

A TWO-VALVE PORTABLE RADIOGRAM

# PRACTICAL <sup>13</sup>

MARCH  
1958

EDITOR: F.J. CAMM

# WIRELESS



## CONTENTS

A SIMPLE INTER-COM  
INCREASING T.R.F. SELECTIVITY  
A MICROPHONE PRE-AMPLIFIER  
A TRANSISTORISED SIGNAL  
GENERATOR  
FURTHER MODULATION ASPECTS







# EMI "HIS MASTER'S VOICE" MARCONIPHONE · COLUMBIA

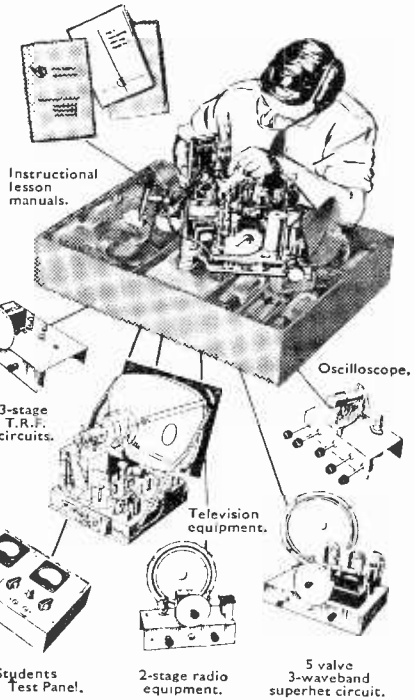
## Announce NEW PRACTICAL WAY OF LEARNING AT HOME

**NEW** — completely up-to-date methods of giving instruction in a wide range of technical subjects specially designed and arranged for self-study at home under the skilled guidance of our teaching staff.

**NEW** — experimental outfits and lesson manuals are despatched on enrolment and remain the student's property. A tutor is allotted to each student for personal and individual tuition throughout the course.

Radio and television courses, with which specially prepared components are supplied, teach the basic electronic circuits (amplifiers, oscillators, detectors, etc.) and lead, by easy stages, to the complete design and servicing of modern Radio and T/V equipments.

If you are studying for an examination, wanting a new hobby or interest, commencing a career in industry or running your own full-time or part-time business, these practical courses are ideal and may be yours for moderate cost. Send off the coupon to-day for a free Brochure giving full details. There is no obligation whatsoever.



- Courses with Equipment**
- RADIO · SHORT WAVE RADIO
  - TELEVISION · MECHANICS
  - CHEMISTRY · PHOTOGRAPHY
  - ELECTRICITY · CARPENTRY
  - ELECTRICAL WIRING · 'HI-FI'
  - ORAUGHTSMANSHIP · ART etc.

E.M.I. Factories at Hayes England.



# EMI INSTITUTES

Fill in for **FREE BROCHURE**  
 E.M.I. INSTITUTES, Dept. 32 X, London. W.4.

Name ..... Age .....  
 (If under 21)

Address .....

I am interested in the following subject(s) with/without equipment  
 (We shall not worry you with personal visits)

1C107

**FREE**

BLOCK CAPS PLEASE

MAR '58

*The only Home Study College run by a World-wide industrial organisation*

# R.S.C. BATTERY CHARGING EQUIPMENT

All for A.C. Mains 200-250 v., 50 c/s. Guaranteed 12 months.

## ASSEMBLED CHARGERS

6 v. 1 amp.....	19/9
6 v. or 12 v. 1 amp.....	27/9
6 v. or 12 v. 2 amps.....	29/9
6 v. or 12 v. 4 amps.....	38/9
6 v. or 12 v. 4 amps.....	58/9

Above ready for use. Carr. 3/6. With mains and output leads.

## SELENIUM RECTIFIERS

<b>F.W. BRIDGE TYPES</b>	
6.12 v. 1 a. 4/11	I.T. Types II.W.
6.12 v. 2 a. 9/9	6.12 v. 1 a. H.W. 2/9
6.12 v. 3 a. 11/9	6.12 v. 4 a. 14/9
6.12 v. 6 a. 19/9	250 v. 50 mA, 5/9
6.12 v. 10 a. 25/9	250 v. 80 mA, 7/9
6.12 v. 15 a. 35/9	250 v. 250 mA, 11/9

## BATTERY CHARGER KITS

Consisting of Mains Transformer, F.W. Bridge, Metal Rectifier, well ventilated case. Fuses, Fuse holders, Grommets, panels and circuit. Carr. 2/9 extra.

6 v. or 12 v. 1 amp.....	22/9
6 v. 2 amps.....	25/9
6 v. or 12 v. 2 amps.....	31/9
6 v. or 12 v. 4 amps.....	53/9

## BATTERY CHARGER KIT

Consisting of F.W. Bridge Rectifier, 6/12 v. 5 a. Mains Trans., 0-9-15 v. 6 a. output and Ammeter, 49/9. Post 3/6.

## ASSEMBLED CHARGER

6 v. or 12 v. 2 amps. Fitted Ammeter and selector plug for 6 v. or 12 v. Louvred metal case, finished attractive hammer blue. Ready for use. With mains and output leads. Double Fused. Only Carr. 3/9. **49/9**



## Assembled 6 v. or 12 v. 4 amps.

Fitted Ammeter and variable charge rate selector. Also selector plug for 6 v. or 12 v. charging. Louvred metal case with stoved blue hammer finish. Fused 75/- and ready for use with mains and output leads. Carr. 4/6. Credit Terms: Deposit 30/- and 4 monthly payments, 13/-.

# R.S.C. MAINS TRANSFORMERS (FULLY GUARANTEED)

Interleaved and Impregnated. Primaries 200-230-250 v. 50 c/s. Screened.

**TOP SHROUDED DROP THROUGH**

250-0-250 v. 70 mA, 6.3 v. 2 a, 5 v. 2 a.	16/9
350-0-350 v. 80 mA, 6.3 v. 2 a, 5 v. 2 a.	18/9
250-0-250 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	23/9
300-0-300 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	23/9
350-0-350 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	23/9
350-0-350 v. 100 mA, 6.3 v. 4 v. 4 a, C.T.	23/9
0-1-5 v. 3 a.	23/9
350-0-350 v. 150 mA, 6.3 v. 4 a, 5 v. 3 a.	29/9

**FULLY SHROUDED UPRIGHT**

250-0-250 v. 60 mA, 6.3 v. 2 a, 5 v. 2 a.	17/6
Midget type 21-3-31n.	26/9
250-0-250 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	26/9
250-0-250 v. 100 mA, 6.3 v. 6 a, 5 v. 3 a.	31/-
for R1355 conversion ...	26/9
300-0-300 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	26/9
300-0-300 v. 100 mA, 6.3 v. 4 a, 5 v. 3 a.	35/9
for Mullard 510 Amplifier ...	33/9
350-0-350 v. 150 mA, 6.3 v. 4 a, 5 v. 3 a.	33/9
350-0-350 v. 150 mA, 6.3 v. 2 a, 6.3 v. 2 a, 5 v. 3 a.	35/9
425-0-425 v. 250 mA, 6.3 v. 4 a, C.T.	49/9
6.3 v. 4 a, C.T., 5 v. 3 a. Suitable Williams Amplifier, etc....	49/9

**FILAMENT TRANSFORMERS**

All with 200-250 v. 50 c/s. primaries 6.3 v. 1.5 a, 5/9; 6.3 v. 2 a, 7/6; 0-4-6.3 v. 2 a, 7/9; 12 v. 1 a, 7/11; 6.3 v. 3 a, 8/11; 6.3 v. 6 a, 17/6; 12 v. 3 a, or 24 v. 1.5 a, 17/6.

**JUNCTION TRANSFORMERS.**

Brand new R.F. Type 17/6.

**VOLUME CONTROLS** with long (in. diam.) spindle, all values, less switch, 2/9. With S.P. switch, 3/9; with D.P. switch, 4/6.

**I.T. ELIMINATOR AND TRICKLE CHARGER KIT.** Input 200-250 v. A.C. Output 120 v. 40 mA. Fully smoothed and rectified supply to charge 2v. accumulator. Price with louvred metal case and circuit, 23/6, or ready for use, 8/9 extra.

## ELIMINATOR TRANSFORMERS

Primaries 200-250 v. 50 c/s.	15/9
120 v. 40 mA, 5-0-5 v. 1 a.	15/9
90 v. 15 mA, 4-0-4 v. 500 mA.	9/9

## CHARGER TRANSFORMERS

With 200-230-250 v. 50 c/s Primaries:	
0-9-15 v. 1 a. 11/9; 0-9-15 v. 3 a. 16/9;	
0-3-5-9-17 v. 3 a. 17/9; 0-9-15 v. 5 a. 19/9;	
0-9-15 v. 6 a. 23/9.	

## SMOOTHING CHOKES

250 mA, 5 H 100 ohms ...	12/9
150 mA, 7-10 H 250 ohms... ..	11/9
100 mA, 100 H 350 ohms... ..	8/9
60 mA, 10 H 400 ohms ... ..	4/11

## OUTPUT TRANSFORMERS

Midget Battery Pentode 681 for 3S4, etc....	3/9
Small Pentode, 5,000Ω to 3Ω ...	3/9
Small Pentode 7/8,000Ω to 3Ω ...	3/9
Standard Pentode 5,000Ω to 3Ω ...	4/9
Standard Pentode 7,000Ω to 3Ω ...	4/9
10,000 Ω to 3 Ω ... ..	4/9
Push-Pull 10-12 watts 6V6 to 3Ω or 15Ω ...	15/9
Push-Pull 10-12 watts to match 6V6 to 3-5-9 or 15 Ω ... ..	16/9
Push-Pull EL84 to 3 or 15 Ω ... ..	16/9
Push-Pull 15-18 watts, 6L6, KT66 ... ..	22/9
Push-Pull 20 watts, sectionally wound 6L6, KT66, etc., to 3 or 15 Ω	47/9

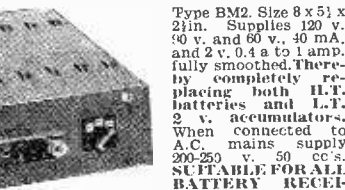
## MAINS TRANSFORMERS

Manufacturers' surplus, Primaries 200-250 v. 50 c/s. 250-0-250 v. 70 mA, 6.3 v. 2.5 a. Drop through type, 11/9. 375-0-375 v. 150 mA, 6.3 v. 4 a, C.T. 6.3 v. 1 a. Fully shrouded, 22/9. Postage 2/9 on either type.

**SPECIAL OFFERS:** Electrolytics, 32-32-32 mfd. 250 v. Dubiler small cap. 2/9 ea. 150 mfd. 450 v. 3/9. Small .0005 mfd. 2-gang, 4/9 ea. Westinghouse Rectifiers 250 v. 250 mA, 7/9. **CO-AXIAL CABLE.** 75 ohm, 1/4 in. 84. yd. Twin-Screened Feeder 11d. yd.

# R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all-dry battery eliminator. Size 5 1/2 x 4 1/2 in. approx. Completely replaces batteries supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 v. and 90 v. This includes latest low consumption types. Complete kit with diagrams, 39/9, or ready to use, 46/9.



**VERS** normally using 2 v. accumulator. Complete kit of parts with diagrams and instructions, 49/9, or ready for use, 59/6.

**MINIATURE MOTORS,** 24-28 v. D.C. or A.C. made by Hoover Ltd., Canada. Size only 2 1/2 x 1 1/2 in. Spindle 1/4 in. long, 1/4 in. diam. Brand New, 9/9.

**HEADPHONES,** Brand new. Low resistance. Only 6/9 pr.

**EX-GOVT. 50 WATT SPEECH AMPLIFIERS.** For normal 200-250 v. A.C. mains. Complete with hand 'mike' with good length of lead and all valves. Ready for use, in wood transit cases. Only 9 Gns., carr. 15/-.

**TANNOY RE-ENTRANT 8 WATT SPEAKERS.** For use with above, 27/6 ea.

## EXTENSION SPEAKERS

Ready for use in walnut veneered cabinet.

8in. 2-3 ohms, 35/9. Very limited number.



**EX-GOVT. METAL BLOCK (PAPER) CONDENSERS.**

4 mfd. 350 v., 2/9;	4 mfd. 1,000 v., 4/9;
8 mfd. 500 v., 4/9;	10 mfd. 500 v., 3/9;

## EX-GOVT. SMOOTHING CHOKES

300 mA, 20 H 200 ohms ... ..	19/9
250 mA, 5 H 50 ohms ... ..	12/9
150 mA, 10 H 100 ohms ... ..	11/9
150 mA, 6-10 H 150 ohms Trop. ...	6/9
120 mA, 12 H 100 ohms ... ..	3/11
100 mA, 5 H 100 ohms ... ..	3/11
80 mA, 10 H 150 ohms ... ..	3/11

## EX-GOVT. E.H.T. SMOOTHING CONDENSERS.

.02 mfd. 5,000 v. Cans. 2/9; .1 mfd. 2,500 v. Bakelite Tubulars. 3/3.

## THE SKYFOUR T.R.F. RECEIVER.

A design of a 3-valve Long and Medium wave 200-250 v. A.C. Mains receiver. It consists of a high gain H.F. stage and low distortion anode bend detector. Power pentode output is used. Valve line-up 6K7, 5P61, 6V6G. Selectivity and quality are well up to standard, and simplicity of construction is a special feature. Point-to-point wiring diagrams, instructions and parts lists, 1/9. Maximum building costs 24/19/6, including attractive Brown wood cabinet 12 x 6 1/2 x 5 1/2 in.

## EX-GOVT. DOUBLE WOUND STEP UP/STEP DOWN TRANSFORMERS.

10-0-100-220-240 v. to 5-0-75-115-135 v. or REVERSE. 80-100 watts. Only 11/9, plus 2/9 post. 10-0-100-220-240 v. to 9-0-110-122-136-148 v. or REVERSE. 200 watts, 35/9, plus 7/6 carr. Both 50 c.p.s.

## EX-GOVT. MAINS TRANSFORMER.

Primary 0-110-120-200-210-220-230-240-250 v. 50 c.p.s. Secs. 275-0-275 v. 100 mA, 6.3 v. 7 a, 5 v. 3 a. Govt. rating, 22/9. Following with 220-250 v. primaries, 400-0-400 v. 100 mA, 6.3 v. 3 a, 5 v. 2 a, 19/9; 230-0-230 v. 100 mA, 12.6 v. 1.5 a, 5 v. 2 a, 11/9; 12.6 v. 3 a, 5 v. 3 a, 9/9. Postage 2/9 on any type. Primary 200-250 v. Sec. 0-16-16-20 v. 60 amps Suitable Welding or Soil Heating, 79/6, carr. 7/6.

## EX-GOVT. CASES.

Size 14-10-9 1/2 in. high. Well ventilated, black-trackle finished. Undrilled cover. IDEAL FOR BATTERY CHARGER OR INSTRUMENT CASE. OR COVER ONLY BE USED FOR AMPLIFIER. Only 9/9, plus 2/9 postage. Size 8 1/2 x 13 1/2 x 6 1/2 ins. with undrilled well ventilated cover, finished in stoved grey enamel. Suitable for charger or instrument case, 7/9, plus 2/9 post.

## EX-GOVT. VALVES (NEW)

1T4	7/9	6J6	4/9	EC931	4/9
185	7/9	6V6G	7/9	EF80	7/9
354	8/9	6X4	6/9	EF91	6/9
5Z4G	8/9	6X5GT	8/9	EF91	8/9
5Z4G	8/9	6L6G	11/9	EF93	4/9
5Z4G	9/9	807	7/9	EL32	3/9
6K7C	5/9	12A6	7/9	KT43	8/9
6S7GT	6/9	15D2	4/9	EZ30	6/9
6SL6T	8/9	35ZACT	8/9	EL84	10/6
6SN7G	8/9	MH4	4/9	PW4500	9/9
6AT6	7/9	EC93	9/9	5P61	2/9

## ELECTROLYTICS (current production)

### NOT EX-GOVT.

Tubular Types		Can Types	
8μF 450 v. ... 1/9	16 mfd. 350 v. ... 1/11	8 μF 500 v. 2/8	16 mfd. 500 v. 2/9
16μF 350 v. ... 2/3	16μF 450 v. ... 2/9	16μF 450 v. ... 2/9	32μF 350 v. ... 2/11
16μF 450 v. ... 2/9	32μF 450 v. ... 4/9	100 mfd. 450 v. ... 4/9	100 mfd. 450 v. ... 4/9
16μF 500 v. ... 3/9	100 mfd. 450 v. ... 4/9	100 mfd. 25 v. 2/3	100 mfd. 25 v. 2/3
32μF 350 v. ... 3/9	100 mfd. 25 v. 2/3	8-16μF 450 v. ... 3/11	16-16μF 450 v. ... 4/11
25μF 25 v. ... 1/3	8-16μF 450 v. ... 3/11	50 mfd. 25 v. ... 1/6	32-32μF 350 v. ... 4/9
50μF 50 v. ... 1/9	16-16μF 450 v. ... 4/11	100 mfd. 12 v. 1/9	32-32μF 450 v. ... 5/9
100 mfd. 25 v. 2/3	32-32μF 450 v. ... 5/9	1.500 mfd. 6 v. 1/6	100 mfd. 25 v. 2/3
3,000 mfd. 6 v. 3/9	100-200 mfd. 7.9	6,000 mfd. 6 v. 3/9	275 v. ... 6/9

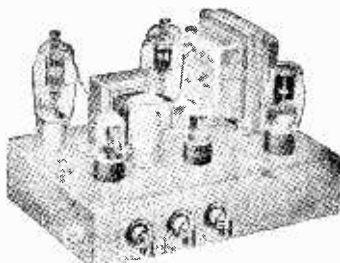
Many others in stock.

**R.S.C. A8 ULTRA LINEAR 12 WATT AMPLIFIER**

High-Fidelity Push-Pull Amplifier with "Built-in" Tone Control. Pre-amp stages. High sensitivity. Includes 5 valves (877 outputs). High Quality sectionally wound output transformer, specially designed for Ultra Linear operation, and reliable small condensers of current manufacture. **INDIVIDUAL CONTROLS FOR BASS AND TREBLE**. "Lift" and "Cut." Frequency response - 3db, 30-30,000 c/s. Six negative feedback loops. Hum level 7 db. down. ONLY 70 millivolts input required for FULL OUTPUT. Suitable for use with all makes and types of pick-ups and practically all microphones. Comparable with the very best designs. **FOR STANDARD or LONG - PLAYING RECORDS.** For **MUSICAL INSTRUMENTS** such as **STING BASS, GUITARS, etc.** **OUTPUT SOCKET** with plug provides 300 v. 20 mA. and 6.3 v. 1.5 a. For supply of a **RADIO FEEDER UNIT.** Size approx. 12-9-7in. For A.C. mains 200-230-270 v. 50 c/s. Outputs for 3 and 15 ohm speakers. Kit is complete - last nut. Chassis is fully punched. Full instructions and point-to-point wiring diagrams supplied. Unapproachable value at £7/15/- or factory built 45/- extra. Carriage 10/-.

**£7-15-0**

If required louvred metal cover with 2



carrying handles can be supplied for 18/9. Additional input socket with associate Vol. control so that two different inputs such as Gram and 'Mike' or Tape and Radio can be mixed. can be provided for 19/- extra. Guaranteed 12 months. **TERMS** on assembled two input model : **DEPOSIT** 25/6 and nine monthly payments 25/6. **HIGH-FIDELITY MICROPHONES and SPEAKERS** in stock. Keep cash prices or Credit terms if supplied with amplifier.

**R.S.C. 30 Watt ULTRA LINEAR HIGH-FIDELITY AMPLIFIER A10**

A highly sensitive Push-Pull high output unit with self-contained Pre-amp. Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 10 db. down. Frequency response - 3 db. 30-30,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used. EF86, EF86, ECC83, 807, 807, GZ33. Separate Bass and Treble Controls are provided. Minimum input required for full output is only 12 millivolts so that **ANY KIND OF MICROPHONE OR PICK-UP IS SUITABLE.** The unit is designed for **CLUBS, SCHOOLS, THEATRES, DANCE HALLS or OUTDOOR FUNCTIONS, etc.** For use with Electronic **ORGAN, GUITAR, STRING BASS, etc.** For standard work. Only 8 GNS. **OUTPUT SOCKET PROVIDES L.T. and I.L.T. for a RADIO FEEDER UNIT.** An extra input with associated vol. control is provided so that two separate inputs such as Gram and 'Mike' can be mixed. Amplifier operates on 200-250 v. 50 c/s. A.C. Mains and has outputs for 3 and 15 ohm speakers. Complete kit of parts with fully punched chassis and point-to-point wiring diagrams and instructions. If required cover as for Carr. 10/-

**£10-19-6**

can be supplied for 18/9. The amplifier can be supplied factory built with 12 months' guarantee, for £13/13/0. **TERMS: DEPOSIT 36/-** and 9 monthly payments of 31/-.

**R.S.C. 45 WATT A5 HIGH-GAIN AMPLIFIER**

A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolts input is required for full output so that it is suitable for use with the latest high-fidelity pick-up heads. In addition to all other types of pick-ups and practically all 'mikes'. Separate Bass and Treble Controls are provided. These give full long-playing record equalisation. Hum level is negligible being 71 db. down. 15 db. of negative feedback is used. H.T. of 300 v. 25 mA. and L.T. of 6.3 v. 1.5 a. Available for the supply of a Radio Feeder Unit, or Tape Deck pre-amplifier. For A.C. mains input of 200-230-250 v. 50 c/s. Output for 2-3 ohms speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis (with baseplate) with Blue hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4/15/-, or assembled ready for use 25/- extra, plus 3/6 carr. or Deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.



**LINEAR L745 HIGH QUALITY TAPE DECK AMPLIFIER.** With "built in" power pack and output Ready for stage. For Tape Decks Use ONLY with High or Low Impedance, Playback and Erase Heads, such as Lane, Truvox, Asplon, Collaro, Carr. 7/6. Fencil, etc. For A.C. Mains 230-250 v. 50 c/s. Linear frequency response of +3 db. 50-11,000 c/s. Negative feedback equalisation. Illustrated leaflet 6d.

**12 GNS.**

**STAA GALAXY 4 SPEED MIXER AUTO-CHANGER.** Attractive two tone finish. A precision manufactured unit with a motor which virtually eliminates "wow" and "rumble." The only changer with exclusive finger tip control. Playing desk size 11 1/2 in. Depth below baseboard 2in. Above 5in. Fitted pick-up with dual sapphire tipped stylus. For 200-250 v. 50 c/s. A.C. mains. A limited number of these luxury units available at only 9 GNS. Carr. 4/6. Brand New.

Terms: C.W.O. or C.O.D. NO C.O.D. under 21. Post 19 extra under £2; 2/9 extra under £5. All goods supplied subject to terms and guarantee as detailed in current catalogue. Open 9 to 5.30; Sats. until 1 p.m. Catalogue 61. Trade list 5d. S.A.E. with all enquiries.

**R.C.A. 20 WATT RE-ENTRANT SPEAKERS.**

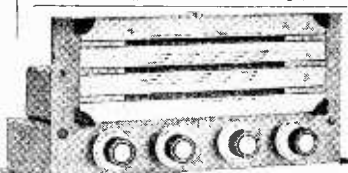
15 ohms or 600 ohms matching. For Outdoor work. Only 8 GNS. **P.M. SPEAKERS.** All 2-3 ohms, suitable for use with LG3, L45, A5, or A7 amplifiers, 5in. Goodmans, 17/9. 7 x 4in. Elliptical Blac., 19/9. 6 1/2in. Goodmans, 17/9. 6 in. Rola, 19/9. 10in. Goodmans, 27/9. 10 x 6 in. Elliptical Goodmans, 27/9. 12in. Plessey, 29/11. 10in. W.B. "Stentorian" 3 or 15 ohms type HF1012 10 watts, hi-fidelity type. Recommended for use with our A8 Amplifier. £4/10/9. 12in. Plessey 3 ohms 10 watts. (12,000 lines), 59/6.

**PLESSEY DUAL CONCENTRIC 12in. 15 ohm HIGH FIDELITY SPEAKER** with built-in tweeter (completely separate elliptical speaker with choke, condensers, etc.), providing extraordinarily realistic reproduction when used with our A8 or similar amplifier. Rated 10 watts. Price complete, only 55/17/6.

**M.E. SPEAKERS** 2-3 ohms. 8in. R.A. Field. 600 ohms 11/9.

**R.S.C. 3-4 WATT A7 HIGH-GAIN AMPLIFIER**

For 200-250 v. 50 c/s. Mains input. Appearance and Specification, with exception of output wattage, as A5. Complete Kit with diagrams, £3/15/-. Assembled 22/6 extra. Carr. 3/6.



**AM/FM RADIOGRAM CHASSIS HIGH QUALITY 6-8 WATT PUSH-PULL OUTPUT**

For 200-250 v. Mains. Long wave, Medium, P.M. and Gram. Complete with 8 B.V.A. valves. Guaranteed 12 months. Only 22 GNS. Or Deposit £2/12/- and 9 monthly payments of £2/12/-.

**COLLARO RC51 4-SPEED AUTO-CHANGERS** with Studio Pick-up. Brand new. For 110 v. 50 c.p.s. A.C. mains. Price with 110 v. to 200-250 v. Auto Trans. only 7 Gns. Carr. 6/6.

**COLLARO RC 457 4-SPEED AUTO-CHANGERS** with high fidelity Studio Pick-up. Latest model. Brand new. Cartoned. For 200-250 v. 50 c.p.s. A.C. mains. Our price £8/19/6. Carr. 5/6. Credit Terms. Deposit 3 gns. and 6 monthly payments of 21/6.

**COLLARO 4-SPEED SINGLE PLAYER** with separate pick-up, as fitted RC457. For 200-250 v. A.C. mains. £4/12/6. Post 6/9.

**LG3 MINIATURE 2-3 WATT GRAM AMPLIFIER.** For use with above or any other single or auto-change units. Output for 2-3 ohm speaker. For 200-250 v. 50 c.p.s. A.C. mains. Overall size 6 1/4 x 4 1/4 x 2 1/4 in. Control Volume and Tone with switch. Guaranteed 12 months. Only 55/9.

**PORTABLE CABINETS.** Exceptionally attractive appearance. Takes above amplifier and 3 or 4 speed auto-changer or single player. 69/3. Carr. 4/6.

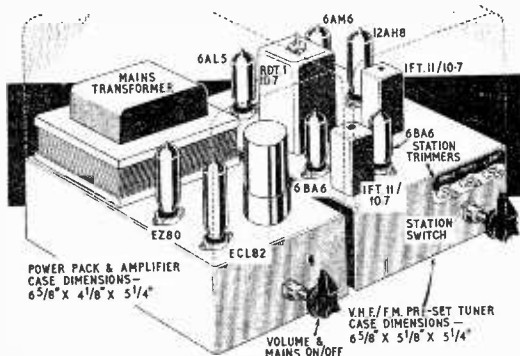
**SUPERHET FEEDER UNIT.** Design of a high quality Radio Tuner Unit (specially suitable for use with any of our Amplifiers). Delayed A.V.C. employed. The W.Ch. Sw. incorporates Gram position. Controls are Tuning, W.Ch. and Vol. Only 250 v. 15 mA. H.T. and L.T. of 6.3 v. 1 amp. required from amplifier. Size of unit approx. 9-6-7in. high. Simple alignment procedure. Point-to-point wiring diagrams, instruction and priced parts list with illustration, 2/6. Total building cost, £4/15/-. For description see leaflet send S.A.E.

**LINEAR L45 MINIATURE 4.5 WATT QUALITY AMPLIFIER.** Suitable for use with Collaro, B.S.R. or any other record-playing unit, and most microphones. Negative feedback 12 db. Separate Bass and Treble Controls. For A.C. mains input of 200-250 v. 50 c/s. output for 2-3 ohm speaker. Three miniature Mullard valves used. Size of unit only 6-5-5 1/2 in. high. Output for 2-3 ohm speaker. Guaranteed for 12 months. Only £5/19/6. Send S.A.E. for illustrated leaflet. Credit Terms. Deposit 22/6 and 5 monthly payments of 22/6.

**LINEAR "DIATONIC" 10-14 WATT HIGH FIDELITY PUSH-PULL ULTRA LINEAR AMPLIFIER.** For 200-250-270 v. 50 c/s. A.C. mains. Valve line-up ECC83, ECC83, EF86, EF86, EF86, miniature Mullard. The unit has self-contained Pre-amplifier Tone Control stages and separate Bass and Treble Controls. Independent 'Mike' and Gram input sockets are provided. Size is only 9-7-6in. Output Matchings for 3 and 15 ohm speakers. Only 12 GNS. or Deposit 26/9 plus 10/- carr. and 9 monthly payments of 26/9. Send S.A.E. for leaflet.

**RADIO SUPPLY CO. (Dept. W) 32, THE CALLS, LEEDS, 2**

## INTRODUCING THE COMBINED POWER PACK AND AMPLIFIER FOR THE "MAXI-Q" PRE-SET OR VARIABLE F.M. TUNER WHICH NOW OFFERS YOU A COMPLETE RECEIVER



each winding is 90 and the coupling critical. Can size 13/16in. sq.  $\times$  1 1/4in. high, 6.6. COILS, TYPE L1, T1 and T2. Specially designed for use in this unit, are wound on polystyrene formers complete with iron dust core tuning, 3/11 each.

THE "MAXI-Q" PRE-SET F.M. TUNER is available completely wired, assembled, valved and housed in a sturdily made gold-finished cover at £8/11/5, plus £3/8/7 P.T. = £12.

VARIABLE F.M. TUNER completely assembled at £7/17/2, plus £3/2/10 P.T. = £11 (carriage 3/-, terms c.w.o.).

GENERAL CATALOGUE covering technical information on full range of components, 1/-, post free.

TRADING TERMS for direct postal orders, c.w.o., plus appropriate postal charge. Please send S.A.E. with all enquiries.

### DENCO (CLACTON) LTD. (Dept. P.W.), 357/9 Old Road, Clacton-on-Sea, Essex

## YOU can build any of these at Low Cost!

### A MINI TRANSISTOR RADIO

#### AN IDEAL PRESENT



A two-stage highly sensitive circuit uses a new super high gain transistor coil and mini tuning Total build-condenser. Gives re- markable performance. With step-by-step instructions. Beginners can't go wrong

Get your order in while prices are low. Send 2/- for wiring diagram and component price list.

**37/6**

includes Plastic case mini ear-piece, Batteries etc. All parts sold separately.

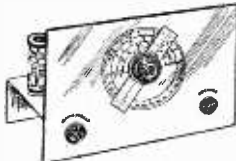
Ideal for:

- Late night listening.
- Children's nursery, etc.

### 1v. WORLD WIDE SHORT-WAVE RADIO

#### EXPLORE THE WORLD ON SHORT WAVES!

Can be built for from our list of components which can all be purchased separately, covers 10-100 metres and is capable of receiving speech and music from all over the world. Price includes the famous 954 acorn valve and one coil covering 40-100 metres. Provision is made to increase to two or three valves and all components are colour coded. Send 2/- for point to point wiring diagram, layout and price list.



30/-

Post and packing: Under 10/- add 9d.; under 40/- add 1/6; over POST FREE.

### TRANSISTOR POCKET RADIO



The ideal low cost transistor pocket radio for the beginner. The Two-Stage circuit utilises the new R.C.S. VARILoopstick transistor coil. A specially designed miniature .0005 tuning condenser permits the receiver to be in a case which fits in the palm of your hand. Works for months off small battery costing 7d. Can be built in 30 minutes. PRICE 30/-

All components are sold separately, full construction data, including plan to parts for 2/-.

### PERSONAL PORTABLE RADIO

#### THE SET FOR PERSONAL LISTENING

This little set was designed to give you a real personal portable radio that you can listen to anywhere without disturbing others. Use it on camping trips, in bed, in your office. Supplied with detachable rod aerial, it covers all the medium waves 200-500 metres. Average building time one hour. PRICE 30/-

Send 2/- for specification, point to point circuit and parts price list.



R.C.S. PRODUCTS (RADIO) LTD., 11, OLIVER ROAD, LONDON, E.17. (Mail Order only)

# TOP QUALITY FULLY GUARANTEED VALVES

## ALL GOODS LISTED ARE ACTUALLY IN STOCK

**EXPRESS SERVICE !!!**

**C.O.D. ORDERS RECEIVED BY 3.30 P.M. EITHER BY LETTER, PHONE OR WIRE, DESPATCHED THE SAME AFTERNOON. ALL ORDERS RECEIVED BY FIRST POST DESPATCHED SAME DAY**

**FOR ONLY 6d. EXTRA PER ORDER WE WILL INSURE YOUR VALVES AGAINST DAMAGE IN TRANSIT. ALL UNINSURED PARCELS AT CUSTOMER'S RISK.**

IA3	3/-	6AT6	8/6	6K8GT/G	10P13	17/6	30P4	15/-	CV63	10/6	ECC33	8/6	EZ40	8/-	PCC85	12/6	UB41	17/7
IA5	6/-	6A06	10/6		11E3	15/-	30P12	13/6	CV85	12/6	ECC35	8/6	EZ41	10/6	PCF80	14/-	UBC41	8/6
IA7	15/-	6B4G	6/6	6L6G	9/6	12A6	6/6	31	CV271	10/6	ECC81	8/6	EZ80	9/6	PCF82	12/6	UBF80	9/6
ID6	10/6	6B7	10/6	6L7M	8/-	12AH7	8/-	33A/158M	CV428	30/-	ECC82	7/6	EZ81	10/6	PCN42	12/6	UBF89	10/6
IH5	11/-	6B8G	4/6	6L18	13/-	12AH8	10/6		CV428	30/-	ECC83	9/-	GZ30	10/6	PEN40DD	UCC85	10/6	
IL4	6/6	6B8M	5/-	6N7	8/-	12AT6	10/6	35J51	D42	10/6	ECC84	10/-	GZ32	12/6		25/-	UCH42	11/-
ILD5	5/-	6BA6	7/6	6Q7G	10/-	12AT7	8/6	35A5	D63	5/-	ECC85	9/-	GZ34	14/-	PEN45	19/6	UCH81	11/6
ILN5	5/-	6BE6	7/6	6Q7GT	11/-	12AU7	7/6	35L6GT	D77	6/6	ECC91	5/6	H30	5/6	PEN46	7/6	UCL82	13/6
IN5	11/-	6BJ6	8/-	6R7G	10/-	12AX7	9/-	35W4	DAF32	11/-	ECF80	13/6	H63	12/6	PLB2	10/-	UF41	9/-
IR5	8/6	6BR7	11/6	6SA7GT	8/6	12BA6	9/-	35Z3	DAF91	8/-	ECF82	13/6	HABC80		PLB3	11/6	UF80	10/6
IS5	8/6	6BV6	8/6	6SC7	10/6	12BE6	10/-	35Z4GT	DAF96	10/-	ECF85	9/-			PM2B	12/6	UF85	10/6
IT4	7/-	6BW7	14/-	6SH7	8/-	12E1	30/-	35Z5GT	DF33	11/-	ECH42	10/-	HK90	10/6	PM12	4/-	UF89	10/6
IU5	7/-	6BX6	14/-	6SHT	10/6	12J5GT	4/6	41MTL	DF91	7/-	ECH81	9/-	HL23	10/6	PM12M	6/6	UL41	11/-
2A3	12/6	6C4	7/-	6SJT	8/-	12J7GT	10/6	50C5	DF96	10/6	ECL80	14/-	HL41	12/6	PY80	9/-	UL46	15/-
2A7	10/6	6C5	6/6	6SK7GT	8/-	12K7GT	7/6	50L6GT	DH63	10/6	ECL82	14/-	HL133DD		PY81	9/-	UL84	11/6
2C26	4/-	6C6	6/6	6SL7GT	8/-	12K8GT		61BT	DH76	7/6	EF36	6/-			PY82	9/-	UY41	8/6
2DI3C	7/6	6C8	12/6	6SN7GT	7/6		14/-	61SPT	DH77	8/6	EF37A	9/-	HVR2	20/6	YB3	9/6	UY85	10/6
2X2	4/6	6C9	12/6	6SST	8/-	12Q7GT	7/6	72	DK32	15/-	EF39	6/-	HVR2A	6/-	QP21	7/-	V1507	5/-
3A4	7/-	6C10	12/6	6U4GT	14/-	12SA7	8/6	77	DK91	8/6	EF40	15/-	KL35	8/6	QP25	15/-	VLS492A	£3
3A5	12/6	6CH6	7/6	6U5G	7/6	12SC7	8/6	78	DK92	12/6	EF41	9/6	KT2	5/-	QSI50/15	VMP4G	15/-	
3B7	8/6	6D5	6/6	6U7	8/6	12SG7	8/6	80	DK96	10/6	EF42	12/6	KT33C	10/-	VP2(7)	12/6		
3D5	5/-	6E5	12/6	6V6G	7/-	12SH7	8/6	83V	DL2	15/-	EF50(A)	7/-	KT44	15/-	QVO4/7	VP4(7)	15/-	
3Q4	9/-	6F1	15/-	6VG6GT	8/-	12SJ7	8/6	85A2	DL33	9/6	EF50(E)	5/-	KT63	7/-		VP13C	7/-	
3Q5GT	9/6	6F6G	7/-	6X4	7/-	12SK7	8/6	150B2	DL92	8/-	EF54	5/-	KTW61	8/-	R12	12/6	VP41	7/6
3S4	8/-	6F6GT	8/-	6X5GT	6/6	12SQ7	8/6	807	DL94	9/-	EF73	10/6	KTW62	8/-	SD6	12/7	VR105/30	9/-
3V4	9/-	6F8	12/6	6Z4/84	12/6	12SR7	8/6	956	DL96	10/6	EF80	14/-	KTW63	8/-	SP4(7)	15/-	VR150/30	9/-
5U4	8/6	6F12	9/-	6Z5	12/6	12Y4	10/6	1203	DL10	10/6	EF85	9/-	KTZ41	6/6	SP41	3/6	VT61A	5/-
5V4	12/6	6F13	13/-	6J30L2	12/6	12R7	10/6	4033L	DM70	8/6	EF86	14/6	KTZ63	10/6	SP42	12/6	VT501	5/-
5X4	10/-	6F16	9/6	7A7	12/6	14S7	10/6	5763	EA50	2/-	EF89	10/-	L63	6/-	SP61	3/6	W76	7/6
5Y3G	8/-	6F17	12/6	7B7	9/-	19A0X	11/-	7193	EA76	9/6	EF91	9/-	LN152	14/-	SU61	12/6	X61	12/6
5Y3GT	8/6	6F32	10/6	7C5	8/-	19H1	10/6	7475	EABC80	9/-	EF92	6/6	LZ319	14/-	TP22	15/-	X65	12/6
5Y4	12/6	6F33	7/6	7C6	8/-	20D1	16/-	9002	EAC91	7/6	EL32	5/6	MH4	7/6	U16	12/6	X66	12/6
5Z3	12/6	6G6	6/6	7H7	8/-	20L1	13/6	9003	EAF42	10/6	EL41	11/-	MHL4	7/6	U18/20	12/6	X79	12/6
5Z4G	10/6	6H6GT/G	7Q7	9/-	25L6GT	10/-	9006		EB34	2/6	EL42	11/-	MHLD5	12/6	U22	8/-	XD(1.5)	6/6
5Z4GT	12/6		3/-	7S7	10/6	25Y5	10/6	AC6PEN	EB41	8/6	EL81	15/-	M4	12/6	U31	10/-	XFW10	6/6
6A8	10/-	6H6M	3/6	7V7	8/6	25Y6	10/6	AC/H/L	EB91	6/6	EL84	10/6	M6	6/6	U43	12/6	XFY12	6/6
6A87	8/-	6J5G	5/-	7Y4	8/-	25Z5	10/6	DDD	EB33	7/6	EL91	5/-	MU14	10/6	U50	8/-	XH(1.5)	6/6
6A88	14/-	6J5GTG	5/6	8D2	3/6	25ZAG	10/6	AC/P4	EB34	10/6	EM34	10/-	OA10	12/6	U52	8/6	XSG(1.5)	6/6
6AC7	6/6	6J5GTM	6/6	8D3	9/-	25ZAG	10/6	AP4	EBF80	10/6	EM80	10/6	OA70	5/-	U76	8/6	Y63	7/6
6AG5	6/6	6I6	5/6	9D2	4/-	28D7	7/-	ATP4	EBF89	9/6	EY51		OA72	5/-	U78	7/-	Z63	10/6
6AJ8	9/-	6J7G	6/6	10C1	15/-	30	7/6	AZ31	EC52	5/6	EC54	6/-	(Small)	12/6	OC71	30/-	U251	15/-
6AK5	8/-	6J7GT	10/6	10FI	15/-	30C1	14/-	BL63	EC70	12/6	EC70	12/6	EY51		P61	3/6	U404	10/6
6AL5	6/6	6K7G	5/-	10F9	11/6	30F5	14/-	CK505	EC70	12/6	EC70	12/6	EY51		P61	3/6	UABC80	
6AM6	9/-	6K7GT	6/-	10F18	12/6	30FL1	12/6	CK506	ECC31	15/-	(Large)	12/6	PABC80	15/-			Z77	9/-
6AQ5	7/6	6K8G	8/-	10LD3	8/6	30L1	12/6	CK523	ECC32	10/6	EZ35	6/6	PCC84	10/-	UAF42	10/6	Z79	14/6

**TERMS OF BUSINESS:—CASH WITH ORDER OR C.O.D. ONLY. ORDERS VALUE £3 OR MORE SENT POST/PACKING FREE. ORDERS BELOW £3 PLEASE ADD 6d. PER VALVE. C.O.D. ORDERS:—MINIMUM FEE, INCLUDING POST AND PACKING, 3/-. WE ARE OPEN FOR PERSONAL SHOPPERS. MON-FRI. 8.30-5.30. SATS. 8.30-1 p.m.**

**ALL VALVES NEW, BOXED, TAX PAID, AND SUBJECT TO MAKERS' GUARANTEE. FIRST GRADE GOODS ONLY, NO SECONDS OR REJECTS. GOODS ARE ONLY SOLD SUBJECT TO OUR TERMS OF BUSINESS, OBTAINABLE FREE ON REQUEST. CATALOGUE OF OVER 1,000 DIFFERENT VALVES 3d.**

When comparing our prices, remember just what we offer. Bentley valves are not only "GUARANTEED NEW AND BOXED," and "GUARANTEED TESTED AT TIME OF DESPATCH," Bentley valves are NEW, BOXED, AND SUBJECT TO THE MAKERS' STANDARD GUARANTEE AS WELL. Only our enormous turnover enables us to select the products of the world's finest manufacturers at lowest prices and pass the benefits on to YOU.

## BENTLEY ACOUSTIC CORPORATION LTD.

THE VALVE SPECIALISTS

38 CHALCOT ROAD, LONDON, N.W.1

PRImrose 9090

PLEASE ENQUIRE FOR ANY VALVE NOT LISTED. 3d. STAMP, PLEASE.



## Stern's "fidelity" TAPE RECORDER

### IT HAS EVERYTHING—EXCEPT A HIGH PRICE

TESTED AND APPROVED AT THE TRUVOX LABORATORIES

IT INCORPORATES: The NEW TRUVOX Mk. IV TAPE DECK together with the "fidelity" MODEL HF/TR2 TAPE AMPLIFIER (both illustrated on this page), and a Rofa 10in. x 6in. P.M. SPEAKER.

PRICE... including CRYSTAL MIKE and 1,200ft. reel of PLASTIC TAPE.

**£49. 10. 0.**

(OR £3 EXTRA WITH REV. COUNTER.)

(Plus £1/10/- carriage and insurance, of which £1 is refunded on return of Packing case.)

● BEFORE CHOOSING YOUR TAPE RECORDER YOU SHOULD HEAR THIS MODEL—"TRULY" "HI-FI" RECORDINGS ARE OBTAINABLE and it is comparable to much higher priced Recorders.

Alternatively send S.A.E. for ILLUSTRATED LEAFLET.

CREDIT SALE: Deposit £12.8/- and 9 m'thly payments of £4 10.8. HIRE PURCHASE: Deposit £24/15/- and 12 monthly payments of £2.5 11.

**NEWS!!** Our "Fidelity Junior" Tape Recorder is now available. It is similar in appearance to the model illustrated above and incorporates the TRUVOX MK III Deck and the correctly matched HF/TR1A Tape Amplifier. Price is only 39 gns. complete with ACOS crystal mike and 1,200ft. of Plastic Tape. **39 Gns.**

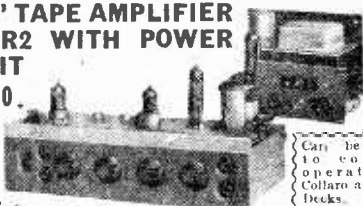
## The "fidelity" TAPE AMPLIFIER Model HF/TR2 WITH POWER SUPPLY UNIT

PRICE **£16. 0. 0.**

(Carr. and ins. 6/-).

H.P. TERMS: Deposit £8 and 9 months of £1.

CREDIT TERMS: Deposit £4 and 9 monthly payments of £1/9/4. When ordering, please advise make of deck in use. Send S.A.E. for full details.



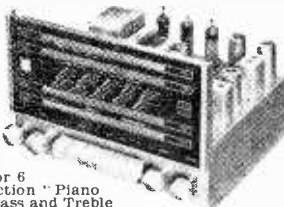
Can be supplied to correctly operate with Collaro and Truvox Decks

HOME CONSTRUCTORS We can supply a COMPLETE KIT OF PARTS to build this TAPE AMPLIFIER for £12 (plus 5/- carr. and ins.). The Assembly Manual, Practical Diagrams, etc., are available for 2/6. WE MAKE SPECIAL PRICES TO PURCHASERS OF TAPE EQUIPMENT (i.e., buyers of Deck and Amplifier together, etc., etc.). SEND YOUR ENQUIRY TO US... H.P. and CREDIT SALE TERMS ARE AVAILABLE.

## MODERNISE YOUR OLD RADIOGRAM

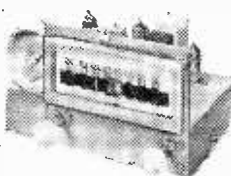
The NEW ARMSTRONG PB. 409 A.M./F.M. Radiogram Chassis

"A chassis for those who want the highest quality." ● A 9-valve line up employing the latest MULLARD preferred-type valves. ● Provides complete coverage of the V.H.F. F.M. Transmissions plus the Short, Medium and Long Wavebands. ● Has Push-Pull Output with Negative Feedback for 6 watts peak Output. ● Quick Action "Piano Key" Selectors and separate Bass and Treble Controls. ● Has "Magic Eye" Tuning Indicator. ● Dimensions 13in. x 9 1/2in. x 8in. high. Dial size 11in. x 5in. PRICE **£29. 8. 0.** TERMS: Credit £7.7.0 and 9 monthly payments of £2.14.0. (Plus 6/- carr. & ins.) H.P. £14.14.0 and 12 monthly payments of £1.7.3. SEND S.A.E. FOR ILLUSTRATED LEAFLET.



## STERN'S "F.M." TUNING UNIT

A 5-valve Tuner incorporating the latest Mullard Permeability Tuning Heart and a "Magic Eye" Tuning Indicator. PRICE ASSEMBLED **£14. 10. 0.** READY FOR USE (Plus 7/6 carriage and insurance). TERMS: (a) Hire Purchase: Deposit £7.5.0 and 9 monthly payments of 18/4. (b) Credit: Deposit £3.12.6 and 9 monthly payments of £1.5.7.



HOME CONSTRUCTORS—You can build this unit for **£10.0.0.** Full Assembly Instructions are available for 1/6.

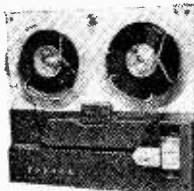
## The NEW TRUVOX MkIV TAPE DECK ONE OF THE BEST DECKS ON THE MARKET.

PRICE **£27. 6. 0.** (Plus 10/- carr. and ins.)

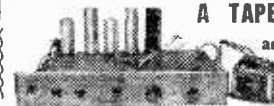
CREDIT TERMS: Deposit £6/17/- and 9 monthly payments of £2/10/-.

H.P. TERMS: Deposit £13/13/- and 12 monthly payments of £1.5 4.

WE ALSO HAVE A FEW DECKS WITH REV. COUNTERS. Price £50.8/- Send S.A.E. for details.



## A TAPE PRE-AMPLIFIER and ERASE UNIT



STERN'S MODEL HF/TR1.—A completely assembled Pre-amplifier with

own Power Supply. Can be supplied correctly matched for use with Truvox or Collaro Decks and incorporates Recording Level Indicator and Monitoring facilities. Please send S.A.E. with any enquiry. Price £50.8/-

PRICE **£11. 10. 0.** (Plus 5/- carr. and ins.) SPECIAL PRICE REDUCTION WHEN PURCHASED WITH TAPE DECK.

## WE HAVE THE FULL RANGE OF DULCIS CHASSIS IN STOCK

THE MODEL H.4. is illustrated but all Chassis and Tuners are similar—send S.A.E. for leaflets. H.P. and CREDIT SALE TERMS are available. Send S.A.E. for details.

RADIOGRAM CHASSIS These two Chassis are really well designed and reproduce most excellent quality on both Radio and gram.

MODEL H.3. A 3 Waveband AM/PM CHASSIS **£20.17.0.**  
MODEL H.4. A 4 Waveband AM/PM CHASSIS **£24.5.6.**  
MODEL H.4.T. A 4 Waveband AM/PM TUNER with self-contained POWER SUPPLY **£20.17.0.**

## "FRUSTRATED EXPORT ORDER"

The Corsor Model 527 X 4-Valve "Aldry" Battery Portable.

Offered for **£6. 15. 0.** Plus 5/- carr. & ins.



Consists of a 4-valve Superhet Receiver covering Medium Waveband 197-575 metres, and two Short Wavebands 13.6 to 136 metres. The new low consumption valves are incorporated and the whole is accommodated in an attractively robustly made case. Battery required is 90 volts and 1.4 volts (price 19/6) and is external to case.

## STERN RADIO

LIMITED (Dept. P.W.)

PLEASE SEND S.A.E. WITH ALL



# COMPLETE KITS of PARTS for the "Hi-Fi" ENTHUSIAST

## STERN'S REMOTE CONTROL UNIT

Designed in particular for use with the MULLARD 5-10 Main Amplifier



Ideally suited for simple domestic installation as an alternative to the more elaborate Pre-amplifier (shown and described opposite). Tone Control facilities are really excellent and in conjunction with the "5-10" Main Amplifier reproduction is of very high quality. Perfectly suitable for use with all the popular Record Players (B.S.R., Collaro, Garrard) and the modern Radio Tuner Units. Front Panel contains: (a) Coloured Indicator, (b) Separate BASS and TREBLE CONTROLS, (c) 3 position Selector Switch, (d) Volume control. Inputs on back for Radio and Gram. and Gram. equalising is incorporated.

FULL DATA is contained in the 5-10 MAIN AMPLIFIER MANUAL at 1/6.

## RECORD PLAYERS

THE VERY LATEST MODELS ARE IN STOCK

**MANY AT REDUCED PRICES!!!**

TRANSCRIPTION UNITS - AUTO-CHANGERS, SINGLE RECORD PLAYERS

Send S.A.E. for ILLUSTRATED STOCK LIST

## SPECIAL CASH OFFERS!!!

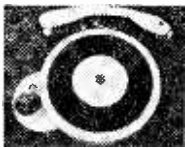


The Latest Collaro 4 Speed Single Record Player.

Incorporating the very popular STUDIO "O" CRYSTAL PICK-UP. For **£5.19.6** (Plus 5/- carr. and ins.)

Incorporates Auto-Stop and Plays 78 r.p.m. and all types of L.P. Records.

The Collaro "Junior" Rim Drive 4 Speed Record Player



Offered complete with Collaro Crystal Pick-up. For **£4.10.0**

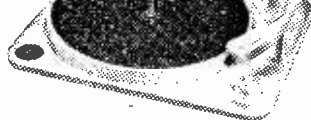
(Plus 4/- carr. and ins.)

We also offer Gram Motor and Turntable at **£3.2.6**. Crystal Pick-up only, **£1.12.6**. (Carr. and Ins. 2/6 extra.)

**THIS LATEST BRAND NEW B.S.R. MONARCH 4-SPEED AUTOCHANGER**

**£8.7.6**

(Plus 5/- carr. and ins.)



● Minimum base-board size required 14in. x 12 1/2in. with height above 5 1/2in., & height below baseboard 2 1/2in.

**WE ALSO HAVE A FEW ONLY**

**COLLARO 4-Speed "Mixer" Auto-changers.** The Units are BRAND NEW and incorporate the STUDIO "O" Pick-up. PRICE, **£8.19.6** (Plus 5/- carr. and ins.)

**109 & 115 FLEET ST., LONDON, E.C.4.**

Telephone: FLect 5312/3/4.

**CORRESPONDENCE**

## The MULLARD "5-10" MAIN AMPLIFIER



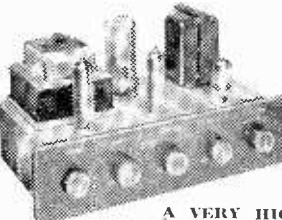
The most popular and successful Amplifier yet designed and certainly needs no recommendation from us. Our kit is complete to MULLARDS specification including the latest PARMKO ULTRA LINEAR OUTPUT TRANSFORMER and the recommended Mullard Valve line-up. PRICE OF COMPLETE KIT OF PARTS (Plus 5/- carr. & ins.) **£9.10.0** or alternatively we supply - FULLY ASSEMBLED and TESTED for **£11.10.0** (Plus 5/- carr. & ins.) THE ASSEMBLY MANUAL, containing FULL SPECIFICATION is available for 1/6. We also offer the "5-10" incorporating the latest PARTRIDGE ULTRA LINEAR OUTPUT TRANSFORMER for an extra **£1.6.0**

## SPECIAL PRICE REDUCTIONS ... WE OFFER YOU ...

PRICES ARE SUBJECT TO 2/6.0. EXTRA IF PARTRIDGE TRANSFORMER IS PREFERRED.

- (a) The COMPLETE KIT of PARTS to build both the MULLARD 5-10 and the REMOTE CONTROL UNIT for..... **£11.11.0**
- (b) The COMPLETE KIT of PARTS to build both the MULLARD 5-10 and the "Fidelity" PRE-AMPLIFIER TONE CONTROL UNIT for..... **£15.15.0** ALTERNATIVELY WE WILL SUPPLY ASSEMBLED and FULLY TESTED, as follows:-
- (a) The MULLARD 5-10 and the REMOTE CONTROL UNIT for..... **£14.0.0** CREDIT SALE TERMS, £3.10.0 Deposit and 9 monthly payments of £1.5.8. 11/P. TERMS, 2/6 Deposit and 9 monthly payments of 17/9.
- (b) The MULLARD 5-10 and the "Fidelity" PRE-AMPLIFIER-TONE CONTROL UNIT FOR..... **£18.18.0** CREDIT SALE TERMS, £4.15.0 Deposit and 9 monthly payments of £1.14.7. 11/P. TERMS, £9.9.0 Deposit and 12 monthly payments of 17/6.

## THE NEW MULLARD "3-3"



A VERY HIGH QUALITY AMPLIFIER PROVIDING EXCELLENT REPRODUCTION AND HAVING AN ATTRACTIVE PERSEFX FRONT PANEL Price - For complete kit of parts: **£7.10.0** (plus 6/6 coverage and insurance).

Alternatively supplied ASSEMBLED and FULLY TESTED - **£8.19.6** (plus 6/6 coverage and insurance).

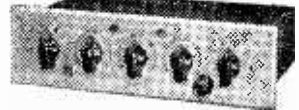
The complete specification is available for 1/6. Developed from the very popular 3-valve 3-watt Amplifier designed in the Mullard Laboratories. Our kit is complete to the Mullard specification, including supply of specified components, valves and a PARMKO OUTPUT TRANSFORMER. We also include switched inputs for 78 and L.P. records, plus a radio position. Extra power to drive a Radio Tuning Unit is also available.

## THE IDEAL AMPLIFIER FOR A SMALL HIGH QUALITY INSTALLATION

- WE ALSO SUPPLY SEPARATELY--
- (a) The 2-Stage (plus Rectifier) AMPLIFIER ..... **£4.2.6**
  - (b) THE PORTABLE CARRYING CASE ..... **£3.17.6**
  - (c) P.M. SPEAKER ..... **18.9**
- Carrage and Ins. 2/6 extra. We also have a smaller PORTABLE CASE Ideal for Record Players. PRICE ONLY **£3.3.0** (plus 3/- carr. & ins.).

## STERN'S "fidelity" PRE-AMPLIFIER TONE CONTROL UNIT

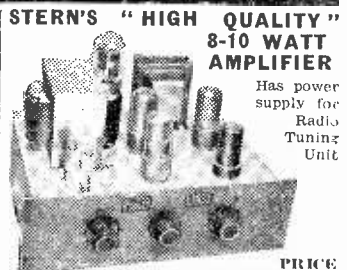
"A design for the Music Lover"



This unit can be used with any Main Amplifier. Briefly it has inputs for all types of MICROPHONES, HIGH and LOW GAIN PICK-UPS and a RADIO TUNING UNIT. It incorporates (a) GRAM EQUALISING CONTROL, (b) STEEPCUT FILTER, (c) Continuously variable BASS and TREBLE CONTROLS, a variable OUTPUT CONTROL, which enables its use with any type of Amplifier, and Jack Sockets on Front Panel for TAPE RECORD and TAPE PLAYBACK. Used with the "5-10" the reproduction is comparable to that normally associated only with the very expensive commercially made High Fidelity Amplifiers. PRICE OF COMPLETE KIT OF PARTS **£6.16.0** WE ALSO OFFER IT ASSEMBLED READY FOR USE, **£9.10.0** (plus 5/- carr. & ins.) THE ASSEMBLY MANUAL, contains full specification and is available for 1/6.

## STERN'S "HIGH QUALITY" 8-10 WATT AMPLIFIER

Has power supply for Radio Tuning Unit



PRICE OF COMPLETE KIT OF PARTS (Plus 5/- carr. & ins.) **£7.10.0** SUPPLIED ASSEMBLED and READY FOR USE **£9.10.0** Proved one of the most popular models yet offered to the HOME CONSTRUCTOR. Provides excellent reproduction up to 8 watts, employing 6V6's in push-pull incorporating negative feedback. Provides for use of both 3 and 15 ohm speakers.

