THE AUSTRALASIAN

Radio World

MAY 1, 1937
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—See Page 8.

- 1937 AMATEUR RADIO SHOW REVIEW: MORE ABOUT THE "INTER-
- NATIONAL": THE "1937 EMPIRE ALL-WAVE THREE": INVERSE FEED-
- BACK CONQUERS PENTODE TONE: LATEST SHORTWAVE NEWS.

Insist on the Guaranteed RADIOKES KIT-SET for the 1937 Dual-wave Pentagrid Four!

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ALL over Australia and New Zealand it's the same story—Radiokes Kit-Sets and components outselling all others by sheer quality and value for money. Last year's Radiokes Dual-wave Pentagrid Four Kit-Sets sold in remarkable numbers.

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1937

"Radio World" International

1 *Tri-wave Coil Assembly, Type TWA-3D* £6/17/6
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1 *Power Transformer, Type L80.* 28/6

Favoured and recommended by the Editor —the ONLY way to get results as good as those secured by the designer of the Set.

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Editorial Notes....

In a news release recently to hand from the States, Mr. Alfred A. Ghirardi, noted radio writer, states that one important trend in radio today lies in the rapidly growing use by servicemen of the cathode ray oscillograph.

Undoubtedly this new device is destined for a very important future in the radio service field. As a tool in the hand of a capable serviceman, its applications are almost endless, while just as important as its flexibility is its value as a time saver. In servicing as in any other profession, time mean money, and any device that can locate faults in half an hour that otherwise might take half a day to find is a far more than worthwhile investment.

According to Mr. Ghirardi, servicemen in the States are, as could be expected, using oscillographs chiefly for alignment work... However, other common uses include the measuring of capacity and inductance, testing overall receiver sensitivity and overall audio fidelity, localising audio distortion, and checking receivers for intermittent reception.

Several progressive manufacturers of test equipment in this country have recently marketed osiillographs designed for service work. The price factor, often a problem with servicemen, has in one case at least been taken care of by the use of the latest type 913 1-inch cathode ray tube. This makes possible the marketing of a complete oscillograph for around £20—a figure well within the means of most servicemen who regard the purchase of equipment of this type not as an expense, but an investment that will mean increased and more profitable business.

Further trends in the radio industry that were noted by Mr. Ghirardi during a nation-wide trip include the new interest in progressive merchandising and business promotion methods by even small radio dealers, and the rapid growth of the use of public address and intercommunication systems, particularly for retail stores. Finally, Mr. Ghirardi also comments on the prevalence of parts departments in radio stores throughout the country, indicating renewed interest and activity on the part of experimenters.

THE AUSTRALASIAN RADIO WORLD

Incorporating the

ALL-WAVE ALL-WORLD DX NEWS.

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

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CONTENTS :

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

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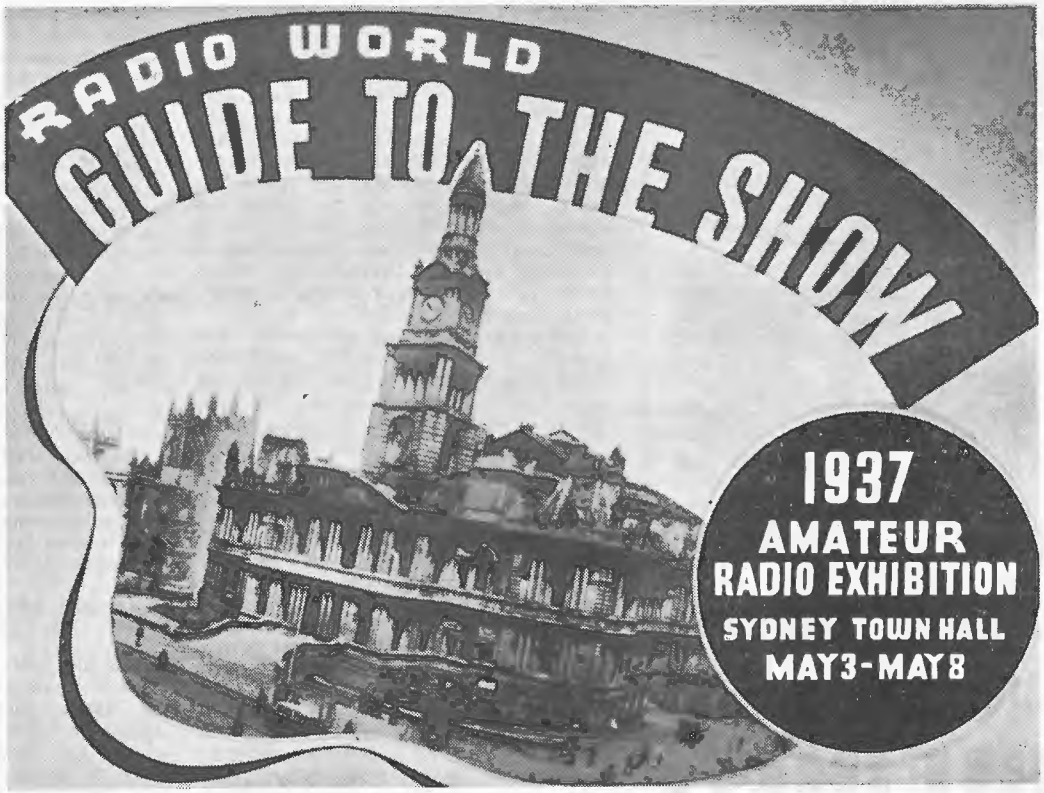


A review of exhibits to be displayed on the 37 stands taken for this year's Amateur Show is given below.

Stand 1—Wireless Institute of Australia (N.S.W. Division)

Exhibits entered by competitors in the various amateur constructional competitions being held will be displayed on this stand.

Stand 2—W. G. Watson & Co. Ltd.

One of the main features of this display will be a wide range of the well-known Triplett electrical measuring instruments and testers.

These will include the new 1937 units, comprising a condenser tester, V.T. voltmeter, A.F. oscillator and modulation monitor. The standard range of Triplett Master Tester units will be featured, while typical examples of the new Ranger-Examiner test instruments will also be included.

Other exhibits will include Erie resistors, Gent's electric clocks and "Switchon" radio receivers, while the latest 8-page Triplett and Readrite catalogue will also be available for distribution.

Stand 3—Amalgamated Wireless Valve Co. Ltd.

Many special features of particular interest to experimenters will be exhibited at the A.W. Valve Co.'s stall, but the centre of attraction will undoubtedly be a special demonstration valve possessing a fluorescent plate. This makes visible to the eye the action of electron flow within the valve from filament to plate, and also illustrates the effect that an alteration of grid voltage has on the electron stream.

Next in pride of place will be a 13-valve amateur communications receiver, of which constructional details are given in the latest "Radiotronics."

Also displayed will be two oscillograph equipments, one fitted with the new Radiotron type 913 1-in. cathode ray tube, and the other using the "long persistence" Radiotron 910 with a 3-in. screen.

Stand 4—Price's Radio Service

As specialists in amateur gear, the display arranged this year by Price's Radio Service is certain to attract widespread interest.

On their stand a feature is being made of amateur communication type superhet kits. One is a simple two-valver using multi-element valves, while the other is a five-valve receiver, both being shown in completed form.

For the 'phone man a simple oscillograph using a type 913 valve will be shown. This will be available in kit form, and will be very reasonably priced.

The country experimenter is not forgotten, as a range of batteries as well as a Wincharger will be on view. As regards components, a complete range of name plates, with condenser scales to match in both 2¾-in. and 2-in. diameter, is worth noting.

A complete "ham" station featuring the "Radio World" 53/6P6 transmitter will be well worth examining, as well as the range of test equipment, which includes a new and very compact multi-meter built round a Ferranti meter. A Clough Brengle oscilloscope will be in operation on the end of an amplifier.

Stands 5, 6, 7, 8, and 9

These stands will be held by the North Suburban, Manly, Waverley, Lakemba and Zero Beat Radio Clubs respectively, and an attractive variety of gear built by members will be displayed.

Stand 10—Noyes Bros. (Sydney) Ltd.

Amateurs and set-builders will find it hard to pass the Noyes Bros. stand without spending some time examining the wide variety of quality equipment for which this firm are agents.

A range of the well-known Gladstone transformers will be on view, together with a display board showing the parts used in the assembly of a typical transformer. A Gladstone emergency lighting plant, providing a shadowless light, will be an interesting working exhibit.

Other lines to be shown comprise Clough-Brengle test equipment (including the latest model oscillograph), Ferranti 2 in. and 2½-in. instruments, Goldring pick-ups, Microhm potentiometers, and Simpson electric turntables.

The potentiometer display will include a board showing the method of assembly of Microhm wirewound and carbon type potentiometers.

Stand 11—Amalgamated Wireless (A'sia) Ltd.

A 750-watt marine transmitter that operates on the medium waveband will be one of the principal features of the A.W.A. exhibit. Amateurs will also be interested in a 250-watt automatic distress transmitter used on small vessels not carrying a wireless operator, and in the other marine equipment on display, comprising a five-valve receiver tuning from 185 to 3,000 metres, and a commercial short-wave receiver.

A.W.A. broadcasting equipment will include a beat frequency oscillator, and also a cathode ray oscillograph as used in broadcasting stations for measuring modulation percentage.

Other features of the display will include a 5-metre transceiver, and as well, an aircraft transmitter and receiver of the type that is to-day being installed in Australian aircraft used for passenger services.

Stand 12—Slade's Radio

A full range of Calstan meters and test equipment, together with broadcast and amateur communication type receivers, will be displayed this year by Slade's Radio.

Of special interest to amateurs will be a 25-watt all-wave 'phone/C.W. transmitter, using three Australian-made thermo-couple meters. Using a pair of 6L6's, the transmitter has been designed for low cost and simplicity of operation, and full information regarding it will be available to inquirers.

Stands 13 and 14—W.I.A. Supplementary Stands.

Stand 15—Philips Lamps (A'sia) Ltd.

Exhibits ranging from microphones to receiving and transmitting type valves, and including photo-electric cell equipment and a selection of cathode ray tubes, will comprise the Philips display at this year's show.

In addition to a range of high quality velocity microphones, which are rather too highly priced for the average amateur, a range of carbon microphones will be shown. These will fill the amateur's needs admirably, both as regards cost and overall characteristics.

Another display will be life-size cut-out photographs of a complete range of Philips transmitting pentodes. Unique among them are valves giving tremendous output for very little input. One delivers 145 k.w. for an input of only 10 watts, while an excitation of 13 watts to a water-cooled model results in a power output of 2.5 k.w.

From their large range of "Maxiwatt" amplifiers, Philips have selected for exhibition a 60-watt model to illustrate how the new Maxiwatt principle patented by them reduces the size and weight of equipment and gives high quality with economic valving. Incidentally, a Maxiwatt amplifier is one which changes its system of operation from class A to class B, and the reverse, in accordance with the input supplied to it.

The model exhibited is provided with a special stand permitting of feeding the amplifier from pick-up microphone, standard telephone line or radio receiver.

An experienced technician will be in constant attendance at the Philips stand. The popular Philips "Technical Communications" will be displayed, and those intercsted in receiving past or future issues, or both, will be able to fill in application forms at the stand.

Stand 16—Swain & Co. Ltd.

Overseas radio periodicals and text-books will comprise the exhibit of Messrs. Swain & Co. Ltd., who specialise in stocking up-to-date radio literature for amateurs, servicemen and experimenters.

Stand 17—Ducon Condenser Pty. Ltd.

Samples of every type of fixed condenser commonly used in radio will be on display at the Ducon stand. The range varies from ceramic-cased mica condensers and paper pigtail condensers, to semi-dry and wet electrolytics, of which over 100 types are made by the company. There will also be a display of Chanex interference suppression equipment.

Of particular interest to amateurs will be the mica transmitter condensers and paper high tension condensers that will be on show, while for set-builders there will be a collection of Sirufer coils in various stages of assembly.

Stand 18—E. F. Wilks & Co. Ltd.

An ingenious method of demonstrating the world-wide range possibilities of Westinghouse radios will be displayed at this year's show by Messrs. E. F. Wilks & Co., distributors for this well-known receiver.

A large map with station locations indicated by red lights, and illuminated verification cards flashing simultaneously with the map lights, tell a fascinating story of the DX possibilities of Westinghouse sets.

Stand 19—Official Committee's Stand

Stand 20—"Wireless Weekly"

As in previous years, sets designed and described by "Wireless Weekly," including a ten-valve short-wayer, will be featured on this stand.

Stand 21—George Brown & Co. Pty. Ltd.

A full range of Rola speakers, comprising twelve different models, will be displayed by Messrs. Geo. Brown & Co. Pty. Ltd. As well, there will be a display board showing all the component parts of one model speaker.

One of the latest Ultimate all-wave chassis incorporating a separate oscillator, all-metal valves and inverse audio feedback, will also be on view.

Stand 22—Radiokes Ltd.

For many years now the well-known firm of Radiokes Ltd. has specialised in kit-sets and radio components, and its display will thus be of far more than average interest to visitors.

As well as a complete range of Radiokes products, the latest kit-sets for 1937 will be on show, completely assembled and in full working order.

Those interested in latest developments in components will be able to study the new Sirufer-cored I.F.'s, which will be shown in various stages of assembly, while "Radio World" readers will recognise the new Trivave Coil Assembly used in the "International" described in this and last month's issues. The latest triple-band tri-colour dial will also be on show.

Free folders, leaflets and booklets describing all Radiokes products will be available.

Stand 23—"Australasian Radio World"

A selection of receivers featured in the "Radio World" will be on show, together with an All-wave All-World DX Club display that will be of interest to all DX enthusiasts.

Stand 24—W.I.A. Supplementary Stand

Stand 25—Radio Transmission Equipment, Ltd.

The main feature of the stand of Radio Transmission Equipment Ltd., London, will be the radio homing device for the guidance of aeroplanes in flight. A complete homing device will be in operation on the stand, together with a model aeroplane, enabling the public to see the actual operation of the visual course indicator when the 'plane is directed towards the various broadcasting stations.

The R.T.E. homing device is a means of radio guidance of aeroplanes requiring no special ground organisation whatever. In operation the device is simply tuned in to any ordinary broadcasting station located on the line of flight desired, and a switch thrown over to put the visual indicator into operation. The pilot then merely directs the 'plane so as to keep the needle of this indicator in the central position.

The whole equipment weighs only approximately 20lbs., and operates from the 12-volt storage battery normally carried for navigation lights, engine starting, etc.

Attention will also be drawn on the stand to the various activities of Radio Transmission Equipment Ltd. such as the manufacture of broadcasting stations, radio beacons for aerial or marine navigation, directional receiving equipment of all kinds, etc.

Radio Transmission Equipment Ltd. are represented in Australia by The Mullard Radio Company (Australia) Limited, 26/30 Clarence Street, Sydney, suppliers of the well-known Mullard Master valves and Mullard Master radios.

Stands 28 and 29—P.M.G.'s Department

A multiplex telephone system, ultra shortwave equipment and interference suppression devices will be features of the P.M.G. Dept.'s stall this year.

Stand 30—Vesta Battery Co. (Aust.) Ltd.

A number of models illuminated with flashing neon lights will demonstrate the many uses of Vesta batteries for electric trains, ocean liners, motor cars, aeroplanes, radio sets, motor cycles, farm houses, burglar alarms, banks and also for fog signals on Sydney Harbour.

A model electric train running on a miniature track winding around the stand will pull models vans loaded with Vesta batteries, while illuminated signals, signal boxes, overhead bridges and station yard lights along the track will assist in making a most attractive display.

Stand 33—A. G. Davis & Co.

Meters, microphones, and pick-ups, with perhaps several amateur shortwave receivers, will be prominent among the various lines that will be displayed by Messrs. A. G. Davis & Co.

Stand 34—Paton Electrical Instrument Co.

The display arranged this year by the Paton Electrical Instrument Co. will include a complete range of the well-known "Palec" 3-in. and 5-in. meters, of the D.C., rectifier and thermo-couple types.

There will also be a full range of latest test equipment for servicemen, including working models of the two oscillographs lately released by the Company. A display of precision dials will complete the exhibit.

Stand 36—W.I.A. Supplementary Stand

Stand 35—John Martin Ltd.

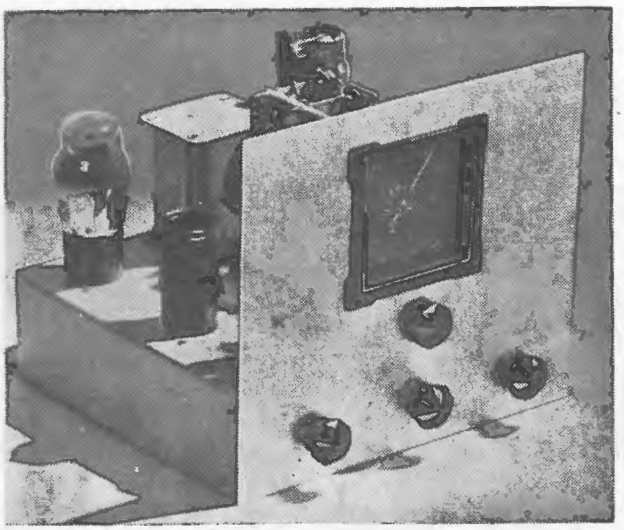
Prominent among the wide variety of radio components exhibited will be a selection of the widely-known Hammarlund shortwave products. A special display will also be made of latest American Regal carbon type microphones, for which this firm has just been appointed sole agent in Australasia.

The agency for Raymart shortwave components has also been granted to Messrs. John Martin Ltd., and it is hoped that stocks will be available in time for display at the show.

Stand 37—Lekmek Radio Laboratories

For several years past, Lekmek Laboratories have specialised in supply-

(continued on page 46)



The . . . 1937 Empire All-Wave Three

A three-valve all-wave battery receiver, using a 1C4 r.f., 1K4 detector, and 1D4 output pentode. Electron-coupled regeneration, automatic bias, and low battery drain are attractive features . . .

THE "1937 Empire All-Wave Three" is a receiver that will undoubtedly become widely popular among amateurs, shortwave listeners, and all DX enthusiasts.

Reasonably-priced and of simple design, it is at the same time an excellent performer, and will bring in on 'phones everything that much larger and far more expensive receivers can pick up. As well, the waveband coverage on the short waves, is continuous from about 12.5 metres upwards, embracing a far greater range than the average dual-waver.

About The Circuit.

The circuit (shown below) was published recently by the Amalgamated Wireless Valve Co., and uses a 1C4 r.f. stage, 1K4 detector, and 1D4 output pentode. A standard two-gang condenser is used in place of the usual pair of .0001 mfd. midgets specified for sets of this type, and has the important advantage that comparatively few sets of plug-in coils are required to give all-wave coverage.

For example, only one pair of coils is needed with the "1937 Empire" to cover the broadcast band, whereas with the smaller condensers, three pairs would be required to give complete coverage.

Volume is controlled by using a .1-megohm potentiometer in the arrangement shown, to vary the screen voltage on the 1C4.

Variable screen voltage control is also used for the 1K4 to give control of regeneration.

Electron-Coupled Regeneration Used.

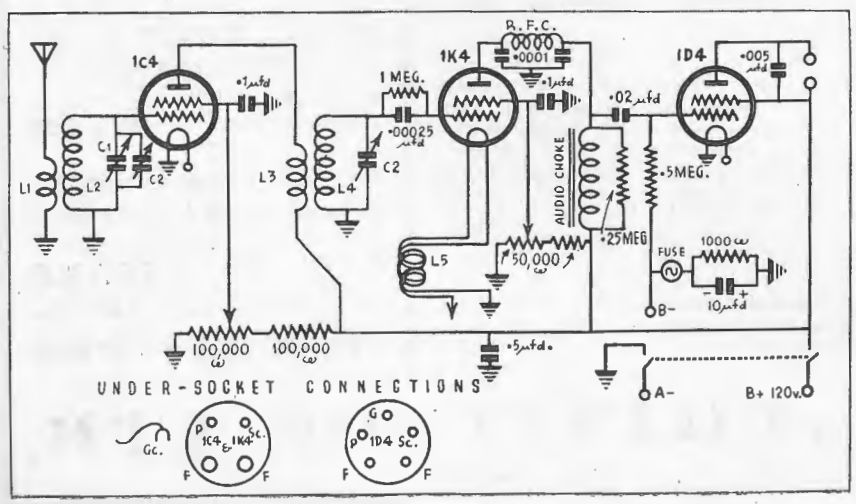
Electron-coupled regeneration is obtained by means of the double winding (L5) forming part of the detector filament circuit. This scheme in effect makes a cathode of the filament, in that it is above earth in regard to r.f. In operation, the regeneration control is velvet-smooth, with no trace of "ploppiness."

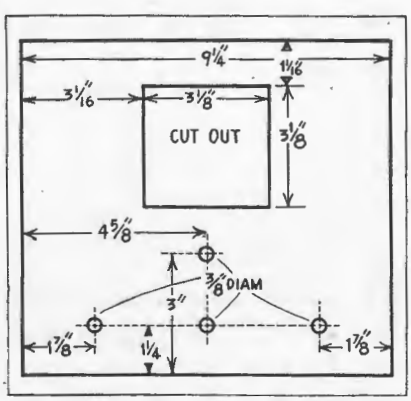
For greatest gain and dependable regeneration, choke coupling is used between the 1K4 and 1D4, a .25-megohm resistor being connected across the audio choke as a precaution against threshold howl, and to improve frequency response.

Automatic bias for the output pentode has been incorporated by connecting a 1000-ohm resistor between earth and "B—," and returning the 1D4 grid leak to the latter point. A 60-milliamp fuse bulb has also been included in this circuit to protect the valve filaments against accidental high tension short circuits.

Low "A" and "B" Battery Drain.

To keep both initial and running costs down, the set was designed to operate from two light duty 60-volt "B" units, giving a 120-volt "B" supply. By slightly over-biasing the 1D4, the total "B" current consumption of the receiver has been kept down to under 7 mills. The "A" drain is .36 amp. (without dial lights), meaning that over 100 hours of service can be expected per charge from a small 2-volt accumulator, such as the Clyde 2VS7 40-ampere hour type.





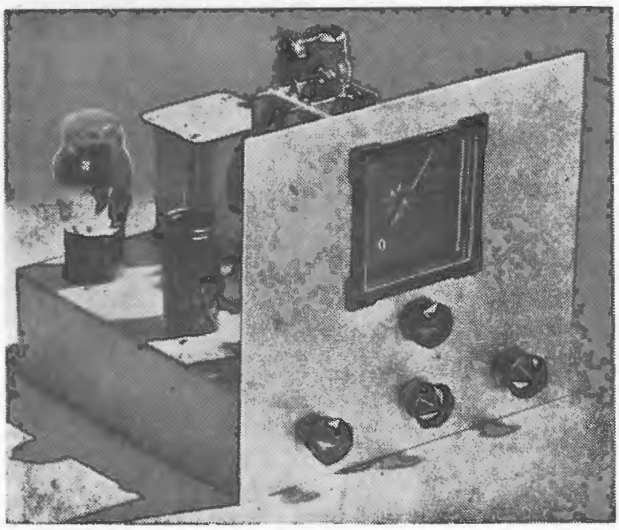
The circuit of the 1937 "Empire" is shown on the left, while above is a sketch giving details for preparing the front panel.

DXers! Here's the set that pulls 'em in!

- ★ Tunes from 12—600 metres, with standard two-gang condenser.
- ★ Uses latest 1K4 screen-grid detector, with electron-coupled regeneration.
- ★ Low "A" and "B" drain, giving low initial and running costs.
- ★ No "C" battery required — automatic bias used.

EMPIRE ALL-WAVE THREE

.... makes HARD-TO-GET stations EASY



Destined to become one of Australia's most popular DX sets — the "Empire All-Wave Three" is a DX receiver from aerial terminal to output jack. Even the most hard-boiled old timer will sit up and take notice when this wonderful little distance-getter is on the job.

Get busy NOW — write for full detailed list of parts and prices — our special Mail Order Department is ready to rush your order immediately.

Retail Price, complete (no extras to buy) **£11-10-0**

We recommend . . .

KESTER SOLDER

for a really sound efficient job. In ½-oz. sticks; as well as 16-oz., 5-lb. and 20-lb. reels.

Thousands of parts and dozens of other RADIO WORLD SETS to choose from! . .

We maintain a complete stock of all parts and Kit-sets for receivers and transmitters, etc., described in "Radio World," including the sensational "1937 International All-Wave Six" — the most outstanding performer of the year.

A full list of these sets will be found in the back of the April issue of "Radio World." Write or call for special quote!

DEALERS! We have been appointed distributors for the famous COLUMBIA DRY BATTERIES and DRY CELLS, manufactured by the National Carbon Company. Send for latest price list.

FOX & MacGILLYCUDDY LTD.

