers and distributors.

The additional premises will be situated at 6th floor, Pomeroy House, cnr. York and Barrack Streets, Sydney. Phone: B 4586.

The registered office of Radio Suppliers Pty. Ltd. will, however, still be at Wingello House, Angel Place, Sydney. Phone: B 4557.

★ ★

NEW PHILIPS CHART

Nearly 700 Valve Types Listed

What promises to be one of the most elaborate Valve Characteristics Charts ever published in Australia will be released within the next few weeks by Philips Lamps (A'sia) Ltd.

Nearly 700 American and Continental type valves will be listed, complete with under-socket connections and full characteristics data. Even information on Continental valve types not available in Australia will be included, to assist servicemen servicing foreign-made sets using them to locate satisfactory equivalents.

Copies of this new Philips Chart will be shortly available free to

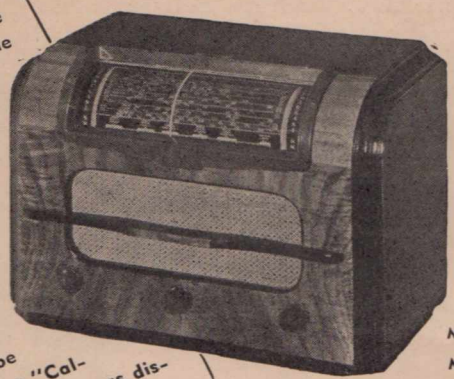
(Continued on page 41)

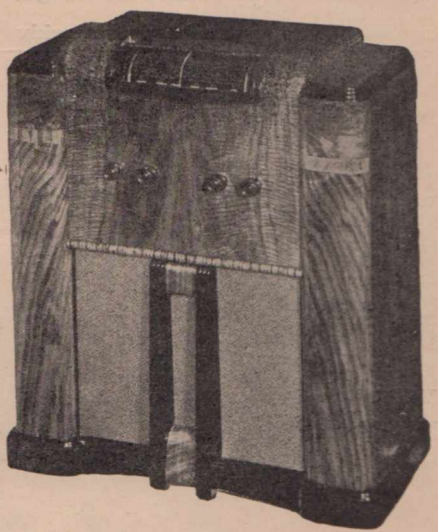
Typically CALSTAN

[CALibrated to STANdard]

IN QUALITY, FINISH AND PERFORMANCE

Slade's Radio Pty. Ltd. have proven themselves to be the leaders in the Radio and Electrical Testing Equipment field, and now bring their superior technical knowledge and ability into producing better receivers. The quality, finish and performance of these sets uphold the famous "Calstan" reputation and they will be sold under the name "Calstan." Exceptionally generous discounts make the "Calstan" Radio a very profitable line, particularly for country dealers. Write immediately for particulars.





Model 45 Table Model 4/5 Electric, D.W., 24 guineas.
Model 46 Console Model 4/5 Electric, D.W., 29 guineas.
Model 47 Console Model, Battery Operated 5 valve (1.4 type), D.W., 32 guineas.
Model 48 Console Model Vibrator Operated D.W., 39 guineas.

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Makers of Highgrade Radio & Electrical Testing Equipment

The A.B.C. of MULTI-RANGE METER DESIGN

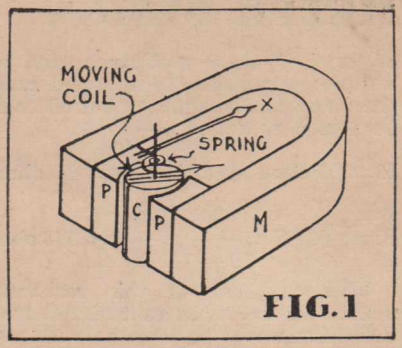


FIG. 1

By using a 0-1 milliammeter as a basis and adding shunts and multipliers to extend current and voltage ranges, a multi-range meter can be made up that will be found invaluable both in set-building and trouble-tracking. This article explains how the necessary resistance values are calculated.

A SET-BUILDER without a meter of some sort is as helpless as a ship without a rudder. Like the ship, he can travel a certain distance, but never for long in any one direction, and his chances of finally reaching his destination are very small.

High accuracy, flexibility and low cost are the three main requirements of a meter designed for radio use. All three are fulfilled by employing a high-grade moving coil 0-1 m.a. meter as a basis, and extending voltage and current ranges by means of multipliers and shunts (series and parallel resistors).

How a Moving-coil Meter Works

The bare essentials of a moving coil meter are illustrated in Fig. 1. M is a U-shaped permanent magnet with soft iron pole pieces PP. A cylindrical iron core, C, is clamped so as to leave a small, uniform air gap. Encircling the iron core and travelling in the gap is a light framework of aluminium or copper, carrying a coil of fine silk-covered wire, and pivoted so that it can rotate over the whole of the arc covered by the pole pieces, the movement being controlled by two springs, one above and one below. These also serve to conduct the current to and from the moving coil.

When a current passes through the latter, the resultant magnetic field set up interacts with that of the permanent magnet, and the coil (together with the pointer X) turns until the restraining influence of the spring brings it to a stop.

The coil frame not only acts as a support for the wire which carries the current to be measured, but also damps the motion owing to the eddy currents induced in it by the permanent magnet.

The coil, over the whole of its arc of movement, will be travelling across a field of constant and uniform flux density produced by the permanent magnet, and the torque, or turning force, that the coil experiences will be proportional to the current in the coil. Thus, readings over the whole scale are uniform.

High Sensitivity Essential

Regarding it first as a current-measuring device, the sensitivity of a meter is best expressed as the current at full-scale deflection. If this current is 1 milliampere, then such is the sensitivity.

In most voltage measurements in

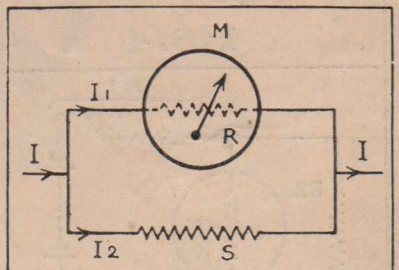


FIG. 2

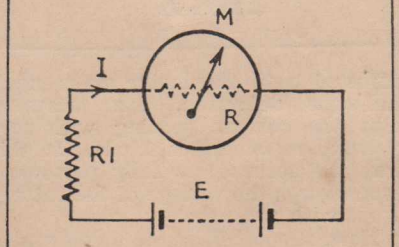


FIG. 3

radio, it is essential that the current taken by the measuring instrument be kept as low as possible, to avoid the danger of obtaining misleading readings.

For this reason, a voltmeter taking 1 m.a. at full scale deflection has higher accuracy than one taking 2 m.a. and much higher than one taking 5 m.a.

The sensitivity, which can be regarded as a good indication of the accuracy of such a meter, can be obtained by dividing the full scale deflection in amperes into 1 — in other words, it is the reciprocal of the full scale current in amperes. The result is given in ohms per volt; in this case, it is $\frac{1}{.001}$, or 1000 ohms per volt.

A 0-2 and 0-5 m.a. meter would have sensitivities of 500 and 200 ohms per volt, respectively.

Extending Current Range

Every meter has a resistance of its own, which for a 0-1 milliammeter is generally round about 30 ohms. In Fig. 2, this is represented by R. If a current of 1 m.a. were flowing through the meter, the needle would register full scale deflection. If a resistance equivalent to that possessed by the meter were then connected across the terminals of the latter, half the current would flow through each, and the meter would register .5 m.a. Thus the current-measuring capacity of the meter has been doubled by the addition of the shunt, as a current of 2 m.a. is now needed to register full-scale deflection. This explains the way that the current ranges are extended. To take a general case, let the resistance of the shunt be S ohms, the main current I m.a., and the branch currents I_1 and I_2 (see Fig. 1). With S across it, the meter will be capable of measuring a current of, say, N times the full scale deflection.

We now have:—

$I = I_1 + I_2$ ..... (a)

$NI_1 = I$ ..... (b)

Next, substituting for I in (a), we get

$NI_1 = I_1 + I_2$

Therefore $I_1 (N - 1) = I_2$ .. (c)

The potential difference across the meter equals RI_1, and that across the shunt, SI_2. Both must be equal, as they are potentials from A to B. Thus we have $RI_1 = SI_2$.

Therefore, substituting for I_2 (from (c))

$$RI_1 = SI_1 (N - 1)$$

$$\text{giving } S = \frac{R}{N - 1} \quad \text{..... (d)}$$

Thus, if we had a 0-1 m.a. meter

(Continued on page 30)

of, say, 30 ohms resistance, and we wanted to measure 10 m.a. full scale, the value of the shunt required could be found as follows:—

$$R = 30 \text{ ohms, and } N = \frac{10}{1} = 10 \text{ ohms.}$$

$$\text{From (d) } S = \frac{30}{10-1} = \frac{30}{9} = 3.333 \text{ ohms}$$

With a shunt of this resistance across the meter, current at full scale deflection would be 10 m.a., with proportionate intermediate readings. In this case, actual readings given by the meter should be multiplied by 10 to obtain the true reading.

Measuring Voltages

To measure voltages, a series instead of a parallel resistor is used. The meter is still purely a current indicator; it measures voltages only because of the resistance in series with it. In Fig. 3, R_1 is used to limit the current passing through the meter at the maximum voltage to be measured to 1 milliamp.

Thus, if R is the meter resistance and E the maximum voltage to be measured, from Ohm's Law, the

$$\text{current } I = \frac{E}{R + R_1}$$

$$\text{As } I = 1 \text{ m.a.} = \frac{1}{1000} \text{ ampere.}$$

$$\frac{1}{1000} = \frac{E}{R + R_1}$$

giving $R + R_1 = 1000$ E.

As mentioned before, R is usually only about 30 ohms. If E is 30 volts, $R + R_1 = 20{,}000$, and compared with R_1, R is very small, and for practical purposes can be neglected. This leaves R_1 equal to 1000 E, which means that the value in ohms of the required series resistor is equal to the maximum voltage the meter is required to measure, multiplied by 1000. Thus, for ranges of 20, 200 and 500 volts, series resistors 20,000, 200,000 and 500,000 ohms are required.

If the meter required 5 m.a. to give full-scale deflection, then R_1 would equal 200 E, and for the voltage ranges given above the necessary series resistors would have values of 4,000, 40,000 and 100,000 ohms, respectively.

Resistance Measurements

Fig. 4 shows the set-up for a single-range ohmmeter, still using a 0-1 milliammeter. The current that will flow is given by the formula:

$$I = \frac{E}{R_1 + R_2} \quad \ldots\ldots\ldots \text{(a)}$$

(where R_2 is the unknown). If E = 4.5 volts and R_1 is fixed, maximum current will flow when $R_2 = 0$ ohms. But the meter will read up to 1 m.a. only, and so the minimum value that R_1 should be to restrict the current passing to this value can now be obtained by substituting in (a).

$$I = 1 \text{ m.a.} = \frac{1}{1000} \text{ amp.} = \frac{4.5}{R_1 + 0}$$

Therefore $R_1 = 4500$ ohms.

In practice, R_1 is made up of a fixed and a variable resistance connected in series, in order to compensate for any voltage drop in the battery. With the test prods shorted, the resistance is

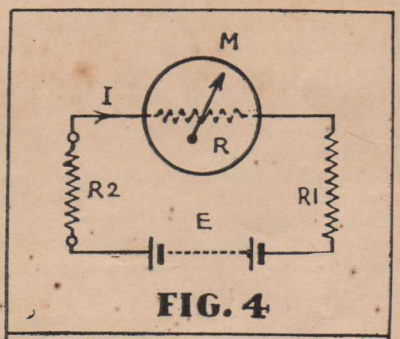


FIG. 4

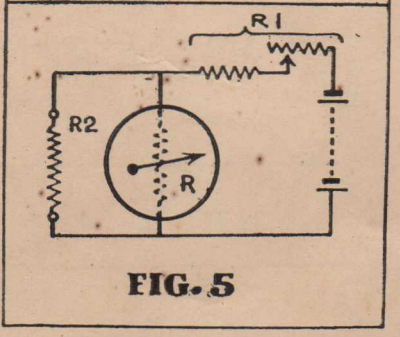


FIG. 5

adjusted until the meter gives exact full-scale deflection, thus ensuring that the current passing with zero external resistance is 1 m.a. In this way the accuracy is fully preserved, even though the voltage of the battery drops with use.

Now, suppose that the unknown resistance has a value of 1500 ohms. In this case the current reading of the meter will be:

$$I = \frac{4.5}{1500 + 4500} \times \frac{1000}{1} \text{ m.a.}$$

$$= .75 \text{ m.a.}$$

From similar calculations, corresponding readings for unknowns of, say, 4000, 20,000 and 100,000 ohms are .53, .18 and .045 m.a., respectively. Using these and other intermediate values, a graph can be easily plotted so that the resistance of an unknown corresponding to any current reading can be instantly read off.

Obtaining Different Ranges

Usually a 0-1 m.a. meter has a scale divided into 50 divisions, each division thus representing a current of .02 m.a. With the meter needle "dead on" the first division, a current of .02 m.a. is flowing. This represents roughly the maximum value of resistance that can be measured using the values assumed for R_1 and E (4500 ohms and 4.5 volts).

From (a) we find that

$$X = \frac{E - IR}{I}$$

$$= \frac{4.5 - (.00002 \times 4500)}{.00002}$$

$$= 220{,}000 \text{ ohms approximately}$$

For the other extreme, the 49th division on the 50-division scale represents a current of .98 m.a. Substituting in the above equation, we find that this represents a resistance of roughly 100 ohms. So the resistance range that is covered is from 100 to 220,000 ohms.

Now, if R_1 and E in Fig. 4 are doubled, each extreme of the original range is doubled, so the new range is from 200 to 440,000 ohms. Values read from the graph should now be multiplied by 2. If R_1 and E are increased to 45,000 ohms and 45 volts — ten times their former values — the range extends from 1000 ohms to 2.2 megohms.

Measuring Low Resistances

As regards measurement of low resistances, the method given above is accurate enough for most purposes. Occasionally, however, the need arises for high accuracy, and in such cases the method shown in Fig. 5 can be used.

The ohmmeter test prods are shorted, and the resistance R_1 is adjusted to give exact full-scale deflection. The unknown R_2 is then shunted across the meter as shown.

This diverts parts of the current flowing through the meter, the amount depending on the resistance of R_2. For example, if it is the same as the internal resistance of the meter, the latter will show a half-scale reading.

