THE AUSTRALASIAN

Radio World

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

VOL. 7 . . . . . NO. 3 AUGUST 15 1942

- **Constructional details of mantel model available in kit form.**
- **Multi-test equipment for service uses only one milliammeter.**
- **New signal tracer design by Bristoe for battery operation.**
- **Big list of new stations logged in the short-wave bands.**

Price 1/-

CROWN RADIO PRODUCTS PTY. LTD.

51-53 MURRAY STREET, PYRMONT, SYDNEY

KEEP 'EM LISTENING

It's of vital importance to the war effort to "keep 'em listening." Morale must be sustained AT ANY COST, and it is realised that radio ranks highest place in keeping up morale.

MAKE THAT YOUR MOTTO FOR THE DURATION

New sets are not in such demand these days, for people are content to keep their old sets in efficient working order until happier days. Yes, you're a mighty important man-about-town these days, for it's up to you to keep those old sets going—"keep 'em listening."

Better replace with Crown, "the reliable line," you'll then be sure that you're living up to your responsibilities. We at Crown Radio are doing our best to keep a constant supply on our distributors' shelves, irrespective of all the wartime obstacles that confront us. We'll help you all we can to—

"KEEP 'EM LISTENING"

Crown Permatune I.F. Transformer, Frequency 455 K.C. Price, 13/9

Crown Compression trimmed I.F., Frequency 455 K.C. Price, 7/9

Crown B.C. Coil Air-core. Price, 6/6

Crown Dual Wave Unit, frequency range 1600—550 K.C. and 13—42 Metres. Price, 29/6

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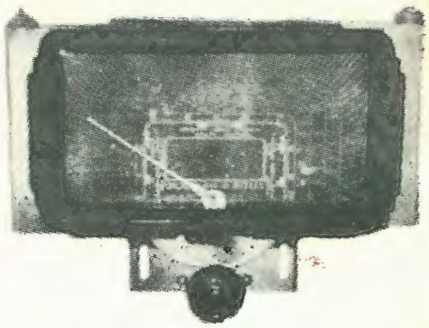

Crown Edglit Dial, friction driven. Price, 24/-

THE AUSTRALASIAN RADIO WORLD

Devoted entirely to Technical Radio

and incorporating

ALL-WAVE ALL-WORLD DX NEWS

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★ Publisher —

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Laboratory Service, 2/6 per set

Vol 7 AUGUST, 1942 No. 3

CONTENTS

EDITORIAL

There are several clauses in the new Broadcasting Act which vitally affect the radio serviceman and dealer. It seems that quite a number of our readers are not yet acquainted with them, but ignorance of the law is not likely to hold good if any trouble ensues.

Probably the most important regulation is the one which states that any person who sells a radio set must notify the Radio Inspector of the sale.

Anyone who deals in radio, whether conducting a shop or not, should make immediate application to the Senior Radio Inspector, at the G.P.O., for registration as a dealer. No fee is required. Another point to be watched is in connection with the multiple licences required when more than one set is operated in any house. If there are two sets, the second requires an extra fee of 10/-. If there are three sets in the house capable of receiving programmes, then the licence fee for the three will be £2.

Those who repair and service sets are entitled to special consideration and require only the one licence.

The position of the extension speaker is interesting, being allowed without extra fee in the case of a private house, but fees must be paid for each and every extension in the case of a hotel or lodging house.

In a boarding house, any lodgers who operate receivers must have their own licences.

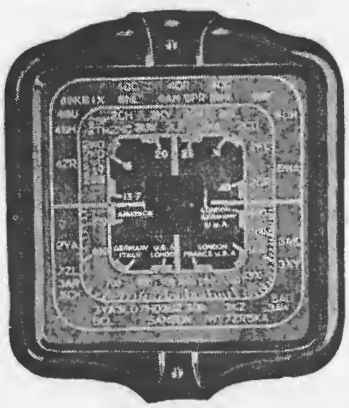
In all cases of doubt about the new regulations it is safer to be sure than sorry. We suggest you make enquiries at the local post office, and if you cannot get a definite ruling be sure to contact the Radio Inspector.

FOR THE BROADCAST VERSION OF THE . . .

"Little Companion"

R.C.S TROLITUL COILS AND COMPONENTS

● For the "Little Companion" —and for all set constructional work—don't forget that R.C.S. Coils and Components are still the best the trade has to offer you. Made by the Coil People, leaders in every worth-while Coil development (including the use of TROLITUL insulating material) they are unbeatable for utmost reliability, dependability and value.



R.C.S. DIALS

Types DA1 and DA2 are single glass dual-wave, the type DA2 having been designed especially for use with the Five-Band Communications Coil Kit and "H" type condenser. Type DA1 is a standard dual-wave dial for use with R.C.S. coils and "F" type condenser. The DA-5 dial is for use on the 1600 to 550 k.c. and 13.7 to 40 metre bands, with "H" type condenser. All this series is edge-lit and wedge-driven. Aperture for the escutcheon is approximately 7" x 4-7/8."

DA1—Standard D/W Dial, "F" condenser	22/6
DA2—Communications Dial	22/6
DA-5—13.7 to 40 metres D/W 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. PERM. 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.

When three I.F.'s are used:

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

465 K.C. I.F.'s

IF166 1st 7/6
IF167 2nd .. 7/6

Air Core 175 K.C.

1E68 1st 7/6
1E69 2nd 7/6

IF162

465 K.C. I.F.'s

When two I.F.'s are used:

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

R.C.S. for dependability reliability and economy

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	Osc.	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	6/6

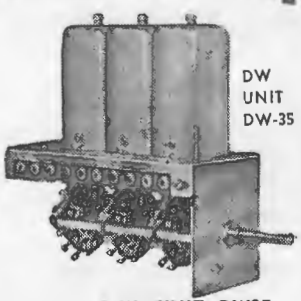
Code DW36

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

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



DW UNIT DW-35

R.C.S. D.W. UNIT DW35

Type DW35, as illustrated, consists of Aerial, R.F. and Oscillator Coils, Wave Change Switch, the necessary B/C and S/W Trimmers and Padder mounted on a rigid steel base, wired up ready to assemble in a set utilising 465 k.c. and R.F. stage. The bands are S/W 13.7 to 40 metres, and B/C 1600 to 550 k.c.

Code DW35. Price £3/7/6

You can buy R.C.S. Products only through these distributors:—

SYDNEY: Bloch & Gerber — Martin de Launay — Fox & MacGillycuddy — Lawrence & Hanson Electrical — John Martin — Radio Equipment — Radio House — United Radio Distributors — Homecrafts Ltd.

ADELAIDE: Gerard & Goodman — A. G. Healing —Newton, McLaren Ltd.

BRISBANE: Chandler's — Trackson's — Homecrafts.

TASMANIA: W. & G. Genders, Launceston — W. & G. Genders, Hobart — W. & G. Genders, Burnie.

MELBOURNE: A. J. Veails — Homecrafts — Hartley's.

WEST AUSTRALIA: Carlyle & Co., Perth.

R.C.S. RADIO Pty. Ltd.

SYDNEY, N.S.W.

A New Version of "LITTLE COMPANION"

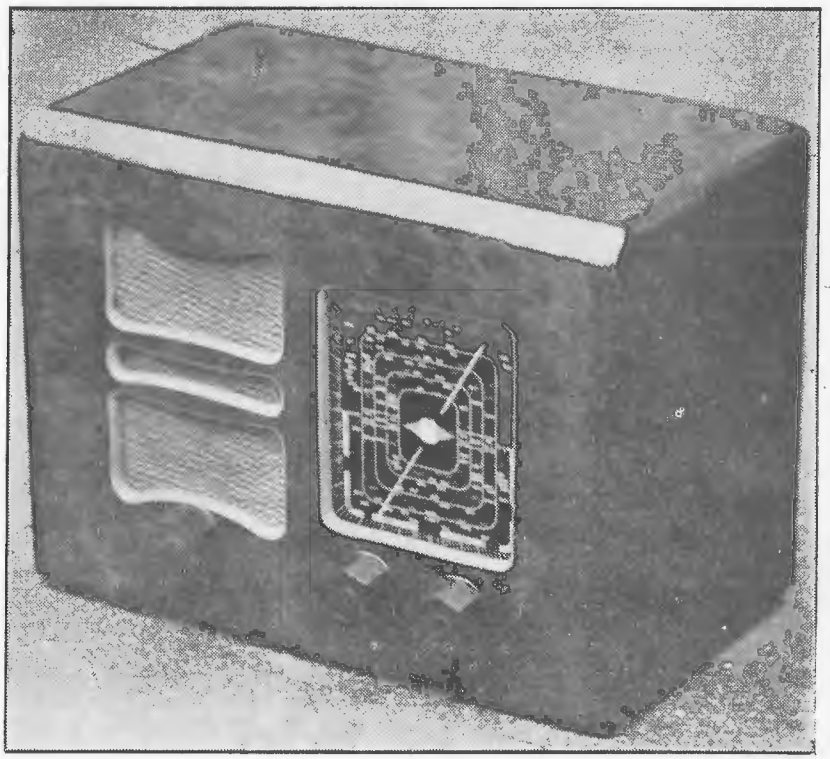
AS most of our readers know only too well, there is a certain amount of difficulty in obtaining radio parts for set construction. Gone are the "good old days" when you could write to every dealer for a kit of parts to build a set and expect them to come along by return mail. Now there seem to be only a few shops in a position to supply a full kit.

One of the first firms to appreciate

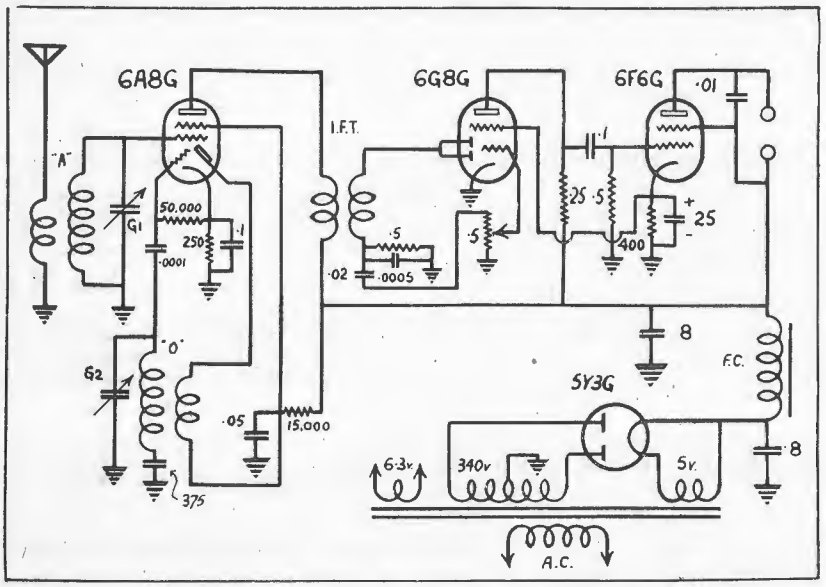
Designed by
CHARLES H. MUTTON
of J. H. Magrath Pty. Ltd.
Melbourne

the full significance of the new order of things in the radio trade was that wide-awake Melbourne warehouse of J. H. Magrath Pty. Ltd., of 208 Little Lonsdale Street.

Mr. Magrath knows the radio game backwards and foresaw the difficulties that were to come. As a result of his foresight, we were able to co-operate with him, in our March issue, to describe a neat and efficient little dual-waver which could be bought as a complete kit, right down to the last screw and packed into a cardboard box as a complete unit.



A photograph of the finished set in the cabinet provided in the kit.



The circuit diagram, which shows the unique screen feed scheme for the detector.

That the effort was appreciated by our readers was quickly in evidence, as orders poured in from all over the Commonwealth. Hundreds of kits have been supplied, but now it looks as though there may be some difficulty in getting sufficient components to keep the kit going. However, Mr. Mutton, who does the technical research for Mr. Magrath, has got to work on the problem and produced a new version of "Little Companion." This time it has been found necessary to make the model for broadcast tuning only, not a dual-waver.