## SPECIAL CASH ONLY OFFER !!

This very attractive PORTABLE AMPLIFIER CASE together with a good quality GRAM AMPLIFIER and a matched P.M. SPEAKER. ALL for **£8.7.6** ONLY (plus 7/6 carr. & ins.) The Amplifier consists of a 2 Stage design incorporating 3 modern B.V.A. valves and has separate BASS and TREBLE CONTROLS. The Portable Case will also accommodate almost any make of Autochanger, and is attractively finished in Maroon and Grey colour Retine.

# Let I.C.S. Train YOU!

## ● COURSES ON :—

### RADIO and TELEVISION SERVICING · ELECTRONICS

## ● EXAMINATION COURSES FOR :—

P.M.G.'s CERTIFICATE (Marine Radio Operators)

C. & G. RADIO AMATEURS' EXAM.  
(Amateurs' Transmitting Licence)

C. & G. RADIO SERVICING CERTIFICATE (RTEB)

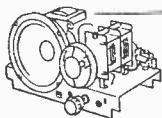
BRITISH INSTITUTION OF RADIO ENGRS., etc.

Whether you plan to have your own business, to become an electronics engineer or to take up a career in industry, an I.C.S. Course will help you to success. You learn at home in your own time, under expert tuition. Moderate fees include all books.

## ● LEARN-AS-YOU-BUILD Practical Radio Course

A basic course in radio, electronic and electrical theory backed by thorough practical training. You build a T.R.F. and a 5-valve superhet radio receiver, signal generator and multi-tester.

Other Learn-as-you-Build radio courses are available



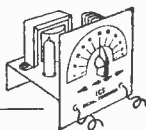
5-VALVE SUPERHET RECEIVER

### MULTI-TESTER

(sensitivity  
1,000 ohms per volt)



### RF/AF SIGNAL GENERATOR



● POST THIS COUPON TODAY for FREE book on careers in Radio, etc., and full details of I.C.S. Courses.

### INTERNATIONAL CORRESPONDENCE SCHOOLS

Dept. 170H, International Buildings, Kingsway, London,  
W.C.2.

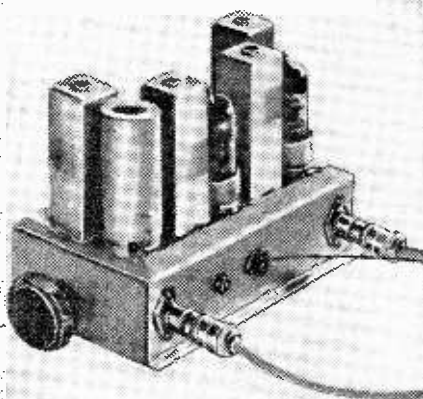
Name..... Age.....  
(Block Letters please)

Address.....

Occupation..... 3.58

**INTERNATIONAL  
CORRESPONDENCE SCHOOLS**

## THE P.C.M. SWITCHED FM TUNER



- Amplified Automatic Frequency Control.
- Low noise earthed grid R.F. stage.
- Grid limiter—two I.F. stages eliminate interference.
- Output 10 volts from included preamplifier. All parts, including Valves, three Diodes, detailed instructions and circuit, £7.19.6 (instructions 3/6). Mail Order only from :

C. & G. KITS,

285 Lower Addiscombe Road, Croydon, Sy.  
Please mark F.M.

## G2AK This Month's Bargains

### HI-FI EQUIPMENT

Available  
for  
immediate  
delivery.

Amplifiers, speakers, pick-ups by  
Gramplan Leak Quad  
Rogers R.C.A. Spectone  
W.B. Wharfedale, etc.

AMERICAN OCTAL BASED XTALS. 100KC Precision Type. Replacements for BC221. Only 30 - ea. post free.

PLUG IN NOISE LIMITERS. 3 Position Limiting. No Rewiring. Best with H.R. Phones. Only 8/6. P. & P. 1/6.

HEADPHONES. H.R. Type 4,000 ohms, very sensitive. Only 12/6 pr. Post 1/6. C.L.R. type (low res.) 8/6. Post 1/6.

SEMI-MIDGET COMBINED I.F. TRANSFORMERS, 10.7 Mc/s and 465 kc/s (can be used on 10.7 Mc/s or 465 kc/s only). 9/11 per pair, postage 9d.

AERIAL WIRE. Copper, 7-25 stranded : 140ft., 10/-, 70ft., 5/-, Hard Drawn 14g. : 140ft., 17/-; 70ft., 8/6. P. & P. 2/-.

RIBBED GLASS 3in. AERIAL INSULATORS. 1/6 ea., or 6 for 7/6. P. & P. 1/6.

CONDENSERS. 8  $\mu$ F 600 v. Trop. 750 v. normal condensers. NEW. ex W.D. stocks, 5/6. P. & P. 1/6.

ABSORPTION WAVEMETERS, 3 to 35 Mc/s in 3 switched bands. Complete with indicator bulb. 17/6 post free.

No C.O.D. on orders under £1.

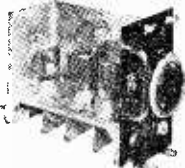
Please Print Your Name and Address.

**CHAS. H. YOUNG LTD.**

Dept. 'P' 110, Dale End, Birmingham, 4. (CEN. 1635)

**CONVERTERS**

Easily the most useful units released by the Ministry. Within minutes you can extend the frequency of any receiver to cover the following:—



R.F.26, 50-65 Mc/s., 20/- each.  
 R.F.25, 40-50 Mc/s., 8/6 each.  
 R.F.24, 20-30 Mc/s., 12/6 each.  
 R.F.24, Shop soiled, 7/6 each.  
 Complete with valves and circuit. 3/6 postage on each.

**HIGH RESISTANCE HEADPHONES.** 4,000 ohms. Brand new 11/6 each, P & P. 2/-.

**WHEATSTONE BRIDGE.** Consisting of four stud switches: 0-10 ohms, 0-100 ohms O-1NF. Galvanometer centre zero F.S.D. 2.5 mA. Ranges easily extended. Housed in oak cabinet 16 x 7 1/2 x 6 in. Complete with instructions, 40/-, P & P. 4/-.

**COLVERN WIRE WOUND POTENTIOMETERS.** 25 watts 50k and 100k. Price 8/6 each.

**INDICATOR UNIT SLC No. 5.** Ideal for conversion into an Oscilloscope using a 139A or ACR 10 tube. Unit consists of 2-VR65, 1-VR66, various resistors, condensers and pots. Size 11 x 6 x 3 in. Brand new, complete with modification circuit. 20/-, P. & P. 3/- each.

**500 MICROAMPS METER.** 2in. circular calibrated 0-15 and 0-700 volts, resistance 500 ohms. 12/6, P. & P. 2/6.

**No. 38 TRANSMITTER/RECEIVER/WALKIE TALKIE.** Range approx. 5 miles. Covering 7.4-9 mc/s. Absolutely complete with junction box, headphones, microphones, webbing, haversack. Brand new, only 60/-, carriage 7/6.

**BENDIX RECEIVER MN26.C.** Covering 150-1,500 kc/s in 3 bands. Valves used, 5-6K7, 2-6N7, 2-6J5, 1-6F6, 1-6L7. Complete with switching motor and dynamotor. This superb unit has been modified for 12 v. operation. With circuit. Only 80/-, carr. 8/6.

**PYE 45 mc/s I.F. STRIPS.** Complete with seven valves, 6-EF50, 1-VR92, 6 tunable I.F. transformers, 30/-, post paid.

**COMPLETE HEADPHONE AND MICROPHONE ASSEMBLY.** A must for every Constructor and "Ham," consists of moving coil, padded headphones and "press to talk" microphone. 10/-, p. & p. 3/6.

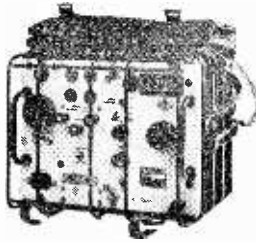


**MONITOR TYPE 28**

Consists of VCRI38, 6-SP61, 1-5U4, 1-VUI20, 3-EA50. 1 m/a meter scaled 100-0-100 volts. Incorporates Y shift, X shift in u/secs., Focus, sync., Bias. Input to X plates switched X 20, X 5 and direct, requires only suitable power pack for use as oscilloscope. 60/-, carr. 10/-.

**R109 RECEIVERS**

8 valves, 5-ARP12, 3-AR8 covering 1.8-8.5 mc/s on two frequency bands. Contains 6 v. Vibrator Pack and built-in 3 1/2 in. Goodman's speaker, operates from 6 v. battery, consumption 1 1/2 amps. Housed in metal case 13 x 12 x 11 in. Designed for Mobile or Ground station. Operates with any normal aerial. Complete and tested, including circuit. Very good condition. Only 80/-, carr. 7/6.



**BATTERIES** suitable for above giving 8-10 hours. FOUR 1.5 dry batteries in series. 5/-, P. & P. 3/6.

**SPECIAL VIBRATOR PACKS**

**12 VOLT** input, 300 volts output at 150 mA. As a bridge rectifier will handle 450 volts RMS at 120 mA. Pack consists of 12 volt vibrator, 4 metal rectifiers, chokes and smoothing condensers. ONLY 30/-, carriage 5/-.

**6 VOLT** input, 230 v. output at 100 mA., complete 4-pin vibrator, OZ4 rectifier. Fully smoothed, 25/6 each, P. & P. 2/6.

**DYNAMIC SOUND POWERED HEADPHONES**

Type D.L.R. 5. 60 ohms. Individual earpieces can be used for room-to-room communication. No Batteries required—just connect up. Can also be used as miniature speakers. ONLY 7/6 pair, P. & P. 2/6.



**COMMUNICATION RECEIVER R.1155**

This magnificent receiver covers 5 ranges: 75-200 Kc/s, 200-500 Kc/s, 600-1,500 Kc/s, 3-7.5 Mc/s, 7.5-18.5 Mc/s. Fully tested before despatch. Complete with circuit and instruction booklet. £8.10.0, carr. 10/-.

**SPECIAL VALVE LIST**

New Original Cartoned American Valves

2C26	3/6	6AG7	9/6	6X5GT	8/6	9004	1/9
2X2	2/6	6H6	2/6	807	6/-	9006	3/6
3B24	7/6	6SH7	6/-	830-B	4/-	12J5GT	6/-
5U4G	7/6	6SL7GT	7/-	955	1/9	446B	25/-
6AC7	5/-	6SN7GT	6/6	956	1/9	464A	25/-
6AG5	5/6	6V6GT	7/6				

All brand new and fully tested. Please add postage.

**LUMINOUS MAGNETIC MARCHING COMPASS**

Pocket size. Brand new with instructions. ONLY 12/6 P. & P. 1/-.



**WESTINGHOUSE FENCIL RECTIFIER.** Type 1,50 output 500 v. at 5 mA. 5/-, post paid.

**MUIRHEAD VERNIER SLOW MOTION DRIVES.** Scaled 0-180 def. Ratio 25 to 1. 3in. dia. 10/6, p.p. 1/6.

**R.T.-7/APN-1 ALTIMETER TRANSCIEVER.** Brand new complete with 14 valves: 3-12S17, 4-12S17, 2-12H6, 1-VR150, 2-9004, 2-955. Famous Wobblulator Unit, Dynamotor, Relays 3,500 ohms and 6,500 ohms. A.F. amplifier. Receiver section covers 400-450 mc/s. Transmitter sweeps 418 to 462 mc/s. Ideal for model control work, etc. With manual. Only 35/-, carriage 10/-.

**LEAD ACID ACCUMULATORS.** 2 volts 16 A.H. Ideal for 6 volts and 12 volts supply. Brand new original cartons. Size 4in. x 7in. x 2in. 5/6 each, p.p. 2/6. 3 for 15/-, p.p. 3/6. 6 for 27/6, p.p. 5/-.

**MAINS R.C.A. TRANSFORMERS.** Input 110-240 v., output 345-0-345 at 150 mA., 6.4 v. at 4.5 amps. 5 v. at 2 amps. Brand new fully shrouded. Limited quantity. Write now. Only 35/-, p.p. 3/-.

**FERRANTI TRANSFORMERS.** Input 225 volts, output 4 volts at 2 amps. or 5 amps. Potted type with ceramic bushes. Brand new, 7/6 each, P. & P. 1/-.

**WESTON 1 Amp. H.F. METERS.** 2in. circular. Brand new, 5/6, P. & P. 1/-.

**SIGNAL GENERATOR AND WAVEMETER.** Type W.1649. Frequency of Signal generator: 140 to 240 Mc/s. Accuracy —0.5 Mc/s. Accuracy —0.2. Mc/s. Containing VR.135 and 4-VR915 meg. crystal. Retractable aerial. Power requirements: 6.3 volts and 120 volts. Unit housed in copper lined wooden case. Size 15 1/2 in. x 13 in. x 14 1/2 in. 45/-, plus 10/-.

**0-25 AMPS. 2in. ROUND FLUSH MOUNTING METERS.** Ideal for battery chargers. New and boxed. 8/6, post 1/6.

**COMMAND RECEIVERS.** 1.5-3 mc/s, fully valved, with circuit. 65/-, P. & P. 3/6. 3-6 mc/s, fully valved. 35/-, P. & P. 3/6.




**PUSH BUTTON COIL PACKS.** 465 Kc/s. I.F. Long, Medium and 2 Shortwaves. 8/6. Post 1/6.

**AMERICAN ROTARY CONVERTERS.** With cooling Fan. Input 12 v. D.C. Output 250 v. at 90 mA. Completely suppressed. Brand new. 19/- each, plus P. & P. 3/-.



**Relda Radio Ltd.**

(Dept. "P") 32A, Coptic Street, London, W.C.1. Phone: MUSEum 9607.  
 Tottenham Court Road Underground. Fourth turning on the left down New Oxford Street.

 <p><b>"Q Coils"</b> Iron dust cores <b>4/-</b> Amazing efficiency</p>	 <p><b>Potted 5/- Coils</b> Superhet, T.R.F. modern technique</p>	<p>Coils for <b>Collaro Tape</b> Officially recommended Transcripator pre-amp. O.S.C. <b>7/6</b></p>	<p><b>STATION SEPARATOR</b> —A positive answer HOME, THIRD, 10/6 LIGHT, Etc.</p>	<p><b>STOP!</b> T.V. Patterning <b>SIMPLE REMEDY 10/-</b></p>
<p><b>SCRATCH FILTER COIL 6/9</b> Whistle Filter <b>10/-</b></p>	<p><b>DUAL RANGE COILS</b> T.R.F. } S'HET } <b>7/6 ca.</b></p>	<p><b>OSMOR Mini-Magic F.M. Tuner Kit Complete</b> <b>£4-10-0</b></p>	<p><b>B.B.C. 1 VALVER</b> Components <b>27/6</b> (Valve 10/- ex.) including diagrams</p>	<p>Also <b>B.B.C. (T.V.) Filter Choke 7/6</b></p>
<p><b>FERRITE ROD AERIALS</b> MW 8, 9 M-L 12, 9</p>	<p><b>I.T.A. Converter KIT</b> To fit inside T.V. FOR ALL SETS Complete Very efficient! <b>£4</b></p>	<p><b>Dial 24/6</b> complete <b>ASSEMBLY</b></p> 	<p><b>The World on a 1 Valve</b> Short Wave Coil &amp; Circuit <b>6/-</b></p>	<p><b>Experimental &amp; Development Dept.</b></p>
<p>Special Coils for <b>HAMS DESIGNERS MANUFACTURERS</b></p>	<p><b>OSMOR Satellite Switch-tuned F.M.</b> Dimensions 4½" x 4½" A completely stable drift-free unit for adding to existing radio or Hi-Fi amplifier. <b>Circuit &amp; wiring diagram on request.</b></p>			<p><b>F.M. COILS</b> For Osmor C'ts &amp; Many Designs</p>

**Thank "Q" FREE!** Send 1/- (stamps) for fully descriptive literature AND OSMOR DESIGNS—5-Valve S'Het, Miniature ditto, Battery and Battery/Main Receiver, Mains T.R.F. S'Het and T.R.F. Feeders, Band 3 Converters, F.M. Tuners, Wiring Diagrams, Chassis Templates, Coil and Coilpack information and price lists and information on circuits in "Wireless World," "Practical Wireless," "Radio Constructor." Full Circuits included. See also classified Advs. on page 74.

**OSMOR** (Dept. P.W. 20) **418 BRIGHTON ROAD SOUTH CROYDON, SURREY CROYDON 5148/9**

**HANNEY**  
offers  
**Components for**

- OSRAM 912 PLUS AMPLIFIER
- OSRAM 912 PASSIVE UNIT
- OSRAM 912 PRE-AMPLIFIER
- OSRAM F.M. PLUS TUNER
- MULLARD 510 AMPLIFIER
- MULLARD 510 "A" PRE-AMPLIFIER
- MULLARD 510 "B" PRE-AMPLIFIER
- MULLARD 3/3 AMPLIFIER
- MULLARD F.M. TUNER UNIT
- "WIRELESS WORLD" F.M. TUNER UNIT
- DENCO MAXI-Q F.M. TUNER UNIT

Manuals available :  
912 PLUS AMPLIFIER—4/- ; OSRAM F.M. PLUS TUNER—2/6 ; MULLARD HIGH QUALITY AMPLIFIER MANUAL (contains F.M. details)—3/6 ; DENCO F.M. TUNER—1/6.  
Send 3d. postage, stating lists required. General Components list also available.

**L. F. HANNEY**  
**77, Lower Bristol Road Bath**

**Train for a Wonderful future in RADIO & TELEVISION...**


Radio and Television techniques are continually advancing and their applications ever increasing. These fields offer to the trained technician a career with an assured and remunerative future. Here is your opportunity to enter for:—

**1 YEAR COURSE** Full-time day course in the Principles and Practice of Radio and Television. Designed for the training of Radio and Television Servicing Engineers and others similarly engaged in the Electronics Industry. Next course commences May 28th, 1958; others in September and January.

The E.M.I. College of Electronics, Dept. 32, 10, Pembridge Square, London, W.2.  
Telephone: BAYswater 5131/2.

The College is part of the E.M.I. Group... Britain's foremost electronic engineers... Pioneers of the world's first public television service.

**THE E.M.I. COLLEGE OF ELECTRONICS**







FOR VALVES—  
Guaranteed New and Boxed

Table listing various vacuum tubes with their types and prices. Columns include tube type (e.g., 6Z1, 1A3, 1A5GT), price, and other specifications.

Bulgin Type P322 Anode Cap. Insulated for high voltage ... 6d. ea.  
Terminal Block, Ref. No. 5X/2234, 20-way 6 yards Top Quality Maroon Flex, 2in. core twisted with 2in. pin plug ... 2 9 ea.  
Marconi Dropper, resistance 1,000 ohms, 3 voltage taps 100/215, 210 235, 250 255... 1 - ea.  
Crescoid Clips, plated strong jaws ... 3d. ea.  
Toggle Switches, various assorted ... 12/- doz  
4B.A. Terminals, Red and Black, Suitable for Battery Chargers, etc. ... 1 6 ea.

Stadio "E" Kit, complete with headphones, battery, Valve, and all other parts to build this Popular Kit, 45/4.

A NEW HIGH FIDELITY AMPLIFIER Type R.C.I. 2 Stage. For use with a 3 ohm speaker, A.C. mains, 250-240 v., recommended for use with any record player. Control Knobs, Mains On/Off and Tone Volume. Complete with 2 valves ready to operate, £3.10 6 each. Post 3/-.

NYLON DRIVE CORD. Non stretch, 6d. yd.

HEAD AND BREAST SETS A pair of low resistance headphones 120 ohms resistance. A breast microphone with straps, etc. Packed in a strong wooden box, 10/6 ea. Post 3/-.

FOCUS UNIT For 10in. or 17in. tubes, vernier adjustment by famous manufacturer, 15/- ea.

W.B. "STENTORIAN" HIGH FIDELITY UNIT. MODEL H.F. 1012 10in. Die-cast unit, incorporating 12,000 gauss magnet. Handling capacity, 10 watts. Frequency response, 30 c.p.s. -14,000 c.p.s. Base resonator, 35 c.p.s., £4.19.9.  
MODELS H.F. 810 and H.F. 812 8in. unit incorporating 10,000 gauss magnet. Handling capacity, 5 watts. Frequency response 50 c.p.s. -12,000 c.p.s. Base resonance, 65 c.p.s. Steel chassis, £3.2.0. Die-cast chassis (12,000 gauss), £3.3.6.

Attractive cabinets for 3 valve TRF Kit, complete with Chassis, dial, backplate, Dial Drum, Pointer, etc., etc., 27 6.

Complete Range of Metal Rectifiers. Compare the Prices. RM1, 4/6 - LM2, 5/6 - RM3, 7/6 - RM4, 1/- - RM5, 1/6, 14/9, 13/- - 14A/6, 13/6 - 14A100, 15/-.  
22 6 ea.  
Mains Units 2 pin Plug & Socket ... 2/6 ea.

STENTORIAN LOUD-SPEAKERS New Miniature Models for use with Transistor Amplifiers, etc., etc., £1.75.  
Diameter 1 1/2in. Total depth 1 1/2in. 3 ohms Impedance, 22 9 ea. 8" x 3" Elliptical Speaker. Size 2 1/4" (gim. x 1 1/2" gim. Depth 1 1/2in. 32/- ea.

Pile wound chokes R.F. 1/8 ea. Resistor, T.S.L. 1 watt 10% Tolerance Full range of Preferred Values, 6d. each. Also good selection of 1 watt 1%, types 2 & 8 each. Order forms available on request.

Ceramic condensers by Top Manufacturers. Good selection in stock Price 9d. ea.

Aerialist Loft Aerials, 3 Element, 27/6 - 5 Element, 37 6 - Suitable for Channels 8, 9, 10.

We hold large stocks of Control Knobs, Brass Nuts and Bolts, Toggle switches, waverange switches, tag boards and panels. All are listed in full detail in our current Catalogue. Send 1/- in stamps for your copy.

CYLDON "TELETURNER" All types available, Stations of your choice. Fit this Converter and your troubles are over, 27.7.0 ea.

Aerials and Oscillator Coils (All Chassis-frequencies), 7/6 pair. Also available from stock, complete table of spares.

Teleton Companion, complete kit of parts for this 3 Transistor Pocket Radio, Ferrite Rod, Case, etc., 89 6.

CONTROL KNOBS Long kneecked knobs for T.V. Receivers in walnut, black and cream, 1 - ea.

SUPPRESSORS Duplicator kits of condensers and chokes for Interference Suppression, 1 amp kits, 5/6 - 2 amp kits, 6/-; 3 amp kits, 8/6.

REVISED SECOND EDITION "POINTS ON PICK UPS" A Replacement Guide to pick up heads, cartridges, stylus. Over 195 illustrations, 5 - ea.

Osmor Coils for Coliario Type Deck Transistor QT6 Bias Filler coil, 7 6 ea.

QT7 Trouble Boost coil in Mu Metal can, £17.6 ea.

QT9 Bias Osc. coil, 7 6 ea.

Osmor Coils for the Beginner's Short wave Receiver Radio Constructor, A/Z, 1957. SW Q1 21 11 Mc's, 8 - ea. SW Q2 12 4.5 Mc's, 6 - ea.

SCRATCHOFF Removes scratches from Radio & T.V. Cabinets in Polythene Dispenser Tubes, 3 - ea.

MAINS TRANSFORMERS 2-WAY MOUNTING TYPE M.T.1. Primary 200 220 240 v. Secondary, 250-0-250 v., 80 mA., 0-6.3 v., 1A, 4 v., 2 A., both tapped at 4 v., 21 9 each. Postage and Packing please add 2/- per transformer.

M.T.2. Primary 200 220 240 v. Secondary, 250-0-250 v., 80 mA., 0-6.3 v., 4 A. 0-5 v. 2 A., both tapped at 4 v., 21 9 each. Postage and Packing please add 2/- per transformer.

M.T.3. Primary 200 220 240 v. Secondary 30 v., 2 A. taps at 3 v., 4 v., 6 v., 8 v., 9 v., 10 v., 15 v., 18 v., 20 v., 24 v., 21 9 each. Postage and Packing please add 2/- per transformer.



103 LEEDS TERRACE  
WINTOUN STREET  
LEEDS 7

TERMS: Cash with order or C.O.D. Postage and Packing charges extra, as follows: Orders value 10/- add 1/-; 20/- add 1/6; 40/- add 2/-; £5 add 3/- unless otherwise stated. Minimum C.O.D. fee and postage 3/-. All single valves postage 6d. Personal Shoppers Monday-Friday 9 a.m. to 5 p.m. Saturday 10 a.m. to 1 p.m.

**DON'T BE CAUGHT LIKE THIS**



**CAR STARTER CHARGER KIT**  
All parts to build 6- and 12-volt charger which can be connected to a "flat" battery and will enable the car to be started instantly. Kit comprising the following:

- Mains transformer..... 22/6
  - 5-amp. rectifier..... 17/6
  - Regulator Stud Switch..... 3/6
  - Resistance Wire..... 2/-
  - Resistance Former..... 2/6
  - Mains on/off Switch..... 0/6
  - 0.5 amp. Moving Coil Meter..... 12/6
  - Construction Data..... 1/6
- Or if bought all together price is 52/6, plus 3/6 post and packing.

**Yours for £1.10.0 Down and 8 monthly payments of £1 or cash price £8.10.0**



The latest most up-to-date Record Player made by the famous B.S.R. company. Using Hi-Fi Crystal Pick Up and fitted with every modern device. Definitely a record changer which will give years of trouble-free music. Not surplus but the current model. Price £8/10/- or £1/10/- deposit and 8 monthly payments of £1, carriage and insurance 5/-.

**MINIATURE MOTOR**

Size only 2 1/2 in. long by 1 1/2 in. diameter—American made—laminated poles and armature—intended for 28-volt D.C. but O.K. on lower D.C. voltages and A.C. mains, through step-down transformer—price 10/6, post, etc., 2/-.



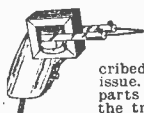
**SUPPRESSOR CONDENSER**



Stop your drill or other appliances

interfering with your or your neighbours' radio or television. Simple instructions given. 2/6 each, 24/- dozen.

**MAKING A SOLDER GUN**



A 7-second solder gun of the type costing £2-44 was described in last month's issue. Only two essential parts are required—(a) the transformer and (b) the push switch. These

we can supply at 13/6, plus 2/- post. The rest of the parts you will have in your own "junk" box. Copy of the article concerned given free with the kit.



Wrap our heater cable around the pipes in your loft to prevent a freeze-up. 21 yards, 11/- post free.

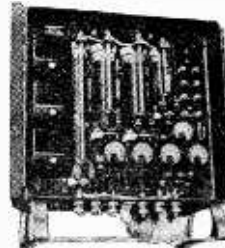
**The "CRISPIAN" Portable Radio**



or 35/- down and 7 payments of 3/6, ready-built chassis 30/- booklet free with parts or available separately, price 1/6.

A 4-valve truly portable battery set with very many good features as follows: Ferrite rod aerials, low consumption valves, superhet circuit with A.V.C. ready-built and aligned chassis if required, beautiful two tone cabinet covered with I.C.I. rexine and Tygan. Guaranteed results on long and medium waves anywhere. All parts, including speaker and cabinet are available separately or if all ordered together the price is £7/15/- complete. B-455-A (or-B) B-454-A (or-B) Transmitter T1154 Fifty-eight walkie talkie Frequency meter B.C. 221

**CHARGING SWITCHBOARD**



Offered at about one-twentieth of original cost. This is an ex-Government switchboard. It contains three reverse current relays, one voltmeter, one main ammeter, two secondary ammeters and three variable resistors for controlling circuits. These are original cases. Price £2/15/- Carr. 10/-.

**MULLARD AMPLIFIER "510"**



A Quality Amplifier designed by Mullard. Power output exceeds 10 watts. Frequency response almost flat from 10 to 20,000 C.P.S. For use with the Acos "Hi G" and other good pick-ups. Made up and ready to work is £12.10.0 or £1.10.0 down and 8 payments of £1.10.0, plus 10/- carriage and insurance.

**MULLARD PRE-AMPLIFIER**

For extra gain and fidelity this unit gives ideal results. It is arranged to plug into the amplifier and has two switches to provide compensation for radio, microphone, L.P. and 78 records. Complete with valve made-up ready to work. £4. Post and insurance 3/6 or 10/- deposit and eight monthly payments of 10/-

**14in. T.V. CABINET**

14in. T.V. cabinet of the latest styling made for one of our most famous firms—beautifully veneered and polished—limited quantity—19/6 each. Carriage and packing 3/6 extra.



**INDICATOR No. 96**



Contains many hundreds of very valuable spares including no less than 12 potentiometers. This indicator unit will take the VCR97 or the VCR98 and with relatively simple modifications can be turned into an Oscilloscope. Limited quantity offered at the extremely low price of 10/- each, carriage and packing 4/6 up to 250 miles, beyond this distance at cost.

All major components for making a tube tester and re-activator (described in December "Practical Television"). Available as a parcel price £3 plus 3/6 post and packing.

**W.D. CIRCUIT DETAILS**

Diagrams and other information extracted from official manuals. All 1/6 per copy, 12 for 15/-.

- |                    |                    |
|--------------------|--------------------|
| American Service   | R. 109             |
| Sheets             | 78 receiver        |
| A.1134             | R28/ARC5           |
| BC.348             | R1116'A            |
| BC.312             | RA-1B              |
| R.103A             | AR88D              |
| BC.342             | AN AFA-1           |
| RA-1B              | 76                 |
| R-208              | 78                 |
| R-1155             | R.T.18             |
| R-124A             | CAY-46-AAM-        |
| R-1132A/R-1481     | RADA.R             |
| R-1147             | A.S.B.-3           |
| R-122A             | Indicator 62A      |
| R-1022             | Indicator A.5.B.3  |
| R-1355             | Indicator 62       |
| B.C.1206-A/B       | Indicator 6K       |
| B-455-A (or-B)     | R.F. unit 24       |
| B-454-A (or-B)     | R.F. unit 26       |
| Transmitter T1154  | R.F. unit 25       |
| Fifty-eight walkie | R.F. unit 27       |
| talkie             | Wireless set No.19 |
| Frequency meter    | Demobbed valves    |
| B.C. 221           |                    |

**THERMOSTATS**



2 1/2 in. x 1 in. x 1 1/2 in. high. Useful for the control of appliances such as convectors, gluepots, vulcanisers, hot plates, etc. Adjustable to operate over temperature range 50-550 deg. F., fitted with heavy silver contacts.

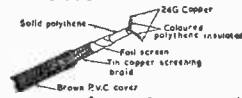
1 1/2 amp., 3/6 ; 5 amp., 8/6 ; 2 amp. QMB, 5/6 ; 15 amp. QMB, 15/- 15 amp. wall mounting type, 19/6.

**SAPPHIRE NEEDLES**

Unrepeatable bargain—new and perfect—two types available: miniature E.M.I. and Standard (trailer). Sale price 1/- each, 10/- doz.



**TWIN FEEDER**

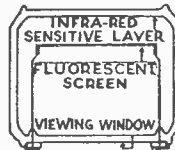


Ideal for FM down lead, as a twin microphone lead, etc. Sale price 6d. per yard. 30 ohm co-ax. low loss for Band III, 8d. per yard.

**CHASSIS ASSEMBLY**



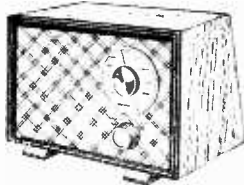
Superhet Chassis, 8-waveband, coloured scale, scale pan, pulleys, driving head, springs, drum, etc. Scale size 14 1/2 in. x 3 1/2 in. Chassis size 15 in. x 15 in. x 2 in. Price 15/- plus 1/6 post. Note: We can supply cabinet for this. Price 39/6 plus 5/- carr. and insurance.



"SNIPER-SCOPE"

"Cats eye" used for seeing in the dark. Will work burglar alarms, counting circuits, smoke detectors and the hundred and one other devices as well as the simpler type of photo cell. Price 5/- each. Post and ins. 1/- Data will be supplied with cells if required.

**OUR 19/6 COLUMN**



**THE SKYSEARCHER**

This is a 2-valve plus-metal receiver set useful as an educational set for beginners, also makes a fine second set for the bedroom, workshop, etc. All parts, less cabinet, chassis and speaker, 19/6. Post and ins. 2/6. Data free with parts or available separately 1/6. 3-valve battery version also available at the same price.

**ALL-MAINS AMPLIFIER**



Powerful three-valve Mains amplifier ideal for dances, parties, etc. Complete less chassis, cabinet and speaker (available if required)—data 1/6 (free with parts). Price 19/6, plus 2/6 post and insurance.

**Simplex Transistor Kit**

Makes ideal bedroom radio, uses one transistor and one crystal diode. Complete less case 19/6, case 5/- extra post and ins. 1/6.



**A.C./D.C. Multimeter Kit**  
15 Basic Ranges



Measures A.C./D.C. Volts D.C. current and ohms. All the essential parts including metal case moving coil meter, selected resistors, wire for shunts, range selector switches, calibrated scale and full instructions.

Price 19/6 plus 2/6 post and insurance.



**BAND III CONVERTER**

Suitable Wales, London, Midlands, North, Scotland, etc. All the parts including 2 EF80 valves, coils, fine tuner, contrast control, condensers, and resistors. (Metal case available as an extra.) Price only 19/6, plus 2/6 post and insurance. Data free with parts or available separately 1/6.

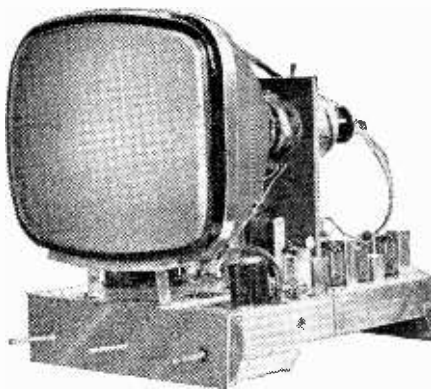
**17" UNIT BUILT TV CHASSIS**

Complete with tube and speaker, delivered to you for £8 deposit and weekly payments of 25/- for 35 weeks or £47 cash with order. Non-callers add 10/- carriage and insurance.

This is a most up-to-date Televisor

for home construction, can be completed in one evening (only 24 solder joints to make). When finished equal to any factory made set. Note these features:

- ★ No technical knowledge required.
- ★ 12 channel turret tuner.
- ★ All miniature valves and metal rect.
- ★ Perfox coated e.h.t. scan coils.
- ★ Vision and sound interference suppression.



If required less tube and speaker price is £29.10.0 or £7 down and 25 weekly payments of £1: add 10/- carriage and insurance. Constructional data and full information 3/6 post free.

**THIS MONTH'S SHOP**

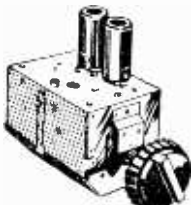
**19 Range Testmeter**



Can be yours for only 10/- deposit and 19 payments of 10/- weekly. Like all AVO meters it is a very fine instrument: it has a sensitivity of 10,000 ohms per volt and 19 most useful ranges as follows:— D.C. volt 5 0-1,000 (seven ranges), A.C. volts 0-1,000 (five ranges), D.C. Current 0-1 amp. (5 ranges), resistance 0-2 megohms. (2 ranges). (complete with test leads). Immediate delivery. Cash price £9.10.0—non-callers please add 3/6 post & ins.

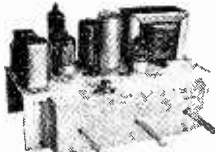
**FREE GIFT.**—All purchasers of the above item this month will receive the M.M. Range Extender which adds: capacity 0.1 m.f. in two ranges—inductance 0-100 henrys and decibel —20 to +35

**NOW 2 MODELS Turret Tuner**



Brand new stock, not surplus, with coils for Banu I and III complete with valves. Model 1 I.F. output 33.33 Mc/s. Series heaters. Model 2 I.F. output 16-19 Mc/s. Parallel heaters. With instructions and circuit diagram. 79/6. With knobs 3/6 extra, post and insurance 2/6.

Guitar Amplifier operates directly from A.C. mains—high-fidelity.



3-valve 45 watt with frequency response better than 40-15,000 c.p.s. Control panel size 8in. x 2 1/2in. comes fixed to chassis but is intended for independent mounting. Separate bass and treble controls giving fullest variation of cut and lift. Separate switch, absolutely no mains hum. Remarkable value at £4 19 6.

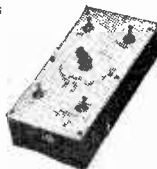
**SPEAKER BARGAIN**



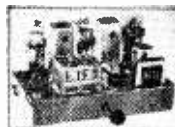
12in. Hi-fidelity loudspeaker. High flux. Permanent magnet type with standard 3 ohm speech coil. Will handle up to 12 watts. Brand new by famous maker. Price 32/6 plus 3/6 post and insurance.

**TRANSISTOR TIMER**

All the parts for making transistorised Enlarging or Process Timer with constructional details. £2.10.0.



**BEGINNER'S SUPERHET**



All the components including metal chassis, valves, metal rectifier, coils tuning condenser, etc., etc., required to build the "Beginner's Superhet" as described in the January Issue, are available as a parcel. Price £3 plus 3/- post and insurance.

**ELECTRONIC PRECISION EQUIPMENT, LTD.**

For Prompt attention post orders should be sent to our Eastbourne address marked Dept. 7.

42-46 Windmill Hill, Ruislip, Middx. Phone: RUISLIP 5780 Half day, Wednesday.

66, Grove Rd., Eastbourne, Sussex. Half day, Saturday.

29, Strand Green Rd., 266, London Road, Finsbury Park, N.4. Phone: ARCHWAY 1049 Phone: CRO 6558. Half day, Thursday. Half day, Wednesday.



The Skater's waltz is, of course, our forte; we delight you in the ballet of Prokofiev; we enthrall you in the rhythm of the pop. We are—have you guessed—Acos GP 65 Cartridges. Type 65-1 is a star performer with hi-fi precision and hi-g grace, characteristics as level as the rink, yet full of vigour\*. Type 65-3 strides out in style and force\*. Poised on Acos x500 tested tips, we glide through our turn with perfect balance.

\* Outputs: Type 65-1, 0.15 V; Type 65-3, 1.0 V, at 1 cm/sec velocity, 1,000 c/s

**acos** ARE DOING THINGS IN STYLE

COSMOCORD LTD WALTHAM CROSS HERTS · TEL: WALTHAM CROSS 5206 (London subscribers please dial WA4 5206)



# PRACTICAL WIRELESS

EVERY MONTH

VOL. XXXIV, No. 615, MARCH 1958

COMMENTS OF THE MONTH

EDITOR : F. J. CAMM

26th YEAR OF ISSUE

BY THE EDITOR

## STEREOPHONIC SOUND TESTS

**E**ARLY in January the BBC, without any prior hint to the press, undertook some tests of stereophonic sound, involving simultaneous transmission and reception on different channels, and intended to give a realistic binaural effect. The experiment involved using two different receivers in the home to receive the transmissions on the two separate channels. The first experiment was radiated from Wrotham and the second on the Medium Wavelength from Brookmans Park. The two receivers have to be placed a few feet away from one another with the listener forming part of a triangle of which the two receivers are the base.

The results were surprisingly good. In its repeat performance, the sound section of the TV station at Crystal Palace was used, but this did not show any marked improvement. A strange effect is that the sound does not appear to come from either speaker. No statement has been made as to whether it is proposed eventually to radiate programmes on this system, which obviously will most benefit owners of V.H.F. receivers. It would seem that the use of two receivers would be a deterrent, until special receivers have been designed for the purpose. Stereophonic sound systems have, of course, been in use in connection with the cinema and P.A. for several years and with marked success.

### "RADIO-CONTROLLED MODELS"

**L**ARGE numbers of our readers are interested in the radio control of models, a hobby which has rapidly developed within the last 10 years and now has a controlling body—The International Radio-controlled Models Society.

They will be interested to know that we have recently published at 12s. 6d., by post 13s. 6d., "Radio-controlled Models," and this deals with almost every aspect of the subject, including the construction of receivers, control gear, transmitters, actuators, tuning control, auto switches, radio-controlled battleships, aircraft, etc. It contains 184 pages and 143 diagrams.

### "THE PRACTICAL HOUSEHOLDER" EXHIBITION

**T**HE Practical Householder "Exhibition, organised by our companion journal, opens on Wednesday, February 19th, at the Empress Hall, Earls Court, London, S.W.6, and closes on Saturday, March 1st. The Exhibition is open from 11 a.m. to 9.30 p.m. Monday to Friday, and 10 a.m. to 10 p.m. on Saturdays. Price of admission is 2s. 6d.

We hope readers who visit the exhibition will call at our Stand No. 52. There will be daily demonstrations in the use of power tools, wood turning, paper hanging, use of paints, etc., and over 100 different manufacturers will exhibit a full range of their various products. We hope you will be able to spare the time to come.—F. J. C.

**OUR NEXT ISSUE, DATED APRIL, WILL BE PUBLISHED ON MARCH 7th**

### Editorial and Advertisement Offices : PRACTICAL WIRELESS

George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

© George Newnes Ltd., 1958.

Phone : Temple Bar 4363.  
Telegrams : Newnes, Rand, London.  
Registered at the G.P.O. for transmission by Canadian Magazine Post.

### SUBSCRIPTION RATES

including postage for one year

Inland - - - 19s. per annum.  
Abroad - - 17s. 6d. per annum.  
Canada - - - 16s. per annum.

### CONTENTS :

	Page
Editorial .....	15
Round the World of Wireless .....	16
Supersensitive Transistor Receiver .....	18
A Simple Inter-Com. ....	19
Switched Sync/X Amplifier ...	22
Increasing T.R.F. Selectivity .....	23
Transistorised Signal Generator .....	29
Transmitting Topics .....	31
On Your Wavelength .....	34
AC/DC Amplifier .....	37
2 Valve Portable Radiogram .....	39
An R.C. Substitution Box .....	44
Transistors in Practice .....	47
Short Wave Section .....	51
Making A Start .....	55
Mike Pre-amp. ....	59
News From the Clubs .....	63
Programme Pointers... ..	64
Open to Discussion .....	67
News From the Trade .....	71

The Editor will be pleased to consider articles of a practical nature. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor PRACTICAL WIRELESS, George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

Copyright in all drawings, photographs and articles published in PRACTICAL WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden. PRACTICAL WIRELESS incorporates "Amateur Wireless."

# Round the World of Wireless



## Broadcast Receiving Licences

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of November, 1957, in respect of wireless receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland. The numbers include Licences issued to blind persons without payment.

Region	Total
London Postal ... ..	1,094,406
Home Counties ... ..	1,108,780
Midland ... ..	827,705
North Eastern ... ..	1,082,489
North Western ... ..	804,073
South Western ... ..	692,970
Wales and Border Counties ... ..	432,203
<b>Total England and Wales ... ..</b>	<b>6,042,626</b>
Scotland ... ..	787,761
Northern Ireland ... ..	189,151
<b>Grand Total ... ..</b>	<b>7,016,538</b>

## Audio Section at Earls Court

PLANS are in hand for broadening the scope of the National Radio Show when it is held at Earls Court, London, from August 27 to September 6, 1958.

At its monthly meeting recently the Exhibition Organising Committee of the R.I.C., under the chairmanship of Mr. F. W. Perks, discussed various new features including provision of a special audio section of the exhibition to cater for the increasing interest in high-fidelity sound reproduction.

This will involve the construction of more sound-proof demonstration rooms, large and small, to suit individual requirements.

"The popularity of sound demonstrations at the show in recent years has proved that there is a demand for more facilities of this kind." Mr. Perks told the Press, "but this is only one of several new plans which we shall be announcing after discussion with the various interests concerned."

## Obituary

WE regret to report that Cecil Barker died on the 10th of December at his home. He had been ill for some years, fighting recurrent severe attacks of asthma and returning to his

## By "QUESTOR"

development work on natural sound reproduction whenever possible.

Cecil Barker was a musician, singer and acoustics engineer. He trained under Kennerly Rumford and sang with the d'Oyly Carte Opera Company for a while. In the 1930's he broadcast many times and began his work on loudspeakers, which led in 1936 to his patented dual drive. This was marketed under the Duode name by the Magnavox Company, and many will remember that unit.

In 1947 he started his own business with the Barker 148, and later revived the famous Duode mark under which a succession of his natural sound units found him many friends in all parts of the world.

## Vice-Admiral Dorling

ON doctor's advice, but not with effect until October 31,

1958, Vice-Admiral J. W. S. Dorling, C.B., M.I.E.E., is to retire from his appointment as Director of the Radio Industry Council. He was the Council's first director, being appointed in 1946, immediately after the formation of the Council as the co-ordinating body of four associations in the industry.

His resignation was regretfully accepted at a recent meeting of the Council. No successor has been appointed.

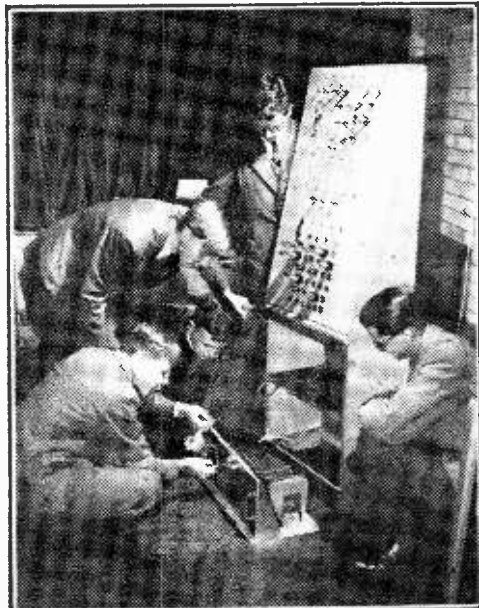
Admiral Dorling is present president of the Radio Industries Club.

He made his first wireless set more than 50 years ago and had a distinguished career as a wireless officer in the Royal Navy in the first world war and after. His last command was the Royal Sovereign and after being Deputy-Controller of the Admiralty he went to the U.S.A. in 1941 as British Admiralty Supply Representative, taking over 813 U.S.-built ships on Lend-Lease.

## New Radio Building for Budapest

WORK has restarted on new studios for the Hungarian Radio, adjoining the present building in Budapest. Begun in 1950, work was held up when it reached the first floor because of lack of funds.

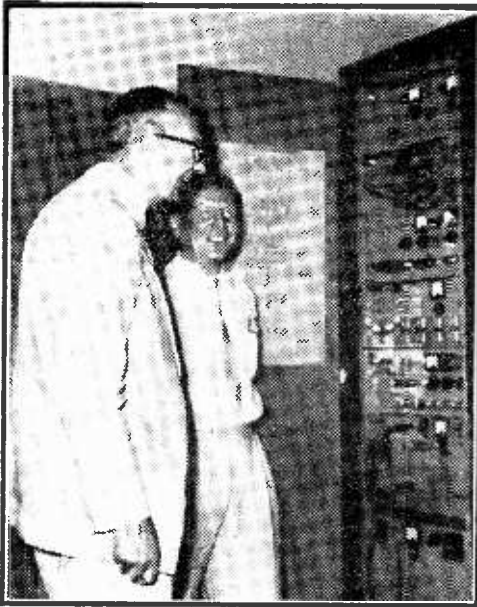
On the ground floor of the glass-fronted building—due to be completely finished by the end of this year—are eight studios. Two are medium sized and will be used for the transmission of light music and prose and the others are smaller news studios.



Sixth Form boys at St. Albans School are building a Computer. The machine is 5 ft. tall and is valued at £75.

On the second floor a studio for the transmission of plays will be built and will include a special sound effects department. There will be a "water room" where different water effects can be created and another room to reproduce the sound of footsteps on pavements, stairs, and different types of floor covering. There will also be an "echo room."

The structure of the building has now been completed and inside building work is going on.



During a recent visit to Nigeria, Sir Gordon Radley, Director General of the British Post Office, visited a number of sites of the extensive tele-communications scheme which is being constructed and maintained by Marconi's Wireless Telegraph Company for the Nigerian Posts and Telegraphs Department.

**New Wenvoe Transmitters**

THE BBC announces that, with the approval of the Postmaster General, additional transmitters are to be installed at Wenvoe, near Cardiff, to enable the station to broadcast the Third Programme and Network Three on VHF (very high frequency). A frequency of 96.8 Mc/s will be used with an effective radiated power of 120 kW. This will bring first-class reception of these programmes to a large number of listeners in South Wales and the West of England who have not hitherto

been able to receive them satisfactorily.

The existing transmissions of the Welsh Home Service on 94.3 Mc/s, the West of England Home Service on 92.125 Mc/s and the Light Programme on 89.95 Mc/s will each continue on the full power of 120 kW as at present. It is hoped that the additional transmitters for the Third Programme will be ready in about a year's time. The temporary low-power transmitter at Bristol, which has carried the Third Programme on VHF since October 28, will then be closed down.

**1957 Radio Record**

NEW export records are assured for the British radio industry for 1957. Exports for November brought the total for the first eleven months of the year to over £39.7m., which is within £500,000 of the value, a record, for the whole of 1956, of just over £40.0m.

The forecast for the whole of 1957 is that the value of exports will approach £43½m., more than four times that for 1947, of £10.2m.

Exports of sound reproducing equipment (including record changers and players, electronic amplifiers, whole public address systems, etc.) were worth nearly £925,000 in November, the highest total since March, 1957. They brought the total for the first eleven months to nearly £9.0m., compared with £7.6m. for the whole of 1956.

The value of exports of components and test gear, over £9.0m., and of valves and tubes, over £3.6m., have also already exceeded those for the whole of 1956 (£8.7m. and £3.5m. respec-

tively), and overseas sales of capital equipment (transmitters, communications equipment, navigational aids, etc.), now within reach of £15.0m. for the first eleven months, compares with £16½m. for the whole of 1956.

**The B.I.R.F.**

THE following meetings will take place during February, 1958:

*London:* London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1. Wednesday, February 26th, at 6.30 p.m.—Decra: A Long-range Navigational Aid—C. Powell.

*South Wales Section:* Wednesday, February 26th, at 6.30 p.m., Glamorgan Technical College, Treforest. Industrial Television—R. Swinden, J. E. H. Brace, B.Sc.

*South Midlands Section,* Friday, February 28th, at 7 p.m. North Gloucestershire Technical College, Cheltenham. Some Advanced Application on Information Theory.—P. H. Blundell.

*West Midlands Section:* Wednesday, February 12th, at 7.15 p.m. Wolverhampton Technical College, Wulfruna St., Wolverhampton. Industrial Applications of Radio Isotopes—R. F. Armitage.

**Siemens Lecture**

A CENTENARY lecture—"Siemens Brothers, 1858-1958—100 Years of Electrical Engineering"—is to be given by Dr. J. N. Aldington, B.Sc., F.R.I.C., F.Inst.P., M.I.E.E., F.I.E.S., Chairman and Managing Director of Siemens Brothers, in the Central Hall, Westminster, at 6.30 p.m. on March 5th, 1958. Lord Chandos, Chairman of Associated Electrical Industries, Ltd., will be in the chair.

Dr. Aldington is principally known for his work on the development of electric lamps. For many years he was head of the Siemens Preston Lamp Research Laboratories which, under his direction, made a number of important contributions to the development of gas discharge lamps, ballast resistances, impulse valves, and kindred devices.

# A Super-sensitive Transistor Receiver

A SINGLE-STAGE RECEIVER WITH NOVEL FEATURES

By C. Sinclair

THE majority of transistor receivers which have appeared in the press in the past have used crystal diodes for detection immediately after the first tuned circuit, the diode being followed by one or more stages of A.F. amplification. However, this type of receiver has little more sensitivity than a crystal set and is only really efficient with an external aerial of reasonable size. The reason for this is the crystal diode itself. The diode is non-linear in its rectifying ability, and below a certain signal level the efficiency is roughly proportional to the signal level. However, now that R.F. transistors are available at reasonable prices a really sensitive pocket receiver may be constructed without going to the complication and expense of a superhet.

As may be seen from the diagram (Fig. 1) the circuit is of rather an unusual nature and has been designed to obtain the highest possible efficiency from a single transistor. Although the circuit appears very simple (the number of components has been kept to a minimum), the actual way in which it operates is surprisingly complex so no attempt will be made to go into details.

## Regeneration

The circuit is in fact a special form of regenerative detector in which oscillation automatically ceases when a station is accurately tuned in. All the components are readily available on the surplus market and the transistor used in the prototype was a white spot; this performed very reasonably.

## Construction

Several coil systems were tried out but the best proved to be a Teletron FRM ferrite rod aerial cut down to a length of 2in. To do this remove the rubber grommet from one end of the ferrite. Now cut a groove on opposite sides of the rod and just about in the centre, using either a small file or a hacksaw. Then, holding one end of the rod in each hand, firmly snap it in two. The rubber grommet must now be replaced on the half of the ferrite which holds the coil. If you wish to wind your own ferrite rod aerial this can be done and the results are very little different if care is taken. Sixty turns of D.S.C. or D.C.C. wire, 34 gauge,

should be close wound in three layers right at the centre of a 2in. piece of ferrite rod  $\frac{1}{8}$ in. diameter.

## Tuning

If a really miniature receiver is required then a trimmer must be used. This should have a maximum value of 500  $\mu$ F, although any value above 250  $\mu$ F will have sufficient capacity to tune in the Home, Light and Luxembourg services, the Home being tuned when the value is approximately 200  $\mu$ F.

If the existing screw is removed from the trimmer, one of the same gauge but greater length may be fitted, making it possible to sweat or bolt a suitable knob on. The battery used depends on

the size to which you wish to keep the set, but if it is to be really small, a Mallory hearing aid cell, the RM250 should be used. This cell, which is obtainable from Boots the Chemists, is ideal as it has almost constant voltage with life enabling the station desired to be preset if necessary.

The 1 megohm potentiometer is of the type used in hearing aids, and several firms sell these as surplus for about 1s. If they are equipped with an on/off switch this may, of course, be used but if there is none the set can be switched off merely by disconnecting the head-phones. The transistor itself can either be wired into the circuit or inserted in a suitable holder.

## Operation

When the set has been completed and inserted into a suitable non-metallic case it should be tested in the following way:—

Connect up an aerial of a few feet of insulated wire (a couple of yards will be sufficient in most areas), turn the volume control to maximum, and switch on by means of connecting up the head-phones or hearing aid carpiece (4,000 $\Omega$  optimum).

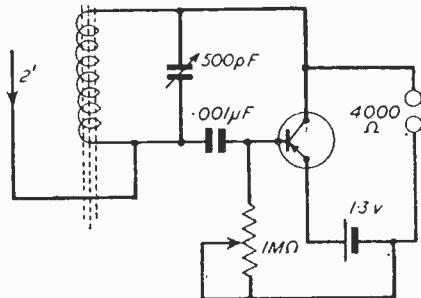


Fig. 1. Theoretical circuit.

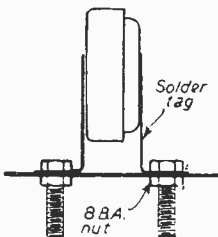


Fig. 2.—Details of the Battery Mount.





By  
D. J. Russell

DETAILS OF A SIMPLE AND EFFECTIVE TWO-WAY LOUDSPEAKING TELEPHONE CIRCUIT

**T**HERE must be many readers, especially those in business, who would welcome a discreet inter-com. set instead of the usual type which makes use of a loud-speaker at either end. Whilst the latter is excellent in certain circumstances, it can have a distinct disadvantage when one end is located, for instance, in a busy shop.

The salient advantage points of the inter-com. to be described can be briefly summed up as follows:—

- (a) A conversation can be carried out between one person or more in a work-room to one person only at the other end, e.g., a floor manager.
- (b) Work-room personnel cannot overhear normal floor conversation or vice versa, due to the limited range of the G.P.O. hand-set.
- (c) Economical and simple in construction, by

using one output valve to amplify speech from either end; one microphone transformer for both loud-speaker and calling system, and the absence of any extensive switching arrangements.

*Circuit Details*

The circuit will be divided into two halves for explanation purposes. The first half, which is quite conventional, is a two stage amplifier using V1 and V2, with a call system wired in.

Speech from the workshop is made into L.S.1 and fed into the grid of V1 via VR1. After further amplification by V2, speech is fed to the G.P.O. hand-set, marked in the diagram as A and B.

The calling signal from the workshop is effected by depressing switch I which cuts out

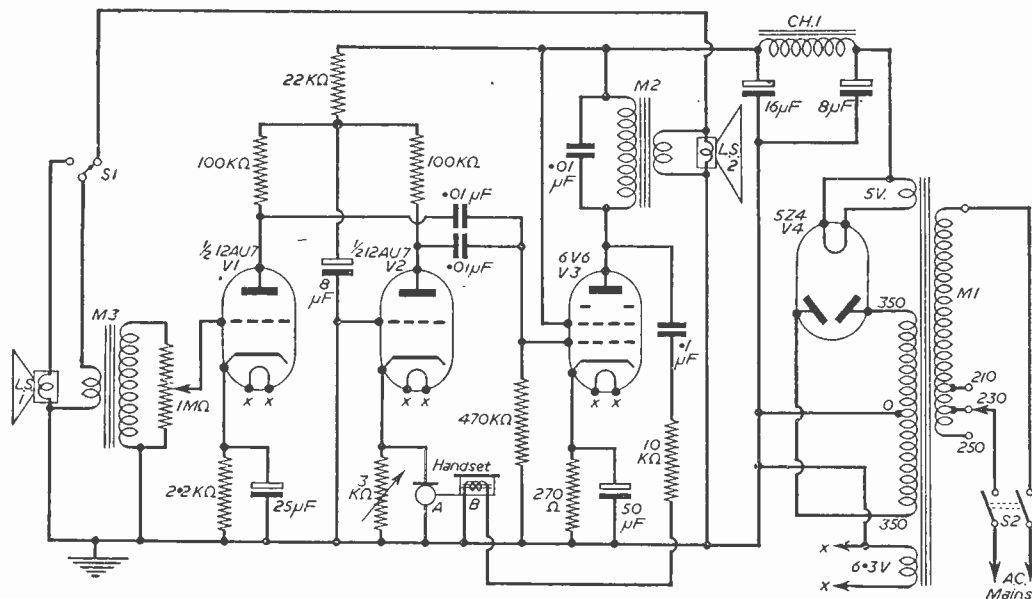


Fig. 1.—Theoretical circuit of the inter-com.

the speech coil of L.S.1 and brings in feed-back from the output transformer, M2. The signal again feeds to the hand-set via C7 and the limiting R7.

The second half utilises a grounded grid L.F. amplifier; V2 being the first valve and V3 the output. Speech from the floor manager end is fed in across the cathode resistor VR2. The cathode voltage energises and makes a low impedance input for the carbon mike "A." VR2 limits the voltage and acts as a gain control. No calling system is needed from the hand-set A and B as the normal voice is amplified to speaker volume in the workroom by L.S.2.

