

A SHIPPING & MEDIUM WAVEBAND RECEIVER

PRACTICAL 13

OCTOBER
1958

EDITOR: F.J. CAMM

WIRELESS



Contents

RADIO SHOW REPORT

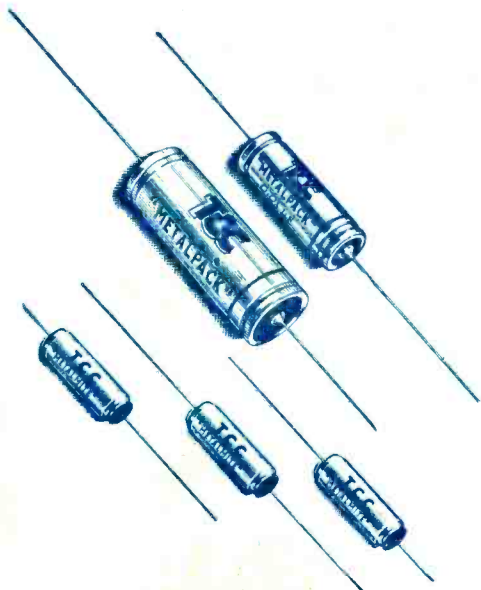
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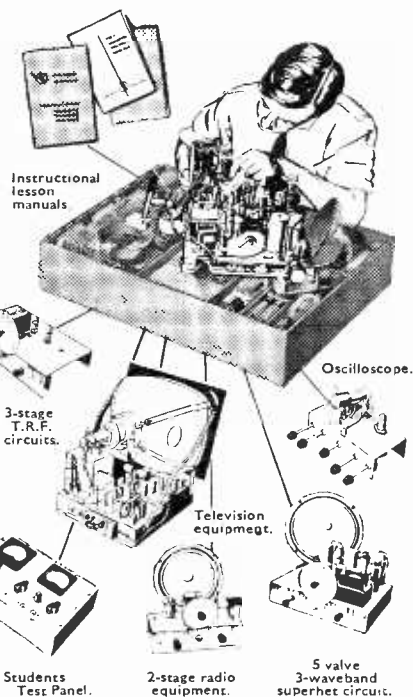
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| IA3 | 3/- | 6B8G | 4/6 | 6SH7 | 8/- | 12K8GT | 14/- | 85A2 | 15/- | DL94 | 9/- | EF89 | 10/- | KTZ63 | 10/6 | SP61 | 3/6 | W77 | 5/6 |
| IA5 | 6/- | 6B8GTM | 5/- | 6SJ7 | 8/- | 12Q7GT | 7/6 | 90AG | 32/6 | DL96 | 10/- | EF91 | 7/6 | L63 | 6/- | SU61 | 10/6 | W81M | 6/6 |
| IC5 | 12/6 | 6BA6 | 7/6 | 6SK7GT | 8/- | 12SA7 | 8/6 | 150B2 | 15/- | DLS10 | 10/6 | EF92 | 5/6 | LN152 | 14/- | TH30C | 25/- | X61 | 12/6 |
| ID6 | 10/6 | 6BE6 | 7/6 | 6SL7GT | 8/- | 12SC7 | 8/6 | 220P | 10/6 | DM70 | 8/6 | EL32 | 5/6 | LP2 | 9/6 | TP22 | 15/- | X63 | 10/- |
| IHS5T | 11/- | 6BJ6 | 7/6 | 6SN7GT | 7/6 | 12SG7 | 8/6 | 807 | 7/6 | E180F | 20/- | EL35 | 19/6 | LZ319 | 9/- | U16 | 12/- | X65 | 12/6 |
| IL4 | 6/6 | 6BR7 | 11/6 | 6SS7 | 8/- | 12SH7 | 8/6 | 956 | 3/- | EA50 | 2/- | EL41 | 11/- | MH4 | 7/- | U18/20 | 10/- | X66 | 12/6 |
| ILD5 | 5/- | 6BW6 | 9/6 | 6U4GT | 14/- | 12SJ7 | 8/6 | 1203 | 7/- | EA76 | 9/6 | EL42 | 11/- | MHL4 | 7/6 | U22 | 8/- | XD(1.5) | 6/6 |
| ILN5 | 5/- | 6BW7 | 8/- | 6U5G | 7/6 | 12SK7 | 8/6 | 4033L | 12/6 | EABC80 | 9/- | EL81 | 15/- | MHLd6 | 12/6 | U26 | 14/- | XD2.0 | 10/6 |
| INS5T | 11/- | 6BX6 | 8/- | 6U7G | 8/6 | 12SQ7 | 8/6 | 5763 | 12/6 | EAC91 | 7/6 | EL84 | 10/6 | MHL4 | 12/6 | U31 | 10/- | XE2 | £5 |
| IR5 | 8/- | 6C4 | 7/- | 6VG6 | 7/- | 12SR7 | 8/6 | 7193 | 5/- | EAF42 | 10/6 | EL91 | 5/- | ML6 | 6/6 | U43 | 10/6 | XE3 | £5 |
| I55 | 8/- | 6C5 | 6/6 | 6V6GTG | 8/- | 12Y4 | 10/6 | 7475 | 7/6 | EB34 | 2/6 | EM34 | 10/6 | MU14 | 10/- | U45 | 10/6 | XFG1 | 18/- |
| IT4 | 6/6 | 6C6 | 6/6 | 6X4 | 7/- | 14R7 | 10/6 | 9002 | 5/6 | EB41 | 8/6 | EM80 | 10/6 | OA10 | 12/6 | U50 | 8/- | XFR1 | 21/- |
| IU7 | 10/6 | 6C8 | 12/6 | 6X5GT | 6/6 | 14S7 | 17/- | 9003 | 5/6 | EB91 | 6/6 | EM81 | 10/6 | OA70 | 5/- | U52 | 8/6 | XFR2 | 21/- |
| 2A7 | 10/6 | 6C9 | 12/6 | 6Z4/84 | 12/6 | 19AQ5 | 11/- | 9006 | 6/- | EBC33 | 7/6 | EN31 | 34/9 | OA71 | 5/- | U76 | 7/6 | XFR3 | 21/- |
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| 2X2 | 4/6 | 6D6 | 6/6 | 7A7 | 12/6 | 25L6GT | 10/- | DDD | 15/- | EBF89 | 9/6 | EY51 | (Large) | P215 | 10/6 | UABC80 | 10/6 | XFW50 | 17/6 |
| 3A4 | 7/- | 6E5 | 12/6 | 7B7 | 8/6 | 25Y5 | 10/6 | AC/PA | 8/- | EC52 | 5/6 | EY86 | 14/6 | PABC80 | 15/- | UABC80 | 10/6 | XYF12 | 6/6 |
| 3A5 | 12/6 | 6F6G | 7/- | 7C5 | 8/- | 25Y5G | 10/6 | AC/VPI | 15/- | EC54 | 6/- | EC70 | 12/6 | PCC84 | 9/- | UAF42 | 10/6 | XYF14 | 17/6 |
| 3B7 | 12/6 | 6F6GTM | 8/- | 7C6 | 8/- | 25Z5 | 10/6 | AL60 | 10/- | EC70 | 12/6 | EZ35 | 6/6 | PCC85 | 12/6 | UB41 | 12/6 | XYF15 | 24/6 |
| 306 | 5/- | 6F8 | 12/6 | 7H7 | 8/- | 25Z4G | 10/6 | AP4 | 7/6 | ECC31 | 15/- | EZ40 | 8/6 | PCC80 | 9/- | UBC41 | 8/6 | XYF34 | 17/6 |
| 30A | 7/6 | 6F12 | 7/6 | 7Q7 | 9/- | 25Z6G | 10/6 | ATP4 | 5/- | ECC32 | 10/6 | EZ41 | 10/- | PCF82 | 12/6 | UBF80 | 9/6 | XYF35 | 17/6 |
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| 354 | 7/6 | 6F17 | 12/6 | 7V7 | 8/6 | 28D7 | 7/6 | BL63 | 7/6 | ECC35 | 8/6 | EZ81 | 9/- | PCL82 | 11/6 | UCB85 | 10/6 | XYF43 | 17/6 |
| 3V4 | 9/- | 6F32 | 10/6 | 7Y4 | 8/6 | 30 | 7/6 | CK506 | 6/6 | ECC81 | 8/- | FW4/800 | 10/6 | PCL83 | 11/6 | UCCH2 | 11/- | XYF51 | 17/6 |
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| 5Z3 | 12/6 | 6IS5GT | 6/6 | 10F18 | 12/6 | 30P11 | 12/6 | D42 | 10/6 | ECCF82 | 13/6 | HABC80 | 10/6 | PM2B | 12/6 | UL41 | 10/6 | XLO1.5 | 10/6 |
| 5Z4G | 10/6 | 6I6 | 5/6 | 10LD3 | 8/6 | 31 | 7/6 | D63 | 5/- | ECH35 | 9/6 | 13/6 | 13/6 | PM12 | 6/6 | UL84 | 11/6 | XPI.5 | 12/6 |
| 5Z4GT | 12/6 | 6I7G | 6/6 | 10LD11 | 16/9 | 33A/158M | 10/6 | D77 | 6/6 | ECH42 | 9/6 | HK90 | 10/6 | PM12 | 6/6 | UY41 | 8/6 | XP2.0 | 12/6 |
| 6A8 | 10/- | 6I7GT | 10/6 | 10P13 | 17/6 | 30/- | 30/- | DAC32 | 11/- | ECH81 | 9/- | HL23 | 10/6 | PM12M | 6/6 | UL84 | 11/6 | XP1.5 | 12/6 |
| 6AB7 | 8/- | 6K6GT | 8/- | 11E3 | 15/- | 35/5J | 12/6 | DAF91 | 8/- | ECL80 | 14/- | HL41 | 12/6 | PY80 | 8/- | UY41 | 8/6 | XP2.0 | 12/6 |
| 6AB8 | 14/6 | 6K7G | 5/- | 12A6 | 6/6 | 35A5 | 5/6 | DAF96 | 10/- | ECL82 | 12/6 | HL13DD | 12/6 | PY81 | 9/- | UY85 | 10/6 | XR4 | 48/- |
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| 6AG5 | 6/6 | 6K8G | 8/- | 12AH8 | 10/6 | 35W4 | 8/6 | DF91 | 6/6 | EF37A | 8/- | HVR2 | 20/- | YP83 | 7/6 | VLS492A | £3 | XSG2.0 | 15/6 |
| 6AJ8 | 9/- | 6K8GTG | 10/6 | 12AT6 | 10/6 | 35Z3 | 10/6 | DF96 | 10/6 | EF39 | 6/- | HVR2A | 6/- | QP21 | 7/6 | VMPAG | 15/- | XVS2.0 | 15/6 |
| 6AK5 | 8/- | 11/- | 12AT7 | 8/- | 35Z4 | 7/6 | DH63 | 10/- | EF40 | 15/- | KF35 | 8/6 | QP25 | 15/- | VP2(7) | 12/6 | XW1.5 | 15/6 | |
| 6AK8 | 9/- | 6L6G | 9/6 | 12AU7 | 7/6 | 35Z5GT | 9/6 | DH76 | 7/6 | EF41 | 9/6 | KL35 | 8/6 | QS150/15 | 10/6 | VP4(7) | 15/- | XW2.0 | 15/6 |
| 6AL5 | 6/6 | 6L18 | 13/- | 12AX7 | 9/- | 41MTL | 8/- | DH77 | 8/6 | EF42 | 12/6 | KT2 | 5/- | R2 | 10/6 | VR105/30 | 9/- | Y63 | 7/6 |
| 6AM5 | 5/- | 6N7 | 8/- | 12BA6 | 9/- | 50C5 | 12/6 | DK91 | 8/- | EF50(A) | 7/- | KT33C | 10/6 | R12 | 12/6 | 9/- | Z63 | 10/6 | |
| 6AM6 | 7/6 | 6Q7G | 10/- | 12BE6 | 10/- | 50L6GT | 9/6 | DK92 | 10/6 | EF50(E) | 5/- | KT44 | 15/- | SD6 | 12/7 | VR150/30/9P | Z66 | 20/- | |
| 6AQ5 | 8/6 | 6Q7GT | 11/- | 12E1 | 30/- | 72 | 4/6 | DK96 | 10/6 | EF54 | 5/- | KT63 | 7/6 | SP4(7) | 15/- | VT61A | 5/- | Z77 | 7/6 |
| 6AT6 | 8/6 | 6R7G | 10/- | 12H6M | 3/- | 77 | 8/6 | DL2 | 15/- | EF73 | 10/6 | KTW61 | 8/- | SP41 | 3/6 | VT501 | 5/- | Z719 | 8/- |
| 6AU6 | 10/6 | 6SA7GT | 8/6 | 12J5GT | 4/6 | 78 | 8/6 | DL33 | 9/6 | EF80 | 8/- | KTW62 | 8/- | SP42 | 12/6 | W76 | 7/6 | Z729 | 17/6 |
| 6B4G | 6/6 | 6SC7 | 10/6 | 12K7GT | 10/6 | 80 | 9/- | DL66 | 15/- | EF85 | 7/6 | KTW63 | 8/- | | | | | | |
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| RM-0 | 7/11 | RM-5 | 24/- | WX6 | 3/6 | 14A163 | 38/- | 14RA | 2-1-16-1 | 21/- | 18RA | 1-1-16-1 | 6/6 |
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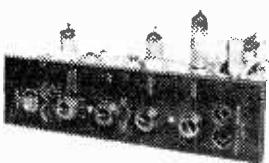
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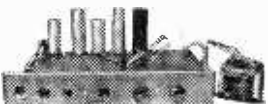
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CREDIT SALE, deposit **£6.17.0** and 9 monthly payments of **£2.10.0**. HIRE PURCHASE, deposit **£13.13.0** and 12 monthly payments of **£1.5.4**.

• TRUVOX MK. IV DECK (Incorporating Precision Rev. Counter). CREDIT SALE, deposit **£7.12.3** and 9 monthly payments of **£2.15.10**. HIRE PURCHASE, deposit **£13.4.8** and 12 monthly payments of **£1.8.3**.

• FORTABLE CARRYING CASE (as illustrated), accommodates HF TR2 Amplifier and available for Truvox or Collaro Decks **£5.0.0**

• High Output ACOS CRYSTAL MICROPHONE **£1.15.0**

• 10in. x 6in. P.M. LOUDSPEAKER **£1.10.0**

• 7in. x 4in. P.M. LOUDSPEAKER **16 9** and **19 6**

• 1,200 ft. reels E.M.I. or SCOTCHBOY TAPE **£1.15.0**

We also have a special line good quality Plastic Tape. 1,200 ft. reels at 21/-.

Please send S.A.E. with all correspondence.

STERN RAD LTD.

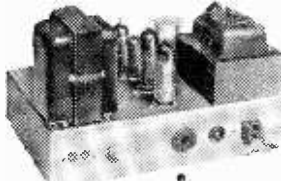
109 & 115 FLEET ST., LONDON, E.C.4

Telephone: FLEET STREET 5812/3/4

**AMPLIFIERS
PRE-AMPLIFIERS
FOR THE "HI-FI" ENTHUSIAST**

**MULLARD DESIGNS FOR
THE
HOME CONSTRUCTOR**

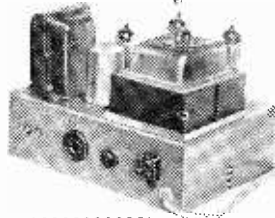
**THE VERY
POPULAR
MULLARD
"5-10" MAIN
AMPLIFIER**



**MULLARD'S
NEW 2-STAGE
PRE-AMPLIFIER
TONE CONTROL**



**THE NEW
MULLARD 3-3
MAIN
AMPLIFIER**



Undoubtedly the most successful amplifier yet designed, and used in conjunction with the new Mullard Pre-Amplifier, an undistorted power output of up to 10 watts is obtained. Thoroughly recommended to the "Hi-Fi" enthusiasts who contemplate a very high quality home installation. In addition the versatility of the equipment makes it quite suitable for use in small halls, etc. We supply complete to MULLARD'S Specification with specified valves and components and including the latest PARMEKO Ultra-linear Output Transformer and the PARMEKO Mains Transformer which has power available to drive Radio Tuning Unit.

COMPLETE KIT **£10.00** Alternatively we supply ASSEMBLED & TESTED **£11.10.0** (Carriage & Insurance 5/- extra.)

THIS "5-10" with the latest PARTRIDGE ULTRA-LINEAR OUTPUT TRANSFORMER for **£1.6.0** tra

A completely new design employing two EFB6 valves, and in particular designed to operate with the Mullard range of Power Amplifiers, but also perfectly suitable for other makes, etc. Briefly it incorporates:

- Equalisation for the latest R.I.A.A. characteristics.
- Input for variable reluctance. ● Magnetic Pick-Ups.
- Input for Crystal Pick-Ups. ● Input for Tape replay.
- (a) Direct from High Impedance Tape Head.
- (b) From a Tape Amplifier or Pre-Amplifier.
- Sensitive Microphone Channel.
- Wide range Bass and TREBLE Controls.
- Attractive Perspex front control panel.
- Our Kit is strictly to MULLARD'S SPECIFICATION.

COMPLETE KIT OF **£6.6.0** Alternatively we supply ASSEMBLED & TESTED **£8.0.0** (Carriage & Insurance 5/- extra.)

Based entirely on the present very popular "3-3" model and designed to operate in conjunction with the new 2-stage PRE-AMPLIFIER (shown left) thus providing all the facilities associated with the more expensive "Hi-Fi" Equipment. We recommend it as the IDEAL HOME INSTALLATION where very high quality is desired at the lower volume level (up to 3 watts). We supply completely to MULLARD'S SPECIFICATION including the latest PARMEKO Output Transformer, specified Valves and Components. Has power available to drive a Radio Tuning Unit.

COMPLETE KIT OF **£7.0.0** Alternatively we supply ASSEMBLED & TESTED **£8.0.0** (Carriage & Insurance 5/- extra.)

● Please enclose S.A.E. if ILLUSTRATED and DESCRIPTIVE LEAFLETS are required; the ASSEMBLY MANUALS, containing Practical Drawings, etc., are available at 1/6 each.

Only NEW HIGH GRADE Components and MULLARD VALVES are supplied with these Kits—

SPECIAL PRICE REDUCTIONS . . .

- (a) The COMPLETE KIT OF PARTS to build both the "3-3" MAIN AMPLIFIER and the 2-STAGE PRE-AMPLIFIER-CONTROL UNIT **£12.10.0**
 - (b) The COMPLETE KIT OF PARTS to build the "5-10" MAIN AMPLIFIER and the 2-STAGE PRE-AMPLIFIER-CONTROL UNIT **£15.15.0**
- PRICES FOR THE "5-10" ARE SUBJECT TO £1.6.0 EXTRA IF THE PARTRIDGE TRANSFORMER IS REQUIRED.

(c) The "3-3" and the 2-STAGE PRE-AMPLIFIER both ASSEMBLED and TESTED **£15.0.0**

CREDIT : DEPOSIT **£3.15.0** & 9 Monthly Payments of **£1.7.6**. H.P. : DEPOSIT **£7.10.0** & 9 Monthly Payments of **19/-**.

(b) The "5-10" and the 2-STAGE PRE-AMPLIFIER both ASSEMBLED and TESTED **£18.18.0**

CREDIT : DEPOSIT **£4.15.0** & 9 Monthly Payments of **£1.14.7**. H.P. : DEPOSIT **£9.0.0** & 12 Monthly Payments of **17/6**. When ordering include an extra 7/6 to cover Carriage and Insurance

Designed for a simple domestic installation with Genuine High Quality reproduction up to a maximum of 10 watts. Separate BASS and TREBLE Controls are incorporated with switched inputs for 78 and L.P. Records plus Radio Tuning Unit. We incorporate SPECIFIED COMPONENTS and NEW MULLARD VALVES. We also give the purchaser the choice of two of the best ULTRA-LINEAR OUTPUT TRANSFORMERS made—first the latest by PARMEKO, LTD., and also the latest by PARTRIDGE (£1.6.0 extra). We also supply the PARMEKO MAINS TRANSFORMER, and this has extra power available to supply a Radio Tuning Unit. The Control Unit can easily be detached from the Amplifier Chassis for use in a remote position.

COMPLETE KIT OF PARTS **£11.10.0** Alternatively we supply ASSEMBLED and TESTED **£13.10.0** (PARMEKO Transformer)

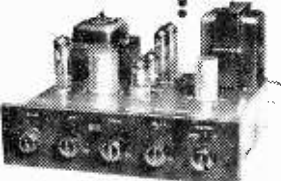
Credit Sale : Dep. **£3.7.6** and 9 Monthly Payments of **£1.4.11**. H.P. Terms. Dep. **£6.15.0** and 8 Monthly Payments of **19/3**. Send S.A.E. for ILLUSTRATED LEAFLET or 1/6 for the COMPLETE ASSEMBLY MANUAL.

THE IDEAL AMPLIFIER FOR A SMALL, HIGH QUALITY INSTALLATION

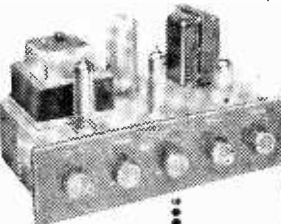
COMPLETE KIT **£7.10.0** Alternatively supplied ASSEMBLED OF PARTS **(plus 6/6 coverage and insurance) £8.19.6**

Developed from the very popular 3-valve 3-watt Amplifier designed in the Mullard Laboratories. Our kit is complete to MULLARD'S SPECIFICATION including supply of specified components, Mullard valves and a PARMEKO OUTPUT TRANSFORMER. Send S.A.E. for leaflet or 1/6 for ASSEMBLY MANUAL.

**THE NEW
COMPLETE
MULLARD 5-10
AMPLIFIER**



**THE NEW
COMPLETE
MULLARD 3-3**



STERN RADIO LTD.

STERN'S FOR STEREO

DULCI'S NEW "STEREO EIGHT" DUAL CHANNEL PRE-AMPLIFIER



A VERSATILE UNIT EQUIPPED WITH EVERY REFINEMENT FOR STEREO or NORMAL "HI-FI" REPRODUCTION

CASH PRICE **£23.20**

CREDIT SALE Deposit **£5.15.6** and 9 months of **£2.2.4** (plus 7/6 carr. ins.). HIRE PURCHASE Deposit **£11.11.0** and 12 months of **£1.5.** This unit can be supplied to correctly operate with our very popular MULLARD "3-3" and "3-10" MAIN AMPLIFIERS (described opposite). For Stereo reproduction TWO Main Amplifiers are necessary but for normal "Hi-Fi" reproduction the "Stereo Eight" is also perfectly suitable to operate with ONE Main Amplifier and the second Main Amplifier can then be added at any time thus transforming a standard "Hi-Fi" installation over to Stereo.

WE OFFER

- (a) The "Stereo Eight" PRE-AMPLIFIER with ONE "3-3" MULLARD MAIN AMPLIFIER **£30.10.0**
- (b) The "Stereo Eight" PRE-AMPLIFIER with TWO "3-3" MULLARD MAIN AMPLIFIERS **£37.10.0**
- (c) The "Stereo Eight" PRE-AMPLIFIER with ONE "3-10" MULLARD MAIN AMPLIFIER **£34.0.0**
- (d) The "Stereo Eight" PRE-AMPLIFIER with TWO "3-10" MULLARD MAIN AMPLIFIERS **£44.10.0**
- (e) The "Stereo Eight" with the DULCI DPA.10 POWER AMPLIFIER **£35.14.0**
- (f) The "Stereo Eight" with TWO DULCI DPA.10 POWER AMPLIFIERS (Provides up to 20 Watts output) **£48.6.0**
- (g) The "Stereo Eight" with the DULCI SP.14 STEREO POWER AMPLIFIER. This comprises TWO MAIN AMPLIFIERS on one chassis and produces up to 8 WATTS output OTHER STEREO EQUIPMENT IS AVAILABLE... INCLUDING...
 • The ROGERS STEREO CONTROL UNIT.....

Or supplied with

- TWO ROGERS "CADET" AMPLIFIERS.....
 - The DULCI "STEREO TWO" TWIN CHANNEL PRE-AMPLIFIER.....
 - The DULCI SP.14 STEREO POWER AMPLIFIER.....
 - B.J. STEREO PICK-UP CARTRIDGE with DIAMOND STYLUS.....
 - The B.J. Arm for this Cartridge is **£5.12.5** extra.
 - COSMOCOD "ACOS" STEREO CARTRIDGE with DIAMOND STYLUS.....
 - The GARRARD ARM for this Cartridge is **£5.17.6** extra.
- A fully descriptive leaflet is available but please enclose S.A.E. HIRE PURCHASE and CREDIT SALE TERMS ARE AVAILABLE.

RECORD PLAYERS

THE VERY LATEST MODELS ARE IN STOCK

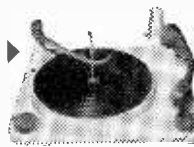
MANY AT REDUCED PRICES!!!

TRANSCRIPTION UNITS—AUTOCHANGERS, SINGLE RECORD PLAYERS.

Send S.A.E. for ILLUSTRATED STOCK LIST.

A FEW CASH BARGAINS

- The latest BSR MONARCH 4 SPEED "MINER" AUTO-CHANGER. Entirely complete with Crystal Pick Up **£6.19.6**
- The latest COLLARO 4 SPEED AUTO-CHANGER—Complete with the Studio "O" Pick Up. (Also available with the "low gain Studio" P" Pick Up for **£8.1.5**) **£7.19.6**
- The latest COLLARO 4 SPEED SINGLE RECORD PLAYER complete with Studio "O" Pick Up **£6.19.6**
- The COLLARO "JUNIOR" 4 SPEED SINGLE RECORD PLAYER, complete with separate Crystal Pick Up (This high output Crystal Pick Up is available separately for **£1.12.6**)



A 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 ONLY **£8.7.6** (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 Auto-changer and is attractively finished in Maroon and Grey Rexine.

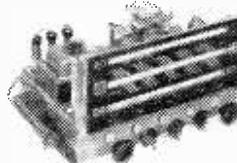
WE ALSO SUPPLY SEPARATELY—

- (a) The 2-Stage (plus Rectifier) AMPLIFIER **£4.2.6**
- (b) THE PORTABLE CARRYING CASE **£3.17.6**
- (c) P.M. SPEAKER..... **18/9**



TO MODERNISE YOUR OLD RADIOGRAM

THE NEW ARMSTRONG "JUBILEE"



A.M./F.M. RADIOGRAM CHASSIS

PRICE **£30.9.0**

(Plus 7/6 carr. and ins.) CREDIT SALE: Deposit **£7.12.3** 9 Months at **£2.15.10**

HIRE PURCHASE: Deposit **£15.5.0** 12 Months at **£1.5.2**

Messrs. Armstrong have always been associated with very high-class equipment, and this chassis is undoubtedly one of the best they have ever produced.

MAIN FEATURES

- 6 watts push-pull output with negative feedback.
- 9 valves and 2 diodes.
- Full F.M. band (87-108 mc/s) plus medium and long waves.
- Automatic frequency control on F.M.
- Adjustable Ferrite rod aerial on A.M. bands.
- Tape playback and record facilities.
- Two compensated pick-up inputs.
- Frequency response 30-22,000 cps, ± 2 dB.
- Separate wide-range bass and treble controls.
- Output impedance for 3-, 7- and 15-ohm SPEAKERS.
- Tuning indicator.
- Provision for booster unit for low output pick-ups.
- A satinised brass dial escutcheon and veneered fascia board is available.
- Size of chassis 12in. x 8in. x 7in. high.

DULCI MODEL H4

A.M./F.M. RADIOGRAM CHASSIS



A 4-waveband Receiver designed for first-rate reproduction of Radio and Gram.

PRICE **£24.6.6**

(Plus 7/6 carr. and ins.) CREDIT TERMS: Deposit **£6.2.0** and 9 Monthly Payments of **£2.4.7**

H.P. TERMS: Deposit **£12.3.3** and 12 Monthly Payments of **£1.2.7**

BRIEF SPECIFICATION

- Covers Short, Medium, Long and F.M. wavebands.
 - Employs full A.V.C.
 - The latest 7-valve line-up.
 - For 3- or 15-ohm P.M. speakers.
 - "Magic Eye" tuning indicator.
 - Excellent tone range up to 4 watts output.
 - Internal aerial for local stations.
 - Overall size 12in. x 8in. x 7in. high
- A Good Quality Chassis and well recommended.

STERN'S MK. II 12/12in F.M. TUNING UNIT

PRICE **£15.0.0**

(Plus 5/- carr. & ins.)

CREDIT SALE: Deposit **£3.15.0** and 9 Monthly Payments of **£1.7.6**

HIRE PURCHASE: Deposit **£7.10.0** and 9 Monthly Payments of 19/-

Incorporates the latest MULLARD PERMEABILITY TUNING HEART and the corresponding MULLARD VALVE LINE-UP comprising LC85, 2 type EF85s (or EF85s), EM84 Tuning Indicator, plus 2 type O.A.79s Germanium Diodes. A really first-class Tuner, very attractively presented and comparable to many offered at much higher prices. Power consumption is only 1.5 amps at 6.3 volts and 25 m a at 250 volts.



HOME CONSTRUCTORS! YOU CAN BUILD THIS TUNING UNIT FOR ONLY **£11.0.0** (Plus 5/- carr. & ins.) Please send S.A.E. for fully descriptive leaflet, or the Assembly Manual is available for 1/6. This contains easily followed PRACTICAL DIAGRAMS together with relative instructions.

HOME CONSTRUCTORS

A RANGE OF "EASY TO ASSEMBLE" PREFABRICATED CABINETS

Designed by the W.B. "STENTORIAN" COMPANY for "Hi-Fi" Loudspeaker systems or to accommodate high-quality equipment. The acoustically designed Bass Reflex Cabinets containing the very successful "Stentorian" Speakers give really first-class reproduction and are well recommended. Models are also available to accommodate high-quality Amplifiers, Pre-amplifiers, Tuning Units, Record Players, etc. All models are very easily assembled. In fact only a screwdriver is required. Fully illustrated leaflets are available, including complete specifications of the various STENTORIAN LOUDSPEAKERS. Please enclose S.A.E.



109 & 115 FLEET ST., LONDON, E.C.4
Telephone: **FLEET STREET 5812/3/4**

NO EXPERIENCE NEEDED TO MAKE THESE CHEAP RADIOS!

LOOK!

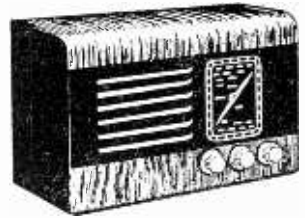


BUILD THIS POCKET RADIO FOR ONLY 37/6

AT LAST! In response to many requests we now present the **HIGH EFFICIENCY PENTODE "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 remarkable sensitivity 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 ipecivan 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 Valve, etc., in fact, everything down to the last nut and bolt—ONLY 37/6**, with plans, Postage, etc. 2/-. **C.O.D. 2/- extra.** (Parts sold separately. Priced Parts Lists & Plans, 1/6.) Demand is certain to be heavy—so **SEND TODAY!**



MAY BE BUILT FOR 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 & Plans, 1/6.) **C.O.D. 2/- EXTRA.**



MAY BE BUILT FOR 107/6 Total building cost including choice of beautiful walnut veneered cabinet of 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 & Plans, 1/6. **C.O.D. 2/- EXTRA.**

Build This TWO-TRANSISTOR POCKET SET For Only 47/6!

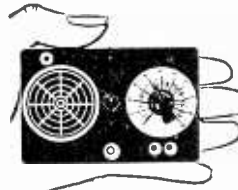


FEW ONLY AT 95/-!

NEW in maker's sealed cartons!—limited quantity of the famous 4-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 TO ORDER NOW—BEFORE IT'S TOO LATE!**

WE'VE DONE IT AGAIN!

our design department in response to a great many requests have designed this **"SKY PINIE" Vest-Pocket TWO-TRANSISTOR PLUS DIODE RADIO** which gives a superb performance. It is highly sensitive. Size only 4 1/2 in. x 3 in. x 1 1/2 in. the weight under 7 ozs.—yet it is a **THREE-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 **LIMITOUS 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 47/6** with plans, Postage, etc. 2/-. **C.O.D. 2/- extra.** (Parts sold separately. Priced parts list & Plans, 1/6.) As the building cost is absolutely **"ROCK-BOTTOM"** (it might increase later) **DEMAND WILL BE VERY HEAVY—RUSH YOUR ORDER TODAY!**

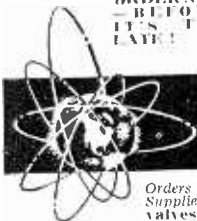


BUILD TRANSISTOR SET FOR ONLY 29/6 **THIS SPECIAL OFFER WHILE STOCK OF PARTS LASTS!**—The "Sky-Seout" Pocket two-stage transistor set, size only 4 1/2 in. x 3 1/2 in. x 1 1/2 in. light "pen-light" battery which costs 6d., and fits inside case. All parts tested before despatch. Can be built for 29/6, plus 2/- post and packing, including Case, Transistor, STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS, nuts, bolts, etc. (C.O.D. 2/- extra). Parts sold separately, priced parts list & Plans, 1/6. **VERY SIMPLE TO BUILD.**



ONLY £7-19-6!

BRAND NEW—NOT SURPLUS! In maker's sealed cartons. Latest UA8 "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 "magdisk" selector gives quickest and quietest change ever. With full instructions and fixing plans. Limited quantities at **£7.19.6**, plus 4/6 Post, Packing, etc. **WHY PAY MORE? SEND NOW WHILE STOCKS LAST!**—modernise your radiogram and increase its value.



CONCORD ELECTRONICS
69 PRESTON STREET BRIGHTON

Dept. PW1

Orders receive prompt attention. Cheques accepted. Cash on delivery 2/- extra. Please print name and address in block letters. Suppliers to Schools, Universities, Government and Research Establishments. Complete range of components and valves stocked. Regret no C.O.D. abroad.

Wireless Set 19—30/-



Transmitter receiver contains £20-£30 worth of spare parts. Complete and in good condition less valves and meter. Price 30/- plus 5/-.

Small Clock Movement

7-day mechanism beautifully made and fully jewelled, few only sale price 12/6 plus 1/6 each.

Simplex Transistor Kit

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

Mains Isolation Transformer



Makes wiring safe. Input 200-250 v., output tapped 200-250 v. Rated at 500 watts, intermittent rating 2,000 watts. Screens for suppressing mains interference. Size 14in. x 6in. x 6in., weight 40lbs. Price £5 12/6. Carriage 7/6 (up to 250 miles).

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.

| | |
|----------------------------|----------|
| Mains transformer | ... 22/6 |
| 6-amp. rectifier | ... 17/6 |
| Regulator Stud Switch | ... 3/6 |
| Resistance Wire | ... 2/- |
| Resistance Former | ... 2/6 |
| Mains on off Switch | ... 2/6 |
| 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.

Variable Rheostat

Heavy duty slider resistor fitted at 25 ohms. Basic resistance is 4 ohms. Can be rewired to suit individual requirements. Ideal for dimmer circuit, etc. Price 8/3, post 2/6.

SUPPRESSOR CONDENSER

Stop your trouble with appliances interfering with your or your neighbours' radio or television. Simple instructions given 1/6 each, 12/- dozen.

Latest AVO Testmeter



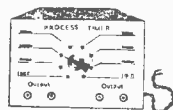
Can be yours for only 10/- deposit and 19 payments of 10/- weekly. Like all AVO meters it is a very fine instrument; it has a sensitivity of 10,000 ohms per volt and 19 most useful ranges as follows—D.C. volts 0-1,000 (seven ranges), A.C. volts 0-1,000 (five ranges), D.C. current 0-1 amp. (two ranges), resistance 0-2 megohms. (2 ranges) complete with test leads. Immediate delivery. Cash price £9.10.0. FREE GIFT.—All purchasers will receive Range Extender scale and data which add capacity 0-1 mfd. in two ranges. Inductance 0-100 henrys, etc. etc.

THERMOSTATS

2 1/2in. x 1in. x 1 1/2in. 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. 8/6. Other types: 1 1/2 amp. 3/6; 5 amp. 2/6; 2 amp. QMB, 5/6; 15 amp. QMB, 15/-; 15 amp. encased wall mounting type, 22/6.

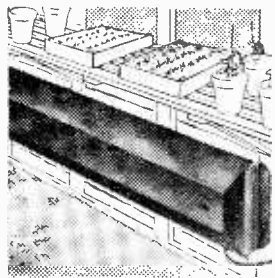


Process Timer for 15/-



Make a time delay switch to work off mains (A.C. or D.C.), all the parts (less case). Price 15/-, post and ins. 2/6.

Instantus Heater



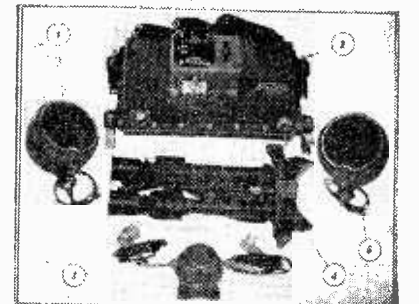
Convector heater. Made from heavy gauge sheet steel (galvanised). For greenhouse, workshop, aviary, etc. 500 watt. £11.2.6; 1,000 watt. £2.10.0, 1,000 watt with wired but separate thermostat. £3.17.6. 2K watt free standing or wall mounting. £3.19.6; 2K watt with built-in thermostat. £4.19.6. Carriage and insurance 5/- per heater. ALL ARE GUARANTEED FOR 5 YEARS.

Introducing . . . THE INDUCTOR 80

80 w 5ft. fluorescent fitting with a 5 year guarantee—uses the latest type of impregnated induction (choke) control gear—absolutely quiet in operation—all steel batten type construction—stove-enamelled white—suitable for direct mounting or for suspending. Undoubtedly the most modern fitting available will last a lifetime and will save its cost in lamps and electricity in about 12 months. Two models available—Type A, fixed voltage suitable for 200-240 v. price 39/6. Type B, Variable voltage suitable for 200-250 v., price 45/-, carriage and insurance up to 150 miles 5/6; up to 250 miles 7/6. Tubes, latest type which give more light for same electricity, daylight or natural to your choice, 14/6 each—no extra carriage if ordered with fitting.

