

PRACTICAL WIRELESS

FEBRUARY 1964

2¹/₂



**MODERN COMPACT
3-TRANSISTOR
S.W. CONVERTER
1.7-31.5 Mc/s**

MAIN TUNING

WAVEBAND

BANDSPREAD

RF GAIN

AERIAL TRIM

ON

9.10.11.12

OFF

RF

ADCOLA

PRODUCTS LTD. (Incorporated in England)
(Long Trade Marks)

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

INEXPENSIVE BASIS OF A COMPLETE HI-FI SYSTEM

OR TOP QUALITY
RADIOGRAM

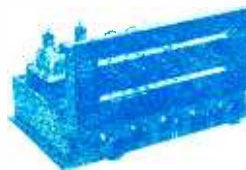
Armstrong

STEREO 55 TUNER AMPLIFIER CHASSIS



One compact chassis combines AM and FM tuners, Stereo Control Unit and two High Fidelity Amplifiers. For mono reproduction the two amplifiers are used together so that up to 10 watts output is available. Provision for tape recording and playback is made with a choice of inputs for crystal or ceramic pick-ups including the Decca Deram. The facilities are also available for use with a tape deck and its associated pre-amplifier.

PRICE £29.18.0



AF 208 AM/FM CHASSIS

A high quality tuner amplifier chassis which can be used for the conversion of an existing radiogram or as the basis for building a new radiogram or reproducing system. A system which can include tape recording and playback as well as the normal AM and FM radio and record reproduction.

PRICE £21.4.0

Write for descriptive literature to

ARMSTRONG

 (Dept. PFC.)

Walters Road, London, N.7. Tel NORth 3213

R.S.T. VALVE MAIL ORDER CO.

Tel: MITcham 6202
Open Daily to Callers
Mon.—Sat. 9 a.m.—5.45 p.m.
Wednesday 1 p.m.

211a STREATHAM ROAD, MITCHAM, SURREY.

All Valves Brand New and Fully Guaranteed — Obsolete valves a speciality.
Quotations given on any type not listed. Send S.A.E.

Special 24 Hour Express Mail Order Service

AC2/PEN 19/6	ECC88 12/6	EY86 7/1	PABC80 13/-	SP61 3/6	UL85 7/6	6A7 9/1	6L19 15/1	12Q7GT 6/6
AC2/PEN DD 19/6	ECC91 3/-	EY91 3/-	PCC84 8/-	T41 15/-	UM80 10/6	6A8G 8/6	6N7GT 9/6	12SA7 8/6
AC/TP 29/-	ECF80 7/6	EZ35 6/-	PCC85 9/6	TDD4 12/6	URIC 15/-	6A8GT 13/6	6P25 10/6	12SK7 6/-
AC/VPI-5-7 15/-	ECF82 8/6	EZ40 7/1	PCC88 12/6	TDD13C 17/6	UU6 17/6	6AC7 6/-	6P28 12/6	12SL7 8/-
AZ1 15/-	ECH3 21/6	EZ41 7/-	PCC89 8/6	TH41 20/-	UU8 15/-	6AK5 5/-	6Q7G 6/6	12SN7 10/-
AZ31 13/6	ECH21 21/-	EZ80 6/-	PCF80 9/-	TY86F 12/6	UU9 7/6	6ALS 4/1	6Q7GT 8/6	12SQ7 12/-
B36 9/-	ECH35 10/-	EZ81 6/-	PCF82 7/-	U10 9/-	UY1 12/6	6AM5 5/-	6SA7 7/1	14H7 10/-
CIC 10/-	ECH42 9/6	EZ90 4/6	PCF84 12/6	U11 15/6	UY21 15/6	6AM6 4/6	6SA7 7/1	14H7 10/-
CHC35 20/-	ECH81 7/6	E1148 2/-	PCF86 12/6	U12 9/-	UY41 7/6	6AQ5 4/1	6S7 8/6	14R7 10/-
CL3 12/6	ECH83 8/6	FC2 1 15/-	PCL82 9/-	U14 9/-	UY85 6/6	6AU6 9/-	6S5F 10/-	19AQS 8/-
CY1 15/-	ECL80 7/6	FC2A 17/6	PCL83 10/-	U22 8/-	VP4 15/-	6AUB 9/-	6S7G 7/1	19BGG 15/-
CY31 12/6	ECL81 10/-	FW4/500 9/-	PCL84 7/-	U24 21/-	VP4A 15/-	6B8G 3/-	6S7H 6/-	20D1 10/-
D77 4/-	ECL82 9/6	FW4/800 9/-	PCL85 9/-	U25 11/-	VP4B 15/-	6BA6 6/-	6S7I 6/6	20D2 21/-
DAC32 9/6	ECL83 10/6	GZ30 10/6	PEN4A 19/6	U26 10/6	VR 105/307/1	6BE6 6/-	6S7K 5/6	20F2 17/6
DAF91 5/6	ECL86 9/6	GZ31 10/6	PEN4B 17/6	U31 9/-	VR 150/307/1	6BG6G 15/-	6S7L 5/6	20F1 22/6
DAF96 7/6	EF6 21/6	GZ32 10/6	PEN4DD 22/6	U35 17/6	W61 11/-	6BJ6 6/-	6SN7GT 5/6	20P1 15/-
DCC90 12/6	EF9 21/-	GZ33 19/3	PEN4VA 17/6	U37 17/6	W76 5/-	6B7A 12/6	6SQ7 8/6	20P3 24/-
DF33 9/6	EF22 14/-	GZ34 13/6	PEN36C 20/-	U47 11/-	W77 4/-	6BR7 10/6	6U4GT 10/-	20P4 20/-
DF91 4/-	EF37 8/-	HABC80 10/-	PEN45 10/-	U50 7/-	W81 6/-	6B8 10/6	6U5G 7/6	20P5 20/-
DF92 7/-	EF39 4/-	HL41 8/-	PEN45DD 25/-	U52 4/-	W81M 6/-	6BV6 8/-	6V6GT 8/6	25A6 8/-
DF96 7/6	EF40 15/-	HL41DD 8/6	PEN46 5/-	U76 7/6	X41 22/6	6BW7 8/-	6V6GT 8/6	25L6 8/-
DH63 6/-	EF41 8/-	HL92 8/6	PEN453DD 20/-	U78 4/6	X61M 10/-	6C4 3/6	6X4 4/6	25Y5 8/-
DH77 7/-	EF42 10/-	HL133DD 9/6	PEND4020 20/-	U82 10/6	X61M 10/-	6C5GT 8/6	6X5G 6/-	25Y5G 8/-
DK32 11/-	EF50A 3/-	HN309 25/-	PL33 15/-	U82 10/6	X65 12/6	6C6 6/6	6X5GT 8/6	25Z4 7/6
DK91 6/-	EF50E 3/-	IW4/350 10/-	PL36 12/6	U83 13/6	X76 12/6	6C9 12/6	6Y6 10/6	25Z5 8/-
DK92 7/6	EF85 5/-	IW4/500 10/-	PL38 21/6	U87 19/6	X76M 12/6	6CD6G 27/6	7B5 12/6	25Z6 8/6
DK96 7/6	EF86 8/-	KT33C 8/-	PL38 21/6	U91 13/6	X78 26/-	6C6 6/6	7B7 8/6	27SU 19/6
DL33 8/6	EF89 9/-	KT36 17/6	PL81 9/-	U91 13/6	X79 40/-	6C9 12/6	7C5 8/-	30C1 9/-
DL35 10/-	EF91 4/-	KT61 9/6	PL82 8/-	U93 15/-	Y61 10/-	6C9 12/6	7C6 8/6	30C1S 12/6
DL91 8/-	EF92 4/-	KT66 15/-	PL83 7/6	U93 15/-	Y63 10/-	6CD6G 27/6	7D5 15/-	30F5 10/-
DL92 6/-	EF95 5/-	KT76 10/-	PL84 8/-	U93 15/-	Z63 7/6	6C6 6/6	7D6 15/-	30FL1 10/6
DL93 7/-	EF98 10/-	KT81 8/-	PL84 8/-	U93 15/-	Z66 10/-	6F1 10/6	7D7 15/-	30L1 8/6
DL94 7/6	EF183 10/6	KTW61 8/-	PLB20 18/-	U801 19/6	Z77 4/-	6F6 7/6	7H8 6/-	30L1S 11/-
DL96 7/6	EF184 10/6	L63 6/3	PM24M 13/6	UAB80 7/-	Z152 5/-	6F12 4/-	7R7 10/-	30P4 18/-
EAB50 2/-	EK32 8/6	LN152 8/6	PX4 15/-	UAF42 8/6	I17 11/-	6F13 10/-	7Y4 6/6	30P12 10/-
EABC80 5/6	EL3 21/6	LN309 11/6	PX25 25/-	UB41 7/6	IC5 10/6	6F14 4/-	8D3 4/-	30P16 9/-
EAC91 4/-	EL32 4/6	LZ319 12/6	PY31 15/-	UBC41 8/6	ID5 8/6	6F15 12/6	8BW6 12/6	30P19 17/6
EAF42 9/6	EL33 10/6	MKT4 17/6	PY32 12/6	UBC81 10/-	ID6 10/6	6F19 12/6	10C1 12/6	30PL1 12/6
EB34 2/6	EL35 10/6	MS4B 17/6	PY33 10/6	UBF80 8/-	IHS 9/6	6F23 10/6	10C2 17/6	30PL13 12/6
EB41 6/-	EL37 17/6	MVS/PEN 17/6	PY80 7/6	UBF89 7/6	ILA 5/-	6F25 16/6	10F1 10/-	30PL14 16/6
EB91 4/-	EL38 17/6	MVS/PENB 15/-	PY81 7/6	UBL21 20/-	IN5 9/6	6F26 13/6	10F9 12/6	35A5 15/-
EB93 21/-	EL41 9/6	MU14 9/-	PY82 6/9	UCC84 11/6	IR5 6/-	6F33 5/6	10LD11 15/-	35L6GT 8/6
EB93 4/6	EL42 9/6	MX40 15/-	PY83 8/1	UCH21 20/-	IS4 8/-	6F36 2/6	10O13 15/-	35W4 7/6
EB81 10/-	EL81 12/6	N18 8/-	PY88 10/-	UCH81 8/-	IS5 5/6	6F37 5/6	10O14 19/-	35Z3 15/-
EBF80 8/-	EL84 6/9	N27 14/-	PY800 15/-	UCL82 9/6	IS5 5/6	6F38 4/6	10O15 23/6	35Z4 7/6
EBF83 8/-	EL85 10/-	N308 18/-	PZ30 15/-	UCL83 13/6	IT4 4/-	6F39 5/6	10O16 23/6	35Z5 8/6
EBF89 8/-	EL90 8/6	N339 30/-	Q595/10 10/10-	UF41 7/6	IT4 4/-	6F40 5/6	10O17 15/-	50C5 10/-
EBL1 21/-	EL91 4/-	N369 10/6	Q5150/15 10/-	UF42 7/6	IT4 4/-	6F41 5/6	10O18 15/-	50C6 30/-
EBL21 21/-	EL95 10/6	R2 10/-	R16 17/6	UF42 7/6	IT4 4/-	6F42 5/6	10O19 15/-	50L6 8/6
ECC35 8/-	EM80 8/6	R16 17/6	R19 16/-	UF42 7/6	IT4 4/-	6F43 5/6	10O20 15/-	75 8/6
ECC40 15/-	EM81 8/6	R19 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F44 5/6	10O21 15/-	78 7/6
ECC81 5/-	EM84 9/6	R20 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F45 5/6	10O22 15/-	80 9/-
ECC82 5/-	EM85 10/-	R20 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F46 5/6	10O23 15/-	85A2 12/6
ECC83 5/-	EY81 7/6	R20 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F47 5/6	10O24 15/-	185BT 30/-
ECC84 8/6	EY81 8/6	R20 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F48 5/6	10O25 15/-	807A 7/6
ECC85 7/6	EY83 12/6	R20 16/-	R20 16/-	UF42 7/6	IT4 4/-	6F49 5/6	10O26 15/-	807B 7/6

COMPLETE VALVE LIST FREE WITH ORDER

METAL RECTIFIERS

RM1 7/6	14A86	23/-	16RD 2-2-8-1	12/- (FC142)
RM2 8/-	14A97	26/-	16RE 2-1-8-1	10/- (FC150)
RM3 10/-	14A100	28/-	18RA 1-1-8-1	5/- (FC118)
RM4 17/6	14RA 1-2-8-2	21/- (FC301)	18RA 1-1-16-1	7/- (FC116)
RM5 19/6	14RA 1-2-8-3	25/- (FC31)	18RA 2N-1-8-1	12/-
	16RC 1-1-16-1	10/-	18RD 2-2-8-1	16/- (FC124)

BRAND NEW TRANSISTORS

OC44	5/-	OC74	6/-	OC81D	6/-
OC45	5/-	OC75	6/-	OC81m/pr.	16/-
OC71	5/-	OC77	6/-	OC82	8/-
OC72	6/-	OC81	6/-	OC82D	8/-

SILICON RECTIFIERS

400 volts 350 mA 7/6 each

TERMS OF BUSINESS C.W.O. or C.O.D.
4/2 PACKING CHARGE ON ALL C.O.D.
ORDERS. POSTAGE 6d. per VALVE

SETS OF VALVES

1R5, 1S5, 1T4, 354, 3V4 Set of 4, 19/-
DAF91, DF91, DK91, DL92, DL94 Set of 4, 19/-
DAF96, DF96, DK96, DL96 Set of 4, 26/6

CHOOSE AND BUILD A GENUINE SINCLAIR DESIGN

SMALLER THAN A 3d. PIECE! THE FANTASTIC SINCLAIR MICRO AMPLIFIER



Makes an ideal broadband R.F. Amplifier

This fantastically powerful amplifier is smaller than a 3d. piece. With a frequency response from 30 to 50,000 c/s. \pm 1 dB. and power gain of 60dB (1,000,000 times) it can be used as a sub-miniature hi-fi amplifier with an output suitable for any earpiece or even loudspeaker. Also makes an invaluable tool in the hands of the keen experimenter.

With MAT Transistors, brand new micro-miniature quality components and micro-printed circuit. With instructions for building and using with pick-ups, micro-radio receivers and transmitters, microphones, etc. Power consumption 0.4 mA at 1.5V to 1mA at 9V.

Build it for only **28/6**

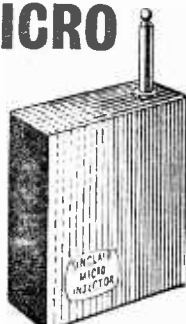
- OUTPERFORMS AMPLIFIERS 20 TIMES LARGER
- 40dB GAIN AT 1 Mc
- 30-50,000 c/s \pm 1dB.

Start now!

There's a whole new world of building and operating with transistor equipment, and Sinclair bring a wealth of designs and equipment to choose from. For results that are that much better, start with SINCLAIR now.

SINCLAIR MICRO INJECTOR

for speedy, accurate fault tracing



- COVERS 1 Kc/s to 30 Mc/s
- EASILY BUILT
- THE SMALLEST AND MOST EFFICIENT OF ALL

Here is a simple, yet highly efficient way to trace faults in valve and transistor audio and radio equipment of all kinds. Two Micro-Alloy Transistors (MATs) are used in this precision sub-miniature instrument which generates and injects a signal into any part of the equipment to be tested, at a frequency from 1 Kc/s to 30 Mc/s. The 6d. standard battery which it uses will last for about 6 months. Making the Sinclair Micro-Injector is extremely easy with the help of the instructions provided. In neat, well-made plastic case, 1 1/2 in. x 1 3/10 in. x 3/16 in., plus probe 3 1/2 in. long.

1 1/2" x 1 3/10" x 3/16"

Total cost including all parts MAT Transistors, printed circuit board, plated probe, and case in royal blue with gold trim.

27/6

Ready built and Tested **32/6**

THREE SPECIAL BOOKS OF TRANSISTOR DESIGNS



GENERAL

"22 Tested Circuits Using Micro-Alloy Transistors." *Post free* **5/6**

SHORT WAVES

"Tested Short Wave Receivers, Using MATs." *Post free* **5/6**

S.W. & COMMUNICATIONS

"Tested Superbet Circuits for Shortwave and Communication Receivers, using MATs." *Post free* **6/6**

SPECIAL PRICE FOR 3 TOGETHER **16/-**

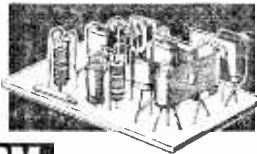
SINCLAIR TRANSISTORS

MICRO-ALLOY TRANSISTORS (MATs) give extremely high power gains.

- 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 V.H.F. and U.H.F.
Suitable for P.M., T.V., V.H.F. and U.H.F. Imp.
Typical alpha cut-off of 400 Mc/s.

SINCLAIR TR.5 VERSATILE 1/2 WATT AMPLIFIER WITH PRE-AMP STAGE



Will produce a perfectly clean half watt of audio noise even from very low output tape heads, pick-ups and microphones. Ready built with instructions and unconditionally guaranteed. CIRCUIT 5 matched transistors and temperature-compensating diode in a transformerless complementary-symmetry configuration. POWER OUTPUT—500 mW into 15 ohms. SENSITIVITY—0.5 mV. POWER GAIN—80 dB (100 million times). FREQUENCY—30 c/s to 20 kc/s \pm 3 dB. SIZE—2 1/2 x 1 1/2 x 3/16 in. POWER REQUIREMENTS—9V. **READY BUILT AND TESTED 59/6**

EQUIPMENT ORDER FORM

SINCLAIR RADIONICS LTD., 69 Histon Road, Cambridge

Please send.....
..... For which I enclose £.....s.....d.

NAME.....

ADDRESS.....
BLOCK.....
LETTERS PLEASE

- ALL ITEMS FULLY GUARANTEED
- FULL SERVICE FACILITIES AVAILABLE
- PROMPT ATTENTION TO ALL ORDERS

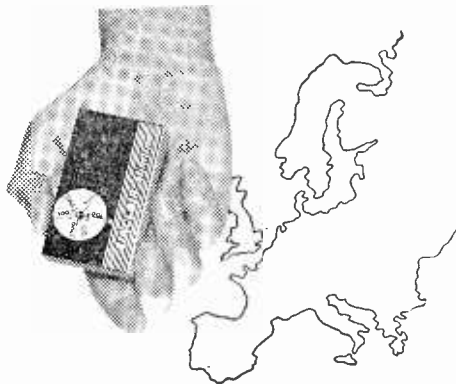
SINCLAIR RADIONICS LTD
69 HISTON ROAD, CAMBRIDGE

If you do not wish to cut coupon out, please mention "Practical Wireless" P.W. when ordering.

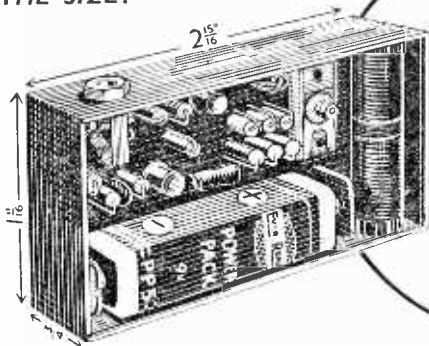
PRECISION DESIGNED FOR SUPERB PERFORMANCE

Gives you Europe in the palm of your hand

For POWER, SELECTIVITY and QUALITY, the Sinclair Slimline has no equal, yet it is actually smaller than a standard packet of 20 cigarettes! Such exciting standards are due entirely to exclusively developed circuitry using famous MAT Transistors —yet it costs so very little to build this wonderful receiver. It gives you Home, Light and Third Programmes as well as many European stations with amazing ease, playing even in cars and trains. For a brand new concept in radio listening, BUILD A SLIMLINE NOW —it's the set you will want to have with you always.



**THIS IS
THE SIZE!**



You can build this set complete with featherweight quality ear-piece for only
49/6

UNIQUE BECAUSE

- ★ It uses MATs and latest micro-miniature components.
- ★ It gives FULL coverage of the MW Band.
- ★ It gives hi-fi quality with incredible volume.
- ★ It will play in car or train.
- ★ It is completely self-contained with ferrite rod aerial and PP.5 battery in elegant gold-trimmed royal blue case.
- ★ Building is simple — results are fantastically good.

Sinclair 'SLIMLINE' MICRO RECEIVER

★ BREAKING ALL RECORDS

There is no set to compare with the Sinclair 'Slimline' for smallness and efficiency. British designed to the highest standards, many thousands are already in use, and each day's just adds to the countless letters of praise which enthusiastic constructors send us. It is no wonder this set is breaking all records—there has never been anything like it, and more and more are being built all the time.

SINCLAIR RADIONICS LTD
69 HISTON ROAD, CAMBRIDGE

If you do not wish to cut coupon, please mention "Practical Wireless", Feb. when ordering

SLIMLINE ORDER FORM

SINCLAIR RADIONICS LTD., 69 Histon Rd., Cambridge

Please send parts for building.....Slimline(s) for which I enclose £.....s.....d.

NAME

ADDRESS.....
BLOCK LETTERS

PLEASE

SURBITON PARK RADIO LTD.

FOR POST HASTE—POST FREE SERVICE

MARTIN RECORDAKITS

HALF TRACK

Collaro Studio Deck, Very latest model, 3apreds, 7in. spools	£10.18.6
Deposit £1.2.0 and 8 monthly	£1.7.3
Tape Amplifier for Studio Deck with ready wired printed circuit, control and input panels, mains and output transformers, knobs, plugs, screws, etc. EFM8, EUC81, EZ260, EMM85 and 2 E1.84. 3 watts output. Mag eye, radio and Mic. inputs. Ext. speaker socket. Tone and Monitor controls. Can be used as an amplifier	£11.11.0
Deposit £1.4.0 and 12 monthly	19/-
Case for above, with 3 5in. speaker, two tone grey	£5.3.0
Complete Kit with Tape and Microphone	£29.0.0
Deposit £2.18.0 and 12 monthly	£28.8.2
B.S.R. Monardeck TDE, latest model 3 1/2in. spools	£9.9.0
Deposit £1.0.0 and 8 monthly	£1.1.0
Tape Amplifier for B.S.R. Deck, printed circuit ready wired with EUC81, EMM85 and EZ260. Complete with all plugs, sockets, panels, knobs, etc. The whole amplifier mounts on to the deck making a self-contained unit	£8.8.0
Deposit £1.0.0 and 8 monthly	£1.1.0
Building Instructions available at 2/6 each kit (refunded if kit bought).	