When the reading has been taken, the value of R_2 is calculated from the formula

$$R_2 = \frac{R \times I}{I \text{ max.} - I}$$

where R is the meter resistance, I the current reading, and I max. the full-scale deflection current.

With this method, highly accurate measurement of resistance from about 2000 ohms down to 20 ohms is possible, and reasonable accuracy is still obtained down to as low as .5 ohm.

Shortwave Review

CONDUCTED BY
L. J. KEAST

London audible at 9.30p.m. ★ KGEI on new Frequency ★ New Daventry Transmitter ★ Verification from FFZ Transmitter ★ Full List of Month's Loggings

"Oh Wind! if Winter comes,
Can Spring be far behind?"

Thus spoke Shelley. Judging by reception during last month, notwithstanding many cold snaps, Spring is on the way. That is, if night reception is any indication — and it generally is.

London Audible at 9.30 p.m.

There were several nights when I was surprised to find London audible on 19.82m. at 9.30 p.m. and also on 13 and 16 metre bands. But I was not to be fooled, and consequently not perturbed to find for the rest of the week they could not be heard much before 11.30 p.m. But I do think Spring is on the way. However, if you prefer to hear the B.B.C. news at 9.30 p.m. direct, and the usual channels are not satisfactory, or Singapore is unfavourable, try **ZHJ**, Penang (49.23m.).

Notwithstanding the indication that night reception is improving, daylight signals are still excellent — as exemplified by listeners' reports. The Americans in the afternoons are particularly good, and quite a choice of news is available.

KGEI

The change in frequency of **KGEI** from 9530kc. to 9670kc. (announced in our last issue) must have been decided on very quickly, as a programme sheet for August from General Electric Company which arrived on July 18, bearing postmark of Schenectady, June 14, gives the old frequency of 9530kc.

On Sundays at 3.30 p.m. the Treasure Island Studio Manager, Buck Harris, conducts a Letter-Bag session. Many Australian and New Zealand names are called.

WCBX

A letter from the Columbia Broadcasting System, New York, clears up the doubt regarding this station on the 49-metre band. It appears they are on the air from 2 to 4 p.m. on 49 metres during June, August and October. At the same hour, but on 48.6 metres, they may be heard during May, July and September.

New Daventry Transmitter

The new Daventry transmitter, GSN, 11.82mc., 25.38m., is heard at excellent strength from 12.25 p.m. to 2.30 p.m., news being given at 12.30 p.m.

WLWO, Cincinnati (31.28m.), were excellent on Sunday morning till long after 10 a.m. News flashes were frequently given.

Nearly all reporters make reference to **CJRX**, Winnipeg (25.6m.). Doubtless the terrific signal, made better by the absence of **Paris Mondial**, caused the investigation.

While, like most S.W. listeners, I am always anxious to locate a "new station," I must confess that I seldom pass over a London transmitter without just ascertaining what they are doing. It was this precaution that enabled me to hear the "running description" of the dog fight over the English Channel. I would not have missed it for anything.

Verification From FFZ

I have received a letter from Station Radiophonique de l'Alliance Francaise, 193 Avenue Joffre, Shanghai, acknowledging my letter and report of May 2. It reads:—

"It is very encouraging to hear that you have been able to pick up our station, as your report corresponds exactly with our records.

Details of Transmitter

"As to our station, the following details might prove of interest to you:—

"Our long-wave transmitter (1400 kc.) has an antenna-power of 2 k.w., and we plan to bring it up to 24 k.w. We are using high level modulation and, as far as we know, are the first station in the Far East to use an automatic volume-compressor, thereby keeping modulation in the neighbourhood of 100 per cent. most of the time.

Shortwave Transmitter

"Our short-wave transmitter, which so far is only experimental, has an antenna-power of approximately 400 watts. We intend in the near future to increase the power as well as the fidelity of our transmission which, so far, has been of secondary importance to us. The wave-length we are using now has so far proved unsatisfactory.

"We intend to revert to our former wave-length, which is on the other side of the 25 metres international broadcasting band. These changes will probably be effected about the beginning of July.

"We enclose herewith a copy of our programme schedule, so as to enable you to check your observations, and we shall be very grateful for your kind co-operation in the future."

The schedule is:—

Daily broadcast in five languages, French, Chinese, German, Russian and English—10 a.m.

News in French.

Then there seems to be a break till 2 p.m. and from then till 2 a.m. without a break.

News in English at 11.30 p.m., 12.30 and 1 a.m.

Times are Aust. Eastern Standard.

Wavelength, 24.80m.

Frequency, 12.09mc.

The Month's Loggings

ALL TIMES ARE AUSTRALIAN EASTERN STANDARD

Dr. Keith B. Gaden (Tharmogindah, Q.) sends a big list of loggings:—

OAX4R, Lima (19.81m.) closed Sunday at 7.45 a.m.

VUD-4, Delhi (25.36m.), **VUD-3,** Delhi, and **WLWO,** Cincinnati (26.27m.) heard frequently at good strength.

2RO-15, Rome (25.51m.) very good at midday.

Have not heard **PRF-5,** Rio de Janiero (25.3m.), as **DJP,** being R9, overwhelms it.

Dr. Gaden has been hearing a South American type of programme on 50 metres in the late afternoon. (This is probably **XEBT,** Mexico (50.00m.) or **HP5K,** Panama (50m.) —Ed.). **YDA,** Tandjonpriok (41.38m.) is heard every afternoon till after 5 p.m. **WRUW,** Boston (49.67m.) at 10 a.m. one morning and then got **"Radio Pacifique,"** Noumea (41.25m.), testing.

He considers **KGEI,** 'Frisco, on their new wavelength of 31.02m. are slightly better than the old frequency of 9530kc. (Unfortunately at my location, although they can be heard quite well, good reception is spoilt by "canary" morse, and worst of all, it always happens when the 10.30 p.m. news session is being given.—Ed.).

VG3BG, Georgetown, British Guiana (48.94m.) weak, but audible at 7 a.m.

Radio Suisse, Schwarzenburg (48.62m.), very fine clear signal at 7 a.m.; several languages heard.

Dr. Gaden refers to the very good strength of **COHI,** Santa Clara, Cuba (46.50m.), when it opens at 8.45 p.m. with announcements in English.

HBJ, Geneva (20.64m.) on Tuesday, July 2, fair at noon.

WITH THE REPORTERS

We acknowledge with sincere thanks, notes from:—

OFFICIAL OBSERVERS—

Arthur T. Cushen, Invercargill, N.Z.
W. H. Pepin, Maylands, W.A.
E. Neill, North Ipswich, Queensland.
Wm. Bantow, Edithvale, Vic.
D. J. Hastings, Ashgrove, Brisbane.
W. M. Chapman, Kensington, Sydney.

and

Dr. Keith B. Gaden, Thargomindah, Queensland.
S. I. Nelson (AW577DX), Cairns.

South Australian and Tasmanian reports would be welcomed.

Have been hearing a very poor signal, on approximately 31.44m. Too poor to identify, closes at 2 p.m. Thought it may have been **OAX4T,** but it does NOT sound like a South American.

Talking of Peru, what I take to be **OAX4G** (48.47m.) was heard closing at 3 p.m. Signal was noisy and worthless.

VPD-2, Suva, has been heard on 20-metre band calling Noumea.

Have been hearing a station just near **DZH,** Berlin (20.75m.) from 9 to 10 a.m., fair signal, mostly music; no English, lady speaking. (This is probably **Radio Malaga.** Malaga, Spain (20.78m.), who relay Salamanca from 8.45 a.m. to 10.30 a.m. Some mornings they also broadcast from 5 to 7 a.m.—Ed.).

YUE, Belgrade (25.57m.), poor in comparison with European stations; starts at 11a.m.

HP5A, Panama (25.64m.) and one very close closing at 2 p.m. (The second station is most likely **CB1170,** Santiago (25.64m.), which also closes at 2 p.m.—Ed.).

Daventry's new transmitter **GSN** (25.38m.) is a great success in Transmission 5, not as good as E, but stronger than D. (That is the rating in Randwick also.—Ed.).

I have been able to separate **PRA-8,** Pernambuco (49.92m.) from **DJC,** but of course **DXO** would kill it, but they have not been heard for a long time.

WDJM, Miami, Florida (49.65m.) was clear enough but weak.

HAT-5, Budapest (31.17m.) heard at 10 a.m., very weak, but badly heterodyned, not by **2RO-3,** Rome (31.15m.), as I could hear them also. (Most likely **CXA-6,** Montevideo (31.17m.) was the cause of the trouble. They are on the air from 6.30 a.m. to 12.30 p.m.—Ed.).

Dr. Gaden reports hearing a station on approximately 31.77m. at 3 p.m. Anticipating it was Ecuador, he was surprised to hear male announcer say "Republic of Peru." But call-sign, if given, was not detected.

DZA, Berlin (29.25m.), very good at 10 a.m., as also **PMN,** Bandoeng (29.24m.).

PSH, Rio de Janiero (29.35m.) could easily be heard, and **PLP,** Bandoeng (27.27m.) very good; this one was on the air at 5 p.m. on July 5.

The Cubans, **COHI** (46.50m.), **COCQ** (47.14m.) and **COCW** (47.4m.), all opening round about 8.45 p.m., are classed as good.

Radio Boy Landry, Saigon (48.27m.), poor.

MTCY, Hsinking (48.94m.), strong, as also **ZHJ,** Penang (49.23m.) and **XYZ,** Rangoon (49.94m.).

On Sunday, July 7, **CJRX,** Winnipeg (25.6m.) at 5 p.m., R8. Q5. (I heard this station also, and was amazed at the strength. A full report has been sent to James Richardson & Sons. **CJRX,** when closing at 5 p.m., said they would be back on the air again at 12.55 a.m., but I have not heard them at that hour.—Ed.).

PYA-2, Rio de Janiero (32.59m.), opens at 9.15 or 9.30 a.m.

Rome is experimenting on 16.84m. for a few days in the afternoons. Perfectly clear and easy to read. Sometimes they are on 19.61m. and 25.52m. Man announces in Japanese, and a woman in English. Reports are asked for. (I heard themon Sunday, July 21, round about 2.25 p.m. on 16.84, 19.61, 25.40 and 25.51m. In my notes I classed them in this order: 25.40, 16.84, 19.61 and 25.51 a very bad last.—Ed.).

SBP, Motala (25.63m.) closed at noon, with English announcements. Fairly good.

VPD-2, Suva (31.46m.) opened nicely at 3 p.m. on Sunday.

KKZ, Bolinas (21.90m.) closes strongly at 2.45 p.m. on Sundays.

Official Observer W. H. Pepin (Maylands, W.A.), in a lengthy report, says:—"There was a noted improvement about three weeks ago, but recently DX reception has fallen off again, although daylight is best at present. Best hours 4.45 a.m.-6 a.m. B.B.C., Berlin, Moscow, Rome on 31.41 and 49 metres.

6.30 a.m. to 6.30 p.m.: B.B.C., Moscow, U.S.A., Java, Japan, Philippines and Indian stations are very good. 8.30 p.m. to 1.30 a.m.: Stations on 25, 31, 41, 49, 58 and 62-metre bands are best received.

RKI, Moscow (19.95m.), directed to North America, is logged daily.

JZK, Tokyo (19.79m.) in English session between 5 and 6 p.m., is received well.

A German station, 20.7m., operates daily-good signal, speaks only German. (This is **DZH,** 20.75.—Ed.).

It was announced by **W4CYU** that all hams throughout U.S.A. and American possessions would continue to operate.

The Central Broadcasting Coy's transmitter (31.43m.), Manchukuo, speaking English, was heard on July 6. They signed off at 1.30 a.m.

GSW, German and Italian stations, on 41 metres, heard 6.45 to 8.46 a.m. Perth time.

Official Observer, Arthur T. Cushen (Invercargill, N.Z.) sends a fine lot of loggings from over the Tasman.

"Have heard **KZRC** and also on their broadcast band of 1200kc. Daylight reception has been great, and my best catches were on the 60-metre band, where the South Americans are coming through very well."

Mr. Cushen, quite justifiably, is proud that in 15 months he has reported 452 stations and 80 countries.

See special reference to TG-2 elsewhere.

His loggings and notes are:—

Australia and Oceania: VLW-3, VLQ-5 and **VPD-2,** all good.

Africa: CNP, Casablanca (34.13m.), good signals at 6.30 a.m. **Radio Maroc III.**—This station is the easiest African to log and puts in an excellent signal. Best before 6.30 a.m., before the "Rebel" station starts on 11.94mc.

VQ7LO, Kenya (6.083m.), now much weaker.

Central America: TIX, San Jose (51.46m.), good signal till 3 p.m., when it closes with "Good Night" melody.

The Guatemalans, **TGQA, TGWA** and **TGWB,** all excellent.

HP5A, Panama (25.6m.) is coming in excellently at R7, from 11 a.m. to 1 p.m. on Saturday, when they close with English announcements.

YSP, El Salvador (28.85m.), heard with fair signals regularly around 2.30 p.m.

North America: WLWO, Cincinnati (25.27m.), excellent signal in dance relays Sunday afternoons at 3 p.m. At 11 p.m. give an R8 signal in N.B.C. news reporters session, when their observers in Rome, Berlin and London give their views. On Saturday afternoon

(Continued on page 36)

TRADING BAN ON RADIO TRANSMITTING PARTS

It was announced in Canberra recently that trafficking in radio transmitting equipment has been forbidden. The regulation, which was issued on July 3, provides that no person may either acquire or dispose of such apparatus without the permission of the Postmaster-General. Large quantities of radio transmitting equipment are known to be in private hands in Australia. About 2,000 amateur transmitting stations were dismantled when war began, but the equipment is still in the hands of its owners.

Similar equipment is also easily obtainable. In 1914 all private owners of radio transmitting apparatus had to lodge it with the postal authorities for the duration of the war.

Reasons the equipment has not yet been taken over are:—

(1) Because of the much larger volume of equipment to be handled.

(2) The difficulty of enforcing distinctions between low-powered transmitting equipment and receiving equipment.

SHORT-WAVE BROADCASTING

Listed in Frequency Order

The stations listed below are those that are being heard here in Australia. The columns are listed as follows:—Call sign, megacycle, wavelength, location.