MERINO HOUSE, 57 YORK ST., SYDNEY. Tel.: B 2409

The "1937 Empire All-Wave Three"—List of Parts

1—Chassis, front panel, and bracket as per sketch.
1—2-Gang Condenser (Stromberg-Carlson).
1—23-plate midget (Radiokes).
1—7-plate midget (Radiokes).
5—Wafer sockets, 3—4, 1—5, 1—small 7-pin (Stromberg-Carlson).
1—4-pin Dalton socket.
1—High impedance audio choke (Radiokes).
1—Full vision dial (Efco Aero Junior).
1—.1 megohm potentiometer (Microhm).
1—.05 megohm potentiometer (Microhm).
1—Double-pole double-throw on/off switch (toggle type).
1—Closed circuit output jack, and plug.
1—4-pin plug and length 4-wire battery cable.
1—Shortwave r.f. choke (Radiokes).
2—Goat valve shields.
3—Small knobs.
1—Pair headphones.
4—4-pin, 47-pin coil formers (Standardised Products) (or complete set of 8 ready-wound coils—Standardised Products).

FIXED CONDENSERS:
2—.0001 mfd. mica (T.C.C. midget).
1—.00025 mfd. mica (T.C.C. midget).
1—.005 mfd. tubular (Solar).
1—.02 mfd. tubular (Solar).
2—.1 mfd. tubular (Solar).
1—10 mfd. dry electrolytic, 25v. working.

FIXED RESISTORS:
1—1,000 ohm 1-watt carbon (Allen-Bradley).
1—50,000 ohm. 1-watt carbon (Allen-Bradley)
1—100,000 ohm. 1-watt carbon (Allen-Bradley).
1—.25 megohm 1-watt carbon (Allen-Bradley)
2—1 megohm 1 watt carbon (Allen-Bradley).

VALVES:
1—1C4, 1—1K4, 1—1D4 (Radiotron, Raytheon, Ken-Rad).

BATTERIES:
2—60v. light duty "B" batteries (Ever Ready).
1—2-volt 40 amp. hour accumulator (Clyde).

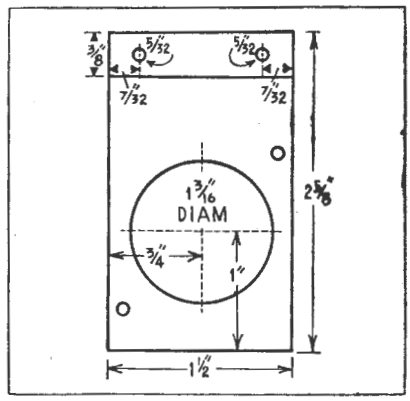
MISCELLANEOUS:
4—terminals, 2 red, 2 black (Dalton); 2 grid clips; 2—60 milliamp dial lights; 1—fuse holder and fuse bulb. Small quantities of 20 enamelled, 26 d.s.c., and 32 enamelled wire for winding coils.

1C4 Mounted Under Chassis.

To avoid long grid and plate leads in the r.f. stage—always undesirable in any receiver, but particularly so in one that is to operate on the short waves—the 1C4 r.f. valve has been mounted horizontally underneath the chassis, parallel to the front of the latter, and in line with the aerial and detector coil sockets. This means that the grid lead to the aerial coil, and the plate lead to the detector coil, are both only about an inch long. A small steel bracket, stamped to take the r.f. valve socket, is all that is needed for the mounting.

Four pairs of plug-in coils, tuning from approximately 12.5 to 600 metres with no breaks, are required, the turns details and approximate coverage for each pair being given in a panel elsewhere.

Accurate tracking over all wavebands is ensured by means of the midget 7-plate variable condenser connected in parallel across the r.f. section of the main two-gang tuning condenser.

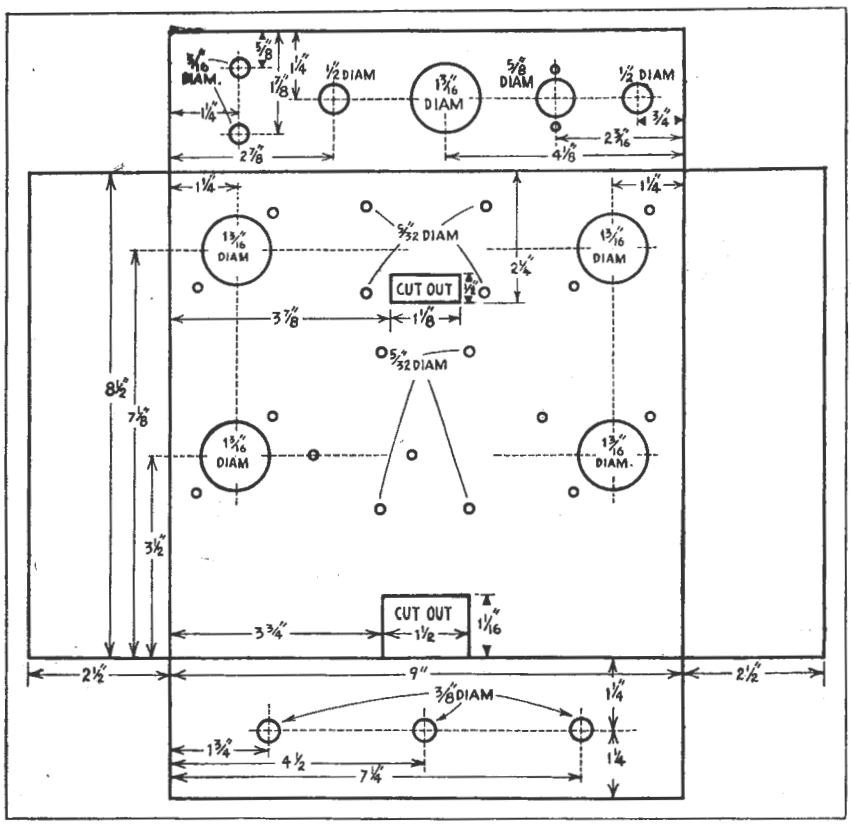


Details of the right-angled bracket used for mounting the 1C4 beneath the chassis are shown above.

Wiring Diagram Next Month.

The parts required to build the "1937 Empire All-Waver," together with full details for preparing the 16-gauge aluminium front panel, and the steel chassis and bracket, are given elsewhere. As well, a separate sketch is

(Continued on page 47)



This sketch gives all dimensions required for st amping and drilling the steel chassis.

This Month's Front Cover

For several years Amalgamated Wireless has conducted intensive research work in the development of radio, and the front cover photograph this month shows a corner of the well-equipped laboratory that has been set up at the A.W.A. radio-electric works, Ashfield. A staff of scientific workers is constantly engaged—all of them being Australians, though some have been abroad to extend the scope of their training. A great deal of valuable scientific equipment has been assembled, and A.W.A. is confident that its developmental and research work will prove an important factor in furthering Australian wireless.

Dr. G. Builder, B.Sc., Ph.D., F.Inst.P., A.M.I.E. (Aust.), is in charge of the A.W.A. laboratory, associated with him being a total of twenty university graduates in physics or electrical engineering. Other members of the staff with high qualifications are Dr. A. L. Green, M.Sc., Ph.D., M.Inst.R.E. (Aust.) and Dr. O. O. Pulley, B.E., Ph.D., B.Sc., A.I.M.E. (Aust.).

YOU HAVEN'T FAR TO GO TO SEE

but you'll have to go a long way to see a finer display of modern, time-saving, accurate test equipment . .

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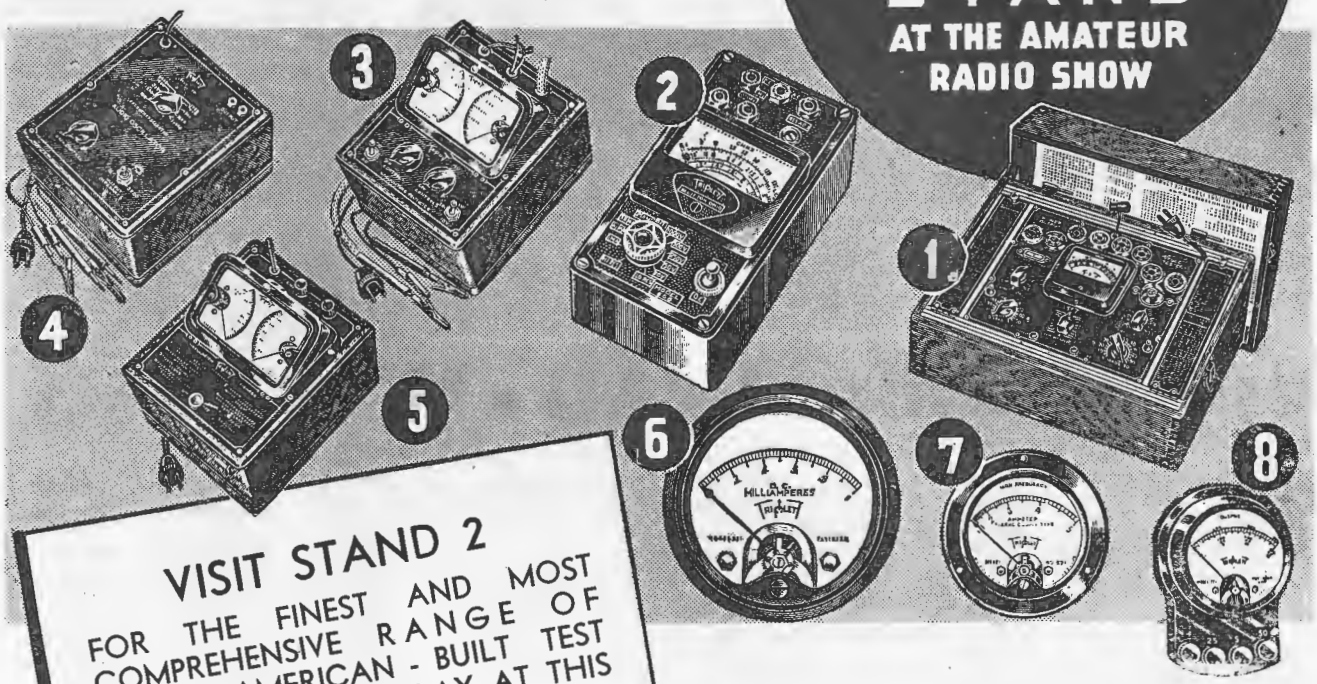

VISIT STAND 2

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1 MODEL 1503 Multi Purpose Nine-In-One Tester checks any type valve, also paper condensers and electrolytics. D.C. voltmeter and milliammeter, ohmmeter, decibel meter. Price £16/10/-

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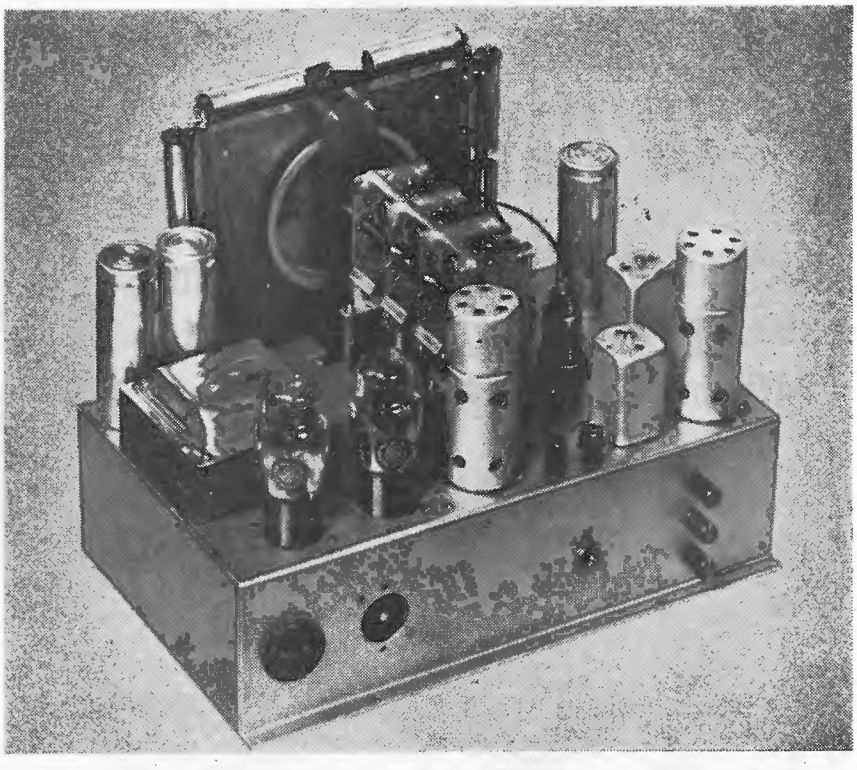
TRIPLETT....THE MASTER TESTERS

★

Right: A rear view of the "1937 International All-Wave Six" featured in last month's issue. It uses the latest Radiokes Tri-Wave coil assembly and three-band edgelit dial, while another "star" feature is the special inverse feedback arrangement used with the 42 output pentode to provide high quality reproduction.

★



Assembling, Wiring, And Aligning . . .

The 1937 International All-Wave Six

THE construction of a receiver like the "1937 International" is not difficult if tackled in the right way. Roughly, there are three stages in the assembly and wiring. 1. Complete assembly of chassis, except for coil box and volume control. 2. Wiring of chassis, excluding resistors and condensers. 3. Wiring in of resistors and condensers, followed by mounting and wiring of coil box and dial.

Mounting The Parts.

The first stage is straightforward. The components to mount are the three electrolytics, power transformer, I.F's., aerial and earth terminals, pick-up switch and the valve, power and speaker sockets.

When mounting the valve sockets, make sure that the heater terminals face in the directions shown in the under-chassis diagram, and also bolt on the shield bases for the 6C6 and 6B7S.

Commencing The Wiring.

The 6.3-volt heaters can be wired first of all, by running a pair of twisted leads from the "6.3-v." "2 amp." terminals on the power transformer panel to the heater terminals on the 42. Another pair of leads is run from the latter terminals to the corresponding terminals on the 6C6 socket, and so on, until the 6B7S, 6A8 and 6K7 heaters have all been wired up.

To wire the rectifier, two separate pairs of twisted leads are run from the "5-v." "2 amp." terminals and the "385-v." "80 m.a." terminals on the transformer panel to the filament and plate terminals on the rectifier socket respectively.

The above wiring has been described in full, because for the sake of clarity it has been omitted from the under-chassis wiring diagram.

The earth terminal on the power transformer panel, together with the centre-taps on the 6.3-volt and high tension windings, may be joined together ready for connection to the earthing busbar that runs around the two sides and back of the chassis.

The speaker plug and the two 8 mfd. wet electrolytic filter condensers can next be wired up. Now run a lead from the rectifier terminal labelled "80 F" on the under-chassis diagram to a lug on an insulated strip mounted about an inch away from the electrolytic that is located near the 6K7. Later on a 40,000-ohm resistor will be connected from this lug to the electrolytic.

The suppressor and cathode pins of the 6C6 and 6K7 can now be joined, and as well the screen-grid terminals of the 6K7, 6A8 and 6B7S.

Next, wire up the intermediates. The green leads should be connected to the plates of the respective valves, and the red and black leads to lugs on bakelite strips, so that when their respective coupling resistors and condensers are being wired up they will be supported firmly.

This now completes all the flexible wiring, except for connections to the coil box and volume control.

16-Gauge Earth Line Needed.

Before proceeding to stage three (wiring in of resistors and condensors) run a length of 16-gauge tinned copper wire along the right hand side of the chassis and around the back on the same level as the earth terminal. This enables by-pass condensers to be placed upright against the right and rear walls of the chassis (see under-chassis diagram). The "shell" terminals of the metal valves can be wired up to this line, as well as earth connections from the power transformer.

The Resistors And Condensers.

The first part to wire in is the .02 mfd. condenser between the 6C6 plate

and 42 grid. Then all parts connected with the 6C6 and 42 can be wired in, followed by all parts associated with the 6B7S, except those connecting to the volume control and A.V.C. circuits.

After this, the volume control should be mounted by means of the metal bracket supplied. It will be necessary to connect the grid of the 6C6 to a lug on a bakelite strip underneath the chassis, and earth it through a 1-megohm grid leak. Also, a .05 mfd. condenser should be wired in between this lug and the middle lug of the volume control.

The Pick-Up Connections.

The pick-up switch and terminals are connected up as shown in the separate diagram this month.

The r.f. end of the set is tackled next. A 50,000-ohm grid leak is connected between the 6A8 oscillator grid and cathode. This connection should be as short as possible.

Mounting The Coil Box And Dial.

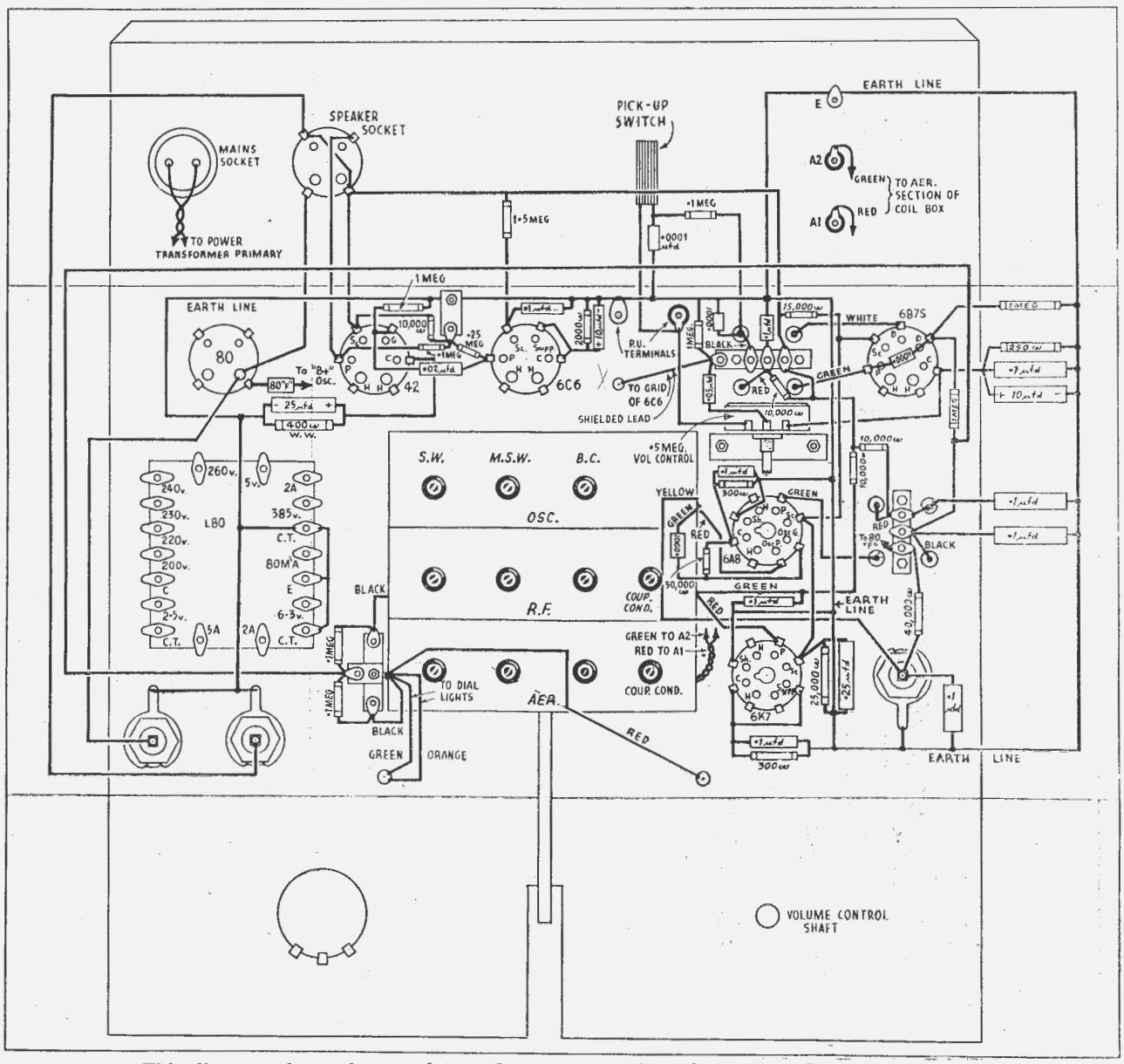
After the remaining parts have been wired in, the coil box can be mounted. The connections, which are all colour-coded, should be made as short as possible. After the box has been bolted in place, the two .1 megohm a.v.c. resistors associated with the aerial and r.f. sections can be wired in.

The dial can next be mounted and connections made according to the colour-code details supplied. In connection with the Radiokes Tri-Wave Coil Box, readers are asked to note that where it is intended to use one of the new Radiokes edgelit dials in conjunction with the box, as in the "1937 International," it is necessary for the condenser gang to be mounted on special pillars, and this fact should be mentioned when ordering the box. The type number of the box when it is intended for use with the dial shown in TWA-3D.

The grid clips are next to be soldered on to the leads requiring them, and the volume control extension shaft fitted by means of the coupler supplied. The valves can then be plugged in, the valve shields placed over them, and the control knobs fitted.

"L" Type Aerial Or Doublet.

The speaker can now be plugged in,



This diagram shows the complete under-chassis wiring of the "1937 International."

and the aerial and earth leads connected up. If an "L" type aerial is being used, a shorting bar should be connected between the earth and "A2" terminals, the aerial being taken to "A1." In the case of a doublet aerial, the two leads are taken to the "A1" and "A2" terminals, and the shorting bar removed.

Now switch on the power, and at the same time closely watch the rectifier for any signs of flashes or of a blue glow, both of which denote a serious overload, most probably caused by a wiring error. If either occur, switch off immediately and recheck the wiring.

If nothing of this nature happens, however, and a faint hum can be heard when an ear is placed close to the speaker, it should be possible to tune in stations on the broadcast band.

Some Wiring And Assembly DONT'S.

Here are a few DONT'S regarding the wiring and assembly of the "International":—

Don't run any wiring in the space that is to be occupied by the coil box. Keep parts away from those terminals on the valve sockets to which connections have to be made from the coil box.

Don't run the heater leads between the 6A8 and 6B7S so that they will foul the volume control bracket when it is mounted.

Connect all de-coupling resistors and by-pass condensers as close as possible to the points where the leads they are de-coupling emerge from the i.f. transformers or coil box. Thoroughly check all wiring before mounting the coil box, and again after the latter has been wired in.

Aligning The "1937 Internatioal."

With a set of this type, accurate alignment with a calibrated signal generator is essential for best results, and builders are strongly advised to have this done rather than tackle alignment by ear themselves. However, the following hints will assist those who wish to line the set up at home, using noise or signal.

First of all set the two coupling condensers underneath the box one full turn out. This will give approximately correct coupling, which is rather critical.

Next, tune the receiver to about 210 metres and adjust the broadcast aerial and r.f. trimmers for best results. After this, swing over to the other end of the band, above 2FC, and adjust the padder (on top of box).

The entire process can now be repeated, and when completed the i.f's. can be carefully adjusted for best response.

(continued on page 46)

Radio Ramblings

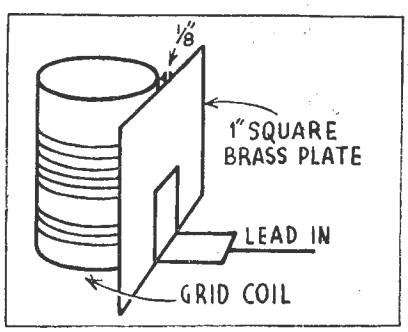
A page for letters from readers. A prize of 2/6 will be awarded for every technical tip published.

★ ★ ★

Automatic Aerial Coupling.

I would like to submit the following method of obtaining automatic aerial coupling to your "Radio Ramblings" page. The vane should be of brass about 1in. square, and should be adjusted so as to be approximately 1-8 inch from the coil.

Once adjusted, it is automatic, due to the fact that the length of the grid coil decreases with the wavelength, and so varies the capacity of the condenser as each coil is used.



I read the "Australasian Radio World" every month, and consider it the best radio magazine obtainable.—N. Wilson, South Perth, W.A.

★

Flying Doctor Station Was Heard Well Last Year.

Alan H. Graham, in "Verifying All Continents," "A.R.W.," April, 1937, page 36, says that he has yet to see a claim to reception in the Eastern States of VK8SC, the Flying Doctor station at Port Hedland, W.A.

About a year ago, when this and the Wyndham and Koolan Island stations were first put into operation, they were receivable at good strength around 7.30 p.m. Sydney time, just "above" the amateur 40-metre band.

I have not noticed them since, probably because I have not particularly looked for them. There is no reason why these stations, with their 100 watts, should not be heard over here just as well, and better, than W.A. amateurs using 'phone with 25 watts input.—Don. B. Knock (VK2NO).

★

B.C. Coils For "Eaglet."