**Construction**

A four sided aluminium chassis 8in. X 6in. X 2in. gives ample space for mounting the components. From Figs. 2 and 3 the

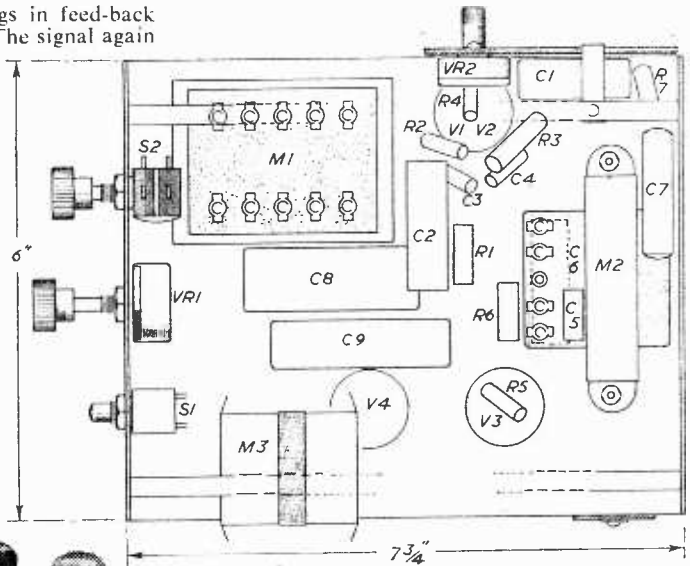
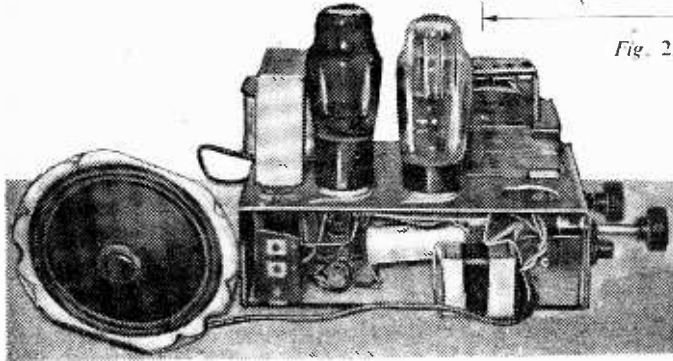


Fig. 2.—Layout of the main components.



Another view of the inter-com. set-up.

general lay-out of the parts can be seen. No special precautions are needed in making up this inter-com. set beyond taking care as to the positioning of the microphone transformer in order to keep hum level at a minimum and ensuring that Sw. 1 is of the "one make one break" type, otherwise feed-back will blow the cone of L.S.1.

**Conclusion**

The set has been in use for several months and has given excellent results.

**COMPONENTS LIST**

RESISTORS		CAPACITORS	
R1 22k	C1 25 $\mu$ F/25 vvk.		
R2 100k	C2 8 $\mu$ F/450 vvk.		
R3 100k	C3 .01 $\mu$ F/450 vvk.		
R4 2.2k	C4 .01 $\mu$ F/450 vvk.		
R5 470k	C5 .01 $\mu$ F/450 vvk.		
R6 270 ohms	C6 50 $\mu$ F/25 vvk.		
R7 10k	C7 .1 $\mu$ F/450 vvk.		
VR1 1M $\Omega$	C8 16 $\mu$ F/450 vvk.		
VR2 3k pre-set	C9 8 $\mu$ F/450 vvk.		
VALVES		SWITCHES	
V1 and V2, 12AU7	S1 Push button (one make one break).		
V3 6V6G	S2 D.P. on, off.		
V4 5Z4G			
TRANSFORMERS			
M1 350-0-350 v. 70 mA. 6 v., 5 v.			
M2 Output (8,000 load).			
M3 Input 100-1.			
CH1 L.F. choke, 40 H. 70 mA., 1.2 k. $\Omega$			
1 G.P.O. type hand set.			

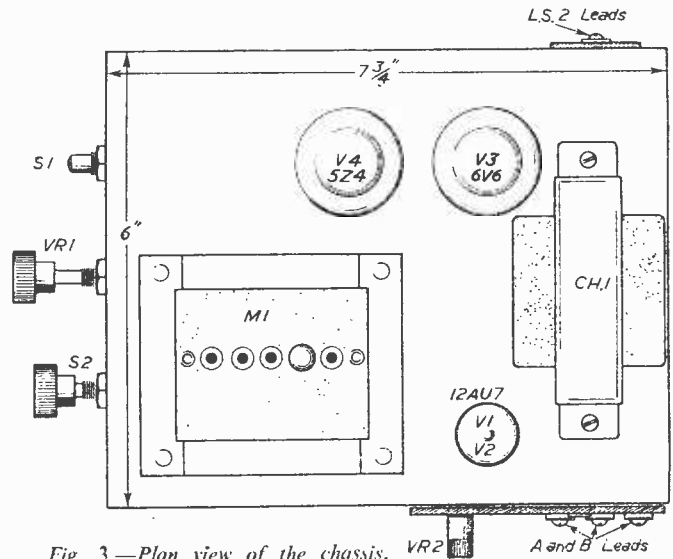


Fig. 3.—Plan view of the chassis.

# Redetermination of the Standard Ampere

AN ACCOUNT OF RECENT TESTS OF THE STANDARD OF CURRENT

A RECENT experiment at the American National Bureau of Standards has shown that the standard ampere maintained by the Bureau has drifted no more than a few parts per million in the last 15 years. Such a small apparent change may well be due to slight errors in measurement, so that the standard ampere may actually have remained perfectly stable since its original evaluation in 1942.

Because of the importance of precise electrical measurements to modern science and industry, the Bureau maintains permanent primary standards of two basic electrical quantities, voltage and resistance. From these basic electrical standards, the Bureau has derived other standards for all electrical quantities in use today. One of these, of course, is electric current. Because current is transitory, the primary standard ampere cannot be kept in the form of a material object, such as the standard cells that maintain the volt or the standard resistors that maintain the ohm. Each time the standard ampere is required, it must be obtained anew from the standard volt and the standard ohm by use of Ohm's law. However, a gradual change might sometimes occur in the standard cells or the standard resistors. One method of checking the stability of these standards is to compare the standard ampere derived from them with the "absolute" ampere, that is, the ampere obtained experimentally in terms of mechanical units of length, mass, and time.

In the present determination, R. L. Driscoll and R. D. Cutkosky, of the Bureau staff, measured the standard ampere in absolute amperes, using two different sets of apparatus. One was the current balance used in the 1942 evaluation; the other was a Pellat type electro-dynamometer, which was introduced to reduce the possibility of systematic errors. The standard ampere was found to equal 1.000008 absolute amperes by the current balance method and 1.000013 absolute amperes by the Pellat instrument. The weighted mean of these two values is 1.000010 absolute amperes, but in this mean there is an uncertainty of 5 parts per million. If no accidental errors were made in either the original or the present evaluation and if all systematic errors remained fixed, then the value of the current yielded by the electrical standards of resistance and voltage has decreased by 6 parts per million. On the other hand, known sources of accidental error in the current balance determinations could easily account for the apparent drift.

## The Current Balance

The ampere was evaluated with helical coils by determining the mechanical force between the two parts of the circuit through which the current flows. In the centre of two large, fixed, coils, a smaller coil is hung from the arm of a precision balance. All three coils carry the current to be measured, but the current in the

fixed coils can be reversed. The electromagnetic force developed by the current in the coils tends to pull the movable coil downward for one direction of the current in the fixed coils but tends to lift it when this current is reversed. From the change in the force on the balance when the current is reversed and from the measured dimensions of the coils, the value of the current in absolute amperes can be computed. The uncertainty in this method arising from all known sources is estimated to be 6 parts per million.

## The Electro-dynamometer

The modified Pellat electro-dynamometer consists essentially of a long stationary horizontal solenoid 28 cm. in diameter, a short solenoid 11.6 cm. in diameter, and a balance. The smaller coil, which is mounted on the balance beam, is inserted into the longer solenoid so that the coil axes are perpendicular. Current in the outer solenoid produces a magnetic field which is essentially constant at its centre. When the coils are connected in series an electromagnetic torque on the smaller solenoid is produced. The small coil therefore tends to tip. Since the balance-beam rests on a knife-edge, the tipping of the coil attached to the beam upsets the balance. The system is restored to equilibrium with a suitable counterweight. When the current in the stationary coil is reversed the coil tips the other way and equilibrium is restored by placing a mass on the end of the balance arm.

During this operation, the current was held constant at about 1.02 amperes, the value being determined by the standard cell and standard resistor. These standards were maintained at a constant temperature and compared from time to time with the Bureau's primary standards. The mass which counteracted the change in torque was adjusted by trial and later evaluated by comparison with known standards. A calibrated scale on the balance allowed for small corrections to the balancing mass. From the known value of the balance weight, the length of the balance arm, and the geometry of the windings, the value of the current was calculated.

The Bureau's electro-dynamometer differs from Pellat's original in several ways. One such difference is its single-layer helical windings. The dimensions of the single-layer windings can be easily checked, whereas the uncertainty in the dimensions of the original balance introduced a source of error. The materials used in constructing the coils also differ from those used in the original. The stationary coil form and balance beam are of fused silica, the rotatable coil form is pyrex glass, and the winding is of oxygen-free copper wire. Special care was taken to insure low magnetic susceptibility in all parts. For example, aluminium alloys were used in the balance supports, and the brass and phosphor-bronze parts of the balance arrestment mechanism were tested for susceptibility.

# A Switched "X" Amplifier for the 62A Oscilloscope

A MODIFICATION HINT WHICH NEEDS NO EXTRA PARTS

THE following notes should be read in conjunction with the articles which were published in the September and October, 1957, issues of this magazine describing the construction of an oscilloscope from the ex W. D. Indicator Unit 62A.

The purpose of this modification to the switching arrangements described in the original article is to enable the X amplifier to be automatically switched as a sync amplifier when the timebase is in operation.

The modification requires no extra components and thus involves no extra expense. The diagrams are really self-explanatory and, as can be

seen, the modification merely requires that certain contacts of the X switch be inserted in the timebase circuit.

top two positions of its movement. This was found to be essential since the timebase was affecting the appearance of the trace due to the self-capacity of the X switch. The only other necessary alteration is to put two previously unused contacts (12 and 13) of the X switch into circuit as shown, and to take the moving contact of the sync potentiometer to Pin 7 of the switch.

### For TV

Several constructors have written to ask if the oscilloscope is suitable for TV work. The oscilloscope is primarily designed for audio-frequency work, and is therefore not suitable for R.F. work in a TV set.

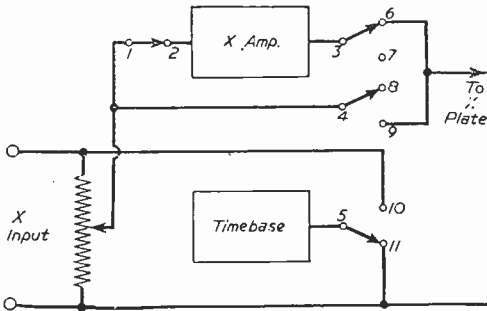


Fig. 1.—Original X switching circuit.

seen, the modification merely requires that certain contacts of the X switch be inserted in the timebase circuit.

### Modification

The timebase output is now connected permanently to the non-earthly end of the X sensitivity potentiometer. This connection can be simply made by unsoldering the appropriate leads from pins 5 and 10 of the X switch and soldering them together, insulating the naked wires from the chassis. Pin 11 is left earthed. Pins 5 and 10 are then connected in the timebase H.T. line as shown. Take care to see that this connection is made correctly for, if the two pins are accidentally reversed in the circuit, the H.T. will be shorted out when the X switch is put into the timebase position. This pair of contacts renders the timebase inoperative when the toggle is in the

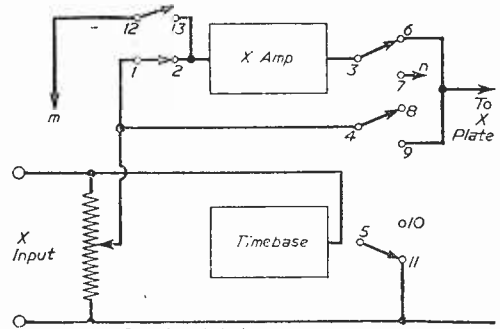


Fig. 2.—Modified switching diagram.

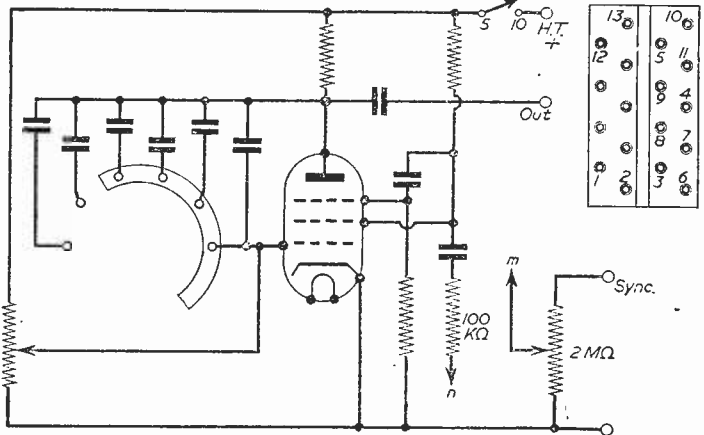


Fig. 3.—Modified timebase circuit. Fig. 4.—(inset) Pin connections to the X switch.

# Increasing T.R.F. Selectivity

HOW TO MODIFY OLDER TYPE STRAIGHT SETS

By F. G. Rayer

MANY T.R.F. receivers, even of comparatively simple type, have a high degree of sensitivity so that a good number of distant stations may be tuned in. The selectivity of tuning of such sets is, however, usually limited severely, and may be very poor with some circuits. The results of this are particularly noticeable during the hours of darkness, when many European transmitters may be received at excellent volume, but with interference from stations on adjacent channels. Some method of increasing

smaller capacity wired in series with it. A pre-set condenser is preferable, as its value can be adjusted. With the usual T.R.F. receiver sensitivity is adequate to permit of quite small values; e.g., a 50pF pre-set. As the value is reduced selectivity is increased, but volume falls off. A compromise is thus necessary.

If no primary is available on the aerial coil, about 40 turns of thin insulated wire (30 to 40 s.w.g.) is usually satisfactory for medium waves, with about 100 turns for long waves. This winding should be situated about  $\frac{1}{4}$  in. to  $\frac{1}{2}$  in. from the tuned winding.

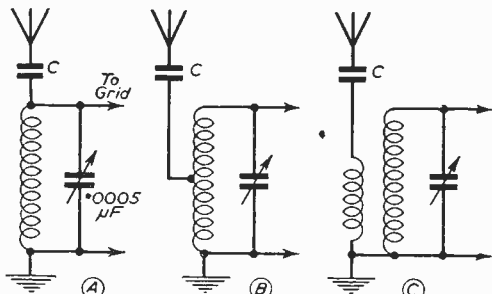


Fig. 1.—Alternative forms of aerial coupling.

the selectivity then becomes really worth-while, and in quite a number of cases this can be achieved without large scale alterations to the receiver.

The most commonly employed aerial circuits are shown in Fig. 1. That at "A" is not infrequently found in amateur designed receivers, and also appears in some simple A.C./D.C. T.R.F. receivers of low cost. The condenser C is usually about  $.0001\mu F$ . This circuit tunes quite flatly, and may almost always be abandoned with advantage. Its advantage lies in achieving good signal strength and in only requiring a very simple aerial coil. It should only be employed with very short aeri-als, and in receivers of comparatively low gain.

The method at "B" uses a tapped coil, and this reduces damping so that the coil can tune more sharply. That at "C" employs a separate primary, or "aerial coupling" winding, and is generally most satisfactory. In each case the value of the coupling or aerial condenser "C" may require to receive attention. In some A.C./D.C. sets the condenser is intended to keep mains voltages out of the aerial, and may be of large value (up to  $.1\mu F$ ). In such instances it may be reduced in value, or have a second condenser of

## Intervalve Couplings

The method of coupling employed between R.F. and detector stages can similarly influence selectivity, and the methods most often seen are depicted in Fig. 2. That at "A" employs a choke and condenser C1. The latter may be about  $.0001$  to  $.0003\mu F$ , and may be reduced in value, or substituted by a pre-set condenser, to increase selectivity.

Transformer coupling, shown at "B," is often very satisfactory, if the coils are soundly designed. Tuned-anode coupling ("C" in Fig. 2) offers somewhat less selective results, but maximum volume. When selectivity is to be increased, choke or transformer couplings are preferable. The former allows of some control over selectivity, by adjustment of the coupling capacity, which is not possible with transformer coupling with standard coils.

A choke and condenser may also be used with a primary, as shown in Fig. 3, and forms one of the most selective single-coil intervalve circuits. Here, C1 is the aerial coupling condenser, and C2 the detector coil coupling condenser. By using low values, quite a high degree of selectivity can be achieved. The choke *must* be of good quality, intended for this application, and may require to be screened.

In T.R.F. receivers of this kind reaction is not often employed. This has the advantage of

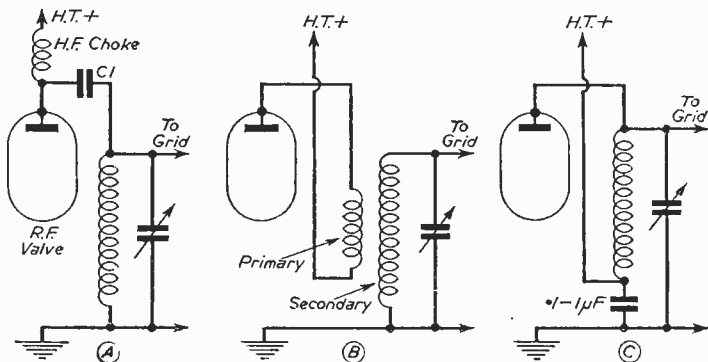


Fig. 2.—Common types of R.F. detector coupling.



simplicity of operation. But if maximum results are to be obtained, reaction should be introduced. It increases the selectivity of the detector circuit, and also compensates largely for the reduced signal strength arising from loose forms of coupling such as have been described. In battery-operated T.R.F. sets reaction is often found; but the higher gain of the main type of circuit has made it less frequent, here, and the possibility of employing it should not be overlooked. In general, it will improve the volume of weak stations quite noticeably. It should operate smoothly—if this is not so, detector voltages may be too high.

In both circuits, the tuning coils are separated, so that no appreciable coupling arises between one tuned winding and the other. The aerial primary and tuned winding will, of course, be coupled together in the usual way.

**Alignment**

Accurate alignment is absolutely essential for best results and maximum sensitivity, and becomes increasingly important as the sharpness of tuning is increased. After *any* modification to any tuned circuit the circuits must be realigned or trimmed. If this is not done, the full benefit possible from such changes will not be achieved.

With simple air-cored coils a single trimmer is usually employed with each coil. This should be adjusted for maximum volume at a point fairly low in the medium-wave band (e.g., about 230 to 250 metres). An insulated tool should be used. If maximum results from some "difficult" station are particularly desired, the receiver may be trimmed for highest sensitivity at this point.

If individual coils are used for medium waves and long waves, then each band may be trimmed separately. With dual-range coils, however, trimming is best undertaken on the medium-wave band, as explained.

If the coils have adjustable dust cores, these should be adjusted for maximum volume at a fairly high wavelength—say 450 to 500 metres, in the case of those tuning medium waves. A fully insulated tool must be used, as the inductance of the coils would be modified by introducing a metal blade into the former.

In old receivers, a fully-variable R.F. trimmer, panel operated, may be present. This is not

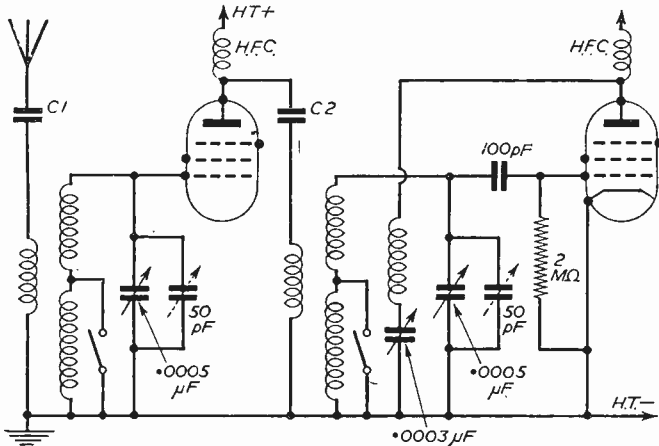


Fig. 3.—R.F. and detector circuit with reaction.

**Additional Tuned Circuit**

When circumstances permit, an additional tuned circuit will give a worth-while increase in selectivity. This may be used with a further R.F. stage as will be explained, or may be introduced without increasing the number of valves.

Fig. 4 (A) shows one method of employing a further coil—this should be of the same type as that already used in this stage, and may be for medium waves only, or for dual-range tuning. The coupling condenser must be of very low capacity, about 5 to 10 pF being usual. It may be made up by twisting together two insulated wires for about 1/2 in. The value may subsequently be adjusted for best results by modifying the length of twisting. A three-gang condenser will be required for tuning, assuming that the receiver has one R.F. stage.

Bottom-end coupling is shown at Fig. 4 (B), and gives similar results. Here, C requires to be of large value—about .005 to .05 μF. The resistor R may be of low value, 250 to 5,000 ohms being satisfactory. Its purpose is primarily to provide a D.C. path to the grid of the valve. With this form of coupling, it is possible to increase selectivity by increasing the value of C. (With the circuit at "A" in Fig. 4, selectivity is increased as the value of the coupling condenser is *reduced*.) It is also possible to omit the condenser, using a very low value for R—about 5 to 50 ohms.

waves. A fully insulated tool must be used, as the inductance of the coils would be modified by introducing a metal blade into the former.

In old receivers, a fully-variable R.F. trimmer, panel operated, may be present. This is not

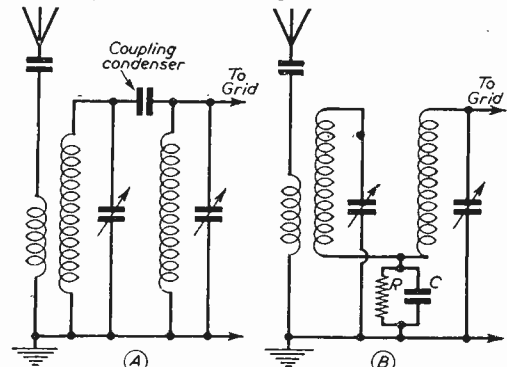


Fig. 4.—Band-pass couplings.

usually required with present-day receivers, but is worth considering if the coils do not gang exactly over each waveband.

**Wavetraps**

Where difficulties arise from some powerful local station, a great improvement is possible if

a wavetraps is added. This is, in its simplest and most general form, a tuned circuit which can be adjusted to the wavelength of the undesired station. The signal strength of this station, at the receiver, is thereby much reduced.

Two such traps are shown in Fig. 5. For medium waves, any medium wave coil is suitable, tuned by a variable or pre-set condenser. In order that the trap may tune more sharply, a small condenser may be added in series with the

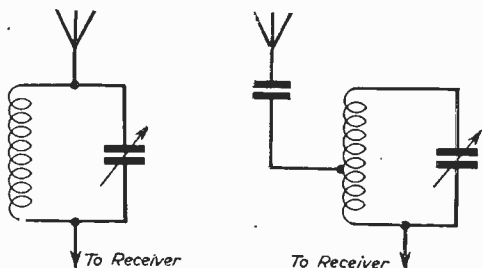


Fig. 5.—Wavetraps for station elimination.

aerial lead-in, or the lead-in taken to a tapping on the trap winding, as shown. With coils having a dust-core, a fixed condenser may be used instead of the variable component, and the circuit brought to resonance by adjustment of the core. The value of the fixed condenser must be chosen with the wavelength of the undesired station in mind.

For such traps to be effective, leads should be quite short. The trap coil may be screened, or kept from coupling with the receiver aerial coil by a suitable layout. A further condenser of fairly low value may be introduced in the wire from trap to aerial socket of the receiver.

To adjust, the troublesome station should be tuned in on the receiver, and the wavetraps then adjusted until the volume is at minimum. Complete elimination of the station will not usually be possible, but its volume will be greatly reduced so that other stations of adjacent wavelength are not interfered with to such a large extent.

**Wavechange Switching**

When the tuned circuits are modified, care should be taken that no H.T. or other shorts are introduced. Some coils have a primary winding which does not require switching for band changing. Others, however, require both primary and secondary switching, and this is shown in Fig. 6. Here, section 1 switches the aerial primary, and section 4 the detector tuned winding. Both these are at earth potential. This is not so, however, with section 2, because of the bias circuit, while section 3 is at H.T. potential.

With coils of this kind, incorrect switch connections usually become evident by results being unsatisfactory on one waveband. For example, if the switch used for the R.F. tuned winding were taken to earth, the V.M. volume control would not operate on medium waves. With section 3, a H.T. short would arise when the switch was set for medium-wave reception, unless the correct circuit, as shown, were employed.

**Additional R.F. Stage**

As there will almost always be sufficient power available for an extra valve of the R.F. type, the addition of a further R.F. stage can be attractive and useful. Three tuned circuits can thus be used without the loss of sensitivity always associated with a band-pass circuit with loose coupling.

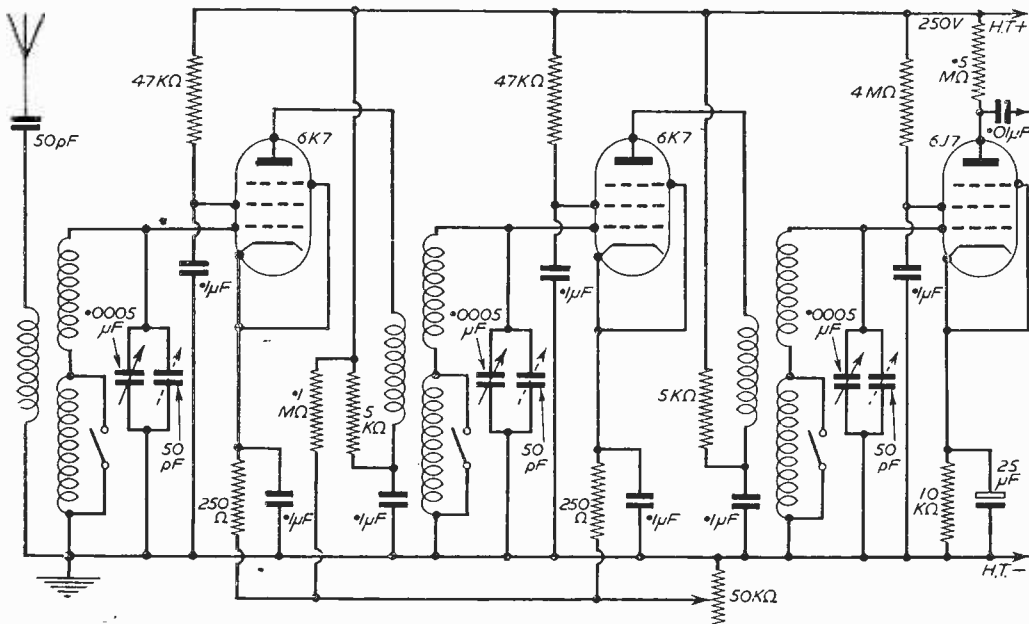


Fig. 7.—Complete R.F. and detector stages.

A typical 2-R.F. and detector circuit is shown in Fig. 7, and can provide a high degree of sensitivity, with very useful selectivity. It is, of course, not essential that the valve types given be employed, but these are shown for guidance.

The R.F. anode circuits are decoupled to avoid instability, and this is usually desirable. With such a circuit, adequate screening and a sound layout

This may be placed between the R.F. stages, or between 2nd R.F. and detector. With such circuit the limit of selectivity reasonably possible with a T.R.F. receiver is approached. In some cases it may be desirable to provide for medium waves only, and the troubles associated with wave-change switching will then be avoided.

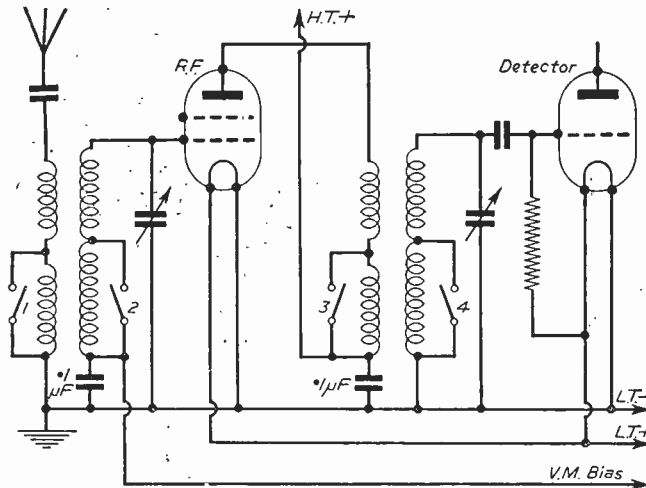


Fig. 6.—Isolation of coil switching.

are essential, or uncontrollable oscillation will arise. It will usually be necessary to fit the coils in separate screening cans. All wiring should also be short and direct. If the valves are of clear glass, screening cans for them will generally prove essential. If the receiver goes into oscillation when the volume control is advanced towards maximum, or when trimming is attempted, this indicates that some form of stray coupling is arising.

Other forms of inter-stage coupling, such as illustrated in Fig. 2, may be employed. It is generally best to avoid tuned-anode coupling, however, as with 2 R.F. stages it may prove almost impossible to maintain stability, unless gain is reduced. Separate coils for medium and long waves, or coils with switched primaries, may be used, but all wavechange switching will be a potential cause of instability, and this must be kept in mind. Any carelessness in this direction will lead to oscillation, due to the presence of three tuned circuits, with associated gang condenser and other wiring, all operating on the same frequency.

More than three tuned circuits are seldom seen in T.R.F. design, but 4-gang condensers are obtainable, and permit of a band-pass coupling being used.

### "Unit" Coils

In some respects the use of separate coils for each waveband has advantages, and the method of switching these will be seen from Fig. 8. Each coil may have its own trimmer, so that each band can be adjusted separately. Coils of this kind are available with adjustable dust-cores, and are very suitable because of their efficiency and small size. Cores and trimmers should be dealt with as already explained, each band being treated individually.

With this form of switching, the leads, etc., associated with one tuned circuit must be kept separate from those in other tuned circuits. As aerial and R.F. anode switching is now employed, more trouble from interaction is likely than when using dual-range coils, or single-range coils in a single waveband set. As an aid in this direction it is best to use a rotary switch with a separate wafer for each tuned circuit, and a long spindle. Wiring may then be kept segregated—a most important point if such coils and switching are employed in a receiver with two R.F. stages.

Finally, bias, screen-grid and other power-supply wiring will usually require no modification, so can be left unchanged. The circuits shown may be used in both battery and mains receivers.

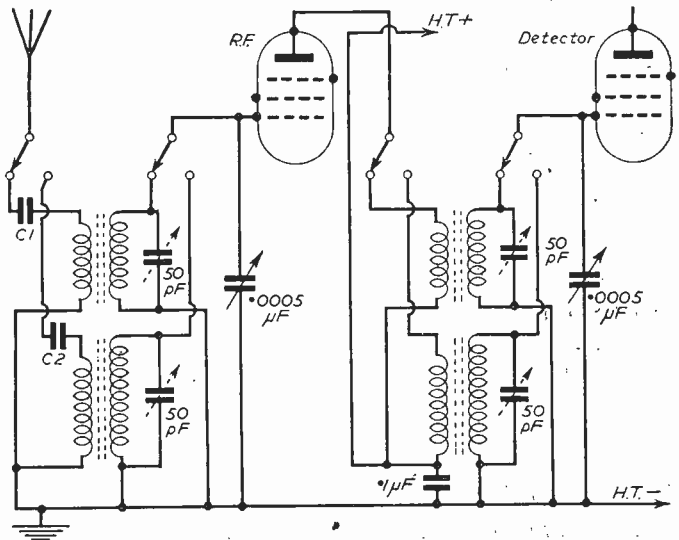


Fig. 8.—Switching for "unit" coils.

# PREMIER RADIO COMPANY

Tel.: AMBassador 4033

B. H. MORRIS & CO. (RADIO) LTD.

Tel.: MUS. 3451

207 EDGWARE RD., LONDON, W.2 & 23 TOTTENHAM COURT RD., LONDON, W.1



## The "Petite" PORTABLE

A completely new design with the all star feature from the firm with 45 years of experience in the supply of designs for the home constructor.

MAY BE BUILT FOR

**£7.7.0**

Plus p. & p. 3/-

Batteries Extra. H.T. 10- (type B128) or equivalent. L.T. 1/6 (type AD35) or equivalent.

★ Size only 8in. x 8in. x 4 1/2in. ★ Instruction Book 1/6  
MAINS UNIT NOW AVAILABLE for ONLY 37/6 plus 2/- p.p.

## THE NEW MERCURY SWITCHED F.M. TUNER

by Jason

Complete set of parts available with built and tested front end.

Price **£9.19.6** plus 2/6 pkg. & carr.

Power Pack requirements 35 ma.

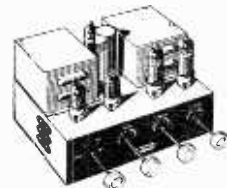
## The NEW De - Luxe TAPE RECORDER TR3



for **£6.5.0**  
**DEPOSIT & 8 MONTHLY PAYMENTS OF £5.17.11**  
**OR CASH 45 GNS.**  
plus 21/- post & pkg.

TRADE ENQUIRIES WELCOMED

Case finished in Red and Cream with gilt styling and fittings. Size 18 1/2in. x 15in. x 9in. for A.C. Mains 200/250 v. 50 cycles.



### BUILD THE 1-VALVE BATTERY RECEIVER

As shown on B. B. C. T.V. This receiver contains a DAF96 valve and a pair of 4,000 ohm headphones, and is powered by a combined 671 and 11 volt battery. Price complete with headphones but less battery 45/- Send for free diagram.

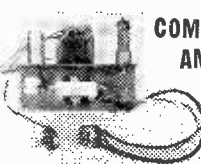
### THE STAAR "GALAXY"

4-speed mixture Auto-changer. Finger-tip stop, start and speed change control. Size 10 1/2in. x 12 1/2in. A.C. mains 110-250 v. Price **£9.15.0**, plus 4/6 pkg. & carr. Credit Terms **£1.5.0** & 8 monthly payments of **£1.5.9**.

2-Volt 18Ah bakelite-cased ACCUMULATOR by Oldham, Dagenite, Exide. New and unused, unspillable, 7 1/2 x 4 x 2. Price 6/6, plus 1/6 p. & p.

### THE TELETRON "COMPANION" 3 TRANSISTOR POCKET RECEIVER

This receiver may be built for **89/6** complete. Postage and packing 1/6.



### COMPACT GRAM AMPLIFIER

Complete ready to connect to any type of Pick-up and Speaker (3 ohms). A.C. Mains 200/250 v.

250 v. Volume and tone control on 9" extended leads. 1 valve. Overall size 7" long x 6" wide x 3 1/2" high.

Plus packing and postage 2/6. **£2.19.6**

## AT LAST!

PREMIER RADIO CO.

have opened a branch in the Middle of the West End at **23 TOTTENHAM COURT RD.**  
*The best HI-FI Showroom in the district*

(2 minutes from Tottenham Court Road Underground Station)  
Tel.: MUS. 3451

WRITE FOR DETAILS OF PREMIER TAPE RECORDER KIT FOR ONLY **£38.15.0**.

### 4-WATT AMPLIFIER

MAY BE BUILT FOR **£4.10.0** Plus 2/3 Pkg. & Carr.

Instruction Book 1/- post free.

A steel case is now available, complete with engraved panel, for 15/6 extra. The amplifier may be supplied complete for **£5.5.0** plus pkg. and post 3/6, or fitted in case at **£6** plus pkg. and post 3/6.

### 2-BAND T.R.F. RECEIVER

MAY BE BUILT FOR **£5.15.0** Plus 3/- Pk. & Post.

3-Band Superhet Receiver may be built for **£7.19.6** plus pkg. & carr. 3/- These two receivers use the latest type circuitry and are fitted into attractive cabinets 12in. x 6 1/2in. x 5 1/2in. in either walnut or ivory bakelite or wood. Individual instruction books 1/- each. Post free.

### 8 WATT AMPLIFIER

This design includes 5 miniature valves of the latest types, an ultralinear output transformer suitable for Speakers of 3 and 15 ohms and a very attractive perspex front panel with gold lettering, complete set of parts.

Postage & packing **£8.8.0** 5/- extra.  
or **£10.19.6** built and tested. Send 1/6 for Booklet.

B.S.R. T.U.S 3-speed Record Player **£3.19.6** plus 2/6 post and packing. P.U. complete with arm, 38/-

THE LATEST COLLARO 4-SPEED SINGLE PLAYER UNIT COMPLETE WITH PICK-UP AND TURNOVER CARTRIDGE **£4.12.6**. PLUS 2/6 PKG. & CARR.

## Why not make the best! MULLARD AMPLIFIER KIT

Now supplied with ultralinear output transformer.

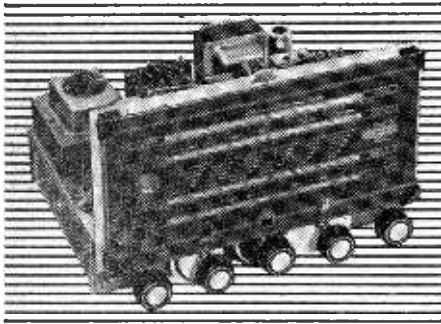
All the components for Model 510, plus pre-amplifier, on one chassis (total six valves), chassis gold hammer finished. May be purchased for **£12.12.0** plus pkg. and post 7/6. This version complete and tested **£15.15.0**. Or pre-amplifier and tone control in a separate unit **£14.14.0**, plus pkg. and post 7/6.

ADDRESS ALL MAIL ORDER ENQUIRIES TO: (Dept. P.W.) 207 EDGWARE RD., LONDON, W.2

FROM THE HOME OF HI-FI

**DULCI**

# High Fidelity at its finest



**Model H3.** Three waveband model (inc. VHF), 6 valves. For 3 ohm. speaker. Chassis immensely sensitive and stable, giving highest quality reproduction. Wide range Tone Control, with pick-up, extension speaker and gram motor sockets. **£20. 17. 0.** inc. P.T.

**Model H4PP.** (Illustrated) NEW! A complete Dulci High Fidelity radiogram chassis, combining sensitivity, selectivity and stability to delight the most discerning listener. Outstanding record and VHF reproduction, 4 wavebands. Ultra linear amplifier gives ample power output. Push-pull system, wide frequency response, bass and treble controls. Fits easily into any existing cabinet. The perfect chassis for modernising your radiogram.

AM/FM Model H4PP. Price **£29.3.10.** inc. P.T.

**Model H4.** AM/FM Radiogram chassis. 7 valve, 4 waveband superhet with FM (VHF). Magic eye tuning indicator. High sensitivity. Dial size 11 1/2" x 5 1/2". Sockets for speaker (3 and 15 ohm.) Mains sockets for motor. **£24. 6. 6.** inc. P.T.

Write for full details

DISTINCTLY



QUALITY PRODUCTS

THE DULCI COMPANY LTD. 97-99 VILLIERS ROAD LONDON N.W.2.

TELEPHONE: WILLESDEN 6678/9

## NOW—the easy way to buy your Test Set



### PORTABLE TEST SETS

#### Series 90 & 100

New easy terms for purchase of the superb M.I.P. Test Sets are offered by the makers. These terms are as follows:—

##### Series 90 Miniature Test Set

Cash price **£9.15.0** or deposit 35/- and six monthly instalments of 28/10.

##### Series 100 Portable Test Set

Cash price **£12.7.6** or deposit 47/6 and six monthly instalments of 36/-.

*Other credit terms from the following suppliers:—*

HOME RADIO (MITCHAM) LTD., 187 London Road, Mitcham, Surrey.

FRITH RADIOCRAFT LIMITED, 69-71 Church Gate, Leicester.

SEND THIS COUPON FOR FULL DETAILS WITHOUT OBLIGATION

To: MEASURING INSTRUMENTS (PULLIN) LTD.,  
Electrin Works, Winchester Street, Acton, W.3.

Please send illustrated leaflet of the M.I.P. Series 90/100\*  
Test Set, together with details of the new easy payment scheme.

\* Delete whichever Series number not required.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

P.W. \_\_\_\_\_



Series 90  
19 self-  
contained  
ranges a.c.  
/d.c. 200  
micro-  
amps—  
5,000ohms  
per volt.



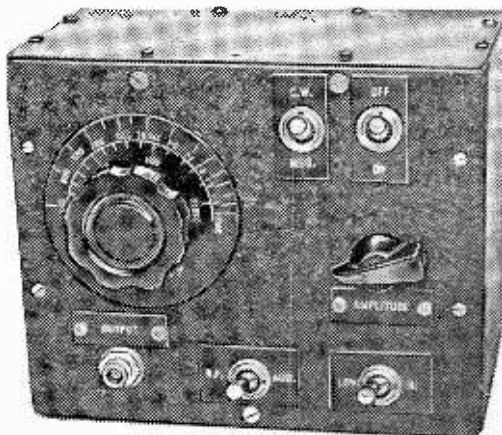
Series 100  
21 ranges  
a.c. / d.c.  
100 micro-  
amps—  
1,000 volts  
10,000  
ohms per  
volt.



# A TRANSISTORISED SIGNAL GENERATOR

ALIGN RECEIVERS AND LOCATE TUNING  
SETTINGS WITH THIS INSTRUMENT

By P. C. Kemp



**T**HE generator described here has the advantage of being completely portable and, since it facilitates the using of transistors, consumes negligible power.

The frequency coverage of the generator is from 400 Kc/s to 1.700 Kc/s in two ranges. Range 1, 400-550 Kc/s; range 2, 550-1.700 Kc/s. Range 1 is primarily used for I.F. alignment. The carrier can be modulated by an audio frequency of 400 c/s to a depth of 30 per cent. Another facility offered is a 400 c/s output, this being provided by the modulating oscillator.

An OC71 Mullard transistor is used in the audio frequency oscillator and an OC45 Mullard transistor in the R.F. oscillator. An OC72 transistor of high current gain and high frequency cut-off can be used in the R.F. oscillator circuit with success, although the carrier output is reduced at the higher frequencies.

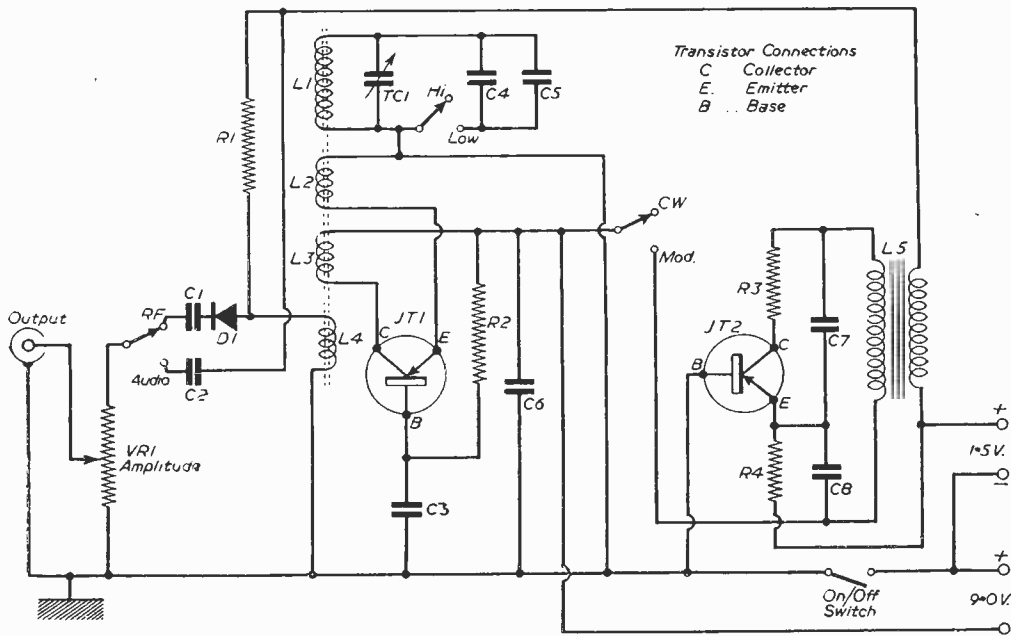
Modulation of the carrier is carried out by

using a crystal diode, the GEX34 point contact diode, which is biased in the forward direction, the audio modulating signal varying the bias, hence providing modulation.

Power is supplied by two batteries, one of 9 volts and the other of 1.5 volts. The author used mercury cells which have long life but are very expensive. Recommended cells are the D21 1.5-volt cell and the PP3 9-volt cell. These are manufactured by Ever Ready. The experimenter may wish to use other types of cell, and this is quite acceptable provided the correct voltages are used.

### Coil Details

Two coils are required. The R.F. coil is wound on a 1½ in. length of Ferrite rod of ¼ in.



Theoretical circuit of the instrument described in this article.

diameter and the audio oscillator coil on a  $\frac{1}{2}$  in. stack of Stalloy laminations as a transformer. The Ferrite rod used in this instance was part of a rod aerial from a portable receiver.

**R.F. Coil**

The winding of this coil is rather critical. The actual numbers of turns of the collector and the emitter windings are preferably found by experiment as the optimum number of turns depends on the transistor characteristics and at present moment transistor variations are widespread and not uncommon.

The author found that the numbers of turns for his particular transistor were as follow and should act as a good guide.

1. Collector winding, 20 turns of 20 strand 47 s.w.g. cotton covered Litz wire.
2. Emitter winding, 3 turns of 20 strand 47 s.w.g. cotton covered Litz wire.
3. Tuning winding, 48 turns of 20 strand 47 s.w.g. cotton covered Litz wire.
4. Coupling winding, 2 turns of 20 strand 47 s.w.g. cotton covered Litz wire.

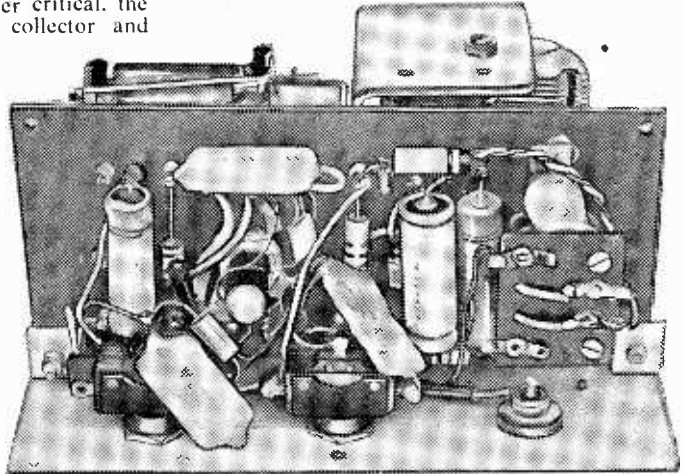
It is advisable to wind the collector winding nearest the rod, the emitter winding next and the tuning winding on the top, the windings being in layers of  $\frac{1}{2}$  in. width. The coupling winding is wound beside the main winding.

If the experimenter finds the R.F. circuit will not oscillate he should reverse the connections of either the collector or emitter winding. Care should be exercised when cleaning the cotton and enamel from the Litz wire.

**A.F. Coil Winding Details**

The A.F. coil was wound on a  $\frac{1}{2}$  in. stack of M.E.A. type 21 Stalloy laminations, the former being made from cardboard. If this type of lamination is not available to the experimenter

the author suggests using the laminations from the output transformer of a small portable receiver. The former can be used also. Number of turns required: primary, 1,000 turns of 38 s.w.g. enamel copper; secondary, 230 turns of 30 s.w.g. enamel copper wire. Before winding



*View of the interior of the signal generator.*

secondary cover the primary with two turns of .002in. paper. The complete winding is covered with  $2\frac{1}{4}$  turns of .01in. thick bitumised cloth and wax dipped.

Frequency	Wavelength
400 Kc/s	750 metres
450 Kc/s	668 metres
500 Kc/s	600 metres
550 Kc/s	545 metres
600 Kc/s	500 metres
650 Kc/s	460 metres
700 Kc/s	430 metres
750 Kc/s	400 metres
800 Kc/s	375 metres
900 Kc/s	355 metres
950 Kc/s	333 metres
1,000 Kc/s	300 metres
1,200 Kc/s	280 metres
1,400 Kc/s	214 metres
1,600 Kc/s	188 metres
1,700 Kc/s	177 metres

**Constructional Details**

The circuit may be incorporated in a 20 s.w.g. aluminium box of dimensions  $6\frac{1}{2}$  in.  $\times$  5 in.  $\times$   $3\frac{1}{2}$  in., depending on the size of the tuning condenser and the batteries. A metal box is recommended as it reduces radiation from the oscillator. The main circuitry is mounted on  $\frac{1}{4}$  in. thick S.R.B.P. board of 6 in.  $\times$  3 in., connections

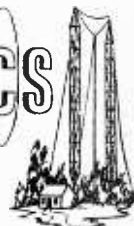
being made via eyelets. The R.F. oscillator circuit must be mounted near the tuning condenser where possible and if a long lead to the output terminal is needed it is advisable to use co-axial cable to

*(Continued on page 68)*

**LIST OF COMPONENTS**

C. No.	Value	Type	R. No.	Value	Type	Misc.	
C1	330 pF	Silver Mica	R1	8.2 K $\Omega$	Carbon	J1	Tuning
C2	0.1 $\mu$ F	Paper	R2	680 K $\Omega$	Carbon	L2	Emitter
C3	470 pF	Silver Mica	R3	15 K $\Omega$	Carbon	L3	Collector
C4	470 pF	Silver Mica	R4	10 K $\Omega$	Carbon	L4	Coupling
C5	47 pF	Silver Mica	VR1	500 $\Omega$	W.W. or Carbon	L5	A.F.
C6	0.1 $\mu$ F	Paper			Variable	J11	OC45
C7	0.1 $\mu$ F	Paper				J12	OC71
C8	0.1 $\mu$ F	Paper				DI	GEX34
TC1	15-525 pF	Variable					Diode

# TRANSMITTING TOPICS



## FURTHER MODULATION ASPECTS

By O. J. Russell, B.Sc., A.Inst.P. (G3BHJ)

PREVIOUSLY it has been pointed out that matching of the modulator valves to the load presented to the P.A. stage is of great importance. Thus, unless the load value is correct, the full rated audio power will not be generated at the rated audio drive to the modulator grids. As previously explained, if the load presented to the modulator tubes is too high, then maximum power cannot be obtained, and overdriving in an attempt to gain more audio power will result in severe clipping of waveforms in the modulator. Conversely, a modulator presented with too low a value of load impedance will require more drive to give the required audio power output, and may draw excessive peak currents.

While, therefore, a certain tolerance is possible on load values, it is preferable to err on the side of too low rather than too high load values of impedance. The "possibility" of gaining increased power output by using a low load value and providing an increased grid drive is, however, not so attractive as it appears. The grid drive power requirements rise steeply, and the peak anode current taken by the modulators also increases. Either of these factors may result in drastically diminished valve life, and are not to be countenanced except when only a small change is made from the accepted ratings of the valve. For example, operation with a load value of some 10 to 20 per cent. lower than the rated figure may be quite acceptable, although the grid drive power may have to be nearly doubled to obtain the benefit of this deviation.

Readers are interested, however, in the opera-

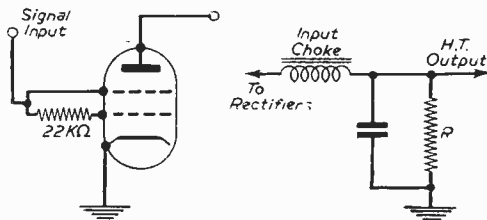


Fig. 1 (Left).—Zero-bias triode connection of the 807. Fig. 2 (Right).—Choke input circuit with bleeder resistor.

tion of modulator valves at voltages "intermediate" between rated values. Thus, for example, a well-known handbook only quotes the full "all-out" values for modulator tubes. The familiar 807 rating and load values are given for the absolute maximum power output of 120 watts of audio at 750 volts on the anodes of the modulator. This immediately poses the question of what load

values and power output are indicated for operation at lower H.T. values. The British amateur, for example, is interested in 75 watts output in order to modulate his 150 watt maximum P.A. input. For reasons of economy, however, he is interested in gaining this power output with as economical a power supply as possible. Conventional books may confuse him here, for under some conditions (i.e., as a Class A amplifier), the performance of a valve falls off as the  $2\frac{1}{2}$  power of the applied voltage. Even apart from this, it would seem that a valve would fall off as the square law of applied anode voltage.

However, as it happens, the situation is simpler with Class AB2 or Class B valves. Thus with tetrodes such as the 807, the power output falls off almost directly as the anode voltage falls. This presupposes, however, that the screen voltage is kept at the rated 300 volts. Thus for the 807 giving 120 watts of audio at 750 volts, we can expect 60 watts of audio at 350 volts H.T. A more exact calculation based upon valve curves indicates a power output of 51.4 watts, so that if we allow a little extra for inefficiency at lowered anode voltages, we may calculate the power output on simple proportion. Moreover, it is always wise with modulators to allow a little power in hand, so by being pessimistic, by ten per cent. or so for small changes in anode voltage, and doubling this allowance for drastic changes (as for halving the H.T. voltage) one is sure of being on the safe side.

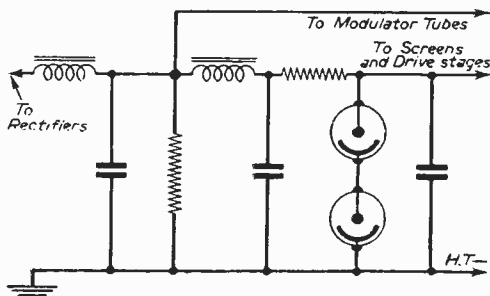


Fig. 3.—The push-pull modulator valves may be fed directly after the input choke of a choke input power supply. The screen and driver H.T. line should have further smoothing and be stabilised by neon stabilisers, as shown.

As an example, for 75 watts from a pair of 807s we would by straight proportion need a voltage of 469 volts, so that 500, or better still, 550 volts would be chosen as the operating voltage. A more accurate calculation based upon

the valve characteristic curves gives 490 volts as the anode potential providing 75 watts of audio. Furthermore, the "safety" figure of 550 volts anode voltage gives a generous 85 watts of audio, which is well on the safe side. Thus, simple estimates made upon a direct falling off of audio power with anode volts will give quite accurate figures, and if a reasonable allowance is made, will indicate in any given case whether full modulation might be obtained. Remember, of course, that whatever the anode voltage, the screen voltage is maintained at 300 volts. The value of this "estimate" is that it indicates, for example, that a 100-watt P.A. stage may be modulated by a pair of 807s at 350 volts anode potential, so that a quite unpretentious power supply using the high current highly efficient receiving type of rectifiers might well supersede 5R4GYs or the faithful 5U4Gs in the power supply.

Notice that the above description implies that the modulator tubes still draw their rated peak current despite the lowered anode voltages. In fact, with the usual driver stage, there is not any difficulty over this. The only point is to budget in the power supply for the rated D.C. input of 250 mA, when the modulator is delivering full rated power. Economically minded readers may no doubt reason that by using the 100 $\mu$ F or larger sizes in receiving type electrolytics for smoothing, and with the largest permissible electrolytics as reservoir condensers, the power pack voltage may be nicely held up by using a 350-volt pack of standard receiving design, so that an economical transmitter with a comfortable 100 watts P.A. input may be modulated. This might obviate the design questions of running the full input by enabling a sizeable economy on the modulator and power supply.

### Load Impedance

The question of load impedance has been skipped over so far, and this question also arises when operating at other than the rated modulator voltages. Precisely the same principles apply, however, and for the above argument on power ratings to hold, the load impedance should also be reduced proportionately to the anode voltage. Thus, ideally, halving the anode voltage requires that the modulators be now matched into a load one half of that required at the full anode voltage. Here again, to be on the safe side, assume a load some 10 per cent. less than the value calculated by proportion.

The above arguments represent the simplest method for the amateur, as by operating in this way—i.e., with the load impedance reduced proportionally to the anode voltage reduction, the greatest power output is obtained, providing that the power pack regulation permits of the full peak 240/250 mA, required for full output. Providing the power pack maintains the rated voltage, this is assured.

One further possibility, in the interests of voltage regulation, is to retain the higher voltage and reduce the current swing. That is to say, the modulator tubes are not driven so hard, so that the reduced power output is obtained by reducing the current swing. If the modulator

load value is unaltered, however, the reduction is not great, and the disadvantage is that we are running the modulators at a higher voltage than is necessary. However, if the load value is increased, it is then possible to reduce the peak anode current appreciably if reduced power output is needed. Thus by doubling the load impedance, the power output is approximately halved as also is the peak current. Under some circumstances this might be preferred as a means of obtaining better power pack regulation.

### Swinging Choke Input

The Class B zero-bias connection of 807s (Fig. 1) offers a problem in power pack regulation, as the resting current in the zero-bias triode connection is only some 10 to 15 mA. The current demands on peaks rise to a steady 240 mA input for full output, so that power pack regulation is severely tested. The swinging choke input circuit is the standard method of obtaining good power regulation (Fig. 2). It is necessary to use a bleeder resistor if a swinging choke is used, in order that the zero signal current should not be less than the rated figure for the choke. Even if an ordinary choke is used, a bleeder passing some 25 mA or so is useful in restricting surges. The smoothing capacitor should be large, and 16  $\mu$ F is a popular choice. Where the power pack is able to supply the total current required, it is possible to run the driver stage as well from the power supply. However, this needs a power pack capable of some 300 to 350 mA output under peak conditions for both Class AB2 and Class B modulators. To do this successfully requires extensive use of electrolytic condensers in the driver stages if trouble is to be avoided on modulation peaks. Also it is necessary to switch on the driver stage filaments before the main power supply, so that the drivers will draw current at all times, and drop enough voltage through the dropping resistor to prevent the electrolytics being "blown." The writer provides the screen and drive stages of his Class AB2 modulator in this way from the modulator supply, but all transmitter filaments are switched on before power is applied. This has so far obviated blowing the many electrolytics decoupling the

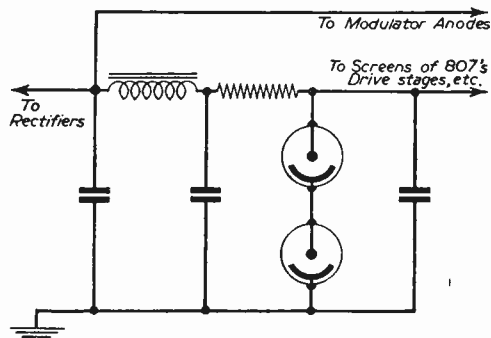


Fig. 4.—Push-pull modulator valves may be fed directly from the input capacitor of the main power supply.

driver and speech amplifier stages. However, as in this case the stabiliser valves for the screen supply draw current through the main dropping resistor (Fig. 3), this prevents the driver supply ever exceeding 300 volts. Moreover, where a zero-bias connected modulator is used, no stabiliser is used as there is no screen supply. It would be worth while fitting stabilisers for the purposes of restricting any possible voltage surge on the

eliminated on peaks. Even with large chokes a 10 or 20 volt drop occurs under peak current conditions with tetrode modulators in Class B and Class AB2.