Otherwise, however, the new model

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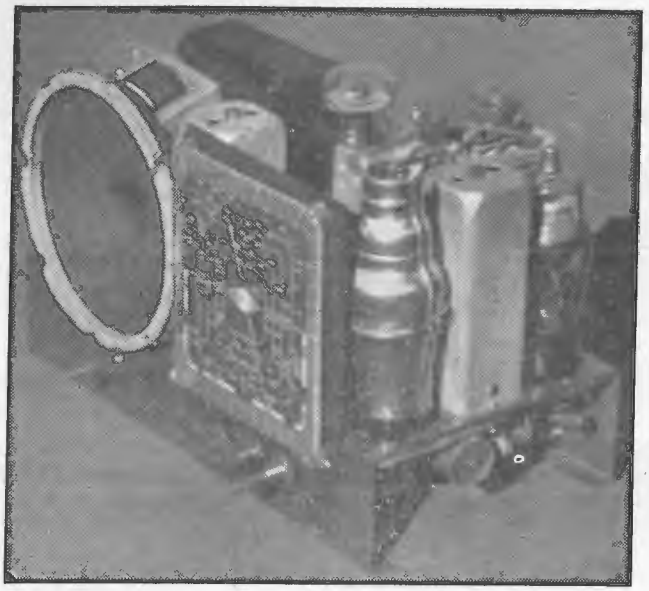
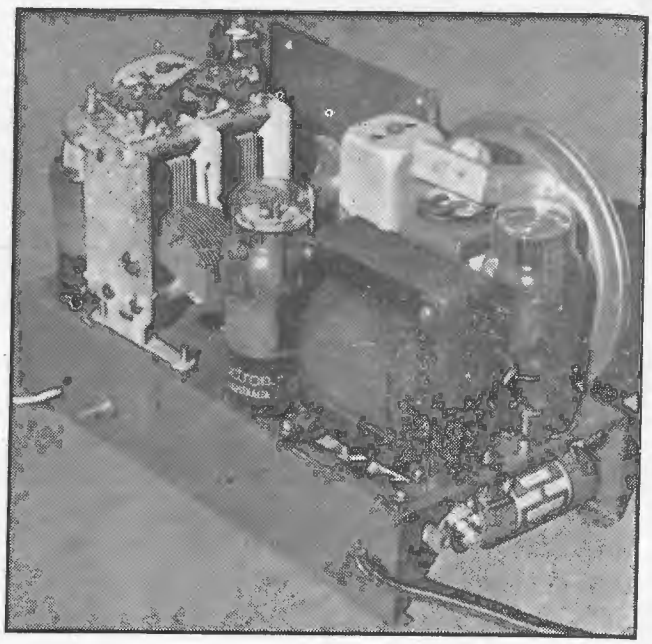




"LITTLE COMPANION" (Continued)

is capable of the same splendid performance as the original "Little Companion," in fact, slightly better as regards power output and tonal quality. Alignment is also simplified, as only one intermediate transformer is needed.

Hundreds of the new kits have been prepared and are ready for immediate delivery. The work of assembling the kit and getting the set into perfect operating condition is only a matter of a few hours pleasant work and then results are quite up to the standard of the best commercial receivers of similar type.

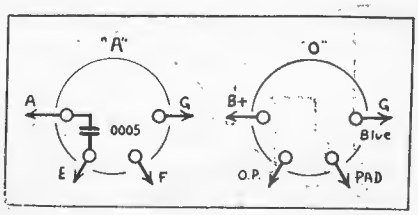
The Circuit

The circuit used is somewhat similar to the "Local Tone Four" which we described as a full-size console model in our issue for February of last year. All the best features of that circuit design have been retained, but it has been adapted to make it suitable for a mantel model.

As mentioned before, the actual circuit design of the new version of the "Little Companion" is the work of Mr. Charles H. Mutton, who also designed the original dual-wave version.

In the designer's own words:

"I am enclosing a circuit which has in its favour an almost certain guarantee of continuity of supplies, if one can be certain of anything to-day. In addition to this I have designed the job to use an absolute minimum of parts, with a view to economy consistent with good results. I have used diode biasing, as my experience with this scheme is that the tonal quality is quite good, disregarding the usual overloading on strong locals, which is more or less counteracted by



Coil connections for the "Aegis" coils as supplied in the kit by Magrath's

Why No Technical Radio In Programmes?

IS it not odd that the science of radio, and the radio industry which supplies the entire listening audience with the means of receiving the programmes, should never be mentioned in these programmes from one years' end to the next? (asks the "Wireless and Electrical Trade"). Yet a short regular "Radio Corner" programme (or call it what you will) would almost certainly be of general interest, without there ever being any question of giving direct publicity to individual commercial interests.

The days of the old-time radio "enthusiast" may have passed, but you have only to listen to the conversation of ordinary people to realise how large a part radio programmes play in their lives.

Why not tell them more about their sets, the people who make and maintain them, the widespread uses of radio, and so on?

It is done in America, and has been a regular feature for a long time past. The programme is called "Radio Magic" and is conducted by Dr. O. H. Caldwell.

Recent programme features have included 'Radio's Expanding Role" (a report of the American IRE convention), "Radio Static, its Cause and Cure," "Radio Tube Devices in Army Camps," "Music Speeds the National Effort," and "Little-known Radio Inventors." During each programme Dr. Caldwell tells listeners how to get the best from their sets and how to take care of them with the help of local radio engineers. In short, "Radio Magic" keeps listeners informed about radio and helps to give them an intelligent interest in their own sets.

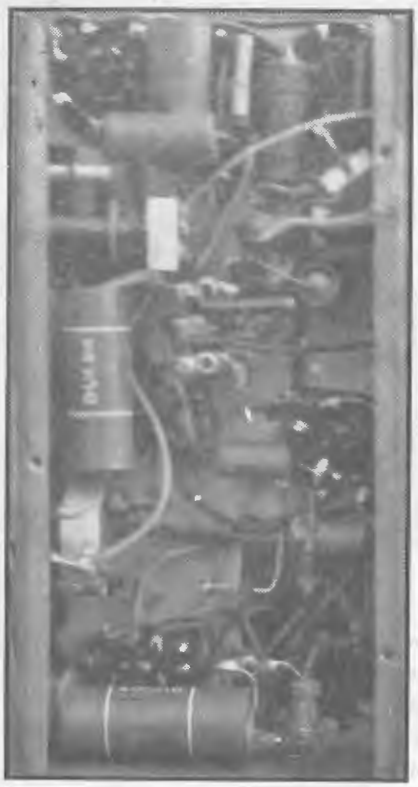
And if it is thought worth while on the other side of the Atlantic, why not here also? There would be no lack of subjects or speakers for suitable talks, microphone interviews, and other features, and such a programme would provide a valuable opportunity for talking direct to listeners about wartime radio servicing difficulties and the reasons for inevitable delays and shortages.

It would, after a period, begin to teach listeners to regard their sets, and the programmes they bring, with a new interest, besides establishing a better understanding with the dealers and manufacturers whose job it is to provide these receivers and keep them working.

the I.F. gain being low, only one I.F. transformer being used. Which, however, is a point giving great improvement in tonal quality, as the side band cutting is not so serious.

"I would like to point out a rather unorthodox method of screen feed for the 6G8. You will notice it connects directly to the cathode of the output tube, thus saving a by-pass condenser and a separate screen resistor.

"The results when the job was built up were really quite good. I firstly



A photograph of the wiring.

tried using the .5 meg pot as the diode load to make a further saving, but, alas, the pots of these days play merry hell as soon as one passes a diode current through them, so I had to revert to the standard arrangement.

"The set has a great deal more punch and output than the "Little Companion," as is to be expected, in view of the extra audio drive, is more stable, easier to handle and has better tone.

"I have used iron-cored coils throughout to make up for the loss

(Continued on page 25)

MAKING THE MOST OF A MILLIAMMETER

By
JOHN BRISTOE
of Denham's Radio Service
Maryborough, Queensland

At the present time many men in the Radio Industry, or those having radio as a hobby, find that it is difficult, or practically impossible to procure new test equipment. Due to the war situation there is little chance of relief in this direction. With radio repairs or service, we are interested in several measurements. The first involves the fall of potential across any circuit, being measured in volts. The second depends upon the rate of flow of current through any given circuit being measured in amperes, microamperes, milliamperes. And then there are other electrical measurements such as capacity, decibles, resistence, valve emissions, etc. To measure these, an electrical meter is necessary which responds to the effect of electricity upon a given circuit. As most men will have an 0 to 1 milliammeter, I will endeavour to describe various test instruments that can be built around this meter and which should prove invaluable to the builder. It is not essential to use an 0 to 1 milliammeter on all of the instruments described, but it is the most satisfactory type, as it can be adapted to suit practically all purposes. The following are the instruments to be described. One milliammeter will serve for all these pieces of test equipment and can be plugged in to each as required.

1. A Volt Ohmmeter.
2. A Volt Ohm Milliammeter in sections and complete.
3. A Universal (AC/DC) Volt Ohm Milliammeter.
4. A V.T.V.M. Battery Model and (V.T.V.M.) A.C. Model.
5. A Modern Valve Tester.

Most radio men have built a volt-ohm-milliammeter at some time, but the details are given for those who have not done so.

John Bristoe

Other instruments besides the above can be built around the meter and will be described later if sufficient interest is shown. All these instruments can be built as one super unit, or separately, as desired.

Before proceeding further, I will give a brief description of this meter and its purposes in test equipment.

Two types of meters are commonly used in radio equipment. (1) The moving iron type. (2) The moving coil type. As the moving coil type is the most efficient for our purpose and is more readily obtainable with calibrated scales to suit our requirements, this is the type of meter used.

Moving Coil Type

The moving coil meter is generally made up as follows:

A horse-shoe type magnet with circular air gap. Inside this air gap, suspended on pivots, is a coil, and attached to this coil is the needle, or indicator, and a hair spring.

One of the objects of the hair spring is to retain the coil at its zero position until some electric force is ap-

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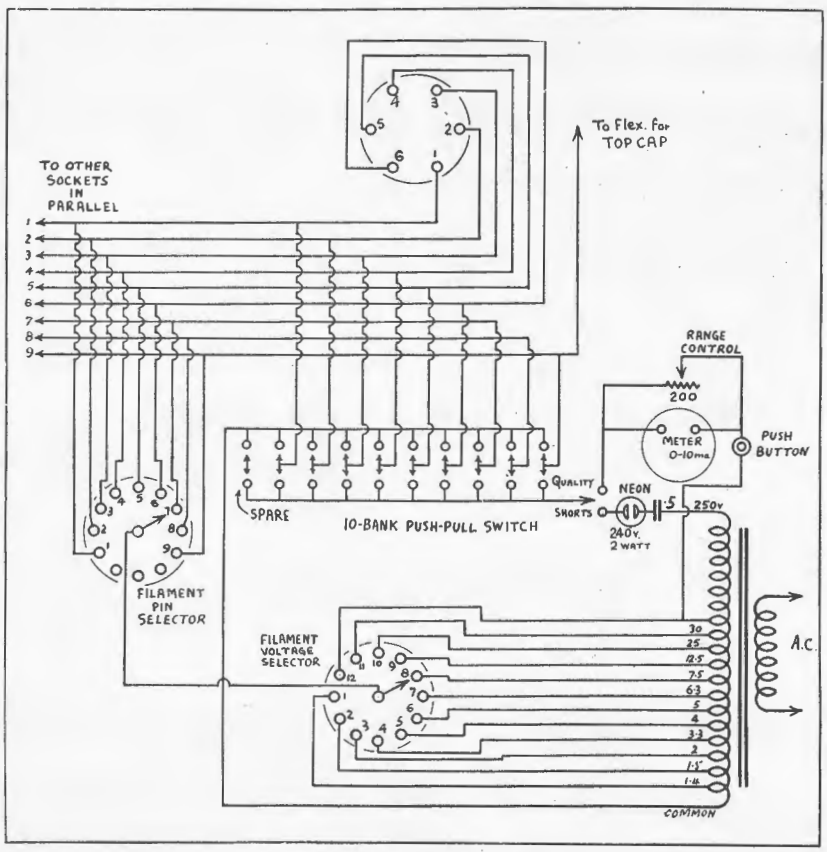


Circuit of the versatile valve tester

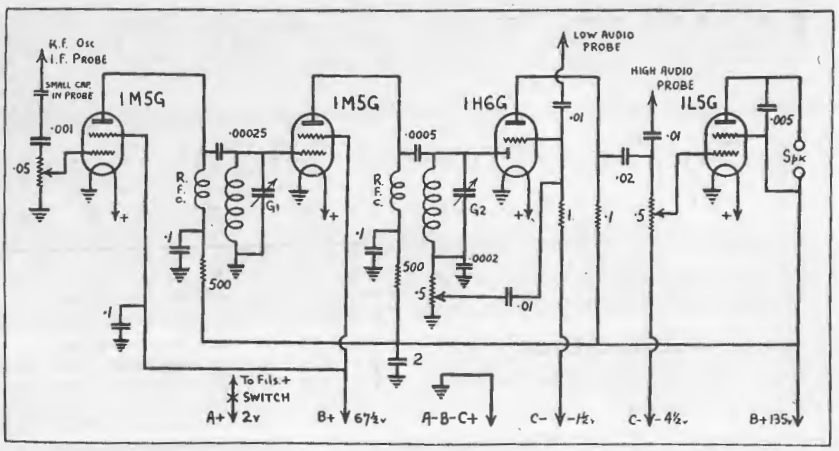
MILLIAMMETER
(Continued)

plied. All good meters have an adjustment on this hair spring to enable the correct zero adjustment to be maintained.