£10 FOR AN IDEA

With the equipment described below you can see but cannot be seen in the dark. It has many obvious uses, driving in the fog, bird and animal watching, rat-catching, watching for intruders, etc., but we believe it has many novel uses and we invite readers suggestions. In fact for the best novel use suggested we will give a prize of £10. If you have an idea, send it in. Closing date October 31st.



As fitted to Army vehicles for night driving, etc. Comprises: 2 Infra Red Radiators, adjustable binoculars, power pack for 6 or 12 volts, control units and inter-connection cables. Original cost probably around £10. Unused and in perfect order—£10, carriage and insurance 10/-, or 10/- deposit and 21 weekly payments of 10/-.

Making a Solder Gun



A 7-sevond solder gun of the type costing £3-4 was described in "Practical Mechanics". 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.

STOP PRESS

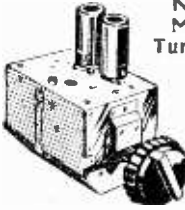
Long, Medium and Short Wave Coil Pack
An exceptionally well made coil pack which covers the standard long, medium and short wave bands for 465 Kc. I.F. complete with diagram of connections, 14/6 plus 1/6 postage and insurance—limited quantity only.
50 More 12 Servive Short—Readers already possessing our service sheets numbers 1-100 will be glad to know that 101-150 are now ready, price 10/- post free.
Electrically Heated Carpet, etc.—Waterproof heater cable 14 ohms per ft., 1/- per yd.
Install 2-way Switches. Our outfit comprises: 30 yd. multicore cable, two 2-way switches, two wood blocks. Full instructions, 9/6 each, post and insurance 2/6.

ELECTRONIC PRECISION EQUIPMENT LTD

Post orders are dealt with from Eastbourne, so for prompt attention please post your orders to 66, Grove Road, Eastbourne, marked Department 7.

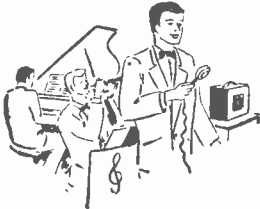
| | | |
|---------------------------------------|-------------------------------------|--|
| 42-46, Windmill Hill, Ruislip, Middx. | 68, Grove Road, Eastbourne, Sussex. | 29, Stroud Green Rd., Finsbury Park, N.4, London, E.C.2. |
| Phone: RUISLIP 5780 | Half day, Saturday. | Phone: ARCHWAY 1049, Phone: CROYDON 6558 |
| Half day, Wednesday. | | Half day, Thursday. Half day, Wednesday. |

NOW 2 MODELS Turret Tuner

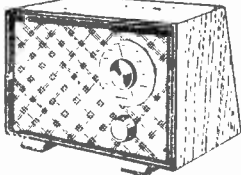


Brand new stock, not surplus, with coils for Band I and III complete with valves. Model I I.F. output 33/33 Mc/s. Series heaters Model 2 I.F. output 16/19 Mc/s. Parallel heaters. With instructions and circuit diagram, 79/6. With knobs 3/6 extra, post and insurance 2/6.

All-Mains Amplifier



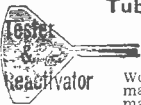
Powerful three-valve mains amplifier ideal for dances, parties, etc. Complete less chassis, cabinet and speaker (available if required)—data 1/6 (free with parts). Price 19/3, plus 2/6 post and insurance.



The Skysearcher

This is a 2-valve plus-metal receiver set useful as an educational set (or 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, 1/1. 3-valve battery version also available at the same price.

Tube Tester and Re-Activator



We can supply all the main components for making this unit which will not only test Cathode Ray Tubes but also will re-activate them, supplied complete with full instructions. Price £3, plus 2/6 post and ins.

A.C./D.C. Multimeter Kit

Ranges: D.C. volts 0.5-0.50, 0-100, 0-500, 0-1,000. A.C. volts 0.5-0.5, 0-100, 0-500, 0-1,000. D.C. milliamperes 0.5-100, 0-500. Ohms 0-50,000 with internal batteries, 0-500,000 with external batteries. Measures A.C./D.C. volts, D.C. current and ohms. All the essential parts include metal case, 2 1/2 in. 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.



SUPER SENSITIVE (2,000 O.P.V.) MULTIMETER KIT

17 ranges including D.C. volts to 1,000 v., A.C. volts to 1,000 v., D.C. milliamperes to 500, ohms to 2 meg., capacity and inductance. All the essential parts, including metal case, selected resistors, wire for shunts, selected switches, calibrated scale and instructions, 32/6, plus 2/6 post and ins.

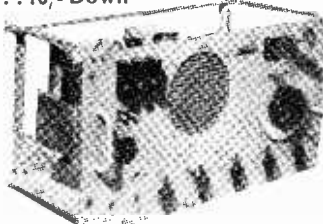
Medresco Hearing Aid

As supplied by National Health, completely overhauled and in good working order with six months' guarantee. Only £2.15.0 plus 2/6 post and ins. Complete with earphone and new ear plug but not batteries, these can be supplied as an extra for 5/- per set.



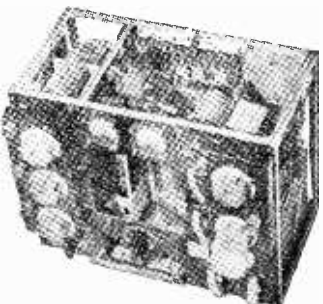
Instructions showing how to convert to pocket radio available free if requested.

Short Wave Communications Receiver R208... 10/- Down



This is a super short wave receiver covering 5-3 metres (10-60 mc/s). Uses 6 valves. Has R.F. stage, 2 I.F. stages B.F.O. etc. Muirhead instrument drive. Two internal power packs, mains and battery vibrator pack. Complete with own P.M. speaker. Provision for phones and speaker muting. Complete in metal transit case; size approx. 24 x 18 x 12; weight 7 1/2 lb. Suitable A.C. mains, 100-250 and 6 volt battery. In perfect condition, practically unused. Tested before despatch and guaranteed. Handbook free with each. Price £6/19/6, carriage and insurance 15/-. Or 10/- deposit, plus 15/- carriage, and 15 weekly payments of 10/-.

Famous Transmitter Virtually Given Away



The famous R1154—unused but slightly soiled and not tested. Covers 200-500 kc/s, 3.5-5 Mc/s and 5.5-10 Mc/s. Has unique "click stop" mechanism (7 stops) and permits selected frequency to be held, returned to, etc. Hartley oscillator, power amplifier, keying and speech. Wonderful breakdown value meters, relays, switches. Complete with valves—real bargain at 29/6, plus 10/- carriage.

Huge Ministry Purchase R.1155—yours for £2 down

Frequency 75 kc/s to 18 Mc/s, 10 valves, metal case, robust receiver, cost over £60 to make—will give years of service, very little used. Price £10 or 5 payments of £2.



Carry. & transit case 15/- etc.

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 19/3, plus 2/6 post and insurance. Data free with parts or available separately 1/6.



Motor Snip

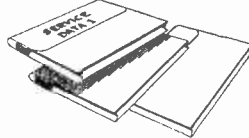
Miniature motor 2 1/2 in. long x 1 1/2 in. diameter. Laminated poles and armature. Separate winding for reversing. Operates off 20-30 v. D.C. or off A.C. mains through stepdown transformer. Original cost at least £3 each. Snip price for one month only 6/6, plus 1/6 postage and insurance.



Unused and Boxed Valves

| | | | | | |
|-------|------|------|------|-------|------|
| 0Z4 | 9/- | 6F5 | 9/6 | 7B5 | 12/6 |
| 1A4 | 9/- | 6F6 | 7/6 | 7C7 | 12/6 |
| 1A6 | 9/- | 6F7 | 12/6 | 7D5 | 9/6 |
| 1F7 | 12/6 | 6F8 | 9/6 | 7D8 | 9/6 |
| 1L18 | 8/6 | 6F32 | 10/6 | 7H7 | 8/- |
| 1LA9 | 8/6 | 6C3 | 7/6 | 7K8 | 12/6 |
| 1N58 | 3/6 | 6H6 | 2/6 | 7R7 | 10/- |
| 1LD5 | 3/6 | 6J5 | 5/6 | 7S7 | 10/- |
| 1T4 | 7/6 | 6J7 | 6/- | 12H6 | 8/6 |
| 1R5 | 7/6 | 6K6 | 7/- | 12SH7 | 8/6 |
| 1S7 | 7/6 | 6K7 | 5/- | 12S07 | 8/6 |
| 1T5 | 9/- | 6L5 | 9/- | 12SK7 | 8/6 |
| 2A5 | 12/6 | 6L8 | 9/- | 25B5 | 12/6 |
| 2A6 | 12/6 | 6L7 | 7/6 | 28 | 10/- |
| 2A7 | 12/6 | 6N7 | 8/6 | 27 | 10/- |
| 2D13C | 5/- | 6R7 | 9/- | 29D7 | 3/6 |
| 2X2 | 4/6 | 6S7 | 9/- | 31 | 7/6 |
| 3A4 | 7/- | 6SA7 | 8/- | 32 | 7/6 |
| 3D3 | 5/- | 6SG7 | 8/- | 34 | 12/6 |
| 3Z4 | 7/6 | 6SH7 | 6/- | 39/44 | 10/- |
| 4D1 | 2/6 | 6SJ7 | 8/6 | 41 | 9/6 |
| 5U4 | 8/- | 6SK7 | 8/6 | 42 | 8/6 |
| 5Z3 | 12/- | 6SL7 | 8/- | 43 | 10/- |
| 5Z4 | 9/6 | 6SN7 | 7/6 | 57 | 10/- |
| 6A3 | 12/6 | 6SQ7 | 9/- | 58 | 10/- |
| 6A5 | 6/6 | 6SS7 | 9/- | 71 | 9/6 |
| 6AC7 | 6/6 | 6T7 | 12/6 | 75 | 12/6 |
| 6A8 | 10/- | 6TB3 | 12/- | 77 | 8/- |
| 6B4 | 5/6 | 6U5 | 8/6 | 83 | 12/6 |
| 6B7 | 10/6 | 6V6 | 8/6 | 84 | 8/6 |
| 6B3 | 4/- | 6X5 | 7/6 | 807 | 6/6 |
| 6BQ5 | 12/6 | 6Y6 | 9/- | 954 | 3/6 |
| 6C4 | 6/6 | 6Z5 | 15/6 | 1625 | 10/6 |
| 6C3 | 6/6 | 7A2 | 12/6 | 805 | 8/6 |
| 6C8 | 5/- | 7A2 | 12/6 | 805 | 8/6 |
| 6D5 | 6/6 | 7A7 | 9/6 | 913 | 9/6 |

T.V. Service Sheets



100 sheets covering the most popular post-war Televisions by leading makers—Cossor, Ekco, Ferguson, Pye, etc. £1 post free.

Cabinet Snip



This fine cabinet as illustrated but less control knobs is available this month at special snip price of 12 6, plus 3 6 post and insurance. Size is 13 1/2 in. x 9 in. x 4 in. and it is nicely covered in two tone I.C.T. fabric.

This Month's Specials

Wire ended Neon Lamp. Midget size as used in mains tester, dozens of applications, 2 - each.
Install Three Extra Power Points. Big purchase of 7,029 3-core cable enables us to offer this at a real bargain price of 37 6 per 50 yd. coil, 100 yd. coil 75 - carriage free.
Hi-Fi snip. Massive (weight approximately 8 lb.) output transformer Parmeko—primary 1,000 ohm, centre tapped, secondary 15 ohm, unrepeatable at 17 6, plus 2 6 post.
Electrolytic Condenser. 500mf, 50 v. with mounting clip, 2 3.
Screened Cable. Rubber covered flexible with metal braiding, ideal for microphone or gramophone extensions, 4d. per yd. 30 - per 100 yds.

Chassis Assembly

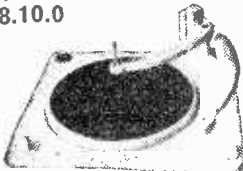


Superhot Chassis, 3-waveband, coloured scale, scale pan, etc. Scale size 14 in. x 4 1/2 in. Chassis size 15 in. x 15 in. x 2 in. Price 9 6, plus 1 6 post.

For Your Lab

Resistance substitution boxes are great time savers and you really cannot have too many of them. Here, then, is an opportunity to acquire these at a very low rate. Our R.S. kit, available for only 8 6, plus 1 6 postage, comprises a 50 w. precision variable resistor, six 2-3 watt fixed resistors, one 6 position switch, two knobs, and instructions. This unit, when made up, will give an infinite variability over the range 100 ohms to 2 meg.

Yours for 10/- down and 17 weekly payments of 19/- 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 Terms.

Build this 17in. T.V. in an evening

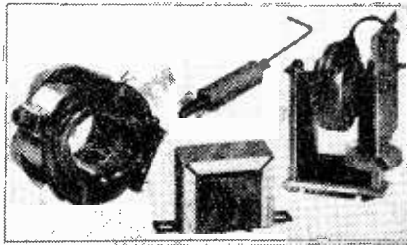
Undoubtedly the most up-to-date television for the home constructor. You can build it in an evening and the set when finished will be equal to a factory made equivalent.

- All miniature valves and metal rectifier.
- 12-channel turret tuner.
- Multivibrator time bases.
- Ferroxcube, E.H.T. and scan coils.

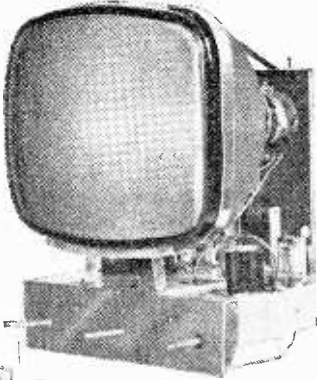
The building cost (less tubes) is only £29.10.0, plus 10/- carriage and insurance. Or £5 down and 23 weekly payments of £1. All parts guaranteed twelve months.

Full information and data free with parts or available separately, price 3 6.

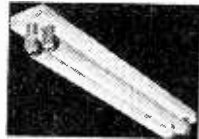
FOUR ITEMS FOR PRICE OF ONE



This set of modern T.V. parts is equally suitable for modernising an old television or for building into a new one. Suitable for wide angle 14in. or 17in. tubes using E.H.T. or 12-14 kV. The four items comprise: (1) Line output E.H.T. transformer. (2) 70" scanning coils on ferrite yokes. (3) Width control with ferrite core. (4) Frame output transformer. With these parts we also give free, complete circuit diagram of a modern television which uses them. We offer the whole lot at the price of the Line output transformer only, namely, 57 6, plus 2 6 post and insurance.

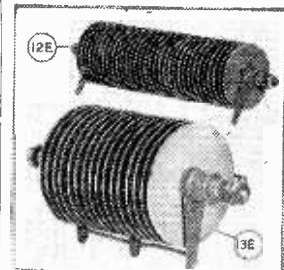


FLUORESCENT LIGHTS



These are complete fluorescent lighting fittings. Built-in ballast and starters—stove enamelled white and ready to work. Ideal for the kitchen, over the work-bench and in similar locations.
Single 40. 4 ft. 3 in. long, uses a 40 watt tube.
Twin 20. Uses 2 20-watt standard tubes.
 Price for either type 39 6, with tubes. Carriage and ins. up to 150 miles 5 6, up to 250 miles 7 6.

Rectifier Bargains



Selenium rectifier type 1-500 v. 4 amp half-wave, easily rebuilt into full wave or multiple type, contains 39 35 mm. discs. Price 8 6, plus 1 6 post.
 Type 2, 3; volt 9 amp, easily rebuilt into six full wave charger rectifiers suitable for 6 or 12 volt batteries at 3 amps, contains 24 84 mm. discs. Real bargain at 19 6, plus 1 6 post.

THE TRANSISTOR 8

A superb little portable receiver which is also loud enough and sensitive enough to be a car radio. A 1 parts, prepared chassis, 8 selected transistors, 7in. x 4in. elliptical speaker and handsome carrying case—supplied for £11.10.0 or 10/- deposit and 24 weekly payments of 10/-.

THIS MONTH'S SNIP Multi-Purpose Mains Transformer

Heavy duty construction, must have cost at least £3 to make. Offered at a snip price of 14 6.

- Specification:—
Primary Standard 230 v., 50 c.p.s. screen to sep. terminal.
Secondary 1. 690 v.-200 mA, centre tapped.
Secondary 2. 80 v.-100 mA.
Secondary 3. 23 v.-750 mA.
Secondary 4. 7 v.-5 amp, centre tapped.
Secondary 5. 5 v.-3 amp.

In addition to the above secondaries there is a window space which will allow extra L.T. windings to be put on. The winding ratio is 21 turns per volt. Weight of transformer is 12 lb. size approximately 6in. x 1 1/2 in. x 4 1/2 in. Connections all brought out to terminals on bakelite panel. We have only 500 of these, so order at once to avoid disappointment. Non-callers add 3 6 postage please.

Coil Pack Snip

Covers the Medium Waveband 200-550 metres and two short wavebands: 35-120 metres and 13-42 metres, for 465 kc. I.F. Extremely well made, supplied complete with diagram of connections. Only 9 6, plus 1 6 post and insurance.



ELECTRONIC PRECISION EQUIPMENT, LTD

Post orders are dealt with from Eastbourne, so for prompt attention please post your orders to 66, Grove Road, Eastbourne, marked Department 7.

- | | | | |
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| 42-46, Windmill Hill, Ruislip, Middx. | 66, Grove Road, Eastbourne, Sussex. | 29, Stroud Green Rd., Finsbury Park, N.4. | 266, London Road, Croydon. |
| Phone: RUISLIP 5760 | Half day, Wednesday. | Phone: ARCHWAY 1049 | Phone: CRO 6558 |
| Half day, Wednesday. | Half day, Saturday. | Half day, Thursday. | Half day, Wednesday. |

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Gain a sound up-to-professional-standards knowledge of Radio and Television as you build **YOUR OWN** T.R.F. and a 5-valve super-het radio receiver Signal Generator and High-quality Multi-tester. At the end of the course you have three pieces of permanent and practical equipment and a fund of personal knowledge and skill. ICS Practical Radio courses open a new world to the keen Radio amateur.

Other ICS courses include : AGRICULTURE. HORTICULTURE. ARCHITECTURE. WOODWORKING. SALESMANSHIP AND SALES MANAGEMENT. ART. PHOTOGRAPHY. MECHANICAL ENGINEERING. MOTOR ENGINEERING. FIRE ENGINEERING. CHEMICAL ENGINEERING. Etc. etc. A WHOLE WORLD OF SKILL AND KNOWLEDGE FOR THE KEEN STUDENT.

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(Dept. 170 K), 71 Kingsway, London, WC2

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 (DEPT. 170 K), 71 KINGSWAY, LONDON, WC2

NAME.....

ADDRESS

R.S.C. BATTERY CHARGING EQUIPMENT

ASSEMBLED CHARGERS

| | |
|----------------------------|------|
| 6 v. 1 amp. | 19/9 |
| 6 v. or 12 v. 1 amp. | 27/9 |
| 6 v. 2 amps. | 29/9 |
| 6 v. or 12 v. 2 amps. | 38/9 |
| 6 v. or 12 v. 4 amps. | 56/9 |

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

SELENIUM RECTIFIERS

| | |
|---------------------------|--|
| F. W. BRIDGE TYPES | |
| 6/12 v. 1 a. | 4/11 L.T. Types H.W. |
| 6/12 v. 2 a. | 9/9 2-6 v. 1 a. 1/11 |
| 6/12 v. 3 a. | 11/9 6/12 v. 1 a. H.W. 2/9 |
| 6/12 v. 4 a. | 14/9 H.T. Types H.W. |
| 6/12 v. 6 a. | 14/9 150 v. 40 mA. 3/9 |
| 6/12 v. 10 a. | 19/9 250 v. 50 mA. 5/9 |
| 6/12 v. 15 a. | 25/9 250 v. 80 mA. 7/9 |
| 35/9 250 v. 250 mA. | 11/9 Trans. 0-9-15 v. 6 a. output and Ammeter. 49/9. Post 3/9. |

BATTERY CHARGER KITS

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

| | |
|---|------|
| 6 v. or 12 v. 1 amp. | 22/9 |
| As above, with Ammeter. | 32/9 |
| 6 v. 2 amps. | 25/9 |
| 6 v. or 12 v. 2 amps. | 31/6 |
| 6 v. or 12 v. 2 amps. including Ammeter. | 41/6 |
| 6 v. or 12 v. 4 amps. | 53/9 |

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 blue hammer ready for use. With mains and output leads. Double Fused. Only Carr. 3/9 |
|----------------------------|---|

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



Assembled 6 v. or 12 v. 4 amps.

Fitted Ammeter and variable charge rate selector. Also selector plug for 6 v. or 12 v. chargings. Louvered steel 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 cc/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. 60 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 |
| 0-4-5 v. 3 a. | 23/9 |
| 250-0-250 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 |
| 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 |
| 350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. | 26/9 |
| 300-0-300 v. 130 mA. 6.3 v. 4 a. 6.3 v. 1 a. | 35/9 |
| for Mullard 50 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. | 35/9 |
| 2 a. 5 v. 3 a. | 35/9 |
| 425-0-425 v. 200 mA. 6.3 v. 4 a. C.T. | 49/9 |
| 6.3 v. 4 a. C.T. 5 v. 3 a. Suitable Williamson Amplifier, etc. | 49/9 |

FILAMENT TRANSFORMERS

All with 200-250 v. 50 cc/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 12 v. 1.5 a. 17/6.

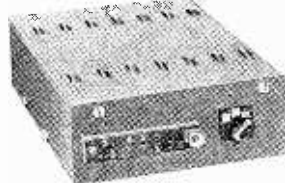
FUNCTION TRANSFORMERS

Brand new R.F. type 17/B. A.F. 7/6.

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

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all-dry battery eliminator. Size 5 1/4 x 4 1/2 in. approx. Completely replaces batteries supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 cc/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.

ELECTROLYTICS (current production) NOT EX-GOVT.

| Tubular Types | | Can Types | |
|-------------------------|-----|-----------------------|------|
| 8µF 450 v. | 1/9 | 16 mfd. 350 v. 1.11 | 1/9 |
| 8 mfd. 500 v. | 2/6 | 16µF 450 v. | 2/9 |
| 16µF 350 v. | 2/3 | 32µF 350 v. | 2/11 |
| 16µF 450 v. | 2/9 | 32 mfd. 450 v. | 4/9 |
| 16µF 500 v. | 3/9 | 100 mfd. 450 v. | 4/9 |
| 32µF 350 v. | 3/9 | 8-8µF 450 v. | 2/9 |
| 25µF 25 v. | 1/3 | 8-16µF 450 v. 3/11 | 1/9 |
| 50µF 12 v. | 1/3 | 16-16µF 450 v. 4/11 | 1/9 |
| 50 mfd. 25 v. | 1/6 | 32-32µF 350 v. | 4/9 |
| 50µF 50 v. | 1/9 | 32-32µF 450 v. 5/9 | 1/9 |
| 100 mfd. 12 v. | 1/3 | 100-100mfd. 350v. 5/9 | 1/9 |
| 100 mfd. 25 v. | 2/3 | 100-200 mfd. | 6/9 |
| 70-70 mfd. 6 v. 1 v. 16 | 1/6 | 275 v. | 6/9 |
| 3,000 mfd. 6 v. | 3/3 | | |

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

EX-GOVT. SMOOTHING CHOKES

| | |
|------------------------------------|------|
| 250 mA. 20 H 200 ohms | 18/9 |
| 200 mA. 3-5 H Parmeko 50 ohms | 11/9 |
| 150 mA. 10 H 100 ohms | 11/9 |
| 150 mA. 6-10 H 150 ohms Trop. | 6/9 |
| 120 mA. 12 H 100 ohms | 9/9 |
| 100 mA. 5 H 100 ohms | 3/11 |
| 80 mA. 20 H 900 ohms | 6/9 |

CHARGER TRANSFORMERS

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

SMOOTHING CHOKES

| | |
|-------------------------------|------|
| 150 mA. 7-10 H 250 ohms. | 11/9 |
| 100 mA. 10 H 200 ohms | 8/9 |
| 80 mA. 10 H 350 ohms | 5/9 |
| 60 mA. 10 H 400 ohms | 4/11 |

OUTPUT TRANSFORMERS

| | |
|---|------|
| Midst Battery Pentode 66L for 2S4, 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 7/8, 000Ω to 3Ω | 4/9 |
| 10,000Ω to 3Ω | 4/9 |
| Push-Pull 10-12 watts 6V6 to 3Ω or 15Ω | 15/9 |
| Push-Pull 10-12 watts to match 6V6 to 3-5Ω or 15Ω | 16/9 |
| Push-Pull EL84 to 3Ω or 15Ω | 16/9 |
| Push-Pull 15-18 watts, 6L6, KT66 | 22/9 |
| Push-Pull 20 watts, sectionally wound 6L6, KT66, etc., to 3 or 15Ω | 47/9 |

ELIMINATOR TRANSFORMERS

| | |
|-----------------------------------|------|
| 200-250 v. 56 cc/s. | 15/9 |
| 12 v. 40 mA. 5-0-5 v. 1 a. | 15/9 |
| 90 v. 15 mA. 4-0-4 v. 500 mA | 9/9 |

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 12 v. 90 v. and 60 v. 40 mA. and 2 v. 0.4 to 1 amp. fully smoothed. Thereby completely replacing both H.T. batteries and L.T. 2 v. accumulators. When connected to A.C. mains supply 200-250 v. 50 cc/s. SUITABLE FOR ALL BATTERY RECEIVER

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

BRAND NEW LUCAS MOTOR CYCLE BATTERIES. 6 v. 22 a.h. in sealed cartons. Only 39/6, carr. 4/6.

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Ready for use in walnut veneered cabinet. 6 1/2 in. 2-3 ohms. 29 1/11. 8 in. 2-3 ohms. 35 9/9. Very limited number



INSTRUMENT KNOBS. Black. 1 1/2 in. dia. Standard type 1/- each, 9/- doz. 9/0 gross.

SENSATIONAL OFFER

STAR GALAXY 4-SPEED MIXER AUTO-CHANGER. A precision manufactured unit with a motor which virtually eliminates "wow" and rumble. Fitted pick-up with dual sapphire tipped stylus. For 200-250 v. A.C. mains. Limited Stock. Only Brand new, cartoned. Carr. 4/6

£4-19-6

Staar Changer LG3 Amplifier. 6 1/2 in. Speaker. 11 GNS. Carr. 7/6.

THE SKYFOUR T.R.F. RECEIVER.

A design of a 3-valve Long and Medium wave 230-250 v. A.C. Mains receiver with selenium rectifier. It consists of a high gain H.F. stage and low distortion anode bend detector. Power pentode output is used. Valve line-up 6K7, SP61, 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. 1/8. Maximum building costs £4 19/6, including attractive Brown or Cream Bakelite or Walnut veneered wood cabinet 12 x 6 1/2 x 5 1/2 in.

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10-0-100-220-230-240 v. to 5-0-75, 15-15 v. or REVERSE. 80-100 watts. Only 12/9. plus 2/9 post. 10-0-100-220-230-240 v. to 9-0-110-12-136-148 v. or REVERSE. 200 watts. 35/9. plus 7/6 carr. Both 50 c.p.s.

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Well ventilated, black crackle finished, undrilled cover. IDEAL FOR BATTERY CHARGER OR INSTRUMENT CASE. OR COVER COULD 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 stovc grey enamel. Suitable for charger or instrument case. 7/9, plus 2/9 post.

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New, boxed. Only 5/6 each. 3 for 15/-, plus 2/6 carr. 6 for 27/6, carr. 3/6.

EX-GOVT. VALVES (NEW)

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|--------|-----|--------|------|---------|------|
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| 1T4 | 7/9 | 6J6 | 4/9 | EF90 | 7/9 |
| 1S5 | 7/9 | 6V6G | 7/9 | EB91 | 4/9 |
| 3S4 | 8/9 | 6X4 | 6/9 | EF91 | 8/9 |
| 5Y3G | 8/9 | 6X5GT | 8/9 | EL32 | 3/9 |
| 5Y4G | 8/9 | 6L6G | 11/9 | KT44 | 8/9 |
| 5AZ2 | 9/9 | 807 | 7/9 | KT61 | 9/9 |
| 6K7G | 5/9 | 12A6 | 7/9 | EZ90 | 6/9 |
| 6S7JGT | 6/9 | 15D2 | 4/9 | EL84 | 10/6 |
| 6SLGT | 8/9 | 3E2AGT | 8/9 | MU12 14 | 9/9 |
| 6SNGT | 8/9 | MH4 | 4/9 | FW4500 | 8/9 |
| 6AT7 | 7/9 | ECC83 | 9/9 | SF61 | 2/9 |

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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 (307 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 - 3 db. 30-30,000 c/s. Six negative feedback loops. Hum level 71 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 STRING 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" x 7". For A.C. mains. 200-250 v. 50 c/s. Outputs for 3, 4 and 15 ohm speakers. Kit is complete to last unit. Chassis is fully punched. Full instructions and point-to-point wiring diagrams supplied. Unapproachable value at £7.15 - or factory built 45 - extra. Carriage 19/-.

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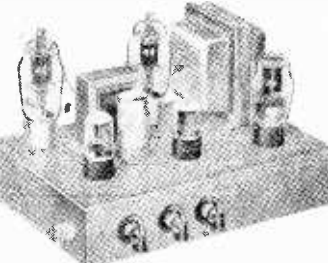
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LG3 MINIATURE 2-3 WATT GRAM AMPLIFIER. For use with above or any other single or auto-change units. Output for 2-3 ohm speaker. For 200-250 v. 50 c.p.s. A.C. mains. Overall size 6 1/4 x 4 1/2 x 2 1/2 in. Controls: Vol. and Tone with switch. Guaranteed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

SUPERHET FEEDER UNIT. Design of a high quality Radio Tuner Unit, specially suitable for use with any of our Amplifiers. Delayed A.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. 9.5" x 7" x 1 1/2". Simple alignment procedure. Point-to-Point wiring diagrams, instructions and priced parts list with illustration. 2/6. Total building cost £4/15 - For descriptive leaflet send S.A.E.

LINEAR 145 MINIATURE 4.5 WATT QUALITY AMPLIFIER. Suitable for use with Collar, 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 v. A.C. mains. Valves ECC83, ECC83, EL84, EL84, E221 miniature Mullard. Self-contained Pre-amp. Tone Control stage, and separate Bass and Treble Controls, Independent 'Mike' and Gram input sockets are provided. Output Matchings for 3 and 15 ohm speakers. Only 12 £ms., or deposit 26/9 plus 10-carr. and 9 monthly payments of 26/9. Send S.A.E. for leaflet.



carrying handles can be supplied for 13/9. Additional input socket with associated Vol. control so that two different inputs such as Gram and 'Mike' or Tape and Radio can be mixed, can be provided for 13 - 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. Keen cash prices or credit terms if supplied with amplifier.

LINEAR STEREOPHONIC 3-WATT AMPLIFIER

Output 6 watts when not used with stereo head. For 200-250 v. 50 c.p.s. A.C. mains. Ganged controls, Volume and Tone with switch. Outputs matched by preset balance control. For use with 2 matched 3 ohm speakers. Only requires connecting to Pick-up, speakers and mains point.

6 GNS.

Supplied with guarantee and instructions.

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. is available for the supply of a Radio Feeder Unit, or Tape-Deck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Chassis is not alloy. 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.



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12 GNS.

Carr. 7/6 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.

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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 70 db. down. Frequency response - 3 db. 30-30,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 307 output valves. All components are chosen for reliability. Six valves are used. EF66, 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 or long-playing records. OUTPUT SOCKET PROVIDES L.T. and H.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 output 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 A8 can be supplied for 18/9. The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6. TERMS: DEPOSIT 36/9 and 9 monthly payments of 31/9.

11 GNS.

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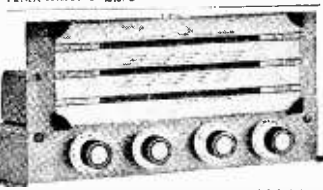
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PLESSEY DUAL CONCENTRIC 13in. 15 ohms HIGH FIDELITY SPEAKER. (12,000 lines) built-in tweeter (completely separate elliptical speaker with choke, condensers, etc.), providing extraordinarily realistic reproduction when used with our A8 or similar amplifier. Rated 10 watts. Price only £5/17/9.

ACOS HGP59 Hi-Fi Crystal Cartridges. (Turnover type with sapphire stylus.) Standard replacement for Garrard and B.S.R. Only 19/9.

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.

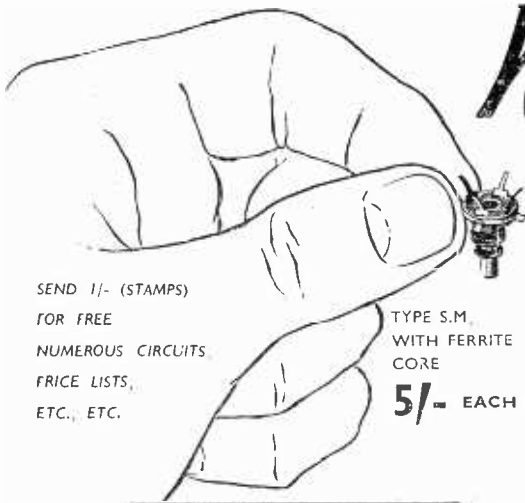


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For 200-250 v. Mains. Long wave. Medium. F.M. and Gram. Complete with 8 B.V.A. valves. Guaranteed 12 months. Only 22 £ms. Or Deposit £2 19/- and 9 monthly payments of £2/12/-.

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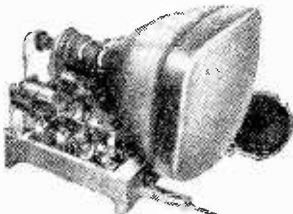
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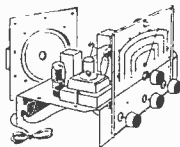
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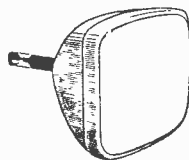
POWER PACK AND AMPLIFIER, 19/6. Output stage PEN45, O.P. trans., choke. Smoothed H.T. 325 v. at 250 mA., 4 v. at 5 A., 6.3 v. at 5 A., 4 v. at 5 A., centre tapped. Less valves. Carr. 5/6.

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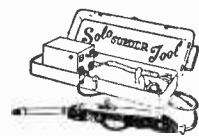
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O.P. TRANS., 1/3. Std. size, 2-5 ohms. Post 1/-, 20 for £1. Post 5/6.

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110 v. or 6 v. (special adaptor for 200/240 v., 10/- extra). Automatic solder feed. Including a 20ft. reel of Ersin 60/40 solder and spare parts. It is a tool for electronic soldering or car wiring. Revolutionary in design. Instantly ready for use and cannot burn. In light metal case with full instructions for use. Post 2/9.



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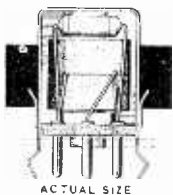
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PRACTICAL WIRELESS

EVERY MONTH

VOL. XXXIV, No. 622, OCTOBER 1958

COMMENTS OF THE MONTH

EDITOR : F. J. GAMM

26th YEAR
OF ISSUE

BY THE EDITOR

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PRACTICAL WIRELESS

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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.

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NO SURPRISES AT THE RADIO SHOW

THE pre-show releases of manufacturers show, as we forecast last month, that no radical changes in design nor new developments have taken place in the past year. It was to be expected that the introduction of sub-standard components would lead to the production of many more midget receivers than last year, and such has proved to be the case. Midget personal pocket receivers are shown by more than a dozen manufacturers, all designed around the midget high-capacity dry battery and making use of transistors or peanut valves. The introduction of stereophonic sound heads for tape recorders is undoubtedly an advance in sound recording technique, and a first step towards the greater use of stereophonic sound equipment in radio and television receivers of which undoubtedly more will be heard. Combined F.M. and television receivers are also being produced by a number of firms.

READERS ARE WELCOME ON OUR STAND, No. 108

THE Show itself has been streamlined and is a great improvement in every way over previous shows. There is a music-hall slickness about the sideshows and there are no gaps throughout the day. We congratulate the organisers on a first-class show, the major exhibits in which we review elsewhere in this issue.

NEXT MONTH—MAKING OUR MICRO-MIDGET

NEXT month we shall describe how to make a small personal receiver which can truly be described as midget in every sense. It measures only 1 3/8 by 3/4 by 3/16 in., rather less than half the size of a matchbox. Yet in this Lilliputian space has been incorporated a 3-transistor, 4-stage, T.R.F. circuit, R.C.-coupled. The battery, one of the comparatively new mercury cells, is only 7/16 in. in diameter and 3/16 in. high. The set uses Permeability tuning. Whilst primarily designed for use in connection with a deaf aid ear piece, under test, the receiver was found to work a small speaker at comfortable volume. It can be built for about £4. We think this is the smallest practicable receiver yet produced in this country and we anticipate that it will be built in very large numbers indeed. Full constructional details will be given.

PRINTED CIRCUITS

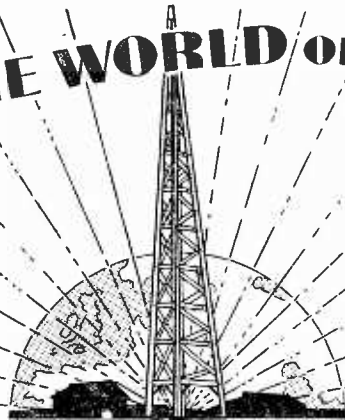
READERS will be glad to learn that one prominent manufacturer is co-operating with us on the production of printed circuit receivers. This means that readers will be able to purchase all of the parts immediately the design is published.

INDEXES

WE receive a large number of queries every day asking us when such and such an article appeared. Readers could save themselves time and help to relieve pressure on our query department if they purchased the annual indexes which cost 1s. 3d. by post.—F. J. C.