JASON F.M. TUNERS

FMT1, complete with 4 EF91 valves	£8.8.6
Deposit £1.0.0 and 8 monthly	£1.0.9
FMT2, less power, complete with 4 EF90 valves	£10.12.6
Deposit £1.8.6 and 12 monthly	17/6
FMT2, with power, complete with 4 EF90 and 1 EZ90	£12.18.6
Deposit £1.8.6 and 12 monthly	£1.1.1
FMT3, Fringe complete with valves, less power	£12.10.0
Deposit £1.0.0 and 12 monthly	£1.0.8
FMT3, with power, complete with all valves	£14.15.0
Deposit £1.9.6 and 12 monthly	£1.4.5
JTV/2, switched F.M. and TV sound, self powered, all valves	£17.0.0
Deposit £1.14.0 and 12 monthly	£18.2.2
Mercury II, as JTV/2 but less power, all valves	£11.12.6
Deposit £1.5.8 and 8 monthly	19/-
Instruction book is included in all kits, but otherwise 2/6 and 3/6.	
JTV/2, ready built, state channels	£22.5.0
Deposit £2.4.6 and 12 monthly	£1.16.11
Monitor, ready built Mercury II	£16.10.0
Deposit £1.18.0 and 12 monthly	£1.7.4

AMPLIFIERS (MONO)

Linear L45, 3 watt, 3 valve	£5.19.6
Linear Diatone, 12 watt, autotune Mic. or Guitar	£12.12.0
Deposit £1.7.0 and 12 monthly	£1.0.8
Linear Concord, 30 watt, ideal Guitar amp. with case	£18.0.0
Deposit £1.16.0 and 12 monthly	£1.9.10
Dulci GA5, integrated amp. and P.A. 5 watt, E1.86 valve	£25.2.6
Deposit £1.8.6 and 12 monthly	£1.1.6
Dulci DPA15, 15 watt with 2 valve pre-amp	£18.4.0
Deposit £2.10.8 and 12 monthly	£2.1.11
Tripletone Hi-Fi Major with pre-amp, Guitar or Mic.	£15.18.9
Deposit £1.15.3 and 12 monthly	£1.6.1
Leak TL18, 10 watt Main amp. only	£18.18.0
Deposit £2.0.6 and 12 monthly	£1.11.1
Leak Variotone III pre-amplifier	£15.15.0
Deposit £1.11.8 and 12 monthly	£1.6.1
Quad, 16 watt Main amplifier only	£22.10.0
Deposit £2.0.0 and 12 monthly	£1.17.4
Quad pre-amplifier, Mono	£19.10.0
Deposit £1.19.0 and 12 monthly	£1.12.4

AMPLIFIERS (STEREO)

Dulci AC202, Integrated	£12.12.0
Deposit £1.7.0 and 12 monthly	£1.0.8
Dulci GA505, Integrated	£18.18.0
Deposit £2.0.6 and 12 monthly	£1.11.1
Rogers Cadet Mk. 3 with pre-amplifier, 4 EF91 valves	£28.6.16
Deposit £2.13.8 and 12 monthly	£2.4.5
Leak Stereo 20, Main amplifier	£30.9.0
Deposit £8.4.6 and 12 monthly	£2.10.3
Leak Variotone III, stereo pre-amplifier	£25.0.0
Deposit £2.10.0 and 12 monthly	£2.1.6
Quad 22 Stereo Control Unit	£25.0.0
Deposit £2.10.0 and 12 monthly	£2.1.6
For Quad Main Amplifiers see Mono section above.	
Armstrong 222, integrated 10 watts per channel	£27.10.0
Deposit £2.18.0 and 12 monthly	£2.5.8

QUARTER TRACK

Collaro Studio Deck Marriot "X" Series heads	£17.17.0
Deposit £1.7.8 and 12 monthly	£1.9.5
Tape Amplifier for Studio Deck, as over, but quarter track	£12.12.0
Deposit £1.17.0 and 12 monthly	£1.0.8
Case for above, with speaker, two tone grey	£5.5.0
Complete Kit with Tape and Microphone	£36.0.0
Deposit £3.10.0 and 12 monthly	£2.16.2
B.S.R. TDE Deck with Marriot "L" Series heads	£11.11.0
Deposit £1.4.0 and 12 monthly	19/0
Tape Amplifier for B.S.R. deck, as over, but quarter track	£9.9.0
Deposit £1.0.0 and 9 monthly	£1.1.0
Tape Pre-amplifier for Studio Deck, with power supplies, EUC81, E1.82, EZ260 and EMM84. Mic. and Radio sockets, gives an equalised output of 400 mV/ohms	Half Track £8.8.0
Deposit £1.0.0 and 8 monthly	Quarter Track £1.1.0
Deposit £1.0.0 and 9 monthly	£1.0.0

TAPE HEADS

MSS Quarter track, Record/Playback and Erase per set	£3.3.0
Erasmatic Half track Record Playback head only	£1.12.8
Erasmatic Half track Record Playback and Erase on plate	£1.19.6
Collan pressure pad for third head position	4/-
Brenell Mk. 5 Series 2 track, Half track 4 speed	£32.11.0
Deposit £3.0.0 and 12 monthly	£2.14.0
Brenell Mk. 3 Series 2 Track Amplifier with power pack	£26.0.0
Deposit £2.12.0 and 12 monthly	£2.3.2

NEW ARMSTRONG TUNER-AMPLIFIERS

Armstrong (Moon) AF208 A.M./F.M. Radio chassis, bass and treble controls, P.I. inputs, etc.	£21.4.0
Deposit £2.0.0 and 12 monthly	£1.14.10
Armstrong (Moon) 227 M A.M./F.M. Radio chassis, 10 watts	£33.18.0
Deposit £3.0.0 and 12 monthly	£2.16.1
Armstrong (Stereo) Stereo 55 A.M./F.M. Radio chassis, with Stereo gram	£29.18.0
Deposit £3.2.6 and 12 monthly	£2.9.5
Armstrong (Stereo) 227 A.M./F.M. Radio chassis, Stereo gram, 10 watts each channel	£48.15.0
Deposit £4.7.8 and 12 monthly	£4.1.1
Armstrong (Stereo) 228 A.M./F.M. Radio chassis, Stereo gram, 10 watts each channel, Filters etc.	£56.0.0
Deposit £5.12.0 and 12 monthly	£4.13.2
Rogers Switched F.M. Tuner, un-powered	£14.12.8
Deposit £1.11.8 and 12 monthly	£1.4.0
Tripletone F.M. Tuner, less power	£13.19.6
Deposit £1.8.0 and 12 monthly	£1.3.2
Tripletone F.M. Tuner, self-powered	£15.14.6
Deposit £1.11.8 and 12 monthly	£1.6.1
Armstrong 224 V.A.M. Tuner, self powered	£22.10.0
Deposit £2.5.0 and 12 monthly	£1.17.4
Armstrong 228 A.M./V.H.F. Tuner, self powered	£28.15.0
Deposit £2.17.6 and 12 monthly	£2.7.9

GRAMOPHONE UNITS

Garrard SRP10 with 41C cartridge, Mono, single player	£8.9.11
B.S.R. UA14 with 7C cartridge, Mono, 4 speed changer	£6.19.6
Deposit £1.0.0 and 6 monthly	£1.3.3
Garrard Autolite, Mono G.C.S. cartridge, 4 speed changer	£7.17.0
Deposit £1.0.0 and 6 monthly	£1.2.6
Garrard AT8 Autolite de Luxe, G78 Mono cartridge	£11.9.0
Deposit £1.6.8 and 6 monthly	£1.4.9
Philips AG1018, stereo cartridge, will change 7 in. records	£12.12.0
Deposit £1.7.0 and 12 monthly	£1.0.8
Decca Deram Arm and Plug-in Shell	£5.5.0
Decca Deram Transcription Cartridge	£4.14.6
Decca Deram Auto Cartridge	£3.18.6
Golding GL58 with arm, less cartridge	£18.19.8
Deposit £1.12.0 and 12 monthly	£1.6.6
Golding "88" Transcription, no arm	£17.14.0
Deposit £1.19.0 and 12 monthly	£1.9.0
Golding GL55, 4 1/2" and 6" tone arm, but less plug-up arm	£18.1.7
Deposit £1.7.7 and 12 monthly	£1.1.6
Garrard 4HF with Mono G.C.S. cartridge	£17.0.0
Deposit £1.14.0 and 12 monthly	£1.8.2
Garrard Lab Type "A" Transcription auto-changer Mono G.C.S.	£19.14.9
Deposit £1.19.6 and 12 monthly	£1.12.9
Garrard 301	£20.12.2
Deposit £2.3.2 and 12 monthly	£1.14.0
Garrard 301 Strobe	£22.0.0
Deposit £2.4.0 and 12 monthly	£1.16.8

LOUDSPEAKERS

Goodmans Axiotele S	£5.5.7	Goodmans Axiom 201 12in. Unit	£10.7.0
Goodmans Axiom 10	£6.5.11	Deposit £1.1.0 and 8 monthly	£1.5.9
Goodmans 5K/20/XL	£7.0.0	Goodmans Axiom 301 12in. Unit	£14.10.0
Wharfedale Super 8/RS/DD	£6.14.2	Deposit £1.9.0 and 12 monthly	£1.4.0
W.B. HF1018 10in.	£4.7.6	Wharfedale W12/EG 12in. 15 watt Guitar speaker	£10.10.0
R.T.C. 12in. 1mt. 15 watt	£5.5.0	Deposit £1.1.0 and 12 monthly	17/6
R.T.C. Hi-Fi Master	£8.8.0	Wharfedale Super 10/RS/DD 10in. high quality unit	£10.18.0
Goodmans XO 5000 cross-over	£1.19.0	Deposit £1.8.8 and 12 monthly	17/11
		Wharfedale RS/12/DD 12in. 15 watt Hi-Fi speaker	£11.10.0
		Deposit £1.7.8 and 8 monthly	£1.4.9

48. SURBITON ROAD, KINGSTON UPON THAMES, SURREY

Established over 30 years Telephone KIN 5549
 We pay all postage and insurance. All orders despatched same day. Money refund guarantee.
 Hours: 9 a.m.-6 p.m. (1 p.m. Wednesday). We do not close for lunch. Open all day Saturday.

THIS MAKES MONEY FOR YOU FOR YEARS TO COME!

- TELEVISION
- RADIO • RADIOGRAMS
- CAR RADIOS
- TAPE RECORDERS
- RECORD REPRODUCERS

CIRCUITS · DATA · SERVICING HINTS
For over 2,900 Models

**A REAL MONEY-SPINNER
 VITAL TO THE SHREWD RADIO MAN**

This New 11th Edition of Newnes famous repair set equips you for quicker servicing and more profit! With sets capable of giving longer service you need this data more than ever. It is your constant reference to sets marketed over the past eight years—always at hand instead of loose paper data so easily mislaid or destroyed. To-day there are also more radios and transistor portables, stereo radiograms, record reproducers, tape recorders, car radios than ever before—all needing expert service from time to time. Newnes RADIO & TV SERVICING provides you with data and information needed for years to come. Prove this investment now by 7 days' Free Trial.

Newnes RADIO and TV Servicing

Over 50,000 sold!
 Now comes the greatest edition of all.

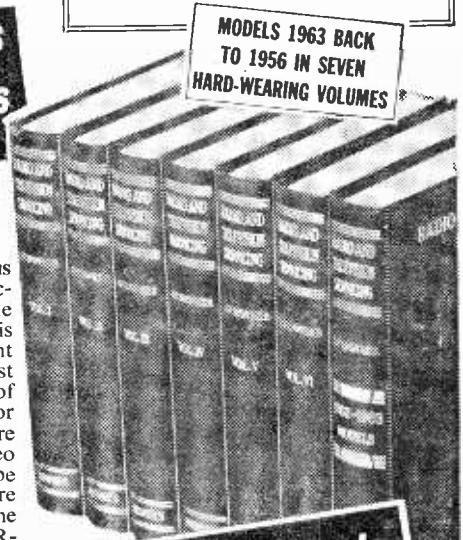
Over 4,500 Pages of Circuits, Component Layout Diagrams, Quick-Ref Data and Latest Technical Developments

DATA FOR ALL THESE MAKES

Ace, Ajax, Alba, Ambassador, Argosy, Armstrong, Baird, Beethoven, Berc, Brayhead, B.R.C., B.S.R., Bush, Capitol, Champion, Channel, Collaro, Cossor, Cyldon, Dansette, Decca, Defiant, Dynatron, E.A.R., Eddystone, Ekco, Elizabethan, Elpico, Emerson, E.M.I., Emisonic, English Electric, Ever Ready, Ferguson, Ferranti, Fidelity, Ford Motor Co., Garrard, G.B.C., G.E.C., Gramdeck, Grundig, H.M.V., Invicta, K-B, Magnavox, Marconiphone, Masteradio, McCarthy, McMichael, Motorola, Murphy, Pageant, Pam, Perdio, Peto Scott, Philco, Philips, Pilot, Portadyne, Portogram, Pye, Radiomobile, Raymond, Regentone, R.G.D., Roherts' Radio, Sobel, Sony, Sound, Spencer-West, Stella, Stereosound, Strad, Ultra, Vidor, Volmar, Walter, Webcor, Zenith.

**EVERY PURCHASER RECEIVES
 2 YEARS FREE
 POSTAL ADVICE**

*Quicker work Builds Goodwill
 -Makes more Profit!*



MODELS 1963 BACK TO 1956 IN SEVEN HARD-WEARING VOLUMES

**Use it for a week
 FREE
 NO OBLIGATION TO BUY**

Given with every set
Newnes TV ENGINEERS POCKET BOOK
 (Value 12/6)

An invaluable companion to your set for on-the-spot repairs. 272 pages of reference data on installing, fault-tracing and repairing, servicing equipment, etc.



Geo. Newnes Ltd.,
 15-17 Long Acre,
 London, W.C.2.

Send me Newnes RADIO AND TELEVISION SERVICING (in 7 Volumes) and TV ENGINEERS POCKET BOOK without obligation to purchase. I will return them in 8 days or send 16/- deposit 8 days after delivery, then twenty monthly subscriptions of 16s., paying £16.16s. in all. Alternatively, in 8 days I will remit the full cash price of £16.16s.

If under 21 your father must fill up this coupon. If married woman your husband must fill it up.

Full name..... { Mr. / Mrs. / Miss }
 (BLOCK LETTERS)

Address.....

Occupation.....

Signature.....

Tick ✓ where applicable
 The address on left is—
 My Property
 Rented unfurnished
 Parents' Home
 Furnished Accom.
 Temporary Address

(RV) 49/91

BENTLEY ACOUSTIC CORPORATION LTD.

Suppliers to H.M. Government. 38 CHALCOT 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 DISMANTLED EQUIPMENT NOR MANUFACTURERS' SECONDS & REJECTS, WHICH ARE OFTEN DESCRIBED AS "NEW AND TESTED," BUT HAVE A SHORT AND UNRELIABLE LIFE

Table with columns for item codes (e.g., OAA2, O244C) and quantities, listing various electronic components like resistors, capacitors, and diodes with their specifications and prices.

WE REQUIRE FOR PROMPT CASH SETTLEMENT ALL TYPES OF VALVES - LOOSE OR BOXED, BUT MUST BE NEW METAL RECTIFIERS, DRUMB 131-, DR2B AND DRMB 156B, LW7 21/, LW13 24/., RMO 711, RW18 8/, RM2 8/3, RM3 7/8, RM4 12/8, RM5 17/8, 14.8x, 17/8, 14.8V 19/8, RA100 22/., RA124 22/6, RA130 35/., RA131 20/., RA132 11/8, RA133 11/8, RA134 16/., RA135 16/., RA136 16/., RA137 16/., RA138 16/., RA139 16/., RA140 16/., RA141 16/., RA142 16/., RA143 16/., RA144 16/., RA145 16/., RA146 16/., RA147 16/., RA148 16/., RA149 16/., RA150 16/., RA151 16/., RA152 16/., RA153 16/., RA154 16/., RA155 16/., RA156 16/., RA157 16/., RA158 16/., RA159 16/., RA160 16/., RA161 16/., RA162 16/., RA163 16/., RA164 16/., RA165 16/., RA166 16/., RA167 16/., RA168 16/., RA169 16/., RA170 16/., RA171 16/., RA172 16/., RA173 16/., RA174 16/., RA175 16/., RA176 16/., RA177 16/., RA178 16/., RA179 16/., RA180 16/., RA181 16/., RA182 16/., RA183 16/., RA184 16/., RA185 16/., RA186 16/., RA187 16/., RA188 16/., RA189 16/., RA190 16/., RA191 16/., RA192 16/., RA193 16/., RA194 16/., RA195 16/., RA196 16/., RA197 16/., RA198 16/., RA199 16/., RA200 16/.

- EXPRESS POSTAL SERVICE! ALL ORDERS DESPATCHED SAME DAY AS RECEIVED. Terms of business: Cash with order or D.D. only. Post 6d per item. Orders over £3 post free, £10 + 5% cash. All orders cleared same day as received. Any parcel insured against damage in transit for 6d. extra. We are open for personal shoppers 9.30-5.30 pm. Tel. 8.30-11.45. Complete sets of metal-rod and obsolete valves, resistors, condensers, transformers potentiometers, microphones etc. with terms of business. Please telephone for any item not listed, with 4 A.E.

LASKY'S RADIO

FOR THE FINEST RANGE OF TRANSISTOR RECEIVERS

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 be built for

£10.19.6

Post & Pkg. 5/- extra. Data for each receiver U2 batteries, 2/8 extra.

GENERAL SPECIFICATION:

7 transistor plus 2 diode superhet, 6 waveband portable receiver. Operating from four 1.5 v. torch batteries. The SKYROVER and SKYROVER DE LUXE cover the full Medium Waveband and Short Waveband 31-94 M, and also 4 separate switched band-spread ranges, 13M, 16M, 19M and 25M. with Band Spread Tuning for accurate Station Selection. The coil pack and tuning heart is completely factory assembled, wired and tested. The remaining assembly can be completed in under three hours from our easy to follow, stage by stage instructions.

SPECIFICATION:
Superhet, 470 Kc/s. All Mullard Transistors and Diode. Uses 4-U2 batteries. 5in. Ceramic Magnet P.M. Speaker. Easy to read Dial Scale. Band Spread Tuning. 500 MW Output. Telescopic Aerial & Ferrite Rod Aerial.

WAVEBAND COVERAGE: 180-576Mc; 31-94M and Band Spread on 13, 16, 19 and 25 metre Bands.

2/6 extra. Refunded if you purchase the parcel. Four Leak-Proof batteries. 3/4 extra. All Components Available Separately.

LASKY'S FIRST AGAIN!

Now offer to the Home Constructor - full short wave coverage

THE SKYROVER and the SKYROVER De LUXE



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 be built for **£12.19.6** P. & P. 5/- extra.

THE "SPRITE"

Can be built for **79/6**

P. & P. 3/6 extra.



★ Six-Transistor Superhet Miniature Personal Pocket Radio. ★ Long and Medium wavebands. ★ Ferrite Rod aerial. ★ I.F. Frequency 470 Kc/s. ★ 3in. Speaker. ★ Printed circuit 21 x 2in. ★ Slow Motion Drive. ★ In Plastic Case, Size 4 x 2 1/2 x 1 1/2 in. In order to ensure perfect results, the SPRITE is supplied to you with R.F. and I.F. stages. Driver and Output stages ready built with all components mounted on the printed circuit. The SPRITE pre-assembled, plus cabinet, speaker and all components for final construction. Can be built for: **79/6** P. & P. 3/6 extra. Data and instructions separately 2/6. Refunded if parcel is purchased. *Real cut leather case/ wrist strap, personal earphone and case for earphone and battery 12/6 the lot extra. Make no mistake this is a SUPERBET receiver of genuine commercial quality. It is not a regenerative circuit.*

READY BUILT BOY'S TRANSISTOR RADIO

Ready built, 2 transistor pocket radio, in attractive plastic case, size only 4 x 2 1/2 x 1 1/2 in. Fitted with 2in. loudspeaker. Socket for personal earpiece & 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 Gift.



LASKY'S PRICE **42/-** with all accessories Post Free.

6 TRANSISTOR POCKET RADIO fully built, 4 x 2 1/2 x 1 1/2 in. with 2in. speaker. Uses single PP3 type battery. Supplied complete with personal earpiece and leather case. Tunable over full medium waveband.

LASKY'S PRICE **79/6** P. & P. 2/6. Complete with all accessories.

"REALISTIC" Seven

★ 7-transistor Superhet. ★ 350 milliwatt output into 4in. high flux 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. in Red, Grey, Blue/Grey or all Grey. ★ Easy to read Dial. ★ External socket for car aerial. ★ I.F. frequency 470 Kc/s. ★ Ferrite rod internal 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. 4/8.

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

REALISTIC Seven De LUXE

By popular request a De Luxe version of the well-proven Realistic "Seven" now available. With the same electrical specification as standard model—PLUS A SUPERIOR WOOD CABINET IN CONTEMPORARY STYLING, covered in attractive washable material, with super-chrome trim and carrying handle. Also a full vision circular dial, externally mounted to further enhance the pleasant styling. ALL FOR ONLY **£1** EXTRA. P. & P. as for Std. model

PRIVILEGE PARCELS

A "Privilege Parcel" allows you to purchase the Audio System of your choice at a worth while cash saving. Some examples are listed below, but we shall be pleased to quote our "Privilege Parcel" Prices for any selection of equipment of your own choice. Send us details of your requirements.

Tudor Stereo Amplifier	£15. 0.0	Tudor Stereo Amplifier	£15. 0.0
Connoisseur Craftsman, 2-speed transcription player.....	£16. 5.6	Braun P.C.I. Stereo Transcription Unit	£12. 9.6
Decca FFSS Stereo Pick-up	£18.18.0	2 x Sharon Loud-speaker systems.....	£18.19.0

Total £50. 4.6

Total £47. 8.6

"PRIVILEGE PARCEL" Price: £47.10.0

"PRIVILEGE PARCEL" Price: £45.0.0

Collaro Studio Tape Deck, 1-track model
 £10.10.0 |

Lasky's Tape Amplifier
 £8.19.6 |

Total £24. 0.0

"PRIVILEGE PARCEL" Price: £22.10.0

Collaro Studio Tape Deck, 1-track model
 £13.19.6 |

Total £31.16.6

"PRIVILEGE PARCEL" Price: £30.0.0

Carriage and Packing on all the above parcels, 10/6 extra.

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., Goudge St. MUSEUM 2605 | Telephone: Fleet Street 2833.
BOTH OPEN ALL DAY SAT. Early Closing Thurs. Rail Orders to Dept. P. W., Edgware Rd. | Open all day Thursday. Early closing Sat.

Make Your Ability PAY

UNLIMITED OPPORTUNITIES exist today for "getting on" . . . but only for the fully trained man. Let I.C.S. tuition develop your talents and help you to success.

STUDY IS EASY with I.C.S. guidance. The courses are thorough. Printed manuals, fully illustrated, make study simple and progress sure.

YOUR ROAD TO SUCCESS can start from here—today. Complete this coupon and post it to us, for full particulars of the course which interests you. MODERATE FEES INCLUDE ALL BOOKS.

Take the right course now . . .

ADVERTISING & ART

Copywriting
Layout & Typography
Commercial Illustrating
Oil & Water Colour

BUILDING & CIVIL ENG'G

Architecture, Bricklaying
Building Construction
Builders' Draughtsmans
Interior Decoration
Quantity Surveying
Heating & Ventilation
Carpentry & Joinery

COMMERCE

Book-keeping
Accountancy & Costing
Business Training
Office Training
Purchasing, Storekeeping
Secretaryship

SHORTHAND & TYPIING

Computer Programming
Small Business Owners

DRAUGHTSMANSHIP

Architectural Mechanics
Drawing Office Practice

ELECTRONICS

Computer & Maintenance
Electronic Technicians
Industrial Electronics

FARMING

Arable & Livestock
Pig & Poultry Keeping
Rabbits & Chinchillas

GENERAL EDUCATION

O.C.E. subjects at Ordinary & Advanced Level
Good English
Foreign Languages

HORTICULTURE

Home Gardening
Park Gardening
Market Gardening

MANAGEMENT

Business Management
Hotel Management
Industrial Management
Office Management
Personnel Management
Works Management
Work Study
Foremanship

MECHANICAL & MOTOR ENG'G

Engineering Maths.
Diesel Engines, Welding
Industrial Instrumentation
Workshop Practice
Refrigeration
Motor Mechanics, etc.