How it Works

This is how the meter works:

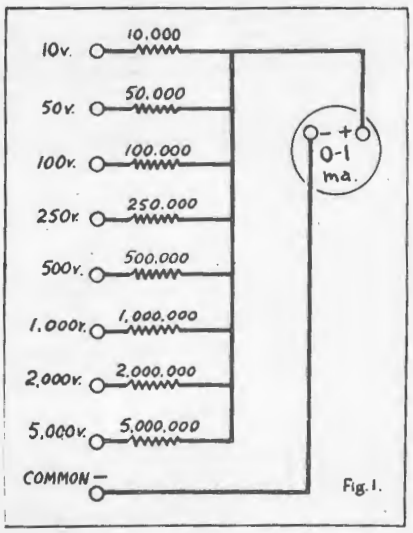
A basic electrical law states that if a coil is located in a magnetic field and some electrical current is applied to the coil, it will tend to turn itself so that its magnetic lines of force will be parallel to those of the magnetic field. This means that the coil in the meter will turn on its axis as the result of interaction between the horse-shoe magnet and a field created by the current applied to the coil.



Circuit for an improved Signal Tracer for battery operation.

Beware of Overloads

As the meter is a one milliamp instrument, it must always be remembered to never force more than one milliamp through the coil. Besides being a milliammeter, the meter is also a voltmeter, or more correctly, a millivoltmeter. If the meter coil has a resistance of 100 ohms and 100 millivolts, or 1/10 of a volt is applied to



Schematic arrangement for wide-range voltmeter.

it, the needle will move to the full scale position, as that is the voltage required to cause a current of one milliampmeter to flow through a resistance of 100 ohms (see Ohms Law). Therefore never apply more than one mil, or 1/10 volt, direct to the meter or it will be damaged.

Method of Construction

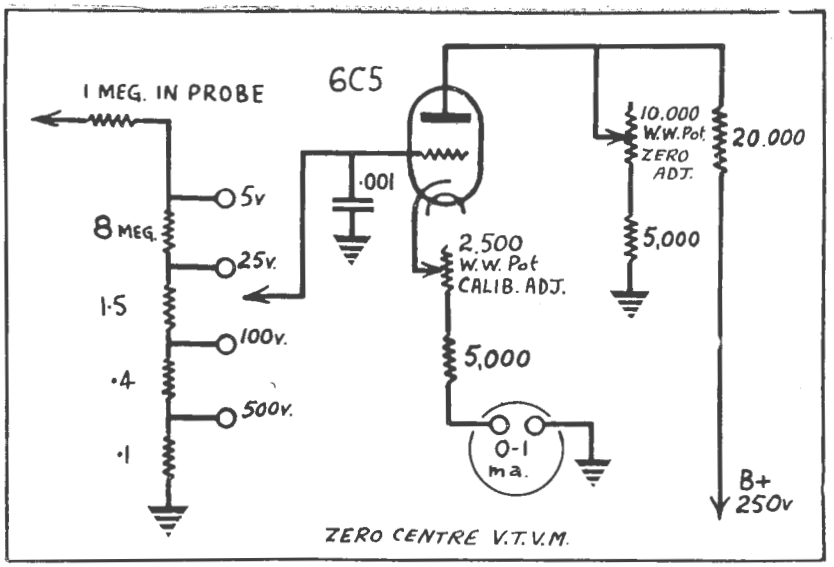
The methods of constructing the various instruments following, are not

the only methods that can be used, but these have been tried and found to be reliable in operation.

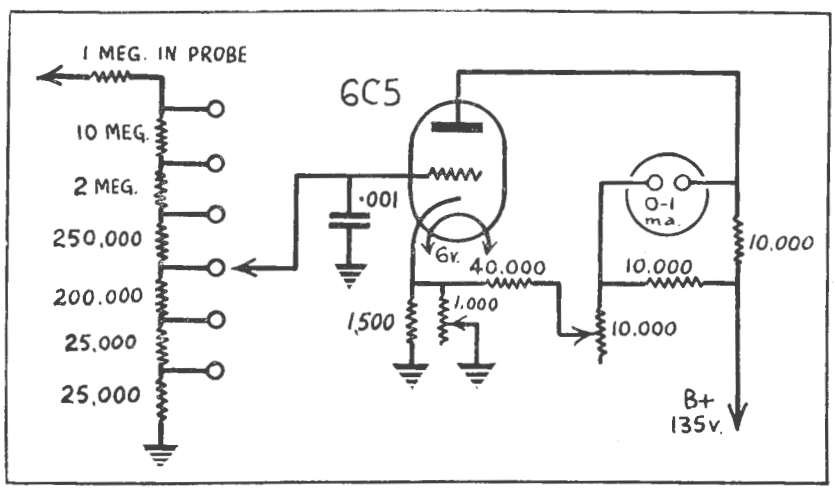
First: Obtain the meter, which should, if possible, have a calibrated scale for volts, ohms, and milliamps. The Australian made instruments are good and have proved thoroughly reliable and the necessary shunts are quickly obtained. Imported meters may require shunts to be specially made.

The first unit is the D.C. Voltmeter. All that is needed is a resistor for each range required. Standard reliable resistors, as used in radio construction are suitable, particularly the I.R.C. 1 watt type. As the meter is calibrated for 1000 ohms per volt, it is easy to arrive at the size of the resistor for each range required, i.e., for the 50 volt scale the resistor would be 50,000 ohms.

The circuit is shown with a large range of voltages. Naturally, the scale on the meter will determine the ranges to include. Delete those not required.



Circuit for a zero-centre vacuum tube voltmeter for a.c. operation. Below: Circuit for a V.T.V.M. suitable for battery operation.



It will be noticed that it is easy to include ranges so that the meter can be used to measure most of the D.C. voltages throughout any radio.

The Ohmmeter

The second unit is the Ohmmeter. A dry battery and an adjustable resistor is required for the section. I think all Australian meters are calibrated for use with a 4½ volt dry battery, but make sure of this. A glance at the ohms scale will indicate what voltage to use. If the centre of the scale is 1,500 ohms then 1½ volts is correct if 3,000 ohms, then 3 volts is correct, and 4,500 ohms—4½ volts.

(Continued on next page)

CHART OF RESISTORS REQUIRED TO EXTEND THE RANGES OF MICRO AND MILLIAMPMETER FOR USE AS VOLTMETERS.

	TYPES OF MICRO OR MILLIAMPMETERS							
Volts Range Required	50 Micro	100 Micro	500 Micro	1,000 Micro or 1 Mil	2 Mil	5 Mil	10 Mil	100 Mil
1	20,000	10,000	2,000	1,000	500	200	100	10
2	40,000	20,000	4,000	2,000	1,000	400	200	20
5	100,000	50,000	10,000	5,000	2,500	1,000	500	50
7½	150,000	75,000	15,000	7,500	3,750	1,500	750	75
10	200,000	100,000	20,000	10,000	5,000	2,000	1,000	100
50	1 meg	500,000	100,000	50,000	25,000	10,000	5,000	500
100	2 meg	1 meg	200,000	100,000	50,000	20,000	10,000	1,000
250	5 meg	2½ meg	500,000	250,000	125,000	50,000	25,000	2,500
500	10 meg	5 meg	1 meg	500000	250,000	100,000	50,000	5,000
1,000	20 meg	10 meg	2 meg	1 meg	500,000	200,000	100,000	10,000
5,000	100 meg	50 meg	10 meg	5 meg	2½ meg	1 meg	500,000	50,000

The internal Resistance of the meter has been ignored in the above calculations; except in very low voltage ranges this can be ignored as the effect is negligible.

MILLIAMMETER
(Continued)

If this voltmeter and ohmmeter are combined they make a very cheap, but efficient little tester, that anyone interested in radio cannot afford to be without.

The Milliammeter

As the meter is already a milliammeter reading up to 1 milliamp, the next instrument can be constructed. Average requirements need an instrument to read up to about 250 mils, having about four or five ranges. All that is necessary to do this is an accurate shunt resistor for each range required. The method of connecting these into the unit is clearly shown in the diagram given. By adding shunts it can be easily extended to read higher current drains.

This instrument can be used to measure most of the D.C. current ranges in radios. It is most valuable for grid, screen grid, and plate currents and for checking the drain in the high tension section of battery, vibrator and electric sets.

The above three units built together in one case comprise the most popular test instrument used in the radio business. So we will combine these three before going further.

An Output Meter

Even if you are interested only in battery sets, the following will be of value to you and can also be used as an output meter. In A.C. sets this addition is invaluable.

This time something more expensive is needed, namely, a copper-oxide rectifier. This is a small article, but usually costs about £2 or more. Also, unless the meter has a staggered scale, a further set of resistors will be needed, one for each range. The reason for this is that a certain amount of current is lost in the rectification.

The next instrument is an output meter. This is simple. just include a condenser in the leads of the A.C. voltmeter.

Vacuum Tube Voltmeter

The meter can be next used for a vacuum tube voltmeter. This is more expensive to build than the other instruments, the main item being the power supply. However, this instrument warrants any additional expenditure and if it is built in conjunction with the volt ohm, and mill unit, the power pack can also be used to extend the ohms readings still further.

The vacuum tube voltmeter described is the one used in the Signal Tracer in April issue of the "Radio World", and for the general purposes and simplicity of operation is outstanding. As it was described in April issue, there is no need for many details. Study the circuit diagram and be careful not to make any mistakes in wiring.

The above vacuum tube voltmeter is most suitable if A.C. mains are available, but as many readers have to rely on batteries there is a diagram of a meter working on a similar principle, but only requiring 135 volt H.T. This can be obtained from a vibrator unit, or "B" batteries. It uses a 6C5 or 6C5G valve.

Valve Tester

In designing a valve tester various methods can be used. All have good points, but for reasonable efficiency and simplicity of operation and construction I have chosen the emission type. There is little doubt that with almost 100 per cent of all radio valves ever made a measurement of the valve's cathode emission is as satisfactory a method as the power output, mutual inductance, grid shift or

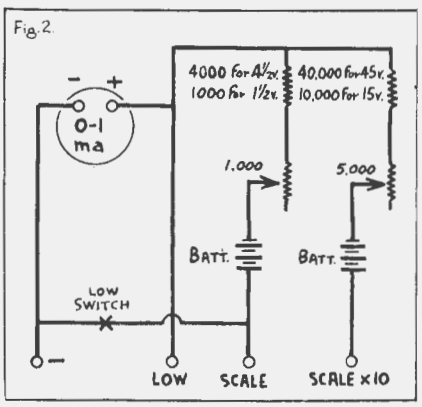
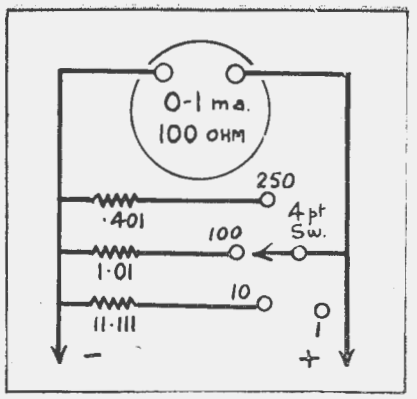


Diagram for a three-range Ohmeter of infinite value to the serviceman.

any other valve quality tests. The fundamental method of testing the emission of a valve is as follows.

The meter is connected to the plate and all other elements except the cathode, so that actually the valve is converted into a diode for the test. The other terminal of the meter has usually about 30 volts applied to it. When the heater, or filament, has its required voltage applied to it the meter will give an indication of the quality of the valve. Apart from this, most valve testers have some method for testing for shorts between the various elements. In the valve tester described this is done with a neon lamp.

