

THE
AUSTRALASIAN

PRICE, 1/-

Radio World

VOL. 4 NO. 7

DECEMBER 1, 1939

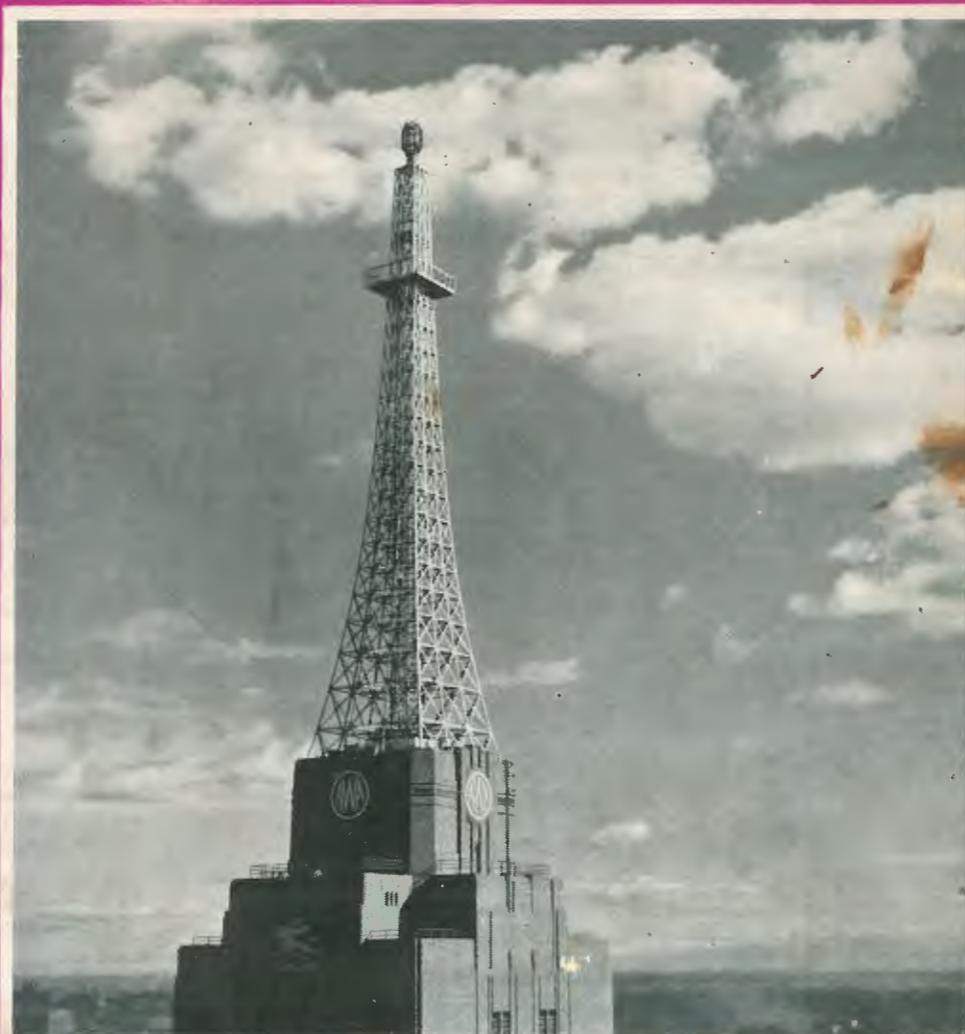
Registered at the G.P.O.,
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by post as a periodical

● MORE ABOUT THE
"VULCAN SHORTWAVER"

● MULTI-METERS AND OSC-
ILLATORS: BEAM-A-SCOPE

● LOOP PORTABLE THREE:
"AIR-SCOUT COMM. SIX"

● LATEST WORLD S.-WAVE
NEWS: B.C. D.X. CONTEST



The 165' steel tower on top of the new A.W.A. building in York St., Sydney (see page 8).

MARKET FLASH...

BUY BRIMAR!

AMPLE STOCKS OF BRIMAR 1.4-V. VALVES

Users of Brimar Valves throughout the Commonwealth are advised that ample stocks are still available, **including Brimar 1.4-volt types.** BUY NOW... deliveries in several months' time cannot be guaranteed by anyone.

1A7G—pentagrid converter, .05 amp. filament, designed primarily for broadcast band operation.

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1E4G—medium-mu triode for general applications, .05 amp. filament, amplification factor 14.

1G4G—medium-mu triode, .05 amp. filament, designed expressly for use as driver for 1G6G class "B" valve.

1G6G—twin triode amplifier for class "B" applications, .1 amp. filament, power output 675 milliwatts.

1H5G—diode triode, .05 amp. filament, designed for use as diode second detector and triode audio driver.

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1A5G—power amplifier pentode with low drain .05 amp. filament, output 115 milliwatts, designed for use in portables using midget batteries.

1C5G—power amplifier pentode, .1 amp. filament, power output 240 milliwatts, designed for use with standard portable batteries.

1Q5G—high gain beam power amplifier, .1 amp. filament, power output 270 milliwatts, suitable for use with standard portable batteries.

1P5G *This latest Brimar release is an r.f. pentode of the super-controlled type, and ensures highly effective a.v.c. action. Strongly recommended for use in r.f. and i.f. stages.*

Brimar 1.4-v. Valves are Non-Microphonic

In portable receivers, where a compact chassis means that the speaker is in close proximity to the valves, there exists a real danger of microphonic trouble that, if present, is difficult to eliminate. Brimar valves have been specially designed to eliminate all danger of this, and are definitely non-microphonic.

In the panel at left is the complete range of Brimar 1.4-volt valve types, of which stocks are available.

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BRIMAR DISTRIBUTORS:

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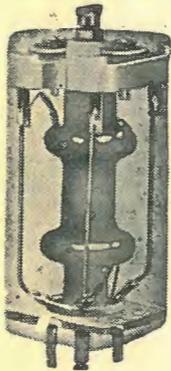
EVERY BRIMAR VALVE IS 10 TIMES TESTED.

R.C.S.

Build the Loop Portable Three with the same R.C.S. Loop Kit as used by the Technical Editor and obtain the optimum in results. Specify Cat. No. K120 and get the correct kit Retail Price: £1/18/3. Post paid.

For the "Vulcan Shortwaver" and "Air Scout Communications Six" make certain of the best performance by ordering R.C.S. Intermediates, Midget Condensers, Potentiometers, B.F.O. Coils, Audio Transformers, Chokes and Voltage Dividers as listed below.

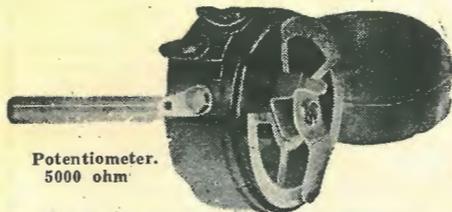
R.C.S. TROLITUL INTER-MEDIATE TRANSFORMERS



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

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IF107. Air Core 1st. Retail Price	7/6
IF108. Air Core 2nd. Retail Price	7/6
IF109. Iron Core 1st. Retail Price	11/-
IF110. Iron Core 2nd. Retail Price	11/-
IF113. Permeability 1st. Retail Price	13/9
IF114. Permeability 2nd. Retail Price	13/9
	175 k.c.
IE68. Air Core 1st. Retail Price	7/6
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20 " "	25 Amp. PT39	5/-	
30 " "	25 Amp. PT34	5/-	
400 " Potentiom.	50 M/A PT46	5/-	
1000 " "	35 M/A PT47	5/-	
2500 " "	30 M/A PT49	5/-	
5000 " "	30 M/A PT51	5/-	
10000 " "	20 M/A PT52	5/-	
15000 " "	20 M/A PT53	6/6	
20000 " "	15 M/A PT54	6/9	

OBTAINABLE FROM YOUR LOCAL DEALER OR WRITE DIRECT TO

R.C.S. RADIO

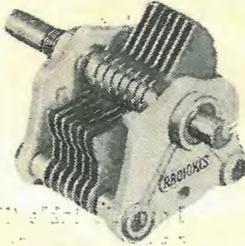
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Glebe, N.S.W.

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If you want to duplicate original set performance, you must instal only R.C.S. Coils—engineered and laboratory tested—to provide the longest service, highest sensitivity and absolutely perfect selectivity. R.C.S. Coils are specially designed for each set described in "Radio World." Order R.C.S. Coils from your nearest dealer or direct from the factory.

R.C.S. TROLITUL MIDGET CONDENSERS



M.C. Type.

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

STAR AND M.C. MIDGETS

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

R.C.S. AUDIO TRANSFORMERS AND CHOKES

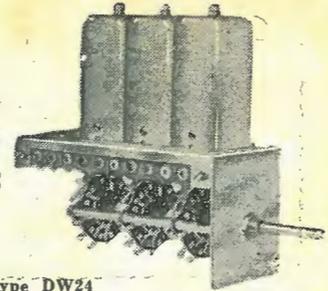


Long experience in the production of highly efficient transformers, combined with extensive research into raw materials and design, has resulted in the production of an audio transformer of excellent performance and complete reliability.

TB6.—"B" Class Input Audio Transformer.

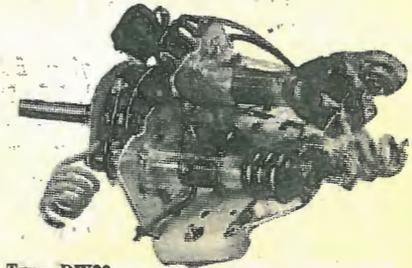
Type.	Retail Price.
TA1 Audio Choke Bakelite Case	18/6
TM1 Modulation Transformer—Power	30/-
TB4 Single Input "A" Class Bakelite Case	20/-
TB5 Push Pull "A" Class Bakelite Case	21/-
TB6 Input "B" Class Transformer, Bakelite Case	18/6
TB35 "A" Class High Fidelity Steel Case	67/6
TB36 "B" Class Input High Fidelity Steel Case	67/6
TB37 "AB" Class Transformer, Bakelite Case	28/6

DUAL WAVE UNITS



Type DW24

B/C 1500 to 550 K.C. S/W 16 to 50 Metres, Aerial, R.F., and Oscillator, 460 K.C., A.C. Battery Operation Cat. No. DW24.
Retail Price £3/7/6
Operation Cat. No. DW25.
Retail Price £3/7/6



Type DW29

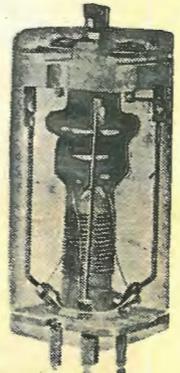
New 4/5 Dual Wave Unit Type DW29, comprising Aerial and Oscillator Coil mounted on Wave Change Switch, complete with Padder. DW Unit Cat. No. DW29. Retail Price, £1/7/6

R.C.S. TROLITUL DUAL WAVE COILS

B/C 1500 to 550 K.C. S/W 16 to 50 Metres, Air Core Aerial Coil, 460 K.C., Cat. No. G19.
Retail Price 14/-

Air Core R.F. Coil, 460 K.C., Cat. No. G20.
Retail Price 14/-

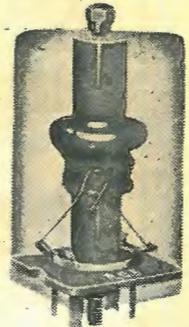
Air Core Oscillator Coil, 460 K.C., Cat. No. G21.
Retail Price 14/-



Type G19

R.C.S. TROLITUL BROADCAST COILS (460 k.c.)

Air Core Aerial Coils, Cat. No. E282.
Retail Price, each, 6/6
Air Core R.F. Coils, Cat. No. E283.
Retail Price, each, 6/6
Air Core Oscillator Coils, Cat. No. E284.
Retail Price, each, 6/6
Permeability Tuned Aerial Coils, Cat. No. E279.
Retail Price, each, 8/6
Permeability Tuned R.F. Coil, Cat.No. E280.
Retail Price, each, 8/6
Permeability Tuned Oscillator Coil, Cat. No. E281. Retail Price, each 8/6



Type E284

"Radio World" Change of Address

Readers are asked to note that, early in December, "Radio World" headquarters will be shifted to a building now being erected for the Bridge Printery Pty. Ltd., at 117 Reservoir Street (off Elizabeth St., near Central Railway Station). As from December 11, all correspon-

dence should be addressed as follows:—

"Australasian Radio World,"
117 Reservoir Street,
Sydney, N.S.W.

The new "Radio World" telephone number—
FL 2842—appears in the current directory.

The Australasian RADIO WORLD

Incorporating the
ALL-WAVE ALL-WORLD DX NEWS

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

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Note: Address of Editorial offices after December 10, 1939, will be 117 Reservoir Street, Sydney.

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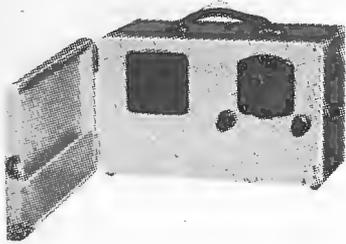
Remington and Rand Electric Close Shavers

We are distributors for the famous American Remington and Rand Close Shavers, which many customers have proved by side-by-side demonstration to be the finest on the market.

REMINGTON SHAVER: £5/19/6

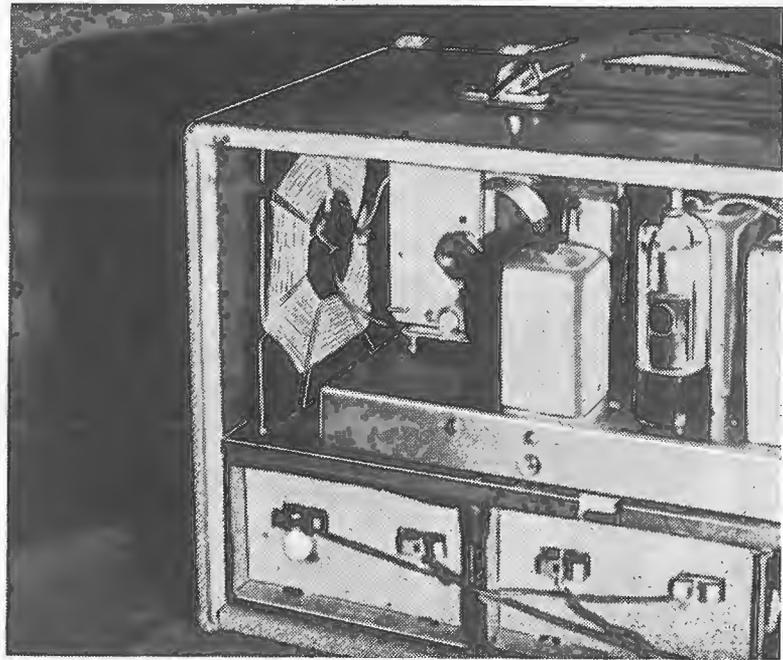
RAND SHAVER (new reduced price): £4/10/-





Above: The "Loop Portable" combines excellent performance with smart styling, achieved by the "airway" canvas covering, green and gold dial with brown escutcheon and knobs, "Reedtex"-covered speaker grille, and plated hinges and catch.

Right: This close-up with the cabinet back removed shows how the "Picnic Portable" chassis has been shortened to permit the loop aerial to be mounted vertically alongside the gang. Comparison with the corresponding view below of the "Picnic Portable" will make the alteration apparent.



Loop Portable Three

A highly-effective tuned loop aerial provides ample signal pick-up in this new three-valve portable, which because it uses the 1D8GT diode triode output pentode combination valve, is actually a "four".

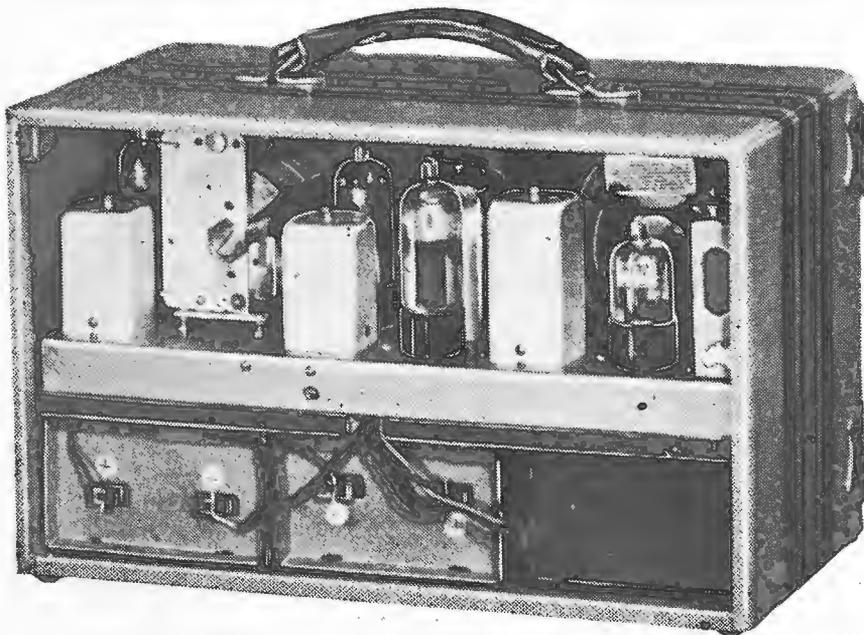
THE "Loop Portable Three," which is a junior version of the "Picnic Portable" described in the October and November issues of "Radio World," is designed around the matched loop portable coil kit Type K120 released recently by R.C.S. Radio (Equivalent Radiokes kit is the RK-

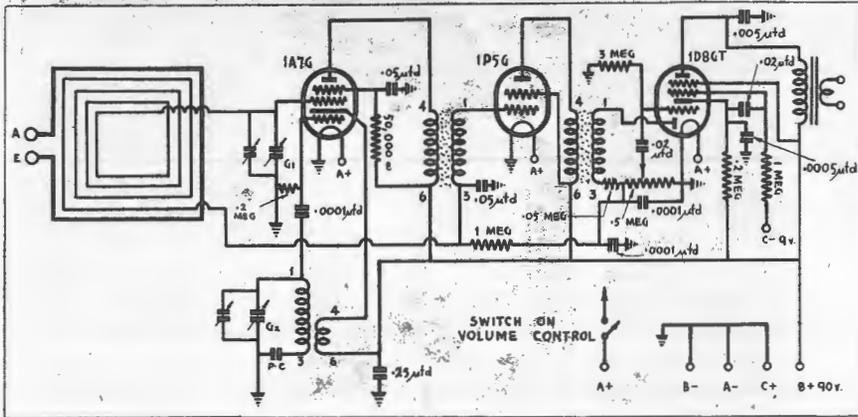
120). The coil kit recommended comprises loop aerial, oscillator coil, padder, and a pair of 465 k.c. high-gain iron-core i.f. transformers.

However, those preferring a cheaper kit with air-cored i.f.'s can use the R.C.S. K117 or Radiokes RK117.

For economic operation of any portable receiver designed for speaker work, the use of standard type portable batteries is strongly recommended. For this reason the cabinet used for the "Loop Portable" is the same as that designed for the "Picnic Portable." As well, except for the omission of the aerial and r.f. coils and r.f. valve, and the substitution of a two-gang condenser for the three-gang used in the "Picnic," the chassis layout is identical. Omitting the components mentioned has made it possible to shorten the chassis from 13½" to 11¾," thus providing space for the loop winding, which is located vertically alongside the condenser gang.

The valve line-up for the "Loop Portable" comprises a 1A7G mixer, 1P5G i.f. amplifier and 1D8GT combination valve as diode detector, triode audio amplifier and output pentode. The total "A" drain is thus only .2 ampere, while "B" drain with new batteries is in the neighbourhood of 7.5 mills. The average "B" drain during the useful life of a set of batteries should not exceed 6 mills. at the most. Hence close on 300 hours of operation should be obtained from a single set of "A" and "B" batteries, comprising an Eveready PR8





Circuit of the "Loop Portable," with full constants.

"A" unit and two Eveready PR45 "B" units.

If desired, the 1D8GT combination valve can be substituted by a 1H5G diode second detector and triode audio amplifier, and a 1C5G output pentode, with no alterations to circuit constants.

As with the "Picnic Portable," the two chassis for the "Loop Portable" are available from Acorn Pressed Metal Pty. Ltd., 1 Marshall St., Surry Hills. Those wishing to build the three-valve model should order "Loop Portable" No. 1 chassis, and the four-valve model, "Loop Portable" No. 2 chassis.

Constructional Hints.

In building the receiver, the chassis is assembled and wired before the loop winding is mounted in position. A diagram published elsewhere shows the complete wiring, the assembly

from the mixer oscillator onward being substantially identical with that of the "Picnic Portable," as described in the October and November issues.

The loop winding is mounted vertically 1" from the left wall of the chassis by means of two 1 1/4" bolts and nuts and two 1" spacers. Before it is mounted, however, approximately 1/4" should be trimmed off each of the four sides of the bakelite form on which the loop is wound, so that it will fit in the position shown.

In connecting the loop, the inside end of the winding should be taken to the fixed plates lug on top of the aerial section of the gang, and the outside end to a.v.c. A single turn of flex wound around the outside of the loop, and with the ends taken to the two banana sockets mounted on the end of the cabinet, permits of external aerial and earth connections.

"LOOP PORTABLE THREE" List of Parts

- 1 sprayed steel chassis to specifications (Acorn).
- 1 canvas-covered carrying case built to specifications (Western Mig.).
- 1 coil kit, including 1 loop aerial, 1 oscillator coil, with 2 465 k.c. iron-core i.f.s. and padder (K.C.S., Radioes).
- 1 midget 2-gang condenser (Stromberg-Carlson).
- 1 midget tuning dial (Efco).
- 2 brown bakelite knobs.
- 1 .5 megohm potentiometer with switch (I.R.C.).
- 1 4-wire battery cable (2-foot length).
- 3 octal water sockets.
- 3 midget grid clips.
- 2 banana sockets and 2 plugs.
- FIXED CONDENSERS:**
 - 3 .0001 mfd., mica (T.C.C.).
 - 1 .0005 mfd., mica (T.C.C.).
 - 1 .005 mfd., mica (T.C.C.).
 - 2 .02 mfd., tubular (Ducon).
 - 2 .05 mfd., tubular (Ducon).
 - 1 .25 mfd., tubular (Ducon).
- FIXED RESISTORS:**
 - 1 3-megohm 1/3-watt carbon (I.R.C.).
 - 2 1-megohm 1/3-watt carbon (I.R.C.).
 - 2 .2-megohm 1/3-watt carbon (I.R.C.).
 - 2 50,000-ohm 1/3-watt carbon (I.R.C.).
- VALVES:**
 - 1 1P5G, 1 1A7G, 1 1D8GT. (Radiotron, Brimar).
- SPEAKER:**
 - 1 5in. permanent magnet speaker to match 1D8GT (Rola, Amplion).
- BATTERIES:**
 - 2 45-volt light duty "B" batteries (Eveready PR45).
 - 1 1 1/2-volt "A" battery (Eveready PR8).
 - 1 9-volt "C" battery (Eveready W9S).
- MISCELLANEOUS:**
 - 2 doz. 3/8in. nuts and bolts, insulating washers for aerial socket, push-back (solid and flexible), solder tags, 8 yds. rubber-covered aerial wire, 4 lin. bolts and 6 nuts for mounting gang, 2-30 mmfd. mica trimmers (MEC.).

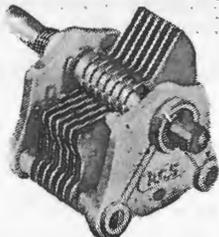
Alignment Details.

When aligning the receiver, set the aerial and oscillator trimmers and the padder about a third of the way out. Next tune in a station on approximately 1400 k.c. and adjust the aerial trimmer for best response. Now

(Continued on page 40)

RADIOKES

"First with the New Release"



Radiokes Trolitul Midget Condensers, made in two types, 14-plate equals old style 23-plate capacity. M.C. type may be ganged.

Max. Cap. STAR	Price	M.C.	Price
mmfda. Type No.		Type No.	
35	37	44	8/6
100	40	47	10/3

Matched Loop Portable Coil Kit

Specially wound loop aerial ready matched to ensure perfect tracking, and oscillator coil, padder, and pair of high gain 465 k.c. i.f. transformers, Type No. RK117. Price £1/18/3. All the parts for the sets featured in this issue are available from Radio Suppliers Pty. Ltd. Write now with details of your requirements!

Radiokes Trolitul Intermediate Transformers.

Trolitul construction ensures complete stability. No loose wires to shift and alter frequency.

Air Core, 1st, 465 k.c. square can, 3 ins. x 1 3/8 ins.

