THE AUSTRALASIAN

# Radio World

PRICE, 1/-

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

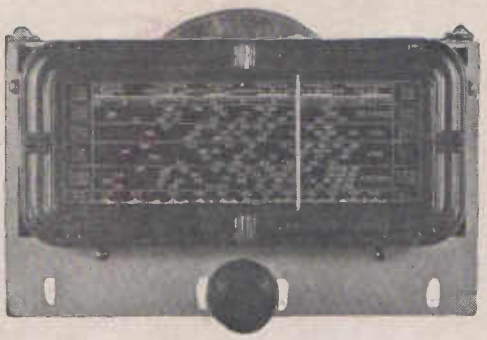
VOL. 6 . . . . . NO. 3

AUGUST 15 . . . . . 1941

- TRADE BUILDER MANTEL MODEL
- SPEEDING UP MORSE CODE
- HOW TO CURE INSTABILITY
- CRYSTAL AND 1-VALVE SETS

BEHIND THE MICROPHONE — A STUDIO SCENE AT 2UW.

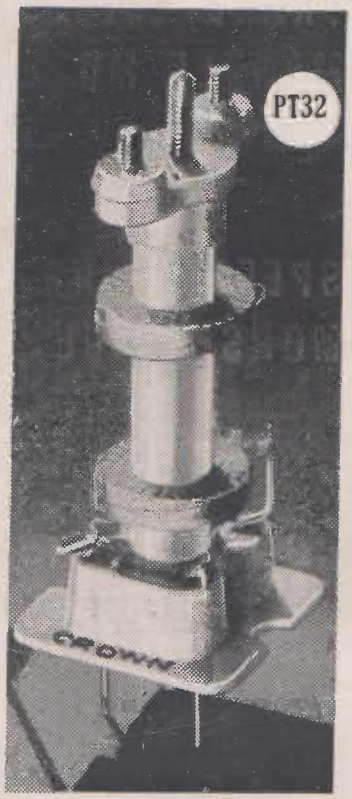
# YOU CAN'T BEAT CROWN PARTS IN THE 'TRADE BUILDER'



**Home constructors, dealers, manufacturers — everyone engaged in the Radio business, whether for pleasure or profit, agrees that it "pays to use Crown." You, too, will find the 100% Australian-made Crown lines measure up to all your requirements in performance and price. Order Crown components from your Crown distributor.**

Order the following Crown components for the "Trade Builder"—

**AU2.**
**(1) PT32 I.F.**
**(1) PT31 I.F.**
**(1) FD. 3B Dial.**




**ABOVE:** Crown FD3B Dial, "H" gang.

**AT SIDE:** Crown AU2 Tuning Unit.

**AT RIGHT:** Crown TROL. Permatune I.F.T. Type PT32.

Crown

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*THE AUSTRALASIAN*

# RADIO WORLD

*Incorporating the*

**ALL-WAVE ALL-WORLD DX NEWS**

Vol. 6 AUGUST, 1941 No. 3

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The "Australasian Radio World" is published monthly by A. G. Hull.

Editorial Offices: 117 Reservoir Street, Sydney, N.S.W. Telephone: MA 2455.

Subscription rates: 1/- per copy, 10/6 per year (12 issues), post free to Australia and New Zealand.

## *Dit d' d' dah!*

It is significant that the morse code sign for "V" is figuring so prominently in the Victory Campaign.

When the full history of this war is written, it will be revealed that the assistance of radio and aviation has been vital.

It is fairly obvious that the Victory Campaign has been nicely timed, as we are undoubtedly around the corner now, and victorious peace may be with us again at any day now.

Let us hope that the two sciences will never again have the restrictions of officialdom which have hampered their progress in the past.

Let us hope that the rising generation will be afforded every assistance to enjoy both radio and aviation as scientific hobbies.

Never let us forget that "The Price of Peace Is Eternal Vigilance."

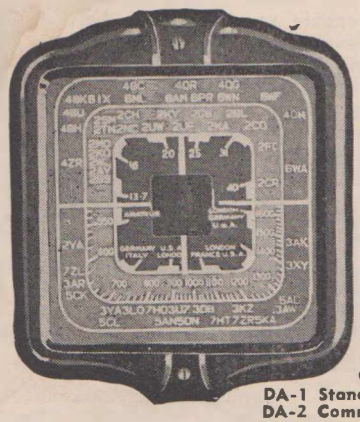
# *There's only one way to be SURE . . .*

# *Specify* R·C·S TROLITUL COILS for MAXIMUM SENSITIVITY OPTIMUM SELECTIVITY

**The "Trade Builder" set is designed to give you maximum sensitivity and selectivity — and you're sure of getting these only if you use R.C.S. High "Q" Trolitul Coils. You'll save time and trouble by specifying coils manufactured by the "Coil People" and backed by their years of experience and leodership.**

**Coil Kit, Code K184 ..... Price £2/15/-**

**Consists of 1 D.W. Unit and 2 Permeability Intermediates**



**The new D.W. Kit Dial, Code DA-9, has all parts supplied ready to assemble. This is an excellent replacement dial and is suited for crystal and small T.R.F. sets. The special walnut escutcheon is easy to fit and requires an aperture 3 in. x 3 in. Available far use with "H" type Gang Condenser on 1600 and 550 k.c. and 13.7 to 40 metres S.W. bands.**

**Code DA-9 .... Price 9/-**

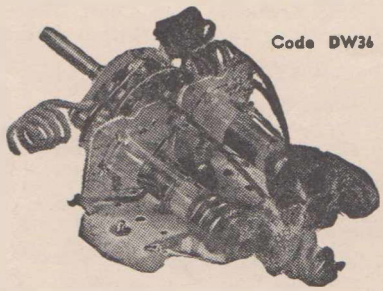
Code DA-9

| | | |
|---|---|---|
| DA-1 | Standard D.W. Dial .... | 22/6 |
| DA-2 | Communications Dial | 22/6 |
| DA-5 | 13.7 to 40 metres D.W. Dial, "H" Condenser | 22/6 |
| DA-6 | Mantel Set Dial, D.W. "H" gang ..... | 18/9 |
| DA-7 | Portable Kit Dial, D.W. "H" gang ..... | 9/- |
| DA-8 | Same as DA-7, but ready assembled .... | 13/6 |

## R.C.S. TROLITUL D.W. UNIT

**Type DW-36, as illustrated, consists of Aerial and Oscillator Coils, Wave Change Switch, the necessary B.C. and S.W. Trimmers and Padder mounted together, wired up ready to assemble into a set utilising 465 k.c., the bands being S.W. 13.7 to 40 metres, and B.C. 1600 to 550 k.c.**

**Code DW-36 — Price ..... £1/7/6**



Code DW36

**R.C.S. D.W. Unit, with R.F. Stage — DW-35 for "H" gang, B.C. and 13.7 to 40 metres ..... £3/7/6**

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

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

**465 K.C. I.F.'s**

**When two I.F.'s are used:**

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

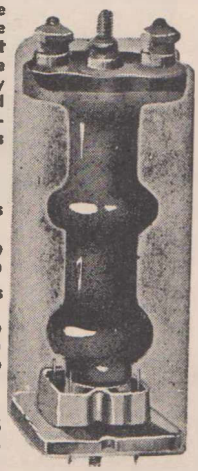
**When three I.F.'s are used:**

**IF164 1st .. 13/9**
**IF164 2nd .. 13/9**
**IF163 3rd .. 13/9**

**Air Core I.F.'s**

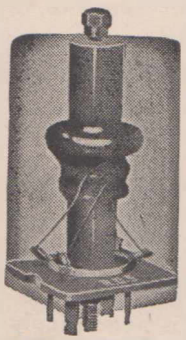
**Air Core 465 K.C.**
**IF107 1st .. 7/6**
**IF108 2nd .. 7/6**

**Air Core 175 K.C.**
**1E68 1st .... 7/6**
**1E69 2nd .... 7/6**



IF162

## R.C.S. TROLITUL BROADCAST COILS



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

**AIR CORE "H" GANG**

| | | |
|---|---|---|
| E342 | Aerial ..... | 6/6 |
| E343 | R.F. ..... | 6/6 |
| E344 | Os. ..... | 6/6 |

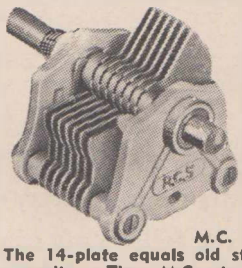
**PERM. TUNED "H" GANG**

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

**T.R.F. TYPE-AIR CORE**

| | | |
|---|---|---|
| T88 | Aerial ..... | 6/6 |
| T89 | R.F. ..... | 6/6 |
| T87 | R.F. with reaction ..... | 6/6 |
| T81 | Reinartz ..... | 3/3 |

## R.C.S. TROLITUL MIDGET CONDENSERS



**R.C.S. Midget Condensers are made in two types, using Trolitul supports, thus guaranteeing practically no lass.**

M.C. Type

**The 14-plate equals old style 23-plate capacity. The M.C. type may be ganged.**

## STAR AND M.C. MIDGETS

| Max. Cap. mmfd. | Min. Cap. mmfd. | Plates | Star Cat. No. | Retail Price | M.C. Cat. No. | Retail Price |
|---|---|---|---|---|---|---|
| 10 | 3 | 2 | CV34 | 4/- | CV41 | 7/3 |
| 15 | 3 | 3 | CV35 | 4/3 | CV42 | 7/9 |
| 25 | 3.5 | 4 | CV36 | 4/6 | CV43 | 8/4 |
| 35 | 4 | 5 | CV37 | 4/9 | CV44 | 9/- |
| 50 | 4 | 7 | CV38 | 5/3 | CV45 | 9/6 |
| 70 | 5 | 9 | CV39 | 5/10 | CV46 | 10/- |
| 100 | 6 | 14 | CV40 | 6/5 | CV47 | 11/3 |

**Obtainable From Your Local Dealer**

# R.C.S. RADIO PTY. LTD.

**50 GLEBE STREET, GLEBE**

**Telephone: MW 2405**

# TRADE BUILDER FIVE

**featuring**

★ **"WESTEX" CABINET**

★ **5V. DUAL-WAVE**

★ **STANDARD VALVES**

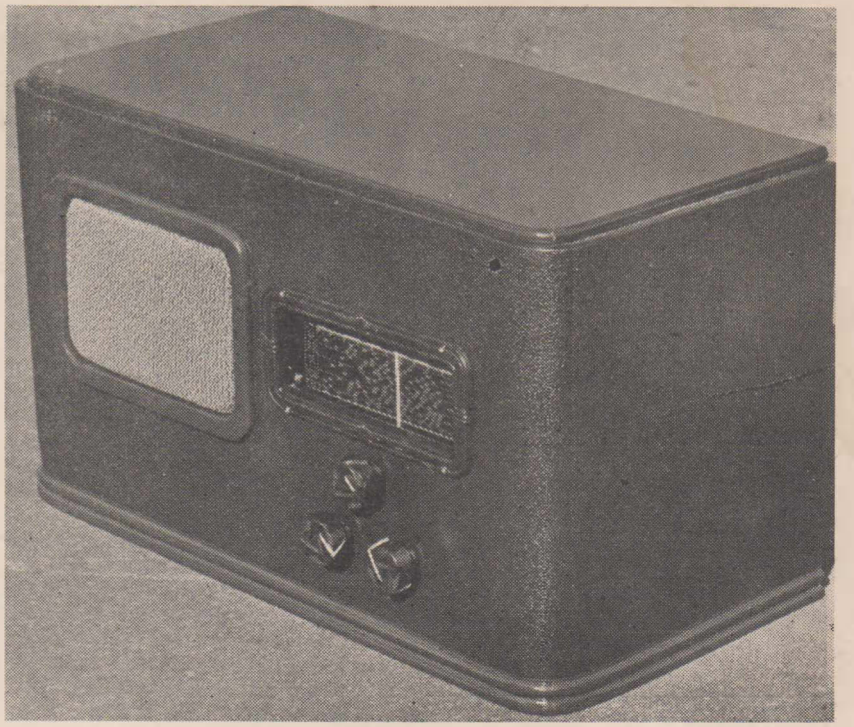
★ **LARGE SPEAKER**

★

***Designed by***

***A. G. HULL***

★



PROBABLY the most popular seller on the market to-day is the dual-wave mantel model of five valves. It comes in a handy price range and gives splendid all-round results, both on broadcast and short-waves.

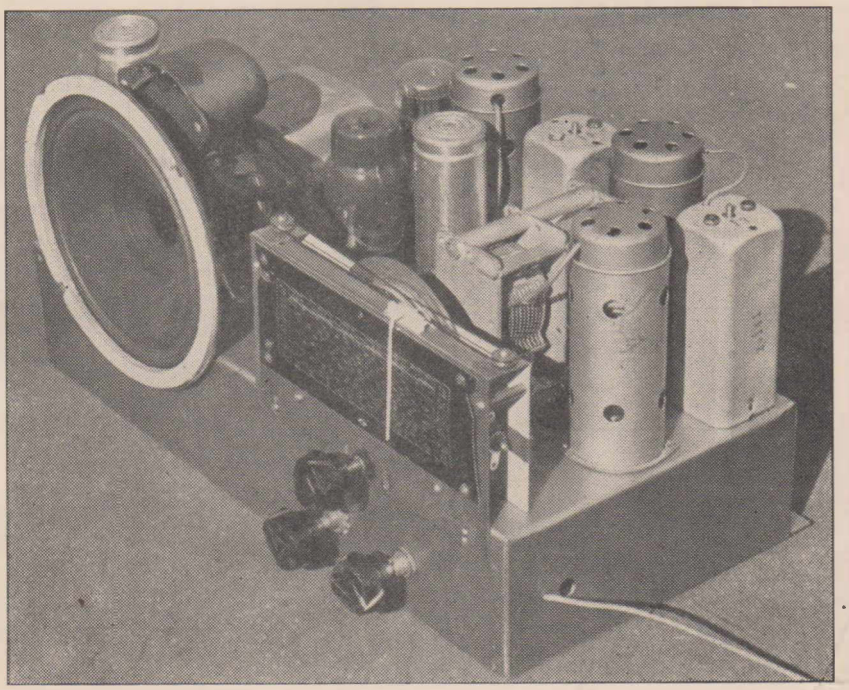
In homes where a console model is already installed, it often plays the role of a handy "second set," to be moved around to the kitchen, the bedroom or wherever else where it may happen to be needed for some special emergency.

Perhaps equally important, from our point of view, is in the fact that this type of set is one of the easiest to build and to get into first-class operating condition.

It is therefore the logical choice for the first of a series of articles covering the construction of receivers for commercial purposes.

Any radio dealer who may happen to be short of stock for a receiver of this type can easily put one together in an evening, safe in the knowledge that it is certain to give good results with a minimum of fiddling about.

For those who want to build a set for their own personal use, it is an equally attractive proposition, as the kits of parts can be obtained at a reasonable price and results are right up to the standard expected from a modern receiver.



### The Cabinet

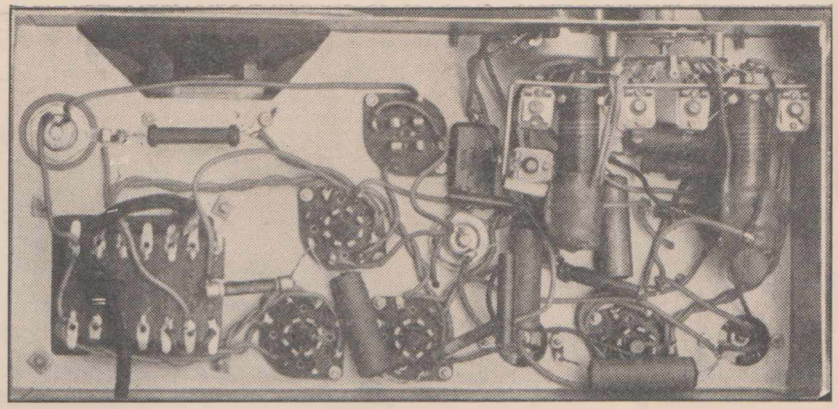
We also take the opportunity of using this set to introduce to you a cabinet design of entirely new construction. Built by the Western Cabinet Company, which has made a specialty of the leatherette-covered cases which have been so popular lately, it offers something quite different from the ordinary run of cabinets and is most attractive in every way, as you will see for yourself from the photographs on this page.

## TRADE BUILDER FIVE
(Continued)

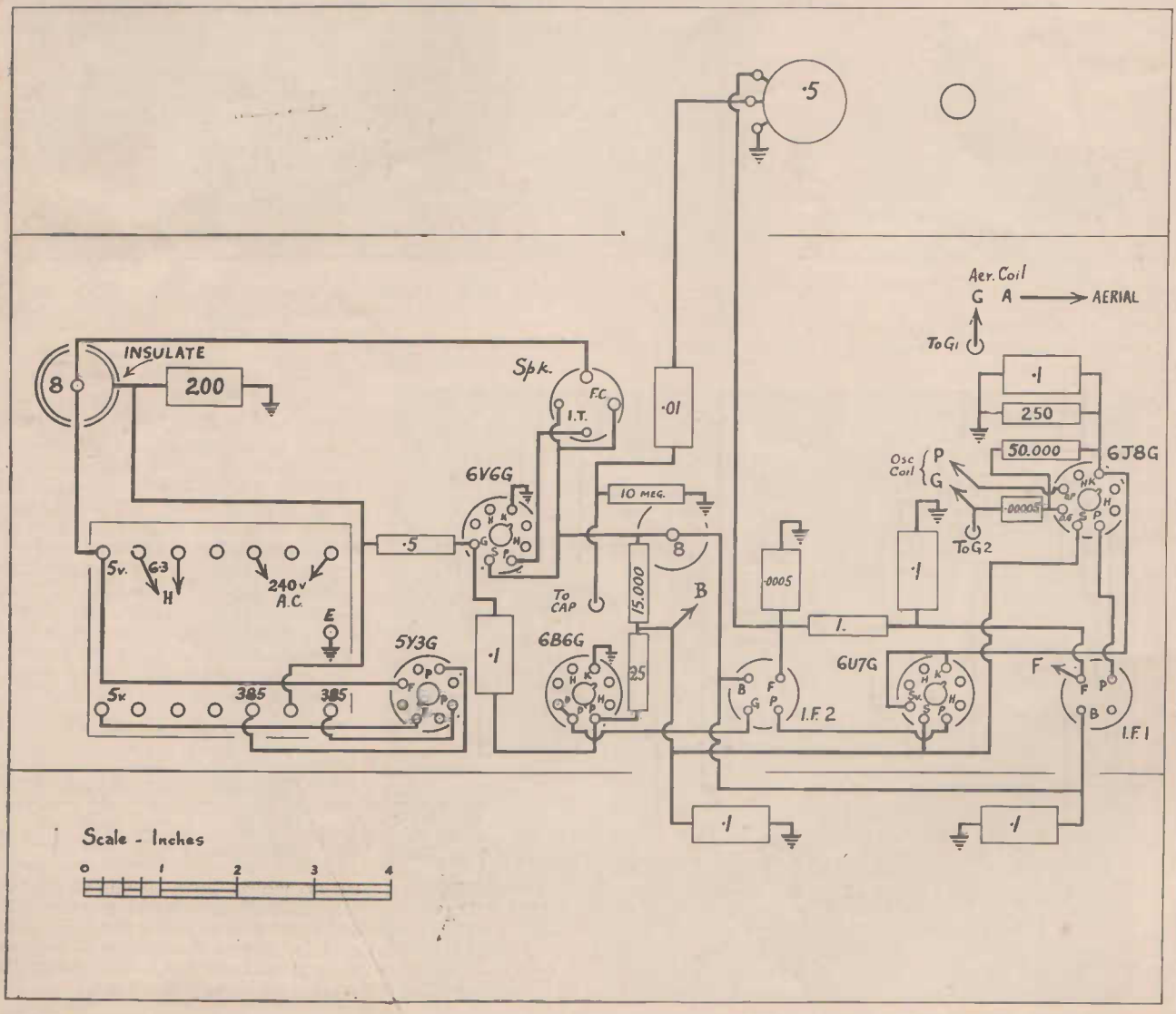
### The Circuit

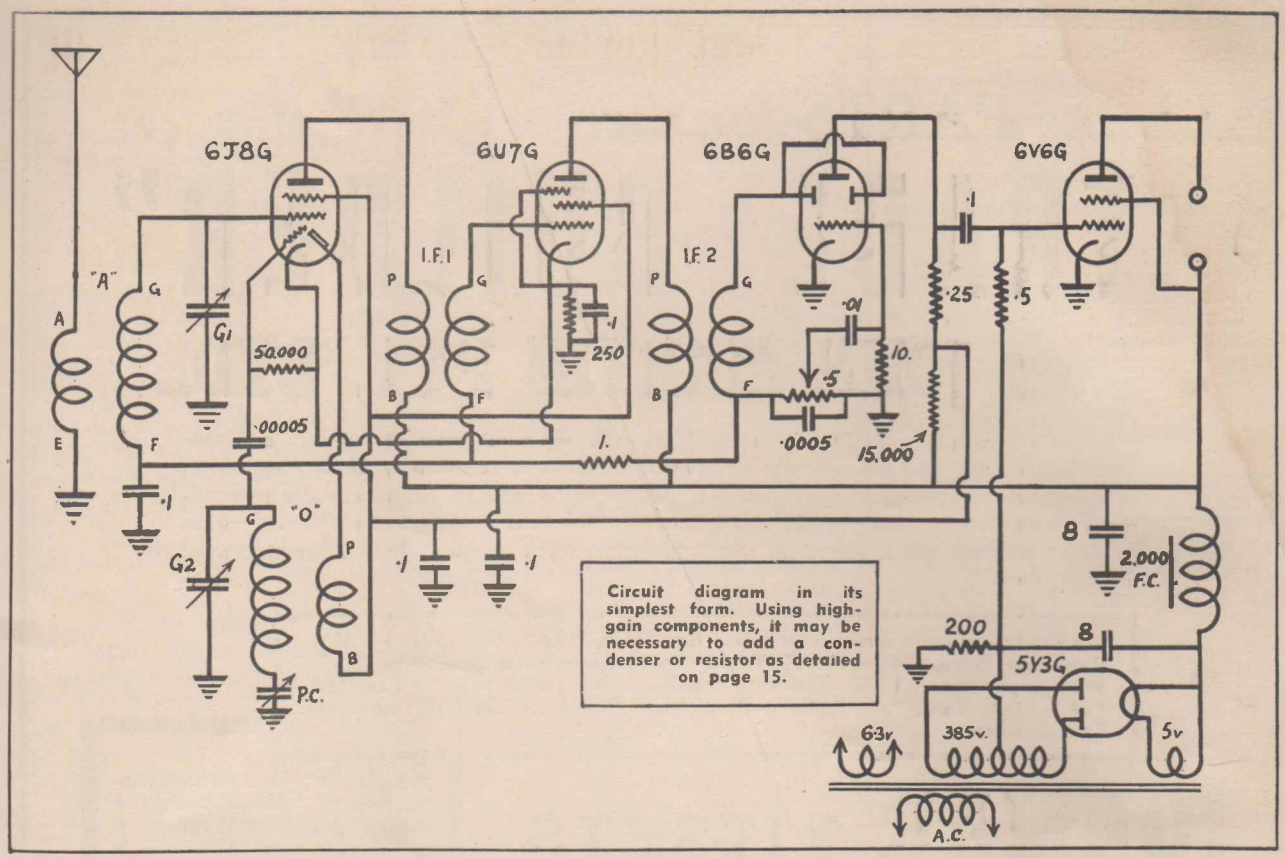
The circuit has been designed to use a minimum of components, only those fundamentally necessary being included in our diagram, which might almost be considered as an outline, rather than a finished circuit. There is quite a chance that one or two extra condensers will be required to give ample stability and still maintain the high gain available. The method of going about the fitting of these condensers and a full explanation of their purpose is given in the special article on the subject of alignment and stabilising which is printed elsewhere in this issue.