Construction. The first thing is to obtain all the required parts, then cut the panel holes to accommodate the sockets to be used. The original



Arrangement for a four-range milliammeter, which is a handy instrument.

valve tester used the following: One each of 4, 5, 6, 7, and 8 pin American type Philips P type and also a 5 and 6 English type. It is advisable to leave sufficient space for any further type sockets, as we are sure to see a number of new type valves when the war is over. The hole for the meter switches, etc., should then be cut. Mount all the sockets and wire them before proceeding to mount other parts. They are wired in the following manner. First connect all No. 1 pins on each socket together, then all No. 2, and so on. Use a different colour for each pin so as to avoid confusion. When these are wired mount the rest of the components except the meter, which should not be mounted until all the wiring is completed. A meter is expensive, so take no chances of damaging it. Two twelve position wave change switches can be used for the filament volts selector, and the filament pin selector. The twenty single pole switches shown can be either push pull, or toggle type, or they could be replaced with ten only double pole zero centre type switches, but these may not be obtainable.

If a socket of every type is included there is hardly a valve that has ever been used that cannot be tested in this valve tester. It would not matter if one of the filament leads went to the top cap, as the switching system in the tester is so designed to accommodate all of them. If space is left for other sockets to be added at a later date, the instrument will never become obsolete.

How to Use the Valve Tester

First make sure all the switches are in the off position. Then adjust the range control. Now, for example, say we wish to test a 6J8G valve. The filament voltage switch should be turned to the 6.3 position. The filament pins on this valve are No. 2 and 7. So move the filament selector switch to one of these numbers. This

puts one of the filament pins into circuit. The other is obtained by pulling out the switch corresponding to the pin on the bottom row of switches. That is to say, if the filament selector switch is turned to No. 2, then No. 7 switch should be pulled on. If the valve is a heater type and has a cathode, this should be switched to one of the filament pins.

With the valve we are about to test, i.e., 6J8G, the cathode is No. 8, so pull this switch on the bottom row. That completes the filament and cathode sections. The remaining elements are all switched into circuit with the top row of switches. If you carefully study how this system works you will see that the instrument is very versatile, and can be used to test all types of valves. If it is desired with dual type valves each section can be tested separately. For instance, a 19 should be tried first and the load setting on the pot be written down for future reference. Charts can be completed as you go along.

The meter used is actually an 0 to 10 milliamp type, so if you wish to use your 0 to 1 milliammeter, place a 10 milliamp shunt across the terminals.

Assistance Offered

For the benefit of those who have not an 0 to 1 milliammeter, but have other milliamp instruments, I am including a chart giving the ohms per volt readings of a number of different types of meter, but for general all round reliable readings I advise you to use the 0 to 1 type if possible. I will be pleased to advise any readers on their meter problems, so write if there is anything you are not sure of. Please enclose a stamped addressed envelope, but do not expect a book on the subject, as like many others these days, I have very little spare time, but I will do what I can.

Calibration of Meters

I have been asked a number of times by men who have built Ohmmeters from Milliammeters without a calibrated ohms scale fitted, how to calibrate the scale properly. The easiest way is to get a number of accurate resistors and take the readings, this is easier said than done, however, as accurate resistors are not easily available in sufficient quantities. So the following formula will serve to obtain the correct calculations:

$$A = \frac{B\,C-D)}{D}$$

A = The resistance being measured (in ohms).
B = The Calibrating resistance (in ohms).
C = The full scale reading of the meter.
D = The meter reading in Milliamps when the resistance is applied to the ohmmeter.

In using the formula the internal resistance of the meter is usually ignored unless it is one of the very high resistance type. Then the internal resistance is added to the value of the calibrating resistance. The following example should help you to understand the formulae.

Say the meter is an 0 to 1 milliamp type and is connected in series with a 1500 calibrating resistor and 1½ volt battery when the meter reads .25 milliamps, what is the resistor being measured?

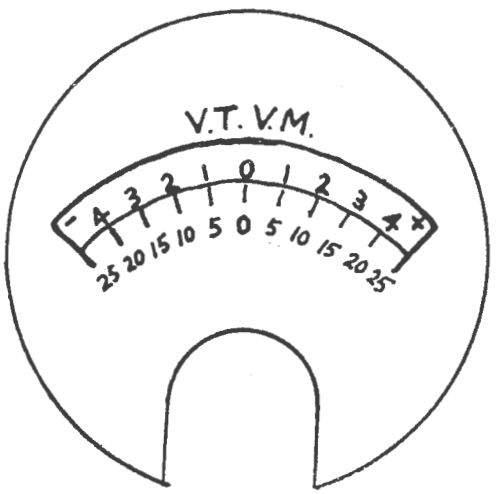
$$A = \frac{B\,(C-D)}{D}$$

$$= \frac{1500 \times (1 - .25)}{.25}$$

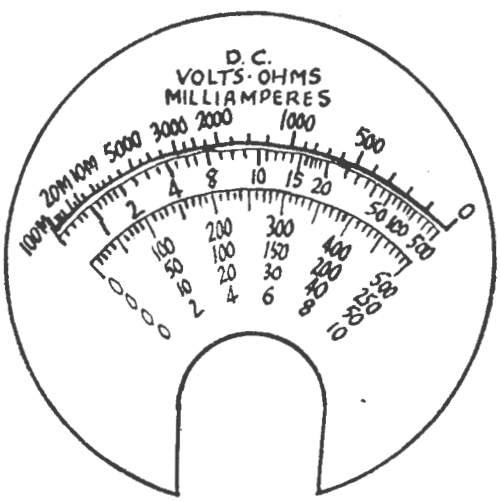
$$= \frac{1500 \times .75}{.25}$$

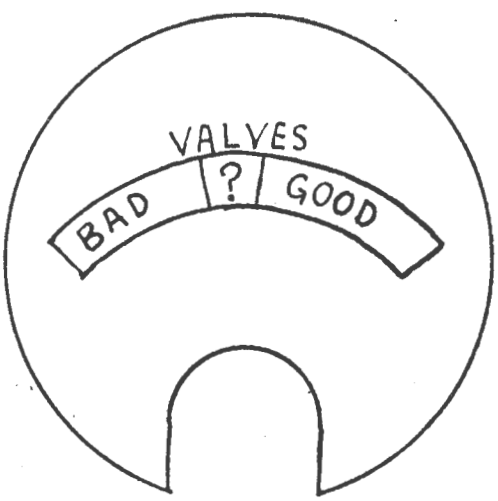
$$= \frac{1125}{.25}$$

$$= 4{,}500 \text{ ohms.}$$



Copying from these rough sketches you can draw your own meter scales. The exact size given is suitable for nearly all the common 3-in. meters, such as Triplett Model 321, Weston 301, Calstan 331, Palec, Jewell, University and others.





A NEW LIGHT SOURCE

Two Hungarian electrical engineers are the inventors of a new light which may soon replace the incandescent filament lamps, or even the only recently introduced fluorescent tubes, states the "New Zealand Electrical Journal."

Zoltan Bay and Gyorgy Szigeti, of Budapest, are the names which will be remembered in illumination science as milestones of progress. The patent has been bought by the General Electrical Co.

The basis of the new conception in illumination is carborundum, which is one of the hardest known abrasives, and serves as the source of the new light which may revolutionise electrical lighting.

Transparent carborundum crystals are used instead of filaments. These crystals have the property of converting electrical current passed through them into a very vivid white light, and the high efficiency is caused by the fact that the crystals do not get heated when incandescent, and so no energy is wasted by heat. The terrific heat produced by the ordinary filament lamps must be regarded as complete wastage from the illumination point of view, causing low efficiency.

Very low current and only ten volts are sufficient to operate the new lamp. No vacuum is needed or rare gases, and the expensive high quality coiled-coil filaments are dispensed with. All these are important factors in the manufacturing of lamps. No expensive transformers, coils or high voltage is needed, as with the fluorescence tubes; indeed, no special apparatus at all. The wattage used will be not even one-quarter of present lamps. All these points will make the new lamp a real bargain for the public.

The filament of the carborundum lamp is made up from tiny crystals of pure, transparent carborundum embedded in an extremely thin plate of copper. The current is passed through the crystals via the copper plates and a second electrode forces the crystals to emit a very vivid white light. A glass bulb, not evacuated, covers the whole arrangement, with the usual two-screw plug insertion in the socket.

Another variety using the same principle is a lamp where the crystals are held between two fine wire meshes which are sealed into two extremely thin glass plates. The current flows through the crystals via the fine wire meshes, and so produces the emission of light. Any desired size or form of lamp can be produced up to five-square yard giants, flat, round, tubular, or in block forms.

The new lamp lasts about four times as long as the best incandescent filament lamp, and naturally this again increases its cheapness.

Carborundum is a combination of silicon and carbon produced by passing a very heavy current through a mixture of coke and sand.

RADIO IN INVASION TEST

The Metropolitan and City Police of the London area recently carried out a mock invasion test over a period of 36 hours. One of the objects of the operations in which policemen represented Nazi parachueists, spies and fifth columnists, was to check the efficiency of the alternative system of communication using short-wave transmitters and receivers. The installations are set up at each chief police station, and it is not difficult to realise how valuable such a vital link would be in the event of the telephone and other forms of communications being broken due to enemy action.

SOME NOTES ON SERVICING VIBRATOR SETS

If vibrator servicing problems are to be simplified, specific troubles and the recommended remedy must be shown. A list of these troubles is given along with the best way of determining the exact trouble and the method of elemination.

No "B" Voltage

If the vibrator is operating and still there is no "B" voltage, first disconnect the lead from the B + output of the filter. If the voltage becomes much higher than normal when this lead is disconnected, the trouble is in the radio receiver proper.

If, after disconnecting the B+ lead, there is still no voltage, the trouble is in the power pack circuit.

The following list shows the probable defects, in the order of their importance:

1. Shorted Filter Condenser.
2. Shorted Buffer Condenser.
3. Shorted Rectifier Tube.
4. Shorted "B+" Bypass Condenser.
5. Grounded Filter Choke.
6. Shorted Transformer Secondary.
7. Ground in Wiring.

If the vibrator does not operate; remove the vibrator and check for the following defects:

1. Low Battery Voltage.
2. Blown Fuse.
3. Burned Switch.
4. Broken "A" Lead.

All of these points may be quickly checked by measuring the voltage between the centre tap of the transformer primary and the REED terminal of the vibrator socket. This voltage should read 5.5 volts or more.

If the check is satisfactory, the vibrator should be tested for proper operation either in a vibrator tester or by the substitution of a new vibrator. Sticking or shortened vibrators are usually caused by "projections" being built up on the contact points. These "projections" (contact transfer) are the result of an unbalanced condition in the circuit. A careful check of the "buffer" condenser should be made. If this condenser is open or the capacity not as specified, it should be replaced. **Never change the specified capacity of this condenser** unless specifically instructed to do so.

Low "B" Voltages

Check the point given below as the cause for low "B" voltage.

1. Battery Voltage Low.
2. Corroded Fuse Clips.
3. High Switch Resistance.
4. Weak Rectifier Tube.
5. Defective Buffer Condenser.
6. Defective Filter Condenser.
7. Worn Vibrator.
   (Check in tester or substitute new Vibrator.)
8. Check for troubles in radio which will cause low voltage such as shortened cathode resistor, bypass condenser, shorted transformer, defective tubes, etc.

Intermittent Operation

1. Generally caused by troubles in the receiver, such as defective antenna insulation or connections, defective wiring, defective tubes, etc.
2. Intermittent vibrator operation usually caused by worn vibrator nearing the end of its life.
3. Loose connections in the power pack.
4. Defetcive Rectifier Tube.

Unusual Mechanical Noise

Unusual mechanical noise from the vibrator may be caused by:

1. Defective filter condensers (low and vibrating against them or causing other parts to vibrate. Correct this trouble with a cardboard pad around the vibrator.
2. An old vibrator nearing the end of its life.
3. Loose case screws, or loose parts in the radio set.

Electrical Hum from the Speaker

Hum from the speaker is usually caused by:—

1. Defective fillter condensers (low capacity).
2. Microphonic Tubes.

(Continued on page 26)

RADIO STEP BY STEP — Part 5.

THE CONDENSER AT WORK

IN last month's instalment, the whys and wherefores of different kinds of inductances were considered. Among those designed to operate at radio frequencies are aerial and r.f. (or radio frequency) coils, intermediate frequency transformers and r.f. chokes, while inductances used for power and audio frequency purposes include power transformers, smoothing chokes, audio chokes, and audio tranformers. These will all be discussed at greater length later on.