My "Eaglet S.W. Two" is working quite efficiently now since I added bandspread as described. Small sets such as this are evidently very popular by the number of letters of thanks published in your columns, and I would like to add my heartiest congratulations for such expert designing. Perhaps it would not be asking too much if you would publish some data for broadcast coils for this set?—A. G. Murray, Geelong, Vic.

(B.C. coil details as given for "All-Wave Bandspread Two" in September issue last year would be suitable, except that about half the number of reaction turns specified should be used—Ed.)

★

Many Happy Returns To "R.W."

I feel I must once again congratulate you on your very fine magazine. I have noticed that with every issue there is always an improvement, which is ever increasing the immense popularity of the magazine. Allow me also to wish it many happy returns of its first birthday, and I hope that the future years will contain a very large helping of good luck and fortune both for it and its readers. I have not had much time for dxing lately, as I am now a student at the Queensland College of Science, where I am studying for a first-class operator's ticket.

The list of ZL call signs was very much appreciated and I will keep it near my receiver for reference. I have also noticed an increase in the number of "Radio Worlds" which appear at the College, and from my own inquiry all the chaps think the magazine the best that they have ever read. They have all decided to take it regularly from now on. The "1937 International All-wave Six" circuit was discussed at length, and we were all very interested in the method of inverse feedback

I am enclosing a tip that may prove interesting to many dxers who can read code but have commercial dual wavers which are not fitted with a beat oscillator.

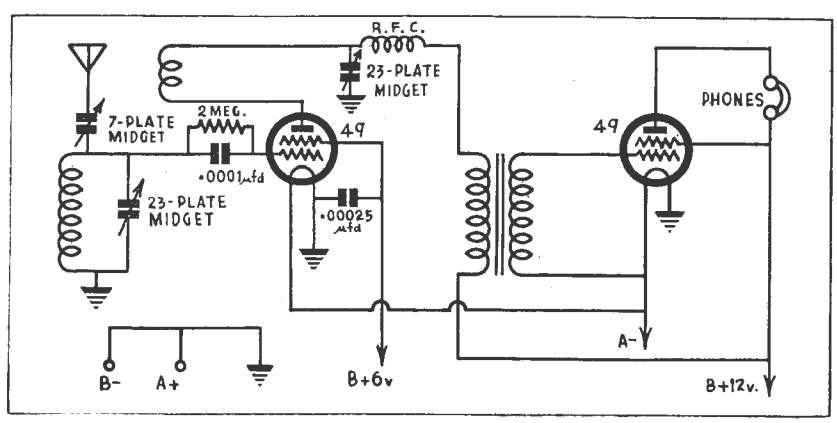
Twist five or six turns of No. 30 gauge wire round the lead from the first intermediate to the top of the valve, continue the wire to the next intermediate, and here again twist five or six turns around this lead from the intermediate to the top of the valve. It will be now found that morse signals can now be received quite easily. The gauge of wire is not important, and the number of turns on each lead can be varied if desired.

It is an undoubted fact that by reading signals under actual receiving conditions one's code improves more rapidly than when receiving on an audio oscillator although, of course, the latter should still be used for learning the morse symbols and sending them.—Cedric W. Marley (AW150DX), South Brisbane, Queensland.

★

Two-Valver With 12 Volts "B."

Now that the issues of the first year are complete I feel that I must congratulate you on your success in supplying to Australasian radio experimenters the long-needed magazine. I consider my copies are far too useful to be damaged, so please find enclosed



According to a reader, this two-valver works splendidly with 12 volts "B."

a postal note for the two covers, so that I can bind them.

I noticed in the January issue that a reader desired a circuit using only 9 volts on the plates. I am enclosing a diagram for a set using 12 volts of "B" supply and two 49's, procurable anywhere at 16/- each.

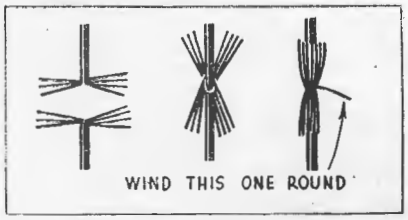
Coil details are as for the "All-Wave Bandspread Two," described last September.—K. P. Mackinnon (AW189DX), Watson's Bay, Sydney.

★

Joining Stranded Aerial Wire.

I have a little kink which might be suitable for the "Radio Ramblings" page of your FB magazine. There comes a time in every radio fan's life when he wants to join his aerial wire when it carries away. The following maks a very good and neat joint:

Take the two ends and unravel back for about four inches. Now part them in shape of "V," four strands on one side, three on the other. Place two "V's"' together, one inside the other, and lie all strands neatly along the unstranded wire. Take one strand



and wind round and round over the top of aerial proper and other strands. Work tight with pliers. Now take another strand and wrap it round—this will start where the other one finished, because the first one was wound over part of it. Repeat with the remaining five strands. Now repeat with other side of joint, and the result will be a very neat joint tapering away from the centre to nothing at the ends. (The sketches illustrate the process.)

The same idea can be used to fasten on the insulators, making a very neat job. By the way, this is how the marine operators join their antennas, so I am told.

Wishing your FB magazine every success—there is only one thing wrong with it—too long between issues.—E. H. Potter, Auckland, N.Z.

★

Connecting An Extra Speaker.

I have been getting the "Australasian Radio World" for over six months now, and it seems to get more interesting every month. The technical articles are very much appreciated up here, and so is the five-metre "dope." I am very interested in building a one-tube five-metre transceiver and would very much appre-

ciate it if you published an article on the construction of one.

Here is a hint that the short-wave fan might find useful. Sometimes one may want to run a permanent magnet-speaker in conjunction with a speaker in a factory-manufactured set. To do this, run one side of the magnetic speaker to the chassis of the set and the other side to the plate of the output valve in the set, through a 2mfd. condenser. This condenser must have a high voltage rating, and must be of a reliable make, because if it shorts or breaks down considerable damage may be done to the set.—E. Docker, Bundaberg, Queensland.

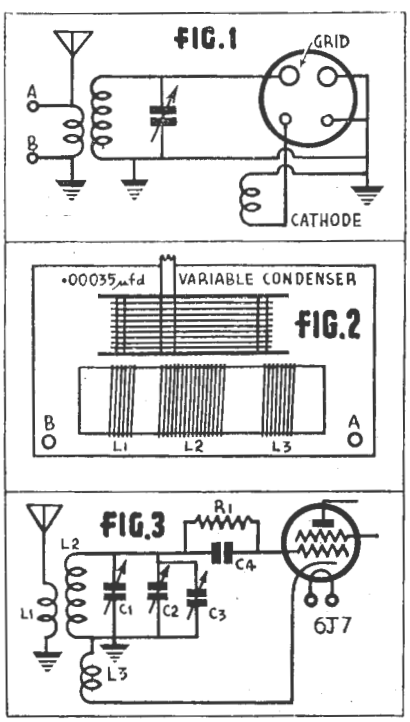
★

Broadcast Operation With The "Eaglet"

I have read every copy of "R.W." since its inception, and I take this opportunity to congratulate you on your excellent publication.

I built the "Eaglet S.W. 2" from the first issue of "R.W.," and am more than satisfied with results. I converted this set to an all-waver in the following way: I wound a B.C. coil and mounted it together with a .00035 mfd. condenser (variable) on an ebonite panel, which is screwed to the shack table. Two terminals are also mounted on the panel. This arrangement is plugged into the "Eaglet 2" in just the same way as an ordinary coil.

Fig. 3 shows the arrangement with the unit in place. C2 and C3 are tuning condensers for short-wave. C4 is grid condenser and R1 is grid leak.



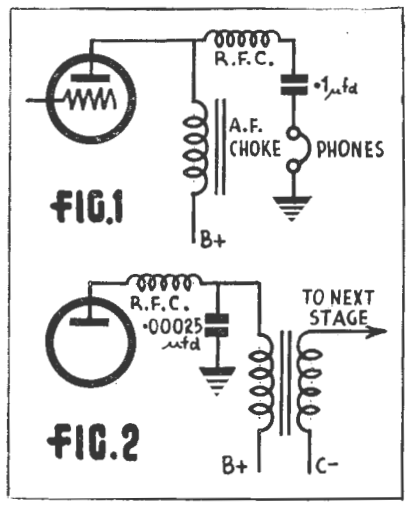
Since C1, C2 and C3 are all in parallel, their total capacity=.00035+.0001 +.000025 = .000475 mfd. = .0005 mfd. approx.

The "ham" course and "Radio Step by Step" are also much appreciated, as I hope to get my ticket soon. Wishing "R.W." all the best.—W. N. Black, Chelsea, Vic.

★

Reducing Hand Capacity In Shortwavers.

I have been reading "Radio World" for only a couple of months, but I have made up my mind not to miss



a copy. I know practically nothing about the technical side of radio, but have started to follow the series, "Breaking Into the Amateur Game"

Here are a couple of useful little arrangements which I use on my short wave two-valve receiver, to protect the windings of speaker or 'phones, and to reduce hand-capacity. Fig. 1 shows a scheme I use to overcome hand-capacity.

For those who experience fringe-howl much Fig. 2 will be of assistance. The use of the .00025 mfd. condenser, as shown, has certainly reduced fringe howl in my set.

Wishing "Radio World" a long life and the best of luck.—J. Shann, Ayr., Queensland.

[In fig. 1, a by-pass condenser of about .0005 mfd. from plate to earth would probably be an improvement.—Ed.]

★

Readers' Theories Wanted

I am describing below a unique experience of mine, and would like to hear the views of other readers per the medium of your paper.

We have at home a 4v. "straight" A.C. set, using a 1561 rectifier. About 18 months ago the set was out of action for some weeks, due to a bad hum which drowned all reception. At that time my knowledge of radio extended scarcely beyond the crystal set stage. However, out of curiosity, I switched the set on to see if I could enhance my knowledge through the defect in the set. To my surprise, on locals, the set showed no signs of any fault, but intermittently between then and until recently it has had temporary lapses.

About a month ago the hum became permanent, and apparently nothing could stop it. I have now, thanks a great deal to your paper, a fair knowledge of radio, and I noticed that in the rectifier only one filament lit up. I had it tested, found it worse than "bad," and had it replaced. However, I could not figure how the set worked intermittently with a "dud" rectifier, so I carefully broke the glass of the 1561 and found one section of the filament intact, though the other section was broken and touching the plate near it.

The only suggestion I can put forward is that the rectifier worked on a sort of half-wave principle when one part of the filament broke. When the set was shaken or knocked, the broken filament touched the plate nearest to it, resulting in the terrific hum mentioned.

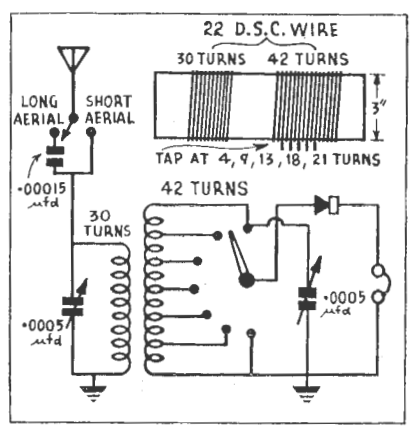
A further knock would separate the broken filament wire and the plate, and the other section of the filament and the other plate formed a half-wave rectifier, which, although very inferior, would not affect the reception of the local stations to any great extent.

This may sound ridiculous to an expert; if so, I would be pleased to hear through your pages a theory accounting for such a unique performance.—R. O. Hiiser, Kilburn, S.A.

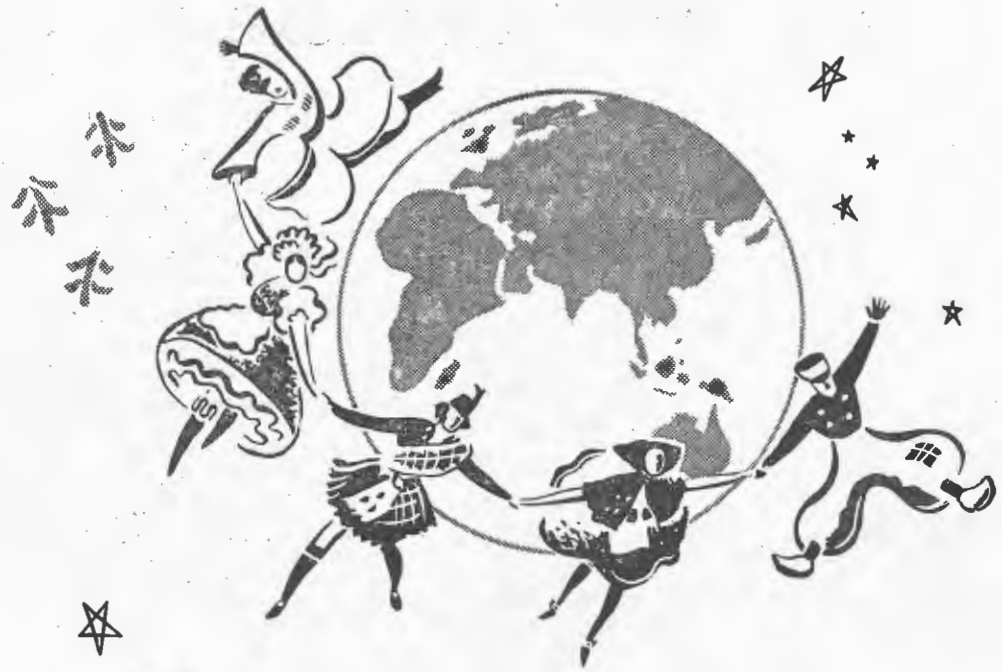
★

A Good Performer

I am enclosing a circuit for a crystal set which, though of ancient design, works very well here. On broadcast



it is an excellent performer on DX, while on 80 metres it is very good after 10 p.m., and the late ZL's come in very well.—S. W. Molen (AW213DX), Kingaroy, Queensland.



National Melodies

Gathered from the four corners of the world Radiotron presents "National Melodies from Afar" through: 2CH at 9.20 p.m., Friday, and 2SM at 3.30 p.m., Monday, Tuesday, Thursday, Friday.

A RADIO SPOTLIGHT FEATURE

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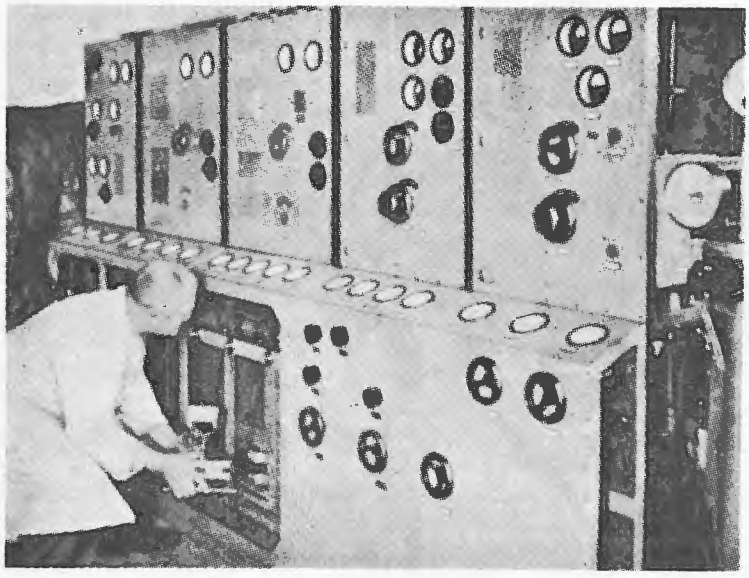
The Story of Television . . (5)



In the concluding instalment of this series of articles the author briefly reviews what progress has been made in leading countries towards perfecting television.

By G. BROWN
Secretary, Lakemba Radio Club.

This 16 k.w. ultra-short wave television transmitter now operating in Berlin has a service range of about 30 miles. A transmitter of the same type and output is used for the sound transmission.

IN presenting this final instalment, it is hoped that readers have by this time gained some knowledge of the general applications of the new science. As mentioned previously, the principles have been but briefly outlined, as any one particular phase could be made to occupy an entire issue of a radio publication.

This instalment will give a brief review of just what is being done in the various countries in the matter of perfecting the art.

ENGLAND.

Mention has already been made of the progress of television in England under the Baird and Marconi-E.M.I. systems.

Despite the fact that the present Baird system has been discarded for the time being by the B.B.C., nevertheless, the ultimate result of the life work of John Baird will live long after television has been established as an everyday public necessesity. Furthermore, we can safely look to Baird for future developments.

AMERICA.

At a recent demonstration given by the National Broadcasting Co. of America, television was presented to representatives of the press in New York City. News-reels, as well as direct pick-ups, were transmitted on approximately six metres from the 10 k.w. transmitter on top of the Empire State Building.

The image and voice accompaniment was picked up at the R.C.A. Building in Radio City, about one-half mile distant. The image was equivalent in clarity to the average home movie, and measured about 6in. x 7½in., the screen having a predominant green color. Two other special machines were demonstrated simultaneously which reproduced with surprising clarity a black and white image of a somewhat larger size (7½in. x 10in.).

This demonstration was given on 343 lines, but in the near future this will be increased to 441 lines. The image signal was transmitted on a frequency of 41.75 mc., and the voice on 52 mc.

R.C.A's. research and technical progress may be judged by the fact that upon a laboratory basis they have successfully produced a 343-line picture, as against the crude 30-line picture of several years ago. The picture frequency of the earlier system was about 12 per second, this being now raised to 60 per second. These advances enable the reception over limited distances of relatively clear images, whose size has been increased without loss of definition. The television results achieved are largely due to the initiative and enterprise of Mr. David Sarnoff, President of the Radio Corporation of America.

GERMANY.

The German television picture standard of the ultra-short wave transmissions is still 180 lines, 25 pictures per second, but most firms in addition to receiving this picture, have concentrated on raising the definition to 375 lines interlaced scanning.

Fernseh A. G. and Telefunken are the biggest and most powerful of the German television firms, and annually these two firms compete for the laurels of the best picture of the Exhibition, with the firm of Loewe usually as a close runner-up.

Fernseh A. G. showed a series of new home receivers with a picture size of about 7in. x 9in. In these receivers special attention has been paid to the simplicity of handling and to the height of the picture relative to the ground. In addition to these standard receivers, the company showed several so-called special receivers which showed cathode-ray pictures of the unusually large size of 12in. x 14in. These receivers of course are not intended for home use, but for special purposes such as public viewing rooms.

Other exhibits by this firm was the electron camera of the Farnsworth type, which had been used with a considerable amount of success for transmision of certain out-door events during the Olympic Games. A special studio had been erected with a small stage from which scenes were transmitted by means of the electron camera. On several days the camera was placed outside the Exhibition Hall, and passing street scenes were transmitted to the receiver within. These transmissions were on a definition of 180 lines, and the pictures were very pleasant.

The 375-line film transmitter using a scanning disc was an interesting piece of work, inasmuch as it showed that even for an extremely high number of lines, the Nipkow disc is still a useful piece of apparatus.

ITALY.

Arturo Castellani has, since the

year 1930, when he displayed and operated his television apparatus at the radio show at Milan, always kept pace with television developments in other countries.

Castellani conducts his television research in co-operation with a well known Italian radio manufacturer of Milan, and has access to a well-equipped laboratory and television studio. A 500-watt ultra-short wave transmitter operating on seven metres for the image transmission, and a similar one of 50 watts for the sound transmission is at his disposal. The latter operates on a wavelength of five metres.

The latest progress of the Castellani-Safar television system is a camera for direct pick-up, called the Telepantoscop. The nucleus of this camera is a very ingenious device, and is actually a combination of a photo-electric cell and a cathode ray tube.

The television receivers made by the Italian Company reproduce an image 8in. x 10in. by means of cathode ray tubes. An image definition of 180 or 240 lines, with 25 frames per second, may be re-created upon the cathode ray screen.

FRANCE.

During the past season, television transmissions from the Eiffel Tower have used 180-line definition. The cameras have what is known as secondary cells fitted, so that street scenes, sporting events, etc., may be transmitted in comparatively dull weather.

It is claimed that these mechanical scanners provide an uninterrupted and stable service. Due to the simplicity of the synchronising method, French engineers have designed television receivers having only six valves. It is anticipated that next season will see the industrial release of French television.

JAPAN.

Japan has been experimenting with television on the same general lines as engineers in England and America.

A Final Summary.

It is obvious that when television comes, the present radio system will be regarded as really "blind broadcasting," on the analogy of silent films. Nowadays the idea of the silent film seems fantastic. The dumb mimicing of strong but very silent men seems just laughable.

Of course, the television position can never be so ludricrous, because film entertainment has been almost entirely dramatic, which makes it seem absurd that we have tolerated the silents for so long. Radio, however, is rarely dramatic. True, we have plays which could provide very dramatic material for the screen, but many items will be just televised boredom.

We have had silent film dramas, which are pictures without sound; we have also had some remarkably good radio dramas, which is sound without pictures. Television will provide us with both, although it is perfectly obvious that time will not permit the presentation of full length pictures as is done in the case of the talkie screen.

At the moment, television is an unwanted "baby" deposited on the doorsteps of an unready public and an unwilling industry. However, as it grows, let us hope that we shall look upon it with glowing pride. It is the writer's opinion that when the industry finds the strain of overproduction and keen competition becoming too heavy to bear, television will save the entire situation, as millions of people will want to start "looking-in" as well as "listening-in."

Breaking Into The Amateur Game...4

The design of power supplies for receivers and transmitters is covered in this instalment—the fourth of a series specially written for the "Radio World" by . . .

GEORGE THOMPSON (VK3TH) and IVOR MORGAN (VK3DH)

PASSING now to the 6D6 intermediate frequency stage (see Fig. 2 in last month's issue), the function of this amplifier is identical with that of the radio frequency stage, and volume control action is supplied by the same 10,000-ohm potentiometer. V3 has in its plate circuit another 465 k.c. intermediate frequency transformer. V3 therefore presents to the grid circuit of V4 an amplified version of the signal first appearing in the plate of V2.

The small condensers shown to tune the pair of coils in each of the two intermediate transformers are usually of the semi-fixed compression type with mica dielectric—having about three plates. These circuits, when once tuned to exactly 465 k.c., are never again touched, while the normal tuning of the receiver is accomplished wholly by the three-gang condenser, C1, C2 and C3, or on the short waves by the band-spreading condensers. The original three-gang condenser then becomes the "band-setting" condenser, which has each section connected in parallel with each section of the band-spreading condenser.

V4—a type 76 indirectly-heated 6-volt triode valve—is the second detector of the receiver, and, in this case, directly operates the headphones. Of course, the' phones may be replaced by a resistance coupling unit and one or two stages of audio frequency amplification could be added.

Plate Detection Employed.

The secondary of the second i.f. transformer feeds the i.f. energy to grid, and since the type 76 is biased to act as a plate detector, we receive an audio frequency signal in the headphones corresponding to the modulation envelope on the carrier from the broadcasting station.

The .0005 mfd. condenser connecting between plate and cathode of V4 is, as explained under detectors, to by-pass around the valve the unwanted r.f. appearing in the plate circuit. Since we are dealing with both a.f. and r.f. voltages in this circuit, an a.f. by-pass is used across the 10,000-ohm bias resistor. This can be one of the now common dry electrolytic condensers, (25 mfd., 25-volt working). Some cases do arise when the electrolytic condenser does not provide sufficient r.f. by-passing effect. This can only be solved by the simple expedient of shunting the 25 mfd. condenser with a .1 mfd. non-inductive condenser of the paper variety.

With reference to power supply, these valves may be operated successfully on either a.c. or d.c. filament supply. The "B" supply may be batteries or rectified a.c. If the latter method is utilised, a good filter would consist of two 30-henry chokes to carry 50 m.a., and three 8 mfd. electrolytic condensers—one across the rectifier output (280) one from the junction of the chokes to earth, and the third across the output circuit.

Power Supplies For Transmitters And Receivers.

Generally speaking, the subject of power supplies, either for receivers or transmitters, may be divided into two parts — the transformer or its equivalent and the filter. Nowadays, the transformer for a receiver is cheaper to buy ready-made than to construct. Since modern valves require usually a standard working plate voltage, transformers are available in a series of standard voltages.

It is not necessary to discuss at length the problem of choosing the correct transformer for a receiver, as this depends on the circuit used. If we are considering a standard superheterodyne circuit of five valves, plus rectifier, we find by reference to a valve-maker's chart that the total current consumption will be approximately 70 m.a. Transformer sizes are usually standardised at 60 m.a.., 80 m.a., or 100 m.a.; and in the case of the receiver stated we would, of course, choose the 80 m.a. model.

This m.a. rating is merely the current-carrying capacity of the high-voltage secondary winding—the m.a. figure being the maximum current drain that can be taken before severe voltage drop or overheating commences. The primary wire and the core are naturally proportionately larger as the m.a. rating increases.

Calculating Voltages Required.