POLICE

Entrance Examination

PHOTOGRAPHY

Practical Photography

RADIO, TV & ELECTRICAL

Servicing & Engineering
Radio Construction (with Kits)
P.M.G. Certificates
Telecommunications
Electricians
Electrical Contractors

SELLING

Company Reps.
Sales Management
Marketing

WRITING FOR PROFIT

Short-story Writing
Free-lance Journalism

INTENSIVE COACHING for all principal examinations —G.C.E., Secretaryship, Accountancy, Engineering, Work Study, Management, Radio, Architecture and Surveying. Special course for French Oral Test.

Member of the Association of British Correspondence Colleges

Start today the I.C.S. way!

INTERNATIONAL CORRESPONDENCE SCHOOLS

(Dept. 172)
Intertext House, Parkgate Rd., London, S.W.11

Send FREE book on . . .

Name

Address

Occupation

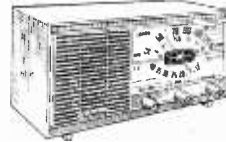
2.64

INTERNATIONAL CORRESPONDENCE SCHOOLS

HARVERSON SURPLUS CO. LTD.

For address see opposite page

OUR LATEST BULK PURCHASE!



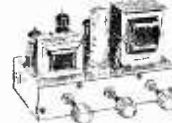
BRAND NEW A.C. MAINS 5 VALVE SUPERHET RADIO RECEIVERS

Housed in beautifully styled cabinets offering terrific 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 5 1/2 in. w. x 9 1/2 in. d. x 4 1/2 in. h. **PRICE ONLY \$7.17.6.** P. & P. 5/6.

MODEL 56. Similar circuitry to above but covers Medium wave only. Size 7 1/2 in. w. x 5 1/2 in. d. x 4 1/2 in. h. **PRICE ONLY \$4.14.6.** P. & P. 5/6. *Either of the above can be easily adapted for use as A.M. Feeder unit.*

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. Incorporates EUC88, EL84, EZ80 valves, heavy duty double wound mains transformer and output transformer matched for 3 ohm speaker, separate Bass, Treble and volume control. 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 our quantity order enables us to offer them complete with knobs **\$4.5.0** P. & P. 4/-

TWO VALVE AMPLIFIER similar to above but using ECL82 and EZ80 with tone and volume controls. Output 3 watts. **PRICE 7/5.-** P. & P. 4/-

SPECIAL OFFER!

MARCONI QUARTZ CRYSTALS TYPES ZMB

(Glass encapsulated, 2 wire lead out Size 1 1/2 in. high x 1/2 in. dia. Following frequencies (Kc/s) only available
15321, 15393, 15946, 15708
13771, 13933, 13993, 13963
14021, 14083, 14146, 14208
14271, 14333, 14396, 14459
6/- each, P. & P. 1/- per crystal, 3 or more Post Free.

4-SPEED PLAYER UNIT BARGAINS

All Brand New in Makers' Original Packing

SINGLE PLAYERS

TB/12 Carr. 3/6
B.S.R. UA14 \$6.2.6
Latest B.S.R. UA16 \$7.2.6
LATEST GARRARD AUTO-SLIM with heavy-duty 4-spool motor. **FEW ONLY \$7.7.0** (Standard Auto-Slim \$6.17.6). Carr. 5/- on each.

SPECIAL TRANSISTOR BARGAINS

ALL BRAND NEW

SET 15 (Matched Pair) 15/-
OC71 .. 5/- PXA101 6/6
OC72 .. 6/- XA103 6/6
OC76 .. 6/- V15/10p 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.F.2 Pack: 2-PXA101 I.F.; PXA102 Osc.; 1-PXA102 Mixer 12/6
L.F.6 Pack: Consisting of PXB113 Driver, Matched pair PXC171, mounted complete with heat sinks (Equiv. OC81B and OC81C) 13/6
ALL TRANSISTORS POST FREE

CARTRIDGE BARGAINS!

B.S.R. TC85 High output compatible Stereo Cartridge, Brand New. Complete with Stereo/LLP75 sapphire stylus and universal mounting bracket. Original list price 44/11. **OUR PRICE 22/6.** P. & P. 1/-.

COLLARO HI-FI STEREO T/0 CARTRIDGE

Type "U". Complete with universal bracket and stylus for Stereo L.P. and T.S. Original list price 59/8. **OUR PRICE 25/-** P. & P. 1/-.

ACCUS GP85/1 T/0 MONO CRYSTAL CARTRIDGE.

Comp. with sapphire stylus and mounting bracket. Limited number only at 12/6. P. & P. 1/-.

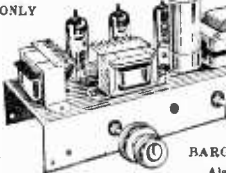


This may be your last opportunity to secure one of these amazing amplifiers—when remaining few are sold no more will be available.

TELEFUNKEN HI-FI STEREO AMPLIFIER

Model 882 with BALANCE CONTROL, 110/250 v. A.C. input 6 watt undistorted output (10 watts nominal). Size 12 x 8 x 2 in. Weight 9 lb. Complete with spec. and instructions **STILL ONLY \$5.19.8.** Carr. 7/-.

FEW ONLY



STEREO AMPLIFIER

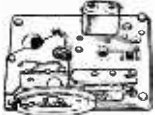
Incorporating 2 ECL82s and 1 EZ80, heavy duty, double wound mains transformer, Out at 4 watts per channel. Full tone and volume controls. Absolutely complete.

BARGAIN PRICE 89/6 P. & P. 5/-

Also available complete with two 8 x 5 in. Speakers for only \$5.10.6. P. & P. 6/6.

SPECIAL PURCHASE! TURRET TUNERS by famous maker Brand new and unused. Complete with PC83 and PEP80 valves, 34-35 Mc/s I.F. biscuits for Channels 1 to 5 and 8 and 9. Circuit diagram supplied. **ONLY 25/-** each. P.P. 2/6.

F.M. TUNER HEAD



A permeability tuned tuner head by a famous maker, supplied without valve (EC85) 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 HEADS

10.7 Mc/s I.F. 15/- plus 1/9 P. & P. EC85 valve, 8/6 extra.

E.M.I. 4-speed Player and P.U.

FURTHER HUGE PURCHASE enables us to offer these **67/6** P. & P. at 4/6.



Heavy 8 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.

RECORD PLAYER AMPLIFIER

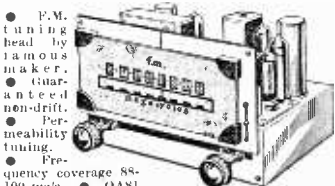
2 valve (EZ80 EC82) A.C. mains, 3 watts output, ready built, tested and complete with valves and output transformer. Size 7 1/2 in. w. x 2 1/2 in. d. x 5 1/2 in. h. 55/-. P. & P. 3/-. Suitable speakers: 6 1/2 in. 12/6 - P. & P. 1/6, 10 x 6 in. 25/-, P. & P. 1/6.

SPEAKER & CABINET FABRICS

Oatmeal, Red and Gold fabrics and various patterns in Vynal and Tycan for speaker and cabinet covering, also Red Rexine for cabinet covering only. All 5 1/2 in. wide and usually sold at 35/- yard.

OUR PRICE 13/6 length, plus P. & P. 1/6. (Minimum order 1 yard). Send S.A.E. for samples.

HARVERSON'S F.M. TUNER Mk. I



● F.M. tuning head by famous maker ● Tuning head is non-drift ● Permeability tuning ● Frequency coverage 88-100 Mc/s. ● OAS1 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 EC83, two EF89's, and EZ80. (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 **£15.6**, plus 5/6 P. & P. (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 (2V12) and tone control. **£7.7.0**. P. & P. 8/6. **Handsome Metal Cabinets.** 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.

6 TRANSISTOR AND DIODE SUPERHET

A first-class 2 wavebands transistor superhet. ● Printed circuit panel (size 8 1/2 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; 2 1/2 in. 10/8; 3 1/2 in. 12/8; 5 in. 17/8; 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. 2/6.

COIL AND TRANSFORMER SET FOR TRANSISTOR SUPERHET

3 I.F. transformers, one oscillator coil, one driver transformer and wound Ferrite aerial (incl. long and aerial coupling). 28/6 complete, post 1/6. If transistor printed circuit board to match. 8/6. Post 3d. Circuit diagram 1/6 extra.

QUALITY RECORD PLAYER AMPLIFIER

A top-quality record player amplifier. This amplifier (which is used in a 29 gm. record player) employs EC83, EL84, EZ80 valves. Bass, treble and volume controls. Complete with output transformer matched for 3 ohm speaker.

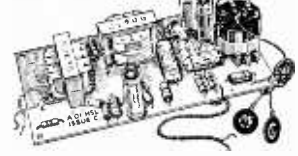
PRICE 69/6 P. & P. 3/6
DITTO. Mounted on board with output transformer and 3 ohm speaker.
Complete at **89/6 P. & P. 4/6**.

QUALITY PORTABLE RECORD PLAYER CABINET

Uncut motor board. Will take above amplifier and B.S.R. or GARRARD Autochanger or Single Record Player Unit. Size 18 x 14 x 8 1/2 in.
PRICE £39.6 Carr. 5/-

HIGH GAIN 4-TRANSISTOR PRINTED CIRCUIT AMPLIFIER KIT
Type TAI

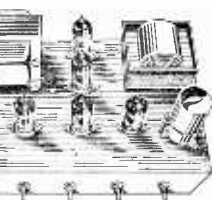
● Peak output in excess of 11 watts. ● All standard British components. ● Built on printed circuit panel, size 6 x 3 in. ● Generous size Driver and Output Transformers. ● Output transformer tapped for 3 ohm and 15 ohm speakers. ● Transistors (GTT14 or 81 Multilink OC81D and matched pair of OC81 o/p). ● 9 volt operation. ● Everything supplied, wire, battery clips, solder, etc. ● Comprehensive easy to follow instructions and circuit diagram 1/6 (Free with Kit). All parts sold separately. Also ready built and tested. **52/6**. P. & P. 2/6. *A pair of T.A.I.'s are ideal for stereo.*



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

10 1/4 WATT HI-FI AMPLIFIER KIT

A stylishly finished monoaural 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 shrouded section wound output transformer to match 3-15 ohm speaker and 2 independent volume controls and separate bass and treble controls are provided giving good lift and cut. Valve line-up 2 EL84s, EC83, EF86 and EZ80 rectifier. Simple instruction booklet 1/6. (Free with parts.) All parts sold separately. **ONLY £6.19.6** P. & P. 6/6. Also available ready built and tested complete with input jack plugs. **£8.15.0** P. & P. 6/6.



£6.19.6 P. & P. 6/6

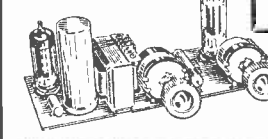
BRAND NEW 3 OHM LOUDSPEAKERS

2 1/2 in. 12/8; 5 in. 12/8; 6 1/2 in. 15/-; 8 in. 21/-; 10 in. 25/-; 12 in. 27/6. E.M.I. 2 1/2 in. tweeter ... 10/6. Bin. x 5 in. By famous maker ... 10/6. Rola (selection approx. 9 in. x 6 in. middle register speaker 10/6; 10 in. x 6 in. 26/-). Also 15 ohm 12 inch, 30/- P. & P. 2/6 to 6 in. 1/8; over 6 in. 2/6 per speaker.

AMPLIFIER CARRYING CASES
BRAND NEW

Strongly made wooden construction, foam tylic covered, complete with carrying handle. Overall size 13 1/2 in. wide x 9 in. deep x 9 in. high with sloping front panel. Weight only 4 1/2 lbs. Ideal for our 10 1/4 watt amplifier and many others. **BARAGAN PRICE 28/6** P. & P. 4/-

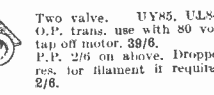
AMPLIFIER ON PRINTED CIRCUIT BOARD



Superior CABINET To take a 3 in. speaker, with motor board will accommodate BSR UA14 or UA16. **£3.9.8**. Carr. 5/6. Speaker 10/6 extra. P. & P. 1/6 extra. **LARGE CABINET** Similar to above with 3 ohm speaker. **£3.5.6**. Carr. 5/6.

TAPE DECKS
COLLARO STUDIO DECK

£10.10.0 plus 5/6 carr. and ins. **B.S.R. MARSEDECK** (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).



Two valve. UY85, UL84. O.P. trans. use with 80 volt tap off motor. 22/6. P.P. 2/6 on above. Dropper res. for filament if required 2/6.

ACOS CRYSTAL MIKES. High Imp. For desk or hand use. High sensitivity. 18/6. P. & P. 1/6.

THE GREAT STICK MIKE. Listed at 45/-. Our price 18/6. P. & P. 1/6.

CARBON MIKE INSERTS. Brand new. 2 1/2 in. dia., 3/8 in. P. & P. 9d. **STANDARD COLVERN 50K W/V Preset Pots** 2 for 4/-, P. & P. 1/6. **CONDENSERS.** 5000 pfd. 12 v. wkg. Size 3 x 1 1/2 in. dia. 3/- each. P. & P. 6d. each. **STANDARD 1 1/2 in. FUSE HOLDERS** Laminated. Twin, 2 for 1/6. P. & P. 9d. Laminated Single, 2 for 1/6. P. & P. 6d. **Belling-Lee Panel mounting** single 2/- each. P. & P. 6d. **TRANSISTOR DRIVER and O/P TRANSFORMERS.** (Tapped 3 ohms and 15 ohms output). plus 4 suitable Transistors giving approx. 1 watt output. 30/- P.P. 2/- **Precision made 2000 2-gang TUNING CONDENSERS.** size 2 1/2 x 1 1/2 in. 4/- each. P. & P. 1/6.

MAINS TRANSFORMER

Drop thru type. Tapped primary 110v., 200v., 220v., 240v., 320-0-320v. at 80ma and 6.3v. at 3 amperes. Generous core. Stack size 3 1/2 x 2 1/2 x 1 1/2 in. Weight 4 lbs. **ONLY 15/-**. P. & P. 3/6. **4-WAY NON-TANGLE TELEPHONE CABLE** Latest spring back coil type, extends 12 in. to 5 ft. Complete with rubber bushes. 3/8 each. P. & P. 1/6.

8 x 2 1/2 in. 3 ohm **SLOT SPEAKERS** Specially designed to handle large output. Ideal for high quality reproduction when speaker space is limited. Special purchase, regret no further technical details available, but an absolute snip at 8/- each. P. & P. 1/6 per speaker. **FEW ONLY 6 x 4 in. 3 ohm Speakers** Similar to above. **Only 9/-**. P. & P. 1/6 per speaker. **8 x 5 in. 3 ohm SPEAKERS BY WELL KNOWN MAKER.** Unrepeatable at only 10/8 each. P. & P. 1/6 per speaker. *A pair of these are ideal for Stereo.*

LOOK OPPOSITE FOR MORE BARGAINS

HARVERSON SURPLUS CO. LTD.

170 HIGH ST., MERTON, S.W.19. CHERRYWOOD 3985/6
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. CHARGES QUOTED APPLY TO U.K. ONLY P. & P. ON OVERSEAS ORDERS CHARGED EXTRA.
SEND STAMPED ADDRESSED ENVELOPE WITH ALL ENQUIRIES

Brand new individually checked and guaranteed VALVES

Table listing various vacuum tubes and valves with their specifications, including types like AC/HL, E1266, EF92, etc., and their corresponding prices.

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

MARCONI COMMUNICATION RECEIVERS. CR.150. Frequency coverage 2-60 Mc/s in 5 bands. Two IFs. 1st 400 kc/s, 2nd 463 kc/s. Image signal rejecting cov 40 dB up to 30 Mc/s and 20-40 dB from 30-60 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 100c/s to 10 kc/s in 5 stages. Acoustic filter associated with 100 c/s. Bandpass position for CW reception. Facilities for diversity reception. In as new guaranteed condition with original mains power supply unit £70 or without power supply unit £60. Carriage 30/-.

Original mains power pack for H.R.O. 110/220 v. A.C. Brand new in original packaging, 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.

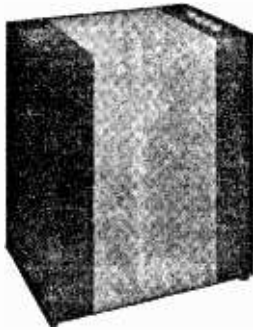
or phone output. Dimensions: Length 12in., width 8in. depth 9in. Weight 23 lb. In as new, tested and guaranteed condition. £23.10.0, including special head-phone and supply leads. Carr. £1.

P.C. RADIO LTD 170 GOLDHAWK ROAD, W.12 Shepherd's Bush 4946 Open 9-5.30 p.m. Thursday 9-1 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. Separate bass and treble "cut" and "boost" controls. Sensitivity 15 m.v. Two high impedance inputs. 10in. loudspeaker. Handsome, strongly made cabinet (size 14 x 14 x 7in. approx.) finished in attractive and durable polychrome. 200-250 A.C. mains operation. **£8.19.6** Or DEPOSIT £1 and 9 monthly payments of £1. 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.**

GLASGOW Opening late January at 236 Argyle St.

TRANSISTOR SALE. Mullard OC71 3/9, OC45 4/11, OC44 4/11, OC72 4/9, OC81 4/11, OC71 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 29/11.

SELENIUM RECTIFIERS
F.W. BRIDGE 24 v. 2 amp. .. 14/9
6/12 v. 1 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. 4 a. .. 12/3 250 v. 50 mA .. 9/11
6/12 v. 6 a. .. 15/3 250 v. 60 mA .. 4/11
6/12 v. 10 a. .. 98/9 250 v. 80 mA .. 5/11
6/12 v. 15 a. .. 35/9 250 v. 250 mA .. 11/9
CONTACT COOLED. 250 v. 75 mA. F.W. (Bridge), 10/11. 250 v. 50 mA. F.W. (Bridge) 8/11. H.W. 250 v. 60 mA. 5/11.

HI-FI 10-WATT AMPLIFIERS. Brand New Complete **£7.19.9** Carr. 5/8. 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 Osmonston Road The Spot

R.S.C. SENIOR 15 watt GUITAR AMPLIFIER

For lead or rhythm guitar. High-fidelity push-pull output. Separate bass and treble "cut" and "boost" controls. Twin separately controlled inputs for two instruments or "mike" and pick-up can be used at the same time. Loudspeaker is a heavy duty high flux 12in. 2 watt model with cast chassis. Cabinet 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 35/- and twelve monthly payments of 35/-.

HEAVY DUTY LOUDSPEAKERS IN SUBSTANTIAL REXINE COVERED CABINETS. Type B61. Suitable for Base Guitar Speaker Unit. High Flux. 15 ohms. 30 watts. Cabinet size approx. 24 x 21 x 13in. Only 191 gns. Or Deposit 37/6 and 12 monthly payments of 37/6. Type B62. Suitable for Bass Guitar. Super Sensitive. 15in. 15 ohms high flux speaker. Cabinet size approx. 30 x 21 x 14in. Attractive covering of two contrasting tones of Rexine and Vynair. Rating 50 watts. Only 29 gns. Or Deposit £3.7.8 and 12 monthly payments of 69/-.

LARGE REXINE COVERED SPEAKER CABINETS. Heavy blackboard construction. Very attractive two tone covering of Rexine and Vynair. Size 30 x 21 x 16in. cut for 15in. or 18in. speaker or for two 12in. 11 gns. Or Deposit 25/9 and 9 monthly payments 25/9. Size 20 x 30 x 16in. cut for 15in. or 18in. speaker 13 gns. Or Deposit 30/4 and 9 monthly payments 30/4. Suitable speakers available

FANE EXTRA HEAVY DUTY LOUDSPEAKER 15in. TYPE 153. 40 watts. Total flux 375,000 lines. Extremely high sensitivity. 15 ohm voice coil. Only 18 gns. or Deposit 35/- and 12 monthly payments 35/-.

FANE EXTRA HEAVY L/SPEAKER 18in. 15 ohms. 60 watts. 9in. diam. Speech Coil. Total Flux 375,000 lines. High sensitivity. ONLY 25 gns. or Deposit 52/9 and 12 monthly payments of 43/- Send S.A.E. for leaflet on 153 and 183.

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. 24 x 21 x 13in. Operation from 200-250 v. 50 c.p.s. A.C. mains.

Send S.A.E. for leaflet. Or Deposit £3.2.0 and 12 monthly payments of 56/10. Carr. 17/6.

29¹/₂ Gns. monthly payments of 56/10. Carr. 17/6.

EX. GOVT. SMOOTHING CHOKES. 200 mA. 3-5 H. 50 ohms. Parmeko 8/9; 150 mA. 10 H. 50 ohms 9/9; 80 mA. 20 H. 90 ohms 5/9; 120 mA. 12 H. 100 ohms 8/9; 50 mA. 50 H. 1,000 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. Louvred metal case only 8 x 5 1/2 x 2 1/2in. 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 (BRIDGE) F.W. ONLY 19/9

R.S.C. (Manchester) MAIL ORDERS to 5 County Arcade, Leeds 1. Terms: C.W.O. or C.O.D. No C.O.D. under £1 Ltd. Postage 2/9 extra under £2. 4/6 extra under £5. Trade Supplied. S.A.E. with all enquiries please.

LEICESTER 32 High St.	BIRMINGHAM 6 Gt. Western Arcade (Opp Snow Hill Sta) No half-day	SHEFFIELD 13 Exchange St. Castle Market Bldgs. Sheffield Half-day	HULL 51 Savile St., Hull Thursday	LIVERPOOL 73 Dale St. Liverpool 2 Half-day	BRADFORD 56 Morley St. (above Alhambra Theatre) Bradford Wednesday	MANCHESTER 8-10 Brown St. (Market St.) Manchester 2 No half-day	LEEDS 5-7 County (Mecca) Arcade Briggate, Leeds No half-day
--------------------------	---	---	--	---	--	---	---

R.S.C.

Manchester Ltd.

MAIL ORDERS to 5 County Arcade, 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.

LIVERPOOL 32 High St.
BIRMINGHAM 6 Gt. Western Arcade (Opp Snow Hill Sta) No half-day
Half-day Thursday

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

HULL 51 Savile St., Hull

LIVERPOOL 73 Dale St. Liverpool 2
Half-day Wednesday

BRADFORD 56 Morley St. (above Alhambra Theatre) Bradford

MANCHESTER 8-10 Brown St. (Market St.) 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 20w., 5 gns. 122/10A 20w., 6 gns. 122/12 20w., 6 gns. 122/12A 20w., 27.19.6 122/14 22w., 9 gns. 122/14A 22w., 10 gns. 122/17 25w., 11 gns. 122/17A 25w., 12 gns. 15in. 15 ohms. Cast chassis. Exceptionally robust 2in. diam. Voice Coil Assemblies. 152/12 20w., 12 gns. 152/12A 20w., 13 gns. 152/14 27w., 14 gns. 152/14A 27w., 15 gns. 152/17 35w., 16 gns. 152/17A 35w., 17 gns. "A" indicates dual cone type. 30-17,000 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-amplifier and Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 dB down. Frequency response -3 dB 20-30,000 c/s. 12 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 amplifier operates on 200-250 v. 50 c/s. A.C. Mains and has output for 3 and 15 ohm speakers. Complete Kit of parts with fully punched chassis and point-to-point wiring diagrams and instructions. If required replacement cover with carrying handles 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/- for 19/9. 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/TABLES 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. 250 v. from amplifier. Size approx 3 9/8 x 7in. high. Simple alignment procedure. Point-to-Point wiring diagrams, instructions and priced parts list with illustrations. 2/6. Total building cost £4.15.0. S.A.E. for leaflet.

