

PRACTICAL WIRELESS

AUGUST 1964

2⁷



**TRANSISTOR
TUNER/CONVERTER**

**1,2 or 5 TRANSISTORS
OPTIONAL I.F. STRIP
PLUG-IN COILS**

RETURN-OF-POST SERVICE

ON CASH OR C.O.D. ORDERS

● **SPECIAL OFFER!! STEREO CARTRIDGES**
RONETTE 165 Stereo/Mono Cartridge. Complete with fixing bracket and stylus. List 59/4. **OUR PRICE 23/6.** Post Free

● ILLUSTRATED LISTS

Illustrated lists are available on **LOUDSPEAKERS, TAPE DECKS, TEST GEAR, GRAMOPHONE EQUIPMENT, AMPLIFIERS.** Any will be sent free upon request.

● AMPLIFIER KITS

We have full stocks of all components for the Mullard 510, Mullard 3-3, Mullard 2 and 4 Valve Pre-amp, Mullard Stereo, Mullard Mixer Fully detailed list on any of these sent upon request. Instruction Manual: All Mullard Audio Circuits in "Circuits for Audio Amplifiers", 9/5. Post free

● LATEST TEST METERS

	Cash Price	Hire Purchase Deposit	Mthly/Pmts
AVO Model 8 Mark II	£24. 0.0	£4.10.0	12 of £1.15.2
AVO Model 7 Mark II	£21. 0.0	£4. 4.0	12 of £1.10.10
AVO Multimeter Mark 4	£9.10.0	£1.18.8	12 of 14/4
T.M.K. TP10	£3.19.6	£1. 3.6	3 of £1.2.0
T.M.K. TP25	£5.19.6	£1.15.6	3 of £1.11.4
T.M.K. Model 500	£8.19.6	£1.15.6	12 of 12/3
TAYLOR MODEL 127A	£10.10.0	£2. 3.0	12 of 15/3

Full details of any of the above supplied free on request
 The AVO models 7 and 8 are the **latest models from current production** — not to be confused with Government Surplus

● TAPE RECORDING EQUIPMENT

	Cash Price	Hire Purchase Deposit	Mthly/Pmts
ALL CARRIAGE FREE			
COLLARO ST1110, latest model, Two track, Bradmatic Heads	£10.19.6	£2. 3.6	12 of 16/4
Four Track, Marriott Heads	£17.17.0	£3.12.0	12 of 26/2

MARTIN TAPE AMPLIFIER KITS

Tape Amplifiers
 For Collaro 8311-V 2-Track £11.11.0. 8311-4-V 4-Track £12.12.0.
 Tape Pre-Amplifiers
 For Collaro 8319-CP 2-Track £8.8.0. 8319-4-CP 4-Track £9.9.0.
 Drop through assembly for mounting 8319 Pre-Amp under Collaro Deck. £1.11.6.
 Carrying Cases with speaker. For Collaro Deck and 8311 Amplifier. £5.5.0.
H.P. TERMS available on decks, amp. and cases. Ask for quote.

● GRAMOPHONE EQUIPMENT

	Cash Price	Hire Purchase Deposit	Mthly/Pmts
ALL LATEST MODELS			
ALL POST FREE			
RECORD CHANGERS			
GARRARD AUTOSLIM (Mono PU)	£6.17.6	£1.12.6	6 of £1
GARRARD AUTOSLIM De-luxe AT6 (Mono PU)	£11. 9.0	£2. 6.0	12 of 18/11
GARRARD AUTOSLIM AT6 (Stereo/Mono PU)	£12. 5.4	£2. 9.4	12 of 18/-
B.S.R. UA14 (TC8 Mono PU)	£8.15.0	£1.10.0	6 of £1
B.S.R. UA14 Monarch (TC8 Stereo/LP/78)	£7.15.0	£1.18.0	6 of £1.2.0
B.S.R. UA15 (TC8 Mono PU)	£7.15.0	£1.18.0	6 of £1.2.0
B.S.R. UA15 (TC8 Stereo/LP/78)	£5.15.0	£2. 6.0	6 of £1.4.0

Many of the above can be supplied for stereo working. See our Gramophone Equipment List for details.

● JASON F.M. TUNERS

We stock all parts needed for the construction of these excellent tuners. All parts can be supplied separately but we can offer attractive reductions in price if all items are purchased at same time as follows:

FMT1, £8.12.6; FMT2 (less power), £7.15.0.
 FMT2 (with power), £9.12.6; FMT3 (less power), £9.9.6.
 FMT3 (with power), £11.7.6. Mercury 2, £10.14.6.
 JTV2, £14.12.6.

Hire Purchase Terms available. Ask for list

● HI-FI LOUDSPEAKERS

GOODMANS: Axiote 8in., £5.5.7; Axiom 10in., £6.5.11; 12in. Axiom 20L, £10.17.4; 12in. Axiom 30L, £15.4.6; 12in. Axiom 40L, £20.17.4; 12in. Axiom 60L, £24.7.8; Treble Tweeter, £8.10.2; X-05000 Crossover unit, £2.0.11.
 WHITELEY: HF1016 10in., £7.7.0; HF1012 10in., £4.12.0; HF816 8in., £6.6.0; TS16 8in., £5.19.6; T10 Tweeter, £4.12.0; T10 Tweeter, £1.12.3; CN3000 Crossover unit, £1.13.3; CN1500 Crossover unit, £2.2.0. H.P. Terms available on all speakers

WATTS RADIO (Mail Order) LTD

54 CHURCH STREET, WEYBRIDGE, SURREY
 Telephone Weybridge 47556

Please note: Postal business only from this address.
 Callers welcome by appointment

CLOSED FOR ANNUAL HOLIDAYS: AUGUST 1ST TO 22ND

ADCOLA

PRODUCTS LIMITED
 (Large Trade Mark)

SOLDERING INSTRUMENTS AND EQUIPMENT



DESIGNED FOR
 THE AMATEUR'S
 RADIO STATION

ILLUSTRATED
 List No. 70 $\frac{1}{8}$ " BIT
 IN
 PROTECTIVE
 SHIELD
 List No. 68

for catalogue apply direct to:—

Sales and Service Dept.,

ADCOLA PRODUCTS LTD.,
 ADCOLA HOUSE,
 GAUDEN ROAD, LONDON, S.W.4

Telephones MACaulay 4272 & 3101 Telegrams SOLJOINT LONDON SW4

- all these and hundreds more

Mon—Sat. 9 a.m.
—5.45 p.m.
Wednesday 1 p.m.

Special 24 Hour
Express Mail
Order Service

ACS/PEN 19/6	ECC85 7/6	EY81 8/6	PABC80 13/6	T41 15/6	UM80 10/6	6A8GT 13/6	6L19 15/6	I2Q7GT 6/6
AC2/PEN 19/6	ECC88 12/6	EY83 12/6	PCC84 7/6	TDD4 12/6	URIC 15/6	6AC7 6/6	6N7GT 9/6	I2SA7 8/6
DD 19/6	ECC91 3/6	EY86 7/6	PCC85 9/6	TDD13C	UU6 17/6	6AK5 5/6	6P25 10/6	I2SJ7 8/6
AC/TP 29/6	ECC80 7/6	EY91 3/6	PCC88 12/6	TH41 17/6	UU8 15/6	6AL5 4/6	6P28 12/6	I2SK7 6/6
AC/VPI-57	ECC82 8/6	EZ35 6/6	PCC89 8/6	TY86F 12/6	UU9 7/6	6AM5 5/6	6Q7 9/6	I2SL7 8/6
AZ1 15/6	ECH3 21/6	EZ40 7/6	PCF80 7/6	U10 9/6	UYIN 12/6	6AM6 4/6	6Q7G 6/6	I2SN7 10/6
AZ31 13/6	ECH21 21/6	EZ41 7/6	PCF82 7/6	U12 9/6	UY21 15/6	6AQ5 6/6	6Q7GT 8/6	I2SQ7 12/6
B36 9/6	ECH35 12/6	EZ80 5/6	PCF84 12/6	U14 9/6	UY41 7/6	6AT6 6/6	6SA7 7/6	I4H7 10/6
CIC 10/6	ECH42 9/6	EZ81 5/6	PCF86 12/6	U22 8/6	UY85 6/6	6AU6 9/6	6SC7 8/6	I4R7 21/6
CCH35 20/6	ECH81 7/6	EZ90 4/6	PCL82 7/6	U24 21/6	VP4 15/6	6BBG 2/6	6SF5 10/6	I9AQ5 8/6
CL33 12/6	ECH83 8/6	E1148 2/6	PCL84 7/6	U25 11/6	VP4B 15/6	6BA6 6/6	6SG7 7/6	I9B6G 15/6
CY1 15/6	ECL80 6/6	FC2 15/6	PCL85 7/6	U26 11/6	VR105/30 7/6	6BE6 6/6	6SH7 6/6	I20D1 10/6
CY31 12/6	ECL81 10/6	FC2A 17/6	PCL86 12/6	U31 9/6	VR150/30 7/6	6BG6G 15/6	6S17 5/6	I20F2 17/6
D77 4/6	ECL82 9/6	FC4 15/6	PEN4A 19/6	U37 17/6	W61 11/6	6BJ6 7/6	6SK7 6/6	I20L1 22/6
DAC32 9/6	ECL86 13/6	FW4/500 9/6	PEN4D 22/6	U47 11/6	W76 5/6	6BQ7A 12/6	6SL7GT 5/6	I20P1 15/6
DAF91 5/6	ECL89 10/6	FW4/800 9/6	PEN4VA 17/6	U50 7/6	W77 4/6	6BR7 10/6	6SN7GT 5/6	I20P2 24/6
DAF96 6/6	ECL93 10/6	GZ30 10/6	PEN36C 20/6	U52 4/6	W81 6/6	6BS7 12/6	6SQ7 8/6	I20P3 20/6
DCC90 12/6	ECL96 10/6	GZ32 10/6	PEN45 10/6	U76 6/6	W81M 6/6	6BVW 9/6	6T4 3/6	I20P4 20/6
DF33 9/6	ECL98 10/6	GZ33 13/6	PEN45DD 25/6	U78 4/6	X41 22/6	6C4 3/6	6U5G 7/6	I20P5 20/6
DF91 3/6	ECL99 10/6	GZ34 13/6	PEN46 5/6	U145 10/6	X61M 12/6	6C5GT 8/6	6V6G 4/6	I20P6 20/6
DF92 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P7 20/6
DF96 6/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P8 20/6
DH63 6/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P9 20/6
DH77 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P10 20/6
DK32 11/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P11 20/6
DK91 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P12 20/6
DK92 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P13 20/6
DK96 8/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P14 20/6
DL33 8/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P15 20/6
DL35 10/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P16 20/6
DL91 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P17 20/6
DL92 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P18 20/6
DL93 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P19 20/6
DL94 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P20 20/6
DL96 6/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P21 20/6
EAS0 2/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P22 20/6
EAB8C0 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P23 20/6
EAC91 4/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P24 20/6
EAF42 9/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P25 20/6
EB34 2/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P26 20/6
EB41 6/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P27 20/6
EB91 4/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P28 20/6
EBC3 21/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P29 20/6
EBC33 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P30 20/6
EBC41 8/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P31 20/6
EBF81 10/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P32 20/6
EBF80 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P33 20/6
EBF83 8/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P34 20/6
EBF89 7/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P35 20/6
EBL1 21/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P36 20/6
EBL21 21/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P37 20/6
ECC35 8/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P38 20/6
ECC40 15/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P39 20/6
ECC81 4/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P40 20/6
ECC82 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P41 20/6
ECC83 5/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P42 20/6
ECC84 6/6	ECL99 10/6	GZ34 13/6	PEN46DD 20/6	U145 10/6	X65 12/6	6C6 6/6	6V6GT 8/6	I20P43 20/6

COMPLETE VALVE LIST FREE WITH ORDER

METAL RECTIFIERS

RM1 7/6	14A86	23/6	16RD 2-2-8-1	12/6 (FC142)
RM2 8/6	14A97	26/6	16RE 2-1-8-1	10/6 (FC150)
RM3 10/6	14A100	28/6	16RA 1-1-8-1	5/6 (FC118)
RM4 17/6	14RA1-2-3-2 21/6 (FC301)		16RA 1-1-16-1	7/6 (FC116)
RM5 19/6	14RA 1-2-8-3 25/6 (FC31)		16RD 2-2-8-1	16/6 (FC124)

TERMS OF BUSINESS C.W.O. or C.O.D.
4.2 PACKING CHARGE ON ALL C.O.D.
ORDERS. POSTAGE 6d. per VALVE

BRAND NEW TRANSISTORS

OC35 10/6	OC72 8/6	OC81D 5/6
OC42 6/6	OC74 8/6	OC81M/pr 12/6
OC44 5/6	OC75 8/6	OC82 6/6
OC45 5/6	OC77 8/6	OC82D 6/6
OC71 5/6	OC81 5/6	OC170 6/6

SILICON RECEIVERS

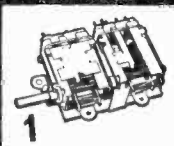
400 volts 350 mA ... 7/6 each

SETS OF VALVES

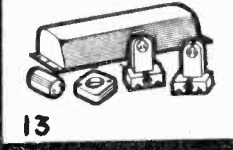
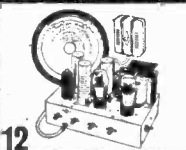
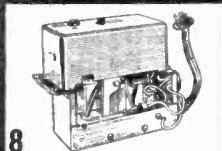
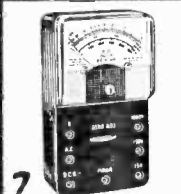
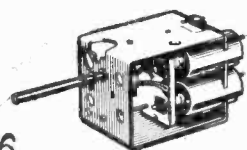
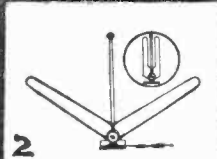
IR5, IS5, IT4, 354, 3V4	...	Set of 4, 17/6
DAF91, DF91, DK91, DL92, DL94	...	Set of 4, 17/6
DAF96, DF96, DK96, DL96	...	Set of 4, 25/6

R.S.T. VALVE MAIL ORDER CO.
211a STREATHAM ROAD MITCHAM SURREY

Tel: MITcham 6202
Open Daily to Callers



Just a few of our BARGAINS



FREE OFFER
ELECTRIC
SOLDERING IRON
with the
POCKET
MULTI METER
See item No. 7
for further details



1. **CYLDON A.M. F.M. PERMEABILITY TUNER FOR ALL TRANSISTOR OPERATION.** Size 2 1/2 x 2 1/2 in. approx. By famous manufacturer. A.M. I.F. 470 Kc/s. F.M.-I.F. 10.7 Mc/s. A.M. coverage from 1920 Kc/s-575 Kc/s. F.M. coverage 108 Mc/s-88 Mc/s. Circuit diagrams 2/6. PRICE with Tuner, 25/-, 1st, 2nd, 3rd A.M. I.F.'s 12/6 set. 1st, 2nd 3rd and 4th F.M. I.F.'s 12/6 set. V.H.F. Osc. choke, 1/-, A.M. I.F. trap, 1/6, A.M. 114 and A.F. 115, 5/- each. All the above are the RF end of an AM/FM receiver car radio, etc. The above six items purchased together, £210.00.

2. **825 INDOOR AERIAL.** Complete with stand, fully extendable coil, also be used for 405, 1TV, BBC and F.M. 19/6, plus 1/- P. & P.

3. **A.C./D.C. POCKET MULTI-METER KIT.** 2in. moving coil meter scale calibrated in A.C./D.C. volts, ohms and milliamperes. Voltage range A.C./D.C. 0-50, 0-100, 0-250, 0-500. Milliamperes 0-10, 0-1000. Ohms ranges 0-1000, 0-100,000, 19/6. P. & P. 2/-. Wiring diagram 1/-, free with parts.

4. **SIGNAL GENERATORS:** Cash £7.5.0 or 30/- deposit and 6 monthly payments of 21/6. P. & P. 1/6. Coverage 100 Kc/s to 100 Mc/s on fundamentals and 100 Mc/s to 300 Mc/s on harmonics. Case 10 x 6 1/2 x 5 1/2 in. Three miniature valves and Metal Rectifier. A.C. mains 200/250v. Internal modulation of 400 c.p.s. to a depth of 30 per cent. Modulated or unmodulated R.F. output continuously variable 100 multivolts. C.W. and mod. switch, variable A.F. output. Magic eye as output indicator. Accuracy 2 per cent.

5. **SIGNAL GENERATORS:** Cash £25.5.0. P. & P. 6/6. Coverage 120 Kc/s to 84 Mc/s. Case 10 x 6 1/2 x 4 1/2 in. Size of scale 6 1/2 x 3 1/2 in. 2 valves and rectifier. A.C. mains 230-250v. Internal modulation of 400 c.p.s. to a depth of 30 per cent. Modulated or unmodulated R.F. output continuously variable 100 multivolts. C.W. and mod. switch variable A.F. output and moving coil output meter. Accuracy ± 2 per cent.

6. **CYLDON PERMEABILITY TUNER** medium and long wave Tuner. Size 3 x 2 x 1 1/2 in. approx. Coverage 150-540 Metres, 1250-2000 metres I.F. 470 Kc/s. Price 19/6. P. & P. 1/6.

7. **POCKET MULTI-METER.** Size 3 1/2 x 2 1/2 x 1 1/2 in. Meter size 2 1/2 x 1 1/2 in. Sensitivity 1,000 O.P.V. on both A.C. and D.C. A.C. and D.C. volts, 0-15, 0-150, 0-1,000. D.C. current 0-150 m.A. Resistance 0-100K Ω. Complete with test leads, battery and full instructions, 35/-, P. & P. 1/6. **FREE GIFT** for limited period only. 30 watt Electric Soldering Iron value 15/- to every purchaser of the Pocket Multi-Meter.

8. **CHANNEL TUNER I.F.** 16-18 Mc/s. Continuously tunable from 174-216 Mc/s. Valves required—PCF80 and PC084 (in series). Cover BBC and ITA ranges. Also Police, Fire and Taxi, etc. Brand new by famous maker, 10/-, P. & P. 3/-.

9. **The MOTORISTS' REV. COUNTER.** Kit of parts comprising 270-degree 3in. moving coil movement. Manufacturer's present price of this movement would be at least £7. Complete with full instructions and circuit diagram. Scale calibrated up to 8000 r.p.m. Can be used with any 4 or 6 cylinder car, 29/6, plus 3/6 P. & P.

10. **D.S.R. MONARCH UA14 WITH PULL-FI HEAD.** 4-speed, plays 10 records, 12in., 10in. or 7in. at 16, 33, 45 or 78 r.p.m. Intermixes 7in., 10in. and 12in. records of the same speed. Has manual play position, colour brand. Dimensions: 12 1/2 x 10 1/2 in. Space required above baseboard 4 1/2 in., below baseboard 2 1/2 in. Fitted with Full-Fi turnover crystal head, £5.10.6, P. & P. 6/6.

11. **50 MICRO-AMP METER** movement by world famous manufacturer. Size 3 x 2 1/2 in., 50/- post free.

12. **3-watt PUSH-PULL 5 VALVE AMPLIFIER** plus METAL RECTIFIER. A.C. mains 200-250 v. Size 10 1/2 x 6 1/2 x 2 1/2 in. 5 valves. For use with all makes and types of pick-up and mike. Negative feed back. Two input, mike and gram, and controls for same. Separate controls for Bass and Treble lift. Response flat from 40 cycles to 15 kc/s. 2 dB down to 20 kc/s. Output 8 watts at 5 per cent total distortion. Note level 40 dB down all hum. Output transformer tapped for 3 and 15 ohms speech coils. For use with Std. or L.P. records, musical instruments such as guitars, etc. Suitable for small halls, £3.19.6. P. & P. 7/-. Crystal mike to suit, 15/-, P. & P. 2/-. 8in. P.M. Speaker to suit, 12/8, P. & P. 2/-.

13. **FLUORESCENT LIGHT KIT.** 40 watt fluorescent lighting kit comprising Siemens Choke, 2 Bi-pin holders, starter holder and starter. 11/6, plus 1/- P. & P.

14. **FIXED FREQUENCY SIGNAL GENERATOR.** Crystal control in metal case, size 10 x 6 x 6 in. Incorporating two FC13 valves, mains transformer, metal rectifier, choke, indicator lamp, crystal and numerous components. Modulated and unmodulated output socket. Originally used for I.T.V. frequencies. Brand new. 20/6 plus 6/- P. & P. A.C. Mains 200-250 volts.

RADIO & T.V. COMPONENTS (ACTON) LTD.

21b High Street, Acton, London, W.3.

All enquiries S.A.E. Goods not despatched outside U.K.

Shop Hours 9 a.m.—6 p.m. Early closing Wednesday.

SPECIAL OFFER! FROM R. & T.V. LTD.

Elegant Seven

COMBINED PORTABLE & CAR RADIO

The Radio with the STAR features
4½" SPEAKER

- ★ 7-transistor superhet. Output 350mW.
- ★ Two-tone grey wooden cabinet, fitted handle with silver coloured fittings. Size 12½ x 8½ x 3½ in.
- ★ Horizontal tuning scale, size 11¼ x 2½ in. in silver with black lettering.
- ★ All stations clearly marked.
- ★ Ferrite-rod internal aerial.
- ★ I.F. 470 Kc/s.
- ★ Operated from PP9 battery.
- ★ Full comprehensive instructions and point-to-point wiring diagrams.
- ★ Printed circuit board, back printed with all component values.
- ★ Fully tunable over medium and long waveband.
- ★ Car aerial socket.
- ★ Full after-sale service.



ONLY
£4.19.6

Plus 5/6 P. & P. Parts list & circuit diagram 2/6. FREE with parts.
Goods not despatched outside U.K.

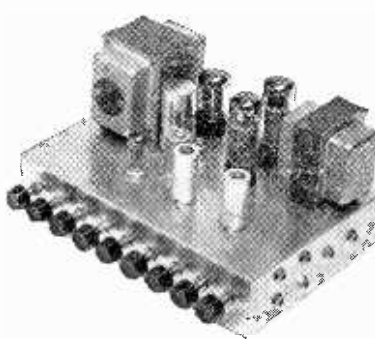
All enquiries S.A.E. Terms C.W.O.

RADIO & TV COMPONENTS (ACTON) LTD 21C High St., Acton, London W3

Open 9 a.m.-6 p.m. including Sats. Early closing Wed.

GUITAR AMPLIFIERS WITH TREMOLO HIGH FIDELITY UNITS WITH ULTRA LINEAR PUSH PULL OUTPUT

We believe these amplifiers to be the most comprehensive to be offered at such reasonable prices.



Five Jack socket inputs, four with separate mixing volume controls, and one input "straight through". All inputs are of very high sensitivity, only 10 millivolts input is required for full output. m a k i n g them suitable for all types of guitars and microphones. Separate Bass and Treble

controls, giving a wide range of lift and cut. Separate master gain control. Tremolo speed and depth controls. Jack socket for remote tremolo switching. Outputs for 3 and 15 ohms speakers. Valves used in the 30 watt amplifier ECC83, ECC83, EL34, EL34, GZ34. In the 15 watt amplifier ECC83, ECC83, EL84, EL84, E281. An extra valve ECC83 is used in the tremolo circuit. Supplied as a kit or factory built. The kit includes full step by step instructions and all parts, with fully punched chassis. The chassis is complete with baseplate and is solidly made of 18 gauge steel, finished silver grey hammer. Size 12 x 8 x 6½ inches high.

PRICES—
30 watt with tremolo. Kit £12.10.0. Factory built £15.10.0.
30 watt, less tremolo. Kit £11.10.0. Factory built £14.10.0.
15 watt with tremolo. Kit £9.10.0. Factory built £12.10.0.
15 watt less tremolo. Kit £8.10.0. Factory built £11.10.0.
Add carriage 10/- any amplifier. Send for free descriptive leaflet.
STROUD AUDIO, Paganhill Lane, Stroud, Glos. Stroud 783

BARGAINS FROM BROADWAY ELECTRONICS

12in. ALTHAM SPEAKER with built-in tweeter. 3 ohm or 15 ohm, 7,000 Gauss Magnet. Only 29/6, postage 3/6.

THE FAMOUS BM3 XTAL MICROPHONE with neck lanyard. 32/6; cable stand 9/6 extra. Xtal insert 7/3.

GUITAR PICK-UP complete with clip and screened lead, 15/-.
3-WAY PUSH-BUTTON UNITS, each button operates a 4-pole, 2-way switch, 4/6.

BARGAINS IN TRANSISTORS. Mullard complete RF Packs OC44, two OC45, 12/6; AF packs OC81d, two OC81, 12/6; OC44, 3/6; OC45, 3/6; OC71, 2/6; OC72, 3/6; OA81 diode, 2/3; AF114, 6/6; AF115, 6/6; ORP12 Light Cell, 7/6; OC29, 12/6.

TRANSISTOR ELECTROLYTICS. 1µF, 2µF, 4µF, 5µF, 8µF, 10µF, 16µF, 32µF, 50µF, 100µF, all at 15V, 1/3 each.

McMICHAEL TELESCOPIC TV AERIAL. 23in. extends to 45in. Fitted with Co-ax Plug, will suit any set, Only 7/6.

CARTRIDGES. Will fit most pick-ups, Acos GP67 2G, medium output. 15/-; GP 59-5 high output, 15/-. BSR Stereo, £1.

EARPIECES. With cord and 3-5 mil plug, 8 ohm magnetic, 3/-; 250 ohm, 4/-; Xtal, 4/-; 180 magnetic with clip, 6/6; 3-5 mil plugs with nice long shank, 3/-; screened, 4/-.

ATTRACTIVE TWO-TONED CABINET, 11 x 6 x 5, room for small amplifier, fitted with ex TV Sin. speaker. Only 19/6, post 2/6.

TOGGLE SWITCHES. Single pole with on-off plate, 2/6, with screw terminals, 2/9.

TERMS: C.W.O. OR C.O.D.

BROADWAY ELECTRONICS
92 MITCHAM ROAD, TOOTING, S.W.17

Phone: BA Lham [3984]

(four minutes from Tooting Broadway Underground Station)

TECHNICAL TRAINING in radio television and electronics

Whether you plan to have your own business, to become an electronics engineer, to take up a career in industry, or to brush-up your knowledge and study new developments, transistors, etc., an ICS Course will help you to success. You learn at home in your own time, under expert tuition. Moderate fees include all books.

EXAMINATION COURSES FOR:—

**C. & G. Radio
and
TV Servicing Certificate**
(R.T.E.B.)

**C. & G. Radio
Amateurs' Exam.**
(Amateurs' Transmitting
Licence)
**P.M.G. Certificates in
Radiotelegraphy**

**Institution of Electronic and Radio Engineers,
C. & G. Telecom. Technician's Cert.
Gen. Cert. of Education, etc.**

New practical radio construction courses

Learn as you build the ICS way. Learn the theory of radio and electronics. Build a 5-valve, 2-waveband receiver, a transistor portable and an A.F. amplifier. Build a signal generator and a multimeter as well, if you wish—two essential pieces of equipment for those engaged in servicing work. Three courses to choose from.

Post this Coupon TODAY! for FREE book on

careers in Radio, and full details of other ICS Courses
Member of the Association of British Correspondence Colleges

INTERNATIONAL CORRESPONDENCE SCHOOLS

(Dept. 171), Intertext House, Parkgate Road,
London, S.W.11

Please send book on.....

Name Age

(Block Letters please)

Address

Occupation.....8.64

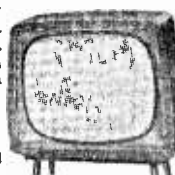
INTERNATIONAL CORRESPONDENCE SCHOOLS

EX-RENTAL T.V. SETS

Send for list of
our range of other
models. Demon-
strations daily in
our shop, from a
large selection.

12 months written
guarantee.

Channels for all
areas.



17in.
£11.10.0
14in.
£7.10.0

Carr. 14in. 20/-
17in. 30/-
Personal Col-
lection Advised

AERIALS. BBC/ITA combined Loft and room aerials—From 25/-. BB2/
UHF and colour aerials—From 37/-. SEND FOR FREE LIST.

REGUNNED TUBES



Guaranteed 1
Year. Ins. and
Carr. 10/6. Add
10/- refundable
on OLD TUBE
(110° Tubes in
stock.)

21 in. 99/6
17 in. 79/6
15, 14,
12 in. 59/6

EX-MAINTENANCE TESTED TUBES

17in. — 35/-. 14in. — 15/-.
Carriage 5/- Satisfaction Guaranteed.

TELEPHONE HANDSET

15/6 pr.
G.P.O. pat-
tern House
to Work-
shop, garage, inter-
office, etc. Works off
any small battery.
P. & P. 4/6.

VALVES. 9d. each. 1,000's available. Send for
List.
CONDENSERS. 100—10/-. New. Assorted
electrolytic and p.f.s. P. & P. 2/6.
VICONTROLS. 20—10/-. A selection of types
and sizes. P. & P. 2/6.
SPEAKERS. 7/6. 6in. 8in. 7 x 4in. and 8 x 3in.
Ex. infd. Salvage. P. & P. 2/3.
NEONS. 1/- per dozen. (S.B.C.D.P. fittings)
Main tester and visual reminders. P. & P. 1/-

Phone
ILford
6001/2/3

DUKE & CO. (LONDON) LTD.

621/3 Romford Road, Manor Park, E.12
Liverpool St.—Manor Pk.—10 mins.

Stamp
For Free
List

VALVES SAME DAY SERVICE

NEW! TESTED! GUARANTEED!

SETS 1R5, 1R5, 1T4, 3R4, 3V4, DAF91, DF91, DK91, DL92, DL94: Set
of 4 for 15/-. DAF96, DF96, DK96, DL96: 4 for 23/6.

1A7GT	7/6	6V6GT	3/9	10X90	6/9	EC180	6/8	PC825	6/9	U191	8/6
1155	6/6	6V6GT	6/6	DF93	8/-	ECL82	7/-	PC881	5/-	U281	8/6
1155GT	8/8	6X4	3/9	DF91	2/6	EC186	9/-	PC886	8/-	U282	11/9
1N5GT	8/6	6X5GT	5/6	DF96	6/-	EC339	3/6	PC889	9/-	U291	9/-
1155	4/8	7B7	8/-	DL17	3/6	EF41	6/6	PC182	6/6	U301	15/9
1R5	3/6	7C5	7/9	DL177	3/6	EF42	4/6	PC183	9/-	U4020	5/9
1T4	2/6	7C6	7/6	DK32	8/-	EF89	4/6	PC184	7/6	U4BC80	5/9
1155	5/-	7H7	5/9	DK91	4/9	EF85	5/-	PC185	8/6	U4F42	8/-
3A5	6/9	7A7	12/9	DK92	6/9	EF86	6/6	PC186	9/-	U4F41	6/6
3Q4	4/10	7Y4	5/-	DK96	6/6	EF89	4/6	PC187	9/-	U4C81	7/3
3R4	4/9	1002	12/3	DL33	7/3	EF91	2/9	PEN44	6/6	U4F80	5/-
3V4	5/6	12AT6	4/3	DL35	6/9	EF92	2/6	PEN44/178	6/6	U4F89	6/9
5U4G	4/6	12AT7	3/9	DL82	9/-	EL38	12/6	PEN383	9/6	U4C92	5/9
5Y3GT	5/-	12AU7	4/9	DL92	4/9	EL41	7/6	PL86	8/9	U4C84	8/-
5Z4G	7/-	2A4X7	4/9	DL94	5/9	EL44	4/6	PL81	7/-	U4C85	6/9
6AL5	2/-	12K7GT	4/3	DL96	6/-	EM34	7/11	PL82	5/6	U4C86	9/6
6AQ5	6/-	12K8GT	8/9	EABCO8	5/3	EM40	6/9	PL83	5/-	U4C87	7/6
6AT6	3/6	12Q7GT	4/3	EAF42	8/-	EM41	7/9	PL84	5/9	U4C88	7/6
6BA6	6/-	19B6GT	8/9	EB41	4/-	EM44	7/6	PL85	9/-	U4C89	8/6
6BQ6	6/8	20P4	12/6	EB91	3/-	EM87	8/-	PC25	7/9	U4C92	7/6
6BQ6G	12/6	20P5	14/9	EB353	5/-	EY51	6/-	PY31	5/9	U4C93	8/6
6BH6	5/-	25L6GT	4/9	EB41	7/3	EY84	7/-	PY32	9/-	U4C94	4/9
6BL6	5/6	25U4GT	10/6	EB81	6/9	EY86	6/6	PY33	8/-	U4C95	6/3
6F1	5/6	30L15	8/6	EBF80	6/-	EZ40	5/9	PY80	5/3	U4C96	8/6
6F13	4/-	30L17	8/-	EBF83	6/9	EZ41	7/6	PY81	5/9	U4L1	7/-
6F14	9/-	30PL13	9/-	EBF89	6/-	EZ80	4/-	PY82	4/9	U4L4	15/-
6F16	6/6	30PL14	12/3	EBL21	8/3	EZ81	4/6	PY83	5/9	U4L6	8/6
6K7G	1/6	35A5	14/-	EC40	7/6	KT32	6/-	PY88	7/9	U4L7	6/6
6K7GT	4/-	35L6GT	6/3	EC81	3/9	KT36	12/3	R17	15/-	U4L8	10/6
6K9G	4/3	35T4GT	4/11	EC82	4/9	KT61	4/9	TDD4	7/9	U4L9	7/6
6K8GT	7/9	53K1	8/6	EC83	7/-	MU14	5/-	TH21C	9/6	U4Y21	7/9
6L6G	5/9	AZ31	6/6	EC84	8/3	MX40	8/6	TH233	5/9	U4Y41	4/9
6L18	7/6	B36	4/6	EC85	6/3	N18	4/10	U22	5/9	U4Y55	5/-
6P28	9/6	CCX35	12/3	ECF80	6/3	PC95	9/-	U25	8/6	VP41	4/9
6Q7G	4/9	CL33	9/6	ECF82	6/3	PC97	7/6	U26	10/-	W78	8/6
6Q7GT	7/9	CY1	12/6	ECF86	10/9	PC84	5/6	U47	8/6	W77	2/6
6R7GT	9/6	DAC32	8/3	ECH35	6/9	PC85	6/9	U50	5/6	W729	18/6
6SL7GT	5/6	DAF91	3/9	ECH42	8/3	PC89	8/-	U52	4/6	X81M	19/6
6SL7GT	8/9	DAF96	6/-	ECH81	6/-	PCF90	8/-	U78	3/9	X109	17/6

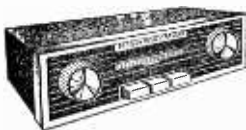
Readers Radio

24 COLBERG PLACE, STAMFORD HILL, LONDON N.16
STA. 4537

Post 6d. per valve extra. Any Parcel Insured against Damage in Transit 6d. extra
Any C.O.D. Parcel 4/3 extra.

STERN-CLYNE

Electronics Centres throughout Great Britain



THE 'HIGHWAYMAN' OUR QUALITY CAR RADIO TO BUILD YOURSELF AT A NEW LOW PRICE

Look at these features:

★ Attractive styling. ★ Push-pull output. ★ Three latest

Mullard transistors plus valves types EBF33 and ECH83. ★ No Buzz, high output and sensitivity. ★ Printed circuit (latest type). 7 x 4 in. high flux p.m. speaker and baffle. ★ Medium and Long Waves. ★ Push button for fingertip control. ★ Extremely low battery consumption (less than 1-amp). ★ Easy to fit any make car (Positive earth only). ★ 12-volt operation. ★ Compact size, measures only 7 x 7 x 2 in. deep. ★ Easy assembly, supplied with dial and drive already mounted.

£7.19.6 Plus 5/- P. & P.

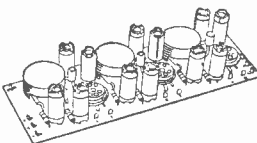
Special inclusive price of ONLY

All parts available separately. Individually priced parts list and comprehensive instruction booklet 2/6 post free. (Deducted from cost if complete parcel purchased later).

Optional extras. 3 section chromium plated weatherproof telescopic aerial type 1 1/4" x 19/16; type 2, 2 1/4" x 29/16, both plus P. & P. 2/6 if purchased separately.

MARTIN Fully Transistorised AUDIOKITS

These ingeniously designed sub-assembled kits enable you to build a transistorised Hi-Fi system by simply linking together your choice of units. No technical knowledge or special tools are needed to build with complete success. All units are supplied on printed circuit boards ready to mount and connect. Latest type transistors used in conjunction with the specially developed circuits give you superb reproduction or battery operation or can be used on A.C. mains with Martin power supply unit.



Following Audiokits available:—

Unit 1.—5 Stage Matching Input Selector Unit. 47/6.

Unit 2.—Pre-Amplifier with Master Volume Control. 37/6.

Unit 3.—3-Channel Mixer. 79/6. (Plug-in matching adaptors for above, 8/6 each.)

Unit 4.—Combined Pre-Amplifier and Tone Control Unit. 62/6.

Unit 5.—10 watt Main Amp (3 ohm o/p imp. only at present). 25.12.6.

Unit 6.—Power Supply Unit. 22.12.6.

P. & P. extra on above items. Full range of attractive Perspex escutcheons available. Send S.A.E. for fully descriptive literature.

THE WORLD AT YOUR FINGERTIPS!!

THE HE-30 4-BAND COMMUNICATION RECEIVER



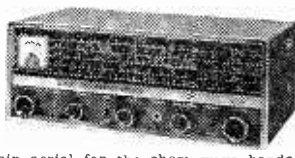
One of the finest general coverage bandspread Receivers available at this price. Covering 550Kc/s—1800Kc/s. 4.8Mc/s—14.5Mc/s. 1.6Mc/s—4.8Mc/s. 10.5Mc/s—30Mc/s. Illuminated slide rule dial, calibrated every 5Kc/s on 80 and 40 metres. Edgewise S-meter. 0-100 logging scale, coverage from 0.55—30Mc/s. 8 valve plus Rectifier superhet circuits. RF stage with B.F.O. control Q-multiplier.

an Aerial Trimmer. 2 IF Stages. Controls: Function Switch, Audio Gain, Selectivity (Q-multiplier) Frequency (BFO), Band Selector, IF Gain, Trimmer, AVC-MVC Switch, Ant Switch, Main Tuning, Bandspeed Tuning and Headphone Jack. Selectivity—80dB at 10Kc/s. 0.8Kc/s at 6dB (with Q-multiplier) IF-455Kc/s. External PM Speaker reqd., 4 or 8 ohms impedance. Output 1.5 watts. 8 modern Miniature B7G Base Valves and 5Y3 Rectifier. Size 15 x 10 x 7 1/2 in. Grey crackle finish. 220/240 volt A.C. mains. 50-60 cycle operation. Full instructions and circuit diagram supplied. Send S.A.E. for leaflet.

PRICE **40 Gns.** Carriage Paid

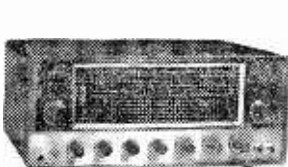
THE HE-40 4-BAND COMMUNICATION RECEIVER

Completely built and ready to go. High sensitivity Superhet receiver covering 550Kc/s—1,600 Kc/s. 1.6 Mc/s—4.4 Mc/s. 4.3 Mc/s—11 Mc/s 11 Mc/s—30 Mc/s. Electrical Bandspeed tuning. Slide rule type tuning dial. Internal ferrite rod aerial for medium waveband reception and 1 5/8 in. 10 section chromium plated telescopic whip aerial for the short wave bands. Sockets for optional outdoor aerial, internal high flux monitor loudspeaker. Latest modern miniature B7G base valves. Headphone socket (may also be used for external loudspeaker). ANL, BFO, built-in "S" meter. 220/240 volt A.C. mains. 50-60 cycle operation. Handsome styled cabinet with grey crackle finish and handsome front panel, with chrome and satin chrome fittings. Measures 13 1/2 in. x 8 1/2 in. x 5 1/2 in. (high) and weighs only 11 1/2 lbs. A comprehensive instruction manual is supplied. An ideal receiver for the radio amateur and short wave listeners of all ages. Send S.A.E. for leaflet.



PRICE **£24.15.0** Carriage Paid

THE NEW HE-80 COMMUNICATION RECEIVER

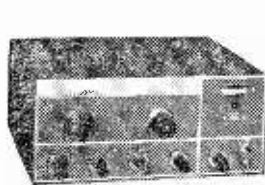


The HE-80 has outstanding sensitivity 0-100 logging scale for instant re-set, built-in "S" meter special recording Jack, remote Control Socket allowing simultaneous control with transmitter. 100Kc crystal oscillator circuit providing accurate harmonic signals of either 4 or 8 ohms impedance. Two headphone sockets, one high, one low.

TECHNICAL SPECIFICATIONS. Frequency Coverage: Band 1 540—1605Kc; Band 2 1.6—4.8Kc; Band 3 4.8—14.5Mc; Band 4 10.5—30Mc; Band 5 14.4—146Mc/s. Band Spread (Ham Band directly read): 80 Metre Band; 40 Metre Band; 20 Metre Band; 15 Metre Band; 10 Metre Band. Sensitivity: 1 micro-volt for 10dB signal to noise ratio. Selectivity: Normal 10Kc at —75dB. 1.25 at —6dB. With Q-multi: variable to 700 c.p.s. at 6dB. Operation: AM, SSB, CW and FM. AM diode detector. SSB/CW product detector (BFO). FM gated beam detector. Power Source: 240 volts 50/60 Cycles A.C. Power consumption: 60 watts. Audio Output: 1.5 watts, 8 or 500 ohms impedance. Auxiliary Circuit: Electrical Bandspeed. Q-Multiplier. ANL. AVC-MVC. BFO. 100Kc crystal calibrator. Valve Line-up: 4—6A08, 6BL8, 3—6BA6, 2—6BE6, 6AL5, 6AQ5, 0A2, 6CA4. Dimensions: 17in. wide, 6 1/2 in. high, 10in. deep.

PRICE **59 Gns.** Carriage Paid

"STARFLITE TRANSMITTER"



Designed to meet the needs of most amateurs the Starflite has single-knob band-switching. Front panel switch to select any of five crystal positions with provision for an external VFO. Controlled carrier modulator permits almost 100% of the CW input to be used on AM peaks. Grid-block keying provides chirp-free operation. A full wave silicon diode power supply effects extremely low output ripple for cleaner CW transmission. electron-coupled Pierce Oscillator, capacitance bridge neutralization of the final and a three-stage lowpass filter. An illuminated edgewise D'Arsonval panel meter. Pi-network output provides the correct impedance match between the plate circuit and any 50-72 ohm co-axial feeder. Easy to follow point-to-point instructions supplied with each set of components. When constructed the Unit is housed in a heavy gauge steel Cabinet finished in grey crackle.

SPECIFICATIONS: Power Input—20 watts Peak; Operation: C.W., AM Phone—crystals or VFO Control; Band coverage: 80-10 metres; Coupling: Pi-network; Valve Line-up: 6246, (2) 6CL6, 12AX7, 6DE7, Low Pass Filter. Size 13 1/2 in. wide x 12 in. deep (inc. knobs) x 6 1/2 in. high (inc. rubber feet). Weight 28 lbs. Power Requirements, 220/240 v. 50-60 CPS. 225 watts.

MAY BE BUILT FOR **35 Gns.** Carriage & Insurance 15/-

SEE FOLLOWING PAGES FOR ADDRESSES AND OTHER ITEMS

STERN-CLYNE

Electronics Centres throughout Great Britain

MULLARD 2-VALVE PRE-AMPLIFIER TONE CONTROL UNIT

Employing two EF88 valves and designed to operate with the Mullard AMPLIFIERS but also perfectly suitable for other makes with input up to 250 mV.

★ Equalisation for the latest R.I.A.A. characteristics. ★ Inputs for Crystal Pickups and variable reluctance magnetic types. ★ Input (a) Direct from High Imp. Tape Head, (b) From a Tape Amplifier or Pre-Amplifier. ★ Sensitive Microphone Channel. ★ Wide range BASS and TREBLE Controls.

KIT OF PARTS **£6.6.0** ASSEMBLED **£9.10.0** (Carr. & Ins. 5/-). AND TESTED
Instruction book and detailed price list (free with kits) available separately at 2/- Post Free.



MULLARD 3-VALVE PRE-AMPLIFIER TONE CONTROL UNIT

Designed mainly for Mullard Range of Amplifiers, also suitable for any Amplifiers requiring input up to 250mV. Incorporates 5 input Channels, including for Tape and Magnetic Pickups. Separate Bass and Treble controls. High pass filter 20 to 180 c/s. low pass filter 50 Kc/s. Totally enclosed in case. Size 11 1/2 x 4 1/2 x 4 1/2.

KIT OF PARTS **£10.0.0** (Carr. & Ins. 5/-). ASSEMBLED **£13.13.0** AND TESTED
Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.



MULLARD "5-10" MAIN AMPLIFIER

For use with MULLARD 2 or 3 valve pre-amplifiers with which an undistorted power output of up to 10 watts is obtained. SPECIFIED COMPONENTS and MULLARD VALVES including PARTRIDGE MAINS TRANSFORMER and choice of PARMEKO or PARTRIDGE Output Transformer. COMPLETE KIT (Parmeko Output Trans.) **£10.0.0** AND TESTED **£13.13.0**

(Carr. & Ins. 6/6). ABOVE incorporating PARTRIDGE OUTPUT TRANS. £1.6.0 extra. Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.



COMBINED PRICE REDUCTION

MULLARD 5-10 Main amplifier and 2 valve Pre-Amp. Kit **£15.15.0**. C. & I. 8/6. Built and tested. **£21.10.0**. C. & I. 10/-.
MULLARD 5-10 Main Amplifier and 3 valve Pre-Amp. Kit **£19.10.0**. C. & I. 8/6. Built and tested. **£25.10.0**. C. & I. 10/- With Partridge Transformer **£1.6.0** extra.

THE MULLARD 5-10RC AMPLIFIER

The popular complete "5-10" incorporating Passive Control Unit providing up to 10 watts high quality reproduction with input of 500mV. Specified components and new MULLARD VALVES. Includes PARTRIDGE MAINS TRANSFORMERS and choice of PARMEKO or PARTRIDGE Output Transformers. Surplus power available for Tuner

COMPLETE KIT **£12.0.0** ASSEMBLED **£16.0.0** (Carr. & Ins. 7/6). AND TESTED

Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.



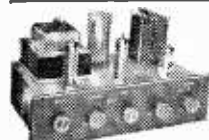
THE MULLARD 3-3RC

A HIGH QUALITY AMPLIFIER DEVELOPED FROM THE VERY POPULAR 3-WATT MULLARD "3-3" DESIGN.

KIT OF PARTS **£8.8.0**

ASSEMBLED **£11.10.0** (Carr. & Ins. 6/6). AND TESTED

Complete to the MULLARD specification including PARMEKO OUTPUT TRANSFORMER. Switched inputs for 78 and



L.P. records plus a Radio position. Extra power to drive a Radio Tuning Unit is also available. Please state L.S. Impedance. Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.

TAPE PRE-AMPLIFIER MULLARD Type "C"

Suitable for most 1 track, Mono Tape Decks. Incorporates Ferro-cube Push-Pull Oscillator, Treble Inductor and 3-sp. Equalisation. Includes separate Power Unit.

KIT OF PARTS **£14.0.0** (Carr. & Ins. 7/6). ASSEMBLED **£19.10.0**
Instruction book and detailed price list (free with kit) available separately at 3/6 Post Free.



THE "MONO-GRAM"

A small Amplifier of genuine high quality performance. Incorporates MULLARD ECL86 Valve, separate BASS and TREBLE controls. PARTRIDGE output Transformer producing up to 3 watts undistorted output. (Carr. & Ins. 3/6).

KIT OF PARTS **£4.10.0** (Carr. & Ins. 3/6). ASSEMBLED **£6.0.0**
Instruction book and detailed price list (free with kit) available separately at 2/6 Post Free.



Perfectly suited for Portable Installations for which purpose we offer PORTABLE CASE (£3.10.0), the AMPLIFIER (KIT £4.10.0) and 8" x 5" SPEAKER (£1.0.0). All for.. **£9.0.0**

Alternatively with ASSEMBLED AMPLIFIER **£10.0.0** (Carr. & Ins. 5/-).

The Case quoted above will accommodate some 4-speed Single Record Units. A larger model is available for extra 10/-. With this Equipment a COMPLETE PORTABLE RECORD PLAYER can be built for **£14.0.0**



MODEL CR3/S TAPE RECORDER

MODEL CR3/S incorporates the HF/TR3 Mk. II Tape Amplifier (described below) and the Collaro "Studio" Twin-Track 3-speed Deck operating at 1 1/2 in., 3 in., and 7 1/2 in. speeds. Complete with microphones and 1,200ft. tape.

KIT OF PARTS **£33.8.0** ASSEMBLED **£43.0.0** (Carr. & Ins. 15/- extra).

STEREO TAPE PRE-AMPLIFIER

MODEL STP-1. For use with current TRUVOX, BRENNEL or COLLARO "STUDIO" 1 and 1 track Stereo Decks. Incorporates Ferro-cube Oscillator, 4-speed Equalisation Signal Lever Meter and separate Gain Control. Includes separate Power Unit. KIT OF PARTS **£22.0.0** (Carr. & Ins. 8/6). ASSEMBLED **£28.0.0**

Instruction book and detailed price list (free with kit) available separately at 5/- Post Free.



MULLARD TAPE AMPLIFIER

MODEL HFT/3/MK. II Based on Mullard's Type "A" design and suitable for most 1 track Mono Tape Decks. Incorporates Ferro-cube Treble inductor, Gilson Output Transformer, and 3-speed Equalisation. Includes separate Power Unit, using PARTRIDGE Mains Transformer.

KIT OF PARTS **£13.13.0** (Carr. & Ins. 7/6). ASSEMBLED **£19.0.0**
Instruction book and detailed price list (free with kit) available separately at 3/- Post Free.



COMBINATION TAPE UNITS

All our Tape Units can be supplied specially matched to any Tape Deck such as Collaro, Brennel Mk.5 Series II, also the Warrick. Specimen prices as below

	Kit	Assembled
STP-1 Pre-amp with Collaro Studio Tape Deck.....	£36. 0.0	£42. 0.0
Assembled with track switch fitted. £44.2.0.		
STP-1 with Brennel Mk. 5 Series II with Track Switch fitted.....	£88. 4.0	£74.15.0
STP-1 with Brennel Mk.5 Series II, 1 Track Deck	£24.10.0	£80. 0.0
Type "C" Pre-amp with Collaro Studio Tape Deck	£22.2.0	
Type "C" Pre-amp with Brennel Mk.5 Series II Deck..	£46.11.0	£58. 1.0
Assembled with deck wired and matched. £55.8.0.		
HF/TR3 with Collaro Studio Tape Deck.....	£24. 3.0	£29.10.0
Assembled with deck wired and matched. £31.12.0.		
HF/TR3 with Brennel Mk.5 Series II Deck.....	£46. 4.0	£51.11.0
Assembled with deck wired and matched. £53.13.0.		
Carr. & Ins. 15/- on above units. Send S.A.E. for comprehensive price list.		

SEE PRECEDING PAGE FOR OTHER STERN-CLYNE PRODUCTS

SEND FOR CURRENT PRICE LIST OF ALL LEADING RECORDING TAPES AND ACCESSORIES

STERN-CLYNE

Electronics Centres throughout Great Britain

THE TUDOR STEREO HI-FI SYSTEM



FOR ONLY
48gns.
Plus 15/-
Pkg. & Carr.

Comprising a Self Powered AM/FM Tuner, Stereo Pre-amplifier, 12 watt per channel Stereo Power Amplifier. The Tuner and Pre-amplifier are housed in matching black crackle finish metal cabinets for shelf mounting, with silver metal dials and matching knobs. Specifications: **Tuner:** Outstanding quality providing full VHF/FM long and medium waveband coverage, frequency range FM 87.5-108.5 Mc/s, AM/MW 522-1630 Kc/s, LW 145-270 Kc/s, 100mV output mains supply 105/240 A.C. Valve line-up: ECC35, ECH81, EBF89, EB91, EM84, ECC33. Multiplex outlet provided. **Pre-amplifier:** Designed for use with Tudor Stereo Power Amplifier with inputs for most types of Pickups, direct play from Tape-Heads and ample sensitivity for either Crystal or Moving Coil Microphone. Distortion 0.1%, tape outputs 100mV from 90K ohm source inputs—Microphone 5 mV, Tape 5.3 mV, R.I.A.A. 4.3 mV flat 250 mV Tuner 100 mV. Valve line-up: 2—EF86, 4—ECC83, 14 watts per channel, sensitivity 1 volt r.m.s. for 14 watts output, frequency response -0.5dB 20 r/s. -20Kc/s, Speaker impedance 4, 8, or 16 ohms, surplus power available for Tape Pre-Amp, mains supply 105/240 v. A.C. Valve line-up: 2—ECC83, 4—EL84, 1—GZ34.

DUE TO PRODUCTION STREAMLINING WE ARE PLEASED TO ANNOUNCE REDUCTIONS IN PRICE!

★ J.L.10 POWER AMPLIFIER



Incorporates the latest triode-pentode ECC86 valves in push-pull. PARTRIDGE ultra linear output transformer, PARTRIDGE mains transformer and smoothing choke, 10 watts power output, surplus power available for tuner, Output impedance 3-7.5-15 ohms.

KIT OF PARTS **£10.00** C. & L. 7/-

READY BUILT **£13.13.0**

★ DOUBLE FEATURE PRE-AMPLIFIER



Inputs for microphone, crystal or magnetic pickups, tuner unit, and in addition offers full facilities for tape recording and high fidelity reproduction. This unique feature means that should you wish to include tape in your hi-fi system at a later date all that is required is a suitable tape deck. Push-button switching for 4 tape speeds—equalised. Tape ease Bias Oscillator circuit incorporating hexa-cube transformer. Function switch, separate base, treble and volume controls, level control and latest EM87 magic eye level indicator. The pre-amplifier is totally enclosed in a silver hammer finish steel case, and an attractive perspex front panel completes the presentation.

KIT OF PARTS **£13.13.0** READY BUILT **£19.19.0** C. & L. 5/-

PRICES: If both above units are purchased together:

KIT OF PARTS **£23.13.0** READY BUILT **£32.0.0** C. & L. 10/-

ACOS MONAURAL STETHOSCOPE HEADSETS

Suitable for Tape Recorders, or monitoring tape recorders, 100 ohm impedance magnetic. Complete with lead. (Originally 21/-). OUR PRICE **12/6** P. & P. 1/6

SEND STAMP FOR COPY OF OUR INTERESTING LITTLE BOOKLET "What is High Fidelity?"

CHASSIS BARGAIN



A 6 valve Superhet Radiogram Chassis of outstanding quality covering MW 200/550 Metres, LW 1200-2000 Metres, VHF 87-100Mc/s.

Incorporating internal Ferrite Rod Aerial and the famous Gorler Tuning Heart for VHF. Pick-up input suitable for most modern Record Players. Power output 4 watts, valve line up EL80, EABC80, EF86, ECH81, EL84, ECC85, Volume On/Off and Tone Control, attractive black Tuning Dial size 15" x 6" with gold lettering and contrasting cream and gold knobs, A.C. 200/250 v. Size 15 x 7 1/2 x 6 1/2". P. & P. 5/-

PRICE **16 Gns.** Or £3.9.0 deposit (plus P. & P.) and 9 monthly payments of 32/8.

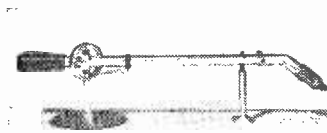
HI-FI STEREO HEADPHONES

For the connoisseur who requires perfection. Each Earphone consists of a 21" Dynamic Loudspeaker with a full frequency range, fitted with foam rubber Ear Pads for added comfort to keep out noise and to maintain an excellent bass response. The resistance junction box with change-over switch provides simple transfer from Phones to Speaker. Specifications: Frequency Range-25-15,000 c.p.s. Input Impedance—16 ohms. Power rating—1 watt. Weight—18 ozs.

PRICE **5 Gns.** P. & P. 2/6. (Junction box 15/- ex.)



OUTSTANDING PRICE REDUCTION



THE B. & O. STM PICKUP COMPLETE WITH SP 11 STEREO DYNE MAGNETIC CARTRIDGE

A Transcription Pickup of outstanding quality employing a specially designed counter-balanced and unique weight adjustment. Specifications: Length 107mm, front tip of Cartridge, Height 24mm, Stereo/Mono Cartridge. Frequency Response: +2.5dB from 30 c.p.s. to 15 K.C. Output Voltage: 7mV per channel at 5 cm/sec. at 1000 cps. Separation: 20dB minimum. DC Resistance: 120 ohms. Inductance: 200mH. Recommended Tracking Force: 2 to 4 grams. Compliance: 5 x 10⁻⁶ cm/dyne in all directions. Stylus: Diamond, radius of curvature 7th Recommended Load: 47000 ohms.

PRICE **9 1/2 Gns.** Plus 3/6 P. & P.

NEWS FLASH !!

YET ANOTHER NEW ELECTRONICS CENTRE

OPENING SHORTLY AT
52, LORD STREET, LIVERPOOL

WEST END:	18 Tottenham Court Road, W.1.	MUSEum 5929/0095	Half-day Sat
(Premier Radio)	23 Tottenham Court Road, W.1.	MUSEum 3451/2	Half-day Thurs
(Premier Radio)	309 Edgware Road, W.2.	PADdington 6963	Half-day Thurs
CITY:	109 Fleet Street, E.C.4.	FLEet St. 5812/3	Half-day Sat.
NORTH LONDON:	162 Holloway Road, N.7.	NORTH 7941	Half-day Thurs
SOUTH LONDON:	9 Camberwell Church Street, S.E.5.	RODney 2875	Half-day Thurs
CROYDON:	12 Suffolk House, George Street.	MUNicipal 3250	Half-day Wed
BRISTOL:	26 Merchant Street, Bristol 1.	Bristol 20261	Half-day Wed
MANCHESTER:	20 22 Withy Grove, Manchester 4.	BLACK Friars 5379	Open 6 days a week

Mail Orders and enquiries to Dept. P.W. 3/5 Eden Grove, Holloway London, N.7.

BENTLEY ACoustic CORPORATION LTD.

Suppliers to H.M. Government. 38 CHALCOT LANE, LONDON, N.W.1 Telephone: PRIMROSE 9090

NEAREST UNDERGROUND: CHALK FARM.

ALL GOODS LISTED BELOW ACTUALLY IN STOCK

ALL GOODS ARE NEW, BEST QUALITY BRANDS ONLY, AND SUBJECT TO MAKERS' FULL GUARANTEE. PLEASE NOTE THAT WE DO NOT SELL ITEMS FROM FAULTY EQUIPMENT NOR MANUFACTURERS' SECONDS & REJECTS, WHICH ARE OFTEN DESCRIBED AS "NEW AND TESTED" BUT HAVE AN UNRELIABLE LIFE

0A2	4/8	6RW6	5/8	6YX5	4/8	20P5	12/8	ACHLDD8/1	EABX8	3/8	E137	12/8	KTZ41	5/8	Q8150/158/8	U30	4/8	AF125	10/8	
0B2	6/8	6BW7	5/8	6YX6	6/8	25A6	7/8	ACH/EN	EAC91	3/8	E141	7/8	LK3	6/8	R12	5/8	U50	4/8	AF126	10/8
024GT	4/8	6RX6	3/8	6Z4	5/8	25L6	4/8	(G) 17/6	EAC92	7/8	E142	7/8	LN132	6/8	R16	20/8	U76	4/8	AF127	9/8
1A3	2/8	6C4	2/3	7A7	12/6	23U4GT12/8	6/8	ACH/EN	EBA4	1/8	E141	6/8	LN309	7/8	R17	17/8	U78	8/8	BYZ13	10/8
1A5	5/8	6C3	4/8	7A6	12/6	25Y5	7/8	(G) 17/6	EBA4	1/8	E143	6/8	LN310	7/8	R18	9/8	U84	10/8	GD3	5/8
1A7GT	7/8	6C6	3/8	7B7	7/8	25Y3G	7/8	ACH/AG 22/6	EBA1	2/8	E144	4/8	LZ310	5/8	R19	6/8	U101	10/8	GD4	5/8
1C1	4/8	6C8	3/8	7C5	7/8	25Z6	7/8	ACH/AG/VM	EBC3	30/8	E145	7/8	LZ329	5/8	R22	9/8	U107	17/8	GD14	9/8
1C2	6/8	6C9	10/8	7C6	6/8	25Z5	7/8	12/6	EBC3	6/8	E146	7/8	LZ329	5/8	R22	9/8	U107	17/8	GD14	9/8
1C3	6/8	6C10	7/8	7D3	15/8	25Z6GT 8/7	12/6	ACH/TH 15/8	EBC41	6/8	E148	2/8	ME41	15/8	R24	6/8	U251	9/8	GET102	8/8
1C5	6/8	6C12	6/8	7D5	15/8	278U	23/8	ACH/TP 18/8	EBC41	6/8	E149	5/8	ME41	15/8	R24	6/8	U251	9/8	GET103	7/8
1C6	10/8	6C12	12/6	7D6	14/8	28D7	6/8	ACH/VP 12/6	EBC41	6/8	E150	5/8	ME41	15/8	R24	6/8	U251	9/8	GET104	7/8
1C8	6/8	6C14	18/8	7D8	14/8	30C1	10/8	ACH/TP 22/6	EBC41	6/8	E151	5/8	ME41	15/8	R24	6/8	U251	9/8	GET105	7/8
1C9	6/8	6C16	7/8	7E7	9/8	30C15	9/8	ATP4	2/3	E150	6/8	E152	18/8	MHLDD12/8	6/8	U339	9/8	GET113	6/8	
1F1	5/8	6CW4	2/4	7K7	12/6	30C18	10/8	AZ1	5/8	E150	6/8	E153	18/8	MHLDD12/8	6/8	U339	9/8	GET114	6/8	
1F2	2/3	6D1	1/8	7K7	14/8	30P5	5/8	AZ41	6/8	E151	6/8	E154	17/8	ME48	20/8	U342	10/8	GET115	6/8	
1F3	2/3	6D3	6/8	7Y4	3/8	30PFL9	9/8	AZ41	6/8	E151	6/8	E155	17/8	ME48	20/8	U342	10/8	GET116	6/8	
6D1	5/8	6D2	3/8	8D1	12/6	30PFL9	9/8	AZ41	6/8	E151	6/8	E156	17/8	ME48	20/8	U342	10/8	GET117	6/8	
1F4	6/8	6E2	9/8	9D1	9/8	30PFL9	9/8	B139	5/8	E153	12/8	E157	13/8	ME48	20/8	U342	10/8	GET118	6/8	
1G6	6/8	6F1	9/8	9D2	3/8	30PFL9	12/6	B139	10/8	E154	6/8	E158	6/8	ME48	20/8	U342	10/8	GET119	6/8	
1H3	7/8	6F5	5/8	9D7	7/8	30PFL9	7/8	C1C	12/8	E157	6/8	E159	6/8	ME48	20/8	U342	10/8	GET120	6/8	
1H4	2/8	6F6	3/8	9D8	12/6	30PFL9	12/6	C1C	12/8	E157	6/8	E160	6/8	ME48	20/8	U342	10/8	GET121	6/8	
1L8	16/10	6F6GT	7/8	9D9	12/6	30PFL9	9/8	CK306	6/8	E161	3/8	E162	6/8	ME48	20/8	U342	10/8	GET122	6/8	
1L9	4/8	6F7	1/8	9D9	10/8	30PFL9	9/8	CL1	19/8	E162	6/8	E163	10/8	ME48	20/8	U342	10/8	GET123	6/8	
1NGT	9/8	6F12	3/8	10P1	10/8	30PFL14	12/6	CL33	11/8	E163	7/8	E164	10/8	ME48	20/8	U342	10/8	GET124	6/8	
1P1	5/8	6F13	4/8	10P9	9/8	35A3	20/8	CX6	2/8	E165	6/8	E166	10/8	ME48	20/8	U342	10/8	GET125	6/8	
1P10	4/8	6F14	23/8	10P18	9/8	35L6GT	6/8	CX6	2/8	E165	6/8	E167	10/8	ME48	20/8	U342	10/8	GET126	6/8	
1P11	8/8	6F15	6/8	10P13	9/8	35L6GT	6/8	CX6	2/8	E165	6/8	E168	10/8	ME48	20/8	U342	10/8	GET127	6/8	
1S5	4/8	6F16	6/8	10D1D1	9/8	35Z3	16/4	CX71	12/6	E166	7/8	E169	10/8	ME48	20/8	U342	10/8	GET128	6/8	
184	5/8	6F17	12/6	10P13	8/8	35Z4GT	4/8	CY1	16/4	E168	10/8	E170	10/8	ME48	20/8	U342	10/8	GET129	6/8	
185	3/8	6F18	10/8	10P14	11/8	35Z5GT	6/8	CY1C	6/8	E168	10/8	E171	10/8	ME48	20/8	U342	10/8	GET130	6/8	
1T2	28/8	6F19	4/8	11B8	17/8	35Z5	3/8	D35	15/8	E168	10/8	E172	10/8	ME48	20/8	U342	10/8	GET131	6/8	
1T3	6/8	6F20	6/8	11D0	16/8	35Z5	3/8	D35	15/8	E168	10/8	E173	10/8	ME48	20/8	U342	10/8	GET132	6/8	
1U4	5/8	6F24	9/8	11E1	15/8	41B8T	15/8	D35	15/8	E168	10/8	E174	10/8	ME48	20/8	U342	10/8	GET133	6/8	
1U5	6/8	6F26	5/8	11E3	17/8	43	10/8	D68	8/8	E168	10/8	E175	10/8	ME48	20/8	U342	10/8	GET134	6/8	
2A7	18/8	6F32	3/8	12A6	2/8	43	10/8	D68	8/8	E168	10/8	E176	10/8	ME48	20/8	U342	10/8	GET135	6/8	
2C20	2/8	6F33	3/8	12A8	16/8	43Z5	15/7	7/8	2/3	E168	10/8	E177	10/8	ME48	20/8	U342	10/8	GET136	6/8	
2D1C	6/8	6F34	3/8	12A9	16/8	43Z5	15/7	7/8	2/3	E168	10/8	E178	10/8	ME48	20/8	U342	10/8	GET137	6/8	
2E	6/8	6F36	1/8	12AD6	9/8	30B3	6/8	DAF91	3/8	E168	10/8	E179	10/8	ME48	20/8	U342	10/8	GET138	6/8	
2P	23/8	6J6G	3/8	12A56	8/8	30C5	6/8	DAF96	6/8	E168	10/8	E180	10/8	ME48	20/8	U342	10/8	GET139	6/8	
2X2	3/8	6J6GT	4/8	12A47	6/8	30C5GT	4/8	DAF96	6/8	E168	10/8	E181	10/8	ME48	20/8	U342	10/8	GET140	6/8	
3A1	9/8	6J6	3/8	12A18	10/8	30B1GT	6/8	DAF96	6/8	E168	10/8	E182	10/8	ME48	20/8	U342	10/8	GET141	6/8	
3A5	6/8	6J6	4/8	12A19	10/8	30B1GT	6/8	DAF96	6/8	E168	10/8	E183	10/8	ME48	20/8	U342	10/8	GET142	6/8	
3B7	3/8	6J6GT	7/8	12A77	3/8	33K1U	14/8	DDF4	3/8	E168	10/8	E184	10/8	ME48	20/8	U342	10/8	GET143	6/8	
3D0	3/8	6J6	12/8	12A10	5/8	72	6/8	DDF25	7/8	E168	10/8	E185	10/8	ME48	20/8	U342	10/8	GET144	6/8	
3Q4	6/8	6K6GT	5/8	12A17	4/8	77	5/8	DDF83	8/8	E168	10/8	E186	10/8	ME48	20/8	U342	10/8	GET145	6/8	
3Q4GT	7/8	6K67	1/3	12A16	6/8	78	4/8	DDF86	10/8	E168	10/8	E187	10/8	ME48	20/8	U342	10/8	GET146	6/8	
3R5	6/8	6K6	1/8	12A17	4/8	78	4/8	DDF86	10/8	E168	10/8	E188	10/8	ME48	20/8	U342	10/8	GET147	6/8	
3V4	5/8	6K6G	3/8	12A17	9/8	83	23/8	DDF91	2/3	E168	10/8	E189	10/8	ME48	20/8	U342	10/8	GET148	6/8	
4D1	5/8	6K6GT	7/8	12A18A	5/8	83V	8/8	DDF96	5/8	E168	10/8	E190	10/8	ME48	20/8	U342	10/8	GET149	6/8	
4K40Y	8/8	6K25	24/8	12B26	4/8	85A2	6/8	DDF97	10/8	E168	10/8	E191	10/8	ME48	20/8	U342	10/8	GET150	6/8	
574	7/8	6L1	10/8	12B17	6/8	90A3	6/8	DDF98	10/8	E168	10/8	E192	10/8	ME48	20/8	U342	10/8	GET151	6/8	
5G4	4/8	6L1	10/8	12B17	6/8	90A3	6/8	DDF98	10/8	E168	10/8	E193	10/8	ME48	20/8	U342	10/8	GET152	6/8	
6V40	6/8	6L1	10/8	12B17	6/8	90A3	6/8	DDF98	10/8	E168	10/8	E194	10/8	ME48	20/8	U342	10/8	GET153	6/8	
5Y3GT	4/8	6L1GT	4/8	12B16GT	2/8	90C1V	4/8	DDF77	3/8	E168	10/8	E195	10/8	ME48	20/8	U342	10/8	GET154	6/8	
5Y4	9/8	6L17	12/6	12B17GT	7/8	90C1V	4/8	DDF81	23/8	E168	10/8	E196	10/8	ME48	20/8	U342	10/8	GET155	6/8	
5Z3	7/8	6L18	10/8	12K13	10/8	150B2	16/8	DDF101	26/8	E168	10/8	E197	10/8	ME48	20/8	U342	10/8	GET156	6/8	
5Z4	2/8	6L19	10/8	12K13	10/8	150C2	16/8	DDF101	26/8	E168	10/8	E198	10/8	ME48	20/8	U342	10/8	GET157	6/8	
5Z5	3/8	6L13	6/8	12K6GT	9/8	1H1	13/8	DDF72	9/8	E168	10/8	E199	10/8	ME48	20/8	U342	10/8	GET158	6/8	
6A8G	6/8	6L13	7/8	12Q2GT	3/8	13ABT	34/11	DK40	15/8	E168	10/8	E200	10/8	ME48	20/8	U342	10/8	GET159	6/8	
6A8T	4/8	6L129	5/8	12NA7	6/8	21A6G	6/8	DKD1	4/8	E168	10/8	E201	10/8	ME48	20/8	U342	10/8	GET160	6/8	
6A8T	3/8	6L129GT	5/8	12NA7	6/8	220B	10/8	DKD2	6/8	E168	10/8	E202	10/8	ME48	20/8	U342	10/8	GET161	6/8	
6A8G	2/8	6L129	5/8	12NA7	6/8	220B	10/8	DKD2	6/8	E168	10/8	E203	10/8	ME48	20/8	U342	10/8	GET162	6/8	
6A8G	2/8	6L129	5/8	12NA7	6/8	220B	10/8	DKD2	6/8	E168	10/8	E204	10/8	ME48	20/8	U342	10/8	GET163	6/8	
6A8G	2/8	6L129	5/8	12NA7	6/8	220B	10/8	DKD2	6/8	E168	10/8	E205	10/8	ME48	20/8	U342	10/8	GET164	6/8	
6A8G	2/8	6L129	5/8	12NA7	6/8	220B	10/8	DKD2	6/8	E168	10/8	E206	10/8	ME48	20/8	U342	10/8			

SURBITON PARK RADIO LTD.

ALL ORDERS DESPATCHED SAME DAY • WE PAY POSTAGE and INSURANCE
MONEY REFUND GUARANTEE

LEADING STOCKISTS OF MARTIN RECORDAKITS AND AUDIOKITS

MARTIN RECORDAKITS

Dep.	&	Mthly. prnts. of
HALF TRACK		
TAPE AMPLIFIER FOR STUDIO DECK with ready wired printed circuit, control and input panels, mains and output transformers, knobs, plans, screws, etc.		
		EF86, ECC83, EZ80, 6BM8 and 2 EL84, 3 watts output. Magic eye, Radio and Mic. inputs, ext. speaker socket, tone and monitor controls. Can be used as an amplifier.
		\$11.11.0
COLLARO STUDIO DECK. Very latest model, 3 speeds, 7in spools.		
		\$10.15.8
CASE for above with 8 x 5in. speaker, two-tone grey.		
		\$5.5.0
COMPLETE KIT with tape and microphone.		
		\$29.0.0
QUARTER TRACK		
COLLARO STUDIO DECK fitted with Marriott "X" heads.		
		\$17.17.0
TAPE AMPLIFIER FOR STUDIO DECK as described above but quarter track.		
		\$12.12.0
CASE with speaker, two-tone grey.		
		\$5.5.0
COMPLETE KIT with tape and microphone.		
		\$35.0.0

BRENELL TAPE EQUIPMENT

DECK Mk. 5 Series 2, half track, 4 speed.	\$32.11.0
AMPLIFIER for above with power pack.	\$26.0.0

MARTIN AUDIOKITS

The new Martin All Transistor Ten Watt Amplifier Kits represent excellent value for money. Each unit is complete, requiring only to be connected to the next. We show the most popular units here. Others are available. Leaflets on request.