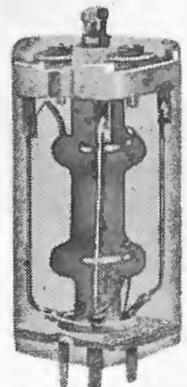
Air Core, 2nd, 465 k.c. square can, 3 ins. x 1 3/8 ins.

Type I.F.A. Price 7/6

Iron Core, 1st, 465 k.c. square can, 3 ins. x 1 3/8 ins.

Iron Core, 2nd, 465 k.c. square can, 3 ins. x 1 3/8 ins.

Type I.F.I. Price 11/-



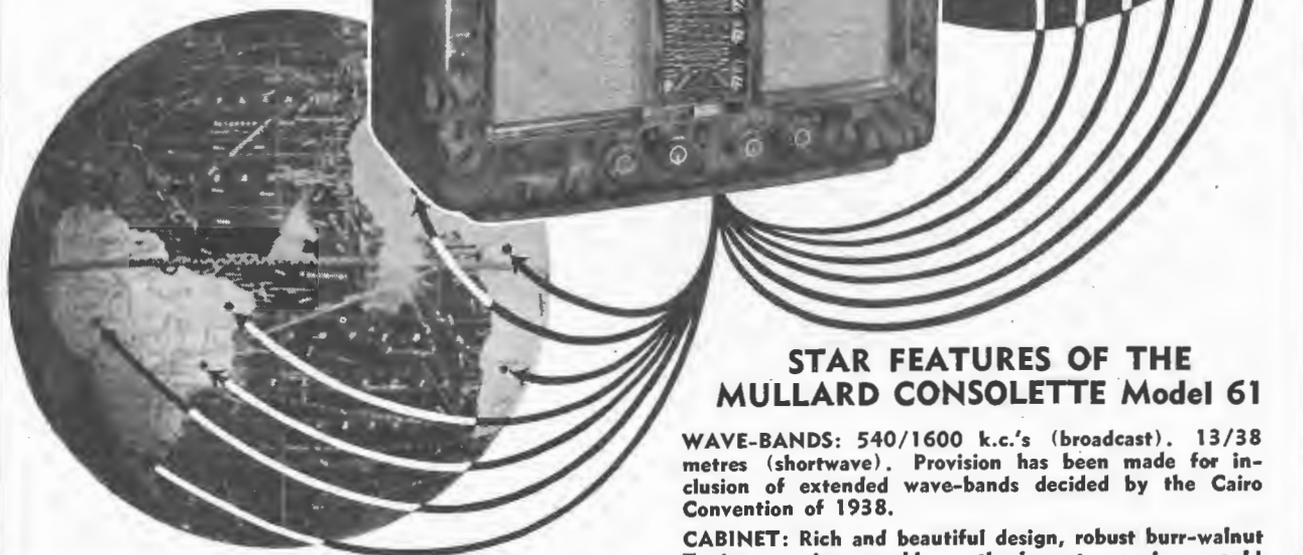
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MULLARD World Master Model 61

Breaks all Records
for World-wide
Reception on
Short Waves!



STAR FEATURES OF THE MULLARD CONSOLETTA Model 61

WAVE-BANDS: 540/1600 k.c.'s (broadcast). 13/38 metres (shortwave). Provision has been made for inclusion of extended wave-bands decided by the Cairo Convention of 1938.

CABINET: Rich and beautiful design, robust burr-walnut Zonite one-piece mould . . . the largest one-piece mould ever produced in Australia. . . . Dimensions: 20 $\frac{1}{2}$ " x 13 $\frac{1}{2}$ " x 8".

DIAL: Large-size Verti-scale with horizontal pointer introducing a new vogue in station markings. This novel Mullard Dial gives you the actual place names from which the Australasian Broadcasts emanate, together with extra large call-signs for all the principal stations. Escalator short-wave scale with alphabetical sub-divisions for tuning ease.

REPRODUCTION: Special 8" (console size) "Rola" Dynamic Speaker.

POWER OPERATION: A.C. mains 200/260 volts.

PRICE (terms available) 21 Guineas
Also for battery operation, Model 62 24 Guineas
Vibrator-powered 5 Guineas extra

Mullard-Australia Pty. Ltd.

367-371 Kent Street, Sydney — Telephone: MJ 4688

STATE DISTRIBUTORS.

N.S.W.: Bloch and Gerber Ltd., 46-48 York Street, Sydney.
VICTORIA & TASMANIA: Frances Howard Pty. Ltd., Vere Street, Richmond, E.I. QUEENSLAND: Trackson Bros. Pty. Ltd., 157 Elizabeth Street, Brisbane; S. Griffiths, Perry House, Elizabeth Street, Brisbane. SOUTH AUSTRALIA: R. C. Woolard, 18 Chesser Street, Adelaide. WEST AUSTRALIA (Factory Rep.): Basil B. Taylor & Co., 194 St. George's Terrace, Perth.

ALAN H. GRAHAM . . . SHORTWAVE EDITOR OF "RADIO WORLD". . . WRITES:

"During a period of approximately one month one of the latest Mullard receivers—the CONSOLETTA Model 61—has been subjected to a series of exhaustive tests on both short-wave and broadcast bands, and at the end of this period the writer has not the slightest hesitation in recommending the Mullard 61 to readers of 'Radio World' as an exceptionally fine receiver—thoroughly efficient from the point of view of DX, of handsome appearance and possessing tonal qualities not often found in table model receivers.

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

Note: A list of 115 world shortwave stations as logged by Mr. Graham appears in his test report on the Mullard Model 61 published elsewhere in this issue.



The Story Of RCS Radio . . . (I)



Ten years ago, when RCS Radio first commenced operations, two operatives were employed making one line of coils. Today, during peak periods approximately two hundred employees are kept busy manufacturing the dozens of RCS lines that are sold everywhere throughout the Commonwealth.

Mr. Ron. Bell,
founder and president
managing director
of R.C.S.
Radio Pty. Ltd.

THE story of R.C.S. Radio opens ten years ago in a small factory in the Sydney suburb of Marrickville, where Mr. Ron. Bell, founder of the company, began winding coils for t.r.f. receivers. Those who were radio experimenters in 1929 will remember the old familiar black bakelite former, wound with green silk-covered wire.

The business made excellent progress, to such an extent that within three months larger premises had to be taken and more plant installed. The next three years saw two further shifts, each time to larger premises with additional plant to take care of increased orders on established lines, and to manufacture new ones.

This view of the lavishly-equipped laboratory at the Ivy Street factory in Darlington shows portion of the several thousand pounds' worth of test equipment that was lost in the disastrous fire that completely gutted the factory in June, 1938.

Lines Increase From One to Dozens.

In 1929 the only line manufactured was t.r.f. coils. To-day dozens of lines are marketed throughout the Commonwealth under the well-known R.C.S. brand. These include a complete range of wirewound products such as coils, i.f. transformers, r.f. chokes, dual-wave coil units, potentiometers, resistors, voltage dividers, audio transformers and chokes, modulation transformers, midget power trans-

formers, aerial and line filters, speaker transformers and vibrator units, while other lines include midget variable condensers, solder tags, etc.

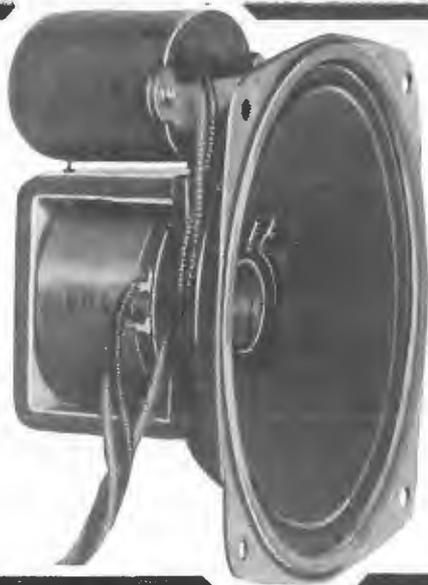
Factory Destroyed By Fire.

For some years after 1934, the two-storied factory at 21 Ivy Street, Darlington, was well-known as the R.C.S. headquarters, until in June, 1938, when there occurred the disastrous fire that completely gutted the entire factory, total damage being estimated at £12,000.

In this fire, which seven brigades fought for six hours before it was subdued, Mr. Bell saw his life's work go up in smoke. Machine shop, design and production laboratories, general store and all offices were completely wiped out, while fire and water so damaged the assembly factory that little of value could be salvaged.

However, undaunted by this severe setback, Mr. Bell leased a new factory the following day at the present R.C.S. address—50 Glebe St., Glebe, and set about putting in fresh plant. Within seven days the entire staff





NEW AMPLION

5 inch

ELECTRICALLY WELDED
LOUDSPEAKERS

AND

7 inch

The most modern advance in speaker design . . . a complete new range. Now, to match the 12" Electrically Welded Amplions, these new BIG 5" and 7" models. Thirty per cent. more cone area than any others, vastly increased output, larger fields than ever, sealed insulated-core transformers. FIDELITY UNEQUALLED IN THE WORLD.

The greatest contribution to better radio. Write now for data.
AMPLION (A/SIA) PTY. LTD.
382 KENT STREET, SYDNEY, N.S.W.

was back on the job once more, and in another week production was in full swing.

Highlights From R.C.S. History.

While discussing the firm's growth with "Radio World," Mr. Ron Bell mentioned several interesting highlights, one of which shows the remarkable progress made in the early days of the company.

In 1933 the "Standard Superhet" coil kit was released, descriptions of a receiver using it being featured in radio journals throughout Australia. Between 1933 and 1936 over 12,700 complete coil kits were sold, representing at 5 units per kit a total of 63,500 units.

This kit was only one of dozens

marketed under the R.C.S. brand. Actually, it is estimated that the number of coil units manufactured and sold by the firm since its inception runs into some millions!

Again, the first superhet coil kit ever sold by a parts manufacturer to the public was an R.C.S. kit designed for the "Universal Superhet," with the oscillator coil designed for use either in an autodyne hook-up or in conjunction with a separate oscillator. This kit was a firm favourite with set builders for years, many thousands being sold.

First Pre-Tuned Coil Unit.

Another item of interest is that in 1936, R.C.S. designed and released what was the first pre-tuned coil kit

marketed in Australia, and perhaps in the world. A rotary switch enabled any one of eight pre-tuned stations to be selected at will, much along the lines of several makes of pre-tuned receivers on the market to-day.

Well designed and reasonably priced, the unit gave excellent results, and record sales were expected for it. It was used in receivers featured in radio journals throughout Australia, and yet only one kit was sold—and that twelve months after the unit was released! It was obvious nobody wanted pre-tuned receivers, yet two years later, when this type of set became popular throughout the world, a modified version of the same kit

(Continued on page 39)

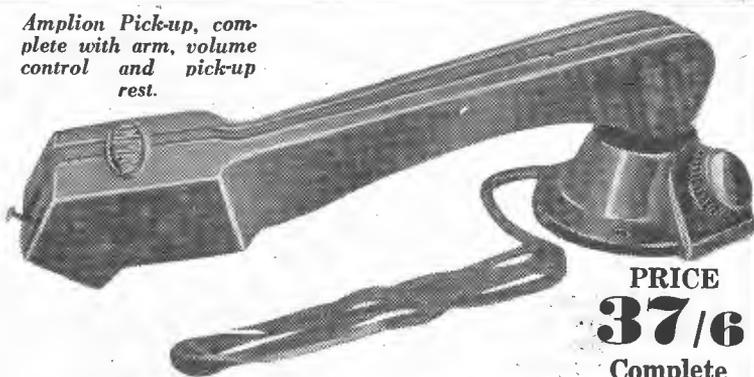
AMPLION PICK UP

The ultimate in Pick-up Production! These Amplion Pick-ups combine excellent reproduction, minimum tracking error and wear, and average output of $\frac{3}{4}$ volt.

- Sparkling Treble
- Brilliant Middle Register
- Full Bass
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- True Tangent Angle Head
- Good Frequency Response
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Obtainable from all Leading Wholesalers and Dealers.

Amplion Pick-up, complete with arm, volume control and pick-up rest.



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Complete

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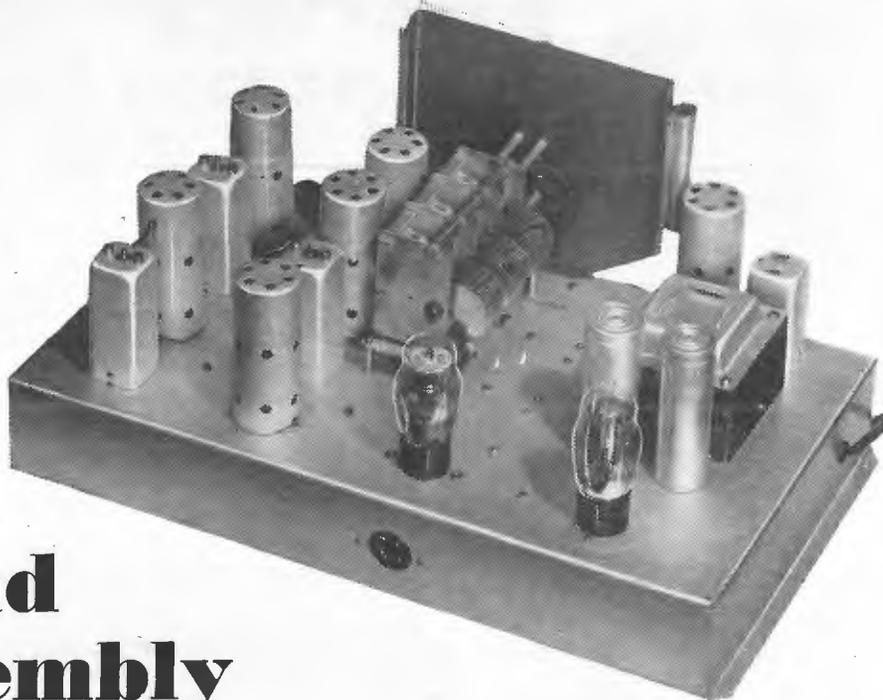
382 Kent St., Sydney.

Please send me without obligation full details of Amplion Pick ups.

Name _____

Address _____

A rear view of the eight-valve communications superhet to be featured in next month's "Radio World." It was specially designed around the new R.C.S. five-band coil assembly reviewed below.



RCS Releases Five-Band Coil Assembly

Features include Trolitul insulation: air trimmers: continuous coverage with ample overlap from 9.8 to 545 metres.

FOR many years now thousands of amateurs and set-builders throughout Australia have been compelled to gaze longingly at illustrations in "QST" and other American magazines, of multi-control communication receivers of the band-switching type, without being able to either buy or build one because no suitable coil assembly has been available.

Now, however, this state of affairs has been altered, with the release by R.C.S. Radio Pty. Ltd. of a five-band switch-coil assembly giving continuous coverage of from approximately 9.8 metres to 550 k.c. Some months

of research have been put into this unit, and R.C.S. Radio are to be congratulated, both on their initiative in developing it, and on the extremely high overall efficiency of the completed assembly.

Special Switch With Built-In Shields.

A special three-section five-band wave-change switch with silver-plated contacts has been built for the job. Shielding partitions of 16-gauge cadmium plated steel are built into it, while provision is made on each section for shorting out all unused grid windings.

The fifteen coils—three sets of five

—are all wound on trolitul formers to ensure highest gain, trolitul air dielectric trimmers being used. No padder is required on the highest frequency band, while fixed padding is provided on the next two bands. On the two lowest frequency bands, variable padding is incorporated.

Coverage is continuous from 9.8 metres to 550 k.c., an important point here being the fact that plenty of overlap has been provided for, enabling the most favourable L/C ratio to be chosen at any point in the tuning range.

Eight-Valve "Super" Uses New Unit.

The receiver illustrated at the head of this article is the first to be developed in Australia using this new coil assembly. There are eight valves in all, a 6U7G r.f. amplifier, 6K8G mixer, a pair of 6U7G's in a two-stage i.f. amplifier, 6B6G second detector, a.v.c. voltage rectifier and first audio amplifier, 6V6G beam output pentode, 76 beat frequency oscillator and an 80 rectifier.

The tuning condenser is a three-gang "H" type, with three 25 mmfd. midjet variables paralleled across it for vernier tuning and to spread the "ham" bands.

Three R.C.S. iron-cored trolitul
(Continued on page 39)

This Month's Front Cover.

"Wireless House," new A.W.A. headquarters in York St., is perhaps the most impressive building in Sydney, largely because of the 185-foot steel tower surmounting it.

Topped by an aerial beacon and rising to a total height of 360 feet above ground level, the tower completely dominates the skyline of Australia's largest city. At night it is flood-lit, the base with sodium vapour

lighting and the steel tower itself with mercury vapour, the combination providing a striking and brilliant effect.

The building itself, which comprises 14 storeys, is one of the most elaborately-appointed in Sydney. It is completely sound-proofed, both ceilings and floors being acoustically treated, while Fisk sound-proof windows have been installed throughout.

Incomparable



IN PERFORMANCE ★ IN BEAUTY ★ IN VALUE

The new 5-valve Fisk Radiola table model strikes an entirely new note in radio receiver design. Matchless tone quality enables programmes to be received with unbelievable realism, extreme sensitivity is provided by new A.W.A. circuits and improved tuning arrangements set new standards in convenience and efficiency. The strikingly beautiful cabinet has exquisitely graceful lines and is a masterpiece of modern streamline simplicity. Moulded in durable "Radelec" it is available in a range of attractive colours.

New built-in loop aerial—just plug in to power or light socket!



Ebony or Walnut
.... 16 guineas

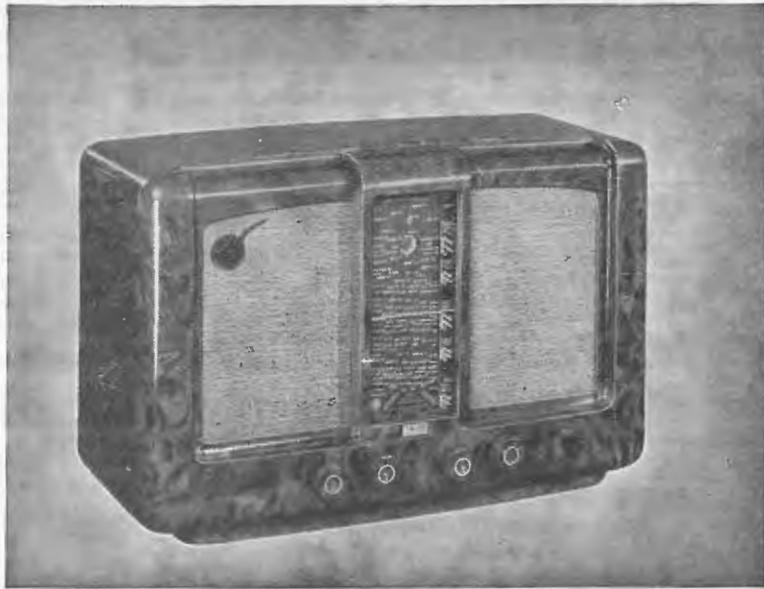
Jade Green or
Ivory, 17 guineas
(A.C. operation)



THE FISK **RADIOLA**

AUSTRALIA'S FINEST
BROADCAST RECEIVER

Manufactured and Guaranteed by Amalgamated Wireless (Australasia) Limited



The Mullard Consolelette illustrated alongside is a six-valve (including tuning indicator) dual-wave a.c. superhet using a 6U7G r.f. amplifier, EK2G frequency converter, EBF2 i.f. amplifier, second detector and a.v.c. voltage rectifier, EL3G high-gain output pentode, and 5Y3G rectifier.

Mullard World-Master Consolelette An Outstanding Performer

A remarkable performance was put up by a Mullard 61 during recent exhaustive tests, several hundred shortwave stations in all parts of the world being logged. Results on the broadcast band were equally striking.

By **ALAN H. GRAHAM**

Shortwave Editor "Radio World."

DURING a period of approximately one month one of the latest Mullard receivers—the Consolelette Model 61—has been subjected to a series of exhaustive tests on both shortwave and broadcast bands. At the end of this period the writer has not the slightest hesitation in recommending the Mullard 61 to readers of the "Radio World" as an exceptionally fine receiver—thoroughly efficient from the point of view of DX, of handsome appearance and possessing tonal qualities not often found in mantel model receivers.

The Mullard 61 (which has a counterpart for battery or vibrator operation in the Mullard 62) is housed in a most attractive moulded bakelite cabinet of figured walnut.

The receiver is of the dual-wave type covering from 540 to 1600 kilocycles on the broadcast band (which incidentally includes the additional frequencies allocated at Cairo last year), and from 13 to 38 metres on the short waves.

The Mullard 61 utilises six valves, including tuning indicator and a 5Y3G full wave rectifier. The valve line-up comprises a 6U7G r.f. amplifier, EK2 frequency converter, an EBF2 as i.f.

amplifier, detector and a.v.c. valve and an EL3G power output valve.

Multi-Colour, Station Calibrated Dial.

The large vertical scale dial with a horizontal pointer is a novelty, and makes possible full calibration of the dial for broadcast stations in Australia and New Zealand. The locality of each station is shown, together with the call letters of the more important transmitters. On the shortwave scale the five broadcast bands between 13 and 38 metres are clearly indicated, and provision is made for accurate logging of shortwave stations.

The controls are simple, yet effective, consisting of volume control, fone control, tuning control and wave-band switch.

The a.v.c. system is most effective, both in minimising fading and preventing blasting from locals. Its value is best appreciated in the reception of shortwave transmissions from the powerful overseas stations. For example, the London programmes provide excellent entertainment, as signals are held steady and perfect readability is assured.

As proof of the receiver's excep-

tional DX capabilities, the list of shortwave stations appended at the conclusion of this article, were among several hundred tuned in during the tests.

High, Even Sensitivity On Shortwave.

In all tests on the short waves, the Mullard 61 proved outstandingly satisfactory in sensitivity and selectivity on all bands. Despite the fact that conditions were not always satisfactory, excellent results were obtained. The usual regulars (such as London, Paris, Moscow, Berlin, Rome, Tokyo and the Americans) came in at great strength, and even when no aerial was used, signals were still quite strong.

A feature of the shortwave tests was the fact that a remarkable evenness of results was obtained on all bands (13, 16, 19, 25 and 31 metres), there being no noticeable falling off on the higher frequencies.

Tests on the 20-metre amateur band were also most satisfactory, despite the fact that the number of stations available there was limited on account of the war. However, Asiatic

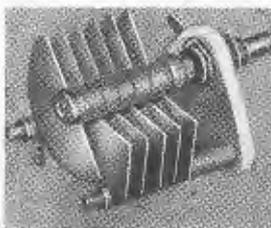
"Radio World"

Recommends

RAYMART

CRAFT A CREED

components for all shortwave receivers, including "Air-Scout Communications Six" and "Vulcan Shortwaver" described in this issue.



RAYMART ceramic short-wave micro-variable condensers have highest efficiency with lowest loss factor of any available. Features include RMX dielectric, all-brass construction, ball-bearing drive, ball race being electrically shorted out to ensure freedom from noise. Designed for ganging, these condensers are available in a wide range of capacities from 15 to 250 mmfd.



RAYMART flexible couplers (Type FC) are insulated with high-grade dielectric, and are ideal for extension drives and for ganging. These couplers take $\frac{1}{4}$ " shaft each end, and provide an effective insurance against shock and burns from grub screws.



RAYMART R.F. chokes are available in two types. Type CHP is solenoid wound on a high-grade form, 5 to 100 metres, 200 m.a. Type CHN is a genuine American 2.5mh. National type, precision pie-wound on an isolantite form with wire pig-tails.



RAYMART VA type ceramic valve and coil sockets, which are fitted with resilient brass sockets, are strongly recommended for all shortwave applications where highest efficiency is desired. Available in all sizes.



RAYMART type TXS 4" indicating dial is supplied complete with pointer. These dials are individually spun in nickel-silver finish, with finely engraved divisions (0 to 100).

RAYMART type TXD direct-drive precision instrument dials are noted for their fine appearance, accurate workmanship and individually-spun nickel finish. Used in conjunction with the Raymart 6:1 epicyclic reduction drive, these dials are excellent for fine tuning on shortwave.



RAYMART type DPA dipole aerial kit contains all that is necessary to erect a doublet noise-reducing aerial, including transmission line, insulators, enamel aerial wire and transformer. Is worth an extra r.f. stage to any shortwave receiver.