R.S.C. BATTERY TO MAINS CONVERSION UNITS

R.S.C. BATTERY TO MAINS Type BML. An all-dry battery eliminator. Size 5 1/4 x 4 1/2 in. approx. Completely replaces battery supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 and 90 v. This includes low consumption types. Complete kit with diagrams, 38/9, 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 a lamp. fully smoothed. Thereby completely replacing both B.T. batteries and L.T. 2 v. accumulators when connected to A.C. mains supply 200/250 v. 50 c/s. SUITABLE FOR ALL BATTERY RECEIVERS normally using 2 v. accumulators. Complete kit of parts with diagrams and instructions. 49/9, or ready for 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 All Amplifier. £4.7.6. 12in R.A. 3 ohms 10 watts (12,000 lines), 59/9.

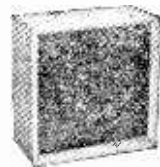
TWEETERS, R.A. 3 ohm. 25/9; 15 ohm 25/9

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

Jason FM1 V.H.F./F.M. Radio Tuner design. Total cost of parts including valves, Tuning dial, Eschutecon, etc., £7.19.6.

LINEAR 1.5 MINUTURE 4/5 WATT FULLY AMPLIFIER. Suitable for any record playing unit and most hi-fi telephones. Negative feed-back 12 dB. Separate Bass and Treble Controls. For mains 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Mullard valves E280, ECC83, EL84. Size only 7 1/8 x 3 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 CABINETS. 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 L631 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 40 millivolts input is required for full output so that it is suitable for use with the latest hi-fidelity pick-up heads, in addition to all other types of pick-ups and practically all "mikes". Separate Bass and Treble Controls are provided. These give full long-playing record equalisation. Hum level is negligible being 71 dB down, 15 dB of Negative feedback is used. L.T. of 300 v. 25 mA and L.T. of 6.3 v. 1.5 a. is available for the supply of a Radio Feeder Unit, or Tape-Deck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Chassis is not alive. Kit is complete in a metal case and includes fully punched chassis (with baseplate) with Blue Hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4.15.0, 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 Opening late January 326 Argyle St.

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.

THE SKYFORD 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, SP61, 6V6G. 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.

MULTI-METERS, CABY MI. 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 £4.17.6. B.20. Sensitivity up to 10,000 ohms per volt A.C. and D.C., £6.10.0. 30,000 ohms per volt, with overload buzzer, £8.19.6.

R.S.C. JUNIOR HI-FI REPRODUCER. The very latest Goodman Axette 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. Limited 8 Gns. Carr. 4/6.

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. Suitable legs with brass ferrules, 19/6 per set of 4.

R.S.C. CORNER CONSOLE CABINETS

Polished walnut veneer finish. Pleasing design. JUNIOR MODEL. Size 20 x 11 x 8in. for 8 or 5in. or 10 x 6in. speakers, £2.9.6. 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 ratings £4.19.9. Carr. 5/-. Or Senior 15 watt, £6.19.9. Carr. 7/6.

AUDIOTRINE EQUIPMENT CABINETS. Size 36 x 15 x 18in. Beautiful walnut veneered finish. Elegant contemporary design. Robust construction. Uncut, removable baseboard. Depth above baseboard 5 1/2". Only 12! gns. Carr. 15/- Terms: Dep. 29/9, and 9 mthly. pmts. 29/9



AUDIOTRON HI-FI TAPE RECORDER KIT 25¹/₂

GNS, Carr. 17/6.

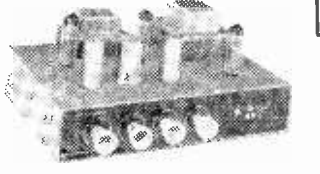


REALISM AT INCREDIBLY LOW COST, CAN BE ASSEMBLED IN AN HOUR. Incorporating the latest Colliaro Studio Tape Transcriber. The Audiotone High Quality Tape Amplifier with negative feedback equalisation for each of 3 speeds. High Flux P.M. Speaker, empty Tape Spool, a Real Best Quality Tape and a Handsome Portable Carrying Cabinet with latest attractive two-tone polychrome finish size 14 1/2 x 8 1/4 in. high and circuit. Total cost if purchased individually approximately £40. Performance equal to units in the £60-£80 class. S.A.E. for leaflets. TERMS, Deposit £2.13.9 and 12 monthly payments of 44/-. Cash price 11 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 A10. High sensitivity. Includes 5 valves, ECC83, ECC83, EL84, EL84, EZ81. High Quality sectionally wound output transformer specially designed for Ultra Linear operation and reliable small condensers of current manufacture. INDIVIDUAL CONTROLS FOR BASS AND TREBLE "Lift" and "Cut". Frequency response + 3 db 30-30,000 c/s. Six negative feedback loops. Hum level 90 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 STANDARD or LONG PLAYING RECORDS. FOR MUSICAL INSTRUMENTS such as STRING BASS, LEAD OR RHYTHM GUITARS, etc.



OUTPUT SOCKET with plug provides 300 v., 30 mA., and 6.3 v., 1.5 A. For supply of a RADIO FREQUENCY UNIT. Size approx. 12 x 9 x 7 in. For A.C. mains 200-250 v., 50 c.p.s. Output for 3 and 15 ohm speakers. Kit is complete to last nut. 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 louvred metal cover with 2 carrying handles can be supplied for 18/9. TERMS ON ASSEMBLY KITS, 10/3 extra. For A.C. mains 200-250 v., 50 c.p.s. Send S.A.E. for illustrated leaflet detailing Cabinets, Speakers, Microphones, etc., with cash and credit terms.

LINEAR TAPE PRE-AMPLIFIER, Type 1P/1. Switched Negative feedback equalisation. Positions for Record (1in., 3in., 7in.) and Playback. EMB4 Recording Level Indicator. Designed primarily as the link between a Colliaro 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 ready to use for 59/6 extra.

A complete set of parts for the construction of a stereo-ophonic 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 (monoaural) 10-watt amplifier. Valve line-up ECC83, ECC83, EL84, EL84, EZ81. Outputs for 2-3 ohm speakers. Point-to-point wiring diagrams and instructions supplied. Send S.A.E. for leaflet. Full constructional details and price list 2/6. Carr. 10/-.

8 Gns.

ONLY 3 PAIRS OF SOLDERED JOINTS PLUS MAINS

HI-FI CRYSTAL PICK-UP HEADS. (Cartridges.) Acos Standard replacement for Garrard, B.S.R. and Colliaro 16/8. Acos Stereo-Monoaural, 20/9. Ronette Stereo-Monoaural 39/9. B.S.R. Stereo 39/9. BRADAMATIC 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 latest Acos/hi-f Turnover Cartridge 29/11. CRYSTAL MICROPHONES. Hand type NP110 14/9, R.T.C. 19/9, Acos Mic 40 25/9. Acos Mic 45 29/9, Stick type Acos 39-1 39/9, BMG with neck band and heavy table stand 59/9. Label type 29/9.

COLLIARO JUNIOR 4-speed Single Player Unit and Crystal Pick-up with hi-f Turnover head. Only £3.19.6. B.S.R. CA14 4-sp/d AUTO-CHANGERS with hi-f turnover head. £6.19.6. Carr. 4/6. GARRARD AUTO-SLIM 4-SPEED AUTO-CHANGER with high fidelity pick-up. Latest model. For 200-250 v. A.C. mains. £7.19.6. Carr. 4/6. GARRARD 48 AUTO-SLIM DELUXE 4-SPEED AUTO-CHANGERS. Turnover GC8 head, for 200-250 v. A.C. mains. £11.9.0. GEA 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 1 1/2 x 2 1/2 in. Controls: Vol. and Tone with Switch. Only 59/6.

B.S.R. MONARDECK TAPEDECKS. Speed 3 1/2 in. per sec. With high quality recording heads. £3.19.6. Carr. 5/-. Cabinets to take Deck and amplifier 39/6.

SENSATIONAL STEREO OFFER

A complete set of parts to construct of a good quality Stereo amplifier with an undistorted output total 5 watts. For A.C. mains input of 200-250 v. Sensitivity 130 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 0-200-230-250 v.; P.W. (Bridge) Selenium Rectifier; Ammeter, Variable Charge Rate Selector Panels, Plugs, Fuses, Fuseholder and circuit. 59/9. Carr. 4/6.

R.S.C. BATTERY CHARGING EQUIPMENT Guaranteed 12 months.



plug for 6 v. or 12 v. charging. stainless steel case with stoved grey hammer finish. Fused and ready for use and battery clips.

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

ASSEMBLED 4 amps 6/12 v.

Fitted Ammeter and variable charge rate selector. Also selector plug for 6 v. or 12 v. Louvred metal case with stoved grey hammer finish. Fused ready for use with mains and output leads.

59/9 Carr. 4/6.

ASSEMBLED 6/12 v. 6 amps.

Fitted Ammeter and selector plug for 6 v. or 12 v. Louvred metal case with stoved grey hammer finish. Fused ready for use with mains and output leads.

49/9 Carr. 3/9.

CHARGER KIT, 12 v., 14 AMP or 24 v. 7 AMP

Consisting of mains transformer, 200-230-250 v. P.W. (Bridge) selenium Rectifier. Ammeter, Variable Resistor, Heavy Steel Stove enamelled case and circuit. Only £9.19.6. Carr. 15/-. Please state if 12 v. or 24 v. kit required.

BATTERY CHARGER KITS. Consisting of Mains Transformer, P.W. Bridge, Metal Rectifier, well ventilated steel case, Fuses, Fuseholders, Gauges, panels, Heavy Duty Clip, circuit. Carr. 3/6 extra.

6 v. or 12 v. 1 amp. 22/9
As above, with Ammeter. 28/9
6 v. or 12 v. 2 amps. 19/9
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. £4.19.6. Carr. 10/-.

R.S.C. MAINS TRANSFORMERS

Interleaved and Impregnated. Primaries 200-250 v., 30 c/s. Screened. FULLY SHROUDED DROP THROUGH 250-0-250v. 70mA. 6.3v. 2a. 0.5-6.3v. 2a. 17/9
350-0-350v. 80mA. 6.3v. 2a. 0.5-6.3v. 2a. 18/9
250-0-250v. 100mA. 6.3v. 2a. 6.3v. 1a. 21/9
350-0-350v. 100mA. 6.3v. 2.5a. C.T. 21/9
250-0-250v. 100mA. 6.3v. 4a. 0.5-6.3v. 3a. 15/9
300-0-300v. 130mA. 6.3v. 1a. 6.3v. 1a. for Mullard 510 Amplifier. 29/9
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. 29/9
350-0-350v. 150mA. 6.3v. 4a. 0.5-6.3v. 3a. 29/9
425-0-425v. 200mA. 6.3v. 4a. 5v. 3a. 49/9
FULLY SHROUDED UPRIGHT 250-0-250v. 60mA. 6.3v. 2a. 0.5-6.3v. 2a. 17/11
Midget type 21 x 3 x 3in. 27/9
250-0-250v. 100mA. 6.3v. 4a. 0.5-6.3v. 3a. 27/11
300-0-300v. 100mA. 6.3v. 4a. 5v. 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. 27/9
350-0-350v. 150mA. 6.3v. 4a. 0.5-6.3v. 3a. 27/9

FULLY SHROUDED (GUARANTEED)

425-0-425v. 200mA. 6.3v. 4v. C.T. 5v. 3a. 55/-
425-0-425v. 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
OUTPUT TRANSFORMERS
Midget Battery Pentode 66:1 for 354. 4/6
etc. 4/6
Small Pentode 5,000Ω to 3Ω 4/6
Small Pentode 7/8,000Ω to 3Ω 4/6
Standard Pentode 5,000Ω to 3Ω 5/0
Standard Pentode 7,000Ω to 3Ω 5/0
10,000Ω to 3Ω 5/0
Push-Pull 8 watts, EL84, or 6V6 to 3Ω or matched to 15Ω. 9/9
Push-Pull 10-12 watts to match 6V6 or EL84 to 3-3-8 to 15Ω. 11/9
Following types for 3 and 15Ω speakers:
Push-Pull 10-12 watts 6V6 or EL84 18/9
Push-Pull 15-18 watts, 6L6, KT66 22/9
Push-Pull Mullard 510 Ultra Linear. 29/9
Push-Pull 20 watts, sectionally wound, 6L6, KT66, EL84, etc. 40/9

MIDGET MAINS

Primarys 200-250 v. 50 c/s. 250v. 60mA. 6.3v. 2a. 11/9
250-0-250v. 60mA. 6.3v. 2a. 12/11
Both above size 21 x 2 1/2 in.

FILAMENT TRANSFORMERS

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

SMOOTHING CHOKES

150mA. 7-10 H. 250 ohms. 11/9
100mA. 10H. 200 ohms. 8/9
80mA. 10H. 350 ohms. 5/9
90mA. 10 H. 400 ohms. 4/11

CHARGER TRANSFORMERS

All with 200-250v. 50 c/s Primarys: 0-9-15v. 11a. 12/9; 0-9-15v. 2a. 14/9; 0-9-15v. 3a. 16/9; 0-9-15v. 5a. 19/9; 0-9-15v. 6a. 23/9; 0-9-15v. 8a. 28/9.

ATTN (step up/step down) TRANS.

0-110/120-230/250v. 50-80 watts. 13/9; 250 watts. 39/9; 150 watts. 27/9.

MICROPHONE TRANSFORMERS

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

PORTABLE TRANSISTOR RADIOS

BACKED BY SUPER AFTER SALES SERVICE

ROAMER SEVEN Mk III

● 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. Ferrite rod aerial for M & L waves and telescopic aerial for S Waves. Air spaced ganged tuning condenser ensures wonderful stations selection. Simulated hide case with gilt 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.)

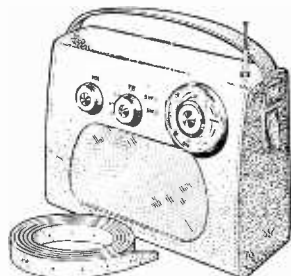
5 WAVEBAND PORTABLE OR CAR RADIO

Amazing performance and specification

Total cost of parts now only

£5.19.6 P. & P. 5/6

Parts Price List and easy build plans 3/-.



TRANSONA FIVE

"Home, Light A.F.N. Lux. 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 line tone super dynamic speaker, etc. Attractive case. Size 6 1/2 x 4 1/2 x 1 1/2 in. 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

NEW!

● 8 stages—6 transistors and 2 diodes.

This is a top performance receiver covering full Medium and Long Waves and Trawler Band. High-grade powerful 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 6 1/2 x 4 1/2 x 1 1/2 in. (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



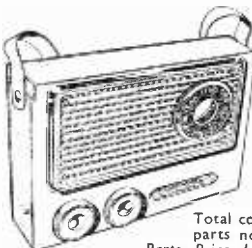
SUPER SEVEN

● 9 stages—7 transistors and 2 diodes

Covers Medium and Long Waves and Trawler band. The ideal radio, can be fitted with carrying strap for outdoor use. Completely portable—has built in aerial for wonderful reception. Push-pull output. 3in. speaker (will drive larger speaker). Size 7 1/2 x 5 1/2 x 1 1/2 in. (Uses PP6 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/-.



MELODY SIX

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

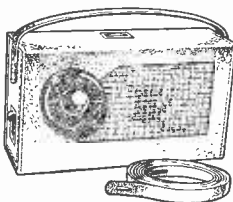
FREE! Miniature Earpiece, plug and socket (value 9/6) and details of conversion to private listening.

● 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 and supplied with hand and shoulder straps.

Total cost of all parts only **£4.9.6** P. & P. 3/-.

Parts Price List and easy build plans 4/-.



ROAMER SIX

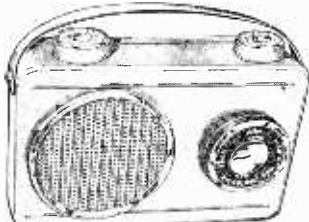
FREE! Miniature Earpiece, plug and socket (value 9/6) and details of conversion to private listening.

● 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 gilt fittings. Size 6 1/2 x 4 1/2 x 1 1/2 in.

Total cost of all parts now only **£4.19.6** P. & P. 3/6

Parts Price List and easy build plans 3/-.



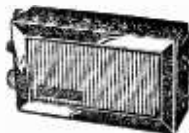
POCKET FIVE

● 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 2 1/2 in. moving coil speaker, built into attractive black case with red speaker grille. Size 5 1/2 x 1 1/2 x 3 1/2 in. (Uses 1289 battery available anywhere.)

Total cost of all parts now only **42/6** P. & P. 3/-.

Parts Price List and easy build plans 1/6

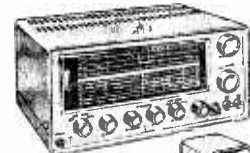


All components used in our receivers may be purchased separately if desired. Parts price lists and easy build plans supplied free with sets of parts or available separately at prices stated.

Radio Exchange Co.

27 HARPUR STREET, BEDFORD
Phone 2367 ● Opposite Co-op. ● 10-1 p.m. Sats

HE-30 SUPER AMATEUR COMMUNICATION RECEIVER



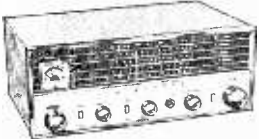
4 bands covering 550Kc/s to 30Mc/s continuous. Operation 200/250 volt A.C. Special features include: Easy to read illuminated slide rule dial—Built in Q multiplier—Aerial trimmer—calibrated electrical bandspread on amateur bands—0-100 logging scale—noise limiter—AVC/MVC selector—stable coil windings—B.P.O. for clear CW and SSB reception—built in edgewise 'S' meter. Output for phones or STD speaker. Supplied brand new and guaranteed with manual. £42 carriage paid. S.A.E. for full details.

SPECIAL BONUS. With purchase of HE-30 receiver matching speaker for only 32/6, or separately for 62/6.



HE-40 DE LUXE 4-BAND COMMUNICATION RECEIVER

Frequency coverage 550Kc/s to 30Mc/s continuous. Operation 220/240 volt A.C. The perfect receiver for short wave listening. Special features include: Slide rule tuning dial—electrical bandspread—0-100 logging scale—improved selectivity—built in 'S' meter—A.V.C.—Noise limiter—B.F.O.—Phone jack built in 5 in. speaker—tone control—standby switch—supplied with three aerials, ferrite loop for broadcast band, adjustable 56in. whip for short wave and wire aerial. Smartly styled durable metal cabinet. Supplied brand new and guaranteed with manual. £24.15.0 carriage paid. S.A.E. for full details.



NATIONAL H.R.O. RECEIVER

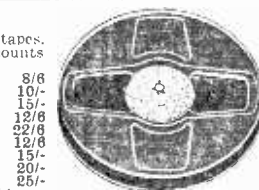
SENIOR MODEL. Supplied complete with full set of nine coils covering 50Kc/s to 30Mc/s. Each receiver thoroughly checked before despatch and available as follows:
Table Model. Good used cond... £19.19.0
Rack Model. As new cond... £22.10.0
Rack Model. Good used cond... £18.18.0
N.B.—Rack model is identical to table model with extended front panel to fit a 19in. rack. Carriage £1 extra.

200/250 volt A.C. power supplied for all above receivers, also sold separately 59/6, carr. 5/-. S.A.E. for details.

200/250 volt A.C. power supplied for all above receivers, also sold separately 59/6, carr. 5/-. S.A.E. for details.

LAFAYETTE BRAND RECORDING TAPES

First grade quality American tapes. Brand new and guaranteed. Discounts for quantities.
5in. 600ft. std. plastic .. 8/6
5in. 500ft. L.P. acetate .. 10/-
5in. 1200ft. D.P. mylar .. 12/6
5in. 1200ft. L.P. acetate .. 12/6
5in. 1800ft. D.P. mylar .. 22/6
7in. 1200ft. std. mylar .. 12/6
7in. 1800ft. L.P. acetate .. 15/-
7in. 1800ft. L.P. mylar .. 22/6
7in. 2400ft. D.P. mylar .. 25/-



COSSOR DOUBLE BEAM OSCILLOSCOPE 1035

9in. tube. Calibrated Y1 amplifier from 50mV to 50V. Bandwidth 10Mc/s. Calibrated Y2 amplifier from 5V to 500V with bandwidth up to 100Kc/s. Directly calibrated X shift providing time measurements from 15 microseconds to 150 milliseconds. Supplied in guaranteed perfect condition. £40 each. Carr. 30/-.

UNIVERSAL AVOMETER MODEL "7"



MINE DETECTOR No. 4A

Will detect all types of metal. Fully portable. Complete with instructions. 39/6 each. Carr. 10/- Batteries 8/6 extra.

SILICON RECTIFIERS

SCR. 100V. P.I.V.	4.7 amp .. 7/6
200V. P.I.V.	9 amp .. 5/6
800V. P.I.V.	500mA .. 5/6
100V. P.I.V.	500mA .. 3/6
70V. P.I.V.	1 amp .. 3/6

0A292 miniature silicon rectifiers. 1/- each. Discounts for quantities. Please add postage.

50 ranges. Guaranteed perfect working order. Supplied complete with leads, batteries and instructions. £11 each. Registered post 5/- extra.

CLEAR PLASTIC PANEL METERS

D'Arsonval Movement. Jewelled Movements. 1 1/2 in. Square Fronts. 1 1/2 in. Overall Behind Panel. 1 in. Dia. Panel Hole. Accuracy 2% of Full Scale. Silver Dials. Black Numerals and Pointers. Front Zero Adjustment. All types moving coil. Individually boxed and guaranteed. Available as follows:

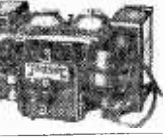
50µA .. 32/6	150mA .. 22/6
100µA .. 29/6	200mA .. 22/6
200µA .. 27/6	500mA .. 25/6
500µA .. 25/6	750mA .. 25/6
50-0-50µA .. 29/3	1A. DC .. 22/6
100-0-100µA .. 27/6	5A. DC .. 22/6
300mA .. 22/6	3V. DC .. 22/6
1mA .. 22/6	10V. DC .. 22/6
10mA .. 22/6	50V. DC .. 22/6
50mA .. 22/6	100V. DC .. 22/6
100mA .. 22/6	150V. DC .. 22/6



Calibrated 'S' meters 35/-. A full range of larger clear plastic and Bakelite panel meters are available. Send for illustrated leaflet. Trade terms available.

FIELD TELEPHONES

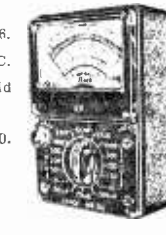
Type "L". Two line connection. generator bell ringings. Complete telephone system. Supplied in excellent condition. Fully tested and complete with batteries. Only 69/6 per pair. Carr. 5/-.
Type "P". As above but moulded bakelite case (as illustrated). Supplied complete with wooden transit case for field use. £4.19.6 per pair. Carr. 7/-.