UNIT 1—FIVE INPUT SELECTOR. Size 31 x 5in. Mag. P.C. Crystal P.C. Radio, Mic. Tape head, 9-15 Volts. Must be used with unit 4.	\$2.7.6
UNIT 4—PRE-AMPLIFIER AND CONTROL. 61 x 2 1/2in. Volume on/off, bass and treble controls, 9-15 volts. Must be used with unit 1.	\$2.6.8
UNIT 7—MAIN AMPLIFIER 10 WATTS 6 transistor transformerless push-pull output. Mounted on heat sink. 15 ohms output. 24 Volts.	\$6.12.6
UNIT 8 POWER SUPPLY, 24 and 9 Volts. Heavy duty transformer, filter and smoothing.	\$2.15.0
CONTROL PANEL for units 1 and 4.	10.8
ALL FOUR ABOVE UNITS WITH PANEL. 15 ohms output.	\$15.8.0
UNIT 5 MAIN AMPLIFIER as Unit 7, 3 ohms output. 24 Volts.	—
UNIT 6 POWER SUPPLY as Unit 8 for use with Unit 5.	\$2.12.6
ALL FOUR UNITS (1456) WITH PANEL. 3 ohms output.	\$14.5.0
STEREO VERSIONS NOW AVAILABLE. DETAILS ON REQUEST.	—

GRAMOPHONE UNITS, MOTORS, PICK-UPS

Decca Deram Arm and Plug-in Shell.	\$5.5.0
Decca Deram Transcription Cartridge.	\$4.14.6
Decca Deram Auto Cartridge.	\$3.13.8
Garrard SRP10 with Mono cartridge, single player.	\$5.9.11
B.S.R. UA14 with TCS Mono Cartridge, 4-speed changer.	\$16.19.8
Garrard Autolim. Mono cartridge, 4 speed changer.	\$7.17.0
Garrard A78 Autolim de Luxe, TCS Mono cartridge.	\$11.9.0
Garrard 4H/P with Mono cartridge.	\$17.0.0
Garrard Lab Type "A" Transcription auto-changer, with Mono cartridge.	\$19.14.9
Garrard 301 Strobe.	\$22.0.0
Philips AG1016, Stereo cartridge, will change 7in. records (adapter 10in. extra).	\$12.12.0
Golding GL58 with arm, less cartridge.	\$17.1.9
Golding GL70 with arm, no cartridge.	\$27.9.4
Golding "88" Transcription, no arm.	\$18.18.5

ARMSTRONG - NEW TUNER AMPLIFIERS

MONO

AF208 A.M./F.M. Radio chassis, bass and treble controls, P.C. inputs, etc.	\$21.4.9
227M A.M./F.M. Radio chassis, 10 watts.	\$33.18.0
223 A.M./F.M. Self-powered (Tuner only).	\$26.15.0
224 F.M. only, Self-powered Tuner.	\$22.10.0

STEREO

227 A.M./F.M. Radio chassis, Stereo gram, 10 watts each channel.	\$48.15.0
226 A.M./F.M. Radio chassis, Stereo gram, 10 watts each channel, Filter, Magnetic pick-up, etc.	\$56.0.0

OTHER TUNERS

Tripletone F.M. Tuner, less power.	\$13.19.8
Tripletone F.M. Tuner, self-powered.	\$15.14.8

STEREO AMPLIFIERS—VARIOUS

Armstrong 222 Integrated, 10W per channel.	\$27.10.0
Dolei GA505, Integrated.	\$18.18.0
Rogers Cadet Mk. 2 with pre-amplifier, 4 EL86 valves.	\$26.15.0
Leak Stereo 20 Main amplifier.	\$30.9.0
Leak Variolope 2 stereo pre-amplifier.	\$25.0.0
Quad 22 Stereo Control Unit.	\$25.0.0
For Quad Main Amplifiers see Mono section.	—

MONO AMPLIFIERS

Linear L45, 3 watt, 3 valve.	\$5.19.6
Linear Dianoic, 12 watt, suitable Mic. or Guitar.	\$12.12.0
Linear Conchord, 30 watt, ideal guitar amp.	\$18.0.0
Dolei GA5, integrated amp., 5 watt, ECC86 valve.	\$13.2.6
Dolei DPA15, 15 watt with 2-valve pre-amp.	\$26.5.0
Tripletone Hi-Fi Major with pre-amp. Suitable for Guitar or Mic. etc.	\$15.18.9
Leak TL/12, 10 watt Main amp. only.	\$13.18.0
Leak Variolope Mono pre-amplifier.	\$15.15.0
Quad, 15 watt Main amplifier only.	\$22.10.0
Quad, pre-amplifier, Mono.	\$19.10.0

JASON F.M. AND TV SOUND TUNER KITS

FMT1, complete with 4 EF91 valves.	\$7.4.6
FMT2, less power, complete with 4 EF90 valves.	\$9.4.6
FMT2, with power, complete with 4 EF90 and 1 EF80.	\$11.4.6
FMT3, Fringe, complete with valves, less power.	\$10.19.0
FMT3, with power, complete with all valves.	\$12.19.0
TV/2, switched F.M. and TV sound, self-powered, all valves.	\$15.12.8
Mercury II, as TV/2 but less power, all valves.	\$11.0.0
Instruction book included in all kits. Available separately. 2/6 switched 3/6.	—
TV/2 ready built, state channels.	\$22.5.0
Monitor, ready built as Mercury II.	\$18.15.8

LOUDSPEAKERS

Goodmans Axielte.	\$5.5.7
Goodmans Axiom 10.	\$6.5.11
Goodmans 5K/20/XL.	\$7.7.0
Goodmans XO 5000 cross-over.	\$2.0.11
Goodmans Axiom 201, 12in. unit.	\$10.17.4
Goodmans Axiom 301, 12in. unit.	\$15.4.8
Wharfedale Super S/RS/DD.	\$6.14.2
W.B. HF1012 10in.	\$4.7.6
FANE 12in. Unit, 20 watt.	\$5.5.0
Wharfedale W12/EG 12in. 15 watt Lead Unit speaker.	\$10.10.0
Wharfedale W15/EG 15in. 15 watt Bass Guitar speaker.	\$17.10.0
Wharfedale Super 10/RS/DD 10in. high quality unit.	\$10.18.0
Wharfedale RS/12/DD 12in. 15 watt Hi-Fi.	\$11.10.0

EASILY REACHED BY FREQUENT FAST TRAINS
FROM WATERLOO TO SURBITON

SURBITON PARK RADIO LTD.
48, SURBITON ROAD, KINGSTON-UPON-THAMES, SURREY

Phone
KIN 5549

- Order for Cash, C.O.D. or Terms
- Hours 9 a.m.-6 p.m. (1 p.m. Wed.)
- Open ALL DAY Saturday
- Established 30 years

Lewis have the Cabinet for you

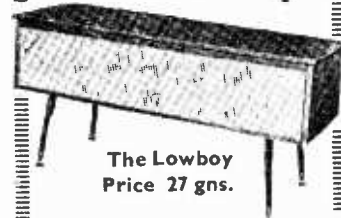
We can supply any cabinet to your own specification

This is only one example of—
THE LARGEST RANGE OF CABINETS IN THE COUNTRY

Equipment is also our speciality.



The Grosvenor
Price 18 gns.



The Lowboy
Price 27 gns.

LEWIS radio

100(P84) Chase Side, Southgate
London, N.14, Pal3733/9666

FREE CATALOGUE

Send today for the new
Lewis Catalogue

Designed to assist your choice of cabinet.

Sent absolutely free. The new Lewis Radio Cabinet Catalogue—the most comprehensive ever prepared. Choose from 49 different Models.

Please send your new free 24 page colour cabinet catalogue.

Name

Address

BLOCK CAPITALS PLEASE

PADGETTS RADIO STORES

OLD TOWN HALL, KNOWLER HILL,
LIVERSEDGE, YORKS.

Telephone: Clockheaton 2868

Motors removed from Washing Machines
Fully guaranteed. 230 volt. $\pm$ h.p. 25/-.
Carriage 8/-.

Hoover Motors 1/6 h.p. Complete with
Drive Pulley, 15/- Carriage 6/-.
Hoover Pump, 7/6, Post 2/6.

New Boxed Drive Unit Type 114. Com-
plete with 5U4, 6L8, V8210 two EF50, one
VR02 valves. Also 25 cycle tuning fork.
Housed in very nice case, 15/- Carr. B.R.S.
7/6.

New 12in. Speaker with Built-in Tweeter.
28/6, 3 ohms. Post free.

Mark III Army Set, Type 19. Receiver side
bench tested on phones. Sets as new, 50/-.
Clean condition. 28/- Carriage B.R.S. 10/-.

Simple drawing with each set explaining pin
connections for mains operated power pack.
This set will not transmit.

POST FREE.
New Valves Ex Units. 6X3 2/6 each, doz.
6X7 1/8 each, doz. 12/- 6X8 2/6 each, doz.
22/- 6V6 2/6 each, doz. 22/- 807 U.S.A. 8/-.

PP3/250 (PX4) 5/- AC2PEN (PEN4A) 2/6.
5U4 3/- 6V6GT 4/6 EF91 1/6 EL91 1/6.
6P8 2/- 5Z4 5/6 5Y4 4/6 6X5 4/6 EF50 1/-.

6/- doz. ART12 1/6 4 for 5/6 box of 50 19/-
KT86 8/- ARTP2 2/- ART4 2/- APF3 2/-
AR8 2/- IT4 2/- G54 new boxed, 1/3.

13 channel TV Sets, 14in. untested 30/-
carr. 10/- Tubes, untested 50/- carr. 10/- Well
packed, sent at owner's risk.

T.V. Tubes. Complete rebuild and re-
faced. 12 months guarantee. Sizes up to
17in. Special trade price of 75/- Carr. and
Ins. 7/6.

RECLAIMED TUBES
Mullard 12 and 14, Mazda CRM141-2 at 17/-
carr. 7/6. Mullard and Mazda 17in., 30/-.
6 months guarantee.

P.M. Speakers. Guaranteed ex T.V. Sets.
6in. round, 8 x 4in. Rola and Plessey, Philips
5in. round, all at 3/- each. Post 2/-, 6 for 20/-
post paid. Goodmans 7 x 4in., 5/-, post 2/-.

8in. round, 6/-, post 2/-.

Valves Removed from T.V. Sets. Tested
on a Mullard Valve Tester and are 100% as
new. Three months' unconditional guaran-
tee. POST FREE.

ECL80	2/-	20D1	3/-	PL33	4/-
ECB82	3/-	20L1	5/-	PL38	6/-
ECV51	2/6	20P1	5/-	PY80	5/-
EBF80	4/6	20P4	8/6	PY81	4/-
EB91	9d.	20P1	5/-	PY82	5/-
EF91	9d.	U35	5/-	PCF80	4/6
6SM7	2/6	U801	8/6	BC684	4/6
6F1	5/-	U261	5/-	B36	4/-
6F14	5/-	U282	5/-	N37	5/-
6F15	5/-	U329	5/-	6U4	5/-
6LD20	5/-	KT36	5/-	6P25	3/6
10C2	5/-	PL81	5/-	6K25	5/-
10P1	1/-	PL82	5/-	6P28	3/-
10P13	5/-	PL83	5/-	PZ30	5/-
10P14	5/-				

EF80 1/6 or 10/- per doz. Grade II EF80
for test purposes 4/- per doz.

RADIO BOOKS

TELEVISION & RADAR ENCYC.

Published Price 30/- Book Bargain 9/6

INDUSTRIAL TELEVISION

Published Price 15/- Book Bargain 4/6

STEREO FOR BEGINNERS 8/6

HI-FI FOR BEGINNERS 8/6

SOUND & CINE FOR BEGINNERS 8/6

AUDIO & ACOUSTICS by Briggs 11/6

MORE about Loudspeakers by Briggs 8/6

CABINET Handbook by Briggs 8/6

AT A GLANCE Valve and T.V.

Tube equivalents 4/6

OSCILLOSCOPE Book 5/6

USING an Oscilloscope 7/6

OSCILLOSCOPE Equipment 7/6

MULLARD Circuits for Audio Amp. 5/6

MULLARD Ref. Transistor Circuits 13/6

EXTRA Equipment Tape Recorder 6/6

TRANSISTOR Circuits for Radio 8/-

Control of Models 8/-

STICKING Transistor Receivers 8/-

ELECTRONIC Novelties 5/6

ELECTRONIC Gadgets 5/6

RADIO Valve Data "Wireless World" 8/6

BEGINNER'S Guide 8/6

MODERN Transistor Circuits for 8/6

Beginners 8/-

ABC of Transistors 5/6

ABC of Ultra Sonics 5/6

ABC of Magnetism 5/6

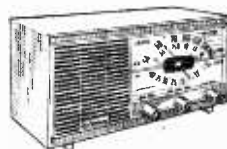
ABC of Missile Guidance 5/6

All books include postage. List S.A.E.

SELRAY BOOK CO.

80 HAYES HILL, HAYES, BROMLEY

KENT. Tel. HU Rsway 1818



BRAND
NEW
A.C. MAINS
5 VALVE
SUPERHET
RADIO
RECEIVERS

Housed in beautifully styled cabinets offering
terrible performance and very high quality
reproduction. Built-in ferrite rod aerial for
reception of all your favourite programmes. Fully
guaranteed.

MODEL 55 (as illus.). Covers Medium, Long and
short waves. Size 8 1/2in. x 3 1/2in. d. x 4 1/2in. h.
PRICE ONLY £21.7.6. P. & P. 5/6.

MODEL 36. Similar circuitry to above but covers
Medium wave only. Size 7 1/2in. w. x 3 1/2in. d. x 4 1/2in. h.
PRICE ONLY £14.14.6. P. & P. 5/6.

SPECIAL OFFER LIMITED QUANTITY HIGH GRADE TWO-STAGE GRAM MAGNETIC AMPLIFIER

Made by very well-known manufacturer.
Using a double-wound mains transformer (fully
isolated chassis) with tapped primary, full wave
output cooled rectifier and Mullard 211/22
triode-pentode valve. 3 watt output. Separate
tone and volume controls. Overall size 6 1/2in. wide x
3 1/2in. deep x 4 1/2in. high. Each amplifier Brand
New and tested and supplied complete with
valve. 3 ohm output transformer and kno-
PRICE 49/6 P. & P. 4/-.

Suitable bin. x 5in. Speaker 10/6, plus 2/6 P. & P.
(Ideal as an add-on self contained Audio unit for
our MK1 or MK2 FM Tuner).

BRAND NEW 3 OHM LOUDSPEAKERS

2 1/2in. 12/6; 5in. 12/6; 6 1/2in. 15/-; 8in. 21/-;
10in. 25/-; 12in. 27/6; (12in. 15 ohm 30/-);
10in. x 6in. 20/-

Latest type E.M.I. 134 x 8in. with high flux
ceramic magnet, 11,000 gauss. Aluminium cen-
tre pole. 10 watts, 50 c/s to 10 Kc/s. 48/-

P. & P. up to 8in. 1/6; over 8in. 2/6 per speaker.

SPECIAL OFFER !!

BRAND NEW HEAVY DUTY 12 in. SPEAKERS

Response 45 c/s-13 Kc/s. 1 1/2in. voice coil. Avail-
able in 3 or 15 ohm. Guaranteed full 15 watts
British rating. Heavy cast aluminium frame.

These are current production by world famous
maker and as they are offered well below list price
we are not permitted to disclose the name.

LIMITED NUMBER ONLY. UNREPEAT-
ABLE AT 89/6. P. & P. 5/-.

SPEAKER AND CABINET FABRIC

Oatmeal or Red and Gold Vynair for speaker
and cabinet covering, also Red Rexine for cabinet
covering only. All 54in. wide and usually sold at
35/- yard.

OUR PRICE 13/6 per yard length.

plus P. & P. 1/9. (Minimum order 1 yard). Send
S.A.E. for samples.

BARGAIN OFFER CORNER

ROLA CELESTION. Approx. 9in. x 6in. x 3in. ohm.
Middle register speaker, 10/6. P. & P. 2/6.

MAINS TRANSFORMER

Drop turn type. Tapped primary 110v., 200v.,
220v., 240v., 320-0-320v. at 80mA and 6.3v.
at 3 amps. Generous core. Stack size 3 1/2 x 2 1/2 x
1 1/2. Weight 4 lbs. ONLY 15/- P. & P. 3/6

ACOS CRYSTAL MIKE. High imp. For desk
or hand use. High sensitivity. 10/6. P. & P. 1/2

TBL CRYSTAL STICK MIKE. Listed at 45/-
Our price 18/6. P. & P. 1/6.

T.C.C. SUPPRESSOR CONDENSERS. 250 v. A.C.
.005 + .005 x 1 1/2in. tubular can 1 1/2in. long x
1 1/2in. dia. x 1/2in. Post free.

TRANSISTOR DRIVER and O/P TRANSFORM-
ERS. (Tapped 3 ohms and 15 ohms output),
plus 4 suitable Transformers giving approx. 1 watt
output. 30/- P. & P. 2/6.

CONDENSERS. 5,000 inFd. 12 v. wkg. Size
3 x 1 1/2in. dia. 2/- each. P. & P. 6d. each.

BRAND NEW PLESSEY 12 v. 4 pin non-syn-
chronous vibrator. Type 12.14SD. ONLY 8/6. P. & P.
1/6 each.

3-PUSH BUTTON SWITCH UNIT. 4 single pole
changeover on each push-button. Approx.
3 x 1 1/2 x 1 1/2in. An absolute Bargain at 4/6 each
P. & P. 1/6 each.

MARCONI QUARTZ CRYSTAL TYPES ZHB.
Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

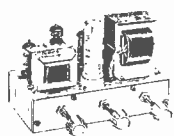
Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

Still available as previously advertised.

3-VALVE AUDIO AMPLIFIER MODEL HA34



Designed for Hi-Fi reproduction of records A.C. Mains operation. Ready built on plated heavy gauge metal chassis, size 7 1/2 in. w. x 4 in. d. x 4 1/2 in. h. Includes E.C.83, EL84, E2280 valves, heavy duty double-wound mains transformer and output transformer matched for 3 ohm speaker, separate Bass, Treble and volume controls. Negative feedback line. Output 4 1/2 watts. Front panel can be detached and leads extended for remote mounting of controls.

The HA34 has been specially designed for us and on quantity order enables us to offer them complete with knobs, valves, P.A.P. & P. etc., wired and tested for only **£4.5.0**

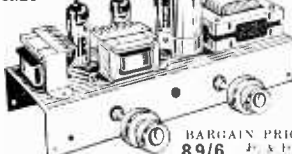
TAPE DECKS

COLLARO STUDIO DECK. £10.10.0 plus 5/6 carr. and ins.
B.S.R. MONARDECK. Single speed, 3 1/2 in. per sec. simple control uses 5 1/2 in. spools. £6.15.0 plus 5/6 carr. and ins. (Tapes extra on both.)

STEREO AMPLIFIER

Incorporating 2 E.C.82s and 1 E2280 heavy duty double-wound mains transformer. Output 4 watts per channel. Full tone and volume controls. Absolutely complete.

FEW ONLY



**BARGAIN PRICE
89/6**

Also available complete with two 8 x 5 in. speakers for only **£5.10.6**. P. & P. 6/6.

6 TRANSISTOR AND DIODE SUPERHET

A first-class 2 waveband transistor superhet. Printed circuit panel size 4 x 2 1/2 in. 3 pre-aligned I.F. transformers. High-gain Ferrite rod aerial. All First-grade transistors. Car aerial winding. Push-pull output. All parts supplied with simple instructions. All parts sold separately. Set of parts if purchased at one time.

ONLY £4.5.0 P. & P. 2/6

35 OHM SPEAKERS

Suitable for use with above. 2 in. (Goodmans). Ideal replacement for most pocket portables. 8/6 3 1/2 in. 12/6; 5 in. 17/6; 7 x 4 in. 21/- P. & P. 1/6 per speaker.

PORTABLE CABINET

Size approx. 9 1/2 x 6 1/2 x 3 1/2 in. Suitable for above using 3 1/2 in. speaker. 25/- P. & P. 2/-

COIL AND TRANSFORMER SET FOR TRANSISTOR SUPERHET

3 I.F. transformers, one oscillator coil, one driver transformer and one Ferrite aerial (med. long and aerial coupling). 32/6 complete. Post 9/- transistor printed circuit board to match. 8/6. Post 9/- Circuit diagram 1/6 extra.

SPECIAL TRANSISTOR BARGAINS

ALL BRAND NEW

GET 15 (Matched Pair) 15/-
OCT1 5/- OCT2 8/- OCT6 8/-
PXA101 6/6 XA103 6/6 X15 10p 12/6
Set of Mullard 6 transistors, OC44, 2-OC45, OC81D matched pair, OC81, 25/-

EDISWAN MAZDA

R.F.1 Pack: 1-PXA102 Mixer: 2-PXA101 I.F. Amp. (Equiv. OC44 and OC45).....10/6
R.P. 2 Pack: 2-PXA101 I.F.—PXA102 Osc.—12/6
1 PXA102 Mixer.....10/6
L.P.6 Pack: Consisting of PXB113 Driver, Matched pair PXB117, mounted complete with heat sinks (Equiv. OC81D and OC81).....12/6
ALL TRANSISTORS POST FREE

QUALITY RECORD PLAYER AMPLIFIER

A top-quality record player amplifier. Size 7 in. w. x 2 1/2 in. d. x 4 1/2 in. h. This amplifier (which is used in a 29 in. record player) employs E.C.83 EL84, E2280 valves. Bass, treble and volume controls. Complete with output transformer matched for 3 ohm speaker. Ready built and tested.

PRICE 69/6 P. & P. 3/6

ALSO AVAILABLE. Mounted on board with output transformer and 3 ohm speaker, ready to fit into cabinet below. **PRICE 89/6**. P. & P. 4/6

QUALITY PORTABLE RECORD PLAYER CABINET

Excellent motor board. Will take above amplifier and B.S.R. or GARRARD Autocchanger or single Record Player Unit. Size 18 x 14 x 8 1/2 in.

PRICE £3.9.6 Carr. 5/-

Superior CABINET To take 8 x 5 in. speaker, with motor board will accommodate B8C1 A14 or A16. £3.9.6. Carr. 5/6. Speaker 10/6 extra. P. & P. 1/6 extra.

LARGE CABINET Similar to above with 3 ohm speaker. £3.8.8. Carr. 5/-

4-SPEED PLAYER UNIT BARGAINS All Brand New in Makers' Original Packing SINGLE PLAYERS

B.S.R. TU12.....£3.10.0. Carr. 3/6.
B.S.R. GL7 with unit mounted pick-up arm £4.18.8. Carr. 4/6.

AUTO CHANGERS

B.S.R. UA14.....£5.19.6
Latest B.S.R. UA16.....£6.19.6
Garrard A76 Mono.....£10.10.0
LATEST GARRARD AUTO-3LIM. With heavy duty 4-pole motor. FEW ONLY £7.7.0. (Standard Auto-5lim £6.10.0). Carr. 5/- on each.

NEW CARTRIDGE BARGAINS!

B.S.R. TC88. High output compatible Stereo Cartridge. Brand new. Complete with Stereo LP/78 sapphire stylus and universal mounting bracket. Original price 44/11. OUR PRICE 22/6. P. & P. 1/6.

RONETTE STEREO 105 CARTRIDGE. Stereo LP/78. Complete with two sapphires. Original list price 67/9. OUR PRICE 24/- P. & P. 1/6.

COLLARO HI-FI STEREO TON CARTRIDGE. Type "C". Complete with universal bracket and stylus for Stereo, LP and 78. Original list price 59/8. OUR PRICE 25/- P. & P. 1/6.

E.M.I. 4 Speed Player and P.U.

FURTHER HUGE PURCHASE enables us to offer these at

67/6

Heavy 5 1/2 in. metal turntable. Low flutter performance. 200 250 V. shaded motor with tap at 45v. for amplifier valve filament if required. Turnover LP/78 head.

THE NEW HARVERSON KIT FOR THE HOME CONSTRUCTOR

A really excellent all purpose A.C. mains 200 240V.

AMPLIFIER KIT TYPE HSL 'FOUR' 3 VALVE 4 WATT USING EC83, EL84, E2280 VALVES

Special features include:

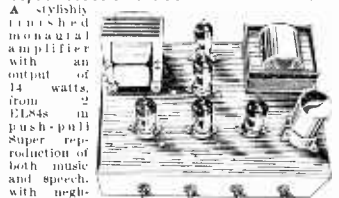
● Heavy duty double-wound mains transformer with electrostatic screen. ● Separate Bass, Treble and Volume controls, giving fully variable boost and cut with minimum insertion loss. ● Heavy negative feedback loop over 2 stages ensures high output at excellent quality with very low distortion factor. ● Suitable for use with guitar, microphone or record player. ● Provision for remote mounting of controls or direct on chassis. ● All this in one compact size only 7 1/2 in. x 4 1/2 in. deep. Overall height 4 1/2 in. ● All components and valves are brand new ● Very clear and concise instructions enable even the inexperienced amateur to construct with 100% success. ● Supplied complete with valves, output transformer (3 ohms only), screened lead, wire, nuts, bolts, solder etc. (No extras to buy)

79/6

● P. & P. 5/-

Complete printed circuit diagram, practical layout and parts list 2/6 (Free with Kit).

10 1/4 WATT HI-FI AMPLIFIER KIT

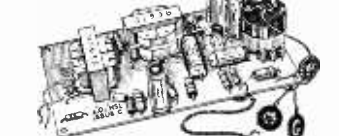


A stylishly finished monaural amplifier with an output of 14 watts, from 2 EL84s in push-pull. Super reproduction of both music and speech, with negligible hum. Separate inputs for mike and gram, allow records and announcements to follow each other. Fully shielded section wound output transformer to match 3-15 ohm speaker and independent volume controls and separate bass and treble controls are provided giving good lift and cut. Valve line-up 2 EL84s, E.C.83, E2280 and E2280 rectifier. Simple instruction booklet 1/6. (Free with parts). All parts sold separately. **ONLY £6.13.6** P. & P. 6/6.

Also available ready built and tested complete with standard input jack sockets. £8.15.0. P. & P. 6/6.

HIGH GAIN 4-TRANSISTOR PRINTED CIRCUIT AMPLIFIER KIT

Type TAI



● Peak output in excess of 1 1/2 watts. ● All standard British components. ● Built on printed circuit panel size 6 x 3 in. ● Generous size Driver and Output Transformers. ● Output transformer tapped for 3 ohm and 15 ohm speakers. ● Transistors (4EFT14) or 81 Mullard OC81D and matched pair (OC81) only ● 9 volt operation. ● Everything supplied, with battery clips, solder, etc. ● Comprehensive, easy to follow instructions and circuit diagram 1/6 (Free with Kit). All parts sold separately.

SPECIAL PRICE 45/- P. & P. 2/6

Also ready built and tested. 52/6. P. & P. 2/6.

A pair of T.A.I.s are ideal for stereo.

HARVERSON'S F.M. TUNER Mk. I

● F.M. Tuning head by famous maker. ● Guaranteed no-drift. ● Permeability tuning. ● Frequency coverage 88-100 Mc/s. ● O.A.S.I. balanced diode output. ● Two I.F. stages and discriminator. ● Attractive maroon and gold dial (7 x 3 in. glass). ● Self powered, using a good quality mains transformer and valve rectifier. ● Valves used E.C.85, two E2280, and E2280 (rectifier). ● Fully drilled chassis. ● Size of completed tuner 8 x 6 x 5 1/2 in. ● All parts sold separately. Set of parts if purchased at one time £5.19.6, plus 8/- P. & P. and ins. Circuit diagram and instructions 1/6 post free. Mark II Version as above but complete with magic eye, front panel and brackets. £6.12.6. P. & P. 8/6.

Mark III Version as Mark I but with output stage (E.C.85) and (E.C.85) rectifier. £7.7.0. P. & P. 8/6. Handsome Metal Cabinet. Choice of Grey, Black or Green. To fit Mark I, 25/- P. & P. 2/6. To fit Mark II, 17/6. P. & P. 2/6.

SPECIAL PURCHASE! TURRET TUNERS

By famous maker. Brand new and unused. Complete with T.C.84 and P.C.80 valves. 34-25 Mc/s. I.P. Biscuits for Channels 1 to 5 and 8 and 9. Circuit diagram supplied. **ONLY 25/- each** P. & P. 2/6.

F.M. TUNER HEAD

Tuning range 88-100 Mc/s. 10.7 Mc/s I.F. A permeability tuned turret head by a famous maker, supplied without valve (E.C.85) and drum and spindle. 18/6, plus 1/9 P. & P. Valve 8/6 extra. Drum and spindle 3/6 extra.

GÖRLER F.M. TUNER HEAD

88-100 Mc/s. 10.7 Mc/s I.F. 15/-, plus 1/9 P. & P. (E.C.85 valve, 8/6 extra).



HARVERSON SURPLUS CO. LTD.

170 HIGH ST., MERTON, S.W.19 CHERRYWOOD 3985

Open all day Saturday

Early closing Wed., 1 p.m.

A few minutes from South Wimbledon Tube Station (Please write clearly)

PLEASE NOTE: P. & P. CHARGED QUOTED APPLY TO U.K. ONLY. P. & P. ON OVERSEAS

ORDERS CHARGED EXTRA.

SEND STAMPED ADDRESS ENVELOPE WITH ALL ENQUIRIES.

SEE
LEFT
HAND
PAGE
1 OR
MORE
ITEMS

Why

NOT BUILD ONE OF OUR PORTABLE TRANSISTOR RADIOS...

BACKED BY OUR SUPER AFTER SALES SERVICE

ROAMER SEVEN Mk III

5 WAVEBAND PORTABLE OR CAR RADIO

Amazing performance and specification

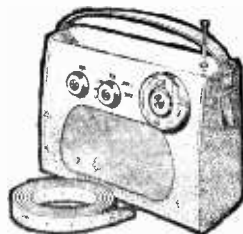
● 9 stages—7 transistors and 2 diodes

Covers Medium and Long Waves, Trawler Band and two Short Waves to approx. 17 metres. Push-pull output for room filling volume from rich toned heavy duty 5in. speaker. Air spaced tuned tuning condenser. Ferrite rod aerial for M & L waves and telescopic aerial for S Waves. Simulated hide case with tilt trim and shoulder and hand straps. Size 9 x 7 x 4in. approx.

The perfect portable and the ideal car radio. (Uses PP9 battery available anywhere).

Total cost of parts now only **£5.19.6** P. & P. 5/6

Parts Price List and easy build plans 3/6



"...amazed at volume and performance... has really come up to my expectations." S. G., Stockton-on-Tees

MELODY SIX

FREE! Miniature Earpiece, plug and socket (value 9/6) and details of conversion to private listening.

● 8 stages—6 transistors and 2 diodes

Our latest completely portable transistor radio covering medium and long waves. Incorporates pre-tagged circuit board. 3in. heavy duty speaker. Top grade transistors, volume control, tuning condenser, wave change slide switch, sensitive 6in. ferrite rod aerial. Push-pull output.

Wonderful reception of B.B.C. Home and Light, 208 and many Continental stations. Handsome leather-look pocket grille and supplied with hand and shoulder straps.

Parts Price List and Total cost of **£4.9.6** P. & P. 3/6
easy build plans 2/- all parts only

POCKET FIVE

● 7 stages—5 transistors and 2 diodes

Covers Medium and Long Waves and Trawler Band, a feature usually found in only the most expensive radios. On test Home, Light Luxembourg and many Continental stations were received loud and clear. Designed round supersensitive Ferrite Rod Aerial and fine tone 2in. moving coil speaker, built into attractive black case with red speaker grille. Size 5½ x 1½ x 3½in. (Uses 1289 battery available anywhere).

Parts Price List and easy build plans 1/6

Total cost of all parts now only **42/6**

P. & P. 3/-

ROAMER SIX

FREE! Miniature Earpiece, plug and socket (value 9/6) and details of conversion to private listening

● 8 stages—6 transistors and 2 diodes

Listen to stations half a world away with this 5 waveband portable. Tunable on Medium and Long waves, Trawler Band and two Short Waves. Sensitive ferrite rod aerial and telescopic aerial for short waves. Top grade transistors, 3-inch speaker, handsome case with tilt trim. Size 7½ x 5½ x 1½in.

Parts Price List and easy build plans 2/-

Total cost of all parts now only **£4.19.6** P. & P. 3/-

TRANSONA FIVE

"Home, Light, A.F.N., Lur. all at good volume." G.P. Durham.

● 7 stages—5 transistors and 2 diodes

Fully tunable over medium and Long Waves and Trawler Band. Incorporates Ferrite rod aerial, tuning condenser, volume control, new type fine tone super dynamic 2½in. speaker etc. Attractive case. Size 6½ x 4½ x 1½in. (Uses PP4 battery available anywhere).

with red speaker grille. (Uses 1289 battery available anywhere).
Total cost of all parts now only **42/6** P. & P. 3/6
Parts Price List and easy build plans 2/-

TRANSONA SIX

● 8 stages—6 transistors and 2 diodes

This is a top performance receiver covering full Medium and Long Waves and Trawler Band. High-grade Ferrite magnet 3in. speaker makes listening a pleasure. Push-pull transformers for ample power. Ferrite rod aerial. Many stations listed in one evening including Luxembourg loud and clear. Attractive case in grey with red grille. Size 6½ x 4½ x 1½in. (Uses PP4 battery available anywhere) (Carrying strap 2/- ex.).

Total cost of all parts now only **59/6** P. & P. 3/6
Parts Price List and easy build plans 1/6



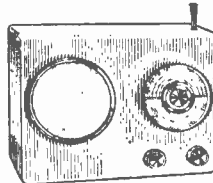
SUPER SEVEN

● 9 stages—7 transistors and 2 diodes

Covers Medium and Long Waves and Trawler Band. The ideal radio for home, car, or can be fitted with carrying strap for outdoor use. Completely portable—has built-in Ferrite rod aerial for wonderful reception. Special circuit incorporating 2 RF Stages, push-pull output, 3in. speaker (will drive large speaker). Size 7½ x 5½ x 1½in. (Uses PP9 battery available anywhere).

Total cost of all parts now only **£3.19.6** P. & P. 3/6
Parts Price List and easy build plans 2/-

All components used in our receivers may be purchased separately if desired. Parts price lists and easy build plans supplied free with sets of parts or available separately at fixed prices stated.



RADIO EXCHANGE CO.

61, HIGH STREET, BEDFORD.

Phone: 2367

Callers side entrance
Barratts Shoe Shop
Open 9—5 p.m.
Sats. 10—12.30 p.m.

THE R.S.C. BASS-MAJOR 30 WATT GUITAR AMPLIFIER

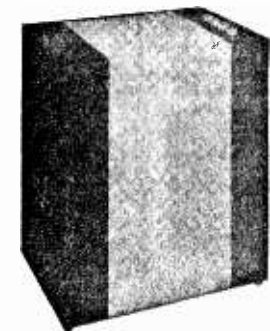
A MULTI-PURPOSE HIGH FIDELITY, HIGH OUTPUT UNIT
FOR VOCAL AND INSTRUMENTALIST GROUPS

Eminently suitable for bass, lead or rhythm guitar and all other musical instruments

- ★ Incorporating two 12in. heavy duty 25-watt high flux (17,000 lines) loudspeakers with 2in. diameter speech coils. Designed for efficiently handling full output of amplifier at frequencies down to 25 c.p.s.
- ★ Dual Cone in second speaker reproduces frequencies up to 17,000 c.p.s.
- ★ Heavily made cabinet of convenient size 24 x 21 x 14in. has an exceptionally attractive covering in two contrasting tones of Vynair.
- ★ For 200-250 v. to 50 c.p.s. A.C. mains operation.
- ★ Four jack socket inputs and two independent vol. controls for simultaneous connection of up to four instrument pick-ups or microphones.
- ★ Separate bass and treble controls providing more than adequate "Boost" or "Cut".
- ★ LEVEL frequency response throughout the audible range.
- ★ SUPERIOR TO UNITS AT TWICE THE COST.

39¹/₂ Gns.

Send S.A.E. for leaflet.
OR DEPOSIT OF £4.3.0 and 12 monthly
payments of £3.9.11. Carr. 17/6.



R.S.C. JUNIOR GUITAR AMPLIFIER
5-watt high quality output. Incorporating high flux 12in. 10 watt 12,000 line loudspeaker. Sensitivity 50 m.v. High impedance jack input. Handsome strongly made cabinet (size 14 x 14 x 7in. approx.) finished in complementary shades of Rexine/Tykan. 200-250 A.C. mains. **£9.19.6** Or DEPOSIT 22/3 and 9 monthly payments of 22/3. Carr. 7/6.

LINEAR TREMOLO/PREAMP. UNIT
Designed for introducing the Tremolo effect to any amplifier which is fitted with a reserve power supply point for smoothed H.T. and 6.3 v. A.C. L.T. This applies to practically all amplifiers of our manufacture, and to those of several other manufacturers. The unit plugs into power supply point and any input socket or amplifier. Controls are Speed (frequency of interruptions), Depth (for heavy or light effect), Volume and Switch. Three sockets are for two inputs and Foot Switch. **4 Gns.** ONLY

R.S.C. SENIOR 15 WATT LEAD OR RHYTHM GUITAR AMPLIFIER

High-fidelity push-pull output. Separate bass and treble "cut" and "boost" controls. Two separately controlled inputs so that two instruments or "mike" and pick-ups can be used at the same time. Loudspeaker is a heavy duty high flux 12in. 20 watt model with cast chassis. Chassis is well made and finished as Junior Model. Size approx. 18 x 18 x 8in.

Only **18 Gns.** Carr. 10/-

Send S.A.E. for leaflet. Or DEPOSIT 37/9 and twelve monthly payments of 31/6.



R.S.C. B20 BASS GUITAR AMPLIFIER

A highly efficient unit incorporating a massive 15in. high flux loudspeaker specially constructed to withstand heaviest load conditions. Rating 25 watts. Individual bass and treble controls give ample "boost" and "cut". Two high impedance jack socket inputs are separately controlled. All controls are conveniently positioned in a recess on top of the cabinet. Cabinet is of substantial construction and attractively finished in two contrasting tones of Rexine and Vynair. Size approx. 21 x 21 x 13in. Operation from 200-250 v. 50 c.p.s. A.C. mains.

Send S.A.E. for leaflet.
29¹/₂ Gns. Or Deposit £3.2.0 and 12 monthly payments of 51/8. Carr. 17/6.

GLASGOW — LONDON — EDINBURGH

226 ARGYLE STREET 238 EDGWARE ROAD 133 LEITH STREET
Three new branches now open

TRANSISTOR SALE. Mullard OC71 3/9, OC45 4/11, OC44 4/11, OC72 4/9, OC81 4/11, OC171 8/9, Ediswan XA101 3/9, XB102 3/9, XA112 3/9, XB113 3/9, XB104 3/9, XC101A 3/9. Postage 6d. for up to 3 Transistors.

D.C. SUPPLY KIT. 12 v. 1 a. consisting of a partially drilled metal case, mains trans., F.W. Bridge Rectifier, 2 fuseholders and fuses. Change Direction switch, variable speed regulator and circuit. For 200-250 v. A.C. mains. Suitable for Electric Trains. Limited number available at 28/11

SELENIUM RECTIFIERS
F.W. BRIDGE 24 v. 2 amp. 14/9
6/12 v. 2 a. 3/11 24 v. 20 amp. 89/9
6/12 v. 2 a. 6/11 H.T. TYPES H.W.
6/12 v. 3 a. 9/9 150 v. 40 mA 3/9
6/12 v. 3 a. 12/3 250 v. 50 mA 3/11
6/12 v. 6 a. 15/3 250 v. 60 mA 4/11
6/12 v. 10 a. 20/9 250 v. 80 mA 5/11
6/12 v. 15 a. 35/9 250 v. 250 mA 11/9
CONTACT COILED. 250 v. 75 mA. F.W. (Bridge) 8/11. 10/11. 250 v. 50 mA. F.W. (Bridge) 8/11. H.W. 250 v. 60 mA. 5/11.

HI-FLI 10-WATT AMPLIFIERS.
Brand New Complete **£7.19.6** Carr. 5/6.
Units.
Manufacturers' discontinued Model. Push-Pull output. Latest high efficiency valves. Dual separately controlled inputs for "Mike". Separate Bass and Treble Controls. High sensitivity. Output for 3 or 15 ohm speaker. Guaranteed tested and in perfect working order.

DERBY

Now open at
26 Osmaston Road
The Spot

R.S.C.

(Manchester)
Ltd.

MAIL ORDERS to 54 Wellington St. Leeds 1. Terms: C.W.O. or C.O.D. No C.O.D. under £1. Postage 2/9 extra under £2. 4/6 extra under £5. Trade Supplied. S.A.E. with all enquiries please.

LEICESTER

BIRMINGHAM

3 Exchange St.

HULL

LIVERPOOL

BRADFORD

MANCHESTER

LEEDS

5-7 County

32 High St

6 Gt. Western

Castle Market

St. Hull

73 Dale St.

56 Morley St.

(Market Street)

8-10 Brown St.

(Mecca) Arcade

Half-day

Snow Hill Station

Bldgs.) Sheffield

Half-day Thursday

No half-day

Half-day Wednesday

No half-day

No half-day

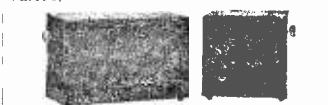
No half-day

EX. GOVT. SMOOTHING CHOKES.
200 mA, 3-5 H, 50 ohms, Parneko 8/9;
150 mA, 10 H, 50 ohms 9/9; 20 mA, 20 H,
300 ohms 6/9; 1200 mA, 12 H, 100 ohms 8/9;
50 mA, 50 H, 100 ohms 6/9; 100 mA, 10 H,
100 ohms 6/9; 60 mA, 5-10 H, 250 ohms 2/11

COMPLETE POWER PACK KIT 19/11
Consisting of Mains Trans., Metal Rectifier, Double electrolytic, smoothing choke chassis and circuit. For 200-250 v. A.C. mains. Output 250 v., 60 mA, 6.3 v. 2 a.

R.S.C. POWER PACK. 39/9. Louvered metal case only 8 x 5 1/2 x 2 1/2 in. Stove enamelled. For 200-250 v. A.C. mains. Output at 4 pin plug and socket 250 v., 60 mA, fully smoothed and 6.3 v. 2 a. Suitable for power requirements of almost any Pre-amp. or Radio Tuner.

R.S.C. BABY ALARM or INTER-COMM. KIT. Complete set of parts with diagrams, etc. Housed in two polished walnut finished cabinets of pleasing design. High sensitivity. For 200-250 v. A.C. mains. Fully isolated. Controllable at both units. An intercomm. of this class would normally cost £20-£30. Only 89/6, carr. 5/- or assembled ready for use 6 Gns.



EX GOVT SELENIUM RECTIFIERS 12v 15 AMP 19/9 (BRIDGE) F.W. ONLY

R.S.C. (Manchester) Ltd.

LEICESTER 32 High St.
BIRMINGHAM 6 Gt. Western Arcade Opp. Snow Hill Station
Half-day Thursday No half-day

MAIL ORDERS to 54 Wellington St, Leeds 1. Terms: C.W.O. or C.O.D. No C.O.D. under £1. Postage 2/9 extra under £2. 4/6 extra under £5. Trade Supplied. S.A.E. with all enquiries please.

SHEFFIELD 13 Exchange St. (Castle Market Bldgs.) Sheffield
Half-day Thursday

HULL 51 Savile St. Hull
No Half-day

LIVERPOOL 73 Dale St. Liverpool 2
Half-day Wednesday

BRADFORD 56 Morley St. (above Alhambra Theatre) Bradford
Half-day Wednesday

MANCHESTER 8-10 Brown St. (Market Street) Manchester 2
No half-day

LEEDS 5-7 County (Mecca) Arcade Briggate Leeds
No half-day

DERBY 26 Osmaston Road THE SPOT

FANE HEAVY DUTY HI-FI SPEAKERS

12in. 15 ohms. Cast chassis. Exceptionally robust 2in. diam. Voice Coil Assemblies. 122/10 20watt. 5 gns. 122/10A 20watt. 6 gns. 122/12 20watt. 6 gns. 122/12A 20watt. £7.19.6 122/14 22watt. 9 gns. 122/14A 22watt. 10 gns. 122/17 25watt. 11 gns. 122/17A 25watt. 12 gns. 12in. 17 ohms. Cast chassis. Exceptionally robust 2in. diam. Voice Coil Assemblies. 152/12 20watt. 12 gns. 152/12A 20watt. 13 gns. 152/14 27watt. 14 gns. 152/14A 27watt. 15 gns. 152/17 35watt. 16 gns. 152/17A 35watt. 17 gns. "A" indicates double the life. 30-17 c.p.s. Send S.A.E. for leaflets. Terms available.

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

A highly sensitive Push-Pull high output unit with self-contained Pre-amp. Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 dB down. Frequency response -3 dB 30-20,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used EF86, EF86, ECC83, 807, 807, GZ34. 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 OUT-DOOR 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. C. RAY FREEDER 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. Required perforated cover with carrying handles can be supplied for 10/-. The amplifier can be supplied, factory built with EL34 output valves and 12 months' guarantee, for 14 gns. Send S.A.E. for leaflet.

11 Gns.

Carr. 10/-. The amplifier can be supplied, factory built with EL34 output valves and 12 months' guarantee, for 14 gns. Send S.A.E. for leaflet.

TERMS: DEPOSIT 33/9 and 9 monthly payments of 33/9. Suitable microphones and speakers available at competitive prices.

ARMSTRONG, DULCI, LINEAR, ROGERS, LEAK and JASON EQUIPMENT, GOODMAN'S, W.B. and FANE SPEAKERS, GARRARD and GOLDRING T/ABLES CASH or H.P.

SUPERHET FEEDER UNIT. Design of a high quality Radio Tuner (specially suitable for use with our Amplifiers). Delayed A.V.C. 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 approx. 9 x 6 x 7in. Simple alignment procedure. Point-to-Point wiring diagrams, instructions and priced parts list with illustrations. 2/6. Total building cost £5.5.0. S.A.E. for leaflet.

R.S.C. BATTERY TO MAINS CONVERSION UNITS

R.S.C. BATTERY TO MAINS Type BM1. An all-day battery eliminator. Size 5 1/2 x 4 1/2 in. approx. Completely replaces battery supplies 1.4 v. and 50 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 and 50 v. This includes low consumption types. Complete kit with diagrams. 39/9, or ready to use. 46/6.



Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 120 v. 90 v. and 60 v. 40 mA and 2 v. 0.4 a. 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 200/500 v. 50 c/s. **SUITABLE FOR ALL BATTERY HE-CEIVERS** normally using 2 v. accumulators. Complete kit of parts with diagrams and instructions. 49/9, or ready to use. 59/6.

P.M. SPEAKERS. 10in. W.B. "Stentorian" 3 or 15 ohms type HF 1012 10 watts. hi-fidelity type. Recommended for use with our A11 Amplifier. £4.12.6. 12in. R.A. 3 ohms 10 watts (12,000 lines). 59/9.

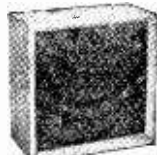
TWEETER. R.A. 3 ohm. 25/9: 15 ohm. 25/9

R.A. 12in. DUAL CONE 3 ohm 8 watt Speakers. Ideal for Stereo. Only 39/9 ea.

Jason FM/IT V.H.F./F.M. Radio Tuner design. Total cost of parts including valves, Tuning dial, Escutcheon, etc., £6.19.6.

LINEAR L45 MINIATURE 45 WATT QUALITY AMPLIFIER. Suitable for any record playing unit and most headphones. Negative feedback 12 dB. Separate Bass and Treble Controls. For mains 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Mullard valves EH80, ECC83, EL84. Size only 7x5x3 1/2 in. High. Guaranteed 12 months Only £5.19.6. Send S.A.E. for leaflet. Terms: Deposit 22/6 and 5 monthly payments of 22/6.

12in. 10 WATT HIGH QUALITY LOUDSPEAKER In walnut veneered cabinet. Gauss 12,000 lines. Speech coil 3 ohms or 15 ohms. Only £4.19.6 Carr. 5/-. Terms: Deposit 11/3 and 9 monthly payments of 11/3. **12in. 20 WATT HI-FI LOUD-SPEAKERS IN CABINET.** Size 18 x 18 x 10in. Finish as above. Terms: Deposit 17/9 and 9 monthly payments of 17/9. Only £7.19.6. Carr. 8/6. For larger types see preceding page. **LINEAR L434 GRAM AMPLIFIER.** High quality. Separate Bass and Treble controls. Handsome appearance. Completely enclosed. Black/Gold Frontplate 5 gns.



R.S.C. 4/5 WATT A5 HIGH-GAIN AMPLIFIER



A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 30 mV 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 reproduction. 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 Type-Buck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohms speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis with Blue Hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4.15.0, 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.

A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 30 mV 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 reproduction. 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 Type-Buck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohms speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis with Blue Hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4.15.0, 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.

GLASGOW — LONDON — EDINBURGH

326 ARGYLE STREET 238 EDGWARE ROAD 133 LEITH STREET
 Three new branches now open.

THE SKYFOUR T.R.F. RECEIVER. A design for a 3 valve long and medium wave 200-250 v. A.C. Mains receiver with selenium rectifier. High gain H.F. stage and low distortion detector. Valve line-up 6K7, SP6L, 5Y6G. Selectivity and quality excellent. Simple to construct. Point-to-Point wiring diagrams, instructions and parts list 1/9. maximum building costs £4.19.6. Inc. attractive walnut veneered wood cabinet 12 x 6 1/2 x 5 1/2 in.

R.S.C. BASS REFLEX CABINETS. JUNIOR MODEL. Specially designed for W.B. HF1012 Speaker, but suitable for any good quality 10in. speaker. Acoustically lined and ported. Polished walnut veneer finish. Size 18 x 12 x 10in. Handsome appearance. Ensure superb reproduction for only £3.19.6.

STANDARD MODEL. As above but for 12in. speakers. Size 20 x 15 x 13in. For vertical or horizontal use. £5.19.6. Set of legs with brass ferrules. 19/6.

R.S.C. JUNIOR HI-FI REPRODUCER. The very latest Goodman Axiette 8 High Fidelity loudspeaker (retailing at approx. 5 gns.) fitted in a specially designed Bass Reflex cabinet size 12 x 18 x 10in. Acoustically lined and ported and finished in polished walnut veneer. Matching impedance 15 ohms. Frequency range 40-15,000 c.p.s. Power handling 6 watts nominal. Ideal for Stereo.

8 Gns.

Carr. 4/6.

MULTI-METER, CABY ML. Sensitivity 2,000 ohms per volt. A.C. and D.C.. 54/- A.10. Basic Meter sensitivity 155 microamps A.C. and D.C. ranges £4.11.6. B.40. Sensitivity up to 10,000 ohms per volt A.C. and D.C.. £6.2.6. 30,000 ohms per volt, with overload buzzer. £8.19.6.

R.S.C. CORNER CONSOLE CABINETS

Polished walnut veneer finish. Piccasen design. **JUNIOR MODEL.** Size 20 x 11 x 8 in. for 8 x 5in. or 10 x 6in. speakers. £2.9.9. **STANDARD MODEL.** Size 27 x 18 x 12in. for 8 or 10in. speakers. £4.11.9. **SENIOR MODEL.** Size 30 x 20 x 15in. for 12in. Speaker. Suitable. Speaker systems below. Only 7 gns.



AUDIOTRINE HI-FI SPEAKER SYSTEMS. Consisting of matched 12in. 12,000 line, 15 ohm high quality speaker; cross-over unit (consisting of choke, condenser, etc.) and Tweeter. The smooth response and extended frequency range ensure surprisingly realistic reproduction. Standard 10 watt rating £4.19.9. Carr. 5/-. Or Senior 15 watt. £6.19.9. Carr. 7/6.

AUDIOTRINE EQUIPMENT CABINETS

Size 33 x 15 x 18in. Beautiful walnut veneered finish. Elegant contemporary design. Robust construction. Uncut. removable baseboard. Depth above baseboard 5 1/2 in. Only 121 gns. Carr. 15/-. Terms: Dep. 29/9, and 9 mthly. pymts. 29/9



AUDIOTRINE HI-FI TAPE RECORDER KIT 25¹/₂ GNS.

REALISM AT INCREDIBLY LOW COST, CAN BE ASSEMBLED IN AN HOUR

Incorporating the latest Collaro Studio Tape Transcriber. The Audiotrine High Quality Tape Amplifier with negative feedback equalisation for each of 3 speeds. High Flux P.M. Speaker, empty Tape Spool, a Reel of Best Quality Tape and a Handsome Portable Carrying Cabinet tastefully covered in contrasting shades of Rexine and Vynair, size 14 $\frac{1}{2}$ x 15 x 8 $\frac{1}{2}$ in. high and circuit. Total cost if purchased individually approximately £40. Performance equal to units in the £60-80 class. S.A.E. for leaflet. TERMS. Deposit £2.13.9 and 12 monthly payments of 44% Cash price if settled in 3 months.

HIGH FIDELITY 12-14 WATT AMPLIFIER TYPE A11

PUSH-PULL ULTRA LINEAR
OUTPUT 'BUILT-IN' TONE
CONTROL PRE-AMP STAGES

Two input sockets with associated controls allow mixing of "mike" and gram, as in All High sensitivity. Includes 5 valves, ECC83, ECC83, EL34, EL24, EL281. 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 $\pm$ 3 db 30-20,000 c/s. Six negative feedback loops. Hum level 60 db down. ONLY 23 millivolts INPUT required for FULL OUTPUT. Suitable for use with all makes and types of pick-ups and microphones. Comparable with the very best designs for STAN- DARD or LONG PLAYING RECORDS, or MUSICAL INSTRUMENTS such as STRING BASS, LEAD OFF RHYTHM GUITARS, etc. OUTPUT SOCKET with plug provides 300 v. 30 mA. and 6.3 v. 1.5 A. For supply of a RADIO FEEDER UNIT. Size approx. 12 x 9 x 7 in. For A.C. mains 200-250 v. 50 c/s. Output for 3 and 15 ohms speakers. Kit is complete to last unit. Chassis is fully punched. Full instructions and point-to-point wiring diagrams supplied. Only 8 Gns. Carr. 10/-

(Or factory built 51 extra.) If required louvered metal cover with 2 carrying handles can be supplied for 18/9. TERMS ON ASSEMBLED UNITS. DEPOSIT 24/9 and 9 monthly payments of 24/9. Send S.A.E. for illustrated leaflet detailing Cabinets, Speakers, Microphones, etc., with cash and credit terms.

LINEAR TAPE PRE-AMPLIFIER. Type 101, switched negative feedback equalisation. Positions for Record 12 $\frac{1}{2}$, 4 $\frac{1}{2}$, 3 $\frac{1}{2}$ in. and Playback. EM84 Recording Level Included primarily as the link between a Collaro Tape Transcriber and a high fidelity amplifier, but suitable for almost any Tape Deck. Only 9 gns. S.A.E. for leaflet.

R.S.C. STEREO/TEN HIGH QUALITY AMPLIFIER



Kit can be supplied assembled and

A complete set of parts for the construction of a stereophonic amplifier giving 5 watts high quality output on each channel (total 10 watts). Sensitivity is 50 millivolts. Suitable for all crystal stereo heads. Ganged Bass and Treble Control give equal variation of "lift" and "cut". Provision is made for use as straight (monaural) 10-watt amplifier. Valve line-up ECC83, ECC83, EL84, EL84, EL281. Outputs for 2-3 ohm speakers. Point-to-Point wiring diagrams and in-structions supplied. Send S.A.E. for leaflet. 8 Gns. Full constructional details and price list 2/6. Carr. 10/- ready to use for 59/8 extra.

SENSATIONAL STEREO OFFER

A complete set of parts to construct a good quality Stereo amplifier with an undistorted output total 8 watts. For A.C. mains input of 200-250 v. Sensitivity 100 m.v. Ganged Vol. and Tone Controls. Preset balance control. Full instructions and wiring diagrams supplied. Stereo Pick-up Head 18/9 extra with above only.

HEAVY DUTY CHARGER KIT. 6/12 v. 6 amps. variable output. Consisting of Mains Transformer 0-200-250 v.; F.W. (Bridge) Selenium Rectifier; Ammeter, Variable Charge Rate Selector Panels, Plugs, Fuses, Fuseholder and circuit. 59/9. Carr. 4/6.

R.S.C. MAINS TRANSFORMERS

Interleaved and Impregnated. Primary 250-300-350V. 50 c/s. Screened TOP SHROUDED DROPT THROUGH

250-0-250v. 70mA. 6.3v. 2a. 0-5-6.3v. 3a. 17/9
350-0-350v. 90mA. 6.3v. 2a. 0-5-6.3v. 3a. 18/9
350-0-350v. 100mA. 6.3v. 2a. 6.3v. 1a. 21/9
250-0-250v. 100mA. 6.3v. 3.5a. C.T. 25/9
250-0-250v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 19/9
300-0-300v. 130mA. 6.3v. 2a. 6.3v. 1a. for Mullard 510 Amplifier 28/9
300-0-300v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 28/9
350-0-350v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 28/9
350-0-350v. 150mA. 6.3v. 4a. 0-5-6.3v. 3a. 28/9

FULLY SHROUDED UPRIGHT

250-0-250v. 90mA. 6.3v. 2a. 0-5-6.3v. 2a. 17/11
250-0-250v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 27/9
300-0-300v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 27/11
300-0-300v. 130mA. 6.3v. 4a. C.T. 6.3v. 1a. for Mullard Amplifier 33/9
350-0-350v. 100mA. 6.3v. 4a. 0-5-6.3v. 3a. 33/9
350-0-350v. 150mA. 6.3v. 4a. 0-5-6.3v. 3a. 35/9

R.S.C. BATTERY CHARGING EQUIPMENT

Guaranteed 12 months,



charging. Louvered steel case with stoved grey hammer finish. Fused and ready for use with mains and output leads and battery clips. Carr. 4/6. Terms: Deposit 12/- and 5 monthly payments of 12/-.

CHARGER KIT. 12 v. 10 AMP or 24 v. 7 AMP

Consisting of mains trans. 200-250 v. F.W. (Bridge) selenium Rectifier. Ammeter, Fuses, Variable Resistor. Heavy Steel Stove enamelled case and Circuit. Only 29.19.6. Carr. 15/-. Please state if 12 v. or 24 v. kit required.

FULLY SHROUDED (GUARANTEED)

425-0-425v. 200mA. 6.3v. 4a. C.T. 5v. 3a. 55/-
325-0-325v. 200mA. 6.3v. 4a. C.T. 6.3v. 4a. C.T. 5v. 3a. 59/9
450-0-450v. 250mA. 6.3v. 4a. C.T. 5v. 3a. 69/9
Midget Battery Pentode 661 for 354. etc. 4/6
Small Pentode 5,000 Ω to 3 Ω 4/6
Small Pentode 7/6,000 Ω to 3 Ω 4/6
Standard Pentode 5,000 Ω to 3 Ω 5/9
Standard Pentode 7,000 Ω to 3 Ω 5/9
10,000 Ω to 3 Ω 5/9
Push-Pull 8 watts. EL84. or 6V6 to 3 Ω or matched to 15 Ω 9/9
Push-Pull 10-12 watts to match 6V6 or EL84 to 3-5 Ω to 15 Ω 10/9
Following types for 3 and 15 Ω speakers: Push-Pull 10-12 watts 6V6 or EL84 18/9
Push-Pull 15-18 watts 6V6 or KT89 22/9
Push-Pull Mullard 510 Ultra Linear 28/9
Push-Pull 20 watts, sectionally wound. 6L6, KT89, EL34, etc. 49/9

ONLY 3
PAIRS OF
SOLDERED
JOINTS
PLUGS
MAINS



R.S.C. GRAM AMPLIFIER KIT. 3 watts output. Negative feedback. Controls Vol., Tone and Switch. Mains operation 200-250 v. A.C. Fully isolated chassis. Circuit, etc., supplied. Only 39/9. Carr. 3/9.

HI-FI CRYSTAL PICK-UP HEADS. (Cartridges.) Acos Standard replacement for Garrard, B.S.R. and Collaro. 18/9. Acos Stereo-Monaural. 29/9. Ronette Stereo-Monaural 39/9. B.S.R. Stereo 39/9. AUTOMATIC RECORDING HEADS. High Impedance Record/Playback 22/- Low Impedance Erase. 12/6.

MARRIOTT RECORDING HEADS. High Impedance. Record/Playback 15/- Low Impedance. Erase. 10/-

PICK-UP ARMS. Complete and with PICK-UP ARMS/hi-fi Turnover Cartridge 29/11. CRYSTAL MICROPHONES. Hand type NP110 14/9. R.T.C. 18/9. Acos Mic 40 25/9. Acos Mic 45 25/9. Stick type Acos 39-1 39/9. BMS with neck band and heavy table stand 59/9. Label type 29/9.

COLLARO JUNIOR 4-speed Single Player Unit and Crystal Pick-up with hi-fi Turnover head. Only 23.19.6.

B.S.R. UA14 4-speed AUTO-CHANGERS with hi-fi Turnover head. 26.18.6. Carr. 4/6.

GARRARD AUTO-SLIM 4-SPEED AUTO-CHANGERS with high fidelity pick-up. Latest model. For 200-250 v. A.C. mains. 27.17.6. Carr. 4/6.

GARRARD AT6 AUTO-SLIM DELUXE 4-SPEED AUTO-CHANGERS. Turnover GCB head, for 200-250 v. A.C. mains. 21.19.0.

GLEA MINIATURE 2-3 WATT GRAM AMPLIFIER. For use with any single or auto-change unit. Output for 2-3 ohm speaker. For 200-250 v. A.C. mains. Size 11 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ in. Controls: Vol. and Tone with Switch. Only 59/8.

BATTERY CHARGER KITS

Consisting of Mains Transformer, F.W. Bridge, Metal Rectifier, well ventilated steel case, Ammeter, Fuse-holders, Grommets, panels, Heavy Duty Clips, circuit. Carr. 3/6 extra.

6 v. or 12 v. 1 amp. 22/9

As above, with Ammeter. 23/9

6 v. or 12 v. 2 amps. 25/9

6 v. or 12 v. 2 amps. inclusive of Ammeter. 35/9

6 v. or 12 v. 4 amps. with Ammeter and variable charge rate selector. 52/9

CHARGER AMMETERS 0-1.5 A. 0-4 A. 0-7 A. 8/9 ea.

CHARGER KIT. 12 v. 10 AMP. with variable charge rate adjustment and ammeter. 24.19.6. Carr. 10/-.

MIDGET MAINS PRIMARIES

50 c/s. 250v. 60mA. 6.3v. 2a. 11/9
250-0-250v. 60mA. 6.3v. 2a. 12/11

Both above size 2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ in.

FILAMENT TRANSFORMERS

All with 200-250v. 50 c/s primaries 6.3v. 1.5a. 5/9; 6.3v. 2a. 7/6; 0-4-6.3v. 2a. 7/9; 80mA. 10H. 350 ohms. 8/9; 6.3v. 6a. 17/6

12v. 1.5a. twice. 17/6.

SMOOTHING CHOKES

150mA. 7-10 H. 250 ohms. 11/9
110mA. 10H. 200 ohms. 8/9
80mA. 10H. 350 ohms. 8/9
60mA. 10H. 400 ohms. 4/11

CHARGER TRANSFORMERS

All with 200-250v. 50 c/s Primaries: 0-9-15v. 11a. 12/9; 0-9-15v. 2a. 14/9; 0-9-15v. 3a. 16/9; 0-9-15v. 20v. 50-30 watts. 13/9; 0-9-15v. 8a. 28/9.

UP/STEP DOWN TRANS.

230 watts. 39/9; 150 watts. 27/9.

DIODE TRANSFORMERS

120:1 high grade. clamped. 8/9.

Brand new individually
checked and guaranteed

VALVES

AC/HL 4/8	D196 5/6	EF86 6/1	KT32 8/1	P21-75 12/1	VP23 3/1	3V4 5/9	6G6G 2/6	9D2 3/1	53A 7/8	5796 6/1
AP14 6/1	D1519 15/1	EF80 3/8	KT33C 6/1	P21-100 6/1	VP133 9/1	40-27 35/1	6H1 8/1	11E3 8/7	58 6/1	6064 7/1
AC/PEPEN 5/1	D1810 3/1	EP91 2/9	KT44 5/9	P25 5/1	VR99 8/1	401 4/1	6H6M 1/8	12A6 2/8	59 6/1	6055 6/1
AL60 5/1	EP0F 23/1	EP92 2/1	KT63 4/1	P23-50 5/1	VR105/30 9/1	5A1734 5/1	6J4 9/1	12A17 5/1	75 5/1	6080 22/1
A34 5/1	EP1148 2/6	EP95 5/1	KT64 12/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A18 11/1	76 5/1	6193 1/1
AKP 3/8	EP1242 9/1	EP183 8/1	KT66 15/1	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARP3 3/1	EP1246 5/1	EP184 8/1	KT67 15/1	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARF12 2/6	EP1415 3/9	EP184 8/1	KT68 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARF21 7/1	EP1524 12/6	EP184 8/1	KT69 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARF24 3/8	EP1530 1/1	EP184 8/1	KT70 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARF34 4/1	EP1530 1/1	EP184 8/1	KT71 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ARF35 6/1	EP1530 1/1	EP184 8/1	KT72 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ATP4 2/3	EP1530 1/1	EP184 8/1	KT73 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
ATP7 5/8	EP1530 1/1	EP184 8/1	KT74 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
AU7 55/1	EP1530 1/1	EP184 8/1	KT75 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BL63 1/9	EP1530 1/1	EP184 8/1	KT76 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
B84 3/1	EP1530 1/1	EP184 8/1	KT77 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
B85 20/1	EP1530 1/1	EP184 8/1	KT78 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
B884 47/8	EP1530 1/1	EP184 8/1	KT79 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BT134 16/1	EP1530 1/1	EP184 8/1	KT80 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BT139 25/1	EP1530 1/1	EP184 8/1	KT81 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BT135 25/1	EP1530 1/1	EP184 8/1	KT82 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BT43 150/1	EP1530 1/1	EP184 8/1	KT83 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
BT43 35/1	EP1530 1/1	EP184 8/1	KT84 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CU3L 6/1	EP1530 1/1	EP184 8/1	KT85 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CU3C 6/1	EP1530 1/1	EP184 8/1	KT86 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CU33 6/1	EP1530 1/1	EP184 8/1	KT87 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV71 3/1	EP1530 1/1	EP184 8/1	KT88 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV77 6/1	EP1530 1/1	EP184 8/1	KT89 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV102 1/1	EP1530 1/1	EP184 8/1	KT90 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV103 4/1	EP1530 1/1	EP184 8/1	KT91 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV4014 7/1	EP1530 1/1	EP184 8/1	KT92 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV4015 5/1	EP1530 1/1	EP184 8/1	KT93 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV4025 10/1	EP1530 1/1	EP184 8/1	KT94 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV4046 4/1	EP1530 1/1	EP184 8/1	KT95 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
CV31 5/1	EP1530 1/1	EP184 8/1	KT96 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
D1 6/1	EP1530 1/1	EP184 8/1	KT97 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
D61 6/1	EP1530 1/1	EP184 8/1	KT98 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
D77 3/8	EP1530 1/1	EP184 8/1	KT99 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DA30 12/8	EP1530 1/1	EP184 8/1	KT100 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DA90 75/1	EP1530 1/1	EP184 8/1	KT101 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DAF96 6/1	EP1530 1/1	EP184 8/1	KT102 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DD41 4/1	EP1530 1/1	EP184 8/1	KT103 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DET5 8/1	EP1530 1/1	EP184 8/1	KT104 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DET20 2/1	EP1530 1/1	EP184 8/1	KT105 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DET23 15/1	EP1530 1/1	EP184 8/1	KT106 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DF73 5/1	EP1530 1/1	EP184 8/1	KT107 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DF91 3/1	EP1530 1/1	EP184 8/1	KT108 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DF92 3/1	EP1530 1/1	EP184 8/1	KT109 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DF96 6/1	EP1530 1/1	EP184 8/1	KT110 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DK92 6/1	EP1530 1/1	EP184 8/1	KT111 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DK96 6/1	EP1530 1/1	EP184 8/1	KT112 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DL92 6/1	EP1530 1/1	EP184 8/1	KT113 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DL93 6/1	EP1530 1/1	EP184 8/1	KT114 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1
DL94 6/1	EP1530 1/1	EP184 8/1	KT115 22/9	Q130/15 10/1	VR150/305/1 9/1	5A1740 5/1	6J4WA 10/1	12A17 5/1	77 6/1	6193 1/1

MANY OTHERS IN STOCK include Cathode Ray Tubes and Special Valves. All U.K. orders below £1 P. & P. 1/-; Orders over £1. 2/-; over £3, P. & P. free G.O.D. 2/6 extra. Overseas Postage extra at cost.

MARCONI COMMUNICATION RECEIVERS. CR.150.

Frequency coverage 2-60 Mc/s. Two I.F.s. 1st 1,600 kc/s, 2nd 463 kc/s. Image signal protecting over 40 dB up to 30 Mc/s and 20-40 dB from 30-50 Mc/s. Self-checking calibration (built in calibrator). Stabilisation of supply and temperature compensation. Electrical and mechanical bandspread. Metering and visual tuning indicator. Bandpass from 100 c/s to 10 kc/s in 5 stages. Acoustic filter associated with 100 c/s. Bandpass position for CW reception. Facilities for diversity reception. Excellent checked condition. £49. Mains P.S.U. by P.C. Radio, £4.10.0. Carriage 30/-.

CR.150/2. Frequency coverage 1.5-22 Mc/s in 4 bands, all other features as in CR.15. Price £35. Carriage 30/-.

P.C. RADIO'S mains P.S.U. for above, 90/-.

R.209 RECEPTION SET. A 10-valve high-grade superhet receiver with facilities for receiving R/T (A.M. or F.M.) and CW frequency 1 Mc/s-20 Mc/s. Hermetically sealed. Built on miniature valves and incorporating its own vibrator power-supply unit driven by a 6 v. battery (2) point connector included. The set provides for reception from rod, open-wire or dipole aerial with built-in loudspeaker, or phone output. Dimensions: Length 12in., width 8in., depth 9in. Weight 23 lb. In as new, tested and guaranteed condition. £23.10.0, including special head-phone and supply leads. Carr. £1.

ROTARY TRANSFORMER. 11.5—12.5 v. D.C. Input 300 v. 200 mA DC Output. 30/-, P. & P. 15/-.

RECEIVER TYPE R.206. Frequency 0.55 Mc/s to 20 Mc/s in 6 bands, 100-250 v. A.C. or 12 v. D.C. Loudspeaker in power supply unit.

eleven valves including a separate local oscillator valve, beat oscillator valve and two valves (Amplifier and Detector) in the A.B.C. system. In very good condition, £20.10.0, including power pack. Carriage and Packing 15/-.

H.R.O. Senior. Table Model. In excellent, fully checked, and tested condition (without coils and power pack), £15.10.0. As above but rack mounted model, £14.10.0.

Original mains power pack for H.R.O. 110/220 v. A.C. Brand new in original packing, 45/-, P. & P. 4/-.

CONNECTORS FOR TCS RECEIVER, TRANSMITTER AND REMOTE CONTROL, with original plugs on both ends. New £1.17.6 each. P. & P. 2/6.

TRANSMITTER RECEIVER, TYPE 68T. 3-5 Mc/s netting facilities. Low power consumption. Requires 150 v. h.t. and 3 v. i.t. dry batteries. In good condition, 35/-. Carriage 8/-.

CARBON INSET MICROPHONE. G.P.O. type, 2/6, P. & P. 1/6.

EVERSHED MEGGER CIRCUIT TESTER. 2 ranges 0 to 1000 Ω , 100 Ω to 200,000 Ω . With test leads, leather carrying case. Tested £4.19.6. P. & P. 3/6.

AR88D RECEIVERS. Fully reconditioned. £55; rebuilt models, £85; brand new, £95. Carriage paid U.K.

CHR HIGH RESISTANCE HEAD-PHONES. New, 16/-, P. & P. 1/6.