RAYMART American type stand off insulators are available in three types—ST ($\frac{1}{2}$ "), SS (1"), and SM ($1\frac{1}{4}$ "), heights quoted excluding terminals. These insulators are manufactured of highly-glazed vitreous porcelain and are fitted with nickel-plated terminals.



RAYMART reduction drive type ERD is an epicyclic reduction movement fitting all $\frac{1}{4}$ " shafts and giving a 6:1 reduction. (Used with a 12:1 dial, gives a 72:1 slow motion). Ideal for vernier tuning, fierce reaction, etc.



RAYMART panel indicating lamps are designed to take a standard screw-in pilot bulb. They provide a certain indication as to whether "A" and "B" voltages are on or off. Designed for one-hole mounting, these lamps are fitted with coloured glass jewels, and are available in red or green.



Telegrams:
"Jonmar," Sydney.
Telephone:
BW 3109 (2 lines)

JOHN MARTIN PTY LTD

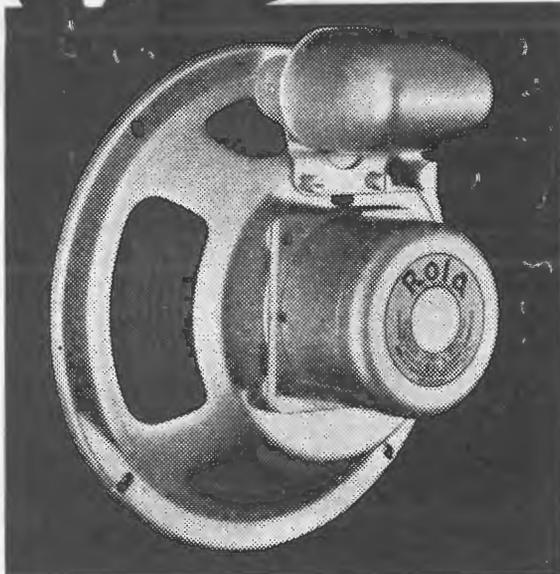


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MATCHLESS Value!

**THE IDEAL
SPEAKER
for the finest
BATTERY SETS**



Rola 8.21

The sound reproducer that is used in the vast majority of battery and console receivers made to-day. Rola 8/21 is now outselling all other permanent magnet speakers because:—

- It offers by far the best value obtainable.
- Manufacturers and engineers have supreme confidence in the name of Rola—confidence won by strict adherence to the highest standard of manufacture.
- It combines an abundance of technical features of which these are but a few:

8/21 delivers a greater volume of sound for given input (technically known as efficiency) than any ordinary speaker. Tremendous power handling capacity combined with high efficiency make Rola 8/21 equally popular in low powered battery receivers and in large factory installations. Extended frequency response and freedom from note discrimination account for the smoothness and naturalness that are qualities of all Rola speakers. Diaphragms are light and responsive yet are made of tough fibre that defies climatic vagaries and the results of hard usage. Incorporating PERMACENTRIC construction (Rola's patented method of diaphragm suspension and dust-proofing) and fitted with Rola ISOCORE transformers, 8/21 offers HIGHER value than any other light speaker, which is another way of saying—**LOWER PRICE. 8/21 - - - - - 52/-**

- 10/21 similar to 8/21 but with a 10-inch diaphragm giving good bass response **55/-**
- 12/21 similar to 8/21 but with a 12-inch diaphragm suitable for the finest of installations **56/6**
- 8/14 a lower priced, shallow 8-inch speaker recommended where space is at a premium **39/-**

Write for further details including New price list, specification sheets and Rola's booklet on extension speakers.

Rola Co. (Aust.) Pty. Ltd.

The Boulevard and Park Avenue
Richmond, E.I. Victoria . J 5351
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Manufacturers of the World's finest sound reproducers.

New Zealand Representatives—Swan Electric Company Ltd., High Street, AUCKLAND, N.Z.

and American amateurs came in in good style.

A noticeable feature of the Mullard in all shortwave work was its extreme sharpness in tuning—at first this characteristic proved a trifle disconcerting, but later its several advantages became quite clear.

On the broadcast band the Mullard 61 more than measures up to any equal-wave receiver we have heard, giving remarkable reception results. Practically all the Australian and New Zealand stations were logged nightly, and in addition numerous overseas stations in the East and in Europe.

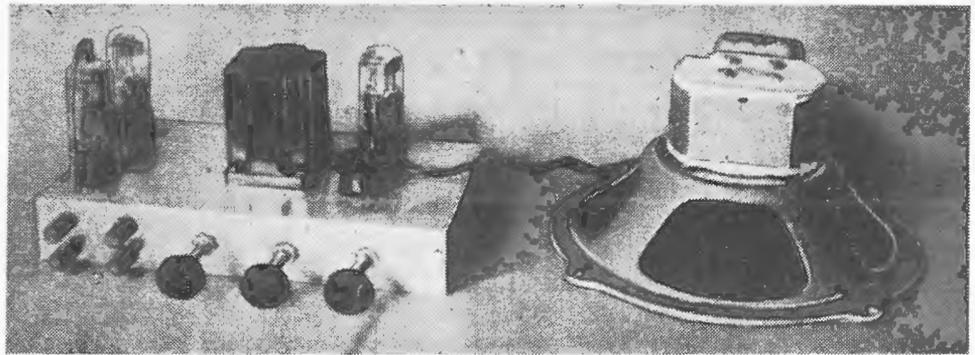


LIST OF SHORTWAVE STATIONS LOGGED BY ALAN H. GRAHAM, SHORTWAVE EDITOR "RADIO WORLD," ON MULLARD MODEL 61 RECEIVER.

- OAX4J, 9340kc., 32.12m., Lima.
- OAX5C, 93.5kc., 31.95m., Ica.
- HCJB, 12460kc., 24.08m., Quito.
- CXA8, 9640kc., 31.12m., Colonia.
- CB1180, 11970kc., 25.06m., Santiago.
- TGWA, 9685kc., 30.96m., Guatemala City.
- XEWW, 9500kc., 31.58m., Mexico City.
- HP5A, 11700kc., 25.64m., Panama City.
- COCH, 9437kc., 31.8m., Habana.
- COBZ, 9028kc., 33.24m., Habana.
- COJK, 8665kc., 34.46m., Camaguey.
- WEXE, 17830kc., 16.81m., New York.
- WCAB, 15270kc., 19.65m., Philadelphia.
- KGEL, 15330kc., 19.57m., San Francisco.
- W2XE, 11830kc., 25.36m., New York.
- KGEL, 9530kc., 31.48m., San Francisco.
- WGEA, 9550kc., 31.41m., Schenectady.
- WRCA, 9670kc., 31.03m., Bound Brook.
- KKZ, 13690kc., 21.91m., Bolinas, Calif.
- VPD2, 9538kc., 31.38m., Suva.
- KZIB, 9500kc., 31.58m., Manila.
- ZHI, 9690kc., 30.96m., Singapore.
- VUD-2, 9590kc., 31.28m., Delhi.
- ZBW3, 9525kc., 31.49m., Hong Kong.
- XGOX, 17800kc., 16.86m., Chungking.
- XGOK, 11810kc., 25.4m., Canton.
- JDY, 9920kc., 30.24m., Dairen.
- JFO, 9636kc., 31.13m., Taihoku.
- OAX4T, 9566kc., 31.38m., Lima.
- LRX, 9660kc., 31.06m., Buenos Aires.
- ZP-14, 11720kc., 25.6m., Villarica.
- CB1170, 11700kc., 25.64m., Santiago.
- CD1190, 11910kc., 25.19m., Valdivia.
- TIPG, 9620kc., 31.19m., San Jose.
- HP5J, 9590kc., 31.28m., Panama City.
- COCM, 9850kc., 30.46m., Habana.
- COBC, 9985kc., 30.03m., Habana.
- COCQ, 84m., Habana.
- WNBI, 17780kc., 16.87m., Bound Brook.
- WPIT, 15210kc., 19.72m., Pittsburgh.
- WGEA, 15330kc., 19.57m., Schenectady.
- WPIT, 11870kc., 25.27m., Pittsburgh.
- W1XAL, 11790kc., 25.45m., Boston.

(Continued on page 40)

The completed amplifier in experimental form, assembled on an aluminum chassis measuring 10" x 5½" x 2." The speaker is a Rola 10" permanent magnet type with a 42-ounce magnet, ensuring extremely high sensitivity.



Junior Class B Amplifier

Separate inputs for crystal microphone and pick-up, with built-in microphone pre-amplifier and mixer system, are features of this class "B" amplifier, which uses 1.4-volt valves throughout.

AN amplifier is one of the most useful pieces of equipment an experimenter can have in his workshop, for its applications are almost endless.

The Junior Class "B" Amplifier described below was designed in response to an enquiry from a reader for a small battery-operated amplifier capable of giving enough volume for conducting dancing classes in a small hall. For this particular application a Brown projection horn, used in conjunction with an 8-inch 42-ounce magnet P.M. speaker was recommended, both to increase coverage and to improve clarity on speech.

Microphone And Pick-Up Input.

Three 1.4-volt valves are used, comprising a 1N5G crystal microphone pre-amplifier, feeding into a 1G4G medium-mu triode driving a 1G6G twin triode class "B" amplifier. The

rated power output of the 1G6G is 675 milliwatts, which when fed into a high sensitivity P.M. speaker of the latest type, such as a Rola 8-10 or 12-42, or the Amplion VP2 or VP3 (20 and 64-ounce magnets, respectively), provides surprising volume.

Provision is also made for the use of a pick-up. A crystal type is recommended, though any magnetic pick-up giving fairly high output will also be found very satisfactory.

Those who want higher power (approximately one watt), with of course higher "A" and "B" current consumption, can use the 2-volt series of valves, the 1K5G, 1H4G and 1J6G replacing the 1N5G, 1G4G and 1G6G, respectively. Corresponding alternatives in earlier type valves are the 32, 30 and 19.

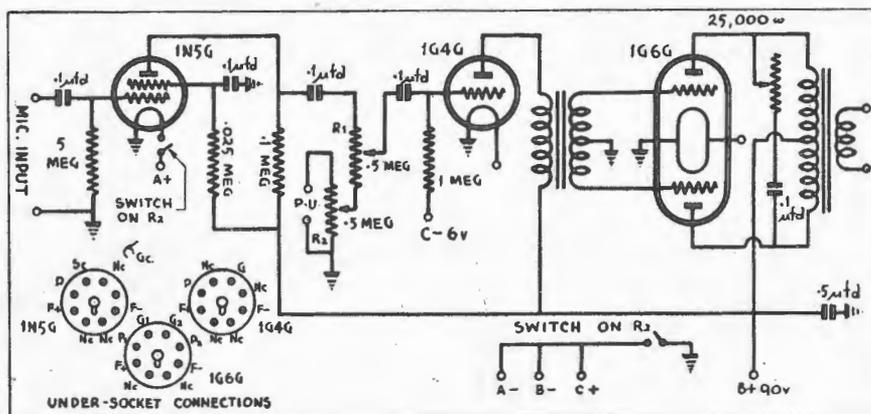
Simple Mixer System.

In the circuit, the two potentiometers "R1" and "R2" provide a

simple but effective mixing system that enables either microphone or pick-up to be faded in or out at will, or the outputs from the two mixed. When the microphone is not in use, the 1N5G pre-amplifier valve can be switched off to conserve current by rotating "R1" to the "off" position, when the built-in switch opens the 1N5G filament circuit. The switch on "R2" is the main on/off switch, which breaks the connection between "A-, B-, C+" and earth.

A tone control, consisting of a .1 mfd. condenser in series with a 25,000-ohm potentiometer connected from plate to plate of the 1G6G, is a further useful refinement that has been incorporated. If desired, a .05 mfd. condenser can be used here, to give less severe suppression of the higher frequencies.

The model shown at the head of



Circuit of the Junior Class "B" Amplifier which uses a 1N5G pre-amplifier and 1G4G triode driving a 1G6G Class "B" output valve, which will deliver an output of 675 milliwatts.

BE IN TUNE



WITH

Xmas

Complete harmony and the utmost enjoyment from radio entertainment during the Christmas season . . . is yours when worn valves are replaced

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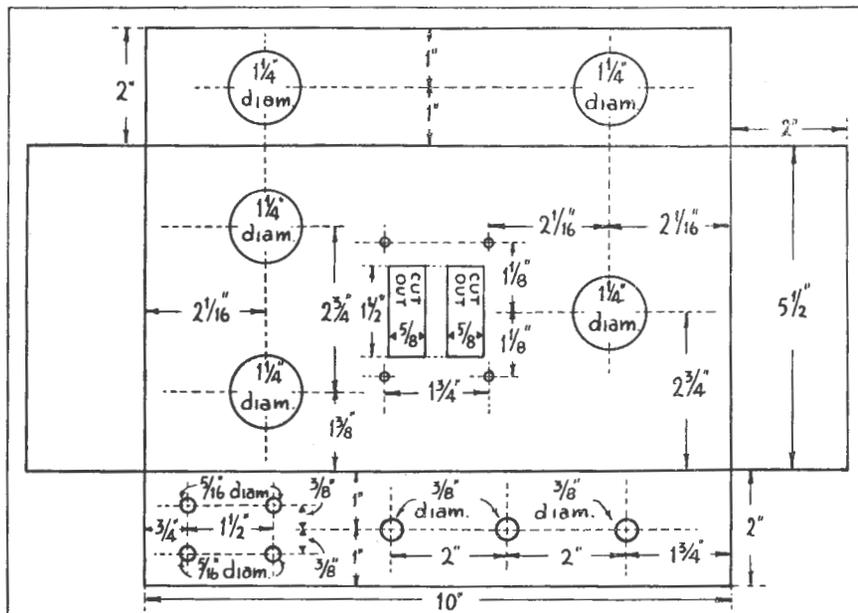
Radiotrons

THE WORLD'S
STANDARD
RADIO VALVES



To Destroy
"TONE BOGEY"
Re-valve with
RADIOTRONS

The valves in the sealed cartons



Dimensions for preparing the chassis are given in this sketch.

this article was built on an experimental chassis measuring 10" x 5 1/2" x 2." In the layout sketch given elsewhere, several minor improvements have been made, the valves being located symmetrically and the speaker socket transferred to the rear wall of the chassis—a much more convenient position for it.

In the photograph, the first pair of terminals is for microphone input, and the second for pick-up input. Then follows the combined microphone gain control (R1) and pre-amplifier filament switch. Next is the pick-up volume control (R2) and main on/off switch, while on the extreme right is the tone control.

About The Parts.

The parts required to build the

Junior "Class B" Amplifier are listed below, and are standard throughout. The class "B" input transformer used is an R.C.S. (also available in the Radiokes brand).

Types of "A," "B" and "C" batteries recommended to give the most economic operation are included in the list of parts. However, if the amplifier is to be built up as a light self-contained unit for portable work, then two Eveready PR-45 volt "B" units can be used, and a PR-8 "A" unit. In this case, however, it is recommended that a negative bias of -1 1/2 to -3 volts be applied to the grids of the 1G6G via the input transformer secondary to reduce the "B" drain as much as possible.

JUNIOR CLASS "B" AMPLIFIER

List of Parts

- 1 aluminium or steel chassis to specifications, 10 x 5 1/2 x 2 inches (with cabinet if required).
 - 3 octal, 1 4-pin, 1 6-pin wafer sockets.
 - 1 6-pin power plug.
 - 1 length 6-wire battery cable.
 - 2 .5 megohm potentiometers with switches (I.R.C.).
 - 1 25,000 ohm potentiometer (R.C.S., Radiokes).
 - 3 control knobs.
 - 4 input terminals (for pick-up and microphone). (Alternatively, 2 open circuit jacks with plugs can be used.)
 - 1 class "B" input transformer (R.C.S., Radiokes).
- FIXED RESISTORS:**
- 1 25,000 ohm carbon (I.R.C.).
 - 1 .1 megohm carbon (I.R.C.).
 - 1 1 megohm carbon (I.R.C.).
 - 1 5 megohm carbon (I.R.C.).

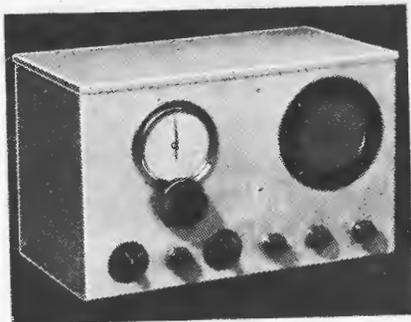
- FIXED CONDENSERS:**
- 5 .1 mfd. tubular (Ducon).
 - 1 .5 mfd. tubular (Ducon).

- VALVES:**
- 1 1N5G, 1 1G4G, 1 1G6G. (Brimar, Radiotron.)

- SPEAKER:**
- 1 permanent magnet speaker, with class "B" input transformer to match 1G6G (Amplion, Rola).

- BATTERIES:**
- 2 45 volt Superdyne "B" batteries (Eveready).
 - 1 1 1/2 volt "A" block (Eveready X250).
 - 1 9 volt "C" battery (Eveready).

- MISCELLANEOUS:**
- Hook-up wire, solder lugs, nuts and bolts,
 - 1 midjet grid clip, 6in. len. shielding.



WANT A RECEIVER BUILT, LINED UP . . OR SERVICED?

If so, we are fully equipped to handle the job for you. For years we have specialised in building to private orders all types of receivers (A.C., D.C., A.C./D.C., vibrator, battery, dual-wave, all-wave or short-wave), amplifiers of all types (P.A. systems a speciality), auto and portable radios. Sets built to individual requirements, or we will design to suit any conditions.

Communications Receivers a Speciality

All communications receivers described in "Radio World," such as the "Radiotron Junior Communications Eight," and the "Vulcan Shortwaver" and "Air-Scout Six" described this month, can be supplied either in kit form or fully assembled and air-tested.

WRITE FOR FREE QUOTATION.

"Little Wanderer" Portable Radio

City, beach or bush . . . anywhere, at any time, a flick of a switch will bring you a wealth of radio entertainment from this sensational new 1.4-volt portable radio.

MAIN FEATURES INCLUDE:

- Power five-valve superhet circuit (using 1.4 volt valves) specially developed to give maximum in performance with minimum running costs.
- Six-inch Rola P.M. speaker with high-sensitivity magnet ensures ample volume with superb tone.
- Litz-wound iron-cored coils and i.f. transformers give exceptionally high sensitivity.
- New improved a.v.c. system, station-calibrated dial, non-directional lid aerial, with provision for attaching outside aerial.

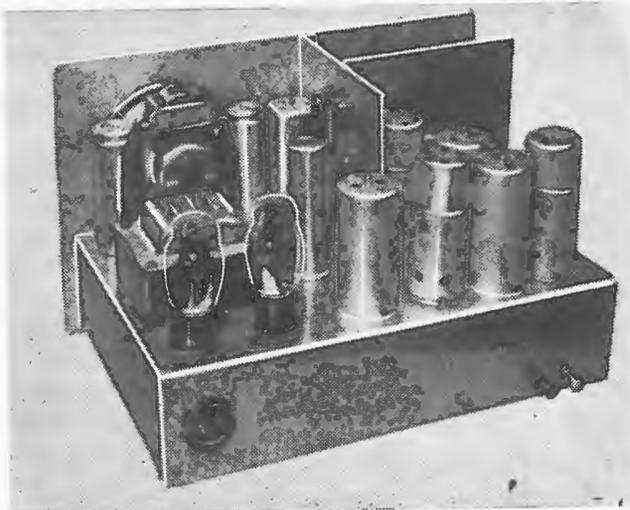
PRECISION RADIO

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A rear view of the "Air-Scout," with the 80 rectifier and 42 output pentode in the foreground. An under-chassis view is shown below.

tions of both are shown in the layout sketch. Two small partitions are also required underneath the chassis, the location of these being apparent from the under-chassis photograph.

Commencing The Construction.

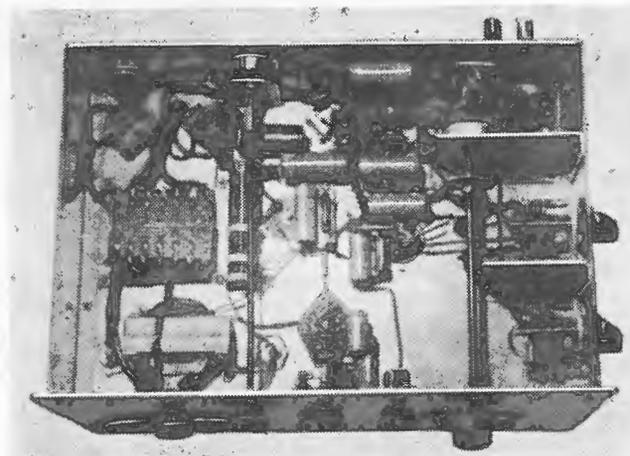
In building the receiver, mount the power transformer and valve sockets first, wiring the heater lugs of the latter before proceeding further. Next follow the electrolytics, i.f. transformers and b.f.o. coil. Then, commencing at the plate of the 6K8G mixer, wire the two-stage i.f. amplifier, 6B7S diodes, triode section of the 6F7, and finally the 42. The two coil sockets can next be mounted and wired as far as possible before the band-setters are put in.

The front panel is now bolted in position, and the front panel controls locked in place and wired. Next follow the above-chassis partitions, the ganged band-spreaders then being mounted, together with the tuning dial. The 5" dynamic speaker is then bolted to the front panel and connected in circuit.

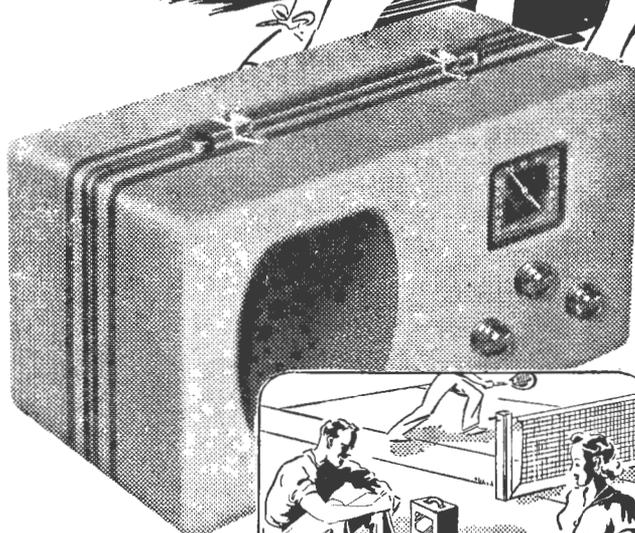
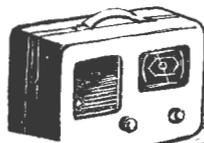
Short, Direct Wiring Essential.

Both the assembly and wiring can now be carefully checked. Incidentally, when the wiring is being put in,

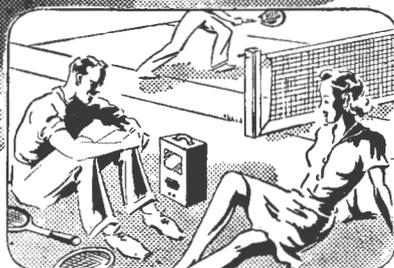
(Continued on page 25)



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Multi-Meters and Test Oscillators

This month's instalment from the Radiotron Lecture Service series discusses typical multi-meter circuits, and outlines the main requirements of an efficient service oscillator.



This new Model 142 Calstan Uni-Tester is an a.c./d.c. multi-meter that as well as covering the usual current, voltage and resistance ranges, also gives direct measurements of impedance, inductance, capacity and output (in decibels). Provision is also made for checking electrolytic condensers of all types.

Volt-Ohm-Milliammeters.

It will be seen from the foregoing discussion that, of the three types of meter, the moving coil is the most suited for use in service equipment, being stable, sensitive and at the same time reasonably robust.

The majority of modern multimeters (or Volt-Ohm-Milliammeters) use a single meter movement in conjunction with a number of shunt and series resistors, the whole being so arranged as to enable the operator to measure conveniently current, voltage and resistance. The actual ranges employed vary considerably from one instrument to another, but the following are typical.

Volts, D.C. and A.C.: 0—10—100—250—500—1,000 at 1,000 ohms per volt.

Milliamperes, D.C.: 0—1—10—50—250.

Resistance in ohms: 0—200,000, 0—20,000, 0—2,000.

The arrangement of the circuit is quite different for each function, and they will be considered separately for the sake of clarity.