MULTIMETERS BRAND NEW—FULLY GUARANTEED LOWEST EVER PRICES

Supplied with Leads, Batteries and Instructions.
1,000 Ω/VOLT .. 20,000 Ω/VOLT
0/15/150/1,000 v. A.C. and D.C. .. 0/10/50/250/500/1,000 v. A.C. and D.C.
0/150 mA D.C. .. 0/150/1,000 mA D.C.
0/100 KΩ etc. .. 0/50K/10/25/500 mA. D.C.
39/6. P. & P. 1/6. .. 0/50K/500K/5 meg. etc., 07/6. P. & P. 2/6.

30,000 Ω/VOLT .. 100,000 Ω/VOLT
0/1/10/50/250/500/1,000 v. D.C. .. 5/2.5/10/50/250/1,000 v. A.C.
0/150/250/500 mA. D.C. .. 10/25/100/250 mA. D.C.
0/10K/1 meg./10 meg., etc. £5.10.0. P.P. 2/6.
30,000 Ω/VOLT .. 100,000 Ω/VOLT
0/1/1/2/10/25/100/250/500/1,000 v. D.C. and A.C. .. 5/2.5/10/50/250/500/1,000 v. D.C. and A.C.
0/50µA/15/50/500 mA/0/12 amp. D.C. .. 0/25µA/2.5/25/250 mA. D.C.
0/10K/100K/1 meg./10 meg., etc., £7.10.0. P.P. 3/6.
100,000 Ω/VOLT .. 250,000 Ω/VOLT
5/2.5/10/50/250/500/1,000 v. D.C. .. 2.5/10/50/250/1,000 v. A.C.
10/25/100/250/500 mA/10 amp. D.C. .. 20K/200K/2 meg./20 meg. ohm etc. £6.19.6. Post Paid.



P.C.R.2 COMMUNICATION RECEIVERS

Excellent 6 valve receiver. Frequency coverage on 3 bands. 800-2,000 metres. 100-250 metres and 6-22Mc/s. Output for phone or speaker. Supplied in perfect condition. £5.19.6 each. Carr. 10/-. The receiver can be supplied with an internal power supply to operate on 200/250 volt A.C. at 39/6 extra, or plug in external power supplies are 35/- extra. Full circuit supplied.

AVO WIDE RANGE SIGNAL GENERATORS

Frequency coverage 50Kc/s to 80Mc/s in six turret operated cases. For use on standard A.C. mains. Packed in original transit cases with accessories. Supplied in as new condition, fully checked before despatch. £15. Carr. 10/-.
£6.19.6. Post Paid.

MINIFLUX TRACK TAPE HEADS

Set of three, record, playback, erase. Only 29/6 set. P. & P. 9d.

MICROAMMETERS

0-500 microamp 2 in. circular flush panel mounting. Dials engraved 0-15 1/6000 volt. Brand new boxed. 15/- P. & P. 1/6.

HEAVY DUTY AUTO TRANSFORMERS

0/115/230 volt step up or step down. Brand new boxed, ex-U.S.A. 3,000 watt. £7.10.0. Carr. 10/- 7,500 watt. £15. Carr. 11/-.

CR.100 COMMUNICATION RECEIVERS

60Kc/s to 30Mc/s on 6 bands. 200/250 volt A.C. operation. Supplied in perfect working condition. £21 each. Carr. 30/-.

FIELD STRENGTH METERS

Frequency coverage 1-250Mc/s. Fitted with 200 microamp meter. Supplied with telescopic aerial earpiece and instructions 69/6 post paid.

LARGEST STOCK OF COMPONENTS IN THE COUNTRY OPEN 9 a.m.-6 p.m. EVERY DAY—MONDAY to SATURDAY.

C.W. SMITH & CO. (RADIO) LIMITED
Phone: GERRARD 8704/9135
Cables: SMITHEX LESQUARE
3-34 LISLE STREET, LONDON, W.C.2

NEW YEAR CLEARANCE SALE — PRICES SLASHED

STOCKROOMS MUST BE CLEARED TO MAKE WAY FOR SPRING STOCK

Stock No. 101—Few Only **MAINS BURG-LAR ALARMS**, with complete set of door and window microswitches and Connecting Wire etc. Advertised at 7 gns. OUR PRICE to clear **39/6**, plus 3/- P. & P.

Stock No. 102—BRASS RIGHT ANGLE BRACKETS, drilled with 2 holes. Approximately 1/2 square. Only 9d. apair.

Stock No. 104—MINIATURE MEDIUM WAVE TUNING COILS with reaction winding. Clearance price 2/- each, plus 6d. P. & P.

Stock No. 105—39 ONLY PRECISION CAMERAS. Takes 127 film. To clear 8/6 each, plus 1/6 P. & P.

Stock No. 106—193 ONLY MINIATURE PLASTIC RADIO CABINETS, complete with chrome carrying handles, dial and tuning knob. Size 5 1/2 x 3 1/2 x 1 1/2 in. Clearance price only 5/6, plus 1/- P. & P.

Stock No. 107—PRINTED CIRCUITS of 3 Transistor Reflex Radio made to fit above radio, 2/6, plus 1/6 P. & P.

Stock No. 108—MINIATURE PRINTED RADIO CABINETS, 5 x 3 1/2 x 1 1/2 in. 2/6 each to clear, plus 6d. P. & P.

Stock No. 109—BEAUTIFUL MINIATURE SIZE PLASTIC RADIO CABINETS. Size 5 x 3 x 1 1/2 in. Printed and ready drilled. OUR PRICE 3/6, plus 1/- P. & P.

Stock No. 110—MINIATURE PLASTIC RADIO CABINETS unprinted. Size 3 x 2 1/2 x 1 1/2 in. 2/6 each to clear, plus 6d. P. & P.

Stock No. 111—BEAUTIFULLY MOULDED MINIATURE PLASTIC RADIO CABINETS, complete with tiny carrying handle and tuning knob. Size 4 x 2 1/2 x 1 1/2 in. Price to clear 3/6, plus 1/- P. & P.

Stock No. 111a—Specially Printed Circuits for above cabinet of two transistor reflex radio, 2/6, plus 6d. P. & P.

Stock No. 112—EXCEPTIONALLY GOOD LOOKING PLASTIC RADIO CABINETS "SLIM LINE". Size 6 x 3 1/2 x 1 1/2 in. Clearance price 5/8, plus 9d. P. & P.

AMAZING CIGARETTE RADIO

only 18/6



Complete set of parts. Amaze your friends! —(this highly sensitive TRANSISTOR "CIGARETTE" receives all medium wave stations clear and crisp—holds ten cigarettes—weighs less than 3 ozs. with cigarette! Tiny battery inside

cost 3d. and last over three months. This brilliant little novelty personal phone radio is ideal for Beside, News, Sports, Office. Can be built by anyone from our simple pictorial diagrams in an hour or two. All parts supplied for 18/6 (add 1/6 P. & P.). C.O.D. 2/- extra. (Parts sold separately, priced parts lists 1/-)

Stock No. 113a—BEAUTIFUL BLACK & GOLD READY DRILL FRONT RADIO PANELS TO GO WITH THESE, 5/-, plus 1/6 P. & P.

Stock No. 114—MINIATURE RADIO CABINETS IN GOLD but undrilled. Size 4 1/2 x 3 x 1 1/2 in. Give away price of 2/6, plus 6d. P. & P. Special carrying cases for above at 1/6, plus 6d. P. & P.

Stock No. 115—RADIO CABINETS same as specified as above, but upright design, 2/6 each, plus 6d. P. & P.

Stock No. 115a—Special carrying case for above at 1/6, plus 6d. P. & P.

Stock No. 116—ANOTHER TYPE RADIO CABINET, horizontal, 2/6 each, plus 6d. P. & P.

Stock No. 125—BRAND NEW MAGNETIC DEAF AID TYPE EARPIECES, complete with Plug and Socket. 300 ohms. OUR SPECIAL PRICE 5/-, plus 6d. P. & P.

Stock No. 126—BRAND NEW CRYSTAL DEAF AID TYPE EARPIECES. Our price 4/-, plus 6d. P. & P.

Stock No. 127—DEORATIVE SPEAKER GRILLS 2 1/2 in. diameter, 3 for 1/-, plus 6d. P. & P.

Stock No. 128—4 in. PLASTIC CARRYING HANDLES with fixing screws, 6d. each, plus 6d. P. & P.

Stock No. 135—93 ONLY STANDARD PLASTIC (EJECTING SWITCHES, two way cord operated) Clearance price 2/6, plus 1/- P. & P.



AMAZING NEW INVENTION

AUTOMATIC CAR LIGHTER

ONLY 10/-

We have been lucky enough to purchase 1,500 only of these fully automatic Car Cigarette Dispenser/Lighters because of a frustrated export shipment. Originally made to sell at about 45/-! Robust and ingeniously designed in heavy chromium. Holds packet of cigarettes (any make and size) you reach out with one hand, press a button and a lighted cigarette is in your hand! Can be lit by anyone in 2/3 minutes. For 6 or 12 volts, full connecting details—only one wire to connect! Each one in own coloured box, brand new and untouched. Only 10/-, add 2/- P. & P. (C.O.D. 2/6 extra).

Stock No. 117—477 SUB-MINIATURE TRANSISTOR RADIO CASES (Plastic, undrilled). Size only 1 1/2 x 1 1/2 x 1/2 in. To clear 1/- each, plus 6d. P. & P.

Stock No. 118—SPRING TIPS for holding Miniature Valves. Price for 3, 1/-, plus 6d. P. & P.

Stock No. 119—72 ONLY MINIATURE 6 TAG COILS covering Medium Wave and Long Wave with reaction winding. Price to clear 3/- each, plus 6d. P. & P.

Stock No. 120—SIMILAR TO ABOVE but Medium Wave only 2/- each plus 6d. P. & P.

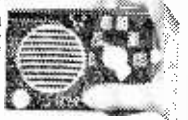
Stock No. 169.

"VOLKSRADIO"

POCKET VALVE RADIO

ONLY 15/-

Take a Over Bid makes this Fantastic Offer possible—the beautifully compact "5 Star Volkstradio" measuring 4 x 2 1/2 x 1 1/2 in. receives perfectly—in the bedroom, office, garden—over all medium waves (incl. Luxembourg). Under 1d. hour running cost. Anyone can assemble in 1 or 2 hours, using our simple A B C plan. Complete set of parts. Only 15/-, plus 1/6 P. & P. C.O.D. ex. (Parts can be bought separately).



Stock No. 137—BRAND NEW TRIMMERS "VOLDON", 250 pF. To clear 1/- each, plus 6d. P. & P.

Stock No. 138—MINIATURE ACORN VALVES. Type 954, 9d. each, plus 6d. P. & P.

Stock No. 139—6K76 BRAND NEW VALVES, 2/9, plus 6d. P. & P.

Stock No. 140—6V66 VALVES, 4/6, plus 6d. P. & P.

Stock No. 141—114 BRAND NEW VALVES, 1/9, plus 6d. P. & P.

Stock No. 142—BRAND NEW B7G VALVE HOLDERS, 6d., plus 4d. P. & P.



THE MINUTE TRANSISTOR RADIO

MIAMI

ONLY 17/6

Unbelievably small—outrageously cheap. You will be amazed at the fine quality of tone and volume of this great little radio. Only a fantastic entertainment for months on an 8d. battery. Type 954, 9d. each, plus 6d. P. & P. simple assembly plan with each set, ONLY 17/6. Plus 2/6 P. & P. (C.O.D. 2/- extra). Satisfaction Guaranteed. Demonstrations given daily. Parts available separately if required.

TERMS OF BUSINESS

C.O.D. 2/6 extra, regret No C.O.D. under 1/- Add extra postage for overseas. Special prices for quantity and the Trade. All orders guaranteed. Components, technical books, Hi-Fi by Leak, Jason, Lotz, Quail, etc. send S.A.E. for quotation or with any enquiry.

Stock No. 121—MEDIUM WAVE LOOPSTICK COILS with Variable Tuning Core, 75 only. To clear 2/9 each, plus 6d. P. & P.

Stock No. 122—FEW ONLY VARIABLE TUNING CONDENSER (Mica Dielectric)—0005 mfd., 2/6, plus 6d. P. & P.

Stock No. 123—173 RADIO DIALS. Printed Medium and Long Wave, Square Shape. Size 1 1/2 x 3/4 in. with central hole. Price 1/6, plus 6d. P. & P.

Stock No. 124—SUB-MINIATURE DIODES, all brand new and tested. Clearance price 3 for 1/- plus 3d. P. & P.

OUR NEW 20-STAGE MINUETTE

Build this newly designed "MINUETTE" 20 STAGE transistor set in very strong ready drilled ULTRA-MODERN CASE. Size only 6 x 3 1/2 x 1 1/2 in.

Uses three transistors and diode and SELF-CONTAINED LOUDSPEAKER. Very sensitive, ideal for office, bedroom, holidays, etc. Months and months of listening off an 8d. battery. You can built FOR ONLY 20/- including PICTURE CASE, miniature speaker, etc. SIMPLE AS A.B.C. PICTORIAL STEP-BY-STEP PLANS etc., plus post and packing 1/6 (C.O.D. 2/- extra). Parts sold separately, priced parts list 1/-.

Stock No. 163—BRAND NEW ASSORTED CONDENSERS 30pF to .01 mfd., 25 for 7/6, plus 1/- P. & P.

Stock No. 164—SPECIAL OFFER OF HOME CONSTRICTED RADIOS NEEDING ATTENTION. Filled with components in good condition.

Stock No. 164b—TYPE (B) 2/3 Transistor. Size 4 1/2 x 3 x 1 1/2 in. Price 5/- each plus 1/6 P. & P.

Stock No. 164c—TYPE (E) 20 only. Valve Radios in small fibre attaché cases. Size 7 x 5 x 2 1/2 in. Price 22/6, plus 2/6 P. & P.

Stock No. 164d—TYPE (D) Miniature Valve Radios in plastic case. Size approximately 3 x 3 x 1 1/2 in. Price 5/- plus 1/6 P. & P.

Stock No. 164e—TYPE (E) 20 only. Valve Radios in small fibre attaché cases. Size 7 x 5 x 2 1/2 in. Price 22/6, plus 2/6 P. & P.

Stock No. 165—SURPRISE PARCEL TYPE (a). Assorted components. Price 5/-, plus 1/6 P. & P.

Stock No. 167—GIANT SURPRISE PARCEL TYPE (c). Price 15/-, plus 2/- P. & P.

Stock No. 132—WANDER PLUGS. New and unused, 2/- doz., plus 6d. P. & P.

Stock No. 134—5 in. MOVING COIL LOUD-SPEAKERS. Brand new, 3 ohms, 10/-, plus 2/6 P. & P.

Stock No. 168—SPECIAL CLEARANCE OF FULLY GUARANTEED BRAND NEW "GOLD FRONT" 6 TRANSISTOR SUPER-HET RADIOS. Complete with real leather carrying case. Personal earpiece, battery. All in beautiful presentation boxes. Only 75/- plus 2/6 P. & P. 74 only. Advertised at 45.6.0 recently. Last 74—no more available.

Stock No. 143—285 ONLY! MINIATURE PRECISION "MINETTA" 8 P.V. CAMERAS complete with 6 rolls of film and real leather carrying case. Size 2 1/2 x 1 1/2 x 1 1/2 in. Price to clear 20/- each. Post Free.



Stock No. 144—BRAND NEW 2 1/2 in. MOVING COIL LOUDSPEAKERS, SPECIAL PRICE 8/6 plus 1/6 P. & P. 30 ohms.

Stock No. 145—BRAND NEW ASSORTED RESISTORS in packets of 100, 6/-, plus 6d. P. & P.

Stock No. 151—BRAND NEW "PLESSEY" MOVING COIL SPEAKERS, 2 1/2 in. 60 ohms. Matches Transistor Direct—No U.P. included. Special prices 8/6, plus 1/6 P. & P.

CONCORD ELECTRONICS (Dept. P.W.4) 210 Church Road, Hove, Sussex

PERSONAL CALLERS WELCOME:—

Open 8.30 a.m. until 1 p.m. and 2 p.m. until 5.30 p.m.

Saturdays: 8.30 a.m. to 1 p.m.

Demonstrations Daily.

STERN-CLYNE

Incorporating STERN RADIO LTD., PREMIER RADIO, CLYNE RADIO LTD.

Three well-known names with a reputation for quality and service.

Combined resources, technical knowledge and over 50 years' experience gives you an organisation offering a fully comprehensive specialist service in the rapidly expanding world of electronics.



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 Pick-ups. Separate Bass and Treble controls. High pass filter 20 to 160 c/s. low pass filter 5-9 Kc/s. Totally enclosed in case Size 11" x 4" x 4". **£10.00** (Carr. & ASSEMBLED **£13.10**)
KIT OF PARTS (Carr. & Ins. 5/-), AND TESTED



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 PARMKO or PARTRIDGE Output Transformer. **£10.00**
COMPLETE KIT (Parmko Output Trans.) ASSEMBLED AND TESTED **£13.10**

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

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 500 mV. Specified components and new MULLARD VALVES. Includes PARTRIDGE MAINS TRANSFORMERS and choice of PARMKO or PARTRIDGE Output Transformers. Surplus Power available for Tuner. **£12.00**
COMPLETE KIT ASSEMBLED AND TESTED **£16.00** (Carr. & Ins. 7/6) With PARTRIDGE OUTPUT TRANS. **£1.6.0** ex.



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

THE MULLARD 3-JRC

A HIGH QUALITY AMPLIFIER DEVELOPED FROM THE VERY POPULAR 3-WATT MULLARD "3-3" DESIGN. **£8.8.0**

KIT OF PARTS ASSEMBLED AND TESTED **£11.10.0**
Complete to the MULLARD specification including PARMKO OUTPUT TRANSFORMER. Switched inputs for 78 and 500 mV. Extra power to drive a Radio Tuning Unit is also available. (Carr. & Ins. 0/6). Please state L.S. impedance. Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.

L.P. records plus a Radio position. Unit is also available. (Carr. & Ins. 0/6). Please state L.S. impedance. Instruction book and detailed price list (free with kit) available separately at 2/- 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 7 watts undistorted output. (Carr. & Ins. 3/6). Kit of Parts **£4.10.0** Assembled and Tested **£6.0.0**

Instruction book and detailed price list (free with kit) available separately at 2/6 Post Free.

THE NEW CHASSIS PUNCH SET

Five of the most used Hole Punches made of the best hardened steel will save hours of tedious hand labour, suitable for Aluminium, Sheet Metal, Plastic, etc. Punch Sizes 1", 1 1/8", 1 1/4", 1 1/2", 1 3/4". Complete with Tommy Bar, Tapped Reamer, and Zip Fastening Case. PRICE **49/6** P.&P. **3/6**

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

SEE FOLLOWING PAGES FOR ADDRESSES AND DETAILS OF OTHER STERN-CLYNE PRODUCTS

PRICE REDUCTIONS

- (a) THE KIT OF PARTS to build both the "5-10" Amplifier and the 2-Valve Pre-Amplifier..... **£15.15.0**
- (b) Assembled and Tested **£21.10.0**
- (c) THE KIT OF PARTS to build both the "5-10" Amplifier and the 3-Valve Pre-Amplifier..... **£19.10.0**
- (d) Assembled and Tested **£25.10.0**
- With PARTRIDGE OUTPUT TRANSFORMER **£1.6.0** extra.

MULLARD 2-VALVE PRE-AMPLIFIER TONE CONTROL UNIT

Employing two EF86 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.L.A. characteristics. ★ Inputs for Crystal Pick-ups 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 ASSEMBLED AND TESTED **£9.10.0** (Carr. & Ins. 5/-). Instruction book and detailed price list (free with kit) available separately at 2/- Post Free.



THE "TUDOR" STEREO AMPLIFIER

PRICE **£15.0.0** (Pkg. & Carr. 7/6)



A self-contained Shell-mounting Amplifier designed to provide high quality stereophonic and monophonic reproduction. Each channel provides a rated output of 6 watts and for monophonic operation approx. 12 watts is produced. Separate BASS and TREBLE controls. The Cabinet is finished in Black Crackle. Size 14 x 8 x 4in. Send for full specification.

HI-FI STEREO HEADPHONES

For the connoisseur who requires perfection. Each Earphone consists of a 2" 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—20-15,000 c.p.s. Input Impedance—16 ohms. Power rating—1 watt. Weight—13 ozs. PRICE **5 Gns.** P. & P. 2/6. (Junction box 15/- ex.)



STEREO STETHOSCOPE HEADSETS

Enjoy personal listening in absolute comfort with the new lightweight Stethoscope Headsets suitable for stereo or monaural. Magnetic low impedance. Complete with 6ft. of Cable and Stereo Jack Plug. PRICE **25/-** P.&P. **1/6**

MONAURAL STETHOSCOPE HEADSETS

Suitable for Radio, Tape Recorders, or monitoring tape recordings, magnetic low impedance or Crystal High Impedance. Complete with 4ft. of lead and miniature Jack Plug. PRICE **10/6** P.&P. **1/6**

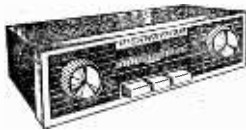
AGOS MONAURAL STETHOSCOPE HEADSETS

Suitable for Tape Recorders, or monitoring tape recordings, 100 ohm impedance magnetic. Complete with 4ft. of lead. (Originally 21/-) OUR PRICE **12/6** P.&P. **1/6**

Great Britain's Greatest Electronic Hobbies Organisation

STERN-CLYNE

NEW LOW PRICES - NOW YOU CAN AFFORD A CAR RADIO

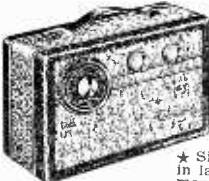


THE 'HIGHWAYMAN' OUR QUALITY CAR RADIO TO BUILD YOURSELF AT A NEW LOW PRICE

Look at these features:
 ★ Attractive styling. ★ Push-pull output ★ Three latest Mullard transistors plus valves types 6BH3 and 6CH3. ★ No Buzz, high output and sensitivity. ★ Printed circuit (latest type). 7 x 4in. high flux p.m. speaker and battery. ★ 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 2in. deep. ★ Easy assembly, supplied with dial and drive already mounted.

£7.19.6 Plus 5/- P. & P.

Special inclusive price of ONLY £7.19.6 Plus 5/- P. & P. All parts available separately. Individually priced parts list and comprehensive instruction booklet 2/6 post free. (Deducted from cost if complete parcel purchased later.)



THE "AIR KING"

Our highly successful six-transistor luxury portable with the "SLIM LINE" look. To build yourself, with printed circuit chassis for reliability and simplicity in construction. May be used as Car Radio, with full MEDIUM wave and LONG wave coverage.

Look at these features:

★ 500 milliwatt output to high flux 7 x 3in. high fidelity loudspeaker.
 ★ Six selected MULLARD TRANSISTORS in latest super-sensitive circuit plus germanium diode. ★ Compact size only 9 1/2 x 3 1/2 x 6in. high. ★ Attractive three-tone cabinet, black, dark grey and silver grey with gilt control knobs and all gilt fittings. ★ Coax. socket for car aerial. ★ Brand new guaranteed components. ★ Push-pull output. ★ Automatic volume control. ★ Long-life battery. ★ Super-sensitive internal Ferrite rod aerial. Special inclusive price for ONLY £7.19.6 P. & P. 4/-.

Attention: special available. Full assembly details and individually priced parts list, all of which are available separately, price 1/6 post free.