We would like to offer a strong reassurance to those who may be frightened at the thought of the circuit being incomplete. It is a perfectly sound design in every way, and the idea of leaving one or two components for individual attention is done purely as a means of ensuring that maximum performance is obtained.



Using this photograph in conjunction with the picture diagram below, you should have no difficulty with the wiring.






Circuit diagram in its simplest form. Using high-gain components, it may be necessary to add a condenser or resistor as detailed on page 15.

Speaking in technical terms, the circuit design follows conventional practice with a typical modern converter, followed by a stage of intermediate amplification in the 460 k.c. band, then the usual diode-triode detector and a beam power output valve. Points of interest are the simple a.v.c. circuit, the biassing of the audio portion of the detector by means of a 10 megohm grid-leak, the absence of inverse feedback and the back-biassing of the output valve. All of these steps have been taken with a view to cutting down on the number of components used.

Those who would prefer to work to a more elaborate circuit could not do better than use the "Acoustic Compensated" circuit which was originally published in our March issue. The layout and chassis design of the "Trade Builder" is equally suitable to receive the more complicated circuit with "every modern convenience included."

### The Layout

Speaking of layout, it will be noticed that careful planning has provided an arrangement which is highly efficient as regards separation between succeeding stages, yet hardly a cubic inch of cabinet displacement is wasted, so that the finished job is neat and compact.

### TRADE BUILDER FIVE

#### Parts List

1—Base, 15" x 7" x 3" (Arcadian).
1—Power transformer (Radiokes).
1—Dual-wave unit (R.C.S., Radiokes, Crown, Britannic).
2—Intermediate transformers (R.C.S., Radiokes, Crown, Britannic).
1—2-gang tuning condenser (Stromberg "H" type).
1—Dial to suit (R.C.S., Radiokes, Crown).

**RESISTORS:**
1—200 ohm, 1 watt resistor (I.R.C.).
1—250 ohm, 1 watt resistor (I.R.C.).
1—15,000 ohm, 2 watt resistor (I.R.C.).
1—50,000 ohm 1 watt resistor (I.R.C.)
1—250,000 ohm, 1 watt resistor (I.R.C.).
1—500,000 ohm, 1 watt resistor (I.R.C.).
1—1 megohm, 1 watt resistor (I.R.C.).
1—10 megohm, 1 watt resistor (I.R.C.).
1—500,000 ohm volume control (I.R.C.).

**CONDENSERS:**
2—8 mfd. electrolytic condensers (T.C.C.).
1—.00005 mfd. mica condenser (T.C.C.).
1—.0005 mfd. mica condenser (T.C.C.).
1—.01 mfd. mica condenser (T.C.C.).
5—.1 mfd. tubular condensers (T.C.C.)

**VALVES:**
1—6J8G, 1—6U7G, 1—6B6G, 1—6V6G, 1—5Y3G (Mullard, Philips, Brimar, Radiotron).

**SPEAKER:**
2,000 F.C., 7,000-ohm load (Rola, Amplion).

**SUNDRIES:**
Power flex, screws and nuts, solder lugs, hook-up wire, knobs, dial lights, 3 valve cans, 5 octal sockets, 1 UX socket.

Provision is made for mounting a speaker of fairly big dimensions, it being considered that the performance of the set is worthy of something better than the smaller midget speakers. With a speaker of the size shown in our photographs the set becomes capable of giving reproduction which cannot be faulted. Tone is sometimes a doubtful point with small mantel models, but we have taken no chance in this direction with "Trade Builder."

### The Parts

Running through the parts list, we first have the base. Templates of the original design have been supplied to the Arcadian people, who pushed out the original base for us. They can supply the trade with identical bases at short notice, so you should have no difficulty in getting one through your wholesaler or dealer. Once you have the properly-drilled base you don't have to worry about layout, and assembly becomes as easy as putting together a Meccano toy.

It is important, of course, to make sure that you obtain matched components to suit the drilling of the base. This applies especially to the valve sockets and their cans.

Next on the list is the power transformer which wants to be a standard flat-mounting type, with a primary to suit your power supply and secondaries with ratings of 385 volts at 80 milliamps for the high tension and

## TRADE BUILDER FIVE
(Continued)

at least two filament windings. Five volts at 2 amperes are needed for the rectifier and 6.3 volts at about 2 amperes for the rest of the valve heaters. If there is an extra filament winding it will do no harm and is merely overlooked.

### The Coil Bracket

Suitable dual-wave coil brackets are available in several different brands, all equally suitable to fit in the space provided and all capable of giving splendid results. Each brand of coil bracket has its own colour coding to indicate the various "P," "G," "B" and suchlike symbols. We publish these colour codings for handy reference, and they are also supplied in leaflet form with the general instructions which are packed with the coil brackets when they come from the factory.

### The Padder

The padder condenser is built into the coil bracket, so a separate padder is not required.

When it comes to the intermediate transformers there are several factors to be considered, and it is possible to get intermediates of high efficiency (at high cost) or low efficiency (at low cost). It is also possible to obtain the standard set, consisting of a No. 1 and a No. 2 or, to vary the performance characteristics by using two No. 2 transformers, which will give higher gain, less selectivity and greater tendency to instability, whilst two No. 1 intermediates will give greater selectivity, will be easier to stabilise, but will not give so much gain.

### The Gang Condenser

A two-gang tuning condenser is required and normally will be of the type recommended for the coils which are being used. The modern gang is known as type "H," and normally an "H" gang will be used with a coil bracket to suit and a dial calibrated for the "H" shape of plate.

Unfortunately, however, there may be some difficulty in getting an "H" gang, as there is a big demand on these at the moment, and materials are not over plentiful. Some dealers happen to have big stocks of the previous model of gang condenser, known as type "F." The "F" gang is quite effective and perfectly suitable for use in this receiver so long as the coils are also "F" type and the dial scale is likewise calibrated for the shape of plates used in "F" gangs.

### The Dial

Apart from suiting the coils and gang, the dial must also suit the cabinet style, and there is room for individual taste in this regard.

For the shape of the Western cabinet we felt that a dial with a rectangular escutcheon on the horizontal would be most suitable and so we used the Crown dial known as type ST1. There are several other types available, and some may prefer the cheaper and simpler type of assembly dials which are so popular with portables.

### Valves

Following our usual practice, the resistors and condensers are all standard lines readily available from stock at any good radio dealer.

The valves are of types made in Australia, so that there can be no difficulty about obtaining them, or any doubt about replacements being available in the years to come.

**CROWN COLOUR CODE**

AERIAL COIL

| | | | |
|---|---|---|---|
| A | Green | G | Brown |
| E | Braid | F | Black |

OSCILLATOR COIL

| | | | |
|---|---|---|---|
| G | Blue | P | Yellow |
| E | Braid | B | Red |

INTERMEDIATES

| | | | |
|---|---|---|---|
| P | Green | G | Brown |
| B | Red | F | Black |

**R.C.S. COLOUR CODE**

AERIAL COIL

| | | | |
|---|---|---|---|
| A | Black | G | White |
| E | Braid | F | Cut busbar |

OSCILLATOR COIL

| | | | |
|---|---|---|---|
| G | Yellow | P | Red |
| E | Braid | B | Green |

INTERMEDIATES

Lettering embossed in moulded base

**BRITANNIC COLOUR CODE**

AERIAL COIL

| | | | |
|---|---|---|---|
| A | White | G | Blue |
| E | Purple | F | Black |

OSCILLATOR COIL

| | | | |
|---|---|---|---|
| G | Yellow | P | Green |
| E | Purple | B | Red |

INTERMEDIATES

| | | | |
|---|---|---|---|
| P | Green | G | Purple |
| B | Red | F | Black |

**RADIOKES COLOR CODE**

AERIAL COIL

| | | | |
|---|---|---|---|
| A | Black | G | White |
| E | Braid | F | Cut busbar |

OSCILLATOR COIL

| | | | |
|---|---|---|---|
| G | Yellow | P | Red |
| E | Braid | B | Green |

INTERMEDIATES

Lettering embossed in moulded base

### Assembly

Having procured the components and become quite accustomed to them, the next step is to fit the valve sockets, at the same time placing the bases of the valve cans under the heads of the screws holding those sockets which are to have shielded valves in them.

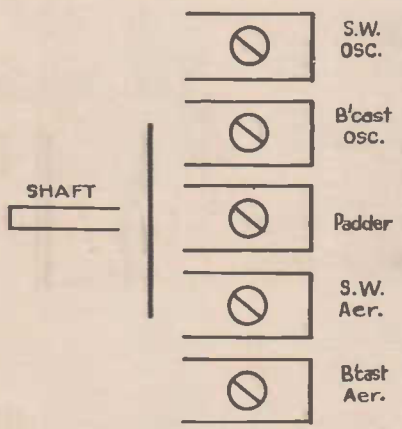
## TRADE BUILDER FIVE
(Continued)

Next component to be fitted is the power transformer, and at this stage we usually proceed with the wiring up of the heaters of the valves, and the filament and plate circuits of the rectifier.

Then the two electrolytic condensers can be fitted, and wired up with the speaker socket. It should be noted that the first electrolytic must have the



can completely insulated from the base, this being achieved by mounting the condenser in the special insulating washers which are provided with these units on request. While on the subject of this condenser, we might suggest that a condenser with a rating of 600 volts is handy to have in this position. Until the indirectly-heated cathodes of the valves warm up, they are not drawing any current from the high tension current, but the rectifier has a directly-heated filament, so that it is ready to supply high tension immediately. For a fraction of a minute



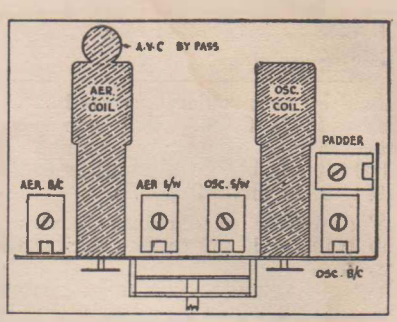

Trimmer layout for the Crown bracket.

when the set is first switched on we have the full high tension potential but practically no current drain. Under such circumstances there may be quite a peak in the high tension voltage, sufficient to overload the first electrolytic. It is seldom that the peak is sufficiently high to cause even a 500-volt electrolytic to sizzle, but if you want to be on the safe side and assured of years of trouble-free service it is just a matter of paying about a shilling extra and getting an electrolytic with a 600-volt rating.

Next step in the job, the way we go about it when we build a set, is to fit the intermediate transformer and complete the wiring, then the volume control and its associated condensers and resistors.

Next the by-pass condensers and bias resistors go in and the gang is mounted on top of the base, at the right height to suit the dial being fitted.

Last job is to fit the coil bracket and connect up the various leads.




Layout of the trimmers on the Britannic coil bracket.

Before this job is done it is a good plan to take off half a minute or so to calculate which leads should be soldered to the valve sockets and brought up to the bracket, and which

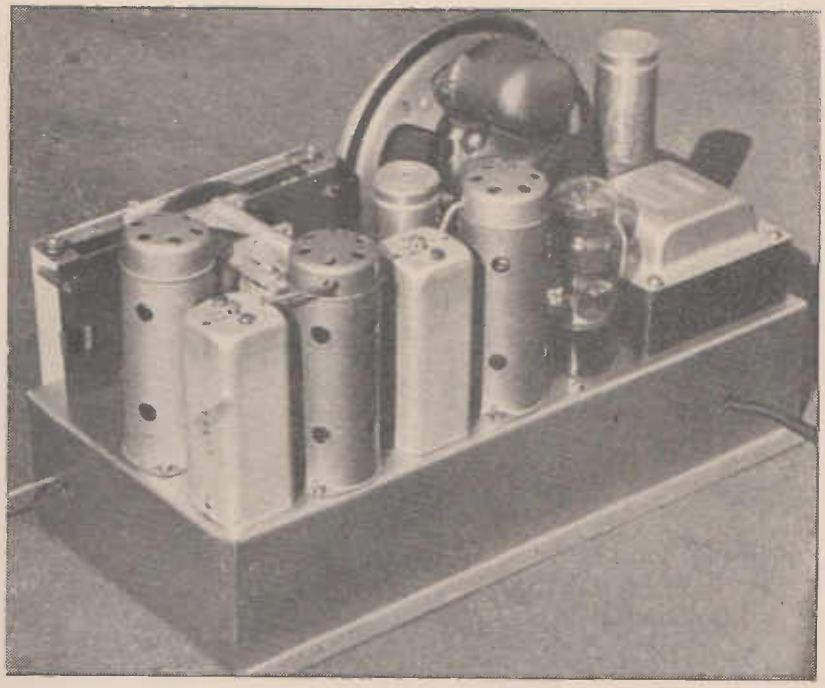
## TRADE BUILDER FIVE
(Continued)

should be first soldered to the bracket before it is fitted. With some coil brackets it is desirable to connect up all the leads before the unit is firmly fitted to its mounting hole.

The matter of earthing is vitally important and, before considering the wiring as completed, a wire should be run right round to join up all earthing terminals into a network. In the case of the coil bracket and the gang condenser it is highly desirable to use each of the several earth wires provided and to interconnect them with the earthing wires from the scraper strips on the gang.

### Testing

Before fitting the valves and speaker and putting the set into operation it is a wise precaution to check and re-check the wiring with both picture and circuit diagrams and also make a careful visual inspection to make sure that all insulated components and connections are quite free from fouling on to the base, screws or other metal parts. A lookout should be kept for splashes of solder which may cause short-circuits which will cause trouble in the event of the set being put to the power before they are detected.



After these precautions, the set should be ready for operation, and a swing of the dial should bring in the stations, or, if the worst comes to the worst, whistles where the stations should be. Then comes the job of aligning and stabilising the receiver, as covered in the special article on the subject published elsewhere in this issue.

# ATTAINING SPEED AT MORSE

IT can be taken as a fairly well-established fact that there are two stages in learning morse, just as in learning to skate or to ride a bicycle, to quote two parallels only. The first stage is the conscious assimilation of the alphabet, so that when dash-dot is heard, N is thought of; the second is the driving of this into the subconscious mind, so that when dash-dot is heard it is impossible not to think of N.

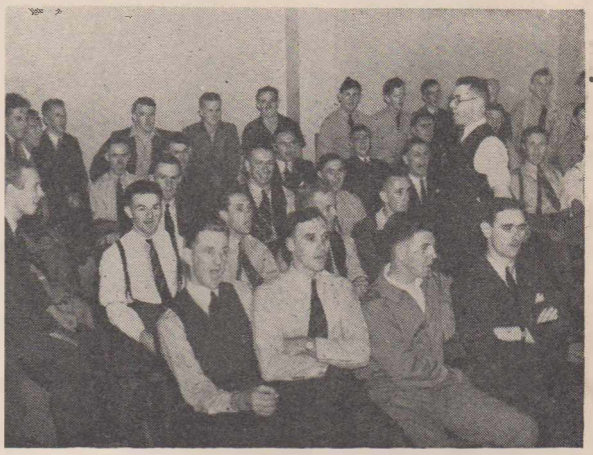
Again, it can be accepted that teaching methods should differ from one stage to the other: slowly sent letters with slow dashes and dots during the short first stage; quickly sent ones with long pauses between letter and letter, these slowly decreasing as the learner gains speed, during the second stage.

Now during this second stage a "pause" almost invariably occurs, a horrid period that may last for days or even weeks, during which the learner makes no progress, curses the shade of Samuel Morse, bites pieces off the end of his pencil, swears that he will never manage it — even chucks up the whole thing in despair. This "pause" often happens at about 14 words a minute or at about 18; some particularly unfortunate people may get it twice. Some, on the other hand, never meet with it at all; they are usually, but by no means invariably, of the stolid, easy-going type; and if one of such favoured persons wants to learn how really unpopular he can make himself, he need only remark happily to some fellow-learner whom he has caught up and passed that he "really can't see what all the trouble is about. Why, I just do a bit better every week, and if you chaps would only——." The rest is likely to be a strangulated silence.

Despite this scepticism, the pause is a very real one, and there is little doubt that it is due to a quarrel between the conscious and subconscious minds (to put it most unscientifically). The bossy conscious worries: "I can't get it. . . . What was that letter? . . . Oh, I am making a mess of it. . . . This will never do, it's worse than last time"; and the squashed subconscious cannot make heard its gentle: "Let me alone; I'm getting it all right. . . . Oh, do let me alone!"

### Helping the Subconscious Mind

Now there are several dodges that can be tried, all with the object of distracting momentarily the conscious interferer, and it is especially worth noting that if this can be done once — if, that is to say, one transmission of a goodish length can be taken reasonably well at an "impossible" speed, it is almost certain that the sticking point will be passed, for good and all. Next time that this speed is heard the subconscious will be able to assert itself: "I did it yesterday — I told you I could do it," and the conscious will ungracefully subside with a grumbled: "Well, perhaps you're right; go ahead, but don't worry me" (which is, of course, exactly what is needed).



Beginners learning the code by the singing method at V.E.N.T.S. class for R.A.A.F. re-servists.

One such dodge, mentioned with all due reserve, is to get slightly drunk. Another, more generally applicable, is to recite mentally (or, better still, audibly) some passage of poetry or the Bible or the multiplication table or anything else favoured while a transmission is being taken; in this case, for obvious reasons, it should be a test in code, not in plain English.

Another, ridiculously simple and often ridiculously effective, is to do with the left-hand something demanding a certain degree of attention while the right-hand writes down the text — for example, to balance a pencil across the forefinger or to keep a pencil standing upright on end by checking it as it falls with the circle formed by forefinger and thumb. Such devices have the advantage that the transmission can be in plain language or code as desired, but may distract the eye too much and make writing too difficult. Others which may be tried, and which need no visual attention, are buttoning and unbuttoning one's coat, turning a coin over and over in the left hand, and such like; the trouble is that, as a rule, these do not demand sufficient attention to keep the conscious mind from interfering. What is "sufficient" here, however, obviously varies from one person to another and even for the same person from day to day; sometimes the subconscious has already so nearly asserted itself that very little is needed for it to take full charge, and here very simple devices will suffice. It is a matter for the learner himself to try; and it is amusing to note that the fact that he is thus observing himself may in itself supply the needed extra attention.