Fig. 5 shows the circuit of a typical multi-range D.C. voltmeter. It will be seen that the meter actually reads the amount of current which flows through a known resistance when an unknown voltage is connected across it. The value of the various series resistors (R2 to R6) may be calculated from the formula:—

$$R = \frac{E \times 1000}{I} - R_m$$

where E = Voltage range in volts.
I = Full scale meter current in milliamps.
Rm = Internal resistance of meter in ohms.

Using an 0—1 mA. milliammeter having an internal resistance of 50 ohms, to read full scale at 250 volts the value of the required series resistor would be

$$R = \frac{250 \times 1000}{1} - 50 \text{ ohms} \\ = 249,950 \text{ ohms.}$$

A close approximation would be 0.25 megohm.

Ordinary carbon or metallised resistors may be used in this circuit. It is, however, usually necessary to select those which have the correct resistance, since the majority of such resistors are only guaranteed to be within plus or minus 10% of their rated value. Where high accuracy is desired, together with freedom from temperature error, it is usually necessary to use the more expensive wire wound resistors.

FIG. 5

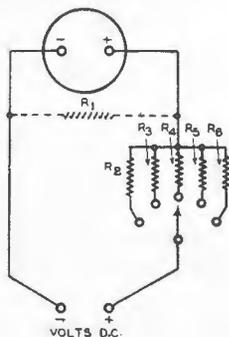


FIG. 6

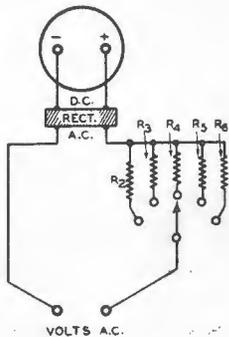


FIG. 7

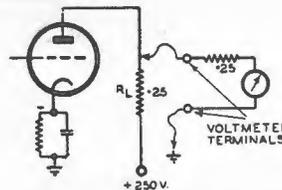
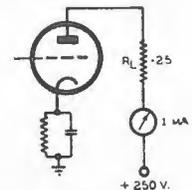


FIG. 8



Figs. 5 and 6 (left) show typical circuits of multi-range d.c. and a.c. voltmeters, respectively. Fig. 7 illustrates how the accuracy of plate voltage measurements in certain circuits is largely governed by the resistance of the meter, while Fig. 8 shows how this voltage can be calculated from Ohm's Law, after the plate current has been measured.

FIG. 9

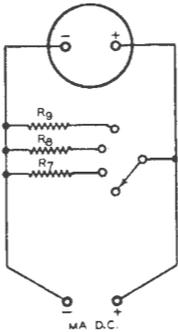


FIG. 10

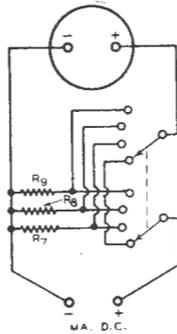


Fig. 9 shows a typical multi-range direct current meter, while Fig. 10 illustrates how errors due to contact resistance in the selector switch can be avoided. (An alternative method is shown in Fig. 11). Fig. 12 shows a popular ohmmeter circuit.

FIG. 11

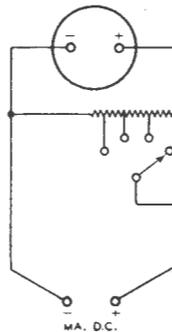
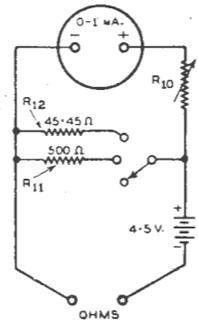


FIG. 12



For the measurement of A.C. voltages, a metal rectifier, usually of the copper-oxide bridge type, is connected directly across the moving coil movement, as shown in Fig. 6, the multiplying resistor being connected in series with the A.C. side of the rectifier.

The A.C. scales of these instruments are calibrated to read directly R.M.S. values of sinoidal voltages and are therefore normally shorter than those for the corresponding D.C. ranges of the same instrument, since the deflection of the moving coil is proportional to the average value of the current passed through it, and also for the reason that the rectification efficiency of the rectifier is less than 100%. The ratio of the R.M.S. value to the average value is known as the Form Factor of the wave-form and for a sinoidal wave-form is equal to 1.11. The scale of a rectifier type meter therefore only indicates R.M.S. values when the wave-form is sinoidal; for non-sinoidal wave-forms, the scale reading is not the R.M.S. value but merely 1.11 times the average value.

The inequality of A.C. and D.C. scale lengths, which would thus occur when the same movement is used for the measurement of both A.C. and D.C. voltages, is usually avoided by reducing the current sensitivity of the movement, when measuring D.C. voltages, by means of a suitable shunt, to

a value in the vicinity of 80% of that for A.C. voltages. For example, if a movement having an initial full scale deflection of 0.8 mA. is used, a resistance (R1 in Fig. 5) can be shunted across the movement to reduce its sensitivity to 1 mA. for D.C. voltages. The meter then has a full scale deflection of 1 mA. for both A.C. and D.C. and as a voltmeter has an internal resistance of 1,000 ohms per volt.

It must be remembered, however, that although the A.C. scales are of equal length to the D.C. scales they do not follow the same linear law but are contracted for small deflections, particularly on the lowest voltage range. On A.C.—D.C. voltmeters, it is customary to find at least three voltage scales, one for all D.C. ranges, one for the lowest A.C. range, and one for all other A.C. ranges.

Importance Of Internal Resistance.

The internal resistance of a voltmeter is a very important factor in its application. Early voltmeters drew from 10 to 20 milliamps. at full scale deflection, having an internal resistance of from 100 to 50 ohms per volt. Such meters were quite satisfactory for testing battery voltages, but are quite unsuited to present-day requirements. Even with meters having an internal resistance of 1,000 ohms per volt, care has to be exercised in their application.

A little thought will show that it

is quite impractical with such a meter to measure accurately the plate voltage of a valve in a circuit such as that shown in Fig. 7. The plate load resistance and the meter resistance form the two arms of a voltage divider and under the conditions shown the plate voltage would always read less than 125 volts. Readings of voltage can therefore only be relied upon when the resistance of the voltmeter (i.e., meter plus series resistor) is very much higher than the impedance of the voltage supply.

Recently multimeters have been released by various firms using a 50 microamp. movement and having for D.C. voltages an internal resistance of 20,000 ohms per volt. Such instruments are extremely useful, but are more expensive and less robust than those employing higher current meter movements.

In Fig. 7 it would be possible to calculate fairly accurately the actual plate voltage by measuring the current flowing in the circuit (see Fig. 8). The voltage drop across RL may then be calculated by applying Ohm's Law.

$$\text{i.e. } E = \frac{I \times RL}{1000}$$

where I = current flowing in mA.
RL = plate load resistance in ohms.

The actual plate voltage is of course the supply voltage minus the drop across the load resistor (RL).

Figs. 13 and 14 show two methods of restricting the range of the zero adjustment in an ohmmeter so that the battery has to be replaced when the voltage has fallen below a certain value. A low-range ohmmeter circuit is shown in Fig. 15.

FIG. 13

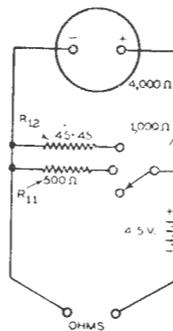


FIG. 14

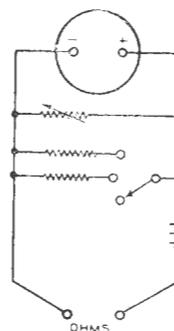
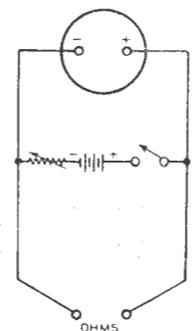


FIG. 15



Multi-Range Milliammeter.

Fig. 9 shows the fundamental circuit diagram of a multi-range direct current meter. The meter test prods are inserted in series with one arm of the circuit in which the current to be measured is flowing.

With the selector switch set to the position shown, all the current would flow through the meter and the instrument would indicate currents within the range of the meter. When it is desired to measure currents of a higher value, resistors are connected in parallel with the meter, and the current flowing is divided between the meter and the shunt, the actual proportion depending on the ratio of the shunt resistance to the meter resistance. For a given current range and meter, the resistance of the shunt may be calculated from the formula:

$$R_s = \frac{I_m \cdot R_m}{I_t - I_m}$$

where

- R_s = Resistance of shunt in ohms.
- R_m = Resistance of meter in ohms.
- I_m = Full scale deflection of meter in mA.

I_t = Desired range of instrument in mA.

Where the meter to be used is an 0-1 mA. milliammeter the formula reduces to

$$R_s = \frac{R_m}{I_t - 1}$$

With a typical meter having an internal resistance of 50 ohms, the value of the shunt for a range of 250 mA. would be—

$$R_s = \frac{50}{250 - 1} = 0.201 \text{ ohm.}$$

The values of shunt resistors are extremely critical and unless adequate facilities for calibration are available, constructors of such instruments are well advised to have the necessary shunts specially made for the actual meter in question.

It will be seen from the circuit diagram that the contacts of the selector switch are in series with the shunt, and considerable error may occur if the contact resistance of the switch becomes appreciable in comparison with that of the shunt.

This trouble may be avoided by re-arranging the circuit as shown in Fig. 10. In this circuit normal variations in switch contacts do not appreciably affect the accuracy of the readings.

An alternative method is to use a "Universal Shunt" as shown in Fig. 11. It will be seen that any additional resistance due to the switch is then in series with the complete circuit and does not affect in any way the ratio of meter current to shunt current. The design of this type of shunt is rather more involved than that of the simple shunt previously described, since for different ranges resistance is added in parallel as well as in series with the meter. The overall resistance of the meter (for a given range) is usually somewhat higher with this arrangement, but is seldom sufficiently high to be important in practice.

The rectifier type meter is not ideal for use as a multi-range alternating current meter. The impedance of the rectifier is subject to considerable variation, and introduces serious complications when used in conjunction with shunt resistances. In the majority of Volt-Ohm-Milliammeters no at-

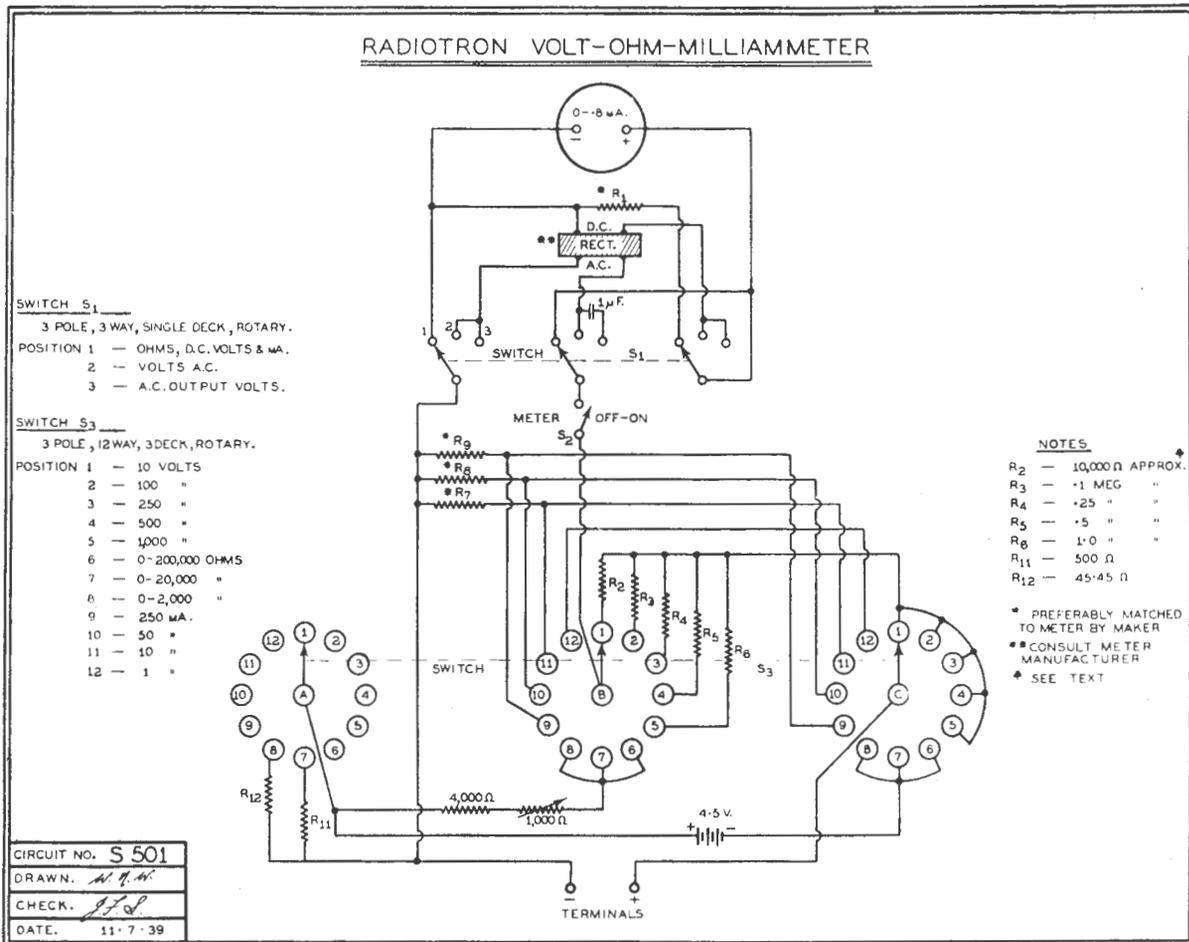


Fig. 16: Complete circuit diagram of a typical volt-ohm-milliammeter, making use of circuits discussed earlier in the text.

Reliable TEST EQUIPMENT



Model
142
Uni-tester

The makers of CALSTAN TEST EQUIPMENT are pleased to announce the release of an addition to their series of push-button-operated multimeters. These multimeters, with other available lines, such as the Calstan 609 Analyser Unit, and units which will be released from time to time, provide the Radio Service Man with a portable testing laboratory, which is not only unique in design and appearance, but above all, LOW in cost. The following outstanding features are typical of all models . . .

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- UNIT CONSTRUCTION THROUGHOUT.
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- EVERLASTING FINGERPROOF PANNELLING.
- AVAILABLE IN SINGLE OR DOUBLE UNITS.
- AVAILABLE WITHOUT CASE, if desired, FOR RACK AND PANEL MOUNTING.
- D.C. Model may be converted to A.C. at later date



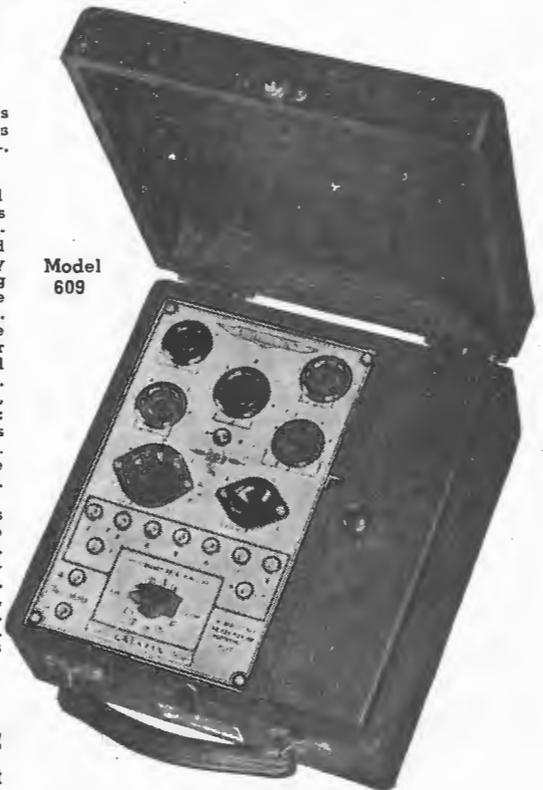
MODEL D141.—A high-grade instrument with similar specifications to 140. Wired for D.C. measurements only, but all necessary provision made for the inclusion of A.C. components at a later date. Price with test prods and full operating instructions. . . . In carrying case . . . £6/2/6. Without case . . . £5/13/6
— With 609 in carrying case, £9/12/6.

MODEL 140.—A high grade push button operated multimeter for the measurement of D.C. Volts, D.C. Milliamps and Ohms. RANGES . . . 1, 10, 100, 500Ma., 10, 50, 250, 500 Volts. 2 Ranges Ohms from internal battery, and extra range available from external 45 Volt battery. Price, complete with test prods and instructions . . . In carrying case . . . £5/15/- . . . Without Case . . . £5/6/-—140 and 609 in case . . . £9/5/-.

MODEL 141.—This instrument has similar specifications to 140 and D141, and is suitable for all A.C. and D.C. measurements. Price with test prods, alligator clips and full operating instructions. In carrying case, £7/15/-. Without case, £7/6/-. With 609, in carrying case, £11/5/-.

MODEL 142 (as illustrated).—Designed for the measurements of practically all components encountered in the Radio, Electrical and sound trades. Incorporates the new "R" type rectangular meter and etched Nickel Silver panel. Unit constructed so as to fall in line with the present and proposed release of standard size instruments. Contains a built-in power supply, which will operate from any A.C. mains in Australia. Will also operate from the Calstan Vibrator unit, enabling country users to make tests by means of a 6-volt accumulator. Although capable of major tests, this instrument occupies no more space than the model 140 multimeter. All tests are read direct on the scale, needing no further calculation. Scale designed to give maximum vision and ease of reading. Available with 609 Analyser unit. With this arrangement the two units form one of extreme flexibility and versatility. The tests and ranges are as follows: Output Volts: 10, 50, 250, 1,000. Decibels: Minus 18 to Plus 43. A.C. Volts: 10, 50, 250, 1,000. D.C. Volts: 10, 50, 250, 1,000. D.C. Milliamps: 1, 10, 50, 250. Ohms: 25 Ohms to 10 Megohms. Inductance: 0.2 Henry to 200 Henries. Capacity: 0.0025 Mfd. to 50 Mfd. Impedance: 5 Ohms to 1 Megohms. Electrolytics: 10, 25, 250. Volt types showing condition on scale. Supplied with all necessary leads and operating instructions. Prices: In portable case, £12/12/-. Without case, £12/2/6. With 609, in dual portable case, £15/15/-.

Model
609



MODEL 609 (as illustrated).—A high-grade Analyser Selector Unit, which enables the 140 series of multimeters to be used to best advantage. Incorporates these features: All R.M.A. numbering permanently etched in the Finger-Proof panelling. This being a great time-saver, and enables the operator to cope with the ever-increasing types of valves and subsequent alterations to the base designations. Rapid Selection of the circuit under test is accomplished by means of a rotary switch, thus eliminating the necessity for shifting the numerous wires with every test made. Price . . . with all necessary wires, adapters and instructions. In carrying case . . . £3/5/0 — without case . . . £2/15/0. For prices with multimeters . . . see prices on multimeters.

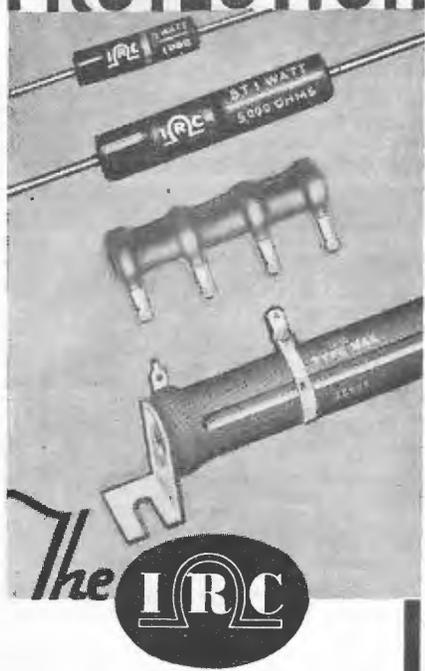
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FIG. 17

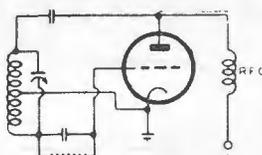


FIG. 18

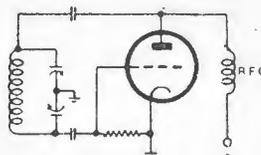
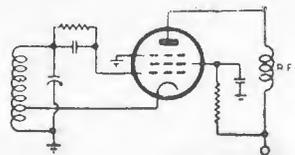


FIG. 19



Figs. 17, 18 and 19 show, respectively, the Hartley, Colpitts and electron-coupled oscillator circuits.

tempt is made to provide facilities for measuring alternating currents since this is rarely required in service work.

The ability to measure the amount of resistance in a circuit is a very important function of a Volt-Ohm-Milliammeter. Extreme accuracy, although desirable, is by no means essential, as in most cases the operator is only concerned with the order of the resistance (say within 10%) rather than with the exact value.

Simple Ohmmeter Circuit.

Fig. 12 shows a very popular ohmmeter circuit using an 0—1 mA. milliammeter and a 4.5 volt battery.

With the switch set to the position shown, the resistor R10 is adjusted to approximately 4,500 ohms, so that when the test points are shorted a current of 1 mA. will flow and cause full scale deflection of the meter. When resistance is introduced between the test points the current flowing is reduced and the meter shows less than full scale deflection.

By suitable calibration of the meter scale it is possible to read off directly the value of the inserted resistance. With this arrangement the meter indicates values of resistance between approximately 100 and 100,000 ohms.

In Fig 12 the meter may be regarded as a voltmeter, the deflection of which depends on the voltage drop developed across the unknown resistance by the local battery. For lower ranges of resistance, it is necessary to arrange for higher currents to flow through the unknown resistance in order to increase the voltage drop developed across it. With the 500 ohm resistor switched into circuit, the maximum current is 10 mA. and the range of the meter 10 to 10,000 ohms. With the 45.5 ohm resistor, the range becomes 1 to 1,000 ohms and the short circuit current 100 mA.

The current should always be considered when measuring resistors. If the unknown resistor is incapable of passing the ohmmeter current, some other form of measurement should be employed.

The use of a more sensitive meter movement (e.g., a 50 microamp. type) simplifies matters in that very much smaller currents can be used. In addition, it is possible with such a meter to measure very much higher values of resistance for a given supply

voltage. To extend the range of an ohmmeter using an 0—1 mA. milliammeter it is necessary to use higher battery voltages.

In the circuit shown in Fig. 12 considerable error occurs when the resistance of the battery becomes excessive due to age. In practice, it is wise to restrict the range of the zero adjustment so that the battery has to be replaced when it has fallen below a certain value, two methods by which this may be done being shown in Figs. 13 and 14.

For low ranges where the resistances are comparable to the internal resistance of the meter, it is possible to arrange the circuit as shown in Fig. 15. This arrangement possesses the advantages that the readings are not affected by variations in battery voltage and that the current flowing through the unknown resistor is small. The circuit, however, involves extra switching and the use of an extra resistance scale on the scale card.

Typical Multi-Meter Circuit.

Fig. 16 shows the complete circuit diagram of a typical Volt-Ohm-Milliammeter, making use of circuits which have been already discussed.

The various ranges are selected by means of two multiple switches shown as S₁ and S₂. These switches greatly simplify the operation of the instrument and are not expensive.

Provision has been made for the measurement of A.C. output voltage, for use when aligning receivers. The output voltage may be measured between the plate of the output valve and chassis (earth), or between plate and B positive. The latter connection is to be preferred both to guard against breakdown in the series condenser, and to avoid the condenser charging current flowing through the meter each time the circuit is closed.

The capacitance of the condenser should be as high as possible, in order that its reactance at the test frequency will be small in comparison with the total resistance of the voltmeter and series resistor. A value of 1 mfd. capacitance is normally satisfactory and a condenser having as high a leakage as possible should be used.

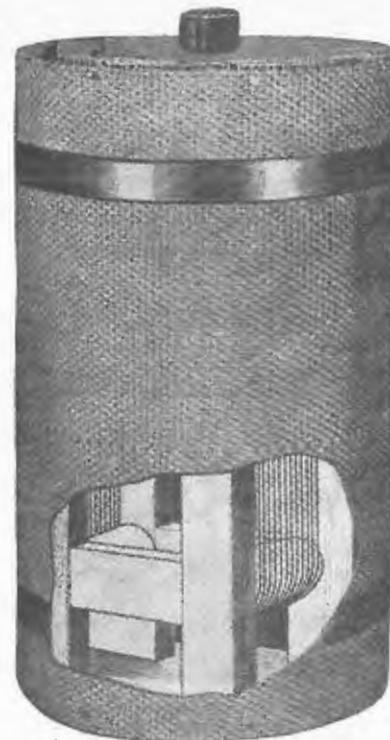
(Continued on page 24).

