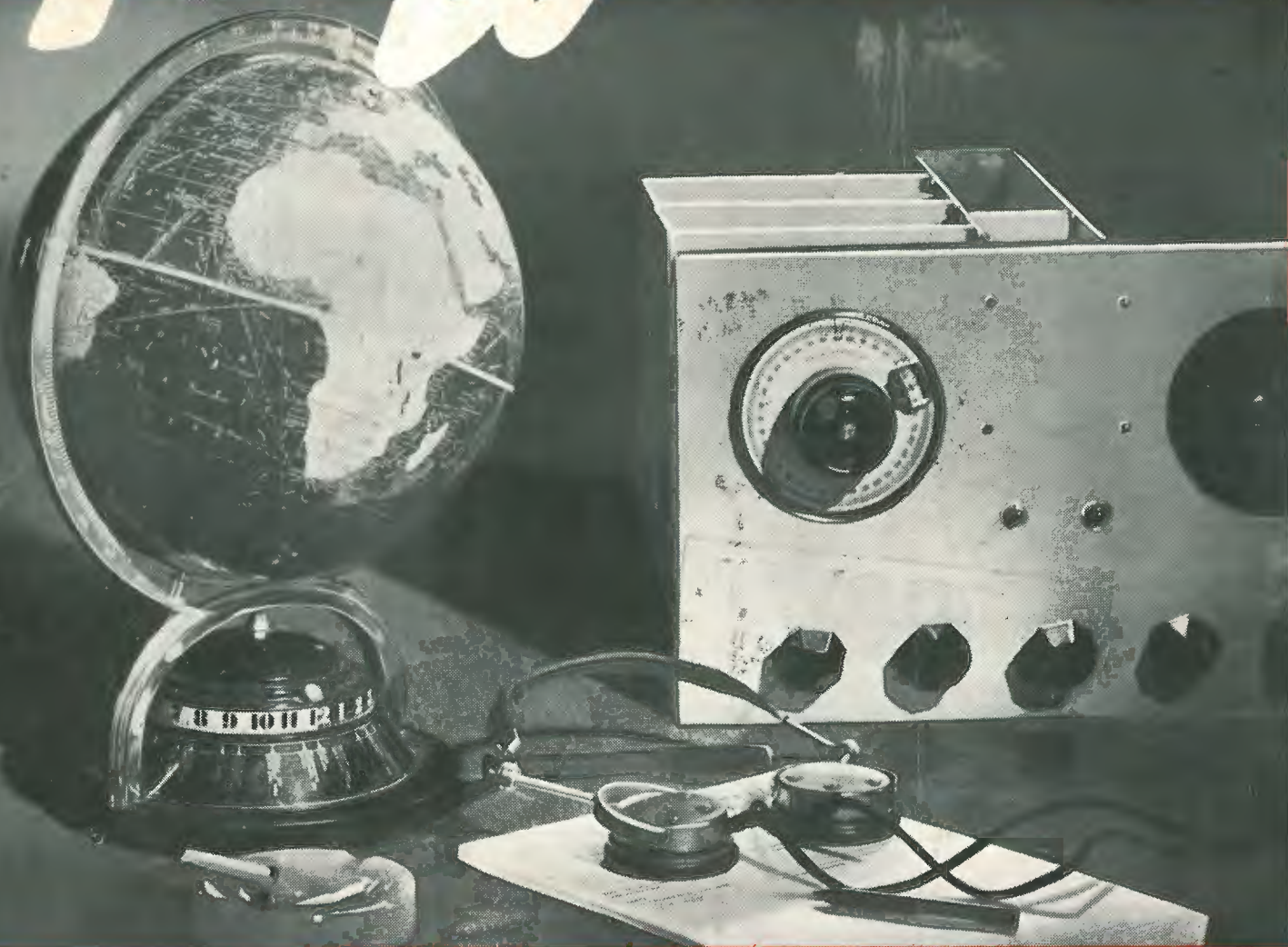


THE  
AUSTRALASIAN

SEPT. 1, 1937  
VOL. 2—NO. 5  
PRICE, 1/-

# Radio World

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



—See Page 45.

- "TOM THUMB PORTABLE TWO": DX JUNIOR TWO-BAND C.C. TRANS-
- MITTER: MORE ABOUT THE "SKY-KING DUAL-WAVE FIVE":
- 13-WATT AMPLIFIER: RESULTS OF FIRST SHORTWAVE DX CONTEST.

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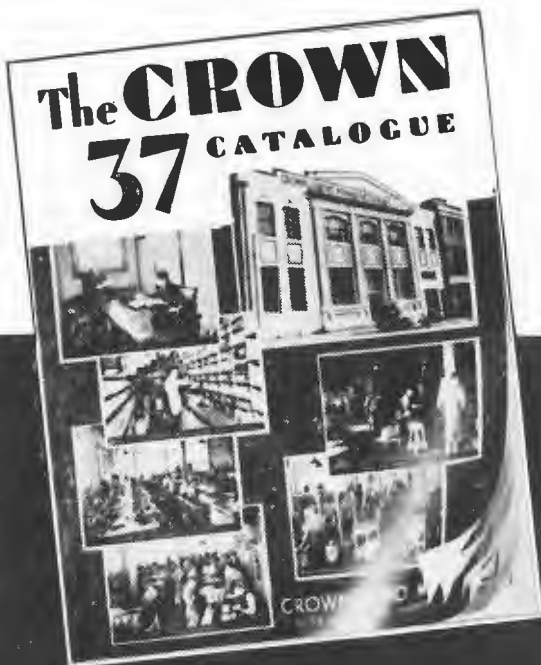
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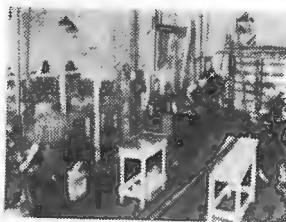


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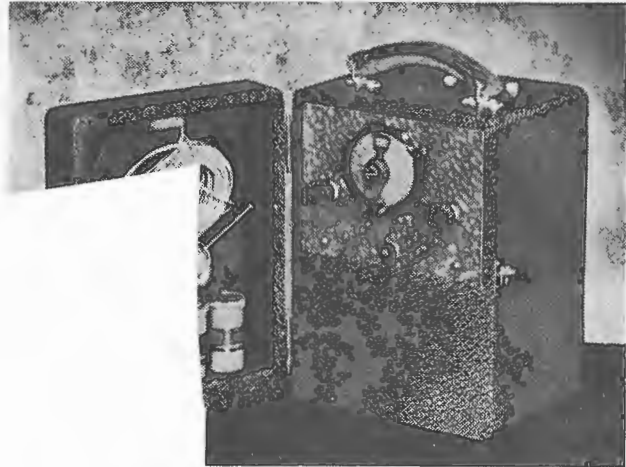
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# A Custom-Built CABINET



FOR THE  
**“TOM  
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The carrying-case used for the original “Tom Thumb Portable” was built by us exactly to the Editor’s specifications, and is supplied as illustrated above, complete with headphones support and coil rack. Lightness and rigidity are ensured by the use of light, strong timber, with dove-tailed joints.

Each case is fitted with plated hinges and catch, and is covered with smart mottled leatherette, obtainable in red, blue, brown, black or crocodile.

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# THE AUSTRALASIAN RADIO WORLD

Incorporating the  
**ALL-WAVE ALL-WORLD DX NEWS.**

*Managing Editor:*  
A. EARL READ, B.Sc.

The “Australasian Radio World” is published monthly by Trade Publications Proprietary, Ltd. Editorial offices, 214 George Street, Sydney, N.S.W. Telephone BW 6577. Cable address: “Repress,” Sydney. Advertisers please note that copy should reach office of publication by 14th of month preceding that specified for insertion.

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# The . . . . Tom Thumb Portable Two

**A compact two-valve all-wave portable using a 49 as space-charge detector, transformer-coupled to a 49 audio amplifier. Weighs under 12 pounds complete, and gives world-wide reception on 'phones.**

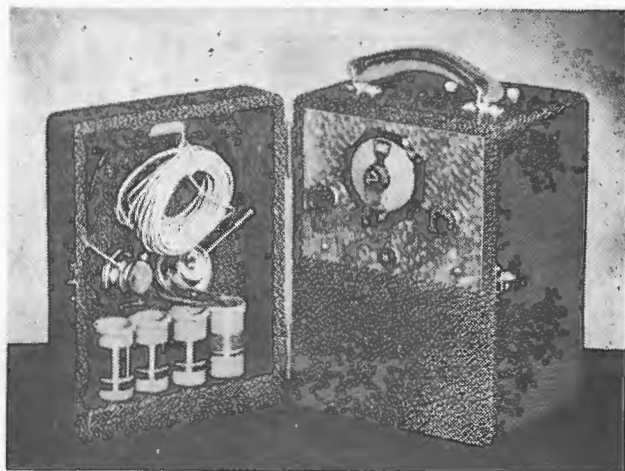
**T**HE idea of designing a compact all-wave portable for headphone reception was first conceived in December last year, when a reader wrote in asking for details of the circuit used for a two-valve receiver employed in conjunction with a portable transmitter for outback communications by the Australian Inland Missions.

The designer of the set was interviewed, and the circuit as supplied by him was published in the January "Radio World." Using a pair of A141's as a space-charge detector and audio amplifier, and a "B" supply of only 9 volts, exceptional DX capabilities were claimed for this little set.

## Trans-Tasman DX On Broadcast

In subsequent issues, further letters from readers reported excellent results from similar sets they had built. In the July "Radio World" a New Zealand reader who had built up a broadcast version using 49's writes: "With a good average aerial, many Australian "B" stations have been logged at surprising 'phone strength, there being no need to force the set at all. The locals, of course, can be received at good speaker strength. A real 'corker,' this little bus!"

Thus the "Tom Thumb Portable Two" was designed and built, using the circuit shown overleaf. It will be noticed that several minor alterations



The completed receiver, mounted in the special carrying-case. The "A" and "B" batteries—two 1½-volt dry cells and two 9-volt bias batteries—are housed in the compartment underneath the set.

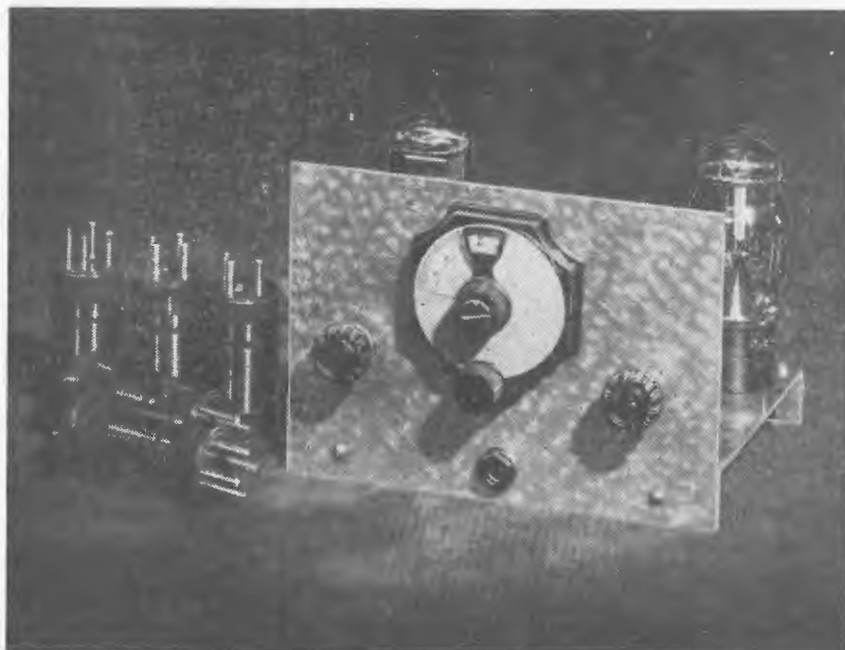
have been made to the circuit as published in January. In the first place, it was found that regeneration was smoother with the grid leak returned to "A—" instead of earth. (In this set "A+" is earthed). Secondly, the space charge connection has not been used for the audio stage for reasons of battery economy.

## Low "A" And "B" Drain

Using 15 volts of "B," obtained from two 9-volt "C" batteries connected in series, the total drain with the space-charge connection used for both valves is around 16 mills., which is far too heavy for batteries of this type. Hence, the grid connections of the 49 audio stage were reversed, and 18 volts "B" applied. This brought the total "B" drain down to the much more reasonable figure of 6.5 mills., which means that some months of service can be expected from a single set of batteries.

The "A" drain is .24 amp., which is well within the limit for economical operation of two standard 1½-volt dry cells. These are connected in series, giving 3 volts, and so a 30-ohm rheostat is used to drop this to the two volts required by the valves. These cells will also give many months of normal service, particularly as the detector will oscillate readily with only 1.4 volts across the filament.

The "Tom Thumb Two" is just as economical to build as it is to operate, in that a complete kit of parts, including everything—carrying case, valve, batteries and headphones—can be bought for six guineas.



A view of the "Tom Thumb Two," with the five plug-in coils used to give coverage of the shortwave and broadcast bands.



### REPLOGLE GLOBES FORM PRIZES IN RADIO WORLD DX CONTESTS

This big, attractively-coloured Replogle World Globe is one of the three being offered as trophies in the "Radio World" Shortwave DX Contests now being held.

Designed especially for short-wave listeners, an ingenious rotary time converter is built into the base so that world time differences can be read off in an instant. As well, the principal shortwave stations of the world are shown, together with over 5,000 cities and towns.

Finished in chromium and black, the model illustrated is very reasonably priced at 59/6.

Other models include the Standard full meridian globe, available in 7, 8, 10 and 12 inch sizes, priced as below:—

- 7-in. .... 15/6    8-in. .... 19/6
- 10-in. .... 29/6    12-in. .... 49/6
- 10-in. Starlite .... 39/6

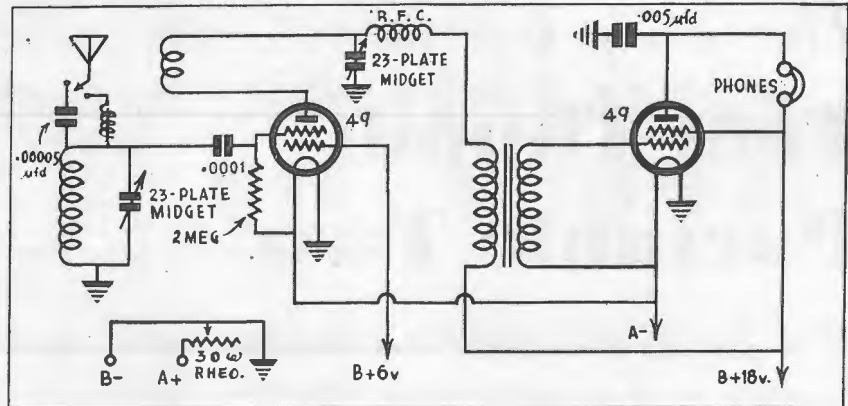
All these scratch-proof, washable Replogle Globes are available in floor and table models.

A 32-page illustrated book showing how to use the Replogle Globe—how to tell the time in any part of the world at a glance—is given FREE with every 10-inch and 12-inch model. Ask your radio dealer about them, or write us direct.

## REPLOGLE WORLD GLOBES

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The circuit of the "Tom Thumb Portable Two."

#### An Outstanding Performer

From the performance point of view the "Tom Thumb Two" is all that readers claim for it. On broadcast, excellent DX is obtained, while the main shortwave stations of the world can be pulled in at good head-phone volume. Regeneration is very smooth, particularly on the short waves, making the set very simple to handle.

The attractive leatherette-covered carrying case illustrated in the photograph was supplied to "Radio World" specifications by the Western Manufacturing Co., of Sydney. The headphones, with the rubber-covered flex used for aerial and earth, fit neatly into the lid, together with the coils, which are plugged into holes drilled in a 1/2-inch block of wood mounted along the bottom of the lid as shown.

#### Set Mounted On Sliding Shelf

The set is bolted to a sliding shelf, which is withdrawn about 3" when the coils are being changed, or slid

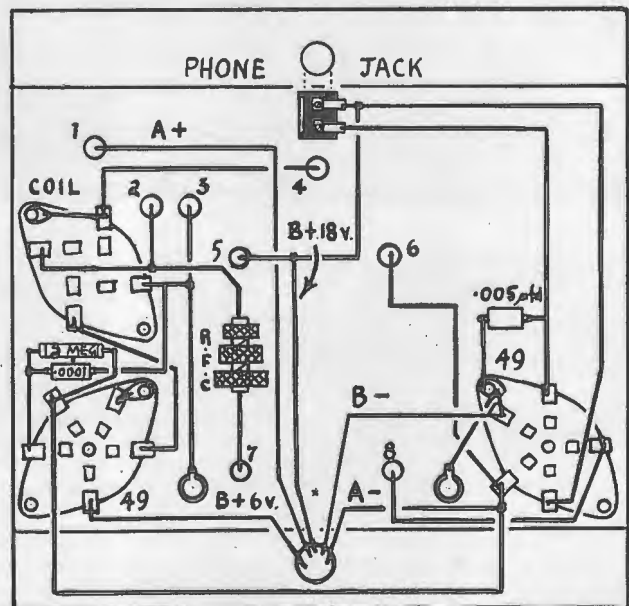
out entirely when new batteries are being put into the compartment below. The total weight of the receiver mounted in the case, with batteries and all accessories, is under 12 pounds.

#### Alternative Aerial Connections

It will be noticed from the circuit that two alternative aerial connections are provided. In one, the aerial is taken to the top of the grid winding through a .00005 mfd. mica condenser, and in the other, coupling is effected by means of twisted flex.

Of the three sockets mounted on top of the case, that on the left is for the earth connection, a length of flex being taken from it inside the case to the earth terminal. One side of a .00005 mfd. mica condenser is connected to the centre socket, and a length of flex taken from the other side to the aerial terminal. Finally, a 6" length of flex is soldered to the socket on the right, and the free end twisted about eight times around the

The wiring is shown in this sketch. The numbered leads passing through holes in the chassis are as follows:—1, to rheostat (terminal not connected to shaft); 2, to fixed plates terminal of reaction condenser; 3, to fixed plates terminal of tuning condenser; 4, to moving plates terminal of tuning condenser; 5, "H.T." on audio transformer; 6, "C—" on transformer; 7, "P" on transformer; 8, "G" on transformer. Of the two terminals, that on the left is the aerial, and the other the earth.



THE  
RADIO  
PIONEERS

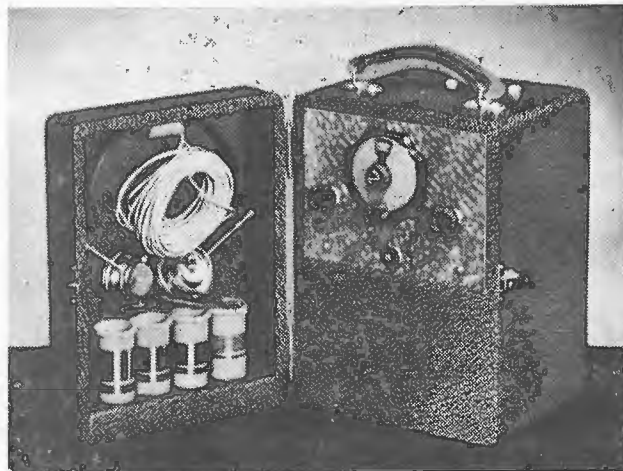
# Fear's Radio News

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## New Portable Gets World On Two Valves



### DX JUNIOR TWO-BAND C.C. TRANSMITTER

The DX Junior Transmitter described this month is the ideal rig for the man wanting the most DX at the cheapest cost. Crystal-controlled, and using a single 6L6, up to 20 watts output can be obtained.

WRITE FOR OUR DETAILED QUOTE.

### "JONES' SUPER-GAINER"

The straightforward, simple construction and excellent results given by the famous "Jones' Super-Gainer Two" (described in July and August "Radio World") will appeal to those looking for a high-performance short-wave receiver that is inexpensive to build.

WRITE FOR OUR DETAILED QUOTE

### "SKY-KING DUAL-WAVE FIVE"

The "Sky-King," a newcomer to the dual-wave field, is fully described in this and last month's issues of the "Radio World." For a receiver costing so little, it has many desirable features for the home builder. Construction is extremely simple, using an inexpensive coil-kit, and first-class results are guaranteed.

In the original "Sky-King," performance left nothing to be desired; selectivity is excellent, and sensitivity is equal to that of many commercial "sixes." We can supply a complete kit of parts, with valves and speaker, for ..... £9/15/-

### OUR LATEST CATALOGUE WILL SAVE YOU MONEY

Our 1937 Catalogue features the finest and most comprehensive range of English, American and Australasian radio components available. Send for YOUR copy now—it's FREE and POST FREE.



### "TOM THUMB PORTABLE TWO"

Here's the little set that every DX fan has been looking for—a powerful little all-wave portable that is cheap to build and run, and gives excellent results on all bands.

Compact, and weighing under 12 pounds complete, it can be taken anywhere—to the city, seaside or bush—and is instantly available for use. With low "A" and "B" drain, the batteries will last for months and are cheap to replace.

Our kit of parts for the "Tom Thumb Portable Two" is exactly as specified by the designer, and includes everything listed—case, batteries, valves, and all accessories.

WRITE FOR OUR DETAILED QUOTE.

### "AMATEUR COMMUNI- CATIONS EIGHT"

For those who require high performance with comfort, this receiver is ideal.

The "Amateur Communications Eight" possesses many attractive features for dxing, such as:—A high



degree of selectivity, high useable sensitivity (i.e., minimum noise level), good frequency stability, and ample band-spread.

A full description and a list of parts appeared in the "Radio World," June and July issues. Our kit of parts is exactly as specified.

WRITE FOR OUR DETAILED QUOTE.

**"TOM THUMB PORTABLE TWO"**

**LIST OF PARTS**

- 1. Leatherette-covered carrying case, to specifications (Western Mfg.).
- 1. Aluminium chassis and front panel, to specifications.
- 1. Set of 5 plug-in coils, wound to specifications (Rayway).
- 1. 4, 2-5-pin wafer sockets (Tasma).
- 2. 23-plate midget variables (Radiokes, Raymart).
- 1. Small Ormond dial.
- 2. Spring type terminals, 1 red, 1 black (Dalton).
- 1. All-wave R.F.C. (Radiokes, Raymart).
- 1. .00005 mfd. midget mica (Simplex).
- 1. .0001 mfd. midget mica (Simplex).
- 1. .005 mfd. midget mica (Simplex).
- 1. 2 meg. grid leak 1/3-watt (Bifrost).
- 1. 3½ or 5:1 audio transformer (Philips, Ferranti).
- 1. 30-ohm rheostat (Radiokes).
- 3. Banana plugs and sockets (black, red, and green).
- 1. Single circuit 'phone jack.
- 1. Pair headphones (Erpees).
- 1. Phone plug.
- 2. Small knobs.
- 2. Feet 5-wire battery cable, with bush.
- 2. 49's (Radiotron, Raytheon, Mullard, Philips).
- 2. 9v. "C" batteries (Ever-Ready).
- 2. 1½v. dry cells (Ever-Ready).
- Hook-up wire, solder tags, 1 doz. ¼in. bolts and nuts, 2-1½ bolts and nuts, aerial and earth wire.

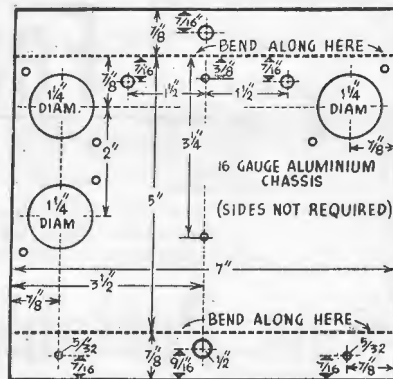
With a medium-length aerial, the centre socket is used for broadcast work and the right-hand one for shortwave. With a long aerial the right-hand socket can be used for both, while with a short aerial the centre socket can be used for both. An earth need not be used unless desired, though it is preferable.

For an earth, a few feet of flex, one end terminating in a plug and the other soldered to a 6 or 8" copper rod, pointed so that it can be easily pushed or driven into the ground, is suitable.

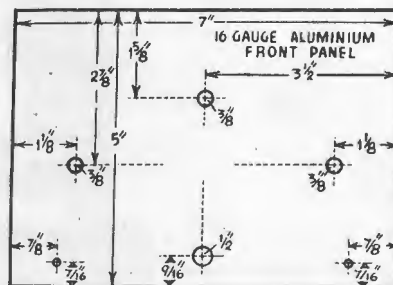
The parts required to build the "Tom Thumb Two" are listed elsewhere, and sketches are also given showing dimensions for preparing the chassis and front panel.

**Coil Details Next Month**

A wiring plan has been included as well, so that most readers will have no difficulty in completing the set from the information supplied. However, for those just making a start in radio, a further article will be published next month outlining the assembly and wiring, and method of winding the coils. (Those who prefer to buy these ready-wound are advised that a special Rayway kit is now available).



Dimensions for preparing the 16-gauge aluminium chassis and panel are shown in these two sketches.