R.107 COMMUNICATION RECEIVER. 1.2/17 Mc/s. 9 valves. "Wide" and "narrow" band switch. AVC and BFO, with internal speaker. 100/250 v. A.C. and 12 v. D.C. Meas. 24 x 13 x 17in. Price £13.10.0. Carriage 20/-.

PANEL METERS (rugged) 2 1/2" D.C. 79/-

0-20 microamps	2 1/2" D.C.	79/-
0-50 microamps	3" D.C.	45/-
0-50 microamps	2 1/2" D.C.**	40/-
0-100 microamps	2" D.C.	35/-
0-100 microamps	2 1/2" D.C.**	35/-
0-200 microamps	2" D.C.	32/-
0-500 microamps	2" D.C.	21/6
0-500 microamps	2 1/2" D.C.	30/-
0-1 mA*	2" D.C.	19/6
0-1 mA	3" D.C.	35/-
0-1 mA	3" D.C.**	35/-
0-5 mA	3" D.C.	45/-
150-0-1,500 mA	3" D.C.	29/-
0-15 v.	2" D.C.	17/6
0-50 v.	2 1/2" D.C.	28/-
0-500 v. (shunt)	2 1/2" D.C.	24/-
0-5 kV	3" electrostatic	85/-
0-10 kV	2 1/2" D.C.	63/-
Freq. 50-70 c/Sec. 125v 33"		52/-
**Weston", as usually used also in H.R.O. as "S" meter. **Projection type.		

P.C. RADIO LTD

170 GOLDHAWK ROAD, W.12

Shepherd's Bush 9496

Open 9-5.30 p.m. Thursday 9-1 p.m.

SPECIAL PURCHASE!

OPERATE YOUR OWN T.V. STATION!

N.E.V. CLOSED-CIRCUIT

T.V. CAMERAS

Assembled and Ready
for Immediate Use
(Not a Kit!)



A Once in a
Lifetime Bargain
—Never to be
Repeated!

New—may need slight adjustment. 405 line for operating on your own television set, on any channel from 1 to 5. 210-240 volt A.C., 50-60 cycle.

Usual price £79. Limited quantity to clear at the ridiculously low price of only—

Complete with E.M.I. "M" Grade Vidicon Tube. Instructions and circuitry supplied.

Lenses available as advertised opposite. These cameras are highly recommended for experimental purposes and enthusiasts. security and home entertainment.

Thousand and one applications

£38.10

(Carr. and ins-24/-).

2-Wave-Band 6-Transistor

POCKET RADIOS

Long/medium wave. Gets all the stations you want: Light, Home, Luxembourg, Continental, etc. Not much larger than a packet of cigarettes, yet giving the volume and tone of a radio twice its size. Should sell at 7/- min. our price direct from docks to you ONLY

89/6

p. & p. 6/6.



Complete with batteries and leather carrying case. Ideal for holidays, picnics, garden, bedside and in the car.

TWO-WAY RADIO-TELEPHONE 'TRANSCIVERS'

28.5 Mc/s Crystal controlled: 9 transistor, volume control, etc. Range approx. 0.5 mile in city—2-3 miles sea and country. With smart leather case, standard rechargable batteries, etc. Ready assembled for use. Limited quota. Usually 45 guineas. OUR PRICE **£34.10** per pair.

(Licence should be obtained for use in U.K.)

Demonstrations of Closed-Circuit Cameras always available at our new city showrooms in Birmingham. Full range of Hi-Fi Stereo Tape and Disc equipment.

HORNTONS ELECTRONICS

LOMBARD HOUSE, GT. CHARLES ST., (Next to Pan American Airways) BIRMINGHAM 3

TRANSISTORISED
LIGHT-
WEIGHT

LOUD HAILERS

Ideal for the Beach!
Rallies, Sports & All
Outdoor Events, etc.

Attractive two-tone finish—
Usual price £10.95.

OUR PRICE

Only **69/6** (P. & P. 4/6)

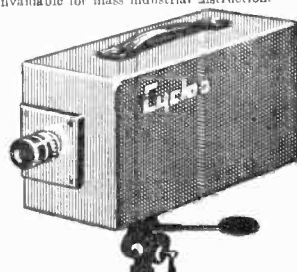
As nationally advertised—
THE HIGHLY SUCCESSFUL

NEW 'CYCLOP' MK. III TRANSISTORISED CLOSED-CIRCUIT TELEVISION CAMERA

Imagine! View round corners, through walls, and into dangerous or inaccessible places. Invaluable for mass industrial instruction. Unseen observation. Security, etc. No technical knowledge whatsoever required to install or operate. Pinpoint focus and view. Designed for standard 405 line, attaching directly into your own television set. Excellent picture quality. ONLY

£68.10

or £17.5 deposit and
12 payments of 93/3.
LESS LENS
(available as below).



Full details on request.



JAPANESE! 'COSMICAR' 1" TELEVISION LENS

'Click-stop' Aperture F/1.9 to F/22. 4 element lens construction, C Mount fitting. Full focusing adjustment from infinity

to 24". Blommed lenses complete with lens caps and polished in an ridiculously low price of only

£9.16.6

p. & p. 3/6. Also ideal for 16 mm. Movie Cameras. Definitely worth treble.

SUPER 'DAUMEYER' 1" F/1.9 LENSES

Designed for T.V. Work, and quite suitable for 16 mm. Cine Cameras. 4 element lens construction. Fully blommed. Focusing from infinity to 24". Standard C mount thread. Aperture closing down to F/16, guaranteed brand New. Normally retailing at £18.12.5. Our Price ONLY

£11.10 p. & p. 3/6



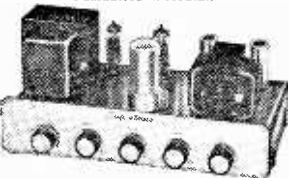
STOP PRESS! MINIATURE 2-WAY F.B.I. TRANSCIVERS

27 Mc/s Citizens Band. Approx. 400-500 yds. range. Limited. Impair ONLY **£9.15** per pair (Easily worth double). (Licence should be obtained for use in U.K.)



Telephone
CEN 6283

THE TRIPLETONE HI-FI MAJOR

PRICE ONLY £15.18.9 COMPLETE
Guaranteed 12 Months.

A 12 watt quality amplifier incorporating negative feedback, with a pre-amp for mic. and provision for mic./gram mixing. Frequency response ± 1 dB; 15-20,000 cps. Distortion only 0.15%, with noise and hum $\rightarrow$ 80 dB. Separate Bass, Middle and Treble filter controls. Valve line-up, 12AX7, 12AX7, EL84, EL84 and E281. Push-pull output with matching 3 or 15 Ω . Fully isolated power supply from 200-250 v. A.C. input, with take-off for tuner etc. Size 12 x 4 x 6 in. h. gins.

De Luxe Case: 14 in. x 9 in. x 7 1/2 in. 30/- extra.

New R.C.S. VALVES 90-day Guarantee

1R5	6/-	6Q7G	6/-	6E6C1	8/-	6C14	5/-
1R5	6/-	6N7	5/-	6E6C1	8/-	6C14	10/-
1Y1	3/-	6V6	5/-	6E6C1	8/-	6C14	8/-
3B4	7/-	6X4	4/-	6E6C1	8/-	6C14	7/-
3V4	7/-	6X5	5/-	6E6C1	8/-	6C14	8/-
514	6/-	12AT7	6/-	6E6C1	8/-	6C14	7/-
5A3	6/-	12AT7	6/-	6E6C1	8/-	6C14	7/-
32A	9/-	12AX7	7/-	6E6C1	8/-	6C14	7/-
6AM6	4/-	12K7	5/-	6E6C1	8/-	6C14	8/-
6AT6	6/-	12K8	14/-	6E6C1	8/-	6C14	8/-
6BE6	5/-	12Q7	7/-	6E6C1	8/-	6C14	8/-
6BE6	5/-	20Y7	9/-	6E6C1	8/-	6C14	8/-
6BW6	7/-	35L6	9/-	6E6C1	8/-	6C14	8/-
6H6	3/-	35Z4	5/-	6E6C1	8/-	6C14	10/-
6J5	5/-	954	2/-	6E6C1	8/-	6C14	8/-
6L6	5/-	14F6	8/-	6E6C1	8/-	6C14	8/-
6L7G	6/-	14F6	8/-	6E6C1	8/-	6C14	8/-
6K6	5/-	14F6	8/-	6E6C1	8/-	6C14	8/-
6K7G	5/-	14F6	8/-	6E6C1	8/-	6C14	8/-
6K8	5/-	14F6	8/-	6E6C1	8/-	6C14	8/-
6N7M	5/-	14F6	8/-	6E6C1	8/-	6C14	8/-

I.F. TRANSFORMERS 7/6 pair
465 Kc Slug Tuning Miniature Can, 2 x 1 x 1 in.
High Q and good bandwidth. Data sheets.

NEW ELECTROLYTICS

TUBULAR		TUBULAR		CAN TYPES	
1/350V	2/-	50/350V	5/6	8/600V	9/-
2/350V	2/3	100/25V	3/-	16/450V	5/-
4/450V	2/3	250/25V	3/-	16/600V	12/-
8/450V	2/3	500/12V	3/-	16 - 16/500V	7/8
16/450V	3/-	1,000/12V	3/-	32 - 32/350V	6/8
32/450V	3/9	5,000/6V	5/-	32 - 32/450V	6/-
25/25V	1/8	8 + 8/450V	3/6	32 + 32 + 32/350V	7/-
25/50V	2/-	8 + 16/450V	3/9	50 + 50/350V	7/8
50/25V	2/-	16 + 16/450V	4/3	64 + 120/350V	11/8
50/50V	2/-	32 + 32/350V	4/6	100 + 200/275V	12/6

TELESCOPIC MONORAIL AERIALS. 12 to 32m, 8m. TRIPLEXERS Bands I, II, III, 12/6. COAX PLUG, 1/- LEAD SOCKET, 2/-. PANEL SOCKETS, 1/- OUTLET BOXES (Surface or flush), 4/- ea. BALANCED TWIN FEEDER yd. 6d. 80 or 300 ohms. TWIN SCREENED per yd. 1/- 80 ohms only. Wirewound Ext. Speaker Control, 10 Ω 3/-, 25 Ω 6/6. WIRE-WOUND POTS, 3 WATT. Pre-set Min. Type. All values to 10 ohms to 25 K, 3/- ea. 30 K, 4/- (Carbon 30 K to 2 meg, 3/-). WIRE-WOUND 4 WATTS. Pots. Long spindles. Value, 50 ohms to 50 K, 6/6; 100 K, 7/6. PHILIPS TRIMMERS, 0-10 pF, 3-30 pF, 1/- TRIMMERS, Ceramic, 30, 50, 70 pF, 9d; 100 pF, 150 pF, 1/3; 250 pF, 1/6; 500 pF, 750 pF, 1/9. TV etc. TRIMMER, 1000 pF, with knob, 2/6. RESISTORS. Preferred values, 10 ohms to 10 meg, 1 w., 4d; 1 w., 4d; 1 w., 6d; 1 w., 8d; 2 w., 1/- High Stability, 4 w., 1% 2/- Preferred values 10 Ω to 10 meg, 10 Ω to 10 meg, 10 Ω to 10 meg, 10 Ω to 10 meg. BRIMISTORS. CZ1, 3/6; CZ2, 2/6; CZ3, 1/6. 5 watt } WIRE-WOUND RESISTORS { 1/3 10 ohms - 10,000 ohms { 2/ 15 watt { 2/- 12.5 K to 25 K 10 w. { 3/ Toggle Switches, s.p.d., 2/- d.p.d., 3/6. d.p.d.t., 4/-. Min. Slide d.p.d.t., 3/6.

Volume Controls 80 ohm COAX Cable spaced 1/4 in. 40 yds. 17/6 60 yds. 25/- 6d.yd. Ideal 225 lines. Low loss 5dB 100ft. 500 Mc/s 1/6yd.

MAINS TRANSFORMERS 200/250 v. A.C.

Postage 2/- each transformer.

STANDARD, 250-0-250, 80mA, 6.3 v. 3.5 a. tapped 4 v. 4 a. Rectifier 6.3 v. 1 a. 5/-	2/6
2 a. or 4 v. 2 a. 22/6, ditto, 350-0-350	2/6
MINIATURE 200 v. 20 mA, 6.3 v. 1 a. 10/6	10/6
MIDGET, 250 v. 45 mA, 6.3 v. 2 a. 15/6	15/6
SMALL, 250-0-250, 45 mA, 6.3 v. 2 a. 17/6	17/6
STD, 250-0-250, 65 mA, 6.3 v. 3.5 a. 17/6	17/6
HEATER TRANS. 6.3 v. 15 a. 7/6	7/6
Ditto, tapped 1.4, 2, 3, 4, 5, 6.3 v. 8/6	8/6
Ditto, sec. 6.3 v. 4 amp. 10/6	10/6
GENERAL PURPOSE LOW VOLTAGE, 2 amp. 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 24, 30 v. 22/6	22/6
AUTO TRANSFORMERS, 150 w. 22/6	22/6
0, 115, 200, 250, 350 v. 500 w. 82/6	82/6
MULLARD "510" Mains Transformer 33/6	33/6
MAINS POWER PACKS. Ready built with Transformers, Rectifiers, Condensers, providing H.T. and L.T. outputs.	
200 v. 20 mA, D.C. 6.3 v. 1 a. D.C. 25/6	25/6
250 v. 30 mA, D.C. 6.3 v. 2 a. A.C. 35/6	35/6
250 v. 80 mA, D.C. 6.3 v. 3.5 a. A.C. 45/6	45/6

INTERVALVE TRANSFORMERS. Set of 3, 9/- O.P. TRANSFORMERS. Heavy Duty, 5/6. Multi-ratio, 7/6. Multiratio heavy duty push-pull, 10 w., 15/6. Battery, 4/6. Sub. min., 5/6. 2 v. or 4 v. or 6 v. or 10 v. or 12 v. L.F. CHOKES 10, 100, 500 mA, 5/6; 10H, 50 mA, 10/6; 10H, 150 mA, 14/6.

C.R.T. BOOSTER TRANSFORMERS for heater cathode short circuit, of tubes with failing emission. Full instructions supplied, mains input. Type A optional 25% and 50% boost 2 v. or 4 v. or 6 v. or 10 v. or 12 v. State voltage required. PRICE 10/6.

TINNED COPPER WIRE 16 to 22 swg. 100, 3/- ENAMEL COPPER WIRE 16-22, 2/9; 24-30, 3/6; 32-40, 4/6; D.C.C. 28, 34, 36 swg. 2oz. 3/6. FULL WAVE BRIDGE SELENIUM RECTIFIER: 2.5 or 12 v., 12 amp., 8/6; 2 a., 11/3; 4 a., 17/6. CHARGER TRANSFORMERS. Tapped input 200-250 v., for charging at 2.5 or 12 v., 11 amp., 15/6; 6 amp., 17/6; 4 amp., 22/6. Circuit included. 4 AMP CAR BATTERY CHARGER with ammeter, leads, Fuse Case, etc. for 6 v. or 12 v., 60/6.

BOOKS list S.A.E.

Boys' Book of Crystal Sets...	2/6
"W.W." Radio Valve Data	7/6
High Fidelity Speaker Enclosure	5/-
Valve and TV Tube Equivalents	9/6
TV Fault Finding	5/-
Mullard Amplifier Manual	8/6
Radio Valve Guide, Books 1, 2, 3, 4 or 5	5/- each
Practical Radio Inside Out	3/6
Master Colour Code Chart	1/6
Transistor Controlled Models	7/6
International Radio Stations	2/6

4 TRANSISTOR PUSH-PULL

Size 1 1/2 x 3 in. AUDIO AMPLIFIER
A really built miniature push-pull amplifier with Driver and output transformers, 4 transistors. Ideal for use with record players, intercoms, BABY ALARMS, etc. Complete with full instructions and circuit.
Price 47/6 9v. Batt., 2 1/2 in. speaker 15/-

1964 RADIOGRAM CHASSIS



THREE WAVEBANDS FIVE VALVES
S.W. 16 m. - 50 m. LATEST MULLARD
M.W. 200 m. - 350 m. ECH81, EF89, EB81,
L.W. 800 m. - 4000 m. EL84, E280
12-month guarantee.
A.C. 200/250 v. Short-Medium, Long/Grm.
Ferrite Aerial A.C. 3 ohm output, 5 watts.
Tape Sockets. Glass dial, horizontal wiring.
Size 13 in. x 7 in. high x 3 1/2 in. deep.
£9.15.6 Carr. & Ins. 1/-

BAKERS
'Selhurst'
-RADIO-THE
CONNOISSEUR'S
CHOICE'none genuine
without this seal'

12in. STALWART HEAVY DUTY 15w. 5 gns.

45-13,000 cps. or 15 ohm voice coils. Unlimited Applications. Flat response 100 to 10,000 cps. magnet, 12,000 lines. Price for quality unbeatable.

12in. STANDARD HEAVY DUTY 25w. 7 gns.

More powerful magnet! 14,000 lines special suspension. 40-14,500 cps. Recommended wherever a high standard of reproduction is desired.

12in. BASS HEAVY DUTY 25w. 12 gns.

New 1964 high power model. Aluminium coil former with magnetic damping 25-15,000 cps. Ideal for all electric guitars.

15in. AUDITORIUM MODEL 35w. 18 gns.

Improved magnet aecomax with heavy plated steel plates, weight 10 lbs. 17,000 lines, 20-12,000 cps. Solid heat proofed Paxolin Coil Former. Ideal Electric Guitars.

LOUDSPEAKERS P.M. 3 OHM. 2 1/2, 3, 4, 5 in., 7 x 4 in., 15/6; 6 in. Rola, 16/6; 8 in. Pioneer, 17/6; 9 x 6 in., 8 x 5 in., 21/6; 10 x 6 in., 22/6; 10 in. Rola, 30/-; 12 in. R.A., 30/-; EMI, Double Cone Ceramic magnet 10 w. 13 x 5 in., 45/-; Horn Tweet 20 6

STENTORIAN HF1012, 10m. 3 to 15 ohms, 10w. 92/-; S.H. HF121, 76/-; Crossover CA3000, 33/-; EXTENSION SPEAKER CABINET, 50m., 13/6; 60m., 19/6; 8m., 19/6; 10m., 29/6; 12m., 60/-.

TWIN GANG TUNING CONDENSERS. 365 pF., miniature 1 in. x 1 in. x 1 in., 10/-; 500 pF. standard with trimmers, 9/-; midge, 7/6; with trimmers, 9/-, 300 pF. slow motion tuning, standard 9/-; transistor gang 208 + 176 pF. with trimmers, 10/6. SMALL 3 gang 500 pF. 17/-, SINGLE 365 pF. 7/6, SINGLE 10 pF., 25 pF., 50 pF., 75 pF., 100 pF., 150 pF. 3/6. solid dielectric 100, 500, 500 pF. 3/6.

CONDENSERS. New stock, 0.001 mfd. 7 kV, T.C.C., 5/6; Ditto, 20 kV, 8/6; 0.1 mfd., 7 kV, 9/6; Tubular 500 v. 0.001 to 0.05 mfd., 9d.; 0.1, 1/-, 0.25, 1/6; 0.5/350v., 1/8; 0.1 350v., 8d.; 0.01 200v., 0.1/100v., 1/8; 0.1 mfd. 2,000 volts, 3/6.

CERAMIC CONDS. 500 v. 0.3 pF. to 0.01 mfd., 9d.

SILVER MICA CONDENSERS, 10% 5 pF. to 500 pF. 9d.; 600 pF. to 3,000 pF. 1/- (close tolerance +1 pF) 2.2 pF. to 4 pF. 1/-, Ditto 1% to 50 pF. to 815 pF. 1/-, 1,000 pF. to 5,000 pF. 1/9.

WAVECHANGE SWITCHES

8 p. 4-way 2 water long spindle	6/6
2 p. 2-way or 2 p. 6-way long spindle	3/6
4 p. 2-way or 4 p. 3-way long spindle	3/6
3 p. 4-way or 1 p. 12-way long spindle	3/6

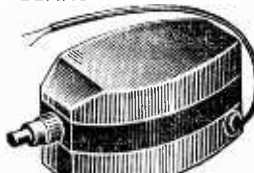
Wavechange "MAKITS". Wafers available: 1 p. 12 way, 2 p. 6 way, 4 p. 3 way, 4 p. 3 way, 6 p. 2 way, 1 water switch, 8/6; 2 water switch, 12/6; 3 water switch, 16/-; additional wafers up to 12, 3/6 each extra.

Valveholders. EA50, 6d. B12A, CRT, 1/3. Envel. and Amer. 4, 5 and 7 pin. 1/3. MOULDED Mazda and Int. oct., 6d; BTG, B8A, B8G, B9A, 9d. BTG with can, 1/6. B9A with can, 1/8. Ceramic L55, 1/6. B7C, B9A, Int. oct., 1/- BTG, B9A cans, 1/- each. Valve plugs BTG, B9A, Int. oct. 2/3.

HIGH GAIN TV PRE-AMPLIFIERS
B.B.C. Channel 1 to 5. Gain 18dB.
ECC84 valve. Kit price 29/6 or 49/6 with power pack. Details 6d. (PC84 valves if preferred).
BAND III I.T.A. - Same prices.
Tunable channels 8 to 13. Gain 17dB.
Circuit and coils only, 9/6, Chassis 4/9.

THE ORIGINAL
RADIO COMPONENT
OPEN ALL DAY
(Wed. 1 p.m.)

THE "INSTANT" BULK TAPE ERASER AND RECORDING HEAD DEMAGNETISER 200/250 V. A.C.



35/-

Leaflet
S.A.E.

PLASTIC RECORDING TAPE

Double Play	7in. reel, 2,400ft. 42/-	Spare
	5in. reel, 1,200ft. 26/-	Plastic
		Reels
Long Play	7in. reel, 1,800ft. 22/6	3in. 1/8
	5in. reel, 1,200ft. 17/6	4in. 2/-
	5in. reel, 900ft. 15/6	5in. 2/-
Standard	7in. reel, 1,200ft. 17/6	5in. 2/-
	5in. reel, 600ft. 11/6	7in. 2/6

"EASISPLICE" Tape splicer 5/-
Leader tape 4/6; Splicing tape 3/-

CRYSTAL SET BOOKLET, 1/-
CRYSTAL DIODE (U.S.C.) GEX34, 3/-, OA81, 8/-
HIGH RES. PHONES, 4,000 ohms, 15/-, 2,000 ohms
12/8. MOVING COIL PHONES, 100 ohms, 10/8
SWITCH CLEANER. Fluid squirt, 4/6 tin.

"6+1" TRANSISTOR RADIO

First class components to make a 6 transistor 2 waveband superheterodyne. Ideal for portable or table radio. All parts including BVA transistors, ferrite aerial, with car aerial coil, printed circuit, 8in. x 2 1/2in., but EXCLUDING Speaker and cabinet.
Speakers, 35 ohms, 7 x 4in., 21/-
5in., 17/6; 3 1/2in., 15/6. Cabinet 27/6.

BULGIN PLUGS AND SOCKETS. Non-reversible P74, 2-pin, 4/8; P73, 3-pin, 4/6; P104, 6-pin, 6/8
JACKS. English open circuit, 2/6. Closed circuit, 4/3. Grundig type 3-pin, 1/3. Grundig lead jack 3/6
JACK PLUGS. English, 3/-; Screened, 4/-; Grundig, 3-pin, 3/6; Phone Plug, 1/-; Sockets, 6d.
ALADDIN FORMERS and cores, 1in., 6d.; 1 1/2in., 10d.
0.3in. FORMERS. 5987 or 8 cane TV1 or 2 1/2in. sq. x 2 1/2in., or 1in. sq. x 1 1/2in., 2/- with cores.
LOW MOTION DRIVES. 8.1, 4/8; 36.1, 10/6.
SOLON IRON, 25W, 250V, or 250V, 24/-
ANTEN SUB-MIN. IRON, 10w, 200 or 240V, 29/6.
BENCH STAND for above, 12/6. Spares in Stock.
Paxolin Panels, 10 x 8 x 1 1/2in., 2/-
Miniature Contact Coiled Rectifiers, 250V, 60mA, 7/6; 250V, 65mA, 9/6. Selenium Rect., 300V 65mA, 8/-; 250V, 60V, 5mA, 5/-
RM4, RM5, 14A100, 14A116, 10/- each. FC31, 20/-
TV etc. Silicon Sub-Min. Rectifiers, 250V 450mA, 10/-; 250V 150mA, 6/6.

455 kc/s. SIGNAL GENERATOR
Price 10/6, ready made with valve 185.
POCKET SIZE, 2 1/2 x 4 1/2in. One resistor to chance, full instructions supplied.
Battery 6/6 extra. Details Free.

Collis Weaire "P" Type, 4/- each.
Osmor Midget "Q" type, ad. dust core, from 4/- each. All ranges. List S.A.E.
Repanco D.R.R. L. and Med. T.R.F. with reaction, 4/6. Med. wave D.R., 3/6.
Ferrite Aerials, M. 8/8; M. and L., 12/6.
Osmor Ferrite Rod Aerials, L. and M. for transistor circuits, 10/- each.
Ferrite Rods, 6 x 3in., 2 x 1in., 6 x 1/2in., 3/-
H.F. Cokes, 2/6. Osmor QCL 6/9.
T.R.F. Collis, A/HF, 7/- pair; HAX, 3/6.
Screwdriver, 5in., 6d. Test Prods, 2/9 ea.
Neoside Trimming Tool, 1/9.
Neon Mains Tester, Screwdriver, 5/-
Multicore Solder, 4d. yd. Dispenser, 2/6.

Blank Aluminium Chassis, 18 s.w.g. 4 sides, riveted corners, lattice fixings holes, 2 1/2in. sides, 7 x 4in., 4/8; 9 x 7in., 5/9; 11 x 7in., 6/8; 13 x 9in., 8/6; 14 x 11in., 10/6; 15 x 14in., 12/6.
Aluminium Panels, 18 s.w.g., 12 x 12in., 4/6; 14 x 9in., 4/-; 12 x 8in., 3/-; 10 x 7in., 2/3; 8 x 6in., 2/-; 6 x 4in., 1/6.

MARTIN TAPE PRE-AMPLIFIERS & DECKS (PLAY-BACK THROUGH YOUR OWN AMPLIFIER)

Collaro 2 track Collaro Studio
Pre-amp. £8.80 (tube deck £10.15.0)
COMPLETE RECORDING & PLAY-
BACK AMPLIFIERS
Collaro amplifier £11.1.0

MAINS DROPPERS. Midget adjustable sliders
0.5A, 1,000 ohms, 8/-; 0.2A, 1,200 ohms, 6/-;
0.15A, 1,500 ohms, 6/-; 0.1A, 2,000 ohms, 6/-
MIKE TRANSFORMERS, 50-1 3/8.
P.V.C. Covered Wire, single or stranded, 2d. yd.
Sleeving, 1 or 2 mm. 2d.; 4 mm., 3d.; 6 mm., 5d. yd.
SPEAKER-FRIT, Gold, Maroon or Green Cloth
17 x 25in., 6/-; 25 x 35in., 10/-
Tykan, various colours
52in. wide from 10/-; 17 1/2in. wide from 5/-
ft. Samples 1/-
Expanded Metal, Gold, 12 x 12in., 6/-
Panel mounting fuse holder, 2/-
Fuses 14in. 50mA-
5A, 6d. Insulated side cutters, 3/8. Rib Striper, 3/8.

RADIO AND TELEVISION SPARES

All leading makes, volume controls, etc., line output transformers, etc., B. V. A. valves (current and obsolete types). Send S.A.E. for quotation.

WEYRAD

COILS AND TRANSFORMERS FOR
2-WAVE 6-TL TRANSISTOR PRINTED
CIRCUIT AND FERRITE AERIAL.

Long and Medium aerial—RA2W 5in. rod
208 pF tuning, with car aerial coil, 12/8
Osc. Coil P501/LAC 176 pF tuning 5/4
1st and 2nd I.F. P502/2CC. 470kc/s 11/16in.
dia. by 4in. 5/7 each
3rd I.F. P503/3CC 6/-
Spare Cores 6d.
Driver Transformer—L.FDT4 9/8
Wavechange Slide Switch d.p.d.t. 3/8
Printed Circuit—PCAI. Size 21 x 8 1/2in.
Ready drilled and printed 9/8
Volume Control—DP 4/6
35 ohm Speakers, 3 1/2in., 15/6; 5in., 17/6;
7 x 4in., 21/-
Tuning Gang with trimmers 10/8
6 Mullard Transistors and diode 42/6
Constructor's Booklet 2/-
3 ohm O.P. Trans. O.P.T.1 10/6

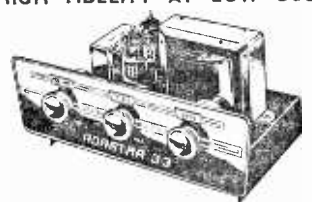
NEW MULLARD TRANSISTORS
OC71 6/-, OC72 7/6, OC81D 7/6, OC81 7/6,
OC44 8/-, OC45 8/-, OC171 10/6, AF117 9/6.
Sub Miniature Condensers, 0.1 mF.
30v., 1/3, 1, 2, 4, 5, 8, 16, 25, 30, 50, 100 mF.
15 volt, 2/6 ea. Transistor Holders, 1/8.

SINCLAIR "SLIMLINE" RADIO
Med. wave kit, 2 transistors, 2 diodes
sapphire, ferrite aerial. Cabinet
3 x 1 1/2 x 1 1/2in. 49/6, batt. 3/6.

THE "POWER MITE" 45/-

PM9 Mains Unit 9 volt for Transistor
Radios. Same size as P.P.9 (200/250V.
A.C.).

ADASTRA 3-3 AMPLIFIER 3 WATTS HIGH FIDELITY AT LOW COST



READY BUILT, WIRED AND TESTED
A.C. 200-250V. Valves EC1, 86 and
EZ80. 3 ohms output. Controls: bass,
treble and volume. Separate front panel
with de luxe finish. Quality mains trans-
former. Enamelled chassis 6in. x 3 1/2in. x
3in. Price £4.18.6. Details S.A.E.

"Performs agreeably well" (The Gramophone)

BUILD YOUR OWN RECORD PLAYER

FROM £9.19.6

AND
SAVE
POUNDS!!



4 Speed Autochanger or Single Player
units with Brand New 2-tone de Luxe
Cabinets 17 x 15 x 8 1/2in. Strong handle,
gilt finish clips and hinges. Used by
Famous Make for 2000 models.
Ready cutout motor board 14x13 1/2in.
Front baffle with 7 x 4in. high flux
loudspeaker and 3 watt 2 valve UY85.
UCL82 amplifier built on metal chassis
12 x 3 x 2 1/2in. Quality 3 ohm output
transformer, low hum level circuit.
Volume and Tone controls, 3-core
safety mains lead. All items fit to-
gether perfectly. Special instructions
only 5 wires to join! 12-month written
guarantee. Available separately or
package deals as below.

AUTOCHANGER KITS (see above)
B.S.R. Monarch .. £11.10.6 P.P. 3/6
Garrard Autolam .. £12.18.6 P.P. 3/6
SINGLE PLAYER KITS. Complete (as above)
E.M.I. Junior .. £9.19.6 P.P. 3/6
Garrard SRP10 .. £11.5.6 P.P. 3/6
OR SEPARATELY

Cabinet with board 14 x 13 1/2in.
cut out to your choice £3.9.6 P.P. 3/6
Amplifier with 7 x 4in. speaker £3.17.6 P.P. 2/6

AUTOCHANGERS
B.S.R. UA14 .. £5.19.6 P.P. 4/4
B.S.R. UA15 Slimline .. £6.17.6 P.P. 4/6
Garrard Autolam .. £6.17.6 P.P. 4/6
SINGLE PLAYERS
Garrard SRP10 .. £5.5.6 P.P. 4/6
E.M.I. auto stop/start .. £5.5.6 P.P. 3/6
E.M.I. Junior .. £5.7.6 P.P. 3/6

TRANSCRIPTION UNITS
Garrard 4HP .. £15.15.6 P.P. 5/-
Philips AG1016 .. £12.5.6 P.P. 5/-
Garrard AT8 .. £10.10.6 P.P. 5/-

BARGAIN XTAL PICK-UP AEM
Complete with ACOS LP-78 Turnover Head, 20/-

Replacement sapphire styl 5/-, diamond 15/-
Mono GP58 Xials 15/-; Stereo Ronnette 30/-.

BARGAIN SINGLE PLAYER KIT 200/250 V. A.C. (1em cabinet) £5.15.0 Post 5/-

With 2-stage Amplifier; 3 watt; 2 valves, UCL82.
UY85: High-flux 5in. speaker; 4-speed E.M.I.
Turntable, 16, 33, 45 78 c.p.m.; Crystal Pick-up
for LP/STD. Records, 7in., 10in., 12in.; Cut out
Mounting boards 12 x 9in.

ARDENTE TRANSISTOR TRANSFORMERS
D3035, 7.3 CT-1 Push-Pull to 8 ohms for OC72, 11/-
D3034, 1.7A-1 CT-1 Push-Pull Driver for OC72, 11/-
D3038, 11.5-1 Output to 3 ohms for OC72, etc., 11/-
D167, 13.2-1 Output to 3 ohms for OC72, etc., 12/-
D239, 4.5-1 Driver, 7in. x 1in. x 1in., 11/6
D240, 8.5-1 Driver, 7in. x 1in. x 1in., 11/6
ARDENTE TRANSISTOR VOLUME CONTROLS
VC145, 8K with switch dia., 9in., 5/8
DEAF AID EARPIECE, Xial or marmette 7/6
SUB-MIN. JACK AND PLUG 2.5 or 3.5 mm., 3/6 pair.

MINIATURE PANEL METERS
Size 1 1/2in. sq. Precision jewelled bearings,
2%, accuracy, silvered dials, black
numerals and line pointers, zero
adjustment screw on front of meter.
0-1 mA .. 2/76 0-500 A .. 32/6
0-5 mA .. 2/76 0-500 A .. 32/6
0-300V .. 2/76 "S" Meter .. 35/-

MOVING COIL MULTIMETER, TK30A
0-1000 V. A.C./D.C. ohms 0-100k, etc., 49/6.
0-150 m 2in. scale.

CRYSTAL MIKE INSERTS, 6/6
High output. Size 1 1/2in. dia. x 1in.
ACOS MIC, 14, insert 1 1/2in. dia. x 1in., 8/6
ACOS 35-THE LUXE STICK MIKE 35/-
ISI, QUALITY STICK MIKE .. 25/-
TELEPHONE TAPE MIKE .. 10/8
GUITAR CONTACT MIKE .. 15/6
MOVING COIL MIKE .. 50/6
FLOOR STANDS .. 57/6

COMPONENT SHOP 337 WHITEHORSE ROAD SPECIALISTS WEST CROYDON

Telephone: THO 1665

(Export welcome. Send remittance,
and extra postage, no C.O.D.)

P.P. charge 1/- C.O.D. 2/- extra.

126/138 or 68 Pass door. S.R. Station Road

**RADIO-AMATEUR GEAR
EDUCATIONAL KITS**

**TEST INSTRUMENTS
HI-FI EQUIPMENT**

**With the clearly-written instruction manuals,
anyone can build one of these models—
have the world's best equipment — and save money**

HI-FI F.M. TUNER. Tuning range 88-108 Mc/s. Tuning unit (FMT-4U) with 10.7 Mc/s. I.F. output (£215.0 inc. P.T.) I.F. Amp. (FMA-4U) complete with cabinet and valves. (£13.3.0). Total kit £1518.0. Assembly can be arranged.



5W HI-FI MONO AMPLIFIER. Model MA-5. A low-priced well designed amplifier. Printed circuit construction makes it easy to build. Kit £10.19.6. Assembled £15.10.0

STEREO CONTROL UNIT. USC-1. Luxury model with inputs to suit any pick-up or tuner. Kit £19.10.0 Assembled £26.10.0

MONO CONTROL UNIT. Model UMC-1. Ideal for use with MA-12 or similar amplifier. Kit £8.12.6. Assembled £13.12.6

HI-FI EQUIPMENT CABINETS. Large range, in kit form or assembled and finished, available to meet various needs. Details on request. ... from £7.7.0 to £37.16.0



"MOHICAN" GENERAL COVERAGE RECEIVER Model GC-1U. Fully Transistorised. Excellent portable or general purpose receiver for amateur or short wave listening. See full spec. leaflet. Kit £37.17.6 Assembled £45.17.6



AMATEUR BANDS RECEIVER. Model RA-1. Covers all Amateur Bands from 160 to 10m. Special features incl. half lattice crystal filter, 8 valves, signal strength "S" meter, tuned R.F. amplifier stage. ... Kit £39.6.6 Assembled £52.10.0

6W DE LUXE AMPLIFIER. Model S-33H. An inexpensive Stereo-Mono amplifier, with high sensitivity. Suitable for Decca Deraam Cartridge. Kit £15.17.6. Assembled £21.7.6

6 TRANSISTOR PORTABLE. Model UXR-1. Prealigned I.F. transformers. Printed circuit. 7 x 4in. high flux speaker. Real hide case. Very easy to build. ... Kit £12.11.0

SHORTWAVE TRANSISTOR PORTABLE. Model RSW-1. Two short bands, trawler and medium wave. ... Kit £19.17.6

HI-FI A.M. F.M. TUNER. Covers F.M. 88-108 Mc/s. A.M. 16-50, 200-550, 900-2,000 m. Tuning heart (£4.13.6 inc. P.T.) and I.F. Amp. £21.16.6. Printed circuit board. Total ... Kit £26.10.0

"OXFORD" DE-LUXE TWO WAVEBAND TRANSISTOR PORTABLE. Model UXR-2. The ideal domestic, car, or personal portable receiver. 10 Semi-conductors. Send for full details. £14.18.0 Kit (inc. P.T.). Assembly can be arranged.



Assembled models also available: prices on request—Deferred terms available over £10. Free delivery U.K.

SEND FOR FREE BRITISH HEATHKIT CATALOGUE—OVER 50 MODELS TO CHOOSE FROM

PA AMPLIFIER. Model PA-1. 50W output. For vocal and instrumental groups, guitars, etc. 4 inputs, 2 speakers, Tremolo. Send for full details. Kit £54.15.0. Legs optional extra 17/6 set. Assembled £74.0.0.

50W POWER AMPLIFIER. Model MA-50. Ideal for PA work etc. Kit £19.18.0. Assembled £27.18.0.



COMMUNICATIONS TYPE RECEIVER Model RG-1. An excellent low cost receiver. Freq. cov.: 600 kc/s-1.5 Mc/s. 1.7 Mc/s-32 Mc/s. A two speed tuning drive. R.F. "front end" supplied assembled, aligned and tested. Send for details. Kit £39.16.0 Assembled £53.0.0

2½in. PORTABLE SERVICE OSCILLOSCOPE. Model OS-1. An ideal light, compact scope for servicing and general work. Printed circuit construction. Kit £21.18.0. Assembled £29.8.0

5in. OSCILLOSCOPE. Model IO-12U. Wide band amplifiers essential for TV servicing. F.M. alignment, etc. T/B covers 10 c/s—500 kc/s in 5 ranges. Kit £32.12.6. Assembled £41.10.0

VALVE VOLTMETER. Model V-7A. Measures up to 1,500 v. (D.C. and r.m.s.) and 4,000 pk-to-pk. Res. 0.152 to 1,000 MΩ. Kit £13.18.6. Assembled £19.18.6



DX-40U

See Heathkit models at the **RADIO SHOW,**
STAND No. 32, EARLS COURT, LONDON,
August 26th—September 5th 1964.

AMATEUR TRANSMITTER Model DX-40U. Self-contained. 80-10 m. Power input 75 w. CV., 60 w. peak C.C. phone. Output Kit £33.19.0. Assembled £45.8.0

40 w. to aerial. Prov. for VFO

DAYSTROM LTD.

Dept. P.W.8, GLOUCESTER, ENGLAND

A member of the Daystrom Group, manufacturers of the
WORLD'S LARGEST-SELLING ELECTRONIC KITS

AMATEUR TRANSMITTER. Model DX-100U. Covers all amateur bands. 160-10 m. 150 w. D.C. input, self contained with power supply. Modulator, VFO Kit £79.10.0. Assembled £104.15.0



DX-100U

Send me **FREE BRITISH CATALOGUE** (Yes/No)
Full details of model(s)

NAME

ADDRESS

PW8

Practical Wireless

Vol. XL No. 690 AUGUST, 1964

Editorial and Advertisement
Offices:

PRACTICAL WIRELESS

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

George Newnes Ltd., 1964

Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London.
Registered at the G.P.O. for trans-
mission by Canadian Magazine Post.

SUBSCRIPTION RATES

including postage for one year

To any part of the world £1.9.0

Contents

Editorial ...	317
Round the World of Wireless ...	318
Transistor Tuner/Converter ...	320
Transistor Superhet Faults ...	324
A Handy Signal Injector ...	327
Audio Oscillator Design ...	332
Making Panel Escutcheons ...	335
Versatile Gramophone ...	
Amplifier ...	336
End Fed Aerials ...	341
Q Multipliers ...	344
Electronic Vibrato ...	347
Cabinet Care ...	348
On the Short Waves ...	357
Transistor Pre-amp. ...	358
Club News ...	362
The Chelmer 4 ...	365
A Simple Carbon Microphone ...	370
Trade News ...	373
Letters to the Editor ...	377

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, London, W.C.2. Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent. Copyright in all drawings, photographs and articles published in PRACTICAL WIRELESS is specifically reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden. PRACTICAL WIRELESS incorporates "Amateur Wireless".

Finishing the job

AT this time of year many readers, we hope, are enjoying a well-earned holiday, or are contemplating one in the near future. Others—sad thought—have already had their annual break from the daily task.

The radio enthusiast, returning from holiday to take up the threads of his hobby will most likely be eager to get started again, like a lion refreshed. This is the time to consider whether enough thought and attention is given to the final appearance of equipment to be constructed.

Too many constructors spoil the ship for a ha'porth of tar. Too many pieces of equipment are electrically efficient but look like something from Steptoe's junk yard. Too many units are housed in unsuitable casings—or none at all—and too many panels are untidy in layout and finish.

There was once a popular saying that "it doesn't matter what it looks like so long as it works". This may have had an element of justification in bygone days but it does not ring true in 1964. Except for purely experimental projects, the average piece of equipment built by a constructor of average ability and experience, should work quite well at first switch-on. But there is no excuse, nowadays, to mar a nice piece of construction by slipshod appearances.

If one is not building from a kit, or from a published design, a little more thought on external appearance will often bring rewarding results. The placing of controls, etc., on a front panel do not have to be exactly symmetrical but they should have a semblance of tidiness.

Knobs do not *have* to match, but it looks better if they do. Potentiometer spindles do not *have* to be the same length, but sawing them to a uniform projection looks neater. Controls do not *have* to be labelled, but the use of stencils or panel transfers will enhance the appearance. Wooden cabinets do not *have* to be painted or polished but they look better if they are. Crocodile clips (and worse) *can* be used for inter-connections but proper plugs and sockets look better and are more positive—and safer.

Also, many enthusiasts do not have a separate radio room or even if they do, certain pieces of gear are used in rooms inhabited by parents or wives. A poorly finished item can be an eyesore to the non-enthusiast! These days neat, compact, units are easily possible but there is no reason for not trying to make them even more compact if circumstances dictate—and to make them as presentable as possible.

In radio clubs and at exhibitions equipment can often be seen which, though built by amateurs, has a crisp professional flavour. It should be the aim of all serious constructors to reach, within practical limits, this kind of standard. But, at least, the care and attention given to achieve electrical efficiency and neat wiring should be allied to a pride in the final appearance.

As for the inside of equipment—that is quite another story!

Our next issue dated September will be published on August 7th



NEWS AT HOME AND ABROAD

Festival QSL-Cards for Johannesburgs Contacts

DURING August, September and October this year, South Africa's capital city will be presenting "The Johannesburg Festival". Johannesburg's hams will be participating in the Festival and a special QSL-card will confirm all contacts with local amateur stations during the festive period. In addition, an award will be given to stations sending a certified list of contacts (no QSL-cards) made in accordance with specified rules, to the Awards Manager, P.O. Box 7227, Johannesburg, Republic of South Africa. The rules require that Dx stations, outside Zone 38, must contact five Johannesburg stations during the period of the Festival. Phone, s.s.b., a.m. or mixed contacts with a minimum report of RS 33 or RST 338 will be acceptable.

Short wave listeners can also qualify by sending a certified list of the required number of stations heard, as provided by the rules, to the same address.

The award, presented on the inside of a folded card, tells the story of the growth of Johannesburg in story and colour illustrations.

U.S. FIRM TO MANUFACTURE E.E.V. TUBES

AS a result of arrangements recently made with Compagnie Generale de Telegraphie Sans Fils (C.S.F.) in Paris, English Electric Valve Company products may now be manufactured in the U.S.A.

The two companies have exchanged manufacturing information, so that each now makes certain products of the other, and this facility is now available to Warnecke Electron Tubes Inc., in Chicago, U.S.A., which is a subsidiary of C.S.F.

AFTER an absence of two years, the Television and Radio Show will be back at London's Earls Court in late August, but with a difference. Following on the success of 1963's "trade-only" shows staged by the different manufacturers, this year's Radio Show will lay restrictions on public viewing time, leaving periods when visiting radio dealers will be able to "take in" the displays at leisure in a relatively deserted Earls Court. This step has been taken to combat criticism from the trade that much of the benefit of the show is lost when dealers have to contend with a public crowd in order to see all the exhibits, as they have had to in the past. The first two days of this year's show then, will be strictly for the trade. The public will be admitted on August 26th but then only from 11 a.m. onwards, as on seven of the remaining ten days of the exhibition the hours of 9.30 a.m. to 11 a.m. will be reserved, once again, for the trade only.

What this means, in fact, is that the public is left with August 26th to September 5th (except Sunday) when they will be admitted from 11 a.m. (10 a.m. on Saturdays) to 9 p.m.

Royal Albert Hall Gets Audio Boost

WHEN the BBC recently televised a "beat" music show from the Royal Albert Hall, screams from the teenage audience effectively drowned much of the output from the hall's audio installation. To prevent this problem arising on the second occasion that "big beat" performers and groups and hundreds of teenagers at the Albert Hall combined to provide BBC-2 with its Top Beat show, Standard Telephones and Cables Limited, who originally installed the Hall's amplification system, brought in extra loudspeakers and stepped up the power to boost voices and musical instruments above the screams.

STC engineers increased the regular installation, consisting of three 45W amplifiers, to over 300W for the performance.

COMMERCIAL RADIO FOR THE ISLE OF MAN

A COMMERCIAL radio station for the Isle of Man has been given the sanction of the Home Office.

This was established by a recent Press release in which it was stated that under an agreement with the Isle of Man Government (in which Pye of Cambridge have entered) a company will be set up to operate a radio broadcasting station on the Island.

Final details of the company and the concession granted to it remain to be finalised, but the principal conditions have been settled. Under the agreement, the company will provide a service on both the medium wave and v.h.f. bands and to broadcast news and items of interest.

Pye have been acting as technical advisers to the Isle of Man Government on the project, undertaking detailed radio sur-

veys of the Island and providing technical recommendations concerning both the transmitters. These recommendations were passed to the British Post Office.

The specific frequency recommended in the medium wave band is entirely available for the purpose and will cause no interference with any existing broadcasting service in the United Kingdom. It is proposed to confine the hours of transmission in the medium wave band to daylight and under these conditions the station cannot interfere in any way with continental stations.

The allocation of a medium wavelength at the outset is essential as only a small minority of set owners would be able to tune into v.h.f. programmes.

The station will be broadcasting under the authority of the Postmaster General's Wireless and Telegraphy Act, and new legislation in the Isle of Man Legislature will ensure high standards of both public broadcasting and of the advertising material.

A complete broadcasting station with medium wave and v.h.f. transmitters and a studio was shipped from Cambridge to the Isle of Man during June.

Amateur Radio Exhibition Dates

THE Radio Society of Great Britain has announced the dates for its Exhibition this year, as October 28th to 31st.

Once again this year, the venue for the exhibition will be the Seymour Hall, Seymour Place, Marble Arch, London.

The 1964 International Radio Communications Exhibition will follow the style of previous shows, with manufacturers, retail firms, amateur organisations and technical publishers taking stand space in the hall. To accommodate extra exhibits, the balcony of Seymour Hall will be open, and occupying the stage at one end of the Hall will be a special presentation, illustrating the part played by radio in ships.

As before, amateur radio stations GB3RS and GB2VHF will be operating from the exhibition, making contacts on 70cm and 2 and 4m bands and other wavelengths, throughout the duration of the show. Amateur TV enthusiasts will be providing demonstrations and a c.c.TV installation will be in operation. The armed services will once again be providing interesting exhibits as will other government bodies.

Various presentations of awards will be made during the show, including a £130 communication receiver to the holder of a lucky ticket. The doors will open daily from 10 a.m. to 9 p.m. The price of admission will be 3s.

LORD FRASER GUEST OF VETERAN HAMS

LORD FRASER of Lonsdale was the principal guest at the Annual Reunion Dinner of the Radio Amateur 'Old Timers' Association which was held recently in London. In 1926 Lord Fraser, then Captain Ian Fraser, was President of the Radio Society of Great Britain, himself holding a transmitting licence.

At the dinner some eighty "hams", all of whom had had a transmitting licence more than twenty-five years ago, heard Lord Fraser speak of the milestones in the history of amateur radio and of his own experiences as a young wireless enthusiast. Recalling how, in 1927, British radio amateurs decided to demonstrate to a BBC reluctant to begin overseas transmissions, that music broadcasts to Australia could be reliable, Lord Fraser said:

"I well remember how, with the help of the transmitter of Mr. Gerald Marcuse, a leading amateur, we organised a transmission from Britain to Australia in the early hours of the morning. The High Commissioner for Australia and some leading Australian artists then in Britain put on an hour's programme from Marcuse's house in Caterham to Australia, and the Australian broadcasting stations gave it national coverage.

"So anxious was Marcuse to get his signals across that he overran his generators and the programme only lasted for a few minutes before they burnt out. Nevertheless we had spurred the BBC to action, and very soon they produced the Overseas Division which began world-wide broadcasting."

Commenting on the experi-

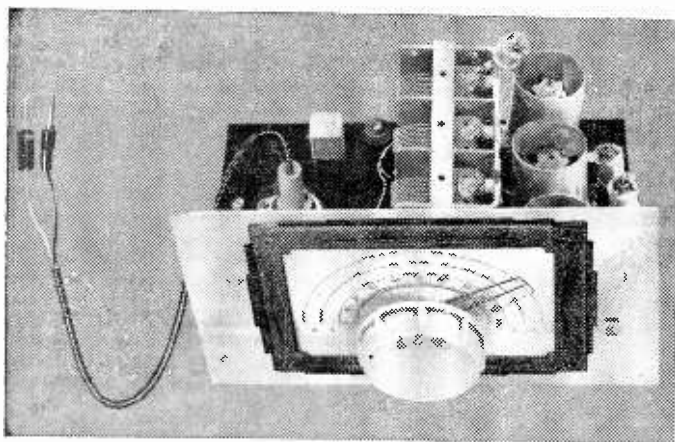
mental work and services to the community performed by radio amateurs, Lord Fraser went on to say:

"I suppose that in every scientific field the amateur has made his contribution. Certainly in the wireless field much experimental work—hardly to be dignified by the name of fundamental research, but nevertheless of considerable intrinsic value and of great educational value—was done . . . When the General Strike occurred in 1926 I was a freshly elected M.P., and I remember helping to organise a skeleton service which offered to enlist hundreds of amateurs all over the United Kingdom who could communicate with each other if official services broke down. In fact there was no breakdown and we had no work to do, which greatly disappointed us."

Transistor Tuner/Converter

1, 2 or 5 Transistors
Optional i.f. Strip
Plug-in Coils

BY F. NEVILLE HART



THIS versatile unit can be built in a number of ways, depending upon the pocket and requirements of the constructor. In the first place it can be made as a one transistor tuner as described in the March 1963 issue of PRACTICAL WIRELESS, in which we had to wind on an extra coil for the base, on to the plug in coils designed by Denco for valve circuits.

This company has now produced a whole range of similar plug in coils for transistor use, still using B9A Noval valve holders, but with the new advantage of the coil former having nine pins, which hold the coil very firmly indeed.

Since some readers asked if the tuner could be made more selective, an r.f. stage is added in this version. In addition, the set has been designed to take a "plug in" 1.6Mc/s i.f. strip with volume control. This can either be used with the output taken to an audio amplifier through the crystal diode, or, as an extension of the first part, as a double superhet into the aerial circuit of any medium band radio.

Choice and construction of a cabinet is left to the reader, but one made of three ply, leaving room for the battery, and with a section of the top hinged to facilitate coil changing, is suggested.

The dial assembly is easily fitted but care should

be taken to see that the shank and the spindle of the tuning gang are concentric, otherwise any undue pressure will make the faster of the two slow motion movements bind. This assembly has approximately 5 degrees either way of 36 to 1 movement, which makes selection very easy. Then the movement changes in either direction, to 6 to 1 for quick tuning.

Two Transistor Tuner

As with the Denco coils for valve sets, the bottom end of each oscillator coil is brought to a different pin on each range to connect with the correct padder capacitor. Although medium and long wave ranges are made, there is no advantage in providing for them in this design, and in any case, since Range 1 and Range 5 use the same padder pins, one would have to choose between the two, or incorporate a simple switch arrangement on the front panel, selecting the appropriate padder.

The coils are supplied in aluminium boxes which are used for screening cans, suitably cut and

This is how the tuner looks when complete except for the i.f. strip which will be described in our next issue.

drilled. The lids of the cans have to be mounted at the same time as, and under, the B9A valve holders and care must be taken to see that they make contact with the metal rim of the holder.

These should be cut as in Fig. 2.

First make two straight cuts across the centre, $\frac{1}{8}$ in. apart, the centre removed, and each end of the slot cut down to the knurled edge. Then with a round file, shape the hole to take snugly the ceramic or bakelite portion of the valve holder. One of the metal ends of the latter can now be inserted and the other end gently forced into place.

This being done before mounting on the paxolin chassis, it can be ensured that some portion makes contact so that when the screening can is screwed on it is properly earthed. It is easier to insert the fixing screws if they are round headed.

The requirements of the tuning capacitor are that it must have ceramic insulation and each portion 300pF. with a minimum capacity of 11pF. The Jackson "F" three gang 300pF fits these conditions admirably.

Solder on three wires to the stators before mounting, as these junctions are inaccessible afterwards. Mount the tag strip first, using countersunk screws to avoid fouling capacitor moving plates when fully open. It is also necessary for the same reason to "bush" up the capacitor with washers or fairly wide nuts on the fixing screws or the moving plates will not open to the fullest extent.

COMPONENTS LIST FOR TUNER SECTION

Resistors:

R1	2.7k Ω	R5	2.7k Ω
R2	10k Ω	R6	10k Ω
R3	1.2k Ω	R7	1.2k Ω
R4	1k Ω	R8	1.8k Ω

All $\frac{1}{4}$ -watt carbon, $\pm 10\%$

Capacitors:

C1	0.005 μ F disc ceramic	C2	0.01 μ F mica
C3	0.05 μ F mica		
C4	0.01 μ F mica		
C5	2 μ F 6V electrolytic		
C6	2000pF mica		
C7	0.01 μ F mica		
C8	0.003 μ F disc ceramic		
C9	0.01 μ F mica		
C10	50 μ F 25V electrolytic		
C11	250pF mica		
Cp1	340pF	Cp2	960pF
Cp3	2000pF		

Variable Capacitors:

VC1, VC2, VC3 3-gang, 300pF per section
(Jackson Bros. Type F)
TC1-TC7 3-30pF beehive type trimmers

Transistors:

Tr1 OC171 Tr2 OC171

Inductors:

IFT1 Denco Maxi-Q 1.6Mc/s i.f. transformer, Type IFT16

T1 Denco plug-in transistor coils. Aerial (Blue)

T2 Denco plug-in transistor coils. R.F. (Yellow)

T3 Denco plug-in transistor coils. Mixer (White)

(Note: ranges of T1, T2 and T3 to suit requirements. Range 3=1.67-5.3Mc/s. Range 4=5.0-15Mc/s. Range 5=10-15Mc/s)

Other items:

Jackson Bros. 6/36 drive assembly, complete with dial. Number 4103. Four B9A valve holders. One blank Denco 9-pin coil former. Slider switch or similar small on-off switch.

Paxolin (7 x $\frac{1}{4}$ in.); two angle brackets ($\frac{3}{8}$ in. long x $\frac{1}{8}$ in.); two pieces aluminium sheeting ($1\frac{1}{8}$ x $\frac{1}{4}$ in.); 10-way tag strip $\frac{3}{8}$ in. long with end tags and tags 4 and 7 as earthing connections; 30 nuts and bolts, 11 with countersunk heads; 10 soldering tags; aerial socket; two miniature crocodile clips; sleeving; 6V battery; battery clips.

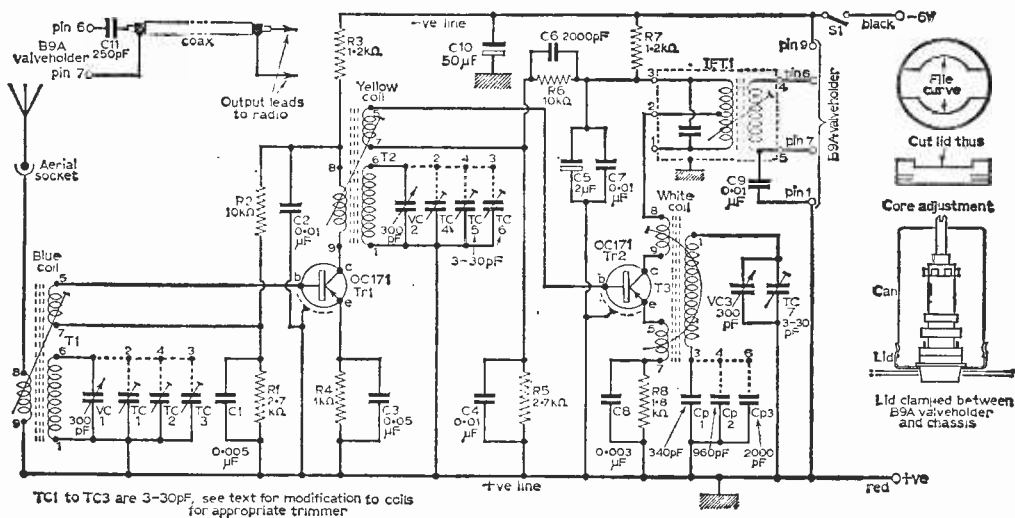


Fig. 1: The circuit of the tuner.

Fig. 2 (pictorial inset): Modifying the coil cans for accommodation on the chassis.

The oscillator trimmer TC7 can now be soldered onto the tuning gang, the "stalk" onto the body with a hot iron, after scraping and tinning the spot where it is to go. The "live" end must be soldered to the stator tag. When wiring up positive earth wires do not forget to connect a wire to each of the two contact springs in the middle of the gang capacitor, taking care to see that there is enough clearance for the moving plates.

Cut and drill the base panel, mount the angle brackets, the tag strip and i.f. coil (Denco IFT16). Also mount the valve holders (4), remembering to put soldering tags onto each of the fixing screws

where indicated in the layout. This also applies to a screw on each angle bracket.

The dial assembly can be mounted after all the base wiring is finished but drilling holes should be marked to coincide with the angle brackets. The side pieces, of aluminium fixed onto the dial, serve the dual purpose of extending the screen and of supporting the dial, and to accommodate the sliding switch. If it is intended to use the i.f. strip, the left hand one will have to be drilled to take the volume control. Mount the switch ready to take the main minus wire when assembling.

Now solder in all the positive leads with bare

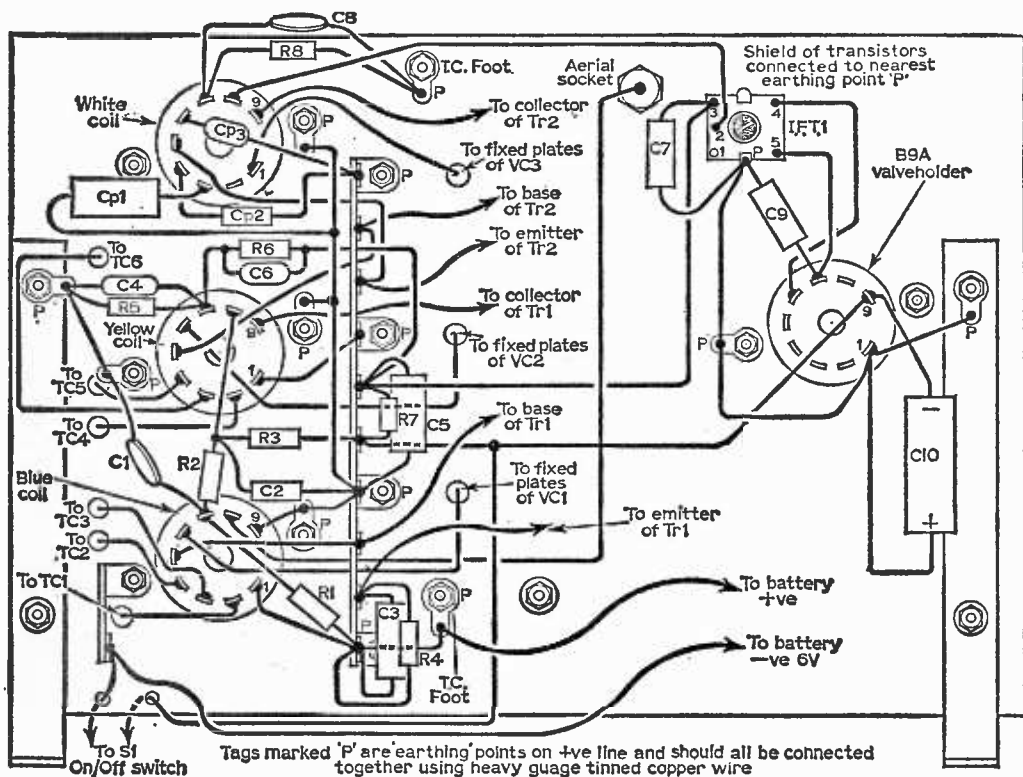


Fig. 3: The main wiring, as it appears on the underside of the paxolin chassis.

tinned 24swg wire, but use a heavier gauge wire for connections to tuning gang and across the four main soldering tags on the tag strip. These should be firmly joined at their bases to form a "bus-bar". It is an essential of short wave working that particular attention is paid to efficient earthing of all tuning components. Also earth the i.f. can.

It will usually be found that the metal around B9A valve holders is solderable, so solder on an earth wire to the three coil holders, slipping it under the slots on the screening can holders. Next wire on the tuning gang leads from the stators, having pushed these, suitably insulated with sleeving, under the tag strip, before attaching to the respective tags on the valve holders.

Proceed to wire on all negative leads except that to the switch. Wire on the resistors, then the fixed capacitors, taking care, as these are of a miniature kind, to make a quick joint. It is a good plan to treat these like transistors and use a heat sink, such as a long nosed pair of pliers with an elastic band around the handle. Transistors should be left until the very last.

When all the wiring of the chassis is done, mount the transistors. Their positions are not shown on the layout of the base panel, but they lie diagonally towards the rear of the underneath side, approximately under the tuning gang, their bases, emitters and shields soldered onto the tags indicated on the layout. It is as well to place

sleeving on each wire and the writer uses a colour code as follows: Black for collectors, Blue for bases, Yellow for emitters and Red for shields. White can be used where needed for base bias circuits.

The output leads are of coaxial cable and terminate in a blank Denco coil former to fit into the B9A output valve holder. This is put there so that if it is decided to add the i.f. strip, it has merely to be plugged in. The 250pF series capacitor is contained in this former, two holes being drilled near the respective pins, through which one wire from the condenser is pushed, and the output earth wire through the other hole.

Separate Aerial and R.F. Trimmers

One of the disadvantages of these plug in coils when they were designed for valve sets was that variations of trimmer capacitance of each individual range were not possible, for only four pins were fitted. But now the makers insert nine pins in the formers, and pins 2, 3 and 4 on the aerial and mixer coils are left blank. As this article covers only the three short wave ranges of these coils, what better than to utilise these blank pins for trimmers?

A small modification is needed on each aerial and mixer coil only, as it is found that the oscillator trimmer (TC7) needs no adjustment on the other bands after setting for band 5. Modify the coils

as follows:—

Range 3. Solder a thin insulated wire from pin 6 to pin 3. Do this on both aerial and mixer coils.

Range 4. Solder same as above from pin 6 to pin 4, both coils.

Range 5. Again wire up both coils pin 6 to pin 2.

When doing this, first insert the coils into a loose B9A valve holder, in order to keep the pins from moving when they get hot, as the plastic former melts at rather a low temperature. Similar connections will be provided on the valve holders to the trimmers, i.e.:—

Range 3.	Aerial coil holder	Pin 3 to TC3
	mixer " "	Pin 3 to TC6
Range 4.	Aerial " "	Pin 4 to TC2
	mixer " "	Pin 4 to TC5
Range 5.	Aerial " "	Pin 2 to TC1
	mixer " "	Pin 2 to TC4

Alignment

This is made very much easier with a signal generator, but the following hints will assist greatly those who do not possess this invaluable aid. Note that the Range 5 mixer coil uses second harmonic in the interests of stability. Alignment of this stage is carried out in the normal way, however. First start by placing Range 5 coils in the holders, with the tuning dial at about 80.

The output connection from the tuner to the existing radio will depend upon the type of set used. With a valve radio which does not use a ferrite rod aerial, take it to the "live" side of the tuning gang, or if this is inaccessible, to the aerial terminal, the wave change switch being, of course, switched to medium waves. With transistor sets, the output should have a miniature crocodile clip and be taken to the connection from the base of the mixer transistor to the ferrite rod aerial.

The ideal way is to fit a two-way slider switch on the front panel so that the mixer base is connected to the centre contact. One side goes to the ferrite rod for normal listening, and the other to a socket on the side, in which to plug the tuner. This socket is also wired up to a normal base bias circuit of 56k Ω resistor to battery negative and 10k Ω resistor to battery positive of the radio circuit. One could not use the existing base bias because it will be by-passed internally by a blocking capacitor.

Unfortunately, many transistor radios have not the room to mount this refinement, but it avoids the risk of medium wave band interference from the ferrite rod aerial. A certain amount of fine tuning can be achieved by varying slightly the radio's tuning dial.

Connect the earth wire of the tuner to earth terminal of the radio, or the chassis. It is not advisable to connect to the chassis of an a.c./d.c. radio, or use an earth connection to the tuner with any mains radio. Sufficient earthing will be made through the mains.

After having thoroughly checked tuner for any circuit errors, switch on both sets. Turn the slugs of all the coils until they are about half-way out, with the trimmers also half-way. Tune the dial of the tuner to about 80. The dial of the radio must be to its highest frequency, somewhat higher

than Radio Luxemburg (208m). This should be as near as possible to 1.6Mc/s but more probably about 1.4Mc/s. In that case, the i.f. coil slug will have to be tuned to this frequency. When any loud signal is received on the tuner, it should be adjusted until maximum volume is obtained.

If using a signal generator, refer to the alignment chart which follows. If not, a fairly strong signal should appear in the 25m band at about 80 to 90 on the dial. Adjust the coil slugs and the i.f. slugs for maximum output. Shift this gradually by moving the oscillator slug, followed by the mixer and aerial slugs until the top of this band is about 89 on the dial.

The trimmers TC1, TC4 and TC7, should be about half-way in, although finally they may have to be in further when aligning 13m and 10m bands. Next try for the 19m band, which should come in with the top of the band at approx. 61 on the dial. Then look for the 13m band which should come in between 30 and 35 on the dial. Here, the trimmers will have to be adjusted. It is probable that the aerial trimmer will have to be furthest in, the mixer and oscillator about three-quarter way in.

Some patience will be needed to bring in the 10m band, which should fall between 15 and 20 on the dial. Instability around this end of the dial may be due to a poor earthing connection, or the 0.003 μ F bypass capacitor across the mixer resistor will have to be reduced to 0.002 μ F.

It may also be found that below 10 on the dial there is some break-through of stations on the fundamental frequency of the mixer coil. This is not important as there is little of interest here anyway! Repeat the whole process until satisfied. The 15m amateurs should be strong about 35 on the dial, and the 20m at about 67.

Align Range 4 coils next. The slugs should be one-third way out. Start at the low frequency end with the 49m band between 75 and 80 on the dial, 41m band 60 to 64, 31m band 37 to 40, 25m band 24 to 25, and 19m band 7 to 10 on the dial. The makers of the coils state that the Range 4 coils coverage is 20 to 60 metres, but they seem to take in the 19m band quite efficiently with 20m amateurs at about 12 on the dial. This is an advantage for it saves coil changing at times. Do not move oscillator trimmer TC7 after setting for the Range 5 coils. For Range 4 coils, the TC2 will probably be half-way and TC5 three-quarter way in respectively.

Next align Range 3 coils which take in the 160m and 80m amateur bands. The slugs will be: oscillator half-way, mixer half-way, and aerial one-third way in. Trimmers. TC6 mixer one-quarter way in, aerial fully out (TC3).

The 160m band can often be found by a broad tuned bubbling noise, presumably caused by some powerful direction beam. This should fall about 80 to 84 on the dial. As the i.f. is 1.6Mc/s, the set will probably burst into oscillation near this, at the i.f. end of the dial, giving one some indication in alignment. The 80m amateur band should be between 25 and 30 on the dial, the trimmers being operative here.

To those possessing a signal generator, the

—continued on page 369

Transistor Superhet Faults

SOME HINTS ON LOCATING FAULTS WITHOUT INSTRUMENTS

FAULTS which may occur in the usual type of transistor superhet can generally be located quite rapidly if the task is undertaken in the correct way. The first step is to determine whether the mixer, i.f. amplifier, or audio amplifier is responsible. The stage where the fault arises is then located. Finally the faulty component or other defect is isolated.

Many faults produce particular and characteristic symptoms, and can be located without instruments. In the testing methods described some tests require instruments, and these are included because a meter, set of headphones, or other test equipment will often be available, and can be used to simplify checking suspected stages.

The circuits are representative of popular pocket and full-size transistor superhets, and most points apply to all such receivers, even when circuit details vary. Stages are dealt with in their logical order, but the first step should be to refer to the type of defect described.

Mixer

This uses the first transistor, Tr1 in Fig. 1, and includes the ferrite rod aerial with its windings, oscillator coil, and variable tuning capacitor, with associated trimmers, etc. Typical mixer stage faults include reception on one band only, inability to tune correct wavebands, poor sensitivity, parasitic oscillation, and flat or ineffective tuning.

In Fig. 1, with the wavechange switch at A, the long wave aerial winding L.W., trimmer T3, capacitor C2, and trimmer T4 are not in use. So if m.w. reception is good, but l.w. reception faulty, investigation can be confined to these items, and wiring to them, including the switch. Faults to check include open-circuited or wrongly connected l.w. winding, a short in T3 or T4, or C2 defective, or of wrong value.

If proper m.w. reception is not obtained, T3, T4, C2 and the long wave winding L.W. can be ignored, and even temporarily disconnected, in a home built receiver. Check that point 1 on the m.w. coil goes to positive line for m.w. reception.

If m.w. reception is poor, and attempts to align aerial and osc. coil fail, a simple test is to disconnect the m.w. winding at 2, and temporarily take this to a 300pF or similar variable capacitor wired from m.w. winding to positive line. If individual adjustment of this new capacitor, and the usual tuning capacitor, provides many stations at good volume, there is probably no fault except wrong alignment.

To secure alignment, aerial and osc. coils must tune simultaneously, with a frequency difference equal to the receiver intermediate frequency (often 470kc/s). This will only be so if all capacitor values are correct. When the temporary tuning capacitor described gives good results, check VC1 for shorts due to long fixing bolts, and see T1

by R. F. Graham

opens fully. T2 may be checked, and fully opened, and point 2 reconnected. If ganged tuning is still impossible, C4 should be replaced.

If the temporary tuning described gives no results, check m.w. winding for continuity (meter, or phones and dry cell). Also check the coupling winding, and connections. Osc. coil windings can also be checked. Wrongly wired pins may prevent results. The circuit can be tested from collector (3) to negative line. No circuit indicates defective windings in IFT1, or osc. coil, or wrong wiring to these.

If the stage still does not operate, R1, R2, R3 and C1 and C3 should be checked. Resistors or capacitors are sometimes defective, and may have a loose end wire, or may have been overheated. Colour coding should be checked.

If all the previous points are in order, Tr1 is suspect. When m.w. results are good, checks can be confined to l.w. winding, T3 and T4, C2 and switch, as mentioned, if l.w. results are poor.

Incorrect coverage with VC1 nearly open is generally due to T1 or T2 being screwed down too far. Coverage with VC1 nearly closed depends on the position of the m.w. winding on the rod, and on the osc. coil core position, in addition to C4.