Fig. 1: The appearance of the completed assembly of the Faraday-shielded broadcast loop aerial, popularly known as the "Beam-A-Scope."

Beam - A - Scope Noise - Killer Aerial

This Faraday-shielded loop aerial for broadcast reception provides excellent signal pick-up, and reduces electrical interference to a minimum.

By **DON B. KNOCK**
Radio Editor "The Bulletin."



MANY years ago broadcast radio receivers were dependent upon more than a reasonable amount of signal gain from the aerial itself, for the reason that valve gain was low. A few feet of wire around a picture-rail was unthinkable as an aerial, and the receivers of those days sported large-diameter tuning coils, including the aerial coupler, which was tuned with the aerial to resonance at the signal frequency. The aerial itself was as high as possible, and not less than 100 ft. long. Even in the light of present-day achievement, remarkably good results

were obtained, but as radio has progressed, valves give r.f. and audio amplification to spare with receivers of compact dimensions. Coils are no longer 3 in. in diameter; they are of the iron-cored type, in small screening cans. With all this, the aerial coupler is, pro rata, a very inefficient part of the modern receiver, but it serves the purpose, because the receiver itself makes up the deficiency. Years ago the loop or frame aerial was popular, when the early superhets made an appearance and such gadgets formed an unsightly affair placed on top of coffinlike cabinets. They had advantages, however, as they contributed to selectivity by reason of directivity, the early superhet being quite inselective inherently.

In U.S.A. the Gernsback publication, "Radio-Craft," recently introduced an interesting and obviously very efficient adaptation of the old loop in modern form, naming it the "Beam-a-scope," and the idea is well worth consideration, both experimentally and commercially. It involves the application of the Faraday-shield principle to a loop aerial for broadcast reception.

The aerial problem is acute with most broadcast receivers used in metropolitan areas, for the reason that plain aerials will pick up unwanted electrical noise and outside interference. Much of the electrical

disturbance created in and around the home is conducted through the electric-light wiring, and radiates to the aerial and lead-in. This Faraday-shielded loop is designed to reduce such noise to a minimum, if not completely eliminate it. The directional characteristics of a loop aerial is one of the properties used for noise-reduction in this method. This is done by so orienting the loop that the principal source of noise is in the direction of zero response of the loop. In addition to this, however, the loop is surrounded by an electrostatic shield, thus eliminating the capacity between loop and earth. By this means noise which would otherwise be picked up in the earth-return path of the aerial is eliminated.

Construction.

The electrostatic shield around a loop aerial in this scheme is cylindrical in form, as shown in Fig. 1,

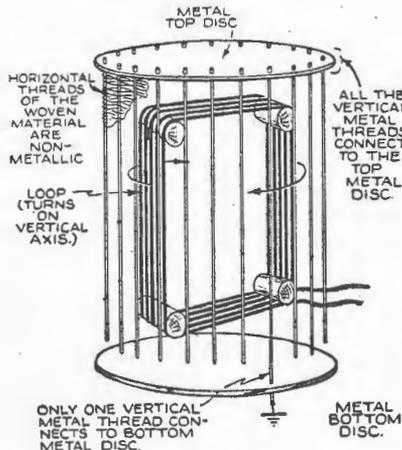


Fig. 2: Explaining the function of a shielded aerial system.

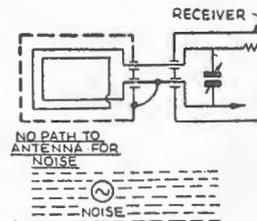


Fig. 3: A skeleton illustration of the construction.



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Complete harmony and the utmost enjoyment from radio entertainment during the Christmas season . . . is yours when worn valves are replaced

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THE WORLD'S
STANDARD
RADIO VALVES



To Destroy
"TONE BOGEY"
Re-valve with
RADIOTRONS
The valves in the sealed cartons

the ends being two metal disks. The side consists of a woven material in which the vertical threads are metallic. All vertical threads make contact with the top disk, but only one of the threads makes contact with the bottom disk. In this way there are no closed conducting circuits parallel to the loop, so that the Q or efficiency of the loop is not impaired, and the magnetic pickup of signals is still possible. Ordinarily, the sensitivity of a loop would be small, but in this construction the sensitivity of a normal indoor aerial is retained because the loop is tuned. Since the loop size is determined in the design of the receiver, the condenser tuning it can be ganged with the condensers tuning r.f. and oscillator sections. Besides the noise-reduction obtainable with this development, there is also the practical advantage that no external aerial or earth connection is necessary with the receiver. The "Beam-a-scope" is designed solely for use on the broadcast wave-lengths, and no noise-reduction properties are claimed for it on the short-wave bands. Fig. 1 is an illustration of the completed assembly; the circuit of Fig. 2 shows how it functions, and Fig. 3 is an exaggerated outline of the principle of construction. In use, the unit is placed under the chassis shelf in a console cabinet.

Service Equipment (2).

(Continued from page 22).

MODULATED OSCILLATORS.

Since the almost general adoption of superheterodyne receivers a satisfactory modulated oscillator has become an essential part of a serviceman's equipment. The performance of a superheterodyne receiver depends very much upon accurate alignment of the various tuned circuits, and many such receivers which have been in continuous use for a number of years will be found to be in need of alignment. While it is possible for one with experience to check roughly the adjustment of a receiver by using normal broadcast stations, it is nevertheless a fact that accurate alignment can only be carried out when a modulated oscillator and an output meter are available.

For service work, an oscillator should be capable of producing signals modulated at 30% or thereabouts, at all commonly used intermediate frequencies, and over the normal broadcast and short-wave bands.

Early superheterodyne receivers on the Australian market used an intermediate frequency of approximately 175 kc. In recent years the majority

of manufacturers have standardised on frequencies in the vicinity of 465 kc., although quite a number use 252 kc. The broadcast band extends from 550 to 1600 kc. and the short-wave bands from approximately 3 to 23 m.c. (i.e., 100 to 13 metres).

In early types of modulated oscillators the various bands were selected by means of plug-in coils. With such an arrangement it is possible at any time to extend the frequency range of the oscillator by the simple expedient of winding additional coils. The method, however, lacks convenience of operation and has been discarded to a large extent in favour of band-switching.

A very flexible oscillator can be constructed by combining both methods and so arranging the band selector switch that at one position it connects to a valve socket, which can be used for additional plug-in coils.

When band-switching is used, the selector switch should preferably be equipped with a shorting ring so arranged that the coils not in use are shorted out. The presence of mutual coupling between used and unused coils is frequently the cause of severe variation in oscillator amplitude at various points in a band.

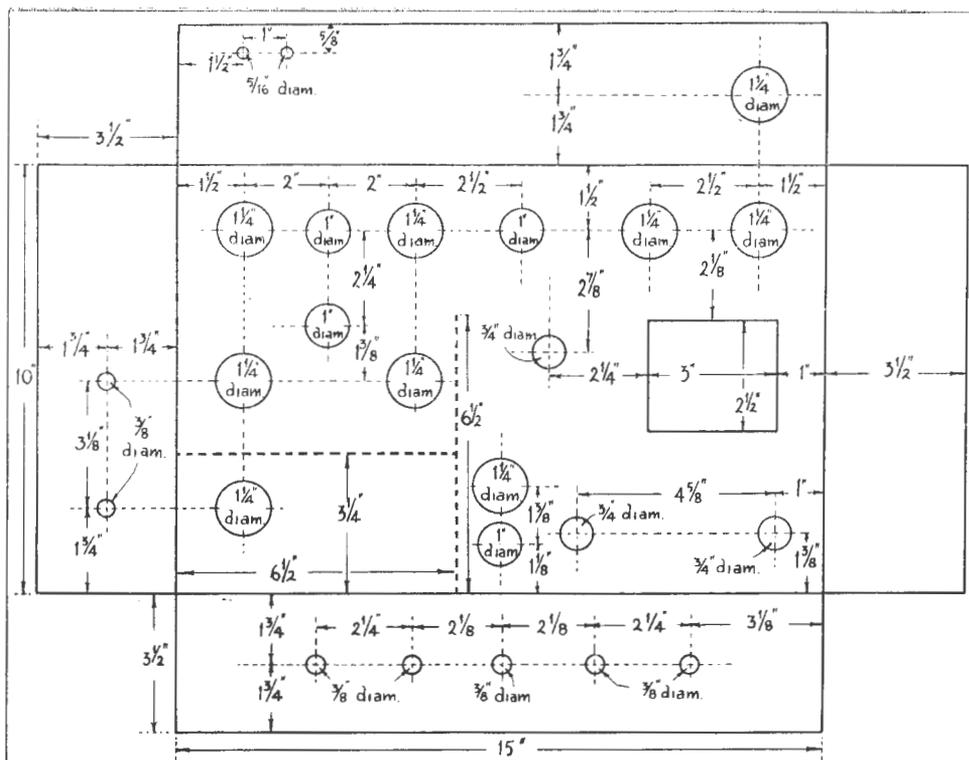
Fundamentals Preferable To Harmonics.

In a number of small oscillators, high-frequency coverage is obtained by utilising the harmonics from the lower frequency bands. The scheme, apart from its cheapness, has little to recommend it since the harmonics are usually so numerous and so alike that identification and hence calibration is extremely difficult. In addition, the strength of the harmonics varies considerably from that of the fundamental, and even approximate calibration of output voltage is impractical.

The accuracy of the frequency calibration should be as high as possible, consistent with cost and weight. In this connection, mechanical design is of prime importance. The chassis should be robust and the design and mounting of the tuning condenser such that it will not alter its capacitance with normal wear, with stresses from the tuning dial, or even with slight warping of the chassis. Tuning coils should be impregnated to prevent movement of turns or moisture absorption and connections wherever possible made with heavy gauge busbar. The high-frequency oscillator should not be made to cover too wide a frequency range in the high frequency bands, as under such conditions, the setting of the tuning condenser becomes increasingly critical and the error due to mechanical failure correspondingly greater.

(Continued on page 39).

Dimensions for preparing the chassis for the "Air-Scout Communications Six" are given alongside, while the sketch below shows the method of winding the plug-in coils. Details of wire gauges and turns are given in the panel.



"Air-Scout Six."

(Continued from Page 16)

note particularly that all by-pass condensers and de-coupling resistors should be mounted as closely as possible to the points they are intended to de-couple. Otherwise their effect will be largely nullified, and instability will result.

To ensure short, direct wiring and plenty of space for pig-tail components around the various valve sockets, it is suggested that third or half-watt carbon resistors be used, except for the 350-ohm bias resistor for the 42, which should be either a one watt or a wirewound resistor.

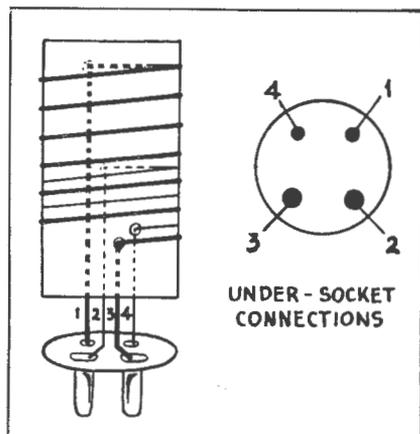
Winding The Coils.

Four pairs of 4-pin plug-in coil formers are required to cover the 10, 20, 40 and 80-metre bands, continuous coverage with plenty of overlap being provided. The band-setters are 160 mmfd. Raymarts and the band-spreaders, 40 mmfd. If desired, the capacity of the band-setters can be reduced to 100 mmfd, these condensers being available in the R.C.S., Radikes and Raymart brands.

Details regarding the number of turns, wire gauges, etc., are given in a separate panel, a sketch also being included showing the method of wind-

ing and connections. As both aerial and oscillator coils are wound similarly on 4-pin formers, it is a good plan to label each coil on a circular piece of cardboard glued inside the top of the former to permit of easy identification.

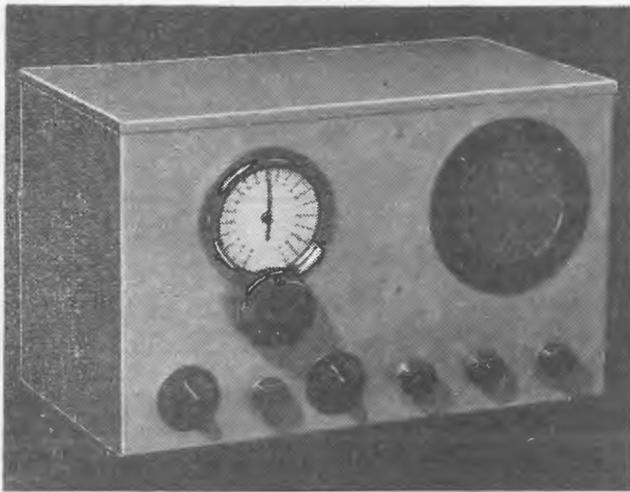
In operation, the audio and i.f. gain controls are turned full on, and the band-setters adjusted until resonance is obtained. For c.w. work, and for easy location of broadcast stations, the beat frequency oscillator can be switched on, the best note being obtained by varying the b.f.o. note control.



"AIR-SCOUT COMMUNICATIONS SIX"—Coil Data.

Band	Aerial Coil		Oscillator Coil		Winding Length
	Pri.	Sec.	Sec.	React.	
10m.	3	3 3/4	3 3/4	3	5/8"
20m.	6	6 3/4	6 3/4	6	7/8"
40m.	8	14 1/4	14 3/4	8	1 3/4"
80m.	10	31	34	12	close-wound

All primary and reaction windings inter-wound at lower ends of secondaries with 28-gauge enam. Wind 10, 20 and 40-metre secondaries with 18 ga. en., 80-metre secondaries with 24 ga. enam. See coil sketch for connections.



The completed receiver is housed in an aluminium cabinet measuring 16" long x 10" high x 9" deep. Lower front panel controls are, left to right, oscillator band-setter, first detector regeneration control, aerial band-setter, audio gain control, second detector regeneration control, and combined tone control and on/off switch.

The Vulcan Shortwaver

Five 1.4-volt valves are used in this battery-operated shortwave superhet. Cheap both to build and operate, it brings in plenty of world-wide DX on the short waves. . . . An Australian version of an American design.

IN the October issue of "Radio World," an advance review was given of the "Vulcan Shortwaver"—actually an Australian version of a five-valve battery superhet featured in the American magazine, "Radio News." The several minor modifications mentioned have now been completed, and the receiver is giving first-class results, a particularly attractive feature about it being its quietness in operation, despite the fact that its sensitivity is such that it will bring in shortwave stations all over the world at full speaker volume.

Circuit Modifications.

The circuit modifications are as follows:—The oscillator grid leak "R4" has been connected across the

grid condenser instead of being returned directly to the negative side of the oscillator filament, which is earthed. Secondly, to give higher and more even oscillator output across every band, the oscillator winding has been inter-wound with the secondary instead of being put on close-wound below it, while the .00005 mfd. coupling condenser (C7) to the first detector has been replaced by a 35 mmfd. mid-gate mica trimmer, which is adjusted for best results.

Thirdly, the "B+" lead to the audio coupling choke in the plate circuit of the 1N5G second detector has been decoupled, using a 50,000 ohm resistor and .1 mfd. by-pass condenser. As well, the 1A5G output pentode originally specified has been replaced by a

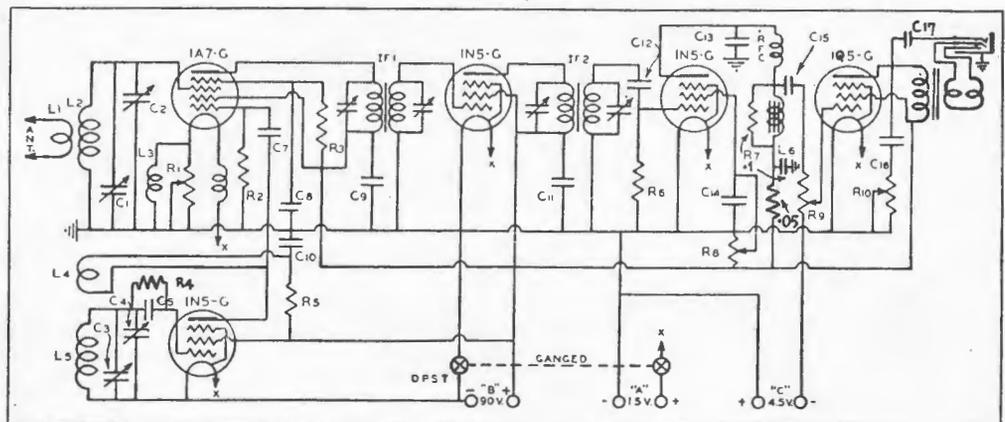
1Q5G to permit of speaker operation. The latter valve is a beam output pentode, and while the plate and filament currents are a little heavier, it is more sensitive and gives much more output than the 1A5G. However, if headphone operation only is wanted, the latter valve can be retained without any circuit changes.

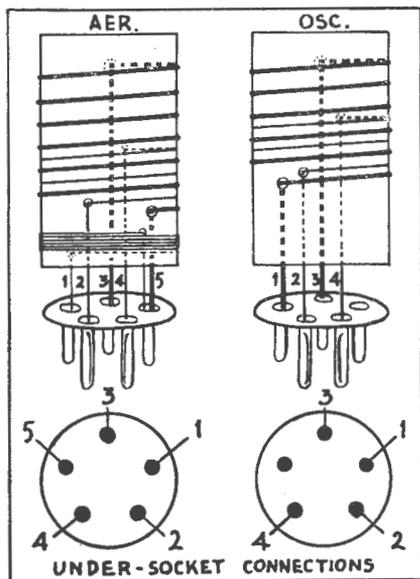
Second Detector Regen. Omitted.

Lastly, it will be noticed that regeneration on the second detector has finally been omitted, though the potentiometer "R8" giving variable control of the second detector screen voltage has been retained.

Regeneration was omitted here for two reasons. In the first place, it necessitated a special three-winding

Circuit of the "Vulcan Shortwaver" which uses a 1A7G first detector, 1N5G separate oscillator, 1N5G i.f. amplifier, 1N5G second detector and 1Q5G output pentode.





i.f. transformer, which is expensive, while, secondly, using standard R.C.S. high gain iron-core i.f. transformers, i.f. gain is very high. Actually, because no special precautions in the way of decoupling the "B+" leads to the i.f.'s—or shielding the r.f. valve—have been taken against it, there is a certain amount of regeneration present without any deliberate attempt being made to introduce it. This regeneration is controllable by "R8," which also becomes an auxiliary gain control as well.

The present arrangement gave such excellent results that it was finally adopted as permanent. However, experimenters wanting to use comparatively low-gain i.f. transformers can introduce regeneration if desired, complete details being given on page 25 of the October "Radio World."

Chassis And Panel Details.

The receiver is built on an aluminium chassis measuring 16" x 9" x 3," and is enclosed in an aluminium cabinet 10" high overall. The above-chassis partition running at right angles to the front panel is 9" from the left-hand end, while the partition separating the aerial and oscillator tuning circuits is located midway between the front and rear walls of the cabinet.

A refinement that is not essential, but that ensures minimum losses, is the use of Raymart ceramic sockets for the aerial and oscillator plug-in coils and for the 1N5G oscillator and 1A7G first detector.

"VULCAN SHORTWAVE FIVE"—Coil Data.

Band	Aerial Coil			Oscillator Coil			Winding Length (secs.)
	Pri.	Sec.	React.	Sec.	React.		
10m.	3 1/4	4 3/4	4 1/4	4 3/4	4 1/4	5/8"	
20m.	5 1/4	10 1/4	6 1/4	10 3/4	6 1/4	1"	
40m.	6 1/4	15 1/4	8 1/4	15 3/4	7 1/4	1 1/2"	
80m.	10 1/4	31 1/4	13 1/4	33 3/4	12 1/4	close-wound	

Aerial primary and oscillator reaction windings are inter-wound at lower end of secondaries with 28en. Aerial reaction windings are put on below secondaries (1/8" between windings), close-wound with 28 en. Wind 10, 20 and 40-metre secondaries with 18 ga. enam., 80-metre secondaries with 24 ga. enam. See coil sketch for connections.

The 160 mmfd. band-setters are Raymart, though those wishing to use R.C.S. or Radiokes midget variables here can substitute the 100 mmfd. type, which is the maximum capacity available in these brands. The band spreaders are 40 mmfd. midget variables. Standard R.C.S. iron-cored transformers were used, and were found entirely satisfactory, though those wanting the last ounce of gain can substitute the more expensive permeability-tuned type.

The Assembly Outlined.

The assembly of the receiver is commenced with the mounting of the

five valve and two coil sockets on the aluminium chassis. Next, the aerial and earth terminals can be mounted, followed by the battery socket, i.f. transformers and audio choke.

The main portion of the wiring is now put in—before the band-setters are mounted or the aluminium cabinet bolted in position. Particular care must be paid to the wiring of the first detector and oscillator sections of the receiver. Rigid, well-spaced wiring is essential here, 16 or 18-gauge tinned copper wire covered with spaghetti being recommended.

(Continued on page 39)

"THE VULCAN SHORTWAVE"—

List of Parts.

- | | |
|--|--|
| 1 aluminium chassis, panel and cabinet to specifications (Acorn). | 1 35 mmfd. midget mica trimmer (R.C.S., Radiokes type MEC). |
| 5 octal, 2 5-pin, 1 6-pin wafer sockets. | |
| 1 vernier tuning dial (Raymart). | FIXED RESISTORS: |
| 10 5-pin coil formers. | 2 50,000 carbon resistors (I.R.C.). |
| 2 indicator plates (Raymart). | 1 70,000 carbon resistors (I.R.C.). |
| 2 iron-core 465 k.c. i.f. transformers (R.C.S., Radiokes). | 1 100,000 carbon resistors (I.R.C.). |
| 2 pointers (Raymart). | 1 200,000 carbon resistors (I.R.C.). |
| 2 r.f. chokes (see text). | 1 250,000 carbon resistors (I.R.C.). |
| 4 knobs. | 1 3 megohm carbon resistors (I.R.C.). |
| 2 terminals, 'A' and 'E.' | FIXED CONDENSERS: |
| 1 closed circuit 'phone jack and plug. | 1 .0001 mfd. mica (T.C.C.). |
| 1 pair headphones (S.T.C.). | 1 .00025 mfd. mica (T.C.C.). |
| 1 high impedance audio frequency choke (R.C.S., Radiokes). | 1 .001 mfd. mica (T.C.C.). |
| 2 40 mmfd. midget variable condensers (R.C.S., Radiokes, Raymart). | 1 .01 mfd. tubular (Ducon). |
| 2 160 mmfd. midget variable condensers (Raymart). (Alternatively, 4 .0001 mfd. midget variables can be used, two for hand-spreaders and two for band-setters; see text.) | 1 .05 mfd. tubular (Ducon). |
| 1 coupler for ganging 2 40 mmfd. variables. (Raymart). | 5 .1 mfd. tubular (Ducon). |
| 1 2,500 ohm potentiometer (R.C.S., Radiokes). | 1 .5 mfd. tubular (Ducon). |
| 1 50,000 ohm potentiometer (R.C.S., Radiokes). | 1 1 mfd. tubular (Ducon). |
| 1 .5 megohm potentiometer (I.R.C.). | VALVES: |
| 1 1 megohm potentiometer with switch (I.R.C.). | 1 1A7G, 3 1N5G, 1 1Q5G. (Brimar, Radiotron). |
| 1 yard 6-wire battery cable. | SPEAKER: |
| 4 1.4 volt valve shields. | 1 5in. P.M. dynamic speaker, input transformer to match single 1Q5G (Rola, Amplion). |
| | BATTERIES: |
| | 2 45 volt Superdyne "B" batteries (Eveready). |
| | 1 1.5 volt "A" battery (Eveready X250). |
| | 1 4 1/2 volt "C" battery (Eveready). |
| | MISCELLANEOUS: |
| | Small quantities of 18, 24, and 28-gauge copper wire for winding coils; 4 midget grid clips; nuts and bolts; solder tags; hook-up wire; 2 feet of earthing busbar. |

What's New In Radio

Palec Test Equipment Catalogue.

"Palec Testing Equipment" is the title of a new two-colour catalogue on art paper just released by Paton Electrical Pty. Ltd., of 90 Victoria St., Ashfield, N.S.W.

Latest Palec test instruments of all types are listed and illustrated, including multi-purpose meters, volt-ohm-milliammeters, all-wave oscillators, valve and circuit testers, oscillographs and moving coil and moving iron meters.