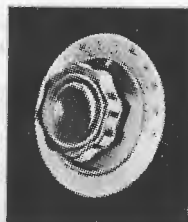
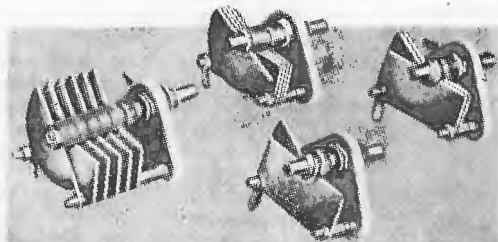


lead attached to the aerial terminal. On all three leads a little slack is left, so that the set can be partly withdrawn whenever the coils are changed.

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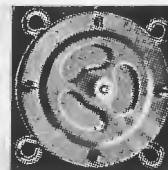
Model	Value	Spacing	Notes	List Price
VC15X	15mmfd.			6/-
VC40X	40mmfd.			6/6
VC100X	100mmfd.			7/-
VC160X	160mmfd. (.00016mfd.)			9/-
(as specified for "Amateur Communications Eight")				
VC250X	250mmfd. (.00025mfd.)			9/6
NC15	(Transmitting) Neutralising,	15mmfd.,		
	spacing, .07in.			7/-
TC40	(Transmitting) Tuning,	40mmfd.,	spacing,	
	.07 in.			8/6

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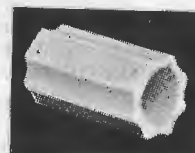
**REGAL MICROPHONES**

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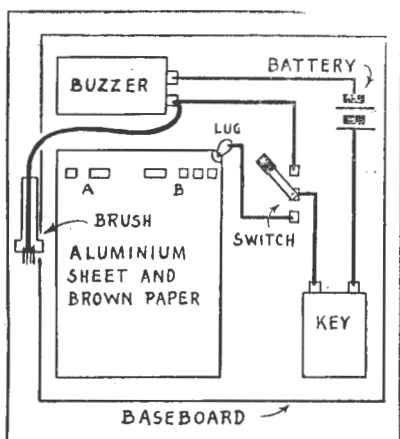


# Radio Ramblings

A page for letters from readers. A prize of 2/6 will be awarded for every technical contribution published.

## An Aid To Better Morse

Almost every month a code oscillator appears in the "Radio World," but as yet no device which will send back code has made its appearance. Anyone endeavouring to learn morse is forced to rely on his shortwave set for practice in listening to code. But, except during certain times, trans-



mitters send at least 12 w.p.m., and no beginner can be expected to follow this. So the following has been evolved as a simple aid for practice in both sending and receiving morse.

On a baseboard about 20" x 18" nail or screw the following pieces of apparatus, in the positions as shown in the diagram:—A piece of aluminium 12" x 10", a morse key, a buzzer, a S.P.D.T. switch and a battery. The battery can be held by an aluminium strip. Under the screw holding the top right-hand corner of the aluminium sheet place a solder lug. Next cut out of a piece of brown paper, the same size as the aluminium, the letters of the alphabet, the numbers 0 to 9, and the punctuation signs, in their morse signals. Make the space of each dot one-third that of each dash (do this very carefully). Paste this on to the aluminium.

Now take an old "Clag" paste brush, and after removing the hairs, make a hole down the centre. This can easily be done with a red-hot steel knitting needle. Run a flexible wire through it and remove the insulation from a small portion at the end. Tie a knot in the wire at both ends of the stick to prevent the wire from slipping. Everything should now be wired up as shown in the diagram.

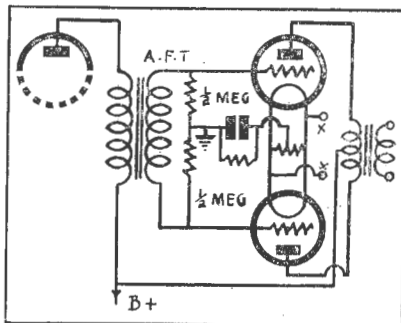
Now for the operation. To practise sending, put switch over so that the aluminium sheet is out of circuit. Simply press the key to operate. To receive code, place switch on other contact. Then depress the key and use the knurled knob on top to keep it there, thereby short-circuiting it. Now, by rubbing the wire brush over the space of aluminium left by the holes in the brown paper, dots and dashes will be produced, whose speed is controllable. The diagram should make everything clear.—K. P. MacKinnon (AW189DX), Bondi, N.S.W.

## Improvising a Centre Tap For P.P. Operation

The first-class presentation of the features, and the variety offered from month to month, stamps "Radio World" as absolutely the best and most complete radio magazine available in Australia, and that is saying a lot, when we see the number of American publications on the bookstalls.

VK2NO is to be congratulated on his excellent series of articles, likewise VK's 3TH and DH. The articles on tonal fidelity are particularly welcome, as I know of no other magazine which regularly publishes similar articles.

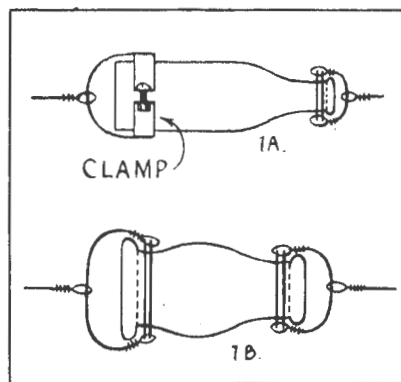
While on this subject of high-fidelity reproduction, the following is a hint which I think may prove useful to any who are contemplating the construction of a push-pull transformer-coupled amplifier. An input transformer for such an amplifier costs anything from £1 to £5,



and even more. Quite a good substitute can be cheaply made from a good quality audio transformer, such as many set-builders have on hand, and two 1/2 meg. resistors, as seen in the accompanying diagram.—John B. Healey, Malvern, Victoria.

## Cheap And Efficient Insulators

Those readers who had insufficient time or patience for boring holes through glass in constructing the sauce bottle and anchovette jar insulators, as described in the July issue,



will be interested to know that there is an easier method of attaching the aerial wire to both ends of the bottle or jar without boring any holes.

The big end of the bottle should be ground rough on a carborundum wheel for about an inch from the end. A strip of emery or sand paper painted on one side with gasket cement is wrapped around the bottle. Now a large hose clamp or earth clip is fitted, to which a strip of metal bent into a half circle is soldered for the aerial wire. As most anchovette jars have a shoulder on the bottom end, it is a simple matter to make the same attachment as to the top end.

It takes very few minutes to construct these insulators with this method, and they are very strong and efficient. As regards insulating qualities, they should be equal to about half a dozen ordinary egg insulators.—H. W. Unger (VK2UJ), Alectown, N.S.W.

## "1937 Empire" Gives Outstanding Results

I am a constant reader of your great radio magazine, and have built many of the sets published in it, and must say, for size and type, the "1937 Empire All-Wave Three" is the most outstanding. I was amazed at the wonderful performance it showed on short waves.

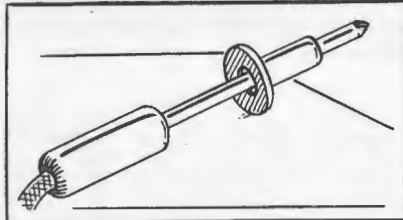
I have logged numerous shortwave stations in all parts of the world, the

strongest being at good speaker strength (the speaker, by the way, is an Amplion K Star midget). I am living in the heart of the city, and have to suffer a lot of interference from traffic, and lights, and many other things, so you see reception is not at its best at any time. In the country this set would, I am sure, surpass many big superhets.—R. G. Cook, Brisbane, Queensland.



**Simple Soldering Iron Support**

A simple and effective rest for an electric soldering iron can be made by



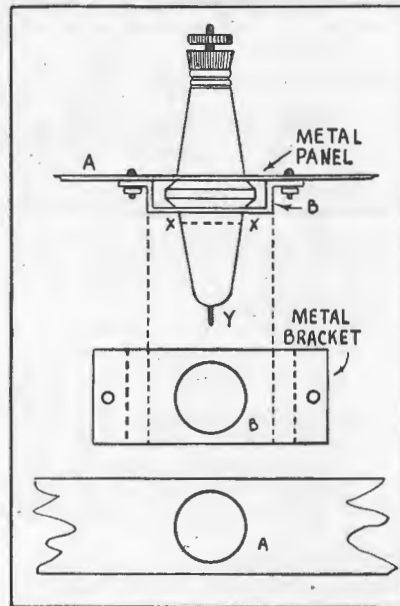
slipping an iron washer over the barrel, as shown in the sketch. When waiting for an iron to heat up, hold or hang it tip upwards. This causes the heat to go to the tip much more quickly than if it is supported horizontally.—J. White, Arncliffe, N.S.W.



**“Stand-Offs” From Spark Plugs**

Enclosed please find postal note to cover cost of six back copies of the “Radio World.” Keep up the good

work, as “A.R.W.” is the best radio magazine on sale. I think “Breaking Into the Amateur Game,” “Radio Step by Step” and “Radio Ramblings” are a great idea, and I also like the



sets described in the magazine. As soon as I build a good s.w. set I will join the “A.W.A.W. DX Club.” It will have to be a battery set, as I live in the country.

As a hint for the “Radio Ramblings” page, good stand-off insulators can be made out of old spark plug cores. All that is necessary is to remove the insulator core and set up as shown in the accompanying diagram.—A. C. Stengert, Manilla, N.S.W.



**“B” Battery Economy Tip**

I must congratulate you on your excellent paper. You are still maintaining the high standard that you started with; but one issue a month is really not enough. It seems such a long time to wait between each issue.

Am using a six-valve vibrator job (dual wave) and a two-valve battery (dual wave) for dxing now. Here is a technical tip that may be of use to some “R.W.” readers, especially those whose receivers (battery-operated) draw a fairly heavy current from the “B” batteries.

Quite a large number of battery-operated receivers have the screens connected direct to the 67½-volt tapping of the “B” battery, but it will be found that if this lead is connected to the 45-volt terminal, the set will run almost as well. In cases where the total “B” drain is around 25 mills. normally, by reducing the screen voltage this will be cut down to about 18 mills., which is quite a

(Continued on page 42)



**“TOM THUMB PORTABLE TWO”**

The ideal radio for the traveler and country man. Very efficient, light in weight, and economical to operate. Tunes in local and interstate stations as well as the principal overseas shortwave stations.

**DX JUNIOR TWO-BAND TRANSMITTER**

The ideal rig for the man just getting on the air, and for the established amateur who wants the best DX at the lowest cost. Write for our special price lists on both the above.

**Dress up your gear with NAME PLATES**

Finished black with brass lettering. Types as illustrated, plus the following: Bandsread, Crystal, B.F.O., C.W., Off-On, Wave Change, Speaker, Pick-Up, Tone, Power, Amp., Phone. Size: 1¼" x ⅜"

4d. EACH

Condenser Scales to Match  
2¼" dia. .... 1/6 ea.  
2" " .... 1/- ea.

- ◉ TRANSMIT ◉
- ◉ PLATE ◉
- ◉ MICROPHONE ◉
- ◉ BUFFER ◉
- ◉ AERIAL ◉
- ◉ KEY ◉
- ◉ CURRENT ◉
- ◉ GAIN ◉
- ◉ MODULATOR ◉

**NAME PLATES**



- ◉ RECTIFIER ◉
- ◉ GROUND ◉
- ◉ RADIATION ◉
- ◉ DOUBLER ◉
- ◉ PHONES ◉
- ◉ MIXER ◉
- ◉ GRID ◉
- ◉ FILAMENT ◉
- ◉ OSCILLATOR ◉

- ◉ RECEIVE ◉
- ◉ VOLTS ◉
- ◉ OSCILLATOR ◉



**A Real Bargain STAND-OFF INSULATORS**

¾" high. Best quality glazed porcelain.

1/- ea.

**New Shipment HOWARD-BUTLER METERS**



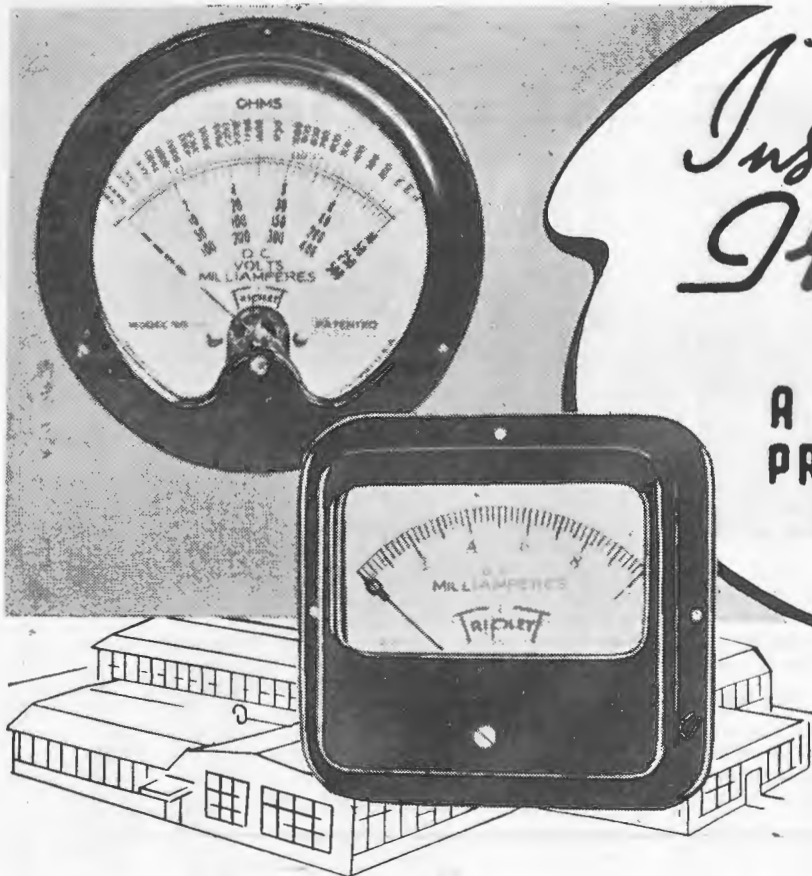
Will operate on either A.C. or D.C. Ranges available:— 0-50, 0-150, 0-250 mills. and 0-10 volts.

8/6 ea.

DO YOU KNOW THAT PRICE'S RADIO SERVICE SPECIALIZE IN SHORTWAVE APPARATUS, AND THAT THE STAFF HAVE HAD YEARS OF EXPERIENCE IN THE “HAM” RANKS? YOU CAN THEREFORE BE ASSURED OF THE BEST POSSIBLE SERVICE IN ALL MATTERS CONNECTED WITH SHORTWAVE RECEIVERS AND TRANSMITTERS.

**PRICE'S RADIO SERVICE**

D. G. McINTYRE  
5 & 6 ANGEL PLACE, SYDNEY.



*Instruments by  
Triplet...*

**A GUARANTEE OF  
PRECISION AND  
RELIABILITY.**

**1937 TEST EQUIPMENT** by TRIPLETT has been designed by Triplet engineers to make servicing simpler, faster and more precise.

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Write for the new 8-page illustrated catalogue giving full details of the complete Triplet range of test equipment and measuring instruments. (This catalogue also features a comprehensive range of the well-known Readrite portable test equipment).

Above is shown the latest 4" square Triplet milliammeter—a D.C. moving coil instrument of the D'Arsonval type, with an extra light moving coil and reinforced strong parts. Uses sapphire jewel bearings; accuracy within 2%.

Above (top) is the Model 521 Volt - Ohm - Milliammeter — an extra large Foundation

instrument, that has a long, easily readable scale. Body 4 7/8", flange 5 1/2", body depth, 1 1/2", scale 3 3/8" in length, knife edge pointer. Moulded bakelite case, flush or projection mounting. Attractive design, rugged construction, and accuracy is guaranteed within 1%.

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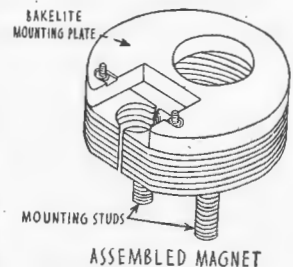
Please send me, free and post free, a copy of your latest illustrated catalogue giving details of the latest Triplet and Readrite instruments and test equipment.

Name .....  
Address .....

**Why Accuracy Can be  
Guaranteed within 2%  
or less**

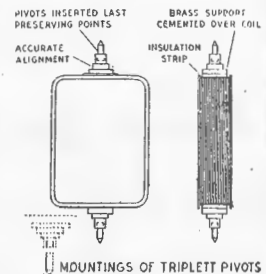
**MAGNET CONSTRUCTION**

★ The magnet construction of Triplet Meters is shown above. Not one piece, but seven separate segments — each segment of selected stock, punched, hardened, peened, and gauged for accuracy. This modern method of construction ensures maximum production accuracy.



**MOUNTINGS OF TRIPLET  
PIVOTS**

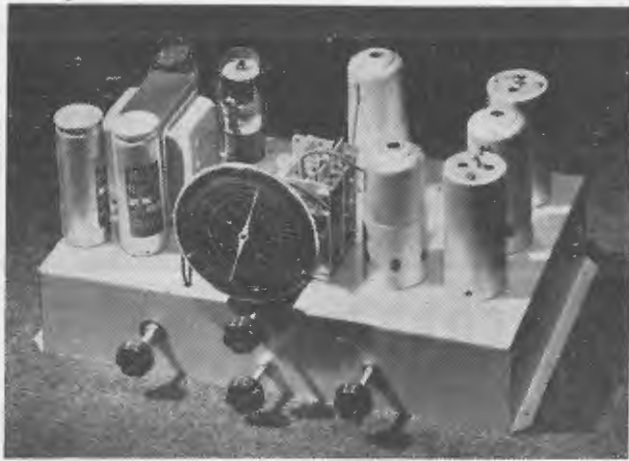
★ Triplet's method of pivot-mounting as illustrated, ensures true alignment of moving element without strain and with maximum insulation against breakdowns. The pivot points are protected perfectly by the method of assembly — attaching them just before inserting in their sapphire jewel bearings.



**TRIPLET**  
*Precision*  
**ELECTRICAL INSTRUMENTS**

# Wiring And Aligning The . . . . .

## Sky-King Dual-Wave Five



The wiring and alignment of the "Sky-King Dual-Wave Five," featured in last month's issue, are outlined below.

In last month's article, the assembly of the "Sky-King Dual-Wave Five" was outlined in detail as far as the completion of the heater and rectifier wiring. The remainder of the wiring is not difficult to complete, especially as it is shown in detail in a sketch included with this month's instalment.

### Earth Line Is Next Step

The next step is to put in an earth line of 14 or 16 gauge tinned copper wire. Next, commencing at the plate of the 6A7 mixer oscillator, wire the first i.f. transformer, then the pentode section of the 6B7S, second i.f. transformer, 6B7S diode, 6C6, and finally the 42. The leads from the i.f. transformers are all coloured differently and are identified on the wiring diagram, while the under-socket connections of the valves are given in a sketch in last month's issue.

All pigtail components are taken point-to-point, except in cases where a support is required in the form of an insulated strip carrying a solder tag or tags. These strips, the locations of which are shown on the diagram, are supported clear of the chassis by means of 3/4" bolts and brass spacers.

### Braiding For Volume Control Leads

All wiring should be as short and direct as possible, and well-spaced. The three leads from the volume control should all be covered with shielding braid for their entire lengths, the braid being earthed at various points. Note also that in the

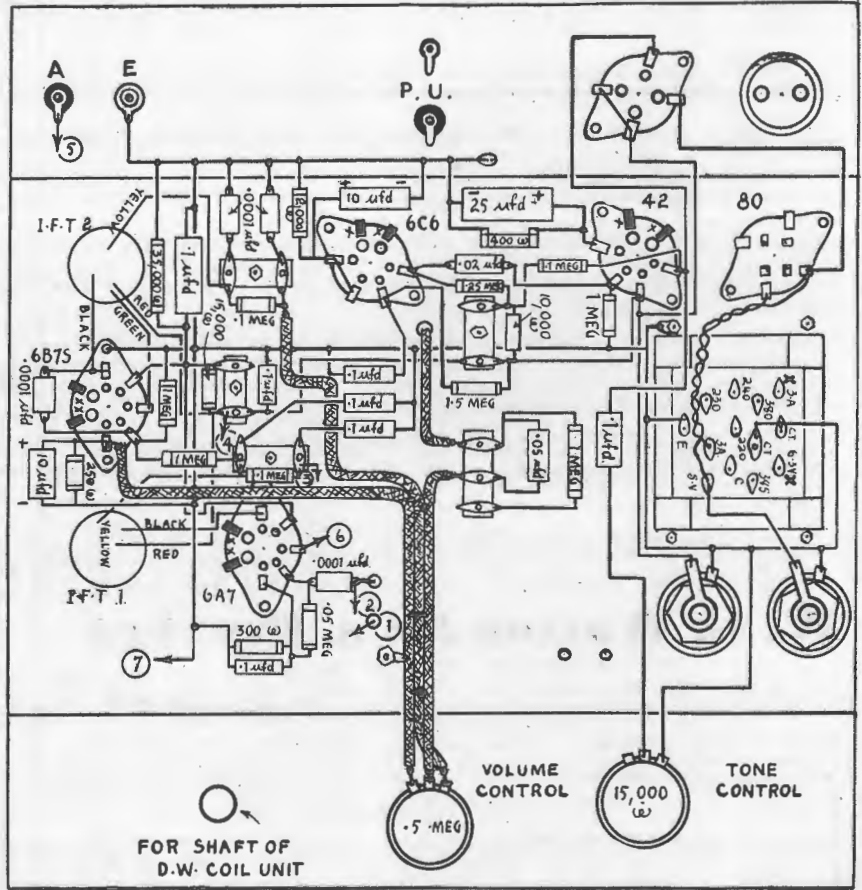
case of each of the three dry electrolytic condensers, the end painted red or otherwise indicated as being positive should connect to cathode.

### Wiring The Coil Unit

When the wiring is finished as far as possible without mounting the coil unit, this should be bolted in place and wired. In the under-chassis dia-

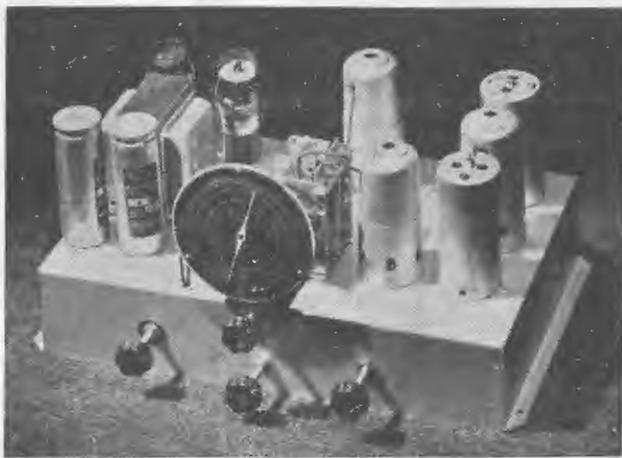
gram, leads going to the coil unit are all numbered, and the destinations of these leads will become apparent when the diagram is studied in conjunction with that of the coil unit, published on page 4 of last month's issue.

The numbered leads and their destinations are as follows:—  
1—Lead from aerial section of



The complete under-chassis wiring of the "Sky-King Dual-Wave Five" is given in this sketch.

**You Can Build . . . The**



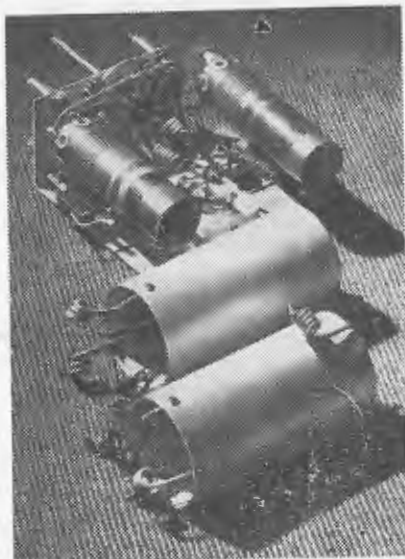
**“SKY-KING”  
DUAL-WAVE FIVE**

for only

**£10-19-6**

(Complete with Valves and Speaker)

**NEW  
FOXRADIO  
COIL KIT**



Above is illustrated the FOX-RADIO Coil Kit responsible for the outstanding success of the “Sky-King Five.” An improved type of dual-wave coil kit, it uses a minimum of shielding, resulting in greatly-increased all-round efficiency.

FOXRADIO type DKI 465 k.c. Coil Kit, comprises Dual-Wave Aerial and Oscillator Coils, with two iron-core 465 k.c. intermediates.  
Retail Price ..... **65/-**

For DX work on both broadcast and shortwave, for volume and for tone, the “Sky-King Dual-Wave Five” is the finest 4/5 we have ever tested. Using finest quality parts throughout, it can be built for only £10/19/6. **ORDER YOUR KIT NOW!**

**“Amateur Communications Eight”**

We are specialising in kits of parts for this outstanding amateur receiver (featured in the June and July issues of “Radio World”). Write for our detailed quote.

**“Tom Thumb Portable Two”**

Build a “Tom Thumb Portable Two” for the summer—it gives all-wave coverage, is completely self-contained, and operates anywhere. Save money by writing for our quote for a kit of parts.

**DX Junior Transmitter**

This crystal-controlled transmitter is ideal for the man just betting on the air, or for the amateur who wants the most DX at the lowest cost. Write for our special complete kit price.