WRCA, 21.63, 13.85, Boundbrook.
WCBX, 21.57, 13.91, New York.
GST, 21.55, 13.92, London.
WPIT, 21.54, 13.92, Pittsburg.
GSJ, 21.53, 13.93, London.
WCAB, 21.52, 13.92, Philadelphia.
2RO-16, 21.51, 13.94, Rome.
WGEA, 21.5, 13.95, Schenectady.
PH13, 21.48, 13.96, Huizen.
GSH, 21.47, 13.97, London.
WRUL, 21.46, 13.98, Boston.
DJS, 21.45, 13.99, Berlin.
HS6PJ, 19.02, 15.72, Bangkok.
HBH, 18.45, 16.26, Geneva.
KHE, 17.97, 16.69, Hawaii.
——, 17.84, 16.81, Dublin.
DJH, 17.84, 16.81, Berlin.
JLS2, 17.84, 16.81, Tokyo.
WCBX, 17.83, 16.81, New York.
LRA-5, 17.83, 16.82, Buenos Aires.
HVJ, 17.84, 16.82, Vatican City.
2RO-8, 17.82, 16.83, Rome.
GSV, 17.81, 16.84, London.
OZI, 17.81, 16.84, Skamlebaek.
OIH, 17.80, 16.85, Lahti.
XGOX, 17.8, 16.85, Szechwan.
GSG, 17.79, 16.86, London.
2RO-20, 17.78, 16.87, Rome.
WNBI, 17.78, 16.87, Bound Brook.
PHI2, 17.77, 16.88, Huizen.
TPB-3, 17.76, 16.88, Paris.
DJE, 17.76, 16.89, Berlin.
FZE, 17.28, 17.38, Djibouti.
——, 15.65, 19.30, Tunis.
XOZ, 15.51, 19.34, Chengtu.
——, 15.50, 19.42, Pitcairn Is.
RW-96, 15.40, 19.47, Moscow.
HAS-3, 15.37, 19.52, Budapest.
LRA-4, 15.35, 19.54, Buenos Aires.
DJR, 15.34, 19.56, Berlin.
WGEA, 15.33, 19.57, Schenectady.
KGEI, 15.33, 19.57, 'Frisco.
OLR5B, 15.32, 19.58, Praha.
DXU, 15.32, 19.58, Berlin.
RADIO LUXEMBOURG, 15.32, 19.58, Luxembourg.
OZH, 15.32, 19.58, Copenhagen.
GSP, 15.31, 19.60, London.
CP-7, 15.30, 19.61, La Paz.
CXA-18, 15.30, 19.61, Montevideo.
KZRM, 15.30, 19.61, Manila.
YDB, 15.30, 19.61, Bandoeng.
HB-—, 15.30, 19.60, Berne.
XEBM, 15.30, 19.61, Mexico City.
2RO-6, 15.30, 19.61, Rome .
VUD-3, 15.29, 19.62, Delhi.
TPB-4, 15.29, 19.62, Paris.
LRU, 15.29, 19.62, Buenos Aires.
CR7BG, 15.28, 19.63, Mozambique.
DJQ, 15.28, 19.63, Berlin.
WLWO, 15.27, 19.64, Cincinnati.
HI3X, 15.27, 19.65, Trujillo.
WCAB, 15.27, 19.65, Philadelphia.
WCBX, 15.27, 19.65, New York.
GSI, 15.26, 19.66, London.
WRUL, 15.25, 19.67, Boston.
TPA-2, 15.24, 19.68, Paris.
CRFBD, 15.24, 19.68, Mozambique.
YUG/F, 15.24, 19.68, Belgrade.
2RO-7, 15.23, 19.70, Rome.
DXT, 15.23, 19.70, Berlin.
OLR5A, 15.23, 19.70, Praha.
PCJ-2, 15.22, 19.71, Huizen.
CSW-4, 15.21, 19.72, Lisbon.
WPIT, 15.21, 19.72, Pittsburg.
DJB, 15.20. 19.74, Berlin.
MTCY, 15.2, 19.73, Hsinking.
XGOX, 15.2, 19.75, Szechwan.
TAQ, 15.19, 19.75, Ankara.
KZRM, 15.19, 19.75, Manila.
OIE, 15.19, 19.75, Lahti.
RV-96, 15.18, 19.76, Moscow.
GSO, 15.18, 19.76, London.
TGWA, 15.17. 19.77, Guatemala.
CP-43, 15.16, 19.78, Bolivia.
RADIO LEO, 15.17, 19.78, Leopoldville.
LKV, 15.16, 19.78, Oslo.
JZK, 15.16, 19.79, Tokyo.
DXS, 15.16, 19.79, Berlin.
XEWW, 15.16, 19.79, Mexico.
SBT, 15.15, 19.80, Stockholm.
YDC, 15.15, 19.80, Bandoeng.
OAX4R, 15.15. 19.81, Lima.
GSF, 15.14, 19.82, London.
JLU-3, 15.13, 19.82, Tokyo.
TPB-6, 15.13, 19.83, Paris.
WRUW, 15.13, 19.83, Boston.
HVJ, 15.12, 19.84, Vatican City.
CSW-4, 15.12, 19.84, Lisbon.
DJL, 15.10, 19.85, Berlin.
2RO-12, 15.10, 19.87, Rome.
RKI, 15.08, 19.95, Moscow.
PSE, 14.94, 20.08, Rio de Janiero.
——, 14.72, 20.38. Moscow.
KQH, 14.92, 20.11, Kahuku.
JVH, 14.60, 20.55, Tokyo.
HBJ, 14.53, 20.65, Geneva.
DXH, 14.46, 20.75, Berlin.
MALAGA, 14.44, 20.78, Malaga.
HF6JEG, 14.18, 21.16, Canton Is.
YN3DG, 13.90, 21.58, Leon, Nicaragua.
SUZ, 13.82, 21.70, Cairo.
KKZ, 13.69, 21.90, Bolinas.
HIIN, 12.48, 24.03, Trujillo.
HCJB, 12.46, 24.08, Quito.
TFJ, 12.24, 24.52, Reykjavik, Iceland.
TPZ, 12.12, 24.75, Algiers.
——, 12.09, 24.81, Moscow.
FFZ, 12.05, 24.85, Shanghai.
RNE, 12.00, 25.00, Moscow.
H12X, 11.97, 25.08, Trujillo.
PIRATE, 11.95, 25.0, unknown.
——, 11.95, 25.10, unknown.
CB1180, 11.94, 25.12, Santiago.
KKQ, 11.95, 25.11, Bolinas.
MAROC, 11.94, 25.13, Rabat.
XGOZ/V, 11.91, 25.17, Szechwan.
CD1190, 11.91, 25.18, Valdivia.
HANOI, 11.90, 25.21, Hanoi.
——, 11.90, 25.21, Moscow.
CXA10, 11.89, 25.22, Montevideo.
2RO-13, 11.90, 25.23, Rome.
TPA-3, 11.88, 25.24, Paris.
VLR-3, 11.88, 25.25, Melbourne.
VLQ-7, 11.88, 25.25, Sydney.
VLQ-2, 11.87, 25.27, Sydney.
WPIT, 11.87, 25.27, Pittsburg.
WLWO, 11.87, 25.27, Cincinnati.
GSE, 11.86, 25.29, London.
DJP, 11.85, 25.31, Berlin.
CB1185, 11.85, 25.31, Santiago.
VLR-3, 11.85, 25.31, Melbourne.
PRFS, 11.85, 25.3, Rio de Janiero, Brazil.
XMHA, 11.85, 25.31, Shanghai.
HAD, 11.85, 25.32, Budapest.
OAX2A, 11.85, 25.32, Trujillo.
TPC-2, 11.84, 25.33, Paris.
OLR4A, 11.84, 25.34, Prague.
CSW-5, 11.84, 25.34, Lisbon.
VLW-3, 11.83, 25.36, Wanneroo.
VUQ-6, 11.83, 25.36, Sydney.
VUD-4, 11.83, 25.36, Delhi.
WCBX, 11.83, 25.36, New York.
XGOK, 11.83, 25.38, Canton.
GSN, 11.82, 25.38, London.
CXA-14, 11.84, 25.38, Colonia.
XEBR, 11.83, 25.38, Hermosilla.
2RO-4, 11.81, 25.40, Rome.
JZJ, 11.80, 25.42, Tokyo.
ZTE, 11.80, 25.42, Durban.
COGF, 11.80, 25.42, Matanzas.
DJZ, 11.80, 25.42, Berlin.
WRUL, 11.79, 25.45, Boston.
HP5G, 11.78, 25.47, Panama City.
SAIGON, 11.78, 25.47, Saigon.
OFE, 11.78, 25.47, Lahti.
DJD, 11.77, 25.49, Berlin.
MTCY, 11.77, 25.48, Hsinking.
TGWA, 11.76, 25.51, Guatemala.
CB-1174, 11.74, 25.51, Santiago.
2RO-15, 11.76, 25.51, Rome.
TG5JG, 11.75, 25.53, Guatemala.
GSD, 11.75, 25.53, London.
CR6RC, 11.74, 25.55, Loanda, Angola.
HVJ, 11.74, 25.55, Vatican City.
YUE, 11.73, 25.57, Belgrade.

STATIONS OF THE WORLD

LKQ, 11.73, 25.58, Buenos Aires.
LRA-3, 11.73, 25.58, Buenos Aires.
ZP14, 11.73, 25.59, Villarica.
WRUW, 11.73, 25.6, Boston.
CJRX, 11.72, 25.6, Winnipeg.
ZP14, 11.72, 25.6, Paraguay.
JVW-3, 11.71, 25.6, Tokyo.
TPA-4, 11.71, 25.6, Paris.
YSM, 11.71, 25.62, San Salvador.
SBP, 11.71, 25.63, Stockholm.
CB1170, 11.70, 25.64, Santiago.
CXA-19, 11.70, 25.63, Montevideo.
HP5A, 11.70, 25.64, Panama City.
ZP-7, 11.70, 25.63, Paraguay.
IQY, 11.67, 25.70, Rome.
XGOK, 11.65, 25.75, Canton.
RW96, 11.64, 25.77, Moscow.
COK, 11.57, 25.93, Havana.
SPD, 11.53, 26.01, Warsaw.
CXA-7, 11.48, 26.13, Montevideo.
TG5JG, 11.44, 26.22, Guatemala.
HBO, 11.40, 26.31, Geneva.
CSW-5, 11.04, 27.17, Lisbon.
PLP, 11.00, 27.27, Bandoeng.
CR6RY, 10.86, 27.60, Benguela, Angola.
JIB, 10.53, 28.48, Taiwan.
DZD, 10.53, 28.5, Berlin.
YBG, 10.42, 28.77, Sumatra.
YSP, 10.40, 28.85, San Salvador.
EAJ43, 10.36, 28.93, Canary Is.
LSX, 10.35, 28.99, Buenos Aires.
ORK, 10.33, 29.04, Brussels.
SOFIA, 10.31, 29.09, Sofia.
PMN, 10.26, 29.24, Bandoeng.
DZC, 10.29, 29.25, Berlin.
PSH, 10.22, 29.35, Rio de Janiero.
ANTI-NAZI, 10.10, 29.8, Location unknown.
SUV, 10.055, 29.85, Cairo.
DZB, 10.04, 29.86, Berlin.
JDY, 9.91, 30.23, Manchuria.
RADIO TANANARIVE, 9.87, 30.24. Madagascar.
EAQ, 9.86, 30.43, Madrid.
COCM, 9.83, 30.51, Havana.
HJAG, 9.81, 30.58, Barranquilla.
HNF, 9.77, 30.69, Baghdad, Iraq.
ZRO, 9.75, 30.75, Durban.
HJFH, 9.75, 30.77, Armenia.
CB970, 9.73, 30.83, Valparaiso.
CSW-7, 9.74, 30.80, Lisbon.
HJFK, 9.73, 30.83, Pereira.
CR7BE, 9.71, 30.9, Lourenco Marques.
HJCF, 9.71, 30.9, Bogota.
ZHP, 9.70, 30.94, Singapore.
JIE-2, 9.69, 30.95, Formosa.
LRA, 9.69, 30.96, Buenos Aires.
GRX, 9.69, 30.96, London.
TI-4NRH, 9.692, 30.96, Heredia.
TGWA, 9.68, 30.98, Guatemala.
RW-96, 9.68, 30.98, Moscow.
EQC, 9.68, 30.99, Persia.
XEQQ, 9.68, 30.99, Mexico.
VLQ-5, 9.68, 30.99, Sydney.
TPC28, 9.68, 30.99, Paris.
DJX, 9.67, 31.01, Berlin.
WRCA, 9.67, 31.02, New York.
KGEI, 9.67, 31.02, 'Frisco.
2RO-9, 9.67, 31.02, Rome.
VLW-4, 9.665, 31.04, Wanneroo.
LRX, 9.66, 31.06, Buenos Aires.
CS2WA, 9.65, 31.09, Lisbon.
WCBX, 9.65, 31.09, New York.
DJW, 9.65, 31.09, Berlin.
VLW-2, 9.65, 31.09, Wanneroo.
12AA, 9.65, 31.09, Addis Ababa.
XGOY, 9.645, 31.10, Szechwan.
LLH, 9.64, 31.11, Oslo.
KZRH, 9.64, 31.12, Manila.
CXA-8, 9.64, 31.12, Uruguay.
HAT-5, 9.62, 31.17, Budapest.
JFO, 9.63, 31.13, Formosa.
HJCT, 9.63, 31.15, Bogota.
2RO-3, 9.63, 31.15, Rome.
CXA-8, 9.625, 31.17, Montevideo.
HAT-5, 9.62, 31.17, Budapest.
TIPG, 9.60, 31.19, San Jose.
VLQ, 9.61, 31.2, Sydney.
DXB, 9.61, 31.22, Berlin.
LLG, 9.61, 31.22, Oslo.
HP5J, 9.61, 31.22, Panama.
ZRL, 9.60, 31.23, Capetown.
CB970, 9.60, 31.25, Santiago.
RADIO ST. DENIS, 9.60, 31.25, Reunion Is.
RAN, 9.60, 31.25, Moscow.
WCAB, 9.59, 31.28, Philadelphia.
WLWO, 9.59, 31.28, Cincinatti.
VUD-2, 9.59, 31.28, Delhi.
PCJ, 9.59, 31.28, Huizen.
VLR, 9.58, 31.32, Melbourne.
GSC, 9.58, 31.32, London.
WBOS, 9.57, 31.35, Boston.
KZRM, 9.57, 31.35, Manila.
HJAB, 9.57, 31.35, Barranquilla.
OAX4T, 9.56, 31.38, Lima, Peru.
VLW, 9.56, 31.38, Wanneroo.
DJA, 9.56, 31.38, Berlin.
WGEA, 9.55, 31.41, Schenectady.
YDB, 9.55, 31.41, Bandoeng.
DJN, 9.54, 31.45, Berlin.
SBU, 9.53, 31.46, Motala.
HEC, 9.535, 31.46, Switzerland.
JZI, 9.53, 31.46, Tokyo.
VPD-2, 9.53, 31.46, Suva.
KGEI, 9.53, 31.48, San Francisco.
WGEO, 9.53, 31.48, Schenectady.
ZBW-3, 9.52, 31.49, Hong Kong.
TPB, 9.52, 31.51, Paris.
RV-96, 9.51, 31.50, Moscow.
GSB, 9.51, 31.55, London.
YUC, 9.50, 31.56, Belgrade.
OFD, 9.50, 31.58, Lahti.
XGOY, 9.50, 31.58, Szechwan.
XEWW, 9.50, 31.58, Mexico.
KZIB, 9.49, 31.60, Manila.
SAIGON, ——, 31.62, Saigon.
TAP, 9.46, 31.70, Ankara.
HCODA, 9.445, 31.77, Quayaquil.
COCH, 9.44, 31.78, Havana.
OAX5C, 9.40, 31.91, Ica, Peru.
COBC, 9.36, 32.04, Havana.
HCETC, 9.35, 32.05, Ecquador.
OAX4J, 9.34, 32.12, Lima, Peru.
HI2G, 9.29, 32.28, Dominica.
XTC, 9.295, 32.28, Shanghai.
BUCHARESTI, 9.23, 32.48, Bucharest.
COCY, 9.22, 32.52, Havana.
PYA-2, 9.205, 32.59, Rio de Janiero.
ZMBF, 9.20, 32.61, Sunday Is.
COCX, 9.20, 32.61, Havana.
HC2ET, 9.19, 32.63, Guayaquil.
HC2CW, 9.13, 32.86, Guayaquil.
HAT-4, 9.12, 32.88, Budapest.
COBZ, 9.03, 33.22, Havana.
TPZ-2, 8.96, 33.48, Algiers.
COCQ, 8.85, 33.90, Havana.
CNP, 8.79, 34.13, Casablanca.
COCO, 8.70, 34.48, Havana.
COJK, 8.66, 34.64, Havana.
KVZC, 8.10, 37.03, Canton Is.
ANTI-NAZI, 8.47, 35.4, unknown.
——, 8.70, 37.17, Moscow.
YSD, 7.894, 37.99, San Salvador.
HSP6, 8.00, 37.65, Bangkok.
SUX, 7.865, 38.15, Cairo.
ZAA, 7.84, 38.22, Tirana.
CR6AA, 7.61, 39.39, Lobita, Angola.
——, 7.52, 39.89, Moscow.
FG8AH, 7.44, 40.32, Guadeloupe.
——, 7.36, 40.76, Moscow.
German Secret Station, 7.35, 40.80, unknown.
CR6RC, 7.31, 41.01, Loanda, Angola.
JIE, 7.29, 41.13, Tyureki.
DJI, 7.29, 41.15, Berlin.
TPB-11, 7.28, 41.21, Paris.
PACIFIC, ——, 41.25, New Caledonia.
VQ2CM, 7.26, 41.32, Luanshya, N. Rhodesia.
OZU, 7.26, 41.32, Skimlebaek.
JVW, 7.25, 41.34, Tokyo.
YDA, 7.25, 41.38, Tandjongpriok.
DXJ, 7.24, 41.44, Berlin.
GSW, 7.23, 41.49, London.
12RO-11, 7.22, 41.55, Rome.
YDX, 7.22, 41.55, Medan, Sumatra.
EAJ-9, 7.22, 41.55, Malaga.
CR6AA, 7.17, 41.75, Lobita, Angola.
——, 7.12, 42.1, Malaga.
FO8AA, 7.10, 42.25, Papeete.
RADIO VOLONTE, 7.10, 42.25, Saigon.
HNF, 7.08, 42.37, Baghdad, Iraq.
XPSA, 6.98, 42.98, Kweiyang.
XOJD, 6.85, 43.8, Hankow.
SUR, 6.78, 44.24, Cairo.
PMH, 6.72, 44.64, Bandoeng.
TIEP, 6.69, 44.81, San Jose.
HBQ, 6.67, 44.94, Geneva.
ANTI-NAZI, 6.49, 46.20, unknown.