Turning now to the question of voltage. By adhering to common practice we will use a dynamic speaker, driven by an output pentode valve. The speaker field resistance will be 2,500 ohms, D.C. resistance. At the working current of the total number of valves, there will be a definite voltage drop across this field winding, and so the terminal voltage of the transformer high-voltage secondary must allow for this. Standard practice at the present time is 385 volts either side of the centre tap—or, in other words, 770 volts across the entire secondary, with a tapping made at the exact centre of the winding.

The only other requirement will be a suitable set of filament windings.

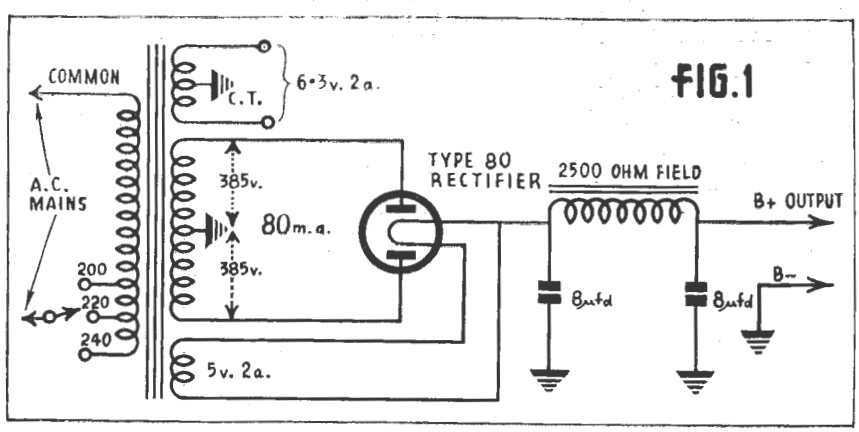


FIG. 1

In the case of the receiver discussed in the preceding article, the filaments are of the 6.3-volt type, and the transformer should be suitably provided with one or two 6.3-volt windings (a centre tap is handy here) and a 5-volt winding good for 2 amps.—that is, the wire size must be sufficiently great to allow 2 amperes to be drawn from this winding without reducing the terminal voltage below 5. The same theory applies to the 6.3 volt windings, the amount of current to be drawn being easily determined by adding the various heater current values of the valves to be used in the receiver.

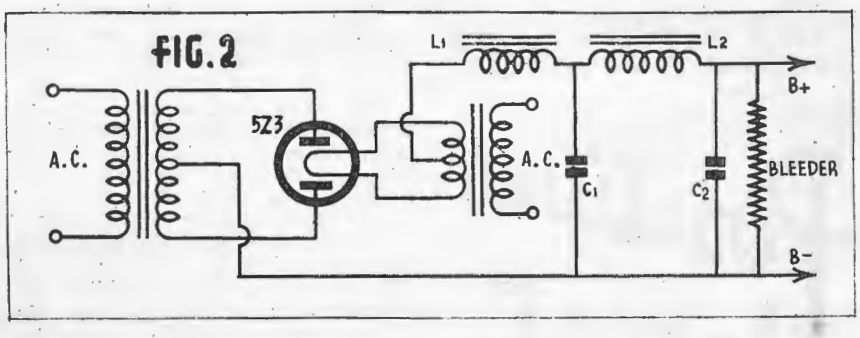
Tapped Primary Preferable.

Another necessary feature to be incorporated in the satisfactory transformer is a series of taps made on the primary winding. This can provide for the varying A.C. mains voltages met with in various districts. Generally speaking these variations are 200, 220 and 240 volts, and by providing taps for these voltages, the transformer primary turns can be adjusted to the mains voltage that is available in any given locality.

Actually the 240-volt tap on the transformer puts more turns of the primary across the mains than the 240-volt tap. This means that the ratio of primary turns to secondary turns is changed as we move the primary tap. From this we see that if the transformer be connected up with 200-volt mains across the "common" end and 200-volt tap, we get the rated 385 volts across each half of the secondary. But supposing the mains go up to 240 volts, we then have more than 385 volts output, and by moving the mains to the 240-volt tap on the primary we again have the 385 volts at the secondary.

Figure 1 depicts the simple set-up suitable for the work to be done by the typical power supply under discussion. The diagram is self-explanatory after the foregoing description.

FIG. 2



Planning The Filter.

We now arrive at the second part of the power supply — the "filter." As discussed earlier, the speaker field to be used on the typical five-valve receiver is made to serve a double purpose, i.e., that of filter and a source of magnetic energy for the correct functioning of the dynamic speaker.

Briefly, these speaker fields are a solid coil of many turns of fine wire wound closely around the speaker pole-piece, a solid soft iron cylindrically-shaped rod. We have learned that this is NOT as good a core for a choke as a laminated one, but since there are so many turns of wire on the core, the D.C. resistance becomes high (in this particular case it is

2,500 ohms). This D.C. resistance helps materially in the process of filtering the output from the type 80 full-wave rectifier valve.

Two 8 mfd. electrolytic condensers are connected up, one on either side of the speaker field, to complete the filter, which is of a type commonly known as the "brute force" filter. A power supply similar to the one just discussed, except that the field is replaced with a 30-henry choke of suitable current-carrying capacity, may be used to supply the crystal oscillator and buffer stage of a transmitter.

From the receiving type power transformer, we may deal with the larger type necessary to deliver enough energy to operate the latter stages of a transmitter.

Again referring to fig. 1, by replacing the transformer with one giving a secondary voltage of about 600 volts each side of the centre tap instead of 385 volts, the balance of the circuit may remain the same, except for the substitution of a choke instead of the field coil. Although the circuit is similar, we must replace the electrolytic condensers and the filter choke by components of larger electrical proportions.

If the transmitter is to be of maximum power rating, i.e., 25 watts input, keeping in mind the possible inclusion of a modulator and/or a buffer stage to be operated from the same power supply, the approximate current drain on the high voltage secondary may be roughly calculated and provided for.

As an example, the final stage could be run at 60 m.a., the buffer stage or stages, which may draw their power from the same supply, 35 m.a. each, and perhaps a modulator to operate at 100 m.a. Simple addition reveals that the total load in this case will be approximately 195 m.a.

Separate Power Supplies Sometimes Essential.

A note at this juncture on the distribution of power supplies must be added. It is distinctly bad practice, when using a modulator of the class "AB" or class "B" type, to operate any other r.f. stage, other than the modulated one, from the modulator power supply. The reason for this is that either class "AB" or class "B" audio frequency systems produce a variable load on the power supply. Obviously this variation in load will cause variation to the voltage output, and such condition is bad for the buffer stage.

To clarify the position — for key work only, two buffers and a final stage could be successfully operated from a common power supply, but a separate supply will be necessary for the crystal oscillator or self-controlled oscillator. Where plate modulation is to be employed, class "AB" or class "B", for good performance we will not consider including any buffer stages in the load on the power supply which is to do service for the modulator.

The modulated amplifier and modulator will be alone on a separate supply, and the crystal or self-controlled oscillator (according to choice) supply will feed the buffer, buffers, or even doublers. Otherwise we must have a third supply for these intermediate stages. In the latter case the oscillators would have their own supply.

Separating these power sources, the receiver type of set-up as discussed earlier for the crystal or self-controlled oscillator stage would be satisfactory. Buffer stages or doublers usually do not require a supply capable of delivering high currents, although a voltage higher than that for the crystal or oscillator stage is desirable.

Earlier we mentioned the necessity of replacing the receiver type of filter choke and electrolytic condensers with components of larger proportions for the heavier power supplies. In the case of the buffer power supply, the receiver type of filter choke would in all probability be suitable, since, as mentioned previously, the current drain is most unlikely to be high. A choke coil of somewhere in the proximity of 30 henries at a current of 100 m.a. would be quite satisfactory in this case.

The filter condensers may be of the paper dielectric type, or some of the new type of electrolytics now available which have a working voltage rating in the region of 600 volts.

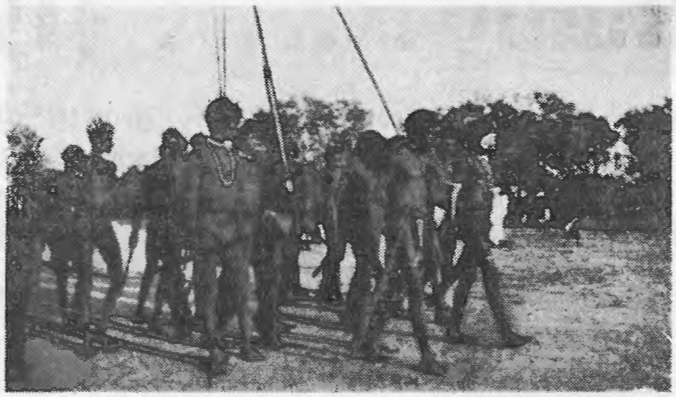
High Voltage Supplies.

We now approach the high voltage supply for modulator or modulated amplifier (including those cases where the power supply is common to both). It was mentioned in the example under discussion that the current drain would be about 195 m.a. Now, if a bleeder is to be incorporated to hold the output voltage from rising to a value dangerous to the filter condensers and the general insulation around the power supply, the total current drain will be at least 200 m.a.

Let us take an output of 200 m.a. at 500 volts as an example. The design of the transformer depends entirely on these figures. The wire for the secondary winding, the cross-section area of core laminations and the size of wire for the primary must all be suitable for the figures given. Tables can readily be obtained showing the current-carrying capabilities of different gauges of wire, though, as mentioned earlier, most amateurs do not construct their own transformers these days since there

(continued on page 34)

Keeping In Touch With Darwin



How the Catholic mission station on Bathurst Island maintains a daily schedule by radio with Darwin, 50 miles away, is explained below . . .

By W.J.P.

The natives of Bathurst Island are taught to be radio-minded, as far as erecting aerials is concerned.

IN the article dealing with radio in the outback, published in the January "Radio World," a brief description was given of an isolated transmitting station in the very heart of Australia. This time a trip will be made further north, to a small island, called Bathurst Island, about 50 miles north-west of Darwin.

Although situated but a short distance from the mainland, nevertheless it would be somewhat isolated were it not for radio communication, as calls made by shipping are none too frequent.

A Catholic Mission Station under the direction of Monsignor G'Sell has been established on the island for some time, but it is only during the last year that radio has played such an important part in the life and work of the missionaries.

Keeping In Touch With Darwin.

The transmitter used derives its power from a motor generator, and is employed to maintain daily communication with the Presbytery at Darwin, which has similar equipment installed, except that power is taken from the local town supply. The transmitting and receiving equipment at both locations was designed and built by Messrs. Colville Moore, of Sydney.

Under a special licence granted by the Commonwealth Authorities, these two stations are permitted to communicate privately and direct, it being unnecessary for them to make use of a control station. In the ordinary course of events, the control station would take the messages, relay them on, and make the usual charge per word accordingly. Of course, such licences are only issued in special circumstances, and in the case of mission stations, it would most certainly prove a very expensive item if a charge were made for every word transmitted, especially in view of the fact that these organisations are not being conducted for any material gain.

Contact Made Twice Daily.

Every morning and evening contact is established at certain fixed hours between the Church authorities at Darwin and those at Bathurst Island. Thus the mainland is constantly kept in touch with doings up north, and vice-versa.

"The radio works perfectly," writes Monsignor G'Sell. "The only interference we receive is when a thunderstorm is directly overhead. The system is working to such perfection, and we derive such benefits from it in the course of our mission work, that we intend installing similar equipment at our new mission station at Port Keats, 120 miles south of Darwin; that is of course, as soon as funds permit."

Both stations operate on radio-telephony, and differ from many of the other inland stations inasmuch as the latter usually transmit by morse, and receive by telephony.

The photograph shown above indicates that the natives of the island are taught to be radio-minded as far as erecting antennas is concerned. Judging by their expressions, they evidently regard their work quite seriously. Nevertheless, the native mind cannot fully comprehend this strange and weird instrument of the white man called "wireless," which breaks down barriers of isolation and benefits the black man as well as the white.

Radio For Aborigines In Torres Straits

Scattered over the islands of the Torres Straits, the Gulf of Carpentaria, and on the mainland of North Queensland, are numbers of Mission stations and posts where Government officials come in contact with the natives. A scheme has been evolved by the Queensland Chief Protector of Aboriginals to provide wireless communication for 15 of these stations, and for the Government ketch "Melbidir" which operates in contiguous waters.

A contract has been made with Amalgamated Wireless (A'sia) Ltd. to provide a central radio station at Thursday Island, and smaller wireless installations at the points mentioned, thus enabling constant communication to be maintained with the Government and the outside world in general. The outlying stations are at distances from Thursday Island varying up to 300 miles.

The extent of the network to be covered caused consideration to be given to the question of economy, and this requirement was met by the decision to use low powered transmitting equipment developed by A.W.A. which derives its energy from small engine-driven generators.

25 Years In Amateur Radio . . . . (1)

The author in 1912—a schoolboy fired by the romance of radio communication.

In this biographical review of the growth of radio, the author takes readers back over twenty-five years, to the time when to every radio enthusiast a slider-tuned crystal set represented the last word in receiving equipment.

By DON. B. KNOCK (VK2NO)

(Radio Editor "The Bulletin")

IN a recent "Radio World" issue "W.J.P." says that the old timers are reticent; ageing oysters in their barnacle-encrusted shells, or words to that effect. Probably the old timer who has lived with, by, and for radio for a literal lifetime is inclined to become blase, but that doesn't mean to say, if he is a genuine "matured in the bottle" ham, that he has lost interest—far from it.

Admittedly some old timers have given up the game, but careful enquiry will reveal that it is always by force of circumstances; for business and other reasons, and after all the shiny metal that makes the world go round and feeds the junior Op. really must come first.

I suppose I can class myself as one of the very fortunate old timers of radio in that I have been able to keep myself lined up alongside it, with a few unavoidable digressions, ever since I introduced myself to the art. Circumstances again? Maybe, to some extent, but if a man sets his heart on something, he can usually find ways and means of keeping next to the thing he likes best. Which is one way of saying to the newcomer to radio.—"If you like it well enough, stick to it by hook or by crook. If you try hard enough and work hard enough, you can do just as well as the next man."

Radio is only a baby yet, and the world is only on the fringe of discovery. Supposing for instance there occurs some enormous cosmic upheaval in the near future. How do we know that by some agency the whole scheme of radio communication may not be reversed? By some freak of the universe, long waves may become "quasioptical" and the ultra-shorts may show entirely different reflective properties. Fantastic? Maybe, but nothing is impossible. Therefore a profound interest in ultra-short-wave experimentation might prove very useful some day.

First Radio Crystal Set.

My experiences in radio go back to the adolescent period, when at the tender age of eleven, as a schoolboy in my Lancashire home town, I was attracted by an article in a boy's paper showing how to construct "The Boy's Own Wireless." It seemed simple. A wooden rolling pin (coaxed from the household kitchen), a piece of iron pyrites (from the school lab.), some bell wire and an ear piece, plus a condenser made from glass plates and foil from chocolate boxes, etc., constituted the parts.

Where the headphone came from I cannot recollect, but I do know that I sat for hours, weeks, and months with that old Bell telephone receiver fastened to my head, and an imposing looking twin spreader aerial of some kind fastened to the chimney, without hearing a sound—not even a crackle when lightning was around! And no wonder. The ear piece was of the 60-ohm variety, the detector was about as useful as a piece of cheese and a penknife, and the single slide tuning coil was a hit or miss affair.

This, be it understood, was in 1910-1911, when crystal detectors of any kind were a new development, and the magnetic and electrolytic detectors held full sway for commercial work.

A year went by, and interest flagged a little. Then providence intervened. Away on holiday in the South of England with the family, this small boy met a much older one who was no less than a wireless expert and an electrical engineer apprentice. An invitation to see his "den" followed.

VK2NO at 16— . . . "the guv'nor thought wireless a new-fangled contraption, and so I had to carry on as an engineer's apprentice."

First sight to gladden the eyes was a massive white painted mast in a garden, with a veritable maze of guys and insulated wires. Explanation revealed that this was an "umbrella" aerial. Inside the "shack" the amount of wonderful apparatus was breath-taking. Huge drain-pipe tuning coils wound with shiny black wire reached nearly to the ceiling. Bright copper helixes glittered entrancingly, and knobs and big glass plate condensers were everywhere. To top it all off, an intriguing rotary arrangement in a corner sporting a number of projections on the big disc introduced itself as a synchronous gap.

First Signal Heard From Eiffel Tower.

While I looked and marvelled my new-found mentor put a pair of dinky little headphones over my ears, and looking at a clock said, "Now three minutes to eight. At 8 p.m. you will hear FL start sending his press."

As the city town hall clock boomed away on the last stroke, I heard what was to me the most beautiful sound I ever recall, my first radio signal. It was the old Eiffel Tower in Paris with his peculiar bugle note, blaring out the evening press.

And how that signal came through! Knobs were shifted a little, handles moving tuning condensers of the inter-leaved glass plate variety were jiggled a bit, and tuning coil sliders were adjusted, until the signal sounded very strong—about R6 in present day rating.

I saw, looked, and listened, and the radio bug bit deeper and deeper. It culminated in a still bigger thrill in the form of a raucous bellowing signal which was described to me as being from another amateur across the town.

Then this god-like person pulled switches, the rotary gap sprang into life, and I jumped with apprehension as the blue flame bit around the disc point with a deafening crescendo of morse code as he "went after" that other fellow.

That settled it. Whatever passing interest I had had in that futile boyish effort of a year previous was enhanced a thousandfold. I determined to be a wireless amateur by fair means or foul. After describing my poor efforts, I was presented with a nice sparkly piece of carborundum, an old but good pair of high resistance Sullivan phones, and a few odds and ends. That boy I had visited became in later years one of the Marconi Company's most prominent engineers.

Returning north, I proceeded to make the house unbearable with the smell of melting paraffin wax and shellac varnish, and conceived a weird and wonderful array of gear with the pretensions of a "wireless." I had no idea of wavelengths; I couldn't read morse more than about three words per, but I had plenty of confidence. Months went by again, and nothing happened, but presto—when thunderstorms abounded, I could distinctly hear the lightning flashes, and that was something at least!

Success At Last.

And then, on a Sunday morning at 11 a.m., the unexpected happened. After moving sliders up and down along the 6-inch diameter coil with its miles of enamelled wire, and juggling around with the pressure of a steel point on the carborundum, the gods suddenly smiled. It was the old Eiffel Tower at last—I could recognise that spluttering note so well engraved upon my memory. Dashing up from the table to run downstairs and call the family to hear the miracle, I forgot, alas, that I still wore the headphones. With a clatter the small table came over and everything with it, and the entire family came running upstairs to see if I had been electrocuted or something. The parental scorn was withering, and believe it or not I couldn't for the life of me find those adjustments again in a hurry.

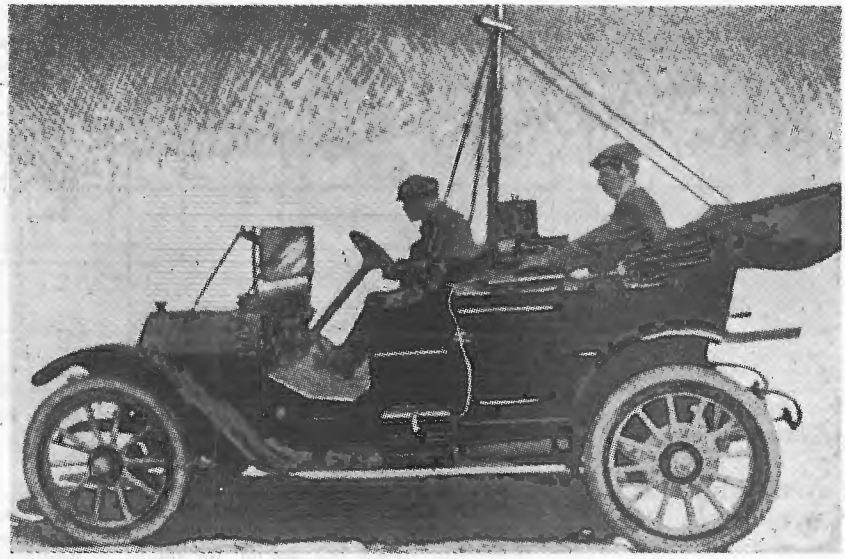
Meanwhile FL had finished his morning time signals, for such they were, and silence reigned supreme. It was the next week-end before I put things where I thought they had been, and sure enough, there were those dashes and ticks again. This time, the 'phones were laid gingerly aside and my victory over former scorn was complete.

With bated breath the detector was covered with a glass jam-jar and attention confined to moving sliders. Gradually I became aware of other sounds, buzzing high pitched whines, deep throaty roars, harsh scratchy sputterings. Although I didn't know it then, these were ships along the coast on the 600-metre range.

The Next Step.

Gradually things got better and I studied and thought about the morse code. It lived with me, and I began to master it. Soon I could identify the call-sign of one of those stations, the most outstanding. It was GLV, the Liverpool coastal station. Then followed the realisation of the call-letters of the station GLV would be calling. In a year or so I could even identify prominent ships by the characteristic sound of the spark.

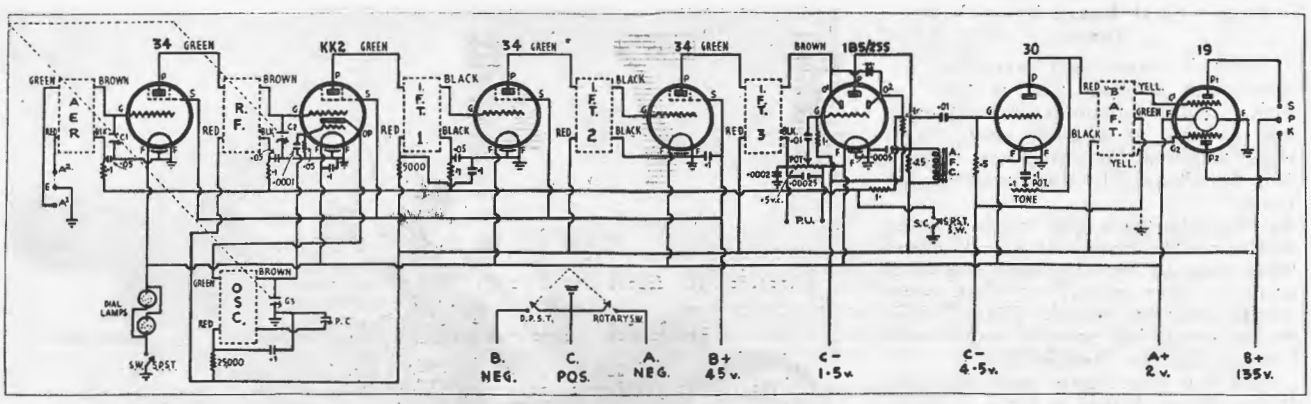
Meanwhile the multi-wire spreader aerial over the house was the subject of much comment and an object of wonder. It increased in size; so did the loading coils in my room, and then I was blessed with the achievement of being able to copy that old station of stations, Poldhu (MPD) in Cornwall. It was later when the war came, that an amateur wrote in the old "Wireless World" a poem that began with "Alas Poldhu, gone is thy blaring bugle note," for then the Post Office people descended and dismantled all amateur stations. But that is a story I will include in the next instalment of this biography.



The latest in car radio—in 1916. During the war radio engineers spent much time developing mobile wireless equipment for use behind the lines, and this photograph shows an experimental radio-equipped car.

Multi-Lingual Broadcaster

The extensive range of certain broadcasting stations has led to announcements being made in several languages. VK3ME, Sydney, the short-wave broadcaster of Amalgamted Wireless, has built up during its ten years' service, a great clientele of listeners in many countries. Together with the sister station, VK3ME, in Melbourne, VK2ME last year received many thousands of letters from persons who had some comment to make either upon the programme or the technicalities of the transmission. As a service to oversea listeners, announcements are now made several times during each of VK2ME's programmes, in Dutch, French, German, Italian and Spanish, as well as in English.



This seven-valve dual-wave battery superhet was designed and built by a "Radio World" reader, who claims an excellent all-round performance for it.

Seven-Valve Battery Dual-Waver Gives Excellent Results.

By JAMES M. KLEIN.

I am enclosing a circuit of a modern 7-valve dual-wave superhet that gives an amazing performance. It is fitted with A.V.C., sensitivity and tone controls, pick-up and doublet aerial connections, and standard parts are used throughout.