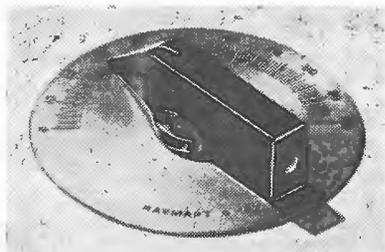
Copies of this catalogue, which is well illustrated throughout, are available on request from the above address.



Latest Raymart Shortwave Components.

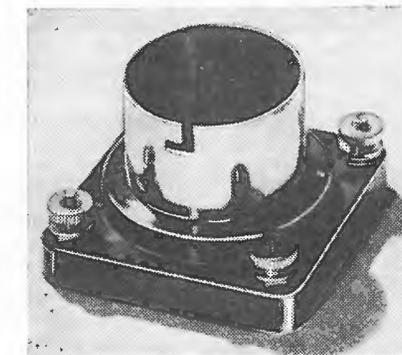
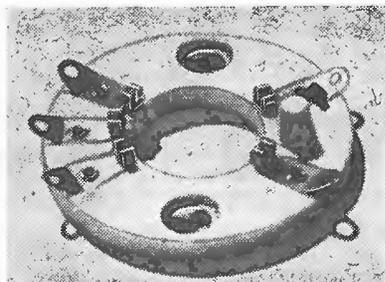
Four new Raymart components for which stocks are available from Messrs. John Martin Pty. Ltd., of 116 Clarence St., Sydney, comprise a new type TSS 0-100 indicator plate, type IL panel indicator, type VAA acorn socket and type VB4 American transmitting valve socket.

The indicating dial is in nickel silver, and is 3" in diameter, with black



engraved scale reading from 0-100. It is supplied complete with pointer as illustrated.

The Raymart acorn socket shown below will fill a long-felt need among



experimenters, as it is the first of its kind on the Australian market. The insulation is of frequentite, ensuring negligible losses even on the ultra-high frequencies, while heavy spring copper contacts ensure positive connections.

The panel indicating lamp is designed to take a standard pilot bulb. Designed for one hole mounting, the holder is fitted with a coloured glass jewel available in either red or green.

The socket is an American type intended for transmitting use for valves such as the 866, 210, 250, etc. As well, it is also suitable for use in large public address and talkie amplifiers using the valves mentioned.

Further details of these and other Raymart lines available—and they now comprise a very complete range—are available to "Radio World" readers from the address given above.

Frequentite insulation is a feature of the Raymart acorn socket (left). On the right is the new Raymart panel indicating lamp, available with red or green glass.

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

New Velco Senior Portable.

Several months ago Messrs. A. J. Vealls, of Melbourne, announced the release of their "Velco Midget Portable Four," a compact four-valve model with built-in speaker, weighing only 11 pounds, complete with batteries.

A larger model is now announced, known as the "Velco Senior." A five-valve receiver designed for broadcast band operation, it is completely self-contained, using standard type portable batteries. As well, an additional power pack unit is available, enabling the receiver to be run from the a.c. mains for home use, thus greatly extending its utility.

The carrying case measures 13" long x 9½" deep x 6½" wide, and is covered with "airway" canvas. Weight, complete with batteries, is 15½ lbs., and the price is £18/10/- (midget model, £14/10/-).

This receiver is marketed in Melbourne by A. J. Vealls (490 Elizabeth St.) and in Sydney by Vealls Agencies (127 York St.), to whom all inquiries should be directed.

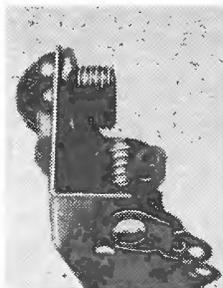


The A.R.R.L. Antenna Book.

The last American mail brought a review copy of the latest A.R.R.L. publication—"The A.R.R.L. Antenna Book." While, of course, there are now no amateurs on the air in Australasia, there will no doubt be many who will find much to interest them in this new handbook.

Comprising eighteen chapters, and profusely illustrated throughout, the book covers the theory and practice of all types of antennas used by the amateur, and outlines the construction of masts and rotating mechanisms.

(The "A.R.R.L. Antenna Book," by George Grammer and Byron Goodman, published by The American Radio Relay League, West Hartford, Connecticut, U.S.A. Our copy direct from the publishers).



NEW UNI-TESTER SERIES OF CALSTAN INSTRUMENTS

Available in Unit Form

A COMPLETELY new series of service instruments—compact and of standard size and uniform panel design—is being released by Slade's Radio Pty. Ltd., of Lang Street, Croydon, N.S.W.

This new Calstan Uni-Tester series will comprise multi-testers, all-wave oscillators, valve checkers, analyser selector units, vibrator units—in fact, every type of instrument that a serviceman could possibly require in a workshop laboratory.

Features common to every model are:—New full-size rectangular meter; unit construction throughout; foolproof push-button operation; everlasting fingerproof panelling; available in single or double units; available without case, if desired, for rack and panel mounting. To date, six instruments have been released, as follow:—

Uni-Tester Model 140 is a push-button operated multi-meter with current ranges of 0-1-10-100 and 500 m.a., voltage ranges of 10, 50, 250 and 500 volts, and two resistance ranges. The sensitivity of this instrument is 1,000 ohms per volt.

Uni-Tester Model 140A is identical with the above instrument, except that it uses a meter movement with a sensitivity of 20,000 ohms per volt.

Uni-Tester Model 141 has similar specifications to the 140, with the addition that voltage ranges as quoted are available for a.c. measurements as well.

Uni-Tester Model 141A is identical with the Model 141 except that its sensitivity is 20,000 ohms per volt.

Uni-Tester Model 142 is an a.c./d.c. multimeter with standard current, voltage and resistance ranges. As well, this instrument will measure output volts (five ranges to 1,000), decibels from -18 to +43, inductances from .2 henries to 200 henries, capacity from .0025 mfd. to 15 mfd. and impedance from 5 ohms to 1 megohm. As well, the condition of 10, 25 and 250-volt type electrolytic condensers is shown directly on the scale.

This instrument uses the new Calstan "R" type rectangular meter, fitted with a large finely-engraved scale, while the 9" x 5½" nickel silver panel is very attractively etched in green and black.

Uni-Tester Model 609 is a high-grade analyser selector unit designed to enable the 140 series of multi-meters reviewed above to be used to the best advantage. RMA numbering is used, permanently etched in the finger-proof panel.

All these instruments can be supplied in standard-size leatherette-covered portable cases. Alternatively, if they are intended for shop installation, a framework in heavy gauge crystalline-finished steel, measuring 11" high x 7½" wide x 6" deep can be supplied instead. This framework has been designed so that any number of instruments may be bolted horizontally or vertically as desired.

Models For Release Shortly.

Intended releases in the "Uni-Tester" series comprise the Model 308 all-wave oscillator. This instrument uses the new 1.4-volt 1D8GT diode triode pentode, thus greatly minimising both "A" and "B" battery consumption, as well as space. The pentode section is connected as



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electron-coupled oscillator, and the triode section as modulator. Battery equipment comprises an Eveready "U2" cell for "A" supply, and a Type Q37 midget 45-volt "B" unit. The instrument covers five bands, including all useful fundamental frequencies from 150 k.c. to 15 megacycles (below this, harmonics can be used).

Also planned for early release is the Model 309 a.c.-operated all-wave oscillator, and the Model V11 vibrator

unit, designed for operating all unit-constructed a.c. instruments in the Calstan "Uni-Tester" series, as well as a.c. instruments in other makes.

Readers requiring further information on the test equipment reviewed above are asked to direct their enquiries to Slade's Radio Pty. Ltd., 61a Lang St., Croydon, N.S.W.

Latest Rola Price List.

A new pamphlet has just been issued by the Rola Company (Aust.) Pty. Ltd. showing prices and abridged specifications of Rola speakers as at October 16 last. Data is given on eight electro-dynamic and twelve permanent magnet type speakers, ranging from 5" to 12½" in overall diameter, illustrations being included of twelve different types.

Technical details given include overall and voice coil diameters, voice coil impedance and normal field excitation.

Copies of this pamphlet are available free on request from the Rola Company (Aust.) Pty. Ltd., The Boulevard & Park Ave., Richmond, E.1, Victoria, or from the Sydney branch office at 116 Clarence Street.

New I.R.C. Catalogue.

A copy of a new catalogue of I.R.C. products has been received from the sole distributors for Australia, Messrs. W. J. McLellan & Co., Bradbury House, 55 York St., Sydney. The catalogue has been divided into three sections, covering volume controls, metallised resistors and wirewound resistors.

The first section gives complete data on the type "CS" volume control, which is obtainable in resistance values from 100 ohms to 10 megohms, and in eight standard tapers. Switches that can be supplied comprise the standard "SPST," with the special "SPDT" and "DPST" types as alternatives. Data is also included on the type "W" wirewound potentiometer, available in values from 5

to 10,000 ohms. Switches for these can be supplied as specified above.

The second section deals with I.R.C. metallised resistors, types BT, F, MP and MV.

I.R.C. power wirewound resistors, both fixed and adjustable, and in sizes for every electrical and radio requirement, are covered in the third section. Wound on ceramic forms and fitted with tinned steel or metal alloy terminals and chromium-plated brackets, these resistors are available in three types of coatings to meet all requirements.

Copies of the above catalogue will be sent free on request to those in the trade writing W. J. McLellan & Co., Bradbury House, 55 York St., Sydney.

VEALLS OFFER THE COMPLETE

Parts for the

PICNIC FOUR

FOR ONLY **£10-10-0**

The Picnic Portable Four incorporates every worthwhile feature in portable receiver construction and yet the cost is only trifling. Order a kit of parts from Vealls to-day—build one in an evening or two and take advantage of the early summer . . . You can take a Picnic Portable Four with you . . . anywhere. (A Velco kit of parts is also available for the "Loop Portable Three" described this month. Write for quotation).

THE VULCAN SHORTWAVER.

See the complete constructional details in this issue. Complete kit of parts £16/16/-.



The Fastest Mail Order in Australia

Vealls offer a choice from the most comprehensive radio and electrical stocks in Australia, plus a rapid same-day service, with individual, expert attention to all orders, big or little. Get the habit—try Veall's first.

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Letters to Box 2135, G.P.O., Melbourne.
490 Elizabeth St., 168 and 243 Swanston St., Melbourne;
299 Chapel St., Prahran; 5 Riversdale Rd., Camberwell;
99 Puckle St., Moonee Ponds. F 3145 (6 lines).



Fast-Selling "4/5" Uses Radiokes Dual-Wave Tuner.

Shown above is a standard mantel model 4/5 dual-wave receiver recently marketed in Sydney, which uses the well-known Radiokes type DAU-1 dual-wave coil unit and trolitul air-cored i.f. transformers.

The station-calibrated, multi-coloured dial, in conjunction with the walnut-veneered cabinet in which the set is housed, combine to make a particularly attractive receiver which is enjoying excellent sales.

The receiver is assembled on a chassis measuring 13 x 6 $\frac{1}{4}$ x 2 $\frac{1}{2}$ inches, full-size first-grade components being used throughout. The valves chosen comprise a 6K8G mixer oscillator, 6U7G i.f. amplifier, 6G8G second detector and first audio amplifier, 6F6C output pentode and an 80 rectifier. There are three controls—volume, wavechange and tuning.

A standard circuit is used, ensuring performance comparable with any other 4/5 on the market. Tone particularly is very good, this being no doubt largely due to the solidly-built wooden cabinet and the use of a 6" Rola speaker.

Mr. R. K. Stokes, managing director of Radio Suppliers Pty. Ltd., Wingello House, Angel Place, Sydney, advises that in view of the excellent all-round performance of this particular receiver, plans are being made to market it in kit-set form. Readers are invited to write re further particulars, including trade discounts, etc., to the address given above.

New S.T.C. Branch In Lismore Will Serve North Coast And Tablelands.

In order to achieve more efficient and more intensive distribution in the North Coast and Northern Tablelands territories, a new S.T.C. branch will open in Lismore early in December, when commodious new premises in Magellan Street will be ready for occupation.

For a long time it has been felt that S.T.C. business in Northern New South Wales has become far too large to be satisfactorily handled from Sydney—500 miles away or more, particularly as prompt service is the essence of success in the radio business. From now on S.T.C. Lismore will render this prompt service, not only in the matter of stocks, but also as regards technical services and accounts.

Mr. George Simpson, who for many years has been special representative in the City of Sydney, has been appointed manager of the new branch. To him, early last year, was assigned the task of re-organising S.T.C. radio business in Newcastle and the coal-fields. This he did, in association with Mr. Les. Fleming, manager of S.T.C. Sales and Service, Newcastle, and the effort was so remarkably successful that he can set out on his northern enterprise with justifiable confidence. Back of him in Lismore will be an adequate trained staff and ample stocks of both S.T.C. radio receivers and Brimar valves.

Mr. Simpson will be extremely busy putting his new premises in order—

when they are ready for occupation—but says he will have visited every S.T.C. dealer in his territory before Christmas. Of course any S.T.C. man who visits Lismore will be heartily welcomed at Magellan Street.

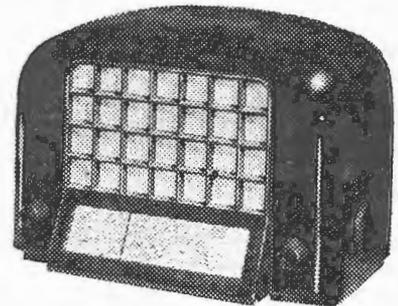


Loop Aerial: Streamlined Cabinet: New Radiola Table Models.

Housed in a strikingly beautiful streamlined cabinet of moulded "Radelec," available in a variety of attractive colours, a new series of Fisk Radiola table models has just been released by Amalgamated Wireless (A'sia) Ltd.

Main technical features include the tuned loop aerial built into a.c. models, obviating the need for both aerial and earth connections for local reception, right-hand tuning (tuning knob on side of cabinet—see illustration), sloping straight-line dial scale designed for maximum legibility, air trimmers, and magnetic frequency locked circuits.

Exceptionally fine all-round performance is claimed for both a.c. and battery models, and this fact, coupled



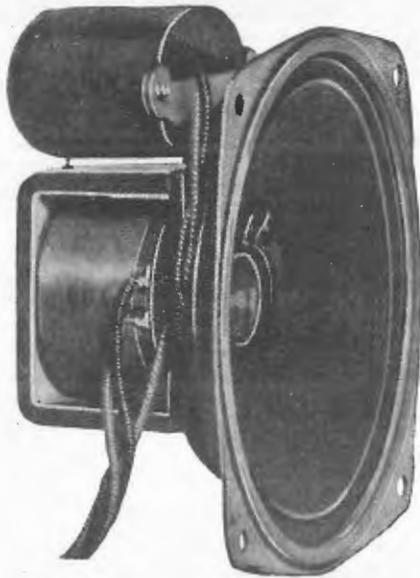
with the features outlined above, should ensure instant popularity for these latest Radiolas.

A standard model will shortly be supplied to "Radio World" for test, and a detailed report on its performance will be published next month.



Shields For 1.4-Volt Valves.

Readers planning to build receivers using 1.4-volt valves are advised that special shields to fit this type of envelope are now available from all leading distributors. While there are many receivers on the market using the 1.4-volt valves without shields, the omission of the latter is only permissible if the set is perfectly stable without them. Their inclusion in any set of this type is recommended as a safeguard towards instability troubles.



The new Amplion "big seven."

AMPLION (A/sia) Pty. Ltd., of 382 Kent Street, Sydney, announce in this issue the release of their complete new range of electrically-welded loudspeakers, in 5," 7" and 12" types.

Early this year the first electrically-welded speakers in two 12" electro-magnet and three 12" permag. types were released by Amplion. Now, the 5" and 7" models make their appearance. They complete the Amplion range, which offers a speaker for every purpose.

These "big" 5" and "big" 7" speakers are really big in every respect. Modern in design, the commonplace circular face-plate is now nearly square, enabling the mounting holes to be placed outside the cone area and not to detract from it. The result is that the 5" speaker has an effective cone diameter $\frac{1}{2}$ " greater than previous models, but at the same time it retains overall dimensions of 5" x 5", representing an increase of about 30% in cone area.

The field coil has been enlarged—actually there is 7 oz. of wire in the average field coil in this new speaker. The transformer presents a sealed insulated-core construction for the first time on such a small speaker, and the core stack is connected to "B" positive internally, preventing breakdown by electrolysis. The speaker is of course completely dust-proofed.

Two New Amplion Speakers

*Release of 5 and 7-inch models completes
Amplion range of electrically-welded speakers.*

The 7" model has similar constructional features in physical appearance and general specifications. This model can be compared with no other speaker on the market, since it is larger than the usual 6" and apparently smaller than the "eights." This smallness is, according to the Amplion Company, only a dimensional matter; the active surface of the cone is but a fraction smaller than that of any 8" model, due to the method of placing mounting holes in projecting corners like the 5" Amplion.

The power handling capacity of this "big" 7" model is exceptionally high, being rated at 8 watts undistorted and 12 watts maximum. The field coil, as with the 5," is again heavier than normal.

Special cones have been developed for this 7" and the 5," with scientific "shading" in the one-piece moulded fibrous material, which has been specially treated to prevent hygroscopic absorption and enhance high-frequency response. The "shading" of the cone enables the response to be extended down to 60-70 cycles without detrimental resonances.

All Amplion field coils are specially manufactured to withstand the most severe atmospheric conditions. Transformer windings are double impregnated by a heat wax treatment which extends over 36 continuous hours after winding, before being sealed in the new-shape housings.

NEW CODING. All Amplion speakers for 1940 are to be designated by the new standard coding system, which indicates at a glance the type and specifications of the speaker. The 5" type is thus designated 5E7, the first figure being the overall dimension, the letter representing electro-magnet (E) or in the case of permags., (P). The last numeral represents the weight of the average field coil or magnet.

Thus the 5E7 is a 5" electro-magnet speaker with 7 oz. field coil, while the 5P8 is a 5" permag. with 8 oz. magnet.

The new range includes the following:—

5E7—5" electro-magnet, 7 oz. field coil.

5P8—5" permag., 8 oz. magnet.

7E12—7" electro-magnet, 12 oz. field coil.

7P14—7" permag., 14 oz. magnet. (Another permag. of 21 oz. magnet weight is to be added to the range shortly).

12E12—12" electro-magnet, 12 oz. field coil.

12E22—12" electro-magnet, 22 oz. field coil.

12P14—12" permag., 14 oz. magnet.

12P20—12" permag. 20 oz. magnet.

12P64—12" permag. 64 oz. magnet.

Amplion also market 6," 8" and 10" models, but these will be superseded by the new series and will eventually be displaced. The adoption of only three sizes will provide uniformity, unhindered by a multitude of sizes which offer little advantage and which often are only variations of smaller speakers with larger cones—something akin to asking a small car to haul a big truck's load.

Full technical data and prices, which are announced to be lower than before, despite greatly increased costs of raw materials, may be obtained from any reputable wholesaler or distributor, or direct from the Amplion Company, 382 Kent Street, Sydney.

Amplion speakers are wholly designed and manufactured in Australia under exclusive patents, and the company's engineering department is available to give advice on any matter pertaining to the use of Amplion speakers, pick-ups, microphones or other of their products. Readers are invited to avail themselves of the Amplion service.

Shortwave Review

CONDUCTED BY
ALAN H. GRAHAM

German Freedom Station Heard ★ Splendid DX on UHF Bands ★ Calls Heard on Amateur Bands ★ Full List of the Month's Loggings ★ Station Changes and Schedules

Latest Station Changes And Schedules.

Argentina.

"Radio del Estado," whose transmitter on 9690kc., 30.96m., LRA-1, was heard well some months ago, have recently been allotted additional frequencies as follow:—LRA-2, 6180 kc., 48.5m.; LRA-3, 11730kc., 25.57m.; LRA-4, 15350kc., 19.55m.; and LRA-6, 17830kc., 16.81m. (QSA-5).

Canada.

CFVP, Calgary, which has recently been off the air, is now back on 6030 kc., 49.75m.

At present under construction is the new Canadian national shortwave station. It is scheduled to come on the air in January. Using 50kw. it will operate on some or all of the following frequencies:—6060, 9630, 11810, 15190, 17810, 21710 and 25620kc. (or 49.5, 31.14, 25.4, 19.75, 16.84, 13.8 and 11.6m.). (QSA-5).

China.

The Japanese-sponsored Hankow Government is building a 20kw. station to advance its aim of "maintaining peace and order in East Asia." With the call XGSA, the station will use the following frequencies:—6105, 9520, 11730, 15240, 17755 and 21450 kc., or 49.14, 31.51, 25.57, 19.68, 16.9 and 13.99m.

Another Shanghai station, under joint Chinese and Japanese control, will soon be on the air; call XGSB, and power 20kw. Frequencies are 6095, 9505, 11875, 15190, 17785 and 21500kc., or 49.22, 31.56, 25.26, 19.75, 16.86 and 13.95m.

Other Shanghai stations reported as preparing to operate on shortwave allocations are:—XGBA, on 21550kc., 13.92m.; XGBB, 17795kc., 16.85m.; XGBC, 11800kc., 25.42m., and XGBD, 9579kc., 31.32m. All these are understood to be powered at 18.5kw. (QSA-5).

Cuba.

COHI, Santa Clara, is a new Cuban station on 6500kc., 46.1m., relaying COCH and COCQ. Present schedule is from 10 a.m. till 1 p.m. (QSA-5).

COBS in Habana is yet another new station. Operates on 7770kc., 38.5m. Relays station CMBS. (Radex).

Denmark.

At present the Danish programmes are transmitted mainly over 31-metre station, OZF. However, additional frequencies recently granted may soon be put in use. These are:—OZR, 6170 kc., 48.62m.; OZG, 11805kc., 25.41m.; OZV, 17810kc., 16.84m.; and OZX, 21710kc., 13.8m. (QSA-5).

France.

The new 100kw. transmitters at Essarts were scheduled to take the air early next year, but perhaps the war will necessitate an alteration in plans. New frequencies on 49, 31, 25, 19, 16 and 13 metres were to be used.

Hungary.

The station formerly listed as HAAQ-2, Budapest, now operates regular schedules with the call HAD. Frequencies are 9625kc., 31.17m (from 10 a.m. till noon); 11850kc. 25.32m. (from 5 till 9 a.m.), and 21680kc., 13.84m. (2 till 5 a.m.) (Radex).

India.

The latest schedules for the A.I.R. transmitters, just to hand from Delhi:—

Delhi, VUD-2, on 4960kc., 60.48m., and 9590kc., 31.3m., from noon till 1.35 p.m.; from 4.30 till 6.30 p.m.; and from 10.30 p.m. till 3 a.m. (On Sundays transmission is continuous from noon till 6.30 p.m.)

VUD-3, on 15290kc., 19.62m. As for VUD2.

Bombay, VUB-2, on 4880kc., 61.48 m. and 9550kc., 31.4m; from 12.30 till 1.30 p.m.; from 5 till 7 p.m.; and from 10.30 p.m. till 3 a.m. (On Sundays from 12.30 till 5 p.m. and from 8 till 9 p.m.).

Madras, VUM-2, on 4920kc., 60.98 m., from 9.30 p.m. till 3 a.m.

Calcutta, VUC-2, on 4840kc., 61.98 m. and 9530kc., 31.48m.; from 3 till 4 p.m.; from 5 till 7 p.m.; and from 9.30 p.m. till 3 a.m. (Sundays from 1 p.m. till 5 p.m.).

Italian East Africa

The Addis Ababa station now uses the call I2AA (in place of IABA), and has been allotted a number of new frequencies on the 31-metre band. (Universalite).

London Calling.

The B.B.C. advise that they are now using 21 transmitters in their overseas broadcasts. These are distributed on the various bands thus:—13 metres: GSH, GSJ, GST and GRZ; 16 metres: GSG and GSV; 19 metres: GSF, GSI, GSO and GSP; 25 metres: GSD, GSE and GSN; 31 metres: GSB, GSC, GRY and GRX; 41 metres: GSU and GSW; 49 metres: GSA and GSL.

News bulletins are given in no less than 10 foreign languages—Afrikaans, Arabic, Czech, French, German, Italian, Magyar, Polish, Portuguese and Spanish.

New Zealand.

The National Broadcasting System is planning a series of shortwave transmissions on six frequencies from a new station to be located in Wellington. Calls are to be: ZL-1, 6080 kc., 49.34m.; ZL-2, 9540kc., 31.45m.; ZL-3, 11780kc., 25.47m.; ZL-4, 15280 kc., 19.63m.; ZL-5, 17770kc., 16.88m.; and ZL-6, 25800kc., 11.6m. (QSA-5).