Oscillation with VC1 nearly closed probably indicates this is reaching the intermediate frequency, due to the i.f. being too high, or the m.w. winding being too far on the rod.

Oscillation with VC1 nearly open may often be cured by adding a 100-500Ω resistor at 4.

I.F. Amplifier

This has two transistors. Tr2 and Tr3, and provides amplification at a fixed frequency (often 470kc/s). When tuning and band coverage are correct, but sensitivity is low, the i.f. amplifier may be responsible.

With a local station tuned in, the cores of IFT1, IFT2 and IFT3 should all have a definite peak giving best results. If so, these transformers are probably in order. If any transformer cannot be tuned in this way, check wiring to it. If wiring is correct, and each winding is continuous, the internal capacitors C12, C13 and C14 may be defective or disconnected from lengthy soldering.

When each i.f.t. can be tuned to a definite point giving best results, leave them untouched. A short aerial may be temporarily connected to point 2, if no signal to work with is heard.

If oscillation begins when the i.f.t. cores are peaked, check that leads to Tr2 and Tr3 are short. If so, check values of R11 and R12, and C10

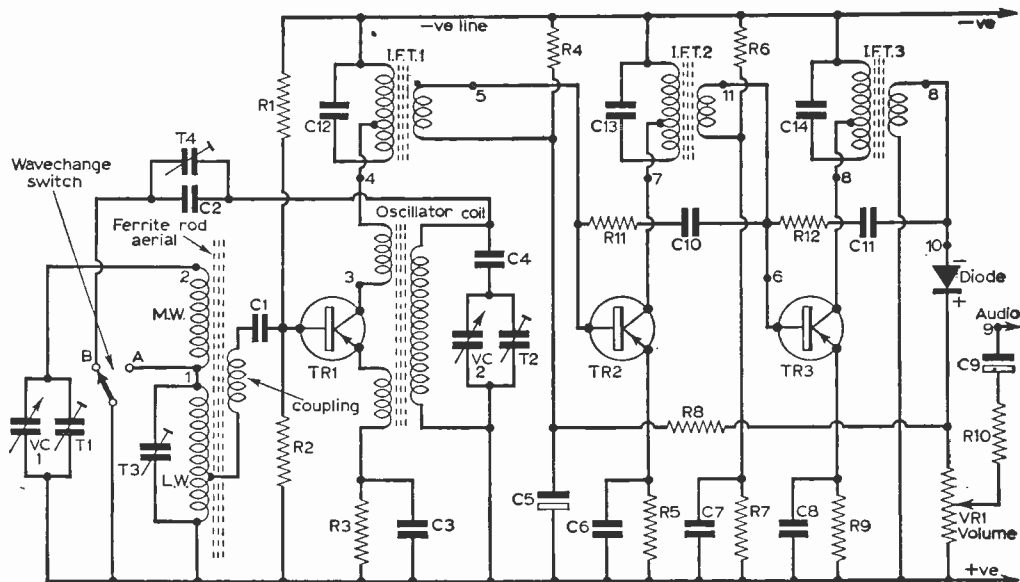


Fig 1: Mixer and i.f. stages of a typical receiver

and C11. In some receivers, i.f.t.'s have to be *very slightly staggered* (off tune) to maintain stability. If oscillation persists, any fairly large capacitor can be temporarily connected across by-pass capacitors C5, C6, C7, C8 and C15 (Fig. 2) to check them.

If gain is still low with i.f.t.'s peaked, resistors R4, R8, VR1, R5, R6 and R7 should be checked. If these are in order, Tr2 and Tr3 are suspected.

Tr2 and all associated items can be checked by temporarily taking lead 5 to Tr3 base, point 6. If results are then quite good, investigation is confined to Tr2, IFT2, R5, C6, R6, R7 and C7. Tr3 and items in that stage can be checked by temporarily taking collector 7 to IFT3 at point 8. This isolates IFT2, Tr3, etc.

If necessary, R11, R12, C10 and C11 can be checked by removing them. The receiver should work quite well, and be stable if the i.f.t.'s are staggered. If phones wired from point 9 to positive line give good results, the whole circuit in Fig. 1 is in order.

A stage-by-stage check can be made by disconnecting the diode at 10 and temporarily taking it to point 5. With a short aerial added at 2, a local station should give reasonable phone results. If not, the mixer stage is not working.

With the mixer working, taking the diode to point 11 brings in Tr2 and IFT2. If results are then good, this stage is working. If results cease, investigate the Tr2 stage as described.

If results are good with the diode connected to 11, but not when normally connected, check the Tr3 stage as described. If results are good with the diode connected to 11, but not when normally connected, check the Tr3 stage as described.

If loud, clear reception is obtained with phones from point 9 to positive line, but the receiver does not operate, investigation can be confined to the audio amplifier, Fig. 2.

First A.F. Stage

Wrong operating voltages here often cause audio distortion. Phones across the driver transformer primary P should give much amplified signals, compared with those heard from the diode. If so, the amplifier Tr4 is in order. If amplified signals are not heard from Tr4, check connections to it, and resistors R13, R14, R15 and capacitor C16.

A similar additional a.f. stage may be present, with a resistor instead of the primary P. If so check this with the phones first.

Output Stage

This has two transistors, Tr5 and Tr6. Faults in this stage cause distortion, heavy battery drain, or overheating of Tr5 or Tr6. When good signals are heard from Tr4, but speaker results are distorted, the values of R17 and R18 are first suspected. These are usually important, and should be within 5% of the specified values for the particular transistors at Tr5 and Tr6.

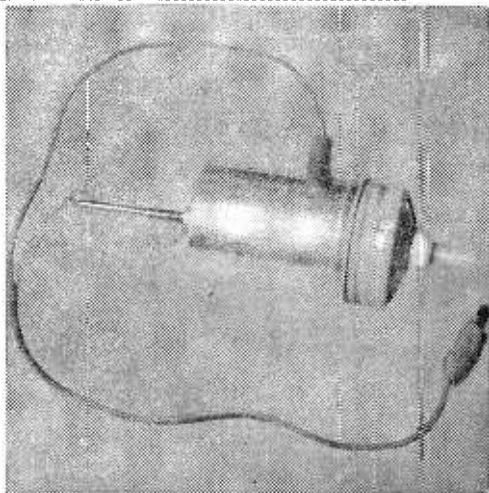
If a meter at point 12 shows a heavy current, R17 is probably too low in value, or R18 too high in value. If so, reduce R18 slightly, until the average type of output stage takes about 2mA to 4mA or so, with no signal, peaking up to 15mA to 25mA or so, with good speaker volume. R18 may be shunted with other resistors, to achieve this. On no account switch on with no resistor in the R18 position.

If the meter at point 12 shows almost no current, reduce R17 (or increase R18) until current is as just described. R19 is often 3.3Ω to 5.6Ω or so, and bad results sometimes arise from using 33 to 56Ω in error.

If good signals are heard at primary P of the driver transformer, but no speaker reception is obtained, check driver transformer connections and

A "HANDY" SIGNAL INJECTOR

BY RAYMOND CRUISE



SEVERAL excellent designs for signal injectors have been described in the past but the one about to be described will bear favourable comparison, mainly as regards cost, ease of construction and ready availability of components.

A printed circuit construction is used which, together with switch and U16 battery, can all be contained quite easily in a 35mm film cassette tin. The total cost inclusive of chemicals, printed board, paint and components is under £1 and, of course, there will be sufficient chemicals and paint left to do quite a lot more printed circuits.

Circuit Description

The circuit, as will be seen by Fig. 1, is the well-known "Multivibrator" or "Astable circuit". This circuit in its valve form was described as long ago as 1918 and was originally conceived as a square-wave generator. Since a square-wave is very rich in harmonics the name "Multivibrator" was coined. The circuit operates as follows:

When the unit is switched on, both transistors conduct a relatively high level of current, approximately 6mA, and this causes a sharp drop in collector voltage and a positive-going pulse is sent to the other transistor which counteracts the effect of the base bias resistor and switches the transistor off. This causes a negative-going pulse which switches the first transistor on again.

Slight unbalance in the components or random variations in the current will always, on switching on, cause the transistors to go into one of the unstable states rather than the other; the circuit is, therefore, self-starting. The circuit subsequently oscillates between the two unstable states and so is quite free running.

The output produced is of square-wave form at a fundamental frequency of approximately 2kc/s

and, as previously mentioned, is rich in harmonics, enabling it to provide a continuous note when injected into any receiver. It may be used for r.f., i.f. or a.f. equipment and is one of the most useful instruments one can have for testing and tracing faults in radios and amplifiers and, as a high voltage is not produced, the unit cannot harm transistorised equipment.

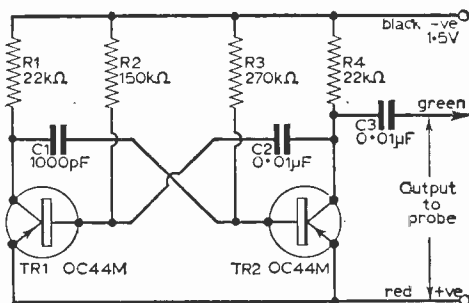


Fig. 1: The two-transistor circuit for this handy instrument.

Whilst not really necessary, due to the fact that the probe and wander lead socket, if assembled as per instructions, are insulated from the can, in the interests of safety when testing equipment of the a.c./d.c. variety the can could be easily and quickly wrapped with insulating tape.

Construction

Obtain first two 35mm film cassette tins, one Ilford and one Kodak. The Ilford can is used with the Kodak screw top. The Ilford can is slightly larger and the Kodak screw top is preferred as this has a raised centre, whereas the

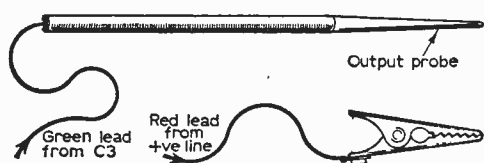


Fig. 2: Details of the probe used with the injector.

Ilford is flat. These can be obtained from any photographer's and if you have to buy them they will cost no more than 6d. for the two.

Construction can commence with drilling cassette tin. Centre bottom of can should be drilled $\frac{1}{8}$ in., a $\frac{1}{16}$ in. hole should also be drilled in side of can $\frac{1}{4}$ in. from bottom, and the centre of the screw cap should be drilled $\frac{1}{8}$ in.

A 2 in. length of 4BA screwed brass rod should next be obtained. Place this in a drill chuck, leaving approximately $\frac{1}{2}$ in. projecting. Leave $\frac{1}{2}$ in. of original thread (next to chuck) and shape the remaining length as shown (Fig. 2); this can be done quite easily in a power drill with a file or an ordinary breast drill secured in a vice.

When this operation is complete remove from chuck and saw off the $\frac{1}{2}$ in. that has been in the chuck as these threads will be distorted due to the

done either by tracing the outline with tracing paper and then transferring this on to the copper, using carbon paper and a hard, fine-pointed pencil or alternatively copying Fig. 3 directly on to the copper, using carbon paper.



Fig. 3: An actual-size representation of the printed circuit board ($1\frac{1}{8}$ in. x $\frac{1}{4}$ in.).

Next the areas thus shown shaded must be painted with the dope to resist the etch (the reason I use nitrate dope is that it is cheap. A 1s. 6d. tin will do literally hundreds of circuits, it is very quick drying—approximately 20 minutes—and is very easily removed by the acetate).

When painting these areas, if you have used carbon paper you may find that two adjacent areas will run into each other. Don't worry about this but wait until the dope has dried, then you can go over the board with a fine-pointed scribe or penknife and separate the conductors.

When this is completed satisfactorily, place the board in a small dish (I use a $2\frac{1}{2}$ in. x $3\frac{1}{2}$ in. plastic print developing dish) and cover with ferric chloride, which will remove the unpainted areas of copper and leave the painted conductors.

The process takes 45 minutes to an hour but can be speeded up considerably by placing the dish containing board and chemical into a larger dish containing hot water. The board should be agitated during the process, using plastic print forceps (this is to displace removed copper as it tends to cling to the board).

When all traces of uncovered copper have been removed wash the board thoroughly under running cold water and dry with an old cloth. After examining the board again to see that there are no traces of uncovered copper left take an old piece of rag, moisten with the acetate and rub over the dope, which will be completely removed in three or four seconds. After rinsing and drying again the board is ready for drilling.

Take care with the ferric chloride not to get it on hands or clothes; it is a poison. When it has been used empty it away on a vacant piece of your garden and not down the sink.

All holes should be drilled with No. 60 drill. This can best be done from the copper side after first lightly centre-punching positions for lead-out wires of components, which should be cut to approximately $\frac{1}{2}$ in., scraped bright with a penknife, then bent at right-angles to body and

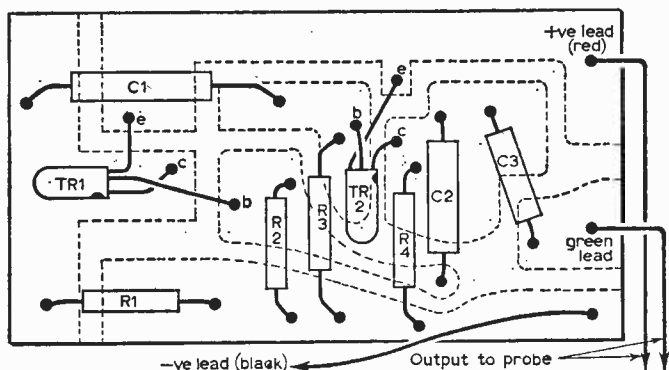


Fig. 4: The complete component layout and wiring diagram.

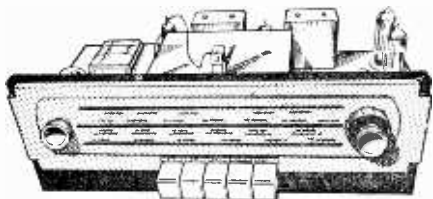
pressure of the chuck. This completes the probe. The next job is to make the printed circuit; the materials needed are:

- One piece of $\frac{1}{16}$ in. thick copper clad board $1\frac{1}{8}$ x $\frac{1}{4}$ in.
- Ferric Chloride } these are available from any industrial chemist at approx.
- Acetate } 1/9 per pint
- "Britfix" Nitrate Cellulose Dope (any Hobbies Shop, 1/6 tin)
- Fine tipped paint brush

The Printed Circuit

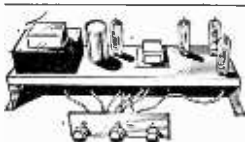
The procedure is as follows: First rub the copper over lightly with steel wool, then the outline shown on Fig. 3 must be transferred on to the copper side of the board. This can best be

BRAND NEW AM/FM (V.H.F.) RADIO GRAM CHASSIS AT £13.13.0 (Carriage Paid)



Chassis size 15 x 6 1/2 x 5 1/2 in. high. New manufacture (1964) 14 1/2 x 4 in. in 2 colours, predominantly gold. 200-250 v. A.C. only. Pick-up, Ext. Speaker, Ac. E., and Dipole Sockets. Five push buttons—OFF, L.W., M.W., F.M. and Gram. Aligned and tested. O.P. Transformer. Tone Control. 1000-1900 Mc.: 200-550 Mc.; 88-98 Mc/s. Uses EZ80 rect.; ECH81, EF89, EABCS0, EL84, ECC83. Speaker 8 x 5 in. and Cabinet to fit chassis (table model), 47/6 (post 5/-).

10 x 6 in. ELLIPTICAL SPEAKER 25/- to purchasers of this chassis. TERMS: (Chassis) £3.10.0 down and 5 monthly payments of £2.4.0. Cheap Room Dipole for V.H.F., 12/6. Feeder 6d. per yard. Circuit diagram 2/6. ALTERNATIVE DESIGN: L.W. 1000-1900 Mc., S.W. 19-15 Mc/s; M.W. 190-475 Mc.; V.H.F. 87-100 Mc/s. Gram provision. Otherwise similar to above chassis. Price £15.15.0 (carr. paid). TERMS: £3.10.0 down and 6 monthly payments of £2.4.0.



PUSH-PULL O.P. AMPLIFIER £5.5.0

(6/- Carr.)

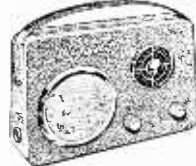
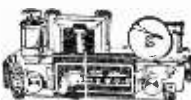
Brand new 200-240 A.C. mains. Bass, treble and vol. controls. With valves EZ80, ECC83 and 2-EL84 giving full 8 w. Chassis 12 x 2 1/2 x 3 1/2 in. With o.p. trans. for 2-5 ohm speaker. Front panel (normally screwed to chassis) may be removed and used as "flying panel"

LAFAYETTE BRAND TAPE FULLY GUARANTEED AT RECORD LOW PRICES

MYLAR BASE	P.V.C. BASE	
5in. Double play, 1,200 ft. ...	5in. Standard play 600ft. ...	8/6
5 1/2 in. Long play, 1,200 ft. ...	5 1/2 in. Standard play, 550ft. ...	11/6
5 1/2 in. Double play, 1,800 ft. ...		
7in. Stand play, 1,200 ft. ...	ACETATE BASE	
7in. Long play, 1,800 ft. ...	5in. Long play, 900ft.	10/-
7in. Double play, 2,400 ft. ...	5 1/2 in. Long play, 1,200ft.	12/6
	7in. Long play, 1,800ft.	15/-
TRIPLE PLAY		
3in. 450 ft.	MESSAGE TAPES	
4in. 900 ft.	3in. - 150ft.	8/6
5in. 1,800ft.	3in. - 225ft.	4/11
5 1/2 in. 2,400ft.	3in. - 300ft.	7/6
7in. 3,600ft.		

P. & P. 1/- extra per reel; 4 reels and over Post Free.

SELF-POWERED VHF TUNER CHASSIS. Covering 88-95 Mc/s. Mullard permeability tuner. Dims. 10 1/2 x 4 1/2 x 5 in. high. Valves ECC83 and 2-EP80s plus 2 diodes with EZ80 rectifier. Mains transformer. Fully wired and tested. ONLY £28.17.6 (carr. paid). Room dipole 12/6. Feeder 6d. per yard.



6-TRANSISTOR PORTABLE — Fully Built

The "SCALA" for only £27.10.6 carr. paid. 8 1/2 x 2 x 5 1/2 in. high. Choice of colours. Reims, M.W. and L.W. Ferrite aerial. Battery 2/9 extra. Printed circuit. Nicely styled. A professional job. 3 1/2 in. speaker. Fully tunable M.W. and L.W. Superbet circuit.

100 mF. + 200 mF. ELECTROLYTIC. New 275 v. (350 v. surge). 4in. x 1 1/2 in. dia. 5/- each. (Post 1/-).

ALL ITEMS ARE NEW AND FULLY BUILT UNLESS OTHERWISE STATED. TESTED BEFORE DESPATCH.

Terms available on Items over £5. Send id. (stamps will do) or 20 page illustrated catalogue. Delivery by return. C.O.D. 2/- extra.

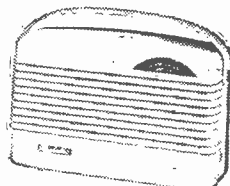
ALL ITEMS GUARANTEED 12 MONTHS. VALVES 3 MONTHS

GLADSTONE RADIO

"SCALA", CAMP RD., FARNBOROUGH, Hants. Farnborough 3871. CLOSED SATS.

"REALISTIC" 'SEVEN'

7 Transistor Superbet. 350 Milliwatt output. 4-inch speaker. All components mounted on a single printed circuit board size 5 1/2 x 5 1/2 in. in one complete assembly. Plastic cabinet, with carrying handle, size 7 x 10 x 3 1/2 in. External Socket for car aerial. Ferrite rod aerial. Price for the complete parcel including Transistors, Cabinet, Speaker etc. and full construction data: **£5.19.6** P. & P. 4/6



PP9 Battery 3/9. Data and instructions separately 2/6. Refunded if you purchase the parcel.

Any parts supplied separately.

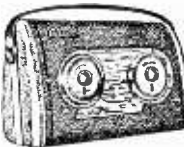


4 TRANSISTOR MINIATURE PUSH-PULL AUDIO AMPLIFIER HIGH IMPEDANCE

PRINTED CIRCUIT. 4in. x 2 1/2 in. 10w. over transformers. Output for 3-ohm speaker. Suitable for microphone, record player, guitar and intercom. 9 volt battery required. Frequency range 100 cps. to 25 Kcps. Push-pull output class B. Instruction sheet provided. Fully wired ready for use. Two types. 200 mw. 29/6; 1 watt. 41/- P. & P. 2/4.

THIS SUPERB SET for £9 (Carr. pd.)

6-transistor radio covered in sponge-clean Duracour fabric, in latest two-tone shades. M.W. and L.W. ferrite rod. provision for car aerial. 2-colour scale. With PP9 battery giving 300 hours use. Weighs under 4 lbs. With carrying handle. 12 x 7 in. high x 4 in. at base tapering to 2 in. at top. Brand new, fully guaranteed. 3 push buttons. Superbet circuit. 5in. L.S.



5 WATT AMPLIFIER

Our price ONLY 55/- (post 5/-); a few hundred only; valves EF91 and EL84 with metal rectifier; 5 x 4 x 1 1/2 in. high (5in. over EL84). Mains trans. and o.p. with vol. and tone controls; on-off; coax. input.

GRAMOPHONE AMPLIFIERS AND PLAYERS

1 1/2 watt type. With 6in. x 4in. speaker. Battle 13 1/2 x 7 1/2 in. 200-240 v. A.C. ECH82 and Rectifier. Tone and Volume. On/Off switch. Two knobs. Ready to play. 49/6 post 5/-.
4 watt type. Valves UY85, UF90 and U184. 200-240 v. A.C. Covered battle 13 1/2 x 7 1/2 in. (6 in. speaker). 3 front controls: bass, treble, on-off/vol., 60/-, post 5/-. Double wound mains transformer. Cabinet to fit either type with plain motor board £3 carr. pd. Complete record player in beautifully styled cabinet, fully built (NOT A EIT) £10.17.6. with UA 14 4-speed autochanger, or with Garrard Autosim 4-speed autochanger, £15.5.0.
Single Player in Cab., 13 1/2 x 13 x 5 1/2 in. B.S.R. Monarch 4-speed deck, £2.17.6.

HIGH QUALITY PUSH-PULL OUTPUT AMPLIFIER

Chassis 10 x 7 1/2 x 7 1/2 in. high over trans. Used, guaranteed and in excellent order. New valve EZ40, ECC83 and 2-EL84; 8 watts. Mains trans. tapped 200-250 volts. O.p. Trans for 3, 8 and 15 ohms. Choke smoothing. On/Off/vol. and tone controls. For tuners, Record Players, etc. £3.15.0 P. & P. 5/6. We can modify for Guitar input for 15/- extra.

TAPE RECORDER AMPLIFIER

Fully built. Front panel 12 1/2 x 3 in. Chassis size 10 1/2 x 5 x 4 1/2 in. Valves EF86, ECC83 and 2-EL84. Controls (1) MIC. Vol. (2) Tuner/H.U. Vol. (3) Play back or monitor. (4) Tone. 2 jack sockets for Tuner/P.A. and MIC-switch for superimpose. Separate power pack containing transformer and rectifier. For Collaro studio deck only. Price £24.10 (6/- P. & P.).

4-SPEED AUTOCHANGERS

BSR-TA14	£5.19.6
GARRARD AUTOSIM	£5.19.6
STEREO	27.5.0
AUTOSIM DE LUXE AT6	£10.19.8
STEREO	£11.10.0

Carr. 5/- each

BATTERY ELIMINATOR

For 4 Low Consumption Valves (90 range) 90v. 15 mA and 1.4v. 125mA. 42/6 (4/- post). 200-250v. A.C. Also for 250 mA 1.4 v. and 90v. 12 mA same price. Two separate units to replace existing batteries. 4 x 2 1/2 x 2 1/2 in. and 3 x 2 1/2 x 1 1/2 in.

13 x 8 in. LOUDSPEAKER

Three ohm. Ceramic magnet of latest type. BRAND NEW.

49/6 (post 3/6).

HEATER TRANSFORMER

Mains input giving 6.3v. 2 amp. Size 2 1/2 x 20 x 1 1/2 in. (2 1/2 in. over winding). 5/6 ea. Less 10% for 12, or 20% for 50. P. & P. 2/- for 1 to 6, post free more than six.

philips paperbacks

The Tape Recorder C. G. Nijsen

13s 6d net by post 14s 3d 142pp. illustrated

Audio Quality G. Slot

13s 6d net by post 14s 3d 156pp. illustrated

Aerials D. J. W. Sjobbema

10s 6d net by post 11s 4d 110 pp. illustrated

obtainable from leading booksellers

ILIFFE Books Ltd.

Dorset House Stamford Street London S.E.1

an important new technical series

Presents up-to-the-minute studies of radio, television and audio subjects, written specially for the amateur who demands complete but not excessively mathematical treatment. The technical authority behind the books is that of the world-famous electrical company Philips of Eindhoven, Holland. Eighteen titles are already planned—the first seven, published in May 1964, are described below.

the radio servicing series

A series of books included in the Philips Paperbacks, which are grouped together to form a comprehensive manual on the repair of radio receivers.

A. F. Amplification

10s 6d net by post 11s 3d 109pp. 82 illus.

Alternating Current & Acoustics

10s 6d net by post 11s 3d 116pp. 86 illus

Direct Current & Magnetism

10s 6d net by post 11s 3d 119pp. 92 illus

Radio Valves

10s 6d net by post 11s 6d 126pp. 90 illus

THE NEXT STAGE

20 watt stereo!

If you have already built a mono Audiokit assembly, then it is going to be easy and economical to convert it to stereo. If you are about to start building Audiokits, you can choose stereo straightaway. All the necessary Martin Units are now available for converting our famous Formula 1456 to a 20 watt hi-fi stereo system. Martin All-transistor Audiokits are the simplest, most efficient and imaginatively designed kits ever offered to the home constructor. Make sure you know about them ALL.

Formula 1456 for 3 Ω : Formula 1478 for 15 Ω

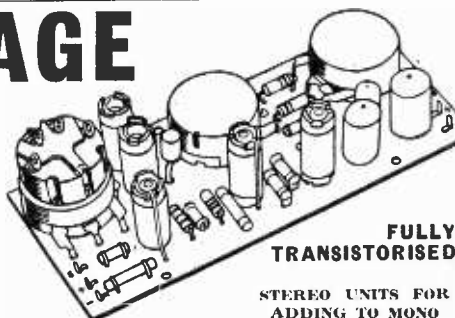
SO EASY TO BUILD AND SAVE WITH

MARTIN
Audiokits

TRADE ENQUIRIES INVITED

MARTIN ELECTRONICS LTD.

154-155 HIGH ST.
BRENTFORD, MIDDLESEX.
181Leworth 1161/2.



MONO		FULLY TRANSISTORISED	
UNIT 1 5-stage input selector	£2 7 6	1A	£2 7 6
UNIT 2 Pre-amp with vol. control	£1 17 6	2A	£2 2 6
UNIT 3 3-Channel mixer	£3 19 6	3A	£2 12 6
Matching adaptor ca.	8 6	4A	£3 15 0
UNIT 4 Pre-amp and tone controls	£3 2 6	Series "S" Units for all stereo construction are twice the price of the original mono series.	
UNIT 5 10 watt power amplifier for 3 Ω	£5 12 6		
UNIT 6 power supply for Unit 5	£2 12 6		
UNIT 7 15 ohm 10 watt power Amplifier	£6 12 6		
UNIT 8 Power supply for Unit 7	£2 15 0	Kits complete with knobs, instructions, etc. Escutcheons available to requirement at 6/6 each.	

MARTIN ELECTRONICS, 154/5 HIGH STREET.
BRENTFORD, MIDDLESEX
Details of MARTIN AUDIOKITS
please

NAME

ADDRESS

BLOCK LETTERS

PW.8

inserted in correct position on board.

The protruding ends should then be cut to leave about $\frac{1}{2}$ in., which should be bent over to be flush with the copper and soldered quickly, using a hot iron and cored solder (preferably 22s.w.g.) and observing the usual precautions with these miniature components and transistors (i.e. heat shunt). The black line down the side of the OC44M indicates collector.

The components when in position and soldered should be as shown in Fig. 4. At the points marked solder 3in. lengths of thin flexible insulated wire, inserting these through from component side of board.

Testing

At this stage the injector can be tested. After first ensuring that no short circuits exist on copper side of board a 1½V battery can be connected, observing correct polarity. If the green lead is now placed on the slider of the volume control of a transistor radio the injected signal should be heard very loud; if not, check the circuit again, paying particular attention to soldered joints and ensuring that no adjacent soldered joints are shorting.

If all is well solder a 4BA solder tag to the end of the green lead. Next run a 4BA brass nut on to the probe about $\frac{1}{2}$ in. from threaded end. Cut a piece of insulated sleeving about $\frac{1}{2}$ in. in length and which fits fairly tightly round the threaded rod, push this on from the threaded end and right up to the nut. Next push an insulated washer over this sleeving and right up to the nut, then insert probe, screwed end into can, drop another insulated washer over rod from inside, followed by another 4BA nut and tighten quite tightly. This will effectively insulate the probe from the can (it should be checked with meter to see if this is so).

The miniature socket can now be fitted, screwing the nut on tightly from inside the can and bending the socket tag up slightly. There should now be about $\frac{1}{2}$ in. of screwed rod left above nut inside can.

Solder a 3in. length of thin black flex to the negative end of U16 battery and cover the end with insulating tape. Take a 2½in. length of red flex and solder to + end of U16 battery. Cover this with tape.

The entire printed circuit board can now be wrapped completely with insulating material. In my case this was a piece of plastic, such as is used for toothbrush containers, secured and wrapped tightly round with Sellotape. If this is not available the whole board can be wrapped completely in insulating tape.

Now drop the solder tag connected to green lead over screwed rod inside can and secure tightly with a 4B.A. nut (with leads left at approximately 3in. lengths—this can be done with the component board out of the can). Now the red lead from board and red lead from battery + can be soldered to socket tag inside can, the board and battery can now be inserted into can, pushing board one side and battery down opposite side. Whilst there is not a lot to spare there is quite

sufficient room to do this; tuck all the wires in neatly.

All that remains now is to remove the screwed collar off the switch and fix in the two black leads, one from the board and one from battery negative, place switch midway between top of board and battery, drop can lid over switch, allowing push-button and screwed neck to come through a $\frac{1}{2}$ in. hole, whilst holding push-button screw can lid on to tin, drop screwed collar over push-button and again whilst holding switch stationary by grasping push-button screw collar home, thus securing switch to lid. Connect a wander clip with lead to the miniature plug and the injector is complete.

COMPONENTS LIST

R1	22kΩ	} Miniature ¼ watt high stab (Henry's Radio)
R2	150kΩ	
R3	270kΩ	
R4	22kΩ	
C1	1,000pF	min tubular (Suflex)
C2	0.01μF	} min tubular paper. 150 volt working
C3	0.01μF	
TR1—TR2	OC44M	
S.P. Press on, press off (Woolworths, 9d)		
Radiospares min. plug and socket		
Eveready U16 1½V battery		

Using Injector

In practice the injector is used as follows. The wander lead is clipped to + battery line of transistorised equipment or chassis (negative line of valve equipment), then in the case of, say, a radio, the probe tip is applied to the volume control slider with this control turned to full volume and, of course, with the set switched on.

If a note is heard then the fault lies in the r.f. or detector stages (from aerial tuning circuit up to volume control). If no note is heard the fault lies between loudspeaker and volume control.

Assuming the latter fault to exist the probe tip should be applied to output transformer secondary and primary windings, bases of output transistors, secondary and primary windings of driver transformer, base of driver transistor and so on, working back from loudspeaker to potentiometer. This injection should proceed until a point is reached where the signal is not heard when the probe is applied; the fault then obviously lies between this point and the one previously checked when a signal was heard.

Similarly if a note is heard when probe is applied to slider of potentiometer, the fault lies between this component and aerial and the same procedure should again be applied, working back from behind diode to collector, then bases of i.f. transistors and mixer oscillator transistor till a point is reached where there is a signal going in but none coming out. The fault can therefore be localised to a few components which can be checked quickly with a meter which should then reveal the malfunctioning component.

As has been pointed out before in previous articles on this method of fault finding, the injector would probably be of no use if the fault is a transistor which for some reason has lost its

—continued on page 335

audio oscillator DESIGN

Transistor oscillator
circuits described
and explained.

By D. K. Greig

THE shortage of design circuits for transistors is at last now being overcome. The designers, however, cater mainly for the experienced constructor. Many designs for audio-oscillators have appeared in these pages, but none have been worth converting to a generator.

A recent development in another magazine introduced a multi-transistor audio generator incorporating a frequency meter. Although the design was admirable, the expense made it virtually impossible for the amateur constructor. With this thought in mind the following circuits were used.

The final professional design can be built for about 50/- and is compact and accurate. The introductory sections leading to the description of this Wien-bridge oscillator are included for the benefit of the home experimenter, who would like to try his own hand. The theory has been kept to a minimum and much of the mathematics omitted so that beginners and experienced constructors alike can follow it.

In the final design it must be emphasised that the OC140 is an n-p-n transistor and is therefore shown connected the right way round.

WIEN BRIDGE OSCILLATORS AND LADDER NETWORK OSCILLATORS

The design of resistance-capacitance oscillators is similar for transistors and thermionic valves, but three factors must be borne in mind. The r.c. phase-shifting network is required to feed into the input of the transistor, which is of low impedance.

The internal phase-shift of the transistor will be added to, or subtracted from, that of the network. When ladder networks are used, the current amplification factor of the transistor must be appreciably greater than the attenuation of the network.

Ladder Networks

The basis of the stable oscillator is the generator network; the ladder network, being basically simple, is in common use. Ladder networks may be built up by cascading a number of similar r.c. phase-shifting sections, using any one of the sections shown in Fig. 1 as a basic element.

The ladder sections (a) and (b) give a phase-shift between the input and output currents, so that the input of the transistor, which is connected across the pair of terminals on the right-hand side, is fed with a current, I_{out} . The input impedance of the transistor should preferably be much less than the impedance of the network—which is R in (a) or the reactance of C in (b)—in order that the transistor impedance will not disturb the operation of the circuit. This requirement is fairly easy to meet. However, a current gain, at low frequency, of at least 60 is needed for satisfactory operation, and since the input impedance of the transistor in grounded-emitter connection may be as high as $2.5k\Omega$ or more at emitter current (I_e) = $1mA$, the resulting circuits are of high impedance, and a collector supply voltage of 12V or more is needed.

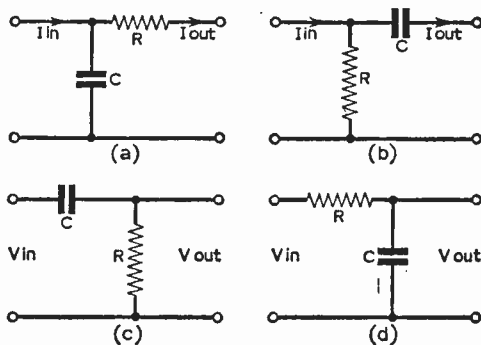


Fig. 1: Four variations on the basic element of ladder networks.

Sections (c) and (d) in Fig. 1 are voltage-transfer networks, and are normally employed with thermionic valves. For transistors, the input impedance, which is connected across the right-hand side, needs to be large compared with the impedance of the network.

The voltage V_{in} across the left-hand terminals of (d) could be generated by allowing the output-current generator of the transistor to work into R . No such simple method can be found for (c) and this circuit may be dismissed as unsuitable.

This way of generating V_{in} sets a lower limit to the value of R which may be employed while obtaining sufficient voltage for oscillation. The condition is $R > A r_e$ where A is the attenuation factor of the network, and is equal to 29 for a network of three equal sections. At $I_e = 1mA$, r_e is equal to $25/I_e = 25\Omega$ and R needs to be greater than $29 \times 25 = 725\Omega$ (say $1.2k\Omega$).

To have an input impedance which is sufficiently high for satisfactory operation, the transistor needs

to have an α'_0 (current amplification factor, at low frequency) greater than 100.

These networks therefore are better suited to thermionic valves than to transistors; although if transistors of sufficiently high α'_0 are available, the circuit can be made to work from lower supply voltages than when using sections (a) or (b).

Number of Sections

The most suitable RC phase-shift networks may be built up, therefore, from sections of the (a) or (b) type.

Neglecting the internal phase-shift of the transistor for the moment, at least three sections are necessary, and the networks could be of the form of (a) or (b) in Fig. 2.

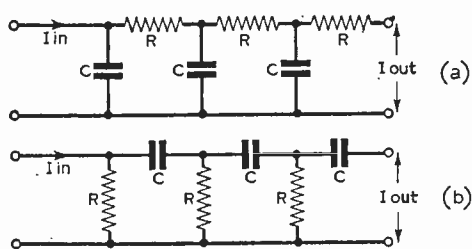


Fig. 2. Suitable ladder networks for transistors.

If the circuit (b) is used, the first R can be the load resistance of the transistor, and the circuit design is considerably simplified.

The current attenuation of these networks, at the frequency where the phase-shift between the input and output currents is 180° , is 29. To allow for losses in the input and output impedances of the transistors, the α'_0 should be greater than about 60.

The OC75 is therefore suitable, though transistors at the top end of the OC71 production spread should also work in this type of circuit.

The current attenuation of 29 applies to a network having three equal resistances and three equal capacitances. These are the simplest to design and the most commonly used. Also, since the grounded-emitter transistor has an input impedance which is only an order or so different from its output impedance, tapered networks are of little use.

Operating Frequency

Single-transistor phase-shift oscillators are best restricted to low-frequency operation, where the internal phase shift of the transistor need not be considered at higher frequencies, both the phase-shift and the reduction in α'_0 cause design difficulties.

For instance, with the network shown at (b) in Fig. 2, the phase shifts in the network and in the transistor vary in opposite senses, so that at high frequencies more phase-shift has to be provided by the network. The phase shift in each section has to be increased, or a fourth section added. There is consequently more attenuation.

With network (a), the transistor and network

phase-shifts vary in the same sense, and a two-section oscillator can be constructed though the operating frequency will be somewhat dependent upon the particular transistor. Also since any shunt resistance across the input capacity of this network reduces the phase shift, a higher collector-load resistance, and possibly a higher transistor output impedance will be demanded.

The phase-shift in V and hence in the output-current generator will be f'_α , where f'_α is the grounded emitter cut-off frequency, and $f'_\alpha = f_\alpha / \alpha'_0$ where $f_\alpha = f_z / 1.22$ for alloy-junction transistors.

800c/s Oscillator

From the fact that single transistor phase-shift oscillators are best restricted to low frequency operation, the following circuit was designed, using the (b) network and a transistor type OC75, and shown in Fig. 3.

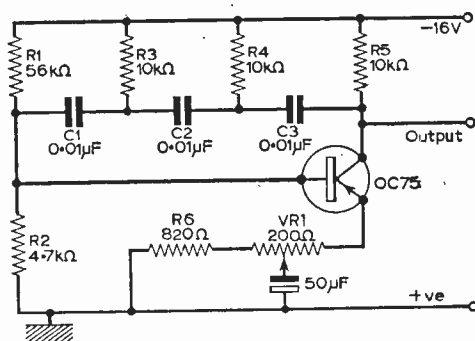


Fig. 3: The circuit of an 800c/s oscillator using a 3-section ladder network.

The circuit operates at a frequency given by
$$f = \frac{1}{2\pi CR\sqrt{6}}$$
 which for the circuit shown gives

650c/s. The transistor input and output impedances, however, modify this to 800c/s.

The value of the phase-shift resistors (10kΩ) is chosen to be a mean between that which will be appreciably affected by the transistor output impedance, which is high, and that which will be appreciably affected by the transistor input impedance, which is low.

With these networks, it is not easy to control the amplitude of oscillation without somewhat affecting the frequency of operation, and the amplitude control may change the frequency by approximately 10% or so.

The gain is controlled by changing the distribution of the feedback current between the base-bias resistors and the transistor input, the unbypassed resistance in the emitter increasing the transistor input impedance. The control should be adjusted so that oscillation amplitude is smaller than that giving objectionable oscillation.

The Wien-Network oscillator circuit follows on naturally from the ladder network system. The advantage of the Wien-Network is that the attenuation factor is only 3 at the frequency

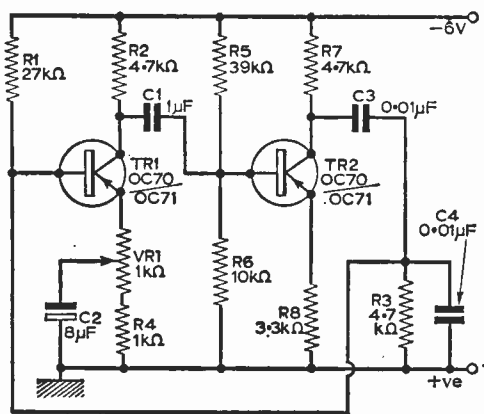


Fig. 4: A two-transistor Wien-network oscillator.

which gives zero phase shift although, since the output is in phase with the input, at least two amplifier stages are necessary.

Two Transistor Circuit

A simple two-stage oscillator of this type is given in Fig. 4, in which the Wien-Network is R7, C3, C4 and R3.

Both stages are d.c. stabilised and the lower base-bias resistance of Tr1 also being part of the bridge network (R3). The 3.3kΩ emitter resistor

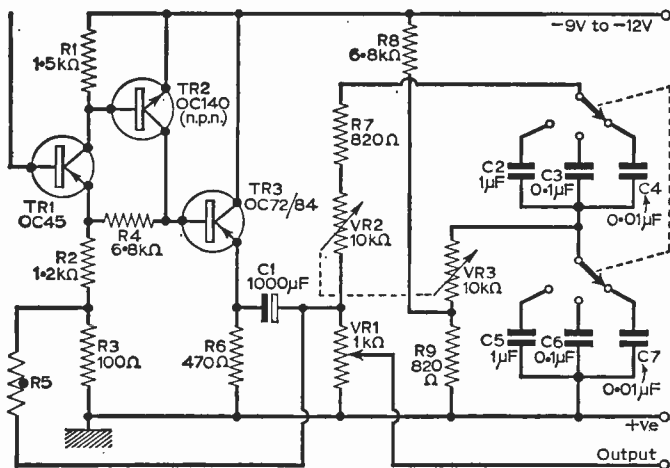


Fig. 5: The final, improved design for a Wien-bridge oscillator.

(R8) of Tr2 is left unbypassed so that this stage has considerable a.c. negative feedback.

VR1 in the emitter of Tr1 provides a convenient means of adjusting the waveform for amplitude and distortion, and for temperature compensation from one day to the next. The wave-form is good, and the short-term temperature stability is fairly good.

Supply voltage may range from -3V to -6V, the lower voltage being necessary to obtain sufficient oscillation, with VR1 suitably adjusted. The output may be taken from the emitter or collector of Tr2 i.e. (R7 or R8).

This circuit operates at very nearly the theoretical

$$\text{frequency of } f = \frac{1}{2\pi\sqrt{(C_3C_4R_7R_3)}} = \frac{1}{2\pi C_3 R_7} \text{ since in fact } C_3 = C_4 \text{ and } R_7 = R_3. \text{ With}$$

the capacitances shown the circuit oscillates at a frequency of about 3.4kc/s.

For operation at other frequencies the capacitances should all be increased or decreased by the appropriate figure. (The resistors cannot be changed without altering the d.c. conditions). The values of C3 and C4 should be chosen according to the frequency accuracy required, but for C1 and C2 the nearest standard values may be taken.

This circuit is sufficiently uncritical of gain to accept the OC70 or the OC71, but if operation is required at higher frequencies, it would be better to use two OC45's.

Three Transistor Circuit

A more professional Wien-Bridge oscillator is shown in Fig. 5, although the design has been kept as simple as possible. This circuit incorporates a thermistor R5 as an amplitude-control device, and the output is essentially independent of small changes in supply voltage or ambient temperature. (A suitable component for R5 is the S.T.C. thermistor type R53).

Apart from the frequency determining capacitors, only one capacitor is required. Consequently the unit can be built compactly, and no difficulties arise from phase shift in the coupling capacitance.

The output voltage is 1V r.m.s., and the circuit operates with supply voltages between 7V and 12V and consumes approximately 10mA. In Fig. 5, a lower limit of 9V has been set to the supply voltage to ensure low distortion.

The frequency coverage is from 15c/s to 20kc/s in 3 ranges (15—200c/s, 150—2,000c/s, 1.5—20kc/s) the lower frequencies being associated with the larger capacitors. The ganged variable resistors VR2 and VR3 allow the frequency to be adjusted within

any given range. In the experimental model the amplitude over the whole range was constant to within better than 2%.

If it is desired to extend appreciably the upper frequency limit of the oscillator, Tr3 should be changed to an OC41. This modification allows the oscillator to work satisfactorily up to

—continued on page 335

Making Panel ESCUTCHEONS

A PHOTO-PRINTING METHOD DESCRIBED BY A. GREGORY

AN important feature of the radio constructor's art which seldom gets more than scant mention, is the making of escutcheons or indicator dials.

The reason, no doubt, is that most workers regard as unobtainable the superior, glossy, indelible appearance of the factory printed article, so settle for a rough pencilled attempt, which somewhat mars the final appearance of their "masterpiece", to say the least.

However a very easy and cheap method of printing escutcheons, one off, or more as required, is ready to hand in the form of "contact photo printing", as is used for making snapshot prints.

Essentially this process consists of: laying photo printing paper in contact with a negative—exposing to electric light—and developing and fixing.

The negative, in the present case, is a paper tracing, made in ink, of the escutcheon design; the latter having first been drafted upon a drawing board in the normal manner.

The tracing is transferred from the drawing to a photo printing frame or sheet of glass serving the purpose, and held thereto with adhesive tape.

A sheet of contact printing paper (hard/white/glossy) is clipped in position, whilst being protected

from exposure to bright light in a dark room, and then the assembly is turned towards an electric light source which is switched on about twenty seconds. This figure should be doubled or halved for subsequent prints if adjustment of exposure time is required.

The print is next detached from the printing frame and immersed in a dish of developer solution for about two minutes whereupon it will be seen to have turned a full black with the detail picked out in white.

This reversal process so described, i.e., white on black, is simpler to obtain and more distinctive in appearance than the original black on white. The print is finally fixed in hypo, washed and glazed, in the usual way.

The process of contact printing is so simple and widely practised that full instructions are included with each packet of papers bought and so the subject does not warrant detailing in the present article. One point of importance regarding the negative is that it should be oiled, to obtain maximum transparency and conducive to print sharpness.

The best adhesive for sticking the escutcheon to the non-responsive shiny surface of the normal plastic panel material is "Bostik C".

AUDIO OSCILLATOR DESIGN

—continued from page 334

and above 100kc/s. For other transistors, R8, the 6.8k Ω bias resistor feeding the bridge, may need to be adjusted to ensure optimum working points for the transistors.

The OC140 (Tr2) is an n-p-n transistor and its connections should therefore be made as in the circuit diagram, with the emitter connected to the negative supply line.

To avoid excessive distortion the external load connected to the oscillator when the output is at its maximum should be not less than 1k Ω . With the addition of the load the change in the maximum output voltage is less than 1%.

Stability

With a change of 3V in the collector-emitter supply voltage (from 9V to 12V) the change in frequency at 10kc/s and the change in the output voltage are less than 1%.

Power Supply

The power supply can be constructed from parts which may be ready at hand, but choke smoothing should be employed and the value of the reservoir capacitance should be high (500—1,000 μ F).

This generator, although simpler than many of its counterparts, fulfils a need on the bench of the hi-fi enthusiast for compactness and accuracy. ■

HANDY SIGNAL INJECTOR

—continued from page 331

gain but is not in any way open-circuit. If this occurred the signal would still pass through the faulty transistor due to the fact that such a faulty device is still a good electrical connection between two stages.

However, this is a very rare fault which is seldom encountered. This could not occur with a thermionic valve which had lost its emission completely, the non-conducting vacuum existing between anode and cathode in this event would effectively isolate two stages.

Incidentally, one of the most revealing tests on a transistor receiver is the measurement of the d.c. voltage across the emitter resistor of each transistor. The voltage measured should be within $\pm 20\%$ of the nominal values shown on service sheet or manual and should a voltage of a stage be outside this limit there is a fault in the stage. Voltage measurements, however, will not show up a.c. faults such as faulty coupling capacitors, etc. The fault-finding procedure with the injector on thermionic valve equipment is similar to that with transistors. Starting at slider of potentiometer to determine whether the fault lies in r.f. or a.f. section, if a.f. inject signal into grid of output stage, then back to first a.f. stage; if r.f. commence at potentiometer and work back to demodulator, then i.f. amplifier and so on until a stage is reached where there is a signal going in but none coming out. This last stage must then be the faulty one. ■

Versatile Gramophone Amplifier

A BETTER-THAN-AVERAGE DESIGN, USING DIRECT COUPLING, FOR THOSE PREPARED TO ACCEPT SOMETHING LESS THAN HI-FI, BUT WITH FULL BASS AND TREBLE TONE CONTROL.

By J. G. Ransome

MANY small amplifiers have been described from time to time in this journal but, in general, the tone control networks in these circuits have been little more sophisticated than "top-cut" controls.

This situation can be quite frustrating on occasions—especially when an "awkward" record is to be played which needs special compensation, and so in order to overcome this problem, this

It must be agreed, however, that the facilities offered by this circuit and its tone controls will be wasted if the amplifier is to be used in conjunction with something like a crude 4in. loudspeaker mounted on a thin wooden baffle!

The basic circuit is shown in Fig. 1 and it is difficult to think of a simpler circuit than that depicted. This circuit (Fig. 1) will work quite satisfactorily as it stands, and if the tone controls are

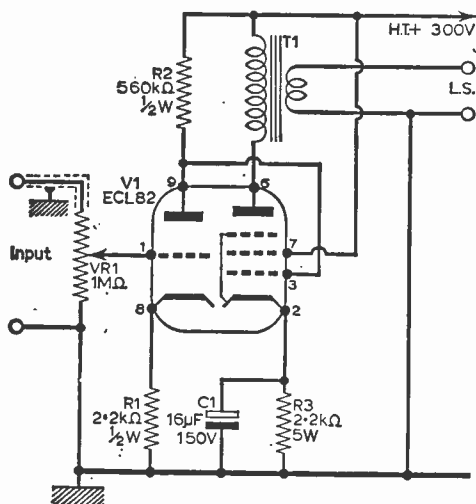
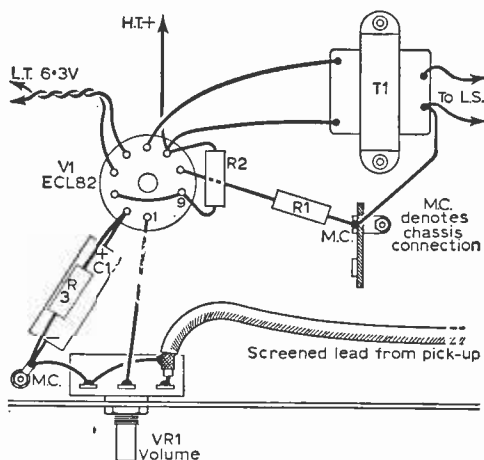


Fig. 1: The basic design.

circuit has been provided with more elaborate tone controls than is usually found in such simple circuits. Now, it could be argued that since the distortion in the final output stage is about 10%, the provision of elaborate tone controls is pointless. Against this it must be said that while distortion may affect the output *quality* the tone controls affect the actual *content* of the output signal and it is felt that it is still useful to have a good control over the signal even if this signal is a little distorted.

Fig. 2: A wiring diagram for the circuit given in Fig. 1.



not required, then the wiring diagram of Fig. 2 may be used.

As will be apparent from the circuit diagram direct coupling is employed and the basic operation is as follows:

Consider the pentode section of the valve V2. V2 draws current from the h.t. line and as it does so there is a current flow through R3 and this means that the cathode voltage rises. In the present case we require that the cathode should be between 90 and 100V so that the anode of the



CLEAR PLASTIC PANEL METERS

First Grade quality. Moving Coil panel meters. available ex-stock. S.A.E. for illustrated leaflet. Discounts for quantity. Available as follows. Type MR. 38P 1 1/2 in. square fronts.

50μA	32/6	1A. DC	22/6
100μA	29/6	5A. DC	22/6
200μA	27/6	3V. DC	22/6
500μA	25/-	10V. DC	22/6
50-0-50μA	29/6	50V. DC	22/6
100-0-100μA	27/6	100V. DC	22/6
1mA	22/6	300V. DC	22/6
5mA	22/6	300V. DC	22/6
10mA	22/6	500V. DC	22/6
50mA	22/6	750V. DC	22/6
100mA	22/6	15V. AC	22/6
150mA	22/6	50V. AC	22/6
200mA	22/6	150V. AC	22/6
300mA	22/6	300V. AC	22/6
500mA	22/6	500V. AC	22/6
750mA	22/6		

Type MR. 21 2 1/2 sq. front.			
50μA	57/6	1mA	32/6
100μA	47/6	10mA	32/6
500μA	37/6	100mA	32/6
50-0-50μA	57/6	1A. DC	32/6
100-0-100μA	47/6	300V. DC	32/6
300V. AC	32/6		

Type MR.65P 3 1/2 x 3 1/2 in. fronts			
50μA	59/6	1mA	35/-
100μA	49/6	10mA	35/-
500μA	39/6	100mA	35/-
50-0-50μA	59/6	1A. DC	35/-
100-0-100μA	49/6	300V. DC	35/-
VU Meter	59/6	300V. AC	35/-

POST EXTRA



BAKELITE PANEL METERS

First grade quality. 3 1/2 in. square fronts.

25μA	65/-	1A. DC	29/6
50μA	42/6	5A. DC	29/6
100μA	39/6	1A. DC	29/6
500μA	35/-	5A. AC	29/6
50-0-50μA	42/6	30A. AC	29/6
100-0-100μA	39/6	300V. DC	29/6
1mA	29/6	300V. AC	29/6
10mA	29/6	300V. AC	35/-
100mA	29/6	VU Mtr.	49/6

*Moving iron. All others moving coil.

ILLUMINATED 'S' METER
1 2 1/2 in. sq. front. Cal. in S units. 6V lamp. 29/6. P.P. 1/-.
Ditto 2 1/2 in. sq. 39/6. P.P. 1/-.

MORE METER BARGAINS
100μA 6in. Flush sq. 92/6
100μA 2 1/2 in. Flush rd. 42/6
30V-0-30mA 2 1/2 in. 9/6
300V. AC 2 1/2 in. 25/-
500V. AC 2 1/2 in. 25/-
1mA Meter Rectifiers 8/6

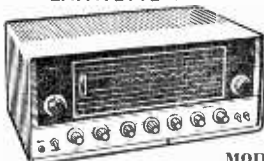
MINE DETECTOR No. 4
Will detect all types of metals. Fully portable. Complete with instructions. 39/6 each. Carr. 10/-. Battery 8/6 extra.

MINIFLEX 3 TRACK TAPE HEADS
Set of three, record, playback, erase. Only 29/6 set. P. & P. 5d.

MAINS MOTORS 220-240V
90 watts, 5,000 r.p.m. 4 1/2 x 3 1/2 in. spindle. 22/6. P.P. 2/-.

BEST BUY!
Send 1/- P.O. for full catalogue and lists.
Open 9 a.m. to 6 p.m. Every day. Monday to Saturday. Trade supplied.

LAFAYETTE COMMUNICATION RECEIVERS



Superlative range of Modern Communication Receivers incorporating many special features at prices to suit every pocket.

MODEL HE-40. 4 Bands. 550Kc/s to 30Mc/s. £24.15.0.
MODEL HE-30. 9 Valves. 4 Bands. 550Kc/s to 30Mc/s. £42.

MODEL HE-80. 15 Valves. 5 Bands. 550Kc/s-30Mc/s. 142-148Mc/s. 59 mms. Each receiver supplied brand new and fully guaranteed complete with manual. Carriage paid. All models for operation on 220/240 Volt A.C. S.A.E. for illustrated leaflet—Generous part exchange allowances.

AMERICAN OSCILLOSCOPE MODEL USM 38

Brand New high quality single beam oscilloscopes. 3in. tube. T.Y.B. 1μ/sec. to 10,000 μ/sec/inch. Calib. markers 1-10-100 μ/sec. 115V. A.C. operation. Supplied with circuit, leads and probe. £29.10.0. Carr. 10/-. (230/115 trans. 18/6).

TRIPLET MODEL 1632 SIGNAL GENERATOR

100Kc/s-120Mc/s in 10 bands. Crystal controlled. Fully attenuated output up to 1 volt with calibrated meter. Operation 115V. A.C. As new condition. £12. Carr. 10/-. (230/115 trans. 12/6).

LAFAYETTE PRECISION TEST EQUIPMENT



Modern range of precision test equipment for the service man. Supplied brand new and guaranteed with manual. For operation on 220/240 volts A.C.

TE-20 Signal Generator. 120Kc/s-280Mc/s on 6 Bands. Directly calibrated. Variable R.F. Attenuator. Variable audio output. £12. Carr. 5/-.

TE-46 Capacity Resistance Analyser. Ranges 2pF-2,000mF; 2 ohms-200 Meg. Also checks impedance, turns ratio. Insulation. £15. Carr. 5/-.

Brand New Double Beam CRT's
Cossor 89D. 59/6. P.P. 4/6.
Dumont K1051P1. 59/6. P.P. 4/6

TS.76 20,000 O.P.V. PUSH BUTTON MULTI-TESTER

Large clear plastic scale. Simple operation. AC volts up to 1,000V. Resistance up to 10 megohm. Current up to 250 mA. Decibels -20 to +36dB. Size 6 x 4 1/4 x 2 1/2 in. Complete with leads, batteries and instructions. £5.19.6. P. & P. 2/-.



MARCONI TF144G/4 STANDARD SIGNAL GENERATORS

First release of this latest mark. 65Kc/s to 25Mc/s ±1%. Output variable from 1μV to 1 volt. Internal sine wave modulation 400c/s up to 75% depth. Operation 200/250 volt A.C. Offered in really excellent condition, like new, fully tested and guaranteed. £25. Carr. 30/-.

FIELD TELEPHONES

2 line connection, generator bell ringing. Supplied fully tested, complete with batteries. TYPE "L" Metal case, 69/6 per pair. Carr. 5/-.
Type "F" Bakelite case, £4.19.6 per pair. Carr. 5/-.

MULTI-METERS

Brand New—Fully Guaranteed. Lowest ever prices. Supplied with leads, batteries and instructions.

MODEL TI-34. 1,000 o.p.v. 0/10/50/250/500/1,000V. A.C. and D.C. 0/1/100/500 mA D.C. 0/100KΩ

39/6. P.P. 1/6.
MODEL NI-201 30,000 o.p.v. 0/25/10/50/250/500/1,000V. DC 0/10/50/250/500V. AC 0/50μA/10/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-2 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

MODEL TI-12 20,000 o.p.v. 0/5/25/250/500/2,500V. DC 0/10/50/500/1,000 V. AC 0/50μA/25/250mA 0/5K/500K/5 MegΩ 99/6. P.P. 2/6.

ERSKINE TYPE 13 DOUBLE-BEAM OSCILLOSCOPE

Time base 2c/s-750Kc/s. Calibrators at 100Kc/s and 1Mc/s. Separate Y1 and Y2 amplifiers up to 5.5Mc/s. Operation 110/230 volt A.C. Supplied in perfect working order. £27.10.0. Carr. 20/-.

CHAMOIS PADDED MOVING COIL HEADPHONES
Canadian noise excluding type. Complete with M/C microphone. New, boxed. 25/-.

SILICON RECTIFIERS

400V. P.I.V. SCR. 4.7 amp.	7/6
200V. P.I.V. 6 amp.	5/6
1000V. P.I.V. 650mA	7/6
800V. P.I.V. 500mA	5/6
200V. P.I.V. 200mA	3/-
400V. P.I.V. 3 amp.	5/6
150V. P.I.V. 185mA	3/6
400V. P.I.V. 500mA	3/6
70V. P.I.V. 1 amp.	3/6
95V. P.I.V. 3 amp.	5/6

Post extra.

LAFAYETTE BRAND RECORDING TAPE

First grade quality American tapes. Brand new and guaranteed. Discounts for quantities. 3in. 200ft. L.P. mylar 4/-
3in. 600ft. T.P. mylar 10/-
3in. 600ft. std. plastic 8/6
5in. 900ft. L.P. acetate 15/-
5in. 1200ft. D.P. mylar 15/6
5in. 1200ft. L.P. acetate 12/6
7in. 1800ft. D.P. mylar 25/6
7in. 1200ft. std. mylar 12/6
7in. 1800ft. L.P. acetate 15/-
7in. 1800ft. L.P. mylar 25/6
7in. 2400ft. D.P. mylar 25/-
Postage 2/-.

LAFAYETTE HI-FI STEREO HEADPHONES

Air Cushioned headband, soft foam rubber ear pads, frequency response 25-15,000 cycles. High sensitivity, impedance 8 ohms per phone. Supplied complete with all cables, wires, overload junction box and 3-conductor plug. 89/6. P. & P. 2/6.



4-CHANNEL TRANSISTORISED MICROPHONE MIXER

Add musical lights and additional s o u n d effects to your recordings. The MM-4 permits mixing of four signals such as microphone, records, tuner, etc. Into single output. Input and output take standard plugs. Fully transistorised and self contained in handsome case. PRICE 59/6. Post Paid.



TWO-WAY RADIOS
Model 1. 3 Transistor Transceiver. Range up to 1 mile. £9.19.9 per pair complete.
Model 2. 9 Transistor Transceiver. Range up to 5 miles. £25 per pair complete. S.A.E. for full details.



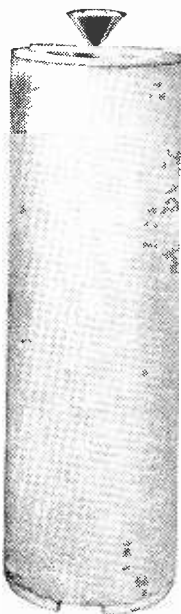
G.W. SMITH & CO (RADIO) LIMITED
Phone: GERRARD 8204/9/55
Cables: SMITHEX LESQUARE
3-34 LISLE STREET, LONDON, W.C2

UNUSUAL SINGLE SPEAKER SYSTEM

A CONCRETE COLUMN

An inexpensive column speaker constructed from a concrete pipe and fitted with a good 8in. or 10in. unit has attracted much interest and admiration because of its clean open sound.

Complete kits of wooden fixtures are available including absorbent wadding and diffusing cone.



Price £3.15.0 for 8" model. Recommended 8" unit—Super 8/RS/DD £6.14.2 including purchase tax.

Price £4.18.0 for 10" model. Recommended 10" units—Super 10/RS/DD £10.18.8; Golden 10/RS/DD £7.17.5; 10" Bronze/FSB £4.12.9. Prices include purchase tax.

Suitable concrete pipes can be purchased from builders' merchants at about 12/6 and 17/6.

Descriptive leaflet free on request from:



WHARFEDALE WIRELESS WORKS LTD.
IDLE BRADFORD YORKSHIRE

Grams: Wharfedale Bradford

Phone: Idle 1235/6

OSMOR

CHANGE OF ADDRESS

To

540 PURLEY WAY

CROYDON

(NEAR AIRPORT)

SURREY

Please send 3d. stamp for new coil list

Telephone

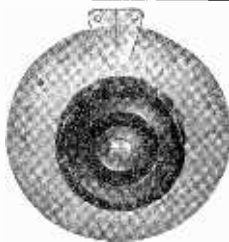
CROYdon 5148-9

JACKSON



the big name in **PRECISION** components

Precision built radio components are an important contribution to the radio and communications industry. Be sure of the best and buy Jackson Precision Built Components.



BALL DRIVE DIAL

A welcome addition to our range which incorporates our well-tryed 6-1 Ratio Epicyclic Ball Drive inside a complete 4" dial. This unit fits on the outside of the panel. Cat. No. 4489. retail price 18/9.

This Ball Drive Dial is used in the 3 transistor S.W. converter together with the type E.3 gang 310 pF, price 19/3. C.801, 25 pF at 6/9. C.801, 15 pF at 6/9. C.808, 25 pF at 11/4.

It's reliable if it's made by JACKSON!

JACKSON BROS. (LONDON) LTD. (Dept. P.W.)

KINGSWAY-WADDON, CROYDON, SURREY

Phone: Croydon 2754-5. Grams: Walfilco, Souphone, London

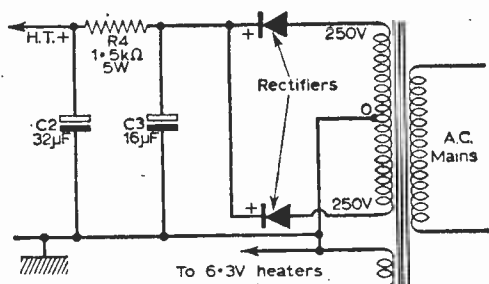
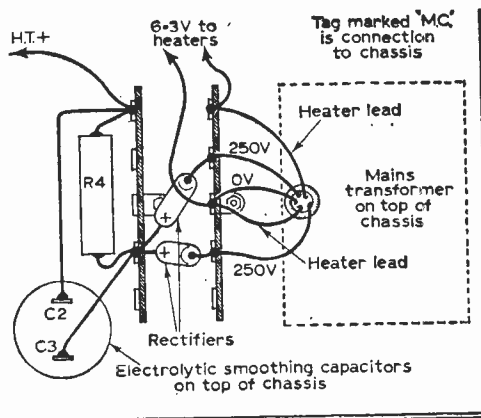


Fig. 3 (above): A power supply circuit suitable for either amplifier. The two rectifiers are 250V r.m.s. 50mA silicon types.

Fig. 4 (right): Wiring for the power supply.



triode has sufficient applied potential, and since the h.t. line is at 300V the voltage drop across the pentode will be some 200V.

Reference to the manufacturers data reveals that the anode current at this voltage is 35mA and the screen current is 7mA. This means that the total current drawn by the valve—and thus through R3, is 42mA. Using Ohm's Law we can see that the value of R3 should be:

using $R = \frac{E}{I}$

where R = resistance—ohms

E = potential—volts

I = current—amps

substituting

$$R3 = \frac{90 \times 1,000}{42} \approx 2.2k\Omega$$

The grid of the pentode should be about 16V negative with respect to the cathode and so the triode anode must be arranged to be at 74V and this is achieved by the value assigned to R2 in the diagram. The output pentode acts as a load for the triode and thus receives all the output developed at the triode anode. The resistor R1 provides a little bias for the grid (about 0.5V).

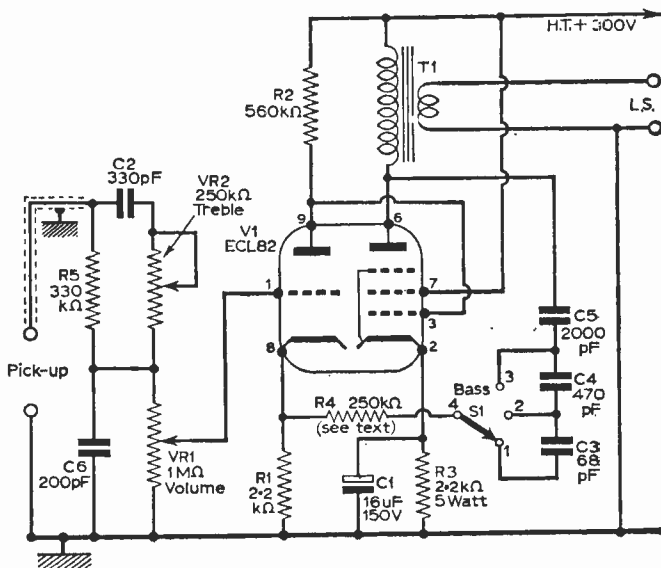
Construction

The wiring diagram of Fig. 2 shows the simplicity of layout and the only special features are that the grid connection to pin 1 of the valve-holder should be made as short as possible and that C1 must not be too close to the resistor R1 or there may be a risk of impairing the function of C1 by subjecting the capacitor to a too high ambient temperature.

The power unit is shown in Fig. 3 and the wiring diagram for this unit is shown in Fig. 4.

The test voltages as measured on the original,

Fig. 5 (below): The final circuit which includes the bass and treble tone controls.



using a $20,000\Omega/\text{V}$ meter, were as follows:

Pin	1	2	3	4	5	6	7	8	9
Voltage H		92	77	0	6.3*	290	300	0.5	77

* = a.c.

* = a.c.

The Full Circuit

The full circuit is shown in Fig. 5 and it will be noted that several additions have been made to the basic circuit.

Let us consider first the input circuit. The voltage developed by the pick-up crystal is applied across the combination of R5 and C6 and this network provides some compensation for a crystal pick-up by providing a little top cut. R6 is shunted by C2 and VR2 and, since C2 offers a compar-

tively low impedance to high frequencies but has a high impedance to low frequencies, the high frequency components of the input signal can bypass R6.

VR2 controls the degree of this by-pass and is, therefore, a treble control. This control provides "treble lift". The compensated signal is applied to the top of VR1 and the slider of this potentiometer is taken to the triode grid—VR1 is the volume control.

The next network to consider is that comprising the resistor R4 and the capacitors C3, C4, C5. This circuit feeds back part of the output signal appearing at the anode of the pentode to the cathode of the triode, and this has the effect of reducing the overall gain of the amplifier.

This effect can be simply illustrated if we consider the case when a positive signal is applied to the triode grid. In this case a negative going, amplified signal appears at the anode of the triode and this signal is applied to the pentode. The resultant amplified signal at the pentode anode is positive going and is fed back to the cathode of the triode. The triode cathode is now driven positive causing the grid to be made more negative with respect to the cathode, and this means that the gain of the triode is reduced.

Fig. 6: The wiring for the second circuit.

Now, if the feedback circuit is made frequency selective we can make the amplifier have a high gain to one set of frequencies whilst at the same time having a low gain to another band of frequencies. The frequency selective network is that R4, C3, C4 and C5.

This network to a greater or lesser degree feeds back the high frequency component of the input signal and in this manner the high frequency gain is reduced providing what is, in effect, a "bass boost" in the amplifier.

With the switch S1 in position 1 the capacitors are all wired in series and therefore there is minimum capacitance in circuit which means that the degree of treble feedback is low and so position 1 is the position of minimum "bass boost".

In position 2 C3 is removed from the circuit and the combined capacitance of C4 and C5 is 400pF and in this condition a greater degree of high frequency feedback and so more "bass boost" is effectively given.

When the switch is in position 3 only C5 (the 2,000pF capacitor) is in circuit and this results in all the high and middle frequency signals being fed-back, and this results in a high degree of "bass boost".

The resistor R4 has an effect on the degree of bass boost and it may be found that the range of control offered with the value given for R4 may be

inadequate and a suitable value will have to be found by trial and error. In general, however, the value of R4 should not exceed 1mΩ nor be less than 47kΩ.

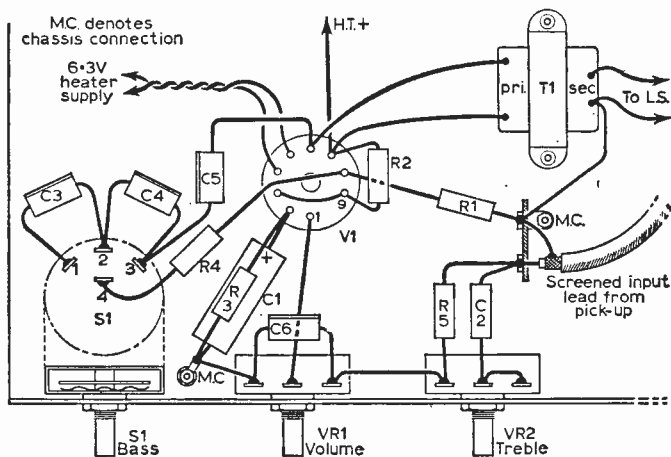
The optimum load for the pentode is 5kΩ and this means that for a 3Ω loudspeaker the transfor-

mer ratio should be: $\frac{5,000}{3} = 40:1$.

Similarly for an 8Ω speaker the ratio will be 25:1 and for a 15Ω speaker 17:1 (nearest preferred value).

Construction

The initial stages of the construction follow that outlined for the basic circuit and Fig. 2 should be followed at this stage. When the circuit has been constructed to the basis of the basic amplifier



it should be tested as such using the voltage test table outlined previously. Fig. 6 shows the wiring diagram for the complete unit.

The first addition is that of VR1, VR2, R5, C2 and C6. The input to this network should be brought in using screened cable but providing that all the wiring is kept as short as possible this is the only screened wire that will be required. The whole sub-unit is easy to construct and no further comment will be required here.

The bass-selection switch wiring is carried out by mounting the components on the switch tags thus keeping the wiring direct. The switch and its associated circuitry should be mounted as far away as possible from the input to prevent instability due to positive feed-back, and a useful precaution in this respect would be to screen the switch with a small metal plate.