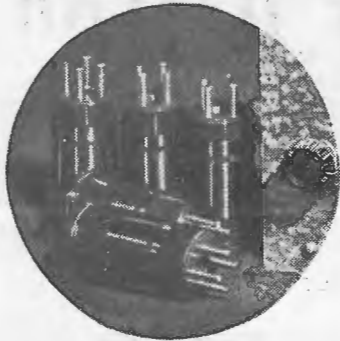
SEND NOW FOR THE  
**1937 FOXRADIO CATALOGUE**

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## "Tom Thumb Portable Two"



### USES RAYWAY COILS

To get results equal to those obtained with the original "Tom Thumb Portable Two," it is essential to use a set of "RAYWAY" Coils, as chosen by the designer for their extremely high efficiency.

Each of the five coils comprising the "Tom Thumb" Kit is precision wound on plug-in formers of a special low-loss material, and is colour-coded to "Radio World" specifications.

Complete kit of 5 coils packed in box **21/-**

Complete coil kits are available for any of the following "Radio World" shortwave and all-wave receivers:—

- "All-Wave All-World Two"
- "Eaglet Shortwave Two"
- "Empire Shortwave Three"
- "All-Wave Bandsread Two"
- "Empire All-Wave Three"
- "Amateur Communications Eight"
- "Jones' Super-Gainer"

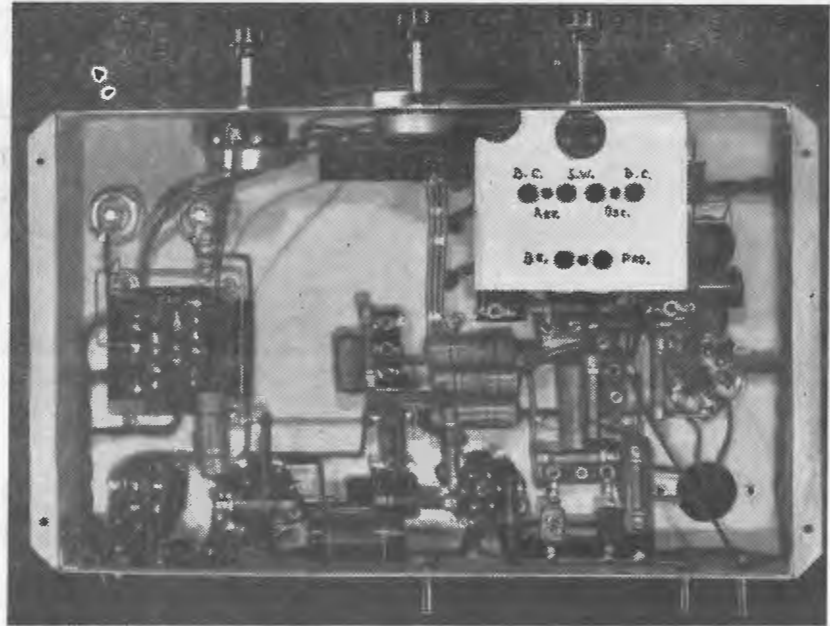
(Note: Due to the use of more expensive bakelite in the latest "Rayway" formers, all previous prices advertised for single coils are cancelled).

If unobtainable from your local dealer, write direct to:—

### Standardised Products

Note new address:—

629 PARRAMATTA ROAD,  
LEICHHARDT, SYDNEY,  
N.S.W.



An under-chassis view of the completed receiver.

condenser gang. Is taken to lug on wave-change switch to which is attached the yellow lead (this is removed).

2—Lead from oscillator section of condenser gang. Green lead from wave-change switch is soldered to this point (i.e., to side of oscillator grid condenser to which is attached lead from oscillator section of gang).

3—Lead from this point is taken to lug labelled "Aer. grid return (for a.v.c.)" on diagram of coil unit.

- 4—To "B+ Osc." lug on coil unit.
- 5—Is red lead from unit.
- 6—Is black lead from unit.
- 7—To earth busbar on unit.

#### Check Of Wiring, Essential

After all coil unit connections have been made, the wiring should be thoroughly checked. The chassis is then reversed, and the grid clips and control knobs fitted. Next, the valves and speaker can be plugged in, the aerial and earth connected up, and the set switched on.

If the rectifier shows any signs of distress in the form of flashes or a blue glow, then switch off immediately, as this indicates a serious error in the wiring. If, however, the heaters all light up and a faint hum is heard from the speaker, it can be assumed that everything is in order, and that the set is ready to be aligned.

#### Aligning The Set

To do this, set the wave-change switch to broadcast and turn the volume fairly well up. There should

now be a fair amount of noise coming through the speaker.

The chassis can now be inverted and the broadcast band alignment completed. Set the broadcast aerial and oscillator trimmers about half-way out (see under-chassis photo) and the padder screws about one-quarter way out. Next, tune in a station somewhere around 220 metres and adjust the aerial trimmer for best results. Then swing over to the other end of the band and tune in a station on about 500 metres.

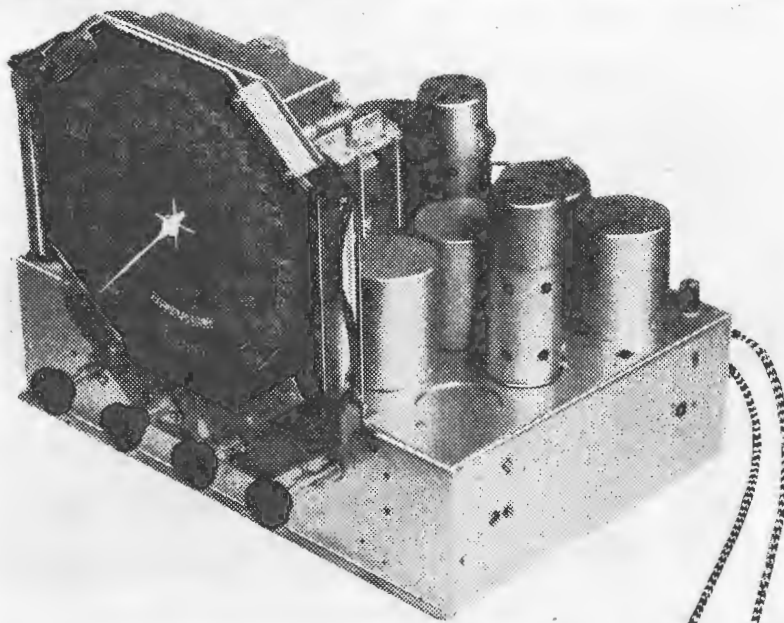
The two condenser sections of the padder used are connected in parallel, and so both screws can be adjusted. The best scheme is to set one almost full in and make the adjustment required with the other. This screw should be turned gradually while the dial is being rocked backwards and forwards over the station. A point will be found where volume is loudest, and this is the correct setting.

The entire process can be repeated, when the alignment should be fairly exact. The i.f. trimmers can now be carefully adjusted, though the original settings should be marked in case it is desired to return to them.

Finally, the shortwave aerial and oscillator trimmers can both be set about 1½ turns out, and then the former adjusted for best results somewhere around the 25-metre band.

#### Receiver Tracks Excellently

An important feature of the Fox-ray coil kit used is that it tracks excellently right across both wave-bands, maintaining high sensitivity all over the dial.



# Operate your radio with a **CLYDE** "A" Battery—*and save MONEY*

**N**OT only will the "quality" and performance of your radio work improve by using a genuine Clyde battery, but the cost will decrease because of the long life and steady delivery from a Clyde rechargeable battery. Clyde Radio Batteries are fully guaranteed.



# CLYDE

RADIO BATTERIES

Obtainable in all sizes from radio dealers and garages throughout Australia.

**THE CLYDE ENGINEERING CO. LTD.**

61-65 Wentworth Avenue, SYDNEY.

Associate Distributors:—

HIPSLEYS PTY. LTD., 27 Palmer St., Sydney. FL 4141.

Victoria: 566 Elizabeth St., Melbourne.

Queensland: 111 Albert St., Brisbane.

South Australia: 155-7 Grenfell St., Adelaide.

West Australia: Dalgety & Co., William St., Perth.

Tasmania: Willis & Co. Pty., 7 Quadrant St., Launceston.





The new Crown factory, located at 51 Murray Street, Pyrmont.

**S**OME thousands of pounds worth of up-to-date plant, installed in a new factory giving over five times the floor space available at their last location, provide an excellent illustration of the rapid progress that is being made by the Crown



A section of the machine shop.

Radio Manufacturing Co. Pty. Ltd., under the managing directorship of Mr. J. B. Phillips.

Commencing operations in 1930 on a very small scale, the organisation has expanded steadily ever since. The need for more space has necessitated three shifts, the latest location

being at 51 Murray Street, Pyrmont.

#### Original Winder Is Still Operating

From a single winding machine designed and built by Mr. Phillips, more and more equipment has been added, so that now the factory is fully equipped to manufacture every single item that is produced. An interesting sidelight is that the original winding machine upon which the present organisation was founded is still giving excellent service, and is, in fact, preferred by some operatives to the latest imported equipment!

The factory has a floor space of over 7,000 square feet, and is well-balanced in layout and has ample natural light. It is divided into three main departments — production, machine shop and store.

#### Production Department Is Largest

The production department, which is the largest, is sub-

# Crown

## New £10,000 Company Commences Operations In Modern Factory With Up-To-Date Plant.

divided into sections for the assembly of components such as dials, I.F. transformers and coils, kit-sets, resistors and voltage dividers. No effort is spared to maintain both quality and uniformity in all components manufactured. As an illustration of this, all parts used for the assembly of padders and I.F. bases are thoroughly cleaned in pure alcohol and are subsequently assembled by operatives with gloved hands. As well, rigid tests are applied to all components that are produced.

#### Rigid Supervision Maintained

Each section of the production is under the personal control of an experienced leader in the line he is supervising, ensuring efficient manufacture and assembly of the lines produced.

In addition to the production department, a well-equipped machine shop has been established, and the array of auto-



Mr. J. B. Phillips, managing director of Crown Radio Manufacturing Co. Pty. Ltd.



# Radio Opens New Factory

A view of the padder and i.f. transformer assembly benches, which form a section of the production department, is shown below.

matic screw-making machines, capstan and turret lathes, drilling machines, power presses and other machinery essential to efficiency of operation ensures accurate engineering and assembly of the many components handled. A spray booth is included in the machine shop, providing an attractive rust-resisting finish to those lines which must be externally treated.

Altogether, the entire organization reflects great credit both on Mr. Phillips and Mr. Frank Jones (general manager and secretary), both of whom have every reason to be optimistic regarding the future of the Company.

## New Philips Cathode Ray Tube Has 2 $\frac{3}{4}$ -Inch Screen

As a result of special research in the Philips Laboratories, a new cathode ray tube has been added to the Philips range—one which is small and economical, yet embodying features which previously could be expected only in a larger tube.

A length of only 6 $\frac{1}{2}$  inches and a screen diameter of 2 $\frac{3}{4}$  inches—these are the remarkable dimensions of the DG7-1, designed by Philips to meet the demand for a low voltage tube with a useful screen diameter. This tube has been designed for double electro-static deflection, and the maximum deflection sensitivity for an anode 2 potential of 500 volts is 0.3 m.m./V.

The screen fluorescence is green, and the tube is fitted with a type "P" base. An additional screw terminal on the side of the base provides separate contacts for each electrode, enabling push-pull circuits to be used in the associated apparatus.

It will undoubtedly prove popular in the design of portable oscilloscopes, and in general will extend the

(Continued on page 42)

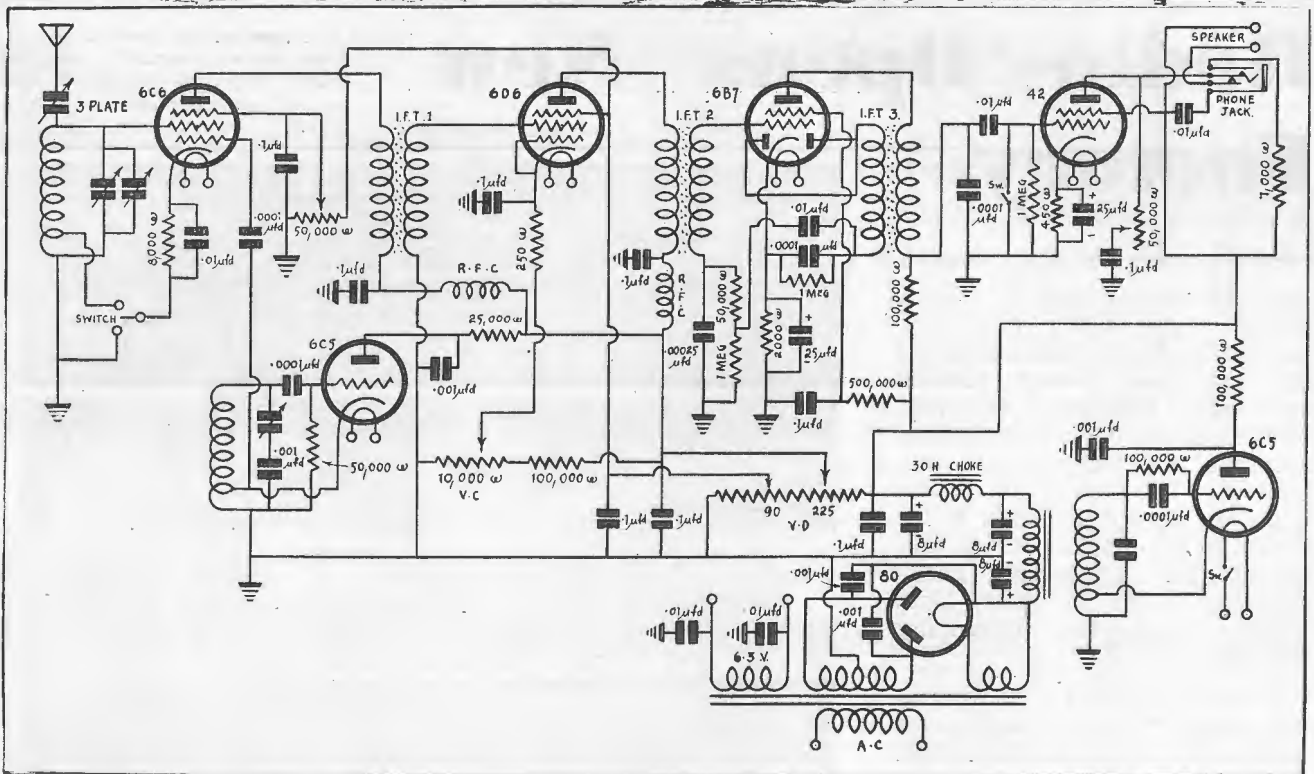


Below are shown the large power presses which form part of the machine shop equipment. They are used to stamp out all pressed metal parts used in Crown products.



In this section (below) of the production department, dials are assembled under the mass production system, with inspectors checking every stage of the assembly.





# S.W. Editor Operates Special 7-Valve Super. Own Design And Construction

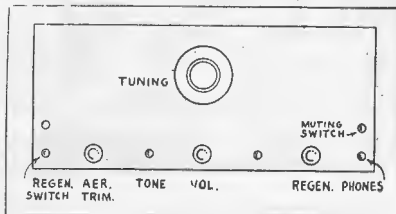
By ALAN H. GRAHAM

THE receiver I am operating at present is a seven-valve superhet, using a 6C6 first detector, with optional regeneration; 6C5 electron-coupled H.F. oscillator; 6D6 i.f. amplifier; 6B7 reflexed as 2nd i.f. amplifier, second detector and audio amplifier; 42 audio; 6C5 beat oscillator (for c.w.), and 80 rectifier.

As can be seen from the circuit diagram, the first detector is coupled to the H.F. oscillator through the suppressor grid, which is connected via a .0001 mfd. condenser to the cathode tap of the oscillator coil. This is the best method yet tried by the writer, and gives efficient transference from 7-90 metres.

### Regeneration On First Detector

Regeneration is added, and can be cut in or out as desired by use of a



switch. It is controlled by a 50,000-ohm potentiometer in the screen lead.

The 6D6 first intermediate frequency amplifier is quite orthodox in design, and uses Radiokes litz-wound i.f. transformers.

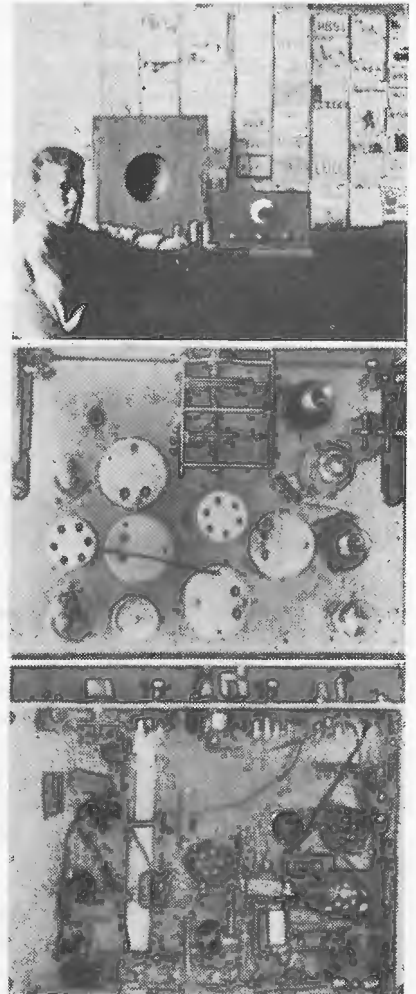
### Reflexed 6B7 Gives More Gain

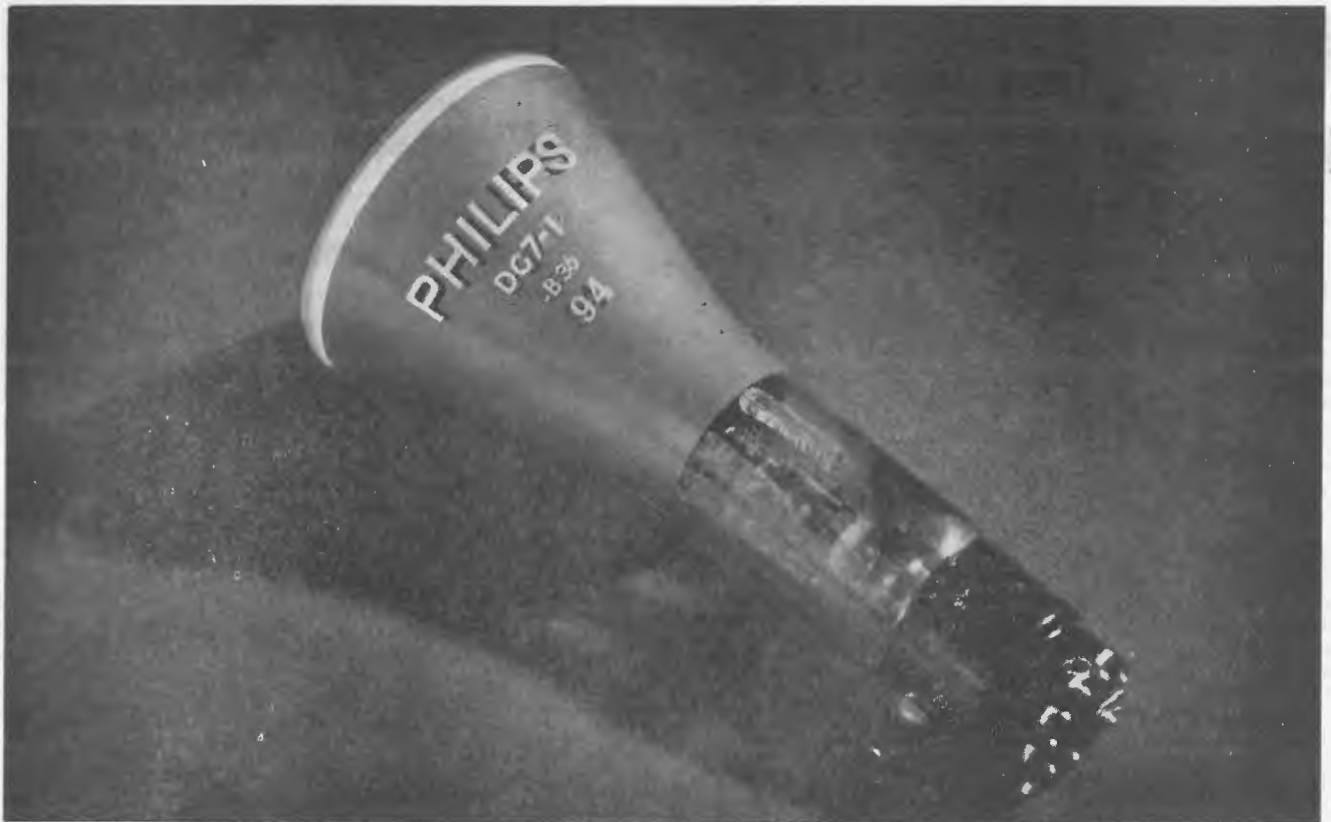
The 6B7 is reflexed, and considerably more gain is obtained by using this circuit, which should present no difficulties in operation. The switch between grid and earth of the 42 is used for muting purposes. The grid leak and condenser for the b.f.o. are mounted inside the coil can.

### Separate Power Pack Used

The coils used are of the plug-in type, full details being given elsewhere. The power pack is a separate unit, and is connected to the set by a cable and 6-pin plug.

The circuit of Mr. Graham's receiver is shown above, with (below) some views of the author and the set he uses for his monthly "Radio World" report. The panel layout is shown in the sketch on the left, while coil details are given on page 40.





# SEEING IS BELIEVING - - - - -

**P**HILIPS announce the DG7-1—a new high vacuum cathode ray tube, designed for double electrostatic deflection, with these outstanding features:--

- ... 2½ inch green fluorescent screen.
- ... overall length of 6½ inches.
- ... separate contacts for each electrode.
- ... operates with 500 volts on anode 2.
- ... fitted with Philips "P" type base.

The DG7-1 is the result of special research in the Philips Laboratories to meet the demand for a small tube with a useful screen diameter, and provides an economical basis for the design of portable oscilloscopes to satisfy modern requirements.

## SPECIAL SCHEDULE

### Cathode Ray Tubes

#### (ELECTROSTATIC TYPES)

DG7-1x	2¾" green screen	£5/-/-
DG9-1x	3¾" green screen	£7/10/-
DB9-1	3¾" blue screen	£10/-/-
DG16-1x	6½" green screen	£20/-/-
DG16-2	6½" green screen	£20/-/-
DB16-1	6½" blue screen	£23/10/-
3962x	8⅞" green screen	£29/10/-
DW39-1	15⅞" white screen	Subject to Quotation

#### (AMERICAN TYPES)

906x	3" green screen	£7/5/-
908	3" blue screen	£10/-/-
904	5" green screen	£24/-/-
903	9" green screen	£58/10/-

x Available from stock.



# PHILIPS CATHODE RAY TUBES

# Breaking Into The Amateur Game . . 8

IN the article devoted to c.w. transmitters published last month we found the manner in which the various units are combined to assemble a complete transmitter, the type and number of units depending largely on the stability required. All these factors apply in precisely the same manner to a radiophone or telephone transmitter, and it may be said that practically any good c.w. 'mitter may be quite readily adapted to 'phone or modulation purposes.

The chief consideration to be borne in mind when arranging for modulation is that of stability. By this is meant that it is quite possible to "get by" with a set-up which, for instance, lacks sufficient grid driving power in one or more stages when only c.w. transmissions are desired—but when high percentage modulation is applied, this same arrangement would break up the carrier wave under heavy modulation conditions.

In its elementary form, modulation by the amplitude method is the process of varying the amplitude of the transmitted radio-frequency wave in accordance with the strength of the sound waves actuating the microphone. The degree of amplitude of the modulation envelope is usually expressed in percentage. Thus, one hundred times the maximum variation of the modulated envelope less the unmodulated value, divided by this unmodulated value, is the percentage of modulation.

### Calculating Percentage of Modulation

For example, Fig. 1 illustrates a so-called "modulation envelope"—the modulation cycle, for the purpose of simplicity, being that of a pure sine wave. Therefore, applying the theory, we have "8"—the modulation envelope peak, less the unmodulated value "5" and multiplied by 100, thus:—

$$8 - 5 = 3. \frac{3}{5} \times \frac{100}{1} = 60\%$$

modulation on peaks. If the modulated value (peak value of envelope) is 10 instead of 8, we have:—

$$10 - 5 = 5. \frac{5}{5} \times \frac{100}{1} = 100\%$$

and so on for different peaks of the modulation envelope.

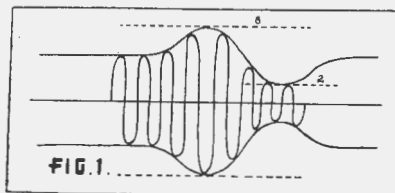
By studying this system of reckoning the modulation percentage, we will see how trouble must occur if the envelope peak is made to rise beyond the resultant 100% mark. If the sine wave modulation be carried beyond 10 on the upward peak, it necessarily follows that it must go

The design of transmitters for operation on telephony is covered in this instalment—the eighth of a series written for "Radio World" readers . . . . .