Another possibility, often recommended by teachers although as a rule with no idea why desirable, is that of forcing oneself to copy one letter behind in code, or several letters behind in plain language, so that no letter is written down until well after it has been sent. Here the conscious mind is kept busy remembering the letter or letters; it is particularly effective when the transmission is taken on a typewriter (a thing that all beginners should learn to do), and above all if the learner is only a fair typist, something about midway between the "three pecks and a damn" class and the machine-gun expert. Yet another is to form the letters with excessive attention, almost drawing them rather than writing; or to make them extremely small and yet legible — I have as a souvenir of the last war a full-length Army test message taken down, quite legibly, on a scrap of paper the size of a Coronation stamp by a learner whom (he said) this dodge saved from "drink and despondency."

It is a matter for personal experiment. In any case, let it yet again be emphasised that if only the pause-speed can be once passed it is extremely rare for any further trouble to recur at this speed, so that a little experimentation may save the learner "weeks of 'orrid doubt" and "faith and 'ope and cursing and despair" (to quote Kipling from memory).

— By R.R.H. in the "Wireless World," England.

# THE PROBLEM OF INSTABILITY

IN THESE enlightened days it is generally appreciated that the final performance of a receiver is governed more by the efficiency of the components and the accuracy of the adjustment, than by the use of any trick of circuit design. Gone are the days, we hope, when a circuit had to have a catchy technical name before it could be expected to give adequate range, selectivity and tonal quality. Given a good circuit and reliable components, however, it is still possible to have a set which is unmannerly in performance. In fact, it is rather the custom than the unusual to find that a set requires a certain amount of individual attention on completion.

Circuits are designed and original receivers built to use certain components and layout and minor changes in these matters may mean that a set built to the same circuit, but with slightly different components or layout, may require a certain amount of taming.

### Alignment

Let it be clearly understood that we are not referring to alignment of the tuned circuits, a subject which has been covered to great length in previous issues. We refer more to the matter of allowing maximum gain and yet avoiding whistles, howling and other indications of instability or unwanted feedback.

The two matters are interlocked to a certain extent, as it is quite impossible to go about the alignment procedure until the receiver is completely stable. In many cases the instability does not make itself noticed until the intermediate transformers are brought into correct alignment. A rough and ready method of stopping such instability is simply to leave the intermediates a shade out of alignment. This bad habit is often practised by servicemen who do not have any time to spare, but it should be discouraged, as it means a loss of efficiency and often results in spoiling the tonal quality of the output.

**Dealing with "Trade Builder" in particular, but also applying to many similar circuits, this article covers every precaution and adjustment necessary to ensure maximum efficiency.**

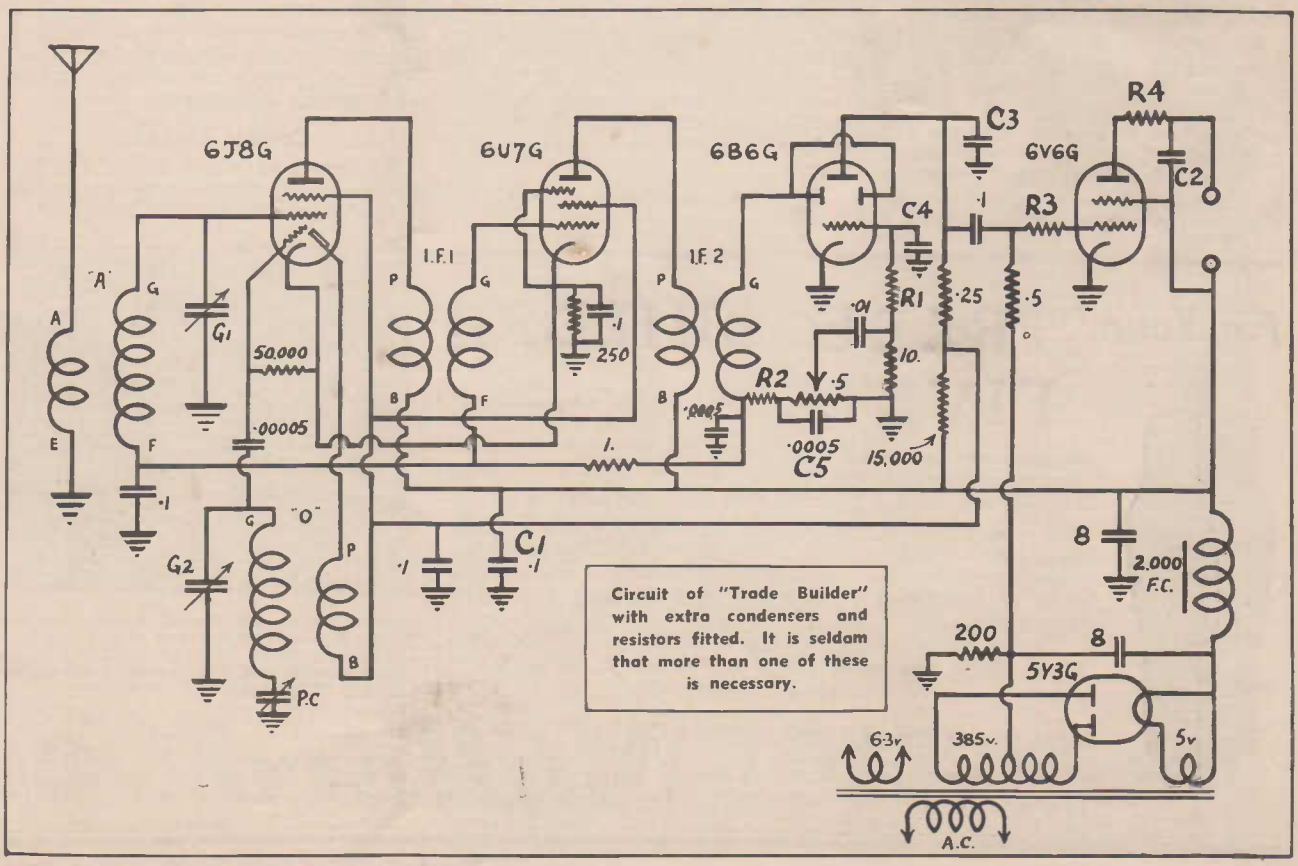
### Tracking Down the Trouble

The correct procedure is to work on the receiver until it is possible to get perfect alignment of all trimmers and yet be able to swing from one end of the dial to the other without any trace of instability.

The task is not a difficult one, especially if the basic cause of the trouble is fully appreciated.

Everything else being in order, the instability is due to feedback and regeneration or, to be more explicit, to radio frequency or audio frequency power being amplified and then creeping back into the earlier parts of the circuit, to be re-amplified all over again. Naturally when re-amplified it creeps back even more strongly to be re-amplified again. By means of this dog - chasing - tail arrangement, the signal soon builds up to a howl or whistle.

In any set there are many precautions taken to avoid feedback of this kind, such as shields around the coils and valves, a layout arranged to keep the signal progressing in one direction as it is amplified and so on. These features must be efficient, of course, but often enough they are not alone




Circuit of "Trade Builder" with extra condensers and resistors fitted. It is seldom that more than one of these is necessary.

## INSTABILITY (Continued)

sufficient to look after the complete stability of a modern receiver with its gain of millions.

### Getting Started

The first step to be taken to deal with a set is to study first the circuit and then the layout.

Dealing with the circuit there are several points to be watched and here are a few at random. First, there is the matter of the by-passing of the high tension. Normally there is the second filter condenser across from high tension to earth, and a certain set designer simply dotes on publishing circuits in which this electrolytic condenser is the only by-pass for r.f. which will find its way into the high tension circuit. Unfortunately it is seldom that the electrolytic condenser proves an efficient by-pass for r.f., and in dozens of cases which we have handled in our laboratory service we have found that a .1 mfd. tubular condenser in parallel with this second filter condenser was quite sufficient to make a fine performer out of a receiver which was otherwise quite useless.

Incidentally, the tubular condenser should be placed up at the r.f. end of the set, for example, at the high tension terminal of the r.f. coil, or of the first intermediate transformer.

In our diagram we show the condenser as C1. Considering the steps to be taken in order of their general effectiveness according to our experience, we would say that the next point most likely to show results is in the matter of putting a by-pass condenser across the speaker, or from the plate of the output valve to earth.

Any r.f. energy which happens to get past the detector and into the audio circuit is likely to be amplified at the same time as the audio component. This extra r.f. amplification is bound to cause trouble and, although the by-pass across the speaker is a cure, if not a preventative, it is an effective measure to take until other ways are found of keeping the r.f. out of the audio end of the set.

The capacity across the speaker should be somewhere betwen .001 and .02 microfarads, and it will have an appreciable effect on the tonal quality, lopping off the high notes to an extent depending on the impedance of the transformer in relation to the value of capacity used.

With the high notes some of the harmonic distortion is also lopped, making the condenser an improvement to the tone of some sets, especially those using a single pentode or beam power valve in the output stage, without inverse feedback.

In our diagram this condenser is shown as C2.

Going back in the audio end it is sometimes preferable to stop the r.f. at an earlier stage, for example, at the plate of the first audio amplifier, or detector as it works out in the average set.

From the plate of the detector to earth a capacity of something between .0001 and .002 mfds. will be found to eliminate the r.f. component before it is amplified by the output valve. This may mean that the fitting of this condenser will make it possible to eliminate the condenser across the speaker, and yet still obtain the beneficial result.

We show the detector plate by-pass as C3.

Going back still further, it is possible to keep the r.f. out of the audio portion of the detector valve by means of suitable by-passes from the grid to earth, coupled with a suitable choke or stopper resistor in the grid lead, or between the secondary of the intermediate transformer and the volume control.

These by-passes and resistors are shown on our diagram as C4, C5, R1 and R2.

### Inverse Feedback

Audio systems of modern receivers, even when consisting of only two valves, can give terrific amplification. It is quite common to get an effective gain of over a hundred in the pentode portion of a detector valve and then feed into a sensitive beam power valve capable of accepting a signal of only ten or twelve volts. Under such circumstances it is possible to get instability due to feedback of higher audio frequencies.

In many such cases the high gain is not truly necessary and a far more attractive receiver is obtained by installing a certain amount of inverse audio feedback. Many different forms of feedback can be suggested, but in our circuit we show a simple form which requires only one additional resistor. With a triode audio stage this form of feedback is not so effective as when the detector valve has a pentode audio section.

The application of inverse feedback results in vastly-improved tonal quality, greatly assisting in the reduction of harmonic distortion.

### Coupled Cathodes

In search of simplicity, the circuit designer may have coupled up the cathodes of r.f., converter and inter-

mediate valves. Often enough this practice is quite permissible, but if the gain is high it may result in instability. The cure is to use separate resistors and by-pass condensers for the bias of each valve. Similarly, there may be cases where all screens are hitched together and some coupling results. In such cases try the effect of

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fitting extra tubular condensers so that each valve has its own by-pass condenser. If this fails try separate series resistors and by-passes for each valve.

### Layout

The actual layout of the receiver and the arrangement of the wiring is of vital importance when it comes to stability. If the suggestions already mentioned have been tried and the set is still unstable, we suggest that the mechanical arrangement should be studied. When this is being done, the imagination should be called upon to suggest places where those flighty little high frequencies might jump across from one parallel wire to another, thereby getting back into a prior circuit for re-amplification.

The location of the padding condenser should be studied carefully, especially if the set appears to be stable at one end of the dial and yet has whistles at the other. It is fatal to allow the aerial lead-in to run down amongst the wiring of the rest of the set, as it is sure to pick up a little stray r.f. and allow it to be re-amplified. Run the aerial lead straight out through the side of the base as directly as possible.

Speaker leads are also important and should be kept well away from the aerial lead-in. We have come across cases where instability was caused solely by the way in which the set was installed, the aerial lead-in having been brought across in such a way as to foul the speaker leads and the grid leads at the caps of the valves. Remember always that a couple of layers of rubber and some cotton may mean proper insulation for ordinary direct current, but it doesn't mean a thing to radio frequency.

The earthing of the many by-pass condensers and other components is important and for preference a bare copper wire should run around the base, joining up all "earths" into a compact network.

### Earthing

The earthing of the shields of the valves and coils is also important and it is a good scheme to fit a solder lug under the holding down nut of each coil can and valve socket and then wire up these lugs to the main earthing network.

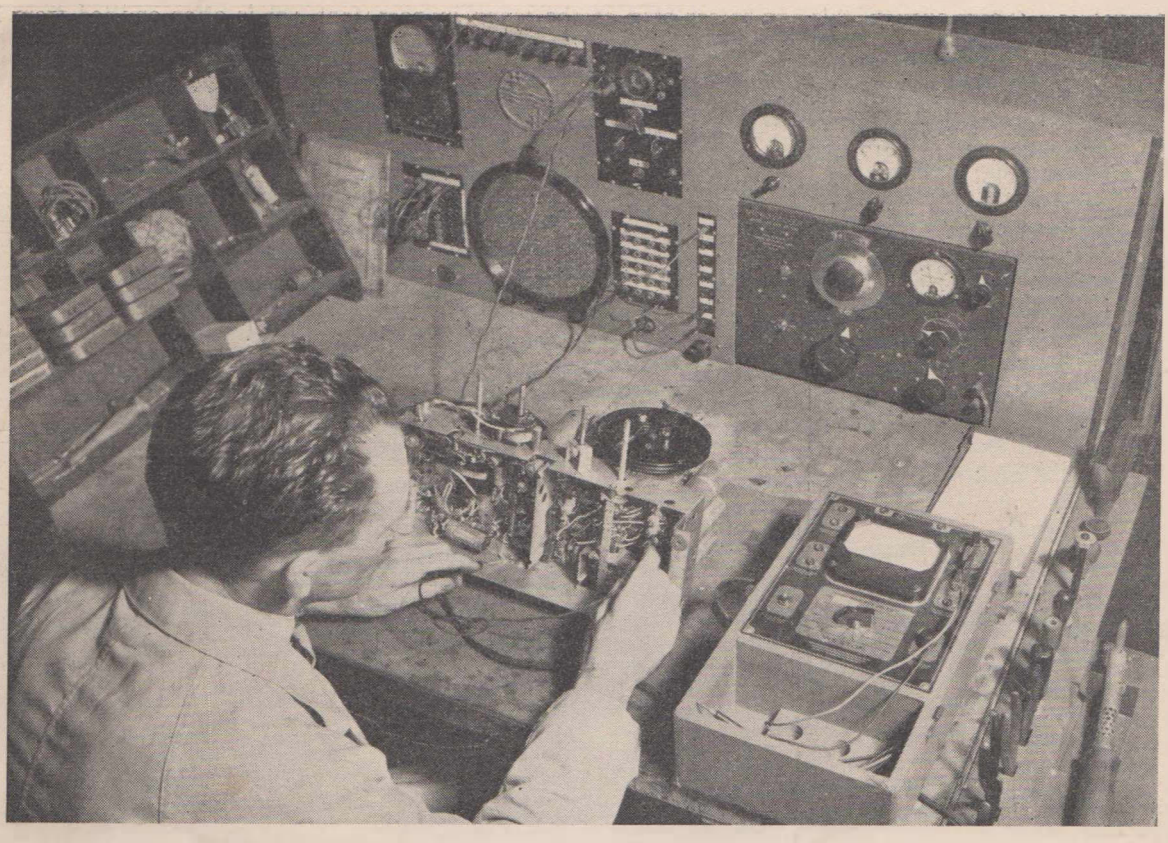
Great care should be taken with the earthing of the gang condenser, using the special earthing contact strips provided, and also earthing the mounting screws. Some arrangement should be made to earth one side of the heater wiring of the r.f. amplifier or converter valve. This matter is important, yet is often omitted from being shown in circuit diagrams. Even if the power transformer is provided with a centre-tapping we prefer to disregard it and earth one side of the heater, right at the valve socket.

### Parasitic Oscillation

Parasitic oscillation can occur in a single output valve, especially with a high-gain type, and plate and grid stoppers may be required to cure this trouble. In the grid circuit the stopper should have a value of about 10,000 to 100,000 ohms. In the plate circuit the value must be kept low on account of voltage drop, and is therefore limited in practice to about 50 to 100 ohms.

These stoppers are shown in our circuit as R3 and R4.

(Continued on page 38)



# *Service is as service does . . .*

. . . and if service DOES give a customer entire satisfaction, then it IS service. Real service.

Naturally it is your aim to make your repair facilities as adequate and as efficient as possible . . . in other words, to inspire the complete confidence of your customers. But no matter how well equipped your service section may be, no matter what degree of technical skill you can bring to bear on radio problems — you cannot do a 100% service job unless you replace worn-out valves with Philips.

**ALWAYS REPLACE WITH**

Philips valves, made in a modern Sydney factory to the world's highest standards of efficiency, are giving unexcelled performance in thousands of receivers throughout the Commonwealth, because the public, educated by Philips advertising over many years, know the importance of thoroughly reliable valves in any set. You'll get more profit from your service work and valve replacement sales if you pin your faith on Philips valves.

# PHILIPS VALVES

THERE IS A PHILIPS VALVE FOR EVERY SOCKET OF EVERY RECEIVER

# CIRCUITS FOR EXPERIMENTERS

## *SOME INTERESTING ARRANGEMENTS FOR SIMPLE SETS*

FROM our readers we often receive letters enclosing details of experiments carried out and circuits found to be capable of doing a special job in an effective way.

These circuits are of great interest to us and we feel sure that they must also hold valuable interest for those of our readers who are keen on experimenting.

The first circuit shows the outline of an amplifier which is being used by a reader who wants to remain anonymous. This reader has specialised in the production of amplifiers for the reproduction of gramophone recordings and has a valuable clientele amongst musicians, dance band leaders and others who want to be able to reproduce every inflection recorded on the disc.

He says that he has found that the amplifiers using push-pull beam power valves with inverse feedback are capable of giving brilliant performance, but only at volume levels which are unreasonably high for use in private homes or flats. On turning the volume down the quality appears to "go to the pack."

To solve this problem our friend says that he has been forced to go back to the triodes, and as many of these types are now not available he uses a pair of 45 type in the output with 6C5 drivers or a triode arrangement of the 6J7G which is obtained by connecting the screen and suppressor grid to the plate.

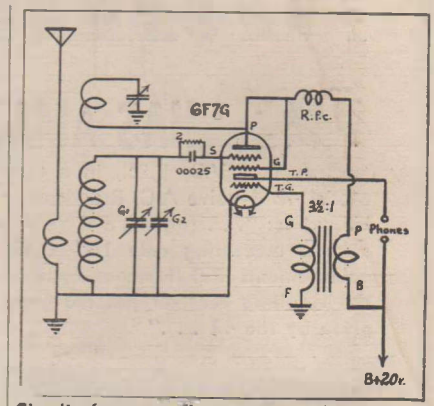
According to his report, this amplifier, especially when used with a hum-free power supply and with a pick-up fitted in a felt-lined cabinet, will give brilliance and distortion-free reproduction, even when operating at a whisper.

### ALL-WAVE ONE-VALVER

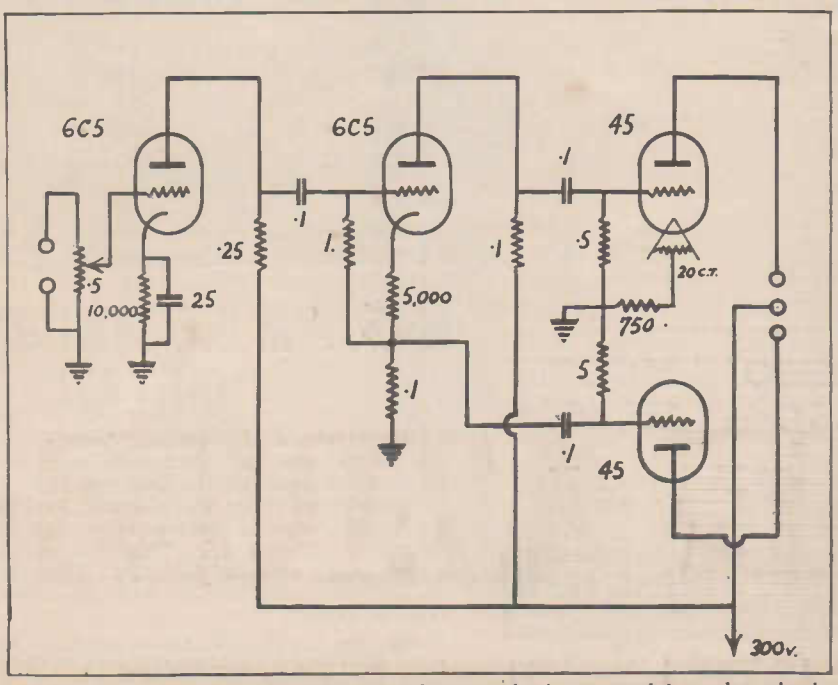
Belonging to a studious family is a young lad called Kenneth Goard. His brother is one of the deeper-thinking members of the committee of the Model Aeronautical Association. But Kenneth devotes his theories to radio design and sends to us a sketch of the circuit he is using for a one-valver which brings in the New Zealand stations on the broadcast band and also gives effective performance on the short-waves. Kenneth reports logging KGEI, on 19 and 31, Vatican City on 25 and all the rest of the usual overseas short-wavers. He says that the set has surprised everyone who has heard it.