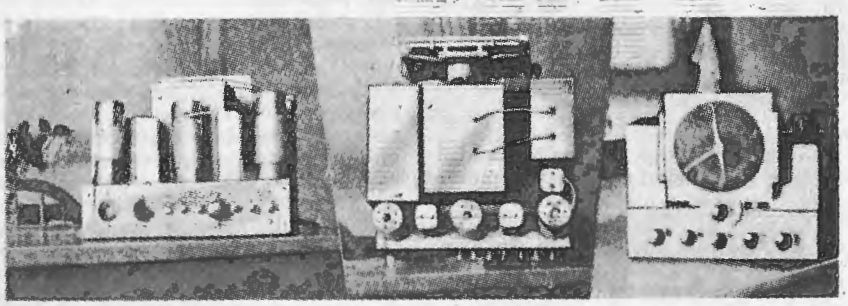
The circuit is standard except, that the 5,000 ohm de-coupling resistor and .1 mfd. by-pass condenser in the "B+" lead of the first I.F. transformer are included to cure a tendency towards motor-boating at high volume levels on the shortwave band. Also, the .1 mfd. condenser by-passing the "B+" lead of the oscillator coil should be placed as near to where the lead enters the coil box as possible. Only one other point in the constructional details needs mentioning, and that is the grid lead of the KK2. This should be kept well away from the R.F. valve grid lead, and should be made just the right length to reach from the gang to the grid cap of the KK2, as a movement to any great extent in this lead altered the tuning slightly on the shortwave band of the original receiver. Do not shield this lead.

The standing drain of this receiver is not low, nor is it exceedingly high, being 17 mills. on broadcast and 18.5 mills. on shortwaves without any bias on the 19 output valve. A few mills. may be saved by using a negative bias of 4.5 volts on this valve.

I would advise any builder who has not a signal generator and output meter to take the set to any reliable radio serviceman and have the job lined up correctly, as I found that it was very "touchy" on the high frequency bands.

A smooth-actioned volume control is essential; otherwise you may get a severe grating noise when adjusting this control. The tone control and the pick-up connections are of course optional, but I would strongly advise that the sensitivity control be included in the set, as it gives at least a rise of ten per-cent. in volume on the broadcast band.

I can safely say that this receiver, built up with a good coil kit and correctly lined up, is capable of putting up an excellent performance, on both bands. The low noise level, high selectivity, and good tone of this set will undoubtedly please the severest of critics.—James M. Klein.



Three views of the completed receiver, showing the details of the assembly.

Brief Appreciations From Readers.

I would like to offer my congratulations to you for producing the "Radio World"—it is certainly "A1." Would it be possible in the near future for you to publish an up-to-date list of ZL call-signs and addresses.?—A. L. Yeatman (AW207-DX), Melbourne, Vic. [A list was published last month—Ed.]

Allow me to congratulate you on your fine paper. I have had each issue so far, and I might add that my copy of the "Radio World" is amongst the first of my mail opened. Your articles are of interest to all connected with radio, and I am sure your success will be far-reaching.—Arthur L. Waltke, Clare, S.A.

I have been taking your "Radio World" since the opening number, and must say that it contains a wealth of knowledge, both for the beginner and also the man who is just a little higher in the scale. Wishing your magazine every success.—E. C. Marr, Temora.

Please send me the May issue of "Radio World." (P.N. enclosed). I have all the other issues and would not miss one for anything. I am glad to see you're going to have a cover for binding each volume—"Radio World" is well worth binding.—Ron Gurr, (AW58DX), Dungog, N.S.W.

After receiving the first three copies of the "Radio World," I am thoroughly convinced that there is no better monthly radio journal to be had. Please send me by return mail the following—Nos. 4, 5, 6 and 7, for which I enclose P.N.—Alan M. Cardwell, Christchurch, N.Z.

Would you be kind enough to forward to me the first issue of the "Radio World"? I have every copy from June onwards but missed the May issue. It is such a good periodical that I would not like to miss even one issue. Wishing your paper every success.—V. J. Mannsell, Brisbane, Q'land.

Inverse Feedback Conquers "Pentode Tone"

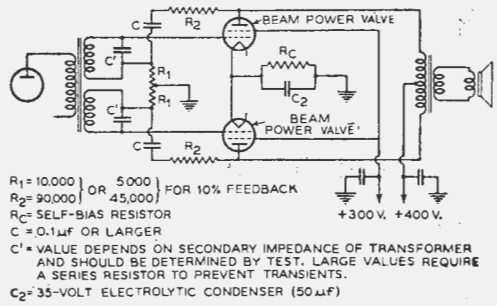


Fig. 1—An inverse feedback amplifier circuit for push-pull 6L6's.

How the relatively high percentage of distortion given by single output pentodes can largely be eliminated by applying inverse feedback is explained in the article below.*

THE phenomenon known as inverse feedback, like so many other developments in radio, has a history extending back many years. Often it is used by accident and its presence is unknown to the designer. In fact, in nearly every receiver precautions are actually taken to avoid it. The by-pass condenser across the cathode resistor is there to avoid the degenerative effects of inverse feedback.

Positive And Negative Feedback.

There are really two kinds of feedback generally encountered in receivers — positive and negative. The former causes oscillation, and the latter, which is otherwise known as inverse feedback, causes stabilization, and is the direct opposite to regeneration. Degeneration, anti-reaction or inverse feedback are among the many names coined for this phenomenon, but probably the most correct is that of "negative feedback."

Positive feedback is so well known as not to need any description. It is found in every oscillating valve, either in a transmitter or receiver, and it crops up in the use of reaction or regeneration in a detector valve or an r.f. amplifier.

Positive feedback does not necessarily result in oscillation, but if sufficient positive feedback is applied it will ensure oscillation taking place.

Negative Feedback Reduces Sensitivity.

Negative feedback is the exact opposite of positive feedback, and consists of the introduction into the early part of an amplifier of voltage from the output of the amplifier in such a way as to be in opposition to the signal input. One obvious effect of this is to reduce the sensitivity of the amplifier.

This action is the direct opposite of positive feedback, which is used to increase the sensitivity of the amplifier or detector. In any general case, there will normally be a certain amount of feedback existing in any amplifier, but it may be positive or negative depending on the design and construction. It may even be positive at certain frequencies and negative at others.

The effect of inverse feedback is not only to reduce the sensitivity of an amplifier, but it has two particularly valuable functions. The first of these is that it provides a stabilising effect. When applied to an amplifier which is inclined to be unstable it will generally produce perfect stability.

Greater Stability And Less Distortion

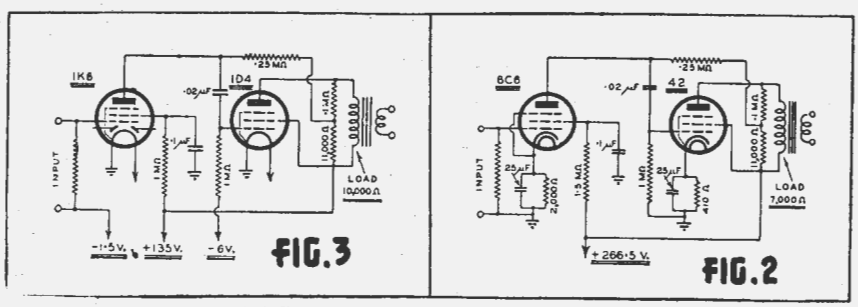
Its second function is to decrease the distortion in the part of the circuit in which it is applied. The greater the voltage fed back from the output to the input of the amplifier, the greater the effect of the inverse feedback, both on stability and in the reduction of distortion.

The effect of inverse feedback on distortion is not limited to harmonic distortion, but also extends to frequency distortion, that is to say, it "levels out" the response through the frequency range. With a pentode valve in a conventional circuit feeding an ordinary loudspeaker there is a marked rise in response with frequency. When inverse feedback is applied it tends to reduce this to a response which is more nearly level at all frequencies.

It is obvious, therefore, that inverse feedback can be used to produce a good fidelity amplifier from what would otherwise be a much less satisfactory amplifier. It may also be used so as to produce a commercially satisfactory amplifier out of what, without its use, would provide a very badly distorted output. Its use is therefore not restricted to any particular standard of valves in the amplifier, and whatever the degree of distortion existing in an amplifier, its application can reduce this amount of distortion by a factor of two or more, depending on the amount of inverse feedback.

Amount Of Feedback Is Limited By Sensitivity.

If sufficient voltage is fed back from the output to the input so as to decrease the sensitivity of the amplifier to half, its harmonic distortion will be reduced to half what it was previously. Similarly, if the amount of degeneration is increased to three times, the harmonic distortion will be reduced to one-third. A limit is set to the percentage of inverse feedback which is employed



Figs. 2 and 3 illustrate the application of universal feedback to resistance coupled audio circuits using a.c. and battery valves.

* Illustrations reproduced by courtesy of Amalgamated Wireless Valve Co., Ltd.

by the sensitivity that can conveniently be sacrificed. In many cases a reduction of sensitivity to half or one-third is a comparatively minor matter, particularly when a very high degree of stability is obtained, and since high-gain audio amplifiers are well-known and easily applied.

In most cases it is far easier to increase the gain of an amplifier than to decrease the distortion, and it is in these cases that inverse feedback finds a particular application.

Inverse feedback may be applied over any number of valve stages, from one upwards. It is essential only to make certain that the voltage which is fed back is introduced in such a way that it is out of phase with the input voltage.

No Advantage With Triodes.

It is generally admitted that the quality given by triode output valves is far superior to that given by pentodes or other high impedance output valves. This is due to two causes—firstly to the low harmonic distortion (which is mainly second harmonic) and secondly to the very heavy damping introduced on the loudspeaker by the plate resistance of the valve.

There is, therefore, no advantage gained under normal circumstances in the application of inverse feedback to a triode power stage. On the other hand, there are very distinct advantages to be gained by its application to pentode or tetrode power valves, and by its use these types of valves can be made to give a degree of harmonic distortion and damping on the loudspeaker not far short of that given by triode valves.

In order to obtain such good results from pentodes or tetrodes, it is essential to use a rather high percentage of inverse feedback. This may not be convenient in many cases, and a lower percentage of inverse

(continued on page 34)

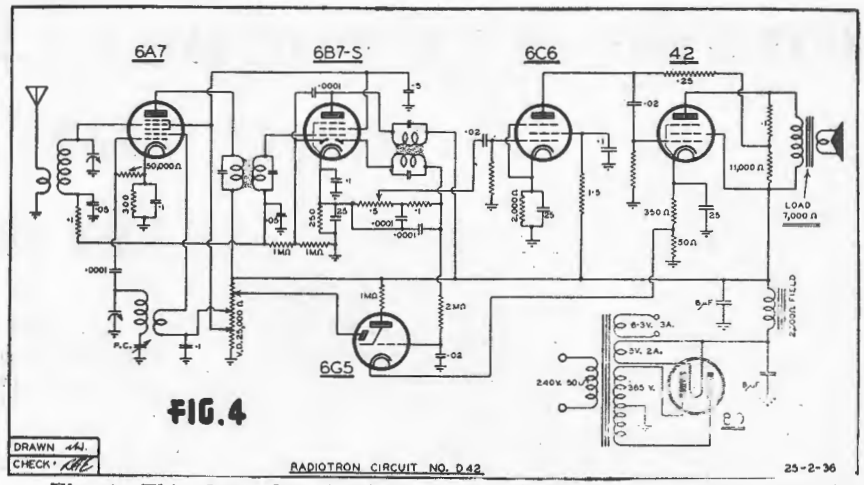


Fig. 4—This five-valve circuit is closely similar to that of the "Fidelity Broadcast Five" described recently. The main difference is that the single 2A3 in the output has been replaced by a 42, with inverse feedback. The value of the 42 grid resistor is 1 megohm, while the voltage divider taps are set to 100, 200 and 250 volts.

Image Frequency Interference On The Short Waves

Three methods of eliminating image frequency interference, generally encountered on the short waves in superhets with no r.f. stage, are given in this article . . .

By E. S. DARLINGTON.

(Of stations W2XAD and W2XAF, General Electric Company, Schenectady. New York).

SEVERAL complaints have been recently received in Schenectady from listeners to international broadcast station W2XAF regarding the subject of code or telephone radio stations operating on or near the assigned frequency of W2XAF, or 9,530 kilocycles.

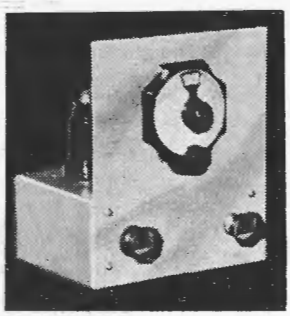
Upon investigation, however, it was found that the stations mentioned as the cause of the interference were not operating within this channel assigned internationally for international broadcast stations, namely, from 9,500 to 9,600 kilocycles, but were operating in full accordance with and abiding by the international agreements on frequencies between 10,440 to 10,460 kilocycles, which lie within the 9,600 to 11,000 kilocycle band assigned for commercial fixed services.

Interference on W2XAF from such stations in a superheterodyne receiver is generally due to the "image response" of the receiver itself. "Image response" may be defined as the increase in response, in such a receiver, at a frequency higher than the oscillator frequency.

In a modern superheterodyne receiver, the intermediate frequency is usually 465 kilocycles, which has been adopted as the general standard. The "image" of a station appears at a point on the dial of twice the intermediate frequency subtracted from the fundamental frequency of the station causing the "image" to appear. For example, twice 465 kilocycles is 930 kilocycles, and this subtracted from 9,530 kilocycles (the fundamental assigned frequency of W2XAF) gives a reading of 8,600 kilocycles on the dial, if the receiver is fairly accurately calibrated and aligned.

There are several ways to reduce such interference in shortwave reception caused by stations operating near the image frequency of the receiver when tuned to a desired signal. If the desired station is operating on 9,530 kilocycles (W2XAF), the oscillator, in most modern receivers, operates at a higher frequency, namely 9,530 kilocycles plus the intermediate frequency (usually about 460 kilocycles) or 9,990 kilocycles. If the radio-frequency selectivity for frequency conversion is inadequate, an incoming signal above the oscillator frequency at 9,990 kilocycles plus 460 kilocycles, or 10,450 kilocycles may produce an audible beat note with the desired signal.

The image response ratio for a receiver without a radio-frequency amplifier preceding the converter averages about 44 at 10,000 kilocycles. This means that the image signal would have to be 4 times as strong as the normal desired signal to produce the same audio output from the receiver.



REGENERATIVE R.F. BOOSTER FOR THE SHORT WAVES.

The simplest and cheapest way of "hotting up" the performance of any dual-wave 4/5 superhet on the short waves is to use a regenerative r.f. booster as illustrated above. Full constructional details of battery and a.c. models were given in the March, 1937, "Radio World." (Back copies are still available at 9d. each.)

With a radio-frequency amplifier preceding the converter, the image response ratio increases to about 140 at the same frequency in typical all-wave receivers. An additional radio-frequency amplifier would increase the image response ratio to about 5,000. Therefore, one or more radio-frequency stages before the converter adds radio-frequency selectivity to discriminate against a signal at the image frequency. In addition, increased sensitivity also results, and this may be desirable for improving the signal-to-noise ratio in a receiver not having a radio-frequency amplifier.

Methods For Reducing Interference From Stations On Image Frequency.

1. A tuned pre-selector may be added for the high-frequency band used. This should reduce the interfering signal by a factor of 35. Adding such a device requires an additional tuning control.

2. By shifting the intermediate frequency about 10 kilocycles either way. This will eliminate interference only from a particular signal, and requires careful re-alignment of all circuits of the receiver to hold substantially the same scale calibration. This change should be made by a competent serviceman who has the necessary instruments and equipment.

When the intermediate frequency is shifted 10 kilocycles, the image frequency is shifted 20 kilocycles. This should be sufficient except for very high keying of the interfering signal. It is important that the intermediate frequency is not shifted too much, as this may seriously affect the tracking of the radio-frequency and oscillator tuned circuits.

3. Probably the simplest method for reducing image frequency interference is to add a wave trap in the antenna circuit. This will be fairly effective if the intermediate frequency is above 450 kilocycles.

A Suitable Wave Trap.

The trap may consist of a good quality midget variable air condenser having a maximum capacitance of 100 micromicrofarads, and an inductance of about 4.5 microhenries. The inductance should be of the "low-

loss" type. It has been found that a 1-inch diameter thin bakelite threaded form (12 turns per inch) wound with 14 turns of No. 18 B & S bare copper wire to be about right for tuning out interfering signals from 7,000 to 18,000 kilocycles.

Depending upon the antenna used and receiver coil constants, the trap may be connected with the coil and condenser in series from the antenna post to the chassis, or the coil and condenser may be connected in parallel. This shunt circuit is then connected in series with the antenna lead.

In either case, it is desirable to shield the coil and condenser, and if a midget air condenser is used, the entire trap may easily be mounted in a can such as used to shield the intermediate frequency coils. For best results the trap should be mounted very close to the antenna terminal using short leads, in order to prevent undesired signal pick-up in the lead extending from the trap to the antenna post.

Adjusting The Trap.

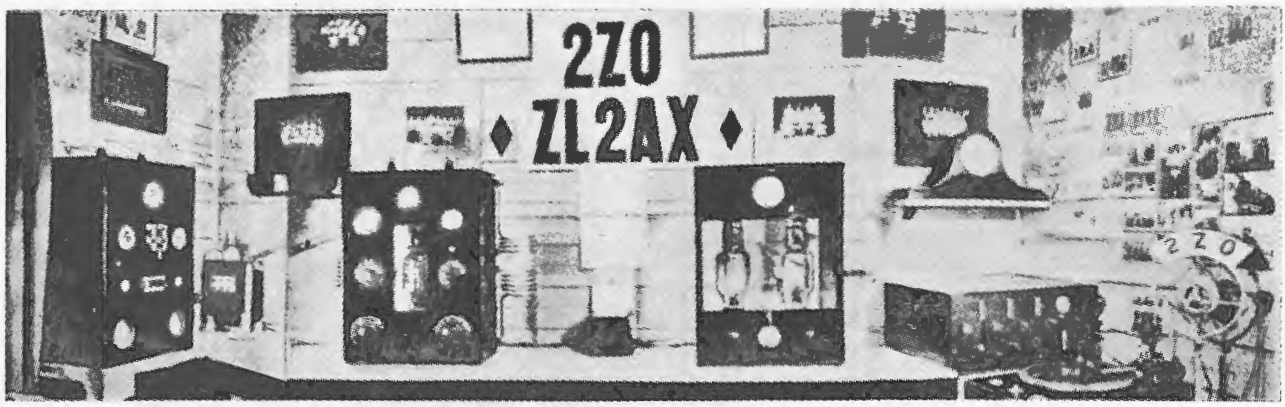
The trap may be adjusted by tuning in the desired signal on the receiver and adjusting the midget trap condenser for minimum interference from a station on the image frequency. Or, the interfering station may be tuned in at two times the intermediate frequency (2 × 465 kilocycles = 930 kilocycles) above the desired signal and the trap then adjusted for minimum response. A slight decrease in the strength of the desired signal may be found when the trap is tuned to the image, depending upon the losses in the wave trap coil.

Amateur Articles Appreciated.

Your articles on the ham game are excellent and most welcome, as they coincide with classes being run in W.A. at the Wireless Institute.

Radio Cartagena was heard over here just recently on 25 metres, and the 49-metre band is beginning to look up now as we get toward winter. Colombo (Ceylon) is getting through at QSA5, R6-7. This station has no call letters—just "Colombo Calling" (verified). W8XAL is heard at QSA4, R6 (heterodyne QRM). There is on HJ station I have not yet received on 49 metres. but I'm still after him. 25 metres produces W8's and F13 about 10 p.m. over here, the best hams being LU1EX, SM5SX, HK1Z, HI7G, SU1CH. Heard VE1CD the other night, at QSA5, R8.—Albert J. Gibbs (AW148DX), Shenton Park, W.A.

Round the N.Z. "B" Stations 3



A general view of station 2ZO, Palmerston North, which is operated by its owner purely as a hobby.

2ZO Palmerston North

The third of a series of articles on New Zealand "B" stations, written for the "Radio World" by "THE SOUTHLANDER"

STATION 2ZO, Palmerston North, which was designed and built by its owner, Mr. J. V. Kyle, is unique among "B" class stations in New Zealand, inasmuch as it has always been operated by its owner entirely as a hobby. It has never transmitted sponsored programmes or advertising matter, while everyone connected with 2ZO gives his or her services in a purely voluntary capacity.

Commenced Operations In 1930.

2ZO owes its existence to the many interested listeners who, after hearing Mr. Kyle operating his short-wave station ZL2AX, suggested that he should apply for a broadcast band license. Thus 2ZO came on the air in November 1930, transmitting on very low power until the arrival of higher-powered equipment and valves from overseas. These duly came to hand and the opening night was fixed for February 3, 1931.

Strangely this happened to be the very day of the disastrous earthquake in the Hawkes Bay province, which adjoins the Palmerston North district. Immediately Mr. Kyle offered the use of his short-wave station to the authorities, and ZL2AX was kept in constant use for two days, sending and receiving messages to and from the afflicted area.

The official opening had to be postponed in this emergency, but a most successful initial programme from the new transmitter took place on March 3.

Listeners' Association Provides The Programmes.

Associated with 2ZO today is a Listeners' Association of over 2,000 members, who provide the programmes for transmission and pay the running costs of the station.

The power supply to the transmitter is from a 1,500-watt motor generator, direct coupled to a 3-phase 3 h.p. motor, with a separate exciter, also direct coupled. This apparatus, which is electrically shielded, is situated some distance from the transmitting room to eliminate any mechanical noise being picked up by the microphones.

The power reaches the power control panel (the left hand panel shown in photo) and is smoothed out and filtered before being applied to the valves.

Transmitter Is Crystal Controlled.

The station was recently remodelled, incorporating crystal control and 100 per cent modulation. The oscillator panel is seen second from the left in the photograph, and the modulator panel, third from the left. Next is the speech amplifier cabinet with control panel in front.

MAIN FEATURES

CALL AND LOCATION: 2ZO, 50 Waldegrave Street, Palmerston North, New Zealand.
OWNER AND OPERATOR: J. V. Kyle.
ANNOUNCERS: D. Spring, E. A. Shackleton, and owner.
FREQUENCY: 1,400 k.c.
POWER: 100 watts aerial rating.
TRANSMISSION TIMES: Tuesday, 5-8.30 p.m.; Thursday, 6-8.30 p.m.; Sunday, 8.30-11 a.m.
TYPE OF TRANSMITTER: 3-stage crystal M.O.P.A.
ANTENNA: Umbrella type and counterpoise.
RELIABLE RANGE OF DAY TRANSMISSION: 200 miles.
AREA SERVED: Lower half North Island and upper half South Island.
LONGEST DISTANCE VERIFIED REPORT: 1,450 miles.
VALUE OF EQUIPMENT: £1,075.

An electric turntable is used for records and there are two microphones, one a double-button type and the other a condenser mike. The power is 100 watts to the aerial.

The antenna system is somewhat different to that of most stations, only one mast 51 feet high being used. The aerial is an umbrella type with a four-wire fan as centrepoise.

The station has two studios, one located beside the actual transmitting room and used for individual artists. The other, approximately a mile away, is situated in the Messrs. C. Ross Coy's. Buildings in The Square. Well furnished and fully equipped, this studio is large enough to accommodate a full orchestra as well as a large audience, and all concerts, etc. are broadcast from there.

The whole station reflects credit on Mr. Kyle, who is one of the earliest amateurs in New Zealand, his radio experience dating back to 1911. 2ZO is also official publicity station for the New Zealand Amateur Transmitters' Association. The station is a dual one, in that by changing three coils and two radio frequency chokes, a changeover from b.c. to s.w., or vice versa, can be made in three minutes.

Mr. Kyle has received reports of correct reception from Australia, over a distance of 1,450 miles, while the area effectively served is the lower half of the North Island and the upper portion of the South Island.

[Note: Transmission times given in the accompanying panel are A.E.S.T.]

Inverse Feedback Conquers Pentode Tone.

(continued from page 29)

feedback may be ample to give results which, if not so good as would be given by a triode, are at least considerably better than those given by a pentode without its application.

We will now give some attention to the question of means for applying inverse feedback in amplifiers and in power stages suitable for broadcast receivers. In this brief treatment only the final stage will be considered, but it is as well to remember that the same principle can be applied to a larger number of stages.

There are two methods by which inverse feedback may be applied conveniently and satisfactorily. The first of these (shown in fig. 1) incorporates an audio transformer with two separate secondary windings so that the voltage which is fed back from the plate circuit is applied between the centre terminals of the secondary and earth.

The percentage of voltage fed back from the plate to the grid is given by the ratio $\frac{R1}{R1 + R2}$. In fig. 1 it will be seen that this is equal to $\frac{10000}{10000 + 90000}$, or 10%. This percentage of feedback is sufficient for most ordinary requirements.

The application of inverse feedback to resistance-coupled circuits is possible with the circuit shown in fig. 2. The values of the resistors given in this circuit are arranged to give 10% inverse feedback. This is obtained from the two resistors arranged across the load resistance, and works out as $\frac{11000}{11000 + 100000} = \frac{11000}{111000} =$ 10% approx. If it is desired to increase the percentage of feedback, the 11,000-ohm resistor can be increased to say 15,000 ohms or more, depending on the requirements.