Our next issue, dated November, will be published on October 7th

ROUND THE WORLD OF WIRELESS



By "QUESTOR"

Broadcast Receiving Licences

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of June, 1958, 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 | 1,027,535 |
| Home Counties | 1,034,516 |
| Midland | 761,736 |
| North Eastern | 956,369 |
| North Western | 733,102 |
| South Western | 636,061 |
| Wales and Border Counties | 397,757 |
| Total England and Wales | 5,547,076 |
| Scotland | 679,525 |
| Northern Ireland | 178,475 |
| Grand Total | 6,405,076 |

B.V.A. Booklet

THE British Radio Valve Manufacturers' Association has just issued a 36-page booklet entitled "The Use of Semiconductor Devices," containing a great deal of advice and design data, for crystal diodes, transistors, and photo-sensitive devices. The book is intended for designers.

"Premium" Miniature Twin Triode

RCA announce the 6J6-WA—a "premium" medium-mu twin triode of the 7-pin miniature type. Constructed and processed to meet the military specification MIL-E-1/243B dated June 18th, 1957, the 6J6-WA is intended primarily for use as a class A amplifier and control tube in military mobile and aircraft equipment where uniformity of characteristics and dependable performance under conditions of shock and vibration are primary considerations.

Technical Publications

ENGLISH ELECTRIC VALVE CO., LTD., Waterhouse Lane, Chelmsford, Essex, have just issued two new technical

publications, "Valves for R.F. Heating" and "Magnetrons." Copies are available free to all readers mentioning this journal.

Communications Transmitters for Kuwait

THE Posts and Telegraphs Department of Kuwait has ordered from Marconi's Wireless Telegraph Company high-frequency transmitters and receivers, together with comprehensive ancillary equipment, for the communications centre at Shuwaikh, on the shores of the Persian Gulf. The new equipment will be used to meet greatly increased traffic demands and is intended mainly for direct telephone and teleprinter services with London, Paris, Beirut and Bombay.

The order includes a 10kW and a 3½kW independent sideband transmitter with their associated drive, keying and monitoring equipments and two 1½ kW telegraph/telephone transmitters. For incoming traffic two H.F. independent sideband receivers, two double-diversity telegraph receivers and four H.F. receivers are to be supplied. Ancillary equipment includes radio telephone terminals, teleprinters, masts, aerials and cables, test equipment and comprehensive spares. The value of the contract is approximately £75,000.

Radio Exports Higher

EXPORTS of British Radio equipment of all kinds for the first six months of 1958, provisionally valued at £21.79m.,

are more than £250,000 higher than those for January-June last year (£21.51m), when for the whole year exports reached a record level of over £43m. Buyers from at least 120 countries, at the radio industry's annual "shop window," the National Radio and Television Exhibition, Earls Court, London, August 27 to September 6, are likely to give a further fillip to overseas orders.

Lectures

THE next series of lectures to be held by The Radar and Electronics Association will be at the Royal Society of Arts, John Adam Street, London, W.C.2.

The lectures will be on the following dates: September 23rd, October 22nd, December 3rd this year; and January 26th, March 2nd, April 6th for the early part of next year.

Previous lectures were held at the Anatomy Theatre, University College, Gower Street, London, W.C.1.

BBC's New V.H.F. Sound Broadcasting Station at Sandale

THE BBC's new V.H.F. sound broadcasting station which has been built on the same site as the BBC television station at Sandale, near Carlisle, was brought into service on 18th August. This new station transmits the North of England Home Service on 94.7 Mc/s, the Scottish Home Service on 92.5 Mc/s, the Third Programme and Network Three on 90.3 Mc/s, and the Light Programme on 88.1 Mc/s, each with an effective radiated power of 120 kW. The transmissions are horizontally polarised as at other BBC V.H.F. sound broadcasting stations, which means that receiving aerials must be fixed horizontally.

The area that is being served by the Sandale station has a population of nearly half a

million. It includes most of Cumberland and Westmorland and most of the Scottish counties of Wigtown, Kirkcudbright and Dumfries.

Listeners in these areas who provide themselves with V.H.F. receivers and suitable aerials will find that V.H.F. transmissions are much less susceptible to interference and that they are capable of giving much better sound quality. Because of the mountainous nature of the country served by the new station many listeners will find it advisable to use an outdoor receiving aerial, preferably of the multi-element type.

Grundig's New Address

ON July 26th, Grundig (Great Britain) Limited moved their factory and offices to new and larger premises at Sydenham. This move has been made necessary by the rapid growth of the company who, with added space and room for expansion, hope to narrow the ever widening gap between demand and supply of Grundig products.

The new address is:—Grundig (Great Britain) Limited, Newlands Park, Sydenham, London, S.E.26. The showroom and publicity and advertising department remain at 39/41, New Oxford Street, London, W.C.1.

German Traffic Control TV

SINCE July the 18th this year, the traffic on the Stachus, or also named the Karsplatz in Munich, has been directed by an

automatic radio guided plant. A TV camera is mounted on top of the "Hotel Konigshot" on a 16 metres high pole. The camera relays the traffic situation to a controller on the switchboard at a police station near the Stachus, and from there, the controller can operate the traffic lights to the best advantage.

BBC Engineering Division Appointment

THE BBC announces that Mr. C. Buckle, A.M.I.E.E., has been appointed Engineer-in-Charge of the Droitwich Transmitting Station in succession to Mr. D. A. G. Curd, A.M.I.E.E., who has retired after 34 years' service.

Mr. Buckle joined the Corporation in May, 1938, as a maintenance engineer. After serving in this capacity with the Television Service at Alexandra Palace and at the BBC's Sound Transmitting Stations at Burgesshead and Preston, he joined the Engineering Training Department in 1942 as an Instructor.

International Convention on Transistors and Associated Semi-conductor Devices

WITHIN a decade of its invention the transistor has become the most significant development in electronics since the discovery of the valve. These ten years have been a period of rapid and spectacular advance, in which new types of transistors, new applications and

mass production technology have been introduced.

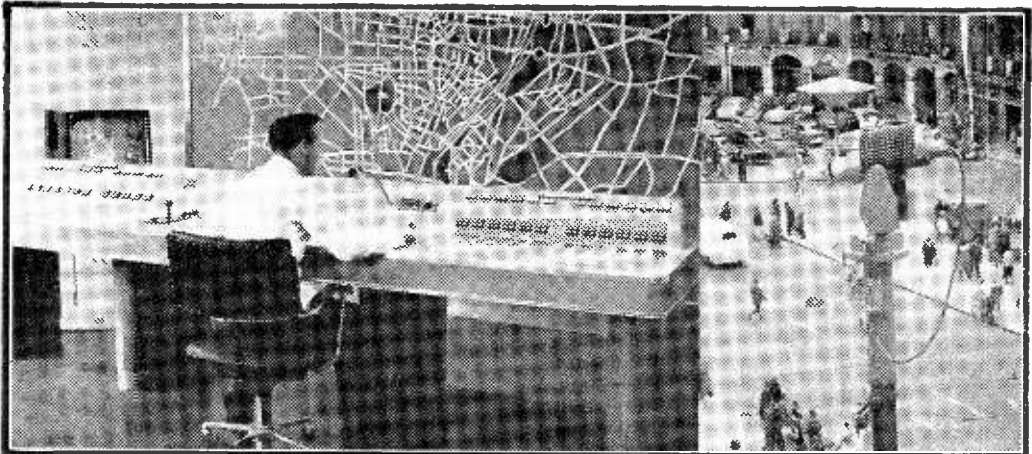
It is with these thoughts in mind that the Radio and Telecommunication Section of The Institute of Electrical Engineers have planned an International Convention on Transistors and Associated Semi-conductor Devices to be held in London on the 25th to the 29th of May next year.

This convention will be the most comprehensive ever held on this subject, covering design, manufacture, materials, basic theory, characteristics, measurements, applications and equivalent circuits.

Extensions to Nigeria Radio Communications

NIGERIA was one of the first African countries to realise that an efficient communications system is a prime requirement in the development of its commercial resources. To-day it possesses one of the largest radio communications networks in the world, and one which is continually expanding.

Marconi's, who have supplied most of the existing installations—some 80,800 channel-kilometres—have now been awarded two further large contracts by the Nigerian P. & T. to extend communications in the area of the Nigerian Cameroons. For this purpose 14 multichannel V.H.F. terminal equipments Type HM100 and 7 multichannel repeater equipments are to be supplied, together with their associated aerials.



Germans control traffic with TV. (Left) The control. (Right) The camera mounted high above the street.

A 3-transistor 200 mW Amplifier

AN EXPERIMENTAL CIRCUIT FOR 6 VOLT OPERATION

THIS 200 mW amplifier evolved by Mullards is designed to operate from 6 v. supplies, in conjunction with the latest record players and high-output crystal pick-ups. Servicemen and engineers will need to familiarise themselves with the basic essentials of the circuit. It is hoped to publish a leaflet, dealing with the amplifier, for home constructors.

This circuit, using an input transformer and a Mullard OC72 transistor for the first two stages, is cheaper, using fewer and less expensive components. It retains the sensitivity of previous designs, and, using negative feedback, gives improved performance.

The circuit is in two stages, driver and output, both of which are transformer-coupled. The input is coupled to the OC72 driver stage by the input transformer. The driver stage is likewise coupled to the Class B push-pull output stage, which uses a matched pair of Mullard 2-OC72 transistors.

Driver Stage

When the amplifier is driven by a high-output crystal pick-up, the 30:1 input transformer provides adequate sensitivity for the OC72. The input impedance of the OC72 is approximately 300 Ω ($I_c = 5\text{mA}$). Assuming a secondary wind-

to use the resistance of the primary of the output transformer to obtain the required thermal stability.

Feedback

Negative feedback is applied to the driver stage. This results in several advantages:

(1) The transistor's effective output and input impedances are reduced, and the bass response of the driver and input transformers is therefore improved.

(2) The spread in amplifier gain, arising from individual transistors, is reduced.

(3) Any harmonic distortion is reduced.

If considered necessary, the feedback resistor can be increased to 100k Ω , improving the sensitivity by sacrificing some of the above advantages.

Transformers

Input Transformers:

Turns ratio: 30:1.

Primary inductance: > 500H.

Primary resistance: < 10k Ω .

Secondary resistance: < 100k Ω .

Driver Transformer:

Turns ratio: 1:1.6 + 1.6.

Primary inductance: > 4.5H at 6.5 mA.

Primary resistance: < 70 Ω .

Secondary resistance: < 200 Ω per half winding.

Output Transformer:

To match a 3 Ω speaker:

Turns ratio: 4.5 + 4.5:1.

Primary inductance: > 0.5H total.

Primary resistance: = 6 Ω \pm 1 Ω per half winding.

Secondary resistance: < 0.3 Ω .

Output Performance

The output is 250 mW into the primary of the output transformer, giving approximately 200 mW into a 3 Ω speaker load. The average sensitivity is 1.7Vr.m.s. for 200 mW into the load, the minimum is 2.0Vr.m.s. for the same output.

Frequency Response

A capacitor is placed across the feedback resistor, to limit the gain at the higher frequencies, and so partly to compensate for the loss of gain arising from the transformers at the lower frequencies. The overall frequency range is 160 c/s to 5 kc/s.

Currents

I_q of the driver 6.5 mA.

I_q of output transistor 1.0 mA.

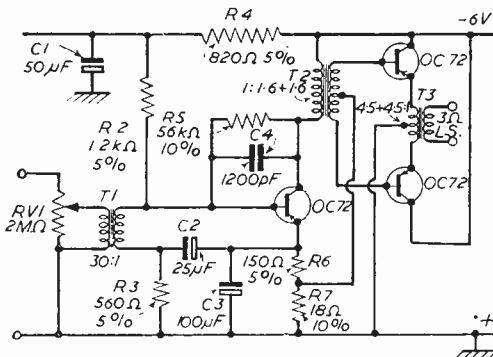
I_c (pk) max. 0.83 mA.

Total amplifier current consumption:

Zero drive 10 mA.

Average speech and music 32 mA.

Sinewave full drive 83 mA.



The Circuit Diagram of the Mullard 3-transistor 200 mW. Amplifier for 6 volt operation.

ing resistance of 100 Ω , the reflected impedance in the primary of the input transformer is about 360k Ω . Therefore, a primary induction of 500H. will give good frequency response down to 100 c/s.

From a similar treatment, the primary inductance required, using an OC71, would be 1,500H. Such an input transformer would be uneconomic.

Output Stage

The output stage uses the transistors in common collector Class B push-pull. The main advantages are reduced cross-over distortion and the ability

A High Quality Record Player

GIVING GOOD REPRODUCTION FOR HOME, AND POWERFUL ENOUGH TO FILL A SMALL HALL

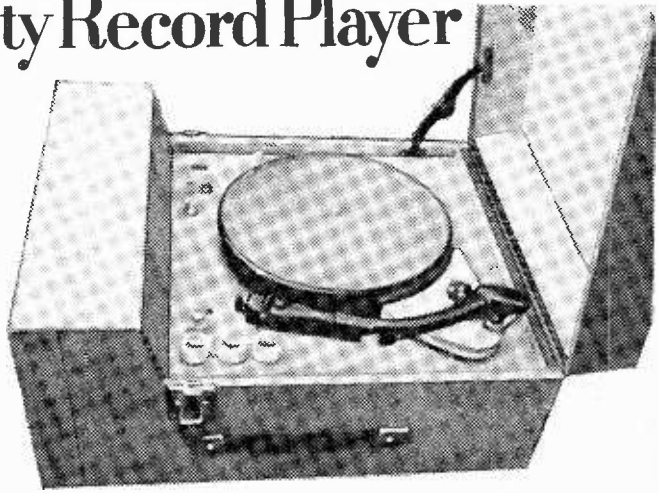
By N. B. Jones

THE input is fed via the tone control network into a 6J5 triode which is coupled to another 6J5 in the second stage. The tone-control provides for both treble and bass cut, but it should be noted that the "boost" is obtained at the expense of overall output. However, the high gain of crystal pick-ups and power of this amplifier enable the circuit to be used satisfactorily (Fig. 1).

The output stage comprises a beam tetrode of the KT66 class. This may seem to be a large valve to use for a transportable record player, but with 350v. H.T. it will deliver a power output of some 10-11 watts, which adequately fulfils the above requirements.

Two 6V6s in push-pull were considered, but the idea was discarded owing to the increased cost that would have been involved and also to the fact that a larger chassis would have been necessary. The output transformer must be capable of carrying the high anode current of the KT66 and it should thus have a generous rating. In the original amplifier a 15 watt transformer was used.

The power pack (Fig. 2) is quite conventional, the H.T. being supplied by a U54 rectifier with choke-capacity smoothing. Because of the large smoothing condensers employed there



is no mains hum in the finished amplifier.

Negative Feedback

This was introduced to eliminate any distortion in the output stage. The value of the feedback resistor R16 is very critical, depending upon the amount of feedback required, and may best be determined by experiment when the amplifier is completed and connected up to a speaker.

If maximum feedback is desired, insert a 10k linear potentiometer in the circuit in place of R16 and adjust it until the point of maximum feedback is reached (this is when the amplifier is just off the point of very severe "motor-

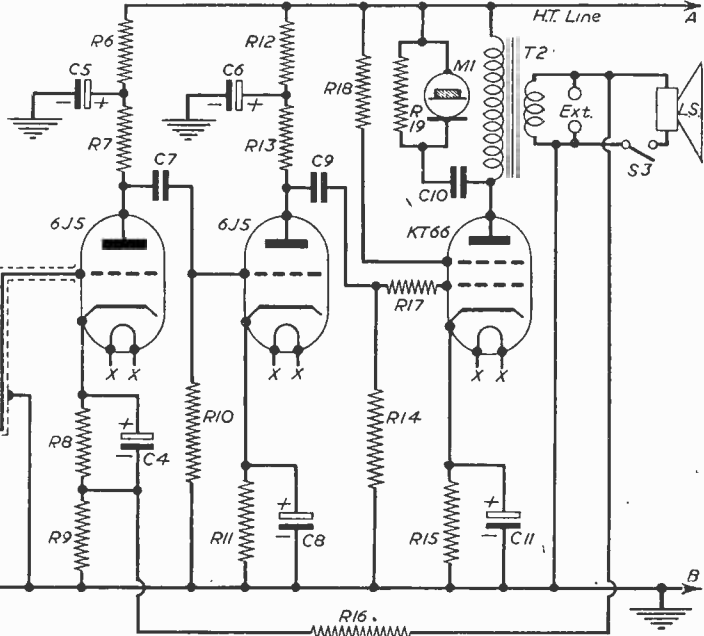
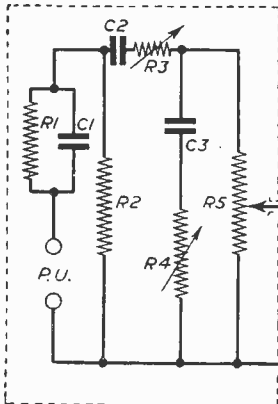


Fig. 1.—Circuit of amplifier.



boating"). Remove the pot. from the circuit, taking care not to alter its setting, and measure its value on a reliable meter. A fixed resistor of the same value may then be substituted in the circuit. For constructors not wishing to go to all this trouble, a 5k resistor will be found satisfactory for most purposes.

The main speaker is a 10in. x 6in. elliptical which gives very good bass response, but the H.F. response, as is usual with a large speaker, leaves much to be desired. This was overcome by inserting a tweeter across the primary of the output transformer. This tweeter is extremely simple.

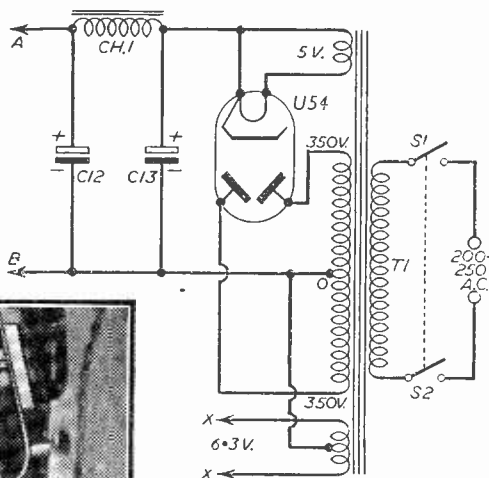
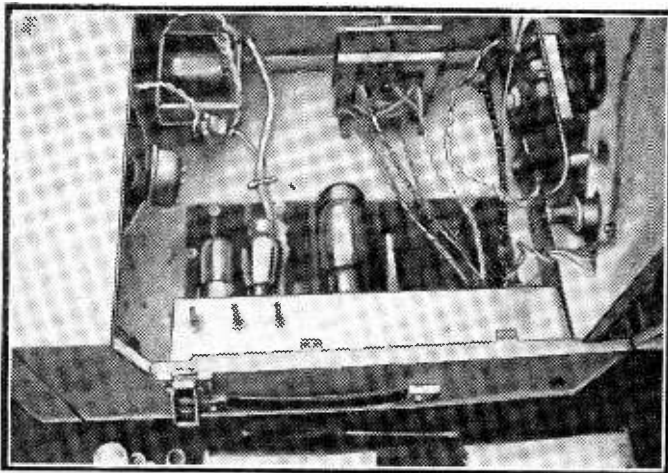


Fig. 2.—(Above) Circuit of power pack. (Left) Showing the internal layout of the amplifier.

An internal speaker silencing switch is incorporated for the main speaker, together with extension speaker sockets. This was thought to be essential because the speaker in the player could not fill a hall, however small, unaided.

taking the form of a crystal mike insert and is the answer for an efficient, low-cost H.F. unit. The condenser C10 should have a high breakdown voltage rating because failure of this component will result in the destruction of the crystal.

Chassis

The chassis was constructed from a sheet of 16 s.w.g. aluminium, and the finished dimensions are 12in. long, 2 $\frac{3}{4}$ in. wide and 2 $\frac{1}{4}$ in. high. As the mains and output transformers are mounted

separately on the floor of the cabinet, the leads to them are brought to terminal blocks on the top of the chassis. The bass, treble, and volume controls are mounted in the side at one end of the chassis and, when the amplifier is installed in the cabinet, their spindles project upwards through the motor-board.

No layout details have been given for the amplifier because these vary with individual constructors. Originally, the four valves and the terminal blocks are the only components on top of chassis.

(To be continued)

COMPONENTS LIST

R1—100 K $\frac{1}{2}$ watt
 R2—100 K $\frac{1}{2}$ watt
 R3—2 Meg. pot. Lin.
 R4—2 Meg. pot. Lin.
 R5—500 K pot. Log. with
 d.p.s.t. switch (S1 and S2).
 R6—20 K $\frac{1}{2}$ watt
 R7—250 K $\frac{1}{2}$ watt
 R8—1 K 1 watt
 R9—100 K 1 watt
 R10—500 K $\frac{1}{2}$ watt
 R11—1 K 1 watt
 R12—15 K $\frac{1}{2}$ watt
 R13—150 K $\frac{1}{2}$ watt
 R14—500 K $\frac{1}{2}$ watt
 R15—250 K $\frac{1}{2}$ watt
 R16—See text.
 R17—50 K $\frac{1}{2}$ watt
 R18—100 K $\frac{1}{2}$ watt
 R19—5 K $\frac{1}{2}$ watt

C7—0.01 mfd. 500 v. wkg. (mica)
 C8—25 mfd. 25 v. wkg. (elect.)
 C9—0.01 mfd. 500 v. wkg. (mica)
 C10—0.005 mfd. 750 v. wkg. (mica)
 C11—25 mfd. 25 v. wkg. (elect.)
 C12—50 mfd. 500 v. wkg. (elect.)
 C13—50 mfd. 500 v. wkg. (elect.)

Valves

V1—6J5 (Brimar)
 V2—6J5 (Brimar)
 V3—KT66 (Osram)
 V4—U54 (Osram)

Output Transformer

Ratio 40 : 1 ; primary impedance, 4,200 ohms ; secondary matched to 3 ohm output 15 watts

Mains Transformer

Primary 200-250 v. ; secondary, 350-0-350 v. 100 mA., 6.3 v. C.T. 4 A., 5 v. 3 A.

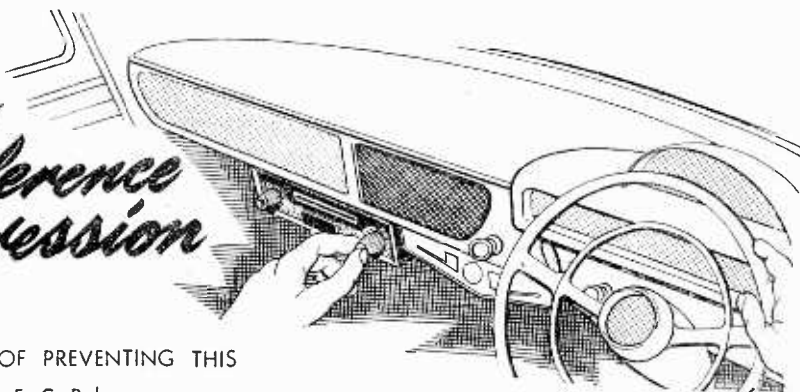
Choke

20 henry 100 mA.

S3—On-off toggle switch
 M1—Crystal mike insert.
 10in. x 6in. elliptical speaker (Elac)

C1—0.01 mfd.
 C2—0.001 mfd.
 C3—470 pF
 C4—25 mfd. 25 v. wkg. (elect.)
 C5—8 mfd. 500 v. wkg. (elect.)
 C6—8 mfd. 500 v. wkg. (elect.)

Car Radio Interference Suppression



METHODS OF PREVENTING THIS

By F. C. Palmer

ENGINE interference falls under several groups, since it will be clear that only the electrical devices, etc., which are made to function with the engine turning over, will result in interference to the radio.

The first electrical component to give trouble is the dynamo; this source of interference can be heard by a whine from the receiver when the accelerator pedal is pressed down, and the remedy here is to correct a 1.0 microfarad condenser of 150 volts working to the *line terminal* of the dynamo. This is usually indicated by a thick yellow lead, or the larger of the two terminal nuts to be found on the dynamo. The thin lead, or the smaller of the two terminal nuts, is the *field*, and under no circumstances whatever must a condenser be connected to this point, since if it were done damage would result to the *field winding*.

The second electrical component to give trouble is the ignition coil. Interference from this unit results in spark interference which will increase as the engine is made to "rev" up. On the ignition coil will be found the letters S.W. and C.B. which represent secondary winding and contact-breaker respectively. The condenser must be connected to the S.W. terminal only and must be earthed at the ignition coil fixing bolt. Its value may be the same as for dynamo suppression. Should there be some doubt as to the correct terminal, if one lead of the ignition coil goes to the distributor, then it is the other terminal on the ignition coil which must have the condenser connected to it.

In some instances it may be necessary to fit suppressors to the *spark plugs*; in this case the suppression is resistive, and takes the form of plug resistors of 12,500 ohms in value, connected to each plug in series with the leads from the distributor.

Some engines have what is termed a "temperature transmitter" which is electrically operated. This will be located at the front of the engine. The usual value of condenser connected to this point, and earthed, will remedy matters here. The main sources of interference from the "engine" have now been dealt with, and if carried out correctly, will result in interference

from those components so far mentioned being reduced to a minimum, or removed.

Other Causes of Engine Interference

In some cases, even with the suppressors correctly fitted as stated, it may be found that engine interference still reaches the receiver to spoil the radio reception. Should this be so, remove the aerial plug from the car radio, if the interference ceases it is clear that the aerial is picking up the interference in some manner. We must, of course, assume that a "Car Radio Aerial" is employed, and not just any old length of wire strung up like a clothes line, which is, of course, quite useless!

Hence the bonnet of the car should be opened and examined to see if it is mounted on rubber grommets, used to prevent mechanical noise. In this instance, the bonnet may be radiating the interference from the "engine" directly on to the aerial, and should be bonded to chassis at points near the aerial. It follows from this that car radio suppression is only effective with the bonnet "closed down" and not otherwise.

If the interference still persists, then the most obvious deduction is that it is reaching the receiver via the live terminal to the receiver. A suppressor choke connected in series with the fuse holder, etc., may help, but in some instances it will be found that some car radio receivers are prone to this type of trouble, and extra filter components are required within the receiver. The sure test is to try another make of car radio under the same conditions, and should the interference stop, then the remedy is obvious.

In some rare cases of interference it has been found that with the "fully retractable" car radio aerial, fitted from within the car, the interior lighting operated by switches, which are fixed within the door hinge, can result in engine interference being directly induced into the aerial.

In this case, the wire going to the switch, directly underneath the aerial, must be screened, or redirected, to lessen the induced interference to the aerial. It will be found in such a case that interference is greater with the interior lighting system switched off, and much less when

switched on, i.e., when the driver's door is shut, and when it is opened.

Further Sources of Interference

An electric clock can result in interference, and a 1.0 microfarad condenser connected to the live terminal, and as near as possible to the clock itself, will clear up matters. Windscreen wipers are a possible cause of radio interference, and the method to be adopted depends upon the system of wiring in use. Should the windscreen wipers have one of their power supplies taken from the chassis-earth then a 1.0 microfarad condenser connected across the supply terminals will result in a cure of the interference.

In some cases, like Coach Radio, the supply is isolated from the chassis of the coach, hence two such condensers are required, one to each of the wiper's terminals, and the condensers being earthed to chassis. Petrol pumps can result in a series of clicks being heard on the

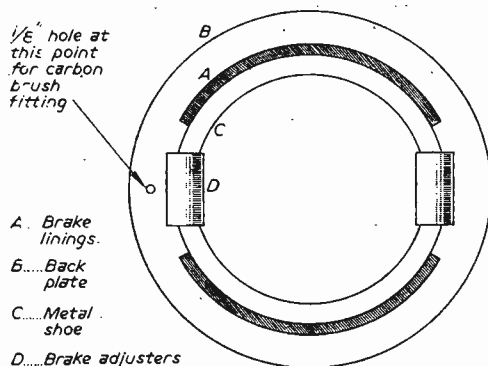


Fig. 1.—Showing the general system of the "brake drum."

receiver, here a 1.0 microfarad condenser connected to the terminal on the petrol pump, and earthed, will remove this trouble.

The main sources of interference have now been covered from the electrical point of view. It is vital, however, to point out that with aerials, the aerial must be fitted so that the bonding is earthed at the point of fixing, and that the receiver is earthed, so that the bonding from the point of fixing is earthed, where it plugs into the aerial socket, i.e., the aerial bonding, or screened cable, must be earthed at each end of the aerial lead.

Interferences Caused by Brake Linings

One of the greatest sources of interference to car radio receivers is that resulting through the application of the car brakes. It resembles a rushing sound, which completely cuts out any radio reception, and if the brake linings are not completely free from the brake drum, results in a series of crackles which increase as the car's speed is made to increase. This is due to frictional electricity of the linings.

One method to reduce such interference, which is referred to as "brake static," is to clean the edges of the metal brake shoe, removing the

paint, etc., and applying a coat of conductive graphite, so as to provide a conductive path for the frictional electricity, when the brakes are applied. This remedy, however, does not maintain its conductive effect for very long, in particular, the front wheels, due to the various parts of the steering system being rubber bonded, prevents the conductive properties of the graphite from retaining its same efficiency, as when first applied.

The best method which the writer has found most effective, is by all means apply the conductive graphite, but the essential method is to fit a carbon brush on to a copper strip, which is held to the back plate of the brake assembly, the carbon brush thus makes continuous contact with the drum. The writer has used this method on a very bad case of brake static and has covered over 1,000 miles with still no signs of brake static.

This method is also used for "wheel static," and this interference is caused by the axle or the tyre building up static electricity during motion of the car. This can be detected by applying the brakes, assuming that the usual case of brake static is not present, or has been treated with, say, the conductive graphite treatment alone, when the brakes have been applied, and it will be found that the interference ceases. The remedy in all these cases is to maintain continuous electrical contact between brake drum and the back plate. The carbon brush mounted on a copper strip will be found to remedy such interference.

With brake static, there are special brake linings which make the application of the conductive graphite, etc., unnecessary, but even these do not prevent wheel, or tyre, static and the carbon brush method given above will be found well worth trying. Fig. 1 shows the general system of the "brake drum," etc.; the brake linings are indicated by A, the back plate by B, the metal shoe by C and the brake adjusters by D. The metal shoe is cleaned to bare metal along the edge where it is "flush" with the lining. Then the conductive graphite is applied, only along those edges, and *not* on the *top* of the linings.

The metal strip is fitted over the brake adjusters, D, by drilling a hole about $\frac{1}{8}$ in. in diameter. The carbon brush has a copper surface about $\frac{1}{8}$ in. around the bottom of it. This allows the brush to be soldered to the copper strip. Then if necessary, the carbon brush is reduced in length to permit the brake drum to slide over it. Then the strip is bent upwards at an angle of 45° to give it the tension necessary to maintain electrical contact with the brake drum. It is vital that the metal around the $\frac{1}{8}$ in. hole be cleaned down to "metal" to ensure an efficient earth. The copper strip will be at rightangles to the back plate, and the carbon brush at rightangles to the copper strip, and adjusted to make contact with the brake drum, at or near its centre of circumference. Lastly, it might be pointed out that whilst the domestic receiver requires, say, 140 microvolt input, the car radio receiver must give a good output with only 20 microvolt input, and in some instances, with only 5 microvolt input.

A Beginner's CONSTRUCTIONAL COURSE-III

6.—MORE DETAILS OF FITTING A SEPARATE VOLUME CONTROL AND OTHER MODIFICATIONS

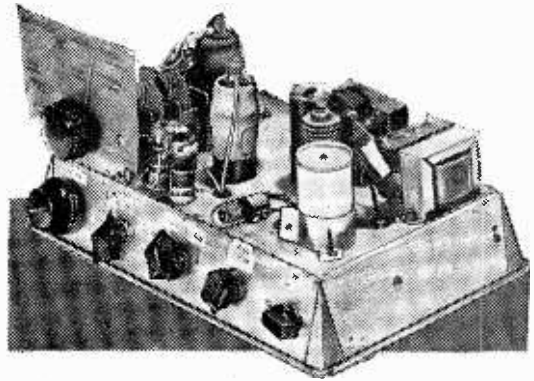
By E. V. King

Fitting a Larger Output Valve

THE volume obtainable from the set as constructed to date is much more than sufficient for any ordinary household. For use at a party or in a small hall more volume may be obtained by using a beam type output valve such as a 6V6. With the voltage available about 2 watts of power would be obtained. $\frac{1}{2}$ watt is more than sufficient for ordinary needs so there will be quite a bit to spare.

In addition to changing the valve holder and connections the H.T. supply will have to be altered to give a much larger current.

The metal rectifier MRI must be replaced by one giving at least 60 mA (best to get one taking 100 mA) or another *exactly* similar one could be wired in parallel but this is not good radio engineering policy. The smoothing resistor R11 is now discarded and is replaced by an L.F. choke rated at 10 Henries. The choke is fitted in position as shown in Fig. 36a and wired to the condensers C12 and C13 making sure the leads are well insulated. Note that the choke is underneath



the filament transformer and that the laminations are at right angles to both filament and speaker transformers. This is a help in keeping hum to a minimum.

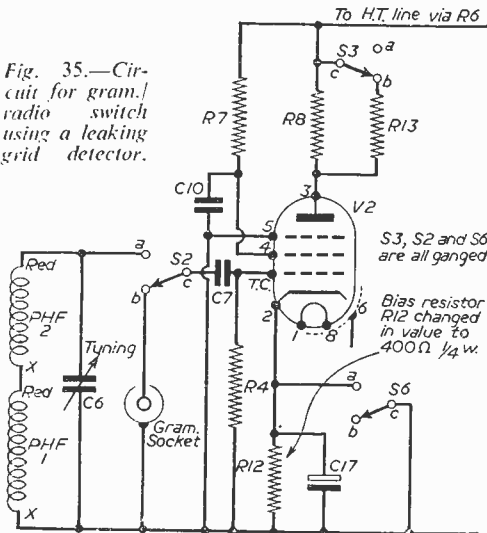
Now, when the H.T. supply has been modified, test the receiver keeping the old output valve for the time being. If the radio does not now work you have wired in the choke or new rectifier incorrectly, they are faulty, or you have caused some other fault mechanically in doing the modification.

Having verified that the radio still works unsolder all the leads going to V3 holder, carefully bend them out of the way and replace the holder with an International octal one. This has now to be wired as shown in Fig. 37. Note that the base numbering is the same but that the electrodes are connected to different pins, i.e. the numbering code is different.

Pin 1 is earthed to a tag. Pin 7 is earthed to another tag. Pin 2 joins to pin 8 on V2. Pin 3 to TR2, C16 and C18. Pin 4 to H.T. supply (junction of choke and R6). Pin 5, this takes the lead which previously went through a grommet to the top cap of V3, that is junction C14 and R10. Pin 6, this becomes the H.T. supply point in lieu of pin 7 on the previous valve used. Pin 8 goes to earth via 400 ohm bias resistor (i.e. R9 is changed in value) with C11 in parallel as before.

Using the valve the overloading on full local station volume disappears and the valve gets very hot. This is quite in order. The metal gets especially can cause a blister if touched after an hour or so's operation, they are black in colour and should always be left that way to help in radiation. No screen should be used round these valves.

Fig. 35.—Circuit for gram./radio switch using a leaking grid detector.



Fitting Safety Fuses

Fuses may be fitted in any convenient position, the back panel seems the best place for them. To protect the rectifier should any smoothing condenser break down a fuse may be fitted in the lead from mains to the black of MR1. This fuse should be rated at 100 mA if the rectifier is a 30 mA type or 150 mA if of the 60 mA type. If smaller values are fitted they will blow on the charging surge when the set is switched on. If they do tend to 'blow' with values stated, put a

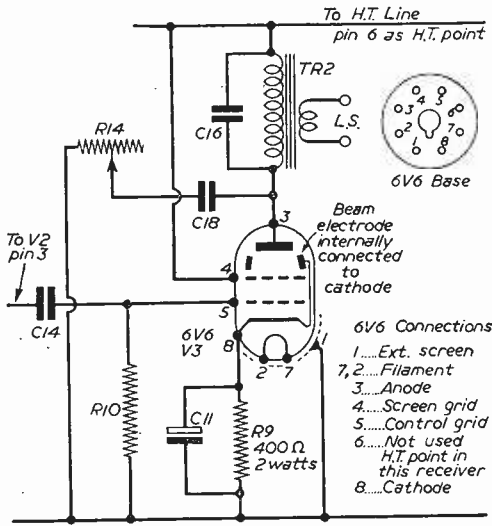


Fig. 37.—Theoretical circuit for 6V6 output stage.

1,000 ohms resistor in series with them to limit the surge.

A fuse may be fitted in each mains lead for added safety. A value of 250 mA should be sufficient, especially on 200 volt mains (which the author has to use), but this could be increased to 500 mA. The smaller the value the better the margin of safety afforded, sometimes a value fitted in one set will not "hold" during the switching surge because the condensers C12/13 are of extra high value or the MRI is of very low resistance.

The fuse-holder fittings may be of any type insulated from chassis but the best type are totally enclosed, mounted like volume controls through a panel hole, and have a screw-on cap which holds the small glass fuse in contact against a spring.

Fitting a Dial to the Tuning Gang

The finished receiver may be fitted with a commercial type tuning drive which can be obtained at any dealer selling to the home constructor. The author has found that quite a good effect (and good utility) can be gained by soldering a thin black wire pointer directly to the tuning control spindle. A piece of postcard is mounted on pieces of tin plate behind this pointer. A large type knob (or small slow-motion assembly) is then fitted.

In the first place a dummy card is fitted, and after trying the receiver on a few stations (i.e., Luxembourg, Light and Home) you should be able to plan out an attractive card to be fitted permanently.

If a cabinet is made a cellophane window is fitted with a hole in the cellophane to take the tuning spindle. The knob is then fitted outside the

window. A dial lamp may be fitted above the card to provide illumination and tell you when the set is switched on.

Fitting an Internal Volume Control for Gramophone Operation

It will be necessary to fit a volume control for use with the gramophone or microphone, especially if a 6V6 is fitted. As stated, this could be fitted on the playing deck, but it is proposed to give details of how one was fitted to the prototype at the back, to the right of the pick-up plug (viewing the receiver from the back). This position was chosen because there was no room on the front panel and, in any case, once a convenient volume is found for recordings it has rarely to be altered.

The value of the potentiometer required depends on the pick-up purchased. Details are usually given with the literature, but a good all-round value for magnetic style instruments would be 250k, and for crystal style 1 or possibly 2 megohms. If in doubt use 1 M.