ANOTHER NEW BRANCH!

OPENING SHORTLY AT

**20-22 WIThey GROVE
MANCHESTER 4**

The finest selection of Hi Fi equipment and a fully comprehensive range of components etc. for the Do-it-Yourself enthusiast

THE HE30 4-BAND COMMUNICATION RECEIVER



One of the finest general coverage bandspread Receivers available at this price. Covering 550Kc/s—1600Kc/s, 4.8Mc/s—14.5Mc/s, 1.6Mc/s—4.8Mc/s, 10.5Mc/s—20Mc/s. Illuminated slide rule dial, calibrated every 5Kc/s on 80 and 40 metres. Edgewise S-meter, 0.100 logging scale, coverage from 0.65—30Mc/s. 8 valve plus Receiver superhet circuit. RF Stage with an Aerial Trimmer, 2 IF Stages. B.F.O. control Q-multiplier. Controls: Function Switch, Audio Gain, Selectivity (Q-multiplier), Frequency (BFO), Band Selector, IF Gain, Trimmer, AVC-MVC Switch, ANL Switch, Main Tuning, Bandsread Tuning and Head-phone Jack. Selectivity—60dB 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 BTG Base Valves and 5Y3 Rectifier. Size 15 x 10 x 7in. Grey crackle finish. 220/240 volt A.C. mains, 50-60 cycle operation. Full instructions and circuit diagram supplied. Send S.A.E. **40 gns.** Carr. & for leaflet. PRICE Pkg. 15/-

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

SEE PRECEDING PAGE FOR OTHER STERN-CLYNE PRODUCTS

THE "TRAVLER" MkII

Introducing our new ready-built transistorised car radio for ONLY **9 1/2 Gns.** P. & P. 5/- including 7 x 4in. speaker fitted to baffle, fixing brackets, filter unit, all nuts and bolts with fitting instructions **£2.19.6** H.P. Terms: Dep. (Plus 5/- P. & P.)



★ Star Features ★ Handsomely Styled. ★ Mullard Valves and Transistors. ★ Push Buttons. ★ 1 1/2 watts Output. ★ Long and Medium Wavebands. ★ Quality Speaker (E.M.I.). ★ Easily Fitted. ★ Radio Luxembourg (and many other foreign stations) 12 volt Positive Earth Only (applies to 99.8% of the cars on the road). ★ Dimensions 7 x 2 x 7in. depth. **Optional extras.** 3 section chromium plated weatherproof telescopic aerials type 1 17/44", 19/6; type 2, 2/743", 29/6, both plus P. & P. 2/6 if purchased separately.

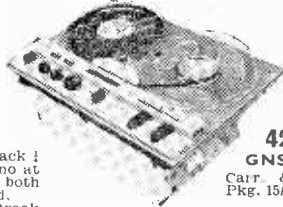
POCKETORDER TRANSDISORISED RECORDER

Why be bothered with a notepad? Take Pocketorder with you on those business trips, the mighty Midget is ideal. Simple to operate, a unique 4-way push-button Switch for record/playback, etc., and remote control switch built into microphone ensures complete ease of handling. Fully adjustable speed through the life of Batteries and the volume and tone from the 2 1/2" internal speaker is outstanding. All accessories included such as Leather Case, Accessory Case, Crystal Earpiece, Tape, Batteries and Microphone, no other extras required. Up to 34 mins. recording time, operates on 1.9 volt PP3 and 2-1/2 volt U12 Pen Batteries. Size 5 1/2 x 4 x 2in. Weight **12 Gns.** P. & P. 2/6. Spare 2 1/2" empty spools, 1/-; Spare 2 1/2" 200ft. L.P. Tape, 5/-.



STEREO TAPE DECK WITH BUILT-IN PRE-AMPLIFIER

A professional addition to your Hi-Fi Stereo System consisting of two basic Units, the Tape Deck and Pre-amplifier, which employs 4 Transistors and 4 Valves. The Unit with record and playback 1 track stereo or 1 track mono at either 7 1/2 i.p.s. or 4 1/2 i.p.s. both speeds being fully equalised. Features: Track System: 1 track 2 channel stereo or monaural record and playback. Independent single channel recording on either channel while playback on other channel. Head Type: 1 track 2 channel inline stereo and associated erase heads. Low loss laminated pole pieces. Level indicators: 2 Meters, 1 per channel. Digital Counter: 3 digit tape position indicator. Automatic Stop: When tape runs out or breaks. Inputs: Microphone 1mV (50K, ohms impedance) Gram/Tuner 50mV (high impedance). Output: (cathode follower). Monitor Sockets: 2 x 5K, ohms impedance. Audio Output: 500mV. Oscillator: Push-pull 80 Kc/s. S/N Ratio: -45dB or better at 7 1/2 tape speed. Separation: 45dB or more between stereo channels. Frequency Response: 40 to 15,000 cycles per sec. at 7 1/2 i.p.s., 40 to 9,000 cycles per sec. at 4 1/2 i.p.s. Single Motor: 4 pole heavy duty induction type. Power Supply: 240V A.C. 50 cycles. Size 6 1/2 x 10 1/2". Tape Size: Up to 7". Line Up: 4-2SB175 Transistors, 2-12AT7, 1-1AU7, 1-12BH7 Valves.



42 GNS. Carr. & Pkg. 15/-

THE HE-40 4-BAND COMMUNICATION RECEIVER

Completely built and ready to go. High sensitivity Superhet receiver covering 550 Kc/s—1,500 Kc/s, 1.6 Mc/s—4.4 Mc/s, 4.4 Mc/s—11 Mc/s, 11 Mc/s—30 Mc/s. Electrical Bandsread tuning. Slide rule type tuning dial. Internal ferrite rod aerial for medium waveband reception and a 59in. 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 BTG base valves. Head-phone socket may also be used for external loudspeaker. ANL, B.F.O. built-in "S" meter. 220/240 volt A.C. mains, 50-60 cycle operation. Handsomely styled cabinet with grey crackle finish and handsome iron mesh panel with chrome and satin chrome fittings. Measurements 13in. x 8 1/2in. x 5 1/2in. (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** Carr. & Pkg. 12/6

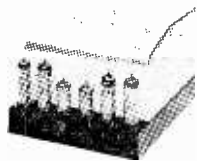
INTRODUCTION OFFER !! Available Shortly



FOR ONLY 48 gns

Pkgs. 15/- Pkgs. & Carr.

THE TUDOR STEREO HI-FI SYSTEM, 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: ECC85, ECH81, EBF89, EB91, EM64, ECC83. Multiplex outlet provided. **Pre-amplifier**—Designed for use with the Tudor Stereo Power Amplifier with inputs for most types of Pick-ups, direct play from Tape Heads and ample sensitivity for either Crystal or Moving Coil Microphone. Distortion 0.1%, tape outputs 100mV from 40K ohm source, inputs—Microphone 5 mV, Tape 5.5 mV, R.I.A.A. 4.5mV that 250 mV, Tuner 100mV. Valve line-up: 2—EF86, 1—ECC85. **Power Amplifier**—14 watts per Channel, sensitivity 1 volt r.m.s. for 14 watts output, frequency response $\pm 0.5dB$ 20 c/s.—20 Kc/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—GZ31.



source, inputs—Microphone 5 mV, Tape 5.5 mV, R.I.A.A. 4.5mV that 250 mV, Tuner 100mV. Valve line-up: 2—EF86, 1—ECC85. **Power Amplifier**—14 watts per Channel, sensitivity 1 volt r.m.s. for 14 watts output, frequency response $\pm 0.5dB$ 20 c/s.—20 Kc/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—GZ31.

DOUBLE FEATURE POWER AMPLIFIER AND JL10 POWER AMPLIFIER

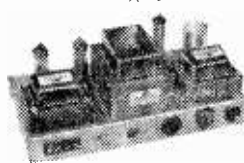
A new conception in the field of audio engineering by Stern-Glyne development engineers. The most up-to-date circuitry is used in the Double Feature Pre-amplifier, it has matched inputs for microphone, crystal or magnetic pick-ups and radio tuner and in addition offers full facilities for tape recording and high fidelity replay. 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. Offers superb reproduction from all sources at low cost. Available shortly.

Offers superb reproduction from all sources at low cost. Available shortly.

Brief Specifications:

★ **J.L.10 POWER AMPLIFIER**

Incorporates the latest triode-pentode ECL86 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 **11 Gns.** C. & L. 7/6.
READY BUILT **14 Gns.**

DOUBLE FEATURE PRE-AMPLIFIER

Inputs for microphone, crystal or magnetic pick-ups, tuner unit. Push-button switching for 3 tape speeds equalised. Tape erase Bias Oscillator circuit incorporating ferrox-cube transformer. Function switch, separate base, treble and volume controls, level control and latest EMBI 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.



enclosed in a silver hammer finish steel case, and an attractive perspex front panel completes the presentation.

KIT OF PARTS **£17.00** READY BUILT **£21.00** C. & L. 5/-.

PRICES: If both above units purchased together:

KIT OF PARTS **£27.10.0** READY BUILT **32 Gns.** C. & L. 10/-.

VISIT YOUR NEAREST STERN-GLYNE BRANCH

WEST END:	18 Tottenham Court Road, W.1.	MUSEum 5929/0095	Half-day Sat
	23 Tottenham Court Road, W.1.	MUSEum 3451/2	Half-day Thurs
	309 Edgware Road, W.2.	PADddington 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 8161/5	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:	10 Withy Grove, Manchester 4.	BLAck Friars 5379	Open 6 days a week

Mail Orders and enquiries to Dept. P.W.
162 Holloway Road, London, N.7. NORTH 8161/5

MODEL CR3/S TAPE RECORDER

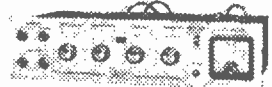


MODEL CR3/S incorporates the HF/TR3 Mk. II Tape Amplifier (described below) and the Collaro "Studio" Twin Track 3-speed Deck operating at 1 1/2 in., 3 in., and 7 in. speeds. Complete with microphone and 1,200ft. tape.

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

STEREO TAPE PRE-AMPLIFIER

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



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

TAPE PRE-AMPLIFIER MULLARD Type "C"

Suitable for most 1 track, Mono Tape Decks. Incorporates Ferroxcube 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.

MULLARD TAPE AMPLIFIER

MODEL HF/TR3/MK.II Based on Mullard's Type "A" design and suitable for most 1 track Mono Tape Decks. Incorporates Ferroxcube 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, Brenell Mk.5 Series II, also the Wearite. 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 Brenell Mk.5 Series II with Track Switch fitted.....	£64. 0.0	
STP-1 with Brenell Mk.5 Series II, 1 Track Deck.....	£74.15.0	
Type "C" Pre-amp with Collaro Studio Tape Deck.....	£24.10.0	£30. 0.0
Assembled with deck wired and matched, £32.2.0		
Type "C" Pre-amp with Brenell Mk.5 Series II Deck.....	£46.11.0	£53. 1.0
Assembled with deck wired and matched, £55.3.0		
HFTR3 with Collaro Studio Tape Deck.....	£24. 3.0	£29.10.0
Assembled with deck wired and matched, £31.12.0		
HFTR3 with Brenell Mk.5 Series II Deck.....	£46. 4.0	£51.11.0
Assembled with deck wired and matched, £55.13.0		

Carr. & Ins. 15/- on above units. Send S.A.E. for comprehensive price list.

Great Britain's Greatest Electronic Hobbies Organisation

RETURN-OF-POST SERVICE

We offer a really efficient Mail Order Service on all items stocked. All cash orders are dealt with on the day of receipt. ★ Hire purchase orders are subject to slight delay but this is kept to the absolute minimum.

● 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 3 Valve Pre-amp, Mullard Stereo, Mullard Mixer. GEC912 Plus. Fully detailed list on any of these sent upon request. Instruction Manuals: All Mullard Audio Circuits in "Circuits for Audio Amplifiers". 9/5. GEC912, 4/6. All post free.

● MARTIN AUDIO KITS

A range of high quality transistor amplifying equipment is now being produced by MARTIN ELECTRONICS. Included are 3 and 10 watt Amplifiers, Pre-amplifiers, mixer and input switching units. Please write for full details.

● ARMSTRONG EQUIPMENT

TUNER AMPLIFIERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
Model 227 Stereo	£48.15.0	£9.15.0	12 of £3.11.6
Model 227 Mono	£33.18.0	£6.18.0	12 of £2. 9.6
Model 226 De Luxe Stereo	£52. 0.0	£11. 0.0	12 of £4. 2. 6
Stereo 55 Stereo	£29.18.0	£5.18.0	12 of £2. 4. 0

RADIOGRAM CHASSIS

Model AF208 AM/FM	£21. 4. 0	£4. 4. 0	12 of £1.11.2
-------------------	-----------	----------	---------------

TUNERS

Model T48 FM	£20. 8. 0	£4. 2. 0	12 of £1. 9.11
Model ST3 Mk 2 AM/FM	£25.12.0	£5. 2. 0	12 of £1.17.11

Makers' literature available on any item.

● NEW MULLARD CONDENSERS

Mullard Miniature Foil and Polyester condensers as used in the latest TV and Transistor sets. Miniature Foil, 30 volt working for Transistor sets. .01mfd, 74d.; .022mfd, 9d.; .047mfd, 9d.; .1mfd, 11d. Polyester Tubular Capacitors. Moulded outer case designed to withstand actual contact with the soldering iron. Tolerance 10%. 125v. range: .01mfd, .022mfd, .047mfd, all 9d. each. 1/2: .22mfd, 1/3: .47mfd, 1/6: 1mfd, 3/-. 400v. range: .001mfd, .0022mfd, .0047mfd, .01mfd, .022mfd, all 9d. each. 1/2: .1mfd, 1/3: .22mfd, 1/6: .47mfd, 2/5. Postage extra.

● MINIATURE ELECTROLYTIC CONDENSERS

Latest miniature types by Mullard and Radio spares. RADIO SPARES. All 15 volt, 2mfd, 4mfd, 5mfd, 8mfd, 10mfd, 16mfd, 32mfd, 50mfd, 100mfd, all 2/3 each. Postage extra. MULLARD, 2mfd, 10v. 1/8; 4mfd, 4v. 1/8; 10mfd, 16v. 1/8; 16mfd, 10v. 1/8; 25mfd, 4v. 1/8; 25mfd, 25v. 1/3; 32mfd, 2.5v. 1/18; 32mfd, 40v. 1/8.

● "SYNCHROTAPE" RECORDING TAPE

Low priced British tape, all reels fitted with leaders. Standard Play: 600ft. (5") 13/6; 850ft. (5 1/2") 17/-; 1,200ft. (7") 21/-. Long Play: 900ft. (5 1/2") 17/-; 1,200ft. (5 1/2") 20/-; 1,800ft. (7") 30/-, All Post Free.

● TAPE RECORDING EQUIPMENT

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
ALL CARRIAGE FREE			
COLLARO STUDIO, 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-V 4 V 4-Track £12.12.0 Tape Pre-Amplifiers For Collaro 8312-CP 2-Track £8.8.0 8312-4-CP 4-Track £9.9.0 Drop through assembly for mounting 8312 Pre-Amp under Collaro Deck, £11.11.6. 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.

MULLARD TAPE PRE-AMPLIFIER KIT We stock complete kits and all separate components for the Mullard Tape Pre-Amplifier. Fully detailed list available.

● LOUDSPEAKERS

GOODMANS: Axlette 8in., £5.5.7; Axiom 10in., £6.5.11. 12in. Axiom 20i., £10.7.0; 12in., Axiom 30i., £14.10.0; 12in., Audiom 51 Bass, £8. 9. 0; 12in. Audiom 61 Bass, £13.14.0; Trebac Tweeter, £6.4.0; X05000 Crossover unit, £1.19.0. WHITELEY: HF1016 10in., £7.0.0; HF1012 10in., £4.7.6; HF16 8in., £6.0.0; T816 8in., £5.13.6; T10 Tweeter, £4.8.3; T359 Tweeter, £11.0.6; CX3000 Crossover unit, £1.11.6; CX1500 Crossover unit, £2.0.0. H.P. Terms available on all speakers.

● P.W. TEST METER KIT

Send for fully detailed list.

● STEREO COMPONENTS

Morganite ganged potentiometers as specified for the Mullard circuits. ★ Log/Anti-Log 500k, 1 meg., 2 meg. ★ Log/Log, 50k, 250k, 1 meg., 2 meg. ★ Lin/Lin 250k, 500k, 1 meg, 2 meg. All 10/6 each. Postage extra.

● TRANSISTORS

MULLARD. Current production types, not rejects. All in makers' boxes. Postage 3d. on each. AF114, 11/-; AF115, 10/6; AF116, 10/-; AF117, 9/6; OC44, 8/3; OC45 8/-; OC70 and OC71, 8/6; OC72, 8/-; OC72 Matched Pairs, 16/-; OC78, 8/-; OC81, 8/-; OC170, 8/6; OC171, 9/-. Any other Mullard type obtained promptly. Ask for quotation.

● 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, £6.12.6; 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.

Hire Purchase Terms available. Ask for list.

● P.W. STRAND, MAYFAIR & SAVOY UNITS

We stock parts for the P.W. Strand Amplifier, Mayfair Pre-Amplifier and Savoy FM Tuner. Detailed price lists are available.

● LATEST TEST METERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
AVO Model 8 Mark II	£24. 0.0	£4.16.0	12 of £1.15.2
AVO Model 11 Mark II	£21. 0.0	£4. 4. 0	12 of £1.10.10
AVO Multimeter Mark 4	£29.10.0	£1.15.0	12 of 1/4
T.M.K. TP10	£3.19.6	£1. 3. 6	3 of £1.2.0
T.M.K. TP28	£5.19.6	£1.15.6	3 of £1.1.4
T.M.K. Model 500	£8.19.6	£1.15.6	12 of 13/8
TAYLOR MODEL 127A	£10.10.0	£2. 2. 0	12 of 15/8

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

● OUTPUT TRANSFORMERS

GILSON: W0696A, W0696B, 50/6, post 2/6. W0710, 55/6, post 2/6. W0892, 62/3, post 2/9. W0767, 27/-, post 1/6. W01796A, 57/6, post 2/6. W01932, 84/-, post 3/-. PARTRIDGE: P2667, 75/-, post 2/9. P4131, 75/-, post 2/9. PARMERCO: P2629, 47/6; P2642, 45/-; P2643, 47/6. All plus post 2/9; P2641, 20/6, post 2/-; P2628, 17/9, post 2/-; P2632, 41/-, post 2/6. ELSTONE: OT/ML, 49/6, post 2/9; OT/3, 27/6, post 2/6.

● MAINS TRANSFORMERS

GILSON: W0741A, 63/-, post 4/-; W0839, 48/9, post 2/9; W01328, 58/6, post 3/6; W01268, 58/-, post 3/6; W01566, 80/-, post 4/6; W01341, Choc, 36/-, post 2/-. PARMERCO: P2631, 35/-, post 2/9; P2630, 54/9, post 3/3; P2644, 76/6, post 4/-; P2930, 41/-, post 3/3; P2931, 56/9, post 3/3. ELSTONE: MT/MU, 49/6, post 3/3; MT/3M, 38/6, post 3/-; MT/510, 46/3, post 3/3.

● GRAMOPHONE EQUIPMENT

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
ALL LATEST MODELS			
ALL POST FREE			

RECORD CHANGERS

GARRARD AUTOSLIM (Mono PU)	£7. 2. 6	£1. 8. 6	12 of 11/2
GARRARD AUTOSLIM De-luxe AT6 (Mono PU)	£11. 9. 0	£2. 6. 0	12 of 16/11
GARRARD AUTOSLIM AT6 (Stereo/Mono PU)	£12. 5. 4	£2. 9. 4	12 of 18/-
B.S.R. U14 (TC8 Mono PU)	£6.19.6	£1. 7. 6	12 of 11/-
B.S.R. U41 Monarch (TC8 Stereo/LP78)	£7.19.6	£1.11.6	12 of 12/4
B.S.R. U416 (TC8 Mono PU)	£7.19.6	£1.11.6	12 of 12/4
B.S.R. U416 (TC8 Stereo/LP78)	£8.19.6	£1.15.6	12 of 13/8
B.S.R. TU12 (TC8 Mono PU)	£3.17.6	£1. 4. 6	3 of £11.0
B.S.R. GU7 (TC8 Mono PU)	£4.18.8	£1. 8. 8	3 of £1.6.8
GARRARD SR10 (Mono PU)	£5. 9.11	£1.12.11	3 of £1.9.0

SINGLE RECORD PLAYERS

GARRARD 4HF (GC8 PU) £12.12.6 £3. 8. 6 12 of £1.4.5
PHILIPS AG1016 (SM PU) £12.12.0 £2.10.0 12 of 13/8
Many of the above can be supplied for stereo working. See our Gramophone Equipment List for details.

★ TERMS OF BUSINESS

Cash with order or C.O.D. We charge C.O.D. orders as follows: Up to £5, minimum of 4/2. Over £5 and under £10, 2/8. Over £10, no charge. Postage extra on CASH order under £5 except where stated. Postage extra on overseas orders irrespective of price.

WATTS RADIO

(MAIL ORDER) LTD.

54 CHURCH ST., WEYBRIDGE, SURREY

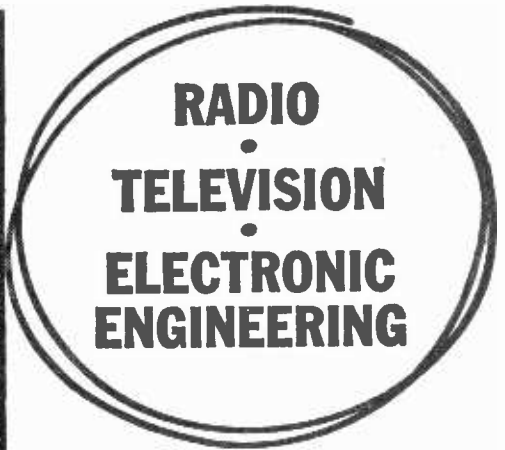
Telephone: Weybridge 47556

Please note: Postal business only from this address

Callers welcome by appointment

★ HIRE PURCHASE TERMS

Available on any item. Repayments over 3, 6 or 12 months as below. Three months: Deposit 6/- in the £. Service charge 5%, minimum charge 10/-. Six months: Deposit 3/- in the £. Service charge 7%. Twelve months: Deposit 1/- in the £. Service charge 10%, minimum charge 20/-.



MEMBER OF THE ASSOCIATION
OF BRITISH CORRESPONDENCE COLLEGES

CHOOSE THE RIGHT COURSE FROM:

RADIO AND TELEVISION ENGINEERING, INDUSTRIAL TELEVISION, RADIO AND TELEVISION SERVICING, ELECTRONICS, COMPUTERS AND PROGRAMMING, ELECTRONIC TECHNICIANS, SERVOMECHANISMS, TELEMETRY, COLOUR TV, INSTRUMENTATION, AND PRINCIPLES OF AUTOMATION.

ALSO EXAMINATION COURSES FOR:

A.M.Brit.I.R.E.; City and Guilds Telecom. Technicians, C. & G. Radio and T.V. Servicing (R.T.E.B.), and P.M.G.'s Certificates. C. & G. Radio Amateurs' Certificate.