A point of some interest about the zero-bias Class B operation of 807s is that the grids being at zero potential, grid current flows throughout virtually the whole signal cycle, as one grid or other is driven positive throughout any signal cycle. This feature of zero-bias operation means that the modulator grids present a fairly constant load to the driver stage under all conditions. This is an advantage compared with Class AB2 and biased Class B type stages, where the grid impedance changes sharply at the point where grid current starts to flow. Furthermore, the impedance of the grids of a zero-bias connected pair of 807s is moderately high, so that driving is not very difficult. No undue alarm need be felt at the grid drive requirement of approximately 560 volts "peak-to-peak" grid swing needed by zero-bias 807s as this merely means that the peak signal per grid is half this, that is 280 volts peak, which again is a swing of 200 volts R.M.S. In fact a 6L6 driver stage is adequate to swing the 807s. The quoted figure for the grid-to-grid impedance of a pair of zero-bias 807s is 7,100 ohms. The diagram illustrates what this means, as one has merely to calculate the driver transformer to match a load of 7,100 ohms across the whole secondary to the primary. Thus, as a simple example, a drive valve requiring 3,550 ohms load would require by the square root rule a ratio of 1:1.4 step-up to match it to a pair of 807 grids rated at 7,100 ohms grid-to-grid impedance. This would approximate to a single 6L6 driver stage, and indicates that a single 6L6 with 300 volts H.T. should be adequate to drive a pair of zero-bias 807s.

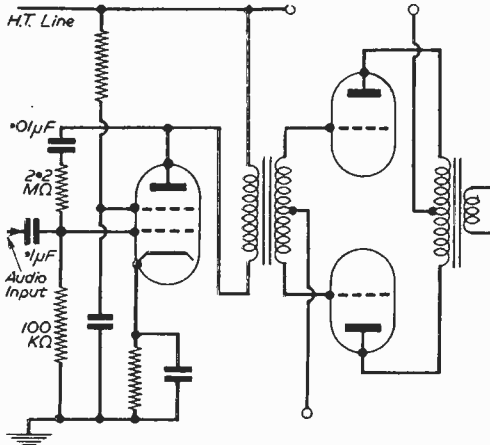


Fig. 5.—A simple and effective way to add negative feedback to the driver stage of a modulator. This helps in reducing distortion on audio peaks.

driver stage H.T. line, and thus protecting any bypass electrolytics that may be used.

**Condenser Input**

A further expedient now very popular is to use condenser input, and to take the modulator supply voltage directly from the input condenser of the power supply (Fig. 4). This is claimed to equal or exceed the conventional choke input method for regulation. Without entering into any arguments on this score, it has the merit of simplicity, and provides a higher H.T. line voltage than the choke input filter. It should be explained that hum is not a problem with this system. If a large condenser at 16 µF or more is employed, then the quiescent ripple is a few per cent. However, this is cancelled out in the push-pull modulator stage, and no hum is discernible on the transmission. Having tried the system the writer agrees that with a given power transformer one does gain "extra" audio power by changing from a choke input to this system. This is mainly because of the higher voltage obtained from the condenser input circuit. Also a further slight gain is obtained as the drop in the choke is

(To be continued)

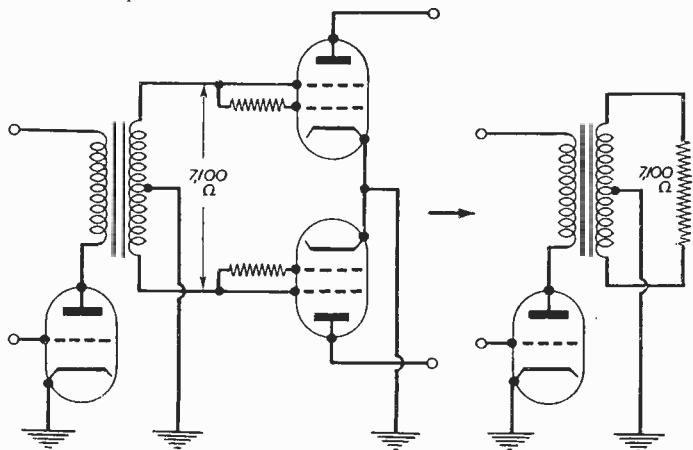


Fig. 6.—The "grid-to-grid" impedance of zero-bias connected 807s is 7,100 ohms. This means that the effect is that of a 7,100 ohm load connected across the whole of the driver transformer secondary. The driver transformer, therefore, should match the driver valve to an impedance of 7,100 ohms across the transformer.





# On Your Wavelength

BY THERMION

## Muggeridge and the BBC

I EXPECTED a heavy correspondence on the paragraph concerning Muggeridge and his ill-timed article on the monarchy. Most of the correspondence has been favourable and a small amount the reverse. Nothing in any of the latter, however, has caused me to have second thoughts on the matter. Some of the letters are extremely critical, not only of Muggeridge, but of the BBC, in wishing to give even wider publicity to his views.

## Pronunciation

THE old rule "An before A, E, I, O and U" will shortly have to be amended to omit the O, if some check is not put upon the BBC to prevent it interfering with the English language and our standard methods of pronunciation as laid down in the dictionary. Even the Prime Minister has caught the disease. In a recent speech he referred to "Furrin" affairs. As a reader remarked in a recent issue, I do hope the BBC does not have to deal with the subject of bombers!

## Catering at Earls Court

MY good friend, the secretary of the Radio Industry Council, thinks that my strictures on the catering arrangements at Earls Court during last year's Radio Show a shade harsh, although he agrees that there was some justification for them. In justification he tells me that immediately before the 1957 Radio Show began the previous Earls Court catering management was replaced by another firm of contractors who, considering that they had to take over at a few days notice, "carried out the catering at the Radio Show so satisfactorily that the number of really serious criticisms received by the organisers regarding the catering arrangements was negligible." He tells me that the new contractor was well aware that what he was able to do this year fell a good way below the ideal which the organisers hope to achieve. The organisers believe that the catering arrangements for this year's exhibition will show a really significant improvement over what we have hitherto experienced. The main objective will be to introduce more in the way of popular meals at inexpensive prices and the new contractor has a number of plans for achieving this. At the same time it must be borne in mind that the special problems connected with catering for only a certain number of weeks in the year in a building such as Earls Court are quite different from the problems which face the average West End caterer. He can remain open 52 weeks in the year. The solution to these problems always tends to militate against low prices and it cannot be expected that an exhibition service can be run economically in

direct competition with outside catering. I agree with all this, but whatever the prices fixed, surely they should be standardised? At different bars there were different prices for drinks, and at one bar the prices varied from hour to hour. I know that there are difficulties, but the organisers have a duty to protect the public from exploitation. An evening meal, as I have said, is part of the show. People cannot leave the exhibition and go elsewhere for a meal without having to pay for readmission. To many radio enthusiasts the show is an evening out, and the catering should be such as to send them home with a happy feeling.

## More About Midgets

IN view of the easy availability of midget components, transistors and printed circuits, I am astonished that more manufacturers have not yet produced a tiny pocket radio which can be used on the odd occasion when you are away from home, perhaps in a train or on a picnic, or at a football match and wish to listen to a play or some particular item of news. I know that there are many problems yet to be solved and that the production of a battery power pack having a reasonable life is only a possibility of the future, in spite of the developments in America of really midget batteries, one smaller than a sixpenny piece capable of running a watch for a year. The battery has always been the bugbear. It is large and cumbersome, as well as weighty in comparison with the receiver proper, but in America they have solved the problem. Large numbers of really small receivers are on the market. They are not cheap, but they sell in very large quantities and I believe that they would do so over here, where only a few manufacturers are supplying them. The midget American receivers on sale are good, but there is difficulty with spares. How many of my readers, I wonder, would be interested if this journal sponsored such a design, making use of a printed circuit?

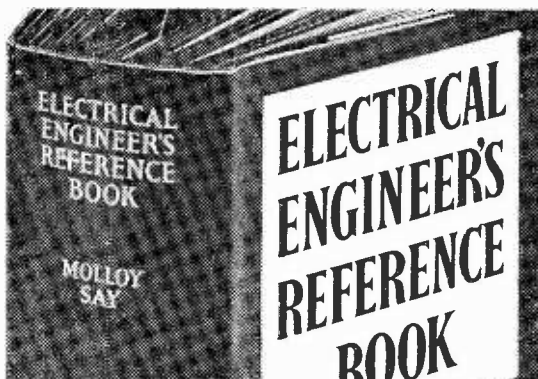
At the recent Turin Motor Show a new pocket portable with six transistors was exhibited, this clipping on to the car's instrument panel. It will function from the car's battery, or from the domestic mains. It receives medium waves only.

The smallest portable radio so far produced on a commercial scale is a Japanese set, as far as is known. This is a medium-wave set with six transistors, approximately the size of a sardine tin. It is said to work for 100 hours on a dry battery smaller than a match-box.

I am certain that if manufacturers showed more interest in the market, sales of receivers would improve, although I am glad to note that over one million sets were sold in the first eleven months of 1957, an improvement of nearly 120,000 over the figures for the whole of 1956.

# NEW EDITION • 2,216 PAGES

AN INDISPENSABLE REFERENCE TO MODERN PRACTICE AND DEVELOPMENTS



READY FEB. 20 AND YOURS  
**Free for 7 days**  
 WITHOUT OBLIGATION

This is the 9th edition of the most up-to-date work of its kind. Many thousands of copies of previous editions are in daily use. If you have never seen it, now is your chance—a big New Edition will appear in a few days' time, and you are invited to examine it free of charge. Newnes Electrical Engineer's Reference Book is a comprehensive exposition, arranged in 33 self-contained sections, each written by a recognised authority.

**Written by  
 73 Specialist  
 Contributors**

- THEORY & CALCULATIONS**
- TRANSFORMERS**
- CABLES & WIRES**
- TRANSMISSION AND DISTRIBUTION**
- SWITCHGEAR**
- MOTORS & CONTROL**
- RECTIFIERS & CONVERTORS**
- WIRING AND INSTALLATION**
- MEASUREMENTS**
- POWER FACTOR CORRECTION**
- WELDING**
- BATTERIES**
- ELECTRONIC ENGINEERING**
- TRACTION, LIFTING AND CONVEYING**
- ELECTRICITY IN MINES, AGRICULTURE, AERO & AUTO INDUSTRY**
- RULES, REGULATIONS AND SUPPLY DATA, ETC.**
- EDUCATION & TRAINING**

*Small text on the book cover: '33 SECTIONS' '2,216 PAGES' '330 DIAGRAMS, 289 PHOTOGRAPHS' 'NEW PROCESSES' 'ALL ABOUT 1958'*

## ALL THESE NEW FEATURES!

● **Analogic and Digital Computers**

World Energy Resources and Electric Power Generation including:—  
 Fuel-fired Steam Stations ● Nuclear Reactor Stations ● Diesel-engine Stations ● Gas-turbine Stations ● Hydro-electric Plants ● Wind Generating Plant ● POWER SUPPLY NETWORKS (including recent advances in U.S.A., Western Europe and U.S.S.R.) ● TRANSISTORS ● RADIOACTIVITY.

**2,096 DIAGRAMS      289 PHOTOGRAPHS**

**SEND TO-DAY for FREE EXAMINATION**

George Newnes Ltd., 66-69 Great Queen Street, London, W.C.92.

Please send me Newnes ELECTRICAL ENG. REF. BOOK without obligation. I will either return it in 8 days or send 7/6 deposit 8 days after delivery, then 8 monthly subscriptions of 10/-, paying 87/6 in all. Cash price in 8 days, 80/-.

Name .....

Address .....

Occupation .....

Your Signature.....  
 (or Your Parent's  
 Signature if under 21)

**EERB 1B**

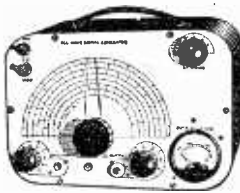
Place X where it applies.

<input type="checkbox"/>	HouseOWNER
<input type="checkbox"/>	Householder
<input type="checkbox"/>	Living with Parents
<input type="checkbox"/>	Lodging Address

## SIGNAL GENERATOR

25/- deposit plus P. & P. 5/- and 4 monthly payments of 21/6. Cash £4/19/6 plus P. & P. 5/-.

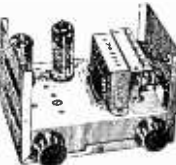
Coverage 123 kc/s, 84 Mc/s. Metal case 10in. x 6in. x 4in. Size of scale, 6in. x 3in. 2 valves and rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent., modulated or unmodulated R.F. output continuous variable 100 milli-volts. C.W. and mod. switch, variable A.F. output and moving coil output meter. Grey hammer finished case and white panel. Accuracy plus or minus 2%.



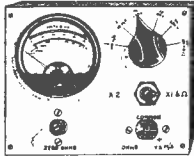
**CONVERT TO I.T.A. FOR ONLY 25/-** deposit plus P. & P. 5/- and 4 monthly payments of £15/6. Cash £5/17/- plus P. & P. 5/-.

ANY T.V. (except Philips) WITHIN 35 MILES OF I.T.A. TRANSMITTERS ALL CHANNELS NO ALTERATIONS TO SET.

Complete with built-in power supply, 200-250 v. A.C. mains. Crackle finish case 5in. long, 3in. wide, 4in. high. Incorporating gain control and band switch. Illus. with cover removed. Complete installation comprises Converter, Wolsey 3-element I.T.A. outside or left aerial, 36ft. I.T.A. lead, two plugs. (Wolsey 4-element 5/- extra.) "CONVERTER" only £3/19/6 plus P. & P. 2/6.



## AC/DC POCKET MULTI-METER KIT



Comprising 2in. moving coil meter scale calibrated in A.C./D.C. volts, ohms and milli-amps. Voltage range AC/DC 0-10, 0-100 and 0-500. Milliamps 0-10, 0-100. Ohms range 0-10,000. Front panel, range switch, wire-wound pot (for ohms zero setting), two toggle switches, resistors and meter rectifier. In grey hammer finish case.

19/6 Plus P. & P. 1/3.

Point to point wiring diagram 1/- free with kit.

## 4 VALVE ALL-DRY SUPERNET PORTABLE KIT

Incorporating Ferrite rod aerial Medium and long waves. In grey leatherette. Size 9in. x 7in. x 6in. Valve line-up: 1T4, 1R5, 1S3, 3V4. Complete kit of parts (less batteries).

£5.19.6 Plus Post & Packing 3/6.



## COMPLETELY BUILT PORTABLE AMPLIFIER

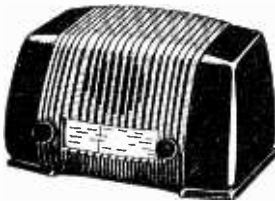
approx. size 6in. x 2in., incorporating 2 valves, contact-cooled metal rectifier, bass and treble lift controls. 39/6 Plus P. & P. 3/6 5" P.M. SPEAKER & D.P. TRANSFORMER, if purchased with the above, 18/6. Plus P. & P. 1/6.

## COLLARO 4-SPEED AUTOMATIC CHANGER

Model 456 (suitable for use with above amplifier), A.C. mains. 220-250 v., turnover crystal head. Brand new, fully guaranteed. £8.19.6 Plus P. & P. 5/- or 25/- deposit, plus P. & P. 5/-, and 7 monthly payments of £1-5-0.

## T.R.F. KIT in PLASTIC CABINET

3 valve plus metal rectifier. A.C. mains 200-250 v. Medium and Long waves. In pastel blue or brown. Valve line-up: 2 VR66s and V752. Size 15in. long by 9in. high by 7in. deep. £3.19.6 P. & P. 7/6.



Point to point wiring diagram 1/6. Free with kit.

## RADIO & T.V. COMPONENTS (Acton) LTD.

23 HIGH STREET, ACTON, LONDON, W.3

GOODS NOT DISPATCHED OUTSIDE U.K.

## EXCLUSIVE OFFER OF THE R. 107

### THE ARMY'S FINEST COMMUNICATIONS RECEIVER

Just purchased from the Ministry of Supply, this magnificent 9 valve 3 Wave-band receiver gives World Wide Reception over a coverage of 1.2-17.0 Mc/s (18-250 metres), taking in several important Amateur Bands, Shipping Band, and part of the Medium Wave Band, including the B.B.C. Light Programme, sensitivity is 1 micro-volt on CW, and 2-6 micro-volts on RT. The controls include a Bandwidth Switch ("Wide" or "Narrow"), choice of A.V.C. and B.F.O., Audio Filter, R.F. Gain, Aerial Trimmer. Has built-in Output Stage with Internal Speaker, which can be switched out to use Headphones. Uses normal interchangeable Octal Valves. Incorporates A.C. Mains Power Unit for 100-250 volts, and Vibrator Pack for 12 volts D.C. In Grey Metal Case size 24" x 13" x 17". These sets are slightly used, but in first class condition, thoroughly checked and aerial tested before despatch.

**COMPLETE, READY TO SWITCH ON**

# £8-19-6

(Carriage 2/- England and Wales, rest of U.K. extra).

S.A.E. for Illustrated Leaflet.

**COLLINS TC'S TRANSMITTERS.** Special offer of these famous American Transmitters. Frequency Range 1.5-12.0 Mc/s in 3 bands. Employs 7 valves, 2 of 1625 in P.A. Stage, 1625 buffer and 1625 modulator stage, 3 of 12A6 in Oscillator stage. Radio Telephone or Radio Telegraph. Provision for VFO or Crystal Control 4 Crystal positions. Has Plate and Aerial Current meters. IN BRAND NEW CONDITION. ONLY £12.10.0 (carriage, etc., 15/-).

**WIRELESS SET NO. 10MK. II.**—The famous Army Tank Transmitter-Receiver, incorporates "A" Set (TX/RX covering 2.0-8.0 Mc/s, i.e., 37.5-150 metres). "B" Set (VHF, TX/RX covering 230-240 Mc/s, i.e., 1.2-1.3 metres) and Intercommunication Amplifier. Complete with 15 valves as follows: 6 of 6KT6, 2 of 6V6G, 2 of 6V6G, and 1 ea. 6B9G, 6H6, E1148, EP50, 807 and booklet giving circuits, notes, etc. Size 17in. x 8in. x 12in. Magnificently made by famous American firms. IN BRAND NEW CONDITION. ONLY 65/- (carriage, etc., 10/-).

**12 VOLT POWER UNIT** for the above available, 25/- (carriage, etc. 5/-).

6 v. **VIBRATOR PACKS.** Output approx. 130 v. at 30 mA., fully filtered and smoothed. Complete. ONLY 12/6.

**R1155 SUPER LOW-MOTION TUNING ASSEMBLY.** As used on all late model 1155s. Easily fitted to "A" sets, etc. ONLY 12/6.

**EHT TRANSFORMERS.** 5.5 kV. (Rect.) with 2 v. 1 a., 73/6. 7 kV. (Rect.) with 2 v. 1 a., 89/6. 2.5 kV. (Rect.) with 2-0-2 v. 1.1 a., 2-0-2 v. 2 a. (for VC897 tube, etc.). 42/6 (postage 2/- per trans.).

**INSULATION TESTERS (MEGGERS).** Read up to 20 megohms at 500 volts pressure. Overhauled and in perfect order. ONLY £3-10-0.

**POCKET VOLTMETERS.**—Read 0-15 volts and 0-300 volts A.C. or D.C. BRAND NEW AND UNUSED. ONLY 18/6.

**CRYSTALS.** British Standard 2-pin 500 kc/s. 15/-; Miniature 200 kc/s and 465 kc/s 10/- each.

**ROLA 6in. P.M. SPEAKER.** Mounted in grey crackled metal cabinet 9in. x 9in. x 4in., with volume-control. Ideal for use with receiver, or as extension. BRAND NEW. ONLY 27/6. (Post 2/6).

**12 VOLTS 1 AMP. BATTERY CHARGER.** Very robust ex-Admiralty. In grey crackled metal case size 6in. x 6in. x 4in. BRAND NEW. ONLY 35/- (Post 2/6).

**MAINS ISOLATING TRANSFORMER.** Manufactured by Vortexion. Fully shrouded. Will provide true 1:1 ratio from nominal 230 v. Primary. Rated at 100 watts. BRAND NEW. ONLY 22/6. (Post 2/6).

## HARRIS ELECTRONICS (LONDON) LTD.

Formerly U.E.I. Corporation

138 Gray's Inn Road, London, W.C.1.

(Phone 2 TERminus 7937).

Please include carriage costs on ALL items.

(Open until 1 p.m. Saturdays. We are 2 mins. from High Holborn (Chancery Lane Station) and 5 mins. by bus from King's Cross).

# Constructing a Direct-coupled A.C./D.C. Amplifier

A USEFUL TWO-VALVE UNIVERSAL AMPLIFIER

By J. S. Kendall

THE universal amplifier in many cases has the advantage of lower cost as well as giving the constructor on D.C. mains a chance. This circuit to be described was developed in the laboratory of Kendall and Mousley Ltd., following the great demand for such a circuit by the home constructor. The basic circuit is simple, and the tone control follows the general lines of the Mullard tone control, but values have been altered to give a different range of action, especially in the bass register. The idea of the circuit is for the construction of a high quality—or at least reasonably high quality—circuit for a portable gramophone. This reduces chassis size as well as speaker size, so the type of speaker chosen was the Elac elliptical, whilst the Garrard T.A. player with a pair of Acos heads can well complete a portable gramophone. The case has been left for the individual constructor to design for himself.

The chassis is a Kendall and Mousley 5in. × 6in. × 2½in., and can be obtained ready punched and drilled with the various holes. However, for those who wish to make their own, the front has three ¼in. holes for the volume control spindles; both ends are drilled ¼in. for jacks or grommets. Jacks were used in the prototype as they give a greater flexibility in testing, on the other hand there is nothing to beat the soldered joint for input and output. It is also cheaper. A further hole of ¼in. diameter is drilled in the rear of the chassis to take the mains lead. There is

nothing to prevent this lead being taken out at any other place in the chassis. The top is drilled for three valves. The valve on the left is the output and takes a B8A holder. The centre for the H.F. pentode is a B9A with skirt and can, whilst the right-hand holder is a normal B9A, but can, of course, have a skirt and can for retaining the valve if required. This screening of the rectifier valve is not to be recommended, as the reduced cooling will most certainly cause the valve to overheat. The centres of the valve holders should be 1¼in. back from the front of

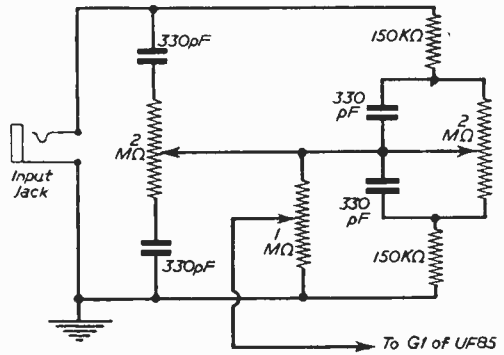


Fig. 2.—Circuit of the tone control arrangement.

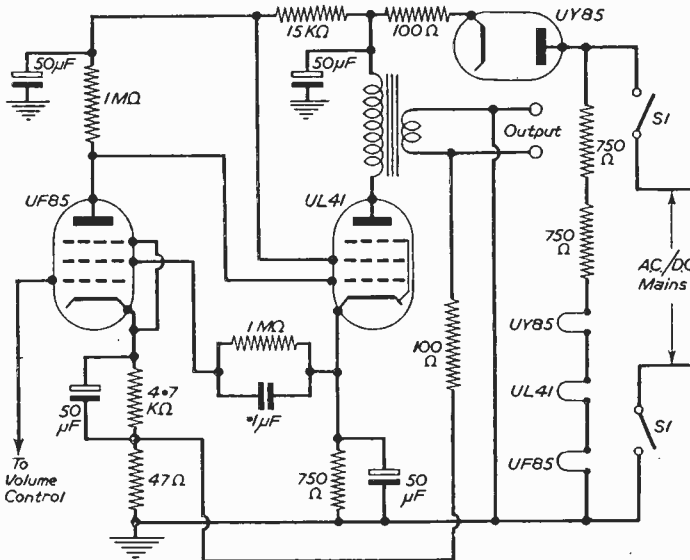


Fig. 1.—The complete circuit of this universal amplifier.

the chassis. The line for the mounting of the output transformer and the electrolytic is 1¼in. behind this again. The chassis should be mounted so that the spindles are in the air, thus allowing the heat to rise. This would not be the case if the chassis were mounted flat, with the spindles at the side.

### Construction

Having made or obtained the chassis, the valve holders should next be bolted in place, followed by the output transformer and the electrolytic. The three potentiometers can be mounted last. As stated previously, jacks were used in the original, but tag strips can be used and the input and output leads soldered. Three three-way tag strips are used in the construction and these are fixed to the fixing bolts of valve holders and the output trans-

former. The component layout of holders and tag strips is shown in Fig. 3.

The layout will, of course, depend on the constructor; rarely do two people construct a circuit in the same manner. The basic circuit is shown in Fig. 1. The mains is taken to the amplifier via a twin-pole switch mounted on the volume control. This is not essential, but is only advisable from a safety angle. With a single-pole switch, there is always the chance of getting a shock with the switch in the "off" position. The anode of the rectifier valve is taken direct to the "live" pole of the switch, the surge limiter is placed in the cathode circuit of the valve. The smoothing is effected with the aid of a double 50  $\mu$ F 350 volt electrolytic capacitor. A Hunts component with a single hole fixing is the best here. The use of a 15K resistor at 50 cycles is far superior to the use of a 20 H choke, as it has a high impedance. Also, the feeding of the ripple from the reservoir capacitor has the effect of allowing a small amount of hum from the output. The hum, on the other hand, fed to the screen is amplified and fed antiphase to the output. The result, if a careful balance is struck, is that hum in the output just doesn't exist. In this amplifier this has been done.

The driver stage is a UF85, direct coupled to the UL41 output valve. This means that the UF85 is run under low anode volt and screen

conditions, thus the gain is very high. The EL41, in order to be directly coupled, has to run with its cathode at a higher voltage than the anode of the UF85. This is done in this case by the aid of a 750  $\Omega$  resistor shunted by a 50  $\mu$ F 50 volt electrolytic. The screen of the UF85 is fed from the cathode of the UL41. This has the effect of applying negative feedback and reducing dis-

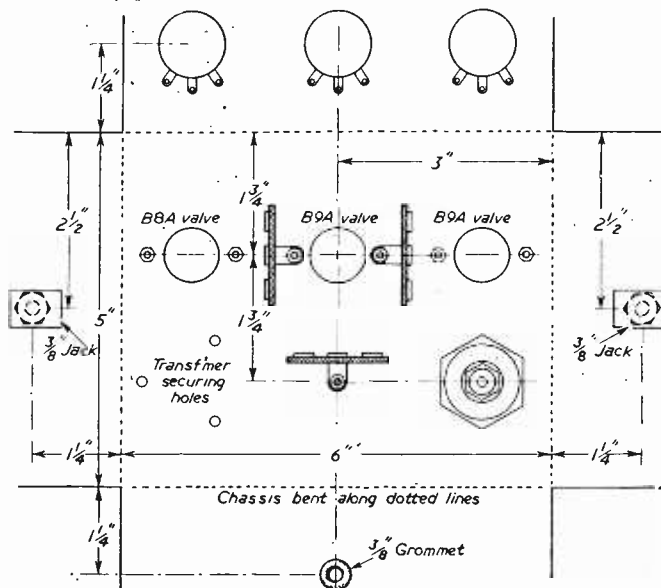


Fig. 3.—Chassis details and layout.

#### LIST OF COMPONENTS

One Mullard UF85  
 One Mullard UL41  
 One Mullard UY85  
 One McMurdo B8A holder  
 One McMurdo B9A holder  
 One McMurdo Skirted B9A holder with screen

#### RESISTORS

Three 750  $\Omega$  7 W wire-wound  
 Two 150 K Type R resistors  
 One 15 K Type X resistor  
 Two 1 M Type T resistors  
 One 4.7 K Type T resistor  
 One 47  $\Omega$  Type T resistor  
 Two 109  $\Omega$  Type T resistors  
 (All "Lab" Components)

#### CAPACITORS

One 50-50  $\mu$ F 350 volt Type KN418A Hunts  
 One 50  $\mu$ F 12 volt Hunts  
 One 50  $\mu$ F 50 volt Hunts  
 One 0.1  $\mu$ F 150 volt Hunts

Four 330 pF Ceramicaps "Lab"  
 Two 2 M $\Omega$  volume controls L/S. "Lab"  
 One 1 M $\Omega$  volume control with double-pole switch  
 One Elstone MR/T output transformer  
 Three three-way tag strips  
 One chassis 6in. x 5in. x 2 1/2in. } Kendall & Mousley  
 Wire, nuts, bolts } Ltd.

ortion as well as stabilising the conditions of the circuit. The stabilising effect is that as the cathode voltage of the UL41 rises, the screen voltage is raised, thus raising the anode current of the UF85. The increased current causes an increase in the voltage drop across the 1M anode load, and thus the grid voltage is dropped on the UL41, reducing the cathode voltage. The circuit is thus self-compensating over a large range of mains variation.

#### Tone Control

The tone control circuit is shown in Fig. 2. The circuit will give a top lift or top cut. The "bass" circuit is designed to work from a higher frequency than the Mullard circuit. The 330 pF condensers do not bypass the low frequencies as would be the case if higher values of capacitors were used. The range of frequencies "cut or lifted" would be lower, and a larger speaker and output transformer would be required to handle them.

If the circuit is required for real "high fidelity" reproduction the Elstone MR/7 can be used, but a larger chassis will have to be used in this case. The values of the bass control capacitors can then be raised, that at the earthy end of the bass potentiometer to 3,500 pF, and 680 pF for the one on the live side of the control. The treble control capacitors can be left as they are.



# A Two-Valve Portable Radiogram

UTILISING ONLY TWO VALVES, THIS PORTABLE RADIO WILL ALSO FORM A USEFUL RECORD REPRODUCER

By M. L. Michaelis

**T**HIS apparatus consists of a small radio amplifier complete in a cabinet only six by eight inches, with the record player built as a separate unit which is attachable to the radio amplifier by only a single cable. The radio amplifier may be used by itself, forming a very handy portable radio for the bedroom, etc., with excellent sensitivity on a small picture-rail aerial. The radio amplifier and record player unit are both designed to operate from 200 to 250 volts A.C. mains, the radio amplifier consuming about 15 watts and the record player motor about 5 watts.

A standard mains output valve of the beam tetrode type is used, capable of up to three watts

speech power under the operating conditions. Although this is far more than is required by the size of the loudspeaker used, it is a decided advantage, from the point of view of tone quality, over the various R.F.-Pentode adaptations so often used in the output stages of simple receivers.

The loudspeaker used is a 5in. P.M. type, which should be carefully selected at time of purchase

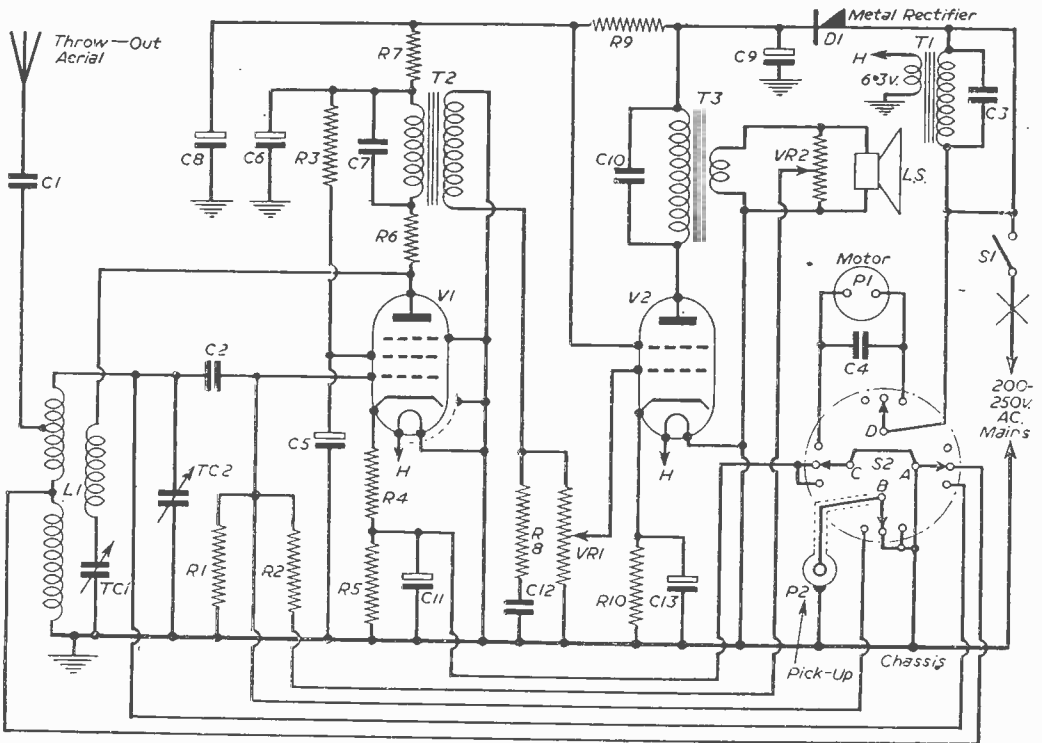


Fig. 1.—The circuit of the portable radiogram.

for freedom of cone movement. In spite of the use of such a small speaker, the quality of reproduction is very good, and it may be claimed that

of negative feedback. This results in the necessity of having two transformers within the loop, giving large phase shift changes from the low to the high end of the audio frequency range, which would cause instability before a useful degree of negative feedback could be applied, if steps were not taken to prevent this. Accordingly, it is seen

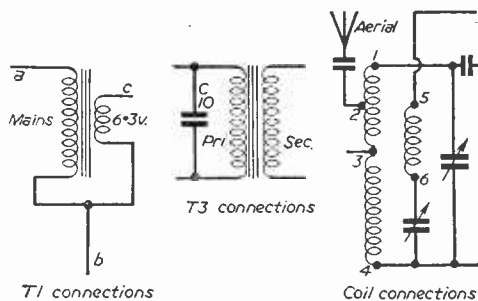
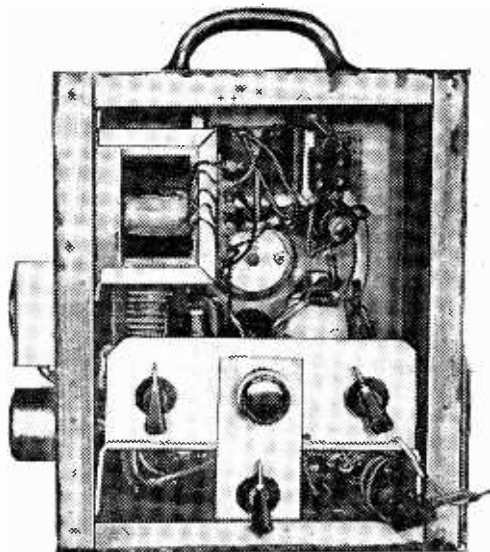


Fig. 3.—Details of transformer and coil connections.

this circuit, whilst maintaining the simplicity and sensitivity of this type of set, gives a tone quality and volume superior to most others of the two-valve type. This can be attributed to a number of special circuit features introduced, which will next be mentioned briefly.

Perhaps the most important novel features lie in the negative feedback arrangements adopted. In two respects these will at once be seen to go directly contrary to accepted custom, namely, that two transformers are included in the loop and that the volume control is included inside the loop. Far from leading to an impossible situation, these measures provide distinct advantages once the problems to which they give rise have been solved. The purpose of using transformer coupling between the detector and output valves is to preserve good sensitivity in spite of the use



View of the interior of the set.

that T2 has been loaded with R8, C12, C7. The reason for the second departure from custom,

#### LIST OF COMPONENTS (FOR FIGS. 1 AND 2).

C1 : 100 pF mica.  
 C2 : 200 pF mica.  
 C3, C4 : 0.1  $\mu$ F 1,000 v.  
 C5, C6, C8 : 8  $\mu$ F 350 v. wkg. electrolytic.  
 C7, C14 : 1,000 pF 350 v. paper.  
 C9 : 16  $\mu$ F 450 v. wkg. electrolytic.  
 C10 : 2,000 pF 350 v. paper.  
 C11, C13 : 25  $\mu$ F 25 v. electrolytic.  
 C12 : 0.01  $\mu$ F 350 v. paper.  
 TC1 : 300 pF solid dielectric small variable condenser (Reaction control).  
 TC2 : 500 pF solid dielectric small variable condenser (Tuning control).

#### SWITCHES

S1 : On/off (see VR1).  
 S2 : Yaxley 4-pole, 3-way, 1 bank (Wavechange).

#### TRANSFORMERS

T1 : Filament transformer, 200/250 v., 6.3 v. 2 A.  
 T2 : "Radiospares" miniature interval transformer. Ratio 5:1.

T3 : Output transformer, 50:1, 4 w.

#### GRAMOPHONE UNIT

The circuits are designed for the ACOS-HIG HGP54 unit taking SK1 and SK2 sapphires.

CARBON RESISTORS :  $\frac{1}{2}$  watt ratings throughout—

R1 : 1 M $\Omega$ .  
 R2, R3 : 250 K $\Omega$ .  
 R4 : 30 ohms.  
 R5 : 680 ohms  $\pm 5\%$ .  
 R6 : 33 K $\Omega$ .  
 R7, R8 : 22 K $\Omega$ .  
 R9 : 4700 ohms.  
 R10 : 220 ohms  $\pm 5\%$ .  
 R11 : 470 K $\Omega$ .

Tolerances  
 $\pm 20\%$   
 unless  
 otherwise  
 stated.

#### POTENTIOMETERS

VR1 : 250 K $\Omega$  log. carbon track with S.P. switch 250 v. 3A (S1) (Volume and on/off).  
 VR2 : 100 ohms linear wirewound miniature preset (Negative feedback adjust.).  
 VR3 : 100 K $\Omega$  log. carbon track (Gramophone volume).  
 VR4 : 250 K $\Omega$  log. carbon track (Gramophone tone).

#### VALVES

V1 : Type SP61, Base Mazda Octal.  
 V2 : Type 6V6GTG, Base Int. Octal.  
 DI : Metal rectifier, high voltage rating 350 v. 50 mA.

#### COIL

Any M L coil with reaction winding (e.g. "PEPANCO").

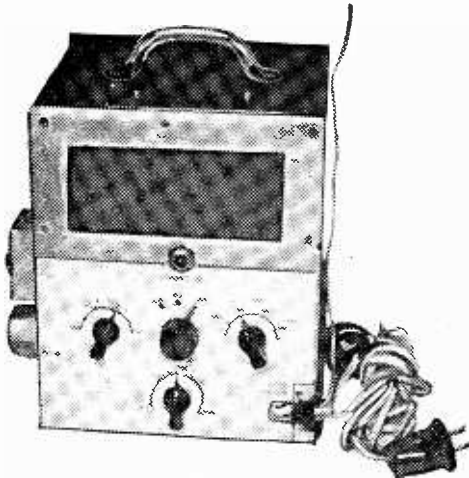
#### PLUGS AND SOCKETS

P1 : 200/250 v. 2 amp. 2-pin plug and socket.  
 P2 : Coaxial plug and socket (TV aerial type).  
 P3 : Mains plug, preferably of the modern fused type. Fuse at 1 amp. If plug not fused, insert 1 amp. fuse at X in Fig. 1.

#### SPEAKER

Goodmans 5in. P.M., 2-3  $\Omega$ .

namely the inclusion of the volume control within the loop, is that it was found by experiment to give the desired results of smooth control of volume coupled with maximum negative feed-



Front view of the receiver.

back at maximum volume. Other circuits of this type of radio have often used increasing negative feedback to reduce volume, so that maximum negative feedback is in use at minimum volume where distortion is least and therefore negative feedback least called for!

Although certain advantages are realised by this, the author has for some time questioned the advisability of praising it too highly. Surely it is also worth considering the merits of doing exactly the opposite, i.e., arranging for the maximum negative feedback to be operative at full volume where it is most needed to cancel distortion. It was on this basis that experiments were conducted in the development of the present circuit, with very pleasing results. It was at first intended to have the negative feedback operative only on the

gramophone function, by taking R2 to a suitable contact on S2 instead of direct to V1 grid: but further experiment showed that the application of negative feedback gives a remarkable improvement also on the radio function, when V1 is functioning as a leaky grid detector. The effect was found to be one of transforming what was a reasonable and average performance into a reproduction with a surprising measure of true bass (as distinct from muffled roar) at the same time as a sibilantly crisp and clear presence of even the highest frequencies. Since the tone was found to be equally pleasant on speech and music, after fixed correction by C10, no variable tone

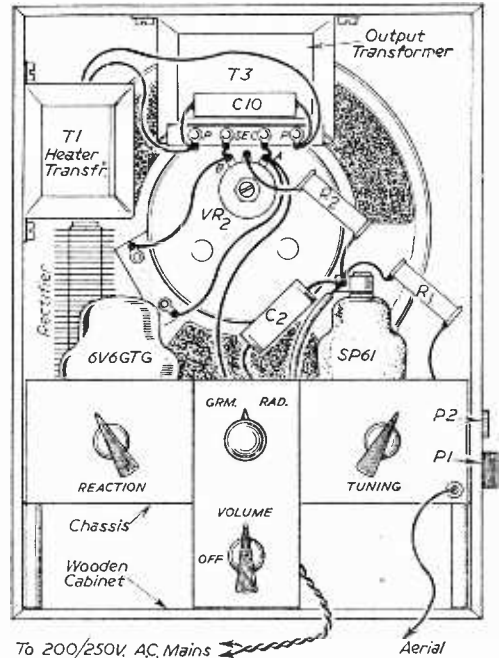


Fig. 5.—General rear view with cabinet open.

control was deemed necessary on the radio-amplifier. A variable tone control is used on the record player only, for the purpose of compensating for the various recording characteristics of commercial records, and to enable treble-cut to be used for reducing needle hiss on poor or old records. No prejudicial effects at all were found with regard to the function of V1 as a leaky-grid detector when negative feedback was applied.

It must be emphasised again that success depends also in quite large measure on the selection of a really good 5-inch loudspeaker. The cone should be felt carefully at the centre, and only if considerable movement is freely and easily possible is the item satisfactory.

The cathode circuit of V1 merits some mention next. Here R4 is a small resistor permanently in circuit, giving a small degree of bias and sub-

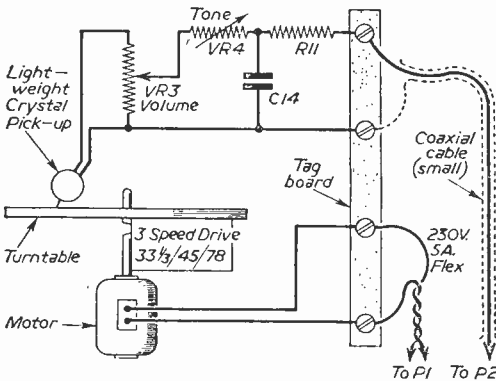


Fig. 2.—Theoretical circuit of the record player deck.

sidary negative feedback to smoothen reaction on the radio function. An extra bias resistor, R5, is switched into circuit on the gramophone function only, to bring V1 to the correct operating point as Class A amplifier. Experiments were tried to leave R5 unbypassed also, but although this had some beneficial effect on gramophone, it led to troublesome instability on radio due to the switch leads. This indicated the essential necessity of C11.

The rest of V1 circuit is more or less conventional. The only other point of possible interest is R3. Here a high value (250K) is best for good sensitivity of V1 as a detector, but a rather lower value might be better for Class A amplifier operation. A suggestion to interested readers is to free one section of S2 by taking live mains direct to C4 and P1, and then use this section to switch a 100K half-watt resistor in parallel with R3 on gramophone function only.

The output stage, V2, is conventional. As

already stated, no advantage in price or effectiveness was found in trying to adapt an R.F. Pentode here. Early experiments with an SP61 also in this position, with a view of interchangeability of V1 and V2, proved a failure due to unsatisfactory maximum undistorted volume, and so a conventional 6V6 was therefore soon adopted. This

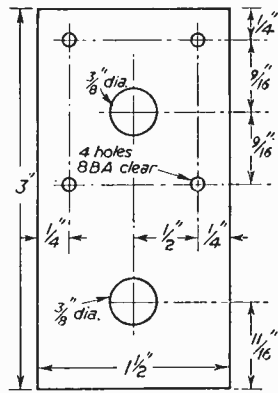


Fig. 4 (a).—Details of volume control panel.

Tight push fit Aluminium brackets one each side screwed to front of cabinet

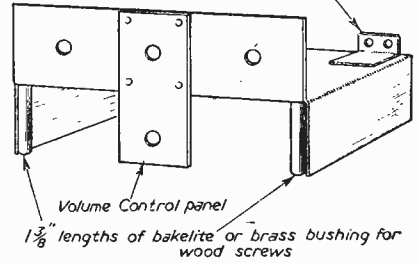


Fig. 4 (b).—Diagram of complete chassis assembly.

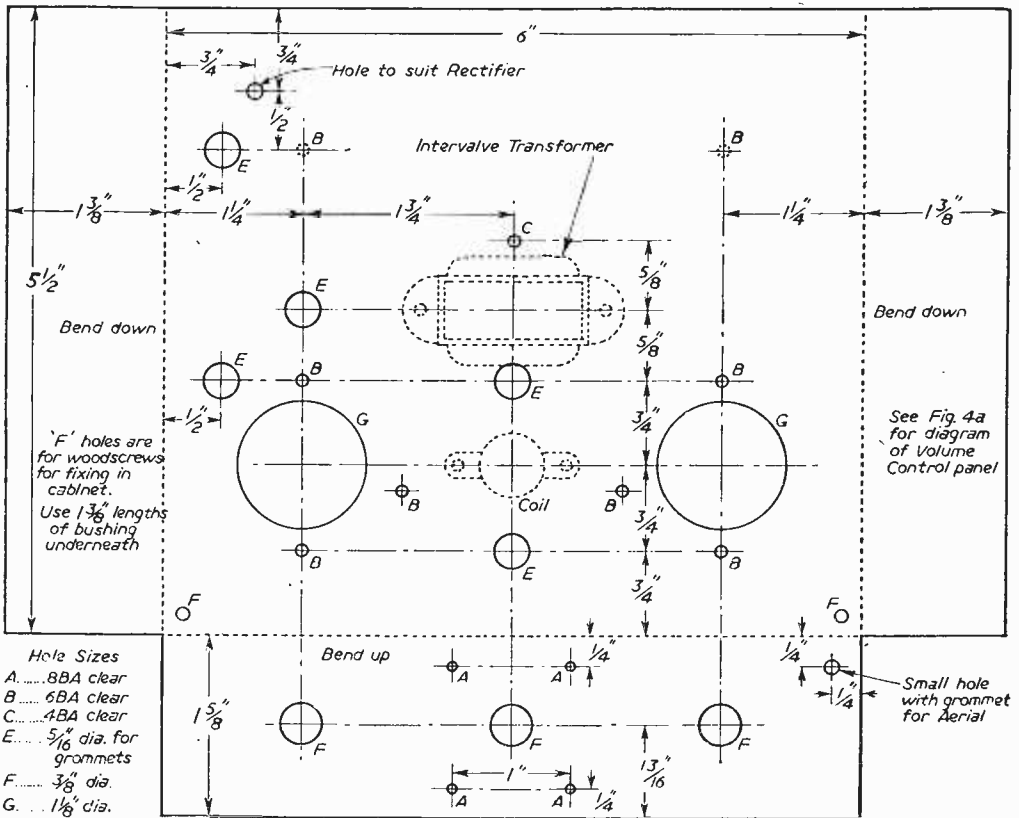


Fig. 4.—Chassis drilling and cutting data.

valve is still obtainable on the surplus market for a few shillings. The 6V6, however, takes a high anode current, and this presented problems with the wattage rating of R9. Accordingly, the anode circuit was fed direct from the reservoir condenser C9, this being permissible without introduction of appreciable hum, because there is no amplification following the anode. This relieved R9 of the heavy anode current of V2, enabling this resistor to be kept to a small rating. But from the screen to the anode of V2 there is significant gain, therefore the screen could not be fed from the reservoir condenser without causing severe hum. For this reason V2 screen is still fed through R9.

**The Gramophone Side**

Changeover from radio to gramophone is performed in the multifunction switch S2, which also performs waveband selection. Mains to the gramophone motor is automatically switched off on the radio function positions, and the tuned circuit is short-circuited on the gramophone function so that radio-breakthrough is positively prevented. C4 is essential to prevent excessive sparking at S2 when the motor is switched on and off. C3 is to prevent modulation hum. Both these condensers must be of high quality, as they have to take the full mains pressure across them continuously.

The record player is designed to use a crystal pickup giving a very high output, i.e., about a volt on standard 78 r.p.m. records, and about half a volt on microgroove records of 45 and 33½ r.p.m. This is far more than is required to load the radio-amplifier fully, and therefore VR3 is included as a volume control in the record player. It is advisable to operate the radio with its own volume control at maximum, so as to be using maximum negative feedback, and control the volume then by means of VR3. VR4 and C14 form a variable tone control for compensating various recording characteristics and filtering needle scratch. R11 is necessary to isolate C14 from the negative feedback circuit at V1 grid, and thus prevent interference with the frequency characteristic of the feedback network. The unavoidable attenuation of about 60 per cent. which R11 gives is easily affordable because of the high output of the crystal pickup.

**Constructional Hints**

Figs. 1 and 2 give theoretical circuits, Fig. 3 the coil connections, Fig. 4 chassis drilling details, Figs. 5 and 6 detailed wiring diagrams. On pages 40 and 41 will be seen pictures of appearance of the radio amplifier. Little difficulty should be experienced in construction if these diagrams are followed carefully.

Keep all leads as short as possible; those shown longer than necessary in the diagrams have been so represented only for clarity. Layout of the few electrical components in the record player is not critical, so long as the very minimum necessary of non-earth leads are run unshielded, and all such unshielded leads are run as far away as possible from the mains leads to the motor. Also, do not forget to bond the metal cases of the controls to the earth lead. The mains flex to the motor and the audio coaxial cable, however, may be run in a single insulated lead, with the two plugs fitting P1 and P2 on the end. This gives the neat appearance of a single-cable connection between the radio and record player.

(To be continued)

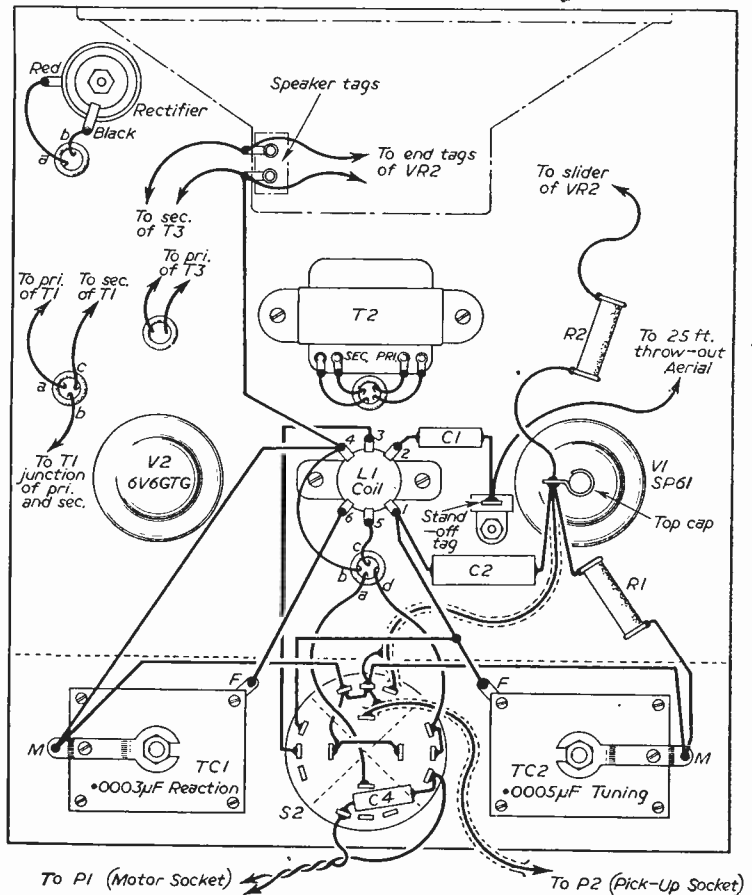
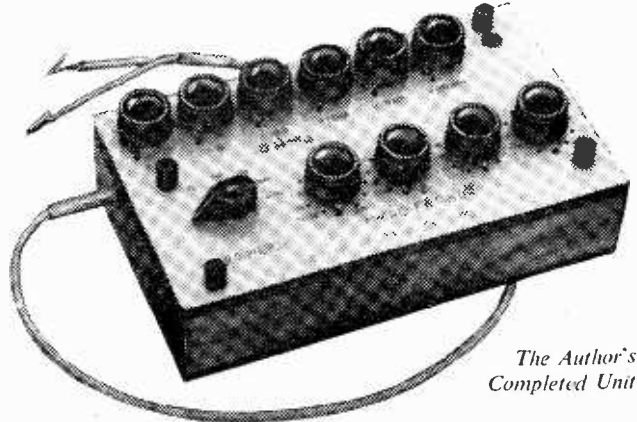


Fig. 6.—Above chassis wiring details.

# An R.C. Substitution Box

AN ACCESSORY FOR THE  
EXPERIMENTER'S BENCH AND  
FOR THE SERVICEMAN

• By F. Quelon, B.Sc.



*The Author's  
Completed Unit*

**A** RESISTANCE-capacitance substitution box is easily made and soon repays the time and effort of making it in time saved and increased fault-finding efficiency. As a matter of fact, during the few months since I completed the box here described it has been, next to the multimeter, the most frequently used instrument on my bench.

The following are some of the possible uses of the R.C.S. box:

(a) The straightforward substitution of a suspected faulty component.

(b) Finding the best value of resistance or capacitance in cases where the original value is not known.

(c) Where it is expedient to depart from the published design, as is sometimes the case with old sets, the best value of resistor or capacitor is conveniently found.

(d) When some visible defect in a TV picture is suspected to be due to a leaky capacitor, an artificial leak can be connected across the suspected capacitor, and if increasing this leak (reducing the resistance) does not accentuate the defect, it can be concluded that leakage of that particular capacitor is not the cause of the trouble. With the clip leads still in place, the box can be switched to the nominal capacitance. In this way a capacitor can sometimes be com-

pletely checked without making any disconnection.

(e) Service manuals often give voltage readings ascertained with a voltmeter having a certain ohms per volt resistance. If only a valve voltmeter is available, it is a simple matter to shunt it with the appropriate resistance, using the box.

(f) It is sometimes useful to know the lowest L.T. voltage with which the oscillator of a battery set will function. This is easily found by connecting the box in series with the L.T. battery and increasing the resistance until the set cuts out.

(g) In experimental work (as opposed to servicing existing apparatus) the box can be invaluable.

### Limitations

Due to stray capacitance and inductance effects, the use of the box at frequencies in excess of a few tens of kc/s becomes unreliable. Whether it can be of use or not at such frequencies will depend on circumstances

### Specification

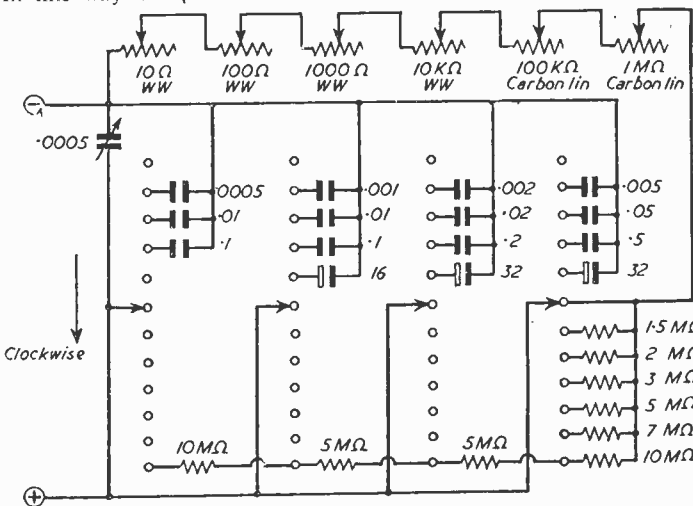
Resistance—any value from zero to 1 megohm, then in steps to 31 megohms.

Capacitance—any value from a few pico-farads to 0.999 microfarads, and 16, 32, 64 and 80 microfarads.

Resistance and capacitance in parallel for most of the above values.

### Construction

The accompanying photograph shows the general layout of the box, which measures 8½ in. × 5 in. × 3 in. overall, and is made from ½ in. plywood. The top panel is faced with white formica, on which the figures of capacitance and resistance have been scratched and coloured black and red.



*The Circuit. 4 Yaxley 12-way switches are used for selection.*

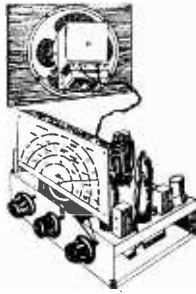
**CASH OR TERMS**

**DENCO RADIO-GRAM CHASSIS, 97/6**

3 and 4 waveband turret tuned. Superhet. A.C. chassis with 6in. or 8in. speaker. Size 8 1/2 in. x 10 1/2 in. x 12 in. Valve line-up:—CCH35, EF39, EBC33, CL33 and CY31. (CIC or dropper.) Ins., carr., 7/6.

**SUPER CHASSIS, 99/6**

5 valve superhet chassis including an 8in. speaker. 4 control knobs (Tone, Volume, Tuning W.C. Switch): 4 waveband with position for gram. P.U. and for extension speaker. A.C. R. & P. 5/6.