Philippines.

The Manila station recently reported on 9580kc., 31.32m., and now believed to be nearer 9585kc., was originally listed as KZHS; however, station also announces as KZEH. Address is Box 119, Manila.

QRA of KZIB is Box 440, Manila.

Spain.

Latest information to hand reveals that there are about thirty shortwave transmitters operating in Spain and Spanish Morocco. The great majority of these are low-powered stations operating on the 40-metre band.

The following may be logged:—EA9AH, Tetuan, Morocco, 6996kc., 42.8m.: English news at 8 a.m.; EA9AI, Melilla, Morocco, 7184kc., 41.7m.: English programme for North America; EA2BH, Jaca, 14115kc., 21.2m.: In English and Spanish, 10-11 a.m.

EAQ, Madrid, 9860kc., 30.4m., is now on irregular schedule with a power of 20kw. News sessions are as follow:—German, 7.30-7.40 a.m.; Italian, 7.40-7.50 a.m.; English, 7.50-8.05 a.m.; Portuguese, 8.05-8.15 a.m.; French, 8.15-8.30 a.m.

United States.

WLWO, Cincinnati, will soon place its new 50kw. transmitter on the air. Frequencies on 49, 31, 25, 19, 16 and 13 metres will be used.

New call signs: For W4XB, WDJM (we must apologise for our mistake in the November issue when new call

was given as **WBKM**). For **W9XAA**, **WCBI**. Readers should note that calls for old **W1XAL** and **W1XAR** are **WRUL** and **WRUW**; for a week or so these stations announced as **WSLA** and **WSLR**, respectively. Also **WRUW** have been granted a new frequency on 11 metres.

Yugo-Slavia.

In addition to **YUA** and **YUC**, Belgrade are also testing on 15240kc., 19.68m. It is understood that they also plan tests on 25 metres.

War News Bulletins In English.

Broadcasts of war news and propaganda continue to dominate the programmes of most of the regular stations. As conditions in the early morning and again at night are favourable, much of this "battle of words" can easily be heard in this country. Watch for the following:—

6.00 a.m. Tokyo (**JZJ** and **JZK**).
6.50 a.m.: Daventry.
7.00 a.m. Hsinking (**MTCY**, 25m.).
7.45 a.m. Daventry.
9.15 a.m. Rome.
4.00 p.m. San Francisco (**KGEI**).
4.15 p.m. Daventry.
5.00 p.m. Berlin.
6.00 p.m. Moscow (19m.).
6.15 p.m. Paris (19 and 25m.).
7.00 p.m. Daventry.
7.30 p.m. Rome (16m.).
8.30 p.m. Manila (31 and 49m.).
9.00 p.m. Paris.
9.15 p.m. Chungking (25m.).
9.30 p.m. Saigon (49m.).
9.30 p.m. Daventry.
10.00 p.m. Berlin.



Ultra-High-Frequency Bands.

Conditions Excellent.

Easily the most interesting development of the month's dx-ing has been the great improvement in conditions between 9 and 11 metres. Police, broadcast and amateur stations are now being heard at good strength, and U.H.F. fans can look forward with confidence to some interesting DX during the next few months.

Police Bands.

Throughout the month the police transmitters have been most active, and despite difficulties a good number of these stations have been logged. At present the band from 30500 to 32000kc. is outstanding, but indications are that some of the higher frequency stations will soon become audible.

Readers will be interested to know that the police stations now use the following U.H.F. bands:—30500 to 32000kc., 9.39-9.8m.; 33000 to 34000 kc., 8.8-9.0m.; 35000 to 36000kc., 8.3-8.57m.; 37000 to 38000kc., 7.88-8.1m.; 39000 to 40000kc., 7.5-7.7m.

Loggings.

The following stations have been noted on the 9.39 to 9.8m. band:—

KQRB, Alameda; **KQCI**, Glendale; **KQN**, Fort Worth; **KQCF**, Tyler; **KQDH**, Amarillo; **WQKB**, Evansville; **WPDS**, St. Paul; **Buffalo**; and about a dozen other transmitters, the location of which is unknown (these include **WQIE**, **KQBW**, **KQBV**, **WRGL**, **KQAO**, **WQMI**, **WQKW** and **KQDP**).

11-Metre Stations Improving.

On 11 metres conditions are also vastly improved, with **W8XNU** putting in a splendid signal daily, and a number of other transmitters making an occasional appearance.

Loggings.

W8XNU, Cincinnati, 25950kc., 11.56 m.: Easily the best on the band. Can be logged daily from as early as 7 a.m. till around noon.

W4XA, 26150kc., 11.47m., Nashville: This station has fallen off somewhat and is seldom at good strength.

W9XPD, 25900kc., 11.58m., St. Louis: We have recently received a verification from this station, confirming our report of August; incidentally, this was the first received by **W9XPD** from Australia since their change of frequency. **W9XPD** are still heard regularly, although signals are not nearly as strong as those from **W8XNU**. **W9XPD** will be very pleased to have reports on their reception since the change of frequency from 9.49 metres.

W9XA, 26000kc., 11.53m., Kansas City: This station has also altered its frequency in recent months, changing from 26450 to 26000kc. They are rather erratic, but may be logged around 8.30 a.m.

W9XH, 26050kc., 11.51m., South Bend: Heard rather weakly in mid-November, closing at 9.30 a.m.

KGEI On 9 Metres.

A most interesting logging during November was that of weakish signals from **KGEI**, San Francisco, on 9.78m. This is in all probability an harmonic of their 19.56m. transmission, and is heard best after 11 a.m. Confirmation of this to hand from U.H.F. Observer Ferrier.

Report From Observer Ferrier.

A most interesting report is to hand from our U.H.F. Observer, James Ferrier, of Coleraine, Victoria. He writes:—

"During the last week conditions have been erratic below 10 metres, but I have managed some nice loggings.

"On about 7.5 metres I heard a station on November 1. Signals were R5-6 for about ten minutes, but faded to about R2 before identification was possible. Announcer was an American.

"A station on the island of Hilo (Hawaii) on about 38500kc., 7.7m., was heard testing. This seems to be an inter-island telephone station.

"**KGEI**, San Francisco, was heard on approximately 9.8m. Also an harmonic of **JZK**, Tokyo, on 9.89m., at R5-9.

"Several police stations logged included: Fort Worth, Glendale, Alameda, St. Paul and **KQTV**.

"Of the 11-metre stations, **W8XNU** is easily the best."



Amateur Bands Review.

Amateur transmitters in the Pacific area provide the best DX on the 20-metre band at the present time. Very few Europeans are listed this month in the calls heard section. Despite announcements that South African amateurs would be compelled to go off the air at the end of September these stations are now understood to be remaining in operation for the time being.

On 10 metres conditions continue exceptionally good. From dawn till around noon good to very strong signals are audible daily from central and eastern states in U.S.A., with an occasional **K6** also to be heard.

Calls Heard.

(Reports for this section to hand from the following Observers: Messrs. Taylor, Chapman (N.S.W.), Linehan, Coggins (S.A.), Pepin (W.A.); Neill (Qld.), Bantow (Vic.) and Cushen (N.Z.). Also Messrs. Taylor (AW409DX), of Brisbane, and Barron (AW516DX), off Ingram, Qld.).

20 Metres.

Africa.

South Africa: **ZS- 1CN**, **5C**, **5DS**, **6EJ**, **2AZ** (N.S.W.); **2V**, **2AV**, **2N**, **2AJ**, **2AZ**, **4L**, **5DA**, **4AA**, **5BZ**, **6W**, **6EB**, **6FD** (W.A.); **1CH**, **2AD**, **5AW**, **1SD**, **1BL**, **5DS**, **4H**, **6EJ**, **6BB**, **6W**, **6DJ**, **2AH** (Q'ld.); **5BZ**, **6EB** (Vic).

Tangier International Zone: **EK- 1AF** (N.S.W.).

Europe.

Spain: **EA7BA** (Q'ld. W.A.).
Denmark: **OZ5BW** (S.A.).
Sweden: **SM7MU** (S.A.).

South America.

Peru: **OA- 4AI** (N.S.W.); **4L** (Qld.); **4CI** (Vic.).
Venezuela: **YV- 5AK** (N.S.W.); **5ABF** (S.A.).
Bolivia: **CP1BA** (S.A.).
Uruguay: **CX2CO** (N.S.W.).
Ecuador: **HC1FG** (N.S.W., S.A.).
Argentina: **LU- 1HI**, **3HA** (N.S.W.); **2DS**, **4XR** (S.A.).

Chile: **CE- 1AS**, **2AM**, **3AG**, **3BM**, **3BE**, **3CE**, **1AO** (N.S.W.); **3AC** (S.A.); **1AO** (Vic.); **1AO**, **3EW** (Qld).

Central America And West Indies.

Honduras: HR5C (Qld.).
Mexico: XE- 1CQ, 1LK, 1GK, 1JE (N.S.W.); 1BA, 1CQ (S.A.); 1CQ (W.A.).
Porto Rico: K4EMG (Qld.).
Guatemala: TG- 5JG, 9BA (N.S.W.); 5JG (S.A.); 9BA (W.A.).

Pacific.

Guam: KB6- ILT (N.Z.); OJG (Qld., S.A.); OCL (W.A.).
Hawaii: K6- PCF, NYD, BNR, OQE, QHU, OJI (N.S.W.); BNR, OQE, MVX, MVA, CGK, RRM (Qld.); NYD, CGK, MVA (W.A.).
Canton and Enderbury Is.: KF6JED (N.S.W.).

The East.

Korea: J8- CI (N.S.W., S.A.); CF (W.A.).
Japan: J- 2GR, 2NG, 2NQ, 2KN, 5CW, 7CB (N.S.W.); 2KN, 2XA, 7CB (S.A.); 2KJ, 2DQ (W.A.).
China: XU- 1B, 8AM, 8RJ, 8RB, 8ZA (N.S.W.); 4JS, 8MN, 8RB, 8RJ, 8ZA (Qld.); 1AB, 5HI, 8ZE (S.A.); 8RB, 8LM (W.A.); 1B, 5TH, 5WT, 8AM, 8ZA, 8RJ, 8ZA, 8ZC (Vic.).
Philippines: KA- 1AF, 1AB, 1CS, 1DL, 1GX, 1LB, 1ME, 1MM, 1JP, 1ZL, 4RB, 7EF, 7HB (N.S.W.); 1AB, 1JP, 1FH, 1CS, 1LB, 1AT, 1LZ, 1WW, 1OZ, 7EF (Qld.); 1KA, 1CW (S.A.); 1ME, 1JM, 1CW, 1FG, 1JD, 1JP, 1MM, 1LZ, 1OZ, 1FH, 3TZ, 7EF (W.A.).
Dutch East Indies: PK- 1OG, 3HI (N.S.W.); 1OG, 1AZ, 1VM, 1TM, 1RI, 1HX, 1XZ, 1MF, 2AY, 3CD (W.A.); 1OG, 1VM (Qld.); 1OG, 3BE, 3RZ (S.A.); 1MF, 3GD, 2LZ, 2AY, 1TM (Vic.).

10 Metres.

Alaska: K7GTP.
Hawaii: K6- PLZ, QXY.
Philippines: KA1ME.
United States: W- 1LLF, 2FGB, 2VH, 2QF, 2LXY, 2KHx, 2JIE, 3BSO, 3HXO, 3GRO, 4FUM, 4AYF, 4EZK, 5IHT, 5IEO, 5ADG, 6RUK, 6NCT, 6PBD, 6NCS, 6NLS, 6GHT, 6MWD, 6POZ, 6KYT, 6KYL, 6LDZ, 6QJL, 6ERT, 6NUQ, 6MUM, 6OXV, 6LHO, 6HUM, 6KOK, 6DUC, 6USA, 6RKI, 7HKI, 7GLX, 8AXQ, 8QGZ, 8SPL, 8GQG, 8RIS, 8DUH, 8AOC, 9JGP, 9LYX, 9CXU, 9JGQ, 9GHW, 9AIF, 9ZUI, 9TPZ, 9UNS, 9QGN, 9WAL, 9TXX, 9EXT, 9DWS, 9CCI, 9CII, 9YRR, 9EAG, 9ABL, 9IXE, 9DLC, 9EW, 9ZNA.



Letter Box Section.

Mr. C. Taylor (AW409DX), Highgate Hill, Brisbane:

Very many thanks for your long letter regarding reception in your locality; also list of overseas QRA's for S.W.L. Exchange Bureau. Hope to hear from you again.

Mr. A. Barron (AW516DX), Ingham, North Queensland:

We hope to receive further reports from you, O.M. Regarding your query about enclosing stamps in reports. It is no use enclosing Australian stamps in overseas reports, as the stamps have no value outside Australia. Some S.W.L.'s enclose unused stamps of the country to which the report is sent, obtaining them from leading stamp dealers or through the Stamp Bureaus of DX Clubs.



QSL Exchange Bureau.

The following addresses of S.W.L.'s who will QSL 100% are supplied by Mr. C. Taylor, of Highgate Hill, Brisbane:—
Ernesto Davis, Santa Fe 758, Buenos Aires, Argentine.
Reuven Sokolovsky, 4 Nachlat-Benjamin Str., Tel-Aviv, Palestine.
J. Malherbe, P.O. Box 44, Robertson, South Africa.
P. Smith, 51 Evole, Neuchatel, Switzerland.
Wally Hill, 24 Oxford Terrace, Cheltenham, Auckland, N.1, N.Z.
Incidentally, Mr. Taylor will exchange QSL cards, shack photos or postcard views with DX Club members. His full QRA is "Mineda," Rosecliffe St., Highgate Hill, Brisbane.

This Month's Loggings.

Not many new stations are listed this month, although conditions have remained very good. Easily outstanding is the logging of the German Freedom Station—Deutsche Freiheits Sender—on 29.8 metres. This station is reported in all eastern States and South Australia.

The other feature of the month's DX is the great improvement on 13 metres, where a number of American stations are now to be heard from around 10.30 p.m.

SOUTH AMERICA.

Peru.

OAX4J, 9340kc., 32.12m., Lima: Still heard daily till 2.30 p.m. in N.Z., but usually only on Sunday afternoons in Australia (Johns).

OAX4Z, 6077kc., 49.37m., Lima: Reported from Queensland; on till 4.30 p.m., except Mondays (Neill).

OAX5C, 9350kc., 31.96m., Ica: Now heard only weakly on Sunday afternoons, although still a good signal daily at 2.30 p.m. in N.Z. (Johns).

Ecuador.

HCJB, 12460kc., 24.08m., Quito: Only a weak signal now at 10.30 p.m. (Chapman).

Chile.

CB-960, 9600kc., 31.25m., Santiago: Being heard very well at present.

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Readers who want to take the "Radio World" on a subscription basis and have their copies posted to them direct each month are invited to complete the coupon below (annual sub. 10/6). New readers are advised that all back numbers in Volumes 1, 2 and 3 are still available, price 9d. post free for all copies up to and including the December, 1938, issue, and 1/- post free for subsequent numbers.

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THE AUSTRALASIAN RADIO WORLD (see page 2 for new address)

opening at 10 p.m. Also strong signal on Sundays at 4 p.m. (Linehan, Johns).

CB-1180, 11970kc., 25.06m., Santiago: Very erratic; sometimes at good strength around 2 p.m.

CD-1190, 11910kc., 25.19m., Valdivia: Not very strong; can be heard around 2 p.m., and sometimes in 1-4 a.m. session.

Uruguay.

CXA-8, 9640kc., 31.12m., Colonia: Like most of the South Americans, much weaker than formerly. Best time to look for this one is on Sunday afternoons (Neill).

Columbian Republic.

HJCX (was HJ3CAX), 6018kc., 49.83m., Bogoto: Reported from N.Z.; heard best on Sunday afternoons (Johns).

CENTRAL AMERICA AND WEST INDIES.

Guatemala.

TGWA, 15170kc., 19.78m., Guatemala City: Now heard at excellent strength at various times—from 7 a.m. on Monday mornings, and early on Saturday and Sunday afternoons (Johns).

TGWA, 9685kc., 30.96m., Guatemala City: Weak to fair on week days till around 2.30 p.m.; good special DX session on alternate Sundays (Johns).

Costa Rica.

TILS, 6165kc., 48.66m., San Jose: Opens with good signal at 10 p.m., and occasionally heard around 5 p.m. (Anderson).

TIPG, 9620kc., 31.19m., San Jose: Very strong signal from 10 p.m.; one of best night stations.

Mexico.

XEWW, 9600kc., 31.58m., Mexico City: Still fair signal just above GSB in the afternoons (Johns).

Panama.

HP5J, 9590kc., 31.28m., Panama City: Fair signal from 10 p.m. (Chapman).

HP5A, 11700kc., 25.64m., Panama City: Erratic, but sometimes at good strength from 10 p.m.

Cuba.

(N.B. All frequencies for Cuban stations are approximate, as they seldom "stay put" for more than a few weeks).

COCQ, Habana: One of the worst culprits in the matter of constant alteration of frequency. Now on approx. 8850kc., 33.9m. Fairly strong from 9.50 p.m. (Chapman, Coggins, Johns).

COCX, 11735kc., 25.57m., Habana: Heard occasionally around 7 a.m. (Neill).

COCW, 6324kc., 47.4m., Habana: Reported in W.A. at 9.55 p.m. at fair strength (Anderson).

COCH, 9437kc., 31.8m., Habana: Best, though seldom very good, in the afternoons. Heard well in N.Z. (Johns).

COBZ, 9030kc., 33.32m., Habana: Reported from N.Z.; weak signal around 3 p.m. (Johns).

COCM, 9850kc., 30.46m., Habana: Reported from N.Z.; excellent signal around 3 p.m. (Johns).

COBC, 9985kc., 30.03m., Habana: Best of Cubans at present; nightly from 9.55 p.m.

NORTH AMERICA.

United States.

WCBX, 9650kc., 31.09m., New York: Weakest of afternoon Americans.

WCBX, 21570kc., 13.91m., New York: Now used at night, from 11 p.m. Weak, but may improve.

WCBX, 17830kc., 16.83m., New York: Heard best now in early mornings.

WCBX, 15270kc., 19.65m.: Excellent early morning signal, especially in N.Z. (Cushen, Johns, Bantow).

WCBX, 6120kc., 49m., New York: Fairly strong in late afternoons.

WCBX, 11830kc., 25.36m., New York: Good signal from 7 a.m., with various news sessions around 8 a.m. (Cushen).

WPIT, 11870kc., 25.25m., Pittsburgh: Daily schedule from 5 a.m. to 2 p.m.; best around 8 a.m. (Pepin, Coggins).

WPIT, 15210kc., 19.72m., Pittsburgh: Still a fair signal from midnight.

WPIT, 21540kc., 13.93m., Pittsburgh: Weak, but should improve; between 10 and 11 p.m.

WLWO, 6060kc., 49.5m., Cincinnati: Not as loud as in previous month, but still heard in late afternoon and again at about 9.30 p.m. (Cushen, Johns).

KGEI, 9530kc., 31.48m., Treasure Island: San Francisco: Good reliable signal from 10 p.m., but heavy QRM from Tokyo transmitter JZI (Chapman, Neill, Pepin, Coggins, Bantow, Johns, Taylor (Qld.)).

KGEI, 15330kc., 19.57m., same location: Not as strong as last month, but still heard around noon.

KGEI, 6190kc., 48.47m., Same location: Used in 3-6 p.m. session in place of 31m. transmitter; fair signal (Johns).

WNBI, 17780kc., 16.87m., Bound Brook: Reliable signal in early morning and again in the early afternoon (news at 1 p.m.) (Neill, Pepin, Coggins, Bantow).

WBOS, 9570kc., 31.35m., Boston: Good signal just before closing at 3 p.m. (Pepin).

WGEA, 15330kc., 19.57m., Schenectady: Excellent signal in early morning around 7.30 a.m. (Pepin, Johns, Bantow).

WGEA, 9550kc., 31.41m., Schenectady: Very erratic, but can be logged

at times between 7.30 and 9 a.m. (Pepin).

WGEO, 9530kc., 31.48m., Schenectady: Good strength both early mornings and before closing in mid-afternoon (Coggins).

WCAB, 9590kc., 31.28m., Philadelphia: Heard at times at very good strength till 4 p.m.; sometimes remains on air till 5 p.m. (Johns).

WRCA, 9670kc., 31.03m., Bound Brook: Very weak in the mornings; a much better signal around 3 p.m. (Johns).

WRUL, 11790kc., 25.45m., Boston: Fair signal in early morning (Chapman).

WRUW, 11730kc., 25.58m., Boston: Opens at 8.30 a.m., but signal now rather poor.

WGEA, 21500kc., 13.96m., Schenectady: Another weak signal on 13m.; scheduled 10 p.m.-1 a.m.

KKZ, 13690kc., 21.91m., Bolinas: Special relays on Sundays 1.30-2.45 p.m.; good loud signal.

KKQ, 11950kc., 25.1m., Bolinas: Special relays; heard irregularly between 3 and 4 p.m.

AFRICA.

Kenya.

VQ7LO, 6082kc., 49.31, Nairobi: Still heard in the very early morning (Coggins).

Ethiopia.

I2AA (IABA), 9650kc., 31.09m., Addis Ababa: Note new call letters. Heard from 1 a.m. at good strength.

Canary Is.

EAJ-43, 10370kc., 28.93m., Tenerife: A fair signal in the mornings.

Mozambique.

CR7AA, 6137kc., 48.88m., Lourenco Marques: Just audible till 7 a.m.

Algeria.

TPZ-3, 8960kc., 33.48m., Algiers: This unusual station is heard with news sessions from 6.30 till 7 a.m.

OCEANIA.

New Caledonia.

FK8AA, 6122kc., 49m., Noumea: Heard at excellent strength from 5.30 p.m. on Wednesdays and Saturdays (Chapman, Bantow).

Fiji Is.

VPD-2, 9538kc., 31.38m., Suva: Good signal till 10 p.m. nightly (Chapman).

Hawaii.

KQH, 14290kc., 20.11m., Kahuku: Special relays to U.S.A. on Sunday afternoons (Bantow).

Tahiti.

FO8AA, Papeete, 7100kc., 42.25m.: Reported in N.Z. at fair strength—on Wednesdays and Saturdays 2-3.30 p.m. (Johns).

"RADIO WORLD" ALL-WAVE OSCILLATOR . .

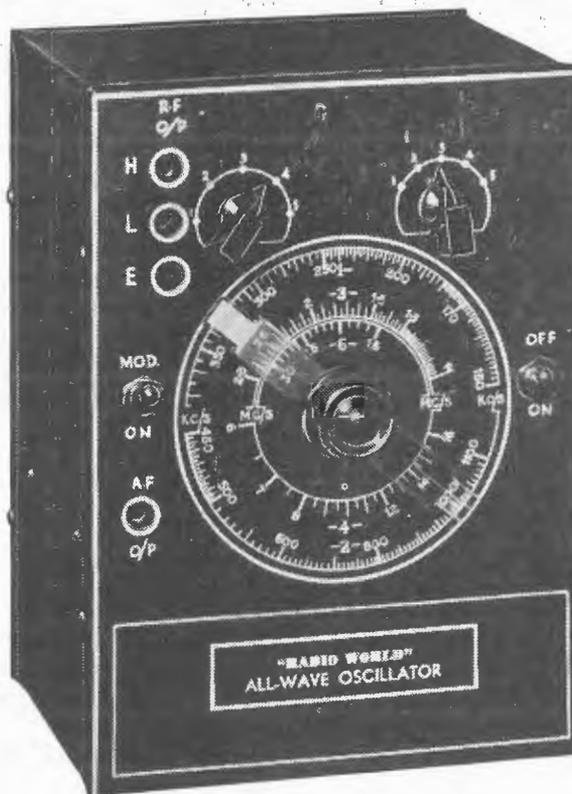
Full Description Next Month

Alongside is shown the "Radio World" all-wave service oscillator, which has been designed with the co-operation of Mr. C. Jones, chief test equipment engineer of Slade's Radio Pty. Ltd.

A battery-operated model, it uses a 1D8GT 1.4-volt valve, the pentode section being used as electron-coupled oscillator and the triode section as modulator. The instrument covers five bands, including all useful fundamental frequencies from 150 k.c. to 15 megacycles (below this, harmonics can be used).