By GEORGE THOMPSON (VK3TH)  
and IVOR MORGAN (VK3DH)

below zero on the downward peak, since it is supposed to be linear sine wave modulation. We cannot have less than nothing—even in radio theory—therefore the modulation is no longer linear, and we are troubled with carrier shift or severe distortion, most probably both.

A transmitter that is modulated more than 100% also spreads over a greater amount of radio frequency territory, with consequent interfering qualities, as extra side bands are created. It is for this reason that present-day amateurs are required to see that their transmitters do not modulate more than 100%.



Another important factor that should not be overlooked is that of linearity of the modulator itself. The modulator must be capable of producing an audio frequency power equal to half the d.c. input power to the radio frequency amplifier. One can see from this that the expression "over-modulation" is not always used in precisely its right sense.

### Overloading Brings Distortion

Should the modulator become overloaded in some manner prior to the peak being reached, whereby the d.c. power to the modulated amplifier is halved, then modulation will of necessity be distorted. Likewise, if the modulator audio frequency voltage does not reach the d.c. value of the voltage applied to the modulated amplifier before overloading occurs, distortion is the result. It is quite possible to produce 100% modulation in a transmitter suffering from one or both of the foregoing faults, but the

modulation cannot be linear, that is, undistorted.

### Three Main Modulation Systems

There are three major methods of modulation in use at the present time that enjoy about equal popularity; they are Plate, Grid and Suppressor Grid systems. The first may be either the single choke Heising or a push-pull modulator coupled via a transformer to the modulated amplifier, or, thirdly, we may have two chokes dividing the d.c. load, but common with respect to the audio frequency signal. Space will not allow of a full discussion on the various merits or failings of the many ways that these fundamental methods are applicable, but the theory of one applies to them all, fundamentally.

Taking as an example the single choke Heising system. Supposing the modulated amplifier is operating at a plate potential of 400 volts at a current of 60 m.a. The power input is then 24 watts. We shall, therefore, design our modulator to have a power output of 12 watts undistorted audio frequency power and be capable of delivering an audio frequency voltage of say 450 to 500 volts on peaks, that is, when the undistorted a.f. power output reaches 12 watts.

Such a valve will, of course, require a certain grid driving voltage at these figures and the usual preceding speech amplifier in order to raise the microphone output voltage to the required level to do this. This part of the situation will be dealt with separately at a later date, since in effect we have to work backwards from the modulated amplifier to the microphone in the designing of it.

A very reasonable question that could be asked at this stage is: "What is done with the difference between the modulated amplifier plate voltage and the modulator plate voltage?" The answer is: We insert a

resistor shunted by a good a.f. bypass condenser (4 mfd.) between the modulation choke and the plate input circuit of the modulated amplifier. The reason for making the modulator voltage higher is because of the impossibility of obtaining a.f. voltage from a modulator equal to the d.c. plate voltage applied.

Dealing with the other plate modulation method, we have a push-pull modulator feeding into a common output audio frequency transformer. The ratio between the centre-tapped primary and the straight secondary must be arranged so that the requirements of our first example are met, namely, higher voltage across the secondary at peaks than the d.c. potential to the modulated amplifier.

Now, in either or both of these examples there is another most important factor that must not be overlooked. The input power to the modulated amplifier is 400 volts at 60 m.a., therefore from Ohm's law we see that—

$$\text{Resistance} = \frac{\text{voltage}}{\text{current in amps.}}$$

$$\frac{400}{60 \text{ m.a.}} = \frac{20}{1} \times \frac{1000}{3} = 6,666 \text{ ohms.}$$

That is, the d.c. resistance of the modulated amplifier is approximately 6,666 ohms, and since a class "C" amplifier presents almost a d.c. resistance, the load resistance on our modulator is 6,666 ohms. All a.f. power amplifiers must work into a suitable load resistance value, and 6,666 ohms is the load in each case on these modulators.

The single choke set-up has no alternative; the load resistance is there and the modulator or valve must be chosen which will come up to the power and voltage requirements when working into this load. Otherwise the modulated amplifier must be changed to suit the modulator. When the push-pull modulator is working into a transformer as in the second instance, the transformer ratio, primary to secondary, determines the actual load resistance presented to the modulator from the modulated amplifier through the transformer.

Taking the example, since the impedance ratio varies as the square of the turns ratio, 1.2:1 turns ratio would give the modulators an impedance of approximately 10,000 ohms to work into (plate to plate). The plate-to-plate voltage would have to be about 500 volts, which, when stepped down, would appear as about 450 peak at the modulated amplifier. Power requirements will again be 12 watts.



## Can you detect the difference?

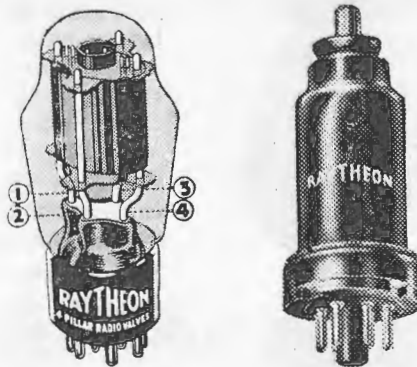
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### Grid Bias Modulation

Turning now to the grid bias method of modulation, the modulated amplifier grid circuit is coupled through a transformer to the modulator. The actual set-up is in the following order: From the modulated amplifier grid, through the radio frequency coupling circuit (r.f. choke or tuned grid coil, depending on the method of coupling), thence through the modulation transformer secondary to the grid bias supply. A radio frequency by-pass condenser of about .0002 mfd. is connected across the modulation transformer secondary to complete the r.f. circuit, but does not affect the audio frequency component.

In this case we can economise in audio frequency power, since very little power is required to operate the modulated amplifier, but a great disadvantage is the low efficiency of the modulated amplifier stage, under correct operating conditions for grid bias modulation. Theoretically, the a.f. voltage built up across the modulation transformer secondary acts against the grid bias voltage on positive peaks, and effectively reduces the bias at audio frequency.

The reason for the low efficiency is the necessity of adjusting the modulated amplifier to run with a very low grid current, with a resultant low

plate efficiency—in practice, from 30 to 60% at 100% modulation.

### Suppressor Grid Modulation

Approaching the third major system of modulation, we deal with the suppressor grid method. The plate efficiency in this system is also on the same low level as control grid modulation; but since the audio frequency signal is applied to an independent grid, leaving the usual control grid to take care of the radio frequency excitation component, the system is more readily handled. The suppressor has the effect of controlling the plate power output in a linear manner over a range of negative voltages, dependent upon the size and type of valve employed. The average operating condition of the average suppressor grid valve is —45 volts d.c. bias on the suppressor.

The actual circuit arrangements are similar to the control grid modulation method, except that the suppressor is by-passed at the valve socket and is therefore at earth potential as regards radio frequency voltages. This by-pass is, of course, small (.0002 mfd.), so as to avoid affecting the a.f. signal. The same modulator as for control grid modulation will be correct for suppressor grid operation.

In operation, the modulated amplifier is adjusted for maximum efficiency with the suppressor bias re-

duced, and then the negative bias voltage is raised at the suppressor unit until the output power falls to approximately half. The a.f. voltages developed across the modulation transformer then act in opposition to the d.c. bias voltage to raise the plate efficiency—100% modulation being possible when the negative suppressor voltage is reduced to the point where maximum plate efficiency occurs at the a.f. peaks.

Since the variation of suppressor bias controls the plate efficiency in a linear manner, it is quite a simple matter to obtain 100% distortionless modulation with the modern suppressor grid valves.

Although it was said earlier that there were three major methods of modulation, the first system (plate modulation) has many "relations," so to speak. A class "B" or class "AB" modulator will function in exactly the same way as our example of a class "A" push-pull modulator did, with the necessary alterations to transformer ratio.

### Controlled Carrier Modulation Popular

Controlled carrier modulation, being a method which economises in power and lessens interference, is a popular adaption. In practice, this controlling arrangement may be applied to most ordinary methods of  
(Continued on page 33)



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# 25 Years In Amateur

## Radio .. (5)



The old original A2NO station in 1926, then located at Cremorne, Sydney. Immediately in front of the author are the crystal oscillator and buffer stages, with a T250 final and MRI rectifiers on the right.

**M**Y own fly-power gear wasn't powerful enough to reach the Antipodes, and so I teamed up with a pal, Bloxam of G5LS, and punched the key from this South London station for a while until once again, business affairs demanded a move.

From "ham" radio I graduated to the more serious side of radio transmission by securing a position with the old British Broadcasting Co. as maintenance engineer, being appointed to the Leeds-Bradford relay in Yorkshire. This relay centre fed two transmitters about 15 miles apart, from the control point and main studio in Leeds, and apart from regular station and control duties, much of the work was in connection with OB's.

I was often to be found lugging amplifiers and microphones about, to Harrogate, York, Scarborough, and various theatres. The work proved interesting, and broadcasting apparatus as used to-day brings a smile at the thought of the antiquated gear of those days.

An amusing but rather disconcerting incident occurred one day, when my duty schedule called for the day at Bradford. The transmitter there was housed on the top floor of a dilapidated warehouse, and once the engineer on duty started up at 11 a.m., he was marooned there without a break on his lonesome until midnight. A motor-cycle combination was available for transportation,

but this was such a "grid" that one preferred to use the train and travel comfortably.

### The Wrong Train!

That morning was a murky, foggy one as I waited on the Leeds station platform for the train. It was due out at 10.25 a.m., but no train showed up until nearly 10.40 a.m. Taking a seat along with morning paper, I glanced up to note that the train was apparently making up for lost time, as, contrary to usual, she hurtled straight through Shipley junction, just outside Bradford.

Then along the corridor came a ticket collector. I handed over my Bradford ticket, whereupon the gold-braided one remarked that I "would be a h— of a time getting there, as this was the Carlisle express!" Carlisle—non-stop—about 150 miles north, and I was due to get that transmitter radiating before 11.30!

At Skipton, north of Bradford, the express stopped to pick up two special passengers, and I nipped out. A train was just leaving for Bradford on the opposite platform, and I made it. Alas, it ambled into Bradford at 11.50 a.m., and I reached the station at almost mid-day.

All land-line indicators from control in Leeds were down, and when I got through to the Chief, his observations were sulphurous to a degree. Furthermore, an ambulance was screaming its way toward me in case I had been electrocuted. Any-

In this instalment the author tells of an impulse that brought him half-way across the world to Australia, and of his early experiences in amateur radio here.

By **DON B. KNOCK**

Radio Editor, "The Bulletin."

way, I never did know whether Chief Engineer Eckersley in London believed the faithful report I returned regarding the fog and the train mix-up, but things never seemed to be the same. Complete silence from a B.B.C. station with dealers waiting to demonstrate receivers, to say nothing of housewives missing their morning cookery chat, was akin to sacrilege!

### Back To Australia

A year of broadcasting experience passed, and once again I sought a change. Radio was moving ahead quickly, but somehow the wanderlust had not worked off since war service and subsequent seafaring.

Back in the home town in Lancashire, I passed one day a shipping office. Australia loomed large on a poster, and without hesitation in I walked and booked a passage on a ship leaving London in three weeks. It was an adventurous step, inasmuch that by the time I had worked out all it would cost me, I would arrive in Sydney with a sadly depleted pocket-book.

Again I spent most of that passage "upstairs" with "Sparks." Out of odds and ends I conjured up a short-wave receiver, and we had much fun logging amateurs from everywhere. By the time I reached Sydney in April, 1926, the radio business had been through a bad slump for some reason or other. Nevertheless, through the agency of a Sydney friend I had met in London, I stepped into a job of sorts in a little wireless business in the city and began to look around.



Amateur radio naturally came up again. Many of the early Sydney amateurs were already known to me by QSL correspondence, and in short order I was invited to attend a W.I.A. meeting in the old rooms in Elizabeth Street. It was there I met a really fine bunch of fellows, simply brimming with hospitality, and in those days a "G" ham was a novelty. Here was amateur radio plus good fellowship as I had always imagined it to be.

#### On The Air As A2NO

After that meeting, two members approached me and asked if I intended getting on the air. Could a duck swim? These two were brothers; one was the original A2TM, Haswell Turner, and the other, Harry. The latter had no "ham" ticket, couldn't punch a key, but had a lot of apparatus and enthusiasm. The result was that I joined forces with Harry and quickly approached the P.M.G.'s Department for a licence.

After due consideration, Mr. Malone, the genial Chief Inspector of Wireless in Melbourne, granted me a special licence on the strength of my old English licence, on condition that I took the A.O.C.P. in the prescribed time. There was not much argument regarding power for Australian amateurs in those days, and

in mid-1926 A2NO went into action with 250 watts at a location in Cremorne, Sydney. Since then the call 2NO has hardly ever been off the air in various locations.

That pioneer station piled up some good work. Harry did the engineering, and my job was handling the dials and key. In short order I was yarning away on 32 metres with old friends back in England, and life took on a very pleasant aspect. It was at that station that much experimentation was done with antenna systems, and soon there sprouted between the two lofty sky-sticks what was really the first "Zepp" feed antenna in this part of the world before "QST" began to deal with the idea.

Try as we would, we could never clean up the note from the Hartley transmitter, despite expenditure of much cash on filter condensers. We even made up a huge "electrolytic" with aluminium pie dishes, glass strips, and borax, and it withstood 2,000 odd volts!

It was only long afterwards that we discovered the reason for that bad note, which sounded something like tearing silk, but reached all over the world. The high voltage transformer stood hard up against the "shack" wall, which carried a shelf holding the transmitter, with large

diameter copper tube coils on glass rods.

It was a massive ex-navy transformer, and it had loose laminations that chattered. The vibration was carried up the wall to the tank circuit, and as the coils merely rested on the glass tubes, they shimmied slightly, but quite enough to modulate the signal almost as if raw A.C. were applied to the plates of the old T250's. If we had only rested that transformer on shock-absorbing material away from the wall, the note would have been at least smooth R.A.C.

#### Two Years Of Key Punching

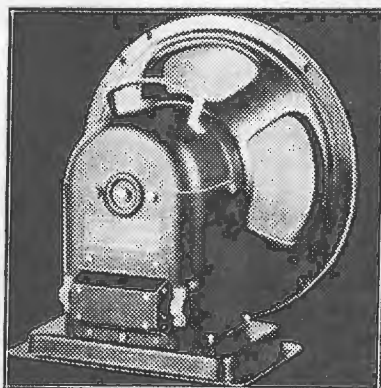
That year and 1927 I seldom slept. The DX bug bit hard, and the week-ends particularly would find me glued to the operating table, hardly deigning to look up for a cup of tea. Lasting world-wide friendships were made, and there was always keen competition between A2TM, A2BK, A2YI and A2NO. From 32 metres we explored 20 metres and worked Europeans all through the day, particularly during 1927.

I well recall the occasion when Belgian 4AU told me to inform A2DY up in Gordon, N.S.W., that he had been "R7 here for three or four hours." A2DY had a lone 201A-Hartley outfit, with about 10 watts input in comparison to our 250 watts

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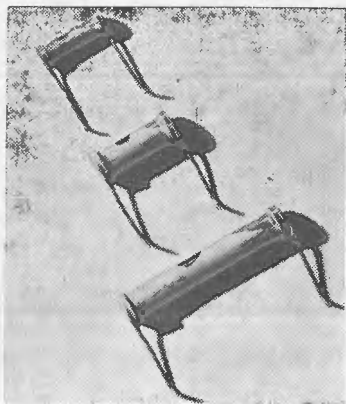
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or more. My own signal report was R7! Don Lindsay (now in A.W.A.'s laboratory) got remarkable efficiency from his little station of those days.

### My First C.C. Transmitter

Then came a new era. "QST" (my bible for years) had been talking crystal control, and it was decided that something ought to be done about it. Harry Kauper, of Adelaide (A5BG), had made a start, and his 32-metre crystal signal was a source of joy and envy. Through the late Clair Foster (W6HM), a crystal was obtained from U.S.A., and the job of building the gear began. That crystal, incidentally, cost us around £10 in those days.

Starting off with a 210 oscillator, 210 doubler, and De Forest H tube buffer, driving a T250, we eventually got on the air. It was the first C.C. amateur station in N.S.W., though we only beat Chas. Maclurcan (A2CM) by a day or two.

Then came disaster. Experiments were undertaken with various forms of crystal oscillators, using our lone and expensive piece of quartz. One day Harry left a partly completed breadboard oscillator on the workbench with the crystal in the holder, which consisted simply of two polished pennies.

Another man who used this bench for odd jobs picked up the breadboard unit and placed it on one end on the floor. Later in the day somebody brushed out the floor of the shack and swept all the debris into the dustbin. Unfortunately our crystal had slipped out of the holder, and had been among all the odds and ends of spaghetti, wire, etc. Wild thoughts of a visit to the Council incinerator were uppermost, but were ruled out as being too much like searching for the proverbial needle in a haystack. The man who shifted that unit was most unpopular!

We visited various opticians in search of suitable spectacle lenses. While the process of examining, cutting and grinding was proceeding, the fact of a silent station chafed, and back went the old 32-metre "rock-crusher." Again that raspy note tore across the seven seas, and all was well.

### Nearly a Silent Key

Around this time I nearly came to an untimely end, when sleepily, somewhere around 3 a.m., I put my hands where they would have been safer in my pockets. For a fraction of a second I took the full kick from the H.T. transformer, 4,000 volts across the outside. I came back to earth about half an hour later, lying across the shack floor, very groggy about the knees, and a little burnt at the fingers. The transmitter was still radiating merrily. The house was about 30 feet distant from the shack, and nobody would have been any the wiser until hours later if anything serious had happened.

Old timers of those days on 32

metres will recall some of the unusual and outstanding DX stations—for example, JKZB in Tokio, SK2 in Borneo, the original OP1HR (Manila, Philippines), and LA1X in Stavanger, Norway. (This latter station I kept skeds with every morning at 6 a.m. Sydney time for months, and never failed to make contact). QRM from thousands of "ham" stations as in these days was almost unknown. FO5X in Johannesburg, G2NM, G2OD, G5XY, NU6HM, NU6AM, NU9DNG, and hundreds of others remain in the memory, and the contacts show in the old log book.

It was in 1927 that commercial radio decided that the amateurs had too much to themselves, and that fateful Washington Conference resulted in the allocation of the bands mainly as they are to-day. With the passing of 32 metres, the Australian amateur lost the finest DX medium that ever was. Those who remember, and now listen occasionally to the overseas broadcasters around the 31/32-metre mark, know that it was the amateur and nobody else who paved the way.

I often wonder what would have been the position if, when in the early days, "200 metres and below" was thrown to amateurs had been taken by them in conjunction with International legal agreements that this should for all future time be strictly amateur territory! Amateur radio might have been very wealthy to-day by sub-letting shortwave channels to commercial interests! Instead of which, despite any assertion to the contrary, amateur radio is literally fighting for International existence. There are people who would take from the amateur entirely what little is left to him.

But wise governments encourage their amateurs as much as possible, and in this respect Australians are indeed fortunate. The VK amateur of to-day enjoys many privileges barred to his fraternity overseas, and the Wireless Institute of Australia plays a big part in this respect.

During 1927-28, I had taken to writing occasional pars for the radio publications of the day, dealing mostly with DX achievements from A2NO.

The published description of my pet receiver led to the permanent filling of a staff vacancy on the old "Radio in Australia and N.Z.," together with the "Wireless Weekly" of those days. That receiver was rather queerly named the "Go-Getter," and how it caught on! Probably many readers of these words well remember that receiver and the subsequent "All-Empire." The latter was the first metal chassis receiver in this part of the world, and the first to realise the advantages of the screen-grid valve as a T.R.F. amplifier for high frequencies.

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SEA 3.

# Push-Pull 2A3's Give 13.5 Watts Output

In last month's "Radio World" the circuit, together with performance data, were given of a 7-watt high-fidelity amplifier using push-pull 2A3's in the output. In the latest issue of "Radiotronics" (Technical Bulletin No. 78), published by Amalgamated Wireless Valve Co. Pty. Ltd., a further circuit is given of an amplifier using a pair of 2A3's in Class AB, and delivering 13.5 watts output.

The smaller model is ideally suited to applications in the average home receiver or pick-up amplifier, but in certain cases, where a higher output is required, the larger amplifier described below will be found to give an outstanding performance.

### Semi-Fixed Bias Employed

The conditions of operation published for Radiotron 2A3 valves show two typical cases in which an output of 10 watts is obtained on self-bias and 15 watts with fixed bias (states "Radiotronics" No. 78).

It is obvious that the greater power output and less distortion given by fixed bias operation have distinct advantages, but it is necessary to employ a separate rectifier and filter for the bias supply. In the circuit

**This article gives details for obtaining nearly 14 watts of high quality output from a pair of 2A3's in push-pull.**

now to be described, a compromise has been made, and an output of 13.5 watts has been found possible from two 2A3 valves operating on semi-fixed bias. In order to give complete protection to the 2A3 valves, the resistance of each grid circuit has been kept to the limit of 50,000 ohms as recommended for fixed bias.

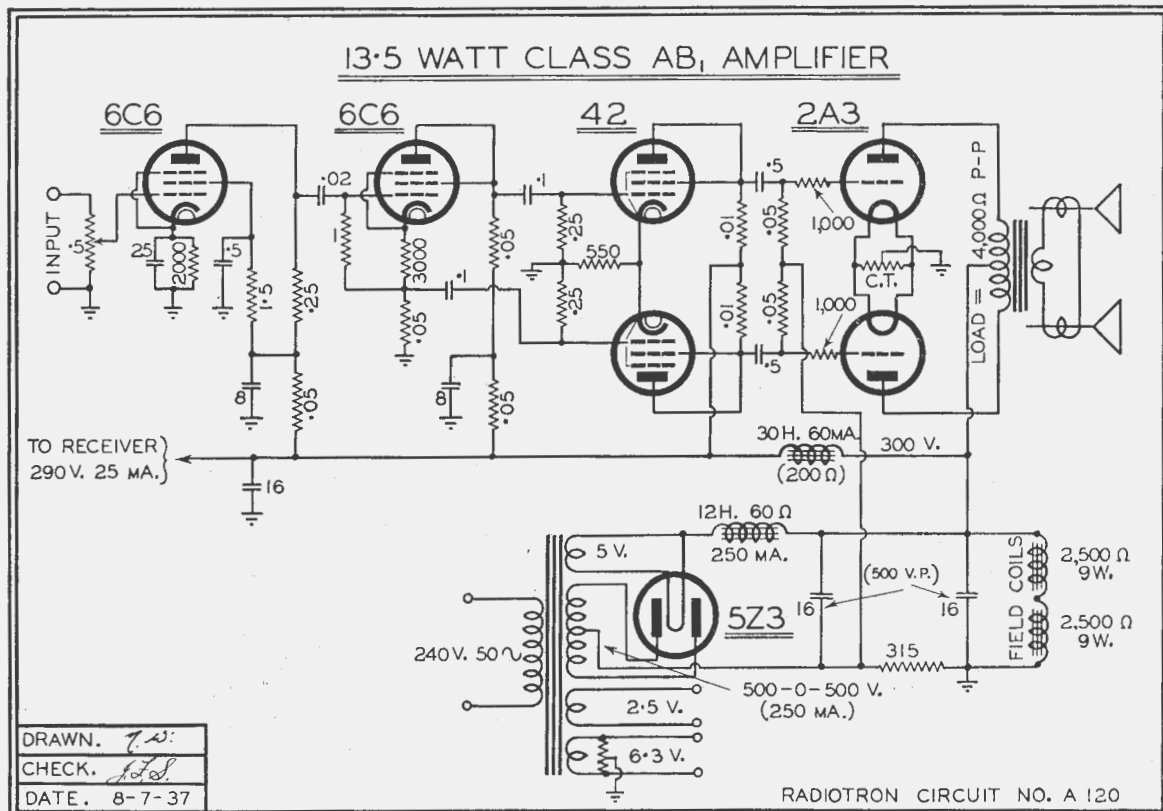
### 42's Used As Power Triodes

In order to do this without overloading the previous stage, it was found necessary to use a power triode which could be operated on a plate load resistance of 10,000 ohms. Radiotron 42 operated as a triode enabled this to be done with a minimum of distortion. It should be noted that the plate current drawn by each 42 valve is limited by the fact that they are resistance coupled. The 10,000 ohm resistors should each be

of 2-watt rating in order to carry the plate current.

In order to excite the grids of the two 42 valves, a somewhat similar arrangement to that adopted for the 7-watt amplifier has been used with success. The complete amplifier therefore incorporates one 6C6 resistance coupled pentode followed by one 6C6 connected as a triode and operating as a phase splitter, two 42's operated as push-pull resistance coupled triodes, exciting two 2A3's. Grid stopping resistances, each of 1,000 ohms, are shown in the 2A3 grid circuits in order to minimise the instability occurring at the grid current point on overload.

In order to obtain 300 volts for the plates of the 2A3 valves, together with the necessary 60 volts bias, a 500-500 volt transformer and Radiotron 5Z3 rectifier were adopted. Pro-



DRAWN. *J.W.*  
 CHECK. *H.S.*  
 DATE. 8-7-37

RADIOTRON CIRCUIT NO. A 120

The circuit of the amplifier. A pair of 42's connected as power triodes drive the 2A3's in the output.