In conclusion, therefore the author would like to say that despite the simplicity of construction the amplifier is capable of some quite excellent results which may prove a surprise to those used to the results of more conventional circuitry. ■

END FED AERIALS

THEORY AND PRACTICE

As the author has several acres available for aeriels, it is natural that many end fed wires have been tried. This type of aerial is simple and can work effectively on several bands. It is hoped the details following will be of use especially to those who are awaiting their transmitting licences, and wondering what kind of aerial to erect.

Advantages of the end fed aerial may be summarised briefly—the same aerial may be used on all bands, the length is not critical, it is inexpensive and often easily erected, and may provide some gain over a dipole, on the h.f. bands.

Its main disadvantages are an increase in receiver static when conditions are poor, and its tendency to cause TV interference, especially when incorrectly coupled to the transmitter. With correct coupling, TVI should not be exceptionally troublesome.

Materials

Hard drawn 14 gauge copper wire is generally used, and may be obtained in any suitable length. Enamelled wire is preferable, to reduce the surface losses eventually likely from oxidization of bare wire. Stranded 7/26 wire, with weatherproof covering is available in coils up to 100ft. The 7/26 wire is cheaper and lighter than 14G, and no reduction in aerial efficiency was apparent when it was used. Necessary joints were made by twisting the wire together for about 2in., soldering, and painting with bitumen.

One 3in. ribbed glass insulator can be used at each support point, or a pair, if available. The polythene line sold for aerial erection is ideal between insulators and supports, though any thin strong cord, for outdoor use, would be suitable.

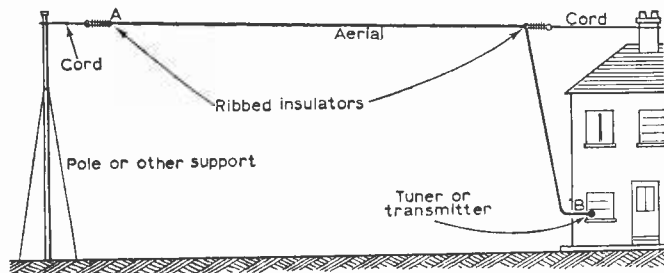


Fig. 1: Typical end-fed aerial system.

With an end fed aerial, the transmitter end is usually supported at the house. The line should be taken to the highest possible point, and is of such a length that the down-lead is at least 2ft. from the walls for most of its descent, as in Fig. 1. In many cases the whole aerial can be a single, uncut wire. Its length is made up by the horizontal top, down-lead, and connection to the transmitter or tuner. That is, from A to B in Fig. 1.

Only one other support is required, again as high as can be arranged. It may be possible to take a line to another building, or to a tree, or to a pole fitted vertically in a tree, or attached to a building. Or a 6ft. 4in. x 4in. or similar post may be set in the ground, and the pole may be bolted to this.

If the line is run through a spare insulator attached to the top of the pole, it will be easy to raise or lower the aerial, or adjust its tension.

Harmonic Working

The lowest frequency at which the aerial is a $\frac{1}{4}$ -wave long is its fundamental frequency, and multiples of this frequency are harmonics. In Fig. 2, the aerial is a $\frac{1}{4}$ -wave long for 40 metres. Current is nearly zero at each end, and reaches a maximum in the centre. Voltage is at a maximum at each end, and low in the centre.

If the aerial were used for 20m. it would accommodate two $\frac{1}{4}$ -waves, as at B. If used on 10m, the length would be four $\frac{1}{4}$ -waves, as at C. The length of wire for a $\frac{1}{4}$ -wave aerial may be found from the following, the result being in feet:

468

Frequency in Mc/s.

The lengths thus found are 0.95 of a $\frac{1}{4}$ -wave in free space, to allow for end effects. A length near the centre of an amateur band is sufficiently accurate for the whole band. Suitable $\frac{1}{4}$ -wave lengths are:

1.8Mc/s band	...	...	246ft.
3.5Mc/s	"	...	128ft.
7Mc/s	"	...	66½ft.
14Mc/s	"	...	33ft.
21Mc/s	"	...	22ft.
10Mc/s	"	...	16½ft.

When the aerial is operated upon harmonics, end effects only apply to one $\frac{1}{2}$ -wave. As a result, the aerial length is more nearly that of the number of $\frac{1}{2}$ -waves in free space. For harmonic working, the length is easily calculated as follows:

$$492 \times (\text{No. of } \frac{1}{2}\text{-waves} - 0.05)$$

Frequency in Mc/s

As example, suppose an aerial is four $\frac{1}{2}$ -waves at 21.2Mc/s. The length is:

$$\frac{492 (4 - 0.05)}{21.2} = 91.7\text{ft.}$$

Feed Impedance

If the aerial is a $\frac{1}{2}$ -wave long, or any multiple of $\frac{1}{2}$ -waves, as in A, B or C, Fig. 2, high voltage but low current will be present at the end connected to the transmitter or tuner. The feed point (end) will thus be at high impedance. The actual impedance can easily be 1,000 Ω , or higher.

Should the aerial be only long enough to be a $\frac{1}{4}$ -wave, as at A in Fig. 3, low voltages but high currents will be present at the transmitter end, which will thus be low impedance. In these circumstances, the feed point impedance may be 50 Ω or even less.

When the aerial is some intermediate length, such as at B in Fig. 3, its feed point impedance will also be some intermediate figure. The feed impedance will also be of some intermediate value when the aerial does not accommodate an exact number of $\frac{1}{2}$ -waves, at some harmonic frequency, as at C in Fig. 3.

It is thus apparent that provision must be made at the transmitter to operate into a wide range of impedances. This can be done by using a pi-output tank circuit, or an aerial tuner. The latter is often preferable, because it allows the whole aerial system to be tuned to resonance, and helps suppress TVI.

Aerial Lengths

Methods of calculating the length for fundamental and harmonic use have been given. The length of the aerial will also help influence the gain (if any) which the end fed aerial will have over an ordinary $\frac{1}{2}$ -wave dipole.

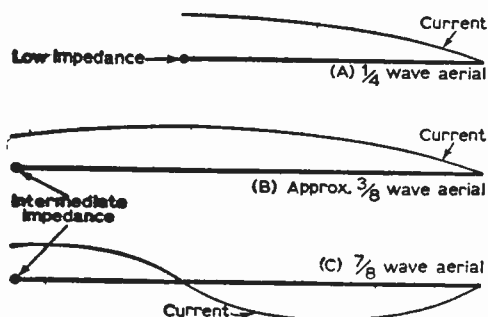


Fig. 3: Current in odd-length aerials

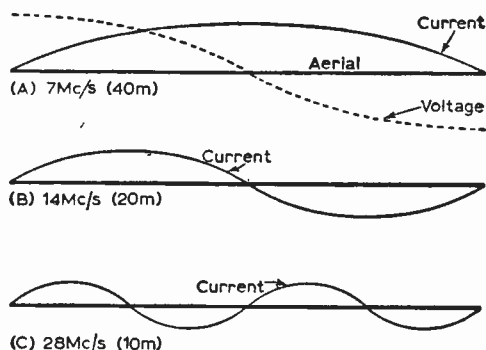


Fig. 2: Fundamental and harmonic operation, showing distribution of current and voltage.

When the aerial is sufficiently long to accommodate a number of $\frac{1}{2}$ -waves, the strength of the signal radiated is increased in some directions. The power gain, for aerials of several $\frac{1}{2}$ -wave lengths long, is approximately as follows:

No. of $\frac{1}{2}$ -waves	Gain in dB
4	1.5
6	2.3
8	3.2
10	4.2
12	5

As example, suppose the aerial is 138ft. long. This could be used as a $\frac{1}{2}$ -wave on 160, and a $\frac{1}{4}$ -wave on 80m. It would be two $\frac{1}{2}$ -waves on 40. On 20m. it would be four $\frac{1}{2}$ -waves, with 1.5dB gain over a dipole. On 15m. it would be six $\frac{1}{2}$ -waves, with about 2.3dB gain, and on the 10m. band it would be eight $\frac{1}{2}$ -waves, with a gain of just over 3dB.

When the aerial is fairly long, useful gain is obtained. It is generally found that the aerial is also a good radiator in other directions. For general purposes, lengths between about 90ft. and 246ft. have all been found effective. The directivity and increased gain are most likely wanted on the 14 and 21Mc/s bands, and suitable lengths for these are as follows:

14Mc/s Two $\frac{1}{2}$ -waves, 68ft. Three $\frac{1}{2}$ -waves, 103ft. Four $\frac{1}{2}$ -waves, 138ft. Six $\frac{1}{2}$ -waves, 207ft.
21Mc/s Two $\frac{1}{2}$ -waves, 45 $\frac{1}{2}$ ft. Three $\frac{1}{2}$ -waves, 68ft. Four $\frac{1}{2}$ -waves, 91 $\frac{1}{2}$ ft. Six $\frac{1}{2}$ -waves, 137ft.

Some lengths will be a multiple of $\frac{1}{2}$ -waves on several or all bands. For example, 138ft. is suitable for 3.5, 7, 14, 21 and 28Mc/s. In experiments between G3OGR and Capetown, reliable contact was maintained with an aerial six $\frac{1}{2}$ -waves long, when attempts to cover this distance with a dipole had failed. When space is limited, 68ft. is useful for 7, 14, 21 and 28Mc/s bands.

Intermediate, odd lengths can be worked successfully provided the method of feeding the aerial is adjusted to suit. This is best done by using an aerial tuner. It is then not even necessary that the length is known, though this information can be useful.

Directivity

When the aerial is about $\frac{1}{2}$ -wave long at the working frequency, there is little directivity, though radiation is best at right angles to the wire. When the wire is two $\frac{1}{2}$ -waves long, strongest radiation is at about 54 degrees to the aerial. For three $\frac{1}{2}$ -waves, the best radiation is at about 44 degrees to the wire, and for four $\frac{1}{2}$ -waves the angle is about 36 degrees. The angle is about 28 degrees for six $\frac{1}{2}$ -waves, and 17 to 18 degrees for eight $\frac{1}{2}$ -waves.

It will be seen that radiation is more and more nearly in line with the wire, as the number of $\frac{1}{2}$ -waves is increased. For example, the 138ft. aerial would have lobes at 54 degrees on 7Mc/s, 36 degrees on 14Mc/s and 28 degrees on 21Mc/s.

This increased radiation may be pictured as a cone extending away from the ends of the wire, and the angles given are for radiation at approximately horizontal levels. At angles above and below the horizontal, the radiation is more nearly in line with the wire, when plotted on a map.

The aerial can thus give good coverage in directions other than those favoured by the angles of the four lobes in a horizontal plane. In addition, much of the low angle radiation obtained is extremely useful for long distance working. If it is wished to know bearings, these must be taken from a globe or great circle map.

Fig. 4 shows a wire four $\frac{1}{2}$ -waves long, with main and secondary radiation lobes. If the same wire were used on one-half the frequency, it would then be two $\frac{1}{2}$ -waves, and the lobes for this are also shown.

Aerial Feeding

The down-lead is brought into the house by means of an insulator or tube, insulation being as good as possible. A detachable earthing clip, or earthing switch, may be fitted here.

In some cases the aerial can be fed directly from the transmitter. If the transmitter has a pi-output circuit, such as that in Fig. 5, the aerial is taken to the tank coil at C2, as shown. C2 (usually a 2-gang or 3-gang 500pF capacitor) is fully closed, and the tank is tuned to resonance by C1.

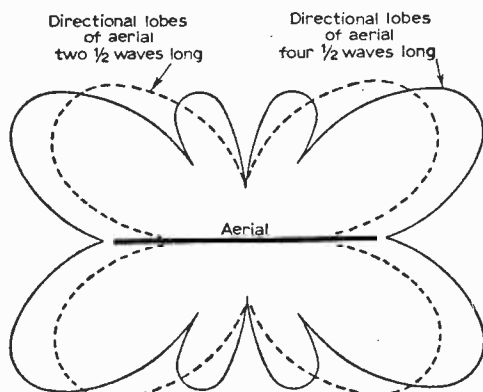


Fig. 4: Directional lobes at 2-waves and four $\frac{1}{2}$ -waves.

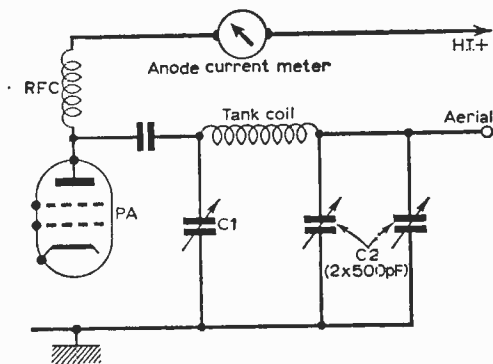
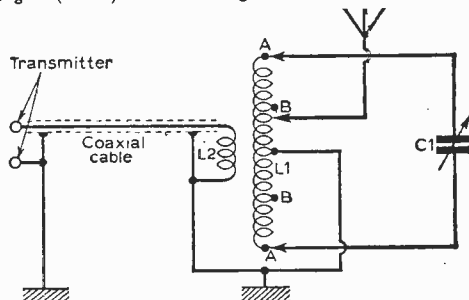


Fig. 5 (above): Typical pi-output circuit.

Fig. 6 (below): Tuner arrangement for end-fed aerials.



Resonance is indicated by a dip in anode current, as read on the meter. If the anode current is too low, C2 is opened slightly, and C1 re-tuned, this being repeated until the valve is drawing its expected anode current.

If the aerial impedance is very high, C2 will have to be opened very much, and the voltages developed will be high. In these conditions, C2 may spark over. If so, an aerial tuner is needed. In other cases, the setting of C2 for correct loading may make it impossible to tune the tank to resonance with C1. An aerial tuner will also avoid this.

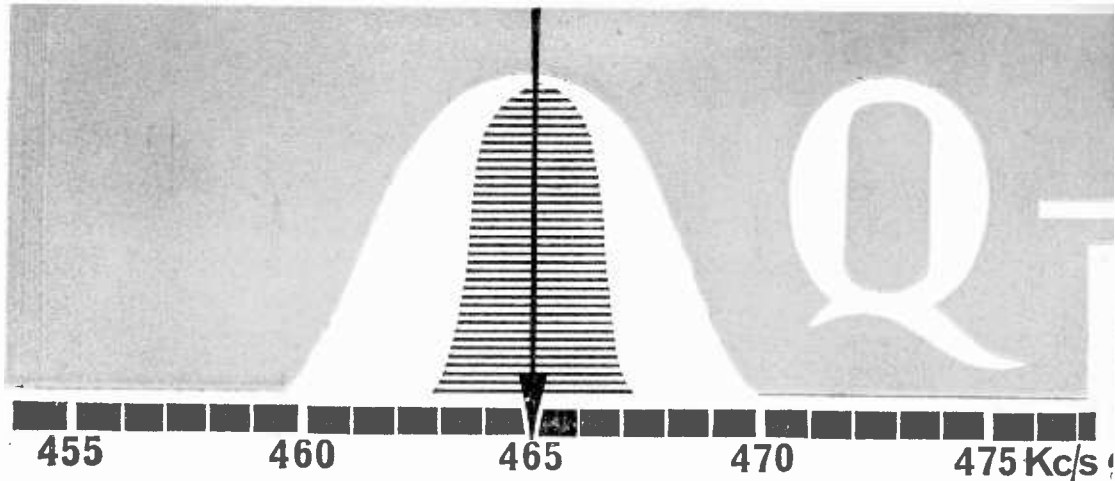
When C2 is at a relatively low value, as it must be with a high impedance aerial, harmonics are more likely to reach the aerial itself, thus causing TVI. An aerial tuner will then also be of benefit.

If TVI does not arise, and if the transmitter can be loaded properly by the aerial then the latter is directly connected, then Fig. 5 may be used. But if there is insufficient loading, sparking over, or other troubles, some kind of aerial tuner is required.

Tuner

Any ordinary aerial tuner will be suitable. A circuit is shown in Fig. 6, and may be easily constructed in a separate case. The coil L1 is tuned to the operating frequency. For 3.5-28Mc/s, 26 turns of 18s.w.g. wire, on a former 2 1/2 in. in diameter and 5 in. long (e.g., Eddystone 1090) will be

—continued on page 378



IN recent years the Q-Multiplier circuit has been widely used as a cheaper and more flexible method of varying selectivity than the crystal filter.

Most Q-Multipliers are in the form of an "add-on" unit employing a single or double triode and have the advantage of requiring no modification to the circuit of the receiver with which they are used. On the other hand, they have the disadvantage that either room for them has to be found within the receiver cabinet or an entirely new unit has to be constructed.

This article describes two extremely cheap Q-Multiplier units which can be formed by simple modification to an existing stage of any superhet receiver and which require an absolute minimum of additional components. Before discussing the new circuits, a word about "Q", which is a measure of the efficiency of a circuit or component.

Circuit Inefficiencies

If the capacitor C, in the simple oscillatory circuit (Fig. 1) is charged, it will discharge through the coil L. In doing so, it will produce an e.m.f. which tends to charge the capacitor up again. This having occurred, the capacitor will discharge again and the whole cycle is repeated.

In theory this oscillation would go on *ad infinitum*. In practice, of course, it soon dies away

due to inefficiencies in the coil and the capacitor and, more particularly, due to the resistance of the circuit. (This is analogous to the decay of a pendulum swing due to air resistance and friction in the bearings.)

If the losses in the oscillatory circuit can be made good, the circuit can in fact be made to oscillate continuously. Thus a simple oscillator can be made up as in Fig. 2. A coupling coil from the anode of the valve being used to feed energy back into the oscillatory circuit.

Similarly, if a tuned circuit is used in an amplifier it is also subject to losses affecting its performance. In theory, the circuit responds only to one

frequency determined by the formula $f = \frac{1}{2\pi\sqrt{LC}}$.

In practice, due to inefficiencies, it allows frequencies either side of the theoretical one to pass through it, although to a lesser degree. The circuit has *bandwidth* (i.e. a band of frequencies which will pass through it) and its response may be shown graphically as in Fig. 3.

Bandwidth

Some degree of bandwidth in a receiver is, of course, essential since, owing to its information content, the received signal occupies a certain width of the r.f. spectrum. For reception of musical programmes a total bandwidth of 10kc/s might be regarded as essential. For speech only this could be much reduced and for c.w. 200c/s could well be adequate (or, indeed, essential if the desired signal was adjacent to unwanted powerful signals).

Thus, assuming that most receivers have a fairly wide bandwidth suitable for reception of music, we see that this bandwidth can be reduced if necessary by increasing the efficiency of the tuned circuits of the receiver (Fig. 3). And we have also noted that the efficiency of a tuned circuit can be improved by feeding energy back into it, thereby increasing (or multiplying) its "Q" value.

The simplest possible Q-multiplier can be formed, therefore, by connecting a small capacitor between anode and grid of one of the i.f. amplifier valves of a superhet receiver. Such a modified stage is shown in Fig. 4. Additional components are shown dotted.

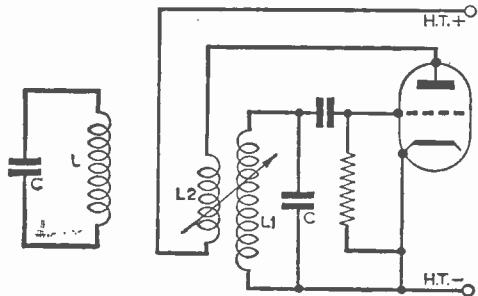


Fig. 1 (left): A simple oscillatory circuit.

Fig. 2 (right): A simple oscillator. Energy for the anode circuit is fed back from the coupling coil L2 into the basic oscillatory circuit (L1 and C) thereby maintaining continuous oscillation.

MULTIPLIERS

by P.R.LEWIS

● Improving selectivity without a crystal filter ●

The capacitor C_x provides feedback to the grid circuit and in practice can be formed by a short length of stiff wire soldered to the anode pin and bent over towards the grid pin of the valveholder. If not already present the gain control VRI must be added to provide control over the stage gain and therefore over the Q multiplication.

In this particular application the stage cannot be allowed to go into oscillation. (If this happens it is because the feedback is cancelling out all losses, the Q is infinite, the bandwidth nil and the circuit is useless as an amplifier.)

Improving Stability

In practice, therefore, it is desirable to adjust the feedback so that the circuit only just goes into oscillation when VRI is at the top of its track. It will be found necessary to keep the gain control turned well down until the required station has been accurately tuned. The gain control is then turned up to a point just below oscillation when the effective Q is as high as can be obtained with this simple circuit.

As gain is increased, music or speech will sound "boxy", indicating a narrowing bandwidth and adjacent interference will be much reduced. The margin between high Q and oscillation with this basic circuit is very fine, however, and its uses are therefore limited.

A more stable configuration is shown in Fig. 5, just a few extra components being necessary to improve the performance enormously. The main change is that by substituting two series capacitors for the original capacitor in the second i.f.t. anode coil, and earthing their centre point, it is possible

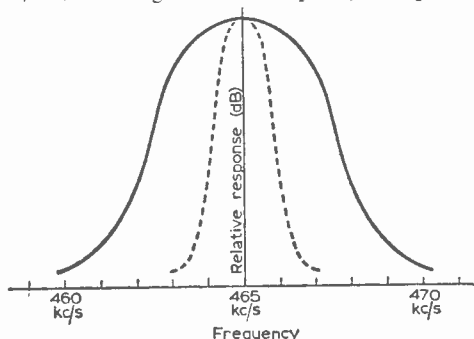


Fig. 3: Theoretical response of a circuit tuned to 465 kc's only. The dotted lines show the improvement which might result if the Q of the circuit is increased.

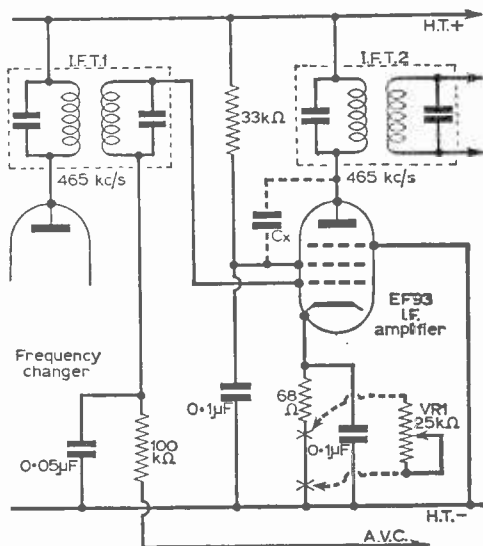


Fig. 4: A simple Q-multiplier circuit, using capacitor feedback between output and input tuned circuits, and incorporated in a typical i.f. stage using an EF93 or similar variable- μ pentode. Additional components are shown dotted. For value of C_x , see text.

to feed back to the grid circuit only a proportion of the signal developed across the anode circuit.

This, together with the introduction of a radio frequency choke, makes for much better control. The feedback capacitor C_x is nominally 5pF but should be adjusted as before until the circuit just goes into oscillation at the top end of VR1.

Note that it is desirable to disconnect the a.g.c. line and use a straight r.f. valve (EF95) instead of the original variable μ valve, although this latter is not absolutely necessary.

Fine Tuning Control

An interesting innovation is the tuning capacitor VC1, which may be fitted if there is room on the chassis. This enables the frequency of the tuned circuit to be varied by ± 5 kc/s from the nominal 465kc/s, thereby permitting investigation of the passband of the receiver without altering the main tuning control.

This method is considered to be a more effective method of *fine* tuning than the more normal band-speed control. The receiver may be tuned over an amateur band with VR1 turned down and the

position of and interference between various stations noted. VR1 can then be turned up to isolate one transmission and, by tuning back over the band with VC1, previously heard transmissions may be picked out in isolation. If VC1 is fitted the lead from it to the anode pin should be screened.

When this type of modification is made to the i.f.t. the core will need to be accurately realigned. A weak but steady transmission should be tuned in with VR1 turned well down. The core should be adjusted for maximum signal and then VR1 gradually turned up, adjusting the core all the time. The most important thing to check whilst doing this is that the original transmission is retained since, with the increasing Q multiplication, it is very easy to move on to another transmission.

Finally, Fig. 6 illustrates another type of feedback arrangement in which alterations are made to the input circuit of the stage. Once again a.g.c. is disconnected from the stage and a straight r.f. valve used.

This type of amplifier provides a very stable system (i.e. the margin between high Q and oscillation is not so critical as in the other circuits. Once VR1 has been set to its highest possible position the circuit is not likely to go into oscillation spontaneously).

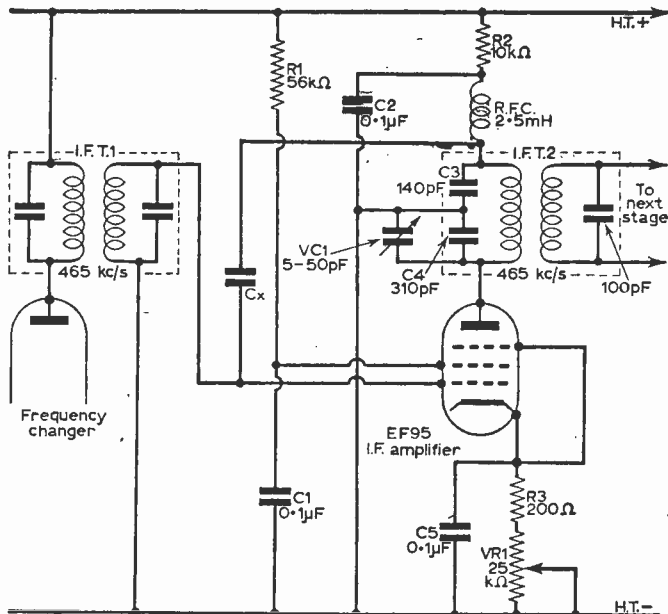


Fig. 6: An i.f. stage modified to form a high stability low gain Q-multiplier unit. The stage is operated as a cathode follower and a portion of the output is fed back via VR1 to the input tuned circuit.

"Q" multiplications of over 150 are obtainable (i.e. the Q of the stage may be 15,000), the only disadvantage being that the stage gain is less than unity. The circuit is thus best incorporated into a multi-stage receiver, in which case the modified stage should be the earliest possible one after the front end.

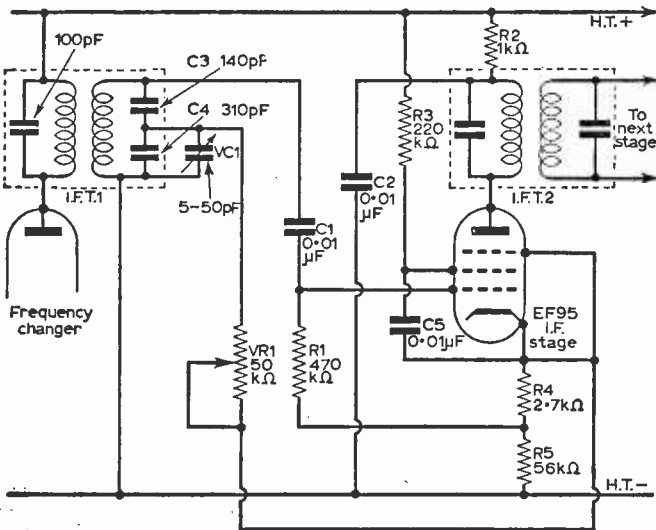


Fig. 5: An i.f. stage modified to form a Q-multiplier unit, feedback being by capacitor Cx from output to input tuned circuits. Values of VC1, C3 and C4 are calculated on the assumption that the original i.f.t. capacitor was 100pF. If VC1 is not fitted, C3 and C4 should both be 200pF.

Mechanical Construction

It should be borne in mind that in both the circuits of Figs. 5 and 6 the object is to achieve a carefully controlled feedback of energy. Therefore precautions must be taken to prevent unwanted feedback.

The two series capacitors replacing the original i.f.t. capacitor must be situated in the can. The tuning capacitor should be screened if possible and, as mentioned in Fig. 5, the lead from VC1 to anode should be shielded.

In Fig. 6 the leads from the centre point of the capacitors C3 and C4 to VC1, from VC1 to VR1 and from VR1 to the valve cathode pin should all be screened, as should the input lead to the grid. VR1 itself should be shielded or, if in metal case, the case back should be earthed.

Electronic VIBRATO

PRODUCING THE TRUE MUSICAL EFFECT FOR ELECTRICAL INSTRUMENTS

BY J. HOLDEN

MANY of us who enjoy the fascinating pastime of electronic music have many times wished for a simple device that would produce a true vibrato and not, as is so often found in published circuits, amplitude modulated tremolo which is to say the least disappointing.

It is well known that the most successful vibrato to date is the Hammond Line Vibrato, which, of course, is used on the Hammond organs, and is accepted by most organists to be the most outstanding feature of these instruments. In fact, records made on the old organs which had amplitude modulated tremulants sound "thin" and artificial.

The Line Vibrato consists of a complicated electronic circuit comprising many chokes and a large number of capacitors, also a high-precision scanner which would be practically impossible to duplicate without special tools.

The following circuit effectively does the same job as the above, but only requires the ordinary parts that are found in most junk boxes. It consists of an inter-valve transformer with centre-tapped secondary, ratio approximately 1:3 primary to secondary—Fig. 1(a).

The centre tap of the secondary in conjunction with a $50k\Omega$ resistor is the output to main amplifier, and should be followed with not less than a potentiometer of $1M\Omega$. One side of the secondary is connected to earth through a $500k\Omega$ resistor.

The other side of the secondary is connected to earth through a variable capacitor of approx. $0.001\mu F$; this is made up of two sections of a tuning gang of $500pF$ per section, the two sections being connected in parallel.

This variable capacitor is driven by a small electric motor at approximately 5-7 revs. per second; this causes the signal to be effective across firstly one half of secondary, and then as the gang attains its maximum capacitance the signal is effective across the section connected to this capacitor.

Now it will be seen from the above, without going into the matter too technically, that we have obtained a phase change which at its maximum is nearly 180° . A change in phase is heard by the listener as a change in frequency so long as the phase is constantly changing.

The idea of phase change vibrato is not new and various devices have been published, but all have used valve methods of changing the phase which always results in a "thumping" sound being added to the original signal: all the above devices are fitted with filters to remove this "thump", but in doing so the signal has to be very much attenuated at the lower end with the result that the final sound is poor.

The system we are discussing requires no filters

whatsoever and the frequency range is entirely dependent on the quality of the transformer. It must be stated at this point that the same effect of phase change can be obtained by replacing the fixed $500k\Omega$ resistor with one of the new light sensitive variable resistances, such as ORP60 cadmium sulphide cell. In this case the variable capacitor is replaced by a fixed capacitor of $0.001\mu F$ —Fig. 1(b).

The change of resistance is brought about by cutting off and on the light from a small dial bulb placed in front of the sensitive portion of the ORP60. This can be done by a piece of suitably shaped card rotated by a small motor.

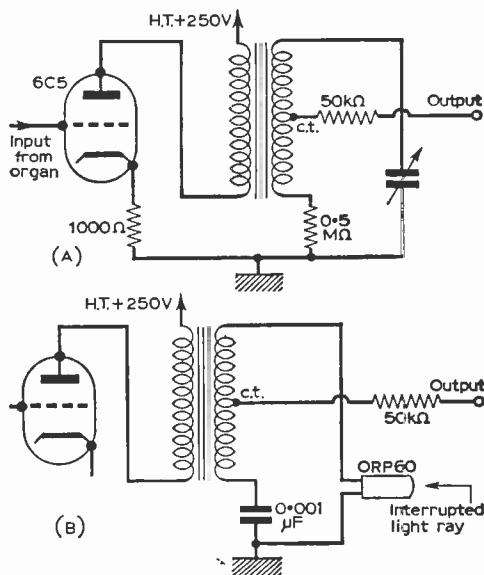


Fig. 1 (a) and (b): The two versions of the circuit required for producing a true vibrato effect.

Both methods have been tried out for long periods with complete success and no fault has been found whatsoever, both on the writer's own home-made organ and a commercial model, viz., Polychord.

The variable capacitor used is the type fitted to most all-dry portables, but must be of construction that will allow the vanes to complete the full circle: the small piece of paxolin which is fitted to the ends of the vanes has to be carefully removed. Do try not to distort either the moving or fixed vanes.

Cabinet Care

by M.A. QUALES

finishing • renovating • repairing

wood • plastics

EVERY home constructor must have suffered the frustration of seeing his laboriously built equipment disparaged because—in the words of the critic—it has “an amateur finish”. Useless to argue that you are getting umpteen distortionless decibels if the distaff side has sniffed: “All those wires and things!” The only answer would seem to be a course on basic carpentry, followed by a study of polishing techniques.

There is no need to be discouraged; nor is it necessary to take such drastic steps. The amount of carpentry that the radio enthusiast needs to undertake will be quite small. This is not the place to discuss it at any great length. For any reader who wishes to follow the subject further, a regular subscription to *Practical Householder* is to be recommended. We are more concerned, at this point, with the art of the “finishing touch”.

Whether one is merely repairing the damage from a careless cigarette or polishing and finishing a complete set of equipment enclosures, there are some basic factors to consider. First, the method of work is determined by the material.

WOOD CABINETS

Most cabinet work is carried out in wood—which is rather like saying that every day is a weekday except Sunday! But there are many types of timber, and each type has its peculiarities. Moreover, the very many veneer and artificial finishes available at present give a bewildering choice to the constructor. Much depends on the required appearance of the piece of furniture we are building to house our electronic dreamchild.

Colour

The simple and obvious answer would seem to be a wood finish left in its natural colour—a trend that has had a recent renewal of life in furniture. But even this has its drawbacks. No timber remains indefinitely the same colour as when it is first cut. There is a gradual darkening with exposure to light, and as this is a chemical change, the type of finish that protects the wood will not prevent this natural tendency.

Any finish will tend to darken the wood slightly; a point that must be remembered when matching pieces. Whilst it is possible to bleach, it is by no

means simple, either to carry out, or control. Far better to begin with a blonde wood, such as birch, in the first instance.

If it is intended to paint or enamel a piece of timber, to obtain the necessary match or to provide a certain decorative effect, the softwoods are best choices. Fir plywood or knotty pine is a common choice.

Preparation

Whatever the material, the first essential is its preparation. Too often, a neglect of this important phase of the work can spoil a finished job, and there's no way of overcoming the fault except to strip down and start all over.

Smoothing

The first thing is to plane and rub down the surface until it is smooth. Remember that the small groove or excrescence becomes alarmingly visible after the decorative finish is applied. This can be very noticeable if a high-gloss finish is used, and is the reason that some people advocate the use of solid core plywood instead of the cheaper veneer-core types, which may have more of a tendency for face veneers to transfer surface ripples from the core veneers.

If a plane is used for preliminary work, a very sharp iron and a smooth setting are required, so that by sighting along the bottom of the plane, only the merest whisker of iron protrudes. Finishing edges with a plane, especially the edges of some plywoods, can be difficult.

A right-angle block sander can be made, as shown in Fig. 1, which takes away some of the anxiety. Two blocks of wood are fastened at right-angles by shelf brackets, so that a space sufficient to take a medium grade sandpaper is left between the upper edge of the vertical block and the lower face of the horizontal block. The latter is fixed to the bracket so that it overlaps an inch or so.

The glass-paper is fastened as shown, and the device allows good edges to be rubbed down without the chipping and scarring that often results from inexpert use of a plane.

When sandpapering, use a coarse grade, followed by a finer grade, clearing dust with a fine brush between sanding operations. (Grades of sandpaper vary according to coarseness of abrasive surface—

the lower the number, the finer the particles. Normal grade for this work would be No. 2 medium for preliminary work, finishing with 0 or 00). The softer the wood, the finer the paper.

Rubbing down of plane surfaces should be done with the grain—usually along the length of a piece of timber. The easiest method of rubbing by hand is to wrap the glasspaper around a wooden block. Cork is an excellent base material for this work, having just that amount of "give" that helps toward a satiny finish.

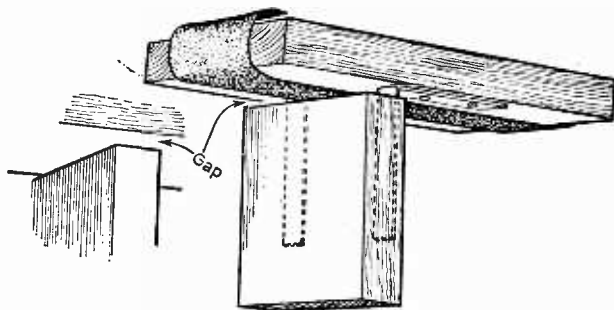


Fig. 1: Rubbing block for sand-papering edges of timber. Note gap between blocks to permit easy replacement of glass-paper.

Power Tools

Nowadays the handyman has a battery of powered tools at his disposal, and sandpapering can be less of a chore. But it should be stressed that some machines are quite unsuitable for delicate finishing.

A rotary sander, for example, must operate for part of its travel *across* the grain of the wood, and this is not advisable for the kind of work we are considering. Where there are ridges, mouldings, etc., it is always better to fashion a block to fit the shape of the moulding and rub down patiently by hand.

The importance of this rubbing down—and the next point to be mentioned—cannot be too strongly emphasised. A good finish will not be obtained unless the basic material is quite smooth.

Small Flaws

If there are small flaws, cracks or crevices, these should be filled. Large holes can be stopped with a putty filler, or one of the water-mix powders on sale for plaster-filling, or with plastic wood.

A point to note is that putty has a linseed oil base. The oil will soak into the wood as the putty dries out and the stopping shrinks. Similarly, the powder mixtures dry and shrink, and being softer than the basic material will tend to drag from the stopping when re-sanded, leaving a noticeable blemish.

Best method of preparation is to impress the stopping firmly, leaving it proud of the main surface, allowing it to dry (the plaster-of-paris mixtures and the newer polymer preparations dry out very quickly—too quickly, as one finds when too much is mixed at one time!) After this, the protruding surface of the stopping is cut down to the level of the wood, and the whole surface sandpapered until no difference can be felt to the level.

If the hole to be stopped is fairly big, or a crack deep, it may be necessary to make two or three stoppings, or the outer skin of the material used for the stopping hardens, preventing the softer inner core from drying out.

This is similar to the filling carried out to even the roughness of hardwood finishes, preparatory to staining and polishing. Depending on the type of timber, and the direction of cut that gives it the characteristic grain, the amount of rubbing

down that can be done will vary. Before taking this operation too far, it is necessary to decide on colouring and type of finish.

Basic Methods

There are three principal methods of finishing a hardwood surface: oil polishing, french polishing and wax polishing. Unless it is required to keep the natural colour of the wood, perhaps protecting it with a clear varnish or a french polish alone, a stain will first be worked into the wood.

It is often necessary to match this colouring very carefully, and the choice of stain depends upon the wood, as well as the effect that is being striven after. Although there are three types of stain available (alcohol, water and oil-based) it is usually the last two which find most popular employment by the amateur.

In general, oil stains do not penetrate the wood as readily as water stains. On a hard, or close-grained wood, water stain may be quicker and easier to use, whereas on soft woods, such as pine or fir, oil stains may be easier to control for colour matching.

Water stains are usually supplied as crystals, mixed as you require, but oil-based, or naphtha-based stains are more often ready mixed. A cheap water stain can be made by dissolving crystals of potassium permanganate in water.

Using a water stain requires patience. A little is applied at a time, until the shade you require has been achieved. Application tends to raise the grain of the wood, and it is often necessary to rub down again after it has been used.

Oil stain is laid on fairly quickly with a well loaded brush, to cover the whole work, then surplus stain wiped off until the right shade is obtained. If the wood is porous, it will be necessary to wipe off fairly quickly to keep the tone even, especially on a surface of any appreciable area.

Care must be taken when staining the end grain of a workpiece, as this is more porous, and will soak up the stain more quickly, resulting in a darker finish.

Grain Filling

The next stage, after staining, is the filling of the grain. A patent filler can be used, and is perhaps a better method for small surfaces, but if a larger amount is required, a powder plaster filler can be mixed as required. The dampening agent for light-coloured surfaces could be linseed oil, or a stain of the same colour as the prepared surface.

After staining, and before filling, the surface should be rubbed down with a fine glass-paper. The object of filling is to level off the ridge-like irregularities of the grain, and thus the filler should be applied with a pad of rough cloth *across the grain*.

The usual method is to begin lightly, over a small area, working until the powder of the filler is used up, recharging the pad until the surface is covered, then going back over the surface in small sections with a circular movement.

As the filler commences to dry, change to a dry pad and wipe all surplus powder from across the grain and at edges and in crevices. After the filler is completely hard—usually an overnight process, even for the quick-drying preparations—the surface can be wiped over with a pad moistened in linseed oil.

This should be done lightly, so as to just form a seal on the surface, combining with the powder filler. Again, leave the work to dry, then rub down with a fine glass-paper, or a worn piece of O-grade, finally dusting to remove all loose particles of filler.

Oil Polishing

Oil polishing is simple to carry out, but it does **take time**. It is absolutely vital that the work be left undisturbed between rubbings.

The oil used is raw linseed oil, and it is worked well into the wood by a soft cloth with a firm surface, varying the direction of movement of the pad as the surface is covered. Between polishings, the surface may be rubbed down with a soft brush to burnish it slightly. Heating the oil a little improves the penetration.

The finish is attractively "deep", without the high surface shine of a hard polish, and re-oiling every six months or so is all that is needed to maintain the work.

French Polishing

French polishing is a different proposition, and the beginner would be well advised to practice on spare pieces of timber before committing himself to the precious cabinet he has constructed. The work is prepared in the same way as before, with the filling done after staining and the surface rubbed down with a fine-grade glass-paper.

There are four kinds of French polish in general use, and different qualities of these polishes. The types are determined by the shellac used as a base, dissolved in methylated spirit. The preparations

ready bottled are in the right proportions, but the professional prefers to mix his own. The following notes are intended only as a guide for the constructor who wishes to experiment.

Finishes

Garnet polish has a rich, greenish-brown colour. It is normally used on dark woods, but may be employed to darken the colour of a piece—although this needs some experience to achieve both a quality finish and a colour match. Six ounces of garnet shellac dissolved in a pint of methylated spirit gives the correct proportion.

Button polish is not quite so dark, having a golden-brown finish, suitable for medium colour woods. It has a slightly cloudy appearance and is rather harder than the other types. Six ounces to one pint.

Orange polish may be used on lightly stained or unstained woods, the latter method giving a pale yellow finish. Again, six ounces to a pint of spirit.

White polish is almost colourless, and can be used on unstained woods, or where it is necessary to preserve the lightness of tone. Eight ounces of bleached shellac are dissolved in a pint of spirit.

The four kinds may be mixed to give intermediate tones. The shellac should be put in a bottle containing the required amount of spirit, tightly corked, and left for several days to dissolve, with an occasional vigorous shaking to help things along. Because of its highly volatile nature, the usual precautions against fire must be taken and the bottle should always be tightly corked.

It is a good idea to groove a cork as in Fig. 2, and substitute this for the stopper when working. This allows a better control of the amount being poured, and limits evaporation. A further precaution is to keep the work well away from any dust.

If possible, work in a warm dry room, where there is likely to be no disturbance; and if it is possible to place the work in front of a window, the bringing-up of the surface can best be gauged.

Fadding

First step is "fadding" with a pear-shaped pad of wadding—unbleached—prepared by first soaking the wadding in the polish, allowing it to dry, then making it into the pad shape, pouring just enough polish on the pad to wet it, without setting up a drip, tapping off any surplus polish on a sheet of paper, then applying directly to the wood.

Fadding seals the timber, giving a good foundation, and the pad should be worked evenly and quickly over the whole surface, with the grain at first, taking care to overlap the edges so as to prevent the building up of light-catching ridges at later stages of polishing. When the first rubbing has dried and hardened, it should be sanded-down with a grade-O glass-paper, then well dusted.

This operation should be repeated several times,

TOP QUALITY—LOW COST **CRC** AMATEUR RADIO EQUIPMENT

BUILD YOUR SHORT WAVE STATION WITH CODAR-KITS.

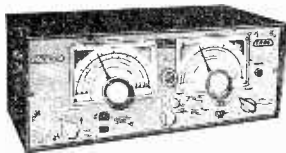
CR 66 COMMUNICATIONS RECEIVER

THE FINEST SUPERHET KIT EVER OFFERED

Hundreds of testimonials (can be seen at our offices) prove this highly sensitive top quality receiver to be the finest value ever offered. No technical knowledge or equipment is required. Assembled Coil Unit and I.F. Transformers are factory aligned. Frequency range 540 Kc/s to 30 Mc/s in 4 bandswitched ranges. Separate Electrical Bandspread. Regenerative I.F. stage for maximum gain and B.F.O. Panel aerial trimmer. AVC, Standby. Speaker switches. 3 watts output or 2-3 ohm external speaker. Valve line-up: ECH81 6BF89 FCC81, EL84, EZ80, EM84. Tuning Indicator. Modern styling in Silver Grey Cabinet 16 x 6½ x 8½ in.

Complete Kit, 17-page Instruction Manual.....	£19. 2/6
Ready Built	£21.12/6
"S" Meter Model Kit	£21. 2/6
Ready Built	£23.15/0

Carriage on all models 6/- H.P. Terms available on request.



★ P.R. 30 R.F. PRESELECTOR ★

Frequency range 1.5-30 Mc/s. Substantially improves the performance of any superhet receiver.

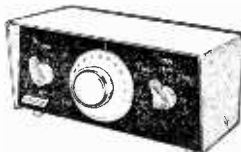
G4HZ writes "... I am delighted with it, it improves my Eddystone 640 in all respects. The difference with the Pre-selector is fantastic, a weak signal on 15 metres about S2 changed to S8. On the L.F. Bands, unwanted noise and mush is cut out.

G3RIA writes "... The results in conjunction with my Eddystone 888 are amazing. Signals are twice as strong with much higher signal/noise ratio. A first-class product well worth the money. The P.R.30 uses EF183 Frame Grid R.F. Amplifier and provides up to 20 dB gain. Features include vernier tuning, gain control, selector switch for either dipole or end fed antenna. External power supplies (obtainable from Rx). Smart styling in grey and black. Complete, READY BUILT, with all plugs, cable.

Now available in two models.

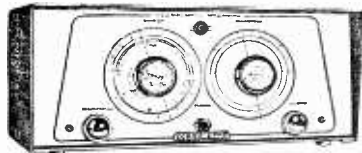
P.R. 30 for external power supplies 180-250 volts H.T., 6.3 volts 3 amp. L.T. (obtainable from receiver). **£4.17.6**

P.R.30X self powered with internal power supply for 200-250 volt A.C. Will provide 200 volts up to 25 mA and 6.3 volts 1 amp. for other accessories. **£7.2.0**



CODAR-KIT CR 45 MAINS T.R.F. SHORT WAVE RECEIVER

World-wide short wave reception, North-South America, India, Russia, Far East, Australia, amateurs, shipping, etc.



- ★ Separate electrical bandspread.
- ★ Three slow motion vernier drives.
- ★ Low loss polystyrene plug-in coils, factory aligned.
- ★ Dials calibrated in frequencies and degrees.
- ★ Power output 3 watts for 2/3 ohm speaker.
- ★ Valve line-up: ECC81/EL84/EZ80.
- ★ Front Panel silver and Black, control knobs Grey.
- ★ Provision for panel phone jack.

Superb modern styling and Top quality components throughout. Complete CR 45 CODAR-KIT, with valves and 3 Coils, 10-28, 25-75, 60-176 metres. Instruction Manual 11 pages, less Cabinet.....

CR 45 Cabinet Silver Grey 12 x 5½ x 7in. with sliding door for easy coil changing and detachable louvred rear panel

Instruction Manual only 4/- post free. Extra coils 4/9 each.

★ CAN BE SUPPLIED READY BUILT PRICE ON REQUEST.

£7.5.0 Carr. 4/6

28/6

★ IT'S HERE! CODAR A.T.5 12 WATT 2 BAND MINIATURE TRANSMITTER

"THE tiny TX with the BIG voice"

The CODAR A.T.5 is the newest, most compact Tx for fixed or mobile use on 160/80 metres.

CHECK THESE OUTSTANDING FEATURES—

High stability new type calibrated V.F.O. 1.8-2.0 Mc/s and 3.5-3.8 Mc/s (up to 4 Mc/s export).

Low loss air-spaced CODAR-Coil Pi-net output.

P.A. Plate current meter, plus neon indicator.

Plate/screen modulation. AM/CW switch and panel key jack.

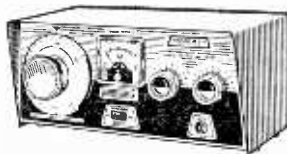
Plug changeover for 6 or 12 volt heater supply.

Small and smart for XYL appeal. Grey cabinet only 8½in. wide, 5in. deep, 4in. high.

Base area is less than this page! Front panel Black and Satin silver, grey and chrome control knobs.

Complete, Ready Built, Delivery July.....

Matching power supply unit for 200-250 volts A.C. with Standby/Net/Transmit and aerial changeover switching, stabilised V.F.O. supply, neon standby/transmit indicator. 12 volt mobile power supply available shortly.



£16.10.0 Carr. 4/-

£8.0.0 Carr. 5/-

CODAR-KITS are famous for PEAK PERFORMANCE, EASY TO FOLLOW INSTRUCTIONS, CLEAR PICTORIAL DIAGRAMS. Some of the Top Quality names who supply material for CODAR-KITS ... MULLARD, BRIMAR, JACKSON, DENCOR, ELECTRONIQUES, THORN, A.E.I. etc. ... only the best is good enough for the high CODAR standards which make complete success certain. 6d in stamps brings illustrated leaflets

CODAR RADIO COMPANY

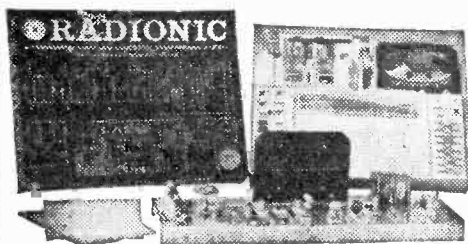
BANK HOUSE, SOUTHWICK SQUARE, SOUTHWICK, SUSSEX

G3IRE

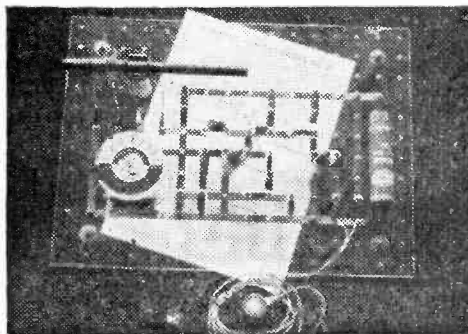
CANADA: CODAR RADIO OF CANADA, TWEED, ONT.

G3HGG

STEP BY STEP BUILD YOUR OWN RADIO!



Enthusiasts everywhere are discovering the Radionic approach to radio building—and finding it an ideal instructional medium. A vast variety of radio and electronic circuits can be built and rebuilt even by novices with this exciting new system. With Radionic, you build and learn at the same time. Colour-coded components and brass connecting strip are simply bolted to a transparent panel... there's no soldering whatever. Battery operated; no danger. Well tried circuits and new instruction sheets enable complicated transistor sets to be built with ease. Brilliant results. Already adopted by numerous Universities, Technical Colleges and schools; selected by the Council of Industrial Design; Featured in Radio and T.V. Broadcasts. Radionic—the modern approach to radio building.



RADIONIC

Radionic Products Limited, Stephenson Way,
Three Bridges, Crawley, Sussex. Tel: Crawley 28700

Designed for the electronics age...

PRIMAX and PRIMAXA solder guns

SPOTLIGHT SOLDER GUNS



Distributed by **S. KEMPNER LTD.**

29 PADDINGTON ST., LONDON, W.1.

Tel: HUNter 0755

EXPRESS ELECTRONICS 32 SOUTH END CROYDON SURREY TEL. CRO 9186

VALVES NEW TESTED AND GUARANTEED FOR THREE MONTHS

101	5/6 8BE8	7/-	12AU7	6/9	12BH150	10/-	EF92	5/6	PL83	7/-	
102	7/6 8BH6	5/9	12AX7	6/9	DK91	5/6	EL41	9/8	PY33	8/8	
103	7/6 8B16	5/9	12BE6	4/8	DK96	7/6	EL84	7/-	PY81	8/8	
1F1	7/6 8BR7	8/9	12BH7	10/6	DL92	5/8	EM85	10/-	PY82	7/6	
1F3	2/- 8BW6	6/8	12K8GT11	-	DL94	8/-	EY81	7/6	PY83	7/6	
1FD1	7/6 8BW7	7/-	12QGT	7/6	DL96	7/6	EY81	10/-	R19	5/6	
1FD9	5/6 8D2	4/-	12SN7	4/8	E191	4/-	EY86	4/8	85A1	9/6	
1P1	7/6 8F12	4/-	16A5	9/-	E1941	7/6	EZ40	5/8	TT15	27/8	
1P10	5/6 8H6GT	2/-	19AQ5	9/6	E1F80	8/8	EZ81	6/9	U76	7/6	
1P11	6/-	8H6GT	5/6	30C1	7/6	ECC82	6/9	HVR2	9/8	U78	5/-
1R5	5/6 8K7G	5/6	30C1	7/6	ECC82	6/9	HVR2	9/8	U78	5/-	
1R5	5/6 8K8G	6/-	30L1	7/6	ECC83	6/9	KT33C	6/-	U142	7/6	
1T4	2/- 6Q7G	5/8	35L6GT	7/6	ECC84	6/9	KT66	13/8	U142	9/6	
1U5	5/6 68L7GT	6/-	35W4	8/6	ECC85	7/8	N17	5/6	U141	8/6	
3Q4	5/6 68N7GT	7/6	3Z4GT	8/-	ECC80	6/8	N18	5/6	U141	8/6	
3B4	5/6 6V6G	7/6	3Z5G	7/6	ECC82	7/8	N19	6/-	UY41	7/6	
3V4	6/- 6X4	5/-	40	8/-	ECC142	9/-	N709	7/-	W17	2/-	
5Y3GT	6/6 6X5G	5/9	DAF91	5/8	ECC181	10/-	PC84	7/6	W78	4/6	
6Z4G	6/6 7Y4	6/-	DAF96	7/6	ECC180	8/6	PCF80	7/6	W142	5/6	
6A6	5/6 8D3	4/-	DP91	2/-	ECC182	7/6	PCF82	7/6	X17	5/6	
6AL5	4/- 9D7	9/6	DP96	7/6	EF41	9/-	PCF82	6/8	X142	9/-	
6AM6	4/- 12AD6	7/6	DI17	7/6	EF80	8/-	PCF84	5/8	X150	9/-	
6AT6	5/- 12AR8	10/-	DI77	6/-	EF86	9/-	PL81	9/8	Z27	9/-	
6BA6	5/- 12AT7	4/-	DH142	8/6	EF91	4/-	PL82	7/-	ZD17	5/6	

ASK FOR RESISTOR AND CAPACITOR COLOUR CODE FREE WITH EVERY PURCHASE

High Stability Resistors 1/4W 5% 50Ω to 1M. 9d. Midget Ceramics 500 v. 9d. Coax. Super Quality 1in. x 1in. 8/6. Contact Cooled 250 v. 50 mA. 6/8. 85 mA. 8/6. NEW TRANSISTORS BY MULLARD. OC19. OC26. OC65. 25/- OC41. OC45. 5/- OC70. 8/- OC71. 5/- OC72. 8/- OC72 Matched pair. 12/- OC74. OC75. OC78. 7/6 OC81. 6/- OC81 Matched pair. 12/- OC170. OC171. 7/6.

VALVES MATCHED IN PAIRS

EL34. 27/8. EL84. 15/- N709. 15/- 6V6. 15/- 6BW6. 14/- per pair. Push-Pull O.P. Transformer for above 3/15Ω. 14/6. P & P. 1/6. 12in. P.M. Speakers 3Ω. 24/6. Baker's 'Belhurst' 12in. 15Ω 15W Stairway. 25.5.0. 12in. Stereo Model. 27.7.0.

SETS OF VALVES

DK91. DF91. DAF91. DL92 or DL84	17/8	12CH42. EF41. EBC41.	
DK96. DF96. DAF96. DL96	29/6	EL41. EZ40	37/6
6K8. 6K7. 6Q7. 6V6. 6Z4 or 6X5G	19/8	ECH42. EF41. EBC41.	
1K5. 1T4. 1R5. 3B4 or 3V4	17/8	UL41. UY41	35/-

Postage and packing 6d.

Over £1 post free.

C.O.D. 4/-.

building up the base of protective polish. The spirit dries out in a few minutes.

Next step is to oil the pad with either a white mineral oil for light pieces or boiled linseed oil for darker wood. Only a small amount of oil is applied to the work surface to act as a lubricant, while the polish is used to dampen the pad as before.

As the pad becomes dry, recharge with oil, working always with small amounts, and covering the whole surface with a sweeping figure-of-eight movement, and the edges with small, regular circles or loops, so that the whole work is covered evenly. Fig. 2 a and b.

When this operation is concluded, view the surface toward the light to make sure that no irregularities remain. Then leave to harden and rub

down with OO grade glass-paper, carefully removing all dust with a soft brush.

Bodying

After oiling, "bodying" is carried out; this is a build-up of several layers of polish, and again, oil is used to lubricate the rubber, which is made of a piece of white linen over a pad of unleached cotton wool.

First stage of the bodying is a straight backwards and forwards movement of the rubber, lifting it cleanly at the ends so as not to scrape the edges, and using a very light touch. As the surface begins to gleam, recharge the rubber and change the directional movements, using long sweeping loops. Fig. 2c.

Do this several times, after each operation leaving the work to harden for 24 hours between rubbings.

Spiriting-off

The final process is "spiriting-off" with a rubber half-charged with methylated spirit and half with polish. This rubber is taken over the surface in a series of oval movements which graduate to straight strokes as in Fig. 2c.

Reduce the polish content with each application, until the last rub is made with a rubber completely charged with methylated spirit only (but take note: very lightly charged).

This burnishes the surface, which can be rubbed over afterwards with a soft cloth, dusted with Vienna chalk.

Wax Polishing

Wax polishing is comparatively simple. A polish can be bought ready-made, or prepared from a mixture of beeswax and turpentine. Dissolve 4oz. beeswax in $\frac{1}{2}$ pint turpentine, cutting the wax into thin slivers and allowing the mixture to stand until the beeswax dissolves.

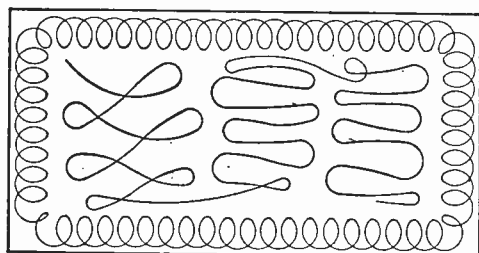
The process is accelerated by heat, but care must be taken not to ignite the polish. Colouring is adjusted by adding dry powder colour to the turpentine before the wax is shredded into it, then decanting the turps into another container through a fine mesh cloth strainer.

The polish can be applied quite vigorously, and as many times as required, until a gleaming surface is obtained.

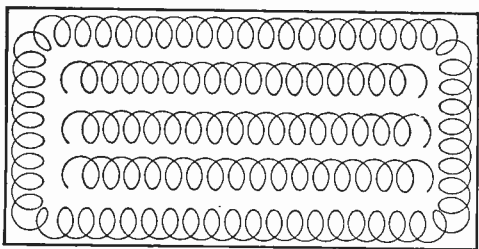
RENOVATING WOOD CABINETS

This is all very fine for the new piece—that virgin cabinet with the flawless surface—but more often we are concerned with "touching-up" operations, and here there may be several short-cuts.

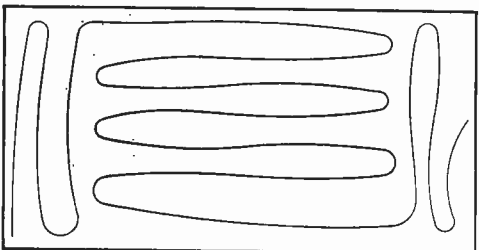
Various scratch removers, stains and retouching polishes are available, and sticks of shellac are readily obtainable. A rubbing compound is a use-



(a)



(b)



(c)

Fig. 2: Rubbing movements for polishing: (a) fadding; (b) loop pattern to cover whole surface, used in latter stages of fadding and first stages of rubbing—the small outer loops carry the polish right to the edge; (c) broad, light sweeps in last stages of rubbing, gradually straightening as the polish becomes harder.

ful finishing aid. Minor scratches, which result in a "tired" look, can be quickly polished out with a rubbing compound used on a gloss finish. For the satin finish, or dull sheen look, a pumice and oil is more suitable, or even fine steel wool.

Deep Scratches

Deeper scratches require individual treatment. If the chipping or scratching lies deeper than the polish, burning in or French polishing will be needed. First, the damaged area must be cleaned up, any loose chips or splinters removed, and the rough edges stained for a colour match.

Then, the application of a shellac stick, with a little heat applied from an alcohol lamp or heated palette knife is employed to fill the depression, finally smoothing out the protruding shellac, rubbing down and polishing as described before.

Shallow Scratches

If the mark is wide but shallow, it may be preferable to French polish with white shellac, rubbing the shellac and spirit mixture with a fairly well dampened pad into the depression, gradually building up the level until it matches the surrounding surface, then spreading the polishing area to obtain an even finish.

This requires a little practice, but can give excellent results. Even bad-looking burns can be camouflaged by this method—but it should be remembered that burnt or charred wood must be scraped away before the polishing begins, or it will leave an eventual discoloration.

Stains

Water or beverage stains—those annoying rings that remain after the party has broken up—are often quite shallow, and will succumb to judicious rubbing with steel wool or pumice. If stubborn, the stain may be treated with a pad lightly dampened with ammonia, brushed lightly over the affected area. Lacquer finishes require a touch of lacquer thinners, but great care must be taken not to remove the actual polish, or the end result will be a complete polishing job.

It is extremely difficult to "patch" this kind of work, and a careless rub may mean completely removing the finish and starting again—if you will pardon the pun—from scratch!

PLASTIC CABINETS

Plastic cabinets require a different treatment. Scratches are often quite easy to deal with. The colour of the material is the same all through, so that removing scratches is usually a matter of polishing them out with a flattening paste and metal polish.

To minimise the effect of the slight depression that is noticeable on a flat surface where a small

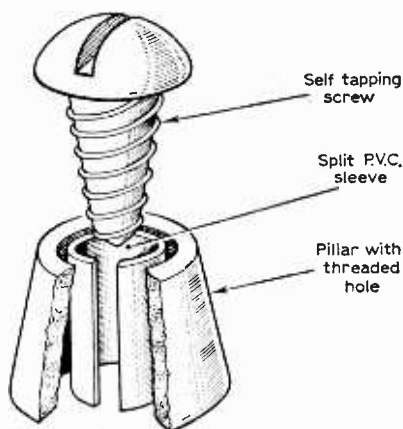


Fig. 3: Method of overcoming worn threads in plastic cabinets and mountings.

area has been polished, simply extend the polished area. Quite deep scratches can be dealt with this way, needing only the application of metal polish, elbow grease and a modicum of patience.

Methylated spirit is a useful cleaning medium for soiled plastic cabinets. The dull smear that it leaves as it evaporates is easily polished away with a dry cloth. But care must be taken, when using methylated spirit, or even warm water and household detergent, which can be effective, if messy; the danger is that painted or leaf-painted lettering will rub off.

It may be necessary to mask the area of lettering, cleaning the main body of the work, then treating the small spaces around the lettering individually with a rag around an orange-stick, or even a fine paint-brush.

Dust

A film of dust rapidly builds up on plastic surfaces left unattended. Much is due to electrostatic attraction. A good cure is a rub over with an anti-static preparation, or a wipe with a record-cleaning cloth—several of which can be obtained on the open market.

Never use a dirty cloth for polishing wood or plastic, and always keep the cloth in a paper or plastic bag when not in use.

Deep Scratches

Particular problems are deeper scratches, broken knobs, and dirt in ridges and milled edges. The latter problem is again a matter of patient cleaning—this time with soapy water and a soft nail-brush, scrubbed across the ribs of a speaker louver or the milled edge of a knob, toward the open end.

Take care that the fabric behind a speaker louver does not get discoloured or stretched—it is often

—continued on page 378

LASKY'S RADIO.

Offer the Finest Value to HOME CONSTRUCTORS

We consider our construction parcels to be the finest value on the home constructor market. If on receipt you feel not competent to build the set, you may return it as received within 7 days, when the sum paid will be refunded less postage.



The SKYROVER

Controls: Waveband Selector, Volume Control with On/Off Switch, Tuning Control. In plastic cabinet, size 10 x 6 1/2 x 3 1/2 in. with metal trim and carrying handle. Can now be built for **£8.19.6** P. & P. 5/-
H.P. Terms: 20/- deposit and 11 mths. at 16/6.

The SKYROVER DE LUXE

Tone Control Circuit is incorporated, with separate Tone Control in addition to Volume Control, Tuning Control and Waveband Selector. In a wood cabinet size 11 1/2 x 6 1/2 x 3 1/2 in. covered with a washable material with plastic trim and carrying handle. Also car aerial socket fitted. Can now be built for P. & P. 5/-.

H.P. Terms: 25/- deposit and 11 mths. at 20/-
Data for each receiver 2/6 extra. Refunded if you purchase the parcel. Four 1/2 batteries 3/4 extra.
All Components Available Separately.

£10.19.6



The "Sixteen" Multirange METER KIT
This outstanding meter was featured by Practical Wireless in the Jan. '64 issue. Lasky's are now able to offer the complete kit of parts as specified by the designer.

RANGE SPECIFICATION: D.C. volts: 0.25-250-500-500 at 20,000 Ω V. A.C. volts: 0.25-50-250-500 at 1,000 Ω V. D.C. current: 0-50 μ A. 0.25-50-250 mA. Resistance: 0-2,000 Ω . 0-200K Ω . 0-20M Ω . Basic movement: 40 μ A f.s.d. moving coil. With universal shunt full scale deflection current is 50 μ A. Size/finish: Black plastic case, 3 1/2 x 5 1/2 x 1 1/2 in. Controls: 12 position range switch; separate slide switch for A.C. volts—D.C. ohms; ohms zero adjustment pot, meter; meter zero. External connections: Two 4mm sockets for test lead plugs. Power requirements: One 15V. and one 1.5V. batteries. Complete with all parts and full construction details.

Data and circuit available separately 2/6 refunded if all parts bought. Pair of Batteries. 2/5 extra.

LASKY'S PRICE £5.19.6 P. & P. 5/-
H.P. Terms: 21/- deposit and 5 months at 21/-.



Ready Built BOY'S TRANSISTOR RADIO

2 transistor pocket radio. In attractive plastic case. Size only 4 1/2 in. x 2 1/2 in. x 1 1/2 in. Fitted with 2 1/2 in. loudspeaker. Socket for personal earpiece and telescopic aerial. Works from single PP3 type battery. Fully tunable over full medium waveband. Supplied complete with earpiece, telescopic aerial, carrying purse and 9-volt battery. Ideal birthday present.

LASKY'S PRICE 42/- POST FREE.

6 transistor pocket radio fully built in plastic case, 4 1/2 in. x 2 1/2 in. x 1 1/2 in. with 2 1/2 in. speaker. Uses single PP3 type battery. Supplied complete with personal earpiece and leather case. Tunable over full medium waveband.

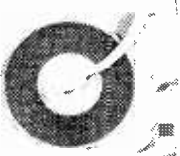
LASKY'S PRICE 69/6 POST FREE

TAPESPLICER OFFER! By famous manufacturer. All metal nickel plated construction with separate razor blade—securely clamps tape while splicing. Listed at 18/6.
LASKY'S PRICE 14/6 POST FREE.

E.M.I. 4-SPEED RECORD PLAYER

New, unused and individually boxed fitted with lightweight pick-up with ACOS G.P. 73/2 stereo cartridge. Cabinet space required 13 1/2 x 12 1/2 x 4 1/2 in. A 9 in. metal turntable is fitted. For use on 200/250 volt A.C. Mains, with Auto-stop. The stereo cartridge will play all types of Mono Records, 78's, L.P.s etc., but if desired a G.P. 67 LP/78 Mono cartridge will be supplied in lieu of the G.P.73 at no difference in cost.

LASKY'S PRICE 79/6 P. & P. 3/6 EXTRA.



The "REALISTIC" Seven

★ 7-transistor Superhet. ★ 350 milliwatt output into 4 in. high μ ux speaker.
★ All components mounted on a single printed circuit board, size 5 1/2 x 5 1/2 in. in one complete assembly.
★ Plastic cabinet with carrying handle, size 7 x 10 x 3 1/2 in. Blue/Grey or all Grey.
★ Easy to read dial.
★ External socket for car aerial.
★ I.F. frequency 470 Kc/s. ★ Ferrite rod intermediate aerial. Operates from PP9 or similar battery. ★ Full comprehensive data supplied with each receiver. ★ All coils and I.F.'s etc. fully wound ready for immediate assembly.
An Outstanding Receiver. **LASKY'S PRICE** for the complete parcel including Transistors, Cabinet, Speaker, etc., and Full Construction Data. Can be built for **£5.19.6** P. & P. 4/6.



PP9 Batt. 2/9. Data and instructions separately 2/6. Refunded if you purchase the parcel.

REALISTIC Seven DE LUXE

With the same specification as standard model—PLUS a superior wood cabinet in contemporary styling. ALSO a full vision circular dial.

FOR ONLY £1 EXTRA P. & P. as std. model

RECORD PLAYERS

45 r.p.m. 6 volt Batt. operated. Complete with pick-up fitted crystal cartridge. Size only 7 1/2 in. x 6 1/2 in. Fitted auto. stop and start. New and perfect.



45 r.p.m. Model 49/6 P. & P. 2/6

2 speed model for 33 and 69/6 P. & P. 45 r.p.m. (as illustrated) 2/6

AUTO. RECORD PLAYER

I.M.V. 45 r.p.m. AUTOMATIC RECORD PLAYER. Designed to take only 45 r.p.m. 7 in. discs. Will play up to 8 automatically. Fitted with lightweight pick-up and crystal cartridge, mounted on a plinth. For 200/250 v. A.C. mains. Size approx. 10 x 10 x 5 in.

LASKY'S PRICE 59/8. P & P. 3/6 extra

TRANSISTORISED TELEPHONE AMPLIFIER

A must for business or pleasure. This neat little transistorised amplifier powerfully amplifies the incoming call and at last leaves you with both hands free while continuing your conversation normally. The pick-up is suction fixed to phone. Battery-operated at negligible cost. Fitted off switch for private conversation. Size: 4 1/2 x 3 x 1 1/2 in. Complete with battery.

LASKY'S PRICE 69/6 P. & P. 2/6

GUITAR PICK-UP

Crystal-high imp. Size only 1 1/2 x 1 x 1 1/2 in. Clips to liner board—no screws. Complete with cable.
LASKY'S PRICE 15/11. P. & P. 1/-.

207 EDGWARE ROAD, LONDON, W.2. | 33 TOTTENHAM COURT ROAD, W.1. | 152/3 FLEET STREET, LONDON, E.C.4.
Near Praed St. PADDINGTON 3271/2 | Nearest Stn., Goodge St. MUSEUM 2605 | Telephone: Fleet Street 2833.
BOTH OPEN ALL DAY SAT. Early Closing Thurs. Mail Orders to Dept. P.W., Edgware Rd. | Open all day Thursday. Early closing Sat.

"THE CONSTRUCTOR'S PARADISE"**BEAR HUDSON LTD.**

63 GOLDHAWK RD, SHEPHERDS BUSH, LONDON W.12 PHONE: SHE 2581
 Now open at 11 JERDAN PLACE, FULHAM, LONDON, S.W.6. Phone: FUL 3405

MICROPHONE OPPORTUNITIES**"Planet" SUPER X-TAL MIKE**

Fantastic value. Beautifully made modern styled crystal mike in strong plastic housing. With approx. 5 ft. sheathed cable and miniature jack plug. Response 50 to 13,000 c/s. High impedance. Guaranteed. List price 30/-.



SPECIAL PRICE

12/6LIST
30/-**TSL "AUDIO HEART"****A VERSATILE HI-FI TRANSISTOR AMP.**

Uses OC71, OC81D transistors with 2 x OC81 in push-pull for full watt output at 3-5ohms. Input sensitivity 5 to 10mV for 1 w. out. Operating voltage—6V.: 3" x 2 1/2" x 1 1/2". Response 60-16,000 c/s. ± 3 dB. This superb amplifier is characterized by exceptional stability, providing full output at up to 112°F. Available ready built or for building yourself Guaranteed. With transistors, transformers, etc., etc. and instructions.