**BEAUTIFUL EXTENSION SPEAKER 29/9**

Complete fitted with 8in. P.M. Speaker "W.B." or "Goodmans" of the highest quality. Standard matching to any receiver (3-5 ohms). Flex and switch included. Unrepeatable at this price. Money refunded if not completely satisfied. Ins., carr., 3/6.



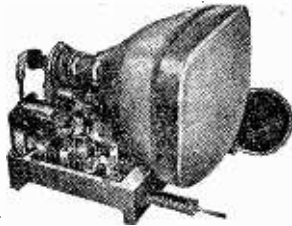
**8in. P.M. SPEAKERS, 8/9** Let the lady of the house listen to that Radio or T.V. programme. Complete with O.P. trans. 10/- P. & P. 2/8.



**P.M. SPEAKERS, 12/9.** Elkco or Goodmans. High quality. 2.5 ohms. Complete with O.P. trans. 14/- P. & P. 2/9.

**HEADPHONES, 1/9.**

Single carphone and band. C-LR type. Ideal for crystal sets, extension radio, etc. P. & P. 1/3.



**17" T.V. CHASSIS, £19.19.6**

Latest improved circuits. Higher E.H.T. (brilliant picture). Improved sensitivity (for greater range). Chassis easily adapted to any cabinet. 17in. rectangular tube on adapted reconditioned chassis. Channels 1-5. 12 months' guarantee on tube, 3 months' guarantee on valves and chassis. Less valves. Valve line-up: (5 valves): 6SNJ6, 6V6, EY51, 2-40D2. Others: 6L18, EL33, 7-6E1s. Turret tuner, 50/- extra. Chassis size: 11 1/2 in. x 14 1/2 in. x 11 in. With 5 valves, £21.19.6. With all valves, £25.19.6. Ins., carr., 25/6 (incl. tube). State B.B.C. channels (and ITA if turret tuner required).

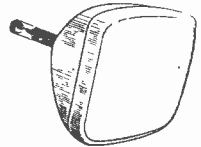
**14" T.V. CHASSIS, TUBE & SPEAKER, £13.19.6**

As above with 14" round type tube. 3 months' guarantee. With 5 valves, £15.19.6. With all valves, £19.19.6. Ins., carr., 25/- (incl. tube). Turret Tuner, 50/- extra.

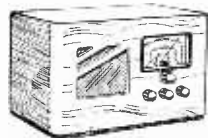
**RECTANGULAR T.V. TUBES. 12 MONTHS' GUARANTEE.**

17in., £7.10.0.

14in., £5.10.0.



6 months' full replacement, 6 months' progressive. Made possible by the high quality of our tubes. Ins., carr., 15/6. Convert your 9in., 10in., 12in. to our special offer of 14in., 15in., 16in. T.V. TUBES. £5, 3 months' guarantee on all round tubes. Details on how to "Do-it-Yourself" in our FREE catalogue. 12in. T.V. TUBES, £6, 3 months' guarantee. 15/6 ins., carr., on all tubes. TUBES WITH ITA KNS, £1 including carriage. Perfect picture. 14in. and 17in. rectangular. This low price owing to slight screen burns. Ideal for stand-by or for testing.



**HOME RADIO 79/6**

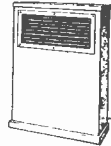
5 valve (octal) superhet. 3 waveband receiver. A.C./D.C. Universal mains can be adapted to gram. P.U. In wooden cabinet. 18 1/2" x 11 1/2" x 8 1/2". Ins., carr., 7/6.

**CONSTRUCTOR T.V. CHASSIS**

**SOUND & VISION STRIP 17/6.** Tested, working, complete less valves. I.F.s. 16-19.5 mc/s. P. & P. 2/6. Drawing 2/6 or FREE with order.

**TIMEBASE 9/6.** Tested. Incl. focus unit, line trans., scan coil, etc. Less valves. P. & P. 3/6.

**POWER PACK & AMPLIFIER 29/6.** 7-9 kV. R.F. E.H.T. unit included. Amplifier stage 6V6 with O.P. trans. 3 ohms matching. Smoothed H.T. 350 volt at 250 mA. 6.3 v. at 5 amp., 22 v. at 3 amp., 6.3 v. at 4 amp. and 4 volt centre tapped. Less valves. Drawings FREE with order or 2/6. Ins., carr., 5/6.



**ELECTRIC CONVERTER HEATER 99/6**

Cleaner, cheaper, safer than paraffin. A.C. D.C. Switched for 1 or 2 kWatts. Illuminated grille. 200-250 volt. Ins., carr., 10/6.

**CO-AX CABLE 6d. yd.** Cut to any length. 16 post on 20 yards 45 - per 100 yds., post 3/6.

**CAR AERIALS 6/9.** Whip antennae, sliding to 11" one hole fixing. Post 1/-.

**MAINS TRANSFORMERS**

350-0-350 v. 80 mA. 4v. 4v. heaters. 200-270 v. Prim. 3/9  
280-0-280 v. 80 mA. 6v. 4 v. 4 v. 200-230 v. Prim. 5/9

Drop through type. Half shrouded. All above 2/3 post.

**HEATER TRANSFORMERS, 12/9.** C-200-250 v. Primary 12 v. heater 1 amp. P. & P. 1/9.

**HEATER TRANSFORMERS, 3/9.** 2-1 ratio auto trans. for heater winding up to 6 v. P. & P. 1/9.

**O.P. TRANSFORMERS, 1/3.** Standard size (2-5 ohms). Post 1/-, 20 for £1. P. & P. on 23, 5/6.

**RECTIFIERS, 2/9.** 250 v. 100 mA. full or half wave. Salvage. Guaranteed. P. & P. 1/3.

**CONDENSERS, 1/6.** Standard size. 2 gang .0005, tested. P. & P. 1/3.

**Boxed VALVES 3 MONTHS' GUARANTEE**

6L19	8/9	T41	8/9	SP61	3/9	EF37	4/9
1S5	4/9	6SC7	3/9	DF66	5/9	EF36	5/9
EZ40	8/9	77	3/9	EB34	1/9	PEN46	6/9
4D1	2/9	8D2	3/9	EB91	6/9	EL32	6/9
6B8	3/9	8D3	7/9	ECC81	8/9	EL91	3/9
6F12	7/9	12AU7	5/9	ECH42	8/9	PEN45	6/9
6D2	6/9	12BE6	6/9	EF39	6/9	TTZ1	6/9
6H5M	1/9	EAF42	8/9	EF41	3/9	X86	3/9
SP41	3/6	12S37	1/9	EF91	7/9	Z77	7/9

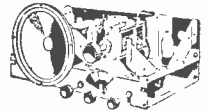
American Types. U.X. All at 3/9 each.

18	75	1D6	90
42	38	6D6	6A7
			6C6

Barrettors 301 and 302 also at 3/9 each.

**POPULAR RADIO OR RADIOGRAM CHASSIS, 39/6**

3 wband and gram. S'het. 5 valve. International Octal. Ideal table gram, but still giving high quality output. 4 knob control. 8" P.M. Speaker, 7.9 extra. Set of knobs 2/- Chassis size 12" x 6" x 9". Less valves. Ins., carr., 4/6.



**T.V. AERIALS, 25/6.** For all ITA channels. For outdoor or loft. 3 elements. Famous manufacturer at half the normal price. Post 2/6.

**T.V. MASKS, 7/9.** 17". Grey plastic. Brand new. Post 2/-.

**T.V. MASKS, 14/9.** 17". Halo lighting. New. Post 2/-.

**T.V. MASKS, 10/9.** 17". White plastic. New. Post 2/-.

**TORCH LANTERNS, 6d. each.** X.W.D. Includes 2 bulbs, uses 800 battery. P. & P. 1/-, Crate of 48 with 22 bulbs extra, 22/- (118 bulbs in all). Ins., carr., 10/-.

Liverpool St. to Manor Park Station.—10 mins. Send for free 1958 Catalogue. Open all day Saturday. **DUKE & CO. (Dept. 4), 621/3, ROMFORD ROAD, MANOR PARK, E.12. Tel.: 1LF 6001-3.**



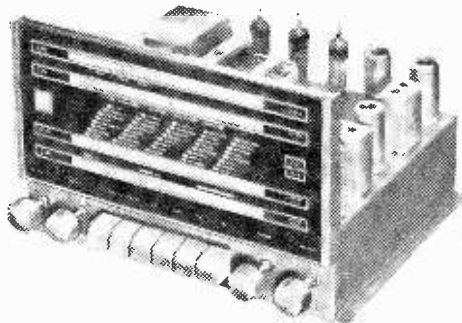
# A NEW *Armstrong* AM/FM RADIOGRAM CHASSIS

Specialists in high quality reproduction for over 20 years

## PB 409

ARMSTRONG quality at an economical price

- ★ 9 valves-6 watts peak output Within 2bb, 20-20,000 cps at 4 watts (double normal room volume)
- ★ Full VHF band (88-108 Mc/s) plus Long, Medium and Short
- ★ Push-Pull Output with Negative Feedback
- ★ Quick-action " Piano-Key " selectors
- ★ Independent Bass and Treble controls
- ★ " Magic Eye " tuning
- ★ Latest Mullard preferred-type valves



**28 GUINEAS** DIMENSIONS : 13" x 9 1/2" x 8" high

ARMSTRONG WIRELESS & TELEVISION CO. LTD.  
WALTERS ROAD, LONDON, N.7. NOR 3313

Post this coupon for descriptive literature and details of Hire Purchase, Home Trial facilities and Guarantee. BLOCK CAPITALS PLEASE.

NAME .....

ADDRESS .....

PW409

We have been making replacement radiogram chassis for nearly 25 years and have concentrated exclusively on the requirements of those who want the best. This is your guarantee of first-class performance and reliability. We shall be pleased to give you a full demonstration of this and other models at our Walters Road Showroom (open 9-6 weekdays and Saturdays).

*Trace the Trouble in a Trice*



**PIFCO**

**ALL-IN-ONE RADIOMETER**

- ★ Circuit Test
- ★ L.T. & H.T. Tests
- ★ mA Test
- ★ Valve Test

Use the Pifco All-in-One Radiometer for the practical testing of all types of radio and electrical apparatus. You can carry out continuity and resistance tests, check H.T., L.T., and G.B. voltages, also Household Appliances, Car Lighting Systems, Bell Circuits, etc. May be used on A.C. or D.C. mains.

Obtainable from your local dealers.  
Write for informative folder to :—

ONLY  
**32/6**  
COMPLETE

PIFCO LTD., WATLING ST., MANCHESTER, 4  
36-37, UPPER THAMES ST., LONDON, E.C.4

## VALVES • SAME DAY SERVICE

All Guaranteed New and Boxed

1.4v. midget. 1R5, 1S5, 1T4, 3S4, DAF91, DP91, DK91, DK92, DL92, DL94; ANY 4 for 27 6.

1A7GT	13 6	8V6G	7	D77	6	EF50	PEN46	6/8
1C5GT	15 6	6V8GT	7 6	DAC32	11	SYL 6 6	PL33	22/6
1H5GT	11	6X4	7	DAF96	8 6	EF80	PL81	19/6
1N5GT	11	6X5GT	6 8	DF33	11	EF85	PL82	9/6
1R5	8	7B7	8	DF96	8 6	EF86	PL83	10/6
1S5	7 6	7C5	8	DH76	7 6	EF88	PY89	8/6
1T4	7 3	7C6	8	DH77	8	EF91	PY81	8/6
3Q4	8	7H7	8	DK32	13 6	EF92	PY82	7/6
3Q5GT	9 6	7S7	9	DK92	8	EL32	PY83	8/6
3S4	7 6	7Y4	8	DK96	9 6	EL33	PZ30	18/6
3V4	6	12A4H	8	DL33	9 6	EL38	R19	13/6
5U4G	8	12AT6	8	DL33	15 6	EL41	SP41	3/6
5V4G	11/0	12AT7	8	DL96	8 6	EL42	SP61	3/6
5Y3GT	7 6	12AU7	8	EABC80	7 9	EL43	TH41	12/6
5Z4G	6 6	12AX7	7 6	EAF42	10 6	EM34	U28	12/6
6A8S	4 6	12BA6	8	EB91	6	EM80	U50	7/6
6AL5	6	12J7GT	10 6	EBC33	7 6	EY51	U76	7/6
6AM6	5	12K7GT	7 6	EBC41	9 6	EY86	U78	7/6
6AM6	6	12K8GT	14	EBF80	9 6	EZ40	UABC80	9/6
6AQ5	7 6	12N7GT	7 6	EBF89	9	EZ41	UAF42	10/6
6AT6	6	12SN7GT	8	ECC81	8	EZ80	UBC41	8/6
6BA6	7 6		18 6	ECC82	8	EZ81	UBF80	9/6
6BE6	7 6	12Z3	7 6	ECC83	8	FW4 500	UCH42	9/6
6BH6	9	14S7	12	ECC84	10 6	GZ32	UCL33	15/6
6BJ6	7	351.6GT	9	ECC85	9	KT33C	UF42	15/6
6BR7	8 6	2574G	9 6	ECP80	10 6	KT44	UF89	10/6
6BW6	7 6	351.6GT	9 6	ECP82	11	KT63	UL41	9/6
6BW7	8 6	352	9 6	ECH21	14 9	MH4	UL84	9/6
6P6G	6 6	3524GT	7 6	ECH35	10	MU14	UY31	7/8
6P12	6	3525GT	9	ECH42	9	NIB	UY41	7/8
6P6	5 6	50CDBG	19 6	ECH81	8	P61	VP41	7/6
6K7G	4 6	50L6GT	8 6	ECL80	9 6	PCF89	VP1321	21/6
6K7GT	6	80	8 6	EF37A	8 6	PCF82	W7	5/6
6KR9	7 9	AC TP	20	EF39	6	PCL82	Y63	6/6
6L8	12 6	AZ31	11 6	EF41	9 6	Z77		6/6
6Q7GT	6 6	E36	20	EF42	11 6			
6SN7GT	7 6	CL33	16 9	EF55	9 6			
6U4GT	11 6							

Any Parcel Insured Against Damage In Transit 6d. extra.

## READERS RADIO

24, COLBERG PLACE, STAMFORD HILL,  
LONDON, N.16 STA. 4587

# TRANSISTORS

## *in Practice*

### 4.—FURTHER NOTES ON THE DETECTOR STAGE

By R. Hindle

*(Continued from page 884 February issue)*

THE variable, R2, determines the voltage from which the biasing current is derived, but R3 serves the purpose of limiting the bias as well as preventing the bias source from loading the input signal.

The transistor used must be capable of amplifying at the operating frequency, of course, so one with a suitable  $\alpha$  cutoff frequency must be chosen. Suitable transistors are now available, but it has to be remembered that the cutoff for a common emitter circuit is lower than for the same transistor in a common base circuit. One with a cutoff quoted at 3 Mc/s at least is preferred for the present work.

#### Practical Application

The circuit of Fig. 27 is complete as shown. The difficulty, from the point of view of a design offered for home construction and which, therefore, must work when built by others and not only as a prototype, is due to the spread in transistor characteristics already referred to many times. If the feedback coupling is excessively tight the reaction potentiometer loses control, but before this stage is reached reaction will operate, but there is backlash on the control that makes it difficult to adjust for optimum results. For the benefit of those who have not had experience with the equivalent valve circuits this means that as the control is advanced the set bursts into oscillation, to stop which the control has to be backed off considerably further than the point initiating the oscillation, with the result that stopping the oscillation has taken place at a relatively insensitive feedback level. Consequently, the aim is to reduce the inductive feedback until the reaction control operates smoothly, sliding into oscillation gently after a build-up of signal, and oscillation stopping with only a slight backing off of the control.

If the constructor wants to experiment with a coil he could wind one covering the medium waveband, tapping at a third of the turns from the earthy end. The feedback coil could well be about a third of the main winding, closely coupled and capable of being adjusted, either in position or by the removal of turns. One possibility would be to use the coil specified previously for use with the crystal detector circuit. Over the winding a layer of drawing paper can be wrapped and gummed so that it forms a close-fitting cylinder that will slide over the main coil. The feedback winding could go on top of this. Now,

when the circuit is put into operation and if it is found to be overcoupled, winding can be stripped off until smooth control is obtained. The windings can be anchored with a touch of coil cement, and if this is used sparingly there will be no difficulty in releasing the wire to strip off some turns. If when first connected it is found that oscillation cannot be induced it is likely that the feedback coil is connected the wrong way round and the connections should be reversed.

The Osmor people are winding a coil to the specification of the writer for this receiver. The use of this recommended, particularly as this same coil will be used in the next stage also, and the present design has been developed around this coil. The windings have been set so that the transistor does not have to be an exceptionally good specimen to be satisfactory in this circuit. The following transistors have all been used in this receiver:

- Goltop V6/R4. Nominal cutoff frequency 5.5 Mc/s.
- Ediswan XA101. Nominal cutoff frequency 5 Mc/s.
- Ediswan XA102. Nominal cutoff frequency 8 Mc/s.

The manufacturing spread may result in the constructor having a transistor that, even with the special coil, oscillates too freely to give satis-

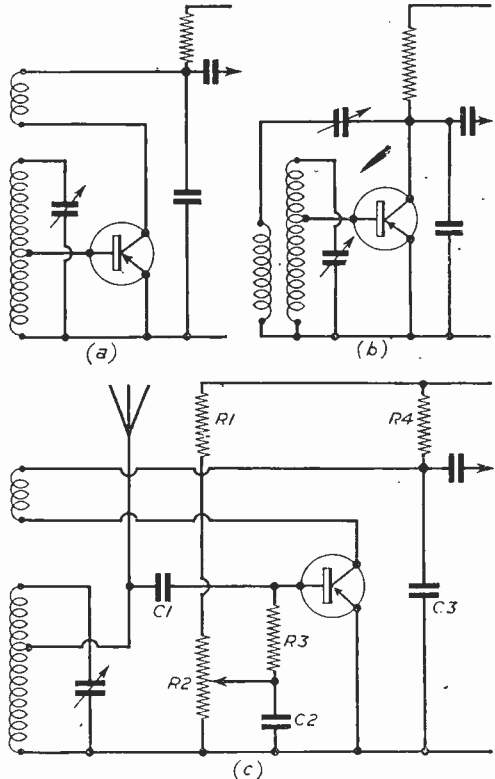


Fig. 27.—Regeneration circuits.

factory control and naturally he will not wish to strip off windings from a commercial coil, but he has still another trick up his sleeve. If he introduces a resistor into the emitter lead of the transistor (which, of course, must not have a bypass capacitor) this will introduce negative feedback which will partially cancel out the positive feedback via the coil. Try first a 100 ohms component and if this is inadequate increase it in steps up to about 500 ohms until the desired result is obtained.

It was found, in practice, that all the transistor specimens tested gave an optimum detector efficiently at a collector current of around 400  $\mu$ A. This will be a guide to set up his transistor circuits with a meter, but it is not really necessary to check this current and, of course, it does not follow that all transistors will be identical in this respect.

**Construction**

For the sake of completeness, Fig. 28 gives the complete circuit for the regeneration detector, followed by the two-stage audio amplifier. The amplifier stages are as previously described

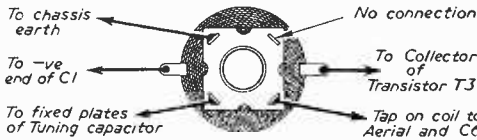


Fig. 29—Details of coil connections.

constructionally, and if the steps in construction previously given have been followed it will be necessary now only to wire in the regenerative stage. In Fig. 28 the audio components are the same as given previously and the same component numbers are repeated.

The third valve-holder mounted on the chassis in the earlier stages of construction is used for

the transistor. The coil is mounted on the rear face of the chassis alongside the twin socket nearer to the tuning capacitor. The input capacitor to the amplifier, previously connected to one pin of the socket, is now disconnected and this socket strip is used for aerial and earth. Fig. 29 gives the wiring for the regenerative stage. R11 (shown in Fig. 28) is not included—the emitter should

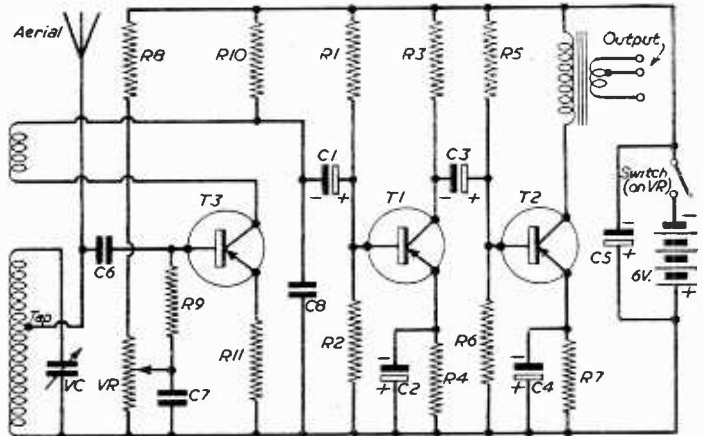


Fig. 28.—The complete circuit. R11 may not be needed (see text).

first be wired to earth as shown and later, if necessary to ease off the coupling, a resistor can be interposed.

It was pointed out previously that one cannot be too dogmatic about connecting the electrolytic capacitors coupling stages with the positive lead to base and, in fact, it was found that C1 of the amplifier had to have its negative lead to the base of T1 because the signal input was assumed to have no DC component. That is changed now that T3 is feeding T1. Not only is C1 disconnected from the two socket lead, but also it is reversed, so that its positive lead is now towards the base of T1.

The receiver as it stands is still a low output type, of course. Putting the detector stage in front increases the capacity of the last transistor to deliver power. The sensitivity of the circuit is quite startling, however, from an R.F. point of view.

(To be continued)

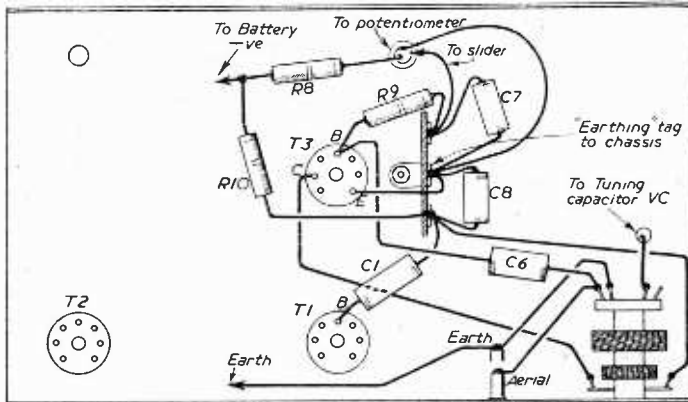


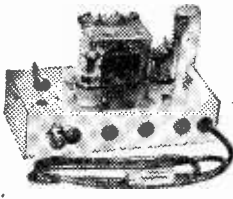
Fig. 29a.—Wiring diagram.

**COMPONENTS LIST**

- (For Audio Section see Fig. 15)
- C6—500 pF (Dubilier).
- C7—10  $\mu$ F 6 v. (Daly H2 5, 1).
- C8—.01  $\mu$ F (Dubilier).
- R8—100 K $\Omega$
- R9—10 K $\Omega$  1/2-watt (Dubilier).
- R10—4.7 K $\Omega$
- R11—See Text.
- V.C. is half of two-gang capacitor already mounted.
- V.R. is 20 K $\Omega$  wirewound potentiometer, with single - pole switch referred to in Fig. 15.

## BAND 3 T/V CONVERTER—185 Mc/s - 199 Mc/s

Suitable for London, Birmingham, Northern and Scottish ITA Transmissions.



**Mk. 2 Model** as illustrated. Latest Cascode circuit using ECC84 and EF80 valves giving improved sensitivity (+18 db) over standard circuits. Built-in Power supply AC 200-250v. Dimensions only 6 1/2 in. x 5 in. Ht. 4 in. simple and easy to fit—only external plug-in connections. Wired, aligned and tested ready for use. State Channel required. Gear. Bargain Offer—good results or full refund, only £3.19.6. Carr. & Pack. 2/6.

**Mk. 1 Model** using 2B2's or EF80's. Full constructor's Kit of Parts including drilled chassis 7 in. x 4 in. x 2 1/2 in.

blueprint, valves and all component, etc., excluding Power supplies to modified W/V design. Bargain Offer only 2 gns. P. & P. 2/6. Power Supply Kit. Complete 20/-. P. & P. 1/6. Band 1-Band III Switch Kit, 6/6.

**CONVERTER ACCESSORIES**

Band 1-Band III Cross-over Unit. 7.8. Var. Attenuators 6/6-25/6d. 6/9. BNC Pattern Filter. 8.6. Band III Aerials-outside Single Dipole with 4 yds. co-ax., only, 13/9. 3 Element Beam, 27/6. 5 Element, 35/-. etc.

### Volume Controls

log. ratios, 10,000 ohms — 2 Megohms. 1 Long spindles. 1 year guarantee. Midget Edison type.

No. 8r. S.P.Sw. D.P.Sw. 3- 4/-. 4/9

Linear Ratio, 10,000 ohms — 2 Megohms. less switch, 3/- each. Coax plugs, 1/2. Coax sockets, 1/-. 4 connectors, 1/3. Outlet boxes, 4/6.

**TWIN-FEEDER**, 50 ohms, 6d. yd.; 300 ohm, 3d. yd.

**TWIN SCREEN FEEDER**, 80 ohms, 1/3 yd.

**TRIMMERS**, Ceramic, 4 pf.—70 pf., 9d.; 100 pf., 150 pf., 1/3; 250 pf., 1/6; 600 pf., 1/9. PHILIPS Reshite Type—2 to 8 pf. or 3 to 30 pf., 1/- each.

**RESISTORS**, Pre-va. value, 10 ohms 10 megohms.

### 80 ohm COAX

STANDARD in. diam. Polythene insulated. GRADE "A" ONLY

### 8d. yd.

**SPECIAL** — Semi-air spaced polythene. 80 ohm Coax in. diam. Standard core. Losses cut 50%.

**Ideal Band 3.**

### 9d. yd.

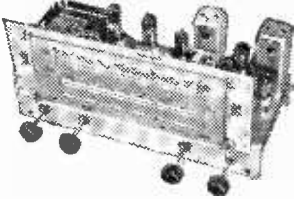
**3 WAVE BANDS** S.W. 16' 200m.—50m. M.W. 200m.—500m. L.W. 800m.—2,000m.

Brand new and guar. A.C. 200/250 v., 4 pos. W/V sw. Short-Medium-Long-Grand. P.U. socket. High Q dust core coils. Latest circuit technique, delayed AVC and neg. feedback. O/P 4 watts. Chassis size 1 1/2 x 5 1/2 x 2 1/2 in. Dial 10 in. x 4 in. Hor. or Vertical position. Walnut or ivory knobs to choice. Aligned and calibrated ready for use. Sensitivity as Quality at Low Cost.

Chassis isolated from mains. **BARGAIN 9 1/2 gns.** Carr. and ins., 4/6.

8 or 10 in. speakers to match, 20/- and 25/-.

**7 Valve De Luxe**, push-pull EL41 version, 7 watt output, with H/Duty Output Transformer, £12.10.0. Carr. & ins., 3/-.  
**RECORD PLAYER BARGAINS**



**ALL-WAVE RADIOGRAM CHASSIS** 5 VALVES LATEST MIDGET B.V.A. SERIES

Brand new and guar. A.C. 200/250 v., 4 pos. W/V sw. Short-Medium-Long-Grand. P.U. socket. High Q dust core coils. Latest circuit technique, delayed AVC and neg. feedback. O/P 4 watts. Chassis size 1 1/2 x 5 1/2 x 2 1/2 in. Dial 10 in. x 4 in. Hor. or Vertical position. Walnut or ivory knobs to choice. Aligned and calibrated ready for use. Sensitivity as Quality at Low Cost.

Chassis isolated from mains. **BARGAIN 9 1/2 gns.** Carr. and ins., 4/6.

8 or 10 in. speakers to match, 20/- and 25/-.

**7 Valve De Luxe**, push-pull EL41 version, 7 watt output, with H/Duty Output Transformer, £12.10.0. Carr. & ins., 3/-.  
**RECORD PLAYER BARGAINS**

4 sp. **BER** (TU9), 99/6. 1 sp. **COLLARO**, 5 gns. 4 sp. **GARRARD** (4 S.P.), £7.10.0. Carr. & ins., 3/6.

**AUTO CHANGERS**—4 sp. **BER** (UA9), £8.15.0. 4 sp. **COLLARO** (RC456), £9.15.0. 4 sp. **GARRARD** (RC120/41), 9/ gns. Carr. & ins., 4/6.

All above units are latest models and are fitted with modern styled 'twelcher' Xtal. P.U. with unromer head and twin sapphire stylus.

**SCOTCH BOY. EMITAPE**, etc., 1,200ft., 27/-. Long playing, 1,800ft. reels, 45/-. Paper tape, good quality, 1,000ft., 12/6. Reels only, 3in., 3/-; 5in., 3/8; 7in., 4/-; 7in., 4/6.

**SPECIAL OFFER**  
Recording tape by famous manufacturer, 1,200ft. on standard 7in. plastic spool (superior quality).  
Special Price, 22/6 (normal price, 35/-)

**NEW BOXED VALVES GUARANTEED ALL**

1R5, 1T4/7/8	DAF95	9/-	ECL80	10/6
185, 184	7/8	DF96	9/-	EF41
354, 3V4	8/-	DK96	9/-	EF80
6N7	9/6	DL96	9/-	EF89
GAT6	8/6	35L6	10/6	EF91
6K7	8/6	EABC80	9/6	EM85
6K8	9/6	EB91	6/6	EL41
6N7	8/6	EBC41	10/6	EL84
6N7	3/6	ECC83	9/6	EY31
6V6	7/6	ECC84	12/6	EZ40
6X4	7/6	ECP80	12/6	EZ80
6X5	7/6	ECP82	12/6	MU14
7C5	9/-	ECH42	10/6	PC84
7Y4	8/6	ECH81	10/6	PCP80

**SPECIAL PRICE PER SET**

1A5, 1T4, 185, 184 or 354, or 3V4	...	27/6
DK96, DF96, DA96, DL96	...	35/-
6K8, 6K7, 6Q7, 6V6, 5Z4 or 6X5	...	35/-

### WIRE-WOUND

5 w. } 25 ohms-1/3  
10 w. } 10,000 1/6  
15 w. } ohms 2/-  
5 w. } 15,000 — 1/9  
30 w. } 33,000

### WIRE-WOUND POTS

Pre-set Min. T.V. Type Knurled Slotted Knob. All values 25 ohms to 30 K., 3- ea., 50 K., 4/-.

Ditto Carbon Track, 9/ K. 2 to 2 Mez., 3/6.

### CONDENSERS

Mica or S. Mica. All pref. values, 3 pf. to 650 pf., 6d. ea. Ceramic types, 2.2 pf. 3,000 pf., 9d. each. Tubulars, 450 v., Huitts and P.C.C., 1005, 501, 3005, 01 and 1 350 v., 8d. .02, .05, 1/500 v. Huitts T.C.C., 1/-, .25 Huitts, 1/6. .5 Huitts, 1/4. 1 250 v., T.C.C. (Simples), 3/6. .001 to 1 kV., T.C.C., 5/6. .001 to 20 kV., T.C.C., 9/6.

### SPEAKER FRET

Expanded Bronze anodised metal 5in. x 5in., 2/3; 12in. x 8in., 3/-; 12in. x 12in., 4/6; 12in. x 16in., 6/-; 24in. x 12in., 9/-, etc.

**TYGANE FRET** (Murphy Patent)—12in. x 12in., 2/-; 12in. x 18in., 3/-; 12in. x 24in., 4/-, etc.



### RECORD PLAYER CABINETS

Contemporary style resin covered cabinet in mottled red with cream interior. Size 14 1/2 x 13 1/2 in. x 11 in., fitted with all accessories, including speaker grille board and plastic fret. Space available for all modern amplifiers and autochangers, etc. Uncut record player mounting board 14 x 13 in.

Cabinet Price, £3. 3. 0. Carr. and ins., 3/6.

**2 VALVE AMPLIFIER** (to fit above cabinet), modern circuit with EL41 output, ready built, with 4in. speaker, and output transformer, £3.12.6. Carr. and ins., 2/6.

## TRS RADIO COMPONENT SPECIALISTS (Est. 1946)

70 BRIGSTOCK ROAD, THORNTON HEATH, SURREY (THO 2188)

30 yards Thornton Heath Station. Listed above are only a few items from our very large stock. Hours: 9 a.m.—6 p.m., 1 p.m. Wed. Best 3d. stamp to pay for Complete Bargain List. OPEN ALL DAY SAT.



### ELECTROLYTICS ALL TYPES NEW STOCK

Tubular Wire Ends	25/25 v., 50/12 v.	1/9	32/250 v., 4/500 v.	2/-
	100/25 v., 2/450 v.	2/-	8/450 v. T.C.C.	5/6
	8/450 v. B.E.C.	2/3	8/16,450 v. Huitts	5/6
	8/500 v. Dub.	2/9	16/16,450 v. T.C.C.	5/0
	8/8,500 v. Dub.	4/6	32/350 v. Dub.	4/6
	16/16,450 v. T.C.C.	5/-	32/432,275 v. Huitts	4/6
	16/450 v. B.E.C.	4/6	32/42,450 v. T.C.C.	6/6
	16/500 v. Dub.	4/6	250,350 v. H.E.C.	8/6
	16/16,450 v. T.C.C.	5/6	60/350 v. T.C.C.	6/6
	32,350 v. Dub.	4/6	60/16,250 v. v.	11/6
	32,500 v. Dub.	5/6	60/40,275 v.	12/6
	50/20,350 v. B.E.C.	5/6	60/250,275 v.	12/6

Many other types in stock.

**TRANSFORMER**—Midget Electrolytics. 2 mfd., 4 mfd., 8 mfd., 6 v. 3/6  
6 mfd., 10 mfd., 16 mfd., 3 v. 22 mfd., 11 v. 3/6

**SENTERCEL RECTIFIERS**. E.H.T. Type Fly-Back Voltages. K3/25 2 kv., 5/-; K3/40 3 1/2 kv., 6/9; K3/45 3 1/2 kv., 7/9; K3/100 8 kv., 13/6. MAINS TYPES.—RM1, 125 v. 60 ma., 4/9; RM2, 125 v. 100 ma., 5/6; RM3, 125 v. 120 ma., 7/6; RM4, 250 v. 250 ma., 16/-; RM4B type 270 ma., 17/6; RM5, 250 v. 300 ma., 21/-.

\* I.F. TRANSFORMER—465 kc. Brand new ex-manufacturer's midget I.F.T., size 2 1/2 in. x 1 1/2 in. dust core tuning. Litz wound coils, High Q. Bargain offer, 7/6 pair.

### MAINS TRANSFORMERS

Made in our own Workshops to Top Grade spec. Fully interleaved and impregnated. **RADIO AND AMPLIFIER TYPE**—250 v. 60 ma. P.W. sec., 5 v. or 0.3 v. 1 a. rect. 4.3 v. 2.5 a. set Hirs., 22/6, etc. G.R.T. HTR. **ISOLATION TYPE**—Low leakage with or without 25% sec. boost voltage. Ratio 1:1 or 1:1.25. 2 v., 4 v., 6 v. or 13 v., 10/6 ea. Ditto with mains primaries 200/250 v., 12/6. SPECIALS to order.

**L.P. CHECKS**—10 H. 65 ma., 5/-; 15 H. 100 ma., 10/6; 10 H. 120 ma., 10/6; 20 H. 150 ma., 15/6.

**OUTPUT TRANSF.**—Standard pentode, 4 1/2; push-pull 12 watt, 13/6. Small pentode, 3/9. Midget battery pentode (1M3, etc.), 4/6.

**SPEAKERS**—PM3 3 ohm, 2 1/2 in. Etac, 10/6. 3 1/2 in. Goodmans, 18/6; 5 in. B. & A., 17/6; 6 in. Etac, 10/6; 18/6; 7 x 4 in. Goodmans, 18/6; 8 in. Rola, 20/-; 8 in. Special Cone G'mans, 21/6; 10 in. L. & A., 25/-.

8 in. P.M. SPEAKER (3 ohm) Ex-Mfrs' units. Rola, W.B., Celestion, etc. All reconditioned and guaranteed. Ideal ext. unit 7/6. P. & P. 1/6. Ditto with O/P Trans. 9/6.



**F.M. TUNER-UNIT** (87 mc/s—105 mc/s) by Jason. As described in Radio Constructor. Designer Approved Kit of parts to build this modern highly successful unit, drilled chassis with superior type III glass dial, coils, cans and all quality components, etc., for only 5 gns., post free. Set of 4 special min. valves, 30/-, post free. Illustrate 1 handbook with full details, 2/- post free. 2-day alignment service now available 7/6 plus P.A.P.

# THE "WEYRAD" SIGNAL GENERATOR



## AN INSTRUMENT OF HIGH ACCURACY AT LOW COST

- Coverage 100 Kc/s-70 Mc/s (on fundamentals).
- Accuracy better than  $\pm 2\%$  on all ranges.
- Large, clearly calibrated scale.
- Modulated or C.W. output.
- 500 c/s A.F. source.
- S.G.M.I.—A.C. mains operation. Double wound, varnish-impregnated transformer, tapped 210/225/250 volts.
- S.G.B.I.—All dry battery operated.
- All components are by well-known manufacturers ensuring maximum reliability.
- Both types in quantity production.
- Illustrated leaflet available, price 2d.

**WEYMOUTH RADIO MANUFACTURING CO., LTD.**  
CRESCENT STREET, WEYMOUTH, DORSET

### BENSON'S BETTER ARGAINS

**TEST SET 127U (105SM).** U.S.A. Micro-wave Frequency Meter, 375-725 mc. B valve bat. operated. Brand New **£7.10s.** **CERAMICONS**—N750L etc. 1, 1.5, 3.3, 5.6, 8.2, 16.12, 14, 22, 27, 33, 40, 47, 75, 100, 110, 150, 180, 200, 230, 270, 330 p.p.s., 61, each. Midget mica 500p.f. 33. **COMMAND RECEIVERS**, brand new, 6 valves, med. wave (0.52-1.5 mc/s.). **97 B**; used 82 B (post 3 6). Conversion data & circ. to CAR RADIO. **1 B.** **RECEIVERS**, battery, 60-250 metres, 4 valves heli. 2 w.t. New **60** (p.p. 3 6). **I.F. STRIP 373**, new, with valves, 42 6. **RELAYS**, coaxial, "P" 12 v., 10; set 3 plug, 1 B. **Type 85**, 5 pole c/heavy-duty; 6/12 v., 7 6 (p.p. 2 6). **RX78**, 2.4 Mc/s. with 6 valves, 100kc s. Xtal. Good cond., 35 (p.p. 2 6). **TEST SET 74A** with 10 valves, VCR 120a and fancy power jack. Fair condition, 40 (carr. 8 6). **BC1038 VHF Receiver**, valves 2 657, 1 1DSGT, new, 15 (p. 3 6). **VIBRAPACKS**, 6 v., 147, 10-250 v., 80 mA., smoothed, cased, 22 6 (post 3 6). **RESPONDER ZC8041**, 100-1000 mc s. New, with valves, 15 (carr. 7 6). **VIBRATORS**, Mallory 6629 12 v., 4 pin, 7 6. **BRAND NEW R.F. 28, 25**—R.F. 27, good cond., 20 (p.p. 3 6). **DYNAMOTORS** (post 3 6); 12 v. to 250 v., 65 mA. and 0.5 v., 25 mA., 12 6; 6 v. to 250 v., 80 mA., 12 6. **METAL RECTIFIERS**—240 v., 100 mA., 4; 240 v., 50 mA., 3 8; 1,000 v., 30 mA., 7 8. **R1155 S.M.** Tuning **DRIVES "N"** type, brand new, 10 8. **CHOKES**, L.F., 10H, 120 mA., screened 7 6; 5H, 200 mA., 4 6. **SWITCHES**, water, 1p. 50, 2 6; 1p. 11a 2h, 6p. 2c 4b, 3 5. **Standard** type, Mirthead 1P24W2B, 7 8. **TEST METERS**, New, 4 4 2 1/2 in. Read 1.5 and 3 v., 60 mA. and 50 0. 12 6. **TS347** contains 10 mA., 3 1/2 in. meter, res., etc., 8 6. **TS350** with 1 mA., 3 1/2 in. meter, valve TP25, etc., 30—. **METERS**, contains 2 separate micro-amp movements and 2 neon, new, 7 8. **MOTORS** 200 250 v. enclosed, 5 1/2. 3 1/2 in. dia., D.E. 1/4 in. spindle, (A.C./D.C.) intermittent, 12 6 (post 3.). **FORMERS** 1/4 in. dia. Twin dust cores, can 2—1/4 in. dia., 9d. **LIST AND ENQUIRIES**—S.A.E. please 7 Terms, C.W.O. Postage extra. Immediate despatch.

Call or Write: **W. A. BENSON**  
138 Rathbone Road, Liverpool 15. SEF 6823.  
List & post: **SUPERADIO (Whitechapel) LTD.**  
(P.W.) 116 Whitechapel, Liverpool, 2. ROY 1130.

### 1958 EDITION RADIO AMATEUR'S HANDBOOK

32/6. A.R.R.L. Post 1/9

**THE MERCURY SWITCHED F.M. TUNER.** Data Publication. 2/- Postage 2d.

**WORLD RADIO HANDBOOK FOR LISTENERS, 1958.** 13/6. Postage 9d.

**A BEGINNER'S GUIDE TO RADIO.** By F. J. Camm. 7/6. Postage 6d.

**ELEMENTARY TELECOMMUNICATIONS EXAMINATION GUIDE.** By W. T. Perkins. 17/6. Postage 9d.

**TELECOMMUNICATIONS.** By W. Fraser. 65/-. Postage 1/6.

**HIGH FIDELITY.** By C. Fowler. 37/-. Postage 1/-.

**TV FAULT FINDING.** A Data Publication. 5/-. Postage 4d.

**GRAMOPHONE HANDBOOK.** By P. Wilson. 15/-. Postage 1/-.

### THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS  
of British and American Technical Books

19-23 PRAED STREET,  
LONDON, W.2

Complete catalogue 6d.  
Phone: PADDINGTON 4185.  
Open 6 days 9-6 p.m.

### FIRST-CLASS RADIO COURSES...

GET A CERTIFICATE!

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification. Prepare for YOUR share in the post-war boom in Radio. Let us show you how!

#### FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as **A.M.Brit.I.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs Exams., Gen. Cert. of Educ., London B.Sc. (Eng.), A.M.I.P.E., A.M.I.Mech.E., Draughtsmanship (all branches), etc.,** together with particulars of our remarkable Guarantee of **SUCCESS OR NO FEE**

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

**FOUNDED 1885—OVER  
150,000 SUCCESSES—OF  
NATIONAL INSTITUTE OF  
ENGINEERING  
(Dept. 461), 148, HOLBORN,  
LONDON, E.C.1.**

# SHORT-WAVE SECTION

## SLOW-MOTION DRIVES AND THE R1155

By A. W. Mann

**T**HE recent release by the Air Ministry of the Model R1155L designed for use by the air/sea rescue branch of the R.A.F. brings within the reach of short-wave listeners a very good general purpose receiver. The ranges covered are 200-500 kc/s, 600-1,500 kc/s, 1.5-3 Mc/s, 3-7.5 Mc/s and 7.5-18.5 kc/s.

### Various Models

It is not generally known that eight different models of the original R1155 receiver were produced. These are R1155A, B, C, D, E, F, L and M. The I.F. in all instances is 560 kc/s.

Model C, now obsolete, incorporated certain modifications which enabled H.F. direction finding to be carried out in conjunction with a suitable loop aerial.

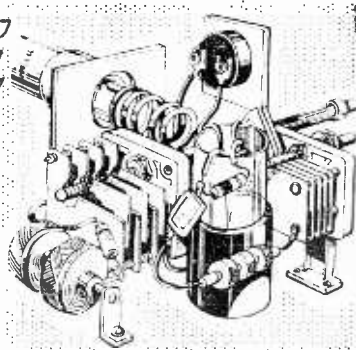
While many listeners use the R1155 type sets as headphone receivers, the general trend is to add a power output stage where loudspeaker reception is desired.

It may be of interest to mention that for 40 metres and 80 metres European amateur phone reception, replacing the headphones with a M.C. speaker will provide in most cases signals of sufficient strength, with a very good signal-to-noise ratio, providing of course that the I.F. and signal frequency circuits are accurately aligned. For general all round loudspeaker reception, however, a power output stage is recommended.

### Slow-motion Drive Mechanisms

The original slow-motion drive as fitted to the R1155 range of receivers apart from models L and N is officially known as the Type 13.

The outer knob provides direct drive to the



gang condenser, and the inner knob a slow-motion drive with a ratio of 100 to 1 for fine tuning. This drive mechanism with a little careful attention and constant use can be made to work smoothly.

The Air Ministry has now released the so-called N type drive which is available from one advertiser at 10s. 6d., which, by the way, must be considerably below production cost.

This drive mechanism is officially designated as Type 35, and incorporates a precision cut gearing arrangement in order to achieve a satisfactory step-down ratio for fine tuning.

There is no direct drive. The inner knob has a ratio of 4.5 to 1 and the outer knob provides a fine tuning ratio of 89 to 1.

The reduction gearing is fitted inside a die casting, the inner knob being fluted and the outer one serrated as is common practice.

Now choice of tuning drive ratio is a serious problem so far as the short-wave enthusiast is concerned, especially in the case of non-handspread receivers.

A 100 to 1 ratio is ideal providing that it is smooth in operation and fitted with a tuning knob of suitable shape and reasonable size.

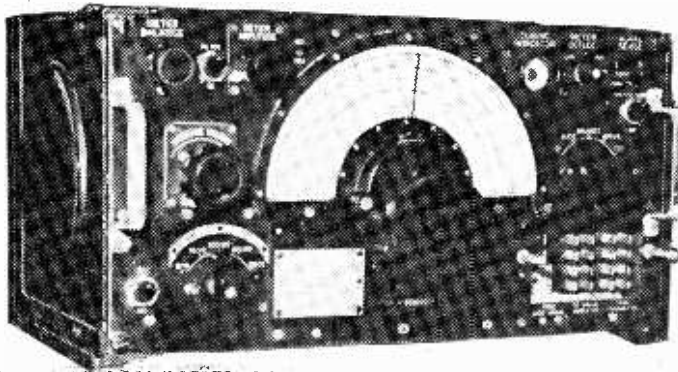
In this case we are discussing two drive mechanisms, each of which offer certain advantages. It would appear a disadvantage to choose a drive ratio of 80 to 1 against the extra 20 to 1 further step down provided by the original model. Much good DX has been achieved by listeners using tuning dials with as low as 10 to 1 ratio.

The author having fitted three of the new type to his R1155 receivers found that while a smooth drive was obtainable it could be further improved.

### Extra Smooth Operation

Before going further it should be appreciated that the Type 35 drive is a splendid example of British precision workmanship. Designed for tuning a receiver fitted in aircraft, it is smooth in operation but not equal to fly-wheel drive fitted to modern commercially produced communication type receivers.

It can, however, be adjusted so that for extra smoothness in



The R1155 ex-R.A.F. receiver.

operation it will compare most favourably with the best drive mechanisms with which we are familiar.

### **Correct Procedure**

In order to achieve the desired results there is no need to remove the drive unit from the receiver. First remove the black wax covering the heads of the three screws holding the slow-motion knob in position. Follow by removing the three screws, and withdraw the slow-motion tuning knob.

This will expose the reduction gearing and two metal guides which fit inside the slow-motion tuning knob. It may be that on examination the inside of the tuning knob shows a very slight irregularity in the moulding.

The tip of one or both horizontal guides touching this at some part of the travel will cause a slight amount of friction denoted by a momentary snatch at one point.

In order to remove it care should be exercised in bending the tips of the metal guides. In the case of the top guide press the tips very slightly and carefully downwards. Follow by pressing the tips of the bottom guides upwards.

As the gear case is open the opportunity to apply a little light lubricating oil with a match-stick to the gears should not be missed and will safeguard against wear due to dryness in the future.

Do not use ordinary machine oil or heavy oil. Gunlock or similar light oil is recommended and will safeguard against clogging the gears.

The slow-motion knob can now be replaced and screwed in position. Test the drive by spinning the slow-motion knob with the index finger. If the foregoing instructions have been carefully followed the drive will be sufficiently smooth to spin the gang condenser with ease and a smoothness which we associate with the more expensive spin wheel drives.

### **Why Modify?**

It may be that some readers wonder why it should be necessary to adjust the newer type drive mechanism. This is a matter of personal choice. The Type 35 drive mechanism as supplied new and unused, in fact unopened, is very smooth in operation and will meet the requirements of the average DX enthusiast. The conditions under which short-wave receivers are used in aircraft, and the tuning procedure, are totally different from that of ground station listening and tuning.

For example, an aircraft receiver may be used under bumpy conditions and subject to vibration, consequently a drive and condenser assembly which is too free in operation under such conditions might prove difficult to keep on a desired frequency. Secondly, traffic working is carried out on definite frequencies. The DX enthusiast spends in many instances long periods tuning over different bands. This being so the smoother the tuning drive the better. The Type 35 drive can be adjusted with ease to suit the individual.

### **Removing the Type 13 Drive**

It is quite possible that some R1155 owners have contemplated purchasing one of the Type 35 drives but do not feel like undertaking the task

of removing the old one. If the dial cover plate is removed, however, it will be found that the job is a straightforward one.

Care is necessary, however, when removing the small bolts which hold the dial cover plate in place, and a screwdriver which is in good condition is most desirable.

While the dial cover plate is off any dust which has collected should be removed. When the small bolts are to be replaced a little soap applied to the threads will remove the possibility of stripping them or breakage.

In the R1155 series of receivers the drive mechanism or unit does not fit directly on to the tuning condenser shaft. A metal clamp fitted with an eccentric pin is used. If the slow-motion driving head is examined it will be noticed that it incorporates a spring grip. When fitting the driving head to the condenser it is necessary to force the spring grip to one side so that the eccentric pin can be fitted in the hole which is disclosed when the spring grip is moved.

Incidentally this is the only snag likely to be encountered, and requires a little patience. First, the receiver panel should be in the usual vertical position in the interests of seeing what one is doing.

We have the new driving head fitted to the dial cover plate and the new brass distance pieces screwed on the appropriate bolts. If the spring grip at the back of the driving head is forced to one side it will be possible to slip the eccentric pin in position.

This pin should be fully engaged by pressing the driving head forward and incidentally locating the dial plate in its correct position so that it may be screwed in place without difficulty.

The author would stress that while the foregoing instructions might imply in the minds of some readers the possibility of unforeseen complications developing, that is not the case. As the advertisers state, this form of drive is easily fitted. It is not, however, a five minutes' job and requires patience. A useful hint is to make notes relative to the sequence followed in removing the original driving head and reverse the process in fitting the new one.

So far as the author is concerned, one of the principle advantages of the Type 35 drive mechanisms is that they can be adjusted so far as smoothness of operation is concerned, to individual requirements.

Old timers will recall the days when slow-motion drives of various types were fitted with a tuning knob much too small for the purpose even with a comparatively high ratio reduction. Tuning, if bandspread facilities were not available, was tricky and long sessions at the dials cramped the fingers.

Comparatively large tuning knobs have the same effect if the drive is at all stiff. Tastes differ, some, and the writer amongst them, prefer a drive which is of ball bearing silkiness. Others feel more confident when a slight friction effect is in evidence. Those facts as they affect the individual should be borne in mind when adjusting the tips of the guides. Whatever the preference a little careful adjustment should produce the desired results.



# SKILLED MEN!

## HERE'S A NEW WAY TO BETTER YOUR INCOME!

*Up to £25 tax-free bonus plus first rate wages for two weeks of your time*

**A**re you in a skilled trade? Then you can probably add a tidy sum to your income by joining the Army Emergency Reserve. For one thing, you get pay and allowances at full Regular Army rates whilst in camp. And the more your skill's worth in civilian work, the higher your Army rank and pay. Better still, you also get £9-£25 bonus tax-free (£50 if you are an electronic specialist). For this you just spend 15 days a year at

a camp, working on your own speciality. And money's not the only profit you get from that. You get a grand refresher course, giving you a lot of new ideas, and putting you right in touch with the latest Army developments. And you get a welcome break from the usual routine, with sports, games and a great social life. For the place is full of people with the same interests as yourself. Don't miss this chance! Send off the coupon now to: H.Q., A.E.R., R.E.M.E., Broxhead House, Bordon, Hants.

VACANCIES  
FOR  
ARMAMENT ARTIFICERS  
RADIO • RADAR  
AND  
ELECTRICAL CONTROL

**POST THIS OFF RIGHT AWAY**  
*Please send me—without obligation—the illustrated book! telling all about the Army Emergency Reserve.*

NAME .....

ADDRESS .....

TRADE .....

PW/AER

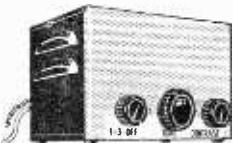
## HIGH GAIN BAND 3 T.V. CONVERTERS

NO ALTERATIONS REQUIRED TO YOUR SET

RETURN OF POST SERVICE. All new goods.

Posted orders to Camberley, please. All 3/- each extra post (4 - for 2). 2/- extra C.O.D.

Following apply to all converters : full instructions supplied. Can be fitted in 10 mins. ; free from drift : fitted with co-axial plug : fully wired ready for use : with power pack, including metal rectifier : double wound transformer : 2 valves : mains on-off switch : fine tuner : B.B.C. to I.T.A. at turn of switch : 12 months' guarantee (B.V.A. valves 90 days) : Terms available, one-third down and balance plus 7/6 in four equal monthly payments ; postage with first payment. FOR ALL SETS EXCEPT EARLY PHILIPS.



**£4.7.6**

ECC81 valves.

With metal cabinet as illustrated. Stove enamel grey hammer finish. 5in. x 7½in. x 4½in.

Pattern rejector fitted. State local B.B.C. station. Walnut wood cabinet, £4 17 6. Chassis less cabinet, £3 17 6. Variable attenuator, 7/6 (1/- p. & p.). Aerial splitter, 8/- (1/- p. & p.). External crossover unit, 7 6 (post 1 6). Genuine low-loss co-axial, 8d. yd.

Postal charges in brackets.

Ex-U.S. Army Valves 6K6 GT/G 5/6 (9d.). I.F. Transformers by Gorler AM FM (10.7 Mc and 465 Kc), 15/- pair (1/-).

Screens for T.V. PERSPEX, tinted, 14in. x 11in., 5/- (2/-) ; White 14in. x 11in., 5/- (2/-) ; 17½in. x 15in., 7/6 (2/6). LAMINATED GLASS, tinted, 14½in. x 11in., 5/- (3/-) ; 17in. x 13½in., 7/6 (3 6).

Battery eliminator for 4 low consumption valves 90v. 15 ma. and 1.4v. 125 ma., 35/- (2 6). 200-250v. A.C. (Size 5½in. x 3½in. x 2in.).

### 13 CHANNEL CONVERTER

Switch positions, off-I.T.A.-B.B.C. Valves PCF80 and PCC84. Moulded cabinet 8½in. x 4½in. x 6in.

Don't confuse with similar article being offered without power pack.

Robust Band 3 AERIALS, for 1in. to 2in. diam. mast or for loft. 3-element, 27/- ; 5-element, 35/- ; 9-element, 55/- ; carr. pd. Billing-Lez 6-e-11, 37/6.



**£5.5.0**

### AUTOMATIC RECORD CHANGERS

are in short supply. Collaro RC456 Studio turnover crystal pick-up. 4-spez:1 mixer. A.C. mains 203-250 v., see illus.

ALSO Collaro single player AC3.554. 3-speed, turnover crystal, pick-up with " T " head. £6 16/6 (3/6 p. & p.).

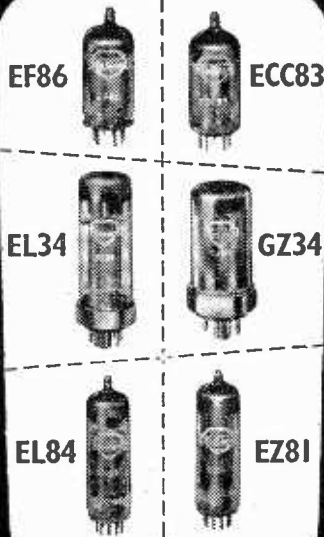


£8/16/6 (5/- p. & p.)

## GLADSTONE RADIO

82B, High Street, Camberley, Surrey. 3, Church Road, Redfield, Bristol. Tel. 51207.

## data for AUDIOPHILES\*



Audiophiles all over the world are demanding Mullard audio valves for their high quality sound equipment. And who can blame them when they know that the Mullard World Series of Audio Valves is the finest in the world. Fill in the coupon below for free data on Mullard World Series Audio Valves.

\* *Audiophile—Enthusiast for high quality sound reproduction who is satisfied with nothing but the best.*

This popular book is available now from most dealers, price 3/6d. It contains designs and full constructional details of the new Mullard EL34 High Quality 20 Watt Amplifier, a Mullard Band II F.M. Tuner, pre-amplifiers for the Mullard EL34 Amplifier and for the popular Mullard 5 Valve 10 Watt Amplifier, together with other useful technical information.



## Mullard WORLD SERIES AUDIO VALVES



Mullard Ltd., Publicity Division, Mullard House, Torrington Place, London, W.C.1.

### COUPON

To Mullard Ltd., Publicity Division  
Please send me, free of charge, leaflets on the Mullard World Series of Audio Valves, and details of "High Quality Sound Reproduction".

NAME .....

ADDRESS.....