The wiring is shown in Fig. 38. R15 is removed. The lead which goes to the plug from S2 is now taken to the slider of the volume control. One tag of the control is now taken to earth. The other to the pick-up plug. If the control works the wrong way round reverse these connections.

Use insulated screened cable for connections if you are using a crystal-type pick-up, as even if the receiver is plugged in correctly to the mains the chassis is live (via TRI primary) when the set is switched off. The pick-up should not have any direct connection with earth.

Fault Finding Techniques

It is now intended to give some details of how faults can be located and diagnosed. The main

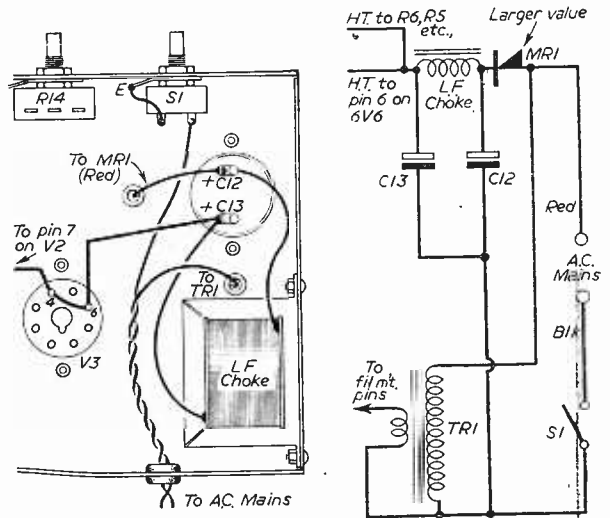


Fig. 36(a).—(Left) An underview of a larger power unit. Fig. 36(b).—(Right) The theoretical circuit of the power unit for 6V6.

consideration is to find out which stage of the receiver is faulty and to guard against the beginner making random guesses and making more faults as he goes along. If he (the beginner) has an expert friend he should get him to make one simple fault at a time for him to locate. If you are a beginner do not make faults yourself as you may do harm. On page 604 are twelve suggested faults which someone could make for you. do not look at this list yourself until after your experiments.

Many methods of fault-finding are possible. the method given is as sure as it is possible to make any system but is somewhat longer than short-cut systems useable by the expert. The author assumes that you are a real raw beginner but welcomes expert approval or criticism.

Do I Need a Meter ?

It is hoped in future to give details of a simple effective multi-range meter for the beginner to make. There is no doubt that a 1,000 ohms per volt multi-meter is a great help. If you have such a meter be very careful to always start on high voltage or current ranges first. Do not risk burning out the meter on the range you think appropriate because a fault may have put an excessive voltage on the point being tested.

For instance, if you were testing the bias on the 6V6 output valve you would expect a value of between 10 and 20 volts, so you might (wrongly) choose the 25 volt range on the meter. If R9 were open circuit there may be 200 volts through the meter (which was!).

Good, expensive instruments, beyond the financial ability of most young amateurs, have safety devices working on the principle that if the needle accelerates too rapidly the current is cut off at once.

A meter is a "must" for reasonably sure fault-finding.

Meter Readings are Not Always Accurate

Meter readings on valve pins are useful but not always accurate because of voltage drop caused by the current drawn by the meter having to go through a resistance in the valve circuit. Say you want to know the voltage on the screen (pin 4)

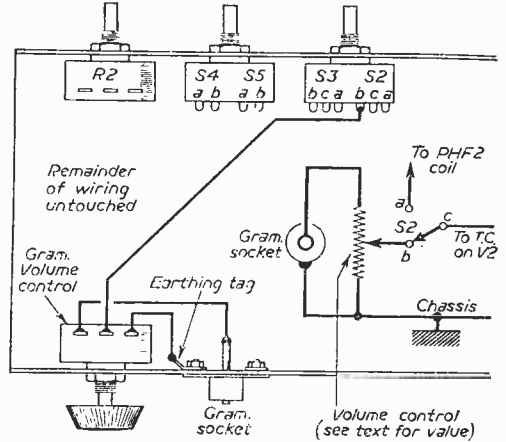


Fig. 38.—An underview with separate P.V. volume control. (Inset) Theoretical circuit for volume control.

of V2. The voltage is really 100v. but it shows as 75v. on a 1,000 ohms per volt meter on 500v. range, and as 35v. on 400 ohms per volt (Avo Multiminor) meter on range 500v. On the chart prepared by the author readings are given for an Avo Multiminor and for a 1,000 ohms per volt meter. However, if you have another type of meter you can construct your own chart for use with your meter. It is a good policy to do this with all equipment made and to put a copy of the chart in an envelope in the back of the cabinet for reference in the future.

How to Use a Meter (for Voltage Tests)

Unless otherwise stated, readings are from chassis to various wiring points. Clip the black negative lead to the chassis making sure it is in good contact. Switch the meter off. Switch to the 500v. or more range and apply the test prod carefully to the test point. If the reading of the meter is a small one switch off the meter, reselect the range and switch on again. The higher the range used the more accurate the actual voltage, but the more difficult it is to read the deflection off on the scale.

TEST FIGURES FOR V.1

| Mains Used | 240 v. A.C. Mains | | | | 200 v. A.C. Mains | | | |
|-----------------------------|-------------------|---------|-------------|---------|-------------------|---------|-------------|---------|
| | 1,000 Ω | | 400 Ω | | 1,000 Ω | | 400 Ω | |
| Meter Used | Range | Reading | Range | Reading | Range | Reading | Range | Reading |
| Test Points as under | | | | | | | | |
| Junction R5/C8 (V1, H.T.) | D.C. 500 v. | 230 v. | D.C. 500 v. | 230 v. | D.C. 500 v. | 180 v. | D.C. 500 v. | 180 v. |
| Pin 7 (Main H.T.) | 500 v. | 240 v. | 500 v. | 240 v. | 500 v. | 195 v. | 500 v. | 195 v. |
| Pin 2 Full volume | 5 v. | 1.6 v. | 5 v. | 1.6 v. | 5 v. | 1.5 v. | 5 v. | 1.5 v. |
| Half volume | 5 v. | .7 v. | 5 v. | .7 v. | 5 v. | .7 v. | 5 v. | .7 v. |
| Zero volume | 5 v. | .2 v. | 5 v. | .2 v. | 5 v. | .1 v. | 5 v. | .1 v. |
| Pin 3 | 500 v. | 200 v. | 500 v. | 200 v. | 500 v. | 175 v. | 500 v. | 175 v. |
| Pin 4 Full volume | 500 v. | 95 v. | 500 v. | 55 v. | 500 v. | 85 v. | 500 v. | 50 v. |
| Half volume | 500 v. | 50 v. | 500 v. | 20 v. | 500 v. | 30 v. | 500 v. | 15 v. |
| Zero volume | 500 v. | 0 v. | 500 v. | 0 v. | 500 v. | 0 v. | 500 v. | 0 v. |
| Pin 8 | 25v. A.C. | 4/6 v. | 25 v. A.C. | 4 6 v. | 25 v. A.C. | 4 6 v. | 25 v. A.C. | 4 6 v. |
| Anode Current (Full volume) | 5 mA. | 1.5 mA | 5 mA. | 1.5 mA. | 5 mA. | 1.5 mA. | 5 mA. | 1.2 mA. |

How to Use a Meter (for Current Readings)

The meter has to be inserted actually in circuit so it will be necessary to unsolder a connection for each test. Care must be taken not to cause feed-back troubles due to the meter wiring. Thus if we wish to take the current reading on the anode of V1 we should insert the meter in the lead from "Z" on the PHF1 to R5 and not in the lead from the anode to Y on the PHF2 as might be supposed. A fairly accurate reading would be given too by putting the meter in series (that is in line) with R1, putting the meter in on the earthy side and not in the cathode side.

The meter is switched off during the unsoldering and lead clipping stages. It is turned to a range of, say, 1 amp and switched on. If there

mains lamp at black of RM1 and TR1 filaments do not light. Note all checks are from the point mentioned to chassis unless otherwise stated.

3. If input to RM1 is not live check S1 for fault.

H.T. Supply check. (Meter on D.C. ranges for volts).

1. Check at red tag RM1. If nil RM1 or C12/13 are u/s (unserviceable).

2. Unsolder R11, C12 and C13. If voltage on RM1 red is not correct RM1 is faulty.

3. Connect C12. If voltage at red tag RM1 is O.K. and is not O.K. when C12 is connected, C12 is faulty.

4. Connect R11 to C13 and C12. If voltage at RM1 is rendered incorrect C13 is faulty.

TEST FIGURES FOR POWER UNIT.

Use 400 Ω (or 1,000 Ω) per volt meter. Readings will be the same on any meter; 20% variation is permissible. All figures are to chassis (negative).

| Test points as under | Range | Reading on 240 v. A.C. | Reading on 200 v. A.C. |
|---|-------------|------------------------|------------------------|
| MR1 (black) | A.C. 500 v. | 249 v. | 200 v. |
| MR1 (red) (main H.T. supply) | D.C. 500 v. | 280 v. | 220 v. |
| MR1 (red with C12/13 disconnected) | D.C. 500 v. | 90 v. approx. | 80 v. approx. |
| C12 (all valves in use) | D.C. 500 v. | 280 v. | 220 v. |
| C13 (all valves in use) | D.C. 500 v. | 240 v. approx. | 195 v. approx. |
| Junction R5/C8 (V1, H.T. supply) | D.C. 500 v. | 230 v. approx. | 180 v. approx. |
| Junction R6,C9 (V2, H.T. supply) | D.C. 500 v. | 225 v. approx. | 185 v. approx. |

is little deflection switch off and reselect the range. Continue until you get the range which gives the most deflection without the needle going "over the top." Here, the smaller the range selected the better. The range selected has no effect on the current consumed by the valve. Current ranges are thus more foolproof and accurate in normal tests.

How to Manage Without a Meter

You can get a fair way without a meter. In the tests given many use no meter at all. Where voltage or current readings are given you are limited to telling if there is H.T. present by gently and momentarily sparking the test point to chassis. Do not expect a big fat spark from, say, the screen of V2 as R7 causes a very large voltage drop as soon as you cause a short to earth.

Headphones are very useful to even the expert.

No Hum From speaker (V3 or supply networks at fault)

Mains check.

1. Check mains at power plug with lamp or other appliance.

2. Check with meter (A.C. range) or small

If a 6V6 has been fitted, for R11 read L.F. choke.

One or two other unlikely faults are still possible, i.e., shorts of an H.T. lead to chassis. *TR2 check.*

1. Check H.T. at pin 3 valve 3 (Sp41, 6l or 6V6). If O.K. TR2 is O.K.

2. If nil, test at input to TR2 if O.K. then TR2 is faulty.

If these two sets of readings are absolutely identical C16 is shorted internally.

Speaker check.

1. Verify that the speaker is not shorted internally by flicking the leads on a torch battery, loud cracks should be heard.

Valve 3 check. (Refer to chart for approximate readings).

1. Check H.T. at pin 7 (pin 6 on 6V6).

2. Check H.T. at pin 4 (pin 4 on 6V6).

3. Check bias between pin 2 and chassis (this really gives the negative potential on the control grid) (on 6V6 check to pin 8).

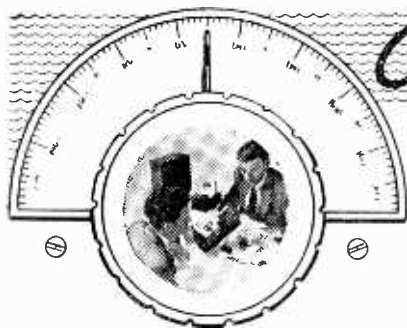
If bias is very high R17 is open circuit. If, low probably C11 is faulty. Substitute another.

If still low, valve is probably low emission. Try substitution with one of the others.

(To be continued)

CHART SHOWING FIGURES FOR VALVES USED.

| Valve | Fil. volts | Fil. amps | Anode volts | Anode current | Screen volts | Bias volts | Base Connections | | | | | | | | T.C. |
|-------|------------|-----------|-------------|---------------|--------------|------------|------------------|---|---|---------------|----------------|-----|---|--------|------|
| | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| 6V6 | 6.3 | .45 | 250 | 45 mA | 250 | 15 | Ext. Scr. F | F | A | (H.T.) Scr. G | Con. N | U | F | K | |
| SP41 | 4.0 | .95 | 200 | 11 mA | 200 | 1.5 | F | K | A | (H.T.) Scr. G | Sup. Ext. Scr. | N/U | F | Con. G | |
| SP61 | 6.3 | .6 | 200 | 11 mA | 200 | 1.5 | F | K | A | (H.T.) Scr. G | Sup. Ext. Scr. | N/U | F | Con. G | |



On Your Wavelength

BY THERMION

It should be remembered however that many people who have scrapped their radio sets and spend their time looking in do not hear these messages. I suggest that the SOS messages should also be announced on television. This could quite conveniently be done in the news features.

Decomposers

MR. JOHN CHRISTIE, of Saltford, thinks that most musically-minded readers will disagree with my comments on those parasitic barnacles who batten themselves on to the music of legitimate composers and "arrange" it. What they really do is to take the work of a composer and decompose it. Mr. Christie says that there are obviously many ways in which an original melodic line can be presented. Quite so, the composer selected his theme for the line and it should be left alone. Some musicians make a fat living from this sort of cribbing. My correspondent goes on to say that a musical arranger does not profess to improve upon an original work but to provide a variation on it, although the result as to whether an improvement has been effected must remain a matter of opinion. He points to the sales figures of such music which is rather like suggesting that a case could be made out for forged bank notes, for such arrangements are really forgeries. Let us be rid of musical limpets, who are in the same category as crooners and pop singers who give their "arrangements," "versions," or "renditions" (appropriate word) of a particular song. There is more nonsense spoken and written about music than there is about horticulture, and there are so many singers, musicians and conductors, so called, who have no musical training whatsoever, cannot play an instrument, cannot read a note of music, yet who reach the top of the tree, that I must be right.

The Disc Jockey

ANOTHER parasitic appendage to musical entertainment is the disc jockey, an American term imported into this country. The disc jockey thinks that we are so ignorant that an eight-minute gramophone record requires two or three minutes of introduction, freely interlarded with their weak attempts at oleaginous humour. A good record makes a good disc jockey! It is a job requiring no musical qualifications, since the gramophone companies feed the jockeys with a nosebag of handouts. The recital of gramophone records with just announcements as to titles in between is now a thing of the past.

It would be interesting to know what other readers think of this new profession.

The SOS Signals

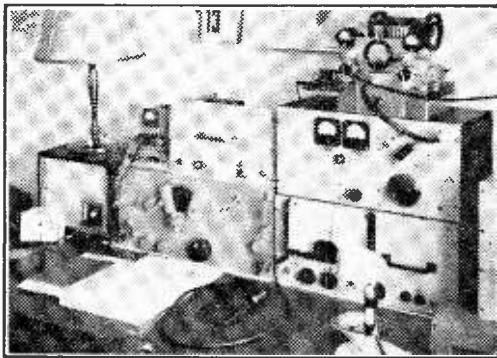
A USEFUL service performed by the BBC is the transmission of those SOS messages.

Calling Amateur Transmitters

WHEN it was suggested some time ago that the transmitting feature of this journal should be discontinued, there was an outcry and it was decided to keep it going. Amateur transmitters, however, appear to be bad correspondents, for very few responded to my appeal for photographs of dens, in spite of my offer of cash for all those published. Perhaps this paragraph will serve as a reminder that that picture of your den may be of interest to other readers. In fact, I should be interested to receive any photographs which have a radio interest. The photograph of that old set you made many years ago, the snapshot of the family enjoying an alfresco meal with a portable radio in the picture, or a picture of a field day. I shall pay for every one published.

Preferred Values of Resistors

IT is almost impossible to obtain a resistor other than of preferred values. Some contributors I see will specify values of resistors which to my certain knowledge are quite unobtainable. This must give readers a great deal of trouble. They may be hunting around, for example, for a 90 ohm resistor, the dealer will tell him that he can only supply either 82 or 100. Either of these will work equally well where 90 is specified, but those without technical knowledge may not know this, and the customer refuses them and commences a search of other radio shops for something which is unobtainable. I understand that a list of preferred values is to be published.



A corner of DJIOD'S den



Aerialite Ltd.

IN addition to a large range of television aerials a representative selection of export and Band V.H.F. aerials are on view. The radio aerial display covers room, loft and outdoor types for short, medium and long wave reception and in the V.H.F. section are models to suit all service areas. These models are available as separate aerials or as arrays for attachment to existing masts.

Ambassador Radio & TV Ltd. Stand No. 26

Antiference Ltd.

Stand No. 22

AERIALS are the main feature on this stand together with a wide selection of equipment including car aerials.

Avo Ltd.

Stand No. 60

THE principal exhibit here is the new Multi-minor which is a compact, pocket size instrument which adequately covers the demands of the amateur radio enthusiast. The recently introduced Avo signal generator should be of interest to engineers dealing with radio reception on narrow band A.M. channels. A large range of equipment is also on view.

Belling & Lee Ltd.

Stand No. 49

V.H.F. aerials to suit all service areas are displayed here. Terminals, terminal blocks, plugs and sockets, fuses, fuseholders, printed circuit connectors, and B.N.C. connectors are other interesting exhibits.

Stand No. 5

Brenell Engineering Co., Ltd. Stand No. 440

TAPE recording equipment is on show here including the "Brenell" Three Star portable tape recorder, the Mark 5 portable tape recorder and the Mark 5 tape deck.

A. F. Bulgin & Co., Ltd.

Stand No. 56

ON show is to be seen a wide range of components including crocodile clips, fuses, knobs, jacks and plugs, mains connectors, plugs and sockets, pilot lamp holders and signal lamp holders and fittings. Among the last named is a number of new and

SPECIAL NOTE

This report has been compiled from information supplied by exhibitors, as we go to Press with this issue before the show opens. The omission of certain exhibits is, therefore, explained by the fact that the manufacturers concerned have not, at the time of going to Press, responded to our request for information.

interesting models.

Burwell Products Ltd.

Stand No. 219

TV aerials are the main exhibit here.

Bush Radio Ltd.

Stand Nos. 3 & 22

V.H.F. receivers are shown here ranging from a mains portable to an impressive table model. Portables are represented by a small all-battery driven model Bp61 and a mains/battery set in a carrying case. Record playing equipment has been extended to two radiograms and two record players. A sound-proof demonstration stand has been built where visitors can listen to the new stereophonic discs now coming on the market.

(Continued on page 609)

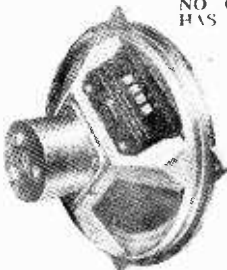
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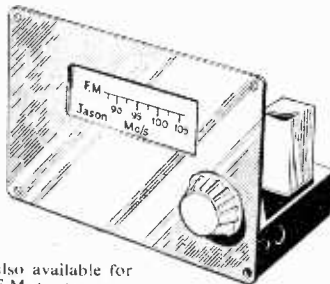
THE STENTORIAN H.F.1016



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Enjoy crystal clear Hi-Fi reception this winter by building this Jason F.M. tuner NOW. All parts standard and available from stock. Full constructional data including point to point diagram and price list, 24. post paid. Complete kit, £7.7.6. Power pack kit for above if required, 35/- plus 1/- post. Kit also available for Mercury switched F.M. tuner.

JASON F.M. TUNER KIT



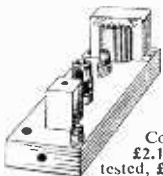
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I.T.V. PRE-AMPLIFIER



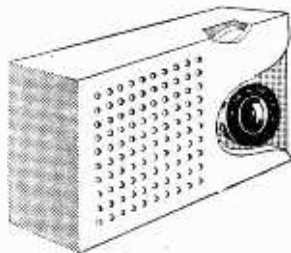
Gives amazing improvement to your Commercial TV picture especially in difficult areas. No need to touch television. Full constructional data 13. Complete kit of parts, £2.14.0. Ready built and tested, £3.14.0. All post paid.

MULLARD 3-3 AMPLIFIER



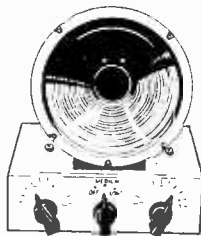
Separate Bass & Treble controls. Suitable gram. radio, mic. or guitar inputs. Really amazing quality and performance. Output for 3 or 15 ohm speaker (state which required). Bronze finish front panel. Complete ready to use, £8.8.0, plus 2/6 post. Leaflet on request.

MINI-7 TRANSISTOR POCKET PORTABLE



Loudspeaker results on internal aerial. Fits easily into pocket. Can be assembled in four easy stages. Start building today. Full constructional data and price list, 19. post paid.

THE "THREE-DEE"

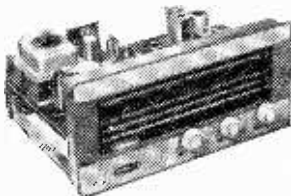


Dual range radio using crystal diode and three transistors. Works from 7½ volt dry battery. Ideal for bedroom, caravan, work shop, etc. Full data and price list, 1/-, post paid.

MAJOR-7 TRANSISTOR PORTABLE



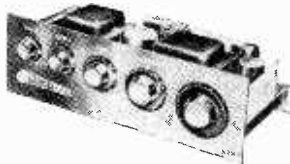
A seven transistor portable with push-pull output and 7 x 4 speaker. Attractive cabinet 9in. x 7in. x 4in. Full constructional data and price list, 19, post paid.



DULCI H4T2

New AM/FM Tuner unit with own power pack. Modern streamlined appearance and attractive front panel. Covers Long, Medium, Short and FM/VHF bands. Latest magic eye tuning. Suitable for any amplifier. Full specification on request. PRICE £24.19.0. Full range of DULCI amplifiers and chassis in stock.

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Brilliant New 10 watt High Fidelity Amplifier. Compact, easy to install and operate the PYE Mozart has a commanding lead in technical quality and modern streamlined appearance. Pick-up compensation, 4 position filter, record equalisation, three speaker impedances, etc. Full details and test report on request, or call for demonstration. PRICE 22 gns.

COSSOR KITS

F.M. Receiver 701K. Amplifier 562K. High quality 3-watt amplifier with twin matched speakers and full instructions. Printed circuit. Delivery from stock. PRICE £15.15.0. PRICE £9.15.0.

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T.C.C. 16 mfd. 350 v. small tubular condensers, 16 ea. or 6 for 7/6. T.C.C. 0.1 mfd. 500 v. paper tubular, 9d. ea. or 76 dozen. T.C.C. 8 mfd. 600 v. High-grade block type condensers, 6-. Single screened microphone cable, 6d. yard, 8-16 mfd. 450 v. wire ended tubulars, 3/6 each. B9C ceramic holders (EF50), brand new, 2/6 dozen.

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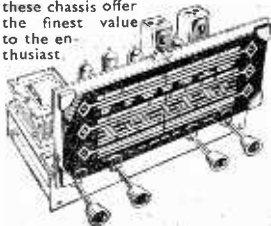
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IDEAL FOR USE WITH OUR CHASSIS

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90-DAY GUARANTEE VALVES ALL BRAND NEW

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| 5U4 | 954 | 1T4 |
| 6K8G | EA50 | 6K6GT |
| 6N7M | E1148 | 8J7 |
| 6V6G | 2/6 | SP61 |
| 6X5G | 6K7G | EF92 |
| 6K7M | | DF91 |

SPECIAL PRICE PER SET

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| 6K8G, 6K7G, 6Q7G, 6V6G, 6X5G... | 27/6 |
| IRS, 1T4, 1S5, 3V4 or 35A... | 25/- |
| Matched Pairs 6V6G... | 12/6 |
| Valve Boxes, All Sizes... | 2/- doz. |

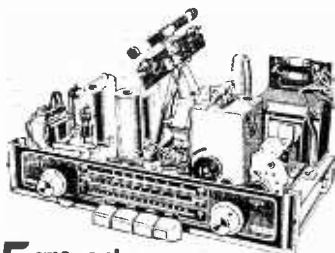
BSR 4-SPEED SINGLE PLAYER Model TU9. Our bargain price, 75/- Ready cut mounting board, 5/-

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CANCELLED EXPORT TO U.S.A. Enables us to offer **BELOW COST**

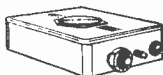
Free of Interference, Jamming and Whistles. Circuit of latest technique, covers entire V.H.F., F.M.—**MEDIUM and LONG WAVE.** Ferrite Aerial. Gram. Pick-Up switching. Full range Tone and Volume controls. Music and Speech—intimate and clear. Size 12 1/2 in. x 6 1/2 in. x 6 1/2 in. A.C. 200/250. **FULL GUARANTEE.**



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"RECO" SUPER TRANSISTOR-3

Covers medium, long and short wave-band. (In many areas this receiver requires no aerial. Call for demonstration. Complete kit with 3 volt battery and balanced armature reproducer 75/-, p.p. 2.6.



"RECO" MIDDY TWO

This receiver is similar to the Middy-3, but is less sensitivity control. Amazing performance. Covers medium and short wave band or medium and long waves 3 1/2 extra. Nothing else to buy. Complete kit with balanced armature output unit 49/6 or with "Sonotone" miniature dynamic earpiece 55/-, p.p. 2/3.

"RECO" SPECIAL TRANSISTOR THREE

This fine receiver has now been greatly improved with the addition of a handsome looking chromium plated telescopic aerial 11 1/2 in. closed, 49 in. extended. Has sensitivity control and High "Q" Fer-rod-aerial. Complete kit with choice of "Sonotone" miniature earphone or balanced armature output unit which, in areas of reasonable signal reception, can be mounted inside case. Case size 6 1/2 in. x 4 1/2 in. x 1 1/2 in. with red plastic ornamental unit cover. 77/6. Less telescopic aerial and with balanced armature output unit 65/-, p.p. 2.6.

"RECO" MIDDY THREE

Small in size, big in performance. Ideal for invalids. Take it on holiday. Vest pocket size 4 1/2 in. x 3 1/2 in. x 1 1/2 in. In areas of reasonable signal reception receives local stations on built-in ferrite rod Vari "Q" aerial. Covers 180 to 500 metres. Complete with three transistors and pencil. Price including "Sonotone" miniature earphone with moulded ear insert and lead 65/-, p.p. 2.3. Overseas orders, Carr. 10/- extra.

All "Reco" kits with ferrite rod aerials can now be supplied either for medium and long waves (3/6 extra) or medium and short wave band. Case finish for Middy 3, Red/Black. Pictorial wiring diagrams parts price list for all the above. 2/6 the set.

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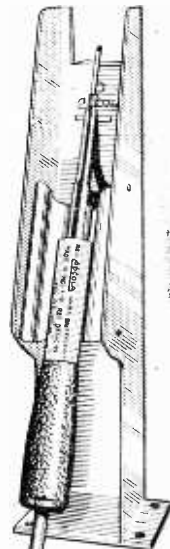
- ILLUSTRATED Protective Shield (Cat. No. 68)
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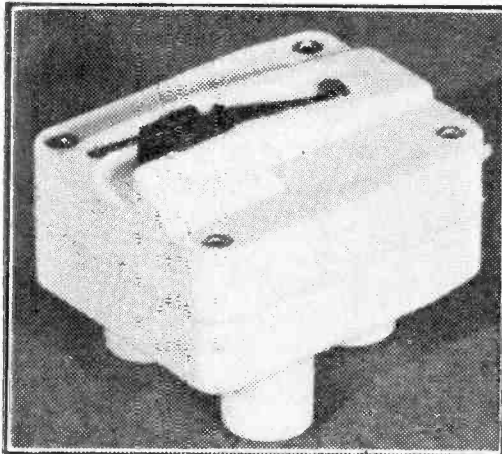
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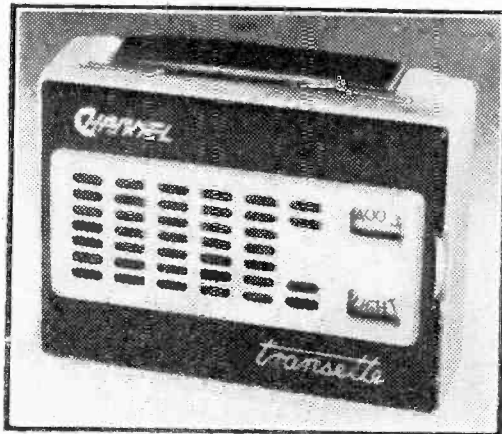
ADCOLA PRODUCTS LTD., GAUDEN RD., CLAPHAM HIGH ST., LONDON, S.W.4.

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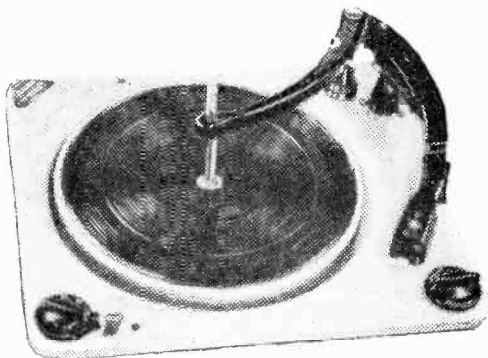




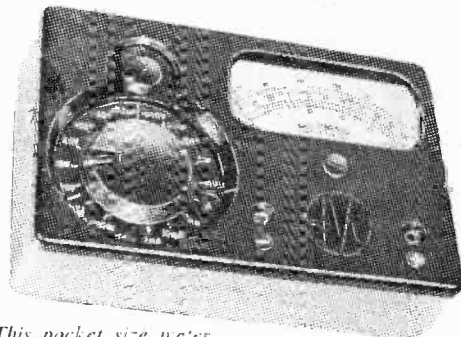
The Cosmocord Acos GP71 Stereophonic pick-up for use in conjunction with the new stereo records.



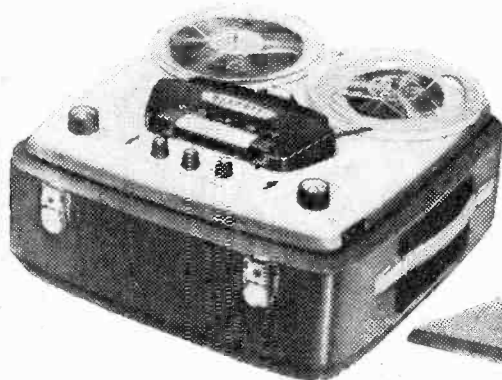
One of the smallest receivers shown at this year's Radio Show, shown by Channel Electronics is the Channel Transette, shown half the actual size.



This photograph shows the new stereo version of the well-known Collaro "Conquest" record changer.



This pocket size meter is being shown by Avo for the first time this year.



Left: The Brenell "Three Star" uses a modern wooden cabinet designed for improved acoustic performance. Right: The Bush S.R.G.71 breaks away from traditional design by mounting the record player underneath rather than on top of the wireless section.

Channel Electronic Industries Ltd.**Stand No. 213**

THIS company is showing a range of transistorised radio receivers. The Maggie and Transette are two portable receivers which will interest visitors as well as the portable record player with a transistor amplifier.

Transistor components on view include miniature O.S.C. and I.F. transformers. Ferrite rod aerials, miniature class B driver and output transformers, matched volume controls and wave change switches.

E. K. Cole Ltd.**Stand Nos. 29 & 442**

IN addition to showing a number of new radio and television receivers, Ekco is exhibiting some new instruments for the first time. Featured on the stand is the new Nine-Octave record reproducer, a mains transportable A.M. receiver, a transistorised car radio, a transistorised portable, and television sets with V.H.F. radio. A novelty is the Radiotime which is a compact, modern medium and long wave radio which incorporates an electric clock and switches itself on or off, and also switches on a kettle, fire or bedside lamp, etc. It operates from A.C. mains. V.H.F./A.M. radios are also to be seen. Car radios are also featured.

Collaro Ltd.**Stand Nos. 35 & 414**

EXHIBITED here is their new stereophonic gramophone equipment, as well as their Mark IV tape transcriber. For the stereo version of the Conquest record changer a variety of pick-up arms is available (all equipped for stereo and monaural playing), both one piece and plug-in types, including the stereo counter-balanced arm. Also being shown is the 4T200 transcription unit. Various combinations of the above equipment are being demonstrated on Stand No. 414.

Cosmocord Ltd.**Stand No. 444**

STEREO equipment is featured here together with the company's range of turnover cartridges, pick-ups and microphones.

Cossor Radio & TV Ltd.**Stand Nos. 10 & 404**

This firm are introducing a new printed circuit television receiver of "unit construction" design together with the established range of radio, television and portable sets.

A.M./F.M. and V.H.F./F.M. radiograms are to be seen and a novel design approach is the Melodygram which incorporates a two waveband printed circuit radio receiver, four-speed automatic record changer with alternative manual control and high fidelity pick-up. It has storage space underneath for books and records. Table models are much in evidence as are portables, a feature of which is the transistorised models. Another highlight is a transistorised battery-operated portable radiogram.

Other interesting items are the V.H.F./F.M. receiver kit Model 701K and the amplifier kit Model 562K.

Decca Record Co., Ltd.**Stand Nos. 25 & 425**

STEREO record reproducers are in evidence here and three interesting models are the

SRG300, the SG188 and the SG177. The stereo pick-up is also featured and is supplied complete with arm and diamond stylus of tip radius .0005in. and tip mass less than 1 milligram. It is designed to track at 3.5 grams. Television models are also on view.

Dubilier Condenser Co. (1925) Ltd.**Stand No. 55**

THIS exhibit comprises the standard range of capacitors, resistors and potentiometers. In addition is an expensive selection of devices meeting B.S.S. requirements for the suppression of electrical interference on all radio and television wavebands, also R.F. suppression chokes rated up to 6 amperes.

Dynatron Radio Ltd.**Stand Nos. 46 & 413**

THIS exhibit comprises new designs in television and radio receivers. The Albany is a 10-valve de luxe radiogram providing pre-tuning of A.M./F.M. (V.H.F.) radio bands and the latest 4-speed record changer. The Company are also introducing their Nomad fully transistorised portable radio in four attractive colour finishes. Other interesting radiograms are also shown together with a range of hi-fi and other radio equipment.

E.A.P. (Tape Records) Ltd.**Stand No. 416**

A NUMBER of Elizabethan tape recorders are shown here. They are the Escort lightweight portable recorder, the Essex and the new Mayfair Consolette. Also available is a new Elizabethan F.M. tuner, which can be housed in the Mayfair, providing instantaneous radio record facilities. Demonstrated together with the above models is stereophonic equipment.

Electric Audio Reproducers Ltd.**Stand Nos. 63 & 431**

IN addition to a complete range of standard record reproducers, numbering more than 20 models, a new series of E.A.R. stereophonic gramophones is on show.

Ever Ready Co. (Great Britain) Ltd.**Stand No. 16**

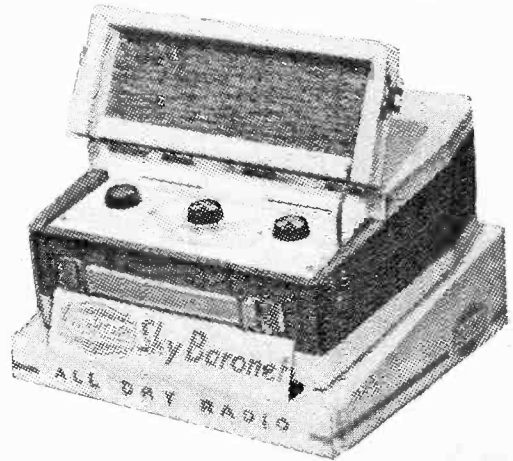
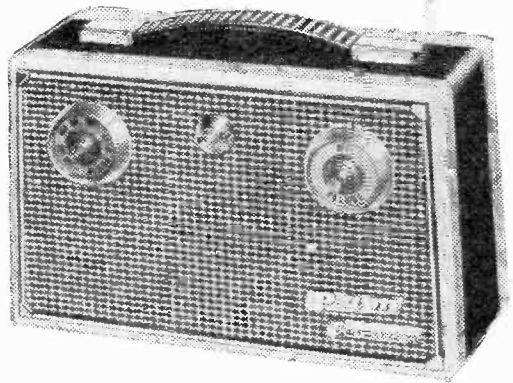
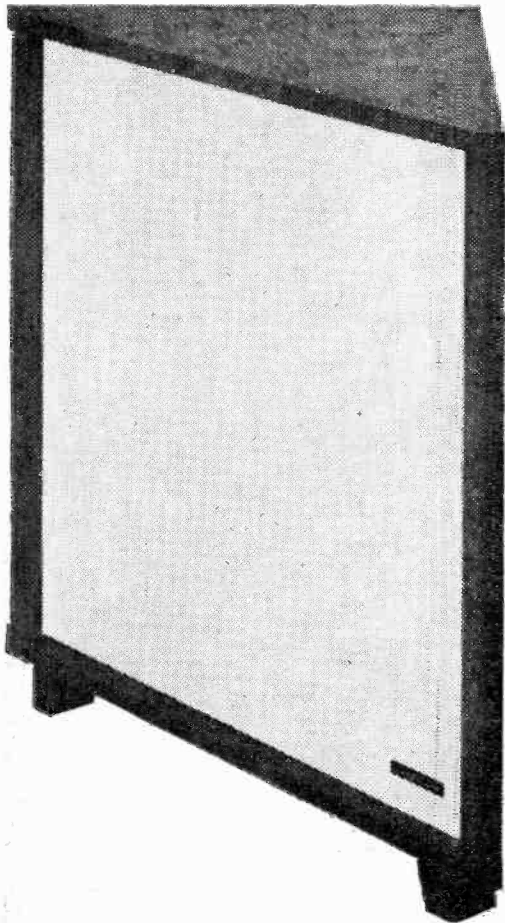
THIS firm who specialise in portable receivers are showing a number of new models. They are exhibiting for the first time their transistorised radios, powered by the Ever Ready Batrymax power pack batteries. The prices are modest and competitive.

Ferguson Radio Corporation Ltd.**Stand No. 17**

Items of particular interest on this stand include a new stereophonic radiogramophone shown for the first time and two other radiogramophones designed for easy adaptation to stereophony. An eye-catching new radio receiver is the Futura which is a A.M./F.M. table radio with an entirely new idea in cabinet design. Also included is a full range of television receivers which include built-in V.H.F. radio units.