BUILD IT FOR **52/6**
 Ready built and tested **59/6**

"SUNDOWN"**AUTOMATIC PARKING LIGHT**

A brilliant application of transistor technique to benefit every owner obliged to leave his car standing at night for long periods. As daylight goes, the Parking Light switches ON automatically, and OFF when daylight returns. The chrome finished lamp (showing red and white) clips securely to window which is left locked. The electronic "brain" attaches inside windscreen. SAVES BATTERY DRAIN, CONFORMS WITH POLICE REQUIREMENTS. EASILY FIXED. "SUNDOWN" PARKING LAMP WITH BULB LEADS AND SELF-OPERATING CONTROL UNIT. **45/-**

COMPONENTS - HI-FI - BOOKS - SERVICE

24-HOUR MAIL ORDER SERVICE with all goods guaranteed.

- FREE POSTAGE on orders over 20/-; add 1/- postage if under.
- LOWEST PRICES FROM BULK PURCHASING AND MANUFACTURING.

BERNARDS BOOKS FOR TRANSISTOR CONSTRUCTORS

183 How to receive foreign TV programmes on your TV set using simple Post free **5/-**

184 Tested Transistor Circuits using Modules. Post free **2/6**

185 Tested Shortwave Receiver Circuits using MATs. Post free **5/-**

186 Tested Superhet Short-wave and Communication Receiver Circuits using MATs. Post free **6/-**

Send 6d. for full catalogue of *Bernards Radio Books*. We stock the Parts You Need for the Circuits too!

SINCLAIR MICRO-6

The world's smallest and most amazing radio. All parts to build. Inc. earpiece and instructions come to We supply all Sinclair designs as advertised **59/6**

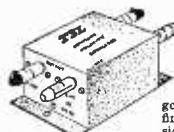
MAKE YOUR CRYSTAL P.U. REAL HI-FI WITH THE TSL CONSTANT VELOCITY EQUALISER**BEST OF ALL**

B.H. "HI-FI 14" with integrated tone controls and mix facilities



A real break-through in hi-fi value! This superb amplifier designed by Dr. W. J. May incorporates valuable features including two high gain inputs, each with its own volume control to permit mixing! Multiple neg. feed-back loops can be varied. Robust design using quality components means dependability at all times. Frequency response—25-25,000 c/s ± 2 dB. Separate bass and treble cut and lift controls Output 3 or 15 ohms. With punched chassis, elegant escutcheon plate, valves and instructions.

FANTASTIC VALUE AT THE PRICE!
 Complete kit of parts as described **£9.9.0** Built and tested **£11.11.0**
 Fitting metal cover with handle, 32/6.



This remarkable new TSL development enables quality almost as good as the finest professional magnetic pick-ups to be obtained from crystal or ceramic types. With it, even cheap record players become first-class instruments. With good equipment results are astonishing. Ideal for B.B.R., Coliars, Garrard and Accos. With plugs for mono or stereo. 3 years' guarantee. Ready for use. Thousands sold. **30/-** POST FREE

TRANSISTOR OPPORTUNITIES

OC.71—special offer. 3/9; OC.45. 5/8; OC.44 8/-; OC.169. 8/-; MAT 100 or 120. 7/9; MAT 101 or 121. 3/6; ADT.140 with 500mc/s cut-off. 15/-.

Orders by post to BEAR HUDSON LTD., Dept. PW8, 63 Goldhawk Rd., London W.12

CAN YOU ANSWER THE FOLLOWING QUESTIONS?

1. What is a transfilter?
2. What are preferred values?
3. Can a ribbon microphone be used out of doors?
4. Where can you buy a 5/8" polythene plug?
5. Where can you buy 130 different sizes of metal chassis, available in 4 different finishes?
6. What is the formulae for the reactance of a coil?
7. Where can you buy a volume control for a Philips 470 A?
8. What is the colour code?
9. What is a dust bug?
10. Where can you buy cartridge connecting tags?

The answer to all the above questions plus 5,000 other items listed, priced (800 of them illustrated) and carefully indexed are to be found in the HOME RADIO CATALOGUE

Price 2/6
 Plus 1/6 Postage & Packing

Please send latest edition of your Catalogue.
 I enclose P.O. for 4/-, to cover postage and packing.

PLEASE WRITE YOUR NAME AND ADDRESS IN BLOCK CAPITALS

NAME

ADDRESS

HOME RADIO LTD., Dept. PW, 187 London Rd., Mitcham, Surrey

on the Short Waves

A MONTHLY COMMENTARY BY J. GUTTRIDGE

IF properly kept a log is invaluable to the DX-er. From it he can gather together the information required when making reports, make notes of station schedules and compare conditions on different bands so that he can quickly choose the best frequency when he wants to tune in again to a station. Here then are some notes on the system I use, but they can be modified or simplified to suit individual requirements.

I use 17 columns to set down details of a listening contact that I require. This is a lot of columns to rule up but the amateur radio station log book issued by Webb's Radio, 14 Soho Street, Oxford Street, London, W.1, can be modified easily to fill the bill.

The first column is for the date. The second contains time that listening started and the third the time that it finished. To avoid confusion always use Greenwich Mean Time and the 24-hour clock. The next column gives the frequency of the station under observation. This wants to be accurate to 5kc/s.

After this comes the name of the station, followed (where applicable) by its call sign. I then use a column for the power of the transmitter. This requires reference to a handbook and is not strictly necessary but can be interesting when comparing signals from two transmitters in the same neighbourhood.

The next five columns give details of the signal being received. I use the SINPO code, which is favoured for reports by most stations (Signal strength, Interference, Noise, Propagation disturbance, Overall merit). Each of these is given a mark out of five. More about how to use the code next month.

I then have another column for details of any interference (e.g. jammer, c.w., telephone, S.s.b., broadcast), the frequency and, where possible, location.

Because of the format of the log sheet I use the next two columns contain the date any report was sent and the date a QSL was received. Logically these would be the last two columns on a drawn-up log sheet. After this comes a column indicating the transmitter beam, if any.

In the final column I record details of the programme being monitored. To save this column getting too unwieldy you will probably have to boil down the information, using your own form of shorthand.

LANGUAGE TUITION

If you're thinking of learning German or just want to pick up a smattering of the language for a holiday try the German lessons for English listeners broadcast by Österreichischer Rundfunk,

Wien IV, Argentinierstrasse, Austria, at 1830 GMT on Tuesdays and Saturdays on 6,155kc/s. This station is on the air to Europe from 0500—2200 on 6,155kc/s, 0600—2000 on 7,245kc/s, 0900—1700 on 9,770kc/s and 0900—1300 on 11,785kc/s. This station QSL's and will also supply special report sheets.

A letter to "Dutch by Radio", c/o Radio Nederland, PO Box 222, Hilversum, Holland, will bring you free of charge full details and printed texts for their second series of "Dutch by Radio" programmes, due to start in November. The 19m band with a standby outlet in the 16m band have now been added to the 25, 31 and 49m bands for this station's 2000 English transmission. This is another station that QSL's.

PROGRAMME CHANGES

All-India Radio has made some changes in the frequencies for its English transmissions from 1945—2045. This is now beamed to the U.K. on 6,130/7,235/9,915kc/s and to West Africa on 7,125/9,690/11,835kc/s. Best reception is on 7,235 and 9,915kc/s. A special three-minute transmission in connection with the International Year of the Quiet Sun gives a chance to hear this station in the 75m band on 3,925kc/s. Other frequencies used include 4,760/7,270/9,615kc/s. Full programme schedules are available from the Director of External Services, All-India Radio, Post Box 500, New Delhi, India.

Slight changes have been made by Radio Prague, Czechoslovakia. Its broadcasts to the U.K. are now from 1200—1230 in the 49 and 25m bands and 1900—1930 in the 49 and 31m bands.

Very good reception of the Spanish programme of Radio Warsaw, Poland, from 2030—2057 is given on the new frequency for this transmission of 9,540kc/s.

Radio Sweden, Box 955, Stockholm 1, Sweden, has now moved from 1,5420kc/s to 15,445kc/s for its 1445—1600 transmissions to South Asia. Unfortunately this frequency is the same as that used to Europe at this time by Radio New York Worldwide. Sometimes New York and sometimes Sweden come out on top!

The full schedule (valid until September) of Radio New York Worldwide is: To the British Isles, 1200—1624 on 11,825kc/s, 1630—1815 on 11,900kc/s, 1830—2145 on 15,290kc/s; to Continental Europe, 1200—1554 on 15,445kc/s, 1600—2154 on 15,440kc/s; to Africa, 1200—1815 on 15,260kc/s, 1830—2145 on 15,290kc/s; and finally, to the Caribbean from 1200—0000 on 11,940kc/s.

An African station now giving good reception in the 60m band is the home service of Radio Ghana. After 1900 it can be heard through the c.w. on 4,915kc/s.

Transistor Pre-amp

WITH TREBLE AND BASS CONTROLS

by P.K. Cripps

ANY small transistor pre-amplifiers do not provide for any form of tone control, and this deficiency has often limited their usefulness. The unit to be described offers separate control of treble, bass and volume, in addition to the pre-selection of one of three alternative input sources.

The Circuits

After selection by S1, a three-way single pole switch, the signal passes to the base of the OC71 transistor via the volume control, VR1, and the

bass control, VR2. Base bias for the transistor is supplied by the potential divider R1/R2.

The amplified signal appears at the collector of the transistor and is fed across a treble cut control circuit VR3/C3 to the coupling capacitor C4 and from there to the main amplifier.

Components

The three variable resistors should be in good condition without worn tracks which could cause crackling when their spindles are rotated.

In the interests of a quiet background, it is

recommended that resistors of half or even one watt rating are used. Quarter watt resistors, of the type normally used in transistor sets, tend to induce rather a large amount of noise, which is undesirable in a pre-amplifier of any sort.

A good quality a.f. transistor is also recommended: r.f. types, although more expensive are generally much noisier than a.f. types.

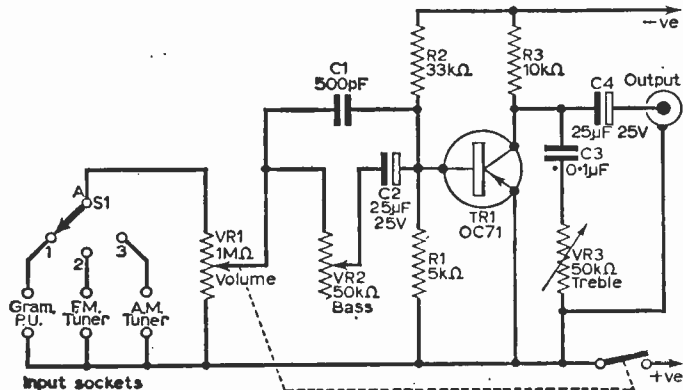


Fig. 1: Circuit diagram of the transistor audio pre-amplifier.

COMPONENTS LIST

- VR1 1MΩ variable, with on/off switch
- VR2 50kΩ variable
- VR3 50kΩ variable
- R1 5kΩ ½W 10% or 20%
- R2 33kΩ ½W 10% or 20%
- R3 10kΩ ½W 10% or 20%
- C1 0.0005μF silver mica
- C2 25μF 25V electrolytic
- C3 0.1μF paper
- C4 25μF 25V electrolytic
- Tr1 Mullard OC71, or equivalent
- S1 3 way, 1 or 3 pole. See text.

Miscellaneous:

6 input sockets with plugs, 2ft of co-axial cable, Ever Ready 1289 torch battery, etc.

Construction

The unit is constructed round the front panel, which can be made of either metal or wood, measuring 9in. x 3in. The four holes should be drilled in this panel, and the four controls mounted securely. Wiring-up may now be commenced, starting with the selector switch and finishing with the coaxial output lead. Most of the wiring is self supporting. A guide to component positioning and positions of holes is given in Fig. 2.

All joints must be soldered, including those to the transistor. There is no danger of damage so long as the transistor leads are not shortened and the soldering process is carried out quickly.

The tags of the three variable resistors may be used to hold the components soldered to them and the other components soldered to them will be supported by these.

ELECTRONICS

**LEARN - THE
PRACTICAL
WAY . . .**

**your career . . .
hobby . . .
own business . . . ?**

The demand for good Electronic Engineers is increasing almost daily throughout the world. Electronics is now the most rapidly expanding of all industries with its applications reaching into almost every sphere of human activity. If you are looking for a new career with new opportunities, then now is the time to choose—Electronics. If you are already employed in this field—then now is the moment to seek high qualifications to secure the top jobs which are waiting to be filled. Most of all, the great potential of electronic development means unlimited scope for the future and will ensure a secure occupation for you—unlikely to be affected by possible future recessions in other industries.

The British National Radio School has had 25 years' experience of HOME STUDY coaching for students wishing to master the fascinating subjects of Electronics—whether the object be career or as a hobby or new interest. The School is entirely independent and specialises ONLY in the teaching of electronic subjects. It employs only fully qualified staff to conduct and supervise each individual course taken by a student and it is this close and personal contact between Tutor and Student which we believe makes possible the successful completion of a course of study.

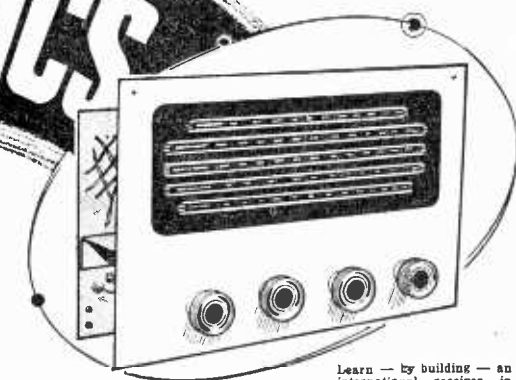
A special feature of our system is that all courses start right from the beginning and no previous knowledge or experience is necessary or expected. Training is carried out in easy step-by-step stages using the most modern methods of tuition. The great advantage of the home study method is that it provides a complete self-contained course giving everything needed for the subject concerned and enabling work to be done in the comfort of one's own home and over any period of time desired.

EXAMINATION COURSES

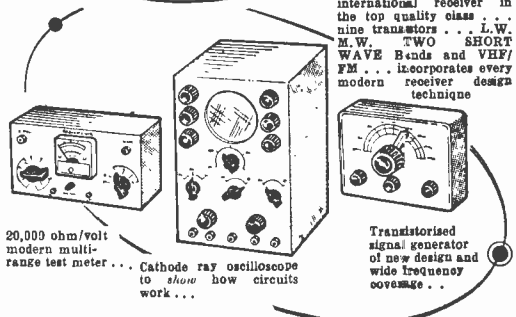
- CITY & GUILDS TELECOM. TECHNICIANS' CERT.
- CITY & GUILDS FULL TECHNOLOGICAL CERT.
- A.M.Brit.I.R.E. EXAMINATION
- RADIO AMATEURS' LICENCE EXAMINATION
- P.M.G. CERTIFICATES FOR RADIO OPERATORS.
- R.T.E.B. SERVICING CERTIFICATES.

OTHER COURSES

- MATHEMATICS
- TELEVISION
- TRANSISTORS
- SERVO-MECHANISMS
- COMPUTERS
- RADAR & NAVIGATIONAL AIDS



Learn — by building — an international receiver in the top quality class . . . nine transistors . . . L.W. M.W. TWO SHORT WAVE Bands and VHF/ FM . . . incorporates every modern receiver design technique



20,000 ohm/volt modern multi-range test meter . . .

Cathode ray oscilloscope to show how circuits work . . .

Transistorised signal generator of new design and wide frequency coverage . . .



Complete Picture way library of theory books and practical manuals . . . NO MATHEMATICS!

BUILD AND EXPERIMENT WITH ALL THE ABOVE—AS—YOU—LEARN . . .

This is a new complete experimental course comprising a mixture of theory and practical work using a very full range of electronic components and apparatus. Starting right from the beginning—or at a later stage if needed—the course enables the student to build up all the basic electronic circuits—amplifier; oscillator; rectifier; detector; etc.—and finally to the design, construction, testing and servicing of a latest design fully transistorised receiver using nine transistors and covering long and medium wave and TWO SHORT WAVEBANDS plus VHF/FM reception. It is of real luxury quality throughout—operates from a 9v. battery and can be used anywhere in the world. Every present-day technique in circuitry is covered and the course also includes multi-range test meter; signal generator and oscilloscope. By the end of the course the student will be able to deal with any type of servicing work with confidence and will also have a very useful workshop of equipment. Nearly 100 interesting and absorbing EXPERIMENTS are carried out during this comprehensive course enabling anyone to gain full mastery of electronics.

FREE



POST NOW
TO: BRITISH NATIONAL RADIO SCHOOL, RADIO HOUSE, READING, BERKS.
Please send me your free Brochure, giving details of your Courses, without any obligation, to:—

NAME.....
ADDRESS.....
I am interested in.....
(We do not employ representatives)

Block Caps
Please

course above
PW 8/64

British National Radio School

Fringevision Ltd

ELCOT LANE MARLBOROUGH · WILTS

TELEPHONE: 657 and 658



WIDE BAND UHF AERIALS for BBC2 now and ITV 2

FIVE STAR QUALITY AERIALS

★ Anodised elements for protection. ★ Modern plastic moulding techniques used for convected reflector and parasitic elements giving longer life. ★ Staggered spaced elements for maximum performance with all channel band width. ★ Multi-element reflector giving high back to front ratio. ★ Maximum efficiency of matching by using laboratory developed collector plate—without any other matching device.

Model	Description	Gain DB	B/F Ratio DB	Retail Price
UF/H3	3-ELEMENT, HEAD ONLY with CLAMP	7-0	18-0	31/6
UF/H5	5-ELEMENT, HEAD ONLY with CLAMP	8-25	19-5	36/6
UF/H7	7-ELEMENT, HEAD ONLY with CLAMP	10-5	24-5	41/-
UF/H10	10-ELEMENT, HEAD ONLY with CLAMP	12-5	26-0	47/-
UF/H12	12-ELEMENT, HEAD ONLY with CLAMP	13-5	28-0	51/-
UF/H14	14-ELEMENT, HEAD ONLY with CLAMP	15-0	29-0	55/-
UF/H18	18-ELEMENT, HEAD ONLY with CLAMP	16-25	30-0	70/-
UF/H22	22-ELEMENT, HEAD ONLY with CLAMP	17-0	31-0	85/-

PLEASE STATE LARGE OR SMALL CLAMP REQUIRED

DE-LUXE RECORD PLAYER KIT

Incorporating a 1 Sp. Garrard Auto-Slim unit and Mullard latest 3 w. amplifier (ECL46 and E250), vol., bass and treble controls, with 8 x 5in. 10,000 line speaker. Superb quality reproduction. Contemporary styled two-tone valmet, charcoal grey and off-white with matching blue relief. Price, as separate unit for stereo, £517.8. Carr. 5/-.

Size 17 1/2 in. x 16 in. x 5 in. £13.19.6
Carr. & Ins. 10/-
COMPLETE KIT. Cat. & Const. details 2/6. (Free with kit).
FRONT SECTION, which houses amp. & speaker is detachable from cabinet. Price, as separate unit for stereo, £517.8. Carr. 5/-.



COLLARO STUDIO TAPE RECORDER KIT. Regret all complete kits of this popular unit now sold out. Only a few cabinets and Collaro Tape Deck remain. NO AMPLIFIERS LEFT. Cabinet size: 18 x 16 1/2 x 6 in. with cut-out mounting board.
SPECIAL CLEARANCE OFFER—
Twin track, £13.10.0. 4-track, £17.10.0. Plus 10/- carr.

BARGAINS GARRARD

PLAYER UNITS
JINGLE PLAYERS: Carr. 4/6.
Model SRP10 5 gns.
Model 4HF £18.10.0. Carr. 7/6.
AUTOCHANGERS: 4 speed. Carr. 3/-. Latest Model AT.5 with transcription arm, plug-in head, mono. 10 gns. Stereo 11 gns. "Autoslim" Model £6.17.6.

EXPANDED ANODIZED METAL. Attractive gilt finish 1/2 in. x 1/2 in. diamond mesh 4/8 sq. ft. Multiples of 6 in. cut. Max. size 4ft. x 3ft., 47/8, plus carr.
TYGAN FREE (Contem. patt.). 12 x 12 in., 2/-; 12 x 18 in., 3/-; 12 x 24 in., 4/-, etc.

RECORDING TAPE

Famous American Columbia (CBS) Premier quality tape at NEW REDUCED PRICES. A genuine recommended Quality Tape—TRY IT. Brand new, boxed and fully guaranteed. Fitted with leader and stop tails.
Standard
1/2 in. 600ft. 13/- 1,200ft. 31/6
3/4 in. 900ft. 10/- 1,800ft. 37/6
1 in. 1,200ft. 21/- 2,400ft. 47/6
Long Play
1/2 in. 900ft. 17/6 per reel, 1/- plus 6d. ea. for additional
1 in. 1,200ft. 28/6 3in. Message
SPECIAL OFFER. 3in. L.P. 225ft. 150ft. 3/8; 3in. L.P. 225ft. 1/9; 3in. L.P. 300ft. 6/6. P. & P. per reel 6d.
TAPE REELS. Murs. surplus
1 in. 2/3; 3/4 in. 2/-; 1/2 in. 2/-; 1/4 in. 2/-; 3in. 1/3. Plastic spool containers. 3in. 1/3; 6in. 1/9; 6 1/2 in. 2/-; 7 in. 2/3.

ENAMELLED COPPER WIRE—1lb. reels 14g-20g. 2/8; 22g-24g. 3/-; 30g-34g. 3/8; 36g-38g. 4/8; 39g-40g. 4/6, etc.

VALVE HOLDERS—Int. Oct. 6d. Nylon or Ceramic, B77, B9A unskirted, 9d. B77, B9A skirted 1/- each; B77 with Can 1/8; B9A with Can 1/9 each.

STYLUS REPLACEMENTS. Diamond Stylus for L.P. or Stereo, for all pop. types. BSR, Collaro, Garrard, etc. 1/3 ea. Old 12 mths. SAPPHERE ditto 5/3 ea. Comp. range in stock.

BONDACUST Speaker Cabinet Acoustic Wadding (1in. thick approx.) 12in. wide, any length cut, 1/8 ft. 4/- yd. **TINNED COPPER WIRE**, 16-22g. 2/8 lb. **ERSIN MULTICORE SOLDER**, 60/40, 4d. per yard. Cartons 2/8 etc.



1st, 1949

RADIO COMPONENT SPECIALISTS

70 Brinkstock Rd., Thornton Heath, Surrey. Hours: 9 a.m.-6 p.m., 1 p.m. Wed. THO2188. Terms C.W.O. or C.O.D. Post and packing up to 10 lb. 14/3 5 lb. 24/3 5 lb. 24/3 5 lb. 24/3

TAPE DECK BARGAINS!

BSR MONARDECK Type TDS	27.7
Four-track	£9.10.0
Carriage 5/-	
COLLARO STUDIO 3-SPEED DECK	
Twin-track	£10.10.0
Four-track	£14.10.0
Carriage 7/6	

JASON F.M. TUNER UNITS
Designer-approved kits available.
FM.TL 5 gns. 4 valves 20/-.
FM.TL 27.5 valves 35/-.
JTV Mercury. 10 gns. 3 valves 22/8.
JTV2. £13.18.6. 4 valves 28/6.
NEW JASON F.M. HANDBOOK 2/8. 48 hr. Alignment Services. 7/6, plus 2/6.

Condensers—Silver Mica. All values 2pF to 1,000pF. 6d. each. Ditto Ceramics 8d. Tub. 450 v. T.C.C. etc. 6,000 mfd. to 0.01 and 0.1/350 v. 9d. 0.02-0.1/500 v. 1/-, 0.25 Hunt. 1/6. 0.5 T.C.C. 1/8, etc., etc. Close Tol. S/Micas—10% 5pF-500pF 8d. 600-5,000pF 1/-, 1% 2pF-100pF 9d. 100pF-500pF 11d. 575pF, 5,000pF 1/6. Resistors—Full Range 10 ohms-10 meg. ohms 20% 1 and 1W 3d., 1W 5d., 2W 9d. Hi-Stab. 5% 1W, 1W 6d. (100 ohms-1 meg.). Other values 9d. 1% 1W, 1/6, etc., etc.

TUB-ELECTROLYTICS-CAN

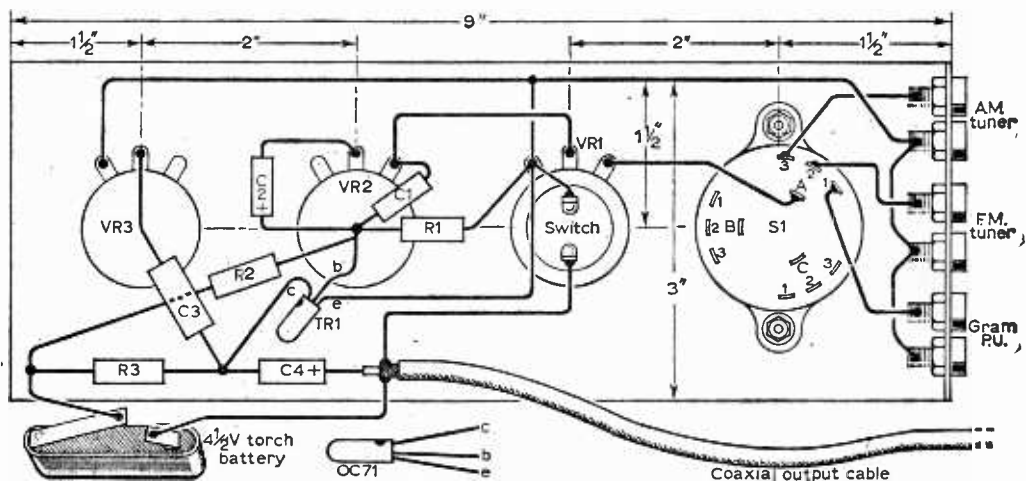
25/25v. 50/12v. 1/9: 8-8/450v. 4/6. 50/50v. 100/25v. 2/-; 32+32/275v; 4/6; 8/450v. 4/350v. 2/3; 50/50/350v. 6/6; 16+16/450v. 5/6; 60/250/275v. 19/6; 32+32/450v. 6/6; 100+200/275v. 12/6.
Transistor Midget types—all values 1 mfd to 50 mfd. 1/9 ea., 100 mfd, 2/- 12 v.

VOLUME CONTROLS—5K-2 Meg. ohms. 3in. SPINDLES, MORGANITE MIDGET TYPE. 1 1/4 in. dia. chat. 1 year. LOG or LIN, nation, less Sw. 2/-, 1 p.p. Sw. 4/6. Twin Stereo less Sw. 6/6. Some values with D.P. Sw. 8/6. Specials to order.

KNOBS—Modern Continental Types Brown or Ivory with Gold Ring 1in. dia. 9d. each. 1 1/2 in. dia. Brown or Ivory with Gold center 1in. dia. 10d. each. 1 1/2 in. dia. LARGE SELECTION AVAILABLE

We manufacture all types Radio Mains Transistors, Chokes, Quality O.P. Trans., etc. Enquiries invited for Specials. Prices for small production runs. Quotations by return. Send for detailed bargain lists, 3d. stamp.

Only a few items are listed from our comprehensive stock. Write now for full bargain lists. 3d.



The battery specified will have a very long life and therefore is a convenient source of power to use. If the pre-amp is to be used with a valve amplifier, the h.t. supply can provide power to run the unit. A suitable circuit is shown in Fig. 3. The 10µF 25V capacitor is for additional smoothing.

Testing

When all wiring is complete, the unit may be tested. Connect the output lead to a suitable amplifier, either valve or transistor, and feed in via one of the input sockets a suitable signal. The action of the Volume, Treble and Bass controls may be tested.

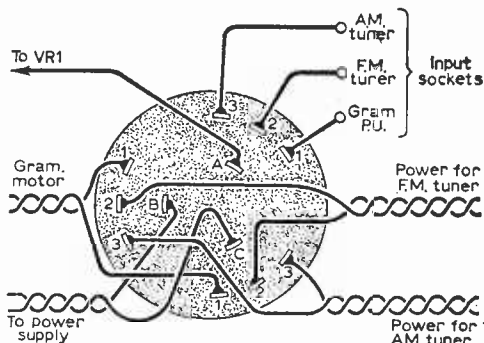
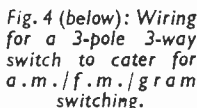
Both Treble and Bass have a wide range of cut-off and this obviates the need for a "middle" control. Indeed, with the controls set at minimum treble and minimum bass, the gain of the pre-amplifier is reduced to less than unity.

In practice, of course, this state of affairs will never come about; the treble control may be set below maximum to reduce needle scratch on old 78 r.p.m. recordings and the bass control similarly set to reduce motor rumble from a cheap turntable.

As has already been mentioned, three inputs are provided. Various signal sources will load the pre-amp: a.m. tuner, f.m. tuner, gramophone pick-up, crystal or high resistance dynamic microphone. A tape head (with a suitable bias oscillator) or even a simple crystal set will give very high quality results when coupled to a good amplifier.

The P.W. *Mini-Amp* is very suitable. If the *Mini-Amp* is used, its volume control and the 330k Ω resistor (R1) should be disconnected and the pre-amp output fed directly to the base of Tr1 (V6/R2).

It is a good idea to obtain a three-pole three-way switch, as the spare poles can be used to apply power to the various other pieces of equipment which feed the input when the respective input source is selected. This arrangement is shown in diagrammatic form in Fig 4.



The control panel may be given an attractive finish by cutting a sheet of cardboard to the exact size of the front panel and carefully writing the functions of the various controls on it and then slipping the card over the four spindles. A sheet of transparent plastic may also be placed over this for protection, if desired.

All the spindles should be sawn down to the same length of about $\frac{1}{8}$ in., so that the knobs are almost flush with the panel.

If a little care is taken in finishing, the appearance of the completed unit will match its excellent performance.



ACTON, BRENTFORD AND CHISWICK RADIO CLUB
Hon. Sec.: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.4.

When the Club next meets on 21st July "Test Equipment for Transistors" will be the title of the talk given and all local enthusiasts are invited to attend.

BURSLEM AMATEUR RADIO SOCIETY

Hon. Sec.: J. R. Sherratt, G3SAJ, 23 Ash Way, Ash Bank, Bucknall, Stoke-on-Trent, Staffordshire.

Members who attended the meeting for 4th June, took the opportunity of discussing the organisation of the Society and forthcoming programmes of lectures, prior to their move to new headquarters at Moorland Junior High School, Burslem, which is scheduled to take place during September.

CHESTER AND DISTRICT AMATEUR RADIO SOCIETY
Hon. Sec.: P. J. Holland, 19 Kingsley Road, Great Boughton, Chester, Cheshire.

On 9th June the Society met to discuss its participation in this year's N.F.D. Later in the month, on the 16th and 23rd respectively, members heard an R.S.G.B. recorded lecture and a talk by Mr. P. White on "Receiver Alignment".

Activities for June ended on the 30th with a sale of surplus equipment.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY
Hon. Sec.: F. C. Ward, G2CVV, 5 Uplands Avenue, Little-over, Derby.

After the N.F.D. activities of the weekend, members who attended the Wednesday meeting on 10th June enjoyed a two-hour film show. This was followed on the 17th by the third d/f practice event.

At the open evening of the 24th, junior members held a discussion and on 28th June, G3ESB and G3IFA handled the local R.S.G.B. d/f qualifying event.

July began with a surplus sale on the 1st. Then on 4th and 5th July, members of the Society took part in the second 144Mc/s portable contest.

DURHAM CITY AMATEUR RADIO SOCIETY

Hon. Sec.: E. D. Watson, G3SHE, 5 Park House Road, Neville's Cross, Durham.

This newly formed Society is proving very popular and any enthusiasts in the area who are interested in joining are invited to attend any of the meetings which are held on alternate Thursdays at the Bridge Hotel, North Road, Durham. Meetings start at 7.30 p.m. Activities include lectures, sales and various contests and an R.A.E. course is being run for beginners.

On 18th June the Society's first Annual General Meeting was held. This was arranged so that members could elect a full committee to replace the inaugural one which had held office for an agreed six months.

NORTHERN HEIGHTS AMATEUR RADIO SOCIETY
Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogdon, Halifax, Yorkshire.

Apart from manning an N.F.D. station on 6th June, this Society also provided a demonstration station at the Halifax Charity Gala, using the call sign G30MM/A. The same call sign was used at the Forest Cottage Gala in Halifax, where members of the Society set up another demonstration station on the 27th.

Activities for the rest of the month were all visits. The first of these, on 10th June, was to the Manchester Radio Society where several members met some old friends. A week later a party of members went on the first of three visits to the Moorside Edge transmitting station of the BBC. This was followed by an inspection of the Bradford factory of Wharfedale Speakers.

Another visit had been arranged for the meeting of 1st July and this was to the Bradford Fire Station.

PLYMOUTH RADIO CLUB

Hon. Sec.: R. Hooper, G3SCW, 2 Chestnut Road, Peverell, Plymouth, Devon.

In anticipation of numbers of mobile amateurs visiting the West Country during the summer months, members of this Club are attempting to contact as many as possible to extend an invitation to them to visit the City of Plymouth where they will find a welcome at any of the Club meetings which are held on Tuesday evenings.

READING AMATEUR RADIO CLUB

Hon. Sec.: R. G. Nash, G3EJA, "Peacehaven", 9 Holybrook Road, Reading, Berkshire.

The June meeting was held on the 27th when the subject of the evening's lecture was "Receiver Alignment". The speaker was G. Preston, G30LA.

ROYAL NAVAL AMATEUR RADIO SOCIETY

At this year's Navy Days (1st-3rd August) the Royal Naval Amateur Radio Society will operate a special exhibition station from H.M. Dockyard, Portsmouth. The station will be located just inside the main gate and will be on the air as GB3RN on all amateur bands from 1.8Mc/s to 145Mc/s inclusive.

Visitors to the Dockyard and the Fleet will be welcomed at the station.

SOUTH SHIELDS AND DISTRICT AMATEUR RADIO CLUB

Hon. Sec.: D. I. Forster, G3KZZ, 41 Marlborough Street, South Shields, Co. Durham.

On 21st June members enjoyed a mobile picnic held at Finchale Abbey, Co. Durham.

SPEN VALLEY AMATEUR RADIO SOCIETY

Hon. Sec.: N. Pride, 100 Raikes Lane, Birstall, Leeds.

The final meeting for the 1963/64 club-year was held on 11th June. The following meeting on 25th June saw the election of the committee of officers for 1964/65 at the Society's Annual General Meeting.

WEST KENT AMATEUR RADIO SOCIETY

Hon. Sec.: H. F. Richards, 17 Reynold's Lane, Tunbridge Wells, Kent.

After two years' absence, this Society returned to participation in National Field Day. On 12th June the annual construction competition was judged. Two awards—the John Wheeler Trophy and the VS9AW Trophy—were presented to the prize-winners of this competition.

The last club event for June was on the 26th when members heard an R.S.G.B. tape-recorded lecture on "Aerials".

July began with an outside visit by a group of members to a local Decca Navigator transmitting station.

COMPONENTS FOR THE "TRANSISTOR RADIO MAINS UNIT"

Some readers have had trouble in obtaining certain components for the "Transistor Radio Mains Unit" as featured in the June 1964 issue. The two diodes specified are now discontinued and replacement ones have been suggested by AEI. They are: silicon junction rectifier type SJ103-F, costing 4s. post paid, and silicon voltage reference diode type VR9-F at 9s. 9d. post paid.

All the components for this unit, including the replacement diodes are available from *Electronic Constructors, Sutton Montis, Yeovil, Somerset*, who will be pleased to submit a price list to any reader without delay.

MORSE PRACTICE OSCILLATOR KIT

A transistorised multivibrator measuring only 21 x 11 x 4 5/8". Fundamental output frequency 1,000 c/s. Battery drain only 3 mA. Simple instructions included. Complete with earpiece. Price 39/6. P. & P. 1/-.

STABILISED POWER UNIT

50 c/s mains input. Stabilised 150 v D.C. output and 6.3 A.C. optional A.C. output from transformer tappings at 190-0-190 v. Primary tappings at 80, 110 and mains voltage. Incorporates neon stabilising valves. Would be useful as battery eliminator for 120 v. equipment. Price 42/6. P. & P. 3/6.

With polished sturdy wooden cabinet and mains lead. 52/6 P. & P. 5/-.

TRANSMITTER/RECEIVER NO. 46

Compactly built to be carried by one man. This has a range of app. 10 miles and being crystal controlled tuning is avoided and operation is as accurate as a telephone. Frequency 3.6-5.1 Mc/s. Complete stations comprising receiver transmitter, rod aerial, 2 sets of headphones and microphones in canvas carrying bag, but less the plug-in crystal coil units (these are easily obtainable). Brand new in maker's cartons.

Price per station P. & P. 42/10.0
Two stations for Post free. 42/10.0

MORSE KEYS

Morse key assembly. Key with base, cover and terminals. Complete with lead.

P. & P. 2/-
2 Morse keys for 12/6. Post free.

H.R.O. HANDBOOK AND NOTES 3/11 each**NO. 19 SET INSTRUCTION HANDBOOK 3/11 EACH****1155 INSTRUCTION HANDBOOK 3/11 each P. & P. 3d.****VALVES 2/6 each**

P. & P. 6d. 2 for 5/- Post free.
6B8G (new), 11L4 (new), DA90 (new) ARP12 (new), ATP4.

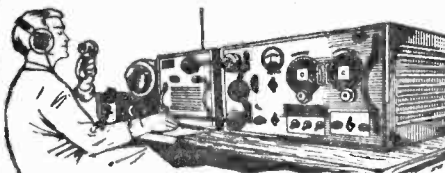
POWER UNIT & LF AMPLIFIER

For the 88 set. In good condition employing modern valves and built-in vibrator pack. Excellent smoothing facilities. 12v. operation. Many applications, including use with car radios. 39/6 P. & P. 5/-.

NEW WALK ROUND STORE OPEN IN LAMBERTS ARCADE, LOWER BRIGGATE, LEEDS 1. NEXT TO HALFORDS CYCLE SHOP. OPEN ALL DAY SATURDAY. 48 HOUR DESPATCH SERVICE. ALL MAIL ORDERS TO OUR BRIGGATE HOUSE ADDRESS.

TERMS:

CASH WITH ORDER.
5/- EXTRA ON C.O.D.
ORDERS
No C.O.D. under 30/-

SONA**NO. 19 SET TRANSMITTER RECEIVER**

New stocks just arrived. Equipment comprises 3 separate units built into one chassis and separate power pack. Specification: "A" set Transmitter/Receiver. Frequency coverage 2-4.8 mc/s and 4.5-8 mc/s. (150-37 metres). For R.T., C.W., or M.C.W. Range on R.T. 15 miles. C.W. 50 miles. Superhet R.X. I.F. 465 kc/s. B.F.O. etc.

R.X. Valve line-up: 6K7, R.F.; 6K8 mixer. 2 6K7 I.F.; 6B8 det. A.F. phone output. T.X.: 6K8, mixer, B.F.O., EF50 buffer, EB34 ADC, and output stage, which has to be de-commissioned to conform with G.P.O. requirements. Transmitter/Receiver 228/241 mc/s. Local use up to 1 mile. Valve line-up CV5, 6K7 and 6V6. Intercom set 2 valve A.F. amplifier for vehicle crew inter-communication. Valve line-up 6K7 and 6V6. A 3 1/2" meter is built in reading L.T. and H.T. voltages, drive etc.

POWER UNIT, 12 volt D.C. input. Output 275 volts 110 ma. and 500 volts 50 ma. Equipment is of American or Canadian manufacture and is supplied in good condition. 42/10.0

PRICE complete with Power Pack
Carriage 17/6.
19 set only 42/10.0
Carriage 10/-
Power Unit only 42/10.0
Carriage 10/-
Two 19 sets complete with Power Packs. 42/10.0
Carriage 30/-.

Accessories
Handbook 3/6 P. & P. 6d.
Connectors 12 pin 12/6 P. & P. 2/6
8 pin 7/6 P. & P. 2/6
Control Boxes, Single, new 7/6 P. & P. 3/6
Whip Aerials 8ft. dia. 7/6 P. & P. 2/6
5ft. 4/6 P. & P. 2/6
Headphones and Mike 17/6 P. & P. 2/6
Headphones less mike insert 5/- P. & P. 2/6

TRANSISTOR SALE

Mullard OC44 (P. & P. 3d.) 3/11
Mullard OC45 (P. & P. 3d.) 3/11
Mullard OC71 (P. & P. 3d.) 3/11
Mullard OA90 (P. & P. 3d.) 1/11
Edlwan X P202 Germanium diodes (P. & P. 3d.) 1/11
Mullard OA79 (P. & P. 3d.) 1/11
Transistor holder 8-pin (P. & P. 6d.) 1/6 each

MICRO ALLOY TRANSISTORS

Mat 100 7/9
Mat 101 8/6
Mat 120 8/6
Mat 121 8/6
VHF Transistor ADP140 15/-
Above MATs postage paid.

Ferrite Slab Aerials suitable for transistor sets 3/- P. & P. 6d

UNIVERSAL PLUG

Plug into all sockets with the NEW UNIVERSAL PLUG. Saves money. Saves time. Fits all 13, 16 & 5 amp. 2 pin, 3 pin sockets and adaptors. Easily adjustable. Robust construction. Only 12/6. P. & P. 11d.

**IMPEDANCE MATCHING UNIT**

An impedance matching device enabling both high and low resistance phones to be used from any given piece of equipment. Incorporates a matching transformer enclosed in a metal case with paroxin terminal board. Four standard jack sockets enabling four pairs of phones to be used simultaneously—two H.R. and two L.R. 19/11 P. & P. 2/6.

BM3/SONA STREAMLINE MICROPHONE STANDS

TYPE 1
Heavy metal base. Black gloss finish. 7/8. P. & P. 3/6.

TYPE 2
Chrome finish. Telescopic desk stand extending to 12in. height. Heavy black gloss base. 25/- P. & P. 3/-.

TYPE 3
Floor stand, 3 sections. Chrome finish. Heavy base. 55/- P. & P. 3/-.

SPECIAL OFFER

High Impedance lightweight headphones Ideal for crystal sets. Only 11/- per pair, or two pairs for 21. P. & P. 1/6 each.

DYNAMOTOR

Run all your mains AC/DC equipment from your car battery. 6v. input gives 250v. output, or 12v. input gives 500v. output at 30 watts. Very low battery drain. Size only 6 1/2 in. x 3 1/2 in. A must for the caravanner. 25/- P. & P. 3/6

**LEAD ACID ACCUMULATORS (Unspillable)**

2 volts at 16 A.H. Brand New. Size 4 x 7 x 2 1/2 in. 4/11 each.
3 for 12/6.
P. & P. 3/- per cell.

9v. BATTERY CHARGER AND A.C. ELIMINATOR MODEL LA. 6P.

A "must" for every transistor set owner! Save those batteries by running your transistor set direct from AC mains this summer. Reactivate all your old PP3 batteries. Unit contains neon indicator and standard battery connections with nearly 2 yards of mains leads and plug. Also snap cord for connection to set. NOW ONLY 19/6 P. & P. 2/6

4 CHANNEL TRANSISTORISED SOUND MIXER

Add musical highlights plus additional sound effects to your tape-recorder. This instrument permits mixing of 4 signals such as microphone, record player, radio, etc. into single output. Fully transistorised and self contained in handsome cabinet. Price 59/6. Post free. Standard jack plugs to fit same, 2/6 each. P. & P. 6d. 2 for 4/6. P. & P. 9d. Chrome shielded 3/6 each. P. & P. 9d. 2 for 6/6. Post free.

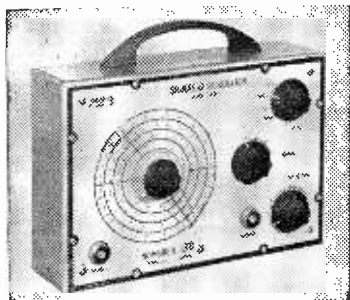
RESISTORS

Special offer. High quality 4 watt resistors. All preferred values (state values required). 10 Ω -10 meg. ohm. 3 1/2d. each, 6 for 1/6, 12 for 1/8, 100 for 24/-.

TRADE SUPPLIED
ORDERS FROM
ABROAD WELCOMED
Telephone: 34703



SONA ELECTRONIC CO. (Dept. PW8), BRIGGATE HSE, 13 ALBION PL., LEEDS



Wide-range Transistorised
SIGNAL GENERATOR—Model 27

Range 150 Kc/s to 350 Mc/s.

- ★ Accuracy better than 2%
- ★ Directly calibrated
- ★ Battery operated
- ★ Compact and light

£9.12.3

with test lead and battery.

Post and Packing 3/6 extra.

H.P. 48/- deposit and 27/- monthly.

Trade and Export Enquiries Invited

NOMBREX INSTRUMENTATION

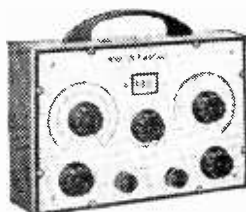
Wide range Transistorised INDUCTANCE BRIDGE

Model 66

- ★ Range 1 μ H to 100H
- ★ Inductance to 5% accuracy
- ★ Measures Q and Tan δ
- ★ Balance by Miniature Meter
- ★ Compact, only 6½ x 4½ ins.
- ★ Portable, weighs only 2 lb.

£18.0.0 Battery 2/3 P. & Pkg. 3/6

H.P. £5 deposit and 49/- monthly.



Wide-range Transistorised
C.R. BRIDGE—Model 62
6 Ranges: 1 Ω to 100M
1pF to 100 μ F

- ★ Visual null indicator
- ★ Power factor check
- ★ Electrolytic leakage test
- ★ Battery operated

£8.7.3

including battery.

Post and Packing 3/6 extra.

H.P. 40/- deposit and 24/- monthly.

S.A.E. for full technical leaflets

NOMBREX LTD. Instruments Division

ESTUARY HOUSE, CAMPERDOWN TERRACE
EXMOUTH, DEVON. Phone: 3515

THE PEMBRIDGE COLLEGE OF ELECTRONICS PROVIDES TRAINING IN RADIO AND TELEVISION

FULL-TIME COLLEGE COURSE IN RADIO AND TELEVISION

Our Course has now been extended to sixteen months' duration to include theoretical and practical instruction on transistor television receivers, U.H.F. television receivers and colour television.

Next course commences 2nd September, 1964.

This Course is recognised by the Radio Trades Examination Board (R.T.E.B.) for the Radio and Television Servicing Certificate examinations.

Provides excellent practical experience on valve and transistor radio receivers and all well-known makes of television receivers.

To:

The Pembridge College of Electronics (Dept. P11)
34a Hereford Road, London, W.2.

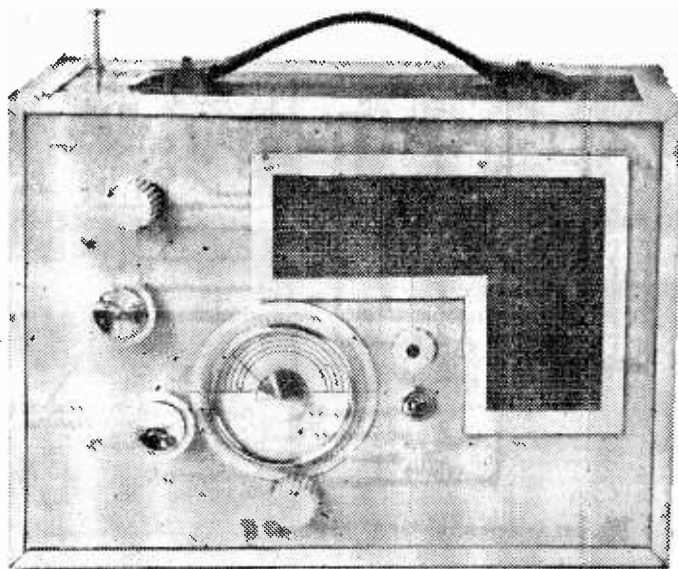
Please send, without obligation, details of the
Full-time Course in Radio and Television.

Name _____

Address _____

**A 4-VALVE,
4-BAND,
ALL-DRY
SUPERHET
PORTABLE**

By L. R. Repage



The CHELMER 4

CONTINUED FROM PAGE 247 OF THE JULY ISSUE

THIS month we continue with the main assembly. Owing to the closeness of the components, particularly between coil-unit and the gang capacitor, it will be impossible to make the few final connections necessary unless the following procedure is strictly adhered to.

Presuming that the below chassis wiring has been completed, this including the l.f. section in its screened compartment, the above components can be assembled. However, firstly connect two short lengths of bare flex to osc. grid and control grid tags respectively. These should be about $\frac{1}{2}$ in. long, and should be twisted around and nipped tight with pliers, then soldered to the tags.

FITTING THE COIL UNIT

The coil unit can then be fitted in the elongated hole, but the nut not fully tightened. The osc. grid and control grid leads below should then be soldered to these short leads just mentioned, as close to their tags as possible. Take care to identify these leads correctly—it is so easy to get reversed connections and then, of course, the coils do not function correctly. The third loose lead osc.

anode should then be soldered to the appropriate tag. Finally, the h.t. tag must go to the h.t. line, and if R2 resistance has been included with its miniature decoupling condenser C3 on the unit, a direct connection only is necessary.

Next fit the ganged capacitor by its three set screws, and solder on the two short wires from the coil unit to the aerial section and oscillator section respectively. The short wires may have to be bent slightly to rest exactly on the tuning capacitor tags before soldering. The other tags on the tuning capacitor can conveniently be utilised for making the parallel connections to the vernier gang; but these connections will have to be made first, by short, but thickish flex leads near the l.f. screen. These leads should not rest on the screen of course, or the vernier effect of the capacitor will be shorted.

This twin vernier may vary in dimensions so take care that sufficient clearance is given between the twin vernier and the main gang moving vanes. This point should be checked before drilling the holes for this vernier in the chassis, of course.

The padder capacitor bank can next be fitted by soldering its "earthed" side to the E main wire, and the four trimmer free tags soldered to the adjacent tag board of the coil unit by short lengths

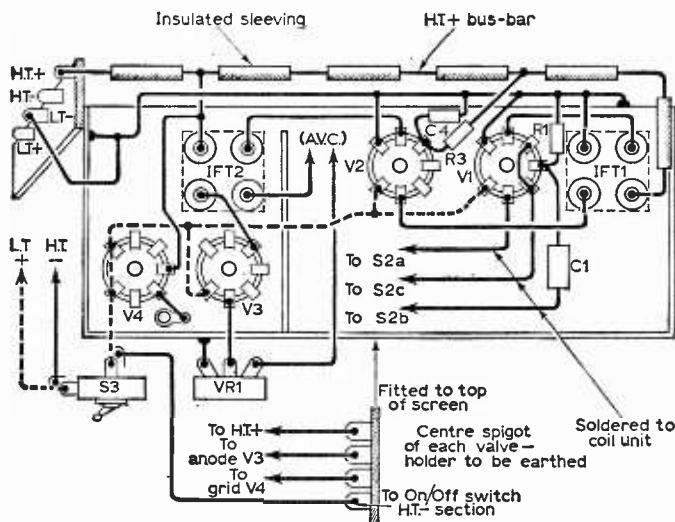


Fig. 5a: An underside view of the chassis showing the wiring in part.

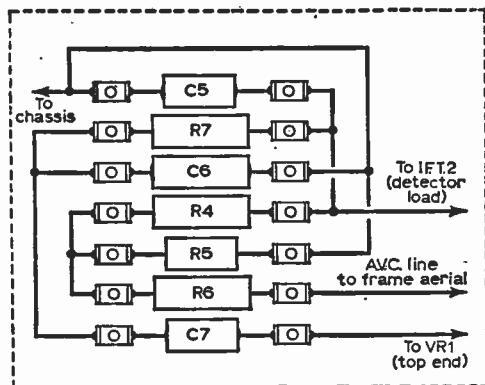


Fig. 5b: The component layout of the a.v.c. panel.

of flex. (Construction of the padder capacitor bank is described below.)

THE A.V.C. PANEL

Finally the a.v.c. panel can be similarly fitted by soldering the "earthed" connecting tag to "E" main wire. The leads to this panel will, of course, have to be brought out from the chassis wiring, and it is a good plan to stick a paper label on each so that the correct tag is used. Colour-spots on tags and leads might be a useful procedure here.

The a.v.c. panel is shown in Fig. 5b. Again this was an experimental arrangement and allowed for easy change of valves or components. Four connections are taken from it to various points in the set, but more will be said of this later. The miniature button-type potentiometer VR1 and the two pole on/off switches S3 are on stand-off panel No. 2 and wires from the inside of the set are passed through holes to them. The button potentiometer stands off the panel by suitable set screws and washers and has a clearance hole cut in the outer cabinet. Another pattern could, of course, be used with the more normal spindle, but may necessitate altering the on/off switch.

The fuse is a flashlamp-type bulb of 1.5V, .0A rating and is a worthwhile fitment.

PADDER CAPACITOR BANK

The padder capacitor "bank" is made up by soldering the four trimmer capacitors to the brass strip by one of their tags, each component being pushed close up against its neighbour.

The tags at the opposite ends go to the small panel on the coil unit.

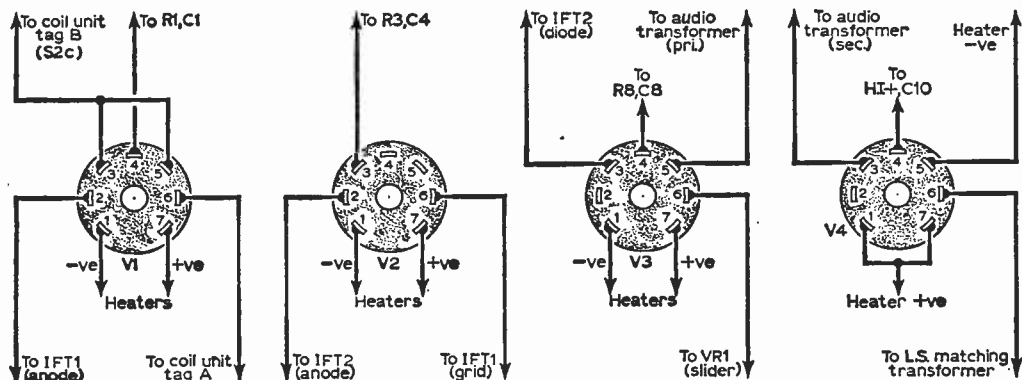


Fig. 5c: Connections to the valve bases. Valveholders shown as seen from underside.

TRADE ENQUIRIES
INVITED**RADIO CLEARANCE LTD.**Telephone: MUSeum 9188
EST. 35 YRS.

THE OLDEST COMPONENT SPECIALISTS IN THE TRADE

27 TOTTENHAM COURT ROAD, LONDON W.1

**ANOTHER SCOOP—
LIMITED QUANTITY ONLY**

Don't miss a chance like this!

The "Minigram" Transistorised Record Player**FEATURES**

- Ready-built amplifier with four first-grade Mullard transistors.
- Plays 45 R.P.M. pop records.
- Built-in automatic stop.
- Lightweight and portable.
- Instruction leaflet supplied.
- Crystal pick-up with expendable Stylus, GP50 Type.
- Operates on a 9V battery (3/9 ext).
- Available in two colours—cream/red or cream/blue.

- A real "FAMILY FAVOURITE".
- Ideal for Teenagers.
- For use ANYWHERE.
- Hours of amusement for the younger members of the family.
- Assemble one of these amazing Players in less than 30 minutes; supplied in 3 complete units with only 10 connections to make. Approximate dimensions 8x6x4in.

A Motor and pick-up deck.....(2/6 P. & P.)**39/6****ONLY****79'6****B** Ready-built 4-transistor amplifier, complete with volume control and L'speaker (2/- P. & P.)**35/-****C** Portable two-tone case with handle, and expanded metal fret.....(2/- P. & P.)**5/-**the complete Pkgs.
(plus 3/- P. & P.)
or any unit sold
separately.**Loudspeaker Bargains Still Available**

Enormous purchases of Brand New and Guaranteed Plessey loudspeakers enable us to offer these units at THE LOWEST PRICES EVER! Don't miss this golden opportunity to obtain a first-grade permanent-magnet LOUDSPEAKER off the production line at LESS THAN THE MANUFACTURER'S COST! Read carefully the prepared list below and choose just the right speaker for the job—COMPARE THE PRICES ANYWHERE! SELLING FAST—STOCKS CHANGING RAPIDLY.

SCHEDULE OF LOUDSPEAKERS AVAILABLE

Diameter in inches	Gauss in lines	Imped. in ohms	Price
2	7000	80	8/-
2½	7000	35	8/6
2½	7000	50	8/6
2½	7000	80	8/-
3½	7000	35	8/6

Diameter in inches	Gauss in lines	Imped. in ohms	Price
3½	9500	50	10/6
4	7000	25	11/6
4	6000	35	10/6
4	7000	55	11/-

Diameter in inches	Gauss in lines	Imped. in ohms	Price
4	9500	35	11/8
5	6000	3	8/-
5	6000	5	8/-
5	7000	3	8/6
5	7000	5	8/6
5	7500	3	9/-

Diameter in inches	Gauss in lines	Imped. in ohms	Price
5	5500	3	8/6
5	9500	8	10/6
5	9500	5	10/6
6½	7000	8	11/-
6½	8500	8	11/6

Elliptical Size	Gauss in lines	Imped. in ohms	Price
5 x 3	6000	3	7/6
5 x 3	7000	3	8/-
5 x 3	9000	3	8/6
5 x 3	6000	25	9/6
5 x 3	7000	25	10/-

Elliptical Size	Gauss in lines	Imped. in ohms	Price
5 x 3	9000	25	11/-
5 x 3	6000	3	8/6
6 x 4	7000	3	9/-
6 x 4	7500	3	9/6
6 x 4	9500	3	10/-

Elliptical Size	Gauss in lines	Imped. in ohms	Price
7 x 3½	9500	3	10/8
7 x 3½	6000	3	8/6
8 x 2½	7000	5	9/-

Elliptical Size	Gauss in lines	Imped. in ohms	Price
8 x 2½	8500	3	9/8
8 x 2½	9500	3	10/-
8 x 2½	9500	5	10/-
8 x 2½	9500	5	10/-

ALLOW 2/- each Speaker for postage and packing, and please specify the exact requirements—the nearest available will be sent.

BOTH SETS STILL AVAILABLE HERE!

Ask for a demonstration in the shop.

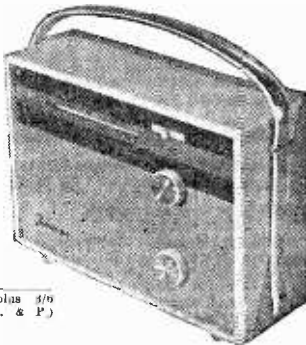
"CAPRI"Sensitive!
Super-selective!
Superb
Speaker!**NOW ONLY
79/6**(2/- P. & Pkg.)
Pocket Super-
het MW and
Droitwich LW
Size 4½ x 2½ x 1½ in.
Constructional data 1/9 Post free.The best and
easiest transistor
built-yourself
sets available.Send S.A.E.
for FREE
PARTS LIST6 First Grade
MULLARD
Transistors
Diode(s) and
all components
BRAND NEW
and
GUARANTEEDChoice of a dozen stations
in daylight...**THE "CONTESSA"**

"QUEEN OF THEM ALL"

To clear existing stocks

ONLY £7.19.6

(3/6 p. & pkg.)

PORTABLE and CAR RADIO
2 WAVEBAND SUPERHET
Construction manual 2/10 Post
Free.Inclusive price for all associated components, case, battery
and Instruction Book complete in every detail.
ANY PARTS SOLD SEPARATELY ON THE
BUILD-AS-YOU-BUY SCHEME**CONTESSA** Battery £7.19.6 (plus 3/6
5/6 extra. F. & P.)
CAPRI Battery 79/6 (plus 2/-
2/6 extra. F. & P.)**SELECTED BARGAINS**

Beautifully geared AM/FM 2'gang Condensers, 4/6; AM/FM IF's 465 kc/s and 10.7 Mc/s, 4/6 pair; Magnavox Crystal Tape Recorder
Mikes, 12/6; transistor sub min. 7 mm. coil set (4) 4/6 the set; 3 watt Stereo Amplifiers, complete, ready to switch on, 79/6; Sentercell
rectifiers R3/2D-D3-2-1-Y, 2/6 each. MODELS—O.A70, O.A73, O.A90, CG-45H, GD10, 2/- each.
TRANSISTORS: OC45 4/6, PXA101 3/9, AF115 4/6. Sub min. Germanium diode 1/3, M1 diode 6d. each. Silicon diodes, 200 p.i.v., 200 mA
1/- each, 400 p.i.v., 330 mA, 2/6 each.

Please send STAMPED and ADDRESSED envelope with any enquiry. We regret no catalogues—our stocks move too quickly! Kindly
make provision for additional postage and packing charges to avoid delay. Terms: Cash With Order or C.O.D. on Orders over 10/-.

ARE YOU TRAINED FOR 1965? 1966? 1967?

Will automation or new techniques in Electronics replace you one day?
DON'T TAKE CHANCES WITH YOUR FUTURE—DECIDE THAT
YOU ARE GOING TO BE THE MAN IN DEMAND!

Never before in history has it been so easy and so inexpensive to train for a rewarding career in Electronics, Radio and Television!

SIM-TECH NOW OFFER THREE EXCLUSIVE HOME TRAINING COURSES.

Anyone can afford these amazing courses—anyone can understand this practical training—No complicated mathematics to hold you back—No old fashioned, obscure explanations to frustrate you!

The lessons are **CRYSTAL CLEAR, PRACTICAL, EASY TO MASTER AND USE**—Early lessons make fundamentals clear even to the beginner, while other lessons will give you the practical "know-how" of an expert!

Compares favourably with some courses costing very much more! By creating a mass market through large volume sales and eliminating individual letter writing we are able to pass on these savings directly to you!

Each course is printed on extra large quarto size sheets and bound into one manual to simplify handling and distribution.

Please select the course most suitable for your requirements from the following:

No. 1. RADIO COURSE. Fundamental facts—Electrons—Conductors and Insulators—Radio Batteries—Circuits—Magnetics—Ohm's Law—Resistance—Colour Code—Chart—What resistor to use—Electro-Magnetism—Electromagnetic Induction—Self Induction—Radio Frequency Inductances—Capacity Coupling—L.F. Transformers—Radio Coils—Radio Capacitors—The Farad—Dielectric—Capacitor Colour Code—Alternating Current Theory & Filters—Reactance and Resistance—Charts to calculate Capacity Frequency and Inductance—Handy Radio Formulae—Practical Aspects of Radio Servicing—Radio Valves—Transistor Theory—N Type Germanium—P Type Germanium—Diode Action—Transistor Action—D.C. Stabilization—Transistor Bias Adjustment—R.F. Amplification—Superheterodyne Principles—A.V.C.—Power Supplies—Meters—Multimeters and Valve Testers—Point to Point Servicing—Signal Generators and Signal Tracers—Using an Oscilloscope for Servicing—Alignment—Amplifiers and P.A. Equipment—High Fidelity—Advantages of Inverse Feedback—Speakers—Frequency Modulation—How to Obtain Radio Jobs. Price for the complete course, **ONLY 36/6**. Plus postage 1/6.

No. 2. ELECTRONICS COURSE. Includes most of the above lessons plus L.C. and R. Combined Circuits—Resonance Phenomenon—Behaviour at Resonance—How Meters Work—Making a Voltmeter—Ohm meter Connections—Valves—Electron Behaviour—Triode—Characteristic Curves—Power Supplies—Audio Amplifiers—Microphones—Resistance Coupling—Obtaining Grid Bias—Push Pull and Parallel—Phase Inverter Circuit—Radio Frequency Voltage Amplifiers—L.F. and Multiband Coils—Detection—Receiver Circuits—Results of Frequency Mixing—A.V.C.—Electronic Oscillators—Quartz Crystals—Radio Transmitter Circuits—Modulation and Tuning—Lines, Antennas and Radiation—Test Equipment Using Meters—Electronic Test Equipment—Thyratrons—Photo-Cell Equipment—Radio Compass—H.F. Heating—Electronic Shaping Circuits—Electron Microscope—Electric Strain Ganges—Inter-Communications—Radio Servicing Techniques—Servicing Printed Circuits. Price for the complete course, **Only 38/6**. Plus postage 1/6. Graduates of the Electronics Course can qualify for a certificate—details sent with each order.

No. 3. TELEVISION COURSE. Effect of Mis-adjusted controls—Pictures of various faults—Service adjustments—Circuit Faults Indicated by a Poor Pattern—Finding Bad Lines by observing Picture Faults—Separate Channels—L.F. System—Inter-carrier L.F. System—Negative Picture—Interference—Antenna Principles and Practices—U.H.F. Transmission Lines—Facts About the T.V. Signal to Help you in Service Work—Synchronizing Separators—T.V. Interference Aids—All about Cathode Ray Tubes—Explanation of T.V. Circuits—Video Detector—Video Amplifier—D.C. Restorer Circuit—Automatic Gain Control Circuits—Oscillators—Deflection Coils—Automatic Frequency Control Circuits—Analysis of Stagger Tuned L.F. Receiver—Analysis of Three Inter-Carrier Type Receivers—The Vertical Deflection Circuit—The Horizontal Deflection Circuit—Waveforms—Schematics of various sections of a T.V.—U.H.F. Converters and Tuners—T.V. Test Equipment and Alignment—Analysis of Various Problems. Price for the complete course, **Only 36/6**. Plus postage 1/6.

UNCONDITIONALLY GUARANTEED TO GIVE COMPLETE SATISFACTION You must be convinced that this is the best value you have ever seen in Electronic, Radio or T.V. Training, otherwise you can return the course (or have your money refunded if sent with order) after you have examined it in your own home for a full seven days.

IF YOU SEND CASH WITH ORDER WE WILL INCLUDE A FREE 70 PAGE BOOK. Tick on the coupon one book for each course ordered with full cash. **RADIO SERVICING FAULT FINDING BOOK. TELEVISION FAULT BOOK. OSCILLOSCOPE BOOK.**

These free books are authoritative, and loaded with information. Would cost at least 5/- each if bought separately. By ordering them you reduce book-keeping and other costs, which savings we pass back to you!

— — — FREE TRIAL OFFER! — — —
Pay only 5/- per week if you wish. Clip coupon right now for this special offer.
To: Sim-Tech Book Company, Dept. CW3, Gater's Mill, West End, Southampton, Hants.

Please send the following courses for a full seven day's trial.

☐ **No. 1. RADIO COURSE.** ☐ **No. 2. ELECTRONICS COURSE.**
37/6, incl. postage. 41/-, incl. postage.

☐ **No. 3. TELEVISION COURSE.**
37/6, incl. postage.

(Free trial customers tick only one please).

If not delighted, I may return the course post-paid without further obligation on my part. Otherwise I will pay cash price **OR 5/- weekly** until purchase price plus 2/6 service charge has been paid.

☐ Tick here if enclosing full purchase price.

Please send me ☐ **FREE. RADIO FAULT FINDING BOOK.**

☐ **FREE. T.V. FAULT FINDING BOOK.** ☐ **FREE. OSCILLOSCOPE BOOK.**
Amount enclosed £ _____

I understand that you will refund this money in full if I am not 100% satisfied. Overseas customers please send full amount (including Ireland).

NAME _____

ADDRESS _____

City _____

County _____

ELIMINATE MAINS FLUCTUATIONS

WITH THE "YEC"

Automatic Mains Stabilizer providing constant perfectly stabilized voltage supply.

NO MOVING PARTS ATTENTION MAINTENANCE

Suitable for both 110 and 240 V.A.C. Accuracy: $\pm 1\%$
Capacity: 250 VA

IMMEDIATE RESPONSE
In attractive vented metal case with leather handle.



£11.10s

Size 8" x 8", weight 21 lbs.

Carriage/Packing 12/6. From stock

WORLD FAMOUS 'SLID-UP'

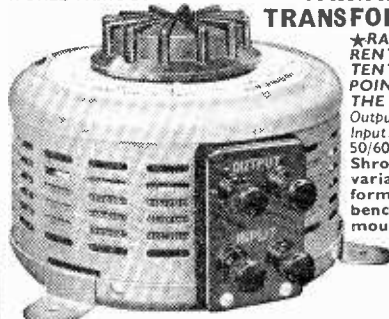
VARIABLE TRANSFORMERS

**★RATED CURRENT
CONSTANT AT ALL
POINTS ALONG
THE WINDING**

Output: 0-260 v.
Input: 230v. A.C.
50/60

Shrouded fully variable transformers for bench or panel mounting.

Model SB5
5 amp.



2.5 Amp. £5.17.6

5 Amp. £9.0.0

10 Amp. £18.5.0

20 Amp. £32.10.0

Ex Works

TRANSISTOR TESTER

**FULLY PORTABLE
PRECISION INSTRUMENT.**

MEASURES:
Ico (Icbo) and the reverse
current of diodes

PNP & NPN—0~50μA
(1μA per scale).

POWER—0~1mA (20μA
per scale).

15-200 (5 per scale)

Bias current—
(1mA on PNP & NPN)

(5mA on POWER)

a0.9-0.995 (from $\beta = \frac{a}{1-a}$)



**MODEL AT-1
ONLY**

£9.17.6

P. & P. 5/6

Terminals: Spring Sockets and Screw Terminals.

Meter: 4in. 50μA moving coil.

Size and Weight: 7 x 5 x 3in. 2½ lb.

Powered by pen cells.

TELESCOPIC AERIAL MASTS

20FT. TELESCOPIC MAST. NEW, self-supporting all steel tubular 4-section masts, suitable for roof or wall fixing, as well as base location. May be extended to full height or locked at any position by special Roller cam locking rings. Bottom section approximately 1½in. diam. Coprised and **ONLY £5.0.0** sprayed finish. Weight 16 lb. Carr. 7/6.

**LIMITED QUANTITY
36ft. BRASS TELESCOPIC MAST**

Complete with built-in hand winding winch for easy rapid extension. Finest quality non-rusting. Bottom section 2½" diam. Winds down to 9ft. One of the best masts **ONLY £35.0.0** ever produced. Carr. 30/-

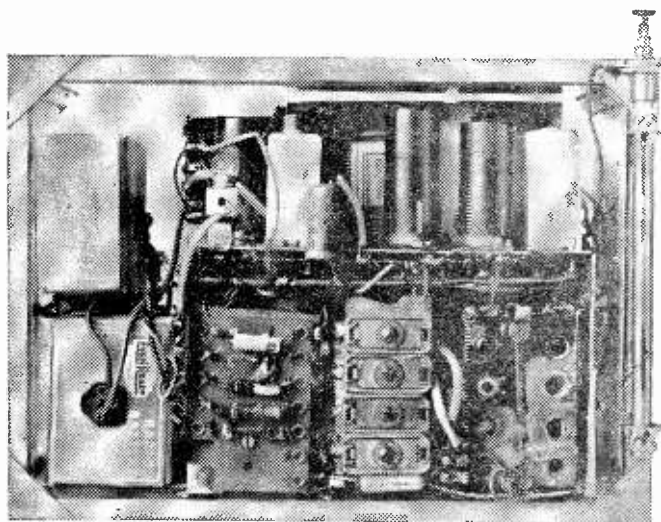
As supplied by us to shore stations and electronic organisations.

I.M.O. LTD.

Dept. P.W.4. 2-5 Powis Mews, Westbourne Park Road
London W.11. BAYwater 1756.

To give added support to the "bank" a stout tinned wire should be soldered to the outside of the shank of the adjusting set screw of each at the back, taking care not to allow the solder to run into the threaded portion of the shanks. This stout wire and the brass strip, are soldered to the lower chassis bar and give adequate support for this unit.

The author fitted all 500pF padders though



ALTERNATIVE VALVE TYPES

There are several "alternatives" for the valves which have been specified. See Table 1.

The centre spigot on each valve should be earthed, since this makes connection with the screening can.

Note that V4 has pins 1 and 7 joined to l.t.+. This is essential for 1.5V working, in this type of output valve. However some valves can be obtained with the normal filament connections for 1.5V operation, as per V1, V2 and V3, their filament connections being to pins 1 and 7 as shown.

BATTERIES

The batteries used with this set are the Ever-Ready A.D.35, 1½V for filament, and the

Looking into the back of the completed receiver

compact 90V battery B.126 for h.t.

The author has not tested the length of life of this h.t. battery for continuous use, and prefer, to use it only when taking out as a portable. For indoor operation the author uses an Ever-Ready B.107. This larger battery cannot be accommodated actually in the set of course.

The h.t. current consumption was found to be 12mA.

		Table 1			
		Mullard	Osram	American	Mazda
V1	...	DK92	X17	1R5	1C1
V2	...	DF91	W17	1T4	1F3
V3	...	DAF91	ZD17	1S5	1FD9
V4	...	DL94	NI7	3S4	1P10

Next month details of the frame aerial and cabinet will be given.

other values can be substituted according to the coil makers' instructions.

A maximum value of 150pF is given by Messrs. Osram for their QO9 long waveband oscillator coil, though the author has not found the 500pF one fitted gives too coarse an adjustment.