In this particular arrangement a higher percentage of feedback would not be generally desirable, since the sensitivity of the audio amplifier would not be high enough for its application in a radio receiver or for use with a low sensitivity pick-up. A similar application to the case of battery valves is shown in fig. 3, where a 1K6 excites a 1D4 with 10% inverse feedback.

The percentage of inverse feedback employed does not give any direct indication of the degenerative effect, since this is affected also by the voltage gain in the valve. Since the 1D4 has a higher amplification factor than the 42, the effect of 10% feedback is greater in its case, and the gain of the amplifier is reduced by approx. 2.8 times, as against approx. twice in the case of the 42.

Another effect of inverse feedback is to decrease the effective plate resistance of the power valve, thereby improving the response of the loudspeaker to transients through an increase of damping.

For example, in fig. 2 the plate resistance of the 42 is decreased by the use of inverse feedback from approx. 80,000 ohms to 3,000 ohms, and since the load resistance is 7,000 ohms, it is obvious that it is fairly heavily damped. The effective plate resistance is still further decreased by an increased percentage of inverse feedback, so that if sufficient voltage is fed back, the plate resistance can be brought down to the equivalent damping which would be produced by a triode such as the 2A3.

The application of inverse feedback to an a.c. receiver using resistance coupling is shown in fig. 4. This circuit is a simple one, and does not incorporate an r.f. stage but has for its object the demonstration of the capabilities of inverse feedback.

While the quality from this amplifier is not as good as that given by a 2A3, it does provide a very considerable improvement on the performance given by a straight 42, and to many listeners it might be considered as indistinguishable from the really preferable arrangement using the 2A3.

[From data supplied by the Amalgamated Wireless Valve Co. Ltd., and published in "Radiotronics."]

Breaking Into The Amateur Game.

(continued from page 22)

are so many standard sizes on the market, making it a much less expensive matter to acquire the commercially-built apparatus.

Choosing The Rectifier.

After the transformer, the next consideration is the rectifier to work at the current and voltage required. The type 5Z3 is ideal for the job, 200 m.a. being well within its capabilities, as also is the voltage required.

Filament windings on this final stage have not been mentioned, since it is always better practice to separate the high tension from the filament circuits. The major reason for putting the rectifier filaments on a separate transformer is to prevent a change in filament volts when a large change in load is made on the H.T. transformer secondary, such as would be the case in a C.W. transmitter being keyed.

All valves in the transmitter, other than rectifiers, could be grouped on a single transformer with many different filament windings but devoid of a H.T. secondary. The power rating of this transformer may be calculated in a similar manner to the H.T. unit. Each valve filament requires a certain current at a given voltage, and all that is necessary is to leave a margin of several amps. when ordering.

From the rectifier, we come to the filtering chokes. A current-carrying capacity of 200 m.a. is again the requirement in the example we are discussing. In this case we will consider the average set-up, including an input choke and one section filter. The idea of choke input is to provide better power regulation.

Referring to fig. 2, L1 represents the input choke which must be capable of carrying the current to be drawn. However, it need not be of very great inductance—5 to 10 henries is ample. L2 is actually the filtering choke, and like L1, it must be wound with wire of sufficient thickness to carry the current without undue voltage drop. Any voltage drop between the input and output side of this choke is waste, and should be kept down by the use of heavy wire in the choke coil windings.

The inductance L2 can be from 10 to 100 henries, depending on what service the power supply would be called upon to give. In the case of a C.W. transmitter that is crystal controlled, and where this supply is to be used only for the last stage, 10 henries would do, but for fone (telephone) work at least 30 henries should be the inductance, under load.

Lastly, the filter condensers must have a safe working voltage rating, which in this case would be 600 volts. Let us now briefly touch upon a method of utilising electrolytic condensers. In some amateur transmitters where class "A" modulation is used, a comparatively high voltage is required for the modulator, to be reduced through a dropping resistor for the modulated amplifier.

A 50-watt type valve capable of delivering about 12 watts of audio frequency energy, may require 1,150 volts on the anode. In this case two 5Z3 type valves would be more satisfactory used as half-wave rectifiers, together giving full-wave rectification. The pair of plates in each valve are connected together and each valve functions as a half-wave rectifier.

The input choke is as before, and also the filter choke, but the paper dielectric condensers will be replaced with three electrolytics in series to take the place of each paper condenser. Electrolytic condensers have been previously discussed, and we are therefore familiar with their characteristic "leakage current." These values differ even in condensers of similar make.

To even up the voltage distribution

across each condenser, it is usual to shunt each unit with a resistor of not more than 500,000 ohms. By putting the resistors across each of the condensers, we divide up the voltage applied to the bank, and each condenser will receive only one third of the total voltage.

Without the resistors, the condenser with the lowest leakage current would have applied across its terminals the greater part of the total voltage.

Other Types Of Power Supplies.

Finally, to check over various other systems of "power source," we have, for portable use, the dry batteries. These are usually made up in units with a voltage of 45 per block, and as many as is necessary may be connected up in series. There is of course, the usual 6-volt accumulator for filaments and a type of H.T. accumulator made up in blocks of 10 volts each. These units may be used in precisely the same manner as the dry "B" batteries.

Whereas the "A" accumulator of 6 volts usually has a capacity of 100 amp. hours (which means that one ampere may be drawn for 100 hours, 2 amps. for 50 hours, and so on); the ampere capacity of the "B" accumulator is generally only 5 amps. Although this capacity may appear very low, it is ample for all "B" purposes, and is greater than most of the dry type "B" batteries.

Vibrator Unit Ideal For Portable Work.

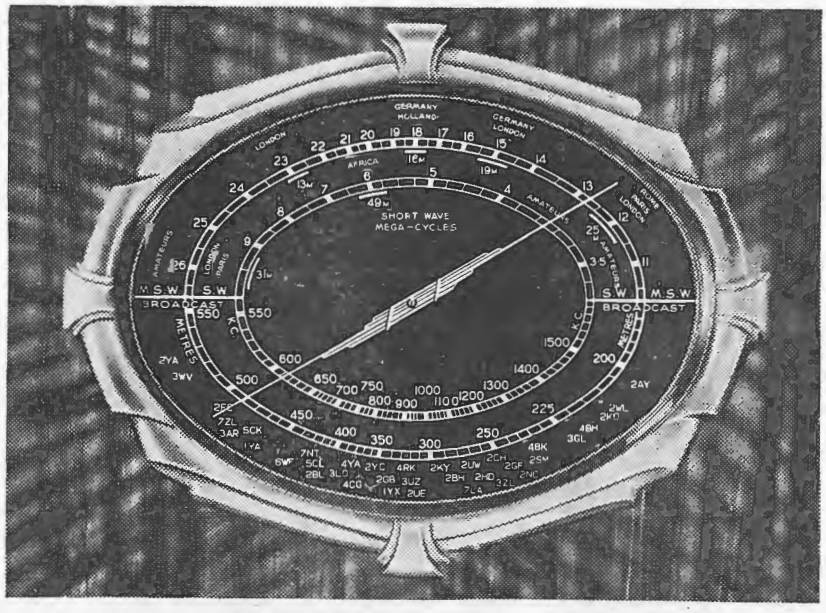
There is still another method of obtaining H.T. supply which is often met with in the case of portable gear, and that is by using a vibrator unit. It consists mainly of a transformer with a primary suitable for 6 volts A.C. and secondary of a ratio to primary, to produce approximately 250 volts. The vibrator itself is generally in the form of a buzzer on a larger scale.

The buzzer action breaks up the D.C. current from a six-volt accumulator, which is the actual source of power, and the transformer primary being in this circuit, operating on the pulsating voltage, functions in a more or less normal manner and a high voltage with a similar waveform appears across the secondary.

This pulsating output is rectified, either by another pair of vibrating contacts, working in synchronism with the primary vibrator, or there is a rectifier valve, made with a 6-volt filament and cathode, as well as two plates. This valve may be wired up in the conventional rectifier circuit—half or full wave.

The rectifier is followed by the usual filter-8 mfd. electrolytic, choke and 8 mfd. electrolytic.

Next Month: Keying Transmitters.



Distinguished in appearance, smooth-actioned, and rugged in construction, this latest Radiokes triple-band tri-colour tuning dial is certain to be widely popular this season. It is used in the "1937 International All-Wave Six" described this month.

Latest Radiokes Tri-Colour Dial A Striking Success.

Provision for three wave bands, with a different colour for each automatically switched in by the wave-change switch, enlarged size, smooth action and distinguished appearance are features of the latest Radiokes Triple-band Tri-colour edge-lit dial. Adding to the popular "Colourvision" series, it embodies all the latter's advantages, together with the added improvements mentioned above.

The dial is calibrated in three bands, from 11 to 31, 31 to 80 and 200 to 550 metres, calibration being in metres, kilocycles and megacycles. The photograph published above shows a scale calibrated to suit the latest Radiokes Tri-Wave TWA-3 coil assembly, but the dial is available with standard calibration to suit most coils.

Cord Drive Gives Smooth Action.

Mechanically the dial has been simplified in a striking way, yet the increase in efficiency is considerable. The movement is of the well-tried and proven cord type, giving smooth action and eliminating the usual trouble due to mechanical wear. Construction is rugged and firm throughout, the main parts being made of 16 and 18-gauge steel and brass. Glass is used for the front scale.

Edge-Lit In Three Colours.

A highly efficient system of edge lighting provides three colours—orange, red and green—to illuminate different sections of the dial in a striking way. The large oval escutcheon—measuring externally 7in. x 5in.—is made of metal and can be had in either antique silver or florentine bronze. A "Magic Eye" escutcheon to match is also available at small extra cost.

To do full justice to the beauty of their new dial, Radiokes Ltd. have prepared an art leaflet in four colours, which can be obtained on application to them or to any wholesale distributor.

S.W. Stations VK2ME And VK3ME—Transmision Schedules For April.

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

VK2ME (31.28m., 9590 k.c.)

	Sydney Time	G.M.T.
Sundays:	4 p.m.-6 p.m.	0600-0800
,,	8 p.m.-Mdt.	1000-1400
Mondays:	1.30 a.m.	
	3.30 a.m.	1530-1730

VK3ME (31.5m., 9510 k.c.)

	Melbourne Time	G.M.T.
Nightly Monday to Saturday (inclusive)	7 p.m.-10 p.m.	0900-1200

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

The . . . A.T.R.S. Bulletin

Conducted by the Secretary, 287 Clarence Street, Sydney, N.S.W.

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From The Secretary's Pen.

DURING the past month the Association has been progressing well. The mail has been particularly heavy, enquiries regarding membership coming in from all over the Commonwealth. It is more than apparent that a serviceman's organisation like A.T.R.S. has been badly needed.

The under-mentioned servicemen have been chosen as branch organisers for their own states, and intending members are invited to give them every possible support:—

Victoria:—V. H. Blight, 30 Ellis Road, Glen Iris, S.E.6, Victoria.

H. Mendoza, 161 Lygor Street, East Brunswick, N.4, Victoria.

Tasmania:—J. G. Oliver, 63 North Terrace, Burnie, Tasmania.

Western Australia:—A. J. Gibbs, 129 Herbert Street, West Subiaco, West Australia.

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Queensland Branch Notes.

By W. HUDSON, Acting-Secretary.

Branches of A.T.R.S. in Queensland now include Townsville and Rockhampton, and prospective members living in these districts are invited to write to Hillman's Radio, 114 Flinders Street, Townsville, or W. A. Minchin, A.M.I.R.E., William Street, Rockhampton. Cairns members are requested to join the Townsville branch. The Brisbane branch has been registered at the Queensland College of Science, Old Town Hall Chambers, Queen Street. During my trip north I visited a number of radio men who had written us, and everywhere I found great enthusiasm for A.T.R.S.

I received great assistance from people connected with talkies and sound recording in Queensland who wish to join A.T.R.S. It is not possible for me to interview people out of town, but if they care to call in at any of the branches mentioned they will be welcomed.

Despite the fact that there is an award in Queensland for radio mechanics, there is a vast field for organising servicemen up there. Everyone informed me that they want retail dealers registered, and some scheme to cut out pirates, unfair discounts, cheap boy labour and the like.

Here is an amusing example of service work brought to me. A Marconi ship's receiver from an overseas boat, after being serviced by a certain service shop, was O.K. on broadcast, but 600 to 800 metres morse had disappeared. I tested it on the test oscillator, with the result that it would not tune higher than 550 metres. The lead from the fixed plates of the tuning condenser had been connected to wrong side of the grid condenser, placing the latter in series with the tuning condenser.

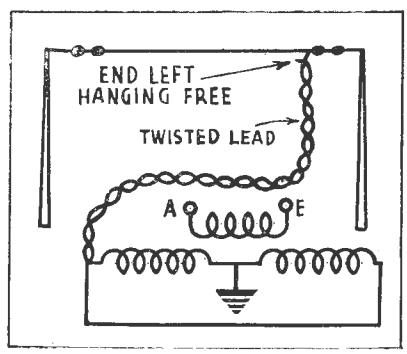
Man-Made Interference

Common Causes And Effective Cures

(By "STATIC.")

The main bugbear of modern radio reception is undoubtedly static, both natural and man-made. So far, natural static has not been conquered, but man-made static can definitely be eliminated or, anyway, greatly reduced, if the problem is approached in the right manner.

The first thing to do when troubled with a noisy receiver is, of course, to make sure the set itself is not at fault. When this is checked up and



found O.K., try the simple expedient of shorting the aerial terminal to the earth, and noting whether the noise stops or continues. If it stops, it can be safely said that it is being picked by the aerial, and consists either of natural or man-made static.

Next, by listening to the regularity of the sounds, the noise can be classified. Loud bursts of crackling at very irregular intervals can be safely put down to natural static, although tram noises often give the same symptoms. However, if the tram line is close at hand its effects can be checked by noting whether the passing tram synchronises with the noise.

If the noise manifests itself as a continual buzz, hum or crackle, then it is definitely man-made static being picked up by the aerial. The obvious thing to do is to erect a noise-reducing aerial, of which there are many types. The cheapest and most effective I have found is one that was designed by the Wireless Branch of the Postmaster General's Department, Victoria. It is the flat-top twisted pair type.

The flat-top may be any convenient length but should, of course, be erected as far as possible from electric light or telephone lines. The lead-in is ordinary twisted pair lighting flex, one lead of which is connected to the aerial proper, the other end being left free. The lower ends are connected as in the diagram. The details of the transformer are:—

20 turns of 22 G. D.C.C.
40 turns of 22 G. D.C.C.
20 turns of 22 G. D.C.C.

wound on a 3in. former with ¼in. space between coils. All coils are wound in the same direction.

Mains interference and its elimination will be described next month.

Common Detector Circuit Faults.

(By "BY-PASS.")

1. HUM—MOTOR-BOATING.

These troubles are often caused by the bypass condenser across the detector cathode resistor. This condenser is usually of the 25 mfd. electrolytic type, which is prone to drying up. The short in the condenser caused by this is sometimes only bad enough to

cause a hum, but at other times it causes severe motor-boating.

2.—NO SIGNALS.

This particular trouble can, of course, be caused by many different things, and often one checks all voltages, coils, etc., without success. In this case the trouble is often caused by a faulty audio coupling condenser.

With this condenser open, all voltages, coils, and valves may be correct but still the set will not function.

In this case it is advisable to check the actual path of the signal right through the set, when the defective condenser will be discovered.

3.—POOR VOLUME AND DISTORTION.

Often a set will be found that is functioning, but as soon as one tries to increase volume to normal distortion results.

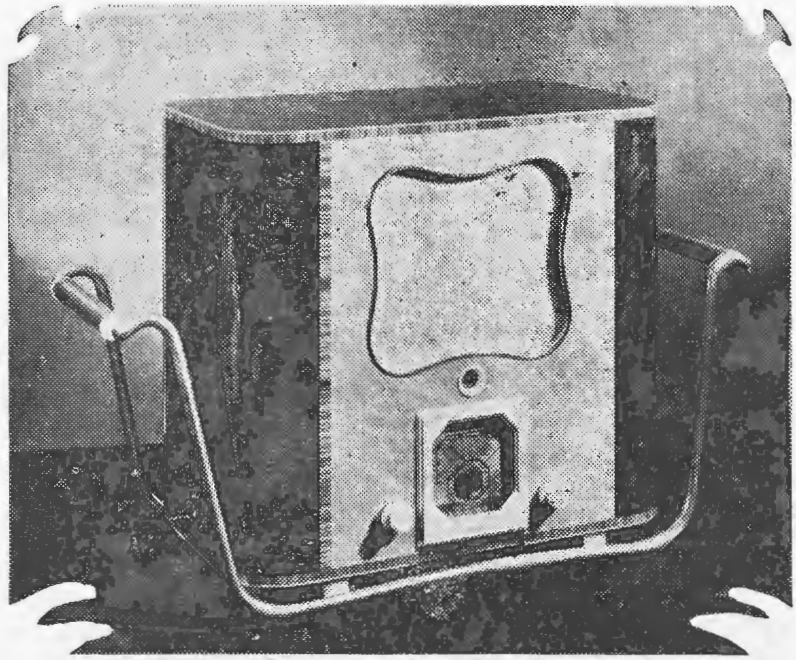
This trouble can be caused by low plate voltage on the detector, due in most cases to one of three things:—

(a) Plate bypass condenser shorting. (This condenser is usually a small mica type.)

(b) Faulty plate supply resistor (usually ¼-megohm carbon type).

(c) If the circuit is de-coupled for eliminating hum, the trouble could be caused by the de-coupling condenser being shorted.

Next month we will give several other troubles which occur in the output circuit. Please let us know if you like these articles.



Special Order From India For De Luxe Radioplayers.

Shown above is one of a number of special Philips Radioplayers supplied recently to the order of the Maharajah of Patiala (British India).

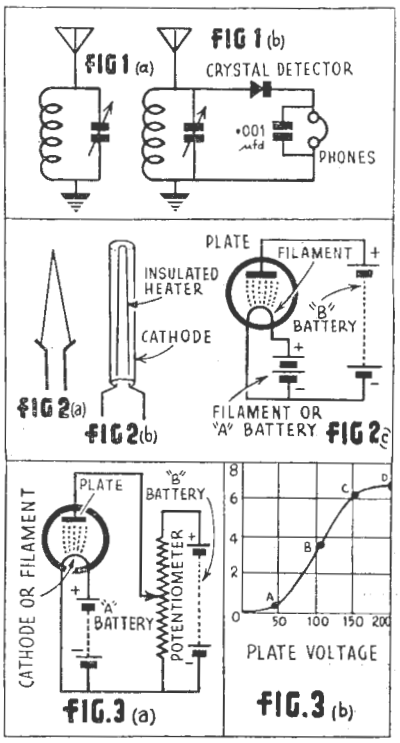
The cabinets were made of costly woods, while the escutcheon and control knobs were of carved ivory. Chromium sledges provided with small wheels and costly leather-covered handles were other features.

The sets have been built after this fashion to be adaptable to the customs of the country, for in Patiala no chairs are used, and the people squat on luxurious carpets or low cushions.

Radio Step By Step 8

The Valve At Work

The theory and construction of the valve are dealt with in this instalment, the eighth of a series of articles for beginners.



PERHAPS the most important link in the radio chain is the detector, which de-modulates the received r.f. signals and hands them on in the form of varying audio frequency currents that are transformed into sound by the headphones or loudspeaker.

We will assume that we have a simple tuning circuit rigged up as shown in fig. 1 (a). It comprises a coil tuned by a variable condenser, both being of the right proportions to form a resonant circuit for the signal we want to hear. The circuit is connected to an aerial and earth system as shown.

Crystal Is Simplest Detector.

The next problem is to make the signal audible, and the simplest way of doing this is to use a crystal detector and a pair of headphones connected across the tuned circuit as shown in fig. 1 (b).

When the tuning circuit is adjusted to resonance there is an oscillating high frequency current surging backwards and forwards in it, but this current will not actuate the 'phones until it is rectified; that is, current flowing only in the one direction is required.

The crystal detector provides this rectification by acting as a valve, in that it passes current readily in one direction and hardly at all in the other. The 'phones are thus provided with uni-directional impulses that rise and fall in strength at audio frequencies.

The .001 mfd. fixed condenser shown in fig. 1 (b) connected across the headphones acts as a reservoir to maintain current through the 'phones during the time between one audio impulse and the next. Both volume and quality are thus improved. Often this component is not included, however, as there is sufficient capacity between the leads in the headphone cord to provide the necessary effect.

Crystal Sets Too Insensitive.

With a crystal set, the headphones are actuated solely by the energy radiated by the transmitter and picked up by the receiving aerial, which explains why receivers of this type are so restricted in their range. As well, there are other drawbacks that make a crystal far inferior to a valve as a detector. For this reason the explanation of the process of detection given above has purposely been made brief. It will be expanded considerably when the action of the valve as a detector is being considered.

How The Valve Works.

The most universally-used device in radio is the valve. There are hundreds of different types designed to perform dozens of various operations, but they all work on the same underlying principle.

Generally, the valve is a glass bulb containing two or more elements. Air particles constitute obstacles against the free movement of electrons within the bulb, and so the air is extracted by a vacuum pump. However, as no pump can produce a perfect vacuum, a little magnesium is placed inside the bulb before it is sealed, and the latter is then placed in a concentrated radio frequency field. This ignites the magnesium (known as the "getter") within the bulb, and the combustion absorbs the residue of air still left in the valve. It is this "getter" that can be seen as a silvery deposit inside the glass envelope of many valves.

Cathode Is Electron-Emitting Element.

The most important element within the valve is the cathode, which is made of or coated with, material that when heated to its correct operating temperature gives off a copious supply of electrons. There are two common types of cathode. That illustrated in fig. 2 (a) is directly heated, and is generally known as a filament.

The other type is the indirectly-heated cathode shown in fig. 2 (b). The wire within the cylinder is the heater, and it is insulated from the cylindrical cathode surrounding it. Its sole purpose is to supply sufficient heat to the cathode to bring the latter to its correct operating temperature.

Indirectly-Heated Cathodes Eliminate A.C. Hum.

Valves using filaments (or directly heated cathodes) require comparatively little heating power, and as economy of operation is an essential with receivers powered by batteries, this type of valve is generally used in battery sets. With sets operated from a.c. mains, however, a filament heated directly by 50 cycles a.c., for example, would have 100 current impulses passing through it every second. This continuous variation in the heat supplied to the filament would, unless the latter was of fairly heavy gauge, result in a corresponding pulsation in the supply of electrons emitted. This in turn would give rise to a bad hum.

The indirectly-heated cathode also has other advantages for a.c. operation, and so for this application it is generally used. It is obviously not nearly as economical to run as the filament type, but where power is taken from the mains this is of no importance.

Diode Is Simplest Valve.

The simplest type of valve is the diode, illustrated in fig. 2 (c). It has two electrodes—filament and plate.

If an "A" battery is conneced across the filament, and another battery, known as the "B" battery, is connected up as shown with its positive terminal taken to the plate and its negative to the negative pole of the filament or "A" battery, electrons will flow from filament to plate. This is because, as explained in an earlier article in the series, electrons are negatively charged, and as unlike charges attract, they will flow towards a nearby positively-charged body, represented by the plate.

This flow of electrons from filament to plate constitutes a current that will flow continuously as long as the plate is positive to the filament. If the "B" battery is connected the other way round, however, so that the plate is negative to the cathode, the electron flow is stopped because of the repulsion there will be between the negative plate and the electrons, which are negative.

How The Diode Rectifies A.C.

Now imagine a source of a.c. connected between plate and filament. On the half cycles when the plate is positive to the filament, current will flow, but there will be no electron flow (no current) when the plate is negative to filament.

Thus the valve is acting as a rectifier in that it has changed an alternating current into a pulsating direct current. This alternating current can be of any frequency, from the 50-cycle variety to the highest radio frequencies. Hence, the diode can be used in a power supply to rectify a 50-cycle current supplied by a.c. mains, or it can act as a detector for radio frequency currents.

Space Charge Between Cathode And Plate.

Not all of the electrons leaving the filament reach the plate. The number that do depends mainly on the potential of the plate in respect to the filament.

Some of the electrons emitted return to the filament, while others remain in the space between filament and plate for a brief period of time to form what is known as a "space charge." As it consists of negative electrons, the space charge has a repelling action on other electrons leaving the filament, and also impedes the progress of those that are on their way to the plate.

Fig. 3 (a) shows a scheme for gradually varying the voltage on the plate of a diode valve from zero to the maximum given by the "B" battery. As the slider of the potentiometer is rotated slowly from the negative to the positive end, so the voltage on the plate gradually increases. As the plate becomes more and more positive, the number of electrons that succeed in passing through the space charge increases, though above a certain plate voltage any additional increase in voltage has little effect in increasing plate current. The reason for this is that all of the electrons being emitted by the filament are being drawn to the plate. This maximum current is called the saturation current.