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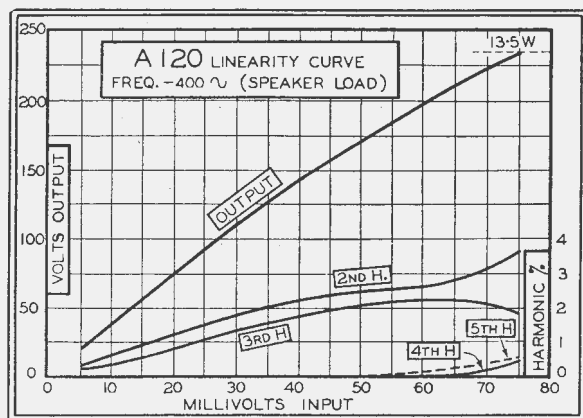


FIG. 2.

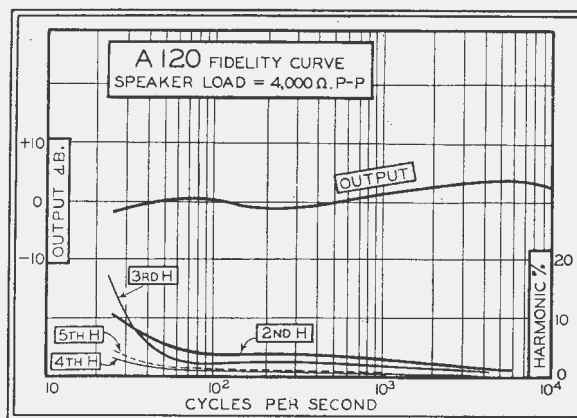


FIG. 3.

vision has been made for a radio tuner to be connected to the power supply.

#### Particularly Low Hum Level

The filtering shown in the circuit diagram was found to be adequate, and the hum level in the model constructed for test purposes was 52 db below maximum output. The load resistance from plate to plate was taken as 4,000 ohms, being a compromise between distortion and power output. A higher load resistance would give slightly less distortion, together with a slightly lower output.

Provision has been made for exciting two loudspeaker field coils of 2,500 ohms at 9 watts each, or alternatively a single field coil of 5,000 ohms at 18 watts. The load provided by the field coils is used in this design to improve the regulation of the power supply, and it is essential to use a load of the value specified. If a smaller wattage is required by the speaker field, an additional load should be imposed by means of a resistor, so that a total of 18 watts is dissipated.

#### Tests Taken Under Practical Operating Conditions

The linearity curve and the curve of distortion against input are shown in figure 2, and the curves of output and distortion against frequency is shown in figure 3. Both these figures were drawn under conditions of a typical loudspeaker load, consisting of two standard 10" speakers.

The curves of distortion and of output against frequency could have been improved by assuming constant resistive loads, but the curves were taken under actual working conditions in order to demonstrate the operation of the amplifier under typical conditions. The distortion is very low indeed for an amplifier of this type, and is very nearly inaudible. The performance of the whole amplifier is extremely good,

not only as regards harmonic distortion, but also in the response to transients and in having very low phase distortion.

A certain amount of distortion and hum has been balanced out by the circuit arrangement adopted, and it is emphasised that this arrangement should be utilised without any modification if the best results are required without further development work being done.

#### Matched Resistors And Valves

In cases where resistors are used

in push-pull stages, they should be matched against one another within a maximum tolerance of 2%. Other components in the circuit are not so critical and may be within the usual tolerances. Matched pairs of 2A3's and 42's as triodes are necessary for the best results in this circuit. This amplifier is particularly satisfactory for use in very large rooms or in small halls, and may be used either in conjunction with a radio receiver or with a pick-up.

## New Radiotron Barretter For A.C./D.C. Receivers Designed for Local Conditions

THE problem of A.C./D.C. receivers has from the first been one of difficulty. In America, where a 110-volt supply is usual, and where practically all the mains supplies are between 110 and 125 volts, the problem has been an entirely different one to that in Australia, where we are confronted with a fairly wide range of voltages and in many cases extremely pronounced fluctuations.

The Australian voltages are all between 200 and 260 volts, which therefore eliminates the necessity for voltage doubling as is used in America. A minimum voltage of 200 permits this voltage to be applied, through a filter system generally incorporating the field coil of the loudspeaker as a choke, to the plate of the power pentode valve.

This method has many attractive features. It is a very simple one to adopt, and is the one almost entirely used at the present time throughout Australia. The number of components in the filter circuit is a

minimum, and the voltage applied to the power valve is sufficiently high to enable ample power output to be obtained.

There has, however, always been a difficulty in the use of the 0.3 amp. series of valves in that a suitable barretter was not available. A barretter is a resistance lamp, the resistance of which varies with the current flowing through it, so that when the current tends to increase, the resistance increases much more rapidly and the current is thereby maintained almost constant.

In an A.C./D.C. receiver the heaters of all valves are connected in series, so that a voltage of approximately 70 volts is required for a five-valve set using a typical combination of Radiotron valves. The difference between the 75 volts required by the heaters of the valves and the voltage actually available from the mains must be dropped through some resistance device.

In the past it has been usual to employ a fixed resistor with two or more tappings to suit various supply voltages, so that an approximately correct voltage was applied to the heaters of the valves. This method, while quite satisfactory in cases where the mains voltage is constant and where a correct tapping is available to suit the mains voltage, has tended to give trouble when used with badly fluctuating mains supply voltages.

It is unnecessary to stress the fact that valves should always be operated with the correct voltage applied to their heaters or filaments, and this is even more true in the case of an A.C./D.C. receiver. One reason for its greater importance with A.C./D.C. receivers is that it is necessary to consider the valves in

The problem in an A.C./D.C. receiver is, therefore, to keep the heater current of the valves within a tolerance of plus or minus 6% under any conditions of mains supply voltages. This can only be done successfully when an automatic device is used, and a barretter is a very satisfactory as well as being a very simple solution.

Although many barretters have been used and are being used, none has been available on the Australian market for operation on the local range of mains supply voltages and at the same time suited to the standard 0.3 amp. series of valves. Amalgamated Wireless Valve Co. Pty. Ltd. are pleased to announce that a barretter (Radiotron Type 302) is now available at a list price of 14/6. This barretter has a range of voltage drop between 112 and 195 volts, and the current flowing through it is 0.3 amp. within the tolerances necessary for the operation of the valves.

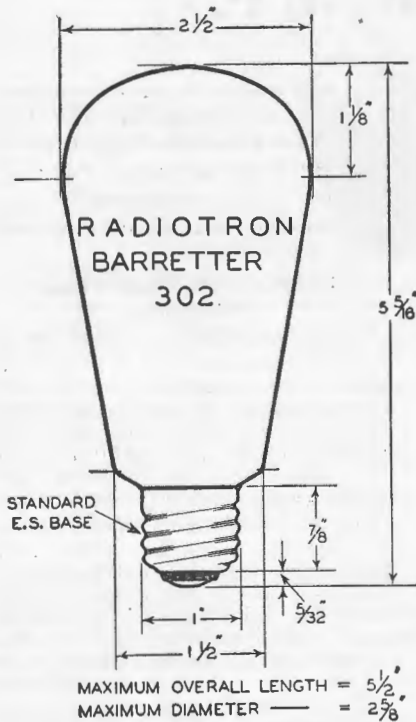
The use of the 302 will undoubtedly assist in the design and satisfactory operation of A.C./D.C. receivers for Australian conditions. One of these barretters has been used for several months past in a receiver which has been subjected to all the ill treatment which could be imagined, and the set has stood up splendidly through it all. It can, therefore, be recommended as being both mechanically and electrically ideal for A.C./D.C. receivers.

The outline and dimensions of Radiotron 302 are shown in the drawing. It will be seen that the overall dimensions are  $5\frac{1}{8}$ " x  $2\frac{1}{2}$ ", and that an Edison screw base is employed. A standard Edison screw socket (as used for electric lamps) provides good electrical contact and mechanical support.

In conjunction with the 302 barretter, it is recommended that a .43 power pentode be employed so as to permit a power output practically identical with that given by most A.C. receivers.

There is no reason why an A.C./D.C. receiver cannot be as satisfactory as an A.C. receiver, either as regards power output or quality. As a rectifier, Radiotron 25Z5 is recommended, with a resistance of 100 ohms in series with each plate and with the two units connected in parallel. With this arrangement a permissible D.C. current of up to 170 m.a. may be drawn, and this would be sufficient for any normal applications while giving an ample margin. A suggested valve combination is:—

Converter	6A7
L.F. Amplifier and Diode Detector with A.V.C.	6B7S
Audio	6C6
Power Output with series inverse feedback	43
Rectifier	25Z5
Barretter	302



terms of the current flowing through the heaters rather than the voltage across one heater.

Due to the fact that most of the resistance, and therefore most of the voltage drop, is not across the heaters but across the dropping resistor, the whole arrangement will tend to follow Ohm's law fairly closely. That is to say, the current and voltage drop are proportional. The tolerance in current of a valve heater is plus or minus 6%, which means that the current of one 0.3 amp. valve should never increase above 0.318 or drop below 0.282 amp. The reason why a tolerance of 10% is permissible when the heaters are connected in parallel is that under these conditions a 10% change of voltage only produces a 6% change of current, due to the heater not obeying Ohm's law.



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Type P/T (Pigtails) measuring only  $\frac{5}{8}$ " by  $\frac{5}{8}$ "—capacity range .000005 microfarads to .001 microfarads.

(All Simplex condensers are subjected to a test of at least 1,000 volts A.C. and D.C.)

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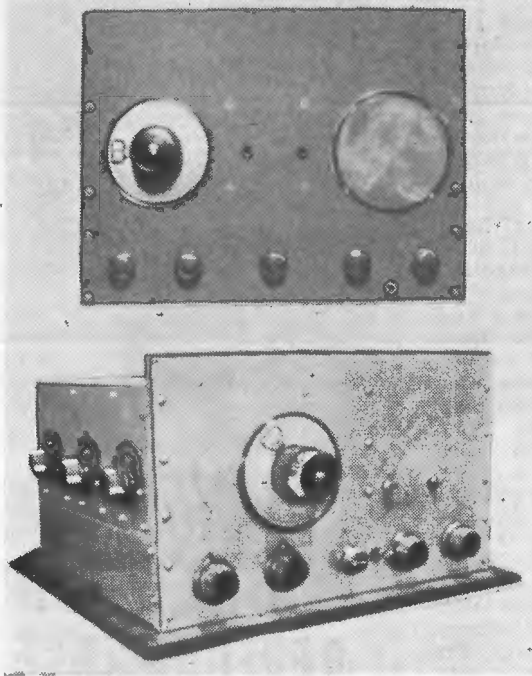
Manufactured by Simplex Products Pty. Ltd., 716 Parramatta Rd., Petersham, N.S.W.  
Phone LM 5615.

AGENTS IN ALL STATES.

# Radio Locates Missing Plane

**Keeps Rescue Party in Touch : 8GF  
Supplies Details of Equipment : Am-  
ateur Communications Eight : Lak-  
emba Radio Club Notes And News . .**

**By W. J. P.**



The photographs on the left show two versions of the "Amateur Communications Eight," built by Lakemba Radio Club members.

SEVERAL months ago an R.A.A.F. Rapide 'plane carrying Sir Herbert Gepp's survey party was forced down in the wilds of Central Australia. Readers will no doubt remember reading an account in the daily papers of the forced landing and rescue, but it is anticipated that details of the actual part played by radio in helping to save the lives of these men will be of interest. The following information is supplied by courtesy of Mr. B. Williams (operator VK8GF), details of whose transmitter appeared in the January issue of "Radio World."

Sir Herbert Gepp's survey 'plane was piloted by Flt.-Lt. A. G. Carr, with Sgt. Blakely as radio operator, and in the course of the survey flight was forced down near Lake Mackay, about 160 miles from the Granites. Fortunately, after the 'plane left Tennants Creek, both Peter Sinclair (VJD, Darwin Radio) and "Bo" Williams (8GF, The Granites) were listening, just in case everything did not go as planned.

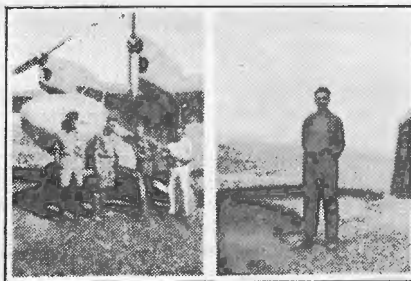
When difficulties were encountered, operator Blakely on board the Rapide transmitted their approximate bearings for half an hour on 600 metres, in the hope of this information being picked up. They then landed, not sure where they were, and with only four gallons of petrol left in the tanks.

Their signals were received, the result being that a rescue party in a Gannett 'plane, piloted by Flt.-Lt. Wm. Hely, arrived at The Granites the following day to conduct a search. This 'plane was equipped with the latest radio apparatus,

which had been installed at Laver-ton but a few days previously.

8GF and VJD kept tabs on the signals transmitted by the operator, Bill Taylor, on 600 and 50 metres at alternate quarter hours. The code signals were 100% readable from Alice Springs on the short wave-length, but not on 600 metres. Throughout the search 8GF also kept a check on the daily flights out to Lake Mackay and during reconnoitring over the ground relief party. Time had not permitted the installation of interference suppressors, so that transmissions only from the rescue 'plane (VMZAS) could be conducted.

"Bill Taylor did remarkably well with the gear," writes "Bo" Williams. "It was only newly installed. It is really fine apparatus—beauti-



The rescue party, with their radio-equipped Gannett 'plane in the background. Left to right: Flt.-Lt. W. Hely, Alan Moore, W. Taylor (radio op.), and C. H. Chapman, owner of 8GF. On the right is "Bo" Williams, operator of VK8GF, The Granites.

fully finished, and certainly a credit to its manufacturers."

## M.O.P.A. C.W. And 'Phone Transmitter

The transmitter consisted of an M.O.P.A. equipped for c.w. and 'phone. The input was derived from a generator requiring 12 volts input, and delivering 1,100 volts output, the input into the final amplifier being 60 watts. Grid or modified Telefunken modulation was used.

On the last flight the telephony was QSA 4/5 to and from Alice Springs—a distance of 380 miles. In the latter part of the work 33 metres only was used, as this proved the most reliable wavelength for daily communication over distances of 300 to 400 miles. Both a fixed Marconi and a trailing aerial was provided, the framework of the 'plane providing the earth.

"I noticed in particular how strongly directional effects were introduced with the fixed aerial," continues Mr. Williams. "This varied signals from R Max to R 3/4 while circling around 8GF at a mile distance. Direction-finding tests were also conducted at a height of 5,000 feet, and proved fairly accurate. If any difficulty had been encountered in locating the missing 'plane, it would most certainly have been useful in narrowing down the search."

Our correspondent concludes by saying that "once again radio has been instrumental in saving lives, and the value of the recently-enacted legislation compelling installation in aircraft was adequately illustrated on this occasion."

(Continued on page 33)



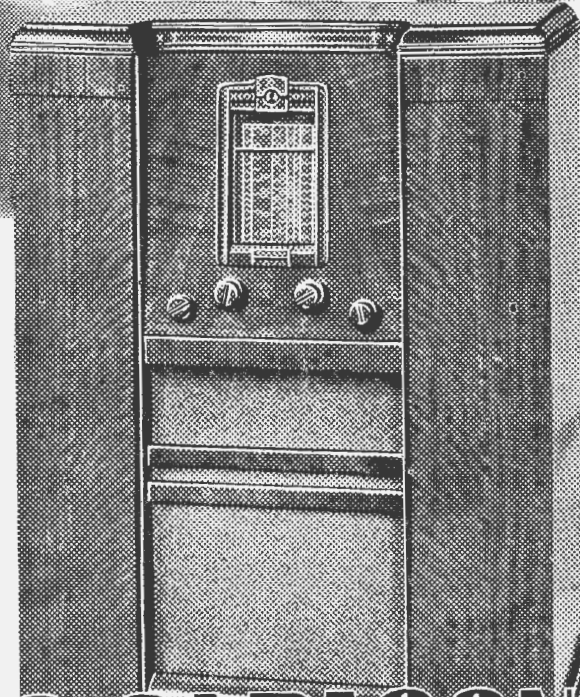
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**A. J. R. S. Bulletin**

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Street, Sydney, N.S.W.

### Queensland Branch Holds Successful Meeting

At the rooms of Radio and Television Ltd., Perry House, Brisbane, on July 29, A.T.R.S. conducted one of the largest and most representative meetings of radio men ever held in Brisbane.

Delegates were present from every radio and electrical firm in Brisbane, from radio servicemen employed by these firms, from independent servicemen in the suburbs and city, and the Electrical Unions.

After an address on the aims of A.T.R.S. and the objectives achieved in Sydney, extracts were read from N.Z. radio service examination papers, kindly sent us by Mr. Camp, of the New Zealand Electrical Federation. Many phases of the proposed exam. in Queensland were discussed, and a committee of six was appointed to go fully into all matters pertaining to the newly-formed Association and to report to a further meeting. We have been informed that there is every possibility of the trade recognising the A.T.R.S. certificate, pending some Government exam. for radio mechanics.

I can now report to interstate members of A.T.R.S. that we have the nucleus of a virile branch in Brisbane, with every prospect of a record membership.

With regard to those intending members in Queensland who have deluged me with letters, for which I thank them sincerely, I have not been able to answer these individually, but would strongly suggest that enquiries in future be directed to the Brisbane Association, Box 1538 V, G.P.O., Brisbane.—W. Hudson, Queensland Organiser.

### Service Kinks And Wrinkles

By E. Y. HOOK (A.T.R.S. Head Office)  
Valve-Testing Idea

Shunting the 2.5 volt tapping of any valve-testing transformer with a pilot light will prove an extremely useful aid to anyone testing valves in large quantities, in that the time waiting for a burnt-out valve to warm up

can be eliminated. In operation, the valves with good heaters will result in the light first burning brightly and then dimming. If the valve is faulty, the light will not light at all.

#### Hair-Waving By Radio

An innovation has been tried with success in London whereby "milady" can have her hair permanently waved without having annoying heavy wires attached to her head. Small high-frequency "receivers" are set in the hair, and the heat is picked up from a high-frequency generator.

#### Safety First

Preventing accidents on 'bus routes

in Germany is the latest aid in which radio has been used. A P.A. system is used, with a microphone at the back of the 'bus and speaker in the driver's cabin. Thus any sounds (horns, etc.) are amplified, and can be easily heard by the driver.

#### Entertainers Use P.A. Systems

While on the subject of P.A. uses, small units have come into vogue in Sydney for use by entertainers. I heard one used by a piano accordionist, who had the "mike" concealed in the instrument. Through the speakers came music more like that of a grand organ.

## Tracking Down Distortion (2) Common Causes And Cures

By G. SIDLER (Memb. A.T.R.S.)

#### Audio Transformers And Chokes

So far we have dealt only with resistance-capacity-coupling; if transformers or chokes are used, weak distorted signals will result if either primary or secondary winding is open or short-circuited to the case. If two audio transformers are used, a great improvement in tonal quality can be obtained by substituting resistance-capacity-coupling in place of the first.

Distortion will be introduced in a screen grid detector if the screen voltage is too high or too low. The screen series resistor is usually to blame, but it can be caused by an open circuit in the voltage divider between the tapping concerned and earth. This will cause almost the full high tension voltage to be applied to the screen.

If a pick-up is used on a receiver which is satisfactory on radio, and the result is very distorted music, the trouble is due to one or both of two things. Firstly, the set may not be designed for pick-up work, in spite of the terminal marked "P.U." That is to say, no suitable bias is provided on the detector. The writer has often encountered this in cheap commercial receivers.

Secondly, the pick-up itself could

be at fault, the armature fouling the magnet pole-pieces, causing a grating sound. This can be verified by connecting a pair of headphones to the pick-up leads, while playing, and the distortion will plainly show up in the 'phones.

A point worth mentioning here is that before overhauling a receiver to improve its tone, it is as well to become acquainted with the customer's taste in reproduction beforehand. Sometimes the improved fidelity is not always appreciated, the customer having become accustomed to the sound of his set as it originally was; even proud of its "clearness" (harshness) or "mellow tone" (thumpiness) as the case may be.

#### Distortion Through Overloading

In some superhets, if the receiver is used close to a broadcasting station or with a large aerial, the autodyne or first detector will overload. This can be remedied by the use of a local-distance switch (i.e., a switch in series with a resistor of from 10 to 50 ohms, depending on location. When a station can be tuned in on wired across from aerial to earth). two positions on the dial, very close together, with distortion in between, this indicates the latter fault (auto-

dyne overloading), or else second detector overloading. Obviously the signal to these valves must be reduced.

Overloading in the audio stages in a normal receiver will only occur when the receiver is running at too high a volume, and as the volume from a modern receiver is quite sufficient for all household requirements, we will not deal with that here.

Too low a filament voltage will cause distortion, while in home-built sets the speaker input transformer should be checked to see if it matches the power valve, especially if this latter is a pentode. The writer has serviced a set in which the plate and screen connections of a screen-grid detector were reversed. The set worked, but the resultant noise was horrible.

Lastly, the station being received should be tuned in exactly on the centre of the carrier. An error either way will result in noise and harshness, the position being much worse in sets with automatic volume control. Many people, through ignorance, do not give this point much attention, and it is the duty of the serviceman to show set-owners how to use their receivers correctly.

### The Amateur Game

(Continued from page 20)

modulation. Because grid and suppressor grid methods reduce the modulated amplifier efficiency considerably, they are not very popular where the valve sizes are governed by the pocket-book, as in most amateur stations. However, a loss in r.f. plate efficiency in the final stage is about balanced by the comparatively low-powered audio frequency equipment necessary, and therefore each has its features.

Space restrictions prevent a full coverage of this subject this month, and we propose to go further into other departments of this very interesting phase of "ham radio" in the next instalment.

### Lakemba Radio Club Notes

(Continued from page 30)

#### The "Amateur Communications Eight"

The "Amateur Communications Eight" described in the June and July issues of "R.W." is the finest type of receiver in its class we have had the pleasure of hearing. The claims made both by Mr. Bennett and the technical staff of "Radio World" are by no means exaggerated.

The photographs shown illustrate two versions of this receiver. The first is owned by Mr. J. Paxton, of Killara, and is constructed similar to the "R.W." version with built-in speaker, while the other belongs to Mr. L. Taylor (VK2CL), of Ashfield, and is built after the style of 2VA's model, with

external speaker.

The results from both these receivers is really remarkable, being all that a dxer or "ham" could desire. As Ashfield, 2CL is surrounded by at least 12 amateurs within a half-mile radius, but he is now enabled to choose the particular station he desires.

★

### High-Frequency "Insulated Conductors."

In television and general ultra-short wave work, the usual method of feeding an aerial is by means of twisted, parallel, or single wires, usually termed a transmission line.

A recent development of the Bell Telephone Laboratories is a rather unusual form of high-frequency transmission line or "guide," which uses no metallic conductor for the transmission of the high-frequency energy to the aerial. Strange to say, the "guide" consists of insulated material, such as rubber, camphor or wax. The frequency of the wave it will carry is dependent on the diameter of the wire. When a long transmission line is necessary the wax or other dielectric substance is protected by an outside metal shield, as it would be rather impossible to suspend a long wax rod from an aerial.

Tests have proved that while the outside rod certainly assists in confining the energy, nevertheless, it plays no essential part in the actual transmission of energy.

The fact of it being possible to generate several different kinds of waves inside a dielectric guide of this type, suggests that it may play a big part in future high-frequency transmissions both by radio and land line. For example, used as a trunk telephone line, about 400 conversations could be carried on the one line, work-

ing on a similar "carrier" system to that in use to-day.

### S.W. Stations VK2ME, VK3ME, And VK6ME — Transmission Schedules For September, 1937.

According to advice just to hand from Amalgamated Wireless (A'sia.) Ltd., the following transmission schedules will be observed by short-wave stations VK2ME, VK3ME and VK6ME during September:—

**VK2ME (31.28 m., 9590 k.c.)**  
Sydney Time G.M.T.  
Sundays: 3 p.m.-5 p.m. 0500-0700  
7.30-11.30 p.m. 0930-1330  
Mondays: 1.30-3.30 a.m. 1530-1730

**VK3ME (31.5 m., 9510 k.c.)**  
Melbourne Time G.M.T.  
Nightly  
Monday to 7 p.m.-10 p.m. 0900-1200  
Saturday  
(inclusive)

**VK6ME, Perth (31.28 m., 9590 k.c.)**  
Perth Time G.M.T.  
Nightly  
Monday to 7 p.m.-9 p.m. 1100-1300  
Saturday  
(inclusive)

### International Film Congress In Paris

On the occasion of the World Exhibition in Paris, an international film congress was held there from July 5 to July 10.

The convention was opened by the Office of Education, on board the liner "Normandie" at Le Havre. This gigantic vessel is equipped with an extensive Philips amplifier installation and with "Reality Range" sound film equipment, also supplied by Philips, which was used for the official opening of the congress.



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# What's New In Radio

**A monthly review of latest releases  
in sets, kit-sets, and components**

## Crown "37" Catalogue Now Available

The complete range of radio components and accessories now being manufactured by the Crown Radio Manufacturing Co. Pty. Ltd. is listed and illustrated in the Crown 37 Catalogue just released by this company.