We reproduce on this page the circuit which Kenneth is using, and it will be noticed that it has many novel features.

It is capable of giving good results with only a low high-tension voltage of 20 volts and even less. This is made possible by using a space-charge detector circuit, using the screen of the pentode portion of the 6F7 valve for detection and tying the proper grid to the plate. The audio output from this detector is then fed to the triode portion of the valve, which operates as an audio amplifier and drives the headphones. For further details of this circuit we can only suggest anyone interested to get in touch direct with Kenneth at his private address, 2 Sutherland Road, Chatswood.




Circuit for an all-wave one-valve set, as described below.




Circuit of amplifier designed for distortion-free reproduction, even at low volume level.

### CRYSTAL CIRCUIT

Going from one extreme to another, amongst our readers we have a gentleman named James R. Sellenger, of 11 Cecil Street, Hurstville. Mr. Sellenger is elderly in years, but young in spirit. He takes a keen interest in crystal circuits and suggests a scheme for producing a crystal circuit to end all crystal circuit arguments, for it can be instantly changed to embrace the features of at least two hundred different circuit arrangements. You can get this set into operation and then switch around for hours on end until you really satisfy yourself that you are getting the best performance possible with this type of set.

Here is what Mr. Sellenger says:—

"I am posting herewith a diagram of a new-style crystal set.

"It has no fixed circuit, yet is capable of 200 different hook-ups. Unlike other sets, not one of the main components — tuning condenser, crystal, 'phones, coil or aerial or earth — is connected permanently. The utmost selectivity with good volume, possible with a 'single tuned' crystal set, will be found in one or more of the possible circuits or hook-ups.

(Continued on page 32)

# Mullard MANTEL R

## 42.. "HAS AMAZING PUNCH"

Says A. E. READ, B.Sc., in a test report on the Mullardette Model 42 4-valve A.C. Broadcast midget mantel shown below. He writes: **". . . to pack a 4-valve receiver into a tiny bakelite cabinet measuring only 10" x 6½" x 5" is in itself a fine achievement. But it becomes nothing short of remarkable when the resulting receiver has the amazing punch and good tone given by the 42 . . ."**


**Inset left: A. E. READ, B.Sc.,** whose test reports on the Mullard Mantel Models 42 and 63 are quoted below, was Editor for three years of the "N.Z. Radio Times" and other technical publications (1933-36), then Managing Editor of "The Australasian Radio World" for four years.

**Inset ri**
ports on
quoted
Editor
and is
Australa

## 63..."A MAGNIFICENT PERFORMER" Says A. E Mullard M

Wave Receiver illustrated below. He writes: **"Both s excellent, while tone is porticularly good . . . can be r to anyone wanting the best possible radio value for the**


## MULLARD PRICE LIST

**MANTEL AND TABLE MODELS**

| | | | |
|---|---|---|---|
| 42—4V. A.C. Broadcast (Walnut) | £12 | 19 | 6 |
| (Extra for Ivory or Green) | 1 | 1 | 6 |
| 61—5V. Dual-wave | 22 | 19 | 6 |
| 63—5V. A.C. Dual-wave | 19 | 13 | 0 |
| 64—5V. A.C./D.C. Dual-wave | 24 | 1 | 0 |
| 65—4V. A.C. Dual-wave | 17 | 19 | 6 |
| 66—4V. Battery Dual-wave | 25 | 17 | 6 |
| 66—4V. Vibrator Dual-wave | 31 | 3 | 0 |
| 67—5V. Battery Dual-wave | 32 | 10 | 0 |
| 67—5V. Vibrator Dual-wave | 37 | 15 | 6 |

(Subject to alteration without notice)

## CONSOLE MODELS ALSO AVAILABLE

RADIO Mullard AUSTRALIA

# Mullard

**RADIO AND RADIO VALVES**

*"For the Empire's Millions"*

**MULLARD-AUSTRALIA PTY. LTD., 367-371 Kent Street, Sydney.**

## 65.. "MORE STATIONS PE OUTLAY" Says A. G. H 65 4-valve

illustrated above. He writes: **"Once over the dial v opinion that this little set has the most remarkable k stations with ease. On the broadcast band, the general and man-made static was the only limitation to dist the weaker overseas stations came through with a c classed as uncanny. . . . This Mullard job can hold receiver using an extra valve. . . . The nett result is stations per pound outlay than any other receiver these columns."**

**(NOTE: Other Mullard Models available in the cabinet i Model 66 — 4-valve dual-wave for both 2-volt battery operat**

# RADIOS

# Acclaimed by leading radio experts

Inset right: **A. G. HULL**, whose test reports on the Mullard models 65 and 67 are quoted below, was for ten years Technical Editor and Editor of "Wireless Weekly" and is at present the publisher of "The Australasian Radio World."

## ENT ALL-ROUND

Says A. E. READ, B.Sc., regarding the Mullard Model 63 a.c. 5-valve Dual-: **"Both sensitivity and selectivity are . can be recommended without reserve lue for their money."**

## NS PER POUND

s A. G. HULL of the Mullard Model 4-valve a.c. Dual-wave table model **the dial was enough to confirm the arkable knack of bringing in distant he general noise level of atmospherics on a distance. On the short-waves with a clarity which could only be can hold its own with the average result is a receiver which gives more receiver we have ever reviewed in**

**cabinet illustrated above comprise the ttery operation and 6-volt vibrator power.)**

## 61..."AN EXCEPTIONALLY FINE RECEIVER"

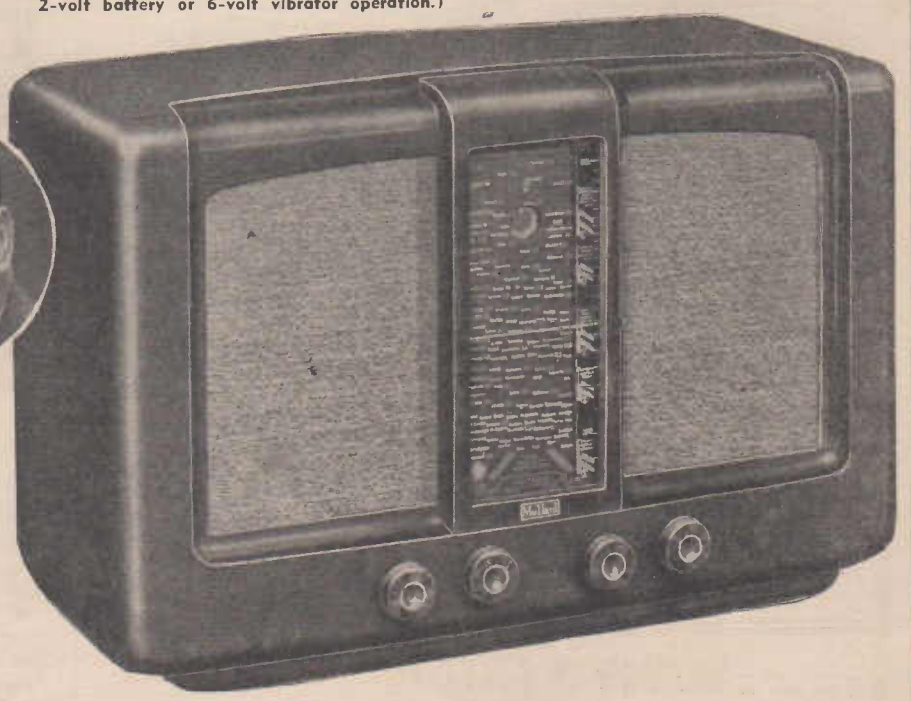
Says ALAN H. GRAHAM, for years Short-wave Editor of "Radio World," and a leading Australian authority on short-wave reception. He writes: **"During a period of approximately one month one of the latest Mullard receivers — the CONSOLETTE Model 61 — has been subjected to a series of exhaustive tests on both short-wave and broadcast bands, and at the end of this period the writer has not the slightest hesitation in recommending the Mullard 61 as an exceptionally fine receiver — thoroughly efficient from the point of view of DX, of handsome appearance and possessing tonal qualities not often found in table model receivers.**

**"In all tests on the short-waves, the Mullard 61 proved outstandingly satisfactory in sensitivity and selectivity on all bands . . . . On the broadcast band, the Mullard 61 more than measures up to any dual-wave receiver we have heard, giving remarkable reception results. Practically all the Australian and New Zealand stations were logged nightly, and in addition numerous overseas stations in the East and in Europe."**

## 67..."ONE IN A MILLION"

Says A. G. HULL, referring to the Mullard 5-valve Dual-wave de luxe table model type 67 (for battery and vibrator operation). He writes: **"The Mullard model 67 is a battery set in a million. It gives extreme sensitivity and selectivity, yet is not at all extravagant, either in initial cost or upkeep."**

**(NOTE: Other Mullard model available in the de luxe cabinet shown below is the Model 64 5-valve Dual-wave a.c./d.c. Receiver. Also the 67 reviewed above is available both for 2-volt battery or 6-volt vibrator operation.)**



# Shortwave Review

*CONDUCTED BY*
*L. J. KEAST*

## NOTES FROM MY DIARY

We have heard of Black Friday, but I guess July 5 will go down in my diary as "gloomy Saturday." Spending the afternoon at home I found my hands wandering over the Radio-player, but signals were fluttery. Thinking perhaps the receiver was misbehaving, I turned on another. No, I was getting the same zizzy reception. Almost at once I suspected sun-spots, remembering that this radio affliction shows the same signs. Towards evening, as conditions got worse, telephonic enquiries started to roll in. By midnight I got a little respite, but on Sunday morning "hullos" commenced again. Fortunately the morning papers had, after enquiries as to why Press telegrams were so slow in arriving, learnt that the trouble was the Aurora Australis. Yes, even the radio telephone had been affected. But one kick I did get out of it was the large number who are interested in overseas reception and so concerned when signals failed to operate normally.

Am sure readers will permit a little hilarity especially when I announce that I heard it over the air.

"The sweet young thing rang the Professor and said, 'Oh, Professor! I'm awfully sorry you didn't let me know you were lecturing last night.' 'But, my dear,' replied the professor, 'the lecture was on 'sun-spots.' 'Yes, I know. That's why I would have been so interested. I've had freckles all my life.' "

On the Saturday mentioned above, just to make matters worse, KGEI seemed to have the fidgets. Wandering around from 9.53 m.c. to 9.67 m.c., they finally settled down on the latter, and it would appear from a check made just a minute ago that they intend to continue on 9.67 m.c. "Most inconsiderate, I calls it," especially after I had upset the usually peaceful surroundings of the Bridge Printery less than a month ago by having a special Stop-Press panel inserted in the July issue, telling the world that KGEI had moved to 31.48 metres. But, as someone once said, "If ever a hasty word be spoke, his anger didn't last, but vanished like tobacco smoke afore the wint'ry blast." So, for their splendid signal and excellent programmes, I will be charitable and forgive them. But just in case their engineers see this — and see it they doubtless will, as the station gets a copy each month — I would venture to say the signal on 9.53 m.c. seemed a little stronger.

Had a visit from a New Zealander the other day who told me in the course of conversation how easily they can bring in distant — especially U.S.A. — broadcast stations. Evidently the geographical position of N.Z., together with the advantage in time, makes this spot ideal for an excursion away from the short-waves. Talking of Maoriland reminds me I must with regret announce one of our N.Z. members, Mr. Hal. Johns, writes that, owing to his new avocation, he will be unable to send any further notes. Like all good DX listeners he was always anxious to tell the other fellow of any discoveries, and had the happy knack of tuning-in the unusual. From details confided to me I can understand he will have very little, if any, time for dial twiddling, so we must ask Arthur Cushen and Neville Gandy to let us know what they hear two and a half hours ahead of us. They might also remind Mr. Knewstubb "it is no breach of radio etiquette to contribute to two radio clubs."

— - —

I am sure readers of these columns will be thrilled to hear that the sign

## HELP WANTED

**Stations Reported But Not Identified**

Readers will show a fine co-operative spirit if, where they can, they help us to establish identity.

**Mr. Arthur Cushen** reports a stranger on 11.54 m.c., heard in news at 10 a.m., closing at 10.15. He is also hearing a station in French with an R6 signal at 6 a.m. on 9.71m. (This may be Martinique.—Ed.)

**Mr. Hugh Perkins,** Malanda, Queensland, sends in a long list of "mysteries":

Approx. 29.25m,e Chinese: Quit.....
Approx. 29.25m: Chinese. Quite fair at 10 p.m.
Approx. 29.35m: Chinese. Quite fair at 10.40 p.m.
Approx. 32.50m: Fair at 6.50 a.m.
Approx. 34.90m: Quite good at 6.45 a.m.

Several others are mentioned but, as they are 'phone stations, we cannot give particulars even if known.

**Mr. Phil Byard,** Launceston, asks for call-sign of Jap on 29.20m who opens at 9 p.m. with the Japanese National Anthem. (Sorry; have heard this laddie for a long while and begged of Dr. Gaden to oblige, but so far no luck.—Ed.)

## ALL-WAVE ALL-WORLD DX CLUB

## *Application for Membership*

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

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

**Name** .....

**Address** .....
**(Please print both plainly)** .....

**My set is a** .....

I enclose herewith the Life Membership fee of 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)** .....

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

"V for Victory" was introduced as far back as seventeen months ago and, yes, sir, on the short-waves. It was Basil Kirke, New South Wales manager of the A.B.C. who, on the inauguration of the Department of Information broadcasts overseas, made identification of the call-signs easier for listeners by referring to them as VLQ, V for Victory, L for Loyalty, Q for Quality, and VLR as V for Victory, L for Loyalty, R for Reliance.

By the way, VLR now becomes VLG, whilst VLR-3 and VLR-4 will be known as VLG-5 and VLG-6, respectively.

Whether Sydney transmitters will be used in the future in the Department of Information broadcasts, I do not know, but just before getting the only taxi in Sydney who had not burned up his last fuel unit, I was told the whole shebang had moved to camp on the Yarra. I'm dreadfully sorry, as I figure, having worked up quite a large audience, helped by this magazine in no small way, it would have been nice to think the programmes were still radiated from the third biggest city in the British Empire.

### Brief Mention

I'm not going to promise it will be heard every night for some time, but at the ??? of typing these notes, Wednesday, July 30, at 10 p.m., I am listening to London on GSF, 19.82m, and reception is excellent. Such an early return of the 19-metre band may suggest an early summer. If this is so, it certainly behoves us more than ever to remember "That Every Gallon Counts." (Since writing the above, I tuned to 16.84 and the signal is even better. The session, "Your Company Is Requested," closing at 11 p.m. on Wednesday, is a fine show.)

Naturally you are interested in News from Russia. One of the best sessions in English is heard at 12.30 p.m. on 19.76m. Announcer sounds very American. Another good half-hour is from 10.5 p.m. on the same wavelength.

Did intend to compile a complete list of the Russian stations but, as they are still bobbing up all over the place, we'll give them a little more breathing space.

There is a Russian on approximately 10.14 m.c., 29.60m., employing an unusual language in the evenings. I am told this station is one of the Frunze transmitters operating in the Caucasus, and the language is one of the many dialects heard in that part of Russia.

MTCY, Hsinking, 15,320kc, 19.57m, is being heard at 7 a.m. on session for Europe. Chimes at 7 followed by News in English, then music, but fades badly by 8. (Announcer will state is operating on 19.69m, but consider 19.57 is nearer the mark.)

Read in a West Australian paper that an unidentified London transmitter was being heard on 28m in the mornings. This is most likely VQG-3 in Nairobi, 10.730kc, 27.95m. Relaying the B.B.C. news at 4 a.m., they seem to follow the B.B.C. for at least an hour.

Just what effect the international situation will have on Radio Saigon I do not know, but if near the radio on a Sunday morning around 10 don't be surprised if you hear the familiar chimes, followed by "Ici Radio Saigon" and news in French.

**This is the listening post of our short-wave Editor, Mr. L. J. Keast, at 96 Frenchman's Road, Randwick. An avid reader of all magazines relating to overseas stations, a member of many radio clubs and the possession of a splendidly equipped "den" fit him to conduct the pages left to his care.**

## BEACON MISSING.

When instructing a newcomer to the short-waves I invariably recommend looking for what I call beacons or markers. By that I mean reliable and regular stations that never vary.

To-day, after fifteen years or so, I miss Mr. R. N. Shaw from the pages of "Wireless Weekly."

He was one of the Beacons. It was his kindly encouragement and his untiring help that kept me exploring the short-waves.

He always affectionately refers to me as his "pupil," and I hope that I have imbued some of his "kind Professor" style that will enable me to help many in this interesting hobby.

I trust it will not be long before we again read, somewhere or other, "R. N. Shaw Discusses Short-wave Highlights."

Three Manila 'phone stations have been heard at various hours in the evening. Call-signs and approximate frequencies are: KZGH, 6775kc, KZGF, 6770kc, and KZGG, 6980kc.

Mid-day notes in front of me show I classed DZD, 28.45m, as splendid. (Volume and clarity, I mean). The session, "Hot Off the Wire,' at 1.50 provides a laugh. KGEI, 19.57m, at 2.15 is very good, and WNBI, 11,890 kc, 25.23m, is excellent in news at 2.55. They close at 3 p.m., and station announcements are given in many languages.

Belgrade, while missing for a time, was being heard again on 49.18m at 6 a.m., with German and Yugoslav announcements. I am told they have now moved to YUC, 9.50 m.c., 31.56m. When on the 49-metre band they announced, "This is Belgrade through the Reichsender Vienna," and were often on the air till 8.

Mr. Nelson, of Cairns, has been hearing a French-speaking station on approximately 32.45m at 7.45 a.m. Any suggestions? He refers to WRCA, 31.02m, as weak on closing at 3 p.m. and that they stayed on till 7 p.m. on June 22.

In addition to RW-15 on 31.36m, we now have the same station a whisper away on 31.43m. I leave it to you as to which is the louder, strength of either would appeal to lot of Europeans.

This reminds me, I have enquiries for times that Bulgaria and Rumania are on the air. I can only quote what were the last notes made:

Radio Sofia, 10,310kc, 29.09m: To 7 a.m. Fair signal.

(Continued on page 34)


ALL TIMES ARE AUSTRALIAN EASTERN STANDARD

Owing to pressure on space, complete schedules cannot be given, but principal changes are shown. (See June issue for complete schedule.)

### AUSTRALIA AND OCEANIA

**VLR-4,** Melbourne .... .... .... 15,230kc, 19.69m
This new transmitter is being heard well in N.Z. (Cushen, Gandy) and in Queensland (Nelson, Gaden, Perkins).

**Fiji:**

**VPD-4,** Suva .... .... .... .... 14,425kc, 20.80m
Heard once or twice at 3.45 p.m. (Perkins).

**VPD-2,** Suva .... .... .... 9535kc. 31.46m
Schedule: 7-8 p.m. except Sunday.
Splendid news service at 7 pm. French session 3 to 3.30 p.m.

**New Caledonia:**

**FK8AA,** Noumea .... .... .... 6130kc, 48.94m
Schedule: 5.30 to 6.30 p.m.
On opening and closing plays "Marseillaise," "God Save the King" and "The Star-Spangled Banner."

**Tahiti:**

**FO8AA,** Papeete .... .... .... 7100kc, 42.25m
Amazing signal at 3.30 p.m. (Cushen).

### AFRICA

**Algeria:**

**TPZ,** Algiers .... .... .... .... 12,120kc, 24.76m
Schedule: 4 a.m. to 9 a.m., 5.30 p.m. to 6.15 p.m.
R6 most mornings (Cushen).

**TPZ-2,** Algiers .... .... .... .... 8960kc, 33.48m
Schedule: 4 a.m. to 9 a.m., 5.30 p.m. to 6.15 p.m.
R6 most mornings (Cushen).

**Belgian Congo:**

**OPM,** Leopoldville .... .... 10,140kc, 29.59m
Schedule: 4.55 a.m. to 5.45 a.m.

**Egypt:**

**SUX,** Cairo .... .... .... .... 7865kc, 38.15m
Schedule: 4.30 a.m. to 6.30 a.m.
R5 at 6.30 (Nelson).

**French Equatorial Africa:**

**FZI,** Brazzaville .... .... .... 11,965kc, 25.06m
From 1.45 to 2 p.m., News in English for U.S.A. (Cushen). Weak on opening at 3.55 p.m. (Nelson).

**French West Africa:**

**Senegal:**

**FGA,** Dakar .... .... .... .... 9405kc, 31.90m
Talk in English at 7.15 a.m. Wednesday and Saturday.
Heard occasionally at 6.30 a.m. (Cushen).