A component that is encountered just as often in radio is the condenser, which is made in a variety of types to suit different purposes, though the same basic principle is common to them all. Every condenser can be grouped under one of two headings, according to whether it is fixed as regards capacity, or variable. The fixed types will be considered first.

How the Condenser Works

Briefly, a fixed condenser in its simplest form consists of two metal plates ("A" and "B" in fig. 1), separated by a layer of air. If a battery "V" and a switch "S" are connected in series with the plates as shown, and the switch closed, the battery will immediately try to drive a current of electricity around the circuit. However, owing to the gap between the plates, no current will be able to flow completely around.

Now, as indicated earlier in this series, an electric current is nothing more than a stream of electrons, each carrying a negative charge, passing from atom to atom within a conductor. Hence, in fig. 1, the tendency is for the battery to drive electrons round the circuit in a clockwise direction. The result is that electrons are drawn off from plate B, passed through the battery (which can be regarded as a sort of electron pump) and accumulated on plate A. Thus this plate acquires negative electricity at the expense of plate B, which loses it, and thus becomes positive with respect to A, as shown.

The fact that this transfer of electrons, or current flow does take place can be proved by including a lamp in the circuit. When the switch is closed, the lamp will light for a moment and then go out, thus proving that although there is a complete break in the circuit between the two plates, electrons have flowed momentarily, and in so doing have lighted the lamp.

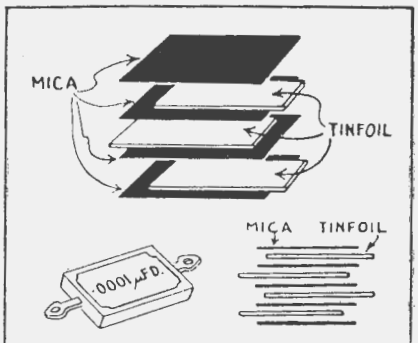


FIG. 4A

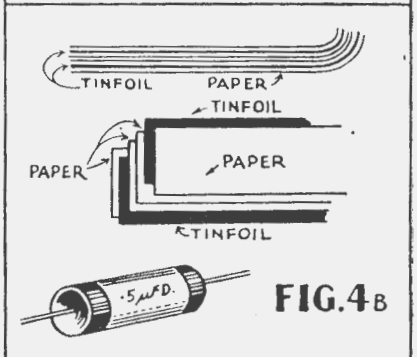


FIG. 4B

The Changing Current

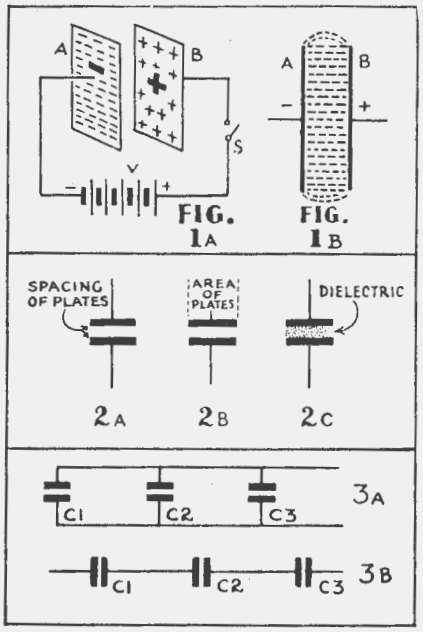
The stream of electrons passing from A to B constitute the charging current for the condenser. While it is flowing, the potential difference between the two plates is building up, and it is in such a direction as to oppose the action of the battery. Consequently the charging current, which is high at first, diminishes until the potential difference between the plates becames equal to the E.M.F. of the battery. The current then ceases altogether, and the condenser is fully charged.

The amount of current that has to flow before the condenser is charged depends upon the capacity of the condenser. The larger this is, the greater is the amount of electricity needed to fully charge it. Thus a condenser acts as a kind of reservoir for electricity.

If the leads shown in fig. 1(a) are removed from the battery, and the ends touched together a spark will be seen (if the condenser is large enough) or if the lamp mentioned above has been left in circuit it will again light momentarily, showing that by the charging action of the battery, a certain amount of electricity has been stored in the condenser plates.

Behaviour to A.C.

If the battery shown in fig. 1(a) is replaced by a suitable source of alternating current, and the lamp mentioned above is left in circuit it will light when the switch is closed and burn steadily all the time the current is flowing.



When the direct voltage was applied, the lamp lit only for an instant, until the condenser had become fully charged. When the alternating voltage is applied, however, the condenser becomes charged first in one direction and then in another. This rapidly changing charging current is equivalent to an alternating current passing through the condenser though no electrons actually pass through the dielectric. This effect explains one common use of condensers in radio—in posieions where it is required that an alternating current be allowed to pass, but where direct current must be blocked.

Inductive Reactance

Condensers, just like inductances, impede the flow of alternating currents, through them. In the case of condensers, the term capacitive reactance is used to describe this effect, the formulae for capacitive reactance being:

$$Xc = \frac{1}{2\pi f C}$$

where Xc is the capacitive reactance in ohms; $\pi = 3.1416$; f is the frequency in cycles per second; and C is the condenser capacity in farads.

Capacity Depends on Three Factors

The capacity of a condenser depends on thsee things: the size of the plates, the distance they are apart, and the nature of the material separating them, known as the dielectric (see fig. 2). If the effective area of the plates is halved, or the distance between them is doubled, then the capacity is halved.

Dielectric's Influence on Capaciey

With regard to the dielectric, this can be anything that is an insulator —a gas, like air, a liquid, such as iertain kinds of oil, or a solid like mica or ebonite. Every insulating substance has its own dielectric constant (alternatively called specific inductive capacity). This is a figure that is based on air as unity, and it indicates the efect that that particular substance has on the capacity of a condenser when it is used as the dielectric.

For example, the dielectric constant of a certain grade of mica might be 6 (as stated above, that of air is 1). Therefore, given the same area of plates and distance of separation, a mica dielectric condenser will have six times the capacity of an air condenser.

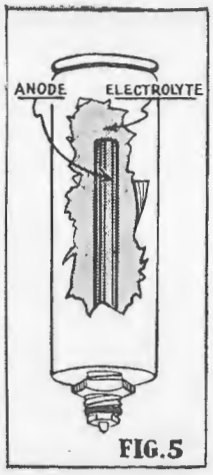


FIG.5

The Unit of Capacity

The quantity of electricity that can be stored in a condenser is stated in coulombs (one coulomb equals the quantity of electricity carried by one ampere of current flowing for one second) and it can be expressed as the capacity multiplied by the voltage. Thus:

Q (Coulombs) = C (capacity) × E (voltage), or transposing,

$$C = \frac{Q}{E}$$

The unit of capacity is the farad, and a condenser has a capacity of one farad when the application of a potential difference of one volt between its terminals drives one coulomb of electricity into it.

Since a condenser of one farad capacity would completely fill a small room, however, it is not a very practical unit, and so the radio engineer works in microfarads and micromicrofarads (mfd. and mmfd.) equivalent to millionths and million millionths of a farad respectively.

Thus, a 1 mfd. condenser has a capacity of one millionth of a farad, and one of a 1 mmfd., a capacity of one million milionth of a farad.

Calculating Capacity

For those mathematically inclined, the capacity of a fixed condenser can be calculated from this formula:

$$C = .0885 \frac{KA}{d}$$

(Continued on next page)

CONDENSERS

(Continued from page 15)

where C is the capacity in micro-microfarads; K is dielectric constant; A the effective area of one side of one plate in square centimetres; and "d" the dielectric thickness in centimetres.

Condensers in Parallel

Just as resistors are connected in series and parallel to obtain certain values, capacities are connected in the same manner, but with contrary results.

When condensers are connected in parallel (see fig. 3(a) (, the resultant capacity is equal to the sum of the separate capacities, no matter how many are so joined. Thus, the resultant capacity C of the condensers shown in fig 3(a) is equal to C1 + C2 + C3. If C_1 = .0005 mfd., C2 = .01 mfd., and C_3 = .006 mfd., then C = C_1 + C2 + C_3 = .0005 + .01 .01 mfd., and C_3 = .006 mfd., then + .006 = .0165 mfd.

Condensers in Series

When condensers are connected in series (see fig. 3(b)), the resulant capacity is always less than that of the smallest condenser used. It can be obtained from the formula:

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C2} + \frac{1}{C_3}$$

As a simple example, if C1=.5 mfd.; C2 = 2mfd.; and C_3 = 4 mfd., then the value of

$$\frac{1}{C} = \frac{1}{.5} + \frac{1}{2} + \frac{1}{4}$$

$$= \frac{8+2+1}{4}$$

therefore $\frac{1}{C} = \frac{11}{4}$

and $C = \frac{4}{11} = .3636$ mfd.

An easy formula to use when only two condensers are involved is the following:

$$C = \frac{C_1 \times C2}{C_1 + C2}$$

If C1 = .044 mfd., & C2, .006 mfd.

$$C = \frac{.004 \times .006}{.004 + .006}$$

$$= \frac{.000024}{.01}$$

$$= .0024 \text{ mfd.}$$

Types of Condensers

Fixed condensers of capacities from 1 mfd. or so downwards are generally either mica or paper types—mica up to about .01 mfd., and paper from .005 mfd. upwards.

Mica condensers are flat in shape, and to keep them compact, a large number of small tinfoil plates, interleaved with thin strips of mica, are used in their construction. Fig. ((a) shows how they are built up. After assembly, the leaves comprising each set of tinfoil plates are joined together and taken to a solder tag, the finished condenser being housed in a flat bakelite case, with the capacity stamped on it.

In paper condensers, a different type of assembly is adopted. Inseead of two sets of many small plates of tinfoil, there are two long strips, and a special kind of waxed paper is used to replace the mica as dielectric. Fig 4(b) shows the arrangement of paper and tinfoil.

The two strips of foil are not entirely covered by the paper. The edge of one strip projects slightly beyond the paper on one side, and the edge of the other emerges similarly on the other. It is to these exposed edgings of foil that the connecting wires, or pigtails, are soldered, after the whole has been tightly rolled into a cylinder, and before it is housed in the familiar tubular case.

Electrolytic Condensers

For capacities greater than 2 mfd. or so, paper type condensers are rather bulky and expensive, and so electrolytic condensers are generally used where large capacities are required, as in power supply filter circuits and across resistors used for providing bias for single output valves.

In appearance, a wet electrolytic is cylindrical, and somewhat resembles a single cell from a dry battery. In its construction also it is not unlike a dry cell. In the centre is an aluminium rod, carefully insulated from the outer round aluminium case. Between the two is a special liquid which is an electrolyte, or conductor of electricity, and which actually forms one plate of the condenser.

In order to convert the arrangement into a condenser, however, current has to be passed through it, this process being termed "forming" the condenser. Its effect is to cause a very thin, non-conducting film to form on the inner metal rod, and it is this film that constitutes the dielectric between the inner positive electrode, and the liquid. The latter is in direct contact with the outer metal case, termed the negative electrode.

The area of the aluminium anode can be increased in several ways, one method of doing so being to provide it with a corrugated surface. Also, the film formed over it is very thin, so that the electrolytic type of condenser gives a high capacity in very compact form.

There are also "dry", as well as wet, electrolytic condensers, but like "dry" batteries they are not really dry. Either a paste or some absorbent

(Continued on page 24)

PARTS FOR MAINTENANCE OF RECEIVERS

ASKING the Minister for Munitions to consider the difficulty being experienced in obtaining maintenance parts for wireless receivers, the Postmaster-General (Senator Ashley), said that it would be a matter of grave concern if listeners were deprived of the use of their sets through inability to obtain essential parts.

Senator Ashley said that the radio industry was confronted with difficulties in obtaining adequate supplies of valves, batteries, condensers and other essential replacement parts.

He commented that broadcasting afforded an excellent medium for the dissemination of Government announcements and its value in this direction would be very much greater in the event of actual hostilities occurring in Australia, or any other grave emergency.

"The important part which radio would play in the maintenance of public morale is realised by the Government," he said.

"I regard it as imperative in the interests of public safety that there should be a wireless receiver in every home, but from the information placed before me it would appear that unless the present position regarding supplies of essential spare parts is improved, a large proportion of the population will, in the course of time, be unable to use their sets."