The first two pages are devoted to Crown tuning dials, which incidentally all employ a friction drive that has been tested and proven over a period of years. I.f. transformers, together with broadcast and shortwave coils in all standard types, are listed. An unusually comprehensive range of coil kits, for broadcast, dual and triple-wave operation, is featured next. Set-builders and small manufacturers are catered for by a selection of foundation kits covering 4/5 and 5/6 dual-wave superhets as well as a 5/6 triple-wave model, all being available for battery and a.c. operation. These kits comprise the coil assembly, pair of iron-cored i.f.'s, matched edgelit dial, condenser gang and ready-stamped chassis.

Other components listed include padders and i.f. trimmers, wire-wound resistors and voltage dividers, r.f. chokes, flexible couplings, resistor panels and shaft extensions.

This latest Crown catalogue is attractively printed in two colours, is well illustrated throughout with photographs and sketches, and contains full technical information on the components listed. Copies can be obtained free on request by writing to the Crown Radio Manufacturing Co. Pty. Ltd., 51-53 Murray St., Pyrmont, Sydney, N.S.W. (a 2d. stamp should be enclosed to cover postage).



## Latest Calstan Catalogue

Mr. C. Slade, principal of Slade's Precision Test Equipment, advises that the 1937 Calstan catalogue is now in the course of preparation. Copies will be released simultaneously with this issue of the "Radio World."

Printed in two colours throughout, and well illustrated, this catalogue is certain to be widely sought by manufacturers, servicemen, amateurs and set-builders, who are all specially catered for by the comprehensive

range of Calstan meters and test equipment available.

Copies will be sent free by return mail to "Radio World" readers writing for them to Slade's Precision Test Equipment, Lang Street, Croydon, Sydney, N.S.W.



## Philips Pentodes Popular With Amateurs

Messrs. Philips Lamps (A'sia) Pty. Ltd. report that, judging by the number of reports coming to hand, Philips valves are becoming more and more popular amongst "hams"



The Philips EL5 Miniwatt Pentode.

and shortwave enthusiasts, who are finding in the wide Philips range a solution to many problems.

For instance, the Eastwood Radio Club (VK2BB) is experimenting with the EL5 pentode as a transmitting valve, and is getting some excellent reports from U.S.A. This valve should prove extremely useful to the

low-power man, since it has a normal class A amplifier rating of 17.5 watts input and a slope of 7 m.a./v. for a plate rating of 250 v.

A well-known Sydney amateur, Con Bischoff (VK2LZ), who is becoming famous for his high frequency receivers, has found the Philips EF6 r.f. pentode a fine amplifier on the 5 and 10-metre bands, in addition to 20 and 40 metres.

Mr. J. Currie (VK4LC), of Bundaberg, reports that he is using Philips CL2 pentodes throughout a three-stage rig operating on 240 v. D.C. mains—a very handy valve tip for the "ham" who is connected to a D.C. supply.



## Raymart Range Of Shortwave Components

Amateurs and shortwave enthusiasts will be interested to learn that a comprehensive range of the well-known English Raymart shortwave components has just been landed by Messrs. John Martin Pty. Ltd., of Sydney.

In particular, the latest Raymart ceramic midget variable condensers will, in the capacities above 100 mmfd., fill a long-felt need. Of all-brass construction, ball bearings are used for smoothest operation, while an added feature is that ganging is provided for. Capacities available are 15, 40, 100, 160 and 250 mmfd. in the receiving types, and 15 and 40 mmfd. in the transmitting types.

Two types of r.f. chokes that are certain to be popular are the solenoid 5-100 metre, and the National type, pie-wound on an isolantite form with wire pigtailed. As well, there is a special all-wave choke and a transmitting choke effective up to 160 metres and designed to carry 500 m.a.

Other components in the range include a Microdisc tuning dial, a reduction drive to fit any 1/4" shaft, flexible couplers, plug-in coil formers and sockets, transmitter dials, and a variety of ceramic and porcelain insulators to fulfil practically all transmitting and receiving requirements.

These new components are of high quality throughout, are reasonably priced, and so should prove immediately popular among experimenters. Further details can be obtained from John Martin Pty. Ltd., 116 Clarence St., Sydney.



## Simplex Mica Condensers Available In Wide Range

A range of Simplex mica condensers (intended for use in the "1937 Outdoor Portable Four" to be described in the September "Radio World") have been received from Simplex Products Pty. Ltd.

The samples received cover the range of types at present being produced, namely "P/T," "S/M" and "M." Type "P/T" is available from stock in all standard capacities from .000025 mfd. to .002 mfd. inclusive, type "S/M" from .000025 to .01 mfd., and type "M" from .004 to .02 mfd. In addition to large stocks of all standard capacities in these ranges, supplies of intermediate capacities are always maintained. As well, even the most unusual sizes can be supplied at very short notice, in tolerances as low as plus or minus 1%.

In the manufacturing of Simplex condensers, every precaution is taken in design and processing to ensure that every condenser leaving the factory is true to label. Rigid inspection of the finished article is carried out, and duplicate tests for both capacity and voltage obviate any possibility of error in these important features. Every condenser leaving the Simplex factory passes voltage tests at 1,000 volts, while condensers of higher voltage tests can be supplied on request to as high as 3,000 volts a.c.



### Radiotron 6V6G Is New High Gain Power Pentode

There are a number of applications in which a 42 is not found to give sufficient output, or in which a valve with a higher grid sensitivity is desirable. In such cases the new 6V6G, recently released by A.W. Valve Co. Pty. Ltd., is recommended.

This new valve delivers a maximum power output of 4.25 watts on a plate and screen voltage of 250. The grid bias is -12.5 volts and the plate and screen currents 45 and 4.5 m.a. respectively. The load resistance for a single valve is 6,000 ohms. The heater is operated at 6.3 volts and draws .45 amp., and it therefore has a special application in automobile receivers, where the heater current is of importance. Two 6V6G's may be used in a push-pull amplifier class AB1 to give a maximum output of 8.5 watts on 250 volts and 13 watts on 300 volts supply. These outputs hold with fixed bias only, and less output would be given where self-bias is employed.

The 6V6G is fitted with an octal base, the socket connections being identical with type 6F6.

### New Radiotron 6.3 Volt .15 Amp. Series

Five additional new types of Radiotron valves have also been released and are now available from stock. These all have heaters rated at 6.3 volts 0.15 amp., and are primarily intended for use in receivers operating from 6-volt accumulators. They are not intended for use in A.C. receivers or in A.C./D.C. receivers, and it is recommended that their application should be limited to

cases where it is essential to economise in heater current. The types included in this new series are given below:—

Type.	Description.
6D8G	Pentagrid Converter.
6L5G	General Purpose Triode.
6N5	Magic Eye Tuning Indicator.
6S7G	Super Control R.F. Pentode.
6T7G	Duo-diode high-mu triode.

All these new types, with the exception of the 6N5, are fitted with octal bases. Technical data on these new valves is available on request to the Unified Sales-Engineering Service, Amalgamated Wireless Valve Co. Pty. Ltd., 47 York St., Sydney.



### Two New Rola Releases

Two special 12" speakers—the "G-12" and "K-12"—were lately released by the Rola Company (Aust.) Pty. Ltd.

The "G-12," which is not provided with a mounting base, is available to manufacturers only for equipment purposes. Capable of handling 15 to 20 watts of undistorted power output, it is claimed that the "G-12" is exceptionally efficient and has an un-

usually high frequency range. The response is substantially flat from 50 to 7,500 cycles per second.

The well-known Rola Model "K12" has been re-designed, the new model having an extended frequency range, greater power-handling capacity, and more rugged diaphragm construction, incorporating a three-point suspension spider instead of the usual two-point external spider suspension. The "K-12" is completely dust-proofed by a patented process which effectively protects the air-gap from foreign particles.

Both the "G-12" and "K-12" are made with transformers having generous core sections, which enable these units to handle the output of present-day power valves without distress. These larger transformers are also available with smaller Rola speakers.



### Schoop Metal-Spraying Process

The Australian rights for the Schoop metal-spraying process, which has been used extensively throughout Europe for some years, have lately



THE  
SYMBOL  
OF QUALITY  
TEST  
EQUIPMENT



### A.V.C. Measurements at INFINITE Ohms per Volt

A new and advanced feature of the Pelec Model "CM" Multitester is the ability to read DC potentials up to 25 volts WITHOUT DRAWING ANY CURRENT from the load resistor. This is essential for the accurate checking of A.V.C. The method employed is superior to that of a V.T.V.M.

Another noteworthy refinement is a SINGLE LINEAR EASY READING SCALE for both DC and AC measurements, also an extra range of OHMS, making five in all. (0 to 10 meg.). The above, in addition to its former wide range, plus the accuracy of the 5in. type Meter, places this Instrument in a class of its own.

Has Multi ranges of DC, AC and Output Volts. MA's, OHMS, Decibels, Capacity Inductance, Impedance. Will test Insulation, also leakage of Electrolytics and Capacity of same.

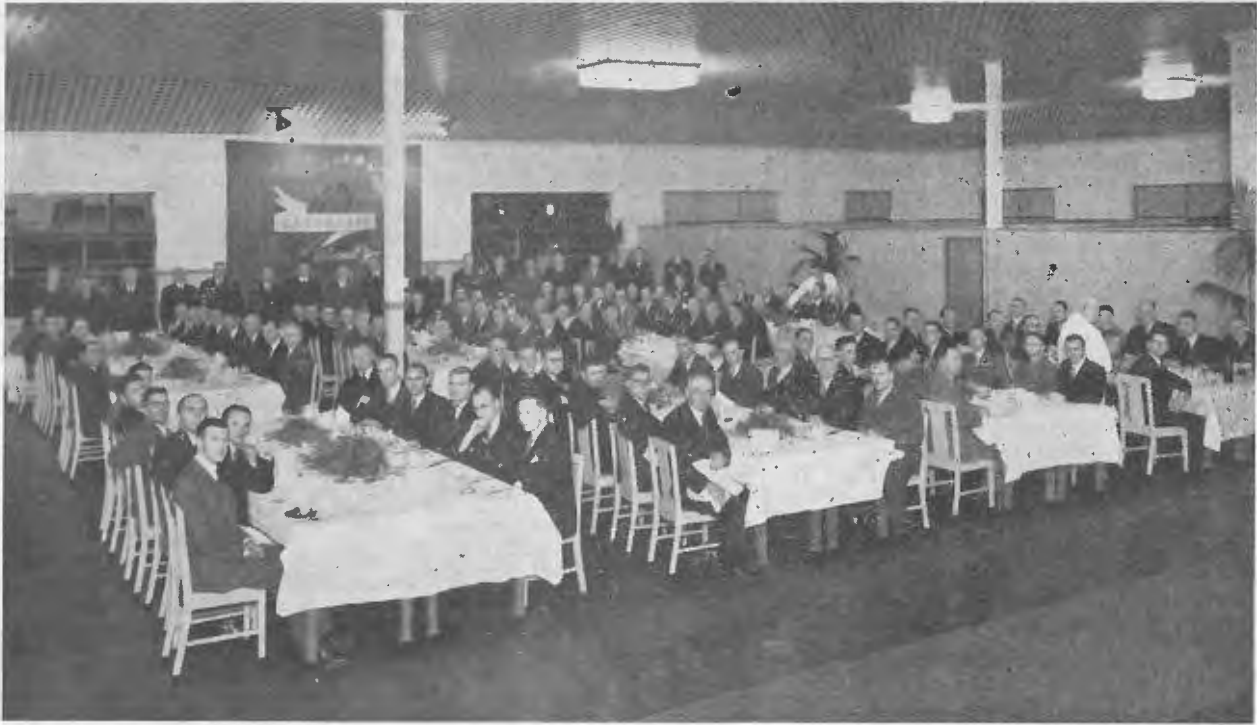
Price, Model "CM" .....	£13 10 0 plus tax
or complete with Analyser-Selector-Unit in same case (as illustrated) .....	£16 10 0 " "
Write for particulars of Model M5, price £5/17/6	

TERMS AVAILABLE

AVAILABLE FROM LEADING DISTRIBUTORS.

## Paton Electrical Instrument Co.

90 Victoria Street, Ashfield



Nearly 150 executive and engineer representatives of receiver manufacturers in Sydney were entertained at this dinner held last month by Amalgamated Wireless Valve Company at the Works cafeteria, Ashfield. The visitors were afterwards taken on a tour of the factory, where the process of valve manufacture from raw materials to the finished product was demonstrated.

been acquired by Mr. W. J. Mills, of Leichhardt, Sydney, manufacturer of the well-known Bifrost resistors. A plant now installed in the factory is being used for metal-coating resistors, and is also available for demonstration purposes.

The Schoop process, which enables any metal to be atomised and impregnated directly on to any surface, was evolved by Dr. M. U. Schoop, a Russian engineer. A wire of the metal to be sprayed is automatically fed through a pistol, where it is fused in an oxy-acetylene flame. The molten metal is then atomised and projected by compressed air against the surface to be treated, giving a smooth, permanent coating. Though intense heat is used to melt the metal, it is so localised that even inflammable materials such as paper, textiles and celluloid can be metalised with safety.

Almost endless uses have been found for the Schoop process, and, as well, there are many and varied applications that can be found for it in the radio industry. Further particulars are obtainable from Mr. W. J. Mills, 187 Catherine Street, Leichhardt, Sydney.

★

### Model 789 Stromberg-Carlson Seven-Valve D.W. Superhet

High sensitivity and low noise level are outstanding features of the latest Model 789 Stromberg-Carlson

seven-valve dual-wave battery receiver design, particular attention has been paid to keeping current consumption as low as possible. A special switch is also incorporated which enables the dial lights to be extinguished when the set is in operation, further reducing battery drain.

Exceptionally high sensitivity is assured by the use of a 1A4 as r.f. amplifier, and of two stages of intermediate frequency amplification (also using 1A4's). A KK2 is used as mixer, with a 1B5 as second detector, a.v.c. and first audio stage feeding a 30 driver with a KDD1 as class "B" power output stage. Throughout the

entire design, particular attention has been paid to keeping current consumption as low as possible. A special switch is also incorporated which enables the dial lights to be extinguished when the set is in operation, further reducing battery drain.

An edgelit vertical straight line tuning dial, identical to that used in the eight and nine valve A.C. receivers, is fitted. The stations are marked in large clear-cut figures, and are divided vertically into States, while the four international overseas channels are grouped on the left-hand side of the dial. The tuning range is from 175-570 metres on the broadcast band and 16.8 to 51 metres on the short waves. A large control knob gives speedy, easy tuning, having dual dial ratios of sixty and ten to one.

A 10" dust-proof per-magnetic dynamic speaker is fitted, which, combined with the outstanding acoustic properties of the Concert Grand Cabinet, gives the 789 a high degree of tonal quality and faithfulness of reproduction under a wide range of atmospheric conditions and geographical obstructions. An additional feature is the variable tone control.

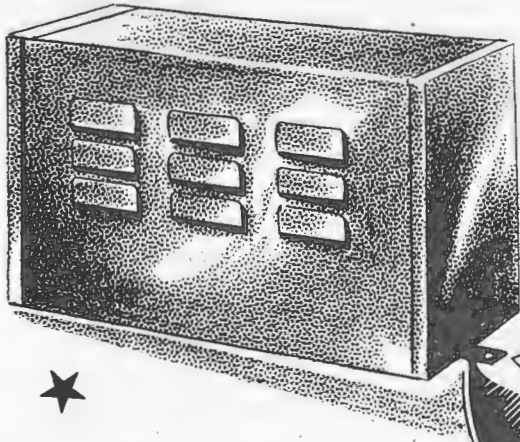
Controls from left to right are as follows:—On-off and dial lights switch, volume, tone, station selector, wave changer and gramo. switch.

Altogether, the 789 is a dual-wave battery receiver which will fill the demand for a de luxe radio for the man on the land.



The Stromberg-Carlson Model 789 Console.

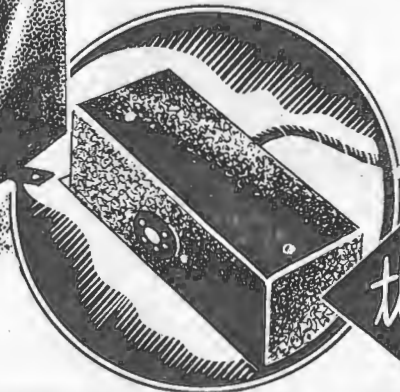
*Anyone* **CAN FIT THIS RADIOKES VIBRATOR**



ANY man or boy — even if he knows NOTHING about radio — can fit his present battery radio with the RADIOKES VIBRATOR — and start saving money and getting better radio reception right away! It is so easy and simple to install, yet marvellously efficient, satisfactory and reliable in service. And how it saves you battery replacements!

The Radiokes Vibrator is designed to supply "B" voltage up to 150 volts, with a maximum current rating of 40 m.a. The power transformer and filter choke have a 60 m.a. rating. Completely assembled on a cadmium-plated chassis, and the whole enclosed in an attractive black crystalline case.

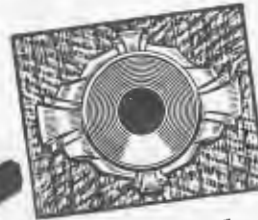
Together with the main Radiokes Vibrator Unit — designed for vibrator operated sets, you get FREE this special VOLTAGE DIVIDER UNIT, which allows you to convert your present battery set into a Vibrator set. Only with the Radiokes Vibrator do you get this valuable unit FREE. Order yours now from your nearest radio dealer.



*this special unit* **FREE**

★  
Free literature describing Radiokes Vibrator is available from Radiokes Pty. Ltd., Box 10, P.O., Redfern. Write to-day.

*Free*



This Valuable **MAGIC EYE ESCUTCHEON**

With each

**RADIOKES TRI-WAVE EDGELIT DIAL**

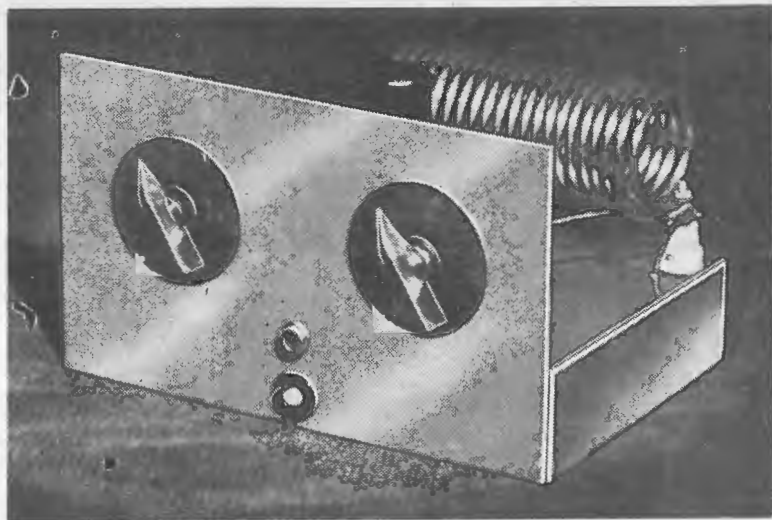


Get this handsome, exclusive Radiokes "Magic Eye" Escutcheon FREE with this latest Radiokes Tri-wave Edgelit Dial—acclaimed everywhere as radio's most beautiful, most efficient dial. It's fine value at all times—now even greater because of the EXTRA value of this free moulded-metal "Magic Eye" escutcheon. Only a limited number available.

Insist on this Radiokes Dial—it's distinguished in every feature—more beautiful than anything similar you have ever seen. It has everything you expect—smoothness, strength, reliability. Edgelit in three colours—orange, red and green. Large oval escutcheon, measuring inside 7in. x 5in. Ask your dealer for details. Insist on Radiokes.

**FREE:** Write to Radiokes, Ltd., Redfern, for the free leaflet describing Radiokes Tri-wave Dial in detail.

# The . . DX Junior Two-Band Transmitter



High performance with low cost are features of this one-valve crystal-controlled transmitter designed for operation on 80 and 40 metres without coil-changing. Designed and described by . . .

VK2DL

NOWADAYS, prevailing conditions on amateur wavebands call for receivers and transmitters of modern design. The old detector-audio and t.r.f. arrangements are fast being discarded, and "supers." being used in their place.

In the transmitting field, self-excited rigs are gradually becoming an evil of the past, giving way to crystal control, or at the very least, M.O.P.A.'s. However, in the matter of modern apparatus, due consideration must at times be given to cost. Although a few in the amateur game have practically unlimited resources at their disposal, cost being a mere detail, nevertheless there are many others who can ill afford to spend large sums on radio as a hobby,

when other more important domestic necessities call for attention. Fortunately, authorised power is limited in Australia, so that the experimenter with his humble apparatus installed in the corner of a shed or attic is not altogether overshadowed by his friend in the next block, whose equipment may approach commercial standard.

### Ideal For Beginners

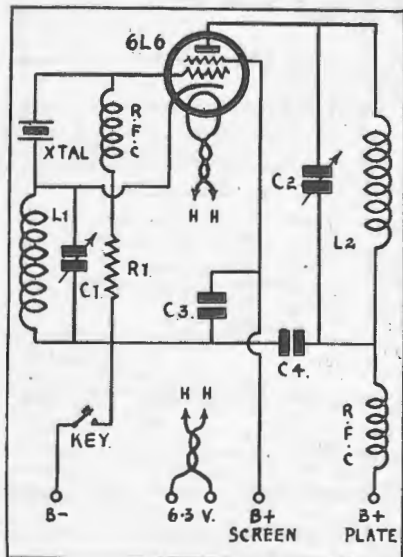
This article is intended for beginners who may be undecided what kind of transmitter to start with. Expenditure on parts for the one-

valver to be described is not wasted, as the complete job may be used to excite further stages at a later date.

Using but a single valve, it is crystal-controlled, and may be operated on 80 or 40 metres, no coil changing being required. The necessary change from 80 to 40 may be made in a few seconds. Up to 20 watts output may be obtained, this depending on the voltage available from the power pack being used.

### The Circuit

No claim of originality for the circuit is made, it being perfectly stan-



Left: The circuit. C1=13-plate midget variable; C2=.0005 mfd. variable condenser; C3 = .005 mfd. mica; C4=.002 mfd. mica; R1=200,000-ohm 1-watt resistor. For L1 and L2, see "Coil Data" panel.

A rear view of the completed transmitter is shown on the right. An aerial coupling coil can be located in the space to the right of the plate coil if desired.





**DX JUNIOR TWO-BAND TRANSMITTER**

**LIST OF PARTS**

- 1—16 gauge aluminium chassis, 10in. x 7in. x 2in.
- 1—16 gauge aluminium panel, 10in. x 6in.
- 2—Indicator plates and pointers.
- 1—Closed circuit 'phone jack.
- 2—Midget stand-off insulators.
- 1—4-pin, 1—5-pin, 1—octal socket (Stromberg-Carlson).
- 1—80-metre crystal and holder.
- 1—13-plate midget variable (Radiokes, Raymart).
- 1—.0005 mfd. variable condenser.
- 1—Copper tubing inductance (see coil data).
- 1—5-pin plug and length of 5-wire power cable.
- 1—6L6 or 6L6G (Radiotron, Raytheon, Mullard, Philips).
- 1—200,000 ohm 1-watt carbon resistor (Bifrost).
- 1—.002 mfd. mica condenser, 500v. working (Simplex).
- 1—.005 mfd. mica condenser, 500v. working (Simplex).
- 2—r.f. chokes, transmitting type.
- 1—4-pin former (Rayway).
- Nuts and bolts, push-back, solder tags, pilot lamp and holder, 18 or 20 gauge tinned copper wire.

ard, containing nothing outstanding or unusual. A 6L6 metal valve is used, but for those who prefer glass valves, its equivalent, a 6L6G, may be utilised. This latter valve is sometimes preferable, as it permits visual observance of any overheating of the elements which may go inside the valve.

The cathode coil, which is tuned to approximately 50% higher in frequency than the crystal, is used only when the transmitter is operated on 40 metres. The edge of one of the moving plates of the midget condenser tuning this coil is slightly bent, so that when the condenser is turned full in, the plates short circuit and consequently cut out the cathode coil when 80-metre operation is desired.

The plate tuning condenser has a capacity of .0005 mfd. Actually, a much smaller one could be used, but in this case the size of coil L2 would have to be larger. The number of turns and spacing would then become rather critical if tuning from 80 to 40 metres without changing coils is required.

The insulation supporting the fixed plates of this condenser should be fairly good, as the r.f. current in the plate tuning circuit is rather high. For this reason, 3/8" copper tubing is used for the coil, to minimise r.f. losses.

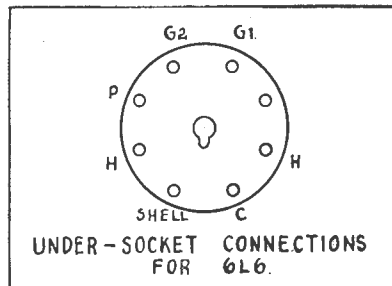
**Assembly And Layout**

The assembly should not require detailed explanation, as there are so very few parts in the set. First of all, holes are cut in the chassis to take the cathode coil socket, the 6L6 socket, and the power supply socket, while the front panel is drilled to take the cathode tuning condenser, the plate condenser, the key jack and pilot light socket. The components are then mounted in their respective positions.