The Futura is a superhet for long and medium wavebands and a magic-eye tuning indicator and piano-key switching are incorporated. Record

Top Right: The continental-styled A.M./F.M. autogram is being shown by McMichael under the number M101RG. Centre Right: The Pam model TB20 is gaily presented in light grey rexine with contrasting maroon suedette. Bottom Right: The Ever-Ready "Sky Baronet" is unusual in that it may be used as a car radio merely by plugging in the car's external aerial. Below: The Goodman "Axiote" enclosure comes in kit form and may be constructed in a very short time with only a screwdriver.



players on show are the Fan, Fortune, and Fortune II.

Ferranti Radio & TV Ltd. Stand No. 21

AS well as a range of television receivers on the radio side is the RP1008 gramophone record reproducer housed in a lightweight carrying case. An A.M. radio receiver, a V.H.F./A.M. receiver and a transistorised portable roughly the size of a lady's handbag.

Fortiphone Ltd. Stand No. 106

Garrard Eng. & Manufacturing Co., Ltd.

Stand Nos. 51 & 438

ON show is a large range of gramophone motors and pick-ups including four-speed record changers. A complete range of sapphire and diamond styli are available for all Garrard pick-ups.

General Electric Co., Ltd. Stand Nos. 8 & 443

ELEVEN different television receivers, six distinct radio models and a "Six Years of Stereo" demonstration are the highlights of these stands. There is also a display of semi-conductors and a special export exhibit featuring radios and batteries. A feature of the radio receivers is a mains/battery portable with push-button control.

Goodmans Industries Ltd. Stand Nos. 34 & 434

IN the main hall Goodmans are showing their full range of high-fidelity loudspeakers, components and enclosures including the Sherwood 1, 2 and 3 systems, the AX/15/4, a four-way system, the Axiette corner reflex enclosure assembly and the I.B.5. Continuous demonstrations of the I.B.3 in a typical room setting are being given on Stand 434.

Invicta Radio Ltd. Stand No. 2

THE main exhibit here are five radio receivers including a transistor portable, two record players, one of which is a stereophonic record reproducer, and three radiogramophones. A number of television models are also on view.

Jason Motor & Electronic Co. Stand No. 441

AMPLIFIERS are featured here and a new, more compact version of the J10 has been developed. The J2-10 is a double version of the J10 with change over from stereo to single-channel working. The JSA2 is a stereophonic amplifier. A new venture is the development of a complete range of electronic test equipment in kit and made-up form that will be marketed under the name of Jasonkit.

J-Beam Aerials Ltd. Stand No. 14

TELEVISION aerials and associated equipment are to be seen here.

Kolster-Brandes Ltd. Stand Nos. 43 & 402

SHOWING here is a well-balanced range of radio and television receivers and radiograms. Hi-fi equipment is included for the first time. Other innovations are stereophonic sound and

printed circuitry which has been extended to all models. Hi-fi equipment is being demonstrated on Stand No. 402.

Labgear Ltd. Stand No. 31

THE main exhibits here are television aerials and a transistorised inter-com unit.

McMichael Radio Ltd. Stand No. 42

A LARGE range of television receivers and radio receivers, radiograms and record players are shown. These include a four-valve mains/battery portable, a four-valve mains superhet, an A.M./F.M. auto-radiogram and a four-speed record player.

Marconiphone Co., Ltd. Stand No. 45

Masteradio Ltd. Stand No. 4

AS well as television receivers a very attractive range of radio receivers is on show, including A.M./F.M. sets and a printed circuit battery portable. A comprehensive range of V.H.F. and A.M. radiograms is available with multiple and single speakers. A special display of receivers with stereophonic sound are also being demonstrated. Record players include a single player and an autochanger and a transistorised car radio is on view.

Meadow-Dale Manufacturing Co., Ltd.

Stand No. 105

A VERY considerably widened range of television aerials is being shown by this company.

Mullard Ltd. Stand No. 41

TWO outstanding features on this stand are the "competition quiz" and some new electronic "gimmicks" designed to demonstrate modern applications of electronics in an amusing fashion. The competition quiz gives every visitor to the stand a chance of winning a radio set. In the set makers reception room Z28, radio and television manufacturers will see displays and demonstrations of the latest Mullard valves, cathode ray tubes, semi-conductors and other equipment.

Multicore Solders Ltd. Stand No. 63

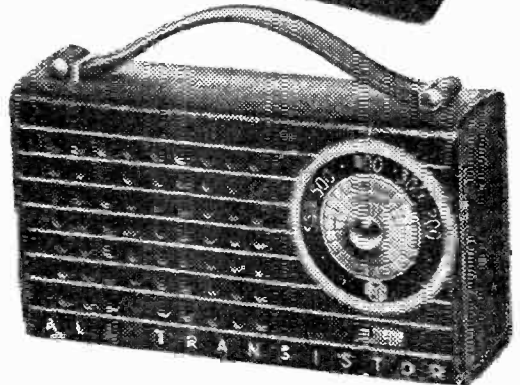
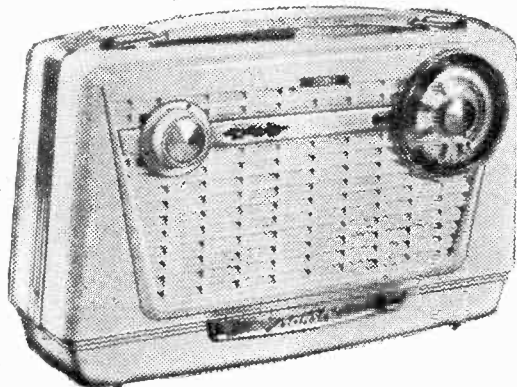
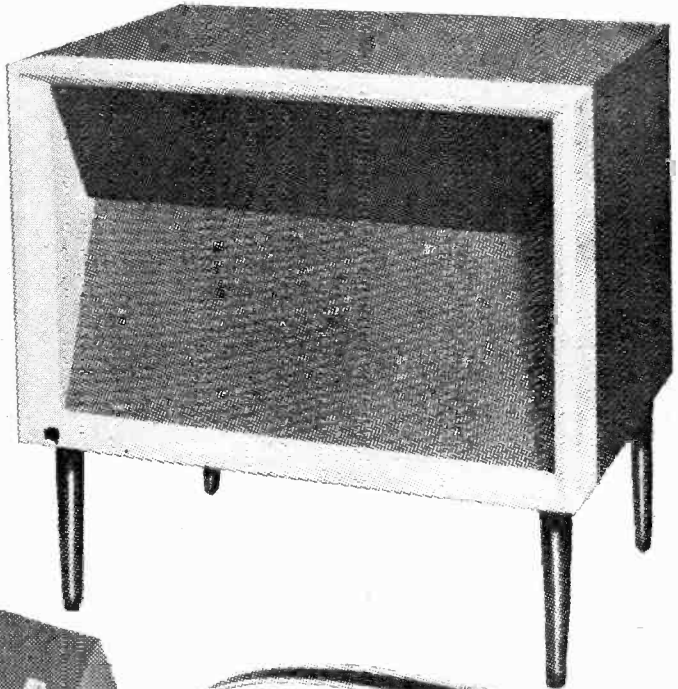
THE main exhibit here is the Ersin Multicore Savbit Type 1 alloy containing five cores of extra fast non-corrosive type 366 flux. Three continuously playing Reflectograph tape reproducers tell visitors to the stand, through ordinary telephones, the advantages of Ersin Multicore Savbit alloy, how to use the Bib recording tape splicer and, very briefly, a description of the range of tape recorders and reproducers being manufactured by Multimusic Ltd., the newly formed subsidiary of Multicore Solders Ltd.

Murphy Radio Ltd. Stand No. 11

Pam (Radio & TV) Ltd. Stand Nos. 6 & 6a

THIS company is showing a completely new range of television and radio receivers and stereophonic equipment is also being

Top Right ; The "Baby Periphonic" is a high fidelity loud-speaker system planned by the G.E.C. for the average size living-room. Centre Right ; The Roberts RT.1, is a two-band battery operated portable receiver employing six transistors and a ferrite rod aerial. Bottom Right ; A good example of the smart appearance of some of the new pocket transistor receivers is the Pye PL.50. Centre Left ; Typical of the modern record players, is the Portogram H.F.10. Bottom Left ; The R.G.D. B56, shows how manufacturers are now using plastic to its full advantage to produce smart contemporary designs.



demonstrated. Features are the Gayplay pocket transistor portable, a fully transistorised, printed circuit battery portable, a printed circuit battery portable, and various table models ranging in price from 19 to 45 guineas. A new model is the A492R radiogram.

Peto Scott Electrical Instruments Ltd.

Stand No. 12

THREE television receivers, a record player and two television cameras are the main exhibits here. The portable record player is fitted with a Collaro Conquest four-speed auto-changer. It is finished in a high quality washable covering in contrasting colours of red and grey in contemporary design. It costs 21 guineas.

Philips Electrical Ltd. Stand Nos. 52 & 53

Pilot Radio Ltd. Stand No. 28

RADIOS on this stand include the Clipper de Luxe A.M./F.M. table model, the Super Ten record player, stereophonic record players. Television receivers are also displayed.

Portogram Radio Electrical Industries Ltd.

Stand No. 58

THIS company is showing a number of new record players and tape recorders.

Pye Limited Stand No. 44

STEREOPHONIC sound reproducing equipment will be the main feature on this stand. The latest radio and television sets, radiograms and hi-fi equipment is also on display. A number of portable receivers and transistorised models can be seen.

Radio Gramophone Development Co., Ltd.

Stand No. 24

A NEW introduction to the R.G.D. range of radio receivers to be seen is the B56, all-transistor portable, at 19½ guineas including tax. It incorporates six transistors, with germanium diodes, printed circuit with push-pull output, two layer type batteries with automatic economiser, slow motion tuning, covering 540 kc/s-1610 kc/s. It covers the medium waveband with preselective Light programme on the long wave. A 5in. loudspeaker is fitted with a built-in Ferrite rod aerial. It measures 9in. wide, 6in. high and 3¼in. deep. The whole is fitted into a plastic cabinet with choice of ivory or ruby colour. The total weight is 3lb. 13oz.

Regentone Radio & Television Ltd. Stand No. 9

THIS company is exhibiting a range of radio and television receivers. There is a model R10, V.H.F. table radiogram—a 6-valve superhet covering long, medium and F.M. bands. It is A.C.-D.C. with a power output of 3 watts, employing six valves and rectifiers and elliptical speaker. It makes use of a printed circuit. The price is 22 guineas. The Nine-Three radiogram is a nine-valve superhet with dual matched stereo radio channels (audio amplifiers), covering the long, medium, short and V.H.F./F.M. The power output is 3½ watts per channel. A Ferrite

rod is provided for A.M. The gram unit is a four-speed autochanger with sapphire stylii on a turnover stereo head with a manual play switch. It measures 43in. × 33in. × 15¼in. The price has not been announced at the time of going to press.

The 6/60 radiogram is a 6-valve superhet covering medium, long and F.M. ranges, with four-speed gram unit. It measures 34¼in. × 14¼in. × 28in. high. It uses a printed circuit and is priced at 59 guineas.

The Model RT 50 tape recorder at 59 guineas is good value for money. It incorporates base and treble tone controls, extra fast reverse, and forward rewind without need for stopping or changing direction. It will function as public address, radio or gramophone, and microphone and radio inputs may be mixed. It takes 600ft. of tape, but using dual track extra play tape (11,800ft.) it will play it for six hours at slow speed. It has three speeds. The circuit is a four-stage plus rectifier printed circuit, frequency-compensated for pre-recorded tapes.

Roberts Radio Co., Ltd. Stand No. 57

THE new transistor portable model, RP1, which has transistors throughout, incorporates a printed circuit and long-life battery. It has a rexine-covered case with choice of colours, scarlet, forest green, Oxford blue, donkey brown, stardust and champagne. It costs 23 guineas and weighs 7lb. It measures 9½in. × 6 5/16in. × 4 3/16in. The R66 portable (A.C. mains/battery operated) is produced in rexine-covered cabinets in a choice of red, green, blue and honey. It has a self-contained aerial, miniature valves, ball-bearing turntable, and costs £19 18s. complete with battery.

The R77 battery portable is of distinctive design, housed in a case of English coachhide. It employs a printed circuit, incorporating four valves and covering medium and long wavebands, and self-contained rod aerial. It costs £18 17s. complete with battery.

Rolaceleston Ltd. Stand No. 30

THOUGH this company manufactures loudspeakers for the trade and multi-ratio and single-ratio transformers for use with Rola and Celestion speakers, it still caters for the amateur. A notable addition to the range is the Celestion Colaudio 15in. wide range loudspeaker. This model combines two distinct techniques in order to provide a satisfactory answer to the ever-widening demand for reproduction that will satisfy the most discriminating listener. Special features of the "Colaudio" 15in. director radiator include 3in. diameter voice coil, more efficient magnet assembly, annular dustproof suspension, two direct radiator high frequency pressure type units mounted in adjustable column form within the cone of the bass radiator.

Spencer-West Ltd. Stand No. 218

THIS firm is exhibiting television receivers priced at 59 guineas and 63 guineas and are reviewed in our companion journal "Practical Television."

(Continued on page 617)

A SMALL DEPOSIT will bring you enough parts to make a complete TRANSISTOR POCKET RADIO

(Size $5\frac{3}{4} \times 3\frac{1}{4} \times 1\frac{1}{4}$) using a printed circuit

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- Attractive high impact polystyrene cabinet with fittings for tuner, trimmers, speaker and circuit board **12/6**

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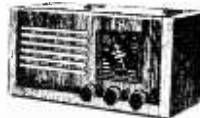
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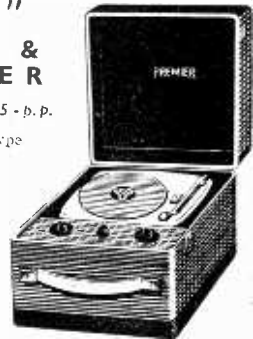
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★ Size 10in. x 9in. x 6in.

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★ 45 r.p.m. Single Record Player complete with pickup.

★ 6 volt Battery operated.

★ Incorporates Pick-up Head protection dome and automatic stylus cleaning brush. Overall size 7in. x 6in. only.

★ Made by well-known British manufacturer.

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★ Construction simplicity itself.

★ Components available separately if required.

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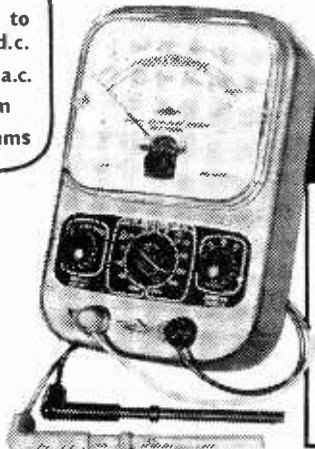
100 Microamps a.c.

0 to 1 Megohm

0 to 10,000 ohms

★ *There is also*
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Multi-Range Test Set having 19 self-contained ranges a.c./d.c. volts up to 1000 v. d.c. current up to 500 milliamps, a.c. current up to 200 microamps. Deposit 35/- and six monthly payments of 28/10. (Cash price £9.15.0).



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E1058

Standard Telephones and Cables Ltd.**Stand No. 18**

THIS company is showing a wide range of products for application in radio, television and electronic equipment. The display includes a comprehensive range of Brimar valves, for radio and television, industrial and service applications. Of special interest is the Brimar Side-display Magic Eye type EM84, especially designed for tape recorders and high-fidelity reproduction equipment. There is also a low-noise pentode, Type 8D8, for application in similar fields. There is a complete range of electrostatically focused cathode ray tubes, the Brimar Special Quality valves and STC valves for communication, transmitting and general industrial purposes, as well as a wide range of rectifiers, transistors, germanium point contact diodes, magnetic materials and glass to metal seals.

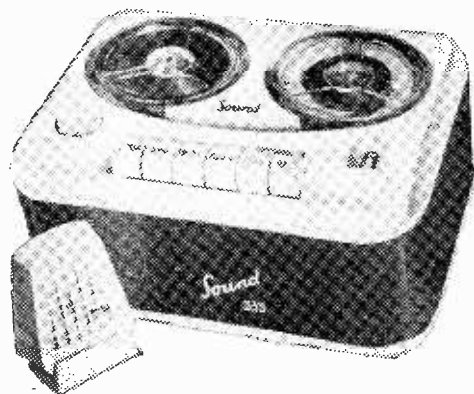
Siemens Edison-Swan Ltd. Stand No. 40

ONE of the interesting features of the exhibits shown on the Siemens Edison-Swan stand is the presentation of new developments in cathode ray tube design. Examples include the new 21in. electrostatic focus tube with a deflection angle of 110 deg. Another 21in. tube is the CRM 212 90 deg. magnetic focus. The 17in. range is represented by two new electrostatic focus tubes: the first again has a deflection angle of 110 deg., and with it is the new CME 1702—a 90 deg. deflection tube with a maximum overall length of 15in. In addition, two new 14in. electrostatic focus tubes can be seen: the CME 1402, which has a 90 deg. angle of deflection, and another tube which has appeared recently, the CME 141, with a 70 deg. deflection angle.

Other exhibits include a selection of valves, power supply units, R.C. oscillators, radio and electronic components.

Tape Recorders (Electronics) Ltd.**Stand No. 420**

THREE new tape recorders are shown as well as the two established models, "Sound" and



"Sound Belle," shown by Tape Recorders, Ltd. is a good example of how well a low priced tape recorder may be built.

"Sound 777." The "Sound Belle" costs only 26 guineas complete. It is small and lightweight, incorporating a tape deck of special design, push-button control, magic eye, three watts output with one hour's playing time. The "Sound 444" is a three-speed automatic tape recorder fitted with the Collaro Mark 4 transcripator with instantaneous track change. The output is 3 watts and it provides 3 hours' playing time. This model costs 45 guineas.

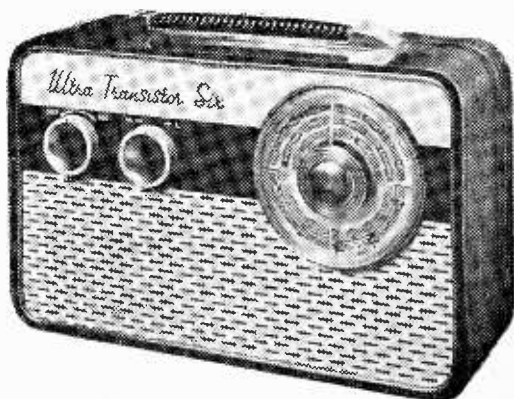
The "Sound 555" is also a three-speed automatic recorder with the Collaro Mark 4 transcripator. It has a matched three-loudspeaker system and an output of 4 watts. It costs 65 guineas. This firm also exhibits microphones and recording playback, erase and stereo heads.

Taylor Electrical Instruments Ltd.**Stand No. 212**

SEVERAL new instruments are displayed amongst the selection of well-known instruments already firmly established. Of particular interest are the two new Multirange instruments, Models 100A and 127A, which make their debut at the exhibition. The 100A is extremely sensitive, a 100,000 o.p.v. with resistance measurements up to 200 megohms, self-contained; automatic cutout is also incorporated. The model 127A is a new pocket-sized instrument with sensitivity of 2,000 o.p.v. with resistance measurements to 20 megohms. These new instruments are of special interest to our readers as they have no equivalent in the world market. Also shown are the 94 v. TV waveform and alignment generator which incorporates four instruments, pattern generator, F.M. signal generator, A.M. signal generator and TV sweep oscillator. There is also the popular Oscilloscope, Model 32A, an entirely new instrument—the Model 68A, signal generator, covering frequencies from 100 kc/s to 220 Mc/s. Other instruments are the 191A Oscillator, and the well-known Multirange meters.

Ultra Electric Ltd.**Stand No. 20**

THE newly introduced 17in. model television receiver V17-63, designed to produce ragged edge, is the highlight of this stand. It is available



The Ultra transistor receiver uses six transistors in the now standard superhet circuit.

with V.H.F. radio built-in with magic eye tuning indicator. Another new model is the V14-53, a 14in. table TV receiver. Both models incorporate the vertical precision feature. The cabinet is of the wrap round type. The 21in. model is also shown. On the radio side, there is a fully portable transistor radio with printed circuit and a battery life of over 7,000 hours. It measures 8½in. X 4in. X 12½in. and costs 20 guineas. Other radio models include the F.M. 950 for V.H.F. reception only, the U960, a table model for A.M. reception only, the Twin, for A.C./D.C. mains or self-contained batteries and the TR100, a transistorised portable.

Valradio Ltd. Stand No. 61

THIS is one of the few firms who are showing a projection TV receiver, available for 408, 525 and 625 lines, covering the British, American and C.C.I.R. European television systems. The latter will receive the BBC experimental transmission on 660 Mc/s. using a band 5 converter. It is claimed that this model overcomes the disadvantages of all earlier projection receivers. They also show a range of their well-known A.C./D.C. vibrator units, including those for tape recorders, television, radio and radiogram, a selection of transistor units from a 6 v. and 12 v. unit, with an output of 90 v. at 10 amps, and 1.5 v. at .125 amp, to a large 12 v. unit giving an output of 120 watts.

Vidor Ltd. Stand No. 32

THIS stand features a range of portables for battery and mains operation. The latest techniques in printed circuits are used and there is an attractive range of cabinets and fabrics and Butyrate. There are the Regatta, at 13 guineas; My Lady Anne, £19 8s. 6d.; My Lady Catherine, at £12 1s. 6d.; Vanguard (A.M./F.M. battery portable) at £28 7s.; the Vagabond at £13 2s. 6d.; the Gem (fully transistorised), at £22 1s.; My Lady Elizabeth, at £14 3s. 6d.; Viking, at £14 3s. 6d.; and the Riviera, at £18 7s. 6d.

Walter Instruments Ltd. Stand No. 115

THIS company really occupies three stands. On No. 115 will be demonstrated the new Walter 505 portable tape recorder. In the adjacent demonstration room, tape recorders are being shown in operation, including demonstrations of putting talkies into home movies. In the Audio Hall, tape recorders are also being demonstrated under ideal conditions.

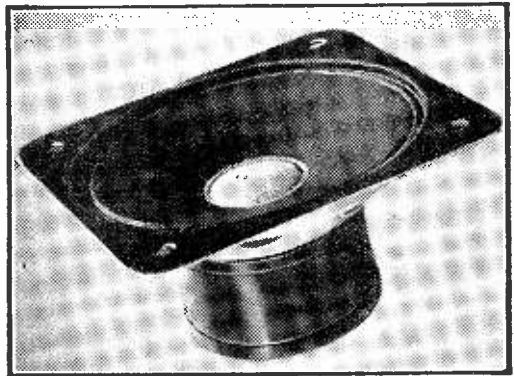
Westinghouse Brake and Signalling Co., Ltd. Stand No. 114

A COMPREHENSIVE display of the various types of rectifiers manufactured by this company are of interest to both professional engineers and amateur enthusiasts.

Copper-oxide rectifiers with their low forward resistance and stable reverse resistance are particularly suitable, in a bridge assembly, to operate moving coil instruments to indicate A.C. values to a high order of accuracy. In telecommunications, the non-linear characteristics of these rectifiers are utilised in modulators, demodulators and limiters, whilst their stable reverse characteristics are used as D.C. stoppers.

Whiteley Electrical Ltd. Stand No. 64

THIS famous firm which commenced business in the early twenties manufacturing components for home constructors has never deserted the construction market although it has widened its sphere of activities by manufacturing for the trade. They are exhibiting a range of Stentorian hi-fi products which this year has been improved and extended. There is now a range of loudspeakers varying in size from 1½in. in diameter to 18in. in diameter and these units are available with a variety of cone construction, speech coil impedance and magnet strengths to suit all requirements. Of particular interest are a 2½in. loudspeaker with a rigid plastic chassis for portable equipment use and an 8in. loudspeaker with 17,000 gauss magnet for horn loading



Whiteley's new T.359 Cone Tweeter Unit which provides a very high standard of reproduction when used in conjunction with the Stentorian 10in. or 12in. units.

operation. The 10in. and 12in. range has been extended to include units with magnets of 16,000 gauss and the cone tweeter range now includes a medium priced unit of 3½in. diameter.

The well-known range of "Breakdown" cabinets is still available and in addition there are "Column" type loudspeakers for use in stereophonic. The other new items are a bass reflex cabinet of contemporary design to house a 12in. unit with tweeter, if required, and a rear loading horn cabinet for use with the drive unit type DU.817. Also displayed are the popular priced Stentorian extension loudspeakers, Radio Relay loudspeakers and accessories, television tables and record storage cabinets.

Winston Electronics Ltd. Stand No. 125

THE Winston de luxe tape recorder is being shown for the first time. It has a full output sufficient for a small hall (4 watts, three-directional). It costs 79 guineas. The Thoroughbred tape recorder has been improved and is also on show.

Wolsey Electronics Ltd. Stand No. 38

THE main exhibits here are a new outlet box with a socket angled at 60 deg., the Triplexer is waterproof and in two types, a solderless safety coaxial plug, a tabletop aerial and the distributor amplifier system.

Servicing Printed Circuits

THIS ARTICLE DEALS WITH THE MORE COMPLICATED TRANSISTOR SETS

By J. Brown

THE servicing of this equipment is akin to servicing Deaf Aids, and is more complicated than normal servicing, as a great deal more time and patience is needed. We will try to give some hints and pass on some ideas to assist during the process of the servicing.

Transistors became a new word in 1948, when the Bell Laboratories followed up on some notes they had found in some old papers. The story is that some Ham once tried two "cats whiskers" as an experiment with a crystal, and noticing some phenomena kept notes of the development.

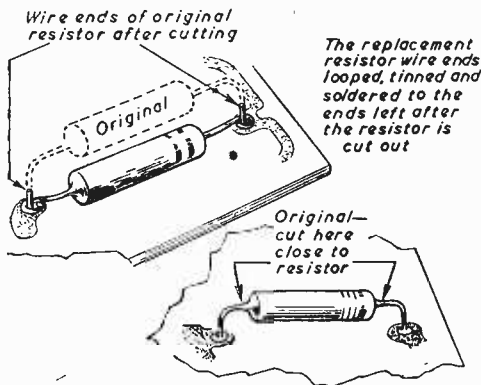


Fig. 1.—Soldering replacement resistors.

so they are quite new commercially. It is not intended to deal with the construction of transistors, or the actual print of the printed circuit. There are various way of obtaining the latter, and we will concern ourselves with copper foil and dip soldered circuits. One of the enemies of the latter is what is known as "hair-lines"; in this we get a slight crack in the circuit, due possibly to some impurity in the solder or similarly some fault during the solder dip. These can be found by some part of the circuit not functioning, or sometimes we have to revert to a magnifying glass to discover these slight cracks.

It can also be caused by stresses or strains to the panel on which the circuit is printed. Once traced, they can be easily repaired by either joining the crack up with a piece of 22 s.w.g. tinned wire, or some solder added and worked into the crack. The ideal solder is 60/40, 60 tin and 40 lead, resin cored: there are a great deal to choose from, and some manufacturers are making special solders for the repair work of printed circuits. We now come to the mounting and removal of components, and this is easier to carry out than to explain, the main factor being patience.

Wax Capacitors

These are best removed by first cutting the wire ends, and removing the capacitor, as should the iron get near the wax when trying to remove the complete capacitor, the wax will melt and run all over the panel. This will lead to more troubles than one realises and can cause bad, as well as dirty joints.

Resistors

Again these are best cut first, and then remove the small ends in the panel. Should a resistor be in an awkward place, the replacement may be soldered to the short ends left on the panel after the faulty one is removed. The method of cutting is to leave a short end of the original resistor about 1/32in. long on the panel. The replacement resistor wire end should be bent in a circle, and soldered after first tinning to the short end on the panel. This is possibly shown clearer in Fig. 1. Should at any time excess heat be applied to the panel, the foil will lift off, the panel will blister or the solder may disappear, so again we emphasise the great care needed.

Valveholders, etc.

These are normally fitted with special lugs that are soldered or fitted to the panel, and should they develop any major trouble, either great care is needed, or they should be returned to the manufacturer for service. The best method is to heat

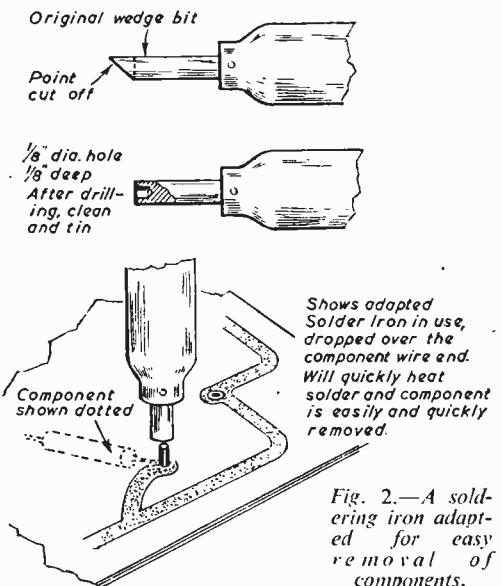


Fig. 2.—A soldering iron adapted for easy removal of components.

a little at a time and brush the solder away with a brass wire brush, taking care not to damage the rest of the circuit. Again, in the stubborn case, cut up the component and remove small bits at a time. As a finale to printed circuits, at all times avoid excess heat, any undue stresses to the panel, excess solder, any physical strain, be clean and patient, and a good repair will be obtained.

Tools

No special tools are needed, the usual workshop tools will suffice, and a normal 25-50 watt iron. (At all times the iron must be absolutely clean and tinned.) Also required is a small wire (brass) brush, small pliers, a selection of wire cutters, some 60/40 solder, a magnifying glass, and some polystyrene dope with which to paint the new repair. The latter will be advantageous, but not actually necessary. An idea is shown in Fig. 2 (this is simple but has to be used to be believed and is a necessity for this type of work). It is an ordinary soldering iron, in the writer's case a Henley, with a wedge removed from the bit and a small impression made with a drill, $\frac{1}{8}$ in. diameter by $\frac{1}{4}$ in. deep. Kept perfectly clean and tinned, it is excellent for the removal of com-

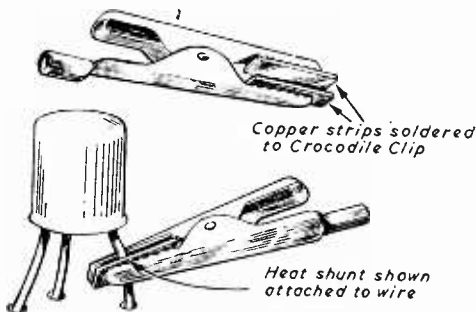


Fig. 3.—Showing how to solder in transistors.

ponents, as the heat from the bit is dissipated all around the joint, and not in one place as with the wedge solder bit as fitted. It does the job quicker and much better than a normal iron.

Transistors

We now deal with transistors. Although these are physically robust, they are easily destroyed by various ways, possibly the simplest and easiest is the reversal of the supply battery. At all times watch the polarity, this is usually made up of cells in series and must be replaced exactly as the manufacturer states on the set. Heat and dampness will also destroy them. Great care is needed in soldering in R.F. transistors. *Never* solder them in without the use of a heat shunt, whether it be round nose pliers or a crocodile clip with a copper piece soldered in as shown in Fig. 3. The latter is excellent as there must be some method of conducting away surplus heat. *Never* have the leads too long, as this can cause physical damage and microphony; the ideal length is $\frac{1}{8}$ in.

Never bend the wires near the actual place where they leave the transistor. *Never* scrape the paint off; if this accidentally happens paint with matt black as used by photographers, as the transistor is really a current device and will react to light. There are special photo transistors or transistors which have photo-electric properties. These, as the transistor with a scratch in the paint, will react most peculiarly especially under a 50-cycle lamp, and will introduce great hum.

All ends from transistors are either tinned or plated and must be kept absolutely clean. *Never* use an ohmmeter with a battery greater than 1.5 volts to drive it, as this can, during tests, ruin the transistor by applying this voltage in the wrong direction. If continuity tests have to be made, isolate the component to be tested first.

In the case of a capacitor, especially the large capacities used for coupling, at all times discharge them before fitting back into circuit. *Never* overload the set; if the I.F. transformers have to be aligned or adjusted, connect the signal source via isolation condensers, .01 or .1 μ F for R.F. and a 50 μ F 12 volt for audio frequencies.

It should be pointed out in passing that base emitter or base collector circuits of a transistor will function as a crystal diode, and at all times overloading should be avoided. Low temperature solder should be used when replacing transistors, so as to minimise the chance of ruination by heat. Should current measurements have to be made, switch off before making any meter connections and before putting the circuit back to the original.

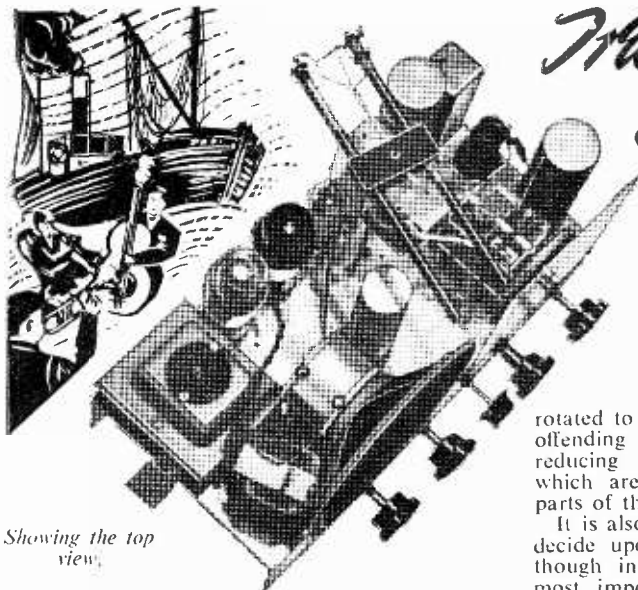
If transistors have to be replaced the correct ones can be obtained from the manufacturer, as in many cases the transistors are specially selected for a particular job, more so in the case of a push-pull or Class B output stage.

Power Type

Whilst on the subject, we may at some time come across the power type, these will, under certain conditions, give as much as 20 watts of audio power, and this is brought about by having a very large cooling plate, e.g., one manufacturer has a transistor which with a 50 square in. cooling plate of 16 s.w.g. aluminium will give 10-20 watts of audio power; this means we can have an amplifier of very small physical size. At present transistors are rather expensive, too expensive, in fact, with which to get careless. Junction transistors are not so sensitive as point contact transistors, but they can be damaged if wrongly handled. The collector current increases rapidly with temperature, and if allowed to get in a runaway state, destroys the component.

Crystal Diodes

A few words about crystal diodes in passing. These should be treated similarly to transistors, although they are more rugged in construction, but are easily damaged by heat and overloading. They are very adaptable for various purposes and will stand up to a great deal of punishment. To close, the field of transistors is limitless, they have been used in television circuits, tape recorders, radio and all allied electronic subjects.



Showing the top view

Trawler & M.W. Directional Receiver

AN UNUSUAL 5-VALVE SET

By F. G. Rayer

When interference from a second station on almost similar frequency is troublesome, the aerial may be rotated to give *minimum* signal pick-up from the offending transmission, thereby considerably reducing the whistles and background noises which are so troublesome from this cause on parts of the M.W. band.

THE band between about 70 and 200 metres is often omitted from even "all-wave" receivers, but contains various transmissions of interest. In addition to the 80 metre and 160 metre amateur bands, which often give good results, there are various shipping and other transmissions on these frequencies.

Rotating Aerials

The rod aerials themselves can be rotated by a panel control, so as to make use of their directional properties. This has several advantages. There is no need to move the receiver itself, since the aerials can be rotated at once for best signal strength, and this considerably increases the volume of weak transmissions.

It is also possible to use the rotating aerials to decide upon the bearing of any station heard, though in the present instance this is not the most important benefit of a directional aerial. As with an ordinary frame aerial, two positions of maximum signal strength arise, with two minimums at 90 degrees. However, in one position of maximum volume, the aerial signal is intensified by the pick-up of non-directional wiring, while in the second position the signals are out of phase, due to 180 degree rotation of the aerial. As a result, there is only *one* optimum directional setting in the 360 degrees of rotation. When ascertaining the direction of a station by ear, it is best to choose the minimum volume setting. An alternative, with any station strong enough to operate the A.V.C. circuit, is to insert a meter in the I.F. stage H.T. circuit, and tune for minimum current. If the bearing of one aerial is the opposite of that obtained with the other, this

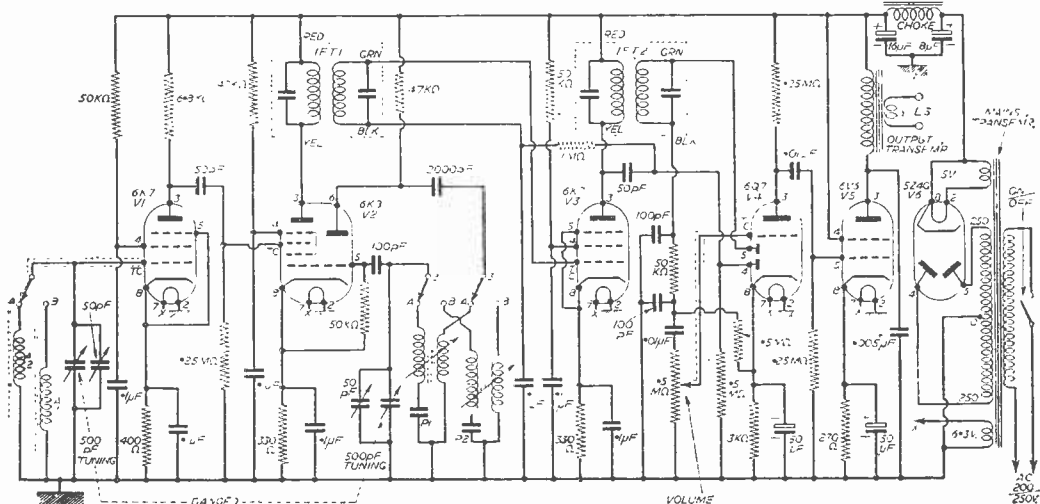


Fig. 1.—Showing the theoretical circuit.