He said that the outlook in respect of battery operated receivers, which were extensively used in country districts, appeared to be particularly serious, because batteries in normal circumstances required replacement at fairly frequent intervals.

The number of broadcast listeners' licences had, in recent months, shown a decided downward trend, and this was probably due to the difficulty in obtaining renewals of essential parts for the sets.

Senator Ashley expressed to the Minister for Munitions the view that if it was practicable to ease the position without interfering with the output of essential defence equipment, supplies of the necessary materials, should be released for civil purposes as soon as possible,

With officers of the Munitions Department, Mr. Makin is investigating the position.


Wireless alone can meet the exacting needs of communication for Mobile Units...
INSTANT ★ CONSTANT CERTAIN
AUSTRALIAN-MADE
RADIOTRON
RADIO VALVES

Shortwave Review

CONDUCTED BY
L. J. KEAST

NOTES FROM MY DIARY

LIDICI LIVES

Readers will remember that, as "compensation" for the death of Butcher Heydrich, the Germans wiped out the beautiful little town of Lidici in Czechoslovakia. There in Wilson St., the Czechs worshipped in the lovely St. Margaret's church, as did their predecessors, the Bohemians, 600 years ago. But, Lidici still lives—this time in Illinois, U.S.A.

Listening to WJQ, New York, on July 13 at 9.45 p.m., we were taken to the new Lidici, 4,500 miles away from Wilson St. and after listening to several of the villagers, we heard a splendid talk from Wendel Wilkie. Truly a most interesting session.

LONDON CALLS THE WORLD

Time was when, if we heard a strange or unusual language over the short-waves, we figured it was a foreign station, and the more peculiar or unfamiliar the lingo, the further away we thought the station must be.

Now, it is quite possible that those very stations we heard then are at the present time using English very often. To-day a foreign language gives no idea of the transmitter's location. One must wait for the announcement and listen intently for the call sign. And do not be surprised to hear London mentioned in several tongues, as the B.B.C. now speak to the world via short-waves in forty languages (not including English, Welsh and Gaelic). In alphabetical order, the forty tongues are: Afrikans, Albanian, Arabic, Moroccan Arabic, Bengali, Bulgarian, Burmese, Cantonese, Czech, Danish, Dutch, Finnish, Flemish, French, German, Greek, Greek for Cyprus, Hindustani, Hungarian, Icelandic, Italian, Kuo Yue, Luxembourg Patois, Malay, Maltese, Norwegian, Persian, Polish, Portuguese, Portuguese for Latin-America, Roumanian, Serbo-Croat, Slovak, Slovene, Spanish, Spanish for Latin-America, Swedish, Tamil, Thai, Turkish.

Frequency jumping was once associated with the Latin and South American stations, but lately if you miss the "Voice of America" on its usual position on the dial, twist round a bit as chances are you will find it. We have had a few changes during the last week or so, but in each case it has meant a better signal, so everybody is probably quite happy about it all. There is no doubt without the American stations, this winter would have been very tame as far as entertainment is concerned in the evenings. The choice of frequencies, together with beamed antennas and great power, are giving us signals little short of remarkable. Considering our relationship, for the life of me I cannot understand why Canada has not tried to give us a service. Admittedly, we do hear CBFY, Montreal, for a little while each night, but it requires careful tuning and a lot of concentration. With the Yanks the opposite is the case, lengthy periods on the air and a strong signal, enough to drown any weak sister on either side. I imagine it may have been WGEO that sent the Jap controlled Hong Kong hurrying up to 31.68 metres. The Schenectady station was putting in a fine signal on 31.48 metres, although the last few nights it was 8.30 before it warmed up, so maybe that is why I found them on 9.65 m.c., 31.09 metres at 8.30 on Sunday, August 2. Reference to "New Stations" will show several other movements that have been made during the week end.

Now that KWID, 'Frisco, changes from 19.62 metres to 31.35 metres at 5 p.m., VUD-3, Delhi, is O.K. from 5 till closing at 7 p.m. News is given at 6 p.m.

It was reported CBFY, Montreal, had shifted frequency from 11,705k.c. to 11,745k.c., but no sooner was this mentioned than back they went to 25.63 metres, where they are now to be found. It transpires a faulty crystal was responsible for the unintended move. Our information comes from "The Globe Circler."

COBC, Havana, has now moved to 9,375k.c., 32.00 metres.

The attention of listeners is drawn to the changes in the Swiss transmissions. After August 2 the monthly programmes from Geneva through the League of Nations' stations, HBJ and HBO, will cease and HER-5, Schwarzenburg, 11,865k.c., 25.28 metres, will, from Aug. 1, broadcast on Saturdays from 3.45 p.m. till 5.15 p.m. in National languages, while at the same hour on Tuesdays, in English. Tests have already been made, and on July 25 signal was excellent

Listeners with sets that do not tune to the 49 metre band and who have wanted to hear VQ7LO, Nairobi (Kenya Colony), now have an opportunity by dialling to 10,345k.c., 29m., where the same programme as on 49.5 metres, is found.

"Command Performance", one of the many fine sessions from WJQ, New York, on Sunday nights, is relayed by 2FC at 8.30 p.m.

If you find it difficult to tune direct to London for the 9 p.m. news, turn to 2YA Wellington on 570k.c. 526 metres. As often as not you will find this preferable to the A.B.C.

Sgt. Clark draws my attention to the splendid signal from XGOY, on 31.17 metres when, from 10 to 10.15 p.m. they give a commentary in English for rebroadcasting by R.C.A. in San Francisco.

BBC EMPIRE SERVICES

Band	Call	Freq.	W'-length
49	GSA	6.05	49.59
	GRR	6.08	49.34
	GSL	6.11	49.10
	GRW	6.14	48.86
	GRO	6.18	48.54
	GRN	6.195	48.43
41	GRS	7.065	42.46
	GRM	7.125	42.11
	GRT	7.15	41.96
	GRK	7.185	41.75
	GSW	7.23	41.49
	GSU	7.26	41.32
	GRJ	7.32	40.98
31	GRI	9.415	31.86
	GRU	9.45	31.75
	GSB	9.51	31.55
	GSC	9.58	31.32
	GRY	9.60	31.25
	GRX	9.69	30.96
	GRH	9.825	30.53
25	GRG	11.68	25.68
	GSD	11.75	25.53
	GSN	11.82	25.38
	GSE	11.86	25.29
	GRV	12.04	24.92
	GRF	12.095	24.80
19	GSF	15.14	19.82
	GSO	15.18	19.76
	GSI	15.26	19.66
	GSP	15.31	19.60
	GRE	15.39	19.49
	GRD	15.45	19.42
16	GSG	17.79	16.86
	GSV	17.81	16.84
	GRP	17.89	16.77
	GRQ	18.025	16.64
13	GSH	21.47	13.97
	GSJ	21.53	13.93
	GST	21.55	13.92
	GRZ	21.64	13.86

He also refers to the ever-increasing strength of XGOX on 19.75 metres giving news in English for Europe at 8.30 a.m.

Roy Hallett says, when tuned to the BBC on Wednesday, July 15, in "Lis-

(Continued on page 24)

The MONTH'S LOGGINGS

ALL TIMES ARE AUSTRALIAN EASTERN STANDARD TIME

Pressure on space does not permit of full loggings, but those considered of most interest, together with unusual items, are noted.

Reports from readers are welcomed and notes for following issue should be addressed to L. J. Keast, 23 Honiton Avenue West, Carlingford, and posted to arrive not later than 27th of month.

AUSTRALIA

VLG-6, Melbourne .. .. 15,230kc, 19.69m 2.25 p.m. to 3.10 p.m. for Western States of North America. 6.15 p.m. to 66.30 p.m. for New Guinea (in Japanese).

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

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

VLQ-2, Sydney .... 11,870kc, 25.27m 8.40 p.m. to 9.15 p.m. for North-East Asia. 1 a.m. to 1.45 a.m., for Western States of North America.

VLW-3, Wanneroo .... 11,830kc, 25.36m Heard daily from 8 a.m. to 11.45 a.m. Fair signal (Condon).

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

VLG-3, Melbourne .... 11,710kc., 25.62m 3.55 p.m. to 4.40 p.m. for Tahiti (in French).

VLW, Perth .... 9680kc, 30.98m Heard nightly 9 am. to 11.15 p.m. in W.A. ABC pro. from 11.15 p.m. till 12.55 a.m. programme for South East Asia (in Dutch, Malay, French and English).

VLQ-5, Sydney .. .. 9680kc, 30.98m Heard daily with programme for British Isles. 3.55 p.m. to 4.35 p.m. (Condon).

VLQ, Sydney .... 9580kc,31.32m 6.25 p.m. to 7.25 p.m. for New Caledonia and French Oceania (in French).

VLR, Melbourne .... 9580kc, 31.32m Nat. Prog., 6.45 p.m. to 11.30 p.m. Closes at 11 p.m. on Sundays.

VLG-2, Melbourne ....9540kc, 31.45m 9.25 p.m. to 10.30 p.m., for Eastern States of North America. 11.15 p.m to 12.55 a.m., for South East Asia (in Dutch, Malay, French and English).

VLQ-4, Sydney .... 7220kc, 41.55m To N. America, from 12.25 a.m. till 1.10 a.m. Heard at 6.50 p.m. in French session to New Caledonia. Heard well up here (Perkins). And over here (Condon).

AFRICA

Algeria:

TPZ, Algiers .... 12,120kc, 24.76m "Radio Algier" (pronounced Radio Alzhay). Broadcasts Vichy-French programme from 5 to 9 a.m., and 4.45 p.m. till 6.15 p.m.

TPZ-2, Algiers .... 8960kc, 33.48m Vichy-French programme from 7.05 a.m. to 9 a.m., 4.45 p.m. till 6.15 p.m.

Bechuanaland:

ZNB, Mafeking .... 5895kc, 50.90m R5 at 6.45 a.m. with BBC news (Perkins).

Belgian Congo:

OPM, Leopoldville .... 10,140kc, 29.59m Being heard weakly. Asking for reports. Closes at 5.45 a.m. with Belgian National Anthem.

Cape of Good Hope:

ZRK, Capetown .... 6097kc, 49.20m Heard June 22nd at 6.45 a.m. with B.B.C. News. Weak signal (Condon).

Egypt:

SUX, Cairo .... 7865kc, 38.15m Fair signal at 6 a.m. No English. Heard at 2.55 a.m. in Arabic.

SUP-2, Cairo .. .. 6320kc, 47.47m Awkward hour but good signal at 2.30 a.m.

Radio Cairo, Cairo .... 5980kc, 50.17m Music till 6 a.m. News in English till 6.15 a.m., when same News is given in French. Closes at 6.30 a.m. Irregularly heard. Has been testing on 6100kc, 49.10m.

Ethiopia:

——, Addis Ababa .... 9625kc, 31.17m Heard closing at 1.30 a.m. in English.

French Equatorial Africa:

FZI, Brazzaville .... 11,965kc, 25.06m Schedule: 1.45 p.m. to 2.30 p.m., 4 p.m. to 4.30 p.m. Transmits Free French programmes. News at 1.45 p.m.

(Continued on page 23)

BBC EMPIRE SERVICES WAVEBAND CHART

OPERATIVE MAY TO SEPTEMBEER, 1942, INCLUSIVE

Prepared for the use of overseas listeners by the BBC's Engineering Division, this chart shows the **short wavebands** the BBC expects to be using in its Empire Services during the next five months to serve the various areas of the world at the three main listening periods of the day (**local time**). A list of the call signs, frequencies, and wavelengths of the various channels in each waveband available for use in the BBC Overseas Service is given on page 21.