In the mounting of the crystal holder and plate tuning condenser, care must be taken to insulate these from the chassis and panel by means of insulating washers.

Referring to the rear view of the transmitter, the components are as

follows:—Cathode coil extreme right, with its associated tuning condenser to the left of it and crystal holder directly in front of both; the 6L6 valve is in the centre, with the plate coil front right. This coil is mounted on two small stand-off insulators, and is kept clear of other components. The main tank tuning conden-



ser is at the right. The space on the chassis at the back right is for an aerial coupling coil, if it is desired to use a zepp. antenna with the set.

The panel controls are as follows:—Left, cathode tuning; right, plate tuning; centre top, key jack; centre bottom, 6-volt pilot. The power supply socket is located at the back, behind the plate coil. Underneath the chassis are the r.f. chokes, grid resistor, by-pass condensers, key jack, and pilot socket.

**Some Wiring Hints**

Most of the wiring is underneath the chassis, connections being kept as short as possible. The leads from either end of the plate coil to the condenser should be of heavy wire, copper tubing or copper braid. Copper braid was used in the original transmitter, as it is flexible and solders easily.

A lead is also taken through an insulated bushing to the plate of the valve socket. It is most important that good soldered joints be made when wiring up these plate tuning connections, the r.f. current in the plate circuit being fairly high. Any resistance introduced, irrespective of how small, will greatly impair the overall efficiency. A lead is also taken through an insulated bushing from the top plate of the crystal to the grid of the 6L6 socket.

**Good Quality Components Advisable**

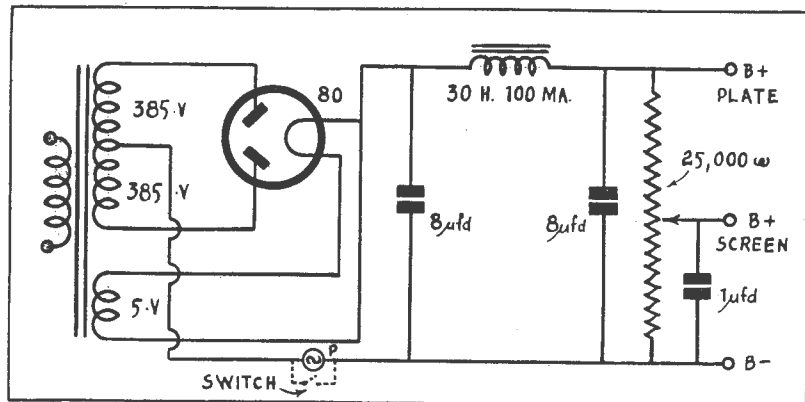
For best results good quality parts should be used. This applies in particular to the 6L6 valve socket and by-pass condensers. The latter should be rated to work at 500 volts. If desired, instead of using say one condenser of .002 mfd. at 500 volts for the plate blocking condenser, two .004's rated to work on 250 volts may be used if connected in series. The same holds for the screen by-pass condensers, this method being adopted in the transmitter being described.

The crystal holder should also be of good quality, with the plates ground perfectly flat. Any fault in this respect may result in a shattered crystal, as the r.f. grid current is fairly high.

The radio frequency chokes are not at all critical. In the original transmitter, ordinary broadcast chokes were used, one in the grid circuit and two connected in series in the plate circuit. However, special transmitting chokes are available from various radio stores, and no doubt would improve the efficiency even more.

**The Power Supply**

The power supply for this trans-



This power supply recommended for the transmitter delivers 385 volts at 100 m.a. high tension, with 6.3 volts .9 amp. for the 6L6 heater.

mitter is a separate unit, and will not be discussed in detail. Undoubtedly, many experimenters already have power supplies on hand which will be suitable.

Voltages between 250 and 380 may be used. As a matter of fact, if the receiver power supply has reasonably good regulation it may be utilised, thus obviating the necessity of an additional pack. However, it must be remembered that the plate current of the 6L6 is fairly high, and consequently the pack must be able to withstand the extra load.

With a supply delivering 385 volts at 100 m.a., the output on 80 metres would be about 20 watts, and on 40 metres, about 15 watts. Even higher voltages may be used with increased output, but this is not recommended for the newcomer, as any incorrect adjustment at high voltage may result in a wrecked valve or shattered crystal. A recommended power supply is shown elsewhere.

#### Tuning And Adjustment

When the assembly and wiring has been completed, a thorough check should be made to ascertain that everything is in order.

First of all the 6L6 filament voltage should be switched on, this being indicated by the lighting of the pilot lamp on the panel. The filament should be allowed to heat thoroughly before applying the high tension voltage. Preliminary adjustments should be made on low power, an excellent method for reducing the voltage of a power supply being shown in the sketch of the power supply, where at the point "P" a lamp-holder is wired in series, and an ordinary household 10 to 30-watt pilot inserted to break down the voltage.

An 0-100 d.c. milliammeter should be connected in the plate lead, and for a start a plate voltage of about 250 with a screen voltage of about 180 may be used.

The transmitter should first of all be tested on 80 metres. Condenser C1 should be turned full in so that the plates short circuit and consequently cut out coil L1. C2 is then tuned to resonance with the crystal, the plates being about three-quarters meshed, and the resonance point indicated by a sudden dip in the meter, or by the lighting of a pea lamp and loop held in the field of the plate coil.

For 40-metre operation, the plate tuning condenser is de-tuned from the 80-metre fundamental, and coil L1 is tuned by condenser C1 until a dip occurs in the meter or the test lamp lights. C2 is then rotated at a point where the moving plates are almost all out, until resonance is obtained with the 40-metre harmonic. When the transmitter has been ad-

justed correctly, the h.t. voltage may be increased.

#### The Aerial

No particular type of aerial system has been specified, as this will depend on individual tastes. The simplest type would be a 66' or 132'

#### Coil Data

L1, 18 turns of 18 or 20 gauge tinned copper or enamelled wire wound on 1 1/4" diam. former (turns spaced approximately by diameter of wire).

L2, 20 turns 3/8" diam. soft copper tubing, 2" diam., spacing about 1/10" between turns.

Note: Number of turns on L1 may vary slightly with layout used.

length tapped on the plate coil through a fixed condenser, 4 or 5 turns from the plate feed end.

With no aerial load, and with a plate voltage of 385, screen voltage 200 or slightly less, the plate current of the 6L6 will be about 15 or 20 m.a., with the circuits correctly tuned. With the aerial coupled, the current should rise anything up to 80 m.a.

#### Performance Is Excellent

The performance of this little set will be found to be up to the standard of many of the larger multi-stage rigs. On 80 metres New Zealand should be worked with ease, while no difficulty should be experienced in working DX on 40 metres.

Of course, like all other transmitters, its DX capabilities depend entirely on conditions, locality and aerial efficiency. What more could a new "ham" desire than a two-valve "Super-Gainer" receiver as described recently in "R.W." and one of these transmitters? Modern equipment at low cost!

And finally, remember that it is

an offence against the regulations to have in your possession apparatus capable of emitting a radio signal, unless you have obtained your amateur licence.

#### Brief Appreciations From Readers

I agree with numerous other readers that the "Radio World" is still the best radio mag. ever published in Australia. I have built the "Eaglet Two," but have not done too much DX as yet, although I feel sure this is going to be a good place for DX. Am enclosing a snap or two taken of my shack at Tailem Bend before dismantling for transferring here.—W. H. G. Dawson (AW121DX), Nantawarra, S.A.

#### Amateur Articles Appreciated

I am enclosing P.N. to the value of 10/6—would you please send me the "Radio World" for one year, beginning with the August issue? I think the articles on "Amateur Radio" are great; they are plain and concise.

I mostly listen to the "ham" bands, as I am just learning the morse code. The 40 m. band is pretty lively at nights, and at present the 80 m. band is "hot" on account of the VK-ZL 'phone contest. There are a few stations on the dial which are about R6-7, while during the day—well, the stations come in stronger than the ordinary broadcast stations, with some very fine entertainment.

Would it be possible later on to publish a few questions on the P.M.G. examination, as I think they would be appreciated very much by all. Also, I would like to correspond with anyone who is studying for his A.O.P.C. I also will exchange QSL cards with other members of the DX Club.—Chas. R. Nelson (AW98DX), 33 Dean Street, Ararat, Vic.

[Typical A.O.P.C. questions, with answers in outline, will probably be published at the conclusion of the series "Breaking Into The Amateur Game."—Ed.]

#### Coil Data For "Graham 7-Valve Superhet." (see p. 16)

RANGE.	AERIAL.	OSCILLATOR.
7-17 m. (Self-supporting, 3/4" diameter).	6 turns 12g. Spaced to cover 1 1/4". Tapped at 1 3/4.	7 1/2 turns 12g. Spaced to cover 1 1/2". Tapped 2 1/2.
16-40 m. (Wound on 1 1/2" bakelite tubing glued to UX valve bases).	7 turns 18g. Spaced to cover 1". Tapped at 2 1/4.	8 1/2 turns 18g. Spaced to cover 1 1/4". Tapped at 2.
39-90 m. (As 16-40 metre coils).	17 turns 22g. Spaced to cover 1 1/4". Tapped at 4.	19 1/2 turns 22g. Spaced to cover 1 3/8". Tapped at 4.



# The All-Wave All-World

Official Organ of the All-Wave All-World DX Club

# DX News



## Second DX Contest Closes On October 1

The closing date for the second "Radio World" Shortwave DX Contest is October 1, and for the third and final one, December 1. Entries can be forwarded at any time up to the dates given. The rules are as follows:—

1. For each Contest a trophy (a Repligle World Globe with time converter, value 59/6) will be awarded to the reader who submits the best individual verification.

2. Verifications from any short-wave station between 5 and 100 metres may be submitted. Thus cards from broadcast, commercial, radiophone and amateur transmitters are all eligible.

3. All verifications must bear a date (a post-mark on the card or envelope will suffice where no date is given on the actual verification); and the frequency on which the station has been received must be clearly indicated.

4. Entries for the second competition will close on October 1, and only verifications of reception between January 1 and August 31, 1937, will be eligible.

5. In judging the entries, the judges will take into account the power of the station received, the frequency on which the station was heard, and the type of receiver used.

6. There is no limit on the number of verifications which may be submitted by any entrant.

7. The decision of the judges will be final; and the result of the second competition will be announced in the November issue of "A.R.W."

8. All entries should be addressed to the Shortwave Editor, and should be endorsed "DX Competition." All verifications submitted will be returned as soon as possible after the closing date.

—The Shortwave Editor.

## More Cuban S.W. Stations

Since my last letter to the "Radio World" a few more Cuban s.w. stations have come on the air, and the following should be added to the list forwarded previously. (Published in the June "Radio World"—Ed.):—

COBC relays CMBC.—Slogan and owners: "El Progreso Cubano. Address: Apartado No. 132, Habana, Cuba. Frequency: 9,363 k.c. (32.04 m.). Schedule: 7.00 a.m. to midnight E.S.T., daily.

COBZ relays CMBZ. "Radio Salas." Owners: Manuel Y. Guillermo Salas. Address: Apartado No. 866, Habana, Cuba. Frequency: 9,030 k.c. (33.32 m.). Schedule: 7.45 a.m. to midnight, E.S.T., daily.

COCW relays CMCW. Slogan and owners: "La Voz de las Antillas." Address: Apartado No. 130, Habana, Cuba. Frequency: 6,880 k.c. (42.60 m.). Schedule: 7.00 a.m. to 1.00 a.m. E.S.T., daily.

COJK relays CMJK. Power 2 k.w. Address: Finlay No. 3 Altos, Camaguey, Cuba. Frequency: 8,665 k.c. Schedule: 7.00 a.m. to 11 p.m., E.S.T., daily.

Also, the following changes to the previous list should be noted:—CO9RY uses now the call COGF and relays CMGF, but on a frequency of 11,800 k.c. Address and owner, same as before. Schedule: 8.00 to 9.00—2.00 to 10.00 p.m., E.S.T., daily.—Ricardo F. Rubio, Habana, Cuba.

## ALL-WAVE ALL-WORLD DX CLUB Application for Membership

The Secretary,  
All-Wave All-World DX Club,  
214 George Street,  
Sydney, N.S.W.

Dear Sir,

I am very interested in dxing, and am keen to join your Club. The details you require are given below:

Name.....

Address.....

[Please print both plainly.] .....

My set is a.....

[Give make or type, number of valves, and state whether battery or mains operated.] .....

I enclose herewith the Life Membership fee of 3/6 [Postal Notes or Money Order], for which I will receive, post free, a Club badge and a Membership Certificate showing my Official Club Number.

(Signed).....

[Note: Readers who do not want to mutilate their copies of the "Radio World" by cutting out this form can write out the details required.]

## Radio Ramblings

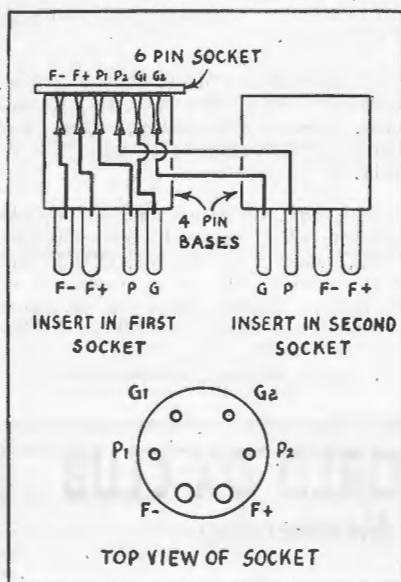
(Continued from page 8)

saving on "B" batteries, and will add several months on to their useful life.

Sometimes it may be found that the above works O.K. on a set for night reception, but the set hasn't got that little extra kick for daytime, so to avoid changing the lead every day, I use a single-pole double-throw knife switch. Thus either of the desired voltages can be selected.—John T. Smith (AW103DX), Glen Innes, N.S.W.

### 19 Replaces Two 30's

The accompanying sketch illustrates a method of using a single 19



to replace two 30's without changing the wiring.

A 6-pin socket is cemented to a 4-pin valve base as shown, and the filament lugs wired as shown. As well, plate and grid leads from one section of the 19 are connected as illustrated. A further two leads are taken from the remaining grid and plate lugs on the 19 socket to the corresponding pins of the second valve base. Finally, the two bases are plugged into the receiver.—C. R. Nelson, Ararat, Vic.

### Tips For DX Beginners

By "OLD TIMER"

The old hand at dxing knows that the golden rule for successful logging is to know when, where, and how to tune. The usual complaint of the newcomer to short waves is that he can only log the more powerful stations, such as those situated in Germany, France and England.

If a dxer wishes to get rare "catches," there are several points he should always keep in mind.

1. Know definitely where to look for the station you wish to "snare." In other words, know your dial.

Fairly accurate calibrations can be made on any band by noting where the powerful stations come in, and then making a graph of that particular band. In this manner you can tell with a reasonable amount of accuracy where you should log a station on your dial. By twisting the dial haphazardly, you'll probably pass over many carriers.

2. The next point is to know just when to tune in. A dxer friend of mine told me recently he had seen where HAS3, situated in Budapest, Hungary, had often been reported, but he was never able to log them.

Firstly, he did not know that this station broadcasts for only one hour a week (Sunday midnight to 1 a.m. Monday, A.E.S.T.), and also that it transmits on 19.5 metres, just below the German Group on the 19 metre band. The following Sunday he had no trouble in logging this "fb" catch.

The novice can do no better than follow Mr Graham's S.W. notes, and tune for stations at the right time; keep plugging away and you'll soon be rewarded. Don't think that because yours is only a humble three-valve set you won't log any stations; persevere and you'll be surprised at the results.

3. A fault common to newcomers is to keep switching from one carrier to another. If you think you've picked up a new station, stick to it till you identify it, even if several others are transmitting at the same time. Better to make sure of one "catch" than to miss them all by chopping and changing.

4. If you want to enjoy listening and become efficient at dxing, set yourself a goal. List the stations you want to hear, and tune at the right time and on the right frequency. Once you've something to aim for in dxing, you'll be surprised at your eagerness to attain that goal.

So go to it, you dx fiends—set yourselves a goal, and follow the "Radio World's" monthly notes. Keep plugging away persistently for the rare ones, and you'll really enjoy the thrill of dxing.

### New Philips C.R. Tube

(Continued from page 15)

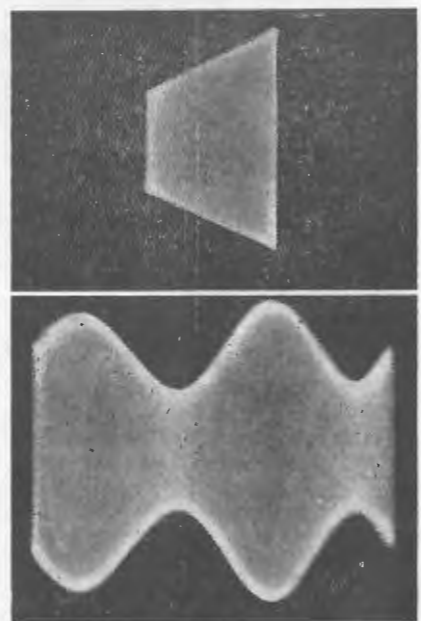
field of cathode ray tube application still further.

Apart from the radio engineer and service expert, who will find in the DG7-1 an economical basis for the design of portable oscilloscopes, the amateur transmitter will also find this tube extremely valuable for

many purposes, particularly with reference to checking and measuring the modulation characteristics of transmitting equipment.



An "exploded" view of the DG7-1.



Patterns for a 37% modulated signal—typical observations on the DG7-1 screen.



# Short-wave Review

CONDUCTED BY  
**ALAN H. GRAHAM**

## Latest About Police Transmitters ★ High Frequency Reception Improving ★ Sino-Japanese War News ★ "Latin- Americans Come In Well ★ Latest From D.E. Indies ★ A Mistake Rectified: Daventry Does NOT Verify.

**R**EADERS will remember that frequent reference has been made in these notes to the police transmitters on 9.9 and 7.9 metres. It is now clear that this latter wavelength is wrong, for the higher of the frequencies allotted for police transmissions is 33 megacycles (i.e. 8.9 to 9.1 metres).

Dxers with receivers whose tuning range extends to these high frequencies should therefore look for four bands:—

- (a) 28 meg. (10-10.7 m.), amateur band.
- (b) 30.1 meg. (9.9 m.), police radio band.
- (c) 31.6 meg. (9.49 m.), broadcast band.
- (d) 33.1 meg. (9.0 m.), police radio band.

Reception conditions over this range have shown signs of steady improvement during the past month. After a rather lean period, American amateurs are coming in very well on 10 metres. On most days only W6's can be heard, but occasionally the "skip" alters and W4's and W2's put in good readable speaker signals. Dxers who desire to obtain cards from amateur stations should concentrate on 10 metres, for reports regarding this frequency are undoubtedly verified more readily than those concerning 20 metres.

### Police Radio In Georgia

From Mr. J. F. Brooks, Engineer-in-Charge, comes a most interesting letter verifying a report on W4XAG, police radio in Rome, Georgia. The equipment at W4XAG is similar to that in use at Newark and Evansville—a 14-valve Western Electric job with a power of only 50 watts.

The transmitter is housed in a room on top of the City Clock Tower, 120 feet above the summit of the highest hill in the city.

The letter explains the reason for the police radios using ultra-high-frequency channels for their broad-

casts. The Federal Communications Commission has ruled that ultra-high frequencies can be used without first-class radio engineers being on duty at all times; and accordingly operators with third-class licences are employed.

With the approach of summer the police bands are showing signs of improvement—especially the 33 meg. channel, on which W5XB, Fort Worth, can often be heard. W2XEM, Newark, is the best of the 9.9 m. stations.

Listeners logging any of these police radios should not hesitate to forward reports to the stations they hear. From personal experience it can be said that the operators are only too pleased to receive information concerning reception of their transmissions.

### West Australian Conditions

A most comprehensive report to hand from Mr. G. O. La Roche, Official S.W. Observer for West Australia, contains references to some interesting reception in that State.

Mr. La Roche reports that Radio Saigon, French Indo-China, is being heard on 25.6 m. It appears that Radio Saigon is conducting a series of tests on 25.6 and 50.1 m. Usually announcements are in French, spoken by a woman who announces "Ici Station Boy-Landry, Rue Cantinat, Saigon." The station is heard in the West between 6 p.m. and midnight (E.S.T. 8 p.m.-2 a.m.) at fair strength, but reception is marred a good deal by distortion of signals.

Rangoon, on 49.94 m., is putting in a good steady signal every evening.

Outstanding stations audible in the small hours of the morning (from 3 a.m. E.S.T.) include VQ7LO, Nairobi, Kenya Colony, transmitting on 49.3 m. (this station is a real dx catch, and must still be on the "wanted" list of many readers); CSW, Lisbon, on 27.17 m.; and the Cubans COCX (26.23 m.), COCQ (30.7 m.), COCD (48.82 m.), and COCO (49.9 m.) are regulars during this period.

Mr. La Roche reports that the majority of the D.E.I. transmitters are being heard at good strength in the West. He states that PLP (27.2

### E. Neill Wins First S.W. DX Contest 10-Watt Irish Station

The winner of the first DX Contest trophy is Mr. Ern. Neill, 26 Canning St., North Ipswich, Queensland (AW64DX). The prize-winning entry was a card from the Irish Free State amateur station EI4L, whose 20-metre signals were logged at QSA4 R5-6 on April 12. As EI4L was transmitting with a power of only 10 watts, reception in Australia of this station was a meritorious performance.

Full details of AW64DX's receiver and aerial system will be published in next month's "Radio World."

Honourable mention goes to Mr. W. T. Choppen, 4 Marston Road, Timaru, N.Z. (AW61DX), for several of the entries he submitted—especially the verification from G6WY, Beckenham, Kent, England, for his 20-metre signals logged on a three-valve superhet. receiver, in conjunction with a 50' vertical antenna.

—The Shortwave Editor.

### Club Stationery Now Available

In accordance with many requests from members of the All-Wave All-World DX Club, a supply of headed club stationery has been made available. Printed on good quality note paper, the price is 1/6 for 50 quarto sheets, post free.

m.), PMN (29.24 m.), PMH (44.6 m.), and YDC (19.8 m.), all in Bandoeng; YDE2, Solo (62.37 m.), YDA, Tandjong Priok (98.68 m.), and YDB, Soerabaia, are all received at good readable strength. The last-named station is listed on 31.2 m., but at present it appears to be operating on approximately 31.45 m.

#### Latest D.E.I. List of N.I.R.O.M. Transmitters

From Mr. J. Hardeman, Shortwave Editor, Netherlands Indies Broadcasting Company Ltd. (N.I.R.O.M.), comes a communication relating to the transmitters now in operation.

Station.	K.C.	M.	K.W.
YDA, Tandjong Priok (10.30 a.m.-5 p.m.)	3,040	98.68	10
*YDB, Soerabaia (10.30 a.m.-5 p.m.)	9,610	31.2	1
	11,860	25.3	
PMN, Bandoeng	10,260	29.24	1.5
PLP, Bandoeng	11,000	27.27	1.5
YDC, Bandoeng	15,150	19.80	1.5
*PMH, Bandoeng	6,720	44.60	1.5
*YDE2, Solo	4,810	62.37	.1
YDA7, Pekalongan	3,270	91.74	15w.

\* Now being heard on 31.45 m.  
\* Native programme only.

With the exception of the stations whose times of transmission are given above, the N.I.R.O.M. transmitters work on the following schedule:—

Week-days: 9-10.30 a.m.; 1.30-5 p.m.; 8.30 p.m.-2 a.m.

Saturdays: As above, except final transmission is extended till 2.30 a.m.

Sundays: 1-5 p.m. and 8.30 p.m.-1.30 a.m.

#### JDY, Dairen, And War News From The East

Of outstanding interest this month has been the special news session broadcast from station JDY, on 30.2 m. JDY usually opens at 10.15 p.m. with a budget of war news in English; this is followed by local Japanese news, also in English. Signals are extremely strong.

#### Chinese 'Phone Stations

To the list of Chinese commercial stations published in last month's issue add the following:—

Call.	Location.	K.C.	M.
XTR	Swatow	9,360	32.0
XTS	Swatow	11,470	26.1
XTU	Canton	12,070	24.8

#### European Notes

The Belgrade shortwave station, YUA, is carrying out a series of special "trans-Atlantic emissions" for Yugoslavian migrants overseas. These special sessions are broadcast on alternate Thursdays from 10-11.15 a.m. over stations YUA (49.18 m.), DJO (25.43 m.), and DZC (29.14 m.).

Belgrade is particularly anxious to receive reports on these transmissions.

#### Australia-England On Five Metres?

A news item of more than usual interest concerning 5-metre DX is contained in the following letter to the Editor from Mr. Don B. Knock (VK2NO). He writes:—

"This week I received a report from Mr. Cecil Mellanby, radio engineer, of Pwllheli, North Wales, British Isles, to the effect that on November 22 last he logged on 5-metre 'phone a station 'VK2N—' in contact with another VK. Time of logging was 7.30 a.m. British Summer Time. He states that the reason for the delay in sending me word is because he was undecided as to the call, as he missed the last letter because of high background noise. Since then, however, he has heard me on 20-metre telephony and recognised the voice as being my own.