**Gold Coast:**

**British West Africa:**

**ZOY,** Accra .... .... .... .... 6000kc, 50.00m
Relays B.B.C. at 4 a.m.
Believe heard **ZOY** on approximately 50.03m around 5 a.m. Heard Accra mentioned (Byard).
(Last month Mr. Hallett reported **ZOY** on approximately 49.95m. Think 50m will be found correct.—Ed.

**South Africa:**

**Rhodesia:**

**THE POST OFFICE STATION,** Salisbury 7317kc, 41m
Schedule: 2 a.m. to 6 a.m. Relays Daventry at 4 a.m. Closes with "God Save the King." R5-6 when closing at 6 a.m. (Cushen).

**Portuguese East Africa:**

**Mozambique:**

**CR7BE,** Laurenco Marques .... 9710kc, 30.9m
Schedule: 5 to 7 a.m. except Mondays. News 5.55.
Some mornings signal is excellent; on others, appears to be missing.—Ed.

### AMERICA

**Hawaii:**

**KHE,** Kahuku .... .... .... .... 17,980kc, 16.69m
R6 closing at 11 a.m. Sundays. Listen to "Hawaii Calls" (Nelson).

**Central:**

**Costa Rica:**

**TIPG,** San Jose .... .... .... 9620kc, 31.19m
Schedule: 10 p.m. to midnight.
Loudest of the Central Americans. Excellent at 2 p.m.; closes 2.30 p.m. (Nelson, Cushen). English announcements.—Ed.

**TILS,** San Jose .... .... .... .... 6165kc, 48.66m
Not as good as last month at 10 p.m. (Cushen).

**TIGPH,** San Jose .... .... .... 5910kc, 50.76m
Good around 10.15 p.m.; also heard at 2.30 p.m. (Cushen).

**El Salvador:**

**YSPB,** San Salvador .... .... .... 6575kc, 45.63m
Best Central American closing a few moments before 3 p.m. (Cushen).

**Guatemala:**

**TGWA,** Guatemala .... .... .... 9685kc, 30.98m
Weak at 6 p.m. (Gandy). R5-6 at 2.45 p.m. (Nelson, Cushen).
Frequent English announcements, and evidently much louder here as signal is easily R7-8.—Ed.

**TGWB,** Guatemala .... .... .... 6480kc, 46.30m
Good signal at 2.30 p.m. (Cushen).

**TG-2,** Guatemala .... .... .... 6200kc, 48.39m
Good after **CP5** closes at 2 p.m. (Cushen). (**CP5** is a station in La Paz, Bolivia, on the same frequency.—Ed.)

**Panama:**

**HP5A,** Panama City .... .... 11,700kc, 25.64m
Schedule: 1 p.m. to 2 p.m., 10 p.m. to midnight.
Calls in English at 1 p.m. (Gaden). Best of the Central Americans. Closes at 2 p.m. with "Merry Widow Waltz." R5 in afternoon, but now heterodyned by **CBFY** at night (Nelson). Always reliable, but interference from **CB1170** (and I suspect **CBFY** also.—Ed.).

**HP5J,** Panama City .... .... .... 9607kc, 31.22m
Schedule: 10 p.m. till midnight.
Have received fine verification card (Cushen).

**North:**

**KGEI,** 'Frisco .... .... .... .... 15,330kc, 19.56m
Schedule: 10.15 a.m. to 3 p.m. News, 10.45 a.m. 2.55 p.m.
R9 at 3 p.m. (Cushen, Collins). Very good here at 2.15 p.m.—Ed.

**WRUL,** Boston .... .... .... 15,130kc, 19.83m
R7 at 10.30 a.m. (Cushen). Weak at 6 a.m. (Gandy). Heard better here at mid-day.—Ed.

**KKQ,** Bolinas .... .... .... .... 11,950kc, 25.11m
R6 at 2.15 p.m. (Byard).

**WNBI,** Boundbrook .... .... .... 11,890kc, 25.23m
Heard testing at 8.55 p.m. (Nelson). R6 at 1.45 p.m. (Byard). News at 2.55 p.m.—Ed.

**WBOS,** Boston .... .... .... 11,870kc, 25.26m
Schedule: 7 a.m. to 2 p.m. News, 9 a.m. and 1 p.m.
R7 at 1.45 p.m. (Byard). Excellent at 9 a.m. (Gaden). R7 at 7 a.m. and R9 when closing at 2 p.m. (Cushen).

**WRUL,** Boston .... .... .... 11,790kc, 25.45m
Schedule: 4 a.m. to 8 a.m. (News 6.30 a.m.)

**WRUW,** Boston .... .... .... 11,730kc, 25.58m
Schedule: 8.15 a.m. to 12.30 p.m. (News 8.15 a.m. and 10.15 a.m.).
R7 at 10.30 a.m. (Cushen, Gaden).

**WLWO,** Cincinnati .... .... .... 11,710kc, 25.62m
Schedule: 8 a.m. to 10.45 a.m. News, 10.30 am.
Top hole at 9 a.m. (Gaden). Fair at 10 p.m. (Cushen). Not audible at Randwick.—Ed.

**KGEI,** 'Frisco .... .... .... .... 9670kc, 31.02m
Schedule: 3.30 to 7 p.m. (News 4 p.m. and 5.55 p.m.). From 6 to 7 p.m. session is "Good Neighbour Hour" in Chinese from Chinatown, San Francisco. 10 p.m. to 3.10 (News 10.30 p.m., 12.30 a.m., 1.30 a.m., 3 a.m.).

**WRCA,** Boundbrook .... .... .... 9670kc, 31.02m
Schedule: 6 a.m. to 3 p.m.
R9 at 3 p.m. (Cushen). R6 at 1.30 p.m. (Byard).

**WLWO,** Cincinnati .... .... .... 9590kc, 31.28m
Schedule: 11 a.m. to 3 p.m.
Heard testing at 8.30 p.m. on 50,000 watts (Nelson).

**WGEA,** Schenectady .... .... .... 9550kc, 31.41m
Schedule: 8.15 a.m. to 11.15 a.m.

**WGEO,** Schenectady .... .... .... 9530kc, 31.48m
Schedule: 5 a.m. to 7.45 a.m., 8 a.m. to —2 p.m. (News 6.55 and 8.25 a.m.).

**KEI,** Bolinas .... .... .... .... 9490kc, 31.61m
R5 at 2.15 p.m. (Byard).

**WCBX,** New York .... .... .... 6170kc, 48.62m
Interference from **HER3** at 3 p.m. (Cushen).

**WCAB,** Philadelphia .... .... 6060kc, 49.50m
Quite good at 3 p.m. (Cushen).

**Mexico:**

**XEQQ,** Mexico City .... .... .... 9680kc, 30.99m
R8 at 5 p.m. (Nelson). R7 at 2 p.m. (Cushen).

**XEWW,** Mexico City .... .... 9503kc, 31.57m
Between 2 and 4 p.m.
R8, Q5 (Nelson). R7 at 2 p.m. (Cushen).

**XEUZ,** Vera Cruz .... .... .... 6120kc, 49.02m
Closes 2 p.m. (Cushen).

**XEUW,** Vera Cruz .... .... .... 6023kc, 49.78m
Good on closing at 4 p.m. (Cushen). Opens at 10 p.m. Very weak signal.—Ed.

**South:**

**Argentine:**

**LRX,** Buenos Aires .... .... .... 9660kc, 31.06m (Quite good at 9.15 p.m. (Edel).

**Bolivia:**

**CP-5,** La Paz .... .... .... .... 6200kc, 48.39m Heard at 10 p.m. (Gaden).
R7 at 2 p.m. when they close down (Cushen).

**CP-2,** La Paz .... .... .... .... 6110kc, 49.10m R5 at 2.30 p.m. (Cushen).

**Brazil:**

**PRA-8,** Pernambuco .... .... 6010kc, 49.92m R7 at 6.30 a.m. (Hallett).

**PSH,** Rio de Janiero .... .... 10,220kc, 29.35m Only heard weakly at 8.30 a.m. (Nelson).

**British Guiana:**

**VP3BG,** Georgetown .... .... .... 6130kc, 48.94m Heard weakly at 7 a.m. (Gaden).

**Chile:**

**CB1180** .... .... .... .... .... .... .... ——, —— One of the best Latins. Strong signal interferes with **FZI** (Cushen).

**CB1170,** Santiago .... .... .... 11,700kc, 25.64m Always good till 3 p.m. (Cushen).

**Ecuador:**

**HCJB,** Quito .... .... .... 12,460kc, 24.08m R7 at 12.55 p.m. (Byard). This station will send some fine pictures for correct reports.—Ed.

**HCJK,** Guayaquil .... .... .... 9420kc, 31.85m R8 at 2 p.m. on occasions (Cushen). This late **HC2AK**.—Ed.

**HCETC,** Quito .... .... .... .... 9355kc, 32.05m R7 at 1 p.m. (Cushen).

**HCQRX,** Quito .... .... .... .... 5975kc, 50.21m Good at 10 p.m. (Cushen). Opens at 9.45 p.m. with march. News in Spanish follows.—Ed.

**Colombia:**

**HJCT,** Bogota .... .... .... .... 9630kc, 31.15m Closes weakly at 2.30 p.m. (Gaden).

**HJFB,** Manizales .... .... .... 6110kc, 49.10m R6 when closing at 1 p.m. (Cushen).

**HJFK,** Pereira .... .... .... .... 6090kc, 49.20m Heard in afternoons and sometimes till 5 p.m. on Sundays.

**HJCX,** Bogota .... .... .... .... 6018kc, 49.85m Excellent at 4 p.m. (Gaden).

**Paraguay:**

**ZP-14,** Villarica .... .... .... 11,720kc, 25.60m Heard at R6 when closing at 11 p.m. (Cushen).

**Peru:**

**OAX5C,** Ica .... .... .... .... 9810kc, 30.58m R5 at 2.15 p.m. (Byard). This is the fifth change in frequencies in a little over twelve months.—Ed.

**OAX4J,** Lima .... .... .... .... 9340kc, 32.12m Heard closing at 4 p.m. (Nelson). R9 at 1 p.m. (Cushen).

**OAX6D,** Arequipa .... .... .... 9455kc, 31.73m R7 till **GRU** opens at 2.55 p.m. (Cushen).

**THE EAST**

**Burma:**

**XYZ,** Rangoon .... .... .... .... 6007kc, 49.94m Good 11 p.m. (Collins).

**China:**

**FFZ,** Shanghai .... .... .... 12,090kc, 24.83m Schedule: 7 p.m. to 1 a.m. News 10 p.m. R8 at 9.30 p.m. (Byard).

**XGRS,** Shanghai .... .... .... 12,015kc, 24.97m Schedule: 6.30 p.m. to 1 a.m. "The Voice of Europe." News 8.45 p.m., 9.30 p.m. and 11.15 p.m.
Good nightly (Collins, Byard, Rickard).

**XIRS,** Shanghai .... .... .... 11,980kc, 25.02m News in English at 9.15 p.m. (Nelson). R5 at 9.30 p.m. (Byard).

**XMHA,** Shanghai .... .... .... 11,853kc, 25.31m Schedule: 6.30 p.m. to 1 a.m. News, 9 p.m. and 11.15 p.m.

**XGOA,** Chungking .... .... .... 9720kc, 30.85m Good at 9 p.m. News at midnight (Beattie).

**XPSA,** Kweiyang .... .... .... 8484kc, 35.36m R8 at midnight (Cushen). Excellent from opening (Rickard).

**XOZS** .... .... .... .... .... .... .... .... .... .... 29.88m Good nightly (Rickard).

**XGOY,** Chungking .... .... .... 5950kc, 50.42m 10.30 p.m. to 11.55 p.m. News 10.30 p.m. Good at 11 p.m. (Cushen).

## LOGGINGS (Continued)

**Thai:**

**HSP5,** Bangkok .... .... .... .... 11,715kc, 25.61m
Schedule: 10.50 p.m. to 1 a.m. except Mondays. News, 11.45 p.m.

**Dutch East Indies:**

**YDX,** Medan (Sumatra) .... 7220kc, 41.55m
R5 at 10.30 p.m. (Byard).

**PMH,** Bandoeng .... .... .... 6720kc, 44.64m
Heard quite often in special programme to U.S.A. at 5 a.m.—Ed.

**YDR,** Tandjonpriok .... .... .... 4470kc, 67.11m
Good at 1 a.m. (Cushen).

**YDA,** Tandjongpriok .... .... .... 3040kc, 98.68m
Schedule: 7.30 p.m. to 1.30 a.m.

**French Indo-China:**

**Radio Saigon,** Saigon .... .... 11,780kc, 25.47m
Schedule: 8.40 p.m. to 2 a.m. News, 9.15 p.m., 1.45 a.m.
Heard opening at 10 a.m. on July 13 with News in French by a man. Opening was preceded by usual gongs and chimes.—Ed.

**Radio Saigon,** Saigon .... .... .... 6180kc, 48.54m
Schedule: 8.40 p.m. to 2 a.m.
Very loud signal.

**Hong Kong:**

**ZBW-3** .... .... .... .... .... .... 9525kc, 31.49m
Schedule: 8 p.m. to 1 a.m. Relays B.B.C. News at 11 p.m.
R6 at 11 p.m. (Byard).

**India:**

**VUD-3,** Delhi .... .... .... .... 15,290kc, 19.02m
News in English at 1.20 p.m. (Gaden).

**VUD-4,** Delhi .... .... .... .... 11,830kc, 25.36m
Schedule: 9.30 p.m. to 3.20 a.m.
News, 10.30 p.m., 1.50 a.m., 3.15 a.m.
R7 at 11 p.m. (Cushen).

**VUD-2,** Delhi .... .... .... .... 9590kc, 31.28m
Schedule: 9.30 to 2 a.m. News, 10.30 p.m., 1.50 a.m.
R7 at 11 p.m. (Cushen).

**VUD-2,** Delhi .... .... .... .... 7290kc, 41.15m
Schedule: 9.30 p.m. to 3.20 a.m. News 10.30 p.m. to 1.50 a.m.
Excellent at 10.30 p.m. (Cushen, Byard).

**VUM-2,** .... .... .... .... .... .... 7270kc, 41.27m
Closes at 10.15 p.m. (Cushen).

**VUB-2,** Bombay .... .... .... .... 7240kc, 41.44m
Good around 10.30 p.m. (Byard). Closes 1.15 a.m. (Cushen).

**VUC-2,** Calcutta .... .... .... .... 7210kc, 41.61m
Fair about 10.30 p.m. R6 at 11 p.m. (Cushen, Collins).

**VUD-8,** Delhi .... .... .... .... 4920kc, 60.98m
Strong but noisy at 9.30 p.m. (Gandy).

**Japan:**
(Tokyo considered source of supply unless otherwise mentioned)
Pressure on space does not permit of full schedules.

**JLU-4** .... .... .... .... .... .... 17,795kc, 16.86m
11 a.m. to 1 p.m. News 11.05 a.m.
Good at 11.30 a.m. (Collins).

**MTCY,** Hsinking .... .... .... .... 15,340kc, 19.56m
R5 at 7 a.m. on June 30 (Nelson).

**JZK** .... .... .... .... .... .... 15,160kc, 19.79m
1.30 p.m. to 4 p.m. (News 2.55 p.m.). 4.30 to 6.30 p.m. (News 4.35 p.m.). 11 p.m. to 12.30 a.m. (News 11.30 p.m.).
Good 4.30 to 6.30 p.m. (Collins).

**JLG-4,** —— .... .... .... .... 15,105kc, 19.86m
5 a.m. to 8.30 a.m. (News 7.30 a.m.). 11 a.m. to 1 p.m. (News 11.05 a.m.).

**JVZ,** —— .... .... .... .... 11,815kc, 25.39m
7 p.m. to 11 p.m.

**JZJ** .... .... .... .... .... .... 11,800kc, 25.42m
5 a.m. to 8.30 a.m. (News 8 a.m.). 7 p.m. to 12.30 a.m. (News 8.30 p.m.).
Splendid signal (Rickard).

**JVW-3** .... .... .... .... .... .... 11,720kc, 25.6m
Schedule: 6.45 a.m. to 8.30 a.m. (Exercises 7.7 a.m.). 6.45 p.m. to 12.30 a.m.

——, .... .... .... .... .... .... 10,274kc, 29.20m
Opens with Japanese national anthem at 9 p.m. (Byard). Sometimes overpowers **PMN.**—Ed.

**MTCY,** Hsinking .... .... .... .... .... 25.48m
7 a.m. to 7.50 a.m. (News 7.03 a.m.).
Weak at 7.30 a.m. (Nelson).

**MTCY,** Hsinking .... .... .... .... 9545kc, 31.43m
Was giving News at 7.03 a.m., but believe now on 25.48m.—Ed.

**MTCY,** Hsinking .... .... .... .... 6125kc, 48.98m
Heard irregularly at night (Rogers).

**Malaya:**

**ZHP-1,** Singapore .... .... .... 9700kc, 30.92m
R5 at 7.45 p.m. (Byard).

**ZHP-3,** Singapore .... .... 7250kc, 41.38m
R6 at 10.30 p.m. (Byard).

**ZHP-2,** Singapore .... .... .... 6175kc, 48.62m
R3 at 8.45 p.m. (Byard).

**ZHJ.** Penang .... .... .... 6095kc, 49.23m
R4 at 9 p.m. (Byard). Relays B.B.C. News at 11 p.m.—Ed.

**Philippines:**
(Manila, unless otherwise stated)

**KZRH** .... .... .... .... .... .... 9640kc, 31.12m
Schedule: 7.30 a.m. to 9.30 a.m. (News 8.15 a.m.). 6 p.m. to 2 a.m. (News 6 p.m., 10.30 p.m. and midnight).
Heard News at 6 a.m. on July 20.—Ed.
Heard on July 6 at 3 p.m. with R7 signal (Nelson).

**KZRM** .... .... .... .... .... .... 9570kc, 31.35m
Schedule: 6.45 p.m. to 1.30 a.m. News, 8.35, 10.45 and 11.45 p.m., also 12.45 a.m.

**KZND,** Manila .... .... .... .... 8790kc, 34.13m
Heard from 9.30 p.m. Give their wavelength as 34.17m (Nelson). Good signal (Collins, Byard).

**KZRA,** Manila .... .... .... .... 8780kc, 34.17m
Heard at 11.30 p.m. Testing station in Manila (Cushen).

**KZRF,** Manila .... .... .... .... 6140kc, 48.86m
R5 at 8.45 p.m. (Byard).

### GREAT BRITAIN

**"This Is London Calling"**

**GSV** .... .... .... .... .... .... 17,810kc, 16.84m
E.T., 8.55 p.m. to 2.30 a.m. News 9 p.m., 11 p.m. and 2 a.m.
Reception doubtful.

**GSP** .... .... .... .... .... .... .... 15,310kc, 19.60m
P.T., 5.30 p.m. to 6.15 p.m.; Af.T., 5.30 a.m. to 7.45 a.m.

**GSI** .... .... .... .... .... .... .... 15,260kc, 19.66m
P.T., 2.57 to 6.15 p.m.

**GSF** .... .... .... .... .... .... 15,140kc, 19.82m
P.T., 2.57 p.m. to 6.15 p.m.; E.T., 8.55 p.m. to 2.30 a.m.; Af.T., 2.55 a.m. to 5.15 a.m., 6.45 a.m. to 7.45 a.m.

**GRV** .... .... .... .... .... .... 12,040kc, 24.92m
Eur., 2.55 a.m. to 4.15 a.m. (News at 4 a.m.).
Heard in French at 7 a.m. (Beattie).

**GSN** .... .... .... .... .... .... 11,820kc, 25.38m
Eur., 11 p.m. to 1.30 a.m. (News 11.30 p.m.). 8.40 a.m. to 12.30 p.m. (Spanish and Portuguese).

**GSD** .... .... .... .... .... .... 11,750kc, 25.53m
2.57 p.m. to 6.15 p.m.; E.T., 11.45 p.m. to 2.30 a.m.; Af.T., 2.55 a.m. to 7.45 a.m.; Am.T., 8.20 a.m. to 2.45 p.m.

**GRX** .... .... .... .... .... .... 9690kc, 30.96m
Eur., 2.55 a.m. to 8.30 a.m., 8.40 a.m. to 12.30 p.m. (Spanish and Portuguese), 6 p.m. to 8 p.m. News, 8 a.m. and 6 p.m.

**GRY** .... .... .... .... .... .... 9600kc, 31.25m
P.T., 3 p.m. to 5 p.m. (News 4.15 p.m.). E.S., 3 a.m. to 7.45 a.m. (News 4 a.m. and 6.45 a.m.). N.A.S., 8.10 a.m. to 2.45 p.m. (News 8.45 a.m., 10 a.m., 11 a.m., 2.30 p.m. (Radio Newsreel 1.30 p.m.).
R8 at 8.45 a.m. R9 at 12.30 p.m. (Byard).
My favourite London transmitter.—Ed.

**GSC** .... .... .... .... .... .... 9580kc, 31.32m
Am.T., 8.25 to 2.35 p.m. Radio Newsreel 1.30 p.m. News 2.30 p.m.
R8 at 8.45 a.m. R9 at 12.30 p.m. (Byard).