A feature that will strongly appeal to set-builders is the fact that the coils, band switch and attenuator are supplied as a single unit enclosed in a compact steel case. The single gang condenser and modulation choke are bolted in position on the outside, and there are holes ready tapped in the case to take mounting bolts for the valve socket and resistor panel. Only four coloured leads need to be connected to wire the coil unit and attenuator into circuit.

The instrument is directly calibrated, and scales will be available to readers. Full constructional details will appear in next month's "Radio World."



AUSTRALIA.

VLR, 9580kc., 31.32m., Lyndhurst: Used during afternoons and at night.

VLR-3, 11880kc., 25.25m., Lyndhurst: Now used till noon.

THE EAST.

Philippine Is.

KZRM, 9570kc., 31.35m., Manila: Very strong and reliable station. English news at 10.30 p.m. (Chapman, Neill, Pepin, Coggins, Bantow, Taylor (Qld.)).

KZIB, 9500kc., 31.58m., Manila: Also strong signal nightly (Chapman, Pepin, Coggins, Bantow).

KZIB, 6040kc., 49.67m., Manila: Same programme as 31m. transmitter; strong signal.

KZRF, 6140kc., 48.86m., Manila: Strong signal; also uses call KZEG (Cushen, Barron, Bantow).

KZRH, 6110kc., 49.1m., Manila: Not as loud as other P.I. stations, and often marred by QRM (Barron).

Malaya.

ZHP, 9690kc., 30.96m., Singapore: Still reliable signal at night, but hardly as loud as previously (Chapman, Bantow).

ZHJ, 6080kc., 49.3m., Penang: Nice signal from about 9.30 p.m. (Johns, Bantow).

India.

VUD-3, 15290kc., 19.62m., Delhi: Heard occasionally at midday (Chapman, Neill).

VUD-2, 9590kc., 31.28m., Delhi: Very good signal on opening at 10.30 p.m. with English session (Chapman, Linehan).

VUD-2, 4960kc., 60.48m., Delhi: Just fair, high noise level on this low frequency (Chapman, Pepin).

VUM-2, 4920kc., 60.98m., Madras: Fair (Chapman, Pepin).

VUC-2, 4840kc., 61.98m., Calcutta: Fair (Chapman, Pepin).

VUB-2, 4880kc., 61.48m., Bombay: As other 60-61m. Indians, heard best around 10.30 p.m. (Pepin, Chapman).

Burma.

XYZ, 6007kc., 49.94m., Rangoon: One of regular low-frequency Easterns; nightly at fair strength (Cushen).

French Indo-China.

Saigon, 6116kc., 49.05m.: Very strong signal; English session from 9 p.m. (Coggins, Johns, Taylor (Qld.), Bantow).

Saigon, 11780kc., 25.47m.: Also very strong; from 11.30 p.m. (Cushen, Chapman, Linehan, Pepin, Coggins, Taylor (Qld.), Bantow).

Hong Kong.

ZBW-3, 9525kc., 31.49m.: Another reliable night station on 31 metres (Cushen, Chapman, Bantow).

China.

XGOY, 11900kc., 25.21m., Chungking: After announcing for a short while as XGX, this transmitter now uses old call of XGOA and XGOY. Regular strong signal (Chapman, Pepin, Coggins, Taylor (Qld.), Bantow).

XMHA, 11850kc., 25.32m., Shanghai: Just fair strength, but heard regularly at night (Chapman).

XGOK, 11810kc., 25.4m., Canton: Only heard once or twice lately, but then at good strength.

XPSA, 7000kc., 42.8m., Kweiyang: Nightly from 8.30 p.m. at good strength; call in English; news at midnight (Johns).

XOJD, 6880kc., 43.6m., Hankow: Fairly strong.

XGOX, 15190kc., 19.75m., Chungking: This frequency being used for special transmissions. Heard around 7.30 p.m. (Neill, Coggins).

XGOX, 17800kc., 16.85m., Chungking: Weak signal around 1 p.m.

Manchukuo.

MTCY, 6125kc., 48.98m., Hsinking: Heard nightly, best just before midnight (Coggins).

MTCY, 11775kc., 25.48m., Hsinking: Excellent signal in early morning session to Europe (Chapman).

MTCY, 15200kc., 19.74m., Hsinking: Sometimes uses this frequency as well as 11775kc., from 7 a.m.

JDY, 9920kc., 30.24m., Dairen: Nice signal from 10 p.m.

Thailand (Siam).

HSSPJ, 9510kc., 31.55m., Bangkok: Still a reliable signal; best just before midnight; frequent identification in English.

Taiwan (Formosa).

JIE, 7295kc., 41.1m., Tyureki: New station listed for first time last month; same programme as **JFO** from 11 p.m.

JIE-2, 9695kc., 30.95m., Tyureki: Same programme as **JIE**; best after midnight.

JFO, 9635kc., 31.13m., Taihoku: Seldom heard now.

Japan.

JZI, 9535kc., 31.47m., Tokyo: From 10 p.m., when it mars reception of **KGEL** (Chapman).

JZJ, 11800kc., 25.42m., Tokyo: From 10 p.m., as **JZI** (Pepin, Chapman).

JZK, 15160kc., 19.79m., Tokyo: Easily best of Japs at present; heard early mornings, early afternoons and at night (Chapman, Pepin, Coggins, Taylor (Qld.)).

JZL, 17785kc., 16.87m., Tokyo: Heard weakly around midday (Neill).

JVW-3, 11720kc., 25.6m., Tokyo: Best in the mornings.

JLG-3, 11705kc., 25.63m., Tokyo: Best at night.

JVW, 7298kc., 41.34m., Tokyo: Now in use as regular transmitter with **JZ** stations; heard late at night.

JLT-2, 9645kc., 31.11m., Tokyo: Heard in early morning, 6-7 a.m. (Coggins).

JLU-3, 15130kc., 19.83m., Tokyo: Sometimes carries same programme as **JZK** late at night.

Dutch East Indies.

YDB, 9550kc., 31.41m., Bandoeng: Fair signal at night (Chapman, Pepin).

YDC, 15150kc., 19.8m., Bandoeng: Excellent station; good signals and bright programmes. At 9 a.m. and at night (Chapman, Pepin, Coggins).

YDD, 6045kc., 49.63m., Bandoeng: Fairly strong, but difficult to separate from **KZIB** at times.

YDX, 7220kc., 41.55m., Medan: Very strong; mainly native programmes (Chapman, Bantow).

PMH, 6720kc., 44.64m., Bandoeng: Always very loud at night.

PMN, 10260kc., 29.24m., Bandoeng: Relay station for **N.I.R.O.M.**

PLP, 11000kc., 27.27m., Bandoeng: As **PMN**.

"Air-Scout Communications Six."

List of Parts.

(See full description on page 15 of this month's issue).

- 1 aluminium chassis, 15 x 10 x 3½ inches, stamped and drilled to specifications, complete with 16-gauge aluminium front panel 16 x 10¾ inches and four partitions (see photos.)
- 1 power transformer, 355v. C.T. 385v. 80 m.a., 6.3v. 2a., 6.3v. 3a. (Radiokes).
- 2 40 mmfd. midget variable condensers (Raymart, R.C.S., Radiokes).
- 2 160 mmfd. midget variable condensers (Raymart). (Alternatively, 100 mmfd. condensers can be used both for band-spreaders and band-setters—see text.)
- 1 5-plate midget variable condenser (Raymart, R.C.S., Radiokes).
- 7 sockets, 2 octal, 1 6, 2 7, 2 4-pin.
- 2 4-pin coil sockets (Raymart ceramic).
- 2 iron-cored i.f. transformers (R.C.S., Radiokes).
- 1 b.f.o. coil (R.C.S., Radiokes).
- 3 flexible couplers (Raymart).
- 1 rotary type on/off switch.
- 2 terminals, 1 rd., 1 black.
- 1 power socket, with flex and plug.
- 3 valve shields.
- 1 30-henry 100 m.a. choke (R.C.S., Radiokes).
- 5 knobs.
- 4 indicator plates (Raymart).
- 2 pointers (Raymart).
- 1 vernier d'al (Raymart).
- 4 grid clips, 3 standard 1 midget.
- 8 4-pin plug-in coil formers.

- 1 25,000 voltage divider (R.C.S., Radiokes).
 - 1 1 megohm potentiometer (I.R.C.).
 - 1 1.5 megohm potentiometer (I.R.C.).
 - 3 flexible couplers (Raymart).
- FIXED RESISTORS:**
- 1 300 ohm carbon (I.R.C.).
 - 1 350 ohm carbon (I.R.C.).
 - 1 400 ohm carbon (I.R.C.).
 - 1 450 ohm carbon (I.R.C.).
 - 1 1,500 ohm carbon (I.R.C.).
 - 4 10,000 ohm. carbon (I.R.C.).
 - 4 50,000 ohm. carbon (I.R.C.).
 - 3 100,000 ohm carbon (I.R.C.).
 - 2 5 megohm carbon (I.R.C.).
 - 3 1 megohm carbon (I.R.C.).

FIXED CONDENSERS:

- 4 .0001 mfd. mica (T.C.C.).
- 4 .05 mfd. tubular (Ducon).
- 11 .1 mfd. tubular (Ducon).
- 1 .25 mfd. tubular (Ducon).
- 1 .5 mfd. tubular (Ducon).
- 2 8 mfd. wet electrolytics, 450v. working (Ducon).
- 1 16 mfd. wet electrolytics, 450v. working (Ducon).
- 1 25 mfd. semi-dry electrolytic, 25 volt working (Ducon).

VALVES:

- 1 6K8G, 1 6F7, 1 6J7, 1 6B7S, 1 42, 1 80. (Brimar, Radiotron).

SPEAKER:

- 1 5in. dynamic speaker, 1500 ohm field, input transformer to match single pentode (Rola, Amplion).

MISCELLANEOUS:

Small quantities of 18, 24, and 28 gauge enamel wire for winding coils, solder lugs, nuts and bolts, hook-up wire, 8in. and 10in. lengths of Erinoid shaft for extension controls, with bushes.

EUROPE.

Sweden.

SBP, 11705kc., 25.63m., Motala: Still quite good till closing at 7.15 a.m. Also reported at 9 p.m. on Sundays in N.Z. (Johns).

SBU, 9535kc., 31.47m., Motala: Still audible in some locations; QRM is usually a difficulty.

Yugo-Slavia.

YUA, 6100kc., 49.18m., Belgrade: Much weaker now (Linehan).

YUC, 9500kc., 31.58m., Belgrade: Excellent signal in early morning, with English news at 7.20 a.m. (Chapman, Johns, Linehan, Barron, Coggins).

Turkey.

TAP, 9465kc., 31.7m., Ankara: Still one of best morning stations, closing 7.30 a.m. (Chapman, Linehan, Coggins, Bantow).

TAQ, 15195kc., 19.74m., Ankara: Still heard occasionally around 10 p.m. (Chapman).

Portugal.

CSW-6, 11040kc., 27.17m., Lisbon: Regular and fairly strong early morning signal (Chapman).

CSW-7, 9740kc., 30.8m., Lisbon: Also consistent signal in the mornings.

Belgium.

ORK, 10330kc., 29.04m., Ruysselede: Fair signal 5-6 a.m.

Holland.

PCJ-2, 15220kc., 19.71m., Huizen: Excellent programme on Tuesday afternoons; also from 10.40 p.m. (Pepin, Coggins).

PCJ, 9590kc., 31.28m., Huizen: Good signal in early mornings at 6 a.m.

PHI-2, 17770kc., 16.88m., Huizen: Only a fair signal around 10.45 p.m. (Chapman).

Spain.

EAQ, 9860kc., 30.43m., Madrid: Good signal at 7 a.m.

Norway.

LKV, 15170kc., 19.78m., Oslo: Reported at good strength in special programme to America at 4.45 a.m. (Neill).

Hungary.

HAS-3, 15370kc., 19.52m., Budapest: On Sundays at midnight.

Lithuania.

LYR, 9280kc., 32.33m., Kaunas: Heard once or twice a few weeks back after 4 p.m.

Vatican City.

HVJ, 6190kc., 48.47m.: Reported from N.Z.; good signal on opening at 6 a.m. (Johns).

U.S.S.R.

The following have been logged:—**RNE**, **RV-96** (19.47m.), **RV-96** (31.51 m.), **RV-96** (19.76m.), **RV-96** (49.75 m.), and **RKI**.

Germany.

Deutsche Freiheits Sender, 10070 kc., 29.8m.: This world-famous secret station is now being heard at good strength. Heard from about 6.55 till 7.45 a.m. (Linehan).

France.

The new transmitter, call unknown, on 9680kc., 30.99m., continues to be heard at good strength in the afternoons, with two English news bulletins (Chapman, Johns).

Also logged: TPA-2, TPA-3, TPA-4, TPB-3, TPB-6, TPB-11.

Italy.

2RO-3, 9685kc., 31.13m., Rome: Tremendous signal in special transmission for South Seas from 4 p.m. Also very good at 7 a.m. (Chapman, Barron).

Also logged: 2RO-4, 2RO-6, 2RO-8, 2RO-9, 2RO-12 and IQY.

Service Equipment . . . 2.

(Continued from page 24)

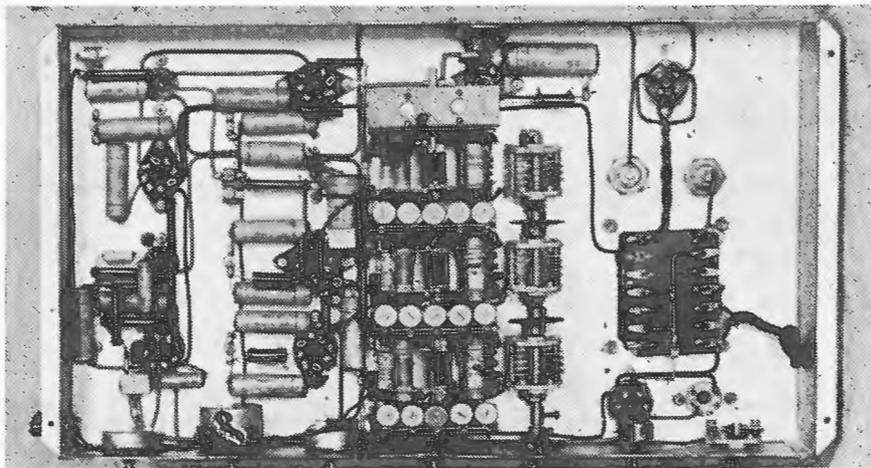
Service oscillators may be either battery or A.C. operated. Battery types do not require an external power connection, are more easily shielded and are not liable to be affected by sudden changes in line voltage, although output and frequency calibration are liable to suffer as the batteries become old and their internal resistance increases. On the other hand, A.C. operated types do not involve battery replacements, use more robust types of valves and give reasonably reliable output.

Figs. 17, 18 and 19 show, respectively, the Hartley, Colpitts and Electron-Coupled oscillator circuits. All three arrangements have been used, but the Colpitts and Electron-Coupled circuits lend themselves more readily to the requirements of service oscillators, and adequate frequency stability may be obtained from either with good mechanical design.

Waverley Radio Club Notes.

The fact that everyone's thoughts are now turning to A.R.P. and the like probably accounted for the popularity of the film on the above phase of war work shown at the Waverley Club during the last month. This really excellent film was supplied by the St. Johns Ambulance, while Arthur Henry and his brother supplied and operated the projection equipment. Other films supplied by the Shell Oil Co. and General Motors completed what all the members voted was an excellent night's entertainment.

On October 17, Ivan Bailue produced a small projector and took us back 15 years by screening a Feltx cartoon and what must have been one



This under-chassis view of the receiver shows the construction of the three-stage five-band coil unit.

R.C.S. Releases Five-Band Unit.

(Continued from page 8)

transformers are used in the two-stage i.f. amplifier, which despite the fact that it is designed for maximum possible gain is perfectly stable. Measured sensitivity of this channel is approximately 3 microvolts, while that of the receiver is under 1 microvolt across the entire tuning range, demonstrating the enormous reserve of sensitivity there is available.

The seven controls along the front wall of the chassis comprise:—B.f.o. note control, b.f.o. switch, bandspread tuning control, waveband switch, tone control, gain control (operating on

the i.f. channel) and audio volume control.

Complete Description Next Month.

A complete description of this receiver will be featured in the next (January, 1940) issue of "Radio World." While the construction of communication type superhets by inexperienced set-builders is generally not recommended, the R.C.S. coil assembly will be fully colour-coded in such a way that wiring it into circuit will be a simple matter. As well, a complete under-chassis wiring diagram will be included with the article, so that even those with only a limited experience of building receivers will be able to complete this de luxe model successfully.

of the first "Our Gang" comedies. Realism was added by the motor breaking down, the operator having to turn the handle for the rest of the show.

The Club still meets on every Tuesday night at the rear of "Almont," 13 Macpherson St., Waverley, and non-members wishing to keep alive the spirit of "hamdom" are cordially invited to be present.

"Vulcan Shortwaver."

(Continued from page 27)

Complete winding data for the coils is given in a panel elsewhere, together with a sketch showing method of winding both aerial and oscillator coils.

A regenerative pre-selector unit for use with this receiver is now being built, and details will be published next month.

The Story Of R.C.S. Radio.

(Continued from page 6)

was produced, several thousand being sold within a few months.

R.C.S. Patented Hetero-Tuner Unit.

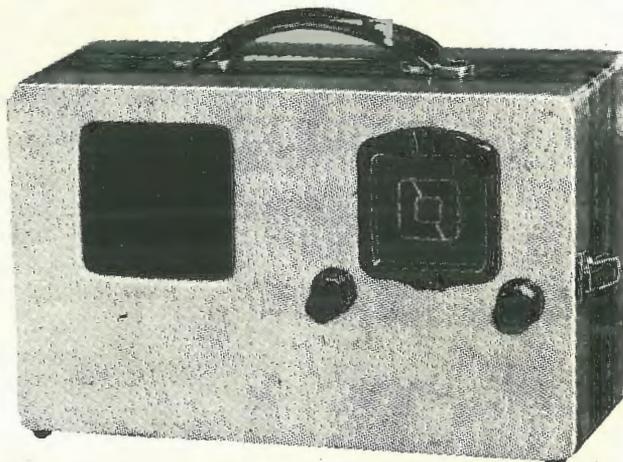
In 1934 Mr. Ron. Bell designed and marketed a superhet tuning unit called the R.C.S. Hetero-Tuner. This comprised a complete basic assembly for a superhet, incorporating aerial, r.f. and oscillator coils, tuning gang, padder, trimmers, bias resistors, bypass condensers and i.f. transformers, assembled on a steel base. This unit was supplied ready-aligned, tested and sealed, so that all that was necessary to build a receiver was to mount this base on a suitable chassis and complete the wiring from the second detector onward.

This idea, which incidentally was patented, was reviewed by the well-known American magazine, "Radio Craft," the review concluding:—

FOR SUMMER PLEASURE

BUILD THE

PICNIC PORTABLE



Latest and most sensational portable yet featured in any Australasian radio magazine, the "Picnic Portable Four" described in the October and November issues of "Radio World" gives you the ultimate in portable performance at lowest cost.

Outstanding features include the use of the newly-released 1D8GT diode triode output pentode, together with a new type dial, condenser gang and speaker. Cover-

ed in the latest airplane luggage cloth, the "Picnic Portable" is smartly styled along latest American lines, and incorporates a host of attractive features that will appeal strongly to every set-builder.

WRITE NOW FOR OUR QUOTATION

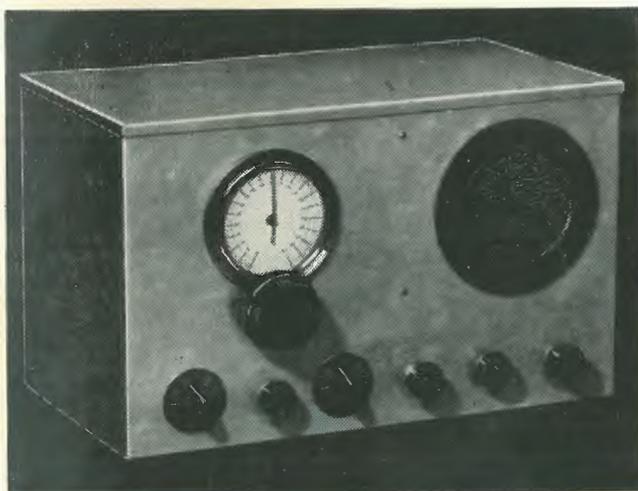
WRITE FOR DETAILS OF OUR FAMOUS "MICRO" KIT-SETS.

High-class components, selected from lines marketed by the world's leading manufacturers, are used in our wide selection of "Micro" kit-sets. Write now for details, stating the types of receivers in which you are interested.

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Build the "Vulcan Short Waver"

Exceptionally high overall gain, coupled with excellent selectivity, are features of this battery-operated shortwave superhet. Designed around the new 1.4-volt battery valves, the "Vulcan Shortwaver" operates from a single 1.4-volt dry cell "A" battery, a small 4.5-volt "C" battery and two midget 45-volt "B" batteries, yet it is capable of extraordinary performance. Complete description of this latest American design appears in the October issue of "Radio World." (Details of local version in this issue).

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The D1503

DELTA

MULTITESTER

The Delta D1503 multitester is destined to become the most versatile instrument yet introduced. This new tester embodies the precise design, the engineering skill and careful craftsmanship so essential to fine performance in test equipment.



DELTA Model D666 MULTIMETER

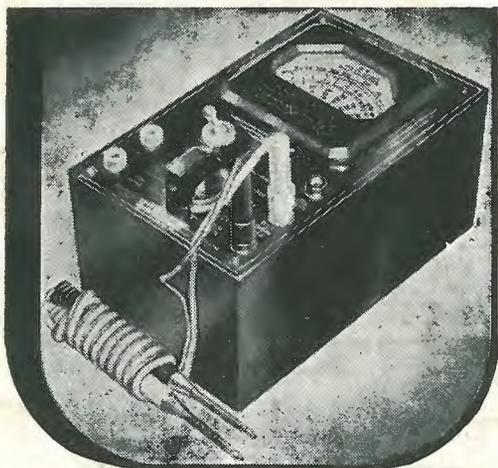
Small, compact, and highly efficient, this new Delta Portable Multimeter incorporates a precision-built Triplett Model 327 D.C. Microammeter, 0/300. Same scale used for A.C. and D.C. Volts.

It is fitted in a highly finished wooden case, 6½in. x 4in. x 3½in., with an attractive engraved panel in black, silver and red.

Ranges—A.C. and D.C. Volts: 10-50-250-1,250; D.C. Milliampers: 1-10-50-250; Ohms: 0.2-500 and 100-100,000. Selector switch for instrument readings. Ohms adjuster and A.C./D.C. switch, A.C. and D.C. jacks.

Self-contained battery. Test leads and prods included.

PRICE: £6/10/-



1. COMPLETE VALVE TESTING — (American and Continental valves). (Emission Method.)
2. SET ANALYSIS (A.C./D.C. Voltage, D.C. Milliampers, Ohms).
3. CONDENSER TESTER.
 - Combines in one instrument the equivalent of eight separate units.
 - Complete tests for all valves by the approved omission method.
 - Separate Diode Test.
 - Neon Short Test, detects slightest leakage.
 - Electrolytic Condenser Test.
 - Paper Condenser Test (for shorts and opens).
 - D.C. Voltmeter 10-50-250-1,000 Volts at 1,000 ohms per volt.

- A.C. Voltmeter 10-50-250-1,000 Volts.
- D.C. Milliammeter 1-10-50-250.
- Ohmmeter, 0.2-10 megohms, in four ranges: 0.2-500 ohms; 0-10,000 ohms; 0-100,000 ohms; 0-10 meg-ohms.
- Line Voltage Adjustment.
- Attractive, durable, black, silver and red etched panel.
- Triplett Model 426 D.C. Instrument, square De Luxe case, 4¼in. x 4¼in.
- Portable leatherette covered case, 15in. x 9in. x 6¾in., sturdily constructed.
- Full instructions and accessories.

PRICE: £16/10/-

DELTA MODEL D735 MULTIMETER

The DELTA Model D735 is a remarkably compact instrument of the most advanced design for service, speed and precision. Employing a Triplett 326 D.C. Milliammeter 0/1,1000 ohms per volt, and fitted in a handsome bakelite case, it measures only 3.1/16in. x 5½in. x 2¼in. high. Coloured metal panel. Ohms zero adjuster. Lo-Hi ohms switch.

Ranges: 1-10-50-250 M.A., 10-50-250-1,000 Volts. Ohms: 0.5/500 and 0/100,000.

PRICE: £4/10/-



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