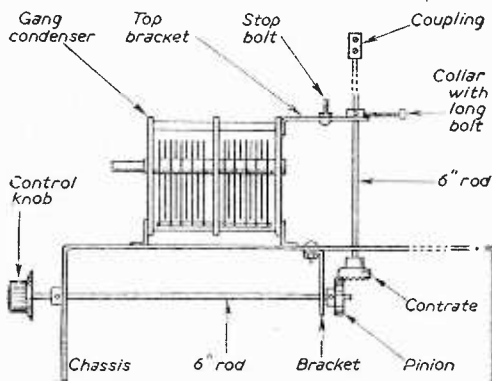


Fig. 4.—Aerial control details.

colour markings given are for the listed transformers. If other 465 kc/s transformers are used, the maker's tag or lead identification *must* be followed.

Wavechange switching is very straightforward. One pole is wired to 50 pF panel trimmer, and the front section of the gang condenser (which also goes to R.F. valve grid cap). This allows either the shipping band or M.W. aerial to be selected, connections from the switch being by means of thin flex.

A further pole on the switch is used for oscillator grid switching, and is wired to the 100 pF condenser. The remaining pole provides for oscillator anode switching. The coils each have a flat side, to permit identification of the tags, which is as in Fig. 3, when the flats face the front runner. Fig. 3 includes a rear view of the switch, so that tag connections may be seen.

Aerial Control Drive

A hole for the vertical rod is drilled $5\frac{1}{2}$ in. from the right-hand edge of the chassis. $2\frac{1}{4}$ in. from its rear. A long bracket, shaped as shown in Fig. 2, and bolted to the top of the gang condenser as in Fig. 4, supports the rod. A collar prevents downward movement, and is fitted with a $\frac{3}{4}$ in. bolt, which strikes against the 8 B.A. stop bolt shown in Fig. 4. This limits rotation to a little under 360 degrees, preventing repeated rotation of the aeri-als, which would eventually pull the flexible leads out of position.

A contrate and pinion, or two bevel gears, transmit the drive, as in Fig. 4. A 1:1 ratio is most convenient, as the control knob pointer then acts as a guide to aerial position. Bevel gears turn a little more smoothly than contrate and pinion. The control knob is supported by a bracket, as shown, and the

pinion is arranged to bear upon this to provide a little friction. Without this, the flexible leads will tend to turn the aeri-als out of position.

Aerial Mounting

The two aerial rods are clamped between paxolin strips as shown in Fig. 5, and have a common earth return to the frame of the gang condenser. A lead from "A" goes to "A" in Fig. 3. "B" on the shipping band winding is similarly connected to "B" on the wavechange switch. These three leads should be reasonably

LIST OF COMPONENTS

- Fixed Condensers: 2 50 pF, 3 100 pF, .002 μ F, .005 μ F, 2.01 μ F, 7.1 μ F, 2 50 μ F, 25 v., 8 plus 16 μ F, 350 v. can.
Resistors: 2 330 ohm, 270 ohm, 400 ohm, 3 K, 6.8 K, 4 50 K, 2 47 K, 3 .25 megohm, 2 .5 megohm, 1 megohm, .5 megohm potentiometer with switch.
2-gang 500 pF tuning condenser with drive and dial (Osmor).
50 pF pre-set condenser. 50 pF panel trimmer.
6-valve chassis, with octal holders (Osmor).
Medium Wave and Shipping Band ferrite rod aeri-als: oscillator coils with padders to suit (Osmor).
2 6K7, 6K8, 6Q7, 6V6 and 5Z4 valves.
Two pre-aligned 465 kc/s I.F. transformers (Osmor).
250/0/250 v. 80 mA. 6.3 v, 2A, 5 v. 2 A. mains transformer.
80 mA smoothing choke.
2 6 in. rods, gears, coupling, 2 collars.
3-pole 2-way switch. Knobs, etc. P.M. speaker with transformer to match 5,000 ohms at 50-60 mA.

short, but long enough to allow complete rotation of the aeri-als. They are twisted together throughout their length to reduce stray and non-directional pick-up. The threaded rod used to clamp the paxolin strips together is inserted in the top of the coupling, and held by a grub screw. Both aeri-als thus rotate together, and remain in whatever position necessary. The aeri-als should not

(Continued on page 631)

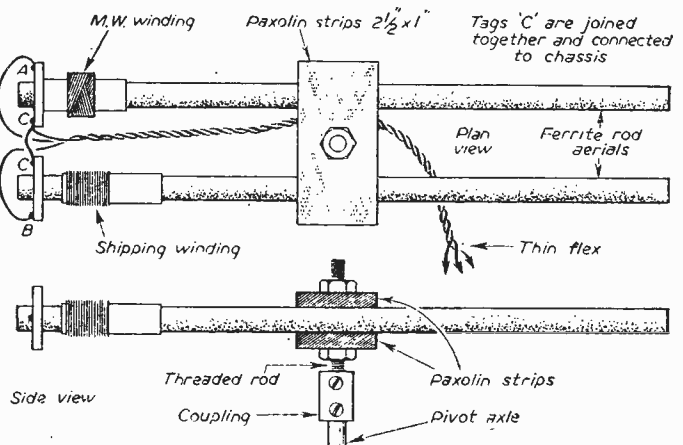
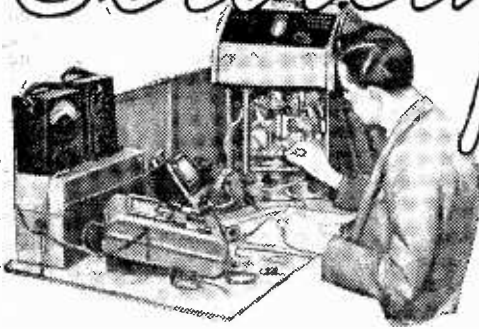


Fig. 5.—The Ferrite rod aeri-als.

Servicing Radio Receivers



THE DECCA MODEL 66

By Gordon J. King, A.M.I.P.R.E.

THIS is an A.C. Table Model (Fig. 1) of high sensitivity which is suitable for V.H.F.-F.M. operation as well as for ordinary A.M. broadcasts on the short, medium and long waves. The F.M. band extends from 87 to 101 Mc/s. while the three A.M. bands are ranged as follows: L.W., 1,150 to 2,200 metres; M.W., 194.5 to 575 metres; S.W., 13 to 50 metres.

The seven valves used in the chassis are arranged in the conventional functional pattern as detailed below: V1, ECC85 F.M. only R.F. amplifier and frequency changer; V2, ECH81, A.M. frequency changer and F.M. first I.F. amplifier; V3, EF89 A.M. first I.F. amplifier and F.M. second I.F. amplifier; V4, EABC80 A.M. diode detector and a.g.c. diode, F.M. ratio detector and A.M.-F.M. A.F. amplifier; V5, EL84 A.M. and F.M. output; V6, EM35 A.M. and F.M. tuning indicator; V7, EZ80, H.T. rectifier.

The receiver is highly suitable for reproduction from a gramophone pick-up, and very good reproduction of both radio and gram. is secured from the loudspeaker system which comprises a 10in. \times 6in. elliptical P.M. unit and an electrostatic treble unit. A crystal pick-up is most suitable, such as the Collaro "Studio" series, the Cosmocord or Garrard cartridge, but the equalisation as stipulated by the pick-up manufacturer should be adopted.

The receiver can be operated from supplies ranged over 100-125 volts and 200-250 volts A.C. only, and the total power consumption is in the region of 50 watts. The EL84 output stage is capable of supplying approximately 3 watts of A.F. at low distortion.

Although the receiver is provided with a ferrite rod aerial for the A.M. bands and an internal resonant aerial for the F.M. bands, which can be adapted for use as an internal S.W. aerial if required, in areas removed from a powerful station best results are possible only by the use of efficient external aerials, and a good earth connection goes a long way in reducing most forms of electrical interference.

Circuit

A full circuit of the receiver is given in Fig. 2. The F.M. tuner section is completely self-

contained, and permeability tuned on coils L4 and L5. It is recommended by the manufacturer that should any fault develop in this section the unit should be removed from the main chassis complete with V1 and returned to their service department for repair.

The F.M. signal from the dipole is coupled to L2 and induced in L3, this transformer being flatly tuned to embrace the whole of Band II. The first triode section of V1 serves as a neutralised R.F. amplifier, while the second triode is arranged in the form of a self-oscillating frequency changer in association with coils L5 and L6. The oscillator circuit is resonated by C12 and C13 in parallel, and a point of zero oscillator voltage for coupling the R.F. signal to the frequency changer is available at the junction of C10 and C11.

The converted F.M. signals are developed across L13/14 at the F.M. intermediate-frequency of 10.7 Mc/s and coupled through a screened cable to a section of the selector switch S2. Before continuing, it is interesting to note that A.M. signals at the centre tap of the F.M. coupling coil L2, which are picked up by the F.M. aerial, can be connected direct to the A.M. aerial socket if required by way of the "flying" lead.

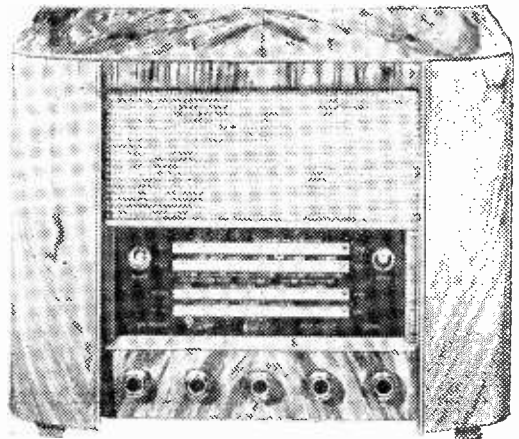


Fig. 1.—Photograph shows the Decca Model 66.

F.M. Operation

Bearing in mind that all the switches on the circuit are shown in the "F.M." position, it will be seen that S1A short-circuits the A.M. aerial signal, S2 short-circuits the a.g.c. line and connects the F.M. tuner's I.F. signal to the signal grid of the heptode section of V2. S3 switches out the A.M. oscillator, S4 switches H.T. to the F.M. tuner and short-circuits the A.M. section of the first I.F. transformer and S1B connects the signal at the ratio detector to the A.F. section by way of the tone and volume controls.

With the circuit thus set-up to accept F.M. signals, V2 and V3 amplify them at I.F. and they eventually find their way in this form to the ratio detector diodes in V4, where the signals are demodulated and appear as A.F. across C51. From here they pass by way of the de-emphasis network, through S1B, the base and volume controls to the grid of the triode in V4.

The A.F. signals are amplified by this section and appear across the anode load resistor R24, from whence they are conveyed through a filter

and coupling network to the control grid of V5. They are converted to power in the output transformer T1 and are then fed to the loudspeaker system. This latter part of the journey, from S1B, is common to both F.M. and A.M. signals.

A.M. Operation

On the "A.M." positions of the selector switch, the F.M. tuner is disconnected from the H.T. line, the A.M. oscillator is brought into action, the tuned aerial circuits are coupled to the signal grid of V2, the short-circuit is removed from the a.g.c. line and S1B changes over to connect the demodulated A.M. signals to the A.F. stages.

The M.W. and L.W. aerial coils, connected to S1A and S2, are wound on a ferrite rod; the "Q" of the coils is then increased to such a degree that satisfactory reception is usually possible without the use of an external aerial. The A.M. oscillator coils are connected to switch S3 and are selected to correspond to the waveband in use. The A.M. I.F. signal of 460 kc/s is developed in the anode of the heptode V2 and

CONDENSER VALUES

| | | | | |
|-------------|-------------------|-------------------|-------------------|---------------------------|
| C1—100 pF. | C15—30 pF. | C28—3.30 pF. | C41—.005 μ F. | C54—300 pF. |
| C2—10 pF. | C16—3.30 pF. | C29—5.000 pF. | C42—300 pF. | C55—.5 μ F (150v.) |
| C3—250 pF. | C16A—5 pF. | C30—30 pF. | C43—.01 μ F. | C56—100 pF. |
| C4—10 pF. | C17— | C31—3.30 pF. | C44—.25 μ F. | C57—32 mfd. |
| C5—3.8 pF. | C18—100 pF. | C32—565 pF. | C45—.01 μ F. | C58—.02 μ F. |
| C6—2.10 pF. | C19—3.30 pF. | C33— | C46—.005 μ F. | C59—.01 μ F. |
| C7—250 pF. | C20—105 pF. | C34—3.30 pF. | C47—100 pF. | C60—5 pF. |
| C8—200 pF. | C21— | C35—220 pF. | C48—.01 μ F. | C61—25 μ F (25v.) |
| C9—250 pF. | C22—50 pF. | C36—.005 μ F. | C49—.1 μ F. | C62—.05 μ F. |
| C10—7.5 pF. | C23—.005 μ F. | C37—.02 μ F. | C50—50 pF. | C63—.005 μ F (1000v.) |
| C11—7.5 pF. | C24—.005 μ F. | C38—.005 μ F. | C51—300 pF. | C64—32 mfd. |
| C12—3.8 pF. | C25—50 pF. | C39—.005 μ F. | C52—.005 μ F. | C65—8 mfd. |
| C13—2.6 pF. | C26— | C40—.005 μ F. | C53—8 μ F. | C66—.01 μ F. |
| C14—9 pF. | C27—300 pF. | | | |

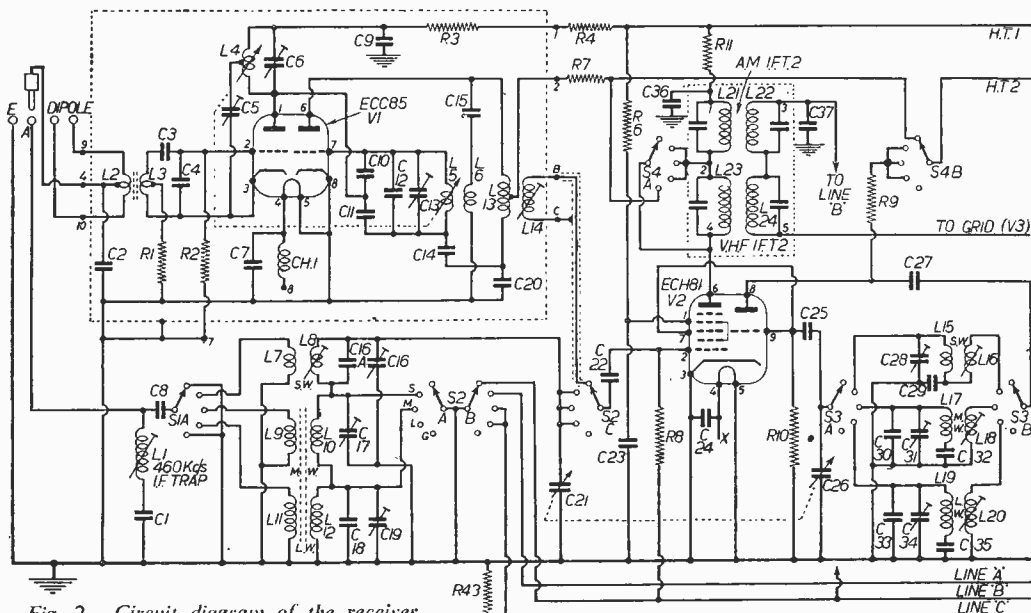


Fig. 2.—Circuit diagram of the receiver.

is selected by the first A.M. I.F. transformer, which, although being connected in series with the second F.M. I.F. transformer, is little influenced by this section in view of the short put across its primary by S4.

Normal amplification of the A.M. I.F. signal is achieved by the common I.F. amplifier valve, V3, and the amplified signal is developed across the second A.M. I.F. transformer and applied to the A.M. detector diode in V4. The fact that the primary of the second A.M. I.F. transformer is in series with the primary of the ratio detector transformer is of little moment, even though it is not shorted in this case, owing to the small value of the inductance in relation to the A.M. intermediate-frequency.

Diode connected to pin 6 of V4 serves as the A.M. detector, and the load resistor is R27, across which the A.F. signal is developed. Resistor

R25 is not integral to the operation of the detector circuits, its purpose being simply to pass a voltage from the ratio detector load resistor, R25, to the tuning indicator valve, V6, when the receiver is switched for F.M. operation.

A.G.C.

Automatic-gain-control is provided on A.M. operation by rectification of a portion of the I.F. signal at the junction of L25 and L27. The signal is fed to the A.G.C. rectifier, WX6, by way of C50, the control voltage is developed across R19 and fed to the grids of both V2 and V3.

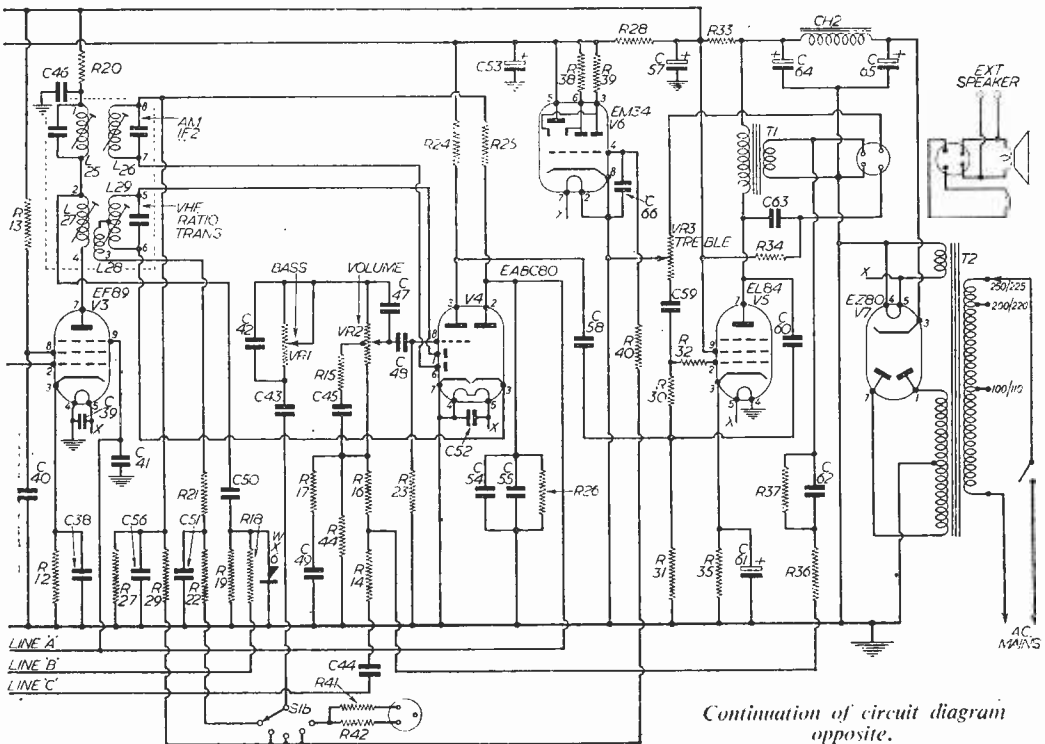
Negative Feedback

An interesting negative feedback loop, which is frequency-selective, is connected between the output transformer T1 and the grid circuit of V4, through various resistors and capacitors. The

RESISTANCE VALUES

| | | | | |
|----------------|------------|-------------|-------------------|--------------|
| R1—20 Ω. | R10—20K. | R19—1.5 MΩ. | R28—10K (½ w.) | R36—500 Ω. |
| R2—200 Ω. | R11—1K. | R20—1K. | R29—1 MΩ. | R37—51K. |
| R3—1K. | R12—330 Ω. | R21—150 Ω. | R30—35K. | R38—1 MΩ. |
| R4—10K (.5 w.) | R13—100K. | R22—1 MΩ. | R31—820K. | R39—1 MΩ. |
| R5— | R14—82 Ω. | R23—10 MΩ. | R32—2.2K. | R40—820K. |
| R6—39K (½ w.) | R15—51K. | R24—220K. | R33—4.4K (5 w.) | R41—6.8 Meg. |
| R7—10K (½ w.) | R16—1K. | R25—500K. | R34—5.6K. | R42—1.5 Meg. |
| R8—1 MΩ. | R17—220 Ω. | R26—20K. | R35—180 Ω (.5 w.) | R43—1K. |
| R9—27K (½ w.) | R18—1 MΩ. | R27—220K. | | |

All Resistors ½ w. unless otherwise stated. A.M. I.F. 460 kc s. F.M. I.F. 10.7 Mc s. All Switches are shown in F.M. position.



reactive and resistive elements are arranged to provide maximum feedback around the centre of the audible spectrum, which thus gives a rising bass and treble response to the audio section. In order to avoid undue treble response at the "normal" setting of the volume control, however, a high-pass circuit, comprising R15 and C45, is introduced into the feedback loop at an 0.3 megohm tapping on the volume control.

The feedback circuit is further modified by C14, C44 and R43, and on M.W. and L.W. R43 is short-circuited to provide an overall lift in treble; in effect, the introduction of R43 on V.H.F.-F.M. reduces the top response in accord with the de-emphasis requirements.

Treble Control

The treble control performs two operations: the normal operation of treble attenuation is secured by reason of the control being connected in series with C59 across the signal circuit at the grid of V5. In addition, as the control is rotated towards minimum treble, it puts a progressive increase in resistance in series with the electrostatic tweeter, thus decreasing its output correspondingly. Resistor R34 provides a polarising voltage for the tweeter.

Servicing Notes

The chassis can be taken from the cabinet after removing the control knobs and the four securing bolts located underneath the cabinet and disconnecting the loudspeaker plug and aerial connections.

Details of the drive cord systems are given in Fig. 3 (a) and (b). When re-threading is necessary a good quality nylon drive cord should be used.

In order to facilitate the location of the valves

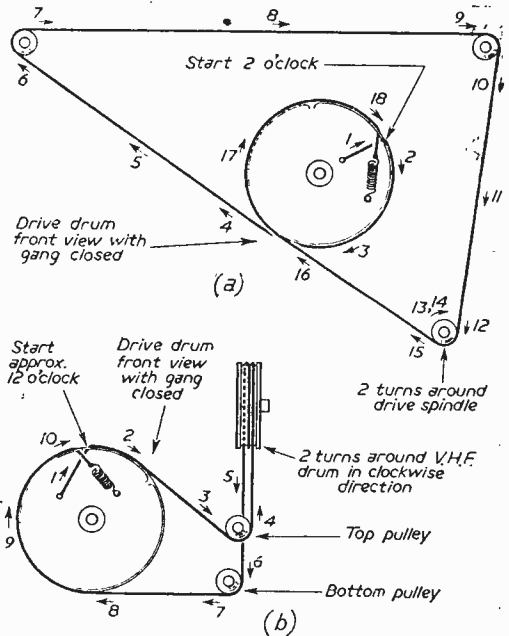


Fig. 3 (a).—Drive cord diagram, AM section only ; (b) VHF section only.

and major components, the top view of the chassis is given in Fig. 4.

Complete failure of the instrument and absence of residual hum from the loudspeaker, bearing in mind that a slight hum is always present and can (Continued on page 631)

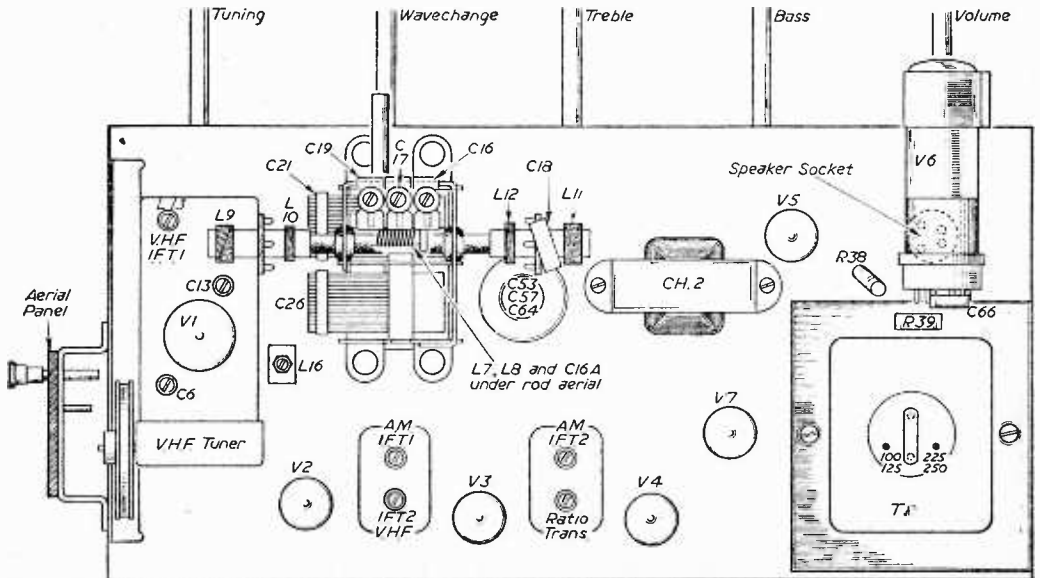


Fig. 4.—Shows the top view of the chassis.

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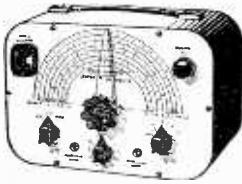
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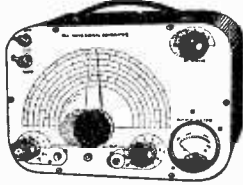
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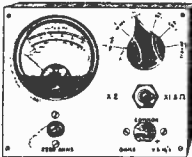


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be detected when an ear is held close to the loudspeaker grille, usually indicates emission failure of the EZ80 rectifier. In the event of a fault of this nature, however, it pays to check the insulation resistance of the H.T. line, as a short-circuit in C65 has been known to promote rectifier failure. If a short develops in the other electrolytic (C64), the resistance of the smoothing choke (CH2) usually prevents immediate failure of the rectifier, but if the set is left switched on under this condition the emission of the valve will quickly be destroyed.

The H.T. dropper resistor R33 (5 watt 4.4k) sometimes fails and cuts off signals, but in this case a slight hum is present in the loudspeaker, even though the screen voltage is cut-off. Open-circuit of the primary of the output transformer (T1) removes all sound from the loudspeaker, while also causing the screen of V5 to glow red hot.

Lack of V.H.F. signals, but normal operation

TRAWLER & M.W. DIRECTIONAL RECEIVER (Continued from page 624)

be fitted until other constructional work is completed, as they will not withstand rough usage.

Aligning the I.F. Stage

Aligning will be much simplified, and more accurate settings will be possible, if a meter is included between the second I.F. transformer primary and H.T. positive line, with a condenser of about .05 μ F in parallel. A 10 mA meter is suitable, or a multi-range instrument set for a full-scale reading of around this figure.

A local station should be tuned in carefully, for minimum current, as shown by the meter. The first I.F. transformer cores should then be adjusted, with an ebonite or other insulated blade, so as to obtain the lowest possible meter reading. The anode coil core of the second I.F. transformer is similarly treated. With this type of circuit, the diode tuning core is best subsequently adjusted by ear, with a very weak signal, since it is not included in the A.V.C. diode circuit, and cannot be adjusted properly by noting the meter reading.

Only a slight adjustment will be required with pre-aligned I.F. transformers. No core should be at the limit of its travel. If the meter reading falls, as adjustments are made, with no station tuned in, this shows that the I.F. stage is going into oscillation. (This will not be audible.) If so, a screening can is required, and the grid lead must be kept very short, or be screened. This depends to some extent upon the type of valve. A clear glass valve in good condition will be unstable, without a can, where a valve with slightly reduced emission will not cause oscillation. If no meter is in use, poor results generally may arise from such oscillation, which generates a continuous A.V.C. voltage, reducing gain.

Aerial Tuning

The M.W. band may well receive attention first. The 50 pF oscillator pre-set is adjusted to about a mid-way position, and this should allow any station near the bottom end of the band to be brought up to maximum signal strength by means of the panel trimmer. A high wavelength station

on the A.M. bands may be caused by failure of R4, though there are times when V1 is guilty. Low emission of V1 may not, however, cause complete failure of V.H.F., but may result in sudden cut-off over a section of the V.H.F. band.

Heavy distortion on all services, including gram, should lead to a check of the condition of V4 and V5. R25 for value (this may increase) and C58 for insulation resistance. The trouble caused by the latter fault (low resistance capacitor) will be accompanied by overheating of V5. Modulation hum on V.H.F. only is invariably caused by trouble in V4; in this case, the suspect valve should be checked by substitution.

The alignment of the tuned circuits rarely drifts under normal circumstances and it is, therefore, not advisable to alter the tuning slugs and trimmers. However, if the tuning adjustments have obviously been tampered with, the complete alignment procedure should be carried out, as aided by the manufacturer's service manual.

should then be tuned in, and the M.W. oscillator coil core adjusted, in conjunction with the main tuning control, for maximum volume. The panel trimmer is not touched during this part of the procedure.

When alignment is correct, only a slight adjustment of the panel trimmer is necessary, when tuning through the band, or after rotating the aerials. If the panel trimmer requires to be fully open, or fully closed, then the oscillator pre-set should be readjusted.

Shipping Aerial

The shipping aerial and oscillator coil are then treated in the same manner. Maximum efficiency is being achieved when it is always possible to adjust the panel trimmer for best volume, throughout the whole tuning range.

The aerial windings can be moved along the aerial rods to some extent, and this has considerable effect on the wavelengths tuned. If dial readings are incorrect, especially with stations of high wavelength, the M.W. coil should be slipped along the rod a little until this is corrected. After each such adjustment, re-alignment of the oscillator coil will be necessary. If the dial reads low (e.g., tuning condenser too far opened, for a particular station) the winding needs drawing a little towards the end of the rod. But if the dial indicates a higher wavelength than is actually tuned, the winding should be moved a little farther on to the rod. After the M.W. band has been adjusted, the shipping aerial and oscillator coil may receive attention. A number of stations should be heard between 200 and 210 metres (gang condenser nearly closed), and these may be used for any adjustment of aerial winding inductance, exactly as explained for the M.W. aerial.

A little experiment will soon show how the directive control operates. The approximate bearing of European stations is most likely to be known, and tuning in these will allow the directional indication to be identified. BBC stations are not always suitable, as the correct bearing of two possible settings may not be known, and the same programme may be radiated simultaneously from various points.

HANDLING TRANSISTORS

MAKING A HEAT-SHUNT FOR EASY SOLDERING

By A. M. St. Clair

A TRANSISTOR must be soldered with care. The usual solution suggested is that the lead-out wire should be firmly gripped during soldering with a pair of pliers. I can never rid myself of the suspicion that this "tip" was originated by an engineer with three hands. You take the pliers in the left hand, the soldering iron in the right, and the solder. . . ?

Before I came across the heat-shunt I used to balance cunningly bent pieces of solder on wire bobbins, or coil cans, or something such. I tried manipulating a length of solder with the third and fourth fingers of the right hand. It was all very frustrating and time wasting. In the really inaccessible parts of a chassis I had to get a helper. And then I found the answer.

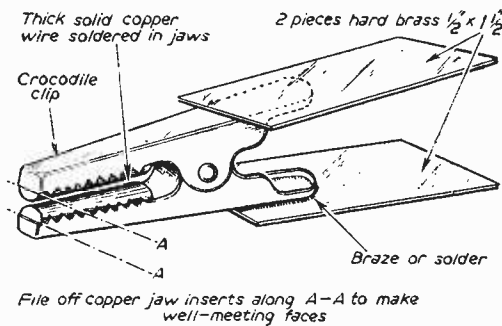


Fig. 1.—The heat-shunt.

The Heat-shunt

The heat-shunt is made from an ordinary crocodile clip. Into each jaw insert a piece of stout copper wire, as thick as will fit. Solder in place and file off flat to the level of the jaw. Remove any terminals or lugs, and attach to the rear end of each member a piece of stiff brass about $\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. Braze or solder here—do not use screws. All the necessary soldering can be done over a gas ring with the aid of a couple of pairs of pliers. Fig. 1 deals with the heat-shunt. It is advisable to take the crocodile clip apart before soldering to avoid ruining the spring; this will also facilitate filing the copper jaws.

In use, simply clip the heat-shunt on the transistor lead being soldered. The copper jaws will conduct the heat away from the transistor, and the brass plates will radiate it, keeping the copper reasonably cool. If you doubt the efficiency of this arrangement, try this experiment. It is worth doing anyway, as a check on the soldering of the parts of the shunt. Take a piece of copper wire of about the thickness of the leads of a transistor. Clip the heat-shunt in the middle. Take one end between finger and thumb, and apply the other end to a soldering iron. Take as long as you like about tinning the end of the wire—you will not burn your fingers.

Transistors are Light-sensitive

Another fact about transistors, not too often appreciated, is that they are light-sensitive. Some time ago I built a transistorised amplifier for a portable tape recorder. The performance became erratic, and the trouble was traced to the transistor input stage. The transistor was replaced, and all was well. Since transistors do not often die in normal service this one was investigated by means of a transistor test-set. It showed no fault! At this point, since darkness was falling I switched on the lights in the lab. The output from the transistor became suddenly full of hum, and the mystery was solved. The black paint on the glass envelope had become scratched and light was able to penetrate to the junctions.

The faults arising from this cause can be many and varied. In A.C. lighting hum will be present. In D.C. or daylight the performance will vary according to the amount of light reaching the transistor; and, since the effect of illuminating the junctions is very similar to that of altering the applied voltages, the net result may be loss of power, instability, distortion, or any combination of all three. The answer, of course, is to repaint the envelope with a good opaque black. But prevention is better than cure, and I have found that by far the best method of mounting transistors is that shown in Fig. 2.

Transistor Mounting

In this method the transistor is first inserted into a close-fitting piece of black rubber tubing long enough to project about $\frac{1}{4}$ in. at each end, and is then secured to the chassis by means of a bent brass clip. It is important to note that the clip should be so shaped that it would not grip the transistor alone, but will hold the transistor-tube combination with a light firmness.

(Continued on page 635)

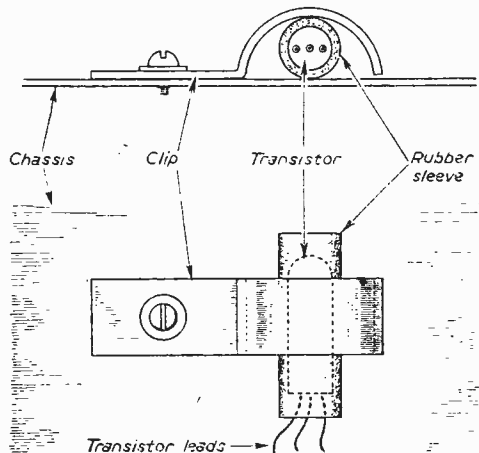


Fig. 2.—Method of mounting transistors.

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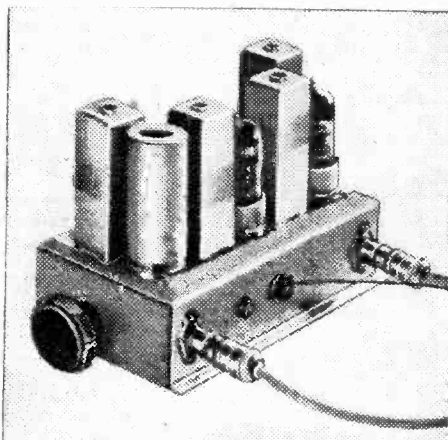


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the arrangement is to be permanent, rather than experimental, it is advisable to fill up the ends of the rubber tubing after fixing with a blob of dark coloured varnish.

It is worth noting, before leaving this point, that a perfectly good photo-transistor can be made by the simple process of removing all or part of the coating from a glass-walled transistor. And noting further that many a "dud" transistor can gain a new lease of life as a photo-diode from such treatment, since when a transistor is wrecked in the course of experiment there is quiet often one junction undamaged. Nothing guaranteed, but it is worth trying!

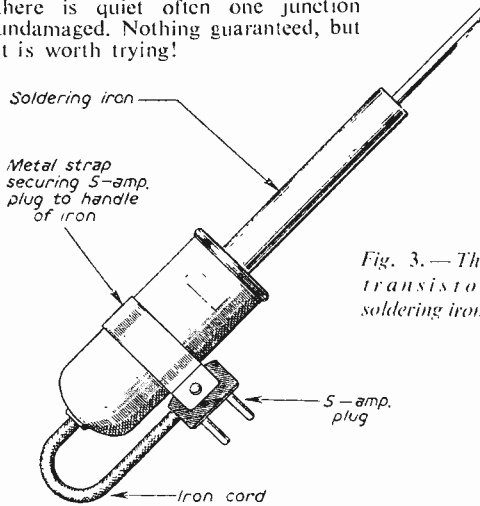


Fig. 3.—The transistor soldering iron.

Device for Disconnecting Soldering Iron

An instruction often issued to professional laboratories and test departments where transistors are handled is to the effect that all soldering irons are to be unplugged from the mains while actually soldering transistors. This is good advice. Earthing effects and A.C. leakage which would be too small to cause trouble in other circumstances can, in fact, be very damaging to transistors. However, it is so troublesome that the instruction is often ignored. I have ignored it myself, and got away with it most of the time. But not all of the time. And so I designed myself the following simple fitting. I attached a 5-amp. plug by means of a strap to the handle of a soldering iron, and cut down the cord of the iron to suit (see Fig. 3). The only soldering iron stand then required is a 5-amp. socket securely fixed to the top of the bench, and, of course, connected to the mains. The iron disconnects itself every time it is picked up. No dangling cord, either. I now use this iron for all purposes, not only transistors, and I find it the handiest yet.

Robustness of Transistors

In conclusion it is worth saying a word about the robustness of transistors. Unless you are by way of becoming an experienced old hand with these components, in which case you know already, then transistors are much, much tougher than you think. Even point-contact

transistors. The manufacturers had quite a resistance to overcome in the early days—prospective users tended to equate "point-contact" with "cat's whisker," and therefore to visualise poor shock stability. A programme of testing was therefore undertaken, and it was proved that even a point-contact transistor can withstand many hundreds of "normal" drops, i.e., falls of a foot or two on to an averagely hard floor. The junction transistor is even more robust. All this, of course, does not mean that you can throw them about as you please. It does mean that the "cottonwool" attitude adopted by so many beginners is unnecessary. Confidence in handling is a pre-requisite for competence in experimenting. Give your transistors the same degree of care that you have grown accustomed to give to valves. It will be more than enough.