"On checking my log, I find that on November 22 last I was working VK2HL, Chatswood, on 5-metre 'phone between 4.20 and 4.45 p.m. Sydney time. I was using my big transmitter with 100 watts input to the final and a Reinartz rotary beam aimed on Chatswood. Chatswood is due N.W. of my location, and N.W. is the direction for European signals in our afternoon.

"It looks fairly conclusive, and I do not treat Mellanby's report lightly, as he is the man who has logged and had verified a batch of East Coast Americans on 5 metres.

"This report bears out my contention that the summer months are the months in which to try for 5-metre DX from Australia, and from now on I shall be busy getting gear up to top form for this summer.

"Yours sincerely,  
"Don. B. Knock (VK2NO)."

#### Free Station Chart And Time Converter

In last month's "Radio World" readers were invited to send for a free copy of the latest two-colour eight-page station chart and time converter, issued by Messrs. Philips Lamps (A'sia) Ltd. Unfortunately, the box number given was indistinct in some copies, and so to avoid confusion, it is repeated herewith:—Radio Sales Division, Philips Lamps (A'sia) Ltd., P.O. Box 2703 C, Sydney.

Further additional frequencies are being used by the Czechoslovakian station OLR; these are as follow:—

OLR2A (49.92 m.); OLR2C (49.06 m.); OLR3B (31.57 m.); OLR4B (25.51 m.); OLR4C (25.26 m.); OLR4D (25.21 m.); OLR5B (19.58 m.); OLR5C (19.79 m.), and OLR6A (13.99 m.).

It is believed that all these stations will be used during the regular Prague broadcasts, changes being made as conditions require.

#### W2XE Is Outstanding N. American

The outstanding U.S. station for the month is W2XE, New York City, which has been recently logged on the 13 and 25-metre bands.

Earlier in the year the 19.65 m. transmitter of this station was received very well around 7 a.m., but seasonal changes have altered the situation, and at present W2XE are best received on 25.36 m., between 8.30 a.m. and 2 p.m. Early morning reception is best, for later in the day remarkably rapid fading is very troublesome.

On 13.94 m., W2XE has shown a vast improvement during August—in fact, the best American signals ever heard on 13 m. were received in the last few weeks. From 9.30-10.15 p.m. their signals are often QSA5—the news service on August 12 was copied one hundred per cent.—but towards 10.30 p.m. the station has practically faded out.

Strangely enough, no trace has been found of the other 13 m. American, W8XK.

On the other wavelengths the Americans have been extremely poor, especially so as far as 49 m. is concerned. W8XAL (48.5 m.) has been reasonably good on occasions, but where are W8XK (48.3 m.) and W9XF (49.1 m.), and W3XAL (49.1 m.)? In previous years these stations were logged regularly around 3-5 p.m.; but 1937 has brought nothing more than weak carriers, as far as the writer's location is concerned at least.

Apparently reception in West Australia is no better, for Mr. La Roche reports that W3XAL (16.87 m.),

W8XK (19.7 m.), and W2XAF (31.48 m.), are the best of a very poor lot.

**Logging Aircraft Stations**

Dxers on the lookout for the unusual should spend a few minutes between 5 and 11 p.m. on 54 metres, on which wavelength a number of American aircraft stations have been logged. Because of the extremely abbreviated nature of the majority of their transmissions, it requires a tremendous amount of patience to identify these stations. A high noise level does not make the task any easier.

**South And Central America—  
More New Stations Heard**

**PERU**

Two new Peruvian stations have been heard during the past month. OAX5C, in Ica, officially listed on 50.0 m., has been reported as testing on 31.1 m.

A transmitter which does not appear in any station list available has been heard on approximately 45 m. The call is OAX4, and the station, which is located in Lima, is to be logged around 5.30 p.m.

**REPUBLIC OF GUATEMALA**

The best-known Guatemalan station, TGWA (31.75 m.), has not been audible for some time now. Its place has been taken by TG2 on 47.55 m., heard at good strength on Sunday afternoons till as late as 6.15 p.m. Occasional announcements are made in English, the calls given being TGW, TG1 and TG2. Send reports to the Director General of Electrical Communications, Guatemala City.

**REPUBLIC OF PANAMA**

Readers will recall that reference was made in the stop-press section of last month's notes to a new station located in Panama—HP5A. This transmitter has been heard conducting further tests on 25.64 m. No regular schedule is adhered to, as HP5A has closed at any time between 1.30 and 7.20 p.m. It was on the air till the latter time on August 8, when good steady R7 signals were logged. Frequent announcements in English make the station easily identifiable.

**MEXICO**

Three Mexican stations have been outstanding. The best of these is XEWW, Mexico City, on 31.58 m. Exceptionally strong signals have been heard every afternoon for several weeks past.

On 25 m., look out for XEBR (25.38 m.), Hermosilla, and XEWI (25.21 m.), Mexico City. The former may be identified by the use of four chimes with each announcement.

**New Stations In West Indies**

**CUBA**

Several new Cuban stations can be added to your station lists—two on 25 m. and two on 32 m.

On 25 m., COGF, Matanzas, is out-

standing. It relays CMGF on a wavelength of 25.45 m., signing shortly after 3 p.m. Address is P.O. Box 51.

The other 25 m. station is on 25.02 m. It is located in Habana, and the call is understood to be COCN.

On 32.1 and 32.6 m. respectively are COBP and COBZ, both in Habana.

**DOMINICAN REPUBLIC**

Broadcasts from Ciudad Trujillo, station HI2X, have been reported on 25.08 m.

**The Amateurs—Calls Heard**

10 m.: W2AOG, W4EDD, W4EEB, W5YJ, WGGCX, W6MEP, W6ITD; ZL1JD, ZL2FY; and K6LNP.

20 m.: G2AK, G2TZ, G2XU, G2PU, G2HK, G5ML, G6LK, G6RH, G6VX, G6DT, G8IK, England; GW5KJ, Wales; F8CW, France; CT1AY, CT-1GU, Portugal; PAOUA and PAOUT, Netherlands; EA9AH, Spanish Morocco; VE4KZ, VE5OT, Canada; XE2FC, Mexico; TI2RC and TI3AV, Costa Rica; CO2JG, Cuba; YV5ABE, Venezuela; CE1AH, CE1AO, Chile; OA4AI and OA4AL, Peru; PK1ZZ and PK2VD, D.E.I.

**Verifications Received**

Broadcast stations: PCJ, Eindhoven, Holland (19 and 31 m.); COCD, Habana, Cuba.

Ship station: WMEF, Solar Eclipse Expedition on U.S.S. "Avocet."

Phone stations: DAF, Norddeich Radio, Germany; XTB and XTV, China; GCP, GBS, GBL and GAS, Rugby, England; IUG, Addis Ababa; CJA and CGA3, Drummondville, Canada; Rabaul, New Guinea; and PLV, Bandoeng, D.E.I.

**The Front Cover**

This month's front cover shows the Replogle World Globe awarded to the winner of the first "Radio World" Short-wave Contest—Mr. Ern. Neill (AW64DX), of North Ipswich, Queensland. The receiver included in the photograph is the "Amateur Communications Eight," described in the June and July issues of the "Radio World."

Printed in colours, with a hard glazed surface that is washable, and with the mounting finished in chromium and black, this globe forms a trophy any dxer would be proud to own. Leading shortwave stations of the world are indicated, and an ingenious time converter is built into the base, so that time differences can be read off instantly.

The globe for this first contest was kindly donated by Mr. Alan Graham, Shortwave Editor, while the globes for the remaining two contests will be given by the "Radio World." Details regarding conditions of entry will be found elsewhere in this issue.

Amateurs: OA4B; LU9BV; LU1CA; VP5PZ; CO2JG; J7CR; VE4EA, VE4HZ; VE5BF, VE5JB, VE5JK.

Police Radio: W4XAG, Rome, Georgia, U.S.A.

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# DX News and Views

A page for  
letters from  
DX readers

## New Cuban S.W. Stations

More s.w. stations are coming on the air, further overcrowding the bands. The latest additions are CMD on 14.00 m.c. in Havana, Cuba, and COJK on 8.75 m.c. in Camaguey, Cuba. Both stations are heard irregularly during afternoons. XEXS, in Mexico City, is heard with good volume early in the afternoon, usually signing off about 2 p.m.

Another new Mexican is XEW, "La Voz de la America Latina," in Mexico City. This station broadcasts on 10.50 and 9.51 m.c. during the afternoons, sometimes until 3.30 p.m. Some very good continental musical records are to be heard from this station. Interval signal is four musical notes—"A, B, D, E."

A new Colombian station now on the air is HJ1ABU, in Baranquilla. The frequency is 6.03 m.c. He usually signs off about 2.00 p.m.

A recent verification comes from EAJ43, Canary Islands. EAJ43 is one of the various broadcasting stations commandeered by the Spanish insurgents for the purpose of putting propaganda over the air. (All times given above are A.E.S.T.).—W. T. Choppen (AW61DX), Timaru, New Zealand.

## An International Log

A few words about dxing in New

Zealand. VK's on 20 metres have been coming in well for the last three months, and very seldom were signals less than Q5, R8-9. A few of the best were VK's 4JU, 2XU, 2ADE, 2HF, 2MH, 3AL, 2IQ, 3ZL, 5GM, 5AW and a few others, the best tone for music being VK5GM and 3AL. VK2XU and 4JU have the best all-round transmitters. My set does not go down to 10 metres, but I can receive VK2GU, 3WB and a few others on harmonics. There are a few ZL's on 10 and 5 metres, but have not heard any yet.

I am building a 5-10 metre receiver, so I will be looking for VK stations. "W" hams on 10 m. come in at good volume over here. During the past two months I have logged and reported to 130 W's, 5XE's, 6CE's, 120 VK's, 4 ON's, 8 K6's, 18 VE's, 3 J's, 10 F's, 2 ZE's, 8 KA1's, 4 CT's, 5 TI's, 4 VP9's, 6 PK's, 6 PAO's, 15 LU's, 3 ZP's, 4 K7's, 3 K4's, 2 ON's, 2 CX's, 6 CO's, 3 XU's, 6 PY's and 3 HA's. All were received on speaker of eight-valve Patterson. My aerial is 200 feet long with lead-in in the centre, direction, n.w.-s.e.—W. Marsh, Otago, New Zealand.

## Hong Kong Station Gives War News

The 40 m. band here has been very "dead," and only VK4's and 2's are being heard. However, last week I

heard VLJ on Lady Elliott Island testing on 'phone with VK4LQ at R5, Q4 and good quality speech. 4LO was coming in here at R8, Q5 with harsh voice.

The 20 m. band has been exceptionally alive, and W's have been coming in at R5 to R9 max., also KA60BE with enough punch to rattle the speaker at 9.30 p.m. on July 17. HI7G, Dominican Republic, was coming in R8, Q5, testing with VK3ZZ, R5, Q4, both with good quality speech. On August 18 I heard VK2ME testing with Rabaul on 16.33 m.c. (18 m.) with an R4-5, Q5 signal, slight QSB and c.w. QRM.

On 70 m. there has been a Hong Kong station giving news of the Chinese war in Japanese, Chinese and English; reception was R4, Q4. On 48.62 there is also a Japanese station which plays music for 15 minutes and then announces in three languages. On the 30 m. band KVR, Manilla, comes in well with an R8, Q5 signal. VPD2 is also fair—R6, Q4, but with bad QSB.

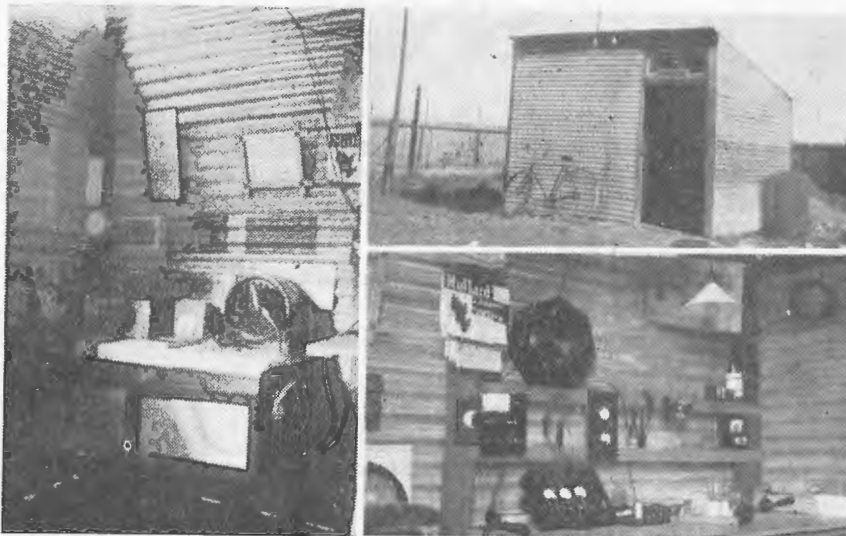
The "Flying Doctor" at Longreach, Q'ld., has been heard giving messages on speech and c.w. on 35.2 metres.

The 80 m. band is only fair; at times a few ZL's are heard at R4. ZL2QL has a regular signal at R6, Q5, with, I think, 150 watts output. The 160 m. band is empty up here, except for a few c.w. stations at R3-4. The set I am using at present is a 5v. a.c. all-wave job.—S. E. Molen (AW213DX), Sarina, Q'land.

## B.B.C. Does Not Verify

In this month's "Radio World" there is a short note re the B.B.C. verifying. The B.B.C. does not verify. The report has evidently arisen from the fact that several dxers in the States have offered to monitor the B.B.C. transmissions on certain days in the week, and then issue verification cards to listeners who send correct reports to them. A charge is made for this.

In my opinion, these cards should not be accepted in any competition, as they are not an official verification issued by the B.B.C., but merely a card issued by a listener. Therefore, in the strict sense of the word, they do not verify.—G. E. Bott, Hastings, N.Z.



DX Club member W. Dawson, of Nantawarra, S.A., has something every radio fan wants—a shack of his own, away from family QRM!



## Round The Shacks . . . . . 2

# VK4JU Completes 47,000 QSO's In 18 Years

The second of a series of articles on VK amateur stations, written for the "Radio World" by . . .  
"REPORTER"

WHETHER VK4JU is modest or merely taking things for granted, due to his long and consistent activity on the air having created a kind of "confident, matter of course" complex, is not known to the writer. To get information from him concerning his activities promised to be a difficult assignment, and the task could be aptly likened to that of opening a giant clam with a tooth-pick.

However, persistency was rewarded by an invitation to tea, and over the cups 4JU thawed. "What do you want to know?" he demanded. My reply, equally brief, was: "Just all about yourself, your rig and results."

"Hm, it's O.K. about the rig and results, but which description do you want of me? I've heard quite a number of them!"

"I only want the facts concerning your career as a 'ham'," I replied. "How long ago did you become interested in radio?"

"1919."

"I suppose you knew very little of radio so long ago as that?"

"Who knew a great deal about it then?"

"Very few," I hazarded, anxious to screen my ignorance.

"Quite correct," 4JU assented, "and it was in those days that the Spirit of Ham Radio came into being. 'Hams' stuck together, applauding the other fellow's work and results, and seeking information so that worth-while experiments might become the property of all. Books told us nothing in those days."

"A sort of mutual aid society," I suggested. Curiosity prompted me to enquire whether there were any "pirates" in the old days.

"What made you bring that up?" he asked. "I suppose there were a few floating around. My funniest experience with the genus came about when I had one staying with me. He brought his bread-board rig with him and managed to get in some fine work. I didn't confide in him that I was even interested."

"What did your first transmitter consist of?" I asked.

"A spark coil and——"

That was too much for me. "No," I interrupted, "not that type, but your first valve job."

"Oh! a 201A in a loose-coupled Hartley, using 'slop jar' rectifiers. I also tried the Colpitts, TPTG, Reinartz, in fact, I think I experimented with pretty well all the earlier circuits. I used to have 400 volts on the 201A, and you may be sure it didn't last very long."

"When did you first go on to crystal control?" was my next shot.

"Eight years ago."

"Who was your first DX contact as VK4JU?"

"NU6BY (W6BY). Since then I have worked 9,472 different W stations and QSO'd W 12,893 times, worked all W three times on 40-metre fone, worked all W 62 times on 20-metre fone, and seven W districts on 80-metre fone. On 80 metres I have QSO'd K7, K6, VE5, KA3, VP1, W and ZL."



Frank Nolan (4JU) and his wife (4LO).



VK4JU's wife has for many years acted as his "second op." She obtained her A.O.P.C. ticket in 1931, and operates her own station (shown above) under the call-sign VK4LO.

### Has Completed 47,000 QSO's

"That's certainly great," I ventured, "and do you happen to have kept a total of your contacts?"

"I have completed 47,000 QSO's, 14 times WAC on fone, and 17 times WAC on CW. That's all!"

"And now," I said, "what about some dope on your present rig?"

"Huh!" grunted 4JU, "what a rig! That wouldn't be of any interest to your magazine."

"It gets you all over the world, and, according to your own ideas of Mutual Aid Societies, you should spill the beans."

"O.K.," he agreed, "though I'd certainly like a better rig than the one I have now. I'm using a 210 crystal controlled oscillator with 350 volts on the plate. It is on 40 metres. The 20-metre doubler and the P.A. are both 46's, with 500 volts on their plates. A UX250 is used as modulator, and the speech amplifier is a 57/57 (Class A) 59 (pent.). The antenna at present in use is two half waves in phase."

"In four months, using this antenna, I completed one thousand QSO's with U.S.A. on 20-metre fone, accomplished my first winter season WAC, and for the first time in winter I've worked Africa, South America and Europe. Previously I thought that my location and conditions would prevent me from working the list mentioned, but antenna experiments have proved otherwise and have more than justified the work I have spent on them."

"And that's all you're going to get out of me! What about another cup of tea?"

### Quixote Radio Club Pay Compliment To VPD2

A neat compliment has been paid to VPD2, the shortwave broadcasting station of Amalgamated Wireless at Suva, Fiji, by the Quixote Radio Club of Santa Barbara, California.

#### "Radio Step By Step"

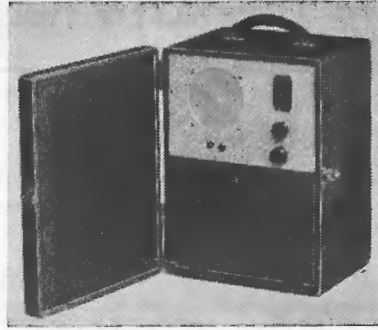
It is regretted that owing to heavy pressure on space this month, it has been necessary to hold over the eleventh instalment of the above series of articles until next issue.

Apparently the whole membership of the club was invited to listen to the Fiji station on their own receivers, as no fewer than thirty-nine members of the club sent reports by a recent mail. In most cases the Fiji station was heard clearly, as in thirty reports the word "excellent" is used.

★

#### "Jones' Super-Gainer" — Error In Price

It is regretted that, owing to a printer's error, the price for a complete kit of parts for the above receiver, as advertised by Messrs. A. J. Veall Pty. Ltd., Melbourne, last month, was wrongly given as £6/19/6. This should have read £8/19/6.



## "1937 Outdoor Portable Four"

Full Description In Next  
Month's Issue

One of the most popular "Radio World" receivers for 1936 was the "Outdoor Portable Four," illustrated above, and described in the October and November issues of last year. The 1937 model is now being built, and will be featured next month.

Except for several worth-while improvements, the circuit is fundamentally the same as that used in last year's model. Giving

exceptionally high gain with low battery drain, it is undoubtedly the best four-valve arrangement available. However, the layout has been altered appreciably to give greater compactness, and the batteries rearranged for the same purpose.

Altogether, the "1937 Outdoor" is certain to be even more popular than its predecessor, and readers are advised to order their next month's copy in advance to avoid disappointment.

## ZL Amateur Transmitters

Following are additions and amendments to the list of N.Z. amateur transmitters published in the April "Radio World." All calls given below should be prefixed by the letters "ZL."

- 1BA—R. J. Taylor, 57 Dominion Rd., Mt. Eden, Auckland, S.W.1.  
 1BX—H. J. Grut, C/- J. Parr, Paterangi R.D., Ohaupo.  
 1DJ—A. Fielder, 24 Fairlands Ave., Avondale, Auckland.  
 1FE—A. F. Woods, C/- P.W.D. Sub-station, Claudelands, Hamilton.  
 2FO—I. S. Savell, 96 Ferguson Street, Palmerston North.  
 1FV—9 Pah Avenue, Epsom, Auckland.  
 1GA—M. E. Dervan, 7 Hereweni St., Rotorua.  
 1GB—I. St. J. Beere, Yacht "Ngataki," Auckland.  
 1GE—G. S. Benson, 13a Marsden Ave., Mt. Eden, Auckland.  
 1IB—R. L. Blair, 12 Weona Place, Auckland, W.2.  
 1JN—W. Walker, 48 Victoria St., Hamilton.  
 1MU—J. H. Langridge, C/- N.Z. Railways, Rotorua.  
 1MV—J. D. Llewellyn, 24 Wynyard St., Auckland.  
 2AQ—D. H. Collett, 72 Hopper St., Wellington, C.2.  
 2CT—S. Scholfield, Lighthouse, Cape Campbell.  
 2DL—R. A. J. Carr, 11 Totara Terrace, Miramar, Wellington.  
 2FC—I. S. Savell, 96 Ferguson Street, Palmerston North.  
 2FI—A. A. Knight, Montreal Rd., Nelson.  
 2FG—H. R. D. Brown, 104 Lyndhurst St., Palmerston North.  
 2GX—J. W. White, 9 Pah Avenue, Epsom, Auckland. (Portable station ZL1FV).  
 2HZ—T. S. Eckford, C/- A.S. "Echo," Wellington.  
 2IZ—C. W. Trimmer, 18 Jessie St., Petone.  
 2MD—A. F. Jackson, Takapau.  
 2MK—J. A. Adams, 122 Trafalgar St., Nelson.  
 2NI—J. W. E. Peacock, 9 Andrew Young Street, Palmerston North.  
 2RS—W. R. Schdroski, 218 Oriental Parade, Wellington.  
 2RU—R. C. Boyens, 26 Aurora Tce., Wellington.  
 2SY—J. R. Ensoll, 9 May Street, Gonville, Wanganui.  
 2TH—H. Weenink, 55 Roxborough Street, Wellington (late Petone).  
 2TI—A. G. Papworth, C/- Chrisp Music Co., Gladstone Road, Gisborne.  
 2TJ—H. A. V. Ambury, 133 Devon St., New Plymouth.  
 2TP—C. A. Borman, 49 Boulcott St., Wellington, C.1.  
 3AO—Mrs. T. M. Souper (late ZL2JF), 66 Mersey St., ChCh.  
 3AU—J. Byrne, 9 Campbell St., Timaru.  
 3BL—G. Askey, 15 Sarah St., Timaru.  
 3CH—S. McKnight, 105 Dyers Pass Road, Cashmere, Christchurch.  
 3CP—C. W. Parton, P.W.D., C/- P.O., Arthur's Pass.  
 3FV—W. D. McCracken, 18 Whiteleigh Ave., Addington, ChCh.  
 3HC—D. C. McGlashan, A.M.P. Bg., Timaru.  
 3HD—L. E. C. Johnson, 352 Gloucester St., Christchurch.  
 3HH—R. J. Griffin, 40 Saunders Rd., Ashburton.  
 3JF—H. P. Henderson, 57 Lindsay St., Christchurch, N.1.  
 3JK—L. A. Eliot, 145 Salisbury St., Christchurch.  
 4BH—R. Motion, 13 St., Heliers St., Caversham, Dunedin.  
 4BK—N. M. McDonald, Railway Sn., Roxburgh.  
 4BL—A. W. Lucas, C/- State Advance Dept., Dunedin.  
 4CP—K. S. Edginton, Cnr. Henderson and Bradshaw St., Bluff.  
 4DV—J. Simpson, 22 Rudleigh Ave., Christchurch (late of Invercargill, new call not given).  
 4FH—C. H. Freeman, 29 Ravenswood Rd., St. Clair, Dunedin.  
 4GG—H. Boddy, 7 Leven St., Dunedin.

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This efficient 4-valve battery superhet, of up-to-date design, using A.V.C. diode detector and Octode valves, will make up a set that has been highly praised by all radio engineers. Kit includes valves, Rola 6-6 speaker, 3 x 45v. H.D. "B" Batteries, 1 x 9v. "C" Battery and a 2v. 11-plate accumulator.

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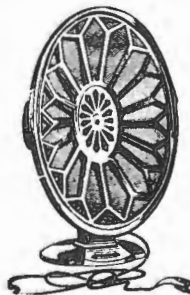
- |             |             |
|-------------|-------------|
| .00005 mfd. | .0008 mfd.  |
| .0005 mfd.  | .0003 mfd.  |
| .0002 mfd.  | .00015 mfd. |
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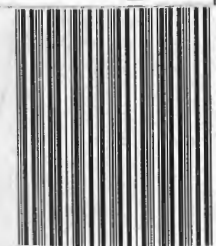
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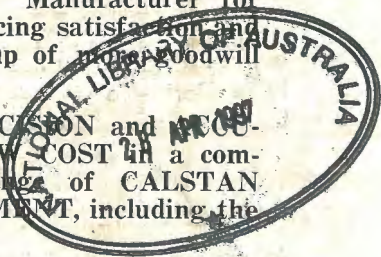
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