LEARN AS YOU BUILD

Practical Radio Courses: Gain a sound knowledge of Radio as you build YOUR OWN 5-valve superhet Receiver and Portable Transmitter, Signal Generator and High Quality Multimeter. At the end of the course you have invaluable practical equipment and a fund of personal knowledge and skill. ICS Practical Radio Courses open a new world to the keen Radio amateur.

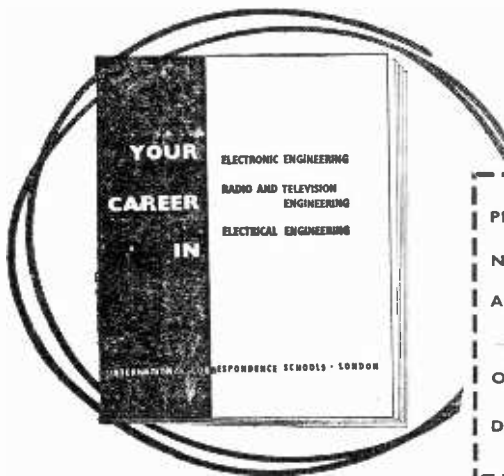
THERE IS AN ICS COURSE FOR YOU

Whether you need a basic grounding, tuition to complete your technical qualifications, or further specialised knowledge, ICS can help you with a course individually adapted to your requirements. There is a place for you among the fully-trained men. They are the highly paid men—the men of the future. If you want to get to the top, or to succeed in your own business, put your technical training in our experienced hands.

ICS Courses are written in clear, simple and direct language, fully illustrated and specially edited to facilitate individual home study. You will learn in the comfort of your own home—at your own speed. The unique ICS teaching method embodies the teacher in the text; it combines expert practical experience with clearly explained theoretical training. Let ICS help you to develop your ambitions and ensure a successful future. Invest in your own capabilities.

FILL IN AND POST THIS COUPON TODAY

You will receive the FREE ICS Prospectus listing the examinations and ICS technical course in radio, television and electronics. PLUS details of over 150 specialised subjects.



PLEASE SEND FREE BOOK ON _____

NAME _____

ADDRESS _____

OCCUPATION _____ AGE _____

INTERNATIONAL CORRESPONDENCE SCHOOLS
Dept. 170, INTERTEX HOUSE, PARKGATE RD, London SW11

ARMSTRONG AF208AM/FM RADIOGRAM CHASSIS



£21-4-0
(carriage free)

- FULL VHF BAND (87-108 Mc/s). MEDIUM BAND 187-570 m.
 - 5 WATTS OUTPUT.
 - 15 dB NEGATIVE FEEDBACK. 7 VALVES.
 - SEPARATE WIDE-RANGE BASS AND TREBLE CONTROLS.
 - 2 COMPENSATED PICK-UP INPUTS.
 - FREQUENCY RESPONSE 30-22,000 c.p.s. ±2dB.
 - TAPE RECORD AND PLAYBACK FACILITIES.
 - CONTINENTAL RECEPTION OF GOOD PROGRAMME VALUE.
- FOR 3, 7 and 15 ohm SPEAKERS.
Write for free literature.

New Boxed VALVES 90-day Guarantee

OZ4	6/-	6EK7G	5/-	EB91	4/-	PCL82	10/-
1R5	6/-	6EK6G	5/-	EB041	8/-	PCL84	10/-
1R5	6/-	6I16G	8/-	EB081	8/-	PL81	10/-
1T4	4/-	6BT7	6/-	EBF90	9/-	PL83	8/-
2X2	6/-	6GT7M	8/-	ECF34	2/-	PL83	18/-
384	7/-	6SN7	5/-	ECB81	9/-	PY80	7/-
3V4	7/-	6V6G	5/-	ECL80	9/-	PY81	8/-
3Q4	7/-	6X4	4/-	ECL82	10/-	PY82	7/-
5U4	6/-	6X5	6/-	EF85	8/-	PQ28	7/-
5Y3	6/-	6Y4T	6/-	EF89	8/-	SP41	8/-
6Z4	9/-	12AU7	6/-	EL82	5/-	SP91	3/-
6AC7	4/-	12AX7	7/-	EL84	7/-	U22	7/-
6AM6	4/-	12BH7	7/-	EY81	9/-	UB041	8/-
6AT8	6/-	18K7	6/-	EY86	9/-	UB081	9/-
6BA6	5/-	12K8	14/-	EZ80	7/-	UBF89	9/-
6BE6	5/-	12Q7	6/-	EZ80	7/-	UCH81	8/-
6BW6	7/-	2E5YG	9/-	EZ81	7/-	UCL82	10/-
6C4	5/-	35L5	9/-	HABC8010	10/-	UCL83	12/-
6D6	5/-	30Z4	8/-	HV22A	5/-	UF89	9/-
6E6	4/-	954	8/-	KT38C	8/-	UL41	18/-
6H6	3/-	DAF94	8/-	KT8	8/-	UV41	7/-
6J6	5/-	DP98	8/-	MU14	7/-	UT84	7/-
6J6	5/-	DK96	8/-	PC084	8/-	UU9	7/-
6J7G	6/-	DL96	8/-	POP86	8/-	VB180	7/-
6K6	5/-	EABC80	9/-	PCP82	8/-	WB1	6/-

NEW ELECTROLYTICS FAMOUS CAN TYPES

TUBULAR	FAMOUS CAN TYPES	1/8
1/350V	2/-	5/8
3/350V	2/3	5/8
4/450V	3/3	5/8
5/450V	2/3	5/8
16/450V	3/3	5/8
22/450V	3/3	5/8
26/25V	1/8	5/8
26/50V	2/3	5/8
50/25V	2/3	5/8

TELESCOPIE CHROME AERIALS. 13in. extending to 45in. 8/6 ea.

TRIPLEXERS Bands I, II, 11L, 12/6. COAX PLUG, 1/- LEAD SOCKET, 2/-. PANEL SOCKETS, 1/- OUTLET BOXES (Surface of dust), 4/- ea.

ALIGNED TWIN FEEDER yd. 6d. 80 or 300 ohms.

TWIE SCREENED per yd. 1/- 80 ohms only.

Windround Ext. Speaker Control. 10 G 3/-, 25 G 6/6.

WIRE-WOUND POTS. 3 WATT. Pre-set. Min. TV Types. 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 spindle. 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., 1/8; 250 pF., 1/8; 500 pF., 750 pF., 1/8.

RESISTORS. Preferred values. 10 ohms to 10 meg., 1 w. 4d.; 1 w. 1/2; 1 w. 6d.; 1 1/2 w., 6d.; 2 w., 1/-.

High Stability. 1 w. 1%. 2/-. Preferred values 10Ω to 10 meg. Ditto 5% 10Ω to 22 meg., 9d.

BRISTOLITE. CRT, 3/6 CZ2, 2/6; CZ3, 1/6.

5 watt } WIRE-WOUND RESISTORS } 1/8
10 watt } 10 ohms—10,000 ohms } 3/8
15 watt } 10 ohms—10,000 ohms } 2/-
12.5k to 47K 10 w. } 8/-

Volume Controls 80 ohm COAX. Semi-air spaced yd. Stranded core 6d. yd. 40 yds. 17/8. Price 40 yds. 28/-.

L.S. 3/-, D.P., 4/6; M.S. L/S 10/6; D.P. 14/6.

air spaced. Ideal 625 lines.

MAINS TRANSFORMERS 200/250 v. A.C.
Postage 2/- each transformer.

STANDARD, 250-0-250, 80 mA, 6.3 v. 3.5 a. Tapped 4 v. 4 s. Rectifier, 6.3 v. 1 a., 5 v. 2 a. or 4 v. 2 a. 22/8, ditto, 250-0-250 ... 23/8
MINIATURE 200 v. 20 mA, 6.3 v. 1 a. 10/8
MIDGET, 220 v. 45 mA, 6.3 v. 2 a. 15/8
SMALL, 250-0-250, 45 mA, 6.3 v. 2 a. 17/8
STD, 250-0-250, 65 mA, 6.3 v. 3.5 a. 17/8
HEATER TRANS, 6.3 v. 1 a. ... 7/8
Ditto, Tapped 1.4, 2, 3, 4, 6, 6.3 v. ... 8/8
Ditto, sec. 6.3 v. 4 amp. ... 10/8
GENERAL PURPOSE LOW VOLTAGE, 2 amp. 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 24, 30 v. ... 22/8
2 amp. TRANSFORMER, 160 w. ... 22/8
0, 115, 230, 320, 350 v. 500 w. ... 32/8
MULLARD '510' Mains Transformer ... 38/8
PARMECO MAINS TRANSFORMER. Made for special contract, the ratings can safely be doubled. Guaranteed 2 years. Primary 0-110-230-250 v. H.T. 300-0-300 v. 50 mA. L.T. 6.3 v. 1.8 amp. Size 4 x 3 1/2 x 3 in. ... 17/8

INTERVALVE TRANSFORMERS 5:3:1 or 5:1:1, 9/-.
O.P. TRANSFORMERS. Heavy Duty. 5/6. Multi-ratio. 7A7. Multiratio heavy duty push-pull, 10 w., 15/6. Battery 4/6. Sub min. 6/9.

10 w. O.P. matching trans. 3, 7, 15 Ω, 12/6.

L.F. CHOKES 10/10H., 60/65 mA, 5/-; 10H., 80 mA, 10/-; 10H., 150 mA, 14/-.

TINED COPPERS. 16 to 22 avg., 1lb. 3/-.

ENAMEL COPPER WIRE 16 to 22 avg., 24-30, 3/6; 32-40, 4/6; D.C.C. 28, 34, 38 gauge. 2oz. 3/6.

I.F. TRANSFORMERS 7/6 pair
465 K/s Sing Tuning Miniature Can, 2 x 1 1/2 in. High Q and good bandwidth. Data sheets. Standard size Weyrad, 10/6 pair.

PULL WAVE BRIDGE SELENIUM RECTIFIER: 2, 6 or 12 v. 1 1/2 amp. 8/9; 2 a., 11/3; 4 a., 17/6.

CHARGER TRANSFORMERS. Tapped input 200/250 v. for charging at 2, 6 or 12 v., 1 1/2 amps. 15/6; 2 amp. 17/6; 4 amp. 22/8. Circuit included.

4 AMP CAR BATTERY CHARGER with ammeter Leads, Fuse Case, etc., for 6 v. of 12 v., 60/9.

BOOKS list S.A.E.

Boys' Book of Crystal Sets. ... 2/6
"W.W." Radio Valve Data. ... 6/-
High Fidelity Speaker Enclosure. 5/-
High and IV Tube Equivalents. ... 9/6
TV Radio Tuning. ... 5/-
Mullard Amplifier Manual. ... 8/6
Radio Valve Guide, Books 1, 2, 3. 4 or 5. ... 5/- each
Transistor Superhet Receivers. ... 7/6
Practical Radio for the Amateur. ... 3/6
Master Colour Code Chart. ... 1/6
Transistor Controlled Models. ... 7/6
Principles of Colour TV. ... 16/-
International Radio Stations. ... 2/6

4 TRANSISTOR PUSH-PULL AUDIO AMPLIFIER
Size 3 x 1 1/2 x 1.

A ready built miniature push-pull amplifier with Driver and output transformers, 4 transistors. Ideal for use with record players, Intercoma, BABY ALARMS, etc. Complete with full 1/8" instruction and circuit.

Price 47/6 ov. Batt. 2.3. 2 1/2 in. Speaker 15/-.

1964 RADIOGRAM CHASSIS



THREE WAVEBANDS LATEST MULLARD S.W. 16 m.—50 m. ECH81, EF89, EB081, L.W. 800 m.—2,000 m. EL84, EZ80 12-month Guarantee.

A.C. 200/250 v. 4-way Switch; Short-Medium, Long/Form. Ferrite Aerial A.V.C. and Negative feedback. 3 ohm output, 5 watts. Glass dial, horizontal winding, size 13in. x 4in. Aligned and calibrated. Isolated Chassis, size 13 1/2 in. x 9in. high x 5 1/2 in. deep.

£9.15.6 Carr. & Ins. 4/6.

BAKER SELHURST LOUSPEAKERS



12in. Baker 15w. Stalwart 3 or 15 ohma. 46-15,000 c.p.s. ... 90/-
12in. Stereo, Foam Suspension, 12w., 36-16,000 c.p.s. ... £6.17.6
12in. Standard H.D. 20w. 40-14,500 c.p.s. ... £6.0.
12in. De Luxe 15w., 35w. 17,000 c.p.s. ... £9.10.0
12in. Bass 25w. 20-18,000 c.p.s. ... £12.10.0
15in. Auditorium, 35w., Bass, 20 c.p.s. to 12 kc/s Ideal Bass Guitar, 218.

Portable enclosures for 12in. "Stalwart", £8 each.

LOUDSPEAKERS P.M. 3 OHM. 2 1/2, 3, 4, 5in.; 2 x 4in. 15/6; 8in. Rod 18/6; 8in. Fleasy, 17/6; 9 x 6in., 8 x 5in. 21/-; 10 x 8in., 22/6; 10in. Bola, 30/-; 12in. R.A. 30/-; 13 1/2 x 8in. Double Cone E.M.I., 35/-.

STENTORIAN HF1012. 10in. 3 to 15 ohms, 10w. 97/6; 12in. H.P.12, 72/-; Tweeter T359, 80/-; Cross-over CX3000, 30/-.

EXTENSION SPEAKER CABINETS. 5in., 15/6; 6in., 18/6; 8in., 19/6; 10in., 29/6.

C.R.T. BOOSTER TRANSFORMERS for heater cathode short circuit, or tubes with failing emission. Full instructions supplied, mains input. Type A optional 25% and 50% boost 2v. or 4v. or 6.3v. or 10.5v. or 12.5v. State voltage required. PRICE 10/6.

TWIN GANG TUNING CONDENSERS. 365 pF miniature 1in. x 1 1/2 in., 10/-; 500 pF Standard with trimmers, 9/-; midget, 7/6; with trimmers, 9/-; 500 pF slow motion tuning, standard or midget, 9/6. Transistor gang 208 x 178 pF with trimmers, 10/6. SMALL 3 gang 500 pF 17/6. SINGLE 365 pF. 7/6. SINGLE 10 pF. 26 pF. 50 pF. 7/6. 90 pF. 150 pF. 5/6. Solid dielectric 100, 300, 600 pF. 3/6.

CONDENSERS. New stock. 0.001 mfd. 7 kV. T.C.C. 5/6; Ditto, 20 kv. 9/6; 0.1 mfd., 7 kv. 9/6. Tubular 500 v. 0.001 to 0.05 mfd., 9d.; 0.1, 1/-; 0.25, 1/6; 0.5/30 v., 1/9; 0.1/500 v., 9d.; 0.1/2,000 v. 0.1/1,000 v., 1/9; 0.1 mfd. 2,000 volta, 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 47 pF, 1/-; Ditto 1% to 50 pF to 815 pF, 1/-; 1,000 pF to 5,000 pF, 1/8.

465 kc/s SIGNAL GENERATOR Price 10/6. Uses B.F.O. Unit. ZA 30038 ready made with valve 18S. POCKET SIZE 2 1/2 x 4 x 1 in. One resistor to change. Full instructions supplied. Battery 8/6 extra. 69V 1 1/2 v. Details Free.

WAVECHANCE 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

Wavechance "MAKITS". Wafers available: 1 p. 12 way, 2 p. 6 way, 3 p. 4 way, 4 p. 3 way, 8 p. 2 way, 1 w. water switch, 3/6.

2 wafers switch, 12/6; 3 wafers switch, 18/-; additional wafers up to 12, 3/6 each extra; Torgie Switches, s.d., 2/-; d.p., 3/6. D.B.D.T., 4/-. Min. Side d.p.d.t., 3/6.

CRYSTAL MIKE INSERTS, 6/6
High output. Size 1 1/2 in. dia. x 1 in.

ACOS MIC. 14, insert 1 1/2 in. dia. x 1 in. 8/6

ACOS 39-1 DE LUXE STICK MIKE 35/-
TSL QUALITY STICK MIKE ... 25/-

TELEPHONE TAPE MIKE ... 10/6
GUITAR CONTACT MIKE ... 15/6

Valveholders. EA50, 6d. B12A, CRT, 1/3. Ensl., and Amer. 4, 5 and 7 pin. 1/-. MOLDED Mags. and Ins. oct. 6d.; BTG. B9A, B9G, B9A, 9d. BTG with can. 1/6. B9A with can. 1/8. Ceramic EF50, BTG, B9A, Int. oct., 1/-, B7G, B9A cans. 1/- each. Valve plugs BTG, B9A, 2/3.

HIGH GAIN TV PRE-AMPLIFIERS
B.C.B. Bands 1 to 5. Gain 18dB. EC084 valve. Kit price 29/6 or 49/6 with power pack. Details 6d. (EC384 valves if preferred). Collie only 9/6.

BAND III I.T.A.—Same prices.

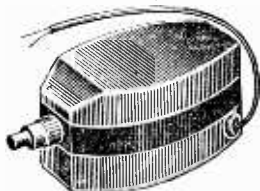
Tunable channels 8 to 13. Gain 17dB. Circuit and cotis only. 9/6.

Our written guarantee with every purchase. NEW COMPONENT LIST 1/-.

RADIO COMPONENT

Bus 133 or 68 pass door S.R. Station Selhurst

THE "INSTANT" BULK TAPE ERASER AND RECORDING HEAD DEMAGNETIZER



200/250 v. A.C. **35/-** Leaflet S.A.E.

PLASTIC RECORDING TAPE

Double Play	7in. reel, 2,400ft. 42/-	Spare Plastic Reels
	5in. reel, 1,200ft. 25/-	
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/-.

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

"6+1" TRANSISTOR RADIO MEDIUM AND LONG WAVE KIT

First class components to make a 6 transistor 2 waveband superhet chassis. Ideal for portable or table radio. All parts including BVA transistors, ferrite aerial, with ear aerial coil, printed circuit, 8in. x 2 1/2in., but EXCLUDING Speaker and cabinet.
 Speakers, 35 ohms, 7 x 4in. 21/- **£4.50**
 5in., 17/6, 3in., 15/6.

BULGIN PLUGS AND SOCKETS. Non-reversible P74, 2-pin, 4/3; P73, 3-pin, 4/6; P194, 6-pin, 6/6. "DOMINA" plugs, 2/6; sockets, 2/6.

JACKS. English open circuit, 2/6. Closed circuit, 4/3. Grounding type, 3-pin, 1/3. Grounding lead jack, 3/6.

JACK PLUGS. English, 3/-; Screwed, 4/-; Grounding, 3-pin, 3/6; Phono Plugs, 1/-; Sockets, 6d.

ALADDIN FORMERS and cores, 3in., 8d.; 7in., 10d. 0.3in. FORMERS 5937 of 8 cans TV1 of 2, 2in. sq. x 2 1/2in., or 3in. sq. x 2 1/2in., 2/- with cores.

FLOW MOTION DEVICES. etc., 4/3.

SOLOIN IRON. 25W, 200V or 230V, 24/-.

ANTEX SUB-MIN. IRON. 15w, 200 or 240v., 20/6.

BENCH STAND for above, 12/6. Spares in Stock.

Miniature Contact Cooled Rectifiers, 250V 50mA, 7/6; 230V 60mA, 8/6; 250V 85mA, 9/6; Selenium Rect., 300V 85mA, 5/-.

TV etc., Silicon Sub. Min. Rectifiers, 250V 450mA, 10/-, K3/25, 600V, 5mA, 5/-.

2M4 RMS, 14A100, 14A116 10/- each, FC31 20/-.

Coils Wearite "P" Type, 3/- each.

Osmor Midget "Q" type, adj. dust core, from 4/- each. All ranges. List S.A.E.

Teletron D.W.R.K. L. and Med. T.R.F. with reaction, 4/-. Med. wave D.R., 3/6.

Ferrite Aerials, M., 8/9; M. and L., 12/6.

Osmor Ferrite Rod Aerials, L. and M. for transistor circuits, 10/- each.

Ferrite Rods, 6 x 4in., 6 x 4in., 6 x 5 1/4in., 3/-.

H.F. Chokes, 2/6; Osmor CCL, 6/6.

T.R.F. Coils, A/HF, 7/- pair; HAX, 3/6.

Repanco DRR2, 4/6. DRX1, 3/-.

Screwdriver, 5in., 6d., Test Prods, 2/9.

Neoside Trimming Tool, 1/9.

Neon Mains Test, 80v. screw driver, 5/-.

Multicore Solder, 4d. yd. Dispenser, 2/6.

Aluminium Chassis, 18 s.w.g. Plain, undrilled, 4 sides, riveted corners, lattice fixing holes, 2 1/2in. sides, 7 x 4in., 4/6; 9 x 7in., 5/9; 12 x 7in., 6/9; 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/-.

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

B.S.R. 2 TRACK	TD 2 DECK
£8.8.0	£6.15.0
COLLARO TRACK	STUDIO 14 K
£8.8.0	£10.10.0

COMPLETE RECORDING & PLAY-BACK AMPLIFIERS

2 TRACK B.S.R.	COLLARO
£8.8.0	£11.11.0

MAINS DROPPERS. Midget adjustable sliders 0.3A, 1,000 ohms, 5/-; 0.2A, 1,200 ohms, 5/-; 0.15A, 1,500 ohms, 5/-; 0.1A, 2,000 ohms, 5/-.

MIKE TRANSFORMERS, 50-1, 3/9.

P.V.C. Covered Wire, single or stranded, 2d. yd. Sleeving, 1 or 2 min., 2d.; 4 mm., 3d.; 6 mm., 5d. yd.

SPEAKER-FRET, Gold, Maroon or Green Cloth, 17 x 25in., 5/-; 25 x 35in., 10/-.

Tygan, various colours 32in. wide from 10/-; 26in. wide from 5/-; it. Samples 1/-.

Expanded Metal, Gold, 12 x 12in., 6/-.

Panel mounting fuse holder, 2/-. Fuses 1in., 60mA -5A, 6d., Insulated side cutters, 8/6. Bib Stripper, 3/6.

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 TRANSISTOR SUPERHETS WITH PRINTED CIRCUIT AND FERRITE ROD AERIAL.

Long and Medium Wave Aerial—RA2W On 6in. rod, 208pF tuning, with ear aerial coupling coil, 12/6

Osc. Coil P501/AC, 176 pF tuning, 5/4

1st and 2nd I.F. Trans.—P502/CC, 470k/25 11/16in. dia. by 4in. 5/7 each

3rd I.F. Trans.—P503/CC, 6/-

Spare Cores 6/- each

Driver Transformer—LFDT4 3/6

Wavechange Slide Switch d.p.d.t., 2/6

Printed Circuit—PCAL. Size 2 1/2 x 8 1/2in. Ready drilled and printed 9/6

Volume Control, 5K-DP 4/6

35 ohm Speakers, 3in., 15/6; 5in., 17/6; 7 x 4in., 21/6

Tuning Gang with trimmers 10/6

6 Mullard Transistors and diode 42/6

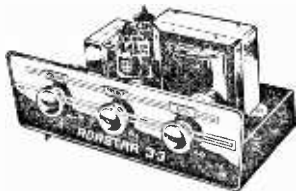
Constructor's Booklet 2/-

3 ohm O.P. Trans. O.P.T.1 10/6

NEW MULLARD TRANSISTORS
 OCT1 6/-, OCT2 7/6, OC81D 7/6, OC81 7/6, OC4 8/9, OC45 8/6, OC110 6/6, AF117 6/6.
 Sub Miniature Condensers, 0.1 mfd., 30v., 1/3, 1/2, 2, 4, 5, 8, 16, 25, 30, 50, 100 mfd., 15 volt 2/6 each. Transistor Holders 1/3.