Tape Automatic Projection

TAPE AUTOMATIC PROJECTION (T.A.P.) is a completely new British apparatus now emerging into the market, which ingeniously overcomes previous shortcomings, and happily combines the sophistication of the sound film with the cheapness of the filmstrip. Copies of quite short sound films may cost anything from £25 to £50 each, while filmstrip copies designed to accompany a commentary of similar duration will cost half as many shillings.

T.A.P. is made by a London firm, Sirameco Ltd. The essential novelty of the apparatus is that the commentary and the *inaudible* signals "instructing" the special projector attachment to move the next picture into position are simultaneously recorded on parallel tracks on one magnetic tape. While recording the commentary, the commentator has merely to press a button switch at the appropriate moment to impress on the second track on the tape the signal for bringing up the next picture. This arrangement would appear to be the acme of simplicity. Moreover, tape and filmstrip (slide, transparencies) may be operated as closed loops.

This system works in conjunction with any standard projector. In the Canadian Pavilion at the Brussels Exhibition a single T.A.P. is used to trigger three projectors simultaneously and continuously. *Any desired number of projectors may be controlled by one T.A.P.*

Moreover, instead of controlling projectors, T.A.P. may be used for automating any desired sequence of switching operations and for maintaining the sequence continuously for any desired period. This suggests interesting applications for process demonstrations accompanied by a recorded and synchronised commentary (or set of instructions) of any pre-determined duration. A particular advantage of using tape over any other existing alternative method is that tape is virtually "everlasting" and easily edited.

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A.F. Filters

ADDING TONE-CORRECTION CIRCUITS

By J. Gray

IF records, pick-up, amplifier and loudspeaker all had perfect characteristics, no filter or tone-correction circuits would be necessary. But such a standard is not reached, and more satisfying results can thus be obtained when correction is applied. The purposes and requirements can be summarised as follow.

For radio, when used for local station listening, some treble emphasis above about 7 kc/s. to compensate for a falling characteristic in the speaker, and in superhet receivers. But for more difficult stations, some cutting around 9 kc/s. to avoid adjacent channel whistles, which are particularly troublesome with the wide-band tuners used for high-quality reception.

For gram, a fixed or variable amount of high-

or other component of fairly high inductance. When the winding cannot be tuned to resonance at the required frequency, the pre-set condenser should be omitted entirely. Such chokes are usually iron-cored, and thus very liable to cause hum, especially with a sensitive amplifier. The component must be well clear of mains transformer and A.C. circuits.

Steep cutting may be achieved with a resistance;

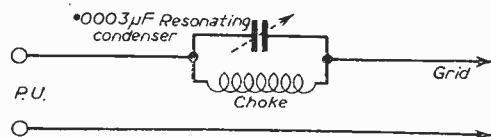


Fig. 1.—Top-cut filter choke.

capacity coupled network, such as that in Fig. 2, which is intended to become effective around 8 kc/s. Anode, S.G., and cathode resistors will be of such values as are required for the particular valve. As with the other circuits, values may be modified to produce different results.

A variable treble control is shown in Fig. 3., and has the advantage that it can readily be adjusted at will. It is, however, less effective than the circuit in Fig. 2. It provides a more steady control of treble, not a steep cut. Even more control can be obtained by reducing the value of the 200pF condenser, or increasing the value of the .005 μF condenser, though this is not normally required.

Treble Boost

A relative increase in treble can be obtained by using a circuit such as that in Fig. 4., preferably between two A.F. stages. The switch gives three levels of treble boost, and the level of bass reproduction can be modified, if desired, by changing the value of the 2 megohm resistor.

As with bass boost circuits,

the required effect is achieved by attenuating the undesired part of the A.F. spectrum, and compensating for this by an increase in gain—that is, by turning up the volume control. Circuits of this type do not provide any actual increase in signal strength,

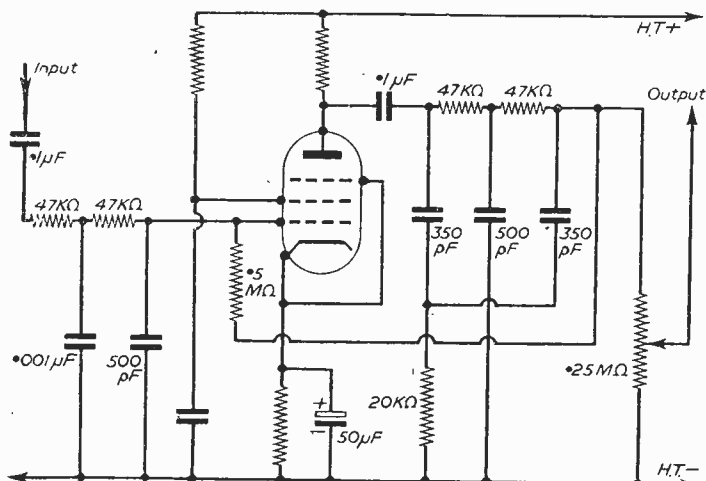


Fig. 2.—Steep-cut R.C.C. filter.

frequency filtering, to reduce surface noise, according to the disc. Also a correction for the pre-emphasis above about 3 kc/s to 4 kc/s, particularly with long-playing records. In addition, bass equalisation from about 400 cycles, with low-frequency cutting, if required, to reduce rumble. A fixed degree of correction is by no means best for all records, and the most satisfactory results also depend upon the pick-up, amplifier, and speakers.

Top-cutting

A simple top-cut or H.F. filter circuit is shown in Fig. 1, and employs a choke. This choke may be used alone, or it may be tuned to resonance with a pre-set condenser, to give maximum efficiency at about 9 kc/s. Filter chokes for this purpose may be obtained, or quite good results can sometimes be achieved with a transformer,

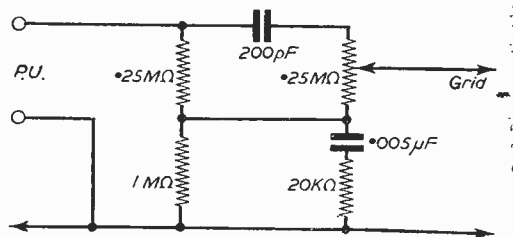


Fig. 3.—A variable treble control.

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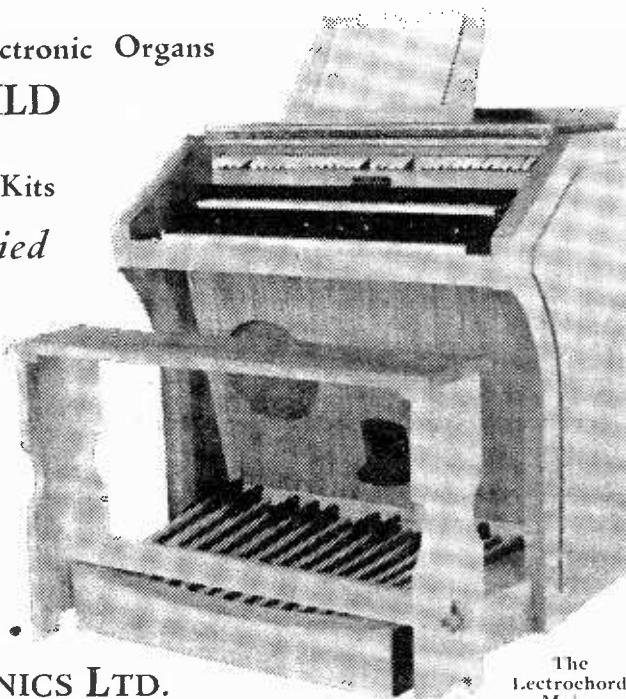
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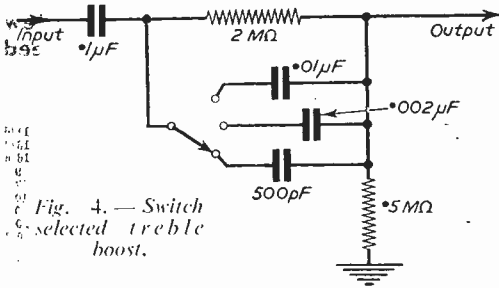


Fig. 4.— Switch selected treble boost.

but can make treble (or bass) have a greater relative strength.

Some very comprehensive circuits cause a considerable loss of gain, and cannot be used with small amplifiers, unless an extra valve or tone-control stage is added.

Selective Feedback

Very effective tone control can be achieved by using negative feedback of the frequencies to be attenuated, and a top-cut circuit operating in this way is shown in Fig. 5. This gives top filtering suitable for many records, to reduce surface noise.

When a tone-control circuit is added to an existing amplifier, it should not be included within stages over which negative feedback is applied. If it is, results will be very poor indeed. The tone control will thus usually be fitted between pick-up and first stage, or between first and second stages.

Similarly, a selective feedback loop, such as that in Fig. 5 should not be used within the stages covered by the main negative feedback circuit, or the same trouble will arise. In very small amplifiers, the feedback circuit may be adjusted to allow bass or treble boost, by a suitable selection of values, but this is only a compromise, and should not be done in large amplifiers.

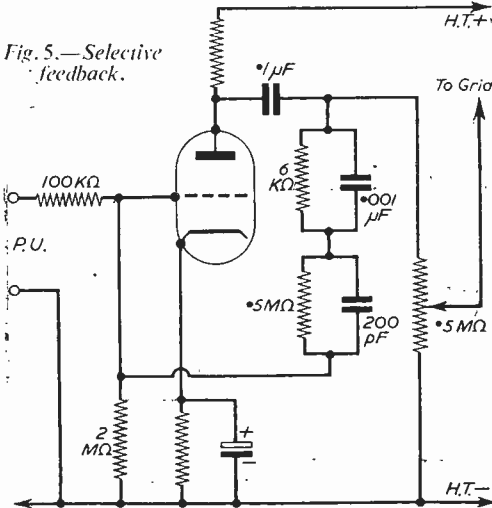


Fig. 5.— Selective feedback.

Bass Boosting

Circuits such as that in Fig. 4 allow bass to be cut, if required. When the equipment has a poor bass response, or no trouble from hum or turntable rumble is likely, bass may be boosted by means of a circuit such as that in Fig. 6. Here, the degree of boost is controlled by the potentiometer, and the frequency at which it begins to become most effective is selected by the two-way switch. The level at which treble remains can be adjusted by modifying the value of the 47 K resistor, or using a variable resistor here.

The various circuits can, of course, be combined, and a comprehensive tone-control unit frequently has several controls, so that response can be modified in any manner required. It is worth noting that the most satisfactory listening may not be achieved with the best possible response. For example, some reduction in treble is often preferred to a full treble response, when whistles or scratch are present. If a switched

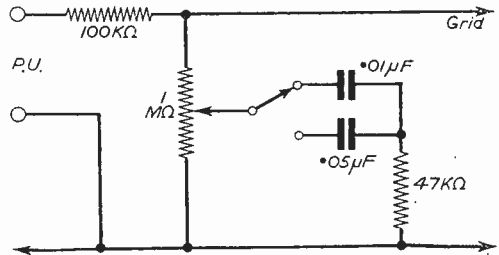


Fig. 6.—A bass boost circuit.

circuit is used, the advantage of proper treble response can be enjoyed when circumstances permit, as with new records, or local reception.

PRACTICAL TELEVISION SEPT. ISSUE NOW ON SALE PRICE 1/3

The current issue of our companion journal, which is now on sale, keeps you abreast with the latest details in television receivers. There is an interesting article on Tubes for Colour Television. Also a Preliminary Review of some of the TV Exhibits at this year's Radio and Television Show at Earls Court is given.

Further articles such as Shared Aerials; Single Line Scanning; Mobile Colour TV Unit; Analysing and Servicing TV Receivers; Television Troubles; the second article on the Buyers' T.V. Guide; and Recording TV on Tape, are fully dealt with and illustrated.

The issue also includes the regular features such as Televiews, Telenews, Correspondence, Underneath the Dipole, Problems Solved, etc.

A Top-band Transmitter

DESIGNED TO TRANSMIT EITHER W/T (MORSE) OR TELEPHONY

By R. H. Wright

PROBABLY one of the main advantages of working on the amateur band of 1.8 Mc/s to 2.0 Mc/s is that everyone is limited to a maximum D.C. input power of 10 watts and this low power can quite easily be obtained from a small receiver type power unit. The newcomer to amateur radio is sometimes at a disadvantage with perhaps only a few watts at his disposal when trying to work a distant station in competition with stations running higher powered transmitters, but on this band he is well able to hold his own.

There is no need to feel that this band is only useful for "local" contacts, transatlantic working is reasonably common and, when conditions are suitable, it is possible to cover much greater distances. Much also depends, of course, upon the efficiency of the station receiver.

The Transmitter

Although the transmitter shown in Fig. 1 was designed particularly for the "top band" and has been used almost exclusively on that band, it has been tested on the 3.5 Mc/s band and appears to have fair efficiency on that frequency. The transmitter is designed to transmit either W/T (morse) or telephony, and the transmission frequency is crystal controlled.

V1, a video pentode type 6CH6, is the crystal oscillator and uses a Colpitts type of circuit. The output from this oscillator is coupled into the aerial via a Pi-type network (C5, L1, C6), which has the advantage that an aerial of almost any length can be used in conjunction with the transmitter. V2 is the speech amplifier and modulator valve. The speech output from the microphone is passed to the grid and cathode of this valve via the microphone transformer and amplified in the valve to produce audio frequency voltage variations across the anode choke, LCF1. These audio frequency voltages are superimposed on the D.C. supply to the screen of the oscillator valve V1 and thus modulate the carrier oscillation. Either W/T or R/T transmission can be selected by switch S1 (a) and (b). With the switch open the modulator valve is switched off (the cathode circuit is opened thus breaking the H.T. current through the valve), and the transmitter is controlled by the key which is connected in the cathode line of the oscillator valve V1. With the switch closed the key is shorted

out and the modulator valve is brought into circuit. The microphone is switched into circuit by means of a switch mounted on the instrument itself. If readers are unable to obtain a suitable microphone locally one may be obtained from The Hull Wireless and Photographic Depot, 18, Paragon Square, Hull, at 6s. 9d. (postage extra). A suitable transformer may also be obtained from the same source at 3s. 9d.

The complete transmitter can be constructed on a chassis measuring 8in. x 6in. x 1½in., but if the power unit is to be included the chassis should be correspondingly larger. Fig. 2 shows a circuit of a suitable power unit, delivering 280 volts H.T. With this value of H.T. the oscillator valve may be loaded to 30 mA, giving a D.C. input power of 8.4 watts.

Tuning

With an appropriate frequency crystal plugged in and the aerial and earth connections made, set both C5 and C6 to maximum capacitance. Put S1 to W/T position and press the key. Now adjust C5 slowly, watching for a dip in the oscillator valve current, as shown by the meter M. When the dip has been found decrease the capacitance of C6 slightly and retune C5 for the dip. Having found the dip in the valve current, reduce the capacitance of C6 further, retuning for the dip again. Continue this process until the current reading at the dip of the

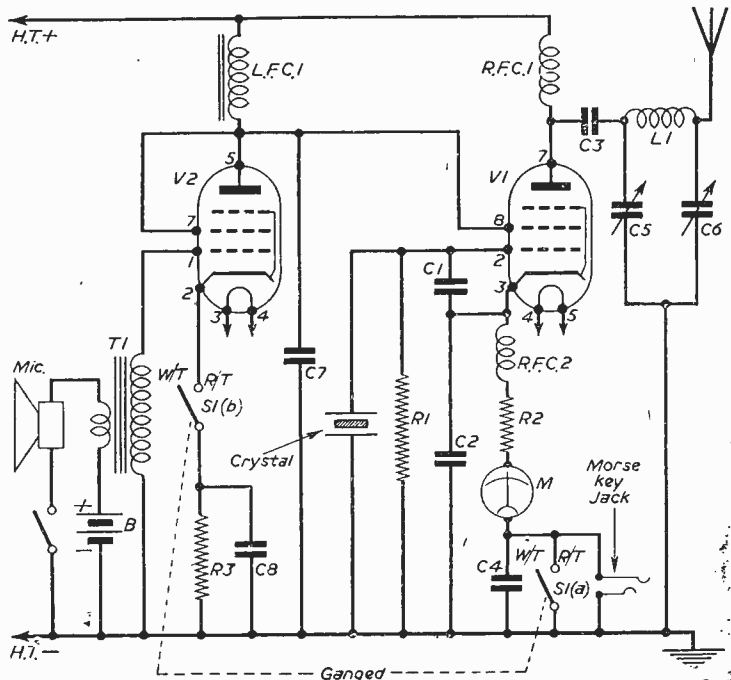


Fig. 1.—Showing circuit of "top-band" transmitter.



| | | |
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| UCL82 23/- | 6BR7 11/6 | 7C6 8/- |
| UCL83 25/9 | 6BW6 8/6 | 7D6 13/6 |
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| UF89 10/6 | 6C5GT 6/6 | 7S7 9/6 |
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| UUB 27/10 | 6F6G 7/6 | 12A8H 11/6 |
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| UY41 8/6 | 6F13 14/- | 12A17 9/- |
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| VP2B 8/- | 6GG6 4/6 | 12AU7 8/- |
| VP13C 3/6 | 6GH6 2/6 | 12AX7 9/- |
| VP23 6/6 | 6HG6T 2/6 | 12VA6 9/- |
| VP41 8/6 | 6J5M 6/6 | 12BE6 10/6 |
| VR105/30 8/- | 6J6 6/6 | 12BH7 11/6 |
| VR116 4/- | 6J7G 6/6 | 12H6GT 3/- |
| VR150/30 9/- | 6J7M 9/- | 12J5GT 4/6 |
| VU120A 3/6 | 6K6GT 7/- | 12J7GT 10/6 |
| VU39 (MU12) | 6K7G 5/- | 12K7GT 8/6 |
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| | 6K8G 8/6 | 12O7GT 11/6 |
| | 6K9GT 10/- | 12S27 1/6 |
| | 6K25 20/11 | 12SG7 7/6 |
| | 6L6G 9/- | 12SH7 5/6 |
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| | 6N7 7/6 | 12SK7 6/- |
| | 6P28 27/10 | 12SL7 8/- |
| | 6Q7G 9/- | 12SN7GT 9/- |
| | 6Q7GT 9/- | 12S9T 17/6 |
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| | 6U4GT 14/- | 20P5 20/11 |
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| | | | |
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meter pointer corresponds to about 30 mA. The transmitter is now tuned and coupled into the aerial.

The meter should have a full scale deflection of at least 40 mA to 50 mA, but if such a meter is not available from the "junk box," a lower current reading meter may readily be adapted by use of a suitable shunt. A shunt is a low value resistor placed in parallel with the meter to pass current surplus to that required by the meter. The meter used in the original transmitter has a full scale deflection of 5 mA, and was fitted with a shunt which enables currents up to 40 mA to be measured. Calculation of a suitable shunt value is easy provided that the resistance of the meter is known, and this is usually marked on the bottom of the scale.

Since the shunt is placed in parallel with the meter so that current in excess of that required by the meter to give FSD passes through the shunt, the voltage drop across the shunt must equal that across the meter, that is :

$$I \text{ (shunt)} \times R \text{ (shunt)} = I \text{ (meter)} \times R \text{ (meter)}$$

$$\text{hence, } R \text{ (shunt)} = \frac{I \text{ (meter)} \times R \text{ (meter)}}{I \text{ (shunt)}}$$

Thus, if a meter having a FSD of 5 mA and a resistance of 10 ohms is required to read up to 40 mA, the resistance of the shunt required to pass the excess 35 mA will be 1.43 ohms, since :

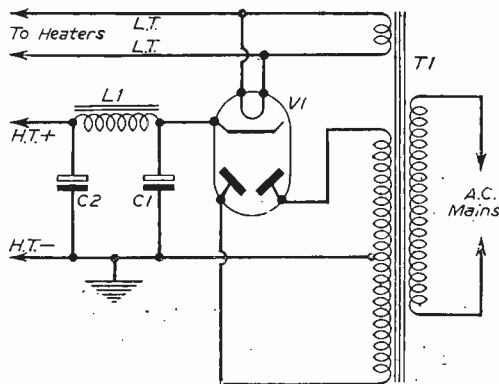


Fig. 2.—Circuit of a suitable power unit, delivering 280 volts H.T.

$$R \text{ (shunt)} = \frac{I \text{ (meter)} \times R \text{ (meter)}}{I \text{ (shunt)}}$$

$$= \frac{5 \times 10}{35} = 1.43 \text{ ohms.}$$

Crystals

Crystals having frequencies between 1.8 and 2.0 megacycles are frequently advertised in this magazine. The original crystal, which had a frequency of 1.815 kc/s, was obtained from Henry's (Radio) Ltd., 5, Harrow Road, London, W.2. Unfortunately, this frequency corresponded to that of a commercial R/T station and so the frequency had to be changed to 1,820 kc/s. This is not an arduous task provided one has patience. A piece of plate glass will be required, together with some common household scouring powder. Sprinkle some powder on to the glass and add sufficient water to form a wettish paste. Now remove the crystal from its holder taking care not to damage it—quartz crystals are comparatively fragile—and rub it in a figure of 8 motion in the paste, applying a fair pressure. After a few minutes rubbing the crystal should be well washed in tepid water and thoroughly dried, then replaced in its holder and the frequency of the transmission checked, after which it should have increased by a few kc/s. The operation may be repeated as necessary, but absolute cleanliness is essential since the crystal will not oscillate if it is dirty or damp.

If the transmitter is required for telegraphy use only, all the modulator circuit components should be omitted together with the switch S1. The screen of the oscillator valve, V1, should be connected to H.T. positive via a 4,700 ohm resistor and C7 increased to 0.01 μF.

If the transmitter is required for use on the 3.5 megacycle band, a suitable crystal should be used and the aerial circuit tuned as above. It will be necessary to remove about six turns from L1.

It should, however, be remembered, that when operating this transmitter on the 3.5-3.635 Mc/s amateur band you will be competing with transmitters having a maximum power rating of anything up to 150 watts. Nevertheless remarkable results have been obtained in the past with low wattage transmitters even with such competition. There is something very satisfying about making long distance contacts with such a small transmitter.

LIST OF COMPONENTS REQUIRED FOR TOP-BAND TRANSMITTER

- C1—27 pfd. capacitor.
 - C2—100 pfd. capacitor.
 - C3, C4—0.01 μF capacitor.
 - C5—0.00035 μF variable, air dielectric.
 - C6—0.0005 μF variable, air dielectric.
 - (These capacitors can frequently be obtained from dealers in "surplus" goods.)
 - C7—0.0005 μF fixed capacitor.
 - C8—12 mfd. electrolytic capacitor.
 - E1—100,000 ohm ½ watt resistor.
 - R2—100 ohms, 1 watt.
 - R3—470 ohms, 1 watt.
 - L1—47 turns, 22 s.w.g. enamelled, close wound on 1in. diameter former.
 - RFC1, 2—R.F. chokes, type Denco RFC/5.
 - LFC1—Audio frequency choke, 15 to 20 Henrys.
 - T1—Microphone transformer (see text).
 - Mic—Carbon-type microphone incorporating switch (see text).
 - S1—2-pole on/off toggle switch.
 - Xtal—Quartz crystal (1.8 to 2.0 Mc/s).
 - M—40 to 50 mA FSD meter (see text).
 - B—3-volt battery, Ever Ready No. 8, held in Terry tool clip No. 80.2 and connections soldered direct to battery.
 - V1—Oscillator valve, type 6CH6.
 - V2—Modulator valve, type EL91 or equivalent.
 - Closed circuit jack and jack plug for morse key connection.
 - Valveholders.
- POWER UNIT**
- T1—Mains transformer, usual primary voltages, Sec. 280-0-280, 80 mA. 6.3 v. 2 A.
 - L1—10 Henrys smoothing choke, 80 mA rating.
 - C1, C2—8 mfd. electrolytic capacitors, 450 volt working. (Although the H.T. to the transmitter is 280 volts, 450 volt working capacitors are required in order to withstand the peak voltage when the transmitter is off load, i.e., key up condition.)
 - V1—Rectifier valve, type 6X5G.
 - Octal valveholder for rectifier valve.

Highlights of the Show!

Silver Jubilee Show

THIS is the 25th National Radio Show—its Silver Jubilee. It has not been an unbroken series, for Radio Shows were abandoned during the war.

Portables to the Fore

A FEATURE of this year's Show is the large number of attractive lightweight and miniature portables, really light in weight. This has been made possible by the introduction of compact lightweight batteries, transistors, printed circuits, peanut valves and midget components.

The Midgets

THERE are several novelty midget receivers using sub-standard components, and deaf aid equipment. We shall describe how to make one next month which is only half the size of a matchbox, including the micro battery which will run the set in normal use for several months.

Stereophony

A LARGE number of exhibitors are now concentrating on stereophonic sound, with V.H.F. reproduction now approaching the ideal.

Stereophonic Records

THE new stereophonic records are being demonstrated for the first time. There is a studio set aside for stereophonic recording on tape.

Electronics

THE Royal Navy and Royal Air Force stands are demonstrating the importance of electronics in those two spheres. The G.P.O. is demonstrating electronic letter sorting, and invites the public to play a game of electronic skittles.

No Turntable

EXHIBITED by Camp Bird Industries (Stand No. 26) is the Wondergram, the first gramophone to dispense with the turntable. Its revolutionary design enables it to play both 33 and 45 r.p.m. records without

switch manipulation, and it is housed in a cabinet only the size of an average camera. It has a two-stage (printed circuit) battery transistor amplifier, with push-pull output through a 3in. high flux magnetic low speaker. It has two speeds, 45 and 33, and can play any size record including 12in., and the weight is only 2lb. The price is only 14 gns.

How Many Exhibitors?

THERE are 160 commercial exhibitors in all, 36 being manufacturers of radio and television receivers.

Technical Literature

VISITORS interested in examining technical books on radio, television, engineering, model making, motoring and a wide range of technical subjects should visit our Stand No. 108. We are showing a large range of technical titles than any other exhibitor in the exhibition. You may examine the books on our stand, and obtain a catalogue of our full list of technical titles—hundreds of them!

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PRACTICAL WIRELESS, also exhibited on our stand, has the largest circulation of any wireless journal appealing to the constructor—by many tens of thousands. Our companion journal "Practical Television" is unique in its own field.

Kits for Test Gear

CONSTRUCTORS will be particularly interested in the kits of parts for making electronic test gear, such as a valve voltmeter, oscilloscope, audio generator, etc., on the stand of Jason Motor & Electronic Co., Stand No. 441.

Portable Television Receivers

IMPROVEMENTS in design and circuitry have made possible extremely sensitive and compact television receivers. These transportables use 14in. and 17in. rectangular tubes and the components are cunningly

mounted round the neck of the C.R.T. To keep weights down to a minimum, the cases are mainly made of aluminium alloy, making the sets extremely easy to carry from room to room.

Television Plus V.H.F. Radio

ANOTHER rather remarkable aspect of the Show is the large number of television sets equipped with V.H.F. radio. Even some of the portables have V.H.F. included, making them doubly useful.

V.H.F./F.M. Kit

ANOTHER trend which will be of interest to all the home constructors is the number of kits now appearing on the market produced by the well-known names in wireless. As well as the test gear mentioned above there is an F.M. kit with pre-aligned R.F. and I.F. tuned circuits and several amplifiers.

Transistors

TRANSISTORS are rapidly displacing valves from the position they have held for so long. Almost every firm now produces one transistor receiver, and several firms are actually specialising in them. One of the sets shown is only 4in. long. There is not really any reason why they should not be made even smaller, although whether this is desirable or not is a matter of opinion.

Printed Circuit Television

AN item shown by Cossor which is arousing considerable interest is a printed circuit television, using "unit construction" design. This is of great help to the service engineer, as he has only to locate the faulty section and replace it as a block.

Miniature Record Players

THE 45 r.p.m. record enthusiasts will welcome the very attractive and compact little players which are shown. These players require no external power and run for many weeks on one set of low tension batteries.

RETURN-OF-POST SERVICE

JASON FM TUNER KITS

We can fully recommend these kits as being the best of all the F.M. Kits available. Construction is easy and results are first class.

Our kits are really complete, the instruction book, all components, valves and small items such as nuts, bolts, wire and solder being included. There is definitely nothing else to buy. All items are available separately if required and detailed lists are available free. Instruction books for either tuner are available at 2/3 each, post free.

VARIABLE TUNING. Kit includes well-made chassis assembly with glass scale and hammer finish front panel. **PRICE £6.19.6** post free. Credit Terms—Deposit 19/6 and seven monthly payments of 20/-.

MERCURY SWITCHED TUNER. All three BBC programmes at the turn of a switch. Kit includes the front-end unit already built and tested.

PRICE £9.19.0 post free. Credit Terms—Deposit £1.10.0 and seven monthly payments of £1.7.0.

AMPLIFIER KITS

MULLARD 510 and GEC 912 PLUS

We carry full stocks for all versions of these popular Amplifiers and our price lists are available free.

MULLARD 2 VALVE PRE-AMPLIFIER

Latest Mullard circuit for use with the 510 Amplifier. Booklet giving full details now available 1/3 post free.

Complete Kit, including drilled chassis and control panel. **£6.12.0.** Credit Terms. Deposit 19/- and seven monthly payments of 19/-.

READY BUILT AMPLIFIERS

QUAD Mk. II with Control Unit. **£42.**
LEAK TL12 Plus **£18.18.0.** **LEAK Varislope III** Pre-amp. **£15.15.0.** **LEAK Point One.** Pre-amp. **£12.12.0.**
Tripletone Hi-Fi Major. **£15.18.9.** **Tripletone Minor.** **£8.19.6.**
 Full literature will be sent on request. Credit Terms available.

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 **£3.3.0** and seven monthly payments of **£3.3.0.** Leather carrying case, **£3.0.0.**

AVO MULTIMETER

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 **£1.8.0** and seven monthly payments of **£1.6.0.** Leather carrying case, **32/6.**

LOUDSPEAKERS

| | | |
|--------------|---------------------------|----------|
| GOODMANS.— | Axiom 300. 12in. | £11. 5.9 |
| | Axette 8in. | £6.18.9 |
| | Tre-bax Tweeter | £6. 4.0 |
| WHITELEY.— | XO300 Crossover unit | 39/- |
| | HF1018 10in. | £8. 0.0 |
| | HF1012 10in. | 99/9 |
| | T10 Tweeter | 8/- |
| WHARFEDALE.— | CX300 Crossover unit | 30/- |
| | Bronze 10in. FSB | £5.11.9 |

CREDIT TERMS are available over three or seven months. Deposit—Three months 6% in the £. Seven months 3% in the £. Service Charge—Three months 5% (10% minimum). Seven months 10% (20% minimum).

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 2/6. 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.

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.**

COLLARO "CONQUENT." Latest Collaro model with Studio Pick-up. **£9.19.6.** Credit Terms. Deposit **£1.10.6** and seven monthly payments of **£1.7.0.**

SINGLE RECORD PLAYERS

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.**

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 4 564.—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. **£7.19.8.** Credit Terms. Deposit. **£1.5.6** and seven monthly payments of **£1.2.0.**

BSR T19.—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.**

TRANSCRIPTION UNIT

COLLARO 4T 200.—4-speed with transcription pick-up. **£19.10.0.** Credit Terms. Deposit **£2.18.0** and seven monthly payments of **£2.12.0.**

MULLARD TAPE AMPLIFIER TYPE "C"

This tape amplifier is designed for use with Collaro, Brénnel, Truax, Weartie and Lane decks. It consists of a recording amplifier and play-back pre-amplifier the output of which is fed into an existing amplifier when playing-back. Instruction Manual for this is available from us free together with our fully detailed price list. Please enclose 4d. for postage.

TRANSISTORS

MULLARD. Audio. OCT7 21-, OCT1 24-, OCT2 30-, OCT2 matched pairs 60/-.

EDISWAN. RF. XA101 35-, XA 102 40-. Audio. XB101 21-, XC101 matched pairs 60/-.

SURPLUS. RF. Yellow, Red. 21-. Audio Yellow Green 7 6d. All transistors post free.

R.L.D. CONSTRUCTION KITS

Introducing a new range of construction kits for the home constructor. All kits are absolutely complete and are supplied with the fullest possible instructions.

R.L.D. KIT NO. 1. CRYSTAL SET. A modern crystal circuit built into a small plastic cabinet. KIT 18/- post free. Less headphones.

R.L.D. KIT NO. 2. TRANSISTOR AMPLIFIER FOR CRYSTAL SETS. A simple transistor amplifier which can be added to any crystal set. The addition of this amplifier will increase the volume in the headphones several times. No soldering required in this kit. KIT 27 6d. post free.

R.L.D. KIT NO. 3. TRANSISTORISED CRYSTAL SET. An up-to-date crystal circuit followed by a transistor amplifier built into a small plastic case. KIT 43 6d. post free. Less headphones.

HEADPHONES. Brand new (not ex-Govt.) light-weight high resistance headphones at 16 6d. per pair, plus 1/- post. Instruction sheets for any kit 6d., plus 3d. post.

WEYRAD

"H" TYPE COILS— FOR MANUFACTURERS, SERVICE ENGINEERS AND INDIVIDUAL CONSTRUCTORS

These coils are supplied in individual aerial, H.F. transformer and oscillator versions for each band. The iron-dust cores are fitted with a threaded brass stem which permits fine adjustments of the inductance without risk of damage to the cores. The coils are mounted by means of a single 6 B.A. screw. Circuit connections are made to four soldering tags at the end of the former.

Recommended for many circuits, including the "Practical Wireless" AC/DC 3-valve Superhet (Feb., 1956 issue) and the "Radio Jack" (July, 1958 issue).

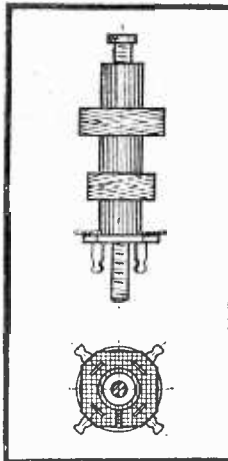
ALL BANDS ARE AVAILABLE FOR DELIVERY FROM STOCK

RETAIL PRICE.....**3/9** EACH

ILLUSTRATED FOLDER.....3d.

A.M./F.M. RECEIVER BOOKLET.....2/6.

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



RANGES :

- Band 1 800-2,000 mtrs.
- Band 2 250- 800 mtrs.
- Band 3 190- 550 mtrs.
- Band 4 90- 250 mtrs.
- Band 5 33- 100 mtrs.
- Band 6 16- 50 mtrs.
- Band 7 12- 37 mtrs.

Coils are coded according to type and range :

- HA1 = Band 1 Aerial
- HH1 = Band 1 H.F.
- HO1 = Band 1 Oscillator

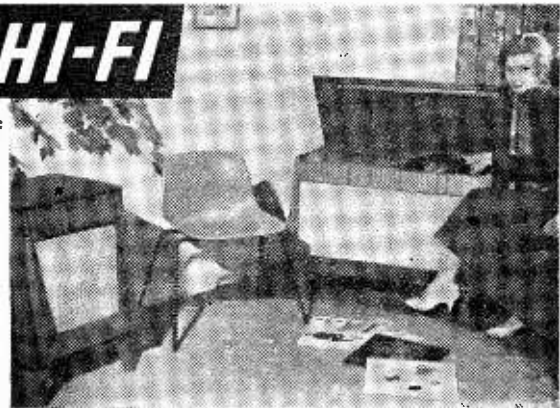
Build your own HI-FI

—with an entirely **NEW** range of Hi-Fi units and cabinets!

Imagine the pleasure of having this magnificent Hi-Fi equipment in its beautiful contemporary style furniture for your home... and experiencing an entirely new realism in sound reproduction. Yet the Emistructor Hi-Fi will save you money and give you all the extra fun and satisfaction of building it yourself—and being able to service and maintain it afterwards. Special instruction manuals guide you at each stage and teach you all about the equipment in simple terms as you build. No skill or experience is needed—only a few simple tools.

Emistructor equipment is made to the highest quality standards and is a product of E.M.I. Institutes Ltd.—part of a Company world famous for sound recording and reproducing equipment.

There is a wide variety of equipment and cabinets at different price levels to suit individual tastes and requirements. The range varies from a complete Hi-Fi installation with separate speaker enclosures to a simple all-in-one compact system for those with more modest requirements. All equipment is suitable for stereo or non-stereo reproduction of records. Full details and complete specifications will be sent with our free Brochure.



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Please send, without obligation, details of your Hi-Fi equipment

NAME
ADDRESS

EMISTRUCTOR Associated with one of the world's largest recording organisations comprising:—
"HIS MASTER'S VOICE" · CAPITOL · COLUMBIA
PARLOPHONE · MGM · etc.

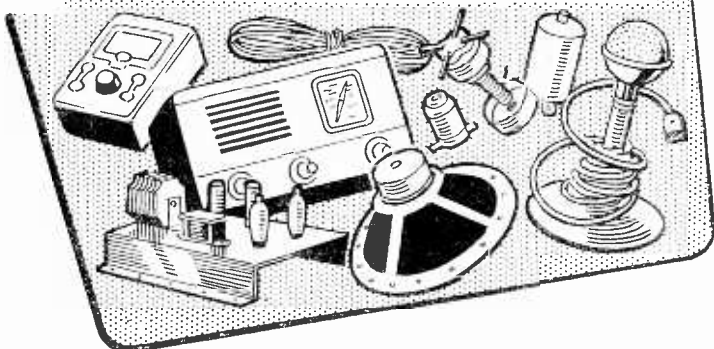
NEWS FROM THE TRADE

LATEST DEVELOPMENTS
OF RECEIVERS AND
COMPONENTS

VERDIK SALES LTD.

VERDIK SALES, makers of the Lane Tape Equipment, have recently moved to a new factory and office building.

The new address and telephone numbers are:—139, 143, Sydenham Road, Sydenham, London, S.E.26. Sydenham 3118/9.



A COSSOR V.H.F./F.M. RECEIVER KIT FOR THE HOME CONSTRUCTOR

COSSOR RADIO & TELEVISION LIMITED announce the second of the new series of Cossor Kits—Model 701K—containing all the necessary parts for the construction of a six-valve V.H.F./F.M. radio receiver.