# Making a Start

INSTRUCTIONS ON HOW TO BECOME AN  
AMATEUR TRANSMITTER

By "Old Timer"

(Concluded from page 862 February issue)

IN the circuit of Fig. 1 "almost any" includes 6L6, 6V6, 6AG7, 6AQ5, 6BW6, QVO3, EF50, KT66, 6K6, 5763, 807, 6F6—indeed almost any small pentode or tetrode, and many small triodes as well. Naturally the circuit must be limited to the ten watt or less input level, depending upon the crystal used. With some very well-shielded types of valves, it may indeed be very difficult to obtain oscillation. In such a case, the addition of 1pF of capacity between grid and anode will ensure oscillation. Thus one pointer is given on the fact that even a "simple" circuit may need a little "know-how" before it operates satisfactorily. In addition, the anode circuit tuning, with its effect upon output, or, indeed, in stopping

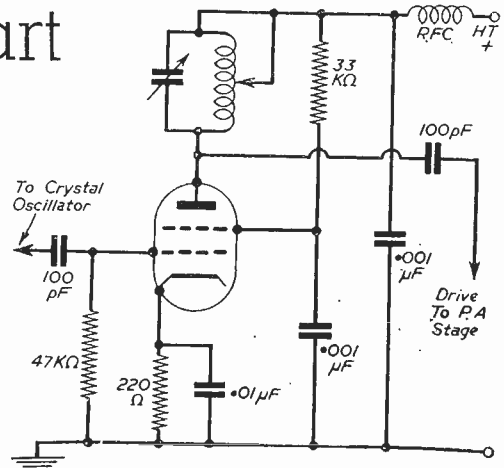


Fig. 10.—A simple buffer/multiplier stage enables the crystal oscillator P.A. stage rig to operate on two or three bands. A 6AG7 or QVO 3-7 may be used as the buffer/multiplier valve.

rapidly. Particularly that, unless tuned for slightly less than maximum output, it will not pick up on pressing the key. It will also reveal that a crystal oscillator will give a chirpy note if pressed to give too much output. With a few minutes experiment, plus the above warnings, anyone can provide ample output plus a rock-steady signal from a keyed crystal oscillator. However, it is not unknown for beginners to struggle for a long while to produce a note that is not chirpy, owing to their having religiously tuned for maximum output. Incidentally, a glance at the DX new column of QST will reveal that crystal-controlled operation on the DX bands is still known in these days of V.F.O.s.

To assist in loading up, some form of aerial

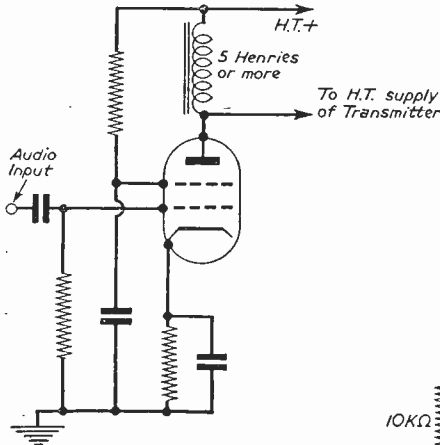


Fig. 8.—A simple Heising modulator for providing phone with simple rigs of low power. With a 6L6, inputs up to twenty watts may be modulated, while a smaller valve such as a 6V6, 6AQ5, 6BW6 enables a top-band rig to be modulated at up to 10 watts input.

oscillation if tuned to too low a frequency, will provide further "know-how." Furthermore, when coupled to an aerial and tuned for maximum output, further know-how will be acquired

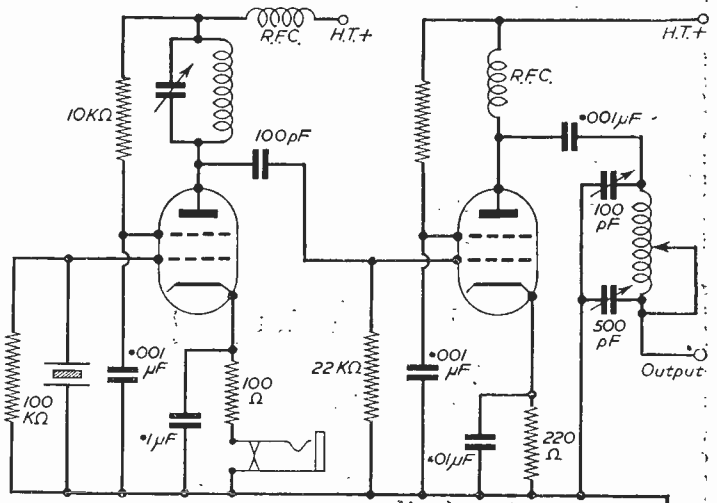


Fig. 9.—The simple crystal oscillator will drive a P.A. stage thus enabling quite high power to be easily attained.

network is to be used, despite the fact that even a simple crystal oscillator could be worked directly into an aerial, or at any rate link coupled. Fig. 2 gives the bare essentials of a tuning network. These may be coupled in many ways to feed many forms of aerial, as the accompanying diagrams show. Indeed, as Fig. 11 shows, the components, plus a load resistance, may be used as an artificial aerial for load and tuning tests without inflicting signals on the ether and the amateur bands. Indeed, if any old surplus quartz crystal is available, an oscillator of this type may be tuned up for experience on an artificial aerial.

### Telephony

The "simple rig" may, of course, be modulated for telephony working by any suitable modulator, including the Heising modulator of Fig. 8, using a 6V6 for QRP, and a 6L6 for "QRO" operation. This at any rate enables an old L.F. choke to be used to give phone, without need for expensive modulation transformers. For R.A.E.N. and topband operating, many stations use similar rigs in addition to their main rig used on the other bands. However, such a simple crystal oscillator rig may be used to drive a stage operating up to at least 50 watts or so. Nowadays, to be in the fashion, a Pi tank rig might as well be used for the P.A., as shown in Fig. 9. If the beginner is using such simple rigs as a means of getting on the air, or of gaining familiarity with handling R.F. gear, there is no reason at all to use an expensive ceramic band-switch . . . just use a crocodile clip and tap in. That way you will be able to select the optimum tap at any rate, and the experience will be of value when "setting up" the inductance taps on the main rig Pi tank circuit. Also, if the loading capacitor is too small, a mica fixed condenser can be clipped in when necessary. The cost, therefore, of running some 50 watts or so with such a simple rig is not necessarily high, particularly if the circuits are made up by raiding the junk box. Naturally new or presentable equipment need not be used on "practice" or standby lashups. However, with a little ingenuity in building and housing such simple items of gear, presentable looking units may be made, even if the veriest junk may be incorporated. Furthermore, the efficiency is not necessarily less because surplus components are used, and indeed a "simple" rig may be made that is a valuable stand-by and "second station" for permanent use in the shack and on expeditions and field-days.

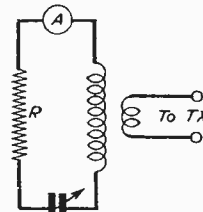
Thus the "one-band" crystal operation may be rapidly expanded by inserting a buffer/multiplier stage, as in Fig. 10. This enables, say, a 7 Mc/s crystal to be used for P.A. output on three bands. This immediately expands the usefulness and general utility of the "simple rig," while V.F.O. operation may be added as well. If a V.F.O. is constructed, the crystal oscillator stage may be used as a buffer/multiplier, by removing the crystal, and applying V.F.O. output to the grid of the valve previously used as a crystal oscillator. If in addition the rig has already incorporated a buffer/multiplier after the erstwhile crystal oscillator, the beginner has now arrived painlessly

at a V.F.O./Multipliers/Pi Tank multiband rig, and obtained also a great deal of fun and experience in so doing.

### Some Snags

Human nature being what it is, we must warn

Fig. 11.—The components of the aerial tuning unit may be combined with a resistor to give an "artificial aerial" for non-radiating tests of transmitter performance. For the load resistor a 12 watt 500 ohm wire wound resistor may be used. Values of R between 50 ohms and 1,000 ohms or so might be used, depending upon the calibration of the R.F. ammeter (A). The wattage rating may be increased for higher powered transmitters.



the unwary beginner that there are two serious snags. The first is that having become familiar with operating his simple rig, he will always be comparing unfavourably his full dress all-band rig in gleaming cabinet with his first love. Secondly, having got to the stage of enjoying QSO's, even if local topband matters on a simple rig, he may find that operating becomes so fascinating that he never seems to find time for getting along with building the "big rig." These snags apart, the second string "simple rig" idea has everything to recommend it, particularly as a very simple low-power top-band rig may even be powered off the receiver power pack. If this is done, one tip is to remove the receiver power stage and use phones for reception to enable the extra load to be met. In fact, some economical amateurs utilise the output valve of the receiver as the oscillator or even PA stage of the "simple rig."

### PRACTICAL TELEVISION FEB. ISSUE NOW ON SALE PRICE 1s. 3d.

Many keen experimenters are interested in improving performance on their receivers, and so far no details have been published in our companion paper, PRACTICAL TELEVISION, on the construction of one of the most important of television components, the scanning coils. In the February issue, which is now on sale, constructional details for these components are given, and circuits for use with them have already been given. This is one of the main articles in the February issue, which also contains some valuable historic data under the heading of TV Comes of Age.

How do you measure oscillator frequencies at V.H.F.? Now that increasing use is being made of these high frequencies it is as well to know how to carry out measurements, and there is an article on this subject also in the February issue.

Other articles in this issue deal with Simplified TV Servicing, Scanning and Synchronisation, Flywheel Sync and A.G.C., a Switched TV/F.M. Receiver and completion of the servicing article on the Ultra VT917. Granada Chelsea, deals with the way in which the old Chelsea Palace has been converted into a studio by the Granada organisation.

# HOME RADIO OF MITCHAM

187 LONDON ROAD, MITCHAM, SURREY. MIT 3282

Stockists for REPANCO and TELETRON coils, I.F. transformers, transistor components, etc. Leaflets on request.

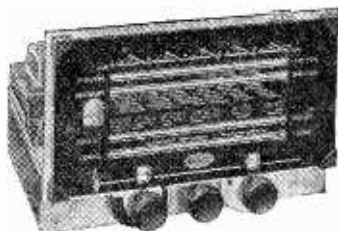


### PULLIN SERIES 100 MULTIRANGE TEST SET

21 ranges A.C./D.C. from 100 microamps to 1,000 volts. Sensitivity 10,000 ohms per volt. Descriptive leaflet on request. PRICE, £12.7.6. or deposit £2.10.0 and 9 monthly payments of 24.6.

A.M., F.M. Tuner chassis with own power supply. Designed for highest quality reproduction, and built to highest technical standards. Full specification on request. PRICE, £20.17.0. We also stock all other DULCI tuners, receiver, and amplifier chassis. ARMSTRONG PB409 and AF105 and the famous A.10 amplifier and pre-amp in stock. Call for demonstration.

### DULCI MODEL H4T

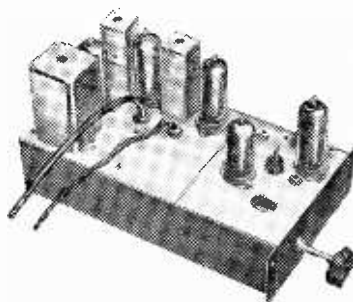


### "TRANSEVEN" PORTABLE

7 Transistor portable radio. Superhet circuit, push-pull output with 7in. x 4in. speaker. 4 pre-set stations (1 long and 3 medium) 7½ v. battery. Cabinet 9in. x 7in. x 4in. Full constructional data and price list, 1/9, post paid. Complete kit, £10.15.0.



### THE MERCURY F.M. TUNER



Enjoy crystal clear high fidelity reception with the programme you want always spot-on tune at the turn of a switch. Foster-Seeley discriminator and A.F.C. incorporated. Full constructional data and price list 2/4, post paid. Complete kit, £10.9.0.

### SOLDERING IRONS

Tyana. 40 watts. 3/16th replaceable bit. Price, 16/9.  
Litesold. 10 watt really miniature iron, ideal for all transistor work. Price, 21/6.  
Adcola. 22 watts. 3/16th detachable bit. A firm favourite with engineers. Price, 33/6.  
Remploy. 25 watts. 3/16th detachable bit with tell-tale neon in handle. Price, 21/6.  
Solon. 25 watt instrument iron. 3/16th detachable bit. The most popular iron, with home constructors. Price, 24/-.  
Please add 9d. post and packing and state voltage.

### GRAM PICK-UPS



Latest type lightweight crystal pick-ups with turn-over cartridge and sapphire stylus for standard and long playing records. Limited quantity at special price of 37/6, plus 9d. post.

### DENCO & JACKSON COMPONENTS

We carry comprehensive stocks of all DENCO coils, coil-packs, I.F. transformers, etc., also all popular types of JACKSON BROS. condensers, dials, scales, and other components.

### BRAND NEW LOUD-SPEAKERS

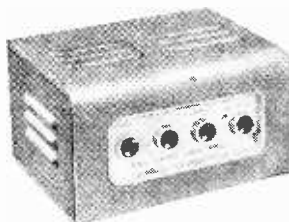
All brand new permanent magnet speakers with 3 ohm speech coil by famous makers. 3½in., 5in., 6½in., all at 17/6 each. 7in. x 4in., 15/-, 8in., 21/-. Please add 2/- post.  
Also full range of the famous W.B. Stentorian Hi-Fi speakers. All models in stock from 1½in. for pocket portable to HF1214 12 in. Lists on request. We now stock 10 different speaker and equipment cabinets, including table units, corner reflex enclosures, record player and amplifier cabinets. Fully illustrated leaflets sent on request.

### THIS MONTH'S BARGAINS

New ELAC miniature output transformer for mains pentode, 4/- plus 9d. post.  
1,200 ft. PVC recording tape. New and boxed. Best quality, 20/-, plus 1/4 post.  
Single screened microphone cable, 6d. yard, plus 1/- post.  
Brand new 6 volt .3 A. M.E.S. dial bulbs. Our price 4/- dozen. Plus 6d. post. Stock up now while available.  
Battery charger meters 2 A. or 4 A. 2½in. dia. New, 13/6, plus 9d. post.

We are stockists for :-  
EDDYSTONE receivers and components.  
PANDA transmitters, including the CUB and EXPLORER. Also the PANDA G4ZU MINI-BEAM.

### TRIPLE FOUR AMPLIFIER



Four stage, 6 watt ultra linear push pull output. Independent Bass, Treble, and equalisation controls. A.C. mains. Complete in case. PRICE, £11.11.0.

# FUN TO BUILD AND A THRILL TO OWN!



**BUILD THIS SHOULDER POCKET SET FOR 38/-**

It's fun to build this "POCKETPAL" shoulder or pocket radio. So easy to build—it covers all the medium waveband with exceptional sensitivity and selectivity. Features a high efficiency pentode valve in well tested, powerful circuit. Personal phone ALREADY battery operation (Batteries fit inside) slings over the shoulder—AERIAL IS INSIDE THE SLING LEAD!—or slips into pocket. Minisize 3" x 2" x 5". Build in about 90 minutes WITHOUT ANY EXPERIENCE, using our "STEP-AND-CHECK" INSTRUCTION MANUAL WHERE EVERYTHING YOU DO IS SPELLED OUT FOR YOU IN PICTURES SO YOU CAN'T GO WRONG! This "POCKETPAL" radio can be built for only 38/- including Case, Valve, Manual, Nuts, etc. Post & Packing is 2/- (C.O.D. 2/-). PARTS SOLD SEPARATELY—shopping list, etc., 1/6. HEAVY DEMAND CERTAIN—DON'T PUT IT OFF—SEND NOW!



**BUILD THIS FOR ONLY 35/-!**

It's fascinating to build this "fantabulous" "TOM-TUM" transistor radio—only the size of a small cigarette packet, yet a marvel of clarity giving unexcelled transistor reception over all the medium-waves. Personal phone circuitry gives loud and clear tone. Can be built by absolute novice in 30 minutes providing endless listening pleasure the moment building is completed. Uses only one small 8t. penlight battery lasting months. Absolute beginners are assured of error-free building because of our SPECIAL INSTRUCTION MANUAL WHERE EVERYTHING IS SPELLED OUT FOR YOU IN PICTURES—SO YOU CAN'T GO WRONG! It costs only 35/- to build the "TOM-TUM" including Case, Transistors, Manual, Nuts, etc. Postage & packing amount to 2/- (C.O.D. 2/-). PARTS SOLD SEPARATELY—shopping list, etc., 1/6. EASY TO BUILD, THRILLING TO OWN—SEND AT ONCE!

**BUILD THIS MAINS "FRYING-PAN" RADIO FOR ONLY 68/6!**



Build this MAINS "FRYING-PAN" SPECIAL—using highly sensitive triode valve circuit and normal size speaker. Covers all Medium and Long Waves giving amazing performance and tone. Costs only 1d. for about 75 hours use! Excellent for KITCHEN, bedroom, garden hut, etc., etc. Robust design.

NO EXPERIENCE WHAT-EVER REQUIRED—YOU CAN BUILD A N.Y. "MERLIN" DESIGN AND GET PERSONAL RESULTS! For A.C. Mains 200 to 250 Volts. LOADS OF FUN TO BUILD!—INSTRUCTION BOOKS

ANYONE CAN FOLLOW. Can be built for 68/6d. including valves, speaker, step-by-step plans, etc. Postage and packing 3/- (C.O.D. 2/-). PARTS SOLD SEPARATELY—shopping list, etc., 1/6. WILL PAN FOR YOUR ORDER TODAY.

NOTE: Complete range of components stocked, re-ster no orders sent abroad, cheques gladly accepted. Sorry no callers at present.

## MERLIN LABORATORIES (Dept. PW1), 167a PORTLAND ROAD, HOVE, SUSSEX

### BUILD THIS AUTHENTIC JASON SWITCHED F.M. TUNER

**JASON MERCURY**

**CONSTRUCTOR'S SWITCH-TUNED MODEL with assembled Front End with two valves and all parts as specified come to £9.0.0**

**5 VALVES FOSTER-SEELEY DISCRIMINATOR**

This British-designed F.M. Tuner provides choice of the three B.B.C. programmes at the turn of a switch, with a fourth position for "OFF." It is a stable unit, free from drift and of high quality. The Switch Tuned Front End is supplied wired, tested and aligned—complete with 2 valves and station-indicating plate. Chassis ready punched. In conformity with all Jason F.M. Units, this model is completely stable and offers the highest possible standards of reproduction.

**SWITCH-TUNED FRONT END with two valves, complete. £6.5.0**  
(Incl. £1 15 0 P Tax)

Data Publication Book of the Tuner (Post Paid) **2/-**

**JASON POWER PACK £2.1.9**  
*Parts come to*

**FROM LEADING STOCKISTS, or in cases of difficulty: THE JASON MOTOR & ELECTRONIC CO.**

3-4 Gt. Chapel Street, Oxford Street, London, W.1

### RST

MAIL ORDER DEPARTMENT  
211 Streatham Road, Mitcham, Surrey.  
ALL VALVES LISTED ARE NEW STOCK. CASH WITH ORDER AND POST FREE. MITCHAM 6201

AZ1 15/6	EF42 12/-	N78 11/6	UL84 9/-	6K7 10/-
B66 8/6	EF80 8/-	N142 9/6	U18 23/6	6K8GT 12/3
D41 8/6	EF85 7/6	N153 11/3	UY41 7/6	6L1 17/6
DA392 9/9	EF86 12/6	N154 11/3	UY85 8/-	6L6G 7/6
DAF91 9/6	EF89 10/-	N271 9/6	VP2B 19/-	6L18 12/6
DAF96 9/6	EF91 8/6	PC84 9/-	W17 8/6	6L19 21/-
DI920 10/8	EF92 9/-	PC85 12/6	W77 9/6	6N7GT 8/-
DF33 9/9	EF95 14/-	PC88 12/6	W81M 18/6	6N7 8/6
DF91 8/6	EL28 23/6	PC89 12/6	W142 9/-	6N17G 7/6
DF96 9/9	EL41 10/-	PC89 12/6	W119 8/6	6N8GT 8/6
DF97 9/6	EL42 10/-	PL36 15/-	W727 8/6	6X4 7/6
DH179 9/6	EL81 17/6	PL38 23/6	X18 11/9	6X5GT 8/6
DK32 12/6	EL84 9/-	PL82 10/-	X78 19/-	7R7 15/-
DK91 9/-	EM90 8/6	PL86 11/6	X79 11/9	7R7 12/6
DK96 11/9	EM90 10/-	PL86 8/3	Z21 10/8	7T4 7/6
EABC80 9/6	EM85 15/-	PV82 8/6	Z77 10/8	8D3 8/6
EACR1 10/6	EY81 10/-	PV83 8/6	Z152 8/6	10C1 18/-
EAF42 10/-	EY84 13/-	PZ30 17/6	ZD152 8/-	10C2 18/6
EB41 10/6	EY91 9/-	R19 22/-	Z19 11/9	10F1 22/6
EB91 5/9	EZ35 8/6	R19 19/-	1F3 8/6	10L12 14/9
EBC41 9/3	EZ40 8/-	SP41 9/3	1R5 9/6	10P13 23/6
EBF80 9/6	EZ41 10/6	SP61 3/6	3T4 8/-	12A8H 10/-
EBF89 9/6	EZ89 8/-	TP194 18/6	5U4G 8/6	12AT6 8/9
EBL21 12/-	EZ81 8/-	TP22 12/6	5Y3GT 8/6	12B17 8/6
EBL21 12/-	EZ90 7/6	TP25 18/-	5Z4G 10/-	12A7 9/-
EC91 8/9	FC2 14/6	U16 11/-	6A8GT 10/-	12AX7 9/-
ECC33 8/6	FC13 14/6	U25 13/6	6AL5 5/9	12BA6 8/9
ECB40 17/6	FC13C 19/6	U78 8/-	6AM6 9/-	12BL6 8/3
ECB81 8/6	GZ32 11/6	U142 8/6	6AN5 5/-	12BH7 10/-
ECC82 9/6	H53 10/8	U145 8/6	6AQ5 7/6	12GT 10/-
ECC83 9/-	H53 10/8	U147 9/6	6AT6 8/3	12K7 10/-
ECC84 10/-	HB90 8/-	U153 9/6	6B8 4/-	12K7GT 10/8
ECC85 10/6	HL92 11/6	U405 9/6	6BAG 8/6	12K8GT 10/8
ECF80 12/6	HL153D 19/6	U404 9/6	6B56 8/3	12L7 8/6
ECF82 12/6	HY90 7/6	U801 27/6	6B76 7/6	12Q7 12/3
ECH21 21/-	HY90 11/8	U802 27/6	6B76 7/6	12Q7 12/3
ECH35 12/6	KBC32 10/-	U803 27/6	6B76 7/6	12Q7GT 8/6
ECH42 9/6	KC35C 12/6	UAF42 10/-	6BW7 8/6	14H7 8/6
ECH81 9/6	KT56 18/6	UCB41 8/6	6C8G 8/6	15D1 20/-
ECL80 10/-	LZ19 12/6	UCB90 9/6	6C16G 8/6	20P2 21/-
ELC82 13/6	MT4 12/6	UCH42 10/-	6D2 5/9	20L4 19/6
EF9 21/-	MKT4(5) 10/-	UCH81 20/6	6F1 19/6	30F5 12/6
EF22 18/-	(Or 7) 21/-	UCL85 10/-	6F12 8/6	35W4 7/6
EF37A 10/3	MSF4 15/6	UCF41 8/-	6F13 18/6	35ZAGT 8/6
EF40 15/-	MC14 19/6	UCF80 10/-	6F16 8/6	50LGT 10/-
EF41 9/6	N87 18/3	UCF41 9/6	6J7GT 10/-	

Quotation given for any types not listed. Obsolete and old types a speciality, send for lists.

# A Microphone Pre-amplifier

A SINGLE VALVE UNIT FOR USE WITH A MOVING-COIL MICROPHONE

By R. Hindie

**H**IGH-FIDELITY amplifiers previously described in this magazine, and those obtainable ready made, generally require a fairly large audio input, probably of the order of half a volt or higher, which is reasonable enough if fed from a radio unit with a diode detector because such a detector should be operated at a high level of signal for the minimum of distortion, though if tone controls are to be used some additional amplification will probably be needed. Many devices, however, are quite inadequate to load such an amplifier unaided and the moving-coil type of pickup and microphone are in this category. The present unit was devised as a pre-amplifier feeding a high-quality amplifier and taking its input from a moving-coil microphone.

The type of microphone under consideration might well give no more than 1 mV of signal at a low impedance. A transformer will be required to match the microphone into the pre-amplifier and this will have a step-up ratio so that the voltage presented to the valve of the amplifier will be higher, but a gain of 100 appears to be a reasonable aim in the present case and that was the design aim for this unit, such gain to be, of course, independent of the transformer step-up.

In the amplifier series of articles published some time ago a design was given for obtaining such a gain in two stages using a double-triode valve but, in fact, it can be obtained in a single stage using a pentode and because the input signal is so small this type of valve is quite suitable. A very important consideration for this purpose is the question of noise generation, for this must be very low compared with the small input from the microphone or else it will be objectionable when amplified along with the required speech, and one has to be very careful in choosing a pentode for this reason, because the pentode is

somewhat prone to noise generation. Besides the straightforward noise generation in the valve there is microphony and hum injection to contend with and these factors vary according to the valve used. The Brimar 6BR7 is particularly suitable and is chosen for this design.

## Power Supply

A power supply of 250 volts is assumed and the valve makers supply curves for the 6BR7 as audio amplifier using such a supply from which it is seen that a gain of 108 times is obtained using an anode load of 220 K $\Omega$ , which satisfies the design aim in this case. The circuit is given in Fig. 1, from which it will be seen that a screen resistor of 1.5 M $\Omega$  and a cathode resistor of 2.2 K $\Omega$  is used. Some 30 volts of output signal can then be obtained for a distortion of 5 per cent. This sounds rather poor for a high-fidelity proposition, but in fact in the present case there is negligible distortion because nothing like the 30 volts of signal is required; in fact, as we have seen, we have budgeted for only about a half volt of output and the characteristic over this range is nearly straight.

The microphone transformer is built into the pre-amplifier as shown, and this is a miniature contained in a mumetal screen. This is a point that is prone to hum pickup and the use of the specified transformer is to be recommended as being particularly good in this respect. Of course it is no use using such a component and then throwing away all the advantages by connecting it with long unscreened leads and it will be seen

## COMPONENT LIST FOR FIG. 1

- T—Input transformer in mumetal case (Belclere EN1-50-01-Z)
- V—6BR7 (Brimar)
- R1—1.5 M $\Omega$   $\frac{1}{2}$  watt high stability (Dubilier type R425)
- R2—220 K $\Omega$   $\frac{1}{2}$  watt high stability (Dubilier type BT)
- R3—2.2 K $\Omega$   $\frac{1}{2}$  watt carbon
- R4—1 M $\Omega$   $\frac{1}{2}$  watt carbon
- R5—22 K $\Omega$   $\frac{1}{2}$  watt carbon
- R6—22 K $\Omega$   $\frac{1}{2}$  watt carbon
- VR—50 ohms potentiometer wirewound (if required—see text) (Dubilier type A2/A)
- C1—4  $\mu$ F 350 volt electrolytic (Dubilier type BR435)
- C2—100  $\mu$ F 12 volt electrolytic (Dubilier type BR1001)
- C3—.1  $\mu$ F 250 volt paper (Dubilier type 410)
- C4, C5—16-16  $\mu$ F 350 volt electrolytic (Dubilier type CT161635, with mounting clip)

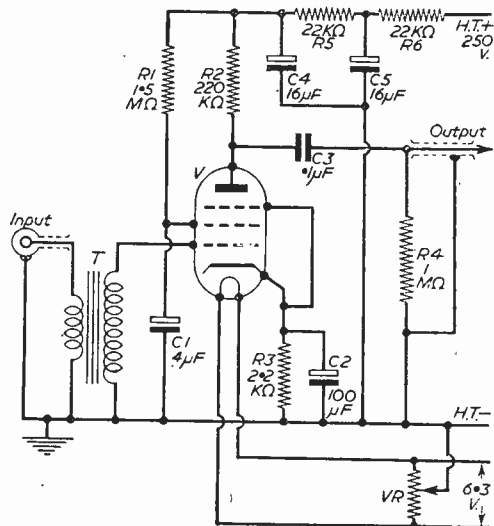


Fig. 1.—The theoretical circuit. VR may be on the main amplifier—(see text).



from the wiring diagram, Fig. 4, that the transformer is brought up as near to the valve base as possible so that the connecting wires are short and they are, in fact, unshielded.

The circuit will be seen to be quite orthodox in principle. A two-stage filter is used in the H.T. feed line because, of course, this stage is

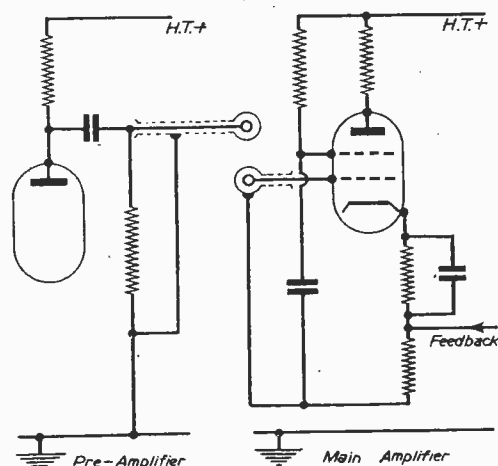


Fig. 2.—Preferred method of feeding signal to mains amplifier.

for use near to the main amplifier and with a comparatively short run to the microphone; in fact it was for use by a dance band combination where the whole outfit was kept quite compact. Consequently, the power required for this pre-amplifier was picked up from the main amplifier. The requirements are quite modest and are not likely to overload any amplifier power pack. The heater takes .15 amp at 6.3 volts and less than a milliamp of H.T. is drawn at 250 volts. If the microphone is to be any considerable distance from the main amplifier it will be better to put the pre-amplifier by the microphone and in this case a separate little power pack should be constructed to feed it. This can be quite modest,

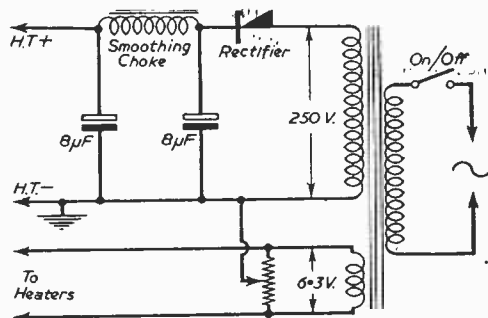


Fig. 3.—The power supply.

very sensitive to all the ills that can travel via the power supply and a 100 µF electrolytic is used across the cathode bias resistor. It will be noticed that a 1 MΩ resistor appears across the output. This is intended to be the grid return resistor of the first valve of the main amplifier and if there is one already built into that position in the main amplifier it should be removed, unless, of course, that amplifier is to be used at times without the pre-amplifier, in which case it had better be left, but preferably it should not be less than 1 MΩ.

When connecting the pre-amplifier it is preferable not to earth the screen of the connecting cable (which is a piece of television coaxial lead-in) to the chassis. The input coaxial socket on the main amplifier can conveniently be mounted on a piece of Paxolin board with a soldering tag underneath one of the holding-down bolts. This tag is then used as the return earthing point for all components associated with the first main amplifier stage. The circuit will then appear as shown in Fig. 2.

**Method of Use**

This amplifier was intended

using a small metal rectifier and a transformer with a single H.T. winding giving 250 volts and a 6.3 volt heater winding as shown in Fig. 3.

(Continued on page 63)

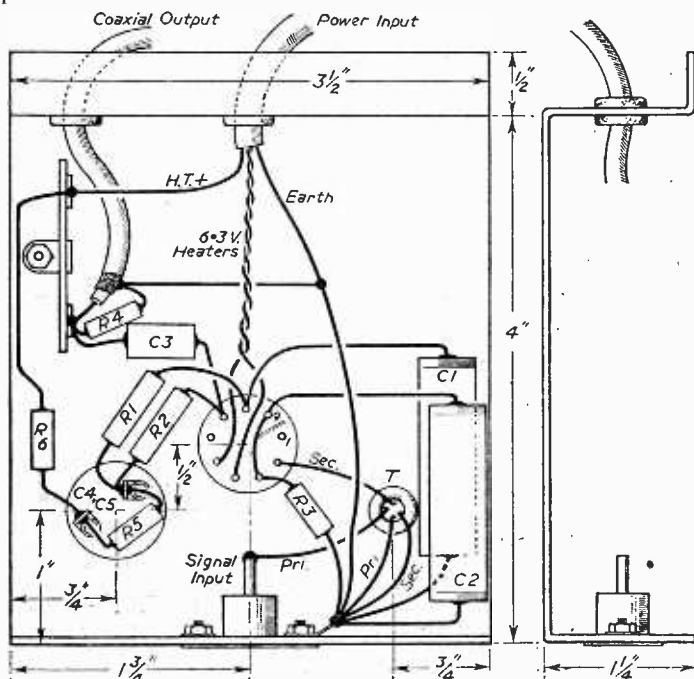


Fig. 4.—Wiring details for the pre-amplifier.

# RETURN-OF-POST SERVICE

## MULLARD 510 AMPLIFIER

**INSTRUCTION MANUAL.**—Gives full details of the 510 and Pre-amplifiers. 3 6, plus id. postage.

**RESISTORS.**—LAB Kit for Main Amplifier. Includes all fixed resistors and three potentiometers. 39/-.

**CONDENSERS.**—TCC Kit for Main Amplifier. 45/-. Our Kit for Main Amplifier. Contains all brand new condensers of good manufacture. 29 6.

**MAINS TRANSFORMERS.**—Elstonec. MT510 for Main Amplifier only 42/-. MT MU for Main Amplifier with Pre-amplifier or FM Tuner. 45/-.

**CHASSIS.**—Denco. Fully drilled. Complete with base and screen. 19 6.

**OUTPUT TRANSFORMERS.**—Partridge. P3657. For 6,000 and 8,000 ohms. 52/6. Gilson W0386A for 8,000 ohms. 47/6. Gilson W0386B for 6,000 ohms. 47 6.

**OUTPUT TRANSFORMERS.**—ULTRA LINEAR.—Gilson W0710/8K. 52/6. W0892 62/6. Partridge P4011. 98/6. P5302. 95/-.

**PLUGS AND SOCKETS.**—Elcom. 6-pin Chassis Socket S06. 4/3. 6-pin Flex Plug S06T. 5 6. 4-pin Chassis Socket S04. 3 3. 4-pin Flex Plus S04T. 5-. Bulgin P340. 4 6. P350. 4/3.

**VALVES.**—EF85 Mullard. 24/4. Our alternative. 15/-.

ECC83 Mullard. 19/-. Our alternative. 10/-.

EL84 Mullard. 16/-.

Our alternative. 12/-.

EZ81 Mullard. 11 10. Our alternative. 8/6.

EZ81 Mullard. 11 10. Our alternative. 8/6.

**OTHER COMPONENTS.**—Full details of the other components required are given in our four page list available free upon request.

### COMPLETE KITS

**KIT A.** Complete kit of components with alternative valves and condensers with Elstonec MT510 Mains Transformer and Gilson Output Transformer. **£14.0.0.** Other kits available. See list for full details.

**PRE-AMPLIFIERS.**—We have all items for both Pre-amplifiers. Full details in list.

## MULLARD TAPE AMPLIFIER TYPE "C"

**THE MULLARD TAPE AMPLIFIER TYPE C** is a new version of the Type B Amplifier. It comprises a recording amplifier and a play-back Pre-amplifier, and is intended to use an existing amplifier for play-back. It uses a Ferricube Inductor in the treble boost circuit and has a switch for the speed equalising circuits in place of the plug-in unit on the Type B Amplifier. The circuit gives details for use with Brenell, Collaro, Truvox and Lane Tape Decks.

**INSTRUCTION MANUAL** is available from us free of charge. Please send 4d. in stamps to cover cost of postage.

**COMPLETE KIT** containing all components, valves and sundries kit.

**KIT A.**—With alternative valves, **£14.0.0.**

**KIT B.**—With Mullard valves, **£15.15.0.**

All items available separately. Detailed list free.

**POWER PACK KIT, £4.0.0.** Items available separately. Send for list.

**CREDIT TERMS.**—**KIT A.** Deposit **£21.6** and seven monthly payments of **£1.17.6.** **KIT B.** Deposit **£27.0** and seven monthly payments of **£2.2.0.**

## NEW JASON "MERCURY" FM SWITCHED TUNER KIT

This fine new switched tuner provides all three BBC programmes at the turn of a switch. The front end unit is supplied ready wired and tested. See our advertisement in December *PRACTICAL WIRELESS* or send for full details. Instruction book 2/3 post free.

**COMPLETE KIT, £9.19.0 POST FREE.**

**CREDIT TERMS.** Deposit **£110.6** and seven monthly payments of **£17.0.**

## GRAMOPHONE EQUIPMENT

**BSR MONARCH RECORD CHANGER.** Latest four-speed model. **£8.12.6.** Credit Terms. Deposit. **£1.4.6** and seven monthly payments of **£1.4.0.**

**RECORD CHANGERS.** We have many types in stock—some at special prices. Send for list.

### SINGLE RECORD PLAYERS

**GARRARD 4SP.**—The latest Garrard four-speed player unit. Fitted with Garrard GC2 Crystal Pick-up. **£8.1.9.** Credit Terms. Deposit. **£1.4.3** and seven monthly payments of **£1.2.6.**

**COLLARO 4564.**—Four-speed unit fitted with the well-known Studio Pick-up "O" or "P". **£9.7.0.** Credit Terms. Deposit. **£1.8.6** and seven monthly payments of **£1.5.6.** Special Offer of the same unit fitted with "T" (High output) Pick-up only. **£7.19.6.** Credit Terms. Deposit. **£1.5.6** and seven monthly payments of **£1.2.0.**

**BSR TU9.**—Four speed motor with separate Pick-up fitted with BSR TC8 cartridge. **£4.15.0.** Credit Terms. Deposit. **£1.5.0** and three monthly payments of **£1.6.8.**

**COLLARO JUNIOR.**—Four-speed motor with separate pick-up. The Pick-up is an ACOS model and is fitted with the HGP59 Cartridge. **£4.13.6.** Credit Terms. Deposit. **£1.3.6** and three monthly payments of **£1.6.8.**

**GARRARD TA MK II.**—Four-speed. Very well made player fitted with Garrard GC2 cartridge. **£9.15.8.** Credit Terms. Deposit. **£1.10.2** and seven monthly payments of **£1.6.6.**

## LATEST AVO TEST METERS

### AVO METER MODEL 8 MARK II

The latest version of this finest of all test meters is now available from stock. 50 microamp movement (20,000 ohms per volt.) Eight DC Voltage, Seven DC Current, Seven AC Voltage, Four AC Current and three ohms ranges. Fully detailed literature available free. Price **£23.10.0.** Credit Terms. Deposit **£3.9.0** and seven monthly payments of **£3.3.0.** Leather carrying case, **£3.0.0.**

### AVO MULTIMINOR

A new and very attractive pocket size instrument at a modest price. Movement is 100 microamps (10,000 ohms per volt). Six DC Voltage, Five AC Voltage, Five DC Current and two ohms ranges. Descriptive leaflet available free upon request.

Price **£9.10.0** Credit Terms. Deposit **£1.6.0** and seven monthly payments of **£1.6.0.** Leather carrying case, **32/6.**

## MULLARD 510 and GEC 912 PLUS AMPLIFIERS

We carry full stocks for all versions of these popular Amplifiers and our price lists are available free.

## TRANSISTORS

### SURPLUS TYPES

Special offer of the famous Red Spot. 7/6 each. Four for 27/6. RF Junction Type. Red/Yellow Spot. 21/-.

AF Junction Type. Yellow/Green Spot. Pair in push-pull give 250 mW. 10/- each.

### MULLARD TYPES

OC70, 21/-.

OC71, 24/-.

OC72 Matched Pairs, 60/-.

All transistors post free.

### CREDIT TERMS

Any of the above items can be supplied on Credit Terms. Details are as follows:—

**SEVEN MONTHLY PAYMENTS.** Deposit 3/- in the £ and balance plus a small service charge (10% of balance, but minimum charge 1/-) payable in seven monthly payments.

**THREE MONTHLY PAYMENTS.** Deposit 6/- in the £ and balance plus a small service charge (5% of balance, but minimum charge 10/-) payable in three monthly payments.

**TERMS OF BUSINESS.**—Cash with order or C.O.D. Postage extra under £3. We charge C.O.D. orders as follows. Up to £3, postage and C.O.D. fee, minimum 2 8. Over £3 and under £5, C.O.D. fee only 1/6. Over £5 no charge.

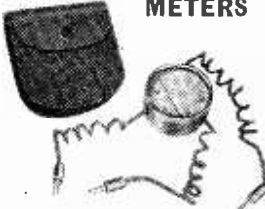
# WATTS RADIO (MAIL ORDER) LTD.

54 CHURCH STREET, WEYBRIDGE, SURREY. Telephone: Weybridge 4556

PLEASE NOTE. POSTAL BUSINESS ONLY FROM THIS ADDRESS.

# LASKY'S RADIO

## BARGAIN OFFER OF POCKET VOLT TEST METERS



Two ranges, D.C. 0-250 v. and 0-25 v. Complete with leads in leather case. LASKY'S PRICE **12/6** Post free. Few only left. Send NOW.

## 4-SPEED SINGLE PLAYER BARGAIN

COLLARO "JUNIOR" 4-spd. motor and pick-up with HGF59 cartridge. LASKY'S PRICE **92/6** Post 3/6. Motor only, 59/6. Post 2/6. Pick-up only, 33/6. Post 2/6.

## TRANSISTORS

Hermetically sealed and unaffected by temperature variations. Tested and guaranteed efficient. I.F. P.N.P. Junction Type, suitable for medium and low freq. oscillators, freq. changers and I.F. amplifiers **21/-** (1.5 to 8 Mc/s). (Double spot—yellow and red.)

AUDIO P.N.P. Junction Type, suitable for high gain and low freq. amplifiers, and for output stages up to 250 milliwatts. **10/-** (Double spot—yellow and green.) Post free.

Full operating data and circuit diagrams for receivers, oscillators, amplifiers, etc., supplied.

## TRANSISTOR AMPLIFIER KIT

200 milliwatts. Output impedance 5 ohms. Operates from 6 v. battery. Miniature size: 3 1/2 in. x 3 1/2 in. height can be under 1 in. COMPLETE KIT including 4 Transistors. PRINTED CIRCUIT, full instructions. **79/6** Post 3/6. Full details on request.

## TRANSISTOR S/HET TUNER

For construction on Printed Circuit. Uses 3 R.F. Transistors, 1 germanium diode, 3 I.F. transformers, Ferrite rod aerial. Operates from 6 v. battery and 1.5 v. cell. Size of Printed Circuit, 3 1/2 in. x 3 1/2 in. CAN BE BUILT FOR **£5/12/9** Post 3/6. Full details on request. Demonstrations at both addresses.

## MINIATURE MOTORS

Will work on any voltage from 6 to 12 v. Complete with gearbox. Overall size 2 1/2 in. long x 1 1/2 in. x 1 1/2 in. Ideal for models, remote control, etc. Original cost over £2.

LASKY'S PRICE **12/6** Post 1/6.

## RADIOGRAM CHASSIS

Large selection—Dulci, Armstrong, Imperial, etc.

AM..... from 7 gns.

AM FM..... from 14 gns.



## COLLARO 4-SPEED MIXER AUTO-CHANGER

Latest model RC456 incorporating auto and manual control enabling records to be played singly or automatically. Complete with Studio crystal p.u. and sapphire stylus. List **£18/17/-**.

LASKY'S PRICE **£8/19/6** Post 5/-.

## LASKY'S (HARROW ROAD) LTD.

42, TOTTENHAM COURT ROAD, W.1.

Telephone: MUSeum 2605.

370, HARROW ROAD, PADDINGTON, W.9.

LAD 4075 and CUN 1979.

Open all day SATURDAY. Half-day Thursday.

PLEASE ADDRESS ALL MAIL ORDERS TO HARROW ROAD.

## REPANCO HIGH GAIN COILS

- Dual Range Crystal Set Coil, Type DRX1 .... 2/6
- Dual Range Coil with Reaction, Type DRR2 .... 4/-
- Matched Pair Dual Range T.R.F. Coils, Type DRM3 ..... pair 8/-
- Pair Dual Range Superhet Coils, Type SH4 pair 8/-

- Miniature Iron Dust Cored Coils, Type "R" :-  
Range Aerial H.F. Osc. Ro1
- 800-2,000m. RA1 RHF1 RO1
- 190- 550m. RA2 RHF2 RO2 each 3/3
- 70- 230m. RA3 RHF3 RO3
- 15- 50m. RA4 RHF4 RO4

- Ferrite Rod Aerial, Dual Range Type FR1 .... 12/6
- Miniature I.F. Transformers, Type MSE (465 Kc/s) ..... pair 12/6
- Standard I.F. Transformers, Type TCG (465 Kc/s) ..... pair 13/6
- Three Waveband Superhet Coil Pack, Type LMS... .. 36/-
- F.M. Coil Set ..... 29/6

(All components boxed complete with circuits.) Send S.A.E. for complete list of Repanco components.

**EASY-TO-BUILD TRANSISTOR RECEIVERS**  
**Repanco "Three Dee."**—A new dual range radio with band pass tuning using a crystal diode and 3 transistors. Easy wiring plans and instructions. 1/- (post free).

**Repanco "Transeven."**—Latest portable superhet 7 transistor receiver with preset tuning for 4 stations. Easy wiring plans and instructions. 1/9 (post free).

**RADIO EXPERIMENTAL PRODUCTS LTD.**  
 33 MUCH PARK ST., COVENTRY.  
 Tel. 62572.

# EDDY'S (NOTTINGHAM) LTD. (DEPT. P.W.)

## This Month's Special Offers

- 6K7G VALVES** ... .. 2/11 each
- 6L6G VALVES** ... .. 5/11 each
- 807 VALVES** ... .. 4/11 each

Single-Piece Throat Mikes, 1/- each, post, etc., 4d. each. Could be used for Electrifying Musical Instruments. Midget Battery Eliminators. To convert all low-current consumption portables for mains operation. Mains input 200/240 v. A.C., H.T. output 85 v. 10 m.a., L.T. output 1.3 v. 125 m.a. Size 3.7 in. x 2.5 in. Actually smaller than H.T. battery alone. Special Price of 55/- plus 2/6 post, etc. Germanium Diodes, 1/- each., 10/- doz., post 4d. extra. ALL NEW AND GUARANTEED.

Any parcel insured against damage in transit 6d. extra		SURPLUS, NEW AND GUARANTEED VALVES		Post, etc., 6d. per valve extra. Over £3 post free					
All tested before dispatch									
1R5	7 11	10F1	14 11	35W1	7 6	ECC82	EL84	10 8	
1S5	7 3	10F9	11 6	35Z46	7 6	8 11	EZ80	8 6	
3V4	8 6	12AH7	7 11	807	6 8	ECC83	EZ81	9 6	
5Y3GT	7 6		7 11	954	1 6		CZ32	12 6	
5Z4C	9 6	12AH8	9 6	955	3 11	ECC84/9 11	PCC84	8 6	
6BA6	6 6	12AT6		956	2 6	ECC85	9 6	PL82	9 6
6B9C	3 11		10 8	958	3 11	ECH33	9 6	PY80	8 6
6B9J		12K7	7 6	DAF96	9 6	ECH42	9 6	PY81	8 11
6F15	14 9	12K8CT		DF96	9 6	EF41	9 6	PY82	8 11
6J5C	3 11		13 11	DL96	9 6	EF80	9 11	UBC41	8 6
6Q7G	8 11	12Q7	7 6	DK96	9 6	EF85	7 6	UCH42	8 6
6K9G	9 6	25L6GT		EB91	6 6	EF96	12 6	UF41	8 11
7C6	9 6		9 6	EBC41	9 6	EF99	9 11	UL41	9 11
7S7	9 6	25Z4C		ECC81		EF91	7 11	UL84	11 6
7Y4	7 11	35A5	10 11		8 11	EL32	3 11	UY41	7 11

172, ALFRETON RD., NOTTINGHAM

The method of connecting the heater of the pre-amplifier will depend on the source of power. If this is taken from the main amplifier it may be that one side of that amplifier's heaters will be earthed and it is fairly certain that to change that will be difficult so it will be as well to connect one side of the pre-amplifier heater also to earth. It is preferable, however, for both sides of the heater to be floating, with a centre-tap to earth by means of a "humdinger" potentiometer. This method is shown in Fig. 1 because the amplifier with which the unit was to work had already this method of connection. The idea is, of course, that any residual hum can be cancelled out by adjustment of this control. In practice complete cancellation cannot be effected by this means because of spurious phase-shifts and so it is essential to take every precaution to avoid hum introduction in the pre-amplifier, but what slight hum is unavoidable can be reduced by adjusting the humdinger.

### Floating Heater

It follows, of course, that if a special power pack is constructed the floating heater method will be adopted and this is given in Fig. 3. If more convenient, the actual potentiometer could be fitted to the pre-amplifier instead of to the power pack. In either case, two interconnecting heater leads will be required in addition to the earth and H.T. + lead; the earth to the potentiometer is made on whichever chassis it is mounted.

Fig. 4 gives the wiring for the chassis. It will

be seen that the heater leads of the interconnecting cable go directly to the heater pins on the valve holder, and these connections should be made first. These are shown as floating, as explained above, so do not forget to link one to earth if the power supply to be used requires that mode of connection.

### Earthing

Note that all earth leads on the pre-amplifier are taken to one point, actually to a soldering tag on the input coaxial socket; if the heater has to be earthed this could go to the chassis, but no other lead should be so connected. A soldering tag strip is used to anchor the output coaxial lead and the H.T. + input, but the earth tag of this strip is not used for connections. After the heater connections wire in the input transformer, cutting down the leads to the minimum required for the connection. The remaining connections can be made in any order, but preferably leaving the comparatively bulky electrolytic capacitors until the last.

Both input and output leads must be screened. Coaxial cable as specified is ideal for the link between the pre-amplifier and the main amplifier, and if it is necessary to provide the lead from the microphone to the pre-amplifier the same material could be used.

Should the run between microphone with pre-amplifier and the main amplifier be considerable it may be preferable to introduce a cathode-follower in the output circuit.

## News from the Clubs

**NORTHAMPTON SHORT-WAVE RADIO CLUB (G3GWB)**  
Hon. Sec.: S. F. Berridge (G3ITW), 20, Eitel Street, Northampton.

A SERIES of lectures from the R.S.G.B. Recorded Lecture Library has been arranged; those so far heard have been "Receivers," by R. H. Hammans (G2IG), on December 6th, and "Transmitter Design and T.V.I.," by N. Shires (G3BTM), on January 3rd. The next two in the present series are scheduled for February 7th and March 7th and the respective subjects will be "Aerials," by F. Charman, M.B.E. (G6CJ), and "Amateur Radio in the Antarctic," by Roth Jones (VK3BG). A film show has been arranged to take place on February 28th: it will consist mainly of films of technical interest connected with radio, but it is hoped to include films on other subjects as well. Details as to programmes, times and place of showing may be obtained from the hon. secretary at the above address.

**PLYMOUTH RADIO CLUB**  
Hon. Sec.: Cyril Teale (G3JYB), 3, Berrow Park Road, Peverell, Plymouth.

THE club continues to meet each Tuesday at the Virginia House Settlement, St. Andrews, Plymouth, at 7.30 p.m.

**MIDLAND AMATEUR RADIO SOCIETY**  
Hon. Sec.: P. G. Turton, 2, Holloway Head, Birmingham, 1.

MORSE classes are held every Thursday at The British Red Cross Society (Birmingham County Branch), 16, Highfield Road, Edgbaston, Birmingham, 15, at 7.30 p.m., by H. B. Bligh (G3HBB). All welcome.

North Midland Mobile Rally to be held at Trentham Gardens (between Stoke and Stafford), on Sunday, April 20th, car park for 120, accommodation for everyone.

G. R. M. Meeting at The Digbeth Institute, Birmingham, 5. Tickets: approximately 7/-, including meal. April 27th.

Club meetings 3rd Tuesday at The Midland Institute, 7.30 p.m.

**RAVENSBOURNE AMATEUR RADIO CLUB**  
Hon. Sec.: J. Wilshaw, 4, Station Road, Bromley, Kent.

MEETINGS are held Wednesday, 8 p.m., at Durham Hill School, Downham. Recent addition to the club station, G3HEV, is a BC348 receiver. On Tuesday evenings a beginners' basic radio class is held—all welcomed. Morse lessons held.

**BURY RADIO SOCIETY**  
Hon. Sec.: L. Robinson, 56, Avondale Avenue, Bury, Lancs.

THE society holds its meetings at the George Hotel, Kay Gardens, Bury, at 8 p.m., on the second Tuesday of each month, and all radio amateurs and short-wave listeners are always welcome. On February 11th Mr. J. E. Hodgkins (G3EJF) will talk about "Elements of Radio Astronomy."

On Tuesday, March 11th, there will be a talk on "T.V.I. Prevention," by Mr. G. Openshaw (G2BTO).

**TORBAY AMATEUR RADIO SOCIETY**  
Hon. Sec.: Geo. Western (G3LFL), 118, Salisbury Avenue, Barton, Torquay.

AT a recent meeting held at the Y.M.C.A., Torquay, unanimous approval was expressed when Arthur Hook (G3CMT), signified his willingness to act as experimental manager. The Annual Dinner and Social is on Saturday, February 22nd, at 7.30 p.m. Tickets for this event are priced 10/6 (ten shillings and sixpence), and can be obtained from the Social Committee Chairman, John Olway, 9, Hoyles Road, Paignton, and the secretary.

**READING AMATEUR RADIO CLUB**  
Hon. Sec.: G3JKA, 12, Chiltern Bank, Peppard.

AN invitation is extended to readers and all who are interested in Ham Radio to attend the following meetings of the above club:

February 22nd, 7.30 p.m., Broad Street H.Q. S. Woodward, Esq., A.M.I.Mech.E., will give a talk on selsyns and desyns, which will interest those Hams with beams.

March 29th, 7.30 p.m., Broad Street H.Q. Lt.-Col. Bower will give a talk on his experiences using VU, V51, etc., call signs, which should be very interesting to those D.X. Hunters.

This club has been in existence for some months now, and the aim is to get together those Hams and SWLs in the district who are keen to meet and help each other in the true Ham spirit.

It is hoped shortly to start Morse classes for those interested in obtaining their tickets, and if sufficient members are keen this will be followed by technical instruction up to C. and G. standard.

The address of the club's headquarters is being changed, and those who do not know of the new address should contact the above temporary officer who will be only too pleased to help.

# Programme Pointers



Our Critic, Maurice  
Reeve, Reviews Some  
Recent Programmes

"WELL" is a one syllable word listed both as a noun and an adjective. Among its many definitions as the former are "a rise of water from the earth," "a spring," "a cavity," etc. etc. Within the latter category are "good in condition," "fortunate," "comfortable," and others. "To issue forth" is to use it as an intransitive verb, whilst "in a proper manner," "rightly," "favourably" or "thoroughly" are adverbial usages. And so on and so on.

What am I getting at? Just this. When shall we ever hear an interview which doesn't begin with that tiresome little word "well"? A Cabinet Minister returns from a foreign mission and answers "our reporter" at London Airport with, "Well, I think my visit to Paris . . ." A famous centre forward says, "Well, it was a fine game . . ." a Trades Union leader replies, "Well, I think the Government . . ." A film or TV star, "Well, I'm thrilled to be in London . . ." a Grand National Winner, "Well, I always knew Dobbin would win. . . ." Well, well, well! A spring. To issue forth. Who knows? Perhaps they are justified, after all!

Audrey Russell presented an enlivening, entertaining and informative programme styled "American Spoken Here." It might well make the forerunner of a series. It was based on "impressions made with the help of a tape recorder in Washington, Philadelphia and New York," and contained many interviews with representative American men and women and observations on things seen there. What a country! What a people!

## Master Pianist

Artur Rubinstein must be very nearly, if not, the last pianist who is both a giant of yesterday and to-day. With the B.B.C. Symphony Orchestra in two concertos—Schumann and Saint-Saens—he showed, both in virtuosity and poetic insight—that the "new school" has nothing to show excelling the masters of yesterday, especially in the latter department. They were memorable performances.

George Gissing was a novelist of little account in his own day—a day of giants—and of even less to-day. Certainly to the present writer. But the admirably presented centenary "Portrait" showed us to be the poorer for our neglect. It was compiled and narrated by Anthony Curtis. But I didn't like the "voices" of H. G. Wells (Chas. Leno), Morley Roberts (P. Woodthorpe), or Gissing himself (Martin Starkie).

## Comedy and Plays

That famous comedy of Aristophanes, "Lysistrata," in which, during the Peloponnesian war, Athens defeated Sparta by the horrible to think of, and never since repeated, ruse of women

segregating themselves from their men, was given a rollicking performance. Googie Withers was enchanting as the conspiratress in chief.

James Bridie's murder thriller, "Dr. Angelus," is popular with amateur dramatic societies and is good entertainment. It doesn't seem to convey any reality or psychological implications. Whether such a scoundrelly doctor—or, for that matter, such a nit-wit as his young English assistant—was ever found with a plate and the usual qualifications on his gate is extremely doubtful.

The Glasgow Citizens Theatre Company put it on with great realism. One noticed a few hesitations in Duncan Macrae's performance of Dr. Angelus, who first poisons his mother-in-law and then his wife (as well as seducing the maid by way of light relief, one presumes); otherwise it was ghoulish and evil enough. Fulton Mackay, as his assistant—who is foolish enough to sign both death certificates against all the evidence—had, I presume the unusual experience for a Scotsman of turning himself into a North country Sassenach. Others in the cast were Edith McArthur, Jessie Morton, Joan Scott, Edward Waddy (very good), Michael O'Halloran and James Nairn. Producer, James Crampsey.

## Documentary

"The Latest Witness" was an absorbing documentary, styled "a spontaneous conversation" between Dr. Ernst Hanfstaengl, Alan Bullock, Peter Fleming and Lindley Fraser. The subject: Dr. Hanfstaengl's recent book, "Hitler, The Missing Years." (The doctor was a friend and confidant of the corporal in his early years and up to his assumption of real power.)

Although speaking very elementary English, some of the doctor's epigrams were so funny that one cannot help wondering as to the degree of spontaneity the programme actually achieved. I cannot refrain from quoting two. Of girls—"they looked at him as if he were the Unfinished Symphony" (he certainly was the unfinished general, thank Heaven). And of Wagner's music—"it had an effect on him like a brassiere: it gave him uplift." These are remarkable linguistic coinages from someone who sounds as though he might frequently be at a loss for the *mot juste* if hard pressed. However, it was a diverting and rewarding forty-five minutes.

# Wanted!

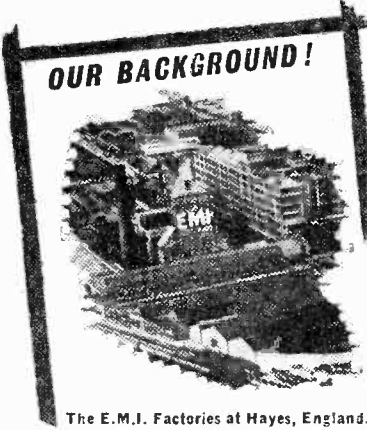
## QUALIFIED MEN AND WOMEN

Industry & Commerce offer their best posts to those with the necessary qualifications—such posts that will bring personal satisfaction, happiness, good money and security. As part of a modern industrial organisation, we have skilled knowledge of what is required in industry to-day and the best means of training personnel for its present day and future requirements. We specialise also in teaching for hobbies, new interests or part-time occupations in any of the subjects listed below. Make your own choice and write to us to-day for further information. There is no obligation of any kind.