**GSB** .... 9510kc, 31.55m
P.T., 2.57 p.m. to 6.15 p.m. (News 4.15 p.m.). 8.40 a.m. to 12.30 p.m. (Spanish and Portuguese).

**GRU** .... 9450kc, 31.75m
Not sure of schedule, but heard opening at 2.50 p.m.—Ed.

**GRW** .... 48.82m
Home Service, 2.30 p.m. to 6 p.m. (News 3 p.m. and 4 p.m.). 2 a.m. to 7.15 a.m. (News 2 and 5 a.m.).

**GRR** .... 6075kc, 49.38m
2.30 p.m. to 6 p.m. (News 3 p.m. and 4 p.m.). 2 a.m. to 8.30 a.m. (News 2 a.m., 5 a.m. and 8 a.m.).
R8 at 8 a.m. (Byard)

**GSA** .... 6050kc, 49.59m
Eur., 1.55 p.m. to 8 p.m., 2.55 a.m. to 8.30 a.m. (News 6 p.m. and 8 a.m.).

### EUROPE

**France:**
(Of course, Nazi controlled)

**"Y"** .... 9520kc, 31.51m
Schedule: 7.50 a.m. to 2 p.m. (News 1.30 p.m.).
Good when Moscow closes at 1 p.m.

**Germany:**
"Station Ananias," Berlin

**DJR** .... 15,340kc, 19.56m
Schedule: 3 p.m. to 2 a.m. News 5 p.m. and 10 p.m.
Reception between 6 p.m. and midnight is erratic, but every indication of rapidly improving.—Ed.

**DXT** .... 15,230kc, 19.70m
R8 at 2 p.m. (Byard).

**DZD** .... 10,530kc, 28.45m
From "Lord Haw-Haw" at 6.30 a.m. till closing at 4 p.m. excellent as far as signal strength is concerned. "Hot Off the Wire" given at 1.50 p.m.—Ed.

**DZC** .... 10,290kc, 29.25m
R9 at noon (Byard).

**DJD** .... 11,770kc, 25.49m
Schedule: 1.40 to 7.25 a.m. News, 2.15, 5.15 and 7.15 a.m. Talk at 3.30 a.m. 7.50 a.m. to 2.05 p.m. (News 11.30 a.m. and 1.30 p.m.

**DJA** .... 9560kc, 31.38m
Schedule: 2.30 a.m. to 6 a.m. News, 2.30, 3.30 and 5.30 a.m. (Lord Haw-Haw).

**DXM** .... 7270kc, 41.27m
"Lord Haw-Haw" 6.30 and 7.30 a.m.

**DJC** .... 6020kc, 49.83m
3.40 a.m. to 7.25 a.m. News at 6.15 and 7.15.

**Hungary:**

**HAT-4,** Budapest .... 9123kc, 32.88m
R9 at 10.30 a.m. News at 11.15 a.m.

**Italy:**
"This is Radio Rama"

**2RO-18** .... 9765kc, 30.74m
11 a.m. to 2.20 p.m.
R8 at 1.30 p.m. (Byard).

**2RO-3** .... 9630kc, 31.15m
Schedule: 2.30 a.m. to 8.55 a.m.; 11 a.m. to 2.20 p.m.; 2.30 p.m. to 3.30 p.m.; 5 p.m. to 5.30 p.m. (News, 7.12 a.m., 8.20 a.m., noon, 1.30 p.m., 3 p.m. and 5.20 p.m.).

**2RO-11** .... 7220kc, 41.55 a.m.
Schedule: 2.30 a.m. to 8.55 a.m. (News, 7.12 a.m.).

**HVJ** .... 11,740kc, 25.55m
From 4 to 5 p.m. gives names of A.I.F. prisoners of war (Cushen).

**HVJ,** Vatican City .... 48.47m
5.15 a.m. to 5.30 a.m. Talks.

**HVJ** Vatican City .... 11,740kc, 25.55m
Heard between 4 and 6 p.m. Fridays, giving names of prisoners of war.

**Portugal:**

**CSW-6,** Lisban .... 11,040kc, 27.17m
Schedule: 3 a.m. to 6.45 a.m.

**CSW-7,** Lisbon .... 9740kc, 30.8m
Schedule: 6.50 to 9 a.m. Talks: On Wednesday, Friday and Sunday from 6.50 a.m. to 7.15 a.m.

**CS2WD,** Portugal .... 6200kc, 48.38m
Schedule: 6 to 9 a.m.

**Russia:**
("This is Radio Centre, Moscow, calling")

**RW-96** .... 19.47m
Schedule: 8 p.m. to midnight.
Only fair at present.—Ed.



**RW-96** .... 15,180kc, 19.76m
Heard in talk in English (very anti-German) at 12.45 p.m. (Gaden). Good 2 p.m. (Collins).

**RWG** .... 14,720kc, 20.38m
Gives News in English at noon (Gandy).

**RNE** .... 12,000kc, 25.00m
Schedule: Noon to 6 p.m., physical jerks; 12.30 and at 1.20 p.m., 10 p.m. to 9 a.m. News 10.30 p.m. and 8 a.m.
English from 8 to 8.25 a.m. (Cushen).
Kremlin bells at 7 a.m.—Ed.

—— .... 11,740kc, 25.55m

**RAL/RVG** .... 11,645kc, 25.77m
Loud around midnight (Gandy).

—— .... 10,239kc, 29.30m
Being heard nightly (Perkins).

—— .... 10,140kc, 29.6m
This is another of the Frunze transmitters. Heard nightly using several strange languages. Sometimes heard around 6.30 a.m.—Ed.

——, Moscow .... 9628kc, 31.16m
Heard at great strength till about 7 a.m. (Muller).

**RW-15,** Khabarovsk .... 9565kc, 31.36m
Schedule: 6 p.m. to midnight.

**RW-96** .... 9520kc, 31.51m
Schedule: 12.30 p.m. to 1 p.m. (English). 10 p.m. to 8 a.m. News 4.30 a.m., 6.15 a.m. and 7 a.m.

**RKD** .... 8035kc, 37.33m

**RV-96** .... 7570kc, 39.63m
R7 at 6.45 a.m. (Cushen). Apparently this is a new one. I have been hearing the Kremlin bells at 7 a.m. on RKI, 7540kc, 39.76m.—Ed.

**RW-96** .... 6061kc, 49.5m
Midnight to 8 a.m.

**RV-59** .... 6030kc, 49.75m
Irregular.

**RW-96,** Moscow .... 6000kc, 50.00m
Irregular.

**RV-15,** Khabarovsk .... 4273kc, 70.2m
Very fair signal.

**Switzerland:**

**HBH,** Geneva .... 18,480kc, 16.23m
Schedule: 11.45 p.m. Fridays to 1.10 a.m. Saturdays. Mostly English, little French. News 12.5 a.m., 11.45 p.m. Mondays to 1.10 a.m. Tuesdays, Italian. German and French.

**HBJ,** Geneva .... 14,535kc, 20.65m
First Sunday in the month. 3.45 p.m. to 5.10 p.m.

**HBO,** Geneva .... 11,420kc, 26.31m
Same remarks as **HBJ.** Fair signal. Very good on June 2.

**HER-3,** Schwarzenburg .... 6165kc, 48.66m
Schedule: 2.40 p.m. to 3.37 p.m. Good signal. 3.30 a.m. to 7.05 a.m. Splendid Signal. Excellent at 3 p.m. (Cushen).

**Yugoslavia:**

**YUB,** Belgrade .... 6100kc, 49.18m
Terrific strength at 6 a.m. Use German and Yugoslav languages (Muller).

### SCANDINAVIA

**Denmark:**

**RADIO DENMARK,** Copenhagen 9680kc, 30.99m
R5 at 3.40 p.m. (Nelson).

**Finland:**

**OIE,** Lahti .... 15,190kc, 19.75m
1.30 a.m. to 8 a.m. News 4.15 a.m. and 7.15 a.m.

——, Helsinki .... 11,966kc, 25.07m
Said to be an air from 5.20 to 6.50 a.m.—Ed.

**OFE,** Lahti .... 11,780kc, 25.47m
Schedule: 1.30 a.m. to 8 a.m. (News, 4.15 and 7.15 a.m.); 3.30 p.m. to 6 p.m.
R8 at 7.15 a.m. (Byard).

**OFD,** Lahti .... 9500kc, 31.58m
Schedule: 1.30 a.m. to 8 a.m. News, 4.15 and 7.15 a.m.
R8 at 7.15 a.m. (Byard).

——, Helsinki .... 8586kc, 34.94m
Said to be on air from 5.20 to 6.50 a.m.—Ed.

**Norway:**

**LKQ,** Oslo .... 11,735kc, 25.57m
Schedule: 3.05 to 6 p.m.; 1.30 to 7.30 a.m.

**Sweden:**

**SBT,** Stockholm .... 15,150kc, 19.8m
Schedule: 6 p.m. Sundays to 7 a.m. Mondays. Daily: 3.56 a.m. to 7.15 a.m.

## LOGGINGS (Continued)

**SBP,** Stockholm .... .... .... 11,710kc, 25.63m
Schedule: 3.56 a.m. to 7.15 a.m. Opens again at 11 a.m. with News for U.S.A. 4.40 p.m. to 6 p.m. (Sundays 6 p.m. to 7 a.m. Mondays).
Good at 11 a.m. (Gaden).

**SBO,** Stockholm .... .... .... .... 6060kc, 49.46m
Schedule: 7.18 a.m. to 8 a.m. News, 7.20 a.m.
R8 at 7.30 a.m. (Byard).

### MISCELLANEOUS

**Arabia:**

**ZNR,** Aden .... .... .... .... 12,110kc, 24.76m
This is a 500-watt station operated by Cable and Wireless Ltd. Heard at 3.45 a.m. (Cushen).

**Canada:**

**CBFY,** Montreal .... .... .... 11,705kc, 25.63m
Heard from noon to 2 p.m. Closes with announcement in French, then slow march and "God Save the King" (Cushen). Heard nightly. R8, Q5 when opening at 9.30 (Nelson, Gaden).

**CJRO,** Winnipeg .... .... .... .... 6150kc, 48.78m
Heard till 3.30 p.m. on occasions (Cushen).

**CBFW,** Quebec .... .... .... .... 6160kc, 48.70m
Heard opening in same programme as **CBFY** at 9.30 p.m. Good at 9.30 p.m. (Cushen).

**Iron:**

**EQC,** Teheran .... .... .... .... 9680kc, 30.98m
Schedule: 11.45 p.m. to 3.30 a.m.

**EQB,** Teheran .... .... .... .... 6155kc, 48.74m
Schedule: 4 a.m. to 6 a.m. (News 4.30 a.m.).
Man and woman announcers. Woman generally gives News).

**Turkey:**

**TAP,** Ankara .... .... .... .... .... 9465kc, 31.70m
Schedule is: Midnight to 6.30 a.m. News at 4.15, and on Sundays English at 5.50. Excellent signals. Splendid dance records N.Y. Times' correspondent at 9 a.m. Good (Collins).

**Location Unknown:**

**"Christian Peace Movement,"** 9440kc, 31.76m
Between 5.45 and 6 a.m. Is anyone hearing this station now?—Ed.

**Location Unknown:**

**EUROPEAN REVOLUTIONARY STATION** 9658kc, 31.06m
Heard from 7 to 7.20 a.m. and from 3 to 3.14 p.m.

### WEST INDIES

**Cuba:**
Havana unless otherwise mentioned

**COK** .... .... .... .... .... .... 11,570kc, 25.93m
Schedule: Noon to 2 p.m. (Gaden). R4 at 1.30 p.m. (Byard). Closes at 2.30 p.m. Sundays; not heard on Mondays (Gaden).

**Martinique:**

**RADIO MARTINIQUE,** Forte-de-France 9705kc, 30.92m
Schedule: 8.30 a.m. to 11.30 a.m.
Excellent on July 6 (Gaden). R7 when closing at 11 a.m. (Cushen).

**COHI** .... .... .... .... .... .... 11,465kc, 26.17m
Heard weakly, morning, afternoon and night. (Nelson). Fair at 2 p.m. (Gandy).

**COCM** .... .... .... .... .... .... 9810kc, 30.58m
Only heard weakly at 9.30 p.m. (Nelson). Note slight change in frequency.—Ed.

**COBC** .... .... .... .... .... .... 9360kc, 32.05m
Very good at 2 p.m. (Gandy). Fair signal at 7 a.m. (Nelson). R5 at 1.45 p.m. (Byard). Very good at 2 p.m. and again at 11 p.m.—Ed.

**(Continued on page 38)**

# LATEST MULLARD MANTEL MODEL

A NOTICEABLE trend in radio during the past few years has been the rapidly-growing popularity among buyers of the compact, mantel type receiver.

The reason for this is not hard to find. At one time practically all components comprising a set were much larger than now, and they needed a correspondingly bulky cabinet. As well, the dictum that for good tonal

**A set review by**
**A. EARL READ, B.Sc.**

quality, a speaker must have the extensive baffling provided only by a large console cabinet was slavishly followed. Actually, this belief vanished years ago, as can be proved by anyone willing to compare reproduction from say a Mullard Model 61 with that of the average five-valve dual-wave console selling at around the same figure.

In all the other qualities that go to make a first-class receiver also, the mantel model will be found to outperform the average console in the same price class, for the simple reason that in the larger set a considerable proportion of the purchase price is tied up in the cabinet.

### First-class Receiver

Thus the fact emerges that those who want a first-class radio, plus an article of furniture perhaps to take the place of a piano, must be prepared to pay more than for a mantel model of similar performance. On the other hand, those who want the maximum in radio performance for their money — and in these days most people are in this class — then a mantel model of reputable make is the only choice.

Mantel models are so popular these days that they form a large part of every manufacturer's range. Actually, several makers, anticipating the trend towards compactness, combined with high-grade performance, have concentrated largely on mantels. with a few console models to fill the needs of those particularly wanting them.

Notable among these is the Mullard Company, which since the release of their famous Model 61 5-valve a.c. dual-wave mantel receiver, have marketed a whole string of further brilliant successes in their "40" and "60" series.

Right from the tiny Mullardette 4-valve broadcast model 42 through the medium-sized models 63, 65 and 66 for a.c., battery and vibrator operation, to the four largest mantels — 61 a.c., 64 a.c./d.c., 67 battery, 67 vibrator — the Mullard people have a range of mantels that is not only the largest in Australia, but also is second to none in either performance or appearance.

Typical of the range is the Model 63 illustrated below, and chosen as the subject of this review.

Briefly, it is a five-valve dual-wave a.c. receiver, housed in a one-piece moulded bakelite cabinet of particularly attractive design. The colour is burr walnut, with Florentine bronze finish metal fret bars.

Band coverage is from 540 to 1600 k.c. on broadcast, and from 13 to 38 metres on the short waves.

The dial is a vertical panel type with horizontal pointer, with Australasian stations zoned in States. On the short waves, the five main bands — 13, 16, 19, 25 and 31 metres — are shown, as well as the stations of the main world capitals.

For the technically-minded, the valve line-up is as follows: Converter, EK2G; i.f. amplifier, 6U7G; second detector, a.v.c. voltage generator and audio driver, 6B6G; output pentode, 6V6G; rectifier, 5Y3G. The speaker is a special six-inch Rola electro-dynamic.

There are four controls, as follows: Left side of cabinet, volume and tone; front, tuning control; right of cabinet, wave-change switch.

### Soundly-Engineered Chassis

After the control knobs, locking screws and fibre dust cover enclosing the rear are removed, the chassis can be withdrawn for examination. The assembly throughout is both neat and rugged, and all components are of the highest quality, ensuring years of trouble-free operation.

### A Remarkable Performer

Put through its paces on the air at various times during a week or so, the 63 proves a brilliant all-round performer, pulling in an impressive list of broadcast and shortwave stations that would not have disgraced a six-valver. This performance test, by the way, was made intentionally severe by using only a few yards of covered wire strung around a picture beading as an aerial, but the 63 came through with flying colours.

Both sensitivity and selectivity are excellent, while tone is particularly

(Continued on next page)

**BRIEF SPECIFICATION**

**Mullard "63"**

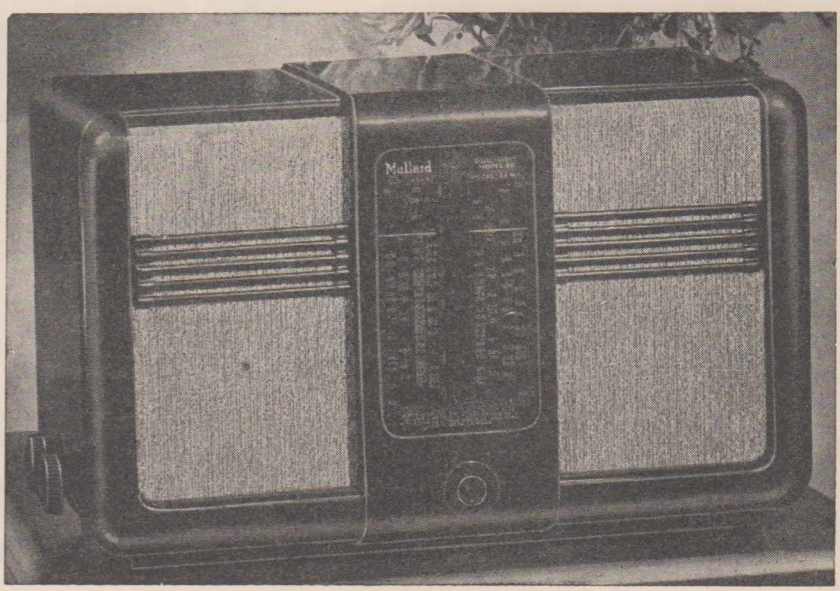
**Type:** Mantel model.

**Bands:** Dual-wave.

**Coverage:** Broadcast — 540 to 1600 k.c.
Short-wave: 13 to 38 metres.

**Valves:** Five in all.

**Supplied by Mullard-Australia Pty. Ltd., 367 Kent Street, Sydney.**



**MULLARD (Continued)**

good, due largely to the special output circuit, which incorporates the latest inverse feedback arrangement to ensure high tonal fidelity.

After a month's exhaustive test of the larger, de luxe Mullard model 61, Alan H. Graham, for years Shortwave Editor of "Radio World" and one of the leading authorities in Australia on shortwave reception, wrote: ". . . I have not the slightest hesitation in recommending the Mullard 61 as an exceptionally fine receiver — thoroughly efficient from the point of view of DX, of handsome appearance, and possessing tonal qualities not often found in table model receivers."

To a large degree these remarks apply equally well to the 63 for, while it is a smaller, lower-priced receiver, at the same time it uses the same number of valves in a circuit giving only slightly less overall sensitivity.

Taken all round, the Mullard 63 is a magnificent little receiver that can be recommended without reserve to everybody wanting the best possible radio value for their money.

# What is "Radio-Location"?

**(Released by the Department of Information)**

THE principle underlying radio-location is that waves or pulses of radiant energy may be reflected on striking a suitable surface just as, in its simplest form, light rays are reflected from a mirror.

Rays of radiant energy travel through space at the same speed (approximately 180,000 miles per second) but the distance between successive waves may vary enormously. The properties of different rays also vary considerably. Some are stopped or absorbed by fogs, clouds or smoke-screens; others pass easily through these so-called "opaque" obstacles.

The application of radio-location devices lies first in the selection of appropriate electro-magnetic waves with the necessary penetrative power to meet the particular conditions; secondly, in the development of instruments to send out a beam of waves in the required direction and with sufficient intensity; and, thirdly, in the design and provision of apparatus to receive rays sent back from any object capable of reflecting them.

The effectiveness of this method of detection is suggested by Sir Philip Joubert, who said: "Radio location eliminates the necessity for continuous patrols of fighters, thus saving petrol, wear and tear on engines and, of course, obviating the immense strain on personnel."

The system keeps continuous watch in dull weather for all objects too far off to be seen or heard or those objects which are close to hand but obscured by mist or fog.

Early in 1939 the Australian Government was invited by the British Government to take an active part in the researches then in progress. At the time there were in Australia a highly competent group of men engaged in radio investigations, which included the study of the ionosphere, that region well above the earth's sur-

face from which radio waves are reflected and which makes possible short-wave broadcasting.

This reflecting medium bends the waves back to earth and, without it, waves would go straight into space.

This work in ionospherics was being carried out by the Radio Research Board run by the Postmaster General's Department, the Navy and the Universities of Melbourne and Sydney, under the aegis of the Council for Scientific and Industrial Research.

A young man from this board was sent to England in 1939 and returned in August of the same year with preliminary details of the plan. A special board was established to direct operations under Professor Sir John Madsen, of Sydney University.

After much laboratory research, a revised plan was completed early in 1940 and the construction of apparatus was put in the hands of the P.M.G.'s Department.

The next part of the task is the development of the operational division. Special training of personnel is essential because radio-location is not a simple matter of pressing the right button at the appropriate time and reading the result. Even a junior operator must have a basic knowledge of physics. The special board has sought the co-operation of the Universities and, a short time ago, a conference of University professors of physics was held in Melbourne.