(Continued on page 36)

SHORT - WAVE STATIONS

(continued)

TGWB, 6.46, 46.45, Guatemala.
COHI, 6.45, 46.50, Santa Clara.
TGQA, 6.40, 46.88, Quezaltenango.
COX7, 6.39, 46.95, Havana.
ZIZ, 6.38, 47.02, St. Kitts, B.W.I.
COCQ, 6.36, 47.14: Havana.
OAXIA, 6.33, 47.36, Ica, Peru.
COCW, 6.32, 47.4, Havana.
RADIO BOY LANDRY, 6.21, 48.27, Saigon.
HVJ, 6.19, 48.47, Vatican City.
OAX4G, 6.19, 48.47, Lima, Peru.
TG-2, 6.19, 48.47, Guatemala.
XEXA, 6.17, 48.58, Mexico.
CXA-21, 6.17, 48.62, Montevideo.
RADIO SUISSE, 6.17, 48.62, Schwarzenburg.
WCBX, 6.17, 48.62, Wayne, N.J.
TILS, 6.16, 48.66, San Jose.
DXQ, 6.17, 48.64, Berlin.
CSL, 6.15, 48.72, Lisbon.
CJRO, 6.15, 48.78, Winnipeg.
EQB, 6.15, 48.74, Teheran.
WPIT, 6.14, 48.86, Pittsburg.
KZRF, 6.14, 48.86, Manila.
RADIO SAIGON, 6.19, 48.87, Saigon.
CR7AA, 6.13, 48.88, Lourenco Marques.
VLW, 6.13, 48.92, Wanneroo.
CHNX, 6.13, 48.94, Halifax, Nova Scotia.
VP3BG, 6.13, 48.94, Georgetown, B. Guiana.
MTCY, 6.13, 48.98, Hsinking.
CXA4, 6.12, 48.98, Montevideo.
FK8AA, 6.12, 49.00, Noumea.
WCBX, 6.12, 49.02, New York.
RADIO SAIGON, 6.11, 49.05, Saigon.
XOJD, 6.10, 49.14, Hankow.
GSL, 6.11, 49.10, London.
YUB, 6.10, 49.18, Belgrade.
KZRC, 6.10, 49.18, Manila.
WNBI, 6.10, 49.18, New York.
ZHJ, 6.09, 49.23, Penang.
ZRK, 6.09, 49.23, Klipheuval.
ZNS, 6.09, 49.25, Nassau, Bahamas.
CRCX, 6.09, 49.26, Toronto.
VQ7LO, 6.08, 49.33, Kenya, Nairobi.
CFKX, 6.08, 49.34, Vancouver.
CRY-9, 6.08, 49.34, Macao, Portuguese China.
OAX4Z, 6.08, 49.34, Lima, Peru.
ZAA, 6.08, 49.3, Tirana.
CFRX, 6.09, 49.42, Toronto.
VE9CS, 6.07, 49.42, Vancouver.
SBO, 6.06, 49.46, Stockholm.
WLWO, 6.06, 49.5, Cincinnati.
RADIO TANANARIVE, 6.06, 49.5, Madagascar.
GSA, 6.05, 49.59, London.
YDD, 6.04, 49.63, Bandoeng.
WRUL/W, 6.04, 49.65, Boston.
WDJM, 6.04, 49.65, Miami, Florida.
KZIB, 6.04, 49.67, Manila.
RW-96, 6.03, 49.75, Moscow.
XEKW, 6.03, 49.75, Morelia, Mexico.
DJC, 6.02, 49.83, Berlin.
HJCX, 6.01, 49.85, Bogota.
CJCX, 6.01, 49.92, Sydney, Nova Scotia.
PRA-8, 6.01, 49.92, Pernambuco.
DXO, 6.01, 49.92, Berlin.
ZRH, 6.01, 49.94, Pretoria.
XYZ, 6.01, 49.94, Rangoon.
XEBT, 6.00, 49.96, Mexico.
HP5K, 6.00, 49.97, Colon, Panama.
RW-96, 6.00, 50.00, Moscow.
XEBT, 6.00, 50.0, Mexico.
VONG, 5.97, 5.25, St. Johns.
——, 5.93, 50.59, Pitcairn Is.
REBEL, 5.92, 50.63, unknown.
ZNB, 5.90, 50.95, Mafeking.
HRN, 5.87, 51.11, Tegucigalpa, Honduras.
TIX, 5.83, 51.46, San Jose.
PMY, 5.14, 58.3, Bandoeng.
YV5RM, 5.01, 59.88, Caracas.
YV3RX, 4.99, 60.12, Barquisimeto.
YV1RJ, 4.97, 60.31, Caracas.
YDF, 4.96, 60.48, Soerabaya.
HJCW, 4.94, 60.73, Bogota.
VUD-8, 4.92, 60.98, Delhi.
YDA, 4.90, 61.22, Java.
VUB-2, 4.88, 61.48, Bombay.
VUC-2, 4.84, 61.98, Calcutta.
YV5RH, 4.83, 62.05, Caracas.
YDE, 4.81, 62.37, Bandoeng.
RW15, 4.25, 70.59, Khabarovsk.
YDA, 3.04, 98.68, Batavia.

LOGGINGS *(continued)*

on 31.28m., **WLWO** gives a excellent signal at 2.30 p.m. All other regular North Americans are classed as good.

South America: OAX4R, Lima (18.81m.) heard on Sunday morning from 7 a.m. to 7.45 a.m., with special English session. Station suffers from interference from **GSF** and **JZK.**

YV5RM, Caracas (59.88m.), heard closing at R4 at 1.30 p.m. with March.

YV3RX, Barquismeto (60.12m.), excellent signals at 3 p.m. when closing with "Beer Barrel Polka."

The East: FFZ, Shanghai (24.80m.), heard excellently at 9.30 p.m.

MTCY, Hsinking (25.48m.), splendid signals when opening at 7 a.m.

All Manila stations are good, with exception of **KZIB** (49.67m.), which suffers from interference.

General: EQC, Teheran, Iran (30.99m.), heard well at 1 a.m.

YUA, Belgrade (49.18m.), good in English at 7.25a.m.

YUC, Belgrade (31.56m.), suffers from interference.

YUG, Belgrade (19.68m.), excellent at noon.

Radio Martinique, Martinique (30.92m.), heard weakly at noon on Sundays.

Mr. Cushen goes on to say he heard **LKQ,** Oslo (25.57m.) on a special transmission, calling America at 7.25 a.m. He also heard **CJRX,** Winnipeg (25.6m.), R8, QSA 5.

YV5RH, Caracas (62.05m.), heard closing, R7, at 2 p.m. with "Good Night" melody.

At last I have logged **FO8AA,** Papeete (42.05m.), says Mr. Cushen. It suffered from "ham" interference. Station is on Wednesday and Saturday from 2 to 3 p.m.

Radio Pacifique (41.25m.), logged at R6 at 6.30, but is only on the air for about six minutes and leaves very suddenly.

Official Observer E. Neill (North Ipswich, Q'ld) writes explaining that absence from home has prevented him from forwarding reports, but a big log is contemplated.

Mr. Neill has a 60-foot ladder mast and is desirous of setting a rotary beam on top. Can any of our readers oblige with ideas? He can walk up the middle of the mast, so it certainly offers facilities.

We are sending on what literature we have available, but doubtless many of our readers have first-hand knowledge of just what should be done. Glad to hear from you again, Mr. Neill; let's have that list for next issue.

Official Observer, Wm. Bantow (Edithvale, Vic.), writes:—

I heard a Cuban on July 4 on approximately 25.70m. at 9.30 p.m. The call sounded like **COCQ-COCH,** but was interfered with by local QRM. (I don't know of any Cuban there, but they have such a habit of jumping about anything is possible.—Ed.).

WLWO, Cincinnati (25.27m.), fair at 3.30 p.m., strong at 5.30.

KKZ, Bolinas, California (21.91m.), fair at closing 2.45 p.m. Sunday.

VLW-2, Wanneroo (31.08m.), strong at 10.30 p.m.

All Manila stations strong, as also Hongkong and Singapore.

VUD-2, Delhi (31.28m.), strong at 10.30 p.m. and **ZHJ,** Penang (49.2m.), fairly strong at 10.15 p.m.

Radio Saigon, Saigon (25.47m.), **JZK,** Tokyo (19.79m.), **JZJ** (25.42m.) and **JVW-3,** Tokyo (25.6m.), all strong.

FFZ, Shanghai (24.8m.), strong at 10.30 p.m., but badly interfered with by QRM.

XPSA, Kweiyang (42.8m.), only weak.

The Dutch E.I. are good, with **PMH,** Bandoeng (44.64m.) most consistent.

Mr. A. Dudley Hall (AW553DX), South Yarra, Vic., writes that he has completed a three-valve converter, which, coupled to his 5-valve broadcast set, is giving wonderful results.

So far he has been sticking to the amateur band, but has found difficulty in getting the addresses, because of the fact that the operator gives the address more as an after-

TELEVISION IN JAPAN

Television research in Japan is being carried out at a number of institutes and laboratories, including the technical research laboratory of the Broadcasting Corporation of Japan; the Electric Laboratory of the Communications Ministry; the Higher Technical School, of Hamamatsu; the Tokyo Radio and Electric Co. Ltd., etc. Experimental broadcasts of television were made recently for the benefit of the general public in Japan.

The Technical Research Laboratory of the Broadcasting Corporation of Japan (devoted to study of the theory and application of radio-telephone), established in 1937 an experimental television station (J2PG), made a test transmission for the first time last year in May, succeeding in transmitting photographs to the Tokyo Broadcasting House, 14 kilometres distant from the laboratory.

Ever since then intensive study and improvements have been sought, with several test transmissions made public to popularise television. And after a considerable experimental period, television has been put on the streets at last.