The Effect Illustrated.

This effect is simply illustrated in fig. 3 (b), which shows a typical characteristic curve of a diode valve, plate voltage being plotted against plate current in milliamperes.

At low plate voltages, the current is also low, showing that the plate is unable to overcome the repelling effect of the space charge to any appreciable extent. After the point "A" this is largely overcome, and the increase in electron flow with rising voltage soon becomes rapid and even. At "C" the curve starts to flatten out again, showing that the electrons are reaching the plate almost as fast as the filament can emit them. The appreciable increase in voltage from "C" to "D" thus produces very little corresponding increase in plate current.

Next Month — "More About the Valve."

"Keep Up The Good Work"

Birthday Greetings to "R.W." : Field Day at Inverell : Lakemba Radio Club holds Seventh Annual Re-Union . . .

By W.J.P.

IN opening our notes this month, it is desired to extend congratulations to the Editor and publishers of "Radio World" on the occasion of the magazine's first birthday.

Its widespread popularity is, no doubt, due to the variety of articles contained within its pages. Set-builders, servicemen, dxers, amateurs, in fact, everyone interested in radio technically finds something to suit his own particular interests. Articles are well set out, and are usually of such a nature that even a novice can understand them.

One very noteworthy point is the fact that "ham jargon" has been practically eliminated from amateur sections. Abbreviated words as used by "hams," while perfectly in order and an advantage over the air, are a very undesirable feature when used too much in print, as readers unacquainted with their meaning, find little or no interest in articles containing such references.

Briefly summarised, the policy of "Radio World" appears to be quite different from that of any previous radio periodical published in Australia, and the only possible suggestion we can offer is to "keep up the good work."

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Set Construction In Hospital.

The above photograph shows a field day being conducted by members of a radio club at Inverell. Seated at the "operating table" is 2HV, with W. Picknell (of Sydney) at the back left, while at the right 2ZP is calling CQ through a microphone which is packed into a jam tin. The photo was taken before 2ZP met with the glider accident the bush surroundings effecting quite a contrast to the snap published last month showing the same "ham" transmitting from a hospital bed.

Incidentally, four lady visitors from Inverell called at the hospital recently, and were astounded to observe the patient sitting up in bed surrounded by a mass of wires, valves, coils, etc. Enquiries revealed that 2CP was only constructing a few radio sets in his spare time! We have often heard it stated that "you cannot keep a good 'ham' down," but it must be admitted that this is one of the most outstanding practical demonstrations yet encountered.

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Lakemba Club Annual Reunion

The Seventh Annual Reunion of the club, held at the Sunrise Hall, Canterbury, on Tuesday, April 20, was the most successful yet conducted.

The Postmaster-General's Department was represented by Mr. H. K. Burbury, who conveyed the regrets of the Senior Radio Inspector, Mr. W. T. S. Crawford, at the latter's inability to attend. Mr. Burbury assured all present that his department was always willing to assist or offer advice to the radio amateur, and welcomed enquiries or problems at any time. With reference to the authorised power for Australia, he stated that it was necessary to impose some limit, in fairness to everybody.

In replying to the toast of Mr. C. Luckman (2JT), Mr. P. Adams (2JX), representing Federal W.I.A., mentioned that Lakemba was the most active club in Sydney. Mr. H. Peterson (2HP), representing State W.I.A., stressed the necessity of co-operation in the forthcoming Amateur Exhibition, and stated that the W.I.A. had hopes of formulating something particularly elaborate for 1938. Mr. H. Garland, representing Waverley, the oldest radio club in Australia, responded to the toast of kindred societies.

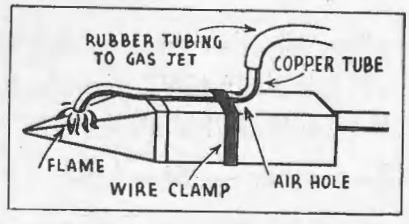
Mr. L. Taylor (2CL) in proposing the toast of the radio press, made special reference to "Radio World" and its remarkable progress during the past 12 months. He added that amateur activities should be given more publicity in the daily press. In responding, Mr. R. South, of "Radio World," conveyed the regrets of the Editor, Mr. A. E. Read, at being unable to attend, but gave assurance that "R.W." would assist the amateurs and experimenters in every way possible.

Messrs. Calder and Haworth were present on behalf of the Amalgamated Wireless Valve Co., Mr. Haworth making reference to the extensive service rendered by his company in circularising amateurs with valve data. In complimenting a Lakemba member, Mr. J. Warren (2QX) on his recent transmitter article, Mr. N. G. McIntyre (Prices' Radio Service) added that as a result of an advertisement in "R.W." for a kit of parts, he had received enquiries from all over Australia.

At the conclusion of speeches the usual cups and prizes were presented by Mr. Burbury, proceedings closing at 11 p.m. The prize list was as follows:—One gold-plated Eversharp pencil, 12 months free subscription to "Radio World," one Eversharp pencil, and the "booby prize" (a farthing).

Novel Gas-Heated Soldering Iron

I am submitting a little idea that readers might find useful. It is for anyone who still uses a non-electric



soldering iron, and I think there are quite a few. The arrangement saves gas, and is very handy.—F. McLeod (AW172DX), Newcastle, N.S.W.

The All-Wave All-World DX News

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

★ ★ ★

Zero Beat Radio Club Notes

(By "Russ")

THE last field day of a series of four, run for the President's Cup, was held at Caramar on April 4. Most of the usual field-day gang were there, with various kinds of direction-finding sets.

After lunch, the transmitter was sent out to be hidden, and at 2 p.m. all the receivers were sent off to search. Within 15 minutes everyone had found the transmitter, the winner of the day's event being K. Keeley, who receives a cup presented by the Club.

Contest Won by H. Walters

The field days were held every two months, so eight months were taken to complete the series for the President's Cup, which was on a handicap basis. The winner of this cup was H. Walters, closely followed by R. Torrington (2TJ), who was only 4 points behind. L. Stocks was third, being 78 points behind 2TJ, and H. Whyte-Meach 10 points away fourth. Throughout the contest 22 members and 12 D.F. sets took part.

The Cups will be presented to the winners at the annual general meeting, which will be held on the last Friday in May. All nominations should be sent in immediately to the secretary in writing, in order that ballot papers can be prepared. As these have to be posted to members throughout Australia, it is necessary to have the nominations in during the first week in May.

Schedule of Club Transmissions

The Club transmitter is on the air four times a week—on Monday and Thursday from 8 to 8.15 p.m. for morse practice, and on Tuesday and Friday from 7.30 to 8.30 p.m. for Club announcements and morse practice. As there is more "soup" being put into the aerial now at the new location, a line from country listeners as to reception would be greatly appreciated by the Council. A ring to the secretary, Tom Priestly (L 3425) would also be appreciated.

Rodger Torrington and Russ Miller attended the Lakemba Club's Reunion on April 20 and report having an excellent time.

The Club is to be congratulated on its fine show, and when we left it was doubtful if some of the music was inspired by personal sentiment or "ham" radio. Anyway, good luck Lakemba!

New members should call at 54 Station Street, Newtown, on a Tuesday or Friday night. Now is the time, as the A.OP.C. class has just commenced, and there is room for plenty more. Don't forget the cinematograph night at the Club rooms on May 14.

"Step-By-Step" Series Appreciated.

I have been taking the "Radio World" since the second issue and will always get it—it's an excellent mag. I know nothing about the works of wireless, though I once made a crystal set which did everything but get our local station, 2ZR! I intend to join the DX Club shortly.

The feature I study most is "Radio Step by Step," and it was this article which first attracted my attention. Keep it going, and I'm sure you will get a number of readers who, like myself are very hazy in regard to technicalities.—Wallace R. Armstead Lake, Nelson, N.Z.

ALL-WAVE ALL-WORLD DX CLUB
Application for Membership

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

Dear Sir,

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

Name.....

Address.....

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

.....

My set is a.....

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

.....

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

(Signed).....

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

All-Continent Hook-Up In 15 Minutes

Amateur Round-Table QSO On January 15 Makes Radio History.

By VK4JU.

The author (VK4JU) and his wife (VK4LO), who obtained her A.O.P.C. ticket seven years ago.

THE "All Continent Round Table Hook-up" is a record that, once made, can only be repeated—not broken, and our best time around of eight minutes ten seconds on January 19, 1937, is going to take some beating.

Here are the most interesting facts from my log book. First of all, VK4LO belongs to my wife, who obtained her A.O.P.C. in September, 1931, and who acted as second operator to me (VK4JU) for about seven years, using key only. Out of 9,000 different American stations worked on c.w., she has 2,381 to her credit during her period as my second operator.

About a year ago I succeeded in persuading her to obtain her own station call sign (VK4LO). She has a marked aversion to 'phone work, and so we came to an agreement. I was to act as her announcer, and she to act as control engineer. Under this agreement we have worked many stations and countries on the 20-metre band, using telephony. YH, PK, XU, VS6, VS3, VS2, VS1, VS7, VS8, VP, KA, OM, J. K4, K5, K6, K7, KZYL (a yacht in Manila), HC, CX, HK, HI, LU, CE, ZT, ZL, ZH, SU, FB, FM, VK, HB, ON, D, G, PA, OH, U3, UO, VQ5, VQ3, VQ8, VU, OA, NY, W, VE, CR9, were the countries contacted on telephony.

First Three-Continent QSO.

On December 19 we were listening to W4DLH and VU2CQ calling each other, and most of the time they were either both calling or listening at the same moment. Having worked both these stations many times, we decided to call both, did, and they both came back. We suggested that they both start again and break the series of both calling, both listening. However, we made a three-continent QSO, and this was the beginning of our All Continent QSO.

On December 20, I again QSO'd VU2CQ, and discussed the subject with him. He was rather keen on the idea, made several suggestions, and assured us of his support. VU2CQ and I decided that the chances of success would be enhanced if we asked W4DLH to act as M.C. VU2CQ said he would get an African station, and I undertook to get in touch with W4DLH, which I did on December 22. Bill fell in with the suggestion immediately, and offered to act as Master of Ceremonies, and agreed that we would look for VU2CQ next night.

Four-Continent Hook-up on Dec. 23.

December 23 was our first four-continent hook-up—W4DLH, VU2CQ, SU1CH and VK4LO—and each was receiving the other from fairly well to very good. W4DLH, VU2CQ and SU1CH said they would try and get a European and South American, as well as us. A sked. was made for Dec. 26, when the roll-call would be made at 12.30 G.M.T.

On Dec. 25 I hooked up with W4DLH again, and learned that he felt confident of getting Europe and South America for Dec. 26. On this date, at 12.30 G.M.T., the roll-call produced W4DLH, VU2CQ, SU1CH, HK1Z and VK4LO, but no European. However, this was our first five-continent hook-up, and each was hearing the other from fair to good.

After going around twice, it was decided to try and get an English station. VU2CQ told W4DLH that the English stations were coming in very well in India, and SU1CH said they were coming through nicely in Egypt, while Tony, HK1Z, could hear them in Bogota, Colombia. I could hear G6XR in Brisbane.

Searching For a "G"

W4DLH asked us to all stand-by while he called England. He did, and G6XR came back at him at Q4, R5 here. Presently W4DLH came back and said: "Sorry, boys, I couldn't hear anyone come back at me." Then he went on to speak about his certainty of having a "G" (England) station for the following night, etc. Funnily enough, VU2CQ, SU1CH. HK1Z and 4LO were wishing Bill would go over, so that we could tell him about G6XR! When he did go over, we informed him about it, and he came straight on calling G6XR, but was too late, as G6XR had hooked up with a "W1" station. Bill was disappointed, and doubly reassured us that he would have a "G" the following night.

The following night, Dec. 27, at 12.30 G.M.T., the roll-call revealed W4DLH, SU1CH, HK1Z, G5ML and 4LO, but no VU2CQ. SU1CH informed us that VU2CQ had apparently broken down,

An Appreciation From 4JU.

Dear Editor.—Many thanks for the February issue of the "Radio World." I also want to thank you for your kindly interest in the "All Continent Round Table Hook-up," and am sure the rest of the boys, Bill Burkhart (W4DLH), Box 32, Goulds, Florida, U.S.A.; Tony J. Restrepo (HK1Z), Box 200 Cali, Colombia, Sth. America; Ed. M. Chorlian (SU1CH), 24 Rue Tel-El-Kebir, Heliopolis, Egypt; M. Mozoomder (VU2CQ), Golab Mohal, Flat 36, Tardeo, Bombay, India; and Fed. W. Miles (G5ML), Tudor Lodge, Gibbet Hill, Kenilworth, Warwickshire, England, will agree with my expressions of appreciation on their behalf.

I am rather glad as co-originator with VU2CQ to have the privilege of saying a few words through the columns of your journal. Before I start, I would like to state that the "Radio World" is the only radio magazine in this country to take any interest in the efforts of your own amateur radio gang. I have received letters from three American, one Japanese, one French and one English radio journals asking for facts, but yours is the only Australian radio journal to display any interest in the efforts of the Australian amateur.

as he could hear VU2CQ's carrier come on, utter a few distorted sounds, and go off again. We had got our "G" O.K., but lost our "VU"! However, this was another five-continent hook-up, which included G5ML. During this contact we were all introduced to Dorothy Hall (W2IXY), New York, who was making gramophone recordings of the "All-Continent Hook-ups."

First All-Continent QSO on Dec. 30.

It was decided to again try for VU2CQ the following night, Dec. 28, at 12.30 G.M.T., but the roll-call revealed that VU2CQ was still absent without leave. SU1CH said he would endeavour to find out what was wrong at VU2CQ, so W4DLH, SU1CH, HK1Z, G5ML and 4LO went around several times. Then W2IXY came in on the last round, and told us how we came out on the recording. After this it was decided to make the next sked. for Dec. 30, on which date the roll-call was complete—W4DLH, VU2CQ, SU1CH, G5ML, HK1Z, VK4LO.

After going around and checking reports, the stage was set. At 12.37 G.M.T., W4DLH handed over to VU2CQ, who at 12.39 handed over to SU1CH, who at 12.42 G.M.T. handed over to HK1Z. At 12.45 G.M.T. G5ML connected up, and at 12.50 G.M.T. handed over to VK4LO, who at 12.52 G.M.T. handed over to W4DLH again, thus taking fifteen minutes to go right around and 21 minutes from when we each checked in.

Thus a mystery of radio was cleared up. We have learnt that it is possible by means of radio for all continents to hear and speak to each other at the same time, under the right conditions. At the conclusion of the test, W2IXY told us how our voices came over on the gramophone recording. The next sked. was made for January 4

Jan. 4 was a repetition of Dec. 30, with an improvement of two minutes in the time, and slightly better reports all round. VK4LO reported as follows:—

	Dec. 30 RST	Jan. 4 RST	Jan. 8 RST	Jan. 19 RST
W4DLH	599	589	589	579
VU2CQ	569	579	569	579
SU1CH	579	579	579	569
HK1Z	569	569	569	569
G5ML	559	459	339	349

January 19 was the last of the "All-Continent Chain Hook-ups." Reports received by 4LO from—

	Dec. 30 RST	Jan. 4 RST	Jan. 8 RST	Jan. 19 RST
W4DLH	569	559	569	569
VU2CQ	579	579	569	589
SU1CH	449	459	449	339
HK1Z	449	449	459	459
G5ML	449	339	349	339

On Jan. 12 we had a five-continent QSO because VU2CQ was again missing. Jan. 22 was a washout, and as a lot of time had already been spent, it was decided just to observe from time to time until conditions again proved satisfactory.

Four-Valve T.R.F. Receiver Used.

The receiver used during these QSO's was a T.R.F. job. On the second All-Continent Hook-up a commercial super was used as a comparison, but there was very little difference in the results, except that there was a little less QRM (with the dual-wave receiver) from other stations. The t.r.f. receiver was used throughout, and consists of a 58 t.r.f., 57 e.c. detector, 56 audio, 59 audio driving speaker.

The reason why we tried to go around as quickly as possible was to allow Dorothy Hall (W2IXY) to get the whole of the "All-Continent Round Table Hook-up" on a one 12-inch record instead of having to use two or three, and sometimes lose part of the "Hook-up" on the changing of records.

It has been suggested that the American Radio Relay League (A.R.R.L.) may issue us with special certificates commemorating the accomplishment of the first all-continent hook-up made by amateurs.

Leaves From A Dxer's Log Book

W8XK At R7 On 13 Metres

By ALAN H. GRAHAM.

MARCH 18: W3XAL (16.87m.) have been gradually losing strength around 6.30 a.m. They were only R5, QSA2, fading being very troublesome, which is very often the case with weak signals on high frequencies.

The best signals for the morning were from **DZB** (29.8m.) and **COCX** (26.2m.)

MARCH 19: Just before noon a fine batch of American hams were logged on 10m. **W9ARA, W7FDL, W6KEI,** and **W5FNH** were all R6-7, QSA5.

Just before 6 p.m., **ASMARA** were again heard on 20.6m. They can be identified by a peculiar 5-note interval signal.

A new 20m. ham heard at fair strength was **LU1QA,** San Luis, Argentine.

In the evening the following were logged—all at good speaker strength: **TPA3** (25.2m.), **PLP** (27.2m.), **CNR** (23.39m.), **YDB** (31.09m.), **COCQ** (30.7m). **HJ1ABP** (31.19) and **W1XK** (31.3m.).

MARCH 20: Rather a disappointing day. The only station worth mentioning was **FTK,** St. Assise, France, calling Saigon on 18.9m. When heard in the early evening, FTK's signals were remarkably loud.

MARCH 21: Conditions on 31m. were extremely good at 8 a.m., when the following were logged: **I2RO** (31.1m), **W3XAU** (31.2), **W1XK** (31.3), **W2XAF** (31.48) **GSB** (31.5), **CTAA** (31.0) and **COCQ** (30.7).

COCQ were also heard at 10.30 p.m., when they were the best station on the air. Their consistency, both morning and evening, is rather remarkable.

MARCH 22: A number of 'phone stations were heard throughout the day. At midday **KAX** (15.0), Manila, were calling **KWU** (19.53). (Incidentally, KAX will not verify.)

In the evening, Asmara were rather weaker than usual on 20.6m. However, a steady signal was audible from **GAQ** (15.81), Rugby, who were calling **ZSS,** South Africa. All efforts to locate the latter station on 15.88m. failed—a great disappointment, since Africans are so hard to log.

A rather unusual feat was the reception of **JVN's** harmonic on 14.07m. The signals were R4—5.

At 11.30 p.m. **PHI** (16.88) were very loud.

MARCH 23: The greater part of the day was spent on the 20m. amateur band, where quite a number of new stations were logged. They included **G5RV, G6LK, G8IK, LU9BV** and **F8MG;** also a host of W's.

MARCH 24: Again a considerable time was spent on the amateur bands. On 10m. a considerable thrill was experienced when the Alaskan **K7FBE** was heard at R4, QSA3. Other stations on this band were **W1SZ, W9MCD, W6CKR, W6NLS,** and **K6MVV.**

On 20m. the period between 2.30 and 6 p.m. was most entertaining. **CE3DW, OA4AB, CE1AH, LU9BV, G6XM, G6LK, EI2J** (Dublin), **VP2BC, CO2ON, XE1AX** and **LU1HI** were amongst those heard.

In the afternoons around 3.30 p.m., the Hawaiian station **KKP** has been heard testing on 18.7m. As the transmissions are of the point-to-point variety, no verifications will be given.

A trio of 'phone stations heard were **VLZ3** (22.4), **ZLT4** (27.15) and **GBP** (27.85).

VK6ME, now operating on a regular schedule, can be heard nightly on 31.2m.

MARCH 25: On 10m., the first Canadian heard on this band was logged at noon. This was **VE4GD,** whose signals were R5, QSA4.

A few minutes on 20m., where the 'phone contest was still in full swing,

produced **G5JO, G2PU, G6DH, CO2ON** and **LU9BV.**

An entirely new station heard on 49.4m. was the Colombian **HJ4ABC,** in Pereira. The station was heard at R8 just before 10 p.m. Signals were rapidly fading out by 10.15 p.m.

On 13m. weak signals were again heard from **W8XK** (13.93), fading being very bad.

Just before midnight the best stations on the air were **PHI** and **DJE** (16m.), **RNE** (25.0) and **JZI** (31.4).

MARCH 26: W1XAL's informative news summary was 100 per cent. readable at 7.45 a.m. This station has been about the best of the 25m. Americans of late.

W2XAD (19.56) were surprisingly good at 8 a.m.—signals being R7-8.

A German-speaking station, just below W2XAD—on approx. 19.53m.—may have been the experimental transmitter **DZG.**

Also on the 19m. band were **W2XE** (19.65) and **DJB** (19.74). Later in the morning, **YDC** (19.8) put in a splendid R8 signal.

MARCH 27: Two new American 'phones were the best for the day. These were **WLA** (16.36m.) and **WOO** (35.05m.).

After 10 p.m. **HPSK** (49.96), Colon, Panama, and **XEXA** (48.61), Mexico City, were the best on 49m.

MARCH 28: In the very small hours of the morning **12RO** (25.4), **OLR** (25.2), **W8XK** (19.7) and **TPA2** (19.6) were outstanding.

The best of the morning session was **W2XAF** (31.48), conducting a "Mothers' and Fathers' Spelling Bee."

Another new 'phone station, **WMA** (22 5), completed the day's work before noon.

In the afternoon and evening some good work produced **XEWI** (25.2), Mexico City; **LZA** (20.04), Sofia; **HJ1ABE** (31.58), Cartagena, Colombia; and **TGWA** (31.75), Guatemala City. Also the amateurs **ON4VK** and **G6WY.**

APRIL 1: During the afternoon **Radio Omsk (ROU)** (20.2m.) were putting in a good steady signal.

APRIL 6: The 33.2m. French station **TYA2** can still be heard daily at good strength around 5.30 p.m. Like **TPA 2-3-4,** its transmission often leaves a lot to be desired in the way of clarity.

APRIL 9: Lisbon, **CSW,** on 27m., were particularly good this morning between 6.50 and 7.20 a.m.

However, the biggest surprise of the year was W8XK's R7 signals on 13.93m. Improving reception on the higher frequencies had raised hopes of a fair signal from this station, but all expectations were exceeded between 9.30 and 10 p.m.

The day's bag of "hams" included **CP1AA** (Bolivia), and **PK3GD** and **PK6HI** (D.E.I.)

APRIL 10: This was another most satisfactory day, as the list of new stations recently received was again added to—this time by the addition of two Peruvian stations.

The first of these operates on approx. 25.4m., and uses the call **OAX4A** (?). It appears to have just come on the air, and as yet no address (beyond the fact that the station is located in Lima) has been ascertained. It has been heard irregularly around 2 p.m.

The other is definitely **OAX4J** on 32.1m. This station has also been heard after 2 p.m., usually closing around 3 p.m. Send reports to Box 1166, Lima, Peru. Incidentally, the station can be easily identified, as it plays "Goodnight Sweetheart" before closing.

APRIL 11: EAQ (30.4) were fairly good this morning at 8.20 a.m. The best station then on the air was once again **COCQ** (30.7), whose musical programmes are quite distinctive, and well worth listening to.

At 1.20 p.m. **OAX4A** (?) were again heard.

APRIL 12: Both **EAQ** (30.4) and **EAQ2** (31.6) were logged before 8 a.m. The latter was easily the better of the two, being a good R8 during their German session, which concluded at 7 a.m., when the station went off the air.

OAX4J (32.1) were heard for a few minutes before closing at 2.53 p.m.

Yet another new 'phone station was **KET** (31.6), relaying an N.B.C. programme to Hawaii.

Later **DHO** (14.9) and **GAA** (14.7) were added to the list of stations heard this month. The former calls Buenos Aires in the evenings.

APRIL 14: Quite a surprise was in store on 31m., where **PCJ** (31.2) were heard at 6.45 a.m., closing at 7.10 a.m. During the letter-box session, the announcer took the microphone to the window, in order to broadcast the croaking of frogs outside.

At 10 p.m. the "Kanimbla's" super signals were heard for the first time for several weeks. Call is **9MI,** and wavelength 49.98m.

APRIL 15: Early rising was rewarded by a nice R7 signal from **ORK,** Belgium, on 29.04m.

After 6 a.m., **JZJ** (25.42) were the best for some time.

A real amateur "catch" was **LA1G,** Oslo, Norway. This was the 63rd country heard on 'phone in the last three years.

APRIL 16: Prague, using the call **OLR4A,** were heard on a new frequency 11.84m.c. (25.34m.) Previously it has been heard on 11.87m.c. (25.24m.), or 11.76m.c. (25.5m.).

A weak South American on 31.02m., heard around 2.30 p.m., may have been **TI4NRH,** Costa Rica; however, bad local QRM intervened and prevented positive identification.

Stations Heard During the Month

10 m.—American, Hawaiian, Alaskan and Canadian hams.