### PERSONAL & INDIVIDUAL TRAINING IN—

- |                                       |                            |                              |                                  |
|---------------------------------------|----------------------------|------------------------------|----------------------------------|
| Accountancy                           | Customs Officer            | Languages                    | Refrigeration                    |
| Advertising                           | Draughtsmanship            | Management                   | Sales Management                 |
| Aeronautical Eng.                     | Economics                  | Maintenance Eng.             | Sanitary                         |
| A.R.B. Licences                       | Electrical Eng.            | Mathematics                  | Engineering                      |
| Art (Fashion, Illustrating, Humorous) | Electrical Installations   | M.C.A. Licences              | Salesmanship                     |
| Automobile Eng.                       | Electronics                | Mechanical Eng.              | Secretaryship                    |
| Banking                               | Draughtsmanship            | Metallurgy                   | Shorthand & Typing               |
| Book-keeping                          | Eng. Drawing               | Motor Eng.                   | Short Story Writing              |
| Building                              | Export                     | Painting & Decorating        | Short Wave Radio                 |
| Business                              | Heating & Ventilation Eng. | Photography & Reproduction   | Sound Recording                  |
| Management                            | High Speed                 | P.M.G. Certs.                | Telecommunications               |
| Carpentry                             | Oil Engines                | Police                       | Television                       |
| Chemistry                             | Industrial Admin.          | Production Eng.              | Time & Motion                    |
| City & Guilds                         | Jig & Tool Design          | Production Planning          | Study                            |
| Civil Service Exams                   | Journalism                 | Radar                        | Tracing                          |
| Commercial                            | Art & Drawing              | Radio Amateurs (C&G) Licence | Welding                          |
| Commercial Subjects                   |                            | Radio & Television Servicing | Workshop Practice                |
| Commercial Art & Drawing              |                            |                              | Works Management and many others |

Also courses for GENERAL CERTIFICATE OF EDUCATION, A.M.I.H.&V.E., A.M.S.E., A.M.Brit.I.R.E., A.M.I.Mech.E., A.M.I.E.D., A.M.I.M.I., A.F.R.Ae.S., A.M.I.P.E., A.M.I.I.A., A.C.C.A., A.C.I.S., A.C.C.S., A.C.W.A., City & Guilds Examinations, R.T.E.B. Serv. Cert., R.S.A. Certificates, etc.



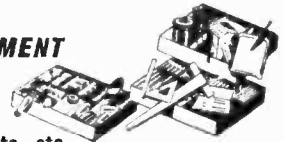
The E.M.I. Factories at Hayes, England.

The only Home Study College operated by a world-wide manufacturing organisation

# EMI INSTITUTES

## NEW! Courses with PRACTICAL EQUIPMENT

in RADIO · TELEVISION · MECHANICS CHEMISTRY · ELECTRICITY DRAUGHTSMANSHIP · PHOTOGRAPHY etc., etc.



COURSES FROM 15/- PER MONTH

POST THIS TODAY

# FREE

E.M.I. INSTITUTES, Dept. 32K, London, W.4

NAME \_\_\_\_\_ AGE \_\_\_\_\_  
(if under 21)

ADDRESS \_\_\_\_\_

Subject(s) with/without equipment \_\_\_\_\_

MAR./58 We shall not worry you with personal visits

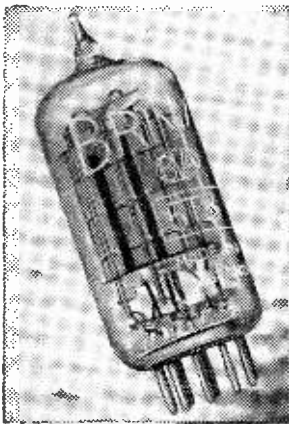
BLOCK CAPS PLEASE

IC 92

- Part of "His Master's Voice", Marconiophone, etc. etc.

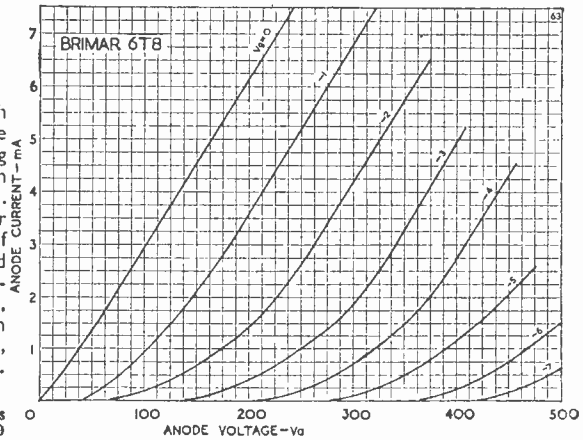
# BRIMAR 6T8

The Brimar 6T8 is a triple-diode triode in which one diode has a separate cathode. The triode section has a high amplification factor making the valve suitable for use in AM/FM receivers in the demodulation and first stage audio circuits. The diodes may be used in series shunt limiter circuits, for example, in the audio sections of



television and communications receivers, followed again by the triode, section for A.F. amplification.

Near Equivalents  
EABC80 DH719  
6AK8



### Typical Triode Operating Characteristics as an R.C. coupled amplifier.

Anode Supply Voltage	...	...	...	250	250 volts
Anode Load Resistor	...	...	...	0.25	0.25 megohm
Grid Resistor	...	...	...	1.0	10 megohms
Cathode Bias Resistor	...	...	...	3	0 kilohms
Peak Output Voltage	...	...	...	43	40 volts
Stage Gain (for 24 V peak to peak output)	...	...	...	42	42
Distortion (for 24 V peak to peak output)	...	...	...	1	5%

Keep this for further reference or write to the Publicity Department for a data sheet.

Standard Telephones and Cables Limited FOOTSCRAY, SIDCUP, KENT Footscray 3333

## SEE THESE FINE BARGAINS AT The Walk-around Shop

### ELECTRIC TIME SWITCH

Beautifully made, clockwork mechanism automatically wound by 6 volt Solenoid. The time switch can be set for any period between 30 minutes and 44 days. This robust unit is housed in strong Bakelite case, 4in. in diameter. ... 12s. 6d. *post paid*

### NEW TANNYO SPEAKERS

External 8 watt unit 7½ ohm impedance complete with matching transformer. ... £1 0 0 *plus 3/6 packing and carriage.*

### CRYSTAL MICROPHONE INSERTS

Suitable for connection directly into pick-up sockets of Radio or Gramophone Amplifier. No transformer required. Very sensitive. Guaranteed. ... 4s. 6d. *each, post paid.*

### F.M. RECEIVER ARR.3.

Frequency : 60 Mc's. Requires only a simple conversion to B.B.C. F.M. Transmissions. Valve Line Up : 1st RF 12SG7, 2nd RF 12SG7, Mixer 12SG7, Osc. 12SG7, 1st IF Amp. 12SG7, 2nd IF Amp. 12SG7, Limiter 12SG7, Det. 12H6, 1st AF Amp. 12SQ7, O.P. 12A6, 2 12SH7's AFC. Magic Eye 12U5G. ... £6 0 0 *plus 7/6 carriage.*

### MARCHING COMPASS

3in. x 2½in. x 7in. Ideal for scouts, hikers, etc. ... 12s. 6d. *plus 1/- postage and packing.*

### WALKIE-TALKIE TRANSMITTER/RECEIVER

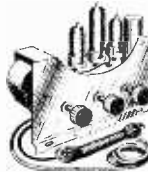
TYPE 38 Frequency 7.4 to 9 Mc's, valves with four VP23's and one ATP4. Brand new and complete, with two pairs of ear-phones, two throat microphones, whip aerial, junction box and canvas satchel. ... £3 5 0 *plus 5/- postage and packing.*

## PROOPS

BROS. LTD. When ordering, please quote Dept. 'P.'

52, Tottenham Court Road, London, W.1. LAN 0141 Shop hours : 9-6 p.m., Thursday, 9-1 p.m. Open all day Saturday

### 3-4 WATT GRAM AMPLIFIER



A three-valve quality amplifier designed to satisfy the more discriminating record enthusiasts. Three controls give a very wide variation of tone. Fully isolated chassis. Output matched for 2-3 ohms. Valves ECC83, EL84, EZ80. Size approx. 6½ in. x 5 in. x 2½ in.

PRICE 79/6 PLUS 2/6 POSTAGE

### SUPERIOR BUREAU

PRICE 16½ GNS. PLUS 25/- CARR.

In richly figured walnut veneer, internal panels in polished sycamore. Uncut control panel (16in. long x 10½in. high) alongside which is an uncut base-board (15½in. long x 13½in. back to front).



Inside front lid is panelled in beige leatherette. In the lower part of the cabinet are two storage cupboards (13½ in. high, 7½ in. wide, 16½ in. deep). Overall dimensions 33 in. high, 34 in. long, 16½ in. deep.

### LARGE SELECTION OF CABINETS

## SUPERIOR RADIO SUPPLIES

37, HILLSIDE, STONEBRIDGE, N.W.10. PHONE : ELGAR 3644.



# Open to Discussion



The Editor does not necessarily agree with opinions expressed by his correspondents

## Wavebands of P.C.R. Set

SIR,—In reply to inquiry by your reader, Mr. W. E. Rigg, Northern Rhodesia (January issue). The P.C.R. sets were made in two models. P.C.R.2, covering wavebands 13-49 metres, 200-600 metres and 800-2,100 metres and P.C.R.3 covering 12-41 metres, 41-120 metres and 200-560 metres. Valve line up: EF59 R.F. stage; X61 freq.-changer; EF39 1st L.F. stage; EF39 2nd L.F. stage; EBC33 det. and L.F. amp.; 6V6G output.

A separate power pack is required, with a 12-volt filament supply, as the valves are linked in pairs series-parallel. This can easily be converted to 6.3 operation, but is hardly worth the trouble, as 12-volt filament transformers are obtainable. I have two of these P.C.R. sets in use, made by the Invicta Radio Co. and have received signals from Newfoundland, Canada, most districts of the U.S.A., including W.6's, Panama, Bahamas and West Indies, South America, Persian Gulf, all Mediterranean countries, Johannesburg, Cape Town, Rhodesia on the 15 and 20 metres ham bands, all at full L.S. strength. The 13, 16, 19, 25, 31 and 41 bring in world-wide stations like the local; in fact you would have a job to beat this set for general all-round short-wave work.—J. A. LAWTON (Southport).

## Peculiar Faults

SIR,—Some time ago you reported one or two peculiar faults which had been experienced by readers, and I should like to add to these with one of my own experiences. It does serve as a reminder that you cannot be too sure, and even the most careful tests may not reveal a fault. I must say that when cases such as that to be described occur in commercial sets, I do feel pity for the poor service engineer. A set which I was using suddenly developed the peculiarity of crackling, for no apparent reason, at odd times. Sometimes it went for days on end without any trouble, then it would start crackling. I listened carefully and it was not due to any microphonic trouble, so I decided I would have to have it down. I removed it from the cabinet, went over all the wiring, and there were no bad joints or loose connections, so I blew out all the dust and replaced it. Everything was all right for about two days, then a fit of crackling again. I stuck it for a week or so, then removed all the valves,

carefully cleaned each pin with emery-cloth but still the crackling went on. I next took out the set and carefully cleaned the switches with special cleaner bought for the occasion, and still it crackled. The reason was discovered quite by accident. I was listening to a programme, and the wife got up to answer the door and as she walked across the room the crackling started, only to cease when she had gone out. Eventually I found that the power point on the floor into which the set was plugged was the cause of the trouble. The switch was

of the surface mounting type with small brass tubular pieces inside, through which the mains lead was passed and then held in place by a small setscrew. The tubular piece was attached to a strip of brass which made contact with the forked piece into

which the switch blade locked. The small tubular piece had come away from the brass strip. The mains wire held it in place, but vibration resulted in it making and breaking, hence the crackle. Apparently passing traffic was sufficient to produce vibration and cause the crackling. A new switch cured the trouble. H. G. WATTS (N.W.).

## A C.R.L. Bridge

SIR,—Many readers may be wondering why Mr. J. Hillman's C.R.L. Bridge (January issue) fails to work.

It can soon be put right by moving resistors and condensers around.

I suggest the following:

- |                            |                               |
|----------------------------|-------------------------------|
| R1—4.7 K $\Omega$          | R16—10 Meg $\Omega$ precision |
| R2—47K $\Omega$            | R17—1K $\Omega$               |
| R3—1K $\Omega$             |                               |
| R4—100K $\Omega$           | C1—8 $\mu$ F 350v.w.          |
| R5—10 $\Omega$             | C2—.001 $\mu$ F               |
| R6—10K $\Omega$            | C3—.001 $\mu$ F               |
| R7—2 Meg $\Omega$          | C4—.1 $\mu$ F                 |
| R8—1 Meg $\Omega$          | C5—.1 $\mu$ F                 |
| R9—1 Meg $\Omega$          | C6—8 $\mu$ F 350v.w.          |
| R10—7.5 K 10 W             | C7—100pF pre.                 |
| R12—10 $\Omega$ precision  | C8—.001 $\mu$ F pre.          |
| R13—100 $\Omega$ precision | C9—.01 $\mu$ F pre.           |
| R14—10K $\Omega$ precision | C10—.1 $\mu$ F                |
| R15—1 Meg $\Omega$         | C11—.1 $\mu$ F                |

One other small point: he states that to use a 6J5 instead of one half of 6SN7 is inconvenient due to its top cap grid. All 6J5s that I have used are single ended (all base connections). The bridge was completed in quite a short time, and is very good. The valves used in mine—6SN7,

Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying commercial or surplus equipment. We cannot supply alternative details for receivers described in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. If a postal reply is required a stamped and addressed envelope must be enclosed with the coupon from page iii of cover.

6J5 and a UU6 (4v. rectifier).—B. E. C. LAVENDER (G3KAQ) (Emsworth).

#### P.W. Organ—Correspondent Wanted

**SIR**,—I am a regular reader of P.W. and I have been building radio sets since the early twenties. I have now built the Mullard 20-watt quality amplifier, and I am interested in building an electronic organ for myself. I have your blue print for the monophonic organ, but I would like to get in touch with someone who has built a polyphonic one. I see references from time to time in P.W. to various parts and improvements, but only the names of correspondents are given. I should like to get in touch with someone who has built the P.W. organ who would be prepared to pass on any hints.—D. J. JONES (Pwllheli).

#### Restrictive Practices

**SIR**,—I was most interested in the Editor's comments in the February issue, and should like to ask one or two pertinent questions of manufacturers. Valves are repeatedly advertised in your pages at below cost. I have bought many from time to time, and although some have been proprietary makes and boxed, I have also had from time to time unboxed (or plain boxed) valves, on which the type number is engraved in a different way from standard valves, and no maker's name appears. They are obviously brand new, and are on a parallel with the "non-ring" lamps as they are called which can be obtained from the popular stores. I have been told that they are standard valves and lamps made by one of the big manufacturers, but sold outside a contract by the "ring."—H. PENN (Edgware).

#### Tag Boards

**SIR**,—I should like to ask readers how they have found the use of tag strips and tag boards in their general application. I always wire components direct between the parts of a circuit, in the case of valveholders actually mounting condensers and resistors direct on the valveholder tags. It always seems to me to be wrong in principle to mount all components on one board and then use long leads to hook them up. Am I alone in this idea?—T. R. YOUALL (Wembley).

#### Fault Finding—a Hint

**SIR**,—I should like to pass on a hint to other readers who are interested in fault finding and may fall into the same trap as I did. I have in my den a number of various lengths of flexible lead, with crocodile clips at each end. I use these a lot in experimental work, and recently was experiencing very bad hum on an experimental layout, which took up a lot of room on the bench. In trying to locate the source of the hum I clipped on a longish lead to an earth point and clipped the other end on various parts of the circuit, hoping by this means to find where the hum was entering the circuit. I got right back to the beginning of the circuit without stopping the hum, and realised that there was something wrong with my diagnosis. I did eventually stop the hum about one-third of the way through the circuit, but with a 5in. lead used in the same way. The long lead was picking up as much hum as

the circuit being checked, and it was not until I used a short earth from one point in the circuit that the hum stopped and the cause was thus traced. Moral, don't use long leads!—G. PRENTICE (Exeter).

#### Beginners' Constructional Course

**SIR**,—I should like to extend my appreciation of the recent series of articles under the above title. I started and built each one and have read in conjunction with it the beginners series when recently published and which I now have in book form. I should now very much like to go a stage further and start on valves, and should like to suggest that it would be very useful if you could arrange to publish a series on the same lines but dealing with valves. I am sure this would appeal to many readers, and it could be made so that it was not too elementary.—J. RINGELY (Finchley, N.).

*[Arrangements have been made to publish a series of articles on the lines mentioned, and we hope to publish the first of these in next month's issue.—Ed.]*

#### A TRANSISTORISED SIGNAL GENERATOR

*(Continued from page 30)*

reduce capacity effects. The R.F. oscillator coil is mounted vertically, a hole of just under  $\frac{1}{2}$ in. diameter being drilled in the board and the Ferrite rod forced through. The leads from the coil to various components should be as short as possible.

The general layout apart from the points mentioned depends on the experimenter. Note: Care must be exercised when soldering the transistor into place as too much heat will damage the germanium.

#### Testing and Calibrating

Before switching on care must be exercised to ensure the correct polarity of the batteries. Damage to the transistors will result if incorrect. Current drain from the 9-volt battery is of the order of 2 to 3 mA and that of the 1.5-volt battery is 0.5 to 1 mA with both transistors switched on.

If no standard signal generator is available to the experimenter calibration can be carried out using a broadcast receiver set to medium wave.

The output of the generator is connected to the aerial and earth terminals of the receiver. Switch on and set "C/W/MOD" switch to "MOD," thus modulating the carrier. If the generator tuning is now rotated a 400 c/s note will be heard on the receiver. Set receiver tuning to 300 metres (1 Mc/s), set generator "HI-LOW" switch to "HI" and rotate tuning slowly until the 400 c/s note is heard. There may be several 400 c/s notes at different settings of the dial, tune for maximum audio output and mark dial 1 Mc/s. Set receiver to 600 metres and tune for maximum sound, "HI-LOW" to "LOW," this will give calibration at 500 Kc/s. The table on p. 30 will give direct conversion from wavelength to frequency. The generator should be calibrated at each of these points.

# REPANCO

## HIGH GAIN TRANSISTOR COMPONENTS

### STANDARD RANGE

**Ferrite Slab Aerials Type FS2.** Designed for Long and Medium Wave reception with transistor portable superhet receivers. Slab size 5½ in. x ¾ in. x 5/32 in. Complete with fixing brackets, 13/6. **Combined Oscillator and 1st I.F. transformer Type OT1.** 13/16 in. sq. x 1½ in. I.F. Frequency 315 Kc/s. 11/6. **2nd I.F. Transformer (315 Kc/s.) Type TT2.** 5/-. **3rd I.F. Transformer (315 Kc/s.) Type TT3.** 5/-. I.F. Transformers enclosed in iron dust pots with slug tuning. **Push Pull Interstage Transformer Type TT4.** Ratio 1 : 1 C.T. Stack size 1½ in. x 1 1/16 in. x 7/16 in., 8/6. **Push Pull Output Transformer Type TT5.** Ratio 15 : 1 C.T. Size as TT4. Matched to 3 ohm speaker, 8/-.

### MINIATURE RANGE.—For pocket receivers.

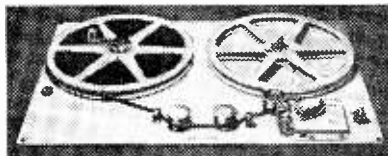
**Ferrite Slab Aerial Type FS3.** Medium Wave only. With fixing grommets. Size 3 in. x ¾ in. x 5/32 in., 7/6. **Oscillator Coil Type XO8.** Medium Wave only. Overall size ¾ in. dia x 1 in. Enclosed in Ferrite pots, 5/-. **I.F. Transformer Type XT6.** Suitable for 1st and 2nd I.F. 455 Kc/s. Size ¾ in. sq. x 11/16 in., 10/-. **I.F. Transformer Type XT7.** Designed for 3rd I.F.T. or detector I.F.T. 455 Kc/s. Size as XT6, 10/-. **Push Pull Interstage Transformer Type TT9.** Ratio 1 : 1 C.T. Radiometal Core. Size ¾ in. x ¾ in. x 13/32 in., 12/6. **Push Pull Output Transformer Type TT10.** Ratio 8 : 1 C.T. Matched to 3 ohm speaker. Size as TT9, 12/6. Practical and Theoretical circuits enclosed with each Repanco Transistor Component.

**JUST RELEASED. "THE MINI-7"** a new personal portable transistor receiver. Size 5½ in. x 3½ in. x 1½ in. Send 1/9 P.O. for instructions.

Mail Order and Trade:  
**RADIO EXPERIMENTAL PRODUCTS, LTD.**  
33 Much Park St.  
COVENTRY  
Tel.: 62572

Wholesale Enquiries and Export:  
**REPANCO, LTD.**  
O'Brien's Buildings  
203-269, Foleshill Rd.  
COVENTRY  
Tel.: 40594

## "ASPDEN" TAPE RECORDER KITS



**TAPE DECKS.** 2-speed, twin track, easy to assemble kits with finest motor. Ferroxcube heads and full instructions.

MODEL 582 for 5in. spools, kit £8.5.0.

MODEL 782 for 7in. spools, kit £9.5.0.

Either model assembled and tested, 30/- extra.

**AMPLIFIER kit,** 2½ watt, record replay, 2 recording positions, neon indicator, etc., £5.18.0. Power pack kit for above, £2.18.6 (both without valves). Carr. and packing extra.

### YOU CAN BUILD A QUALITY TAPE RECORDER

R.C.W. of Co. Durham writes:—

"... I have been using this equipment very successfully for some months now. Many people who have heard it have been staggered that such quality can be obtained for such a low price."

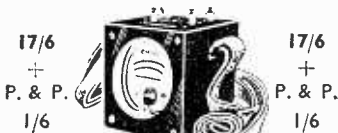
This tape deck and amplifier is being used in the Antarctic by an Expedition member.

Send stamp for full particulars to:—

**W. S. ASPDEN** Stanley Works, Back Clevedon Rd., BLACKPOOL, Lancs.

## GRAND SCOOP!

### EX.-W.D. TEST METERS



Reading:

- 0—1.5 volts
- 0—300 volts
- 0—60 milliamps
- 0—5,000Ω

In strong bakelite case. 3½ in. x 3½ in. x 2½ in. with carrying strap. Immediate Delivery.

### W. B. SUPPLIES

Mail Order Dept.

22, Swan St., Manchester, 4

## CHASSIS

### UNDRILLED ALUMINIUM CHASSIS

4 Sided Chassis	ca.
7in. x 4in. x 1½ in....	4/3
9in. x 6in. x 1½ in....	5/6
10in. x 6½ in. x 2in....	6/6
12in. x 8in. x 2½ in....	8/-
11in. x 7in. x 1½ in....	6/6
10in. x 8in. x 2½ in....	7/-
16½ in. x 8½ in. x 2½ in.	9/-
2 Sided Only	
7in. x 4in. x 2in. ....	3/-
9in. x 6in. x 2in. ....	4/-
10in. x 5½ in. x 2in....	4/3
10in. x 8in. x 2½ in....	4/9
16½ in. x 8½ in. x 2½ in.	6/9

One minute hole punches and screw-up type hole punches available from ¼ in. dia. to 2in. dia. in ¼ in. steps. Send for price list. Postage and packing charged extra 1/9. Send sketch of your requirements for prices by return to:

### Oliver & Randall

LIMITED

53 Perry Hill, London

S.E.6

## THE BARGAIN OF THE YEAR



### BERIC (EVER-READY) BATTERY RADIO

4 Mullard Valves

MW 200-550 m SW 20-75 m

Brand New in Sealed Cartons.

BELOW COST £5.19.6

While they last.

### CASH ONLY CARRIAGE PAID

Cancelled Export Order.

Not a kit. A factory built Super-sensitive All Dry Battery Receiver.

Uses Ever Ready B136 or B103 obtainable everywhere.

### H. P. RADIO SERVICES LTD.,

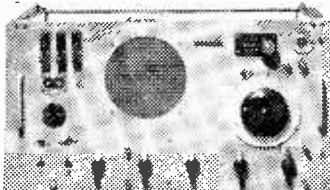
51, County Road, LIVERPOOL, 4.

Tel.: AINtree 1445. TELEX 62-244

Established 1935

## SPUTNIK SPECIAL

SHORT-WAVE RECEIVER 10-60 Mc/s (5-30 Metres)  
RECEPTION SET TYPE 208



Complete with 6 valves, 2-6K8G, 2-EF39, 6Q7G and 6V6G. Internal mains power pack and 6 v. vibrator pack. Built-in 6" speaker. Multi-head slow-motion drive. R.F.O. and R.F. stage. Provision for Phones and Muting and 600 ohm. Input 100-250 v. A.C. and 6 v. D.C. Size 24 x 18 x 12. Weight 70 lbs. In metal transit case. All sets in new condition and air tested.

£6. 19. 6. Carr. 15 6d.

BE PREPARED TO LISTEN TO THE SATELLITES

## "TRANSISTOR-8"

Push-Pull Portable Superbet  
Can be built for £11/10/-

This Portable 8 Transistor Superbet is tunable for both Medium and Long Waves and is comparable in performance to any equivalent Commercial Transistor Set. Simplified construction enables this set to be built easily and quickly into an attractive lightweight cabinet supplied.

Send for circuit diagrams, assembly data, illustrations and instructions, and full shopping list. 3d. in stamps.

We can supply all these items including Cabinet for £11/10/- All parts sold separately.

## "EAVESDROPPER"

THREE TRANSISTOR POCKET RADIO  
(No Aerial or Earth required)

Variable Tuning. Total cost, as specified including Transistors, Transformers, Coils, Condensers and Battery, etc., with circuit and plastic case.

77/6 POST FREE.

All items sold separately. With Balanced Armature, 81/- . With Acos Mike, 90/- . With Min. Hearing Aid, 90/- .

## MINI-TWO

TWO-TRANSISTOR MINIATURE POCKET RADIO

The smallest Transistor set offered on the market. Variable Tuning. Drilled Chassis, Plastic Case size 3in. x 2in. x 1in. Miniature Hearing Aid, 2 Transistors; and all components including 1 1/2 volt Battery, Circuits and full practical layout diagrams. All items sold separately.

Total Cost 49/6 Complete

"HOMELIGHT" 2-TRANSISTOR PERSONAL PORTABLE  
Variable Tuning

We can supply all components including 2 Transistors, Diode, Resistors, Condensers and Miniature Hearing Aid and Plastic Case size 4 1/2 x 2 1/2 x 1 1/2 in. and 1 1/2 v. Battery. FOR 52/6 All items sold separately.

TRIPLETT A.C./D.C. POCKET TEST-METER TYPE 68811  
15 Ranges, 1,000 ohm p.volt.

A.C./D.C. 10/50 250/1,000/5,000 volts.  
Milliamps, 0-10 100-500 m.a.  
Ohms, 0-300/250,000 ohms.

£5/10/-

In new condition with Prods and Internal Battery.

U.S.A. TESTMETER TYPE "834-S"  
A.C./D.C. 15-RANGES F.S.D. 1,000 o.d.v.

A.C./D.C. Volts, 12/60/300/600 v. 1,200 6,000 v.  
Milliamps, 1.2/12 60/600 m.a.  
Ohms, 0-5,000/5 meg.

£6/19/6

Complete in wooden carrying case with leads and internal batteries.

SEND STAMPS FOR NEW 1958 28-PAGE CATALOGUE  
OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock.

# HENRY'S RADIO LTD.

5 HARROW ROAD, EDGWARE ROAD, LONDON, W.2  
TEL.: PADDINGTON 1008-9

# EXPRESS ELECTRONICS

## ROSEDENE LABORATORIES

### KINGSWOOD WAY, SELSDON, SURREY

### VALVES NEW, TESTED AND GUARANTEED

IAC6	8/6	6BR7	10/6	12AU7	7/6	E8F80	9/6	N17	7/6
ICI	7/6	6BW6	7/6	12AX7	8/-	ECC35	7/6	N18	7/6
IC2	8/6	6BW7	8/-	12K7GT	8/-	ECC81	8/6	N19	7/6
IC3	9/6	6CH6	7/-	12K8GT	12/6	ECC82	7/6	PCC84	9/-
IF1	8/6	6C10	9/-	12Q7GT	8/-	ECC83	8/6	PCF80	10/6
IF3	7/6	6D1	1/6	25L6GT	8/6	ECC84	10/6	PCF82	10/6
IFD1	8/6	6D2	6/9	25Z4G	8/6	ECC80	10/6	PL82	9/-
IFD9	7/6	6F12	6/-	35L6GT	8/6	ECC82	10/6	PY81	8/-
IP1	9/-	6F15	9/-	35W4	8/6	ECH42	10/-	PZ30	17/6
IP10	7/6	6J5G	5/6	35Z4GT	8/-	ECH81	8/-	U52	8/6
IP11	7/6	6K7G	5/6	5763	10/6	ECL80	8/6	U76	8/-
IR5	7/6	6K8GT	9/6	D77	6/9	EF37A	9/-	U78	7/-
IT4	7/6	6L6G	10/6	DAF91	7/6	EF39	5/-	UBC41	8/6
IS5	7/6	6Q7GT	9/-	DF91	7/6	EF41	9/-	UCH42	8/6
IUS	7/-	6SA7	8/-	DP96	8/6	EF80	8/6	UF41	8/6
3Q4	7/6	6SL7GT	7/6	DH76	8/-	EF91	6/-	UL41	8/6
354	7/6	6SN7GT	8/-	DH77	7/6	EF92	5/6	UY41	7/6
3V4	7/6	6V6G	7/6	DH142	8/6	EL37	19/6	W76	8/6
5U4G	8/6	6V6GT	7/6	DH150	10/-	EL38	20/-	W77	5/6
5Y4G	7/-	6X4	7/-	DK91	7/6	EL41	10/-	W142	8/6
5Z4G	9/6	6X5GT	6/6	DK92	8/6	EL51	12/6	X17	7/6
6AL5	6/9	7S7	8/6	DK96	9/-	EZ35	6/6	X18	8/6
6AM6	6/-	8D3	6/-	EA50	1/6	EZ40	8/-	X142	6/6
6AT6	7/6	12AH9	10/6	EABC80	8/6	EZ80	8/-	X150	10/-
6BA6	7/6	12AT6	8/6	EB91	6/9	KT33C	8/5	Z77	7/6
6BE5	8/-	12AT7	8/6	EBC41	10/-	KT66	11/-	ZD17	6/6

### MATCHED PAIRS

EL84 23/-, 6V6G and GT 17/-, 6BV6 18/- per pair.

### SETS OF VALVES

DK91, DF91, DAF91, DL92 or DL94	27/6
IR5, IT4, IS5, 354 or 3V4	27/6
6K8, 6K7, 6Q7, 6V6, 5Z4G	35/-
12K8, 12K7, 12Q7, 35L6, 35Z4	35/-

Postage and packing, 6d. Over £1 post free. C.O.D. 2/6.

# FREE TO AMBITIOUS ENGINEERS!

This 148-page Book

Have you sent for your copy?



### 'ENGINEERING OPPORTUNITIES'

is a highly informative guide to the best-paid Engineering posts. It tells you how you can quickly prepare at home on "NO PASS—NO FEE" terms for a recognised engineering qualification, outlines the widest range of modern Home-Study Courses in all branches of Engineering and explains the benefits of our Employment Dept. If you're earning less than £20 a week you cannot afford to miss reading this unique book. Send for your copy to-day—FREE.

### WHICH IS YOUR PET SUBJECT?

Mechanical Eng.  
Electrical Eng.  
Civil Engineering  
Radio Engineering  
Automobile Eng.  
Aeronautical Eng.  
Production Eng.  
Building, Plastics,  
Draughtsmanship,  
Television, etc.

GET SOME LETTERS AFTER YOUR NAME!

A.M.I.Mech.E.  
A.M.I.C.E.  
A.M.I.P.E.  
A.M.I.M.I.  
L.I.O.B.  
A.F.R.Ae.S.  
B.Sc.  
A.M.Brit.I.R.E.  
CITY & GUILDS  
GEN. CERT.  
OF EDUCATION  
etc., etc.

--- FREE COUPON ---  
Please send me your FREE 148-page "ENGINEERING OPPORTUNITIES"

NAME .....  
ADDRESS .....

Subject or Exam. that interests me.....  
British Institute of Engineering Technology  
409B, College House, 29-31, Wright's Lane,  
Kensington, W.8.

# BIET

# News from the Trade

## K.B. PLASTIC COVER

A NEAT transparent plastic cover for the K.B. "Rhapsody" portable radio is now being supplied with each new set leaving the Footscray, Kent, factory.

The cover is being introduced not only for protection after purchase, but also to guard the highly polished injection moulded cabinet during factory assembly and delivery to dealers.

A K.B. official said this week that although the covers could not be supplied free to dealers for issue with existing stocks, they would be available as a separate item for sale to present "Rhapsody" owners. — Kolster-Brandes Ltd., Cray Works, Footscray, Sidcup, Kent.

## NEW THREE-IN-ONE BEAM AERIAL

AMATEUR radio enthusiasts have long worked to perfect the quality of their signal transmission and reception. A beam aerial for home-assembly was recently introduced by the Panda Radio Company of Rochdale, Lancashire.

Known as the "Globemaster Minibeam," this new piece of apparatus, which was designed to provide high-gain directional antennae for the three amateur wavebands, was invented by Capt. G. A. Bird. It employs a simple lightweight array or aerials which, together with a unique method of feed, permits of transmission on three wavebands—10, 15 and 20 metres—eliminating the necessity of tuning or switching. The array is easily erected and requires no elaborate supporting tower and does away with the need for complex arrays. A single feed line to the trans-

wavelength required, and to the transmitting amateur concerned with 10, 15 and 20 metres this often results in cumbersome structures, difficult to rotate, and weighing as much as 500lb. for the more complex arrays.

In order to overcome structural problems created by a wide range of climatic conditions in various parts of the world, high-tensile aluminium alloys supplied by Northern Aluminium Company Limited were specified for the "Globemaster Minibeam." Noral 51SWP tubing is used for the boom and elements and Noral 350W for the clamps. A complete array weighs only 35lb., and the manufacturers claim that it can withstand the worst weather conditions.

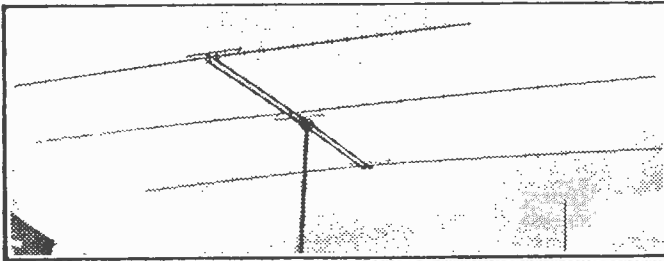
The gain on 10 metres is 9.5db., on 15 metres 7.5db., and on 20 metres 4.5db., over a simple dipole. Expressed as power, this is equivalent to a power gain of 9 on 10 metres, 5.6 on 15 metres and 2.8 on 20 metres. The front to back ratio is 20-30db. To the transmitting amateur in this country, restricted to an input of 150 watts, the use of the beam gives an equivalent power of 1,350 watts on 10 metres, 840 watts on 15 metres and 420 watts on 20 metres if only a simple dipole is used.

## NEW MINIATURE BEAM POWER VALVE

THE 6973 is a beam power tube of the 9-pin miniature type designed for use as an output tube in high-fidelity audio equipment.

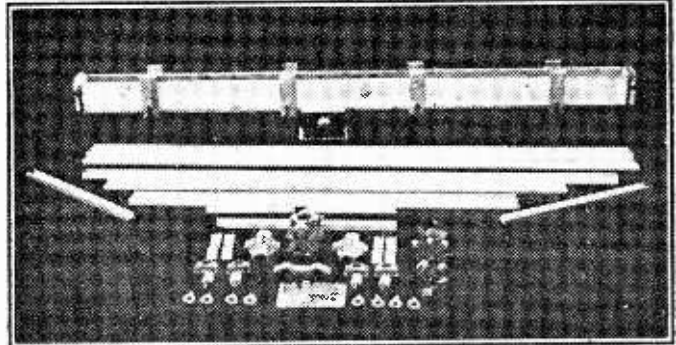
The 6973 features linear operation over a wide range of power, higher power sensitivity, and high stability. These features in addition to low heater power (6.3 volts at 450 milliamperes) permit the design of compact, relatively low-cost audio equipment where high output voltage with low harmonic distortion is a primary consideration.

For example, in push-pull class AB1 audio, two 6973s operating at a plate voltage of 350 volts, grid No. 2 voltage of 280 volts, and fixed grid No. 1 voltage of -22 volts, can



mitter is used on all three bands and no adjustment to the aerial is required when changing from band to band. The performance on each band is equal in every way to that of a comparable single band beam.

The benefits of the ordinary beam aerial are well known—its ability to concentrate a signal in the required direction, to give similar gain on reception and to reject signals from an unwanted quarter—but its drawback is that a separate aerial is required for each waveband used. The physical size of the beam aerial is determined by the



The complete set of parts for constructing the aerial shown above  
This is the "Globemaster Minibeam."

deliver a maximum-signal power output of 20 watts with a total harmonic distortion of only 1.5 per cent.

Design features of this valve include double base-pin connections for both grid No. 1 and grid No. 2 to provide cool operation of these grids and thus to minimise grid emission. Furthermore, cool operation of both grids permits use of relatively high values of grid-circuit resistance to reduce driving power.

During manufacture, close controls for dynamic zero-bias plate current, plate-current cutoff, grid No. 2 current, and grid emission ensure dependable performance of the 6973 in high-fidelity audio equipment.—R.C.A. Gt. Britain Ltd., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex.

### TRANSISTOR TRANSFORMERS

THE great interest shown in the various uses of transistors during recent months has resulted in a demand for suitable transformers for incorporation in factory-built and home constructed equipment.

For nearly 35 years Messrs. H. W. Forrest have designed and manufactured transformers for the radio, electrical and television industry and have now produced a complete range of transformers from 200 mW to 20 W rating.

These cover all the popular transistor types at present obtainable and further designs will be added from time to time.—H. W. Forrest (Transformers) Ltd., Shirley, Solihull, Warwickshire.

### NEW RECTANGULAR SPEAKER

IN instances where television, radio and gramophone cabinet space is severely restricted it has been considered good practice to employ an elliptical loudspeaker. This arrangement has been generally satisfactory, but the fullest use has not been made of the loudspeaker panel area.

To meet this requirement The Plessey Co., Ltd.,



The new Plessey 9 x 4 in. rectangular loudspeaker, which is ideal for use in table gramophones, car radios, table television sets and A.M./F.M. receivers.

has now introduced a new 9in X 4in. rectangular-shaped loudspeaker, which provides considerably improved high efficiency and firm low-frequency performance. Moreover, it has extremely good power handling ability.

It can be supplied with alternative cones made from different qualities of materials to give a varied high note response to suit customers' specific requirements. The standard cone has a smooth extended high note characteristic.

This speaker is ideal for use in table gramo-

phones, car radios, table television sets and A.M./F.M. receivers, for which quality of reproduction above average is desired. The ½in. voice coil can be supplied with any of the Plessey ½in. range of magnets from 7,000 to 12,000 gauss.—The Plessey Co., Ltd., Ilford, Essex.

### JACKSON BROS. (LONDON) LTD.

THERE have been certain alterations to some of the J. & B. range of products. These are as follows:

Dilecon Condensers: capacities from .0001 to .0005, price now 4s. 6d.; .00075, price now 5s.

Jackson Bros. range of ball drives are now available with a flange for use for scale or pointer mounting. Part No. 4511/F.

The S.L.16 Drive, Cat. No. 5191, will in future be supplied complete with escutcheon and glass 6½in. X 1½in. opening, 7¼in. X 2¾in. overall. The escutcheon will be provided in Florentine bronze finish. Retail price 13s. each, complete.

The Jackson Type OPC 2 gang condenser, Cat. No. 5250/2/PC, has the following specification: Stator terminals and earthing tags for frame and rotor are formed to provide resilient plug in mounting, for use in printed circuit technique. Provides instantaneous and accurate location which retains the component firmly until soldering is completed, no tags or wires to bend or clench. Resilient stator tags make it possible to unsolder and remove if necessary. Trimmers are provided as standard (2-25 pF). Specification otherwise same as for "O" gang.—Jackson Bros. (London), Ltd., Kingsway, Waddon, Surrey.

### CLIP-ON CABLE MARKERS

THE most recent addition to Creators range of identification systems is the "Clip Marker." This, as its name implies, is a plastic moulding which is designed to clip on to a cable. It is provided with interchangeable paper or plastic shields which can be supplied either pre-printed or blank so that the user can write or print his own code on to them. The standard clip marker can be used anywhere along the length of a cable but an alternative design is available which can be pushed on to the end of a cable. This type also acts as a binding sleeve.

Both types of marker are available in a wide range of colours and sizes. Cables can thus be colour coded by this means as well.

The two types of clip marker have been designed to overcome some of the disadvantages of the more usual type of identification sleeve, which are that a wiring system cannot be coded *in situ* and that once it has been coded that coding cannot be changed without dismantling the whole layout.—Creators Ltd., Plansel Works, Sheerwater, Woking, Surrey.

### A NEW HANDBOOK RADIO CONTROLLED MODELS

By F. J. CANN

Price 12/6, by post 13/4d.

From

GEORGE NEWNES, LTD.,

Tower House, Southampton Street, Strand, W.C.2

# Best Buy at Britain's

**AMERICAN MULTIMETERS.** by Precision. U.S.A. 400 micro-amps basic. A.C. and D.C. volts to 6,000 D.C., milliamps to 600, Ohms to 5 megs., 20 ranges in all. In polished wooden case. 7 1/2 x 5 1/2. Complete with leads, batteries and instructions. Tested and guaranteed. **£6 19 6.**

**AVOMETERS.**—34 range Universal meter, for A.C. and D.C. volts, A.C. and D.C. current and Ohms. Large easy-to-read 5 in. mirror scale, B.S.I. standard. Complete with batteries and guaranteed in first-class working order. **£8 19 6.** P. & P. 4/-.

**AVO BRIDGES.**—Measures capacity to 50 mfd., resistance to 50 megohms, meter indicates balance, and reads 0.1 to 15 v. as valve voltmeter. Leakage test and power factor scale. Full instructions. Tested and guaranteed. A.C. mains operation. **£7 19 6.**

**MULLARD GV4140 1 C. & R. BRIDGES.**—0.1 Ohm to 10 Meg-ohms in 4 ranges : 10 pfd. to 10 mfd. in 3 ranges. For 50 c/s A.C. mains. In perfect working order. **£7 10/-.** P. & P. 3/6.

**W.F. M446ERS.**—0 to 50 Megohms at 500 v. BRAND NEW in leather case. With leads and instructions. **£12 10/-.** Ditto, but 100 v. **£6 10/-.**

**MINIATURE 373 LF. STRIPS.**—For F.M. tuner described in April and May P.W. Complete with 3 of EF81, 2 of EF82 and EB91. A fresh release enables us to offer these once again. BRAND NEW, with circuit. **42 6.** OR less valves, **12 6.** Post either, 2 6.

**SPEAKERS.**—3 Ohms, 6 1/2 in. diam. In grey wrinkled steel cabinet. 9 x 9 x 5 in. Complete with volume control and transformer for 600 Ohms line. Brand new. **27 6.** P. & P. 3/6.

**VIBRATOR PACK.**—Input 6 v. D.C. Output approx. 100 v. at 10 mAmps. D.C. Fully smoothed and R.F. filtered. Size 6 1/2 x 5 x 2 in. Fitted with Mallory 629C vibrator. BRAND NEW. **12/6.**

**VIBRATOR PACK.**—Input 6 v. D.C. Output 200 v. D.C. 100 mAmps Fully smoothed and R.F. filtered. Size 9 x 5 x 6 1/2 in. Complete with 024 and vibrator. Brand new. **25/-.**

**MAINS ISOLATING TRANSFORMERS (Vortexion).**—For testing A.C. D.C. sets in safety. 230 v. input, output 230 v. 100 watts. **22/6.** P. & P. 2/6.

**MAINS TRANSFORMERS.**—Input 200-250 v. A.C. Outputs 275-0-275 v. 100 mAmps ; 8.3 v. 7 Amps ; 5 v. 3 Amps. (Govt. rating.) 4 x 4 1/2 x 4 in. high. Upright mtg. Brand new. **25/-.** P. & P. 2/6.

**R.C.A. OUTPUT TRANSFORMERS.**—Pri. push-pull 6L6s. Secs. 600 Ohms, tapped at 15, 7.5 and 5 Ohms. Tertiary winding for NFB. Handles 20 Watts. Potted. Circuit of R.C.A. amplifier supplied FREE. Brand new. **27/6.**

**AVONINOR LEATHER CASES.**—Brand new, with strap. **7 6.**  
**PLEASE ADD POSTAGE OR CARRIAGE ON ALL ITEMS**  
**CHARLES BRITAIN (RADIO) LTD.**  
 11 Upper Saint Martin's Lane, London, W.C.2  
 TEMple Bar 0545  
 Shop hours 9-6 p.m. (9-1 p.m. Thursday). Open All Day Saturday

# ADCOLA

PROUDLY LISTED  
(Regd. Trade Mark)

## SOLDERING EQUIPMENT

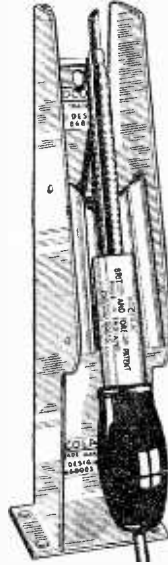
### ILLUSTRATED

3/16" Detachable bit type (List No. 64)

Protective Shield (List No. 68)

Catalogues sent FREE

Telephones :  
 MACaulay 4272 & 3101



British and Foreign Pats.

Reg. Designs, etc.

Head Office, Sales :

**ADCOLA PRODUCTS LTD.**

Gauden Road, Clapham High St., London, S.W.4

## COPPER WIRE

ENAMELLED, TINNED, LITZ, COTTON AND SILK COVERED. RESISTANCE WIRES. 1 oz., 2 oz. & 4 oz. REELS. All gauges available. B.A. SCREWS, NUTS, WASHERS, soldering tags, eyelets and rivets. EBONITE AND BAKELITE PANELS. TUFNOL ROD. PAXOLIN TYPE COIL FORMERS AND TUBES. ALL DIAMETERS. Latest Radio Publications. SEND STAMP FOR LISTS.

## SPECIAL OFFER

G.E.C., B.T.H. & WESTINGHOUSE GERMANIUM CRYSTAL DIODES

1/- each. Postage 3d. Diagrams and three Crystal Set Circuits Free with each diode. A large purchase of these fully GUARANTEED diodes from the manufacturers enables us to make this attractive offer.

**CRYSTAL SET** INCORPORATING THE SILICON CRYSTAL VALVE. Adjustable Iron Cored Coil. **RECEPTION GUARANTEED** Polished wood cabinet, 15/-, post 1/6. A REAL CRYSTAL SET, NOT A TOY

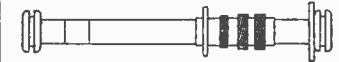
**POST RADIO SUPPLIES**  
 33 Bourne Gardens, London, E.4

## TELETRON TYPE FX. 25



Self-tuned, Dual-wave Ferrite Rod Aerial, 15/- each.

Designed for use in pocket Transistor receivers. Descriptive folder with circuit-component layout, and wiring instructions for a three-Transistor regenerative receiver. Price 6d. NO aerial, earth or tuning condenser required. Operates speaker from 3 Penlight cells. All parts, including cabinet and chassis, available from component stockists.



Miniature Transistor IFTs & Osc coil for 315 kc/s, 6/6 ea. FRM/2 Transistor Ferrite Rod Aerial, 10/- Available from component stockists. Stamp for complete lists and circuits.

**THE TELETRON Co. Ltd.**  
 266 Nightingale Rd., London N.9  
 HOW 2527

## ORDER YOURS NOW!

THE **SOUND 777** TAPE RECORDER  
 ... is in great demand



The most compact, lightweight and small, 3-speed tape recorder with simple push-button automatic controls. Up to 3 hours' playing time possible. The Sound 777 incorporates the latest Collaro Mark IV tape transistor with digital footage indicator, pause control and instantaneous track reversal. Piezo-electric desk microphone. £2.15.0. optional extra.

Cash Price, 40 gns.  
 Credit Sale Deposit, 93/4.  
 and 8 monthly payments of 104/6.  
 (Delivery after first payment.)

**E. & G THE RADIO CENTRE**  
 33, Tottenham Court Rd., London, W.1.  
 Telephone : MUScum 6667.





**VALVE CARTONS.**—Miniatures. 10/6; "GTs." £12; "Gs." 14/- per 100 plus 2/- p. and p. Lists free. R.H.S., 155, Swan Arcade, Bradford, 1.

**P.W. COPIES,** 1949 to 1957. Offers to: 124, Clee Rd., Grimsby.

**HEADPHONES,** new, light-weight, 4,000 ohms, 15/9 pair; Pocket-type Neon Mains Tester Screwdrivers, 4/3; c.w.o.; s.a.e. for Elec. list. J. HARRISON, 26, Thurligh Rd., London, S.W.12.

**PUBLIC APPOINTMENTS**

**RADIO TECHNICIANS IN CIVIL AVIATION.**—A number of appointments are available for interesting work providing and maintaining aeronautical telecommunications and electronic navigational aids at aerodromes and radio stations in various parts of the United Kingdom.

Applications invited from men, aged 19 or over, who have a fundamental knowledge of radio or radar with some practical experience. Training courses are provided to give familiarity with types of equipment used. Salary £600 at age 25, rising to £705. The rates are somewhat lower in the provinces and for those below age 25. Prospects of permanent pensionable posts. Opportunities for promotion to Telecommunications Technical Officer are good for those who obtain O.N.C. in Electrical Engineering or certain City and Guilds Certificates. The max. salaries of Telecommunications Technical Officers are Grade III £370, Grade II £1,030, Grade I £1,250.

Apply to **MINISTRY OF TRANSPORT AND CIVIL AVIATION** (ESB 1/RT), Berkeley St. House, London, W.1, or any Employment Exchange (quoting Order No. Westminster 2109.)

**ELECTRICAL**

**ASBESTOS RESISTANCE WIRE,** 10, 30, 40, 65, 220 ohm. Per yard, 1/3, p.p. **SEMPLE,** The Mount, Heswall, Cheshire.

**TRANSISTOR PUSH-PULL AMPLIFIER** Complete kit of parts (less speaker and battery). 90/-.

Circuit and assembly data of this high efficiency 250 M.W. amplifier. 1/6.

**TRANSISTOR** transformers for the Mullard 200 mw circuit. Miniature interstage at 8/-. Output at 7/6. Sub-miniature interstage, 12/6. Output at 12/-.

**TRANSISTORS,** surplus, tested, guaranteed. P-N-P Junction. Audio 10/-. R.P. to 8 Mc/s 21/-. by well known manufacturer.

**COIL PACK.** S. M. L. and gram position. with circuit, prealigned, 27/6.

**HEADPHONES.** New boxed, H.R. 4,000 ohms. 17/6.

**RECTIFIERS.** LT. 612 v. 1 amp. 7/6; 2 amp. 12/-; 4 amp. 18/9.

**TRANSFORMERS.** Small mains, for amplifiers, test gear, etc. 200-250 v. A.C.; 200 v. 25 mA. 6/3 v. 1 amp. 10/6; Heater trans. 6.3 v. 1.5 amp at 7/6. Low capacity isolation trans. 2, 4, 6, 10 or 13 v., outputs at 1 : 1.25 ratio, 10/6 each.

**AERIALS.** Band III dipole. 7/6. Combined 33/9. Combined, indoor. 30/- F.M. Dipole, 10/6.

**RESISTANCES.** 100 assorted values all types at 15/-.

Postage on all orders. Trade and mail order.

**OSMABET LTD.**

14, Hillside Road, Tottenham, London, N.15.

**SERVICE SHEETS**

**SERVICE MANUALS/SHEETS,** Tel./Radio for hire, sale and wanted. Mixed Manuals and Sheets. 12 for 10/-; s.a.e. enquiries. W. J. GILBERT (P.W.), 24, Prithville Gdns., London, W.12.

**SERVICE SHEETS** for sale and hire. Radio/T.V. S.A.E. enquiries. J. PALMER, 32, Neasden Lane, N.W.10.

**WANTED**

**GLASGOW.** Cameras bought for cash or taken part exchange for Tape Recorders, Players, or Amplifiers. **VICTOR MORRIS,** 406, Argyle St., Glasgow, C.2.

**WANTED.** Ferranti A.F.5 Transformers. Quantity and price to: **ELWELL** 25, Sefton Close, Stoke Poges, Bucks.

**WANTED FOR CASH!** Tape Recorders, Tape, Hi Fi Equipment, etc. Best prices from **E. C. KINGSLEY & CO.** (G), 132, Tottenham Court Road, London, W.1. (EUSTON 6500.)

**VALVES WANTED.** EY51, EY86, PCF80, PCC84, PCI83, U25, 10F1, 10C1, 10C2, 10P14, 5Z4G. Prompt cash; brand new only. R.H.S., 155, Swan Arcade, Bradford, 1.

**WANTED VALVES**

All types for prompt cash. Must be new. State quantity.

**WILLIAM CARVIS LTD.**  
103, North Street, Leeds, 7.

**813 VALVES** wanted for prompt cash. **MODO,** Inverkeithing, Fife.

**WANTED.** Transmitter/Receiver Sets TR-1520, TR-1934, TR-1935, TR-1936, TR-1987; Receivers type 110 and BC-312; Control Units type 310; Power Supply Units 381. **R. GILFILLAN & CO. LTD.,** 7, High Street, Worthing, Sussex. Tel.: Worthing 8719 and 30181.)

**CABINETS**

for **EQUIPMENT, SPEAKERS, PYE BLACK BOX & RECORDS.**



Write for Catalogue

**A. L. STAMFORD (Dept. R29),** 20, College Parade, Salisbury Road, London, N.W.6

**ASTRAL RADIO PRODUCTS**

**"HOME RADIO,"** 32-page illustrated booklet. Simple wiring instructions for Crystal Set. 1, 2, 3 Valves. 2/-, post 3d. **TRF COILS,** Specified for "Bedside Push-button 4", "All Dry 3 Band 3" Push-button 4", etc. 7/- pr., post 6d. Push-button Unit with modification data 7/-. **DUAL WAVE HF Coil,** Specified for "Summer All Dry Portable", "Modern 1 Valve", "Modern 2 Valve", "A.C. Double Triode 1", etc. 4/6, post 3d. **IFT'S** Miniature, 1" x 1 1/2" x 2 1/2" in cans. Extra high 'Q'. Special offer, 9/- pr., post 6d. **K COILS,** AC, B pass 3, 3 3 each, post 3d. **FRAME AERIALS,** M.W., 5/-, post 4d. **COIL PACKS,** 1.2 Mc/s, 3/6, post 1/-; Crystal Set Coils, L & M.W., 2/6, post 3d. **82 Centurion Road, Brighton**

**VALVES**

**VALVES** from 1/6. Radio, T.V. Components; low prices. Lists 3d. **J. PALMER,** 32, Neasden Lane, N.W.10.

**SITUATIONS VACANT**

**THERE IS** a national shortage of Mercantile Radio Officers. Why not make Communications your career? You can be assured of a sea-going appointment after qualifying at The School of Marine Radio and Radar (A.S.T.), Hamble, Southampton. For details, apply Commandant, quoting A.12

**ELECTRONICS TRAINING**

1958

**FIVE-YEAR APPRENTICESHIPS IN THE MINISTRY OF SUPPLY**

The Ministry of Supply is offering five-year Apprenticeships in Electronics to boys who were born between 2nd March, 1941, and 1st September, 1942, who wish to become qualified Electronic technicians.

Applicants should be in possession of, or be studying to obtain, by the end of September, 1958:

- (a) General Certificate of Education with passes at Ordinary Level in English Language, Mathematics and Physics (or other Science subject covering Physics) and one other subject, or
- (b) Qualifications giving exemption from S.1 stage of the Ordinary National Certificate and have reached a corresponding standard in English Language.

Application forms and further particulars may be obtained from the Departmental Training Officer, Ministry of Supply, 66/72, Gower Street, W.C.1. The closing date for receipt of completed application forms is Saturday, 15th March, 1958.

(Continued overleaf)

**ELECTRADIX**

**FOR FULL VALUE**

**MINIATURE MOTORS.** 4 1/2 volts. The lightest and most efficient electric motor in the world. For 18in. motor boats, motor cars, aeroplanes, toys and models. Weight only 1 oz., size 3/4in. dia., 3in. wide, 10/9 post free.

**A.C. MOTORS.** Crompton and Hoover 1 h.p., 230 volt A.C. 50 cycles, S.P. 1,425 r.p.m., tested and guaranteed, £4/12/6, carr. 5/-. 0.6 h.p. 230 volts A.C. 50 cycles S.P. 940 r.p.m., foot mounting, £6, carr. 7/6. 1 1/10th h.p., 110/250 volts A.C. 50 cycles, S.P. 2,850 r.p.m., 49/-, carr. 3/6.

**"S" METERS.**—For A.R.88 or other receivers, 2 1/2in. square flush, new stock, 39/6, post 1/6.

**MORSE PRACTICE KEYS.**—A.M. service type on base, back and front contact. 4/6, post 1/-.

**MUIRHEAD SLOW-MOTION DRIVES.**—4in. solid brass with heavy bakelite knob. New surplus. 10/-, post 1/-.

**ELECTRADIX RADIOS**

Dept. P., 214 QUEENSTOWN ROAD, BATTERSEA, S.W.8. MACaulay 2159

**RADIO (METEOROLOGICAL) TECHNICIANS** required by Meteorological Office. Qualifications: Basic knowledge of radio and radar and experience in maintenance/operation of radar equipment including oscilloscopes. Successful applicants serve in United Kingdom and overseas. Commencing London salary £600. at age 25 or over, rising annually to £705 subject to deductions for each year below age 25. Provincial salary £28 to £30 lower. Overtime, night duty allowance, etc. Apply at any EMPLOYMENT EXCHANGE, quoting King's Cross 2468/066/99.