Regular television broadcasts are to be put out shortly.

thought than any desire for the world to hear it. (Many thanks for your kind remarks regarding A.R.W. Let us have some of your loggings, and if you can provide the call-sign, we will endeavour to give you the address.—Ed.).

Official Observer D. J. Hastings (Ashgrove, Brisbane), writes:—

"I have given up listening on the 20-metre amateur band for the time being, as there are very few about now. I found it a bit strange at first in identifying a lot of the high-powered broadcast stations, and I didn't think there were so many stations on the air until I came to write out the list."

Mr. Hastings provides a very long list I wish it were possible to print in full. Here are some of the observations:—

VPD-2, Suva (31.46m.), testing from 3 p.m. to 3.40 p.m. on Friday, July 5, relayed B.B.C. news in French at 3.15 p.m. Very strong signal, and give a fine signal also from 7 to 8 p.m.

FK8AA, Noumea (49m.), good between 5.30 and 6.30 p.m.

CR7BE, Mozambique (30.9m.), only fair in Queensland at 6 a.m.

TIPG, Costa Rica (31.19m.), fair signal at 10.30 p.m.

TG-2, Guatemala (48.47m.), quite good on Sunday afternoons.

KGEI, San Francisco (19.56m.), good till closing at 2.15 p.m. Also good on Saturdays when giving news at 4 p.m. (Actually on each alternate Saturday, **WGEA** "talks" to Admiral Byrd's expedition, and we hear it through **KGEI.** The 4 p.m. news from Hollywood can be heard daily from **KGEI** on their new frequency of 9760kc.. 31.02m.—Ed.).

WPIT, Pittsburg (25.27m.), heard well till 8 a.m.; **WLWO,** Cincinnati (26.27m.), very loud on Sunday afternoons from 2.30 p.m., with news at 3. On 31.28m. **WLWO** are heard on Saturday mornings with a terrific signal. **WLWO,** on 49.50m., are good till closing at 5 p.m., sometimes 5.30.

Mr. Hastings was another who heard **CJRX,** Winnipeg (25.6) and credits them with an R8-9 signal.

RW96, Moscow (19.76m.). good at 4 p.m., gives news at 4.35.

YUB, Belgrade (19.68m.), fair at 11 a.m.

COHI, Santa Clara, Cuba (46.50m.), strong at 9 p.m.

SPEEDY VERIFICATIONS

Buck Harris, of KGEI, in his Letter-bag session on Sunday, July 14, at 3.25 p.m., put over a call to me and thanked me for my report of June 17, at the same time making reference to my visit to San Francisco in 1926.—L.J.K.

Official Observer, Wm. Chapman (Kensington, Sydney), writes:—

Heard Bangkok on 25 metres at 10.55 p.m. one night, but missed call-sign given by the woman announcer. (Unfortunately Mr. Chapman does not give the date, and as he is away on vacation I cannot question him, but I remember someone, I think it was Mr. Ray Simpson, telling me he had heard Bangkok one night on 25 metres.—Ed.). Mr. Chapman also says he heard one of the Manila stations on 25 metres, but missed the call-sign.

Herewith detailed list of stations at my location. Conditions have been very varied of late, sometimes good, sometimes awful.

13 and 16 metres not of much value, a.m. or p.m.

19 metres: London, good morning and afternoon; **KGEI,** fair after mid-day; **WGEA,** fair morning only; **WRUL,** fair around noon, sometimes good; **WLWO,** good in afternoon.

24 metres: **FFZ,** still fair signal at night; **HCJB,** still fair signal at 10.30 p.m..

25 metres: London, okay, morning and afternoon; **Radio Maroc** and **MTCY,** good in a.m.

27 metres: **CSW-5,** getting weak in morning now.

30 metres: **HJFK,** very good some nights; **XEQQ,** good in afternoon when conditions O.K. **IRF,** very strong in morning. **CR7BE,** good in a.m.

31 metres: **TIPG,** fair at night, also **HP5J. VUD-2,** strong p.m.; **TAP,** good in a.m.

49 metres: **VQ7LO,** fair in morning.

Mr. Sam I. Nelson (AW577DX), Cairns, Qld., sends a surprisingly good list of loggings, all the more remarkable when it is noted they were picked up on a 5-valve mantel model of a well-known brand. But if the neatness and care shown in the compilation of the report is indicative of the patience displayed in "logging" the great number of stations submitted, then it is understandable. My greatest regret is that space prevents the list being published in its entirety. Inter-alia, Mr. Nelson says:—"My latest logging is a new Colombian, **HJCT,** located in Bogota. On 31.15m. they close at 2.30 p.m. on Saturdays and Sundays, with English announcements. Signature tune is "Ave Maria." Signal strength only about R4. Most of the Cubans are putting in very fine signals here at night, the loudest of these being **COCQ,** Havana (33.98m.), which puts in an R8 signal on Sunday afternoon till closing at 4.45 p.m. and also at nights sometimes as early as 8.30 p.m. At 10 p.m. until 10.15 every night they broadcast a religious service in Spanish and English, which is directed by Arthur W. Payne. The other outlet on 47.06m., while not as loud, is heard at 8 p.m.

COHI, Havana (46.48m.) now opens nightly at 8.45 p.m. with an English announcement. "This is the Havana, Cuba, Blue Ribbon Radio Network, with studios in Havana. We hope you will enjoy our programme." Signal strength is R8.

COCX, Havana (32.61m.) is the next best Cuban which opens at 10 p.m. It is easily identified by the announcement, "Radio Westinghouse," which is given with station details every fifteen minutes.

Have not heard **OAX47,** Peru (31.38m.) for a week, but when opening at 10.30 p.m. or 11 o'clock signal is good.

FFZ, Shanghai (24.85m.), good when not interfered with by morse; best on Sunday nights.

XTC, Shanghai (32.28m.), fair at night from 11 o'clock.

YUF, Belgrade (19.68m.), good signal from 11 a.m. till noon, and **YUG,** same location and wavelength, is good from noon till 1 p.m.

The usual Americans are being heard well in the afternoons, while India and the West Indies, also Central America, are classed as good to very good in the evenings. The East, as also Europe, has been well covered and reported.

Mr. Arthur T. Cushen, of Invercargill. N.Z., advises amongst verifications received this month is one from **TG-2,** Guatemala (48.50). They state they have been conducting a competition and owing to the excellent report, his has been kept for inclusion in the finals. (Good luck, Arthur; hope you get a prize.—Ed.).

20-METRE 'PHONE

Reported by Dr. Gaden:—

KG6MV, Jarvis Is.

XUY, Chungking, calling Manila at 10 a.m. on July 6. R9, Q5. Gave frequency as 14,140kc.

K4BNT was heard at 9.25 p.m. on July 1 and not one other "ham" could be heard. He was talking to Nevada.

K7ESW, very strong and clear at 10 p.m. on July 8, talking to **W9ROK;** the latter was heard replying.

Reported by Mr. Chapman:—

J2NF, Y5IMS, XE2AH, K6SPS, K6MV, KF6FG, KC4USA, KC6OKS, and quite a number of **W7's, W6's, W9's** and **W4's.**

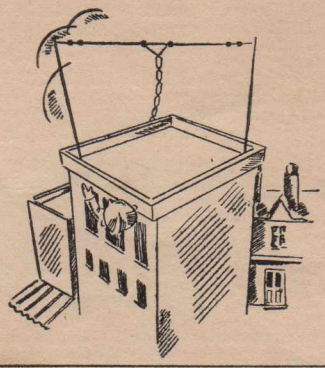
CALSTAN *(continued)*

tetrode; and one 5Y3G, rectifier. This combination feeds a Magnavox type 182, twelve-inch diameter, 2,000 ohms field, loudspeaker.

The chassis assembly of this receiver is particularly clean and shows ample evidence of careful design. Pick-up terminals are fitted and adequate A.F. gain is available for gramophone reproduction. Design features are found in the use of negative feed-back and a comprehensive power supply filter and decoupling system.

Taken all round, the Calstan 46 is a thoroughly sound engineering job throughout. As well, is is very competitively priced, and should prove a fast-selling favourite among dealers.

AERIALS for BETTER RECEPTION



The use of scientifically designed aerials to reduce man-made static is explained in this article.

By ANTENNA

How effective is your aerial? Have you ever stopped to think what difference a really good aerial would make to your set?

Quite a number of people have the idea that the modern set will function equally as well with or without an aerial. To a certain extent this is correct; the radio sets of to-day will receive a number of stations with little or no aerial. But, under these conditions, reception is often ruined.

This is mainly due to local interference, such as noise from power lines, trams and buses, etc. This interference extends in a belt above the ground for approx. 25ft., so bear this in mind when erecting that new aerial.

Noise Pick-up

It is quite a simple matter to realise that an aerial within this belt will be just as sensitive to the interference as to the radio waves. So your first job will be to put the aerial up as high as possible. Now, suppose the mast is 35ft. high, that will seem all right, but we must not overlook the fact that the lead-in still passes through this interference belt. This means the noise pick-up is as great as ever.

High Aerial.

It now becomes obvious that if the high, noise-free flat top could be coupled to the receiver by a lead-in of such a type that all pick-up by it is eliminated, man-made interference would be greatly reduced, if not cured altogether.

The easiest way to do this would be to shield the lead-in and earth the shield. Unfortunately, this is not very satisfactory, because of signal loss due to leakage of radio frequency currents to earth via the small capacity that exists between the outer metal sheath and the lead-in wire within it.

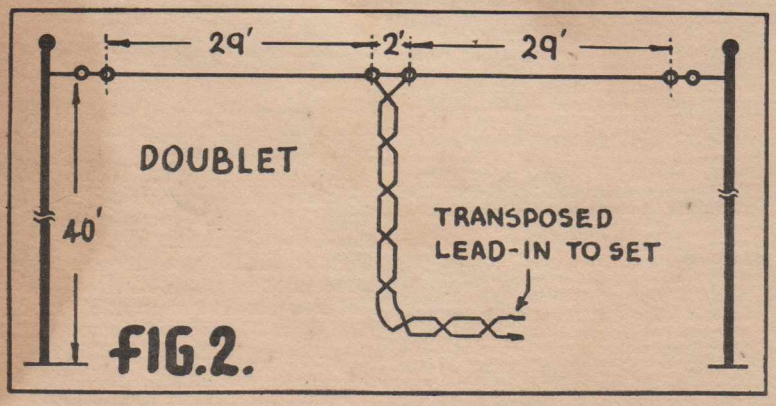


FIG.2.

Transposed Lead-in

This problem can be solved by the use of a transposed lead-in. (See Fig. 1). The two leads are transposed or crossed over every 12 or 18 inches by means of transposition blocks. Because of this transposition, any voltages induced by electrical disturbances in the two wires as they pass down through the interference field are balanced out, since the voltages in each wire of the pair are equal and opposite.

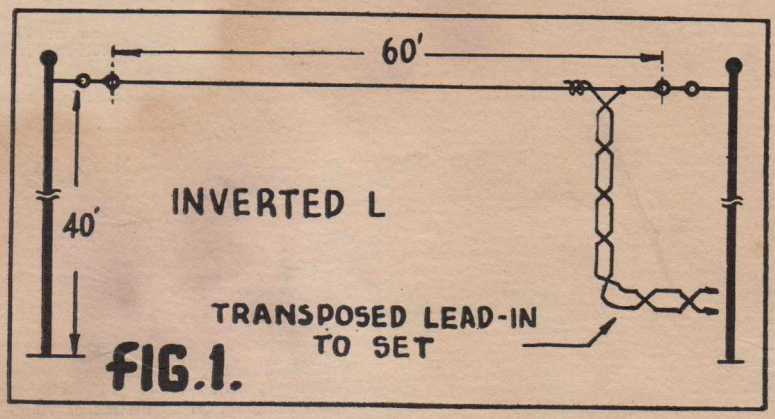


FIG.1.

Result

This leaves the signal free to pass through the "noise" area to the set.

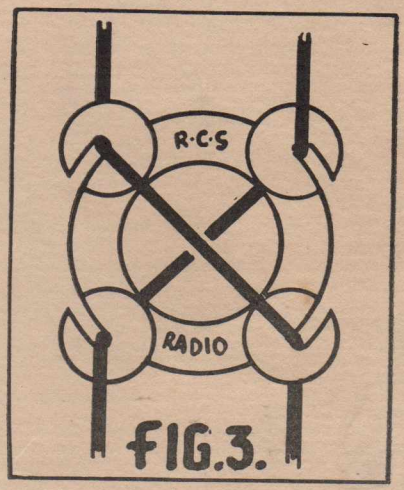


FIG.3.

Diagram above shows the exact size of the new R.C.S. trolitul transposition blocks.

To make it easier to understand, we might say that one of the transposed lead-in wires feeds signal plus noise to one end of the primary coil of the set, whilst the other lead feeds

only noise to the other end. The two noise components cancel out, leaving only clear signal to be fed to the grid of the first valve of the set.

The doublet aerial shown in Fig. 2 employs a centre-feed transposed lead-in; and in very "noisy" areas would be superior to that shown in Fig. 1.

Several Varieties

There are several varieties of doublets in use at the present time, but they all have one thing in common. This is a flat top erected above the interference area and a transposed lead-in.

Low Loss Material

When buying transposition blocks make sure they are made of some good low loss material such as trolitul.

The diagram in Fig. 3 shows how these blocks are arranged in the lead-in.

Both of these systems use a coupling transformer to the receiver to match the impedance of the aerial to that of the set.

Location

The question of location is just as important as the aerial itself. Choose a position well away from roofs, particularly if the roof is made of iron.

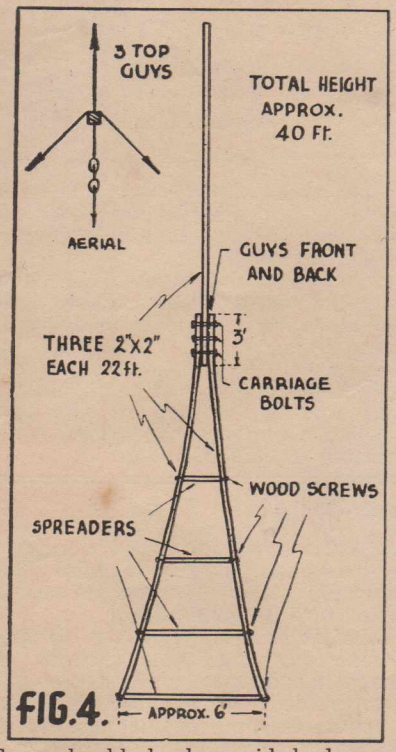


FIG.4.