The radio-frequency and intermediate-frequency tuned circuits of this receiver have been pre-aligned in the Cossor factory. This fact, coupled with the printed circuit construction, ensures that when assembled in accordance with the comprehensive instructions provided the receiver will work satisfactorily without subsequent alignment.

Related parts have been placed in separate polythene bags to facilitate assembly and the tools required, such as a screwdriver, cutting pliers and a soldering iron, will be found in the average handyman's home. Construction time, on average, is about 9-10 hours. The retail price is 15 gns, tax paid.—Cossor Radio & Television Ltd., Cossor House, Highbury Grove, London, N.5.

"THE MATADOR"

JUST released by Bercé Radio Ltd., subsidiary of The Ever Ready Co. (Great Britain) Ltd., Europe's largest battery manufacturers, is "The Matador." This attractive, battery operated, portable radio receiver incorporates printed circuit. Of superhet type, it utilises four Ever Ready low consumption valves. The cabinet, in two-tone—beige and red and black mottle—is of contemporary styling, and is fitted with a strong easy-grip carrying handle. A special feature is the car aerial socket. No additional licence is required if used in a car. Low running cost is ensured through the use of the Ever Ready balanced "Batrymax" B141 combined H.T./L.T. battery. Excellent reproduction is obtained through the high sensitivity 5in. diameter

moving coil type speaker. Easily portable. "The Matador" weighs 7lb. 12oz. complete with battery. The price is £14 7s. 3d.—Bercé Radio Ltd., Hercules Place, London, N.7.

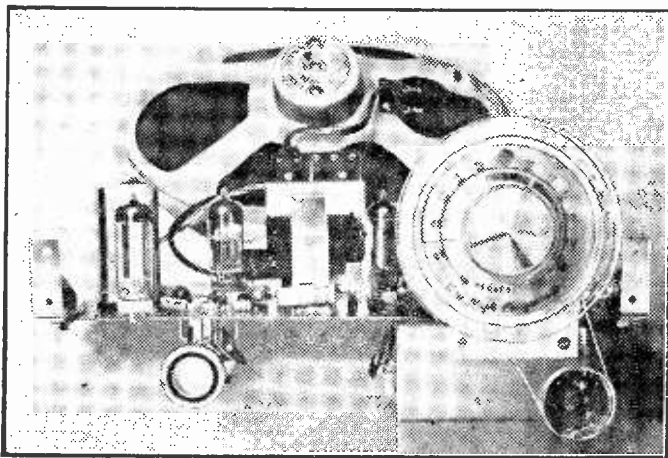
NEW TAPE RECORDER FACILITIES

THE new Walter 303 De Luxe tape recorder has facilities rarely found on a machine of its price and type. It is easy to operate.

It has two speeds—3½in. per second and 7½in. per second. It will record for periods up to three hours, making it suitable for conference work.

The 303 De Luxe has many features which make it ideal for use in offices, factories and shops, as well as in the home. It has a combined on/off switch, volume control and record level control; safety button to prevent accidental erasure; speed-change control; instant stop/start control, and tone control. It has a revolution counter to enable any part of the recording to be pin-pointed. Its price of 42 gns. includes a high-fidelity crystal microphone.

Available as extras are three attachments—stethoscope-type earphones for transcribing office dictation, a cine-synchronisation attachment for adding sound to silent films.



A view of the Cossor V.H.F./F.M. Receiver Kit.

Programme Pointers

OUR CRITIC, MAURICE REEVE, REVIEWS SOME RECENT PROGRAMMES

The Ocean

JAMES HANLEY'S novel, *The Ocean*, in which victims from a torpedoed ship drift and drift, came over in soft, almost whispered tones. It sounded very effective, tragic and dramatic. Script and production by Donald McWhinnie.

Famous Stars

The Laughtermakers is a series of programmes each devoted to a famous star in the music-hall and light entertainment world. The last one I heard was honouring Douglas Byng, and, with its numerous contributors, each equally famous, made up a pleasant and nostalgic half-hour. The excellent script was by Gale Pedrick and the producer John Browell.

Famous Trials

The Parnell Case, in the Famous Trials series, was sadly disappointing. Usually so exciting when read, as in St. John Ervine's life of Parnell, it was dull, uninspired and unimaginative. All the speeches lacked passion and fire, whilst the "crowd" effects were pathetic in their feebleness. Hugh David played Parnell and Tony Quinn Capt. O'Shea. Nesta Pain produced. Lord Birkett "summed up" afterwards.

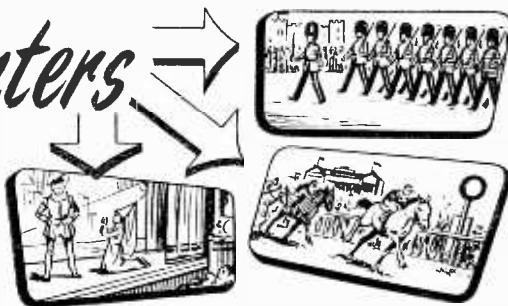
Independent Witness—Monday night plays for radio—was interesting for presenting what was to me, at any rate, a new view of the reliability or otherwise of witnesses to road accidents. Nobody, the author Henry Cecil contends, is actually watching the traffic when accidents occur, or in any way anticipates that one is going to happen. He is merely fortuitously there and looks round after he hears the crash; at least in the vast majority of cases. It made for an interesting play with Richard Williams and Frank Atkinson as rival counsel, and Geoffrey Lewis as the involved driver—each very good.

The Stock Exchange

They Only Use Pencil, a play about The Stock Exchange by Christopher Landon, who was a member for twelve years, both amused and perplexed. Taking for granted the authenticity of the scenes enacted, I can only say "nice goings on I must say."

Guided Missiles

Yet another documentary gave us an hour on *Guided Missiles*. Given that title by the author and producer David Woodward and narrated by Arthur Bush, it was an amazing collection of both data and speculation, factual observation and the "might be's" of a future nuclear war,



which didn't exactly act as a soporific before slumber time. It didn't trespass on the moralities. It seemed amazingly factual and authoritative. The cross-talk and differences of opinions between the participants made it sound very real.

True Glory

The True Glory—what a dreadful cliché type of title!—was the complete Fuchs saga in ninety minutes of narration by all the leading participants in that remarkable trans-Antarctic journey. What would Scott or Shackleton have thought of it! Much as the Wright Brothers or Bleriot would have looked upon a jet. Although we have had plenty of Fuchs and Hillary all the winter and spring through one medium and another, it was enthralling and proper that this programme should have been devised and presented. Arranged by Eileen Moloney it was very well done indeed.

Beyond Our Ken

The new Kenneth Horne weekly show, *Beyond Our Ken*, has a hidden meaning in its title which I leave to readers to fathom for themselves. With script by Eric Merriman and Barry Took, and Kenneth Williams, Hugh Paddick, Betty Marsden, Ron Moody, Patricia Lancaster and Stanley Unwin in the cast, it seems a very ordinary affair indeed. The opening crack gives the clue to its general entertainment level—"advice to the people of Iceland, wrap up." Really! Lincoln it was who said you can fool all of the people some of the time, and some of the people all of the time, etc. It must be admitted there was a good deal of laughter from the studio audience. But an early return of *Much Binding* is called for if Mr. Horne's fan mail is not to drop seriously.

Jean Moulin

The Man with the Scarf—the story of Jean Moulin, resistance leader and martyr—made a very good documentary. From the book "Four in the Shadows," by E. P. Wicks, adapted for radio by Marjorie Ward and narrated by Edward Ward, it reminded some of us of what we probably very narrowly missed during the war. Moulin was one of the bravest of many brave Frenchmen in that movement. But wouldn't it be better to get right away from these wartime recollections? We do have a surfeit of them, on and off!

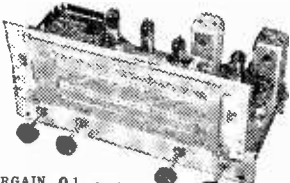
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ALL-WAVE RADIOGRAM CHASSIS 3 WAVEBANDS 5 VALVES



LATEST MIDGET B.V.A. SERIES Brand new and guar. A.C. 200 250 v., 4 pos. W.C. sw. Short-Medium-Long-Grand P.C. socket. High Q dust core coils. Latest circuit technique, delayed A.T.C. and neg. feedback O.P. 4 valvetube chassis. Size 12 1/2 x 3 1/2 x 2 1/2 in. Dial 10 in., 4 1/2 in. Hor. or Vert. Station names. Walnut or ivory knobs to choose. Aligned and calibrated ready for use. Sensitivity and Quality at Low Cost. Carr. and ins., 4/6. 7 Valve De Luxe, push-pull EL41 version. 7 watt output, with H Duty Output Transformer, £12.10.0. Carr. & ins., 5/-.



BARGAIN PRICE 9/1 gns.

8 or 10 in. speakers to match. 20- and 25- in. P.A. P. 1, 6.

Table with columns: NEW BOXED VALVES, ALL GUARANTEED, and various valve types and prices.

Table with columns: SPECIAL PRICE PER SET and various radio sets and prices.

Table with columns: ELECTROLYTICS ALL TYPES NEW STOCK and various electrolytic components and prices.

VOLUME CONTROLS. Famous Make... 10 to 100 ohms to 2 Meg-ohms. All Long Spindles. Midlet type. 1 1/4 in. dia. Guar. 1 year. Log and linear Ratios. LESS SWITCH. 1/P. SWITCH. 3/- 4/9

TV TUBES-RECONDITIONED GENUINE OFFER.-All tubes Reactivated and Re-vacuumed and Guar. 6 months. 12 in. Mullard, Mazda, etc. £8.10.0. (As available) 15 in. Mullard, Mazda (Rec'd), £7.0.0. 17 in. Mullard, Mazda (Rec'd), £8.10.0. Carr. & Ins. 12/6.

LATEST DEVELOPMENT.-New Heater, Cathode and Gun Assembly can now be fitted to your old tube-reconditioned virtually as new and unconditionally guaranteed 6 months. As used in our service Dept. and eminently recommended. 12 in., £8; 14 in., £8.10; 17 in., £10. Carr. & Ins. 12/6. Delivers approx. 7 days. Regret only Mullard and Mazda types at present.

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. & 1/6. Ditto with 0 P Trans. 9/6.

JASON P.M. TUNER UNIT, 87-105 mc s. Designer Approved Kit of parts to build this modern highly successful unit, drilled chassis and superior type dial. Coils, caps and all quality components, etc. for only 5 gns., post free. Set of spec. EPB or equivalent valves, 30 post free. Illus. handbook with full details 2/-, post free or FREE with Kit. 48 Hour Alignment Service. 7/6 and 2/- p.p. AND NOW - Jason 'Mercury' switched P.M. Tuner with A.F.C. Complete Kit only 8/3 gns., plus 2/6 p. & p. set of 3 x EPB-9 valves, special price, 2/-.

MULLARD 3-3 QUALITY AMPLIFIER.- A first-class H-F Companion Unit to the Jason Tuner. H Duty Main Trans. allows for H.T. and L.T. Power supply. Mullard's latest circuit, 3 valves, 3 watt. Pres. response 40 c/s-25 Kcs. or -1db with special sectionalised O.P. Trans. Punched Chassis, all components, valves, etc. Only £8.19.6. Ready wired and tested. 8 gns. Carr. and Ins. 4/6.

COLLARO TAPE TRANSCRIBOR MK. 4.- This latest Tape Deck featured in our advertising other Limited stocks. New and sealed in muffs, cartons. Bargain 22 gns. Post Free.

EMITAPE Reconding Tape Special Offer. Type 88 (Standard) Type 96 (Long Life) 5 in. ... 17/4d. ... 15/0d. ... 8/- 5 in. ... 6/0d. ... 3/9. ... 2/6 6 1/2 in. ... 8/0d. ... 24/6 ... 12/0d. ... 3/6 7 in. ... 12/0d. ... 3/0 ... 1/9d. ... 4/5 - ALL NEW & BOXED.

Replacement Reels, 7 in. 1/6 each, 5 in. 2/6.

RESISTORS.-Full Range, 10 ohms-10 Megohms. 20% 1 w. 3d.; 1 w. 5d.; 1 w. 6d.; 2 w. 9d. 10% Helistab, 1 w. 5d.; 1 w. 7d.; 5% 1 w. 8d. 1% Helistab, 1 w. 1/6. (10 ohms-100 ohms 2/-)

SENTERCEL RECTIFIERS. E.H.T. Type Fly-back Voltages, K3 25 2 kV., 5/-; K2 40 3.2 kV., 6/8; K3 45 2.6 kV., 7/8; K3 50 4 kV., 7/2; K3 100 8 kV., 13/6. MAINS TYPES.- RMI, 125 v., 60 m.A., 4/8; RM2 125 v., 100 m.A., 5/6; RM3 125 v., 120 m.A., 7/6; RM 250 v., 250 m.A., 15/-; RM4B type 270 m.A., 17/6; RM5, 250 v., 300 m.A., 21/-.

C.R.T. Heater Isolation Transformers New improved types-mains prim. 200/250 v. tapped. All Isolation Transformers now supplied with alternative no boost, plus 25%, and plus 50% boost taps, at no extra charge. 2V -2A 13p. 12/6 (P. & P. 1/6) 6.3V. .5A .. 12/6 .. 10.5V. .3A .. 12/6 .. 15V. .3A .. 12/6 .. 17V. .3A .. 12/6 .. Other voltages in course of production. Small size and tag terminated for easy fitting.

RECORD PLAYER CABINETS Contemporary style (some covered cabinet in mottled red with cream interior. Size 18 1/2 x 12 1/2 x 10 1/2 in., fitted with all accessories, including shocker handle board and plastic fret. Space available for all modern amplifiers and autochangers, etc. Unit record player mounting board 14 x 13 in.

Cabinet Price, £3.3.0. Carr. and ins., 3/6. 2 VALVE AMPLIFIER MK. I. To fit above cabinet, modern circuit with EL4 output, ready built, with 6 in. speaker and output transformer, £8.12.6, carr. and ins., 2/6. 2 VALVE AMPLIFIER MK. II.- As above complete, wired and tested but with latest twin stage valve EPB28 giving higher fidelity and greater output, £8.19.6 and 2/6 p. & p.

RECORD PLAYER BARGAINS 4 sp. BSR (TU)9, 92.6. 4 sp. COLLARO JUNIOR, £4.10.0. 4 sp. GARRARD (4 sp.), £7.15.0. Carr. & Ins. 3/6. AUTO CHANGERS.-4 sp. BSR (1A)8, £7.19.6. 4 sp. COLLARO, £7.19.6. 4 sp. GARRARD (10/120 4H) 2, £10.5.0. Carr. & Ins., 4/6. All above units are latest models and are fitted with modern styled Tweight Xtal. P.I. with turnover head and twin sapphire stylus.

SPEAKER FRET.-Expanded Bronze anodized metal, 2 3/4 x 12 x 8 in., 3/-; 12 x 12 in., 4/6; 12 x 16 in., 6/-; 24 x 12 in., 8/-, etc.

TYGAN FRET.-Max. width 5 1/4 in. 12 in. x 12 in., 2/-; 12 x 18 in., 3/-; 12 x 24 in., 4/-, etc.

TRANSISTOR RECORD PLAYER.-Ready wired Push-Pull Transistor Amplifier using latest 4G.E.C. Transistors. Genuine 1 w. output into standard 4 ohm speaker. Superb quality with neg. feedback circuit, Var. Tone and Volume controls. Special Size to fit in Player Cabinet. Amplifier, 5 gns. 8 x 5 in. Speaker, 20/- P. & P. 2/6.

LATEST STARR. 4 1/2 sp. Record player unit, H.F.I. lightweight crystal pick-up and 54 phase system, 9 v. battery operated. Contemporary styled-constant speed from 4 1/2 v. Only £2.6. P. & P. 3/-.

RECORD PLAYER CABINET to fit above units. Attractively covered in Red rexine with white polished relief. Fitted with modern 4 x 4 1/2 in. x 4 1/2 in. dial. Cabinet size. Bargain Price, 55/- P. & P. 3/6. Seal for special build giving full details.

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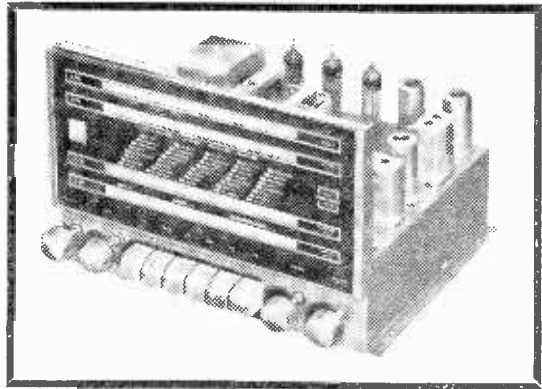
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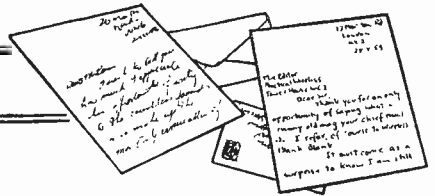
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Open to Discussion



The Editor does not necessarily agree with opinions expressed by his correspondents.

Stereophonic Sound—Canine Proof

SIR.—Stereo sound runs a very close parallel to stereo pictures with this difference. The stereo picture depicts depth, front to rear, provided the distance of the subject does not exceed about 35ft.

Stereo sound depicts depth almost to infinity plus position and movement, the latter two qualities not hitherto available.

The human ears are extremely sensitive to direction, particularly as regards linear movement, whilst depth is depicted by volume of sound.

Your July editorial states that the recent BBC experiment showed little improvement on the already high standards of single channel broadcasts.

Whilst admitting the super-sensitivity of a dog's hearing, it was a revelation to me when, sitting listening to the BBC experiment with my dog on my knee, upon the approach of the train the dog popped up his head in the direction of the right-hand loudspeaker and with it, described a steady, slow arc through 60 deg., and after the train had cleared, resumed his recumbent posture.

My opinion is, stereo sound for position and movement, stereo picture for depth.—H. B. Rochester (Sale).

Stereophony is Worth While!

SIR.—I feel that your paragraph "The Stereophonic Sound Experiment," in your July editorial, calls for some comment. You state that "It was almost impossible to detect any worth-while difference between it and the ordinary sound programme."

In my set-up the R.H. channel was an A.M./F.M. table receiver using the F.M. band and the treble cut control adjusted to match as far as possible the L.H. channel. This was a small A.M. set of doubtful make and quality. The receivers were placed as directed in the *Radio Times* and balanced as nearly as possible by means of the volume controls.

Although neither set was of good quality, and one I would call "poor," this one having a 5in. or 6in. speaker and the other a 7in. X 4in. elliptical, my greatest impression was one of a very large sound source, which in the extracts from the Beggar's Opera and Tchaikovski's

Fourth Symphony seemed to be spread right across the 10ft. or so between the receivers. The string tone seemed to have a natural quality which I had never previously heard on monaural equipment, even of the highest quality.

In my opinion stereophonic sound is a worthwhile advance in sound reproduction comparable with the advent of the L.P. disc and F.M. broadcasts. To me it provides a far greater approach to original sound than reducing harmonic distortion from 1 per cent. to 0.1 per cent. or flattening frequency responses from ± 5 dB to ± 1 dB 20 c/s-20 kc/s. One can

spend hundreds of pounds on a "Hi-Fi" monaural system in which these last two conditions are achieved, but which simply cannot, however good its quality, provide that "depth" of sound which to me even such crude stereo equipment as I

have described immediately replaces, at any rate to a large extent.

I agree with your correspondent H. G. W. that it is impossible to obtain true stereo by means of two loudspeakers spaced apart and away from the listener. Of course the sound will not "stand out," but this is not necessary or even desirable for musical reproduction provided the listener is not too far away from the speakers—and who wants to listen to himself being run over by a train, anyway? The great advantage of two channel stereo of this type is the apparent size and "depth" of the sound image it produces.

In conclusion, I fully agree with your views that most modern receivers, at any rate the larger ones, provide reasonable quality of sound, and, of course, the expense of stereo is not a necessity. But neither is monaural "Hi-Fi" or even music itself. Like these two, stereo is a luxury which those of us who are keen enough will some day want in our homes.—S. Cox (Southampton).

Sponsored Broadcasting

SIR.—In answer to Thermion's request for views on sponsored sound broadcasting, may I say that I deplore the whole idea of it. One has only to listen to Radio Luxembourg to realize why. I listen to the radio to be entertained, not to learn all about some football pool and how somebody's washing powder is so much better than anyone else's. I dislike listening to—say—

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.

a record programme where an advertisement is hawked out every five minutes.

I have spent some time sailing in and near North American ports, and the advertising heard over the air there, after passing the novelty stage, is sickening. Who wants to be interrupted in the middle of an enthralling play by some obviously falsely gay announcer extolling the wonders of "Goldsteins Coffee Beans" or some such thing.

No thanks, sponsored radio is boring, false, slapdash and overrated, and here's one who is selling his radio if it is introduced by the BBC.—M. McDONALD (London).

Mains/Battery Portable

SIR.—I have received many queries regarding suitable I.F. transformers for the Mains/Battery Portable. Suitable transformers which have actually been tried are the Weyrad type P6/2. These are high Q transformers and are available from the makers in quantity direct, price 7s. 6d. each.—G. KEATING (Lewisham).

Electronic Flash Unit

SIR.—I trust that a high percentage of readers were as interested in the photo-flash unit described in August issue as I, and I hope that we will shortly see the more modern circuits explained as thoroughly as that one. The type I have in mind does away with the cumbersome case slung over the shoulder, and is no larger than the conventional flashbulb gun. I do not know, but I surmise that this type is the transistorised version referred to in the article in August issue as being expensive. But surely over a long period of time the replacement of high tension batteries in the circuit described would off-set any saving effected in construction? Let's hope that we shall hear from those in the know, and that, in keeping with usual practice, PRACTICAL WIRELESS will give us the real up-to-the-minute gen.—B. BICKERDIKE (Ireland).

Correspondence Wanted

SIR.—I am seventeen years old and I am very much interested in radio as a hobby. I hope to become an amateur transmitter and I would like to correspond with other amateurs who would have the patience to answer my letters. I shall answer all letters received.

I have been reading your magazine for quite some time now. I find it very interesting especially the article, "Transmitting Topics." I have no doubt that many readers would agree with me in asking you to publish a design for a transmitter with a 100-150 watts output or at least 60-100 watts output modulated. I wish you further success with your magazine and hope that my suggestion may be given consideration.—JOE SPITERI (76, St. Augustine Street, Zeitun, Malta, G.C.).

Information Wanted

SIR.—I have an ex-Air Ministry amplifier, type A.1368. I would be very grateful if any of your readers could tell me whether this is suit-

able for use as a gramophone amplifier, and if so, how it should be connected.—J. R. CALVERT (21, Parkway, Barnston, Wirral, Cheshire).

Circuit Wanted

SIR.—I have an old wireless, about 1937 I believe, an R.A.P., "Transatlantic" 4-waveband receiver, superhet. On a booklet I have it says that these receivers were made at Ferry Works, Thames Ditton, Surrey. I have been told, however, that they have gone out of business, and I haven't seen any new types about.

I wondered if any of your readers could supply me with a circuit diagram, and values of components for this set?—A. F. NEWMAN (Reading).
[This firm ceased business in 1947.—ED.]

Playing a Tape Recording Backwards

SIR.—There must be a number of amateur tape recordists like myself who enjoy trying out stunts on their machines. One of these is, of course, playing a recording backwards. As most domestic machines are twin track and play back in one direction only, I find that quite a bit has to be done to produce this interesting effect.

I have worked out a foolproof method for myself, but I do not propose to detail the various necessary steps because people usually prefer to think these things out for themselves. To save unnecessary anguish, however, I would like to give a hint or two.

The essential thing to remember is that the length of tape selected for playing backwards has to be turned inside out lengthways and not merely turned over once. This latter would only displace the straight recording from one track to the other. Turned inside out, the original track is kept in its true relation to the track from which it was cut.

Volume and quality are better than one might expect, despite the fact that the magnetic coating is separated from the playback head by the thickness of the tape.—K. G. RICHMAN (Chester).

"Arrangements"

SIR.—Musically, Thermion must be a provincial square. I challenge him to produce the names of half-a-dozen composers of worth-while music born before 1850 who have not at some time "arranged" other people's music.

A few—Bach and Schubert, for example—have thought highly enough of pieces of their own composition to want to arrange them. It is, I think, unfortunate that Handel's music is performed as written only very seldom—far too seldom for Thermion to have had the opportunity of hearing an authentic performance. "The Messiah," Fireworks Music, Water Music, etc., are invariably given to the public in a vastly different form from that intended by Handel.

"Leaving compositions to be played as the composer intended" is a meaningless phrase, anyway. We have very inadequate knowledge as to how 99 per cent. of all music written before 1900 was intended to be played—crotchets

(Continued on page 655)

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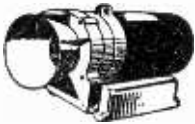
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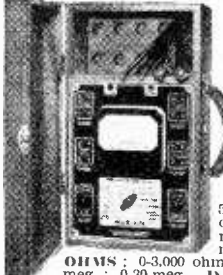
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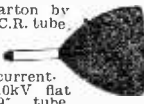
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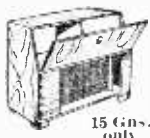
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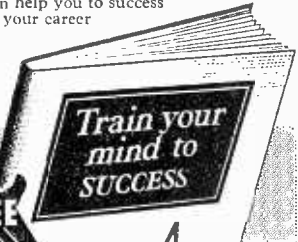
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and quavers in themselves do not mean very much to the professional performer. The marks of expression and phrasing are more often than not the work of skilled musicologists. Thermion's comment appears even more inept if applied to music written before 1800, as the composer often gives no clue as to the instrument he intends the performer to use. Even when this is not the case it is found that the instruments themselves or skilled performers are not readily available.

If Thermion had his way half the items to be given in the first night at the "Proms" would have to be withdrawn, and I think it would be a pity to throw out music by Wagner, Rachmaninov and Tchaikovski which must (owing to its inclusion in any "Prom") give so much pleasure to millions of people.—F. S. WILLIAMS (London).

That Mysterious Signal

SIR—The mysterious signal heard by Mr. D. A. Newell of Lumb is quite definitely reaching him through the mains supply. It is the high frequency signal injected into the mains which automatically switches on the street lighting. I have myself heard the signal on radio, television, and the telephone. I have even heard the reflector of an electric fire resonate in sympathy with it. If Mr. Dewell will look through his window towards the main road on first hearing the signal commence, he will notice the street lights come on within about 30 to 45 seconds.—GEOFFREY TATTERSALL (Waterfoot).

Re Loudspeaker Enclosure

SIR—Like G. L. Bradley of Hove, I have made the loudspeaker enclosure designed by W. Arthur Adams and described in PRACTICAL WIRELESS of October, 1956. I use a WB Stentorian 1012 for the base, a 5in. Rola for the middle register and a Lorenz LPH65 tweeter which is built into the top of the top chamber:

News From the Clubs

GRAFTON RADIO SOCIETY (G3AFT) RADIO AMATEURS EXAMINATION

Hon. Sec.: A. W. H. Wennell (G2CJN), 145, Uxendon Hill, Wembley Park, Middlesex.

GRAFTON RADIO SOCIETY announce that they have again made arrangements with the Islington L.C.C. Men's Evening Institutes for official courses in the Radio Amateurs Examination and Morse (both for beginners) to be held this winter at the Montem School, Hornsey Road, Holloway, London, N.7. The classes will meet on Mondays, with a repeat lecture on Wednesdays, commencing Monday, September 22nd, for the R.A.E. at 7 to 9 p.m. (instructor S. H. Iles—G3BWQ), followed by the Morse at 9 to 10 p.m. (instructors L. Barber and A. Ralph). The fee is 20s. for either course, or 22s. 6d. for the two, and application in the first instance should be made to the hon. secretary of the Grafton Radio Society, A. W. H. Wennell (G2CJN), 145, Uxendon Hill, Wembley Park, Middlesex, at once so that a place may be assured. In the City and Guild's examination held last May, 26 passes were obtained making a grand total of 85 in the five years this course has run.

FORMATION OF NEW SOCIETY

THE Halifax and District Amateur Radio Society, Candy Cabin, Ogden, Halifax, Yorks. have formed a new society. The first meeting was held on Tuesday, August 5th, 1958, and it was decided to hold meetings on the first Tuesday of each month

this faces upwards and gives a good dispersion effect to the upper register. I used Weyrock for the body of the cabinet and found no need for lining. The effect is really remarkable and wants hearing to realise how good the reproduction of LP records and tape can be.—J. J. GROVER (Rotherham).

The Great Transistor Chaos

SIR—I have looked with great interest at the growth of transistors. A few years ago there was hardly a set on the market which used them, now there is hardly a set which does not. I have no doubt that they do save a lot of time and money in commercial receivers, but, as yet, they certainly save nothing as far as the amateur is concerned.

A transistor has many advantages over and above the thermionic valve. But it possesses some disadvantages as well. They are no cheaper than the valve, they are delicate, they require complicated, if not only costly, circuitry. In my opinion for the radio enthusiast these disadvantages pull the scales over considerably.

There is far too much fuss made of the transistor; you cannot open a wireless magazine without seeing it mentioned on at least every other page. Surely, until the manufacturer can reduce the price by half, and the cost of the associated circuitry equally, they cannot be universally accepted in preference to the thermionic valve.—M. M. PRITCHETT (Woking).

Information Wanted

SIR—Could any reader supply me with some information about a government receiver M.C.R.L. especially:—

- (1). What are the correct valves (5) for the set? (4 IT4s and 1 IR5?)
- (2). Are the valves filaments in series or parallel, or series parallel?

There is no supplier's name or any other identification marked on the set.—MICHAEL J. GOULD (Solihull).

at the Sportsman Inn, Bradshaw, Halifax, which is near to the club rooms. Other meetings in between each main meeting will be at the premises of the club.

The aims of the above society are to encourage anyone interested in radio to pass an examination for their licence; also as a get-together of local amateurs. If anyone has any spare equipment of which they are disposing it would be welcome for the new beginners who are setting up a station.

TEES-SIDE AMATEUR RADIO CLUB

Hon. Sec.: Allan Taylor (G3JMO H.S.), 12, Endsleigh Drive, Acklam, Middlesbrough, Yorks. (Tel. 86933).

AT Settlement House, Newport Road, Middlesbrough, at 8 p.m.

Sept. 12th: "Instrumentation," by Brian Wilson (G3LXG).
Sept. 26th: A tape recorded lecture.

On July 18th the club heard a tape recorded lecture called "Hints on Mobile Operation," by G8TL from the R.S.G.B. taped lecture library.

LEEDS AMATEUR RADIO SOCIETY

Hon. Sec.: J. R. Hey, 40, Richmond Ave., Headingley, Leeds, 6.

OPENING night for next season is September 24th, 1958, when we welcome new members. Meetings have returned to Wednesday, 7.45 p.m. and are held as usual at Swarthmore Educational Centre, 4, Woodhouse Square, Leeds, 3.

An interesting programme is being arranged, including films, lectures and demonstrations, junk sales, and visits to places of interest.

RECEIVERS & COMPONENTS

"OSMOR NEWS." Information and circuit available for the following: Push-pull bias Osc. Coil. 7/6, as supplied to several tape recorder manufacturers. New Band I/III tunable Receptor. "P.W." Consul Car Radio. "R.C." 1-valve S. Waver. Transistor Regenerative Circuit. See page 590. OSMOR RADIO PRODUCTS LTD., Sth. Croydon, Surrey.

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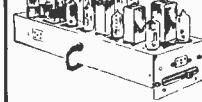
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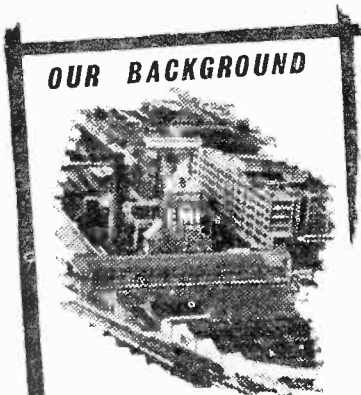
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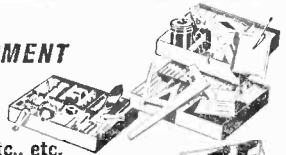
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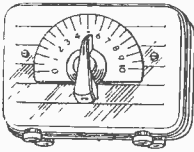
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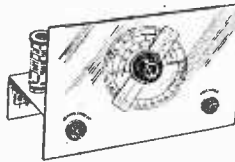
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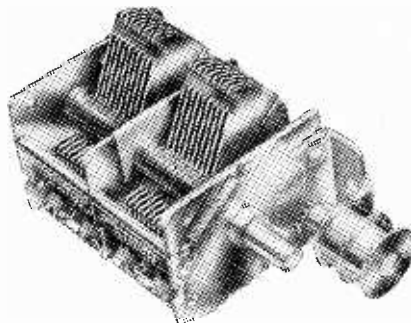
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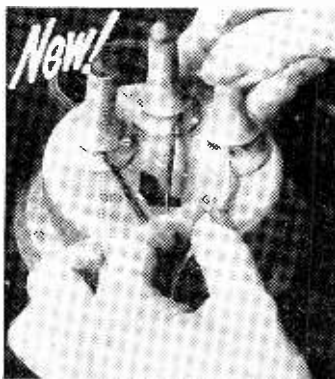
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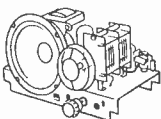
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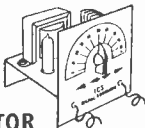
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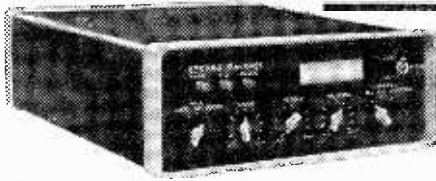
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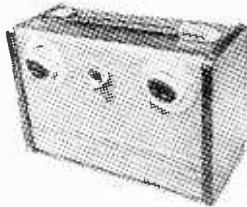
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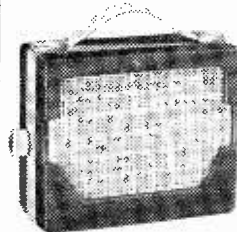
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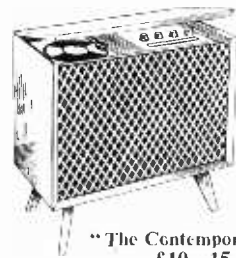
Miniature Single ended Transistor Output Transformer, 7.6.

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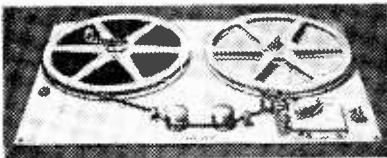
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ABSORPTION WAVEMETERS, 3 to 35 Mc/s in 3 switched bands. Complete with indicator bulb. 17/6 post free.

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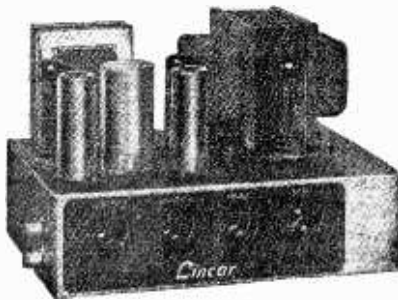
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A 10-WATT HIGH FIDELITY ULTRA LINEAR AMPLIFIER WITH INTEGRAL PRE-AMP

A special feature is the compactness of the unit. Full advantage has been taken of latest component miniaturisation developments to produce a 10-watt Hi-Fi push-pull amplifier incorporating tone control pre-amplifier stages within the measurements of 9 x 7 x 6½ ins.

In addition two high impedance input sockets are provided for microphone and gram, etc. Each input has its associated vol. control, five B.V.A. valves are employed ECC83, ECC83, EL84, EL84, EZ81, H.T. and I.T. power supply point is included for a radio tuner.



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In excess of 14 watts.
RATED OUTPUT 10 WATTS.

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Volume (1) 22 millivolts for rated output.
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Continuously variable +6 d.b. to -13 d.b. at 12,000 c.p.s.

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Continuously variable +13 d.b. to -18 d.b. at 15 c.p.s.

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Referred to maximum output and including integral pre-amp -60 d.b.

HARMONIC DISTORTION
0.19% measured at 6 watts.

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Total 32 d.b. including 24 d.b. in main loop.

Weight 12½ lbs. Power consumption 90 watts. For 200-230-250v. 50 c.p.s. A.C. mains. Outputs for 3- and 15-ohm speakers. Chassis finish stoved Blue-Grey hammer.

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12 GNS.

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L45 MINIATURE 4/5-WATT QUALITY AMPLIFIER
Size only 6 x 5 x 5½ in. high. 12 d.b. Negative Feedback, Sensitivity 30 m.v. for full output, 3 Mullard valves. ECC83 Twin Triode, EL84 Power Output, EZ90 Rectifier. Separate Bass and Treble Controls. Mains switch incorporated in control. For 200-250 v. 50 c.p.s. A.C. Mains. An ideal unit for use with Gram. or 'Mike.' Output matching for 2-3 ohm speakers.
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Battery Operated

- One-valve : 2/6
B.B.C. Special One-
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Mains Operated

- Two-valve : 2/6 each
Consoelectric Two (D,
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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
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- Two-valve : 2/6 each
Ultra-short Battery Two
(SG, det Pen) ... WM402*

- Four-valve : 3/6 each
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beater (HF, Pen, D, RC,
Trans) ... AW436*

- Standard Four-valver
Short-waver (SG, D,
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Mains Operated

- Four-valve : 3/6
Standard Four-valve A.C.
Short-waver (SG, D,
RC, Trans) ... WM391*

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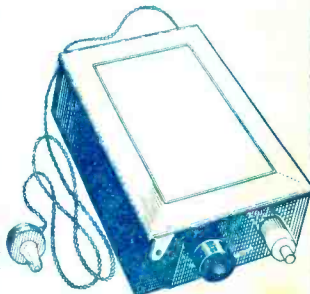
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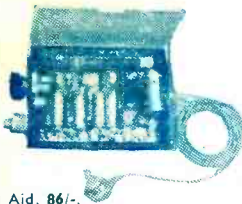
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Two sets for the price of one.

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