Once adjusted for correct alignment, these oscillator padders are left alone, of course, as are also the slug trimmers in the oscillator coils themselves.

TRANSISTOR TUNER/CONVERTER

—continued from page 323

following table gives spot frequencies:—

L.F. Band end	L.F. Tracking point	H.F. Tracking point	H.F. Band end
Range 3— 1.67Mc/s	1.83Mc/s	4.5Mc/s	5.3Mc/s
Range 4— 5.0Mc/s	5.5Mc/s	13.5Mc/s	15.0Mc/s
Range 5— 10.5Mc/s	11.5Mc/s	28.5Mc/s	31.5Mc/s

The h.f. tracking point should be approx. 15° from minimum and the l.f. point 20° from maximum. Note what has been said about the 19m band earlier and if it is desired to include this on Range 4, trim the h.f. end accordingly to

minimum, about 16Mc/s.

Oscillator Pulling. When adjusting the signal circuits, some slight detuning of the oscillator can occur (pulling) and in order to prevent this effect giving a false peak, the tuning capacitor should be slightly rocked to and fro while aligning either mixer coil or trimmer.

Second channel. Owing to the fact that an r.f. stage is used, second channel images will not be obvious. It is, however, essential that one uses the higher frequency of the two always present in a mixer, so if two settings are found during adjustment of trimmer or core of oscillator coils, the one with the trimmer or core furthest out is the right one, thus putting the oscillator above the incoming signal.

Check on this by moving the core both ways on lower frequencies, and if two similar signals appear, the correct one is the furthest out. The same applies to trimmer TC7 on the high frequency end of each range.

A SIMPLE CARBON MICROPHONE

BY P. H. P. HARRIS

THE unit to be described was made for home entertainment purposes, and has given much pleasure, although it is certainly not in the hi-fi class.

The carbon was obtained by crushing the rods from old dry batteries, and is sandwiched between two Meccano plates, each 2½ in. square, although they can easily be made up from sheet metal. Also required are two pieces of plywood, each 2½ in. square, and some ¼ in. x ¼ in. balsa strip. In the prototype, 3-ply only ⅛ in. thick was used, so that

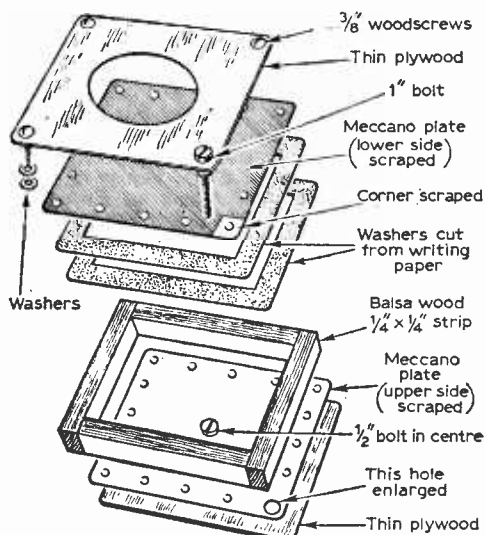


Fig. 1: Illustrating the simple construction of the microphone.

the finished microphone was both light and slim. The balsa wood can be obtained from any do-it-yourself shop.

Construction

Construction is shown in Fig. 1. The lower plate, with its upper surface scraped clean of paint, and one corner hole enlarged, is glued over one piece of plywood. (Evo-stik is a suitable adhesive agent.) A hole is drilled in the centre of the plate to take a small bolt, and a nut and a terminal are fitted to the bolt. The balsa sides are then glued in place.

The tray can now be filled with the crushed carbon. The particles must be as small as possible,

and they must fill the space completely, or the microphone will make rattling noises as it is moved.

The two large paper washers and the upper plate are laid on top. This plate acts as the diaphragm; its lower surface and one upper corner is scraped clean. (This corner must be over the enlarged hole in the lower plate.)

The upper piece of plywood is used to cover the diaphragm, and present a neat appearance. A 1½ in. diameter hole is cut in its centre with a fretsaw (or a pattern of holes may be drilled), together with small holes in the corners for screws. Through one of these, a bolt 1 in. long is passed, and a nut screwed up tight.

A hole is drilled through the scraped diaphragm corner to the back. Washers are placed on the screws in the other corners to the same thickness as the nut, and the diaphragm cover is screwed down. The bolt from the top plate must not touch the lower plate. A further nut and terminal are placed on this bolt.

The corners can now be rounded off, and the microphone painted, if so desired.

The Circuit

The circuit is shown in Fig. 2. When the diaphragm vibrates, the resistance between the terminals varies. When a voltage is applied, the

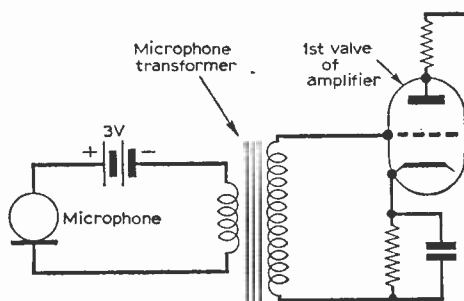


Fig. 2: The input circuit used with the microphone.

varying current induces a varying e.m.f. on the secondary of the transformer, which is amplified in the usual way.

A microphone transformer with a ratio of 50:1 will be suitable. The author used a small bell transformer, connecting the microphone to the 5V output, and the amplifier to the 230V input. ■

DO IT YOURSELF

Build a Record Player and Save Pounds The Cheapest Way The L.K. Way

● **SCOOP! Transistor Tape Recorder.** The best obtainable by very famous manufacturer. Brand new, boxed, guaranteed. Reduced from 12 gns. **OUR price £7.10.0 P.P. 3/6.** Complete with microphone, tape, batteries and operational booklet. Features push-pull amplifier, two motors, single switch operation, pause, speed, wind, rewind, record, play back. Can be used in any position, indoor or outdoor.

Famous Autochanger or Single Player Units supplied with brand new, two-tone, de-luxe portable cabinets, 17 x 15 x 8½ in. Strong carrying handle, gilt finish clips and hinges are used by famous make for 22 gn. model. Ready cut out motor board, 14 x 13 in. Front baffle 7 x 4 in. High flux loudspeaker and 3 watt amplifier. Amplifier ready built on metal chassis with output transformer, volume and tone controls. All items fit together perfectly. Assembly in 30 minutes. Only 5 wires to join. 12 months' written guarantee. Available separately or package deals as below.

Our NEW MKII Superb Kits are now being dispatched. **L.K. PRICES FOR COMPLETE KITS:**

Autochanger Kits as above
B.S.R. U.A. 14, T.C. 8 Mono £10.17.6 P.P. 5/6
Garrard Autolism, Mono £11.7.6 P.P. 5/6

Single Player Kits as above
Garrard S.R.P.10, Mono £10.12.6 P.P. 5/6
E.M.I. Autostop, Mono £10.17.6 P.P. 5/6
Individual Prices for those who wish to purchase separately.
Record Player Cabinet with Cut-out Board... £2.15.0 P.P. 3/6
Amplifier with 7 x 4 in. speaker £3.10.0 P.P. 2/6

Autochangers
B.S.R. U.A.14, T.C. 8 Mono £5.7.6 P.P. 5/6
Garrard Autolism, Mono £6.0.0 P.P. 4/6

Single Players
E.M.I. Autostop, Mono £5.7.6 P.P. 4/6
Garrard S.R.P.10, Mono £5.5.0 P.P. 4/6
E.M.I. Separate Pick-up £3.0.0 P.P. 3/6

Transcription Units—Stereo Head—Mono
Garrard 4 H.F. Stereo £14.10.0 P.P. 5/-
Philips A.G.10/16, Stereo £12. 0.0 P.P. 5/-
Garrard A.T.6, Stereo £9.19.6 P.P. 5/-

● **SCOOP! B.S.R. U.A.14 Autochangers.** T.C. 8 Mono P.U. Brand new and boxed. Wired for stereo. Note **OUR price £5.7.6.** P.P. 5/-. Latest model.

● **SCOOP! Garrard Autolism Mono P.U.** Brand new and boxed. Wired for stereo. Latest model. Note **OUR price £6.0.0 only.** P.P. 5/-.

● **SCOOP! Diodes—over 1,000,000 in stock—ideal substitute** O.A.81 vision detector.

Note **OUR price £1.0.0 per 500.** P.P. 2/- (In 500 lots only).

● **SCOOP! 3-watt Gramophone Amplifier.** Complete with 5 in. Speaker, 49/6. P.P. 5/-.

The amplifier is complete, on a fabric-covered baffle board. Output transformer included. Tone and volume controls and on/off switch. Ready to switch on and play. Terrific volume. Size 12½ in. x 6 in. x 3½ in. back to front. For 200-250 v. A.C. Output 3 watts.

● **SCOOP! A Stereo Amplifier** by world famous amplifier designers. 5 watts per channel. Facia panel in black and silver. Assembled, tested, guaranteed. Even leads and plugs supplied. Maker's package unopened.

OUR price £7.10.0. List price £15.15.0. P.P. 5/6.

Please send for our Amplifier and Hi-Fi lists they are FREE. Our prices the most competitive in the trade.

● **SCOOP! Microphones** Complete Lead Coax. Plug, Brand New. Our Price, 5/- only. P.P. 1/6.

● IF NOT ADVERTISED IT IS STILL IN STOCK
● MAIL ORDER ONLY TO THIS ADDRESS PLEASE

TRANSISTOR SECTION

● **SCOOP! A first-class 2 wave-band 6 transistor superhet chassis** by world famous manufacturer. Fully built, aligned, tested, guaranteed. Full coverage long and medium waves. Note **OUR price £4.4.0 only.** Suitable speaker 10/6. A few cabinets can be supplied at 22/6 each. **OUR price for the package deal £5.5.0 only.**

● **SCOOP! As above, 7 transistor**
OUR price £4.15.0 only. Suitable speaker 10/6. Cabinet (very attractive), 22/6.
OUR price for the package deal £5.14.0 only.

● **SCOOP! As above, 8 transistor.**
OUR price £5.4.0 only. Suitable speaker 10/6. Cabinet (very attractive two-tone), 22/6.
OUR price for the package deal £6.10.0 only.

● **SCOOP! A Limited Number Only. Tape Decks** by B.S.R. Latest model. A.C./200/240 v. Brand new and boxed. **OUR price £6.0.0 only.** P.P. 4/6.

● **SCOOP! Tape Recorder Amplifiers.** Suitable for B.S.R. or Collaro Decks. Price: £6.10.0 for B.S.R. Deck; £6.12.0 for Collaro Deck. P.P. 6/-.

Mk.III. Fully built, high gain, low noise, printed circuit. Attractive grey and gold front panel 13 x 1½ in. Overall height 5½ in. Front to back measurement 5½ in. The amplifier is supplied complete with the switch wafer fully wired for B.S.R. deck. For Collaro deck, a completely wired separate switch with spindle is supplied. Magic Eye DM70 fitted.

● **SCOOP! Superb 1964 F.M.-M.W.-S.W. 3-Band Radiogram Chassis** with F.C.C. certification. Frequency: F.M. 88-108 Mc/s; B.C. 535-1605 kc/s; S.W. 3.5-9 Mc/s. Output, 5 watts. A.C. only. Ferrite rod aerials. Product of very famous manufacturer. Brand new with full maker's guarantees. List price 22 gns. **OUR price 15 gns. only.** P.P. 5/6

FREE! with this superb chassis for one month only, two 5 x 6 in. P.M. Dynamic Speakers and beautiful cabinet with matt chrome trim. Knobs are included to suit the chassis. Please send for our Chassis Lists they are FREE. We are Main Agents for Brittner "Empress" Chassis.

● **SCOOP! Complete 14 in. TV Sets—Untested.** Choice of Pye, Philips, Ekco and Sobell, well packed—but at owners' risk. £2 each. Also few 17 in. TV sets £4.10.0 each. Plus carriage and packing inner London 10/-, elsewhere 15/-.

VALVES—Ex-equipment Tested and Guaranteed

EB91 2/-	EX80 4/-	PY80 3/6	6F1 2/6	6BW7 4/-
EBF80 4/-	KT33C 4/-	PY81 3/6	6F12 2/6	6BW7 4/-
EBF89 4/6	KT86 7/-	PY82 3/-	6F13 5/-	1A57 10/-
ECC81 3/6	PCC84 4/-	PY83 6/-	6F14 5/-	30F5 5/-
ECC82 4/-	PCF80 4/-	PZ30 7/-	6F15 5/-	35Z3 5/-
ECC85 5/-	PCF82 4/6	U25 6/-	6F16 5/-	35Z4 5/-
ECH35 6/-	PCL82 5/-	U26 6/-	6F19 6/-	30PL1 7/-
ECH42 6/-	PCL83 5/6	U191 7/-	6L1 7/-	6L12 5/6
ECH81 6/-	PCL84 6/6	U301 9/-	6L18 7/-	30PL13 6/-
ECL82 6/-	PL33 7/-	UAF42 5/-	6P25 5/-	30FL1 7/-
EF85 4/6	PL36 6/6	UBC41 5/-	6P28 8/-	6J30L2 7/-
EF91 2/3	PL81 5/6	UCB47 7/6	7B6 6/-	R19 6/6
EL33 5/-	PL82 4/-	ECC80 7/6	7C5 6/-	50CD6 16/-
EL84 5/6	PL83 5/-	UF42 2/6	757 10/-	6CD6G 12/-
EY51 3/-	PY32 7/6	6C9 10/6	7B7 6/-	
EY86 4/6	PY33 7/6	6X5 4/6	7V4 5/-	

EF80 in a batch of 12 for 16/-, plus 2/6 P.P. ECL80 in a batch of 6 for 14/-, P.P. 2/6. P.P. is 6d. on each valve.

Mullard 14 in. tubes of all types. AW and MW. All 17/6 each. P.P. 10/-.

Speakers ex Equipment. 5 in. 5/-, 7 in. x 4 in. 6/-, 6 in. 6/6, 8 in. 7/-, P.P. 1/6 each.

S.A.E. enquiries please. Our Complete Lists 1/- only—credited against your order.

● **THE CHEAPEST, THE BEST, THE QUICKEST SERVICE.**

L.K. ELECTRONICS (Victoria) LTD.

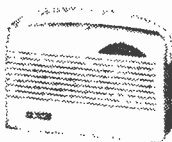


27 OLD BOND STREET, LONDON, W.1.



CONSTRUCTORS BARGAINS THE 'REALISTIC' 7

Transistorised Portable Receiver made to the highest professional standard. Comprises 7 Mullard Trans. plus Crystal Diode, 350 milliwatt output to 4in. speaker.—I.F. frequency 470 Kc/s.—fully tunable over medium and long wavebands. Two-tone plastic cabinet with handle—size 7 x 10 x 3 1/2 in. fitted socket for car aerial. Complete with full instructions.



MAY BE BUILT FOR £5.19.6 All parts sold separately
Battery 3/9 extra.
P. & P. 4/6 extra. (Circuit diagram 2/6, free if all parts bought.)
Also De Luxe Model with superior PVC covered wood cabinet and full view tuning dial.
ONLY £1 EXTRA All parts sold separately
Battery 3/9 extra. P. & P. 4/6

"THE SPRITE"

6 transistor mini pocket receiver. Full L. and M. waveband coverage. Size only 4 x 2 1/2 x 1 1/2 in. In sub assemblies. 3in. speaker. CAN BE BUILT FOR **79/6** Leather case, ex- **12/6** extra
All parts sold separately. P. & P. 3/6.

SUPER AMERICAN TAPE

LAFAYETTE BRAND, FULLY GUARANTEED
RECORD LOW PRICES

MYLAR BASE	ACETATE BASE
5in. Double play, 1,200ft. 15/-	5in. Long play, 900ft. 10/-
5in. Long play, 1,200ft. 15/-	5in. Long play, 1,200ft. 12/6
5in. Double play, 1,800ft. 22/6	7in. Long play, 1,800ft. 15/-
7in. Stand. play, 1,200ft. 12/6	
7in. Long play, 1,800ft. 19/6	MESSAGE TAPES
7in. Double play, 2,400ft. 25/-	3in.—150ft. 3/6
P.V.C. BASE	3in.—225ft. 4/11
5in. Standard play, 600ft. 8/6	3in.—300ft. 7/6
5in. Stand. play, 850ft. 11/6	Full range of Triple Play
P. & P. 1/- extra per reel. 4 reels and over Post Free.	Tape available.

WIRECOMP ELECTRONICS

378 HARROW ROAD, LONDON W9

TEL: CUNNINGHAM 9530

Hours of business: 9 a.m. to 6 p.m. Open all day
Saturday. Opposite Paddington General Hospital.
Buses 18B and 36 pass the door.

Boy's 2 Transistor Pocket Radio

Ready made as illustrated—complete with personal earpiece, telescopic aerial, battery and carrying case! Wonderful value and performance—full medium waveband coverage—built in 2 1/2 in. speaker gives full tone reproduction. Works on single PP3 9 v. battery. In attractive plastic case—size only 4 x 2 1/2 x 1 1/2 in. All accessories included in the price. Not a toy.



WIRECOMP'S 42/- POST FREE

Also 6 transistor model. Long and medium waveband. Fully built complete with earpiece, battery and leather **69/6** Post Free carrying case.

HMV 40 r.p.m. AUTO RECORD PLAYER

Takes only 45 r.p.m. 7in. discs. Plays up to 8 automatically. Fitted with lightweight pick-up and crystal cartridge. Mounted on sturdy plinth—size 10 x 10 x 5 1/2 in. For 200/250 v. A.C. mains. **WIRECOMP'S 59/6** P. & P. 3/6



250MW TRANSISTOR AMPLIFIER Suitable for use with the above changer. Battery 2/6 extra. P. & P.

PRICE 35/- 2/6

Suitable 6 x 4in. speaker 12/6 Post Free.

The transistor amplifier can be incorporated in the plinth of the changer with the speaker—thus making a self-contained Record Player.

Can be purchased together for **£5.9.6** POST FREE

Transistor BABY ALARM/INTERCOM.

In 2 compact units, each size 4in. x 2 1/2 in. x 1 1/2 in. Internal loudspeakers give ample volume. Complete ready for immediate use. Works from PP3 battery. Complete with battery and sixty feet of connecting wire **69/6** P. & P. 2/6.

Transistor TELEPHONE AMPLIFIER

A must for business or pleasure. This neat little transistorised amplifier powerfully amplifies the incoming call and at last leaves you with both hands free while continuing your conversation normally. The pick-up is suction fixed to phone. Battery-operated at negligible cost. Fitted off switch for private conversation. Size 4 1/2 x 3 x 1 1/2 in. Complete with battery. **WIRECOMP'S PRICE 69/6** P. & P. 2/6.

NORCOL LTD.

wish to announce their latest developments shortly.

TRANSISTOR TOP BAND Tx

8 watts Carrier Power. 12V h.t. 70Ω aerial output.

KIT complete with microphone, £14.

TRANSISTOR TOP BAND Rx

1μV in for 200mW into 3Ω speaker. 12V h.t. I.F. 455 kc/s. Tunable 1.8-2.0 Mc/s.

KIT complete, £10 (covers broadcast band).

TRANSISTOR RADIO batteries are expensive.

The **NORPACK** miniature battery eliminator pays for itself. Approximately 4 1/2 x 2 1/2 x 2in. 9V O/P from mains. KIT complete, 35/-.

An Alignment Service is available for assembled kits. **NOMAD** Car Radio still available, £6.19.6.

Please send S.A.E. or phone for more details:

PHIL SMITH, (G3PPU) Shop Manager

147 LONDON ROAD, CAMBERLEY, Surrey
Camberley 3743.

AMATEUR RADIO CHAS. H. YOUNG LTD.

AERIAL EQUIPMENT

TWIN FEEDER 300 ohm twin ribbon feeder, similar K25, 6d. per yard K35B Telecon (round) 1/6 per yard. Post on above feeder and cable 1/6 any length.

COPPER WIRE, 14 G., H/D 140ft. 17/-; 70ft. 8/6. P. & P. 2/6. Other lengths pro rata.

AERIAL INSULATORS, Shell type, 2in. 9d. Plus Postage. **CERAMIC FEEDER SPREADERS**, 6in. type F.S. 10d. each. P. & P. 2/-.

CERAMIC "T" PIECES, Type A.T. for centre of dipoles 1/6 each. P. & P. 1/-.

2 METER BEAM 5 ELEMENT W.S. YAGI. Complete in box with 1-2 1/2 in. mast head bracket. **PRICE 49/-** P. & P. 3/6.

SUPER AERIAL CABLE, 75 ohms 300 watts very low loss 1/8 per yard. P. & P. 2/- 50 ohm, 300 watt coax very low loss 1/9 yard. P. & P. 2/-.

ABSORPTION WAVEMETERS 3.00 to 35.00 Mc/s in 3 switched bands. 3.5, 7, 14, 21 and 28 Mc/s. Ham bands, marked on scale. Complete with indicator bulb. **A MUST** for any Ham shack, 22/6 post free.

VARIABLE CONDENSERS All brass with ceramic end plates and ballrace bearings, 50 pF, 5/9, 100 pF, 6/6, 160 pF, 7/6, 240 pF, 8/6 and 300 pF, 9/6 All fitted with rear extension for ganging. P. & P. 1/- Also Flexible Couplers, 1/- each.

SETS OF VALVES for AR88 (14) £3.10.0 post free.

METERS 3 1/2 in. with 2 1/2 in. scale, 0-10 mA, 15/-; 0-100 mA, 15/- P. & P. 1/6.

THERMO, 2 1/2 in. round 0-2.5 amp, 7/6 each. P. & P. 1/6.

**170-172 CORPORATION ST.
BIRMINGHAM 4**

Telephone CEN 1635



Trade News

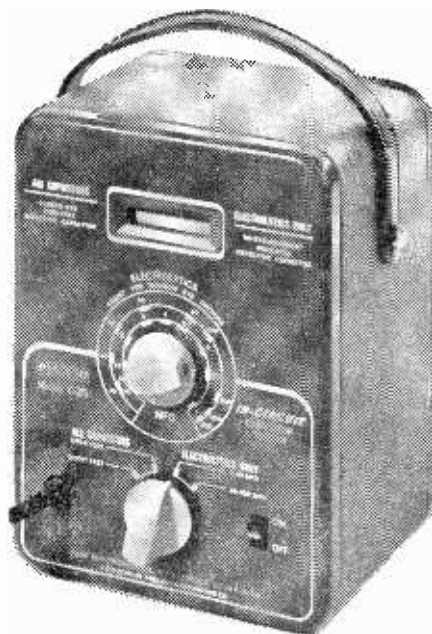
Two in Tune

FEATURES of the two latest transistor portables from Baird, are their light weight and neat design.

Model 290 weighs 1½lbs. with PP6 battery, covers medium and long waves and employs seven transistors. It has a 3in. speaker, aerial and earth sockets and tape recorder/earphone socket. The brown fibre case is covered with foam-filled leathercloth and measures 7½in. x 2in. x 5in. Price is 11 guineas inc. P.T.

Model 292 weighs 2lbs. with PP6 battery, has seven transistors and covers medium and long waves. Like the model 290 it has a 3in. speaker and tape recorder/earphone sockets. Provision is also made for the attachment of an external aerial and earth.

Housed in a deep grey leather grain plastic case, model 292 measures 8½in. x 1½in. x 5in. Price is 10½ guineas inc. P.T. *Baird TV Distributors Ltd., 414 Chiswick High Road, W.4.*



This new capacitor tester is made by KLB Electric Limited.

In-Circuit Capacitor Tester

THE PACO C.25 "In Circuit" capacitor tester is described as one of the most valuable pieces of fault-finding equipment that any service engineer could have on his workbench. It reveals immediately any open or short-circuited capacitors without removing them from the circuit. The PACO C.25 also locates dried-out electrolytics in one quick test. Price is £15 19s. 6d. complete, or may be purchased in kit form for £14 12s. 6d. *KLB Electric Limited, 335 Whitehorse Road, Croydon, Surrey.*



The model 292 transistor receiver new from Baird.



The Danetone model SRT 620 record player.

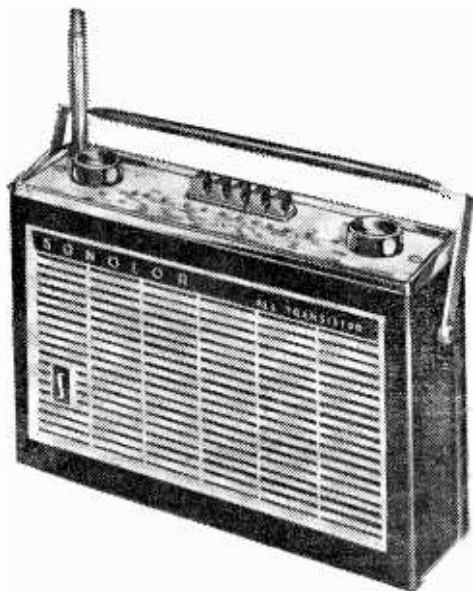
Danish Record Player

FROM Denmark comes this new Danetone SRT 620 Hi-Fi mains record player. Typical of Scandinavian design, this record player is styled for use as a portable unit, and its black base and

teak coloured wooden top make it a very attractive accessory in the home.

Features include autostop mechanism, 4 speeds, stereo cartridge, tone control and $2\frac{1}{2}$ W virtually undistorted output into an 8in. speaker housed in an acoustic wooden cabinet.

The Danetone SRT 620 costs 21 guineas inc. £3 1s. purchase tax. An additional matching loudspeaker for stereo is available in a cabinet with extension lead supplied, at an extra cost of 7 guineas. *Denham and Morley Ltd., Denmore House, 173/175 Cleveland Street, London, W.1.*



This new French receiver has recently become available in this country.

Portable Car Radio

NEW from Sonolor, of France, comes the "Flash 64" portable transistor receiver. It is said to work equally well in a car and in the home. The Flash 64 covers long, medium and short waves (16—50m) with push-button wave-change and variable tone control. The circuit includes seven transistors and a $6\frac{1}{2}$ in. speaker. Also fitted are telescopic aerial, slow motion tuning, earphone socket and car aerial socket with ferrite rod isolating switch.

The Flash 64 measures $9\frac{1}{2}$ in. x 8in. x 3in. and costs 22½ guineas, including £3 5s. 4d. purchase tax. *Denham and Morley Ltd., Denmore House, 173/175 Cleveland Street, London, W.1.*

New Codar Transmitter

CODAR RADIO COMPANY announce a new transmitter, the A.T.5. The dial is calibrated 1.8—2.0Mc/s and 3.5—3.8Mc/s, covering the 160 and 80m amateur bands. At the rear of the $8\frac{1}{2}$ in. x 5in. x 4in. cabinet, are Mic. co-ax socket, preset mic. gain control, power supply socket, phone/c.w. switch and output co-ax socket.

The valve line-up is: EF80/EF80/6BW6/12AX7/6BW6, and the power requirements are 250V, 100mA: 6.3V, 1.8A (or 12V, 0.9A) 150V stabilised for VFO supply. There is a matching power pack for 200-250V a.c.

Also included is standby/net/transmit switching, together with aerial changeover, transferring the aerial to the receiver in the "standby" position. Neon indicator monitors "standby" and "transmit". Price of the transmitter complete £16 10s., and the power unit, £8. *Codar Radio Company, Bank House, Southwick Square, Southwick, Sussex.*



The latest transmitter from Codar.

Wonder Plug

A BOON to all servicemen and constructors is the "Fittall", a plug which eliminates the continual changing of electric plugs to fit different sockets. Five types of plug can be made: 13A fused, 5A 3-pin, 15A 3-pin, 15A 2-pin and 5A 2-pin. All that is needed to change the plug pins being simple movement of the selector arm fitted at the base of the plug. The whole unit is housed in a shock-proof unbreakable plastic housing. Price is fixed at 12s. 6d. *R. W. Rumble (G.B.) Ltd., Coastguard Road, Larne, Co. Antrim, N. Ireland.*

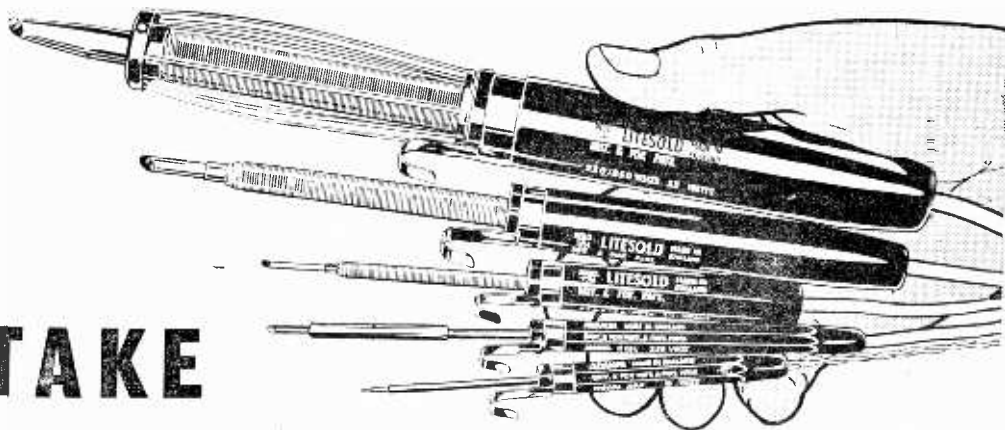
WARNING: LIVE CHASSIS

With reference to the article a "Voice-operated Baby Alarm" published on page 253 of the July PRACTICAL WIRELESS, we bring to reader's attention that the chassis in this design is connected directly to one side of the mains supply. It is therefore possible for the chassis and the microphone to be "live," presenting a danger of shock to the user.

Certain modifications should thus be carried out to render the equipment safe. The fitting of 0.02µS 1,000V d.c. capacitors in each of the leads to the television receiver, and also in the microphone leads before they leave the chassis is recommended to readers intending to construct this piece of equipment.

Contact with the chassis should be avoided, and no attempt should be made to "earth" the equipment. It is further recommended that the equipment is contained in either a wood or bakelite type cabinet to reduce the risk of shock to others. Any fixing screws that appear on the outside of the cabinet should be carefully "hidden" or covered. If a slight "shock" is experienced when contact is made with the microphone, either the mains lead to the wall plug should be reversed, or the plug itself.

TAKE FIVE!



There are 30 other models, too. There ARE several other makes of soldering instruments. Big ones. Small ones. Good ones. We've seen them. We don't make the biggest ones. Or the most expensive ones. Or the most elaborate ones. We DO make the smallest ones. And the widest range. We make the best. Always have. May we send you details?

Brochure P.W.10 post free on request

LIGHT SOLDERING DEVELOPMENTS LTD., 28, Sydenham Road, Croydon, Surrey.

Telephone: CROydon 8589

WEYRAD

TRANSISTOR COILS

The P50 series remain the most popular and widely used components for Medium and Long-wave Transistor Superhets:—

P50/1AC Oscillator Coil for 176 pF tuning ...	...	...	5/4 ea.
P50/2CC 1st & 2nd I.F. Transformers ...	...	...	5/7 ea.
P50/3CC 3rd I.F. Transformers ...	...	...	6/- ea.
All mounted in individual cans $\frac{1}{16}$ in. diam. x $\frac{3}{4}$ in. high.			
RA2W Ferrite Rod Aerial 208 pF Tuning ...	...	...	12/6 ea.
LFDT4 Driver Transformers ...	...	...	9/6 ea.
OPTIA Output Transformers ...	...	...	10/6 ea.
PCAI Printed Circuit Panel ...	...	...	9/6 ea.
Constructor's Booklet ...	...	...	2/- ea.

VALVE RECEIVER COILS

Our individual "H" type iron-cored coils are without equal for the construction of a wide range of receivers. For the simplest T.R.F. sets covering one or more wave-bands the Aerial and H.F. Transformer coils are ideal. The standard superhet circuit using the ever-popular triode-hexode frequency change layout would employ the Aerial and Oscillator coils and the coverage can be selected from 7 different bands ranging from 12.5 to 2,000 metres. For a really high-performance receiver an R.F. stage can be added by using the Aerial, H.F. Transformer and Oscillator Coils and a circuit is provided illustrating such a layout.

H Coils 3/9 each.

WEYMOUTH RADIO MANUFACTURING CO., LTD.

REGENT FACTORY, SCHOOL STREET,

WEYMOUTH, DORSET

LINEAR

For

HIGH SENSITIVITY**MAXIMUM RELIABILITY****HIGHEST FIDELITY****REASONABLE COST**

We regret to announce that after maintaining our prices for seven years (with the exception of one unit) we are reluctantly announcing a revised price list.

L.50. 50 watt Amplifier approximately 14x10x8 in. Sensitivity 25 m.v. output for 3 and 15 ohm Speakers. Retail price 22 guineas.

CONCHORD. 30 watt Hi-Fi Amplifier with two separately controlled inputs. Retail price 17 guineas.

L.10. 10 watt Hi-Fi Amplifier with separate pre-amp. Retail price 16 guineas.

L.1/10. 10 watt Hi-Fi Amplifier with integral pre-amp. Retail price 13½ guineas.

DIATONIC. 10-14 watt Hi-Fi Amplifier with integral pre-amp. Retail price 12½ guineas.

L.5/5. Stereophonic Amplifier. Output 5 watts each channel. Retail price 12½ guineas.

LT.45X. Tape Amplifier with equalisation adjustment for 1½, 3½ and 7½ in. per second. Suitable for Collaro Studio Tape Transcripator. Complete with integral power pack. Retail price 12½ guineas.

LP.1 Tape Pre-Amplifier. As above but less power pack facilities.

L.45A. 4/5 watt Amplifier. Retail price 6 guineas.

LG.34. 3/4 watt Amplifier. Shelf mounting type for gram use. Retail price £5.10.0.

TREMOLO UNIT. For Guitar purposes to plug into mains Amplifier. Retail price 4 guineas.

Trade and Export Enquiries invited—

LINEAR PRODUCTS LTD. **ELECTRON WORKS** Tel. Leeds 63-0126 (3 lines). **ARMLEY, LEEDS.** S.A.E. for catalogue.

SUMMER CLEARANCE SALE - PRICES SLASHED

MAKE 5 DIFFERENT TRANSISTOR RADIOS FOR 30/-



Vernor Radio Construction Set! Become a radio expert for 30/-. A complete Home Radio Course. No experience needed. Part 1 incl. Radio book, instructions for each design. Step-by-Step Plans. All Transistors, loudspeaker, personal phone, knobs, screws, etc., all you need. Box size 14 x 10 x 2in (parts avail. sep.). Originally £6, 30/-, plus 2/6 P. & P.



MINUTE TRANSISTOR RADIO ONLY 17/6

Amaze at the quality of tone and volume. 23 x 22 x 1½ in. the **MIAMI** works for months on a 1/2d. battery. Simple assembly plan with set. 17/6, plus 1/6 P. & P. All parts available separately.

AMAZING CIGARETTE RADIO ONLY 18/6 NO MORE TO PAY



Amaze your friends! this highly sensitive **"GIGA-RADIO"** receives all medium wave stations clear and crisp—holds ten cigs.—weighs less than 3 ozs. with cigs. Tiny battery inside costs 3d. lasts over 3 months. This brilliant little novelty personal 'phone radio is ideal for Bedside, News, Sports, Office. Can be built by anyone from pictorial diagrams in an hour or two. All parts supplied for 18/6 (add 1/6 P. & P.). (Parts sold separately).

MINIATURE SPY CAMERA ONLY 19/6



This exciting little 2-speed camera is a precision-made instrument in chromed steel and leather with milli-magnifying lens—each 14 mm. film takes 40 pics. Size 11 x 11 x 2½ in. only 19/6. P. & P. 1/6 extra. **FREE Leather Carry-case. Six Rolls of Film.**

"VOLKSRADIO" POCKET VALUE RADIO ONLY 15/-



Take-over Bid makes this Fantastic Offer possible—the beautifully compact "5 Star Volkradio" measures 4½ x 2½ x 1½ in. receives perfectly—in the bedroom, office, garden—over all M.W. incl. Luxembourg. Under 1d. hour running cost. Anyone can assemble it in 1 or 2 hours, using our simple A.B.C. plan, 15/-, plus 1/6 P. & P. (Parts can be bought sep.)

Fabulous ST. TROPEZ MK. 6 The Sensational Pocket Radio



This fantastic offer will amaze you—the beautifully compact **ST. TROPEZ**, measuring 4½ x 3 x 1½ in. receives perfectly in bedroom, office or garden—over all medium waves including Luxembourg. Under 1d. per hour running cost. ANYONE can assemble it in one or two hours using our simple A.B.C. plan, 25/- (P. & P. 2/6 extra). (Case extra). Parts can be bought separately.

Brand New, Boxed, **AUTOMATIC CAR CIGARETTE LIGHTERS.** Heavy chrome looking, holding 10 cigs. and issues ready-blt. cigs. Works off 6 or 12V. Special Clearance Price 10/6, plus 1/6 P. & P.

STOCK ROOMS MUST BE CLEARED TO MAKE WAY FOR NEW STOCK

Our New 4-Stage MINUETTE



Build this newly designed "MINUETTE" 4-STAGE transistor set in very strong ready drilled **ULTRA MODERN** Case, size only 6 x 3½ x 1½ in. Uses three transistors and diode and **SELF-CONTAINED LOUDSPEAKER.** Very sensitive, ideal for office, bedroom, holidays, etc. Months and months of listening off a 1/2 battery. Can be built **FOR ONLY 30/-** including Proper Case, miniature speaker, etc. Simple as A.B.C. Pictorial Step-by-Step Plans, etc., plus post and packing 1/6. Parts sold separately.

TRANSISTOR POCKET RADIOS



BULK PURCHASE ENABLES US TO MAKE THIS FANTASTIC OFFER—AND WITH MONEY BACK GUARANTEE!! The "SAN REMO" ... so tuned that it brings the voices of star entertainers and vocalists dramatically to life—in your home, office, etc. Only 4½ x 2½ x 1½ in. Fits easily into your pocket or handbag. Works for months off 1/2 battery. Should last a lifetime. Anyone can assemble it in an hour or two with our easy plan. Miniature speaker, carrying case—everything only 28/6, 2/6 P. & P. (Parts can be bought separately.)

READY TO PLAY

TRANSISTOR RADIO FULLY TRANSISTORISED SKYROMA MK. 7



This latest 1964 model is cheered by experts for its fantastically low price. Built in two-tone case, size 4½ x 2½ x 1½ in. Receives M.W. stations loud and clear. Every radio is fully tested before dispatch. Price ready built 25/-, P. & P. 1/6 extra. Free carry-case with set. No more to pay

FOR ONLY 25/-

CONCORD ELECTRONICS LTD. (Dept. P.W.10) 9 Western Road, Hove, Sussex



LETTERS TO THE EDITOR

PRE-WAR FIELD DAYS

SIR.—Before the last war I used to belong to the "Thornton Heath S.W. Society", now defunct. Some of our members were G2RD, G2DP, G4AA and G4FW, but I had only reached the 2FXT artificial aerial licence stage.

In June, 1938, we had a 5m field day and I partnered G4AA. We found a beautiful spot near Warlingham, off the beaten track, with no screaming jets flying over, just an occasional visit of a stately Hannibal.

We settled down to logging the various stations till about 2.30 in the afternoon, when we discovered that our beer had run out. We tossed up to see who would make the trip to the nearest "boozer" some two miles away and my partner lost, so away he went, leaving me strict instructions about the liveliest part of the band.

After logging several stations I turned to one end of the band and could hear music, classical music; appropriately enough Beethoven's Pastoral Symphony. I opened the back of the set, stretched the coil a little, and heigh ho, there was "Ally Pally" spot on!

I listened on and on to the orchestral concert. Suddenly a shadow appeared over my shoulder. It was my partner, who had been lucky enough to get a lift back by car and so arriving back a lot quicker than I had expected. Was my face red and was he mad! Needless to say, we finished well down the field at the end of the day.

I often wonder what has happened to all my acquaintances since then. But one I do know and often hear him, Alvar Liddell. In those far-off days Sunday mornings used to be a busy time and even 2FXT used to "jump" the artificial aerial, but nowadays I think the bands seem empty of local 'phone stations.—P. O. HUBBART (West Croydon, Surrey).

(Out of those licensed amateurs mentioned by Mr. Hubbart G2RD and G3FP are known to be still operating.—Ed.)

A NOVEL ECHO UNIT

SIR.—I wonder if any of your readers have ever tried the arrangement that my friend and I used to obtain an echo. The quality is by no means hi-fi but is suitable for a lot of "science fiction" music.

One tape recorder containing the loaded spool is set to "record" and the other is set to "play". The first one's microphone is placed near the second one's speaker. This system has one serious drawback, though: the distance between the heads is too great for an echo. However, if

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 the cover.

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

the first recorder has its pressure pads held off the tape, and the tape is guided over the record head, the second tape recorder can be put on to "fast rewind". Upon pushing the tape on to the head it will play. The effect of the increased speed is the same as decreasing the distance between the heads and so an echo is obtained with no additional equipment.

When played on fast rewind on the second machine (now detached from the first) the echo can be recorded on the first recorder at a more orthodox, less tape-consuming speed. Incidentally, good effects are also obtainable by playing the tape in reverse.—P. RILEY (Croydon, Surrey).

NOT SO OBVIOUS

SIR.—Regarding the 7Mc/s Transceiver (June P.W.), it occurs to me that it might develop a little fault after a few weeks' operation. Those who have studied the circuit of the ex-W.D. No. 19 will have found that almost all the decoupling capacitors in the "A" receiver are 350V wkg. The maximum voltage to which they are subjected is in the order of 250V. It will be observed, however, that the a.g.c. time constant/decoupling capacitor to the r.f. amplifier is of 600V d.c. working (provided the set is post-1942 or modified).

Six hundred volts of a.g.c. does seem a bit much! It bothered the poor wireless mechanics in the early 1940's, too, until someone had the bright idea of putting a valve-voltmeter across the then 350V a.g.c. capacitor and *switching to send*. As the receiver heaters were left on when transmitting and only the h.t. switched off (as in the 7Mc/s Transceiver) the control grid, tuned to the transmitter frequency, acted as a most excellent diode, and the resulting voltage was usually too much for the poor old a.g.c. capacitor.

I'm not sure how much transmitter voltage will be induced into the grid circuit of the triode of the receiver in the "Transceiver" as I have not built this circuit myself but I suggest some tests are made—just to make sure about these voltages.—MAYDAY (name and address supplied).

SIR.—The 19 set runs an 807 to some 25W input, i.e. 500V at 50mA, whereas the 7Mc/s Transceiver runs an ECL86 to some 5W input and with a difference in power of less than a quarter. The corresponding voltage across the capacitors would be very much less. The receiver blocks on keying obviously because of the diode action referred to and I use this as an aural indication when I am sending. "Mayday" doesn't say the

value of the a.g.c. capacitor he's referring to but in the grid circuit of the Transceiver the values are 2pF bandpass coupling and 300pF grid leak. I should therefore imagine that a.g.c. decoupling would be 0.05 μ F or 50,000pF.—D. GIBSON, G3JDG (St. Albans, Hertfordshire).

Sir,—I would be grateful if any reader could sell or loan me . . .

. . . any information at all on the No. 19 Set.—P. I. PETERS, 59 Manvers Road, Swallow Nest, Sheffield.
. . . any circuits, manuals, etc., on the Marconi Canadian No. 52 Set.—P. WOODS, 46 Chaucer Road, Bedford, Bedfordshire.

. . . information dealing with modifications to the Wireless Set 19 Mk.3.—G. FAUNPEL, 86 No Sudley Road, Liverpool 17, Lancashire.

. . . the circuit diagram and instruction manual of the Collins TCS11 receiver.—G. GREENSLADE, 2 Millham Road, Lostwithiel, Cornwall.

. . . the circuit and any data for the Marconi CR300 receiver. All postage refunded.—E. FORD, 106 Skinner Street, Cresswell, Worksop, Nottinghamshire.

. . . service data or manual for the Hallicrafter Marine Radiophone, Model H.T.11 or 11a.—K. E. LE MASURIER, "Aquir," Feugre, Cobo, Guernsey.

. . . the manual or circuit diagram for the v.h.f. transmitter/receiver type TR1986.—K. ORCHARD, 25 Kenmore Drive, Yeovil, Somerset.

. . . one clean copy of P.W. for December 1962 (with blueprint) for two clean issues of November 1962 (with blueprints).—R. TUPPEN, 122 Old Farm Avenue, Sidcup, Kent.

. . . the issues of P.W. covering the conversion of the No. 19 Set (May and June 1958).—D. L. HUGHES, Mountain Air, Began Road, St. Mellons, Nr. Cardiff.

. . . copies of P.W. for April, May and June 1961, dealing with the P.W. Signal Generator. All postage costs paid.—N. HURST, 7 Marston Road, Silversands Caravan Park, Lossiemouth, Morayshire, Scotland.

. . . the April 1963 issue of P.W.—A. WILLIAMS, 24a Gwyddon Road, Abercarn, Newport, Monmouthshire.

. . . information concerning the frequency ranges, crystal frequency, power supplies, etc., and any other information on the W191A Wavemeter.—W. BOURKE, 33 Victoria Street, Rutherglen, Lanarkshire, Scotland.

. . . manual or any information on the USA Valve Tester/Multi-range Meter, Model No. 774/4, 774/5, or 744/4.—R. HICKLIN, 13 Clive Road, Heath Park, Romford, Essex.

Cabinet Care

—continued from page 354

quicker and easier to remove it and refasten after cleaning. Always use a quick-drying cement, fasten one edge, allow to dry, then stretch to shape.

The deeper scratch may be filled, as with shellac filling of woodwork, but this time a weld is necessary to make the filler hold. If the filler is a piece of similar plastic, this can be chipped to a fine powder, then pressed into the crack, moistening the inner edges of the crack with carbon-tetrachloride—(CTC) which is the basis of most switch cleaners and a solvent for many plastics.

Great care must be taken not to allow the CTC to drip on the exposed surface of the plastic, and the filling should be such that it can be polished down to the normal surface. A break can be treated in a similar way, the raw edges of the crack being brushed with CTC and the parts held together until the solvent evaporates.

End Fed Aerials

—continued from page 343

satisfactory. Tinned copper wire is more easily tapped than enamelled wire.

Capacitor C1 should be wide spaced, and equipped with an insulated extension spindle. It can be 100pF to 200pF. Spacing equal to that of the p.a. anode capacitor (C1, Fig. 5) is usually sufficient. For the h.f. bands, fewer turns are needed, so the capacitor is tapped equal amounts towards the centre of the coil, by transferring clips from A-A to B-B, etc., or by using a double pole rotary switch.

L2 is three turns, adequately insulated, and overwound on the centre of L1. This number of turns should generally do for 3.5–28Mc/s, but if the 3.5Mc/s band is not worked, two turns may be used instead. A convenient length of 75 Ω or similar co-ax goes from L2 to the transmitter pi output (C2 in Fig. 5).

When the aerial is of such a length that it is near a $\frac{1}{2}$ -wave, or multiple of $\frac{1}{4}$ -waves, on all bands, it may be connected directly to point C. It

This is by no means a perfect joint, and can hardly be expected to take great strain, but gentle care will often save the cost of a new—and expensive—cabinet.

Worn Screws

Worn screw threads when self-tapping screws have been removed and re-inserted too often can give a lot of trouble. The common mistake is to use a larger screw. This is no good—the hole must be exactly drilled to clearance first, or the plastic will crack. A better way is to make a plug of sleeving, to fit the hole easily and take up the slackness of the screw.

Use p.v.c. sleeving, and slit it along its length, so that the screw can get a good start and as it tightens it will press the p.v.c. to the walls of the hole and ensure a good fit. See Fig. 3.

Special plastic cements are available, for different kinds of material, but a good general purpose contact adhesive is often as effective for both wood and plastic breakages, where no strain has to be placed on the mended parts. ■

is then only necessary to change the taps A-A, when changing bands.

If the aerial impedance is low on some bands (due to its length) the aerial should be tapped down the coil. This is most easily done by moving the aerial tapping a turn at a time away from the centre, until sufficient transmitter loading is obtained. If possible, an aerial length that is fairly high impedance on all bands is recommended.

If the tuner is in circuit for both transmitting and receiving, C1 may be adjusted for maximum signal strength on the receiver. If the receiver aerial input impedance is low, and the aerial impedance high, an actual increase in signal strength will be obtained.

Loading of the transmitter is accomplished as previously described, but as the transmitter is working into the low impedance of L2, C2 will need to be at relatively high capacity for the l.f. bands. If a standing-wave indicator is used, it should be included between transmitter and L2, and tuning is adjusted for minimum reflected power. When an r.f. meter is favoured, it should be included in the aerial lead, *not* in the lead from transmitter to tuner. ■

ADVERTISEMENT

Sinclair

NEWS

No. 4

JULY/AUGUST 1964

A CHANCE FOR PHOTOGRAPHERS

Completely built Micro-6 sets are a rarity at head office which is why a couple of our secretaries slipped into the test room to listen for themselves and got caught in the act by the works manager who had his camera handy. If you have any amusing or interesting pictures of the Micro-6 in use, let us see them. 3 gns. will be paid for each one published. Brief details should accompany each print sent. Unused photos will be returned to readers.



DESIGNS WITH A PEDIGREE

It is but little more than a year ago that the name Sinclair Radionics appeared to the public for the first time, offering entirely new concepts in micro-radio receiver design. The impact was fantastic. There had never been anything like it before. Various other designs were introduced, leading up to the world's smallest radio, the Micro-6 and then the TR 750 Power Amplifier. Today, Sinclair is the best known and most quoted name in anything to do with transistor designs for constructors.

There are two simple, but exclusive principles behind this triumph—firstly the extraordinary efficiency of Sinclair Micro Alloy Transistors (Golden MATs). These make possible standards of performance far ahead of anything the public can obtain from other transistors. Secondly, there are the designs themselves. These come from a team accustomed to working to very high standards in transistorised electronics, for this group is but part of Sinclair Radionics Ltd. who are in fact industrial electronic consultants!

So we are well used to solving problems and every design we produce for you is exhaustively tested long before being advertised. That is why Sinclair Micro Transistor Designs have completely captured the imagination and enthusiasm of constructors everywhere. They have never had the chance to build to these professional levels in the transistor field before,

to say nothing of the pleasure and satisfaction to be obtained from their wonderful performance.

There are other intriguingly efficient designs using MATs which are well worth trying. These will be found in three books advertised on the following pages. In the meantime we learn that a number of constructors wearing Micro-6 receivers on their wrists, on being asked the time have replied with a somewhat far away look, "Half past Housewives' Choice" or words to that effect. Why not? The Micro-6 on its "Transista" Strap is setting a new and original fashion in listening.

THE WAY TO LUXEMBOURG

It is interesting to note that having applied band-spread to higher frequency end of the Medium wave band to make it easier to tune in Luxembourg, other manufacturers are now doing the same thing—but no other set compares in size with the Micro-6.

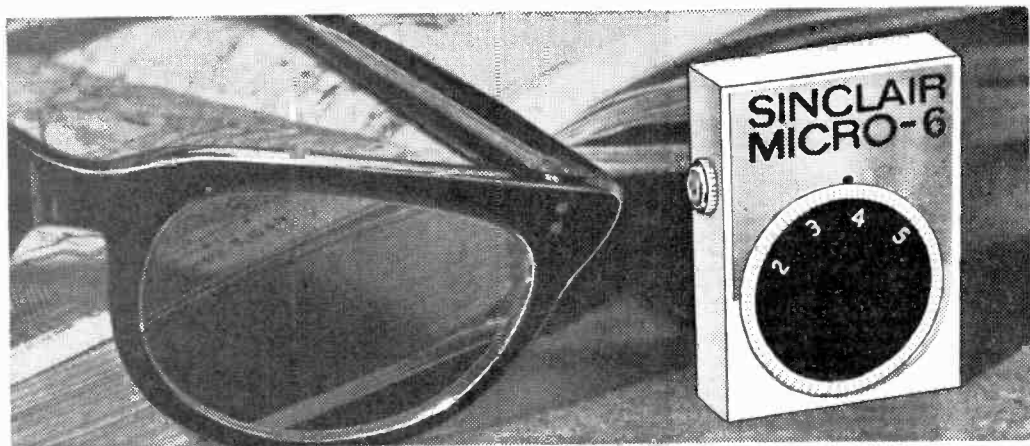
BRINGS IN PIRATES!

We receive enthusiastic letters from Micro-6 builders with such regularity that we could be forgiven for taking them as a matter of course. But a new note begins to appear in our correspondence. T.F.C., Windsor, among many, reports excellent reception from "Caroline" and "Atlanta" anchored in the North Sea, whilst it is interesting to note that J.M., Bromley, Kent, listens nostalgically to Athlone at the other end of the scale.



Micro-

THE WORLD'S SMALLEST AND MOST EFFICIENT



SINCLAIR MICRO-6 THE WORLD'S SMALLEST RADIO

SIZE $1\frac{1}{8}" \times 1\frac{3}{10}" \times \frac{1}{2}"$

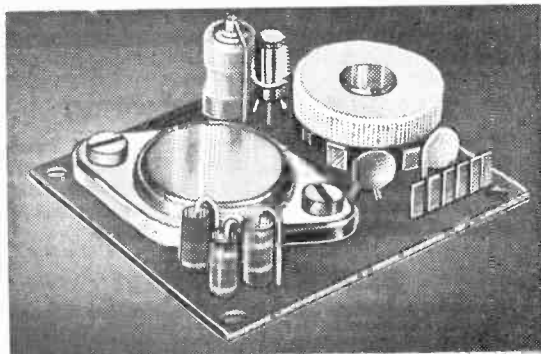
COVERS M.W. BAND

WEIGHS LESS THAN
1 OUNCE COMPLETE
with SELF-CONTAINED
BATTERIES and AERIAL

When you have built this wonderful set, you will find it your constant companion everywhere—indoors and out—in car, bus, train—wherever you want to listen. Its power is such that it ensures good reception under the severest operating conditions, yet it is so small you can wear your Micro-6 like a wrist-watch! Tuning covers the entire medium waveband with bandspread over the higher frequency end to ensure better separation of Luxembourg, Continental and other stations. Listening is by means of the lightweight high quality earpiece provided (except when you want to use the set with the TR750 and a loudspeaker). The earpiece switches on when plugging in. **THE SET IS SO WELL DESIGNED AND THE INSTRUCTIONS SO CLEAR THAT ANYONE CAN BUILD THE MICRO-6 AND HAVE IT WORKING IN A SINGLE EVENING.** All parts including earpiece and instructions come to:

Mallory Mercury Cell Type ZM.312 (2 required)—1/11d each.

59/6



SINCLAIR TR750 POWER AMPLIFIER MAKES A CAR RADIO OF YOUR MICRO-6

This outstandingly successful power amplifier builds on to a printed circuit board 2×2 in. and includes its own volume control with on-off switch. The TR750 is primarily intended to provide powerful loudspeaker reproduction from the Sinclair Micro-6 or Slimline receivers, to enable owners of these sets to use them also for car radios, loudspeaker portables or domestic radios. Amongst many other useful applications, the TR750 makes an excellent record reproducer used singly for mono or paired for stereo. Frequency response ± 1 dB from 30 to 20,000 c/s. Transformerless output of 750 milliwatts for 10mV input into 2 K ohms, using standard 25-35 ohm speakers. Operates from 9-12 volt supply.

All parts inc. MAT and Magnagain Transistors and instructions come to

39/6

Ready built for immediate use

45/-

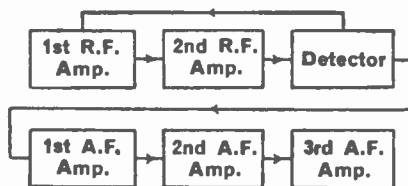
Supplied with plug for connecting to Micro-6 and Slimline.

SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE. Phone: 53965

Masterpieces

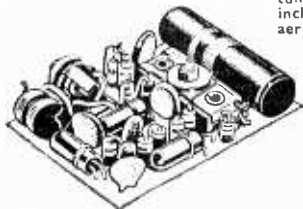
TRANSISTORISED CONSTRUCTIONAL DESIGNS

A.G.C.



6-STAGE POWER AND SELECTIVITY

The Micro-6 uses Micro-Alloy Transistors in a completely new circuit as follows:—Two stages of R.F. amplification are followed by an efficient double-diode detector which drives a high-gain 3-stage A.F. amplifier. Powerful A.G.C. applied to the first R.F. stage ensures fade-free reception from the most distant stations tuned in. Everything including ferrite-rod aerial and batteries is contained within the elegant tiny case.

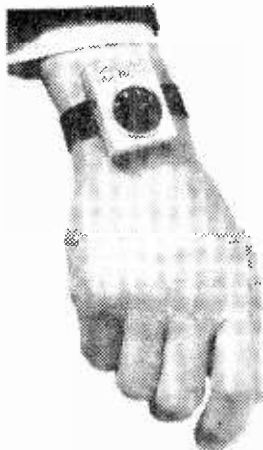


CHASSIS
SIZE ONLY
1.2 x 1.65in.

**Wear it like
a wrist watch**

A very convenient way to use the Micro-6. Simply slide the set on to the "Transistor" wrist strap, to which it is securely held by means of the special mounting. The strap is well made in black or grey nylon and costs.....

7/6



SINCLAIR GOLDEN MAT TRANSISTORS

As specified for Micro-6, TR750, etc., etc. give extremely high power gains and greatly improve performance of any R.F. or A.F. circuit.

MAT 100	High gain low level..	7/9
MAT 101	Extra high gain, low level..	8/6
MAT 120	High gain, medium and high level..	7/9
MAT 121	Extra high gain, medium and high level..	8/6
ADT 140	For F.M., T.V., V.H.F. and U.H.F. 16/-	

SINCLAIR 'MAGNAGAIN' A sensational new power transistor

Gives phenomenal performance. Maximum dissipation obtainable up to 39 watts! Gain greater than 150 at 1 amp and at least equal to 100 at 5 amperes. As used in TR750, better than any other available.



18/-

THE WORLD'S SMALLEST BATTERIES

Mallory ZM312 (or RM312) Mercury cell as used in Micro-6. Every experimenter should use them! In packs of six. Special Offer.

10/6

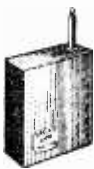


Full service facilities always available to Sinclair customers

SINCLAIR INJECTOR

The Smallest and most efficient of all

Using two MAT8 it generates and injects a test signal into any part of equipment at any frequency from 1 kc/s to 30 Mc/s to locate faults rapidly.



**EASY TO BUILD
EASY TO USE**
Plans and instructions come to

27/6

Ready Built 32/6

MAKE A FM TRANSMITTER



Sinclair
Micro-Amp

This is one of the things you can do with this fantastic Sinclair amplifier as described in the instructions. It is smaller than a 3d. piece! Frequency response 30 to 30,000 c/s ± 1 dB, power gain 40dB (1,000,000 times)—also makes a superb broadband R.F. amplifier, or a subminiature hi-fi amplifier with an output suitable for any earpiece or even loudspeaker. With MAT transistors, instructions and parts.

28/6

THIS VEST-POCKET RADIO IS EXTRA EASY TO BUILD

The Sinclair Mini-line is ideal for newcomers to set building keen to get their hand in. It has self-contained ferrite rod aerial and takes standard PP5 battery, yet measures only 2 1/2" x 1 1/2" x 1 1/2". Times over the medium waveband. Great power and quality. Building is particularly easy. All parts, including rapid blue and gold case, earpiece and instructions come to

49/6



3 IMPORTANT BOOKS FOR CONSTRUCTORS

GENERAL
"22 Tested Circuits Using Micro Alloy Transistors." Post free 5/6

SHORT WAVES
"Tested Short Wave Receivers Using MATs." Post free 5/6

R.W. & COMMUNICATIONS
"Tested Superhet Circuits for Short Wave and Communication Receivers, using MATs." All three ordered together 16/6. Post free

UNIQUE SINCLAIR GUARANTEE

If you are not completely satisfied with your purchase (we are confident that you will be delighted), your full purchase price will be refunded instantly and without question.

If you do not wish to cut out coupon below, please mention P.W.S. when ordering.

TO SINCLAIR RADIONICS LTD., 69 HISTON ROAD, CAMBRIDGE

Please send items detailed below

£ s d

NAME

ADDRESS

TOTAL £

BLOCK LETTERS

P.W.S.

For which I enclose cash/cheque/money order

RECEIVERS & COMPONENTS

TRANSISTORS! Give-away price. NKT124/5 Power Type. 6 for 10/-, 2SO17 4W. up to 60mc/s. 5/- each. Post free. G. F. MILWARD, 17 Peel Close, Drayton Bassett, Staffs.

RESISTORS! You can't resist this! 1W, 1W, 2W Polythene wrapped on cards of 10. Mixed values and wattages. £2/10/- per 1,000. Your selection 10/- per 100. G. F. MILWARD, 17 Peel Close, Drayton Bassett, Staffs.

"HEATHKITS" can now be seen in London and purchased on easy terms. Free brochure. DIRECT TV REPLACEMENTS LTD., Dept. PW7 9, 126 Hamilton Road, West Norwood. S.E.27. GIPsy Hill 6166.

TUBES—FAMOUS MAKES!

MW43/69, AW43/80, MW36/24, AW43/88 etc. Fully screened, aluminised, 100% new (except glass). Mostly £4.15s. (12/6 cge.). **LISTS. One Year's Guarantee Card.** We do NOT sell regunned only tubes. Also **NEW VALVES, 12 months guarantee!** P. BEARMAN, 43 Leicester Road, New Barnet, Herts. Tel.: BAR 1934.

SPEAKER REPAIRS, cones fitted. Satisfaction guaranteed. L. S. REPAIRS, Pluckley, Ashford, Kent.

TRANSISTORS now half price, unmarked but tested packets of 16, unmarked untested packets of 40; duds suitable as diodes, packets of 80. All packets 10/- each, postage 1/-, Four packets post free C.W.O. K. R. WHISTON (Dept PWT), New Mills, Stockport.

SPECIAL PURCHASE

of
"NOMBREX"
TEST EQUIPMENT

Signal Generators Model 27
FULLY TRANSISTORISED
Ranges 150 Kc/s to 350 Mc/s
LIST PRICE £9.10.0,
OUR PRICE £8.8.0

C.R. Bridge Model 62
FULLY TRANSISTORISED
OUR PRICE £7.17.6
Ranges: 1 ohm-10K ohms
100 ohms-1 Megohms
10K ohms-100 ..
LISTED PRICE £8.5.0

Audio Generators
FULLY TRANSISTORISED
OUR PRICE £15.15.0
Ranges 10-100,000 cycles in four multipliers.
LISTED PRICE £16.15.0
Further Particulars and Lists,
Send S.A.E. to:—

DIAMOND (Mail Order) PRODUCTS
(Dept. PT) MBC/DIA
LONDON, W.C.1

RATES: 7/3 per line or part thereof, average five words to line, minimum 2 lines. Box No. 1/- extra. Advertisements must be prepaid and addressed to: Advertisement Manager, "Practical Wireless", Tower House, Southampton St., London W.C.2.

RECEIVERS & COMPONENTS
(continued)

A.1. POST FREE BARGAINS. Guaranteed set tested valves. AF80, EB91, 10F1, 9d. each, 3 for 1/6. L36, ECL80, 2/- each, PY31, PZ30, 3/6. PY80, PY82, 3/3. ECC81, ECC82, 3/6. PL82 3/9, B36, PCF80, PL83, 20P1, 4/-, EBF80, N37, 4.3. PL33, 4/6. PL81, 4/9. 30P5, 6/-, 53KU 6/6, 185BT 7/-. Send for full list of cheap valves. A.1. RADIO COMPONENTS, 14 The Borough, Canterbury, Kent.

THE FINEST and cheapest mail-order service in Britain now supplies everything Electronic/Electrical. S.A.E. brings details of genuine bargain offers. HANDLEY, 112 Baysham St., Hereford.

R & R RADIO & T V SERVICE

Dept. P.W.
44 MARKET STREET, BACUP
Telephone 465

SALVAGE VALVES		Tested before dispatch.	
6F13 4/6	10P14 5/-	PL82 3/6	20P4 6/6
6L18 4/6	20P5 6/6	10B1 7/6	30P16 5/-
EF80 1/6	30P4 7/-	10F1 1/6	PCF84 4/-
ECC82 3/6	6F15 5/-	20P2 5/6	PL13 5/-
PL180 3/6	EB91 1/-	3PL1 5/-	PY81 3/6
30P5 5/-	EP85 5/-	PY32 8/-	10P1 5/6
PL18 6/-	ECC83 3/-	6L46T 5/-	10P1 5/6
PCF80 4/-	20P3 6/-	6F1 2/6	20P1 2/-
PL81 5/-	30P11 4/-	ECC81 3/-	30P12 5/-
PZ30 5/-	PL36 6/-	EB86 4/-	PY82 5/-
U229 5/-	PL182 5/-		

Speakers, Ex-TV. 5in. round, 6 x 4in., 3/6; 5in. round, 8/-; post 2/-.
Line Output Transformers available. State set model No.

Turret Tuners 8/-; post 2/-.
Scan Coils etc. Quote set model No. with all enquiries and S.A.E. for prompt reply. All goods subject to satisfaction of money refunded.

DIRECT TV REPLACEMENTS LTD., largest stockists of TV Components in the UK. Line Output Transformers, Frame Output Transformers, Deflector Coils for most makes. Official sole suppliers for many set makers. Same Day Dispatch Service. Terms C.O.D. or C.W.O. Send S.A.E. For quotes. Day and Night Telephone GIPsy Hill 6166, 126 Hamilton Road, West Norwood. S.E.27.



POWER UNITS. For 200 250volt A.C. mains Outputs, 250 volts D.C., 100 M.A., 6.3 volts A.C., 4 amps Double choke and paper capacitor smoothing. Fully fused. Size 19in. rack panel x 7in. x 10 1/2in. deep, complete with dust cover. Suitable for R1392, P104 and R1132 receivers. In good condition. £2/5/-. Carriage 10/-. Useful Two Metre Unit, Transceiver SCR522, 100 to 150mc/s. crystal controlled (no crystals). Receiver section valves, 3 of 12SG7, 12C8, 12AH7, 12J5, 3 of 9003, 9002, 12H6. Transmitter valves, 6SS7, 3 of 12A6, 6G6, 2 of 832. Very useful modulation and driver transformers for push pull 12A6 (or 6V6). Price only 50/- with all valves. No attachments.



FOR SALE

HAMMER FINISH PAINT. The modern finish for all electronic equipment. (Not crackle finish). Just brush it on, no stirring, the effect appears at once and dries in 20 minutes. Blue or pewter 2lbz. tins 3/6, 1 pint 7/6, 1 pint 15/-. From radio & model shops or post free from us. Trade supplied. FINNIGAN SPECIALITY PAINTS, (pw1, 5 Stanley Sq., Stalybridge, Ches.

SURPLUS SWITCHES. Capacitors Valves, Transistors, Transformers etc. New, very cheap. S.A.E. list. Rosedene, Eversholt, Bletchley.

MORSE MADE EASY!

The famous RHYTHM RECORDED COURSE cuts the practice time down to an absolute minimum!
One student, aged 20, took only 13 DAYS and another aged 71, took 6 WEEKS to obtain a G.P.O. pass certificate. If you wish to read Morse easily and naturally enclose 6d. in stamps please for full explanatory booklet.

To G3CHS, 45 GREEN LAKE, PURLEY, SURREY

5-TON FACTORY CLEARANCE. Radio, TV, Electrical Components, in mixed parcels. Example: 28lb. mixed parcel £1, pp 5/-. Speakers, grilles, valves, bases, i.f.s., covers, condensers etc. Hundred other items. S.A.E. List and Postal Orders to P. NEWTON, 16 Shalcross Crescent, Hatfield, Herts.

SALE. Ex Ministry Ground Radar Unit, new and unused. Cost £2,000 when built. Weight 5 cwt. Offers. E. M. MARRINER, 27 Hurworth Rd., Croft, Darlington.

TESTED TRANSISTORS

1/- each, Red or White Spots.

2/- each, XA101, XA102, XB103, XB104, OA90, OC430.

3/- each, OC44, OC45, OC70, OC71, OC81, OC81D, OC200, GET16.

4/- each, AF114, AF115, AF117, OC170, OC171.

5/- each, OC72, OC139NPN, OC800, OC204, ORP60, BY100.

10/- each, OC35, OC26, GET571.

ZENER DIODES 4.7 v. to 33 volt 1/4 watt, 3/6 each. 1.5 watt, 5/- each, 7 watt, 6/- each.

Send 3d. stamp for Full Price List, and Free Equivalent Chart.

B. W. CURSONS

78 BROAD STREET
CANTERBURY, KENT

SUPER BREAKDOWN UNIT

Remote Control Unit Type F. New in sealed cartons, containing P.O. Relay 2,000 ohms Resistance, 100 volt Plessey Hand Generator, Telephone Ringing Bell A.C. 8 amp Morse Key on base, 2 D.P. D.T. Key Switches, Double Phone Jack, moulded, 5 position 6 pole Yaxley Switch, Induction Coil tapped 1-17-33 ohms, 7 Brass Screw Terminals on panels, plus Resistors, Condensers, Pointer Knobs. All in a handy metal box with hinged lid and side fasteners. Also web carry strap. Size 10 1/2 in. x 7 in., 2 1/2 in., post free. Or items may be purchased separately. Relay 5/-, Hand Generator 7/6, Bell 5/-, Morse Key 4/6, Key Switches 5/6, pair, Double Phone Jack 2/6, Yaxley Switch 2/6, Ind Coil 2/6, Terminals 7 for 2/6, all post free.

Also available Key Switches. 4 pole 2 throw 3/6 each or 3 position D.P. plus D.P. centre off 5/- or rotary switch 6 pole 3 way 3/6.

Bank of 4 Pye Sockets with plugs and leads 5/- set. Ever Ready Batteries, 90 volts plus 4 1/2 volts 4/6 each. Plessey 2-4-12-25 way plugs and sockets, all 5/- pair.

Jones Plugs and Sockets 4-12-18-24-32 way all 5/- pair.

Special Lightweight 7 in. x 4 in., 3 ohm P.M. Speaker, 6/-.

Metal Frames, suitable for stock, Job Cards, Bins, Crates, 2 1/2 in. x 5 in., 12/6 per 100—£4 per 1,000.

19 in. RACK FITTING CABINET 34" high by 21" deep with telescopic drawer slides. Louvred sides, back and top. Brand new Swedish make. £4.00 only, plus B.R.S. delivery.

ECR Tube with Screen and Base with ECR 35 data. 25/-.

SUP7 Tube with Screen and Base, with data, 30/-.

20ft. Steel Telescopic Mast, 50/-.

ELECTRICAL CAMERA CONTROL

This item is brand new in varnished wood case original packing. Makes a good timer for exposure. Infinitely variable up to one minute. 24 volt operation. Containing motor, solenoid, clockwork mechanism. Driven by motor. 30/- post free.

Copper Laminate Board, single or double sided, 5/- per square foot panels, either type 3ft. by 4ft., 33/-.

High Stab Resistors. 5% 6d., 2% 8d., 1% 1/-, Every six packed in 7-compartment linen finish component box. Unmarked.

Speakers. 3 ohm P.M. 5in. 5/-, 6in. 6/-, 7 x 4in. 7/-, 8in. 8/-, 10in. 12/6.

U.K. ONLY

E. R. NICHOLLS

Mail Order and Retail Shop:

46 LOWFIELD ROAD

off SHAW HEATH, STOCKPORT
CHESHIRE

FOR SALE (continued)

240WATT ELECTRIC POWER ANYWHERE
ANYTIME from 12V CAR BATTERY
THE AMERICAN DYNAMOTOR UNIT
Input 12v. output 240/240v. at 150 to 220 watts
Perfect for television, power 1000s and all
universal AC/DC electrical equipment, plus
wonderful results. Price only £8.00 + postage.
Send stamped envelope for full illustration details
W. SCIENTIFIC PRODUCTS, CLEVELAND, OHIO

CONDENSER BARGAIN! Miniature paper condensers. 1in. x 1in. Ideal for transistor sets. .0001, .001, .002, .005, .02, .04uf. Your choice. 7 6d. per 100 or £3 per 1,000. G. F. MILWARD, 17 Peel Close, Drayton Bassett, Staffs.

ALBATROSS ENG., CO.