Trees should also be avoided wherever possible.

Another point to remember is to keep the lead-in well away from electric power lines, etc.

(Continued on page 43)

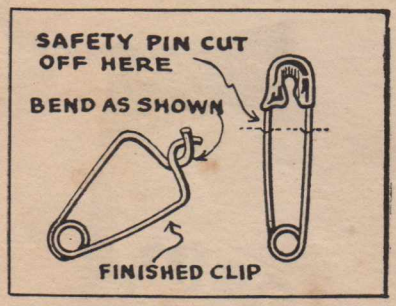
HINTS and TIPS

by Nicholas G. Walters

HANDY CONNECTOR CLIPS

While it is possible for the experimenter to find himself short of alligator or similar small clips, his wife can usually supply him with a safety pin or two.

The snap head of the pin is first removed, as indicated in sketch, and

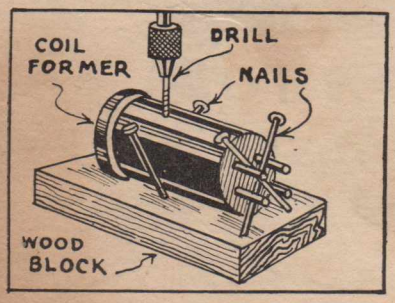


the ends bent to the shape illustrated. At first glance one might not appreciate the effectiveness of such a clip, but it is surprising how well it works.

★

SHORT-WAVE COIL HOLDER

We all know how short-wave coil formers are inclined to roll all over



the place when being drilled to receive the wire. A handy little cradle can be simply made which will hold the former rigid during the drilling process.

Four nails are driven into a wooden block to form a cradle as illustrated. Two of the nails engage the legs of the coil former, whilst the other two prevent the top of the former from sliding around.

★

MINIATURE INSTRUMENT KNOBS

Very handy knobs can be made, for the various radio instruments around your shack, from the cap off a tube of toothpaste. Take a $\frac{3}{16}$" bolt and place the head of it inside the threaded interior of the cap.

Cut off the threaded portion of the old toothpaste tube and pass this over the stove bolt and screw it into the threads of the cap to act as a bushing to hold the bolt in place, as shown in the sketch.

Then take a penknife and force it between the bolt and the bushing, spreading the bushing to make a tight fit. This knob is both neat and compact and will be found most useful.

★

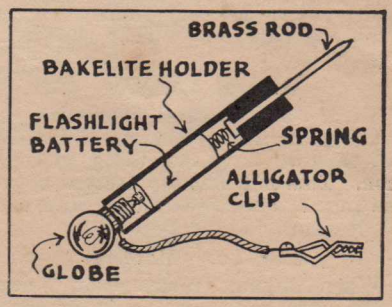
USEFUL TEST PROD

This little gadget will find a welcome home on the experimenter's test bench. It is ideal for making earthing or short tests on all kinds of apparatus.

The constructional details are clearly given in the illustration. A suitable bakelite tube of the correct internal diameter to take a pencil type flashlight battery is obtained. The globe is fitted to one end, making sure it contacts the top of the battery. An alligator clip is fitted to a length of flex wire, the other side of which is soldered to the other side of the globe socket.

A plug is then fitted to the other end of the bakelite tube, having a hole drilled in it to accommodate the brass test prod. A brass spring takes care of making contact between the battery and test prod.

In use clip the alligator clip on to

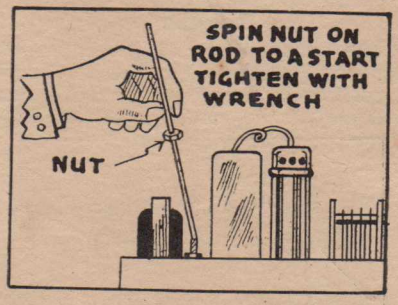


the earth terminal and every time an earthed portion of the apparatus is touched the globe will light.

★

A NUT STARTER

A number of ideas have been suggested for starting the nut that must



be placed in some awkward cramped position, but this idea we feel sure will prove an easy solution for some of our readers.

First procure a length of 14 gauge wire and slide the nut on same. Hold the nut with the index finger while placing the end of wire on end of bolt on which the nut is to be started. Retain an upright position of the wire while you spin the nut around with a small shanked screw-driver. The drawing explains the idea.

Nifty Door-Stop

A spate of inventions for fastening doors has appeared during the past twelve months or more. Strictly speaking, another that has made its advent does not "fasten" the door, which can be pushed or pulled open; but it holds it closed against strong draughts through the house, and entirely prevents rattle. This so-called door-fastener is magnetic.

What represents the lock is a permanent magnet. Made of a metal alloy that has become popular for the permanent magnets of loud-speakers, cycle dynamos and other small magnetic devices, this magnet is of the horseshoe type. A soft iron keeper between the poles eliminates flux leakage and enables permanent attraction to be guaranteed.

Similar to a small lock in form, a non-ferrous metal case encloses the magnet and keeper. It is recessed into the door-stop and fixed with two screws. A plate of magnetic metal on the door comes in contact with the "lock" when the door is shut, this plate also being fixed by two screws. As it is on the face of the door instead of on the edge, shrinkage has no effect on the magnetic fastener.

TRADE PARADE

(continued)

"Radio World" readers from any Philips office, or direct from Philips Lamps (A'sia) Pty. Ltd., 69-73 Clarence St., Sydney.

In Latest Philips Technical Communications

Of particular interest to amplifier enthusiasts is an article entitled "The Reproduction of High and Low Notes in L.F. Resistance-Coupled Stages"—featured in Philips Technical Communication No. 72 (March, 1940). Data is also included on the Philips Australian-made EBF2 duo-diode pentode.

In T.C. No. 73 (April, 1940) are given full technical details, including circuit, of the Philips universal bridge for measuring resistance, capacity and impedance, while additional information is also supplied on the EBF2.

"Inverse Feedback" is the feature article in T.C. 74 (May-June, 1940). General properties are outlined, and applications in receivers and amplifiers described. Circuits are included of two typical amplifiers incorporating inverse feedback to improve overall frequency response.

Technical Communication No. 75 (July, 1940) comprises a paper entitled "Pentode And Tetrode Output Valves," by J. L. H. Jonker, of the Philips Eindhoven works. This article analyses the requirements necessary in using screen-grid output valves to ensure a minimum of distortion.

"Radio World" readers can obtain copies of the above Communications free on request from Philips Lamps (A'sia) Pty. Ltd., 69-73 Clarence St., Sydney.

NATIONAL MARKETING SCHEME FOR CALSTAN RECEIVERS

Slade's Radio Pty. Rtd., of Croydon, Sydney, recently announced that the marketing of Calstan radio receivers is now to be placed on a national basis. Territories are open in all States of the Commonwealth, and inquiries are invited in regard to the particularly attractive proposition offered.

Included in the models released to date is the Model 46 a.c. dual-wave console. It comprises a five-valve chassis of up-to-the-minute design, housed in a sturdily-built cabinet with particularly attractive lines.

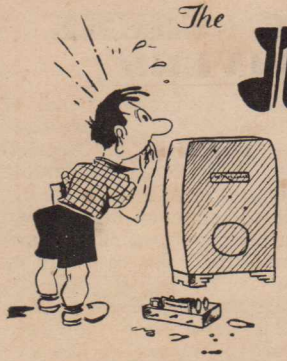
Tuning on this receiver is effected by means of a fly-wheel-type medium-ratio control which operates in conjunction with a straight-line dial of the curved-scale, "top-front-edge" type. Actual dimensions of the dial are 10 in. by 3½ in., so that ample space is available for the complete set of straight-line frequency state-zoned broadcast calibrations which is provided. On broadcast, the coverage of this receiver is from 550-1,600 kc., while on short waves, the band from 13.5 m. to 42 m. is covered. Independent scales are provided for the two wave-ranges and the illumination of these is controlled by the wave-change switch.

In addition to the fly-wheel loaded tuning control, three other controls are provided on this receiver. These are for volume, wave-change and tone (continuous).

Circuit Arrangement

The five valves used in this receiver are all Australian-made octal-based glass-envelope types, with numbers and functions as follow: One 6J8G, triode-heptode frequency converter; one 6U7G, I.F. amplifier; one 6B6G, detector, A.V.C. rectifier and A.F. amplifier; one 6V6G, "beam" output

(Continued on page 37)

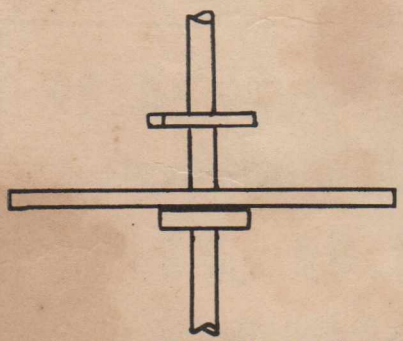


The JUNIOR TECHNICAL SECTION

A SIMPLE ELECTRIC MOTOR

There are many different types and sizes of electric motors, but they are all actuated by the forces set up when an electric current is passed through a coil of insulated wire.

Some motors are designed to deliver high power and yet revolve slowly. These are the big fellows with huge armatures or rotors carrying a large number of pole-pieces. At the other end of the scale we have the little chaps which, in order to deliver power, must rotate at a high speed, and their armatures, for direct current motors, or rotors for alternating current motors, carry comparatively few poles.



The rotor bars are fitted close together and soldered to the spindle.

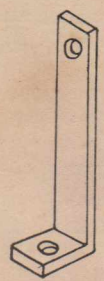
This little motor that we are describing is just about the simplest type possible, and although its design is not commercially usable, it is nevertheless an interesting job for the home constructor.

MATERIAL REQUIRED

7½ ins. x ¾ in. x ⅛ in. soft iron.
4½ ins. x ¼ in. x ⅛ in. soft iron.
One No. 10 steel knitting needle.
Odd pieces of sheet brass.
Wood block, terminals and screws.
2 ozs. 24-g. D.C.C. wire.

CONSTRUCTION

Make and wind the field yoke first. Bend the strip of ¾ in. x ⅛ in. iron to a U-shape with legs 2¼ ins. long. Drill two holes in the bottom section to take short wood screws. Four layers of wire are wound on each leg,

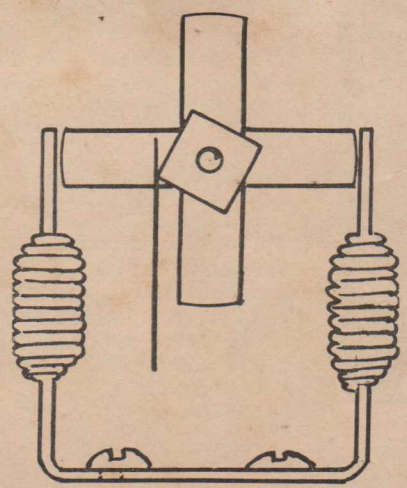


The bearing brackets (two required) are made from 16-gauge sheet brass. The brush is of a similar shape.

leaving ¾ in. of each leg clear.

The coils must be wound in opposite directions; that is, if the yoke were straightened out the two coils would be one continuous winding in the same direction. Finish off the windings by tucking the wire ends under two or three turns, and pull tight.

The rotor consists of two pieces of iron ¼ in. x ⅛ in. drilled centrally and soldered on the spindle (piece of needle). The ends of the rotor bars are slightly rounded and their length should just fit between the yoke bars with the smallest possible clearance. A contact sector consisting of ½ in. square piece of sheet brass is also soldered to the spindle in the position shown.

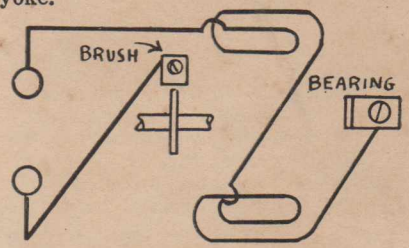


Here we see the position of the contact sector in relation to the rotor bars.

Bearing Brackets

Next we make the two bearing brackets from 16-g. sheet brass. The holes through which the spindle passes should be countersunk in order to avoid friction and alignment troubles. The actual bearing surface is an almost sharp edge.

The field yoke may now be screwed to the wooden base and the rotor and bearing assembly placed in position. Make sure that the rotor spins freely and its pole-pieces do not foul the yoke.



This diagram shows the direction of winding and the connections.

The Brush

This consists of a strip of thin brass or copper foil about ¼ in. wide. One end is bent at right angles, drilled, and screwed to the base-board so that the corners of the contact sector each make contact every revolution. The point of contact should be timed by setting the brush so that a corner of the sector is touching the brush when one rotor bar is approaching the horizontal position. The current flow will then pull the rotor around for part of one turn, contact is broken, and the momentum gained repeats the sequence, and soon the rotor spins at a great speed.

To finish off the job, we fit the terminals to the base-board and connect up. One end of the field winding goes straight to one terminal. The other end connects to one of the rotor bearings. Lastly, the brush is connected to the remaining terminal.

Thus we see that the current passes through the field coil to the bearing, along the spindle to the contact sector and from the sector through the brush and thence to the battery.

Battery Power

Two or more wet or dry cells will supply ample current; more, of course, will give greater speed and power.

An interesting point about this lit-

ELECTRIC MOTOR—

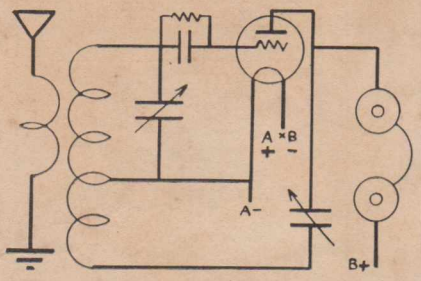
tle motor lies in the fact that it will run from an alternating current supply provided that the rotor is given a sufficiently energetic initial spin. We have set up in fact a non-self-starting synchronous motor, similar in many respects to those with which electric clocks are equipped.

SIMPLE RECEIVER

Quite a number of readers have asked for details of an amplifier to make louder the signals from a crystal receiver.

Now, such an amplifier would be quite feasible and efficient, but since one has to obtain at least one valve and its associated batteries, it is better by far to dispense with the detector altogether.