MONTH	LOCAL TIME	AUSTRALIA, NEW ZEALAND, AND OCEANIA	FAR EAST	INDIA, BURMA, MALAYA	NEAR EAST	EGYPT AND EAST AFRICA	SOUTH AND CENTRAL AFRICA	WEST AFRICA	CANADA AND U.S.A.	CENTRAL AMERICA & WEST INDIES	SOUTH AMERICA
MAY	*M	25; 31	31	19; 25; 31	25; 31	19; 31	19; 31	19; 31	16; 31	16	13; 16
	A	19; 25; 31	16; 19; 25	16; 19; 25	16; 19	16; 19	13; 16; 19	13; 16	16; 19	16; 19; 25	19; 25
	E	—	16; 19; 25	16; 19; 25	19; 31	19; 25; 31	16; 19; 25; 31	19; 25	19; 25; 31	25; 31	19; 25; 31
JUNE	M	25; 31	25	25; 31	19; 25; 31	19; 25	19; 31	19; 25	16; 31	16	13; 16
	A	19; 25; 31	19; 25	16; 19; 25	16; 19; 25	16; 19	16; 19	16; 19	16; 19	19; 25; 31	19; 25
	E	—	16; 19; 25	16; 19; 25	19; 25	19; 25; 31	16; 19; 25; 31	19; 25	19; 25; 31	25; 31	19; 25; 31
JULY	M	25; 31	25	25; 31	19; 25; 31	19; 25	19; 31	19; 25	19	16	13; 16; 19
	A	25; 31; 41	16; 19; 25	16; 19; 25	16; 19; 25	16; 19	13; 16	13; 16	19; 31	19; 25; 31	19; 25
	E	—	16; 19; 25	19; 25; 31	19; 25; 31	19; 25; 31	16; 19; 25; 31	19; 25; 31	25; 31	25; 31	19; 25; 31; 41
AUGUST	M	25; 31	31	19; 25; 31	25; 31	19; 31	19; 31	19; 31	19	16	13; 16; 19
	A	25; 31; 41	16; 19; 25	16; 19; 25	16; 19	16; 19	13; 16	13; 16	19; 31	16; 19; 25	19; 25
	E	—	19; 25; 31	19; 25; 31	19; 31	19; 25; 31	16; 19; 25; 31	19; 25; 31	25; 31	25; 31	19; 25; 31; 41
SEPTEMBER	M	25, 31	31	19; 25; 31	25; 31	19; 31	19; 31	19; 31	19	16	13; 16
	A	19; 25; 31	16; 19; 25	16; 19; 25	16; 19	16; 19	13; 16	13; 16	19; 31	16; 19; 25	19; 25
	E	19; 25; 31	19; 25; 31	19; 25; 31	19; 31	19; 25; 31	16; 19; 25; 31	19; 25; 31	25; 31	25; 31	19; 25; 31

* NOTE—M. = MORNING A. = AFTERNOON E. = EVENING

NEW STATIONS

VQ7LO, Narobi (Kenya Colony, Africa) 10,345 k.c., 29m.: Reported that same programme is heard on this frequency as 6060k.c., 49.5m. Schedule is 2.15 to 5.15 a.m. News, 2.30 a.m. and 4 a.m.

JQHA, Hong Kong, 9470kc., 31.68m.: This seems to have replaced the old Hong Kong frequency. Opens about 10.30 p.m., gives news at 11.10 p.m. Fair signal.

KWID, San Francisco, 9570k.c., 31.35m.: First heard on this new frequency on July 25. Schedule is 5 p.m. till 11 p.m. Splendid signal and excellent programme.

HCJB, Quito, 9970 k.c., 30.09m.: Here is a new frequency for the popular Missionary Station in Ecuador. Sgt. Clark, from an A.I.F. camp "somewhere in Australia," advises hearing this station on July 15. Opening 10 p.m. with a march. At 10.02 p.m. announcement in Spanish giving their call sign and slogan "La voz de los Andes", also wave length, both broadcast and short-wave. This was followed by national news until 10.15, then international news till 10.30. (These people verify with interesting card and literature.Ed.)

WDI, New York, 5065 k.c., 59.23m.: Another Press Wireless station heard from 5.45 p.m. to 8 p.m. Signal would be good but for very high power morse. Reported by Dr. Gaden and Mr. Cushen.

WGI, New York, 5053.5k.c., 59.4m.: This is another new one reported by Dr. Gaden. Did not hear WGI open at 5, but at 5.50 p.m. they are on Spanish, 6 p.m. news in English, 7 p.m. news in English, 7.15 German, 7.30 French, 7.45 Spanish. Closes at 8 and announces "Back in two hours on 14.4—k.c., 20.7m."

Voice of Thailand, Bangkok, 7190k.c., 41.72m.: This is a new station reported by Mr. Condon of Laura, South Australia. He first heard same on July 28 at 11.30 p.m. with English. Anti-British, fair signal. Closes at 11.45 p.m.

Singapore Radio, 12,000k.c., 25m.: Another new outlet first mentioned by Mr. Condon. English at 11 p.m. Closes 11.30 p.m. Under Jap control.

KWV, 'Frisco, 10,840k.c., 27.67m.: Heard on August 1 at 8 p.m. in parallel with KWID. Very fair signal. Do not know call sign or location, yet.—Ed.

WGEO, Schenectady, 9650k.c. 31.09m.: Heard this one at 8.23 p.m. on Sunday, August 2, at 8.30 when news concluded they gave station announcement and frequency. Terrific signal. This is the allotted frequency for WCBX, but they all seem very chummy in the States, particularly when its for the troops "over there."

KGEI, 'Frisco, 9550k.c., 31.41m.: Heard an announcement on Sunday, August 2, that "as and from 4th August, they would be heard on 9.5m.c., 31.41m." (This is the frequency allotted to their sister station, WGEA in Schenectady.) These notes will be set up before I can check this new wave length, but apparently the alteration will be at 5 p.m. Sydney on August 5.

KGEI. Since forwarding in "Loggings," I have heard KGEI on 31.41 metres, and it is without doubt one of the most woeful signals I have heard from this famous station. I listened at 8.30 p.m. on August 4, when they were asking for reports. It was distressing to hear such a signal from 'Frisco when, by tuning to 31.35 metres KWID are, as usual, excellent. I hope KGEI will find a better channel, or go back to 41.38 metres.

LOGGINGS

(Continued from page 22)

Kenya Colony:

VQ7LO, Narobi ....10,345kc, 29m Heard a weak signal which I take to be this one at 2.15 a.m. At 2.30 French session (Hallett).

VQ7LO, Nairobi .... 6060kc, 49.5m 2.15 to 5.15 a.m. News, 2.30 a.m. and 4 a.m. Heard them announce at 2.15 a.m., also on 29 metres (Hallett).

Madagascar:

Radio Tananarive, Tananarive 6063kc, 49.48m Heard from 11.30 p.m. till 2 a.m.

Morocco:

CNR, Rabat .... 8035kc, 37.34m 4 a.m. to 10 a.m. Fairly good at 6.50 a.m. (Perkins).

Portuguese East Africa:

Mozambique:

CR7BE, Lourenco Marques .... 9840kc, 30.48m News at 6 a.m. Closes 7.20 a.m.

Portuguese West Africa;

CR6RA, Luanda Angolo .... 9470kc, 31.68m Monday, Tuesday, Wednesday and Thursday, 5 to 7 a.m.

CR7BD, Lourenco Marques .... 15,245kc, 19.68m 3 p.m. to 4 p.m. News at 3.50 p.m.

Senegal:

FGR, Dakar .... 9410kc, 31.88m Opens at 5.15 a.m. and often heard till 8 a.m. Announces "Allo allo ici Radio Dakar." French talks and operatic music. Signs off with "Marsellaise." (Dissinger)

Transvaal:

ZRH, Johannesburg .... 6007kc, 49.95m Schedule: 1.30 a.m. to 7 a.m. News 5.30. News in Afrikaans at 5.45 a.m. B.B.C. News at 6.45. R5 at 6.45 a.m. with re-broadcast of BBC News

Southern Rhodesia:

Post Office Station, Salisbury .. 7317kc, 41m Schedule: 3 to 6 a.m. Only just audible.

AMERICA

Central:

Costa Rica:

TIEMC, San Jose .... 11,900kc, 25.21m Heard around 11 p.m. Fades by m/n.

TI4NRH, Heredia .... 9740kc, 30.80m Heard with an excellent signal 2 p.m. on Sundays, Wednesdays and Fridays.—Ed.

TIPG, San Jose .... 9620kc, 31.19m Schedule: 10 p.m. to midnight. Strong signal nightly, but spoilt by XGOY's terrific signal (Clock).

Guatemala:

TGWA, Guatemala City .... 9685kc, 30.98m 2 p.m. till 2.45 p.m.

TGWB, Guatemala City .... 6480kc, 46.30m Soid to be on from 2 p.m. to 2.45 p.m.

Nicaragua:

YNRS, Managua .... 8585kc, 34.95m "Radio Nicaraguense." Heard about 11 p.m.

Panama:

HP5G, Panama City .... 11,780kc 25.47m Can be heard quite clear of the Finn at lunch-time. (Gaden).

HP5A, Panama City .... 11,700kc, 25.64m Can be heard in mornng and late at night.

HP5J, Panama City .... 9607kc, 31.12m 10 p.m. till 11.30 p.m.

North:

WCDA, New York .... 17,830kc, 16.83m This 10 k.w. station is beamed to Europe from 5.30 to 6.45 a.m., and from 7 to 9.45 a.m. directed to Central America.

WNBI, New York .... 17,780kc, 16.87m Irregularly heard at 11 p.m.

WRUW, Boston .... 17,750kc, 16.9m 11.56 p.m. to 12.55 a.m. News at midnight.

KGEI, San Francisco 15,330kc, 19.57m. Shedule: 9 a.m. to 2 p.m. News 1 p.m. R6 at 10.30 a.m. (Perkins). (Much later before signal good down here. Ed.).

WCW, New York .... 15,850kc, 18.93m This Press Wireless station heard from 7 a.m. to 9 a.m. English news on the hour, German, quarter past; French, half post; Italian at the third quarter.

WRUW, Boston .... 15,350kc, 19.54m Poor signal in mornings, closes 8.25 a.m. Special session for U.S. troops from 2 to 2.30 p.m. Opens at 11 p.m. with news.

(Continued on next page)

LOGGINGS

Continued

WGEA, Schenectady .... 15,330kc, 19.57m Listen to "March of Time," 7 a.m. to 7.30 a.m. Sundays. Closes at 8.30 a.m. with fair signal.

KWID, San Francisco .... 15,290kc, 19.62m Schedule: 8 a.m. to noon for Americas; 12.30 p.m. to 4.35 p.m. for Pacific in general. Good signal, good prog, (Hallett). News at 9.20 a.m. (Perkins).

WCBX, New York .... 15,270kc, 19.64m 9.30 p.m. to 1¼ p.m. News at 11 p.m.

WLWO, Cincinnati .... 15,250kc, 19.67m Opens at 8.30 a.m. (Hallett).

WBOS, Boston .... 15,210kc, 19.72m 11 p.m. to 3 a.m. News at midnight and 1 a.m.

WRCA, New York .... 15,145kc, 19.81m 11 p.m. till 7.30 a.m. News at midnight.

KKZ, Bolinas .... 13,690kc, 21.91m R7 at 2.13 p.m. (Perkins).

KKQ, Bolinas .. .. 11,950kc, 25.11m Good on Sundays at 2.13 p.m. in "Lucky Strike" programme (Perkins). Heard at 4 p.m. when news from Fairmount Hotel is given.

WNBI, New York ....11,890kc, 25.23m 8 a.m. to 3.10 p.m. News at 1 p.m. Fair at 9.30 a.m. (Perkins).

WBOS, Boston .... 11,870kc, 25.27m 6 a.m. till 3.10 p.m. News at 9, 9.45 a.m. and 1 p.m. Not as strong last month. (Perkins).

WCRC, New York .... 11,835kc, 25.35m Opens at 8 p.m. with news. Fair signal, but fades after 9.30 p.m.

WRUL, Boston .... 11,790kc, 25.45m This channel seems to have been dispensed with in mornings. Opens about 1.50 p.m.—I think.—Ed.

WRUL, Boston .... 11,730kc, 25.58m 8.30 a.m. to 1.30 p.m. News from "Christian Science Monitor" at 8.45 a.m.

WLWO, Cincinnati .... 11,710kc, 25.62m Announced when closing at 8.15 a.m. programme had been beamed to Europe and last hour was for U.S.A. Expeditionary Forces in British Isles (Hallett).

KJE-9, Los Angeles .... 10,750kc, 27.90m Opens about 1 a.m. (Perkins).

KEZ, Bolinas .... 10,400kc, 28.84m Heard in parallel with KWID from 4 to 7 p.m. News bulletins at 4.30, 5.30 and 6.30 p.m. Joins KGEI after 7 p.m., but since KWID moved to 31.35 metres after 5 p.m. stays with them.

KWV, Frisco .... 10,840kc, 27.67m Heard in parallel with KWID from 7 p.m. Do not know call or location.