NEW COMPONENTS & TOOL BARGAINS
15 Redstors * 15 Spring * 4 Knobs * 12 Clamps
6 Tag Strips * 3 Valve Holders * 7 Coil Formers
30ft. Sliding * 120 min. Resistor * 20ft. Preset
potentiometer * 30 Self Tap Screws * 100 Sleeves and Trim-
pins * 250 sq.in. Alumn. Screen * 100 sq.in. Insulating
Card * 24 sq.in. Felt Tape * 12 1/8 dia. * 20
Mounted Tape * 1/8 in. (P. & P. 6d.) or Lot 12/6 (2/5)
to Ceramic Condensers * 30 Condenser Clips, etc.
16 Socket Panels * 6 Coils * 3 Pots * 6 RP Chokes
3 2 a. 2 p. sw Sockets * 8 wafer sw., add-ons & blanks.
6 Trimmers * Gram mounting Kit * 1 wave rectifier
Twin Ion Trap * 10 S.E. Lampholders * 8 Impedance
Matching Panels * 4 Printed cts * 12 Anti-vibration
Mounts * 8/6 each (1/- P. & P.) or Lot 7/6 (3/6).
6 Main Droppers * 15 Sub-min. & Stamp Trimmers
6 Electrolytics * 7 Block Papers * 15 Metalpacks
30 Mica Conds. * 40 Ceramic * 24 Krait Feet
3 Slider Switches * 150 Pot. Washers * 20 Fuse
Holders etc. * 12 Bulbs * 10 HD Carbon Brushes
40 Socket Panels * 5/- each pack (plus 1/6 P. & P.).
EX GOVERNMENT EQUIPMENT (Mint Condition)
Pocket Voltmeter 0-150-0-500v. 9/6 (1/6). 4 Valve
Modulators 11/6 (2/3). AC/DC TV Pils. 11/- (1/3).
No. 19 Twin Control Units, 5/- (2/3). 7 New TV Pots
on Strip 7/6 (1/-). Dimmer Switches. 7/6 (6d.).
Modulator Unit No. 4. £16. Modulator Unit No. 28.
411. Pulse Generator No. 19. 28. Test Set Mic. &
Receiver No. 4. £27. New Radio Chassis. 7/6 (2/6).
Ditto Larger. 12/6 (3/-). 0-40 R.F.M. Meters. 88/-
(2/-). Voltmeter (Webbing) Cases. 1/6 (6d.). Large
Pots. Insulators Overhead 2/6 pair (1/-). 6V 6P
Vibrators. 6/6 (1/-).
Bargain Parcels:—Our selection of New Misc.
Components including above types: 1lb.—4/-, 2lb.—
7/-, 3lb.—10/-, 4lb.—12/6, 6lb.—14/6, 8lb.—16/-,
10lb.—18/6, 16lb.—20/- (Plus P. & P.).
Radar Equipment to callers—Catalogue 1/—come
and have a look round.
Tools:—5 in 1 Screwdriver Set, 6/11. 2 Flex-shaft
Screwdrivers, 8/11. 3-way Phillips Screwdrivers, 5/6.
7in. Pliers, 6/8. Insulated Pliers, 7/6. Wire Stripper
& Cutter, 2/6. 11 piece Socket Set, 9/6. 7 piece Nut-
Driver Set, 8/11. Rubber Hammer, 14/-, Panel
Beating Hammers, 12/11. Small, 8/11. 9in. Hack-
saw Blades, 4d. Finishing Trowels, 10/6 & 12/6.
Grooving Trowel, 5/11. Pointing Trowel, 6in., 2/6.
(Add 2/6 P. & P. on all Orders over 2/-)

ALBATROSS ENGINEERING COMPANY

Dept. P.W.48 78-80 HIGH STREET, OGBERTON
SPALDING, Lincs. Tel. Gorberton 458

WANTED

A PROMPT CASH OFFER for your surplus brand new Valves and Transistors. R.H.S., Beverley House, Mannville Terrace, Bradford 7.

WANTED VALVES ONLY

Must be new and boxed
Payment by return.

WILLIAM CARVIS LTD.

103 North Street, Leeds 7

WANTED (continued)

WE BUY new valves for cash, large or small quantities, old types or the latest. Send details, quotations by return. **WALTONS WIRELESS STORES**, 15, Church St., Wolverhampton.

WE BUY new Valves and Transistors Amplifiers. Short-wave Receivers and Components, etc. **A.D.A. MANUFACTURING CO.**, 116 Alfreton Road, Nottingham.

NEW VALVES WANTED

Any type, or quantity

CASH PAID

R.S.T. Valve Mail Order Co.

211A Streatham Road

Mitcham, Surrey

Telephone: MITCHAM 6202

MISCELLANEOUS

YOUR KITS expertly built. Mains & Battery Radios, etc. of every description. Enquiries — **S.A.E. to JOHN THOMAS**, 106 North Avenue, Ruabon, near Wrexham.

CONVERT ANY TV SET into an oscilloscope. Instructions and diagrams 12/6. **REDMOND**, 26 St John's Road, Hove, Sussex.

ELECTRONIC MUSIC?

Then how about making yourself an electric organ? Constructional data available—full circuits, drawings and notes! It has 5 octaves, 2 manuals and pedals with 24 stops—uses 41 valves. With its variable attack you can play Classics and Swine.

Write NOW for free leaflet and further details to **C. & S. 20 Maude Street, Darlington, Durham**. Send 2d. stamp.

LAMINATED PLASTIC engraved nameplates for your P.W. Guitar Amplifier Control Panel. 15/6 Post Paid. Engravings to your specification. Enquiries **S.A.E. HOLDEN**, 20 Maesgwyn, Cwmbran, Monmouthshire

ALUMINIUM

Sheet for Radio Chassis and general use. Cut to size. Also Brass, Copper, Steel, etc. in Sheets, Tubes, Rods, Fills, Sections, etc. Write for **FREE ILLUSTRATED PRICE LIST**. Callers welcome.

SENMOR METALS, Dept. R/6
35 St. Johns Road, Isleworth, Middx.
ISL: 6017

SOUND RECORDING

A UNIQUE BUY! Recording Tape, top brand, 5 1/2 in. 1,200ft., 18/6; 7 in., 2,400ft., D.P., 28/6. P. and P. 1/6 per spool. Bargains in all sizes. **S.A.E.** for list. **E. C. KINGSLEY AND CO.**, 132 Tottenham Court Road, London. W. 1. EUSTON 6509

SERVICE SHEETS

SERVICE SHEETS for all makes of Radio and TV. 1925-1964. Prices from 1/- with free fault-finding guide. S.A.E. inquiries. Catalogue of 6,000 models, 1/6. Valves, modern and obsolete. Radio TV Books. S.A.E. lists. HAMILTON RADIO. Western Road, St. Leonards, Sussex.

SERVICE SHEETS. Radio and Television. 3/6, post paid. VEST AND EMERY, 17 Hallgarth St., Durham.

SERVICE SHEETS: Radio, TV, 5,000 models. List 1/-. S.A.E. inquiries. TELRAY, 11 Maudland Bank, Preston.

SERVICE SHEETS: Radio and TV 4/- each, 1964 list now available. 1/6. All orders dispatched on day received. Also Manuals for sale and hire. List 1/-. S.A.E. please. SULTAN RADIO, 29 Church Road, Tunbridge Wells, Kent.

S.E.S. SERVICE SHEETS for all TV. Radio and Tape Recorders, etc. List 1/6 plus S.A.E. SUN ELECTRICAL SERVICES, 38 St. George's Road, Hastings, Sussex.

RADIO SERVICE SHEETS, 3/6 each. S.A.E. and P.O. to HANDLEY, Bastian Mews, Hereford.

WANTED — Service Sheets and Manuals. No quantity too large, highest prices paid. SULTAN RADIO, 29 Church Road, Tunbridge Wells, Kent.

SERVICE SHEETS, also current and obsolete Valves for sale. JOHN GILBERT TELEVISION, 1b Shepherd's Bush Road, London. W.12. Phone: SHE 8441.

SERVICE SHEETS

4/- ea., plus postage.

We have the largest display of Service Sheets for all makes and types of Radios, Televisions, Tape Recorders, etc., in the country, and can supply by return of post.

To obtain the Service Sheet you require, please complete the attached coupon:

From:

Name: _____

Address: _____

To: S.P. DISTRIBUTORS

44 Old Bond St., London, W.1
Please supply Service Sheets for the following:

Make: _____

Model No.: _____ Radio/TV

Make: _____

Model No.: _____ Radio/TV

Make: _____

Model No.: _____ Radio/TV

I also require list of Service Sheets at 1/6.

I also require list of Manuals at 1/-.
(please delete items not applicable)

I enclose remittance of _____

MAIL ORDERS ONLY

EDUCATIONAL

RADIO OFFICERS see the world. Seagoing and shore appointments. Our many recent successes provide additional trainee vacancies during 1964-65. Day and Boarding Students. Grants and scholarships available. Stamp for Prospectus. WIRELESS COLLEGE, Colwyn Bay.

BECOME "TECHNICALLY QUALIFIED" in your spare time. Guaranteed Diploma and Exam. Home-study Courses in Radio, TV Servicing and Maintenance. R.T.E.B., City and Guilds, etc. Highly informative 120-page Guide—FREE. CHAMBERS COLLEGE (Dept. 363), 148 Holborn, London, E.C.1.

TRAIN FOR SUCCESS
WITH ICS

Study at home for a progressive post in Radio, TV and Electronics. Expert tuition for I.E.R.E., City & Guilds (Telecoms and Radio Amateurs), R.T.E.B., etc. Many unique diploma courses incl. Colour TV, Electronics, Telemetry & Computers. Also self-build kit courses—valve and transistor. Write for FREE prospectus and find out how ICS can help you in your career.
ICS, DEPT. 541, PARKGATE ROAD, LONDON, S.W.11.

THE INCORPORATED PRACTITIONERS in Radio and Electronics (I.P.R.E. Ltd.). Membership Condition booklet 1/-. Sample copy of I.P.R.E. Official Journal 2/- post free. Dept. B Secretary, 32 Kidmore Road, Caversham, Reading, Berks.

BOOKS & PUBLICATIONS

FIND TV SET TROUBLES IN MINUTES from the great book. The Principles of TV Receiver Servicing. 10/6 all book houses and radio wholesalers. If not in stock from Dept. B Secretary, 32 Kidmore Road, Caversham, Reading, Berks.

SITUATIONS VACANT

TV AND RADIO. A.M.I.Brit.I.R.E., City and Guilds, R.T.E.B., Cert., etc., on "no pass—no fee" terms. Over 95% successes. For details of exams. and courses (including practical apparatus) in all branches of Radio, TV and Electronics, write for 148-page handbook—free. B.I.E.T. (Dept. 242G), 29 Wright's Lane, London, W.8.

ENGINEERS REQUIRED

Experienced in audio techniques and relay circuitry, for work on public address systems.

Write, giving details to:
CLARKE & SMITH MFG. CO. LTD.,
Special Products Division,
Hanworth Air Park,
Feltham, Middlesex.

SITUATIONS VACANT

(continued)

I.E.R.E. CITY AND GUILDS and R.T.E.B. exams. Specialised I.C.S. home-study course will ensure success. For details of wide range of exam. and diploma courses in Radio, TV and Electronics, also new practical courses with kits, write to I.C.S. (Dept. 542), Parkgate Road, London, S.W.11.

RADIO AND TV exams and Courses by Britain's finest Home-study School. Coaching for Brit.I.R.E., City and Guilds, Amateur's Licence, R.T.E.B., P.M.G. Cert., etc. FREE brochure from BRITISH NATIONAL RADIO SCHOOL, Russell Street, Reading.

A.M.I.Mech.E., A.M.I.Brit.I.R.E., City and Guilds, G.C.E., etc., brings high pay and security. "No pass—no pay" terms. Over 95% successes. For details of exams and courses in all branches of Engineering, Building, Electronics, etc., write for 148-page handbook—free. B.I.E.T. (Dept. 242B), 29 Wright's Lane, London, W.8.

TECHNICIAN required for interesting post of technical storeman. The person appointed will be given the opportunity to assist in the design, construction and servicing of electronic and mechanical apparatus. Applicants should have a working knowledge of general workshop practice, be capable of neat work and would be expected to help in laying out apparatus for laboratory classes. Application forms from Secretary, University College, London. Gower Street, W.C.1. quoting Psycho/1.

ARE YOU INTERESTED IN
INSTRUMENTS OR ELECTRONICS
and their

APPLICATION TO AIRCRAFT?

The College of Aeronautics offers an opportunity for an enthusiastic young man to learn new techniques in flight test instrumentation. Tidiness, ability to handle delicate instruments and attention to detail are essential. The successful applicant will, after a probationary period of training, take charge of a small laboratory and be responsible for calibration and installation of flight test instruments in the College aircraft.

The post is established in a skilled grade in accordance with the N.J.C. scales for Civil Aviation.

Applications, giving full particulars, to

CHIEF CLERK

The College of Aeronautics,
Cranfield, Bletchley, Bucks.

METAL WORK

METAL WORK. All types cabinets, chassis, racks, etc., to your specifications. PHILPOTTS METAL WORKS LTD., Chapman St., Loughborough.

CABINETS • CASES
CHASSIS

Anything in metal. "One-offs" a pleasure. Send your drawing for quote. Stove enamelled in any professional finish.

MOSS, WATSON

40 Mount Pleasant Street, Oldham, Lancs. MAIN 9400

*Just
Out!*

COMPLETE FAMILY LAWYER

Your Rights fully explained

● IN BUSINESS

PATENTS • COPYRIGHT • TRADE UNIONS
EMPLOYMENT • SALE OF GOODS
PARTNERSHIP • STARTING A BUSINESS
INSURANCE • INVESTMENT • TAX
CONTRACTS • BANKRUPTCY

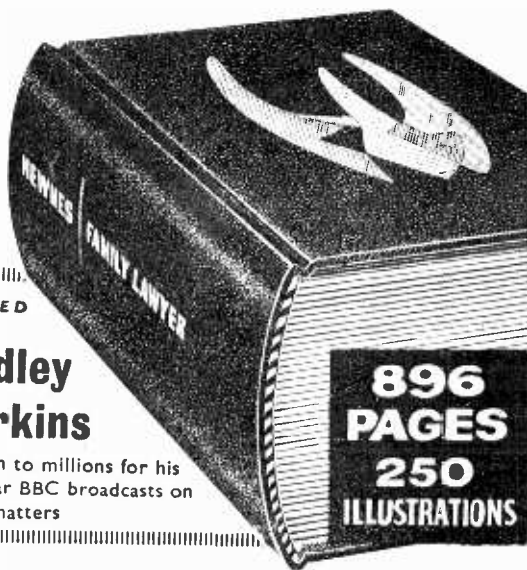
● IN PERSONAL AFFAIRS

BUYING AND SELLING • LEASES
ACCIDENTS • MARRIAGE • SEPARATION, DIVORCE • SLANDER • HP
AND CREDIT SALE • NEIGHBOURS
WILLS • FREE LEGAL AID

EDITED
BY

**Dudley
Perkins**

Known to millions for his
popular BBC broadcasts on
legal matters



STUDY IT FREE FOR 7 DAYS

Written in Everyday Language by
leading Barristers and Solicitors

Everything in Law—Land ownership. Leases. Tenancy Agreements. Repairs. Sub-letting. Rent-control. Parents and Children. Changing your name. Negligence. Blackmail. Misrepresentation. Pensions. IOUs. Libel. Slander. Damages. Town and Country Planning. Provocation. Trespass. Nuisance from noise. Factories Act. Cheques. Road Traffic Laws. Rights of a finder. Neighbours. Investments. Annuities. Insurances. Wills. Law on Clubs, Gaming, Lotteries. Fishing Laws. FREE LEGAL AID explained . . . And much more besides.

**HANDSOME DURABLE BINDING
WITH CONTEMPORARY DESIGN**

**THIS IS THE FIRST
ILLUSTRATED FAMILY LAWYER**

DUDLEY PERKINS clarifies points of law with 250 special illustrations—the modern way to explain simply! Send now and see this practical new Home Lawyer for a week without cost.

In this complex age of do's and don'ts, rules and regulations, laws and liabilities, the need for an understanding home legal guide is urgent. You know that ignorance of the law is no excuse—yet you are burdened by complicated language which only a legal mind can fathom! Here at last is the answer—Newnes FAMILY LAWYER which explains your rights and privileges *and liabilities* in all your personal, family and business affairs. It will save you annoyance and anxiety . . . and prevent you from taking risks. Study it free for a week without obligation to buy!

Post To-day

To: GEORGE NEWNES LTD., 15-17 LONG ACRE, LONDON, W.C.2

Please send NEWNES FAMILY LAWYER without obligation to purchase. I will return it in 8 days or send 5/- deposit 8 days after delivery, then ten monthly payments of 10/-, paying 105/- in all. Alternatively, in 8 days I will remit the full cash price of 105/-.

*If you are under 21 your father must fill up coupon.
If married woman your husband must fill up.*

Full name _____
(BLOCK LETTERS)

Address _____

Occupation _____

Signature _____
(Mr., Mrs., Miss)

Tick ✓ where applicable
The address on left is—

My Property	
Rented unfurnished	
Parents' Home	
Furnished Accom.	
Temporary Address	

(FL)39/717

TRANSISTORS

AC107	14/6	AF127	9/6	OC72	5/6
AD140	25/-	OAZ207	7/-	20C72	16/-
AF102	27/6	OC18W	35/-	OC74	8/-
AF114	11/-	OC18	25/-	OC75	5/6
AF115	10/6	OC35	12/-	OC81	5/6
AF116	10/-	OC42	6/-	OC81M	8/-
AF117	9/6	OC44	5/-	OC82	10/-
AF118	20/-	OC44M	9/6	OC83	4/-
AF124	10/-	OC45	5/-	OC139	8/-
AF125	10/6	OC70	6/6	OC170	9/6
AF126	10/-	OC71	4/3	OC171	10/6

DIODES

BY100	7/8	OA90	3/-	GEX34	4/-
OC70	3/-	OA91	3/-	GEX35	4/-
OC79	3/-	OA95	3/6	GEX36	10/-
OC81	2/-	OA210	9/6		

SETS OF TRANSISTORS

Set 1. Comprising OC44, 2xOC45, OC81 Driver, matched pair OC81 20/- set
Set 2. Comprising OC81 Driver, matched pair OC81 .. 10/- set

VALVES

DK96	7/9	PCC84	7/8	PCL82	9/-
DAF6	6/9	PL82	7/6	6V6G	4/-
DF96	6/9	PV83	7/6	6X7G	2/-
DL96	6/9	UABC80	7/6	6AM6	3/6
ECC81	5/-	UAF42	7/6	EB91	3/-
ECC82	5/6	UBF80	7/6	1R5	5/3
ECC83	6/-	UCH42	7/6	1T4	3/6
ECC84	7/6	UL41	7/6	155	4/6
ECC85	7/6	EY51	8/-	354	5/6
EBC81	7/6	PL81	8/6	6K8G	4/9
EBC41	7/6	PL36	9/6	6L6G	7/6
EF41	7/6	PCL83	9/6	6Q7G	5/6
ECL80	7/6	PCF82	9/6	6X5G	5/-
PCF80	7/6				

METAL RECTIFIERS

K3/25	6/9	K3/25	6/9	M3	2/10
K3/40	9/-	K8/40	9/-	R3/20	4/3

Contact Cooled Types

C2D	8/6	C3B	14/-	C3D	10/6
-----	-----	-----	------	-----	------

Silicon Rectifiers

125v. 500mA	5/-	250v. 500mA	6/6		
-------------	-----	-------------	-----	--	--

MICROAMMETERS

0-50 μ A, 39/6, 0-500 μ A, 32/6, 0-1 mA, 27/6, 0-5 mA, 27/6, 0-300 v., 27/6, "S" Meter, 35/-					
--	--	--	--	--	--

MULTI-RANGE TESTMETERS

Caby M1	..	..	..	£2	14	0
Caby B20	..	..	..	£6	10	0
Eagle EP10K	..	..	..	£4	12	6
Model 200H	..	..	..	£5	5	0
Eagle EP50K	..	..	..	£9	19	6
Caby A10	..	..	..	£4	17	6
Taylor 127A	..	..	..	£10	0	0
Eagle TK20A	..	..	..	£2	9	6
Eagle EP30K	..	..	..	£6	19	6

MICROPHONES

Acos Mic 39/1	..	..	..	£1	12	6
Floor Stand Adaptor	..	..	..	£2	6	0
Acos Mic 45	..	..	..	£1	6	0
Table Stand	..	..	..	£2	6	0
Table Stand	..	..	..	£1	19	6
Acos Mic 40	..	..	..	£1	6	0
BM3 Microphone	..	..	..	£2	5	0
Floor Stands MS4-3 sections	..	..	..	£2	19	6
Table Top Stand	..	..	..	£8	0	0

American Recording Tape, standard play 5in. spool, 600ft., 9/6; 5in. spool, 850ft., 11/9; 7in. spool, 1200ft., 14/9; long play 5in. spool, 900ft., 12/6; 5in. spool, 1200ft., 15/-; 7in. spool, 1800ft., 19/6.

1964 CATALOGUE 56 PAGES

Now available send 1/- in stamps for your copy. Trade Catalogue also available. Please attach your Business Letter Heading.

CATALOGUE SENT FREE WITH EVERY ORDER RECEIVED.



ALPHA

RADIO SUPPLY CO.

103 LEEDS TERRACE

WINTOUN STREET

LEEDS 7

GRAMOPHONE UNITS

BSR TU12 unit, with Mono TC8H cartridge, £3.19.6.
BSR GU7 unit, with TC8M or TC8H cartridge, Mono, £4.15.0.
BSR GU7 unit, with TC8S cartridge, Stereo, £5.5.0.
Garrard Autolism, automatic, with GC8 Mono cartridge, £7.15.0.
Garrard Autolism, automatic, with EV26 Stereo cartridge, £8.10.0.
Garrard Autolism, de luxe, with GC8 Mono cartridge, £11.5.0.
Garrard Autolism de luxe, with EV26 Stereo cartridge, £12.0.0.
BSR Monarch UA14, with TC8 Mono cartridge, £6.6.0.
BSR Monarch UA14, with TC8S Stereo cartridge, £7.7.0.
BSR Monarch UA16, with TC8 Mono cartridge, £6.19.6.
BSR Monarch UA16, with TC8S Stereo cartridge, £7.19.6.

15 watt Transistor Amplifier, 2 mixing and separately controlled inputs for microphone and gram, push-pull output operated from 12 v. battery, output 15 watts peak into 15 ohms low, size 9 x 5 1/2 x 6 1/2 in., weight 6 1/2 lbs., price, £16.10.0.

1 watt Transistor Amplifier, isolated 3 ohm speaker output, 2 good quality transformers, nylon bobbins, pre-set volume control, flying leads for 9 v. D.C. supply, 2 input points, with sensitivities of 10 mv and 250 mv, size 3 1/2 x 2 1/2 x 1 1/2 in., weight 7 ozs., price 42/-.

TERMS: Cash with Order or C.O.D. Postage and Packing Charges extra. Single valves 9d. Minimum Parcel Post charges 2/-. Please include sufficient postage with your order. Minimum C.O.D. fees and postage 3/6. These Postal Rates apply to U.K. only. For full terms of business see inside cover of catalogue. Personal shoppers 9 a.m. to 5 p.m. Mon. to Friday, Saturday 10 a.m. to 1 p.m.



The PUNCH you need!

HOLE PUNCHES

Instant Type	...	...	...	6/10 ea.
1/2" diameter	...	...	...	...
Screw-up Type	...	...	...	...
1/2" diameter Toggle switch	...	...	...	8/6 "
"	...	...	...	8/6 "
" B7G	...	...	...	9/- "
" B8A, B9A	...	...	...	9/6 "
"	...	...	...	10/2 "
"	...	...	...	10/8 "
"	...	...	...	11/8 "
1 1/8" diameter Int. Octal	...	...	...	13/4 "
1 1/2" "	...	...	...	16/2 "
1 3/4" "	...	...	...	18/10 "
1 1/2" B9G	...	...	...	27/6 "
1 3/4" "	...	...	...	24/4 "
2 1/4" Meter	...	...	...	33/2 "

Complete Set £9.3.6.

No extra charge for postage and packing in the U.K.

Oliver & Randall Ltd

Dept. 7
7 KELSEY PARK ROAD
BECKENHAM, KENT
Tel.: Beckenham 8262

PHILIPS PAPERBACKS

ON

RADIO SERVICING

AUDIO QUALITY, by G. Slot. 10/6. Postage 9d.

AERIALS, TV, FM AERIALS, by D. Sjoberg. 10/6. Postage 9d.

RADIO VALVES by E. J. Black. 10/6. Postage 9d.

THE TAPE RECORDER, by C. G. Nijssen. 13/6. Postage 9d.

ALTERNATING CURRENT & ACOUSTICS, by E. J. Black. 10/6. Postage 9d.

A.F. AMPLIFICATION by E. J. Black. 10/6. Postage 9d.

GUIDE TO BROADCASTING STATIONS

Compiled by "WW". Revised edition covering European long and medium wave broadcasting stations and all short wave stations of the world. 5/-. Postage 8d.

COMPLETE CATALOGUE 1/-.

THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS of British and American Technical Books

19-21 PRAED STREET

LONDON, W.2

Phone: PADdington 4185

Open 6 days 9-6 p.m.

FIRST-CLASS RADIO AND T.V COURSES... GET A CERTIFICATE!

After brief, intensely interesting study —undertaken at home in your spare time—YOU can secure a recognised qualification or extend your knowledge of Radio and T.V. Let us show you how.

FREE GUIDE

The New Free Guide contains 120 pages of information of the greatest importance to both the amateur and the man employed in the radio industry. Chambers College provides first rate postal courses for Radio Amateurs' Exam., R.T.E.B. Servicing Cert., C. & C. Telecoms., Grad. Brit. I.R.E. Guide also gives details of range of diploma courses in Radio T.V. Servicing, Electronics and other branches of engineering, together with particulars of our remarkable Guarantee of

SUCCESS OR NO FEE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

FOUNDED 1885—OVER 150,000 SUCCESSSES

CHAMBERS COLLEGE

(Incorp. National Inst. of Engineering)
(Dept. 461), 148 HOLBORN
LONDON, E.C.1

TEST METERS



30,000 OHMS PER VOLT MODEL 5000. Reads voltages up to 1,000 D.C. at 30,000 ohms per volt and A.C. at 15,000 o.p.v.; D.C. current to 12 amps. Resistance to 60 Megs.; Decibels from -20 to +50; Incorporates internal buzzer for audible warning of direct shorts and blocking condenser for A.F. output measurements. Size $3\frac{1}{4} \times 6\frac{1}{2} \times 2\frac{1}{2}$ in. £8.19.6.

2,000 OHMS PER VOLT MODEL TP-10. Reads A.C. and D.C. volts up to 1,000; D.C. current to 500mA; Res. 20,000 ohms per volt and distance to 1 Meg.; Capacitance to 1 μ F; Decibels from -20 to +36; Output Jack for Audio measurements. Size: $3\frac{1}{4} \times 5 \times 1\frac{1}{2}$ in. £3.19.6.

DOUBLE BEAM OSCILLOSCOPE TUBES
Another purchaser of Type CV 1506, equivalent to Cosor 09D as used in Oscilloscopes by Cosor (339 series) and Hartley & Erskine (13 series) Listed £12.
Brand new in Maker's box, crates (Carriage 5/-). **25/-**

HIGH FREQUENCY A.C. VOLTMETER. A First Grade Moving Iron Instrument with 6in. Mirror Scale, reading up to 150 v. A.C. at 400 and 1,200-2,400 cycles. In suit stainless steel case with removable lid overall size $8\frac{1}{2} \times 8\frac{1}{2} \times 5\frac{1}{2}$ in. Made for the Air Ministry by Everett Edgcomb, and in perfect order. Brand New and Unused. **ONLY £5.** Can also be supplied for 50 cycles, use either 0-150 or 0-300 volts.

20,000 OHMS PER VOLT MODEL TP-5S. Reads voltages up to 1,000 D.C. at 20,000 ohms per volt and A.C. at 10,000 o.p.v.; D.C. current to 500mA; Resistance to 10 Megs.; Capacitance to 0.01 μ F; Decibels from -20 to +36. Size: $3\frac{1}{4} \times 5\frac{1}{2} \times 1\frac{1}{2}$ in. £5.19.6.

TRANSISTORISED INSULATION TESTER. One handed operation, no cranking of generator. 5 testing voltages 100, 250 and 500, to measure up to 500 Megohms. Complete with leather carrying case and test leads. **ONLY £17.10.0.** Illustrated details on request.

SMALL CRYSTAL STICK MIKE. Complete with heavy desk stand neck cord, and screened lead. **ONLY 49/6** (post 2/6).

SPRAGUE CONDENSERS. Metal cases, wire end. New 0.1 mF, 1,000 volt, and 0.1 mF, 500 volt, 7/6 per dozen. Special quotes for quantities.

RESISTORS. 100 assorted values, our choice. New 7/6.

PANEL METERS

25 microamps D.C. 2 1/2 in. Proj. circular 59/6. 50 microamps D.C. 2 1/2 in. Flush circular 59/6. 100 microamps D.C. 2 1/2 in. Flush circular 59/6. 40 amps D.C. 2 1/2 in. Proj. circular 7/6. 500 volts A.C. 2 1/2 in. Flush circular 55/-.



VARIABLE VOLTAGE TRANSFORMERS. Fully shrouded. Input 230 v. A.C. 50/60 cycles. Output 0-250 v. 2.5 amps. type £5.17.6. 5 amps. type £9. 10 amps. type £18.16.0. Brand new import. Fully guaranteed. Immediate delivery and service. Illustrated details on request.

MOVING COIL STICK MIKE. Complete with heavy desk stand and screened lead. **ONLY 59/6** (post 2/6).

ACOS 39/1 STICK MIKE with screened lead and table stand **ONLY 32/6** (post 1/6).

CRYSTAL DESK MIKE with screened lead and built-in stand. **ONLY 15/-** (post 1/6).

15 OHMS P.M. SPEAKERS. Special Heavy Duty 12in. £5.5.0.

Wharfedale W12EG 12in. for Lead Guitars, £10.10.0. Wharfedale W12EG 15in. for Bass Guitars, £17.10.0. 12in. wedge type speaker cabinet, £2.17.6. (Please add 5/- carr. all items.)

CONDENSERS. 100 assorted mica and silver mica. NEW 10/-.

HETERODYNE FREQUENCY METERS TYPE LM14. Frequency range 125-20,000 kc/s in 2 bands. This is the United States Navy Model of the well-known BC221 Frequency Meter, but has many additional features which increase its usefulness. Voltage stabilisation circuits and crystal control ensure extreme accuracy and in addition it is fitted with an internal Modulation switch to allow use as a Signal Generator. Size only $8\frac{1}{2} \times 8 \times 4\frac{1}{2}$ in. Full information on request.

HARRIS ELECTRONICS (London) LTD.

138 GRAY'S INN ROAD, LONDON, W.C.1

Telephone **TERminus** 7937.

Please include carriage cost on all items

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

"Tripletone" Convertible Amplifier. size $10 \times 3 \times 4\frac{1}{2}$ in. high. 4 watts output matched for 2-3 ohms, OR 2 amplifiers can be coupled together for STEREO. £6.19.6 each.

"Tripletone" F.M. Tuner, size $11 \times 6 \times 3\frac{1}{2}$ in. high. Coverage 86-104 Mc/s. £13.19.6 (unpowered), or £15.14.6 (self powered). Details on request.

TRIPLET 1632 SIGNAL GENERATOR. Handsome well designed instrument, ex U.S.A. Forces. 100Kc/s to 120Mc/s on fundamentals. 10 directly calibrated ranges. 6 valves, buffer amplifier, well screened ladder, attenuator, variable carrier level (100 μ A monitor meter), stabilised H.T. Int. mod. Ext. mod., 10Mc/s crystal mixing facilities for crystal check and for use as heterodyne wavemeter. In first-class condition, tested, with circuit attenuator, etc. In metal portable case, operates from 115V A.C. 50 c/s (suitable auto transformer for 240V. A.C. operation. 17/6 extra). **PRICE ONLY £12.** Carr. 10/-.

SILICON RECTIFIERS. Type BY100 (Hin. x Lin.) will handle 250 volts at up to 500 mA. Replaces any TV metal rectifier. BRAND NEW—not seconds, 7/6.

AR-88 VIBRATOR PACKS. For 6V. operation. Complete with vibrator and OZ4 rectifier. NEW in original cartons. 17/6. P. & P. 2/6.

AR-88 SPARE VALVES. Complete Set of BRAND NEW individual boxed original valves (1-4). 50/-. Plus 2/6 P. & P.

MOVING COIL PHONES. Finest quality Canadian with Chamois ear muffs and leather covered headband. With lead and jack plug. Noise excluding. supremely comfortable BRAND NEW—not seconds. £2/6, post 1/6.

MAGNETIC COUNTERS (ex-G.P.O.). 4 figures to 9,999. Coils 500 Ω for 24V. operation. Tested. (No reset). 5/- each. P. & P. 1/6. **SPECIAL OFFER!** 10 for 30/-. P. & P. 6/-.

MICRO-AMMETER. 0-500 μ A. Made by R.C.A. Weston Westinghouse, and other famous American manufacturers. Circular 2 1/2 in. flush panel mounting. Dials are engraved 0-1. 0-500 volts. As used in the American version of the "19 SET". **TESTED AND GUARANTEED 15/-.**

HEAVY DUTY TRANSFORMER. Input 220 to 250 volts A.C. mains (capped every 5 volts). Output 50V. at 15 amps. A really rugged job, very conservatively rated. Size $7\frac{1}{2} \times 5\frac{1}{2} \times 7\frac{1}{2}$ in. Weight 28 lbs. **ONLY £5.19.6.** Carr. 7/6.

CANADIAN RECEIVERS No. 9. Similar to 52 Set, but cover 1/8 to 5 Mc/s. Tip-top condition, complete with crystal calibrator, valves, etc. **BARGAIN FOR CALLERS ONLY.** 79/6. **PCR-5 RECEIVERS.** 3 wave bands, medium wave and 2 short wave, from 120-13 metres. Good condition, tested. 8 kns. Carr. 10/-. A.C. mains internal power supply £2 extra.

CHARLES BRITAIN RADIO LTD.

11 UPPER SAINT MARTINS LANE, LONDON W.C.2

TEmple Bar 0545

shop hours 9-6 p.m. (9-1 p.m. Thursdays). Open all day Saturday.

R.G.S. PERSONAL SET

Designed for personal listening without disturbing others. Supplied complete with battery and earpiece—no extras to buy! Sensitive one transistor diode circuit gives quality reproduction over medium wave band. Attractive case with large tuning dial. Ideal for use as tape tuner. Size only **22/6** P. & P. $3\frac{1}{2} \times 2\frac{1}{2} \times 1\frac{1}{2}$ in. **ONLY 2/-**



BATTERY ELIMINATORS

The ideal economical and safe way of running any TRANSISTOR RADIO, RECORD PLAYER, TAPE RECORDER, AMPLIFIER, etc. requiring voltages shown.

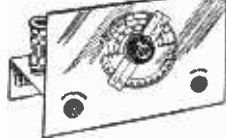
Types Available: 9 volt, 6 volt, 4 1/2 volt (single output). Size $3\frac{1}{2} \times 3 \times 1\frac{1}{2}$ in. **PRICE 35/-** each. P. & P. 2/9.

9 v. + 9 v., 6 v. + 6 v., 4 1/2 v. + 4 1/2 v. (Two separate outputs). Size $3\frac{1}{2} \times 3 \times 2\frac{1}{2}$ in. **PRICE 42/6** each. P. & P. 2/9.

All the above units are completely isolated from mains by double wound transformer ensuring 100% safety.

LISTEN TO THE WORLD ON TELSTAR OUR I-VALVE

SHORT WAVE RADIO



Receives speech and music from all over the world. Price includes valve and one coil covering 40-100 metres. Can be extended to cover 10-100 metres. Can be converted to 2 or 3 valve and all-mains speaker use. Total Building Costs **35/-** P. & P. 2/-.

R.G.S. CRYSTAL RECEIVER

Covering medium wave band. Ideal for the beginner! All components included case. **8/6** P. & P.

(Suitable headphones 9/6). Easily converted to 1-transistor or 2-stage transistor receiver.



All parts available separately.

R.C.S. PRODUCTS (RADIO) LTD.

11 Oliver Rd., London, E.17. (Mail Order only)

Export Trade Enquiries invited

BARGAINS

NOT TO BE
MISSED

Filament Transformer. 12 volt 13 amp standard mains input easy to adapt for other voltages. 6/6 each. Plus 2/- post.

Waterproof Heater Wire. 16 yds. length. 70 watts, self regulating temperature control. 10/- post free.

Refrigerator Thermostat. Standard type with adjustment for all normal refrigerator temperatures. 7/6, plus 1/- post.

Simmerstat Heater Regulator. Suitable to control elements, heater, soldering irons and boiling rings up to 2,500 watts. Complete adjustable, normal price 55/- each. Special snip price 12/6, plus 1/6 postage and insurance.

Pre-Amplifier. Made to Mullard design to suit the 10 watt amplifier, made to specification. New Unit. Simply needs valves. Type EFS6. 37/6 each.

48 Sets (Receiver/Transmitter pack set). 14 used sets complete, except for crystals. Packed with parts and easily rebuildable into other gear. 19/6 each. Post 3/-.

Mains Transformer. 250-0-250 at 80 mA. 6.3 volts, 5 a. (normal mains input). 12/6 each. Carriage 2/6.

Output Transformer. Standard pentode matching type. 3/6 each. 36/- per doz.

Vibrator Transformer. Suitable for 6 or 12 volts input. 5/9 each. 23 per doz.

Slide Switch. Sub-miniature but dpdt. 2/6 each. 18/- per doz.

Battery Charger Rectifier—selenium 12-15 v. 5 amp. 9/6.

Metal Chassis—punched for Mullard 510 Amplifier. complete with inner screening sections and stove enamelled. 12/6 set.

Twin Twisted Lighting Flex—equivalent 14/36, rubber insulated cotton covered 12/6 per 100 yard coil.

Moving Coil Meters
0-200 microamp. 2 1/2 in. flush .. 17/6
250-0-250 microamp. 2 1/2 in. surface .. 27/6
750 microamp. 2 1/2 in. surface .. 17/6
0-30 milliamp. 2 1/2 in. flush .. 17/6
0-100 milliamp. 2 1/2 in. flush .. 15/-

Where orders are not definitely stated add 2/- all posts under £3.

GOOD COMPANION Mark IIIB

The 6 transistor set with the 8 transistor performance.

Incorporating all the latest requirements. Anyone who can solder can make it. Many thousands already in use all over the country. Full coverage of Long and Medium wavebands.

Fine looking cabinet, size 11" x 8" x 3". Q.P.P. Output approx. 750 mW. Excellent reception of difficult stations like 208.

Variable feed back gives excellent tone. **ONLY £6.19.6**

Plus 4/- post and insurance.

THIS MONTH'S SNIP

Complete kit of parts to build this 6 transistor 2 wave Loud-speaker receiver at only 39/6. "CORONET" MK. III

It fully covers the medium waveband and that part of the long waveband to bring in B.B.C. Light. The circuit includes a highly efficient lab aerial and Plessey tuning condenser. Overall size approximately 4 1/2 x 2 1/2 x 1 1/2 in. Supplied complete with carrying case.

CABINET & PICK-UP

Made for a famous company intending to make a Battery Record Player but changing their minds. This is an extremely fine looking cabinet, must have cost at least £2 to make. It is complete with handle and fasteners as illustrated. Also included in the parcel is a Cosmocon pick-up with crystal cartridge and sapphire stylus. Both items new and perfect. Only 19/6, plus 4/6 post and insurance.



Building A 'Scope



3in. oecilloscope tube. American made type No. 3FP7. 6.3 v. 0.6 amp. heater electrostatic deflection. Brand new and guaranteed with circuit diagram of scope. 15/- each. Plus 2/6 post and insurance.

YAXLEY SWITCHES

Complete range available. See June issue or send for list.

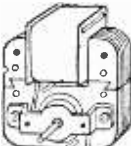


Fishing Rod from Dinghy Mast

Tubular aluminium not separate sections. extends like telescope from 15 ins. to 9 ft. 6/6 each.

MOTOR BARGAIN

Silent running mains motor by a famous maker. Very ideal for gramophone, tape recorder, fan etc. etc. 200-250 volts, A.C. shaded pull start. size approximately 2 1/2 x 2 1/2 x 1 1/2 in. 27/60. r.p.m. Spindle diameter 5/32 in. Spindle length 1 in. Brand new guaranteed. Price 12/6, plus 1/- post

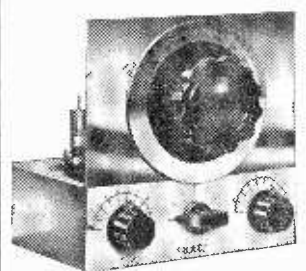


ELECTRONICS (CROYDON) LTD

266 LONDON ROAD, WEST CROYDON, SURREY
Post orders to: 43 Silverdale Road, Eastbourne, Sussex

FAVORITE FOR THIRTY YEARS for
SHORT-WAVE EQUIPMENT of QUALITY

H.A.C. SHORT-WAVE KITS



H.A.C. were the original suppliers of Short-Wave Receiver Kits for the amateur constructor. Over 10,000 satisfied customers—including Technical Colleges, Hospitals, Public Schools, R.A.F., Army, Huns, etc.

IMPROVED 1964 RANGE

1-Valve model "CX", complete kit. Price 34/6

Customers say: "Definitely the best one-valve S.W. kit available at any price." This kit contains all genuine short-wave components, a drilled chassis, accessories and full instructions. Ready to assemble and, of course, as all our products, fully guaranteed. FULL RANGE of other kits still available including the famous model K, price 77/-.

Before ordering call and inspect a demonstration receiver or send for a descriptive catalogue and order form to—

"H.A.C." SHORT-WAVE PRODUCTS
(Dept. T.H.), 44 Old Bond St., London W.1

FUN WITH TRANSISTORS

by Gilbert Davey
edited by Jack Cox

Explicit instructions in how to make all types of transistors & appliances
Illustrated 12s 6d

KAYE-WARD
194-200 Bishopsgate EC2

Audio — I.F. — R.F. Oscillator. Simple square wave circuit giving output at audio frequency, and over the whole radio spectrum up to 1.5 Mc/s. Use for rapid "dead" set testing, use for morse practice etc. Variable amplitude. Basic kit comprises transistors, condensers, resistors, tag strips, pot. switch. Knob. Price 10/-, post 1/-, with circuit and instructions.

Precision Wirewound Resistors — 1W. 1 ohm to 5K 1% 3/-; to 20K 4/3; 1% add 3d. Your value wound to order.

High Stub Resistors. 1W 1% 2/- Full standard range 10 ohms to 10M plus many special multimeter values.

Meter Rectifiers. New Salford f.w. bridge 1mA or 5mA. 8/6

Multimeters. TK20A 1,000 opv 33/-, post 1/6; EP10K 10,000 opv 69/6, post 1/6; EP30K 30,000 opv 99/6, post 1/6; EP50K 50,000 opv £6.10.0. post 2/6. Illus. leaflet available.

Crystal Diodes or Westectors, tested, guaranteed. 2d doz. Post 6d.

New Miniature Meters. 50µA 39/6; 1mA 27/6. Internal resistance measured if requested. Post 1/3.

PLANET INSTRUMENT CO.,
25 DOMINION AVENUE, LEEDS 7

PETHERICK'S

FOR

REPANCO COMPONENTS

DRX1 Crystal Set Coil M & L. With circuit. 3/-.

DRR2 Dual Range Coil with Reaction. Boxed with Valve and Transistor Circuits. 4/6.

TT49 Transistor Interstage Transformer. 5/-.

TT45 Driver Transformer. 6/-.

TT46 Output Transformer. 6/-.

FR2 Ferrite Rod Aerial M & L. With circuit. 12/6.

FS48 Ferrite Slab Aerial TRAWLER BAND. 7/6.

AF2 Audio Choke 200M/h C.T. 6/-.

TT23 10 Watt Transistor. Push-Pull Driver. Transformer with Circuit. 22/6.

TT24 10 Watt Transistor. Push-Pull Output Transformer with Circuit. 22/6.

TT51 Transistor Inverter Transformer. 12 v. D.C. to 240 v. A.C. with Circuit. 32/6.

TRANSISTORS.

GREEN SPOTS 1/3 each 3 for 3/3.

RED SPOTS 1/6 each 3 for 4/-.

WHITE SPOTS 2/- each 3 for 5/3.

MAT100 7/9, MAT101 8/6, MAT120 7/9, MAT121 8/6.

TRANSISTOR HOLDERS 3 or 5 pin 1/- each

WIRELESS WORLD VALVE DATA 7/6

ALL SENT POST FREE IN U.K. by

PETHERICK'S RADIO SUPPLIES

22 HIGH STREET
BIDEFORD, N. DEVON

Tel: Bideford 1217

85 TOTTENHAM COURT ROAD. LONDON W.1
Tel.: LANGHAM 8403

Tel.: LANGHAM 8463

RADIO FREQUENCY METERS	
350mA 2in. round plug-in ..	12/6
1 amp 2½in. round projecting ..	15/-
2.5 amps, 2in. round or square ..	25/-
3.0 amps, 2in. round or square ..	25/-
4.0 amps, 2in. square ..	20/-

Please add 2/6 in £ for postage and handling

THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD

TRANSISTORISED MORSE OSCILLATOR

Fitted 2 1/2 in. Moving Coil Speaker. Uses type PP3 or equiv. 9 v. battery. Complete with latest design Morse Key. 22/6. Plus 1/6 P. & P.

SEMI-AUTOMATIC "BUG" SUPER SPEED MORSE KEY

7 adjustments precision toolled, speed adjustable. 10 w.p.m. to as high as desired. Weight 2 1/2 lb. Price £4.12.6. post paid.



BUILD AN EFFICIENT STROBE UNIT FOR ONLY 37/6

The ideal instrument for workshop, lab. or factory. This wonderful device enables you to "freeze" motion and examine moving parts as stationary. We supply a simple circuit diagram and all electrical parts including the NSP2 Strobe tube which will enable you to easily and quickly construct a unit for infinite variety of speeds, from 1 flash in several seconds to several thousands per minute. New modified circuits bring price down to 37/6 plus 3/- P. & P.

NSP2 CV296 STROBOTRON FLASH-TUBE made by Ferranti, brand new, I.O. base. Price 15/- P. & P. 1/-.

MAGNETIC COUNTERS

10 IMPULSES PER SECOND

TYPE 100D, 4.1 ohm coil, 3-6 v.

D.C. operation. TYPE 100A, 500

ohm coil, 18-24 v. D.C. operation

TYPE 100B, 2,300 ohm coil, 36-48

v. D.C. operation. Any type

15/- each. P. & P. 1/6.



VARIABLE VOLTAGE TRANSFORMER

Post Paid.

Input 230 v. A.C. Output

0-230 v. at 1 amp. fully

regulated. New. Also available

2.5, 5, 8, 10, 12 and 20 amp.

Write for details.



SIEMENS SEALED HIGH SPEED RELAYS

H96A, 2.2 ohm + 2.2 ohm, new .. 12/6

H96B, 50 ohm + 50 ohm, new .. 12/6

H96C, 145 ohm + 145 ohm, new .. 12/6

H96D, 500 ohm + 500 ohm, new .. 12/6

H96E, 1700 ohm + 1700 ohm, ex-equip. 18/6

NOLENOID. Overall length 3 1/2 in. stroke

1/2 in. Maximum push 8oz. 12-24 v.

D.C. operation. D.C. resistance 35 ohm.

Price 8/6. P. & P. 1/6.

VAN DE GRAAFF ELECTRO-STATIC GENERATOR

fitted with Motor drive for

230 v. A.C. giving a

potential of approx. 50,000

volts. Supplied absolutely

complete, including

accessories for interesting

experiments, and full

instructions. This instrument

is completely safe,

and ideally suited for

School demonstrations.

Price £6.6.0. plus 4/-

P. & P.

LIGHT SENSITIVE SWITCH

Kit of parts, including ORP. 12 Cad-

mium Sulphide Photocell, Relay,

Transistor and Circuit, etc. price 25/-

plus 2/6 P. & P. ORP 12 including

circuit, 10/6 each, plus 1/- P. & P.

TRANSISTORS

OC41 7/- OC84 10/- GET573 12/6

OC45 5/- OC139 12/- 2G110 10/6

OC71 2/- OC140 19/- 2N438 20/-

OC72 3/- OC171 10/6 SB345 7/6

OC73 6/- OC200 10/6 AC107 14/6

OC75 7/- OC201 21/- AF114 11/-

OC76 6/- OC203 14/- AF115 10/6

OC77 9/- GET104 6/- AF118 10/-

OC81 8/- GET105 10/- AF117 9/6

*Available in matched pairs.

SERVICE TRADING CO.

All Mail Orders also callers

47-49 High Street, Kingston on Thames

Tel: KINGS 9450

Personal callers only

9 Little Newport Street, London, W.C.2

(off Leicester Square) Tel: GERard 0765

COMPONENTS

NEW, TOP QUALITY, GUARANTEED

Moulded valveholders B7G, B9A, Octal	8d.
Air spaced variables, small, 17 pF/d, 50 pF/d	
130 pF/d, 365 pF/d	8/6
Slider switches S/P	1/8
Slow motion drive with dial flange	3/8
3in. dial 0-100 to fit above	2/6
Mains transformers, fully shrouded, 250-0-250	
60 mA, 6.3 v. 3 amp	P. & P. 2/9
Midget 239 v. 40 mA, 6.3 v. 1 amp P. & P. 2/3	14/6
Contact rectifiers 1 x lin. 250 v. 30 mA	8/6
405 kcs 1 F. Trans. high gain, ferrite cores,	
pre-aligned pair	9/6
1 mg V.F. controls D.P. switch	2/9
loss switch	2/9
16 + 16 mF/d, 450 v.w. electrolytics	3/8
8 mF/d, 450 v.w. small	3/8
Midget sensitivity chokes 10h. 60 mA	5/6
0.01 mF/d 400 v.w. tubular	8d.
0.1 mF/d 425 v.w.	8d.
0.1 mF/d 400 v.w.	10d.
100 pF/d, ceramic	2/9
OA21 diodes	5/6
5K ohm edge type volume controls with	
switch, white	3/6
Resin-core solder	4d.
Coax sockets	9d.
Coax plugs	1/-
High sensitivity Headphones, 4000 ohms	15/-

B. ELLIS

7 RECTORY FARM ROAD, SOMPTING, SUSSEX

P. & P. charge 1/-. Cash with order, no C.O.D. please.

Cash refunded if not completely satisfied.

RES/CAP. BRIDGE 39/6

P. & P. 2/6

Checks all types of resistors condensers

6 RANGES

Built in 1 hour. Direct reading

READY CALIBRATED

Stamp for details of this and other kits.

RADIO MAIL (Dept. C)

Raleigh Mews Raleigh Street, Nottingham

NEW VALVES!

Guaranteed Set Tested

24-HOUR SERVICE

1R5, 1S5, 1T4, 3S4, 3V4, DAF91, DF91,

DK91, DL92, DL94, SET OF 4, 14/-

DAF96, DF96, DK96, DL96, SET OF 4, 22/-

OA2 3/9 DL35 6/- PCL82 6/3

ID5 4/9 DL92 4/3 PCL83 7/9

1R5 3/9 DL94 5/- PCL84 7/-

1S4 3/9 DL96 5/6 PL36 7/6

1T4 2/3 EB91 1/11 PL81 6/9

3S4 4/3 EBC41 6/3 PL82 5/-

3V4 5/- ECP80 6/- PL83 5/-

5Y3GT 5/- ECC80 6/5 PL84 5/3

3C6 6/9 ECC81 3/3 PY32 8/6

6K7G 1/3 ECC82 4/6 PY33 8/6

6K8G 3/- ECC83 4/6 PY80 4/9

6Q7G 4/3 ECC84 5/6 PY81 5/-

6U7G 6/6 ECC85 6/- PY82 4/9

5Y6G 3/6 ECP80 5/9 PY83 5/6

6X5GT 5/- ECP82 5/9 U25 8/-

12K7GT 3/3 ECH42 7/3 U191 8/3

12K8GT 8/6 ECH81 5/3 U801 15/-

12J7GT 3/3 ECL80 5/9 UABC80 5/-

2E6G 4/9 ECL82 8/3 UAF42 6/9

30PL1 7/9 EF41 6/6 UBC41 6/9

35L6GT 6/- EF80 3/9 UBF80 5/6

35Z4GT 4/6 EFB8 5/9 UCC84 7/11

85A2 6/6 EFB9 4/6 UCC85 7/11

CL33 8/6 EF91 2/9 UCF80 8/3

DAC32 7/9 EL41 7/- UCH42 6/9

DAF91 3/3 EL84 4/6 UCH81 5/9

DAF96 5/6 EY51 5/6 UCL82 7/3

DF93 7/6 EY65 5/- UCL83 7/9

DF96 5/6 EY80 5/- UF41 6/3

DH77 3/6 EY81 3/3 UF42 6/3

DK32 7/6 MU14 3/9 UL84 5/6

DK33 3/6 PCC84 5/3 UR1C 5/1

DK92 6/9 PCC89 7/6 UY21 7/6

DK96 6/- PCF80 5/9 UY41 3/11

DL33 6/9 PCF82 6/- UY85 4/9

Postage 6d. per valve extra. Any Parcel

Insured against Damage in Transit 6d. extra.

Any C.O.D. Parcel 4/3 extra.

Office address, no callers.

GERALD BERNARD

83 OSBALDESTON ROAD,

STOKE NEWINGTON,

LONDON, N.16

BBC2 (625 LINE) TV AERIALS



EXTERNAL MAST MOUNTING ARRAYS

9 element 45/-; 11 element 55/-;

14 element 62/6

WALL MOUNTING with CRANKED

ARM. 9 element 60/-; 11 element 67/6;

14 element 75/- CHIMNEY ARRAYS

with LASHINGS, 9 element 72/-; 11

element 80/-; 14 element 87/6. LOFT

ARRAYS, 7 element 32/6; 11 element 62/6

14 element 70/- Co-ax. Flugs, 1/3. Low

Loss Co-axial Cable, 1/8 yd.

BCC • ITV • F.M. AERIALS

B.B.C. (BAND D). Tele-

scopic loft 21/-, External

S/D 30/-

I.T.V. (BAND 3). 3 Element

loft array 25/-; 5

Element 35/-, Wall mount-

ing, 3 Element 35/-, 5

Element 45/-

COMBINED B.B.C./I.T.V.

Loft 1+3, 41/3; 1+5, 48/9.

Wall mounting 1+3, 56/3;

1+5, 63/9. Chimney 1+3,

63/9; 1+5, 71/3.

F.M. (BAND 2). Loft S/D, 12/6. "H".

30/-, 3 Element, 52/6. External

units available. Co-ax. cable 8d. yd. Co-ax.

plugs, 1/3. Outlet boxes, 4/6. Diplexer

Crossover Boxes 12/6. C.W.O. or C.O.D.

P.P. 3/-, Send 6d. stamps for illustrated

lists.

K.V.A. ELECTRONICS (Dept. P.W.)

3b, Godstone Road, Kenley, Surrey.

CRO. 2527

2 METRES 4

The thrills of VHF Amateur Radio

can now be yours for as low as 39/6.

complete kit (by post, carriage and

packing, 2/6 extra). Tuning range

70-150 Mc/s. Stamped addressed

envelope for free copy of literature

and full details. Newcomers to

Short-Wave Radio ask for details of

the famous "Globe-King" kits and

receivers. Home and Overseas Sales.

www.americanradiohistory.com

We supply from stock most of the components and items specified or circuits published in this and other magazines and radio books. Let us quote for your circuit, first grade components at realistic prices.

DEAC RECHARGEABLE BATTERIES

18 volt 100mA/H 4 x lin. diameter. Brand new sleeved, 30/-.
3.9 volt 450mA/H, 12/6.
All types easily split into any multiple of 1.2 volt. Brand new.



MULTI-METERS

Multi-range test meters featuring easy to read scales and provided with full operating instructions, lead and batteries. Suitable for amateurs, designers, repair shops, all domestic uses. Full details and specifications in our catalogue.

★ PT34	1 Kohm/volt	£1 19 6
★ M1	2 "	£2 9 6
★ THL33	2 " (illus.)	£3 15 0
★ EP10K	10 "	£4 9 6
★ IT1-2	20 "	£5 5 0
★ TP55	20 "	£5 19 6
★ EP30K	30 "	£6 19 6
★ 500	30 "	£8 19 6
★ EP50K	50 "	£9 19 6

* Leather Cases available.

NOMBREX TEST EQUIPMENT

LEAFLETS ON REQUEST

- ★ 150 Kc/s to 350 Mc/s generator. RF, Mod., AF. 8 ranges. Leads, batt., instructions, £9.10.0.
- ★ Resistance/Capacitance Bridge, £8.5.0.
- ★ Transistorised Power Supply, £6.10.0.
- ★ Audio Generator, £16.15.0.
- ★ Inductance Bridge, £18.

HI-FI SPEAKERS

CX300 12 inch 25 watt	12 Gns.
CR12AE 12 inch 20 watt	8 Gns.
CR30AE 12 inch 20 watt	
triple range	10 Gns.
8A7 8 inch 6 watt	79/6
10 watt Horn Tweeter	29/6
20 watt Rect. Horn Tweeter	69/6

MINIGRAM TRANSISTOR PORTABLE RECORD PLAYER



● Made by well known British manufacturer. Features ready built 4-transistor printed circuit 1 watt amplifier, elliptical speaker and volume control. Low current. Starr constant speed 45 r.p.m. turntable with crystal pick-up. Strong moulded two colour cabinet with handle. Plays anywhere on long life 9 volt battery. Requires less than half an hour's work to connect up using ready built units and easy instructions.

TOTAL 79/6 P.P. (Battery 3/9).
Or Amplifier with volume control and 5 x 3 inch Speaker, 4-Transistor, 35/-, P.P. 2/-.
9 volt Starr Player with Pick-up 39/6, P.P. 2/6. And Two-Tone Case 5/-, P.P. 2/-.

TRANSISTOR TRANSCIEVER

Two way Trans. receivers. 9-Transistor superhet circuit, crystal controlled both transmit and receive. Push-pull output. Range up to 5 miles under best conditions. Supplied complete with batteries, Telescopic aerials and leather cases. Overall sizes: 6½ x 3 x 1½ inches. Sold in pairs. **PRICE PER PAIR £25. P.P. 3/-.**

QUARTZ CRYSTALS

100 Kc/s 3 Pin	15/- ea.
500 Kc/s 2 Pin	15/-
455 Kc/s (AR88)	12/6
5000 Kc/s 2 Pin	10/-
10 Mc/s 2 Pin	15/-
27 Mc/s Radio Control	15/-
456 Kc/s HRO	15/-
Twin Marker Crystal 1 Mc/s and 100 Kc/s.	22/6.

Over 600 Frequencies in Stock for all purposes. Catalogue on request.)

MAINS AND BATTERY

RECORD AND TAPE DECKS

All Decks Complete with Cartridges	
★ BSR UA14 4-speed Auto	£5 16 6
★ BSR UA15 4-speed Auto	£6 19 6
★ Garrard Autoslim Auto	£6 10 0
★ Unpluggable Hd. Versn. Auto	£6 19 6
★ Stereo Version Auto	£7 19 6
★ SRP10 4-speed Single Player	£5 5 0
★ BSR GU7 4-speed Single Player	£5 0 0

★ Garrard AT6 with Stereo Cartridge Autochanger	£10 19 6
★ AT6 Mono	10 gns.

★ Collaro 2-track Studio Deck	£10 10 0
★ 4-track Deck	£13 19 6

P. & P. 3/6 any type above.

★ 9 volt Starr, 45 r.p.m.	39/6
★ 45 or 33 r.p.m. Starr 9V	92/6
★ 45 r.p.m. Garrard 6V	35/6

★ 4-speed B.S.R. 9V	5 gns.
★ Garrard 9V, 2-speed, 2-track	

Tape Deck with cassette... £11 15 0
P. & P. 2/6 any of above.

SUBSTITUTION BOXES

- Capacitor Box. 0.001 to 0.22 mfd., 29/6.
- Resistor Box. 15 ohms to 10 meg., 37/6.

TO BUILD YOURSELF

Sinclair TR750 Amplifier	39/6
Sinclair Micro-6	59/6
Sinclair Micro Injector	27/6

Leaflet and details on request.

All parts in stock for 9 volt mains power pack, PW Inverter and Build and Learn series. Please send full list of parts required for quotation.

ALL PARTS IN STOCK FOR PW SHORTWAVE TRANSISTOR CONVERTER. As per Feb. Edition 1964.

CRYSTAL MICROPHONES

Acos 39-1 Stick Microphone	32/6
Acos 60-1 Stick Microphone	27/6
Acos 40 Deck Microphone	15/-
Acos 45 Hand Microphone	22/6
Lapel/Hand Microphone	12/6
100C Stick with Stand	39/6
BM3 Stick with Stand	49/6
Lapel/Hand Magnetic	8/6

MINIATURE PANEL METERS

*0/50µA (D.C.)	39/6	*0/5mA (D.C.)	27/6
*0/500µA (D.C.)	32/6	*0/300V (D.C.)	27/6
*0/1µA (D.C.)	27/6	"S" Meter	35/-
All Brand New Boxed. *Available Clear Plastic Front or Black Moulded.			
200µA D.C. Edge meter	69/6		
1 mA D.C. Edge meter	59/6		
3½ x 1 inch Front Panel.			

POCKET SOLDERING IRON. 30 watts. 220/250 volts A.C. Complete with pointed bit, mains plug, carry pouch. 14/6. P.P. 1/6.

RECORDING TAPE

- Sin. 600ft. 12/6; Sin. 900ft., 15/-; 7in. 1,200ft., 18/6; 7in. 1,800ft., 25/-; 7in. 2,400ft., 27/6. Excellent quality.
- 3 inch square 3 ohm Speaker, 12/6.

CATALOGUE

Now 86 pages fully detailed and illustrated with hundreds of new items and bargains. **PRICE 2/6. Post Paid.**

- Stereo Stethoscope Headset... 25/-
- Mono Stethoscope Types. Crystal 10/6. Magnetic 12/6.
- Fully Retractable Car Aerial—Thief Proof, 39/6.
- PP3 Battery Eliminator, 18/6.
- Tape Demagnetiser, 29/6.
- 1K ohm Dynamic Microphone, 12/6.
- 8+ Bohm Stereo Headphones, 62/6.
- Transistor Signal injector, 39/6.
- Crystal Ovens, 6/12 volt, 22/6.
- 12 inch 15 ohm Speaker, 35/-.
- DFI dynamic Mic. 50 k. with stand, 52/6. New range in stock. See catalogue.
- 5-Piece Hole Cutter for all chassis work 3in. to 1½in. with pouch, 49/6.
- Crystal Contact Microphone... 12/6 P.P. 9d.
- 2K, 4-track Tape Head... 15/- P.P. 9d.
- Telephone Recording... 12/6 P.P. 9d.
- 4-Channel Transistor Mixer Unit... 59/6 P.P. 1/6.
- Tape Jack Radio Tuner... 29/- P.P. 1/-.

MARTIN RECORDAKIT BUILD A QUALITY PORTABLE TAPE RECORDER

Complete in every detail. ● Pre-built units—Collaro Studio Decks—Portable Cabinets with speakers. 6 valve designs.

TWO TRACK Total £26.00 P.P. 8/6

FOUR TRACK Total £30.00 P.P. 8/6

Cost

ALL AUDIOKITS IN STOCK

● Leaflets on Request ●

- 4 Transistor 9 volt, 3 ohm, 1 watt. Amplifier... Built 49/6 Kit 39/6
- New 3-Transistor. Xtal controlled Transceivers. Up to 1½ mile. Price per pair, £8.19.6. P.P. 2/6.

FIELD STRENGTH METER

Five channels cover 1 Mc to 200 Mc/s. Fitted 200 microamp meter for CW or RF. Indication and Earphone for A.F. Monitoring. Designed for checking all types of transmitters. Size 4 x 2½ x 2½in. Complete. Ready to Use, with instruction and telescopic aerial, 69/6. Post Free.

PP3 9 volt Battery Eliminator	18/6
-------------------------------	------

- 3 Transistor MW Superhet Tuner 82/6
- 4 Transistor MW/SW Superhet Tuner... £7.9.6
- BM3 Stick Xtal Mic with Stand... 49/6
- 100 C Stick Xtal Mic with Stand 39/6
- 8A7 15 ohm 6 watt Hi-Fi Speaker 79/6

TEST LEAD KIT supplied in Pocket Pouch. Contains probes, leads, clips, etc. 8/6. P.P. 9d.

- EMI 2½ inch Plastic Cone Tweeter 3/5 ohms, 17/6. P.P. 9d.
- New 6 pole 2 way Miniature Push Switch, 6/-.

HEADPHONES

2000 ohms 12/6.	4000 ohms 14/-
-----------------	----------------

Henry's Radio Ltd.

PADDINGTON 1008/9

303 EDGWARE RD., LONDON W.2

Open Monday to Sat. 9-6. Thurs. 1 o'clock.

PLEASE TURN TO BACK PAGE

Practical Wireless

BLUEPRINT SERVICE

ALL of these blueprints are drawn full-size and although the issues containing descriptions of these sets are now out of print, constructional details are available free with each blueprint except for those marked thus (*).

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, London W.C.2.

DOUBLE-SIDED BLUEPRINTS

Each blueprint in this series contains details of two separate instruments or items of equipment.

The Strand Amplifier	}	*	5/-
The PW Signal Generator			
The Savoy VHF Tuner	}	*	5/-
The Mayfair Pre-amplifier			
The Berkeley Loudspeaker Enclosure	}	*	5/-
The Luxembourg Tuner			
The PW Troubadour	}	*	7/6
The PW Everest Tuner			
The PW Britannic Two	}	*	6/-
The PW Mercury Six			
The PW Regency	}	*	5/-
The PW International Short Wave Two			

RECEIVERS

The Tutor *	3/-
The Citizen *	5/-
Junior Crystal Set	PW94 2/-
Dual-wave Crystal Diode	PW95 2/6
Modern One-valver	PW96 2/6
All-dry Three	PW97 3/6
Modern Two-valver	PW98 3/6
A.C. Band-pass Three	PW99 4/-
A.C. Coronet-4	PW100 4/-
A.C./D.C. Coronet	PW101 4/-
The PW Pocket Superhet	5/-

MISCELLANEOUS

The PW 3-speed Autogram	8/-
The PW Monophonic Electric Organ	8/-
The PW Roadfarer *	5/-
The PT Band III TV converter	1/6
The Mini-amp *	5/-
The PT Olympic *	7/6
The PT Multimeter *	5/-

SOME EARLIER DESIGNS

THE following blueprints include some pre-war designs and are kept in circulation for those constructors who wish to make use of old components which they may have in their spares box. The majority of the components for these receivers are no longer stocked by retailers.

Experimenter's Short Wave	PW30a 2/6
Midget Short Wave Two	PW38a 2/6
Simple S.W. One-valver	PW88 2/6
Pyramid One-valver	PW93 2/6
BBC Special One-valver	AW387 2/6
A One-valver for America	AW429 2/6
Short-Wave World Beater	AW436 3/6
Standard Four Valve S.W.	WM383 3/6
Enthusiast's Power Amplifier	WM387 3/6
Standard Four Valve	WM391 3/6
Listener's 5-Watt Amplifier	WM392 3/6

QUERY COUPON

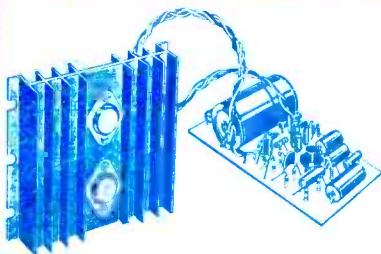
This coupon is available until 7th August, 1964, and must accompany all queries in accordance with the notice on our "Letters to the Editor" page.

PRACTICAL WIRELESS, AUGUST, 1964.

TRANSISTOR HIGH FIDELITY EQUIPMENT

MAINS OR BATTERY OPERATION. 3 AND 15 OHMS.

10 WATTS MONO
OR 20 WATTS STEREO



● 10 WATT POWER AMPLIFIERS. Two versions. — 1dB 40 c/s to 20 kc/s. 60dB Feedback 100mV input and less than 0.2% distortion for 10 watts output. 3 and 15 ohm versions. Very low current. 6-Transistors and Rectifier.

● 3 ohm 10 Watt. ● 15 ohm 10 Watt.
BUILT £5.10.0 BUILT £5.19.6

P.P. 2/6.

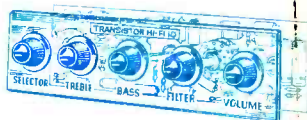
P.P. 2/6.

★ MAINS UNIT—will run 2-amplifiers for 3 ohm and 15 ohm. 69/6, P.P. 2/6. Each type.

★ Mains Unit for single amplifier. 59/6, P.P. 2/-.

● Pre-amplifier Built.
£5.10.0 P.P. 2/-.

COMPLETE CIRCUITS
WITH FULL DETAILS
ON REQUEST



● Low Distortion.
● High Performance.
● Mains or Battery.
● Low Noise Design.
● Mono or Stereo.

Dark Brown and Gold
Panel Plate. 8/6.

GUARANTEED HIGH
PERFORMANCE UNITS.

● Trade Discounts
Available. Send For
Details.

● MONO PREAMPLIFIER AND CONTROL UNIT.

For use with either of above amplifiers or valve amplifiers — Hum Free — High Sensitivity — 8 Inputs between 1.5mV and 300mV. For all pick-ups — Microphones, Tuners — Tape Replay. Separate treble and bass with cut and boost — 4 position Low Pass Filter — Volume etc. Panel size 9 x 2 1/2 in. Battery operated or from power supply.

MULTI-INPUT PREAMP



Simplified version of Mono Preamp above. 8 inputs as above. Input selector, Tone and Volume Controls. Size 5 x 2 1/2 x 2 in. Ideal as a Preamp for any valve or Transistor amplifier.

● PRICE BUILT 65/- P.P. 1/6.

● Dark Brown and Gold Panel Plate 6/6

● HIGH PERFORMANCE — LOW DISTORTION
— LOW NOISE — HI FI

STEREO TRANSISTOR INTEGRATED PRE-AMPLIFIER AND CONTROL UNIT

● Low noise printed circuit design developed from above mono equipment.

● Ganged controls, 8 inputs per channel for all types of input. Treble, bass, volume selector, on/off mono-stereo, etc.

● Designed for use with either of above 10 watt amplifiers.



● PRICE BUILT
£10.19.6 P.P. 3/6

Dark Brown and Gold
Panel Plate. 12/6.

"CONVAIR"



ALL PARTS SOLD SEPARATELY
(Batteries 6/- extra).

PUSH-BUTTON PORTABLE CAR RADIO

- New printed circuit 6-Transistor design. Over 700mW push-pull output.
- Push-button selection of MW and LW with full tuning on both wavebands.
- A new design with amazing performance at a realistic price.
- New attractively designed portable cabinet with horizontal tuning and all stations marked.

Total Cost of ALL Parts

£7.19.6 P.P. 3/6.

● FOLLOWING A LINE OF QUALITY AND VALUE IN PORTABLES

● VHF FM TRANSISTOR TUNER

- 5-Transistor.
- High Sensitivity.
- 4 Diodes.
- Full coverage 87 to 105 Mc/s.
- AFC and AVC.
- Up to 1 volt output.

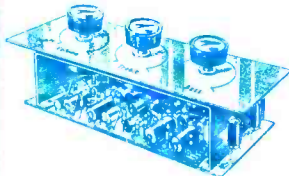
Printed circuit design of high sensitivity and quality. Output for valve or transistor amplifiers. Size 3 1/2 x 2 1/2 x 4 in. Simplified building instructions. All parts sold separately.



TOTAL COST £7.19.6 P.P. 2/6.

(Cabinet assembly 20/- extra.)
Detailed Circuit Book on Request.

7-TRANSISTOR RECORD/PLAYER/RADIOGRAM AMPLIFIER



- Mains or Battery operation.
- 4 watt peak output.
- Full Treble and Bass boost and cut.
- 40 c/s to 20 kc/s ± 3 dB.
- Inputs for Pick-ups, Radio Tuners, Microphones, mixers.
- 9/12 volt for 3 ohm speakers. (mains unit 49/6 extra).

Built Ready To Use £5.19.6 P.P. 2/-.

● Size only 6 x 2 1/2 x 2 in.
Ideal for mains or battery, portable or domestic record player, grams, etc. Or car.

Latest 86-page fully detailed and illustrated catalogue. Components, accessories. Hi-Fi equipment, etc. 2/6 post paid.

SPECIAL OFFERS

- SCOTCH BOY TAPE. 3 1/2 in., 300ft. L.P. complete with spare spool. 5/6. P.P. 9d.
- MARRIOT TAPE HEADS. Type R/RP/3. 1 track. Complete with Mullard P. MAG. erase ring. 15/4. P.P. 1/4. The pair.

HENRY'S RADIO LTD. PADDINGTON 1008/9.

303 EDGWARE ROAD, LONDON W.2.
(Open Monday to Saturday all day 9 a.m. to 6 p.m. Half-day Thursday 1 p.m.).

PLEASE TURN TO INSIDE PAGE