A single-valve regenerative receiver



A single valve circuit using a triode type valve.

will give far more range, selectivity, and possibly volume, than the best possible crystal-valve combination. The only extra parts required would be a Reinartz coil, a 23-plate midget condenser, and a grid leak with condenser.

AERIALS

(continued)

A simple and inexpensive mast that can be erected where space is limited is shown in Fig. 4. This type of mast will be found satisfactory for heights up to 40 feet.

Materials

Apart from the 2" x 2" timber, the only materials required are three ½" carriage bolts 5½" long with washers, a few wood screws, about 300 feet No. 12 galvanised iron wire and several small strain insulators. These should be used about every 10 or 12 feet to break the guy wires into sections.

Good sound timber should be used throughout; the finished mast should be protected by two or three coats of paint.

J. T. QUERIES

W.G.B., Dubbo—

A variable series aerial condenser is preferable to the fixed one. A tapped tuning coil gives more tuning range; the coil should be wound to tune to the highest wavelength.

* * *

V.G., Ipswich—

The small accumulator mentioned is called a "Plante" cell and is the forerunner of the present pasted-plate cells. For greater output the surface of the lead plates should be increased.

A section of lead pipe fitted in a similar length of larger diameter makes a compact cell.

* * *

J.D., Granville—

(1) The use of fine wire keeps the magnetic field concentrated around the needle. Thicker wire will not be so efficient.

(2) Try breathing in another direction or place a jam-jar right over the galvanometer!

CUTTING THREADS WITH DIES AND TAPS

THE home constructor often finds that the job in hand calls for a certain amount of threading work or, to use the proper term, "screwcutting."

As far as model construction is concerned, we find that a set of low-price taps and dies ranging in size from ⅛" to ⅜" will be a valuable addition to the toolkit.

Dies.

Dies are used to cut threads on rods. The cheapest form (and nothing more is called for in our case) is the "one-inch button die." As the name suggests, all of the dies in the set have the same outside diameter and therefore only one holder or stock is required.

Button Dies.

Button dies are to a small extent adjustable in order to cut a tight or loose-fitting thread. This adjustment is carried out by squeezing or opening the die with the set screw in the holder. The die is slotted to allow of this.

The thread should first be cut with the die in the opened setting (screw forced into slot) and then final cleaning up is done with the die compressed (screw tightened against side of die).

Before cutting a thread the end of the rod should be filed square and then slightly bevelled. Care must be taken to see that the die is started square on the rod. Once started, the die should be screwed continuously in the one direction.

It is not good practice to screw backwards and forwards with the idea of clearing the die. Such practice often is responsible for breakage of teeth and spoilt threads.

Taps.

A tap is used to cut a thread in the hole into which the rod or bolt is to fit.

Taps are not adjustable, so usually two taps of each size are required.

Tapered Tap

One is a "tapered" tap used for starting the thread, and the other is the "plug" tap used for finishing.

One end of the tap is cut square to fit a double-ended handle or stock.

Tapping.

Tapping is done in the same manner as with the die. However, if a "blind" hole is being threaded, the tap should be removed now and then and the metal particles should be cleared out.

Naturally the hole to be threaded should be smaller than the diameter of the screw to be fitted. Here is a handy table:—

TAP	WHIT.	S.A.E
1/8"	7/64"	—
3/16"	5/32"	—
1/4"	13/64"	7/32"
5/16"	17/64"	9/32"
3/8"	5/16"	21/64"

The Whitworth standard thread is coarse and deep when compared with the S.A.E. standard, which is finer and shallower.

When screwing brass and cast iron. no lubrication is required. Steel should be lubricated with soapy water.

MORSE CODE PRACTICE OUTFITS. Complete with Buzzer and Lamp, with switch to changeov . 25/-. With heavier type Morse key, 30/-. Book, "How to Learn Morse Code," 1/-. Professional buzzer, 15/-. Complete De Luxe Morse Key and Light Sets, 35/-. With P.M.G. Key, 39/6.

Collapsible Frame AERIALS. Cost £9/9/-. Now, 42/-. Costly imported articles, slight defects, easily adjusted.

The World's Best POCKET KNIFE, 6/6. Cobalt Stainless Steel Blade, all metal. Opens one finger control. Three positions. 6/6. Ever-lasting. Sheffield make.

RADIOKES BACK PANEL ILLUMINATED DIALS. Straight Vision, back Panel, 22/6 value. NOW 5/-. Circular Travel Spotlight, 4/-.

RADIO PUBLICATIONS

The Australian Official Radio Service Manual. A Standard Circuit Book for all Radio, 1939. 7/6 and 10/6 (stiff cover). General information, circuits, valve connections, wire tables in full — all you want to know.

ACCUMULATORS. All guaranteed 12 months. You can't beat these values. Packing Cases, 1/- to 1/6 extra, according to size.

RADIO ACCUMULATORS.		
2v.	110a.	17/-
2v.	150a.	20/-
4v.	65a.	20/6
4v.	90a.	22/6
6v.	90a.	36/3
6v.	110a.	45/6
6v.	130a.	66/-
6v.	150a.	73/9

"Bulgin" English LIGHTNING ARRESTER SWITCH, 5/-.

"Ormond" 3in. two - action VERNIER DIAL. 8/6.

3-in. Illuminated Back Panel Slow Motion DIAL. Smallest made. Circular escutcheons. 7/6.

4in. BLACK FRONT-OF-PANEL BAKELITE, 1 to 100 DIALS, ¼-in. shaft, with lock-nut fixing for Condenser Spindle, 3/6.

Lessen English 4000-ohm HEADPHONES, 19/6.
ERICSSON'S 4,000 ohm Professional Head Phones, 32/6. S.T.C. or B.T.H., British, 30/-. "Like-A-F'ash" 4,000 ohms, 17/6, 21/-. Other types, 9/6, 11/6, 12/6. Acme De-Luxe Flyweight Headphones, 4,000 ohms, U.S.A., 15/9. Acme Special, 12/11. Rubber Phone Pads, 2/-.

ELECTRIC GRAMOPHONES, British built, 240 A.C., 39/6.
COLLARO GRAMOPHONE MOTORS AND TURN-TABLES. Complete. 48/6. Sturdy built 240-volt Electric Motor, with all fittings; were listed to sell at 75/- from overtime Customs Sale; now 50/-.

LINES TO CLEAR. 5,000 ohm small imported Pots., 2/6. Lissen Super Audio Trans., 15/-. Telsen .0005 sturdy Var. Condensers, 6/9 (British). Telsen Audio Transformers, 10/6. Set Testing Kits, Leads, Clips, etc., 4/6. NOW 2/6. Radio Saw, 3 Blades, for Metal, Wood, Bakelite, 1/9. Breast Drills, large, 4/11. U.S.A. made .00035 Variable Condensers, 5/6.

ENGLISH POCKET VOLTMETERS. 2 Reading, reads "A" and "B" batts., 8/6. 3 Reading, as above, also reads 0-30 M/A, 10/6. 4 Reading, reads 0-6, 0-15, 0-180 volts, 0-30 M/A, 14/-.

GRAMO NEEDLES for Pick-up playing, as used by B.B.C., London. 150 Golden Pyramid Radiogram Needles, each play 5 records, 4/6. "Embassy" semi-permo. needles, each plays 10 records, 2/- tin. 50 needles of 40-minute play, 4/3. 100 needles of 15-minute play, 3/6.

Insulated British Police Patrol AERIAL. Rubber clad, highly sensitive, multi-strand tinned copper wires, needs no separate lead in or insulators, 50ft., 2/6; 100ft., 5/-. Heavier clad, super grade multi-strand tinned wires, 50ft., 5/-; 100ft., 10/-.

B.G.E. Table Type Microphone, highly recommended for amateur or professional use. Built-in Transformer and Battery, with volume control incorporated. Just plug into pick-up terminals of any set or amplifier. 39/6.

CRYSTAL SETS AND CRYSTALS Famous All-Station Model. Charts 6d. All Parts 25/-. Built 35/-, in Cabinet 45/-. Phones 12/6. Aerial—Earth 2/6. Phones 12/6. Aerial—Earth 2/6. CRYSTALS A.1. Semi Fixed, 2/6. "Tec" Fixed Crystal 2/6. Liontron 5/6. Lion Micro 5/6. Refills 2/6. Red Diamond 4/6.

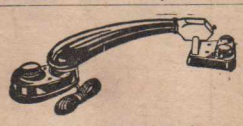
VALVES. We have always on hand part-used Valves which are near or 100%. We guarantee these or replace them. Let's know what types interest you. Used 57, 58, 6/6. New 4XP, 5/-. New MH4, 2/6. 44Su Rectifier, new, 5/-. New 41MRc, ML4, 2/6. Used 1C6, 6A6, 6A7, 6A8, 6B7, 6F6, 6F7, 6L7, 6/6. Used 6F7, 6J8, Ek2, 2B7, 2A3, 5/6. 2-Volt, 4-Volt, 6-Volt Batt. Valves, used, 5/-. 42, used, 6/6. 201a Types, 2/6. Let us know your wants.
Packing Case for Valves up to 3 Valves, 9d.; 6 Valves, 1/-. Postage extra. Inquiries welcomed.

SET TESTING LEADS. Wire and prods complete, 2/6.

VALVES, MADE IN U.S.A.

Type	Price	Type	Price
57	10/6	85	12/-
58	10/6	6D6	11/-
33	12/9	6C6	11/-
32	11/3	6A7	11/9
2A5	10/6	6B1	12/-
2B7	14/-	42	12/-
27	11/9	80	9/6
6E5	9/-	71A	11/9
6K7MG	12/9	19	13/6
5Y3	8/9	75	11/-
6J7	11/3	24A	11/3
2A7	13/-	30	11/-
6H6	12/9	247	13/3

PANEL METER. MOUNT 0-20. AMPERES 12/6.



COSMOCORD CRYSTAL TYPE BRITISH BUILT AND DESIGNED GRAMOPHONE PICK-UP DE LUXE, with volume control built in as illustrated, 59/6.

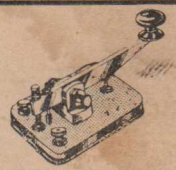
GRAMOPHONE PICK-UPS. All have Vol. Control built in. British made.
"Cosmocord" Special, 30/-. "Cosmocord" Extra Special, 35/-. "Cosmocord" High Definition, 38/6. "Cosmocord" Studio Model, 48/6. Collaro.

½IN. RED, GREEN, OPAL, BLUE SIGNAL LIGHTS. Complete, 2/6.

THE WIRELESS CONSTRUCTORS' ENCYCLOPEDIA, 7/6. A splendid book for young and old. amateurs or professionals. Nearly 400 pages, properly illustrated.

TELEVISION AND SHORTWAVE HANDBOOK, 5/6. Up to the moment; lavishly illustrated — a splendid publication; over 250 pages.

BRAND NEW AND TESTED. 280 VALVES. Made in U.S.A. 9/6 each.



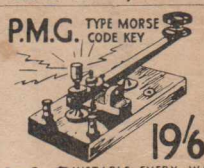
As illustrated. Long or Short Tappers, 12/6. Adjustable all ways Bakelite base. Nickelled fittings.

GOLDRING PICKUP HEADS. Head and Volume Control, 18/6. Head and Volume Control, 21/-. Head only, 16/-.

MAKE YOUR OWN RECORDINGS. Cutting head and overhead cutting unit complete, 99/6. Plain Records, 2/6, 3/6, 4/6, 5/6. Cutting Needles, 2/-.

MICROPHONES, as illustrated, Hand Holding Type, 22/6.

17-PLATE MIDGET CONDENSERS, 2/6. Transposition Bakelite Aerial Blocks, 8 for 2/6.



P.M.G. ADJUSTABLE EVERY WAY MORSE CODE KEYS, 19/6.

ELECTRIC 240-VOLT GRAMOPHONE MOTORS. Complete with all fittings and turntable. 240 Volts A.C. Purchased from Overtimes Customs Sale, 48/6 and 55/-. Splendid for Recording or Record Making.

"Emicol" POCKET VOLT METER, with leads. 0-30 M.A.; 0-6; 0-150 volts, 12/6. Write for full list of Meters and Testers.

Contains 2/- Rebate Coupons. Illustrated from cover to cover. Full of Bargains and New Things galore. Radio, Games, Hobbies, Tricks, Jokes, Cutlery, Sports, etc.

LEVENSON'S WIRELESS

Wholesale, Retail. **Wholesale, Retail.**

Games, Hobbies, Novelties, and Slot Machine Specialists.

226c PITT STREET, SYDNEY

Everything from A to Z in Radio at Sane Profit Prices.

'Phones: M 2525 and M 2526-7. Goods forwarded C.O.D. Post or Rail. (C.O.D. Mail within N.S.W. only. Not Interstate). We welcome Prepaid Telegrams and Long-Distance 'Phone Calls.

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

C.L. (Paddington, Q.) has built the "World Cruiser" from the February issue, and is having a shade of difficulty in getting correct padding, as padder seems to need to be screwed right in. He asks if padder should have a shunting condenser across it.

A.—No, there should be a condenser across the 80-metre band padder, but not across the broadcast padder. It should have ample capacity as supplied, and it seems hard to believe that there can be any real fault, as these units are tested on the air before they leave the factory. Perhaps you are not using an "H" gang? When correctly padded, the stations should fall right by the wavelengths shown on the dial.

* * *

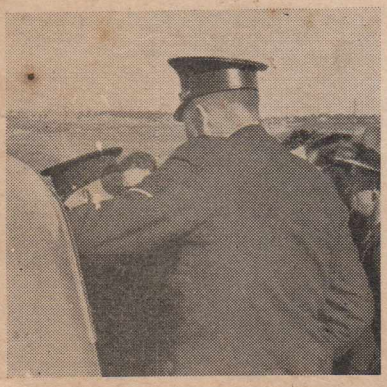
A.K.D. (Jamestown, S.A.) asks whether it would be possible to use the 13 to 50 metre coils in the r.f. booster unit described in the June issue.

A.—Yes, it would be possible if you could get them, but they wouldn't be any help unless the receiver, with which the booster is used, is capable of covering that band too. It would also make it essential to use a single gang with the "H" type characteristics, but "H" gangs are not listed in single-gang units. So, in a nutshell, it is theoretically quite O.K., but in practice, impossible!