WJQ, New York .... 10,010kc, 29.97m "The Voice of America." Present schedule is 8 p.m. till midnight. Novel way of presenting news at short intervals. Still a delightful signal. "Command Performance" at 8.30 p.m. on Sundays introduces well known radio artists. Just before opening with news call "Hullo, Australia" (Clack).

WRUW, Boston .... 9700kc, 30.93m News at 8.45 a.m., but signal poor now.

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

WGEA, Schenectady ....9,550kc, 31.41m 9 a.m. to 3 p.m. Mostly in Spanish for South America. News at 10.15 a.m.

WGEO, Schenectady .... 9530kc, 31.48m 6.55 a.m. till 3 p.m. News at 8 a.m. and 10.15 a.m. Opens again at 8 p.m. in special prog. for Forces overseas. News at 9.45 p.m., closes at 10 p.m. R max. signal and grand entertainment nightly (Clack). Also presents "Command Performance" at 8.30 p.m. on Sundays—Ed.

KRCA, San Francisco .. . . 9480kc, 31.65m Opens at 2.15 p.m. with news. Also news again at 4 p.m., 5 p.m., 6 p.m., 7 p.m., 9.30 p.m., 10.30 p.m. 12.30 a.m., and 1.45 a.m. Closes at 2 a.m.

WDJ, New York .... 7556kc, 39.70m Opens at 2 p.m. News 5 p.m. Commentary 5.10 p.m., Spanish 5.15. At 5.30 p.m. announced next session in 15 minutes on 59.4 metres (Gaden).

KGEI, San Francisco .... 7250kc, 41.38m Good from 3.30 p.m. News at 4, 5, 6, 7, 8, 9.30 and 10.30 p.m. At midnight turns Chinese till 12.30 a.m. and news is given again. Final news at 1.45 a.m. Listen to "March of Time," on Sundays, at 3.30 p.m. Announced at 7.30 on Sunday August 2, would be moving to 9.5m.c., 31.41 as and from August 4. (that would be 5 p.m. on August 5 in Sydney.—Ed.).

KGEI, San Francisco .... 6860kc, 43.73m Believe this now off the air.—Ed.

WLWO, Cincinnati .... 6075kc, 49.38m Heard at 4.15 p.m. in same programme as WRCA 31.02m. (Hallett).

Mexico:

XEQQ, Mexico City .... 9680kc, 30.99m Fair in afternoons till 4 p.m.

XEWW, Mexico City .... 9503kc, 31.57m Good in afternoon from 3 p.m. till 4.15 p.m.

XEXA, Mexico City .. .... 6170kc, 48.62m Heard around 11 p.m. with good signal.

(To be Continued.)

SHORT-WAVE REVIEW

(Continued from page 21)

teners' Log," he heard Mr. Hugh Perkins of Malanda, Queensland, called.

All India Radio are broadcasting in several languages, Chinese, Thai and Burmese being detected, amongst others.

A letter received from FZI, Brazzaville, by Roy Hallett, mentions they hope to occupy several additional channels and to increase power soon, so if you hear a loud Free French station pop up somewhere, listen intently.

Don't get despondent if you have not received a reply to reports sent overseas; Sgt. Clark only got a verification this week for one sent to WCBX in March, 1941. This was for a programme heard on 15,270k.c. 19.62 metres.

CONDENSERS

(Continued from page 18)

material soaked in a liquid constitutes the electrolyte.

Electrolytic condensers of only a few cubic inches in size, having capacities of up to 1000 mfd., are made, while, of course, the usual 8 mfd. high-voltage electrolytic filter condensers are used in all a.c. receivers nowadays.

Variable Condensers

In the well-known variable type of condenser, one set of metal plates (termed the moving plates, or rotor) is arranged so that it can be interleaved to any desired degree with a second set (termed the fixed plates, or stator). Usually the dielectric is air, but in some instances a solid dielectric is employed.

This type of condenser will be dealt with more fully next month, when the way in which a tuned circuit works is being considered.

"LITTLE COMPANION"

(Continued from page 7)

in the missing I.F. stage, but I can say, with the exception of selectivity, the results are much more pleasing.

"Mr. Magrath seems to think there may be a shortage of 7 plate padders, so would you kindly state in the write-up that we can supply a 375 M.M.F. fixed padder for the oscillator which was tried and found quite satisfactory.

"A word about the correct method of aligning the iron-cored coil would not go amiss either. Set 600 K.C., or about 2FC with iron slug in oscillator coil and 1400 K.C. with oscillator trimmer. Repeat this operation until top and bottom of the band come to correct calibration, then peak slug in aerial coil on a station at the low frequency end of dial—2FC or 3AR, then go back to 1400 K.C. and peak trimmer on aerial section of gang. I merely suggested this because I've found so many home constructors in a hopeless muddle trying to align iron-cored coils.

In conclusion, I will say that there are many other output tubes I would liked to have used, e.g., EL3NG, 6V6, etc., but, alas, they are becoming scarce, so we have to cut our cake accordingly, I know you will appreciate this.

"Our next feature, we hope, will be an entirely new set utilising permeability tuning exclusively, no gang at all (maybe I'm being ambitious), but I'm working on the design now."

SPEEDY QUERY SERVICE

Conducted under the personal supervision of A. G. HULL

E.S.D. Bendigo, Vic.) tells a sad tale about his difficulties in regard to obtaining supplies of components.

A.—Yes, we fully realize the position, which explains one of the reasons why we do not handle the set construction articles as we did in the good old days. Many of our readers, however, are doing good business and getting a world of experience by buying up junk sets, stripping down the components, testing them carefully and then designing o circuit to use the serviceable components. This might be considered a woste of time by an efficiency expert, but actually it is good practice for the keen experimenter. We recently had the pleasure of hearing an amplifier built up from odds and ends in this way and it gave exceptional results. Three old-type speakers were used, one for the lows, one for the middle register, and an old magnetic type for the highs. A pair of old 45 type triods were used in the output and although they must have seen at least ten years' service, they were running on over 300 volts and pumping out lots of good quality output.

* * *

M.S. (Frankton). We have a letter for you, returned from the dead letter office as your address insufficient. Please let us have full address including name of State.

* * *

T.K. (Coburg, Vic.) falls into an old trap. He wants a heavy-duty resistor to take the place of an 8,000 ohm field coil in an old set, to which he is now fitting a permagnetic speaker. He has tried to earth both ends of an old 15,000 ohm voltage divider and then used the centre tapping, thinking that he is thereby obtaining an effective resistance of half the original, but finds that the set is heating up and the divider burns out.

A.—When you use the tapping in the way you mention, you are actually splitting the divider into two separate resistances, each of 7,500 ohms, and when you put these two in parallel you get an effective resistance of only half this amount viz., 3,750. When you put this across the full high tension, you draw quite a heavy current, more than double the amount for which the resistance wire on the divider was originally intended to carry. The proper solution to the trouble is to use two 15,000 ohm voltage dividers in parallel, which will then give you an effective 7,500 ohms of resistance and capable of carrying the current. However, in most cases those old sets were fairly heavily loaded when energizing the speaker across the full high tension, and we think it might be a good idea to use only one divider. This will lower the high tension drain by about 15 milliamperes or so, but this should be all to the good, possibly giving you an increase in high tension voltage of ten or fifteen volts, but this should not overload the filter condensers.

* * *

J.S. (Bourke) is worried about loudspeaker matching, as the shortage of type 38 valves has made it necessary for him to change over to another type of valve, which requires a load of only 7,000 ohms, as against 10,000 specified for the old 38.

A.—This is just another one of the cases where practice and theory give quite a different impression unless you understand them fully. It will be quite O.K. for you to run the new valve with the old speaker input transformer. There may be a slight difference in power output for a given percentage of distortion, but this will not be serious, in fact, it may turn out that you will find it impossible to tell the difference by ear. To exploin this we might mention that only a small percentage of the overall distortion of any set comes from the output loading so that even if it increases by a per cent or two, it is still not a big factor. At normal volume the outut valve will not be operating at anywhere near its maximum power output, and only on peaks will the question of power output become worth considering. Even then it takes a whale of a lot of distortion to really become nasty. Our advice, anyway, is to use the old transformer for a start, and then if you really think you can notice the distortion you can easily get one of the correct ratio, so that your loading will be according to the maker's recommendation.

* * *

K.L. (Frankston, Vic.) wants a circuit of an amplifier with a direct-coupled phase-changer.

A.—Although not described exactly os an amplifier, you can get this circuit from the issues of March and June, 1941. Copies of these issues are still avoilable at 6d. each post free.

VIBRATORS

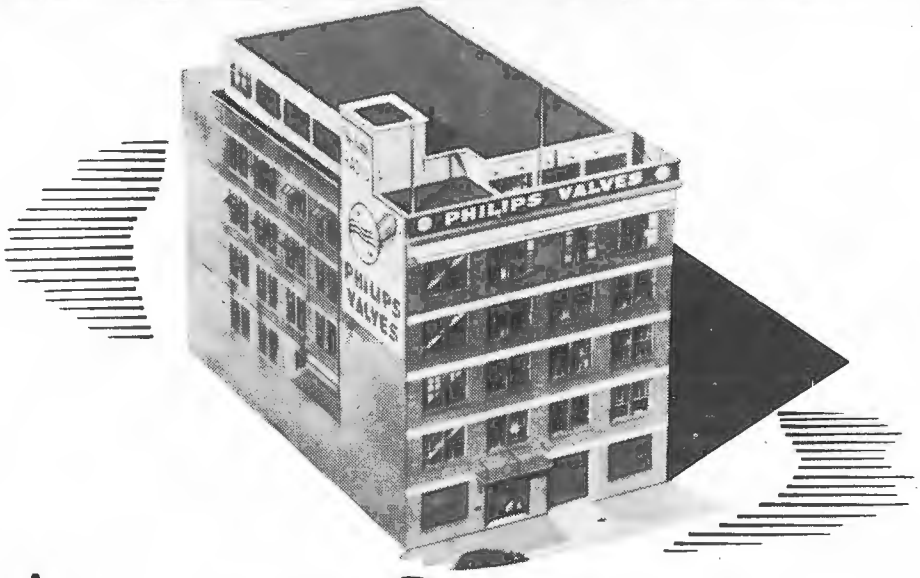
(Continued from page 15)

3. Microphonic Condensers. (Usually variable condenser.)
4. Loose chassis screws.
5. Poor Grounds in Radio.

Don'ts

1. Never change the specified capacity of the buffer condenser.
2. Never attempt to repair a vibrator. Filing contact or bending springs destroys the factory adjustment which has been carefully made with expensive instruments.
3. Never replace the vibrator until you are sure it is defective.

—Lamphouse Annual, N.Z.



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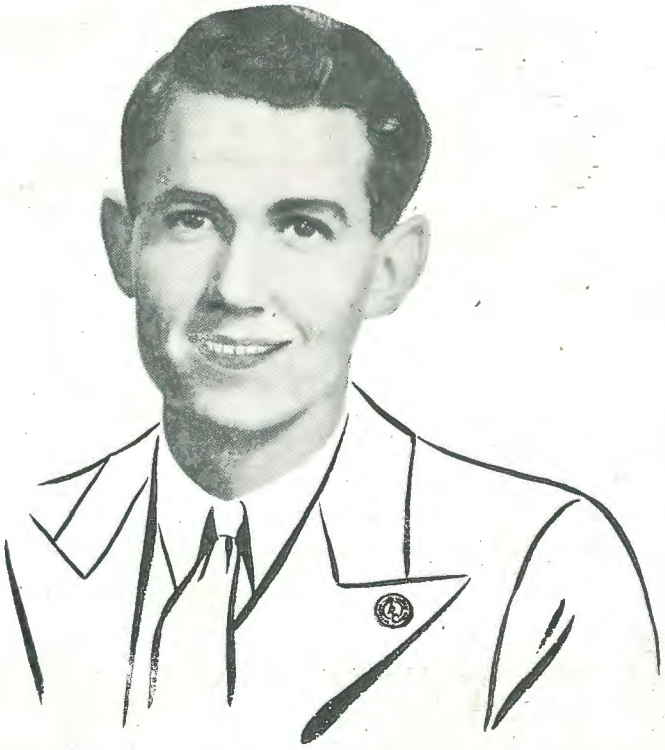

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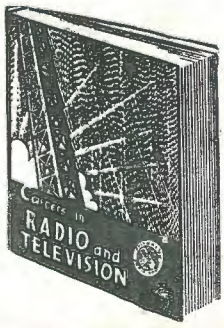

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