13-18 m.—W8XK (13.9), GSH (13.9), GAA (14.7), DHO (14.9), KAX (15), PLE (15.9), GAQ (15.8), WLA (16.3), GSG (16.86), W3XAL (16.87), PHI (16.88), DJE (16.89), KKP (18.7), and FTK (18.9).

19 m.—? DZG (19.5), KWU (19.5), DJR (19.56), W2XAD (19.56), GSP (19.6), DJQ (19.63), W2XE (19.65), RIM (19.67), TPA2 (19.68), PCJ (19.71), W8XK (19.72), DJB (19.74), GSO (19.76), YDC (19.8), GSF (19.82), DJL (19.85), RKI (19.88).

20-24 m.—LZA (20.04), ROU (20.2), Asmara (20.69), VLZ3 (22.4), WMA (22.4), and CNR (23.39).

20 m. Amateurs

25 m.—RNE (25.0), XEWI (25.21), TPA3 (25.23), OLR (25.2 and 25.3), W1XAL (25.4), I2RO (25.4), JZJ (25.4), DJD (25.49), GSD (25.5), TPA4 (25.6), SM5SX (25.6), and ? OAX4A (25.4).

26-30 m.—HBO (26.2), COCX (26.2), ZLT4 (27.1), CSW (27.2), PLP (27.27), GBP (27.8), JVN (28.1), VLK (28.5), ORK (29.05), DZC (29.1), DZB (29.8), EAQ (30.4), VLJ (30.5) and COCQ (30.7).

31 m.—CT1AA (31.0), ? TI4NRH (31.0), YDB (31.09), I2RO (31.1), HJ1ABP (31.19), PCJ (31.28), GSC (31.28), VK6ME (31.2), VK2ME (31.2), W3XAV (31.2), W1XK (31.35), GSB (31.5), VK3LR (31.32), VK3ME (31.5), W2XAF (31.48), DJA (31.38), DJN (31.45), VPD2 (31.4), JZI (31.4), ZBW3 (31.4), EAQ2 (31.6), HJ1ABE (31.5), and TGWA (31.7).

Above 31 m.—OAX4J (32.1), TYA2 (33.2), WOO (35.05), XEXA (48.6), YTC (49.18), W9XF (49.18), OLR (49.75), W8XAL (49.5), DJC (49.8), HJ4ABC (49.4), HPSK (49.9), RVS9 (50), and RVI5 (70.4).

DX News and Views

A page for letters from DX readers

★ ★ ★

World DX Jottings.

Listeners who enjoy popular dance music will find an entertaining hour over LRX, Buenos Aires, Argentina, from 1.30 to 2.30 p.m. The latest in popular dance tunes are played. LRX's frequency is 9.66 megacycles, and it is one of the best received of the South American stations.

One of the most powerful of the Peru stations now on the air is the new OAX4Z, on 6.09 megacycles. This station is owned by the Government, and relays long wave station OAX4A irregularly during the afternoons.

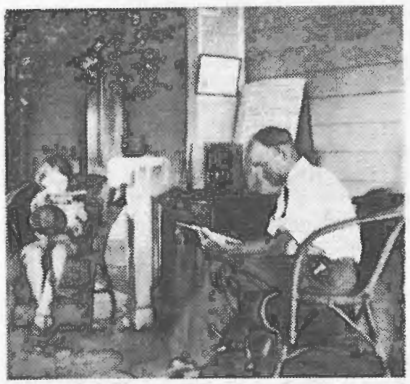
The Civil war in Spain has brought many new Spanish s.w. stations on the air. The two sides have taken control of all the amateur and commercial stations, and are using them for broadcasting war news and propaganda. These stations do not operate under the regular "EA" prefixes for their call letters, but use all sorts of unorthodox calls. Each apparently tries to keep other stations off the air, and listeners may hear 10 or 15 minutes of an English news bulletin from Barcelona or Madrid, only to have it ruined by a roar that sounds as if the radio was falling to pieces. It is interference set up by the opposing force, so that the news bulletin will probably be heard on some other frequency.

Among the stations in Spain broadcasting war news are: PSU1, Barcelona, generally on 7.29 megacycles on Mondays near 9.00 a.m. "Radio Guardia Civil," Tetuan Spanish Morocco, generally on 6.55 megacycles from 8 to 9.00 a.m.; EAQ, Madrid, on 9.87 megacycles near 10.00 a.m. EA9AH, Tetuan, usually on 14.04 megacycles near 8.00 a.m. Excepting EAQ, each station has many frequencies, and is likely to be heard almost anywhere on the dial. (Note: Times given above are A.E.S.T.).

Plans for Italy's new Imperial short-wave centre have been approved by the Italian Council of Ministers. The plans call for the enlarging of the well-known 2RO, increasing the power of the present two transmitters from 25 to 40 k.w., and the building of two new 100 k.w. transmitters and a 50 k.w. reserve transmitter. Each of the four principal outfits will be able to work on either of two wavelengths, each carrying a separate programme, while the fifth (reserve) transmitter will be able to operate on any frequency between 21 and 5 megacycles, either as a substitute for one of the four principal transmitters, or as a completely separate experimental station. The aerial system will include 14 lattice-work towers about 240 feet high.—W. T. Choppen (AW61DX), Timaru, N.Z.

Wants To Exchange QSL's.

I have a QSL card and would like to exchange with other readers. At present I am using a two-valve all-waver, but am building a much larger set shortly.—Ron Daniels (AW230DX), 95 Targo St., Bundaberg, Q'land.



"My set and self"—a snap from dxer Aubrey R. Jurd, of Ingham, Nth. Queensland, who is a member of the DX Club and a regular contributor to the "Radio World."

S.W. Programmes from Czechoslovakia

The latest information from Ministry of Posts and Telegraphs of the Czechoslovakia Republic gives schedules of their test programmes on 19.58 and 49.92 metres. They are as follows:—

Sundays: 7.00-12.00 a.m., 7.30-9.30 p.m. G.M.T.

Monday & Wednesdays: 2.00-5.00 p.m. 7.30-9.30 p.m. G.M.T.

Tuesdays & Fridays: Midnight to 2 a.m., 2.00-5.00 p.m., 7.30-9.30 p.m. G.M.T.

Thursdays & Saturdays: 10.00 a.m. to 12.30 p.m., 2.00 to 5.00 p.m., 7.30-9.30 p.m. G.M.T.—B. R. Connor (AW205DX), Auckland, N.Z.

Too Long Between Issues!

I am enclosing my application for membership to your Club, and a postal note for 5/- covering subscription and cost of 50 report forms. I am anxiously waiting for the latter, as the high standard of the information in your magazine has contributed largely to my being able to log many overseas stations in the past few weeks.

The magazine is definitely the best procurable, its greatest disadvantage being the long spell between issues. Nevertheless, it is well worth waiting for, as I have only recently started in the DX game, and find it a wonderful help.—J. Stewart (AW224DX), Ivanhoe, Vic.

New Mexican S.W. Broadcasters.

A recent mail brought verifications from the following s.w. stations:—HJCB (8948), XEUW (6020), TGWA (9450), W9XF (6100), HAT4 (9125), F3AQ (7000—amateur). HAT4, Station of the Royal Hungarian Post, verifies with a very attractive card in three colours. In the centre is a small photo showing the bridge which spans the Danube at Budapest. This station, using 5 k.w., is on the air every Monday from 9—10 a.m. A.E.S.T.

W9XAA 6080 k.c., has been heard several times recently asking for reports on the station's transmissions.

Following is a list of the many new Mexican short wave stations coming on the air.

CALL	K.C.	LOCATION.
XEBM—	15,300	Mazatlin, Tinaloa, Mex.
XEBQ—	6,030	Mazitlan, Tinaloa, Mex.
XEXR—	11,895 and 6,065	Mexico City.
XEXA—	11,880 and 6,133	Mexico City.
XEXS—	6,200	Mexico City.
XEPW—	6,110	Mexico City.
XEXF—	6,050	Mexico City.
XECU—	6,075	Guadalajara, Jalisco, Mex.
XEDQ—	9,480	Guadalajara, Jalisco, Mex.
XERV—	5,920	Exact locality not known.

—W. T. Choppen (AW61DX), Timaru, N.Z.

Stations Heard During W/VE DX Contest.

During the Easter weekend I did a great deal of listening on the 20-metre band. The W/VE DX Contest was at its height then, and quite a number of stations were heard here, though I concentrated mostly on VK's.

The receiver was a one-valve affair, using a '19, one triode being employed as detector, resistance coupled to the other as audio amplifier. I have about 300 volts on the plate of

the valve from a power supply with a 201A The antenna starts at a pole about 18 feet high, runs at that height for about 30 feet then bends down at an angle of 45 degrees for a couple of feet, then through the house to my receiver. It is about 60 ft. long over all. The antenna is screened by brick walls, except on the south, the direction it is pointing.

Following is a list of the stations heard during that weekend.—**VK's**: 2ZC, 3HY, 3ZJ, 3ZL, 3IW, 3MR, 3GQ, 3ZZ, 3LA, 3AR, 3XD, 3ES, 3XJ, 3GX, 3VF, 3KT, 3SE, 4JX, 4JU, 4VD, 4GG, 4VJ, 5KG, 5AI, 5JC, 5LD, 5KL, 5GM, 5SU, 7CL. **DX** Stations: W9ARA, HK3JA Colombia, W9CI, K6JLV, W6BKY, W5DQ, KA1KY, W6AM, W5JC, PK1ZZ, PK3WI, W7AO, W6ITH, W6MVK and W9IQ. All these stations were heard on 2-metre 'phone.

On Sunday night late and Monday morning early very good conditions prevailed. Many more "W" stations were heard, but, owing to the terrific QRM, I could not get their call signs. Other stations heard since includes VK5WB, 5PS, W2MO, W8ANO, W4AH, W9ETH and W7BCU.—Bill Plant (AW152DX), Newcastle, N.S.W.

An Enzedder Worth Trying For.

Since my last letter, my log has grown to 1,500 odd stations. I have a card here from 1ZM in New Zealand, which I received with a note complimenting me on the logging of the station as at the time of sending there were only five other verifications in Australia. In case any other DX fans should care to have a try for him the frequency is 1260 k.c. (238m.) He comes in here just round 2SM.

Amateurs heard on 20m. of interest have been HJ1GK, VS2AK, HI7G, ZU6P, YP5AA, ZMSX, F8OQ, VU2BG, PY1IZ, ON4VK, ON4PA, ON4SS, ON4ZH, YD5AA, HB9AY, YR2FF, VP9R, VP5PZ, G5ZG, PAOWK PAOWV, XU3GG, ZE1JR, ST4AA, VS4CS, F8MG and G2BY.—Ken Moyes (AW5ODX), Mullumbimby, N.S.W.

Conditions Good On 20 Metres.

I am enclosing a report on my latest loggings on the short waves. Your magazine is certainly excellent, and I enjoy the articles by 3TH and 3DH very much. It certainly is a long time to wait for the next issue, but there is plenty of reading in it that keeps one busy. I would like to see some articles on 10 and 20-metre receivers and also 5-metre receivers.

Conditions have been good on the 20 m. band this last week or two. My best loggings have been, W4DSY, QSA4-R7; W8MRR (QSO with VE4NI), QSA4-R6; W9BBC, QSA4, R6-7; KA1RB, QSA4-R6. VK2's, 4's and 5's are too numerous to mention, but VK4's have been best on Sunday, March 7. The best commercials on shortwave have been PCJ on 19.71 m., QSA4-R7; GSO on 19.76 m., QSA4-R5; DJB on 19.74 m., QSA4-R8. Then on 31 m. W2XAF comes in at R8 in the mornings. Night time has been good on this band, VPD2 being R7-8, HJ1ABP, R7, and YDB. R6-7.

I would like to make pen-friends, inter-state or in New Zealand.—Robert King (AW147DX), Mordialloc House, Centreway, Mordialloc.

Conditions On 20-M. Band Excellent.

After a few months poor reception owing to heavy summer QRN. conditions this week have improved slightly, stations on the 19 and 20-metre bands being excellent. These bands peak here at 5.30 and 10.30 p.m.

My log on 20m. includes the following:—OA4AR, HI7G, PK3ST, PK1GL, K6JLV and dozens of W's. Stations on higher wavelengths are fair, the best being ZMBJ, "S.S. Awatea" on 33.49m., which can be heard nearly every night at 7.30 p.m.

I have built up a small 4-watt amplifier suitable for indoor work, using three valves—a 6F7 (as two valves), 42 and an 80. Good results have been obtained from it, faders being used to fade in mike and pick-up.

Since purchasing the first copy of "Radio World" I have found it is the best radio magazine available for the amateur.

So keen have been the requests for my QSL card that my supply is exhausted, but now I have a new one and will be only too pleased to exchange it with members.—Doug. Pearsall (AW18DX), Albury, N.S.W.

Guide To The Show

(Continued from Page 5)

ing high-grade equipment to broadcasting stations throughout Australasia, and also to the P.M.G. Department.

A typical range of this equipment will be on display at the show, and will include high fidelity audio transformers, power transformers, power chokes, faders of all types, potentiometers (registering types), hand wheels and microphone stands.

A complete Lekmek speaker system, which utilises a dynamic speaker as both microphone and receiver, will also be on show.

Set-builders will be interested in the 6-valve dual-wave Chassis kit that will be displayed, incorporating the new Sirufer intermediate frequency transformers, and also in the mobile 5-metre transmitters used by Lekmek in 1935 to carry out the first two-way radio telephony tests for an ambulance service.

Official Opening of 1937 Amateur Show

A world-wide shortwave hook-up has been arranged for the opening of this year's Amateur Show, which will take place at the Sydney Town Hall at 9 p.m. on May 3.

At 9 p.m. W. M. Moore, Esq., Federal President of the W.I.A., will outline proceedings and introduce Professor E. C. Woodruff (W8CMP), President of the I.A.R.U. and A.R.R.L., who, speaking from New York via shortwave station W2XAF, will declare the exhibition open. At 9.13 p.m., E. T. Fisk, Esq. (managing director A.W.A.), will speak from London, while at 9.23 p.m., H. Peterson, Esq., State President of the W.I.A., will introduce the last speaker, Mr. J. S. Duncan, Esq., Deputy Director of Posts and Telegraphs.

The ceremony will be re-broadcast by National Station 2BL.

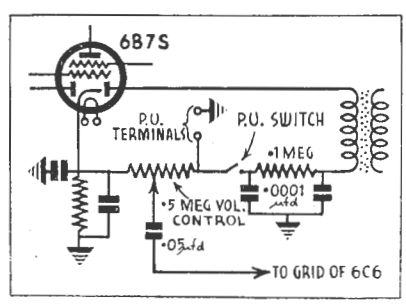
The "1937 International All-Wave Six"

(Continued from Page 13)

The shortwave bands are aligned in the same way—the aerial and r.f. trimmers being adjusted for greatest gain towards the lower end of each band.

The Best Aerial

If an ordinary "L" type aerial is used, the flat top should be as high as



This sketch shows pick-up connections

possible, with a direct lead-in, but the overall length should not be much in excess of 40 feet. A suitable type of wire to use is 7/22 gauge enamelled, though a single strand of 14 or 16 gauge enamelled will give just as good results. The lead-in should not be shielded, and if possible the aerial should be in one continuous length from the insulator at the far end to the aerial terminal at the set. To obtain the best possible signal-to-noise ratio, however, an all-wave doublet aerial should be installed.

Coil-Winding Details

		AERIAL		R.F.			
		L1	L2	L3	L4	L5	Waveband
I.	25(a)	114(b)	40(a)	114(b)	9(c)	470 — 1,440k.c.	
II.	18(a)	55(b)	30(a)	55(b)	7(c)	770 — 2,800k.c.	
III.	7(e)	20(d)	15(e)	19(d)	4(c)	2,450 — 9,020k.c.	
IV.	3.5(e)	7(d)	5(e)	6(d)	3(c)	7,100—24,000k.c.	

(a) 32 S.W.G. enamel close wound over earthed end of secondary with Empire cloth insulation between layers.
(b) 32 S.W.G. enamel, close wound.
(c) Two windings, put on together in same direction as grid winding with 26 gauge enamelled.
(d) Space-wound 20 g. S.W.G. enamel.
(e) Interwound in L4, 32 S.W.G. enamel.
Wind coils L1 and L2 on 4-pin 1¼in. former.
Wind coils L3 and L4 on 7-pin 1¼in. former.

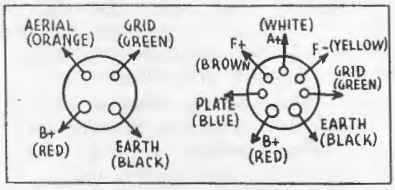
Tuning condenser for above:— 14—400 mmfd. two-gang condenser with 7-plate trimmer connected across R.F. section.

The "1937 Empire All-Wave Three"

(continued from page 8)

included, showing under-socket connections for the 4 and 7-pin coil formers needed for the aerial and detector coils.

Next month the assembly of the receiver will be outlined, and a sketch published showing the complete under-chassis wiring.



Under-socket connections for the coils are shown in these sketches.

"Radio World" Covers Available

Readers are advised that special covers for volumes 1 and 2 of the "Radio World" are now available. Using a strong, durable leather board covered in dark blue book-cloth, they are attractively printed in gold with the title of the magazine, volume number and dates of issue.

Twelve strings are attached along the inside back portion of the cover, so that each issue of the magazine as it is bought can be slipped into place in a few moments. This method of binding is cheap, effective and very convenient, as any issue can be instantly removed if desired.

These covers are now available from the "Radio World," 214 George Street, Sydney, price 3/- each (or for two covers for volumes 1 and 2, 5/6, post free).

North Suburban Radio Club News.

(By CB-GV.)

FOLLOWING the success of the first annual dinner, the North Suburban Radio Club has just concluded its annual transmitting contest. Judging by the interest taken, it has also proved very successful. Although all logs are not to hand at present, it appears that the first prize will be awarded to VK2VG, with VK2GV and VK2CB second and third, respectively.

Owing to pressure of work, VK2NN has been compelled to resign the position of secretary, his resignation being accepted with deepest regret. The position has been placed in the able hands of VK2KJ.

The club's transmitter, VK2ADF, is being rebuilt, and should be on the air within a few weeks. Reports from listeners will be very much appreciated.

Regular Code Practice Transmissions.

Code practice transmissions are conducted by VK2VG (every Sunday morning on 80 metres from 8.30 a.m. to 9 a.m.) for the benefit of members and other s.w. listeners.

Code classes now commence at 7.30 every Tuesday. Intending hams or s.w. listeners interested in the above club are invited along to the club rooms next Tuesday night or Saturday afternoon at 3, where they will be made welcome.

Further information can be had from the secretary, W. K. Cramond, 59 Bridge Street, Lane Cove, or from the club headquarters, second floor, Guest's Building, corner Brown Street and Pacific Highway, Chatswood. (Brown Street is first street north Victoria Avenue.)

What's New In Radio

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

New Palec Oscillograph Uses Type 913 1-inch C.R. Tube

The latest release by the Paton Electrical Instrument Co. is the Palec Model MI cathode ray oscillograph, using the new American type 913 1-inch cathode ray tube.

Designed along the lines of the larger Palec Model CR, the Model MI is just as flexible in its applications. Amplifiers are provided on both plates, and the time base range extends from 40 to 50,000 cycles per second. There is provision for synchronisation, either externally, internally or using the 50-cycle supply. The usual beam shift and focus and intensity controls are provided.

The Model MI uses six valves—types 913, 885, two 6J7's, one 6C5, and one 80. The price is £14/15/- plus tax (with valves, approx. £5/7/6 extra), equivalent prices for the Model CR being £23/10/- (valves £11/10/-).

A 30-page book is supplied with both models, outlining dozens of radio applications of the cathode ray oscillograph, including a number of tests, details of which have never previously been published. The book has been compiled by the Paton Electrical Instrument Co., and is specially written around their two latest oscillograph releases.

★

Radio Cabinet Display by U.R.D.

United Radio Distributors Pty. Ltd. are featuring a wide range of radio cabinets, from small short-wave converter types to de luxe radio-gramophone lowboy consoles. These are mainly the products of Messrs. Ricketts & Thorpe, Anderson & Frantzen and Hammersley, and in all comprise about twenty models.

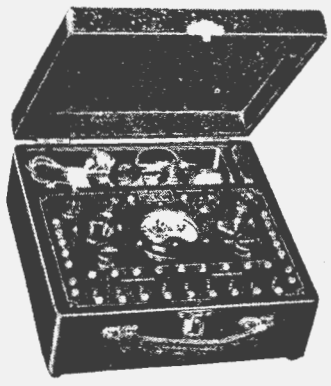
Radio dealers are requested to write for illustrations and special trade prices, or to call and view the 1937 models which are on display at United Radio Distributors Pty. Ltd. showrooms, 234 Clarence Street, Sydney.

★

Velco Model S431 Analyser

Radio dealers to whom an analyser that is accurate, flexible and reasonably-priced would appeal, will be interested in the Velco Model S431 Analyser illustrated.

The instrument uses a Calstan type 501 0-1 milliammeter. Six sockets check all American type valves, as well as Continental types with "P" or "V" bases. A nine-point selector unit enables a separate test to be applied to every element. Meter ranges comprise 10-50-250-1,250 d.c.



volts, and 1-5-25-100 m.a., while there are two resistance ranges, covering from 0 to 20,000 ohms and 0 to 200,000 ohms.

The analyser is supplied in a portable case, together with flex and seven adaptors, for £8/5/- complete.

★

Transmitting Valves Listed In Latest "Radiotronics"

According to the latest "Radiotronics" (Technical Bulletin 74) issued by Amalgamated Wireless Valve Co. Ltd., types 806, 807 and 808 Radiotron transmitting valves are now available. The 806 is a triode having a tantalum plate and rated with a maximum dissipation of 150 watts. The 807 is a 21-watt beam tetrode, and the 808, a 50-watt H.F. triode.

Amateurs will also be interested to know that stocks of the 1in. type 913 metal cathode ray tube are now available, together with an extensive range of Radiotron photo tubes, comprising the 868 and the 917 to 920 inclusive.

Articles for the radio engineer featured in this issue of "Radiotronics" are entitled—"Series Inverse Feedback with Resistance Coupling," "A.C. Circuit Using Inverse Feedback 42," "Distortion in Diode Detectors," "Tone Compensation" and "Self Compensating Pentodes."

★

Jones' U.H.F. Handbook

A review copy of the "Jones Ultra High Frequency Handbook" (price 3/6), is to hand from McGill's Agency, 183-185 Elizabeth Street, Melbourne.

Written by Frank C. Jones, the noted American authority on amateur radio, the book deals with radio communication below 10 metres. Many and varied types of receivers, transreceivers and transmitters are described in detail, while special chapters on antennas for ultra high frequency operation, and directive antennas, contain much invaluable information on a subject that is of vital importance in u.h.f. work.

★

Philips Technical Communication No. 57

"Philips Cathode Ray Tubes" is the title of the 34-page Technical Communication No. 57, released last month by Messrs. Philips Lamps (A'sia) Ltd., Sydney. It is designed to supplement the information given in Technical Communication No. 45, which lists many important uses for cathode ray tubes and gives details on its principle of operation.

The wide range of Philips cathode ray tubes now available includes eight types, with screens ranging in diameter from $3\frac{3}{4}$ ins. to $15\frac{3}{8}$ ins.

Properties, method of application and practical applications of the cathode ray tube, together with details of the design of voltage supply units, of an oscillograph amplifier and of a time base generator, are covered in full.

Brief Appreciations From Readers

Just dropping you a line to show my appreciation of your fine radio magazine. I have been a keen dxer for several years, and it is indeed good to see that we have at last a good radio magazine in Australia. So far, I have not yet missed one issue, and in a couple of weeks I will join the All-Wave All-World DX Club.—Phillip J. Costa, Geelong, Vic.

I have read only two copies of the "Radio World," and am now anxious to have all the back numbers, as in publishing a book like this you have filled a long-felt want amongst radio enthusiasts for a good Australian paper. Please find enclosed postal notes to cover the cost of the first ten copies. Hoping you keep on with the good work.—D. E. T. Bell, Chinkapook, Victoria.

Printed by the Bridge Printery, 214 George Street, Sydney, N.S.W., for the proprietors of the "Australasian Radio World," 214 George Street, Sydney.

Technique..

And now Stromberg-Carlson, with the patented acoustical labyrinth, brings perfection to radio reception. Being the only known method to eliminate boominess and cabinet resonance, the acoustical labyrinth brings you entertainment with a new realism as life-like as life itself. Not only local stations, but the entire world, offers you continuous programmes of music and song. World-famous celebrities and artists, far-off lands and strange people, await you. Stromberg-Carlson, a name that has been outstanding since 1894 in the transmission and reception of sound, now offers you perfection of radio reception.

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