* * *

I.B. (Bunbury) wants articles about magnetic recording on wire. He also says he doubts 6C5 driving 6V6G as in "Vibra" P.A. amplifier.

A.—We will keep your request in mind, but we haven't anything on magnetic recording on hand at the moment. The amplifier does



"Cops" called to suppress the "Vibra" amplifier.

work, and at recent Model Aero championships the police were called to suppress it, as the noise was disturbing a church service being held nearly a mile away!

* * *

P.T. (Bundaberg) wants details of amateur examinations.

A.—Examinations are still being held on first Tuesday morning in January, April, July and October. Fee is 7/6. Full details can be had from Chief Inspector of Wireless, Treasury Gardens, Melbourne.' For location of nearest examination see your local postmaster.

* * *

J.W.W. (Townsville) sends circuit diagrams and details of an elaborate amplifier, but says that it may be published only if details of resistor values are omitted.

A.—We were glad to get the diagram and we must thank you for the trouble you have gone to in order to draw it out, but we regret that we do not consider it suitable for publication unless we are able to give the full details. Often enough in the past we have been quite annoyed when we got interested in a circuit in some book or other and then found that the resistor values were secret.

* * *

H.M.L. (Woodford, Q.) writes an interesting letter, and says: "The short-wave section could be cut down, as far as I am concerned," and goes on to speak of the merits of the 6B5 for amplifier work.

A.—Your newsy letter greatly appreciated, and undoubtedly your views are sound, especially as regards the Amplifier Championship. So far as we can recollect, only one amplifier has appeared with the 6B5 valves, and it did very well indeed. Frankly we haven't had much experience with these valves, but we have heard commercial sets using them and they don't sound any better or worse than usual.

* * *

L.F. (Grafton) enquires about the value of the cathode resistor in the "Mystery" dual-waver.

A.—The correct value is 2,000 ohms, as shown in the circuit and picture diagrams, and not 20,000 ohms as listed in the parts list.

* * *

R.O. (Parramatta) writes of a strange coincidence, and sends congratulations.

A.—Very interested to hear from you, Reg., and many thanks for the good wishes. Trust that business is bright with you, too. Sorry there is not enough time on hand to answer correspondence in full.

* * *

J.C. (Wattle Flat, via Bathurst) asks for details of the power supply unit, mentioned by Mr. Carter.

A.—As you will see from this issue, your request has been acted upon.

* * *

J.K. (Punchbowl) asks how far a flat baffle should be mounted from a wall.

A.—There is no easy way of telling how to make acoustics right, and we can only suggest practical experiments. In some cases it is good to have the baffle fairly close to the wall, but every case must be diferent. Hung as a picture, the baffle should be quite O.K. in the majority of cases. We suggest that you keep the speaker leads down to less than twenty feet, and use fairly heavy wire. The De Luxe Fidelity 8 should make an ideal amplifier for pick-up work.

* * *

J.M. (Northwood) writes in response to the recent editorial, as follows:—"I am a keen listener, but I can honestly say I never read the short-wave pages. I prefer to search for the stations myself, and I get a kick out of hearing a new one. I don't like looking for stations I know are there. If I wanted to do that I could do it with the broadcast band."

A.—Glad to have your views about the editorial content of the paper, but we do not feel inclined to do anything drastic, such as cutting out the short-wave section entirely. We feel sure that there are a number who do make good use of those pages.

* * *

J.G.A. (Ingleburn) wants articles on the principles of sound engineering, photo-cells and their application, and details of pick-ups.

A.—Glad to get your note. Weren't you the fellow who was having difficulty with a "Big Boy" amplifier? If so, we trust that you got it into proper shape, and we'd like to know how you like it. Will see what can be done in the way of articles on the subjects you mention.

* * *

T.S.J. (Port Kembla) wants to know whether the battery short-wave converter would be O.K. for a vibrator-powered set.

A.—It is very doubtful whether you can expect short-wave reception from a vibrator-type set without some special filtering in the power supply. At any rate we would suggest that you use the a.c. version, with an indirectly-heated valve as it would be less likely to pick up noise from the vibrator via the accumulator.

SPEEDY QUERY SERVICE

(continued)

M.E. (Bendigo) offers some sound advice about business matters and other items.

A.—Your letter appreciated. We never cut a subscription without giving ample notice and at least one issue after it has actually expired.

* * *

R.F. (Bondi) wants a classified advertising column for the use of amateur experimenters and set builders.

A.—As you will see from this issue we have started a column for classified advertisements and we have got the ball rolling. It is now purely a matter of readers giving us the necessary support to make it a success. From time to time we have had requests for such a column, but in the past the support has never come up to expectations. It is up to you and the rest of the readers to show their appreciation in a practical way.

* * *

G.H. (Gosford) wants coil winding data for the "Wonder One" to cover the five bands.

A.—Sorry, but we do not have this data on hand, and it would not be any great use to you, as the materials used in the construction of these coils is not available on the open market. The efficiency of the job is largely tied up with the use of litz-wire honeycombs, wound on trolitul moulded formers. For a simple set, thoroughly described in every detail, we couldn't suggest anything better than the "All-waver" described in the May, 1936, issue. Copies of this issue are available at 6d. each, post free.

* * *

D.M. (Kew, Vic.) wants to modernise an old set using 201A type valves.

A.—It would not be a proposition. You would need new valves, indirectly-heated ones, before you could run a.c. on the filaments. By the time you finished the job it would cost you more than building a complete set, and when you finished you would have more of a liability than an asset. We strongly advise you to build "Tip-Top." Complete cost should be well under a "tenner," and results completely satisfying, with a certainty of years of trouble-free service.

* * *

F.S. (Maroubra) enquires about back numbers.

A.—Yes, we are able to supply almost any back number and we do not make any extra charge; in fact, back numbers three months or over are available at 6d. each. Even No. 1 of Volume 1 is available at this price. The two-valve a.c. superhet to which you refer would be the Local Station Superhet in the March, 1938, issue. It used an EK2 and EBL1, and was an extraordinary job in every way.

* * *

M.G. (Arncliffe) asks about the regulation governing the sale of transmitting gear.

A.—Yes, it is now unlawful to dispose of transmitting gear without permission. You will see a paragraph on the subject elsewhere in this issue.

W.H.P. has heard KC4USC and desires the address.

This is the call sign of the Snow Cruiser attached to Admiarl Byrd's Expedition to Little America. Admiral Byrd's "mail" is radioed each alternate Saturday by **WGEO,** the General Electric Station in New York, and can be heard plainly through **KGEI,** 19.57m.

* * *

M. Rodgers.

Yes, your station would be **VPD-2,** Suva, 9535kc. ,or 31.47m. They are on the air daily from 7 to 8 p.m., corresponding to 9 to 10 Suva time. At the outbreak of war they closed down for a period. Prior to this their schedule was from 9 to 10 our time; that was why you heard them closing at midnight and making a suggestion regarding a certain brand of tea.

* * *

G.M. (Mosman) enquires about the parts list of the "War News Booster Unit."

A.—Yes, there was an error in this, the "O" being dropped from the .0005 mfd. condenser. This was fairly obvious, as the diagrams showed the correct value clearly enough. There was another slight error, however, which you did not notice. A 250 ohm resistor is included in the parts list, but is not used in the actual unit, as it was found unnecessary and omitted, but somebody forgot to take it out of the parts list.

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in these columns will be accepted only from non-professional readers. The charge is 2/- for the first 15 words, and 2d. for each additional word.

AIR-CELL (Eveready), brand new, sealed. £1 f.o.r. Sydney. No. 102, C/- this office.

ALL WAVE a.c. Oscillator, with in-built output meter, practically new. £12, no offers. Flat 1, "Glen Innes," Lamrock Avenue, Bondi.

CARTER GENEMOTOR, 6 volts input with output of 180 volts D.C. at 60 m.a., with 90 volt tapping. Will definitely sell for best cash offer. 1 Arthur Street, Dover Heights, Rose Bay. FU 8788.

FOR SALE.—Triplett 0-1 milliammeter, 1,000 ohms per volt. Ideal for making up a multi-meter. Offer wanted. 1 Arthur Street, Dover Heights, Rose Bay. FU 8788.

FOR SALE.—Cambridge Uni-pivot galvanometer, 100-0-100 micro-amps scale, complete with two thermo-couples to suit. £2/10/- complete. No. 101, C/- this office.

FOR SALE.—Vertical Enlarger, quarter-plate, commercial, not home-built model, as new. Original price was 21 guineas. Will sacrifice for £5, complete with lens. 87 Murriverie Road, North Bondi.

BREVILLE AIR TEST

(continued)

tuning. This broad tuning means that the tuning of the short-wave broadcasting stations is not at all critical, in fact just about as easy as tuning in any ordinary broadcast station.

Variable Intermediates

These variable intermediates are also a great help in getting the greatest possible fidelity from nearby broadcasting stations, handling a wide band of audio frequencies without appreciable discrimination.

The ability of an intermediate channel to handle a wide band of audio is not in itself a proof that any set will have fidelity, but with this new Breville job a great amount of development work has been put into the audio end, with a thorough system of inverse feedback, comprehensive tone control and a compensated volume control which ensures that the full brilliance is retained, even at lowest volume control settings.

The tone control manipulates on the inverse feed-back circuit and can be set to attenuate the middle register, giving a truly brilliant response which makes ordinary broadcast recordings sound like the wide-range heard from 2GB. This must be the first receiver which we have tested in which the matter of tone control and compensation has been handled in a thorough manner. Most receiver manufacturers are satisfied to fill the demand for a tone control by putting in a potentiometer and a condenser, so that the highs can be lopped off. This just gives a soggy type of muffled reproduction and is not to be compared with the Breville arrangement.

Zip Tuning

The Breville Model 237, as this model is called, is also fitted with a mechanical system of keyboard tuning, known as the Breville "Zip" system. Levers operate on a set of cams, and finger pressure on one of indicators shifts the dial setting instantly to the correct position to tune in the station indicated.

Adjustment, or alteration of the station tuned by any key can be carried out quite simply with a screwdriver, and such adjustments cannot affect the general alignment of the set or its operation when used in the ordinary way.

The Zip tuning is perfectly reliable in operation and even on the "selective" position of the tone control switch, the Zip keys will tune the stations in perfectly.

A Good Example

Altogether our experience with this Breville model showed us that there has been a decided improvement in the design and construction of the popular types of five-valve dual-wave receivers, of which the Breville is an excellent example.

SMALL IN SIZE.. BIG IN PERFORMANCE

● Here's an outstanding Volt-Ohm Milliammeter that fits your pocket both ways — in size and price. The Ranger Examiner has Triplett precision instrument, selector switch, moulded case and individual zero adjustment for resistance measurements. Can be carried easily in the coat pocket. For home and shop servicing, and a handy instrument for engineers or in the laboratory. Ranges: 15-150-750 D.C. volts; 1.5-15-150 D.C. milliamperes; ½ to 1,000 low ohms; 0-100,000 high ohms at 1.5 volts. External batteries may be used for higher resistance measurments. Accuracy of tester, 2%. Black moulded case, 3 1/16" to 5 7/8" x 2 1/8." Silver and black etched panel. Battery and test leads with alligator clips are included. Price, £4/10/-.

RANGER EXAMINER

★ Why not call in and inspect the Ranger Examiner to-day . . . In fact, make a point of inspecting the complete range of testing equipment available at

W. G. WATSON & CO. PTY. LTD.

• DISTRIBUTORS OF WATRIC PRODUCTS

279 CLARENCE ST., SYDNEY PHONE: M 4331 BRANCHES IN ALL STATES

We Have a Good Job, Mr. Graham for one of your Keen A.R.C. Men

TRAINING COSTS LITTLE

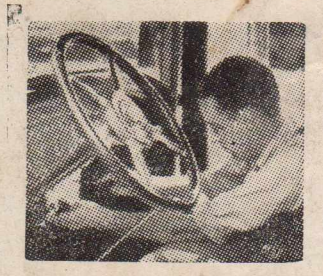
Think of this — for a few pence each day — actually less than many fellows spend on tobacco — you can prepare yourself for a good pay proposition in Radio. You can whilst learning make money. Many A.R.C. students earn £3 and up to £6 per week at SPARE TIME WORK.

Below: Outside Television.

This Student Says:—
"There must be a shortage of trained men all right. I get offers every so often . . . One was a promise of a branch managership."

G.C., of Oatley, N.S.W., says:—
"Before turning to Radio professionally, I had found it impossible to obtain employment in the line for which I was qualified. Thanks to your aid, I was placed in a position within two weeks of my exams."

Below: Car Radio Man at Work.



You, too, can do what these men have done. Write me personally. Address your letter to L. B. Graham, Principal, Australian Radio College, Sydney, and I will go out of my way to give you a helping hand.

The DEMAND for TRAINED RADIO MEN exceeds the Supply

Whilst many other trades and professions are passing through difficult times owing to present conditions, Radio is booming. Unusual as this may seem, a little reflection will speedily enable you to see why this is so! People are news-hungry as never before — that means terrific activity on the part of the broadcasting organisations, with an inevitable sky-rocketing of radio receiver sales. Furthermore, many radio units and components previously imported must now, owing to dollar exchange and other restrictions, be made in Australia. Costly equipment for defence and other national needs is being produced in ever-increasing quantities.

WHAT DOES ALL THIS MEAN!

It means the Radio industry is crying out for trained men — the demand often exceeds the supply — day after day employers ring me up and say, "We have a good job open. Have you a trained man available?" Let me show you how to get into Radio NOW. I can train you in your spare time at home and speedily fit you for a man-sized job. Get busy NOW!

AUSTRALIAN RADIO COLLEGE PTY. LTD.

BROADWAY, SYDNEY **Telephones: M 6391, M 6392**

MAIL THIS COUPON NOW

To Mr. L. B. GRAHAM,
The Australian Radio College Pty. Ltd., Broadway (opp. Grace Bros.), Sydney. Telephones: M 6391-M 6392.
Sir,
Please send me your book, "Careers in Radio and Television." It is understood I am under no obligation in making this request.

NAME .....

ADDRESS .....

A.R.W.5

SEND FOR FREE BOOK — "CAREERS IN RADIO AND TELEVISION"

Every man should read this book — thickly illustrated with photos of Radio, Television Equipment and Engineers at work; it shows you definite steps you can take for a better job — how YOU can succeed in life. Post coupon NOW!

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