Some hundreds of young men will be needed who, for the most part, must have a knowledge of physics at least equal to that required for a pass in the subject in the first-year University course. These men will undergo a six months' course of intensive theoretical and practical training, during which they will devote the whole of their time to one line of work.

It is likely that many men will be required, and when Australian demands have been met, men not needed here will be welcomed in other parts of the world.

There is still much work to be done — work of co-ordination that is made still more difficult by the imperative need for secrecy regarding technique, wave lengths, ranges, accuracy or limitations.



# New Microphones Available

IT IS good news to radio servicemen, dealers and enthusiasts to hear that a new line of Australian-made microphones has been placed on the market.

These microphones are specially designed for public address work, dance bands, theatres and suchlike applications in addition to studio work.

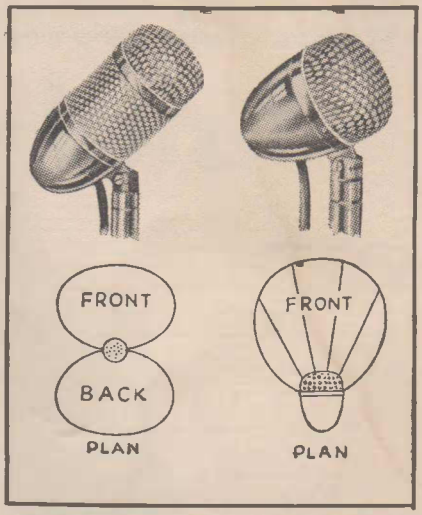
They are of the velocity type, capable of splendid performance in every way, yet selling at most attractive prices, especially when compared with the prices of overseas microphones.

The "Ellipsoid" model is the cheaper, listing at only £5. The frequency range of this job runs from 80 to 8,000 cycles, giving adequate response to allow crisp reproduction of speech and ample to give satisfactory musical reproduction, yet avoiding the feedback difficulties which are sometimes encountered with microphones having a wider range.

Another feature of this microphone, which is of great assistance, is its unidirectional properties. They mean that it is merely a matter of keeping it pointing in the right direction and feedback can be avoided. As will be appreciated by all who have tried public address work, this feature is a highly desirable one.

The other model is the "Torpedo" studio model, which has a full response over the entire audio range, and is claimed to be flat (within 1.5 db.) over the useful range of from 40 to 10,000 cycles. The price is £7/10/-, a most reasonable figure for a microphone with such brilliant performance.

Both models have high output impedance, making them suitable to feed directly into the grid circuit of the pre-amplifier, and the studio type is also available, alternatively, with low impedance output to suit 50, 200 or 500 ohm line transformer primaries.

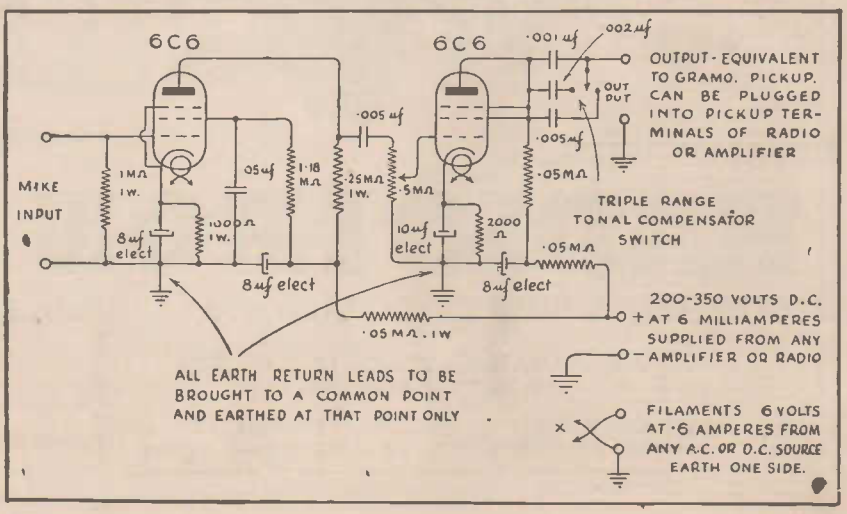



**Left: The "Torpedo." Right: The "Ellipsoid," showing directional characteristics.**

These new microphones are manufactured by a firm which has had infinite practical experience in public address work, including the installation of the sound system which was described in our March issue. This outfit has an undistorted audio power output of 1200 watts, making it one of the most powerful in the world. Our description of this amplifier created great interest in the United States and was reprinted in several technical journals there.

**Distributors for New South Wales are Reg. Rose and Co. Pty. Ltd., of Kembla Building, Margaret Street, Sydney, and anyone desiring further details of these microphones is invited to write, mentioning the type of work for which the unit is required.**

**Below: Circuit of Pre-amplifier for use with the new microphones.**

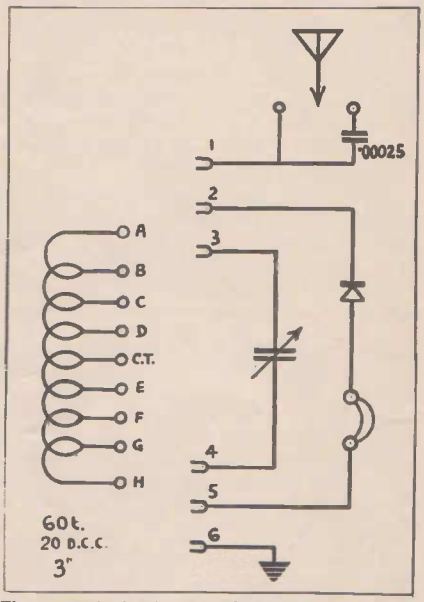


## EXPERIMENTERS' CIRCUITS

(Continued from page 19)

"Referring to diagram:—Coil is wound with No. 20 D.C.C. on a 3 in. diameter former, 6 in. long. Starting at tap A, wind 6 turns to B, 5 turns to C, 4 to D, then 15 turns to C.T. (centre-tap), then 15, 5, 6 and 4 turns to E, F, G, H, respectively. Total, 60 turns.

"Attach by 9 in. lengths of flex, an 'alligator' clip to each of the points Ae1, crystal (2), fixed plates of condenser (3), moving plates (4), 'phones (5) and earth (6). Tie coil to baseboard, 7 in. x 6 in., horizontally with taps upward. Fixed panel, 7 in. x 6




**The crystal circuit to end all crystal circuits. You can hook it up in 200 different ways!**

in. bakelite, carrying crystal, 5 terminals, tuning condenser and fixed condenser .00025.

By adopting the following notation system for recording different hook-ups tried out, the most efficient circuits to suit your aerial and locality can be reproduced at will.

For example with aerial on Ae1 you can try clip 1 on tap B, clip 2 on tap C, clip 3 on tap B, clip 4 on tap G, clip 5 on tap H, clip 6 on tap C.T.

With the aerial on Ae1, you can try clip 1 on tap C, clip 2 on tap B, clip 3 on tap A, clip 4 on tap H, clip 5 on tap G, clip 6 on tap C.T.

With the aerial on Ae2, try clip 1 on tap A, clip 2 on tap B, clip 3 on tap B, clip 4 on tap G, clip 5 on tap G, clip 6 on tap H.

"I believe this to be a new idea in crystal set building.

"More than one clip may be put on one tap above the centre tap, also 4, 5 and 6 may be used together on E, F, G or H."

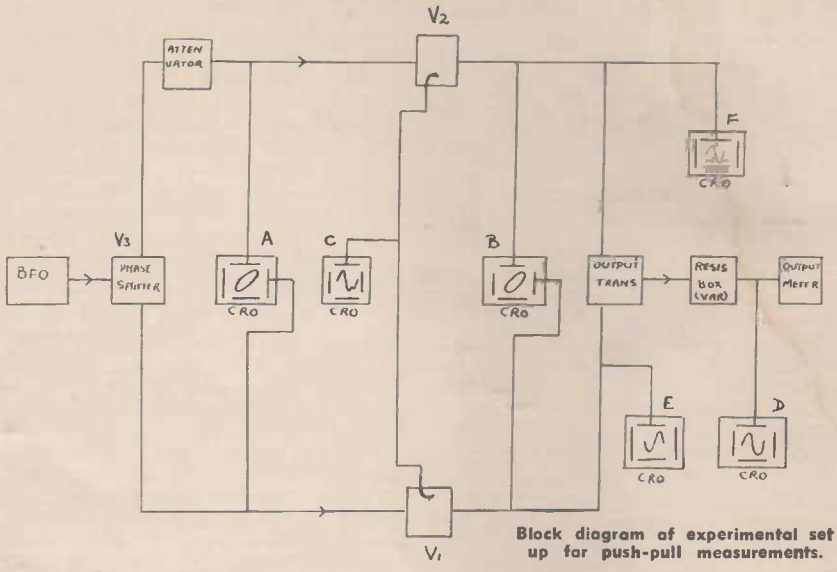
# ANALYSING PUSH-PULL OUTPUT

JUDGING by the amazing demand for the back numbers of February, March, May and June, the articles from the pen of that young radio developmental engineer, C. Parry, have filled a gap in radio journalism.

Going rather deeply into technical matters, they tend to frighten a few of our readers, especially when Parry goes to equations in Greek. Actually there is no need for this fear, for they are essentially practical, as well as technical.

Now to hand is a further article from Parry which, in his own words, ". . . in my own opinion, and disregarding boloney for a while, is one of the most interesting yet to be offered to the technical public. The general conclusions are known quite well by a few top-notchers, like Langsford Smith, but the general run of engineers are quite hazy about it. I know because I have asked them. I have had three requests to prepare this data for a lecture at the Institution of Radio Engineers. so I think you might make a few extra sales over it. Don't forget to express my thanks to the Rola Company for their co-operation and assistance."

The article, which runs to more than eight pages, with twenty-one diagrams, deals with the operation of push-pull valves, showing the effects of unbalance in the signal inputs, of different circuit arrangements and a dozen other fine points in connection with the popular push-pull type of audio system. It gives a complete analysis and explanation of the "mystery" of the "Barnes Mystery Circuit," which aroused such controversy a few years ago.




**Block diagram of experimental set up for push-pull measurements.**

In order to obtain the necessary data for this article, Parry made over one thousand separate experiments, using a complicated set-up, with cathode-ray oscilloscopes to reveal the exact nature of the signal at various stages of its handling by the phase splitter and output valves. On this page we show a diagram to give an idea of the layout of the equipment used.

It will be noted that six oscillographs are shown. As only two were available, one was left permanently in position A to check grid phase shift, and the other used for observation in the other five positions.

The attenuator was carefully arranged so that the ratio of the drive on $V_2$ to that on $V_1$ could be altered in steps from 0 to 1.2 times.

At each step of this control, it is therefore possible to determine —

(a) Phase shift in the grid circuit from true 180° push-pull;

**(Continued on next page)**

# ALL-WAVE ALL-WORLD DX CLUB

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| AW678DX | L. T. Woods | Larras Lake North, Larras Lee, N.S.W. |
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## PUSH-PULL (Continued)

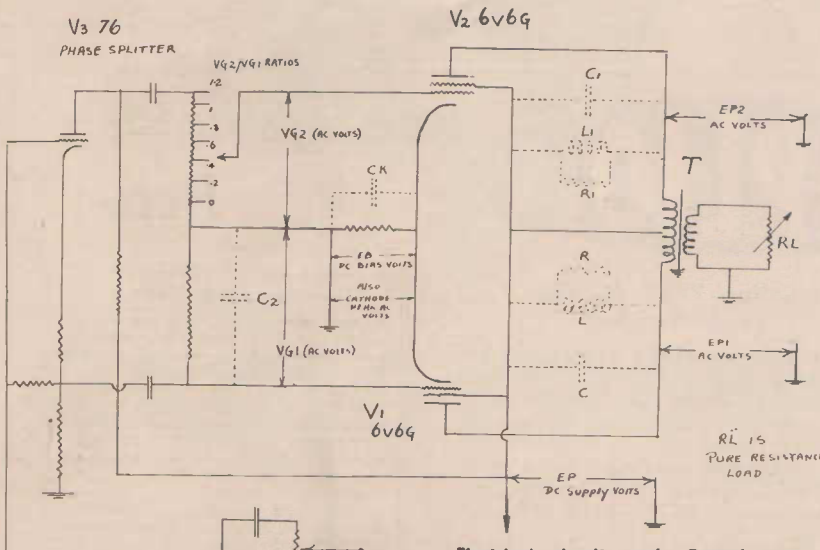
(b) Similar shift in the plate circuit;

(c) Ratio of alternating plate voltages on $V_1$ ($EP_1$) and $V_2$ ($EP_2$);

(d) Power output and overall gain;

(e) A.c. voltage appearing across the cathode circuit.

The actual electrical circuit is shown in Fig. 20, with the equipment disconnected.




**Electrical circuit used. Dotted components show positions used for graphical purposes and are normally out of circuit.**

**Voltages shown are referred to in graphs and text.**

## BIG BEN MOST POPULAR STAR

Big Ben is easily the most popular star in the B.B.C. Empire broadcasts.

At a gathering in London of women doing war-time duties at the B.B.C., Miss Marjorie Anderson, an Empire announcer, said scores of letters received from Empire listeners showed that Big Ben topped the list in popularity.

"They seem to get a tremendous comfort from hearing his chimes," she said. "I think they listen to him and feel that all is well with London. So we put him on the air at every possible juncture."

## SHORTWAVE REVIEW

(Continued from page 23)

**Radio Bucharesti**, 9245kc, 32.45m: Fair at 5 a.m., but fades.

The B.B.C., as far as I know, still give news in Bulgarian from 5 to 5.15 a.m. on 49.59m and 41.49m, and news in Rumanian from 6.30 to 6.45 a.m. on 49.59m, 41.49m and 30.96m. Can any listener help? Please drop me a line.

**WLWO**, Cincinnati, is still quite good at 8.55 a.m. on 25.62m, and **2RO-18**, Rome, puts in a splendid signal at 9.10 a.m. At the same hour **KZRH**, Manila, 31.12m, is very good in news service.

**Radio Belgrade**, as they call themselves, announce they are on 25.31m, 31.56m, 49.13m and 437 m, from 2.10 to 2.20 p.m. Talk in Ukranian, and very anti-Russian.

**Paris Mondial**, on 19.68m, has been heard again closing at 3.30 p.m. (Saigon announced the other night that a new station in Paris, with power sufficient to reach all French territories, was now broadcasting — but no frequency was heard.—Ed.)

Mr. Arthur Cushen, Invercargill, N.Z., says he is hearing **KZRA**, Manila, on 8710kc, 34.17m, at 11.30 p.m. and that a good signal is spoilt by QRM. "That is just what is happening to **KZND**, who gave a most interesting talk the other night regarding air-raids, black-outs, etc. Trust the Japs were tuned in. By the way, I am told **KZND** will shortly move to their assigned frequency of 9515kc, only non-arrival of essential equipment keeping them on 8790kc at present.

Mr. Cushen is another who hears the Vatican City station, **HVJ**, 11,740 kc, 25.55m, between 4 and 5 p.m., giving list of A.I.F. prisoners of war.

He makes us envious when referring to a letter from **TIPG**, 9620kc, 31.19m, in which was enclosed a beautiful verification card. Another verification was from **XYZ**, Rangoon, 6007kc, 49.94m, also **VUB-2**, Bombay, 3360kc, 89.28m.

And here is a station that I have not heard for ages that gets R8 from him at 3.30 p.m. The station is **FO8AA**, Papeete, 7100kc, 42.25m.

# TRADE PARADE

## "WESTEX" CABINETS

Big news of the month in the radio trade is the release of a new style of cabinet from the Western Manufacturing Company.

Known as the "Westex," this cabinet is of wooden construction, with a combination of duco and leatherette finish.

The Western Manufacturing Company pioneered the aeroplane-cloth covered cabinets which have been so popular for portables and mantel models and, as might be expected, their latest release shows the same appreciation of public taste. You can't help liking the new "Westex" cabinet, and we feel sure that it is going to be extremely popular with all types of set manufacturers, from the biggest factories to the most modest amateur experimenter.

An idea of the appearance of the "Westex" cabinet can be obtained from the photographs appearing in the article on the "Trade Builder" on page 5 of this issue.

All types of Western cabinets are available through all radio stores, dealers and wholesalers.

• • •

## INTERESTING HOBBY

Levenson's are known throughout the length and breadth of Australia as mail order experts for radio parts and accessories, but it may not be so well known that they also supply games, toys and hobby equipment.

Levenson's have just released a new supplementary catalogue dealing exclusively with a hobby which is exceedingly popular at the moment, the finishing of rough-cast models.

Levenson's can supply castings for model aeroplanes, ashtrays with models mounted on them, badges, propellers, aero engines and a hundred and one other attractive gadgets.

They can also supply the completed models, finished, polished and chrome plated.

Any of our readers who would like to have a copy of this special catalogue of rough castings, which is completely illustrated and gives full specifications of all the items, can obtain one by writing direct to Levenson's Radio at 226 Pitt Street, Sydney, mentioning "Radio World."

## COUNTER TESTING EQUIPMENT

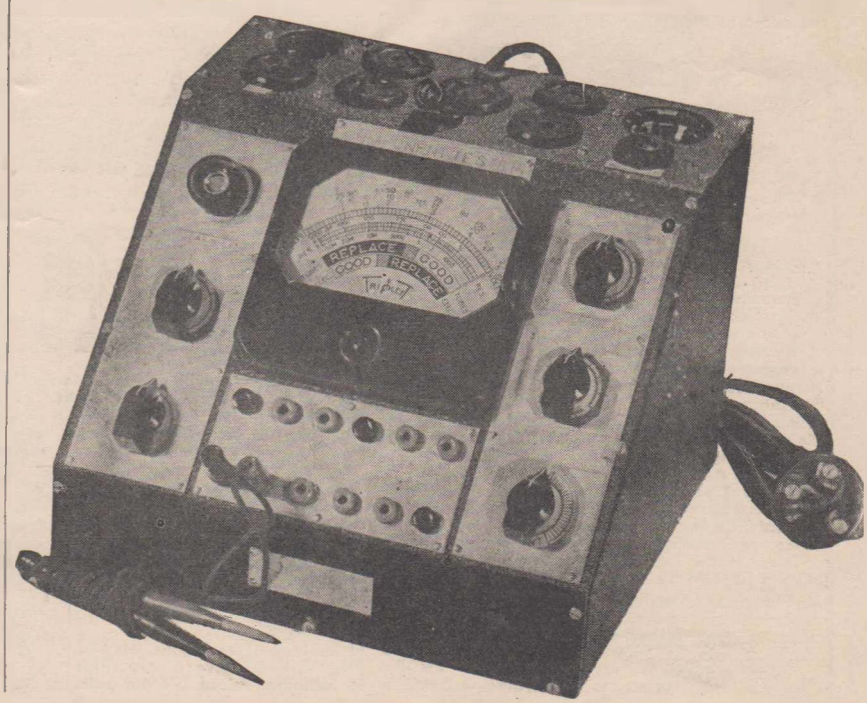
Radio dealers who contemplate the installation of testing equipment on their counters should lose no time in getting full details of the Delta appliances from W. G. Watson's.

Only limited stocks of these instruments are available and, as they are of inestimable value to the wide-awake radio dealer, they are expected to be in heavy demand.

One of the most popular models in the Delta range is the D2000. This instrument provides a quick and accurate means of testing power consumption of radios, refrigerators, fractional horse-power motors and household appliances generally under actual running conditions. An invaluable feature is the "Hours Per Unit Cost" scale, which indicates the number of hours that the appliance under test will operate for the cost of one unit.

Power factor adjustment can be made when testing fractional horsepower motors, fans, etc., or any inductive loads, while another selector switch adjusts the line voltage from 200/250 to correspond with the operating voltage.

Further details are readily available from W. W. Watson and Co. Pty. Ltd., 279 Clarence Street.




LEFT: One of the "Delta" appliance testers.

## 50 YEARS' PROGRESS

REPORTS that the world's most famous clock — London's Big Ben — is "carrying on" with scarred and blackened face after a heavy Nazi raid, recall to mind the fact that this historic timepiece played a major part in the first short-wave broadcast relayed to the four corners of the earth.

March 11, 1927, was the date, and the station was the Philips experimental transmitter, PCJJ (afterwards PCJ). During the progress of the history-making relay, engineers wondered anxiously how the broadcast was "going over," but next day cables told of the reception of the transmission at excellent strength in many parts of the world, and later on thousands of reports were received from short-wave listeners who had followed the relay with receivers that were, in the main, home-built.

A few weeks later another successful short-wave transmission was carried out by PCJJ — a broadcast that enabled Royalty to address its subjects throughout the world. On this occasion the Queen of the Netherlands spoke before the microphone of PCJJ, and this broadcast also was received with excellent strength and clarity.

### Philips' Jubilee

To-day, because of the Nazi occupation of the Netherlands, the "pioneer

(Continued on page 38)

# LEVENSON'S WIRELESS

Wholesale, Retail. Wholesale, Retail.