**MINISTRY OF TRANSPORT AND CIVIL AVIATION:** Trainee Communications Officers. Min. age 18. Morse 20 w.p.m.; type or teleprint 30 g.p.m.; elementary knowledge of radio. Pay while training, £3.1/9 p.w. at age 18, and £3.17/6 (men) and £3.13/- (women) at 25 or over; free meals and accommodation. After training salary £2650. Slightly lower for women and at certain stations. Apply: M.T.C.A. (ESB1, Comm. I, Berkeley Sq. House, London, W.1).

### EDUCATIONAL

**FREE!** Brochure giving details of Home Study Training in Radio, Television, and all branches of Electronics. Courses for the Hobby Enthusiast or for those aiming at the A.M.Brit.I.R.E., City and Guilds, R.T.E.B. and other Professional Examinations. Train with the college operated by Britain's largest Electronics organisation. Moderate fees. Write to: E.M.I. INSTITUTES, Dept. PW28, London, W.4.

## ALFRED PADGETT

40, MEADOW LANE, LEEDS, 11

Tel.: CLECKHEATON 99

**TX 1154.** Model M. four-wave band, complete with all valves and meters, good condition, £15.0. carriage 12.6. Model N. 17/8 12.6 carriage.

**MIXED RADIO PANELS.**—Full of Resistors and condensers. 5- per doz. post free.

**BRAND NEW RECEIVERS.**—Type 3645. The cleaned-up 1355. Metal Mite Condensers and Potted Transformers, etc., less valves. 6/6, carriage 8/-.

**NEW MAINS TRANSFORMERS.**—Ex. equipment. 230 volt 50 cycles, 345 volts, 0.345 volts, 5 volts 2 amps., 6.3 volts 5 amps., 6.3 volts, 2.5 amps., 10-, carr. 5/-.

**6-WAY JONES PLUG AND SOCKET.** 1-, post 1/3.

**BRAND NEW EF50 VALVES.**—Four on a strip with valveholders and locking rings. 10-, with Red Sylvanian Valves 12/6, post 2/-.

**NEW METAL RECTIFIERS.**—250 volts. At 60 ma. 2/6, post 1/3. 150 volts at 40 ma. 1-, post 1/3.

**BRAND NEW POT METERS.**—250 K. 1 inch spindle length. 6d. each, post 5d.

**250 OHMS WIRE WOUND POT.**—1-, post 9d.

**NEW RADIO VALVES.**—Ex. equipment. Special offer for one month only. All at 1- each, post 9d. VR65, VR116, DL150, VR137, VR66, 954, QP220, VS110, 12SH7 (metal), 12SJ7 (metal).

**NEW FUSE HOLDERS.**—With clip on cover, for two fuses, 1/3, post 9d.

**DIODES,** 10d. each, post 3d.

**8 MFD,** 450 working small tube type, ex. equip., 1- each, post 3d.

11 +

### EXAMINATION

Write for **FREE 24-page GUIDE** and Test, stating age of child, to: **THE REGISTRAR** (Dept. M8), Mercer's Correspondence College, 69, Wimpole St., London, W.1.

**LEARN IT AS YOU DO IT**—we provide practical equipment combined with instruction in Radio, Television, Electricity, Mechanics, Chemistry, Photography, etc. Write for full details to: **E.M.I. INSTITUTES**, Dept. PW47, London, W.4.

**THERE IS** a national shortage of Mercantile Radio Officers. Why not make Communications your career? You can be assured of a sea-going appointment after qualifying at The School of Marine Radio and Radar (A.S.T.), Hangle, Southampton. For details, apply Commandant, quoting A.12.

**WIRELESS.** See the world as a Radio Officer in the Merchant Navy; short training period; low fees; scholarships, etc., available. Boarding and Day students. Stamp for prospectus. **WIRELESS COLLEGE**, Colwyn Bay.

**World Radio Handbook 1953**, by Hans Johansen. 13/6, postage 1-.

**Cathode Ray Oscillographs**, by Reyner. 20-, postage 1-.

**Transistor Circuits**, by Rufus Turner. 23-, postage 1/3.

**How to Make Aerials for T.V.** Bands 1 and 3 and V.H.F. Band 2. 2.6, postage 3d.

**Radio Valve Data**, by "Wireless World." 5-, postage 6d.

**Electronic Novelties for the Constructor**, by Bradley. 5-, postage 6d.

**Brimar Valve and T.V. Tube Manual** No. 7. 6 - postage 9d.

We also have a full range of Slide Rule® and Drawing Instrument Sets. Send for list!

## UNIVERSAL BOOK CO.

12 Little Newport Street, London, W.C.2

(adjoining Lisie Street)

## WIRING ACCESSORIES

Return of Post Service. Lowest possible prices consistent with high quality. Money back guarantee.

**PVC Cable Flat Twin Twin with E. 3 Core**

1.041	£2. 9. 2	£3. 1. 9	£3.10. 5
3.029	£3. 5. 7	£3.17.11	£4.18. 5
3.036	£4. 9. 6	£5. 2.11	£6.11. 4
7.023	£5.12. 6	£7. 0. 7	£8. 4. 7

**TRS CABLE**

1.044	£2.10. 0	£3. 1.10	£3.10. 3
3.029	£3. 3.11	£3.18. 4	£4.19. 4
3.033	£4. 3. 5	£5. 1. 7	£6. 5. 10
7.023	£5.10. 5	£6.16.11	£7.18.10

Prices per 100 yds. All sizes stocked. Supplied in 25, 50, 75 or 100 yd. lengths. 7.020 and above cut to length—no cutting charge. Carriage paid on all orders over £2. Full range of accessories available. Send for complete lists.

**F. HUNT & CO.**  
STEPCOTE HILL, EXETER

Phone: Exeter 56687

**A.M.I.P.R.E.**—For details of suitable study courses (only a limited number of students accepted) send for free Syllabus of Instructional Text. I.P.R.E. Conditions of Membership Booklet. 1/-: "The Practical Radio Engineer" Journal, sample copy. 2/3. 6,000 Alignment Peaks for Superhets. 6/-. All post free from SECRETARY, I.P.R.E., 20, Fairfield Rd., London, N.8.

**A.M.I.Mech.E., A.M.Brit.I.R.E.,** City and Guilds, etc., on "no pass—no fee" terms; over 95% successes. For details of exams. and courses in all branches of engineering, building, etc., write for 144-page handbook, free. **B.I.E.T.** (Dept. 242B), 29, Wright's Lane, London, W.8.

**CITY AND GUILDS** (Electrical, etc.) on "no pass—no fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook free and post free. **B.I.E.T.** (Dept. 242A), 29, Wright's Lane, London, W.8.

**T.V. and RADIO.**—A.M.Brit.I.R.E., City and Guilds, R.T.E.B. Cert., etc., on "no pass—no fee" terms. Over 95% successes. Details of exams. and home training courses in all branches of radio and T.V. write for 144-page handbook free. **B.I.E.T.** (Dept. 242G), 29, Wright's Lane, London, W.8.

## VALVES—Guaranteed

EA50	2/-	VR65	3/6	6BE6	7/-	6U7	5/-
EB41	7/6	VR65A	3/6	6BH6	5/7	7B6	8/-
EB91	7/-	VR91	4/-	6BW6	6/6	7D3	7/6
ECC33	8/6	VR137	4/-	6CSM	8/-	8D2	4/6
EF36	4/6	VT20	3/6	6D2	7/-	9D2	5/-
EP37	7/6	VT50	4/-	6F6	7/-	9D3	5/-
EP39	5/6	VT51	4/-	6F13	11/6	10P1	11/6
EP30	5/-	VU11	2/6	6J3	6/-	12BA5	7/6
EP8	8/6	W7	5/-	6K6	8/-	12BE6	6/-
EL32	5/-	OZ4	5/-	6KTG	4/8	12I7	8/6
PG1	4/-	Z152	8/6	6KT7M	5/8	12K7	8/-
PY31	9/0	1D5	8/6	6SA7	8/-	15D2	6/-
SP31	10/-	1LN5	6/-	6SN7GT	13	18	7/6
SP4	4/-	1D1	4/-	8/6	20D1	12/-	
SP61	6/-	6AK6	7/6	6U3	7/6	33W4	7/6
TT11	3/6	6AL5	7/-	6US(UX)	30C5	3/6	
VR21	4/-	6B8	6/-		7/8	7/6	

Postage 6d. per valve, orders over £1 post free. (Also all components) TV, Tubes, Perfect condition (callers only) MW22/16, MW22/18, £4.0.0 each. Also all Transistor Components.

### TELEKIT SUPPLY

104 High Street, Beckenham, Kent.  
Phone: BEC 3720

## H.A.C. SHORT-WAVE EQUIPMENT

Noted for over 18 years for S.W. Receivers and Kits of Quality.

Improved designs with Denco coils: **One-Valve Kit, Model "E"** Price, 25/-  
**Two "E"** "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z" "AA" "AB" "AC" "AD" "AE" "AF" "AG" "AH" "AI" "AJ" "AK" "AL" "AM" "AN" "AO" "AP" "AQ" "AR" "AS" "AT" "AU" "AV" "AW" "AX" "AY" "AZ" "BA" "BB" "BC" "BD" "BE" "BF" "BG" "BH" "BI" "BJ" "BK" "BL" "BM" "BN" "BO" "BP" "BQ" "BR" "BS" "BT" "BU" "BV" "BW" "BX" "BY" "BZ" "CA" "CB" "CC" "CD" "CE" "CF" "CG" "CH" "CI" "CJ" "CK" "CL" "CM" "CN" "CO" "CP" "CQ" "CR" "CS" "CT" "CU" "CV" "CW" "CX" "CY" "CZ" "DA" "DB" "DC" "DD" "DE" "DF" "DG" "DH" "DI" "DJ" "DK" "DL" "DM" "DN" "DO" "DP" "DQ" "DR" "DS" "DT" "DU" "DV" "DW" "DX" "DY" "DZ" "EA" "EB" "EC" "ED" "EE" "EF" "EG" "EH" "EI" "EJ" "EK" "EL" "EM" "EN" "EO" "EP" "EQ" "ER" "ES" "ET" "EU" "EV" "EW" "EX" "EY" "EZ" "FA" "FB" "FC" "FD" "FE" "FF" "FG" "FH" "FI" "FJ" "FK" "FL" "FM" "FN" "FO" "FP" "FQ" "FR" "FS" "FT" "FU" "FV" "FW" "FX" "FY" "FZ" "GA" "GB" "GC" "GD" "GE" "GF" "GG" "GH" "GI" "GJ" "GK" "GL" "GM" "GN" "GO" "GP" "GQ" "GR" "GS" "GT" "GU" "GV" "GW" "GX" "GY" "GZ" "HA" "HB" "HC" "HD" "HE" "HF" "HG" "HH" "HI" "HJ" "HK" "HL" "HM" "HN" "HO" "HP" "HQ" "HR" "HS" "HT" "HU" "HV" "HW" "HX" "HY" "HZ" "IA" "IB" "IC" "ID" "IE" "IF" "IG" "IH" "II" "IJ" "IK" "IL" "IM" "IN" "IO" "IP" "IQ" "IR" "IS" "IT" "IU" "IV" "IW" "IX" "IY" "IZ" "JA" "JB" "JC" "JD" "JE" "JF" "JG" "JH" "JI" "JJ" "JK" "JL" "JM" "JN" "JO" "JP" "JQ" "JR" "JS" "JT" "JU" "JV" "JW" "JX" "JY" "JZ" "KA" "KB" "KC" "KD" "KE" "KF" "KG" "KH" "KI" "KJ" "KL" "KM" "KN" "KO" "KP" "KQ" "KR" "KS" "KT" "KU" "KV" "KW" "KX" "KY" "KZ" "LA" "LB" "LC" "LD" "LE" "LF" "LG" "LH" "LI" "LJ" "LK" "LL" "LM" "LN" "LO" "LP" "LQ" "LR" "LS" "LT" "LU" "LV" "LW" "LX" "LY" "LZ" "MA" "MB" "MC" "MD" "ME" "MF" "MG" "MH" "MI" "MJ" "MK" "ML" "MM" "MN" "MO" "MP" "MQ" "MR" "MS" "MT" "MU" "MV" "MW" "MX" "MY" "MZ" "NA" "NB" "NC" "ND" "NE" "NF" "NG" "NH" "NI" "NJ" "NK" "NL" "NM" "NN" "NO" "NP" "NQ" "NR" "NS" "NT" "NU" "NV" "NW" "NX" "NY" "NZ" "OA" "OB" "OC" "OD" "OE" "OF" "OG" "OH" "OI" "OJ" "OK" "OL" "OM" "ON" "OO" "OP" "OQ" "OR" "OS" "OT" "OU" "OV" "OW" "OX" "OY" "OZ" "PA" "PB" "PC" "PD" "PE" "PF" "PG" "PH" "PI" "PJ" "PK" "PL" "PM" "PN" "PO" "PP" "PQ" "PR" "PS" "PT" "PU" "PV" "PW" "PX" "PY" "PZ" "QA" "QB" "QC" "QD" "QE" "QF" "QG" "QH" "QI" "QJ" "QK" "QL" "QM" "QN" "QO" "QP" "QQ" "QR" "QS" "QT" "QU" "QV" "QW" "QX" "QY" "QZ" "RA" "RB" "RC" "RD" "RE" "RF" "RG" "RH" "RI" "RJ" "RK" "RL" "RM" "RN" "RO" "RP" "RQ" "RR" "RS" "RT" "RU" "RV" "RW" "RX" "RY" "RZ" "SA" "SB" "SC" "SD" "SE" "SF" "SG" "SH" "SI" "SJ" "SK" "SL" "SM" "SN" "SO" "SP" "SQ" "SR" "SS" "ST" "SU" "SV" "SW" "SX" "SY" "SZ" "TA" "TB" "TC" "TD" "TE" "TF" "TG" "TH" "TI" "TJ" "TK" "TL" "TM" "TN" "TO" "TP" "TQ" "TR" "TS" "TT" "TU" "TV" "TW" "TX" "TY" "TZ" "UA" "UB" "UC" "UD" "UE" "UF" "UG" "UH" "UI" "UJ" "UK" "UL" "UM" "UN" "UO" "UP" "UQ" "UR" "US" "UT" "UU" "UV" "UW" "UX" "UY" "UZ" "VA" "VB" "VC" "VD" "VE" "VF" "VG" "VH" "VI" "VJ" "VK" "VL" "VM" "VN" "VO" "VP" "VQ" "VR" "VS" "VT" "VU" "VV" "VW" "VX" "VY" "VZ" "WA" "WB" "WC" "WD" "WE" "WF" "WG" "WH" "WI" "WJ" "WK" "WL" "WM" "WN" "WO" "WP" "WQ" "WR" "WS" "WT" "WU" "WV" "WW" "WX" "WY" "WZ" "XA" "XB" "XC" "XD" "XE" "XF" "XG" "XH" "XI" "XJ" "XK" "XL" "XM" "XN" "XO" "XP" "XQ" "XR" "XS" "XT" "XU" "XV" "XW" "XX" "XY" "XZ" "YA" "YB" "YC" "YD" "YE" "YF" "YG" "YH" "YI" "YJ" "YK" "YL" "YM" "YN" "YO" "YP" "YQ" "YR" "YS" "YT" "YU" "YV" "YW" "YX" "YZ" "ZA" "ZB" "ZC" "ZD" "ZE" "ZF" "ZG" "ZH" "ZI" "ZJ" "ZK" "ZL" "ZM" "ZN" "ZO" "ZP" "ZQ" "ZR" "ZS" "ZT" "ZU" "ZV" "ZW" "ZX" "ZY" "ZZ"

All kits complete with all components, accessories, and full instructions. Before ordering call and inspect a demonstration receiver, or send stamped, addressed envelope for descriptive catalogue.

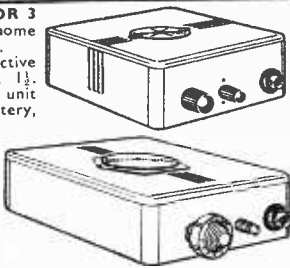
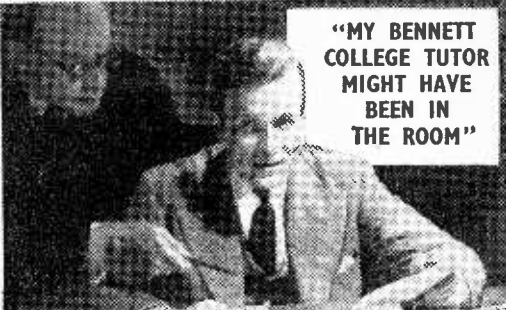
**"H.A.C." SHORT-WAVE PRODUCTS**  
(Dept. TD), 11, Old Bond Street, London, W.1.

**"RECO" TRANSISTOR 3 PORTABLE:** Receives home and continental stations. Ferrite rod aerial. Attractive plastic case, 4½ x 4½ x 1½. Balanced armature output unit included, all parts and battery, 65/-.

**"RECO" PORTABLE TRANSISTOR 3**

Uses high gain frame aerial mounted on metal chassis. Has variable gain control, 65/- buys all parts, case, battery and output unit. All parts sold separately. Wiring circuit parts price list, 1/- each. P.O. only.

**RADIO EXCHANGE CO.**  
27 HARPER STREET, BEDFORD

**"MY BENNETT COLLEGE TUTOR MIGHT HAVE BEEN IN THE ROOM"**

**PERSONAL POSTAL TUITION**

**WHAT CAREER DO YOU WANT?**

Architecture  
Building  
Carpentry  
Commercial Art  
Diesel Engines  
Draughtsmanship  
Electrical Eng.  
Electric Wiring  
Forestry  
Locomotive Eng.  
Machine Drawing  
Mechanical Eng.  
Motor Engineering  
Plumbing  
Quantity Surveying  
Radio Engineering  
Sanitary Science  
Surveying

Telecommunications  
Television  
Wireless Telegraphy  
and Telephony

Book-keeping  
English  
Geography  
Journalism  
Languages  
Mathematics  
Modern Business Methods  
Police Subjects  
Salesmanship  
Shorthand  
Short Story Writing  
and many others

OR WHY NOT OBTAIN A QUALIFICATION

A.M.I.C.E. A.M.I. Mun. E. A.C.I.S.  
A.M.J. Mech. E. A.M.S.E. A.C.C.S.  
A.R.I.B.A. A.A.C.C.A. A.R.I.C.S.  
A.M.I. Struct. E. A.C.W.A. A.A.I.  
GEN. CERT. OF EDUCATION & R.S.A. Exams.

Every Bennett College student enjoys this friendly, intimate coaching right through his Course. A few of the Courses are listed opposite. Tell us your subject. We will send you the Bennett College Prospectus and the famous FREE book "Train your mind to SUCCESS." This will show you how you can advance to a better, finer future by Personal Postal Tuition. Fill in and post the coupon today.

**BENNETT COLLEGE**  
(Dept. G.104 PT.) SHEFFIELD

Please send me the Prospectus on..... and my free copy of "Train your mind to SUCCESS."

NAME.....  
ADDRESS.....  
TOWN.....  
AGE (fill under 21).....  
Please write in BLOCK letters

**Post this coupon NOW!**

**TELEVISION TUBES**

**RECLAIMED GUARANTEED:**  
12"—£6 14"—£5 17"—£7.10.0

**FULLY GUARANTEED HIGH QUALITY REBUILT**  
10"—£8.10.0 12"—£9 14"—£11.10.0 15"—£12 17"—£14.

CARRIAGE AND INSURANCE 15/6 EACH TUBE.

**PRIME ELECTRICS** (Dept. W/3)  
36, QUEENSDALE ROAD, W.11  
Phone: PARK 1131

CALLERS 10.30-3 MON.-SAT. CLOSED WED.

**Solder with**

**LITESOLD**

**"PERMATIP"**  
AND  
**"PERMABIT"**  
INSTRUMENTS  
FOR  
**GREATER  
SOLDERING  
EFFICIENCY**

The soldering bit which maintains its face indefinitely without attention. 25 models available for mains or low voltage supply. Bit sizes 3/32 to 3/8 inch. Full details in booklet S.P.10 from sole manufacturers:—

**LIGHT SOLDERING DEVELOPMENTS LTD.,**  
106, GEORGE STREET, CROYDON,  
SURREY. Tel. CR0ydon 8589.



**RECORD PLAYERS**

GRAM MOTORS  
AUTOCHANGERS  
CABINETS

**COLLARO AC.3.554.** Three-speed, single player for A.C. mains 200/250 v., cream finish, complete with turnover crystal pick-up. "T" type head. Strictly limited quantity at £6.10.0, plus 3/6 carr.

**CRYSTAL PICK-UPS** fitted Aeos. TG127 cartridge. Ultra lightweight. Our price 37/6, plus 2/6 carr.

**3-SPEED RECORD PLAYERS,** fitted with Aeos turnover HOP59 pick-ups with twin sapphire styli, resin case with lid, fitted clasp and handle. Worth 10 gns. Our price £7.15.0, plus 3/6 carr.

**3-SPEED GRAM MOTORS,** complete with crystal pick-up. Our Price 79/6, plus 5/6 carriage.

**REXINE COVERED CABINETS,** single player size, suitable most non-auto units, including transcription motors. (Motor board uncut.) Our price 46/6, plus 3/6 carriage.

**PORTABLE RECORD PLAYER CABINETS** to home Monarch, Collaro or Garrard 120 Changers, with space for Amplifier and Speaker. Resine finish in attractive colours, fitted catches and handles. Our price £3.5.0, plus 3/6 carriage

Send stamp for complete bargain lists.

**RONALD WILSON & CO.**  
(DEPT. P.W.). 12 BRIDGE STREET, WORCESTER

**LYONS RADIO LTD.**

Dept. M.P., 3 GOLDHAWK ROAD,  
SHEPHERDS BUSH, LONDON, W.12  
Telephone: SHEPherds Bush 1729

**SELENIUM RECTIFIERS.**—Condition as new and unused.

**Type 1067-10.**—Overall length 9" x 2½" dia.; can be used as in voltage doubler circuits for outputs up to 200 v. at 0.6A. or by using 2 as a full wave bridge type, 136 v. at 1.2A. Circuits supplied. Listed at over £5 ea. OUR PRICE 12/6 ea. p.p. 2/6 for 1 or 2.

**Type H45-5-1FWZ.**—Overall length 8" x 2½" dia. Full wave bridge type, output up to 65 v. at 1A. PRICE 12/6 ea., p. p. 1/6.

**MURHEAD SLOW-MOTION DRIVES.**—3" dia. Ratio 50:1 fit standard 1" dia. spindles. Calibrated 0/180. As fitted to the well known Ind. Units type 62, etc. One of the finest S.M. drives made. New in original cartons with cursor. PRICE 8/3, p. p. 1/3.

**RECEPTION SETS TYPE R109.**—Ex-Army 8 valve superhet receivers employing 5-AR12 (VF23) and 3-AR8 (HL23DD) valves. Fitted with miniature speaker, and vibrator power pack for operation from 6 v. car or motor cycle battery. (No other power supply reqd.). Frequency range 1.8 to 8.5 Mc/s (35 to 167 metres). Front panel is fitted with all controls including RT/CW switch and 2 jacks for alternative headphone reception. Size approx. 13 x 12 x 11 in. In good condition and working order supplied with circuit diagram and input plug. PRICE ONLY 85/- or less valves 45/-, carriage 8/6.

**POWER UNITS TYPE 234.**—Input 200/250 v. 50 cps. A.C. mains. Output approx. 250 v. D.C. at 100 mA. and 6.3 v. A.C. at 5 A. Double section choke filter gives exceptionally good smoothing. For bench or rack mtg., size 19" x 10" x 6½". In good condition and working order complete with 574 rect. valve. PRICE ONLY 57/6, carriage 9/6.

**Morse Code operating . . .**  
**. . . as a PROFESSION**

45 years of teaching Morse Code is proof of the efficiency of the Candler system. Send 3d. stamp for Payment Plans and Full Details of all Courses.

**CANDLER SYSTEM CO.** Dept. 51.0  
52b, Abingdon Road, London, W.8.  
Candler System Co., Denver, Colorado, U.S.A.

**GUESSING?—DON'T!**

PIN-POINT THOSE FAULTS WITH A RES/CAP BRIDGE, 35/- (P. & P. 1/6)

**READY CALIBRATED**

Stamp for details of this and other kits.

**RADIO MAIL** (Dept. H)  
Raleigh Mews, Raleigh Street, Nottingham

**TECHNICAL TRADING CO.**

SCR522 AMERICAN BENDIX TRANSCEIVERS. 100/130 mc. s., convertible 2 m., less valves, 2/- with 10 valves (two 832's), £3/10/- JASON F.M. TUNERS, assembled, tested, valved, £7/10/- GORLA/F.S.L. A.M./F.M. KIITS. Consisting complete miniature-F.M. Tuner, less only ECC85 valve, and 2 Double wound I.F. Discriminator Transformers, comprehensive instruction manual, £3/15. Octal Valveholders, 2 8 doz. 230 v. 80 mA RECTS. 5/- . 12 v. RECTIFIERS, 3-4 amps., 9/6. SOUND POWER Headsets and Mikes, 3 units, 7/6. SPEAKERS, 10in. Parmeko, etc., in cabinet, 19/-.

**TRANSISTORS** L.F. RED SPOT up to 830 Kcs. 7/- (Guaranteed) L.F. OUTPUT up to 250 milliwatts, 10/- R.F. WHITE SPOT, up to 2.5 Mcs., 14/-

13 CHANNEL CONVERTERS. Famous make complete PCC84, PCP80 Beaut. Cabinet. All instructions, all coils, £3.15.0. GERMANIUM XTAL DIODES. Guaranteed, 9d. ea., 8/- doz. S.A.E. FREE LIST 400 AMAZING SNIPS INCLUDING 5U4G 6/6 6BA5 8/6 6SN7GT 5/9 12AU7 7/- 6E50 2/6 5Z4G 9/- 6J5G 3/- 6V6G 6/- ECC31 9/6 6E91 7/6 and 100 other valves. 16 16 350 v., 3-. Midret 465 Kcs. I.P.s., 2/6. 10,000 OTHER BARGAINS AND TELEVISION SETS AT - 350/352 FRATTON ROAD, PORTSMOUTH

**“DIY”**

Yes! YOU can DO IT YOURSELF with the aid of our RADIO HOME CONSTRUCTOR'S HANDBOOK. Thousands of enthusiasts already own this famous 66 p. book which gives full parts lists and circuits of many modern receivers, tape recorder, scope, feeder units, communications set, crystal set, hi-fi amplifiers, etc. Also packed with data, building and servicing hints, facts and formulae, colour code, soldering hints, etc. Easy-as-A.B.C. FULL SIZE p-p. Construction sheets for our outfits are available FREE with orders so that even the beginner gets professional results first time! This claim is confirmed by hundreds of genuine testimonials received. Send 2/11 to-day for your copy!

NEVER BEFORE HAS THERE BEEN A BOOK SO VALUABLE TO THE RADIO NOVICE AND EXPERT ALIKE!

**RODING LABORATORIES**  
Hurn Airport, Christchurch, Hants

**PRIZES FOR IDEAS**

To introduce our new catalogue, and to give you the opportunity of helping to compile the next edition, we are offering prizes for the best suggestions and/or criticisms of our No. 11 catalogue.

**FIRST PRIZE:** Taylor 120A Multi-range Test Meter, value £9.15.0.

**SECOND PRIZE:** Acos MIC33-1 Crystal Microphone, value £5.5.0.

**THIRD PRIZE:** Pair Brown's "F" Headphones, value 35/-.

Ten additional consolation prizes, value 10/- each.

Entry form free with all orders for Catalogue No. 11, price 9d. received before Feb. 28th, 1957. Order now requesting entry form.

ILLUSTRATED CATALOGUE No. 11 9d. POST FREE. 56 pages, 108 illustrations, over 2,000 items.

Please note British Isles and H.M. Forces only.

**SOUTHERN RADIO & ELECTRICAL SUPPLIES**  
SO-RAD WORKS  
REDLYNCH, SALISBURY

**RADIO AND TELEVISION COMPONENTS**

We operate a prompt and efficient MAIL-ORDER Service. 3d. stamp (only) for Catalogue.

**JAMES H. MARTIN & CO.**  
FINSTHWAITE, NEWBY BRIDGE,  
ULVERSTON, LANCs.



**PULLIN SERIES 100. HIGH RESISTANCE TEST METER**  
A.C./D.C.  
10,000 ohms/volt  
21 RANGES  
100 microamps to 1000 v.

Complete in die-cast case with test leads, clips & prods.

**FULLY GUARANTEED**

CASH PRICE or Deposit £2-10-0 & nine further monthly payments of £1-4-6.  
**£12-7-6**

Illustrated brochure free on request

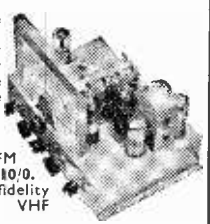
**FIRTH RADIOCRAFT LTD**  
69-71 CHURCH GATE LEICESTER  
& 28 HIGH ST NEWPORT PAGNELL Bucks.

**Fidelia HAND BUILT**

Fidelia genuine hand built real high fidelity equipment for those people who desire the finest.

Major AM/FM 12 valves, £44.  
De-Luxe AM/FM 11 valves, £34/10/0.  
Imperial, high fidelity amplifier and VHF tuner, £34.

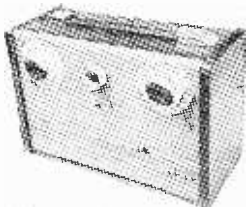
Full details willingly but 6d. in stamps is appreciated.



ELECTRO ACOUSTIC DEVELOPMENTS  
2, Amhurst Road, Telscombe Cliffs, Sussex.

**THE WAVEMASTER**

TRANSISTOR PORTABLE



**AN OLYMPIC WINNER**

Pick of the World's Stations at your finger-tips.  
Long and Medium Wavebands. Comprehensive assembly data and Components Lists, 1/6.  
Complete Receivers Available.

**OLYMPIC RADIO COMPONENTS, LTD.**

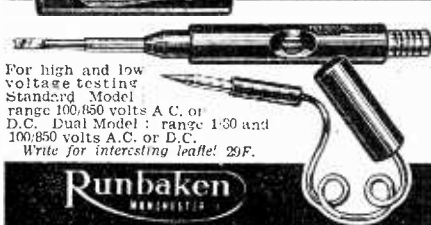
224, Hornsey Road, Holloway, N.7.

**1-Finger Pianists**

Build your own electronic keyboard and play everything! Send for free leaflet. Guitar, cello, flute and trumpet are all easy. Write now...

**C & S, 10 Duke St., Darlington, Co. Durham**

**TESTOSCOPE MAINS TESTER**



For high and low voltage testing. Standard Model: range 100,850 volts A.C. or D.C. Dual Model: range 1-30 and 100,850 volts A.C. or D.C.  
Write for interesting leaflet! 29/-.

**Runbaken**  
MANUFACTURERS

**NEW SHOP IN LEEDS, I**

We specialise in All Spares for Radio & TVs. Plenty of Valves in stock. FULL RANGE OF HI-FI EQUIPMENT available for comparative testing.

**TV SPARES**  
41 CALL LANE, LEEDS, I

**SOUTHERN RADIO'S WIRELESS BARGAINS**

**TRANSCEIVERS.** Type 38 (Walkie Talkie) complete with 5 valves, etc. New condition, untested by us, but serviceable. No guarantee. £12.6 each.

**ATTACHMENTS** for Type "28" Transceivers. ALL BRAND NEW. Headphones, 15/6; Throat Microphones, 4/6; Junction Boxes, 2/6; Aerials No. 1, 2/6; No. 2, 5/-; Webbing, 4/-; Haversacks, 5/-; Valves—A.R.P.12, 4/6; A.T.P.A. 3/6. Set of FIVE VALVES, 19/- the set.

**TRANSCEIVERS.** Type "18" Mark III. Two Units (Receiver & Sender). Six Valves. Microammeter, etc., in Metal Carrying Case. Untested, without guarantee but COMPLETE. £218.6.

**ATTACHMENTS** for "18" Transceivers. ALL BRAND NEW. Phones, 15/6; Microphones, 12/6; Aerials, 5/-. Set of SIX VALVES, 30/-.

**RECEIVERS R109.** S.W. Receiver in Case. 8 valves. Speaker and 6-v. Vibrator Pack. Untested. No guarantee but COMPLETE, £218.6.

**RESISTANCES.** 100 Assorted useful values. New wire end, 12/6.

**CONDENSERS.** 100 Assorted. Mica, Tubular, etc., 15/-.

**BOMBSIGHT COMPUTERS.** Ex-R.A.F. NEW. Hundreds of Components, Gears, etc. Ideal for Experiments, £3.

**LUFBRA. HOLE CUTTERS.** Adjustable 1/4 in. to 3/4 in. For Metal, Plastic, etc., 7/-.

**QUARTZ CRYSTALS.** Type F.T.241 and F.T.243. 2-pin, 1/2 in. Spacing. Frequencies between 5,675 kcs. and 8,650 kcs. (F.T.243). 20 Mc/s and 38.8 Mc/s (F.T.241, 54th Harmonic), 4/- each. ALL BRAND NEW. TWELVE ASSORTED CRYSTALS, 45/-.

**Holders** for both types, 1/- each. Customers ordering 12 crystals can be supplied with lists of frequencies available for their choice.

**MORSE TAPPERS.** Standard type, 3/6; Extra Heavy on Base, 5/6; Midget, 2/9.

**TRANSPARENT MAP CASES.** Plastic, 14 in. x 10 1/2 in. Ideal for Maps, Display, etc., 5/6.

**DINGHY AERIALS.** Ex-U.S.A. Reflector Type, 4/6.

**STAR IDENTIFIERS.** Type I A-N covers both Hemispheres, 5/6.

**CONTACTOR TIME SWITCHES.** 2 Impulses per sec., in case, 11/6.

Postage or Carriage extra. Full List of RADIO BOOKS, 3d.

**SOUTHERN RADIO SUPPLY LTD.**  
11 LITTLE NEWPORT ST., LONDON, W.C.2. GERrad 6653

**'EMISTRUCTOR' HI-FI**

- \* ASSEMBLE THE UNITS
- \* LEARN AS YOU BUILD

At last! Here's YOUR opportunity to own a magnificent HI-FI—a complete hi-fi system in a beautifully styled cabinet at two thirds of normal price—plus all the extra satisfaction and fun of building it yourself! The units are easy to assemble—no experience needed—and the FREE instruction book guides you at each stage and teaches you all about HI-FI! Don't miss this really amazing value in HI-FI enjoyment—send NOW for a FREE brochure giving full details of...



**CHOICE OF UNITS AVAILABLE:**  
Contemporary style cabinet - 8 or 14 watt high quality amplifier - F.M. or AM/FM Radio Unit - 4-speed auto. record player - Twin 10" loudspeakers - Tape recorder - Record storage compartment.

**E.M.I. INSTITUTES**  
(Dept. HF32) London, W.4.  
The Educational Organisation of  
'HIS MASTER'S VOICE'  
CAPITOL - COLUMBIA  
PARLOPHONE - M.G.M. Etc.

Please send FREE BROCHURE and Price List of Emistructor Hi-Fi to:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

MAR 58 \_\_\_\_\_ IC122

**Forrest**

Transistor Transformers for Quality Equipment

**H. W. FORREST (Transformers) Ltd.**

349, Haslucks Green Road, Shirley, Solihull, Warwicks. Tel.: SHirley 2483.

**The "TYANA" Standard Soldering Iron**



- Adjustable Bit.
- Weight approx. 4 oz.
- Heating Time 3 min.
- 40 Watt economy Consumption.
- Standard Voltage Ranges. 16/9

Replacement Elements and Bits always available.

**"DIPLOMA" HEADPHONES**



Lightweight High Resistance (4,000 ohms). Complete with cord. 17/6

Ideal for CRYSTAL SETS and also for use with TAPE RECORDERS.

**KENROY LIMITED**  
152/297 UPPER ST., ISLINGTON, LONDON, N.1.

Telephone: Canonbury 4905-4663

**HERTFORDSHIRE WE'RE HERE!**

Ex-Government Radio Equipment and Surplus Components. At Lowest London prices.

**E.M.A.**

41 Cowbridge, Hertford

**B.B.C.-I.T.V.-F.M.-AERIALS**

Band I (B.B.C.). Telescopic 10ft. 19/6; External S/Dipole, 26/3.  
Band III (I.T.V.). 3-element loft array, 24/-; 5-element 32/6. External wall mounting, 3-element, 33/9; 5-element, 41/3.  
Combined (B.B.C.-I.T.V.). Loft 1+3 element, 41/3; 1+5 element, 48/9. External wall mounting 1+3 element, 58/3; 1+5 element, 63/9. Room aerial, 12/9.

Band II (F.M.). Loft S/Dipole 12/6; loft "H." 28/-; External S/Dipole, 26/3. Postage and Packing all types, 2/6. Co-axial, 8d. yd.; Co-axial plugs 1/3. State channel when ordering. S.A.E. for Price List. Trade enquiries invited.

**KVA ELECTRONICS**  
189, Kent House Rd., Beckenham, Kent SYD 2488

**AC/DC MULTIMETER 45/-**

Build yourself this fine multimeter for 45/- 500µA meter included. No calibrating or adjustments, just wire up. Ranges 15, 60, 150, 600 volts A.C. and D.C. at 1,900 ohms per volt; 6, 60, 600 mA D.C. 1 ohms range. Kit is in two parts and comprises Part "A" 500µA moving coil meter scaled 0-15 and 0-600, three range 1" shunt, one 1" wirewound resistor, 1 p. 8 w. switch and 4 p. 3 w. switch. Part "B", five special 1% and one 10% high stability resistors, potentiometer, G.E.C. meter rectifier, Part "A" with circuit, instructions, 26/-, p. & p. 1/6, available now. Part "B" 19/-, p. & p. 9d., available next month, 45/-, post free if ordered together. This is terrific value. Order Now. Limited Supplies. Goods previously advertised still available.

S.A.E. with enquiries, please.

**PLANET INSTRUMENT CO.**  
25, DOMINION AVE., LEEDS, 7.

**TRANSISTORS ARE OUR SPECIALTY FULL TECHNICAL ADVICE SERVICE ALL PRICES ARE POST PAID**

Transistors. Red Spot, 8/-; Red/Yellow Spot (P.F.), 21/-; Green/Yellow (Audio), 10/-; Crystal Diodes, 1/3.  
-Transistor Portable Circuit, 1 6.  
-3-Transistor Radio Circuit, 11d.

Complete kit £3.17.6. Speaker extra.

**ELECTROLYTICS—GUARANTEED**  
16 mfd. 450 v. 150 mA. 1 1/2" x 1 1/2" 2/4 each.  
8-8 mfd. 450 v. 100 mA. 1 1/2" x 1 1/2" 2/9.  
8-16 mfd. 450 v. 100 mA. 1 1/2" x 1 1/2" 2/9.  
50 mfd. 50 v. 1 1/8. 25 mfd. 25 v. 1/8.  
Condensers: .01 mfd. 1,000 v., 6d.  
.1-350 v., 8d.; .002 150 v., 6d.; .005-150 v., 6d.  
Resistors: All Values 10% 1/2 watt, 6d. ea.

**HEADPHONES.** Low Res. Exw.D. 9/11  
TERMS: C.W.O. or C.O.D. (over £2)  
FULL COMPONENT LIST, 6d.

**OAKFIELD RADIO**  
44 OAKFIELD ROAD, STOCKPORT

## NEW ELECTROLYTICS FAMOUS MAKE MINIATURE TUBULAR

150 v., 1/6; 350 v., 1/9; 212 v., 1/6; 275 v., 1/9; 4/350 v., 1/9; 8/350 v., 2/9; 10.25 v., 2/6; 12.150 v., 2/-; 20/12 v., 2/-; 25.25 v., 2/6; 50.12 v., 1/9; 100.6-12-25 v., 2/-; .033/200 v., .01/350 v., .03/200-350 v., .001 350 v., .002500 v., .5/250 v., .1/350-200 v., 10/- doz. 16 16 450 v., 5/- TRANSISTOR CONDENSER.—1.25 v., 2/12 v., 4/12 v., 8.3 v., 6 v., 15 v., 10/3 v., 2/6 each.

Terms: C.W.O. Please add postage.

**G. GODDARD**

5, LAVINGTON ROAD, EALING,  
LONDON, W.13

## TELEVISION

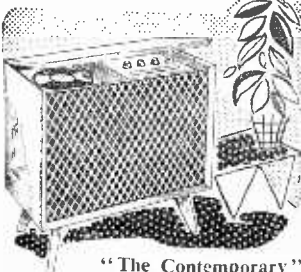
The advance of Radio Technique will offer unlimited opportunities of high pay and secure posts for those Radio Engineers who have had the foresight to become technically qualified. How you can do this quickly and easily in our spare time is fully explained in our unique handbook.

Full details are given of A.M., B.I.T., R.E., City & Guilds Exams., and particulars of up-to-date courses in Wireless Engineering, Radio Servicing, Short Waves, Television, Mathematics, etc., etc. We guarantee "NO PASS—NO FEE." Prepare for to-morrow's opportunities and future competition by sending for this very informative 144-page guide NOW—FREE and without obligation.

**BRITISH INSTITUTE OF  
ENGINEERING TECHNOLOGY**  
(Dept. 242), COLLEGE HOUSE,  
29-31, WRIGHT'S LANE, KENSINGTON, W.8

## CABINETS & HI-FI EQUIPMENT

We can supply any Cabinet  
to your own specification



"The Contemporary"  
£9. 15. 0

This beautifully made cabinet is oak veneered with mahogany interior and is waxed finished. Available in any shade to order at slightly extra cost. We can also supply and fit this on any cabinet with the latest Hi-Fi amplifiers, tuners, transcription units, record changers, speakers, etc.

Send for comprehensive illustrated catalogue of cabinets, chassis, autochangers, speakers, etc., all available on cash H.P. terms.

**LEWIS RADIO COMPANY**  
(Dept. PW5) 120, GREEN LANES,  
PALMERS GREEN (Nr. The Cock),  
N.13. BOWES Park 1155/6

## TEST METERS

D.C. Brand New ex-W.D. By famous makers at a fraction of original cost. Size 4 x 4 x 2½ ins.

Reads: 0-5,000 ohms. 0-500 ohms  
0-60 milliamps. 0-300 volts.  
0-1.5 volts.

Moving Coil can be converted to A.C.



**22/6**

Plus 2/- postage.

MADE TO LAST A LIFETIME.

**NORMAN H. FIELD, Electronics,**

20, Snow Hill, Birmingham, 4  
and 68, Hurst Street, Birmingham, 5.

## FM and HI-FI Components

DENCO F.M. TUNER circuits	1s. 6d.
RADIO CONST'R. F.M. "	2s. 0d.
MULLARD AMPLIFIERS "	3s. 6d.
G.E.C. 912 PLUS AMPLIFIER "	4s. 0d.
G.E.C. F.M. PLUS TUNER "	2s. 6d.

Separate price lists available on request to

**J. T. FILMER 82, DARTFORD RD.,  
DARTFORD, KENT.**  
Tel. Dartford 4057.

## Constructors! Build the "PIXIE-PAK"

Pocket-sized Loudspeaker Set

This receiver is designed for cheapness, ease of construction, and guaranteed reception. Using transistors and the minimum of easily obtainable components, it is powered by small torch cells, and contained in a pocket-sized plastic case.

Covering long and medium wavebands it provides loudspeaker reception in most districts without an aerial or earth. In poor reception areas a short indoor aerial is sufficient.

Send stamped, addressed envelope for free illustrated folder, component layout, full description, and price list.

This offer applies only to Great Britain and Northern Ireland.

## RADIO COMPONENT SERVICE

No. 1, Summers Rd., Bristol, 2.

Orders By Post Only.

When replying to Advertisements  
please mention  
"PRACTICAL WIRELESS"

## SPARKS' DATA SHEETS presents

### THE "SEAFARER"

Battery Two-valver offering New Interests and Thrills on Trawler, Ship-to-Shore, Aeronautical and 80/160 m. Amateur Bands Plus normal Med. and Long-waves. A Great Little Set. Data Sheet, etc., etc. 3/3. All Components and Chassis available.

**L. ORMOND SPARKS (P), VALLEY ROAD, CORFE CASTLE, DORSET**

## TRANSISTOR SUPPLIES

TRANSISTORS. L.F. 7/6; R.F. 13/6; Mullard OC71, 24/-; OC72, 30/-; Matched pairs OC72, £3. Diodes, 1/6; Mullard 5/-; Brimar, 7/6. MORCO TRANSISTOR and Diode Coil for transistor and diode circuits, 3/-. TRANSISTOR TRANSFORMERS. Interstage, 8/6; Driver Push-Pull, 8/6; Push-Pull output, 8/6. ELECTROLYTICS for transistor circuits, 8/P. 2/-; 15/P. 2/-; 50/P. 1/6. TELETRON COMPANION PARTS, 87/-. All items at Manufacturers' Prices. FERRITE ROD ASSEMBLY. Long, medium wave and coupling coil for MORCO CIRCUIT, 13/6. LOUD-SPEAKER, sensitive P.M. 5in., 18/6; output transformer for same, 5/-. HEAD-PHONES, I.R. 8/6; H.R. (2,000 ohms), 17/6. TRANSFORMERS, MULLARD CIRCUIT, 20/-; Bargain Line—Balanced Inserts (as miniature speakers), 5/-; Trimmers 100, 250, 750 H., 1/9; Var Condenser, air 0.003 5/-; Bins, speakers with output trans., 16/6; Sub-Miniature Transistor Transformers, 8/6; MORCO RELEN RECEIVER. We claim this to be the best two transistor receiver on the market. Gives loudspeaker results from indoor aerial (some districts without aerial), details in our notes (see below). Terms: C.W.O. postage extra. Excess refunded. Sand 8d. stamps for transistor circuits and list.

## MORCO EXPERIMENTAL SUPPLIES

(Props.: Moorcs (Sheffield), Ltd.)

8 & 10, GRANVILLE ST., SHEFFIELD, 2

Tel.: 27461

## Full-range VHF/FM Radio Units

1½ Guineas

POPULAR HI-FI AMPLIFIERS, GRAM UNITS, etc., in cabinets to match. FM HIGH GAIN LOOP AERIALS for fringe reception, 35/6. All products fully guaranteed. Easy payment terms available.

Full details from:

**M. RICHARDS  
RADIO & TELEVISION SERVICE  
CARVOZA BLD., TRURO, CORNWALL**

## COVENTRY RADIO

Component Specialists  
since 1925

We have now trebled  
the size of our premises  
in order to supply a  
larger range of Com-  
ponents, Amplifiers and  
Hi-Fi Equipment.

Send your enquiries to:

189-191 Dunstable Road,  
Luton, Beds.

New Telephone No.:  
LUTON 7388-9

Practical Wireless

**BLUEPRINT SERVICE**

**PRACTICAL WIRELESS**

*No. of  
Blueprint*

**CRYSTAL SETS**

- 2/- each
- 1937 Crystal Receiver ... PW71\*
- The "Junior" Crystal Set ... PW94\*
- 2/6 each
- Dual-Wave "Crystal Diode" ... PW95\*

**STRAIGHT SETS**

**Battery Operated**

- One-valve : 2/6 each
- The "Pyramid" One-valver (HF Pen) ... PW93\*
- The Modern One-valver ... PW96\*
- Two-valve : 2/6 each
- The Signet Two (D & LF) ... PW76\*
- 3/6 each
- Modern Two-valver (two band receiver) ... PW98\*
- Three-valve : 2/6 each
- Summit Three (HF, Pen, D, Pen) ... PW37\*
- The "Rapide" Straight 3 (D, 2 LF (RC & Trans)) ... PW82\*
- F. J. Camm's "Sprite" Three (HF, Pen, D, Tet) ... PW87\*
- 3/6 each
- The All-dry Three ... PW97\*
- Four-valve : 2/6 each
- Fury Four Super (SG, SG, D, Pen) ... PW34C\*

**Mains Operated**

- Two-valve : 2/6 each
- Selectone A.C. Radiogram Two (D, Pow) ... PW19\*
- Three-valve : 4/- each
- A.C. Band-Pass 3 ... PW99\*
- Four-valve : 2/6 each
- A.C. Fury Four (SG, SG, D, Pen) ... PW20\*
- A.C. Hall-Mark (HF, Pen, D, Push Pull) ... PW45\*

**SUPERHETS**

- Battery Sets : 2/6 each
- F. J. Camm's 2-valve Superhet ... PW52\*
- Mains Operated : 4/- each
- "Coronet" A.C.4 ... PW100\*
- AC/DC "Coronet" Four PW101\*

*No. of  
Blueprint*

**SHORT-WAVE SETS**

**Battery Operated**

- One-valve : 2/6 each
- Simple S.W. One-valver ... PW88\*
- Two-valve : 2/6 each
- Midget Short-wave Two (D, Pen) ... PW38A\*
- Three-valve : 2/6 each
- Experimenter's Short-wave Three (SG, D, Pow) ... PW30A\*
- The Perfect 3 (D, 2 LF (RC and Trans)) ... PW63\*
- The Band-spread S.W. Three (HF, Pen, D (Pen), Pen) ... PW68\*

**MISCELLANEOUS**

- 2/6 each
- S.W. Converter-Adapter (1 valve) ... PW48A\*
- The P.W. 3-speed Autogram ... (2 sheets), 8/-\*
- The P.W. Monophonic Electronic Organ (2 sheets), 8/-

**TELEVISION**

- The "Argus" (6in. C.R. Tube), 3/-\*
- The "Super-Visor" (3 sheets), 8/-\*
- The "Simplex" ... 3/6\*
- The P.T. Band III Converter 1/6\*

*All the following blueprints, as well as the PRACTICAL WIRELESS numbers below 94, are pre-war designs, kept in circulation for those amateurs who wish to utilise old components which they may have in their spares box. The majority of the components for these receivers are no longer stocked by retailers.*

**AMATEUR WIRELESS AND WIRELESS MAGAZINE**

**STRAIGHT SETS**

**Battery Operated**

- One-valve : 2/6
- B.B.C. Special One-valver ... AW387\*

**Mains Operated**

- Two-valve : 2/6 each
- Consoelectric Two (D, Pen), A.C. ... AW403

**SPECIAL NOTE**

THESE blueprints are drawn full size. The issues containing descriptions of these sets are now out of print, but an asterisk denotes that constructional details are available, free with the blueprint.

The index letters which precede the Blueprint Number indicate the periodical in which the description appears. Thus P.W. refers to PRACTICAL WIRELESS, A.W. to *Amateur Wireless*, W.M. to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the Blueprint (stamps over 6d. unacceptable) to PRACTICAL WIRELESS, Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

*No. of  
Blueprint*

**SHORT-WAVE SETS**

**Battery Operated**

- One-valve : 2/6 each
- S.W. One-valver for American ... AW429\*

**Two-valve : 2/6 each**

- Ultra-short Battery Two (SG, det Pen) ... WM402\*

**Four-valve : 3/6 each**

- A.W. Short Wave World-beater (HF, Pen, D, RC, Trans) ... AW436\*

**Standard Four-valver**

- Short-waver (SG, D, LF, P) ... WM383\*

**Mains Operated**

**Four-valve : 3/6**

- Standard Four-valve A.C. Short-waver (SG, D, RC, Trans) ... WM391\*

**MISCELLANEOUS**

- Enthusiast's Power Amplifier (10 Watts) (3/6) WM387\*

- Listener's 5-watt A.C. Amplifier (3/6) ... WM392\*

- De Luxe Concert A.C. Electrogram (2/6) ... WM403\*

**QUERY COUPON**

This coupon is available until Mar. 6th, 1958 and must accompany all Queries, sent in accord with the notice on our "Open to Discussion" page. PRACTICAL WIRELESS, MAR. 1958.

Published on the 7th of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, Strand, London, W.C.2. and printed in England by W. SPEAIGHT & SONS, Exmoor Street, London, W.10. Sole Agents for Australia and New Zealand: GORDON & GOTCH (A/sia), LTD. South Africa: CENTRAL NEWS AGENCY, LTD. Subscription rate including postage, for one year: Inland 19s., Abroad 17s. 6d. (Canada 16s.). Registered at the General Post Office for the Canadian Magazine Post.



# ANYONE CAN BUILD THESE CHEAPLY!

LOOK!



**BUILD THIS POCKET RADIO FOR ONLY 37/6**

**AT LAST!** In response to many requests we now present the **HIGH EFFICIENCY PEN-TODE™ SKYPOCKET™** a beautifully designed precision **POCKET RADIO**. No radio knowledge needed! **EVERY SINGLE PART TESTED BEFORE DESPATCH**—our simple, pictorial plans take you **step-by-step**. This set has a remarkably sensitively due to painstaking design. Covers all medium waves 200 to 550 Metres. Size only 5 1/2 in. x 3 in. x 2 in. in Strong Transparent case with panel, cover and ivory dial. A really personal-phone, pocket-radio with **DETACHABLE ROD AERIAL**. Self-contained all-dry battery operation. Average building time 1 hour. **Total Building Cost—including Case, High Efficiency Pentode Valves, etc., in fact, everything down to the last nut and bolt—ONLY 37/6**, with plans. Postage etc. 2/- C.O.D. 1/6 extra. (Parts sold separately. Priced Parts List, etc. 1/6.) Demand is certain to be heavy—so **SEND TODAY!**



**47/6**

Build this exceptionally sensitive high efficiency Pentode radio. Uses unique assembly system and can be built by anyone without any radio knowledge whatever in 45 minutes. Handsome black-crackle steel case with specially made black and gold dial with stations printed. Size of radio only 6 1/2 in. x 5 1/2 in. x 3 in. Covers all Medium and Long waves—uses only one all-dry battery. H.T. consumption only 1 to 1.5 mA. Uses personal phone. Ideal for Bedroom, Garden, Holiday, etc. Many unsolicited testimonials. **Mr. Norton, of Oxford writes: "Yesterday evening on the Medium waveband, I counted 32 separate stations. I am very pleased with the set, which is well worth the money. BUILD THE SKYROMA NOW!"** Total building cost—everything down to last nut and bolt—47/6 (Postage, etc. 2/-)—with full set of clear, easy-to-follow plans. (Parts sold separately. Priced Parts Lists, etc. 1/6.)



**107/6**

Total building cost including choice of beautiful walnut veneered cabinet or ivory or brown bakelite. This is the lowest possible price consistent with high quality. No radio knowledge whatever needed... can be built by anyone in 2-3 hours, using our very simple easy-to-follow diagrams. The terrific new circuit of the **"OCEAN-HOPPER"** covers all medium and long waves with optional negative feedback, has razor-edge selectivity, and exceptionally good tone. Price also includes ready drilled and punched chassis, set of simple easy-to-follow plans—in fact, everything! All parts sparkling brand new—no junk! Every single part tested before despatching. Uses standard octal-base valves: 6K7G high-frequency pentode feeding into 6J5G anode-bend detector triode, coupled to 6V6G powerful output beam-power tetrode, fed by robust rectifier. For A.C. Mains, 200-250 Volts (low running costs—approximately 18 Watts!). Size 12 in. x 6 in. x 5 in. Build this long range powerful midget NOW. All parts and set of plans, £5.7.6. (Post and packing 3/6.) Parts sold separately. Priced Parts List. 1/6.

## Build This TRANSISTOR POCKET SET For Only 49/6!



**FEW ONLY AT 95/-!**

**NEW** in maker's sealed cartons!—limited quantity of the famous 3-speed record player units, exceptionally easy to fix, with lightweight pick-up, incorporating "Acos" crystal turnover head and separate sapphire stylus for Standard and Long-Playing. With full instructions and fixing plans. Unbeatable price 95/- plus 3/6 Post, Packing, etc. C.O.D. 2/- extra. **RUSH YOUR ORDER NOW—BEFORE IT'S TOO LATE!**

**WE'VE DONE IT AGAIN!** In our design department in response to a great many requests have designed this **"SKY PINE"** Vest-Pocket **TRANSISTOR RADIO** which gives a superb performance. It is highly sensitive. Size only 4 1/2 in. x 3 1/2 in. x 1 in., the weight under 7 ozs.—yet it is a **TWO-STAGE** receiver covering all medium waves, working entirely off a tiny "pen-light" battery, which costs 6d.—fits inside the case—and lasts many months. Uses personal phone and has push-button **LUMINOUS** On Off Switch. Every part tested before despatch. **SPECIAL STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS**. Total building cost including case, transistors, etc.—everything down to the last nut and bolt—**ONLY 49/6** with plans. Postage, etc. 2/- C.O.D. 1/6 extra. (Parts sold separately. Priced parts list, etc. 1/6.) As the building cost is absolutely "rockbottom" (it might increase later) **DEMAND WILL BE VERY HEAVY—RUSH YOUR ORDER TO-DAY!**



**ONLY £8-12-6**

**BRAND NEW—NOT SURPLUS!** In maker's sealed cartons. Latest UAR "Monarch" 4-speed record-player complete with High-fidelity "turnover" head. Type HGP 37-1. Capacity of 10 Records—plays 12 in., 10 in. and 7 in. intermixed in any order. 78, 45, 33 and 16 r.p.m. For A.C. mains 100 to 250 volts. Exclusive "mardisk" selector gives quickest and quietest change ever. With full instructions and fixing plans. **Limited Quantity at £8.12.6, plus 4/6 Post, Packing, etc. WHY PAY MORE? STAND NOW WHILE STOCKS LAST!**—modernise your radiogram and increase its value.

**BUILD THIS TRANSISTOR SET FOR ONLY 35/-**  
**VERY SPECIAL OFFER WHILE STOCKS OF PARTS LAST!**—The "Sky-Scope" Pocket two-stage transistor set, size only 1 in. x 3 1/2 in. x 1 in. Covers all medium waves and works entirely off tiny "pen-light" battery which costs 6d. and fits inside case. All parts tested before despatch. Can be built for 35/- plus 2/- post and packing, including Case, Transistor SET, STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS, nuts, bolts, etc. (C.O.D. 1/6 extra.) Parts sold separately, priced parts list, etc. 1/6. **VERY SIMPLE TO BUILD.**

**CONCORD ELECTRONICS** Dept. PWS  
 69, PRESTON STREET, BRIGHTON.

Orders receive prompt attention. Cheques accepted. Cash on delivery 1/6 extra. Please print name and address in block letters. Suppliers to Schools, Universities, Government and Research Establishments. Complete range of components and valves stocked. CALLERS WELCOME. Shop Hours: 9 a.m. to 6 p.m. (1 p.m. Thursday). Reorder no C.O.D. abroad.