Games, Hobbies, Novelties, and Slot Machine Specialists.

226c PITT STREET, SYDNEY

Everything from A to Z in Radio at Sane Profit Prices.
'Phones: M 2525 and M 2526-7. Goods forwarded C.O.D. Post or Rail.
(C.O.D. Mail within N.S.W. only. Not Interstate). We welcome
Prepaid Telegrams and Long-Distance 'Phone Calls.

**VALVES AT SANE PROFIT PRICES. ALL GUARANTEED.**

New 227 Valves, 5/9; used, 3/6. New 4XP, 5/-; S215, 5/-; MH4, 2/6. 38, 78, used 5/6. Raytheon B.H. Rectifier, new, 15/-; DU10, 5/-; 2A6, 35, used, 5/6. Used 224, 5/6. 610RC, 610XP, new, 6/6. Used 42, 5/6. New 41MRC, ML4, 3/-. 44SU Rectifier, 5/-. PM22, new, 7/6. Used 1C6, 6A7, 6A8, 6B7, 6U7, 6F6, 6F7, 6L7, 6/6. Used 57, 58, 59, 6/6; 201A, 3/6; A409, 6/6; A615, E406; E452, 6/6. Used PM6, PM5B, A609, 6/6. Used 6J7, 6J8, AL2, EK2, 2B7, 226, 5/6. New PM12, PM2A, 18/-. Let's know your valve wants.

Cone Speaker Units. Leading makes. Were up to 35/-. Now 7/6 and 10/6.

**VALVES. MADE IN U.S.A.**

| Type | Price | Type | Price |
|---|---|---|---|
| 57 | 11/- | 85 | 12/9 |
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| 38 | 12/9 | 6C6 | 11/3 |
| 32 | 11/9 | 6A7 | 12/- |
| 2A5 | 10/6 | 1D8-Gt | 27/- |
| 2B7 | 14/3 | 42 | 11/- |
| 27 | 12/- | 2A7 | 13/6 |
| 6E5 | 9/- | 71A | 11/9 |
| 19 | 13/6 | 47 | 13/- |
| 5K3 | 8/9 | 75 | 11/3 |
| 6J7 | 11/3 | 1A7G | 15/- |
| 2B7 | 10/- | 30 | 11/- |
| 6H6 | 16/- | 80 | 9/6 |

**SPECIAL! SPECIAL!**

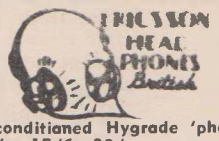
**Cosmocord Crystal Pickup**
**British manufacture**
List Price
84/-
**Now 49/6**

Special price to traders, lots of 6 or more.

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

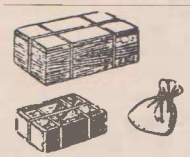
**AMPLION British built Gramo-Radio Pick-up with volume control. Moulded bakelite tone arm. List Price 37/6 Now 32/6. Dealers write for wholesale price.**

**Five-cell Focussing Torches, 8/6.**




**Reconditioned Hygrade 'phones, 15/-, 17/6, 20/-. Headphones—13/6, 15/-, 17/6, 21/-. Ericsson's Professional 4,000-ohm 'phones, 47/6.**

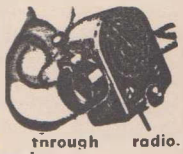
**Radio and other Publications Learn Morse, 1/-. Radio Dictionary, 1/-. Beginners' Radio Book, 1/-. Everyman's Radio Book, 5/6. The Television and Short-wave Handbook, 5/6.**



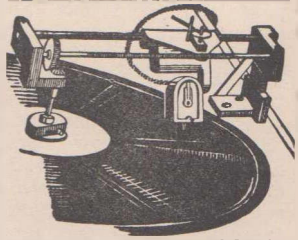
**"PRESTO" THE MAGIC BOX**
**The most Amazing Trick — Just out**

**"Presto"— the grandest, most alluring and outstanding little trick ever introduced. 2/9, post free. Special quantity price.**

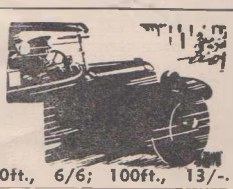
**RAZOR BLADE SHARPENER**
**Highly recommended "Re-juv" Razor Blade Sharpeners 7/6. NOW 2/6. New type, complete with Strop and Paste, 3/-.**



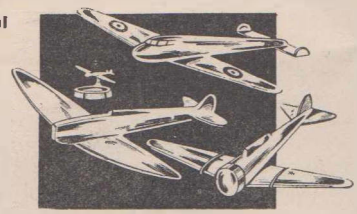
**Pick-up Heads. Fit and suit all tone arms and gramophones. For operating gramophone through radio. 15/-, 19/6 each.**



**LIKE-A-FLASH Overhead Cutting Head and Cutting Gear £5/5/-. MAKE YOUR OWN RECORDINGS. Cutting head and overhead cutting unit complete, £5/5/-. Plain Records, 2/11, 3/11, 4/11, 5/11. Cutting Needles, 2/-. Aluminium discs, 1/-, 1/6.**



**Police Patrol Multi-Strand Rubber-covered Aerial. Needs no separate lead - in. 50ft., 3/3; 100ft., 6/6.**
**Man - o'- war Heavy Duty Insulated Aerial, multi-strand wires, 50ft., 6/6; 100ft., 13/-.**



**Rough Gunmetal Castings of Model Planes**

●

**Write for Full List**

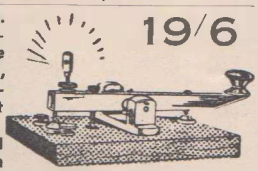
**SPECIALS**

**Rough-cast Propellor, with space for clock mounting in hub; length, 11," and stand 3/6**
**Rough-cast Ashtray, with mounting standard; diameter 4" ..... 3/6**
**Rough-cast tear-drop shaped Ashtray, with mounting standard; length, 6" ..... 3/6**
**Rough-cast Circular Concave Ashtray, with mounting standard, diameter 4¾" 3/6**
**Rough-cast Model Planes. Need little filing and finishing.**
**Comet, 3/-; Spitfire, 2/6; Hurricane, 3/-; large Fairey Battle, 4/-; Hudson, 2/6; large, 6/9; large Flying Boat, 15/-; Skua, 3/9; Wirraway, 2/6, 3/-; Anson, 2/6; Curtis, 2/9; Douglas, 3/-.**
**Chromed Ribbed Spun Metal Ashtry with standard (curved or straight) for mounting Plane Model; diameter, 6"; height, 1¾" 6/-**
**Chromed Hurrican, Lockheed, Spitfire or Wirraway Plane Model mounted on tear-drop shaped Ashtray ..... 22/6**

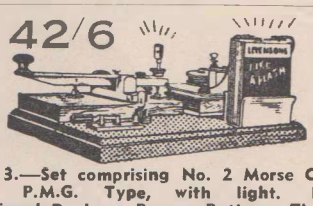
**PLEASE ADD SUFFICIENT POSTAGE**

**SET TESTING LEADS WITH SILK FLEX and METAL TIP ENDS. 3/9 value. NOW 2/6**

**No. 1. — Adjustable Morse Code Key, with long or short tapper arms, splendidly made and finished. Strong reliable heavy plated fittings mounted on bakelite moulded base, 12/6. P.M.G. Type Sounders 35/-.**

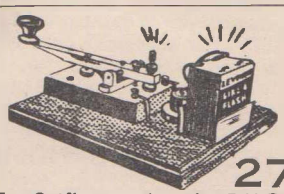



**No. 2.—P.M.G. Type adjustable Morse Code Key, strong and reliable; will last a lifetime Heavy plated fittings on thick solid wooden base. Perfect action.**

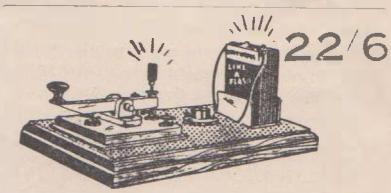



**No. 3.—Set comprising No. 2 Morse Code Key P.M.G. Type, with light. Professional De Luxe Buzzer Battery. Throw-over Switch for buzzer or light. Use as required. Mounted on baseboard. Complete.**

**Listen in comfort. Rubber HEADPHONE PADS give a new thrill to listening. Priced 2/6 per pair.**




**No. 5.—Outfit comprises the P.M.G. No. 2 Morse Code Key, with adjustable buzzer and battery all mounted on a stained baseboard, ready for immediate operation. Battery included.**




**No. 6.—A real good little outfit which incorporates the No. 1 adjustable Morse Code Key, in moulded bakelite base, with a smart little adjustable buzzer all complete to operate. Junior model, 13/6.**

**No. 102 — "Like-a-Flash" adjustable Buzzer. 4/6. Bakelite Case High Pitched.**

**New h.p. Buzzer, 3/9.**

**At left: PYREX TYPE INSULATORS. 3" barrel type, 1/-. Pyrex, 4," 3/6; 5½," 6/6; 7½," 30/-.**

**Ormond Slow Motion Front Panel 2-action Vernier Dial, 8/6.**

**Model Electric MOTORS. Work off small wet or dry batteries. 5/9, 10/6, 12/6.**

# SPEEDY QUERY SERVICE

**Conducted under the personal supervision of A. G. HULL**

**C.T. (Coogee) brings up the old argument about the coils for home-made receivers not being as efficient as the coils used in commercial receivers.**

A.—The coils specified for our sets are exactly the same coils as used in many commercial receivers and there is positively not the slightest trace of reason in the argument. The coils used by us in our original receivers are coils actually taken from the production lines where coils are being made in thousands, portion of them going into factory-built sets and the balance being made available on the open market for the convenience of home builders.

If there is any reason for superior performance it must be on account of the factory-built sets being properly stabilised and aligned. This job, however, is not beyond the capacity of any intelligent amateur set-builder who cares to put in the necessary time and effort to do the job thoroughly.

* * *

**T.T. (Marrickville) is going to build a new all-wave receiver and wants to know if it would be worthwhile to hunt up a 6L7 and use a separate oscillator valve.**

A.—We do not think that it would be a good plan to use the 6L7, even if you had it on hand. When that particular type of valve was introduced a great deal was expected of it, and the article which you mention was typical of the enthusiasm with which it was greeted. In practice, however, the valves proved irregular and unreliable and did not reach any heights of popularity. We feel sure that you would be far better advised to use one of the later types of combined converter valves, such as the 6J8G or the 6K8G. If you really find it necessary or desirable you could experiment with the application of regeneration to a converter of this type, but we doubt if you will be able to handle the normal gain without a tendency towards instability. Keeping the noise level down is vitally important for effective short-wave reception, and complete stability is more likely to give you a good signal to noise ratio.

* * *

**M.M.B. (Maryborough, Q.) has a high-quality amplifier but is troubled by interference in the form of mechanical rattle from the pick-up.**

A.—This difficulty is often encountered and we can only suggest mechanical means for dealing with it, such as enclosing the turntable and pick-up in o lidded box, with felt lining on the inside to dampen the noise if found necessary. Naturally, the trouble is more pronounced with worn records and with those which are heavily cut in the first place, but we doubt if either the weight of the pressure or the type of needle used is likely to have any big effect on the level of the noise. For a box type of baffle there is no problem if you have plenty of room. Any completely enclosed box having a capacity of nine cubic feet or over will serve as an effective baffle for any speaker up to a 12" auditorium model. The box should be quite air-tight and lined with absorbent material, if only old shirts.

## ULTIMATE CATALOGUE RELEASED

George Brown and Co., distributors of "Ultimate" receivers, have just released a new catalogue of the latest band-spread models.

There are five main models in the "Ultimate" band-spread range, three with 7 valves, and two with 9 valves. These models are fully detailed in the new "Ultimate" catalogue, which is full of interest for those who want to know something about receivers which give superlative performance on short-waves, as well as the best in broadcast reception.

The new catalogue of the "Ultimates" is available free and post free from George Brown and Co. Ltd., 267 Clarence Street, Sydney.

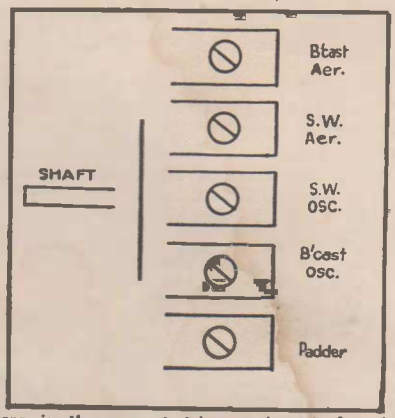
**R.G.G. (Manly) raises the point about the necessary adjustment of simple sets.**

A.—We don't recall using exactly those words, but it is quite possible that we mentioned somewhere or other that we would rather build a five-valve dual-waver and get it into operation than mess around trying to get maximum efficiency from a simple single-valver. With a dual-waver using factory-wound coils there should be nothing except straightforward work and adjustment, but in the case of a single-valver it is quite common to find that each set required individual attention, even if commercial coils are used.

* * *

**T.H.Y. (Rockhampton) has a receiver with a 57 type converter and it operates only over the lower end of the dial.**

A.—This complaint is only too common with the old autodyne type of superhets which used the 57 as first detector. In many cases the trouble is due to humidity affecting the windings of the oscillator coil, in which case the set may be made to work by drying it out by leaving it in front of a fire for an hour or two. Don't get it hot enough to melt the wax in the condensers, of course. Sometimes the trouble is due to old-age creeping on the valve itself and we struck one or two cases where two 57 type valves were used in the one set, one as converter and the other as detector. Changing over the valves would put the set back into commission for some months until the two valves were both inoperative as autodyne valves, although testing fairly O.K. on a valve tester. The sure cure and the most satisfactory in the long run is to rebuild the set to take a 6J8G converter valve, with a new coil kit.




**Here is the correct trimmer layout for the Crown coil bracket. The diagram on page 11 of this issue is for the R.C.S. and Radiokes brackets and not for the Crown, as incorrectly stated on that page.**

* * *

**L.G.S. (Albury) draws attention to the fact that we often omit to give a picture diagram or full details of the wiring above the base, although we cover the underside wiring in full.**

A.—Yes, there may be something in what you say on this subject. We may be a bit careless about the above-panel wiring, mainly because it is practically the same with every receiver, whereas the under-panel wiring varies with each. We usually show a couple of arrows indicating where the grid leads run through to the gang, and where the lead from the volume control runs through to the cap of the detector. Apart from earthing the gang effectively and connecting up these leads, there is little to be done. The first intermediate transformer is supplied with a wire running out the top of the can and you don't need to be a Sherlock Holmes to deduce that this lead runs to the cap of the intermediate amplifier. The photographs are a help, too, and as they show the actual wiring of the original receiver they can be considered as a trustworthy guide.

# Free Charts Available

The present valve situation makes it highly desirable for every service engineer, radio mechanic and experimenter to have a replacement chart on hand. One of these charts will show exactly what steps should be taken to deal with a receiver needing valve replacement with a type of valve at present not available.

In practically every case where such a problem arises it is merely a matter of knowing what alterations are necessary, and in a few moments the work can be carried out so that the receiver will operate with a standard type of local valve which can be obtained without difficulty.

And it is easy enough to know what to do if you have one of the new Radiotron replacement charts, which are available free to all our readers.

It is handy to have a characteristic chart to consult in conjunction with the replacement chart, and so the Amalgamated Wireless Valve Company has the two booklets made up in pairs, ready for immediate despatch to any of our readers who write them direct, enclosing 3d. to cover postage and packing.

**Address your letters to the Amalgamated Wireless Valve Company Pty. Ltd., at 47 York Street, Sydney, and mention "Radio World."**

## QUERIES (Continued)

**B.R.A. (Hornsby) asks whether it is possible to get as good quality from a single output valve as from a pair of push-pull valves.**

A.—This is an old conundrum, and has been the cause of about as many fights as "That man's father is my father's son." As regards frequency response you can have as wide a response as you care to cover in your fundamental design, and



the difference is more likely to be in regard to harmonic distortian. The push-pull job should have most of the second harmanic distortion cancelled out, but some say that the third harmonic is the one which is most distressing. In a nutshell, you can make up an excellent single-ended amplifier, especially if you use correctly arranged inverse feedback. A paint to watch is the output transformer, which should be of ample dimensions if it is to carry the heavy plate current of the output valve.

* * *

**O.A. (Waverley), enquires about the laboratory service which we offered a few months ago.**

A.—We haven't actually discontinued the service, but we don't mention it more than we can help, as we are short of staff and cannot handle the work offered. Being short of man-power at the moment, we are unable to undertake rush jobs in particular, and everybody seems to be in a hurry. If you can leave your set with us for at least a week we should be able to squeeze out the time necessary to look to it for you. Sorry, but we can't help you in regard to the replacement valve. The type you require is particularly difficult to obtain.

## LOGGINGS (Continued)

**COCH** .... .... .... .... .... .... 9435kc, 31.82m R7-8 at 4 p.m. Morse interference (Nelson). Fair at 1 p.m. (Gandy).

**COCX** .... .... .... .... .... .... 9200kc, 32.61m Very good late at night. Fair in morning —Ed.

**COKG,** Santiago .... .... .... .... 8920kc, 33.50m Weak and only seldom heard at night.—Ed.

**COCQ** .... .... .... .... .... .... 8850kc, 33.9m Best Cuban from as early as 8.30 p.m. Religious service now heard at 10 p.m. (Nelson). R7 at 9.45 p.m. (3yard).

**COCO** .... .... .... .... .... .... 8700kc, 34.48m R8 at 10 p.m. some nights (Nelson). Often heard from 8 p.m.—Ed.

**COHI,** Santa Clara .... .... 6455kc, 46.48m Opens at 8.30 and is heard till midnight.—Ed.

**COCQ** .... .... .... .... .... .... 6375kc, 47.06m Same programme as 33.98m at midnight, but also heard from 2 to 3.15 p.m.—Ed.

## INSTABILITY

**(Continued from page 17)**

### Shielded Wires

Sometimes an effective remedy for instability is to shield the various plate and grid leads by means of copper braiding.

Frankly, we don't like the idea, and we have seen more cases where it has been the cause of difficulty rather than an assistance. The distributed capacity of such shielding will often upset the normal tuning of the associated tuned circuit. Shielding of the leads from the volume control, however, is to be recommended, as the stray capacity in this case will act only as a beneficial by-pass for r.f. which may have found its way into this audio circuit.

### Cutting Down Gain

If all the foregoing precautions have been taken and the set is still unstable, we can only suggest that too much gain is being attempted and the only sure solution to the problem is to reduce the gain. This can be done in several ways, such as using higher value bias resistors for the valves, say, 1,000 ohms, instead of 250 for the r.f., converter or intermediate valves.

Another way to cut down gain is to use a lowered screen voltage. If obtained by means of series resistors, higher value resistors can be used, or if a voltage divider is used the screen clip can be set down lower on the divider.

Another method of cutting down gain is to use lower gain intermediate transformers, and in this regard it is well to remember that the usual No. 2 intermediate has much greater gain than the No. 1, so, for stabilty use two No. 1 intermediates.

## 50 YEARS' PROGRESS

**(Continued from page 35)**

station" no longer broadcasts the cheery voices of Bob Wybrands and Eddie Startz — familiar to hundreds of thousands of listeners throughout the globe. But the organisation that built and maintained this famous station, although having temporarily lost its Holland factories, is carrying on the manufacture of its goods in Great Britain, U.S.A., South America, South Africa, India, Australia, New Zealand, the Dutch East Indies, and other countries free from the Nazi yolk.

And this year the Philips organisation is commemorating its Golden Jubilee! Yes, it was away back in 1891 that Frederik Philips and his son Gerard purchased a very small factory in Eindhoven, Holland, for the manufacture of carbon filament lamps. In 1895 Dr. Anton Philips became associated with the venture, at a time when the factory employed 30 hands and produced about 500 lamps per day. Insignificant figures, these, in comparison with the enormous quantity of lamps now marketed by the company each year, and the 48,000 employees on the payroll up till the outbreak of war. At the present time Philips employ some 25,000 hands, all but 5,000 of whom are in the British Empire.

### Helping War Effort

To-day Philips lamps, valves, radio receivers, amplifiers and transmitting apparatus are made in five Australian factories, modern in every respect and staffed by skilled Australian operatives. This fact affords proof of the firm's policy of carrying on, and furthering the cause of Australia's national self-sufficiency to the limit of its possibilities.

So many enlistments have taken place to date among Philips employees that a special fortnightly "Staff News" is published and mailed overseas in order to keep absentees in touch with the firm.

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"You will be pleased to know that I have just got a new job with the Agency here, in charge of the Service Department. Thanking you for the great help you have given me, wishing the A.R.C. the success it deserves.—W.A.S., Devonport, Tas.

"I would like to add that I owe my present position in the field of Radio entirely to the Australian Radio College, and to the great help and co-operation of the instructors that it was my pleasure to work with.—C.C., Vaucluse, N.S.W.

"It may interest you to know that I have been passed into the R.A.A.F. Reserve. While I had some experience in electricity, I should like to acknowledge the great assistance I have received from the course.—J.P., Cooma, N.S.W.

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