SINCLAIR "SILIMINE"
 Med. wave, 2 transistors, 2 diodes, min. earphone, ferrite aerial. Micro receiver 3 x 1 1/4 x 1 1/2in. 49/6, batt. 3/6.

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



READY BUILT WIRED AND TESTED A.C. only, 300-350 V. 5Vces ECL86 and ECL84, 3 ohms quality output. Mullard tone controls. Controls: bass boost, treble and volume. Separate engraved front panel with de luxe finish. Quality mains transformer. Stove enamelled chassis—size 6in. x 5in. x 2in. Bargain Price £4.19.6
 Details S.A.E.
 "Performs agreeably well" (The Gramophone)

BUILD YOUR OWN RECORD PLAYER

FROM £9.16.0

AND SAVE POUNDS!!



4 Speed Autochange or Single Player units supplied with hand and foot tone Portable Cabinets 17x15x5 1/2in. de luxe Strong carrying handle, gilt finish clips and hinges. As used by Famous Make for 20Gns. models. Ready cut-out motor board 14x13in. Front baffle with 7 x 4in. high flux loudspeaker and 3 watt 2 valve UY85, UCL82 2-stage amplifier ready 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 together perfectly. Special instructions enable assembly in 30 minutes, only 5 wires to join! 42-month written guarantee. Available separately or package deals as below.

AUTOCHANGER KITS COMPLETE (as above)
 B.S.R. Monarch ... £11.10.0 P.P. 5/6
 Garrard Autolism ... £12.18.0 P.P. 5/6

SINGLE PLAYER KITS COMPLETE (as above)
 E.M.I. Junior ... £9.19.6 P.P. 5/6
 E.M.I. auto stop/start ... £11.5.0 P.P. 5/6

OR SEPARATELY
 Cabinet with board 14 x 13in. cut out to your choice **£3.8.6** 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. 4/6
 B.S.R. UA15/18 ... £3.17.6 P.P. 4/6
 Garrard Autolism ... £4.17.6 P.P. 4/6

SINGLE PLAYERS
 E.M.I. auto stop/start ... £5.10.0 P.P. 4/6
 E.M.I. Junior ... £3.7.6 P.P. 3/6

TRANSCRIPTION UNITS
 Garrard 4HF ... £16.10.0 P.P. 5/-
 Philips AG1016 ... £12.5.0 P.P. 5/-
 Garrard AT6 ... £11.0.0 P.P. 5/-

BARGAIN
 B.S.R. Autochange UA12 Stereo/Mono ... £7.10.0 P.P. 4/6

Replacement sapphire stylus available from 6/3.
 Replacement Xtals from 15/-; Stereo from 31/6.

BARGAIN SINGLE PLAYER KIT 200/250 v. A.C. (less 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 r.p.m.; Crystal Pick-up for LP/SD. Records, 7in., 10in., 12in.; Cut out Mounting board 12 1/2 x 9 1/2 in.

ARDENTE TRANSISTOR TRANSFORMERS
 D3035, 7.3 CT-1 Push-Pull to 3 ohms for OC72, 11/-
 D3034, 1.74:1 C.T. Push-Pull Driver for OC72, 11/-
 D3058, 11.5:1 Output to 3 ohms for OC72, etc., 11/-
 D167, 18.2:1 Output to 3 ohms for OC72, etc., 12/-
 D229, 4.5:1 Driver, 7in. x 7in. x 7in., 11/6
 D240, 8.5:1 Driver, 7in. x 7in. x 7in., 11/6

ARDENTE TRANSISTOR VOLUME CONTROLS
 VC1545, 5K with switch dia., 9in., 5/3

DEAF AID EARPIECE, Xtal or magnetic, 7/6

SUB-MIN. JACK AND PLUG 3/6 pair

MINIATURE PANEL METERS

Size 1in. sq. Precision jewelled bearings, 2% accuracy, silvered dials, black numerals and fine pointers, zero adjustment reset on front of meter.

0-1 mA	27/6	0-50 mA	39/6
0-5 mA	27/6	0-500 mA	32/6
0-300 V	27/6	"S" Meter	35/-

CARY MULTIMETER M.1
 0-1200 v. A.C./D.C., ohms 0-100k, etc. 54/-

COMPONENT SHOP 337 WHITEHORSE ROAD WEST CROYDON

P.P. charge 1/-. C.O.D. 2/- extra. Telephone: THO 1665 (Export welcome. Send remittance, and extra postage, no C.O.D.)

**RADIO-AMATEUR GEAR
EDUCATIONAL KITS**



**TEST INSTRUMENTS
HI-FI EQUIPMENT**

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



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

HI-FI F.M. TUNER. Tuning range 88-108 Mc/s. Tuning unit (FMT-4U) with 10.7 Mc/s. I.F. output (£2.15.0 inc. P.T.). I.F. Amp. (FMA-4U) complete with cabinet and valves. (£13.3.0). Total Kit £15.18.0
Assembly can be arranged.



5W HI-FI MONO AMPLIFIER. Model MA-5. A low-priced amplifier based on the S-33. 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 £6.19.6 to £29.8.0

6W DE LUXE AMPLIFIER. Model S-33H. An inexpensive Stereo-Mono amplifier, with high sensitivity. Suitable for Decca Deram 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



"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 £39.17.6
Assembled £48.17.6

"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.).

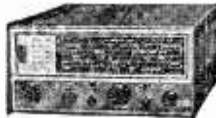


Assembled models also available; prices on request — Deferred terms available over £10. Free delivery U.K.

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

AVAILABLE NOW!

PA AMPLIFIER. Model PA1. 50 W. (rms.) 100 W. pk. output. For vocal and instrument groups, guitars, etc. 4 inputs, 2 loudspeakers. Send for full details.
Kit £54.15.0
Assembled £74.0.0



RG-1

AVAILABLE NOW!

COMMUNICATIONS TYPE RECEIVER Mod. RG-1. An excellent low cost receiver. Freq. cov.: 600 kc/s-1.5 Mc/s. 1.7 Mc/s-32 Mc/s. Send for details. Kit £39.16.0.
Assembled £53.0.0.

PORTABLE SERVICE OSCILLOSCOPE. Model OS-1. Compact portable scope, ideal for servicing and general work. Printed circuit.
Kit £21.18.0. Assembled £29.8.0

Sin. OSCILLOSCOPE. Model O-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 £35.10.0. Assembled £43.10.0

VALVE VOLTMETER. Model V7A. Measures up to 1,500 volts (D.C. and R.M.S.) and 4,000 pk. to pk. Res. 0.1 Ω - 1,000MΩ
Kit £13.18.6 Assembled £19.18.6

6W STEREO AMPLIFIER. Model S-33. 3 w/chl. Inputs for radio-tape-gram. Stereo/Mono, ganged controls. Sensitivity 200 mV.
Kit £13.7.6. Assembled £18.18.0

MULTIMETER. Model MM-1U. Ranges: 0-1.5 v. to 1,500 v. A.C. and D.C. 150ΩG—15A D.C. 0.2Ω to 20ΩM 4 1/2 in. 50μA meter
Kit £12.18.0 Assembled £18.11.6

R.F. SIGNAL GENERATOR. Model RF-1U. Up to 100 Mc/s fundamental, 200 Mc/s on harmonics. Up to 100 mV output all bands.
Kit £13.8.0. Assembled £19.18.0



DX-40U

40 w. to aerial. Prov. for VFO Kit £33.19.0 Assembled £45.8.0

250

AMERICAN HEATHKIT MODELS
Full details of direct Mail Order Scheme and catalogue can be obtained from us for 1/- post paid. (FREE to Service Departments.)

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



DX-100U

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

DAYSTROM LTD.

Dept. P.W.2, GLOUCESTER, ENGLAND

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

Send me **FREE BRITISH CATALOGUE** (Yes/No)

Full details of model(s) _____

NAME _____

ADDRESS _____

PW2.

Practical Wireless

Vol. XXXIX No. 684 FEBRUARY, 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

	Page
Editorial	913
Round the World of Wireless ...	914
3-Transistor S.W. Converter... ..	916
Applications for the P.W.	
"Sixteen"	923
Wiring for Sound	927
Test Gear Accessories	930
Photographic Timer	932
A Medium Wave Receiver	937
On Your Wavelength	939
Practical Circuits for Electric Guitars	940
A Door Intercom	943
The Versatile EF91	946
Simpler Electronic Music	957
Neon Relaxation Oscillators ...	958
Books Reviewed... ..	962
Trade News	965
Long Waves for the M.W. Pocket Superhet	969
Mains Voltage Adjuster	973
Testing Dry Batteries	974
Club News	977
Letters to the Editor	978

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 designs 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."

In Search of a Leader!

ONCE every month, it behoves your editor to write the several hundred words which comprise the leader column. It is, of course, an old cynical precept that nobody bothers to read leader articles (except in *The Times*!) and that if sufficiently emboldened an editor could fill his column with all manner of libellous, scurrilous and defamatory matter and no one would be the wiser.

Anyone who has sat at an editor's desk will be able to refute this most emphatically! This hoary old gag is only a gag and was most likely first thought up by a frustrated assistant editor!

Thus, in framing the month's leading article, an editor is aware that a large percentage of his readers is going to read the results of his literary efforts, be they modest, be they profound. However, there is more truth in the assertion that the leader is the toughest part to write and there can be very few editors who at some time in their career have not sat temporarily baffled, awaiting an idea to bourgeon.

For, especially in a magazine such as PRACTICAL WIRELESS, the subject matter must relate to something with which the average reader can associate himself. That is why, though often tempted, we seldom stray into the realms of trade and broadcasting politics, ethics and practices; these subjects receive sufficient airing via more appropriate mouthpieces.

The aim is to deal with topics of direct interest to readers. To comment. To provide talking points. To stimulate activities. To offer guidance. It is an opportunity for your editor to forge a personal link with readers once a month.

Before becoming a professional journalist, your editor would willingly have volunteered to write a supply of leaders for the contemporary radio magazines on what were (at the time) burning issues or pet theories. And now, hundreds of leaders later, it might be interesting and enlightening to reverse the procedure. In short, we invite you to write a leader!

Here is a glorious opportunity to air your comments on a chosen subject, to address fellow readers. The rules are simple: just write approximately 250-300 words (about half the length of this article) on a suitable theme—anything providing it deals with the hobby of radio construction—and give it a title. Send it to PRACTICAL WIRELESS, marked "Leader Competition". Entries need not be typed, though this is preferable.

Two guineas will be awarded to the entry considered the best by a panel of judges from the staff of PRACTICAL WIRELESS, and one guinea for the runner-up. The judges' decision will be final and we regret that it will not be possible to acknowledge individual entries.

The winning leaders will be published within the pages of the April issue. The closing date is *January 31st*.

Let's have a good response to this invitation. At least it will prove that you *do* read the leader page!

Our next issue dated March will be published on February 7th



**NEWS AT HOME
AND ABROAD**

Retailers Association Adopts New Symbol

AS a result of a large number of requests from domestic and electrical retailers, the Radio and Television Retailers Association recently formed a separate association for the benefit of these retailers. Known as the Electrical Appliance Association, this new body has recently adopted a symbol which will be displayed in shops so that the consumers may benefit by identifying firms belonging to the E.A.A.

The new symbol has been designed along the same lines of the already well known R.F.R.A. trade mark.



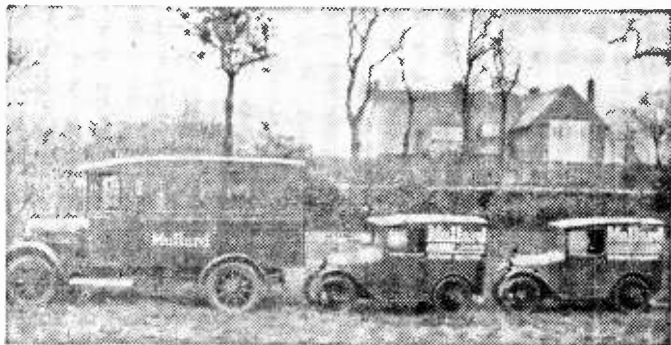
IN ASSOCIATION WITH THE RADIO & TELEVISION RETAILERS' ASSOCIATION

The symbol of the Electrical Appliance Association

25 Years of Valve Manufacturing

DESPITE the transistor, the Blackburn plant of Mullards Limited—25 years old in November last year—still manages to produce approximately 50 million valves a year. This recent anniversary was also marked by the 80th birthday of Mr. S. R. Mullard who founded the first Mullard Radio Valve Company in 1920. During the two decades which followed, the demand for radio valves increased enormously so that new premises were always being sought and larger factories being built to supply this demand, with the eventual establishing of the plant at Blackburn in 1938.

By 1944 the output from this plant, which had a labour force of 200, was 6.5 million valves a year. This had risen to 33 million by 1955 and to 50 million by 1958, when 5,000 were employed in this one factory. Now the Blackburn plant is only one of 18 Mullard factories throughout England, producing a variety of sophisticated components for the electronics industry, bearing only a technical similarity to the early transmitting and receiving valves, with which S. R. Mullard began his manufacturing company 43 years ago.



Even in 1924 the growing importance of valves was indicated by the number of Mullard vans such as these, which were then familiar sights on the roads.

RADIO EQUIPMENT FOR TSR-2

THE R.A.F.'s new tactical-strike-reconnaissance and strategic nuclear bomber, the TSR-2, will be fitted with instrument landing system and h.f. communication equipments manufactured by the Marconi Company Limited.

The H.S. is that of the Marconi Sixty Series equipment. The communication equipment will provide both single and double side-band transmission and reception at high power.

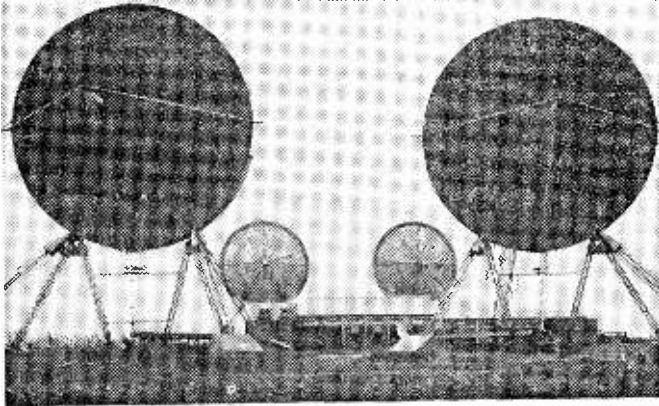
NATO COMMUNICATIONS NETWORK COMPLETE

THE Supreme Headquarters Allied Powers Europe has recently accepted, on behalf of the North Atlantic Treaty Organisation, the final station in NATO's ACE HIGH communi-

cations network. This vast system of radio stations stretches from Norway to Turkey; an 8,300 mile link, incorporating 82 stations, located in nine of the NATO countries.

The design, manufacture and installation of the complete project has been the task of International Telephone and Telegraph Corporation and its affiliated companies, and included in each of the stations is multiplex equipment made by Standard Telephones and Cables Limited.

The purpose of the ACE HIGH system is to provide a reliable method of communication between the nations of the European-wide command area of NATO, and to accomplish this, both tropospheric forward scatter (over-the-horizon) and line-of-sight types of transmissions are used throughout the network. The stations have all been built on high ground, each with two pairs of 65ft. circular dish-aerials positioned to pick up and re-transmit any of the 250 telephone and 180 telegraph circuits which can be accommodated by the system.



One of the 82 stations of NATO's ACE HIGH network.

NEW TITLE FOR I.E.E. JOURNAL

THE official organ of the I.E.E., in which papers originally presented to meetings of the Institution are published, has for years been known as the Journal of the Institution of Electrical Engineers. Now the Council of the Institution has changed the name to "Electronics and Power", with the previous title remaining as a sub-title.

The Council decided on this change as a means of emphasising the scope of the Institution and to dispel the idea that the I.E.E. is mainly concerned with power engineering when, in fact, for several years electronic subjects have been more in evidence in papers and at meetings than power engineering.

Aircraft Equipment Tours West Germany

A DEMONSTRATION aircraft belonging to the Marconi Company Limited, recently completed a sales tour of West Germany. Aboard the aircraft was a variety of equipment, manufactured by the company, which was shown to aircraft operators and constructors throughout the Federal Republic during the ten days of the tour.

Included in the demonstration equipment was standard airline Doppler Navigator and the new helicopter Doppler systems.

change as a means of emphasising the scope of the Institution and to dispel the idea that the I.E.E. is mainly concerned with power engineering when, in fact, for several years electronic subjects have been more in evidence in papers and at meetings than power engineering.

R.T. for Desert Patrols

IN its fight against the menace of locusts, the Desert Locust Control Organisation of East Africa keeps a constant surveillance on the breeding grounds and movements of this pest. Much of this work involves patrols over barren and underdeveloped areas, extending sometimes hundreds of miles from centres of communication. To provide their patrols and static stations with a reliable means of communication, the D.L.C.O. recently selected and ordered Marconi h.f., s.s.b. transmitter/receiver equipment.

This equipment can provide adequate daytime communications over many hundreds of miles, using only a simple dipole aerial and a transmitter power of only 100W.

STC ACQUIRES HUDSON ELECTRONICS

THE firm of Hudson Electronic Devices Limited, manufacturers of mobile radio communication equipment, was formed and built up by Mr. A. D. Hudson, at one time an apprentice of Standard Telephones and Cables Limited. Now STC Limited has acquired the issued capital of Hudson Electronic Devices, so that it becomes part of STC's radio division.

Mr. Hudson will remain as a director, however, as plans for the firm's expansion go on under new management.

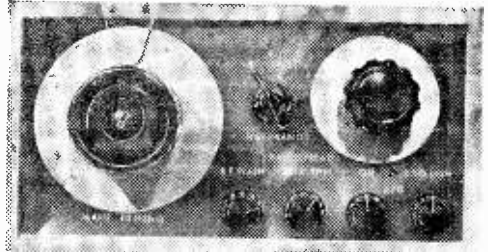
Electronics Symposium in Birmingham

A ONE day symposium on "Electronics in the Automobile Industry", has been arranged by the Electronics Section of the South Midland Centre of the I.E.E. and the West Midland Section of the British I.R.E. The symposium is to be held during April, this year, and will take place in the Electrical Engineering Department of the University of Birmingham.

A MODERN COMPACT 3-TRANSISTOR S.W. CONVERTER

FOR 1.7—31.5 Mc/s

BY J. VAITES



THE converter to be described is a portable, high performance, transistorised front-end unit covering the short wave bands from 1.7Mc/s to 31.5Mc/s. It is designed to feed into any broadcast receiver without any alteration at all to that receiver.

Being of compact size, it is an ideal companion to any standard transistor portable, provided the portable has an external aerial socket. It can, of course, be used also with any

other type of broadcast receiver, whether mains domestic receiver or car radio. This add-on unit thus converts the basic receiver into a double conversion receiver, providing an interesting and useful combination.

The unit provides a cheap introductory step to the short wave bands for the beginner, who will almost certainly have the use of at least one broadcast receiver in the household. At the same time, being electrically bandspread and incorporating facilities for s.s.b. reception, the converter is an ideal piece of equipment for the "ham" station, whether fixed or mobile.

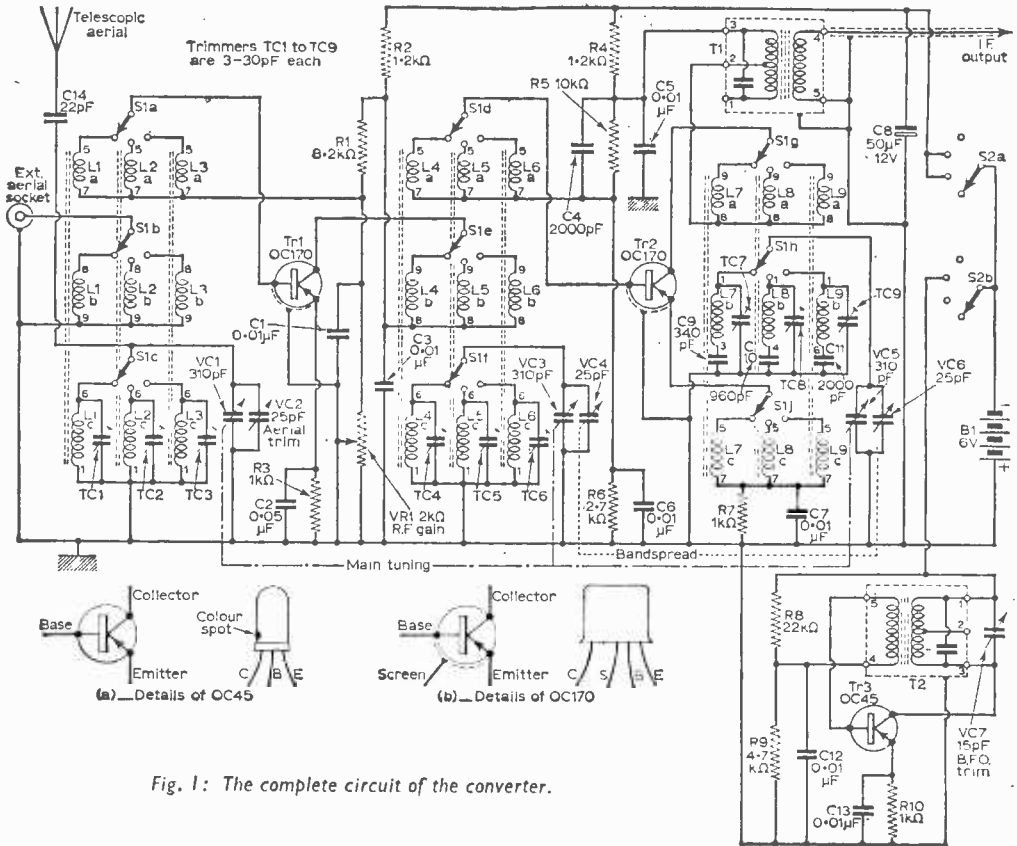


Fig. 1: The complete circuit of the converter.

Circuit Description

The circuit (see Fig. 1) is designed around the new Denco transistor coils—based on their well-tried range of Miniature Dual Purpose Coils. Ranges 3, 4 and 5 are used, covering respectively 1.67 to 5.3Mc/s, 5 to 15Mc/s, and 10.5 to 31-Mc/s. The coil connections are switched by a 3-way 9-pole Yaxley switch (S1), using three wafers with interposed screens.

The r.f. stage uses an OC170 transistor (Tr1) with blue coils in the aerial stage and yellow coils as coupling to the second stage. An r.f. gain control VR1 varies the base voltage of Tr1. An external

fore, tuned to this frequency, corresponding to 187.5m on the medium wave band. In practice, since the medium wave band of many receivers only goes down to just below 200m, the lowest clear wavelength on the band is selected (this may fall anywhere between 190 and 200m) and the output of the converter adjusted to it.

The three-gang tuning capacitor (VC1, 3, 5) is fitted with a calibrated dial incorporating a slow motion tuning device. The bandspread capacitor (VC4, 6) is coupled to the mixer and oscillator sections only; this two-gang capacitor is also fitted with a calibrated dial. The aerial section is trimmed separately by VC2, this being necessary to accommodate different types and lengths of aerial.

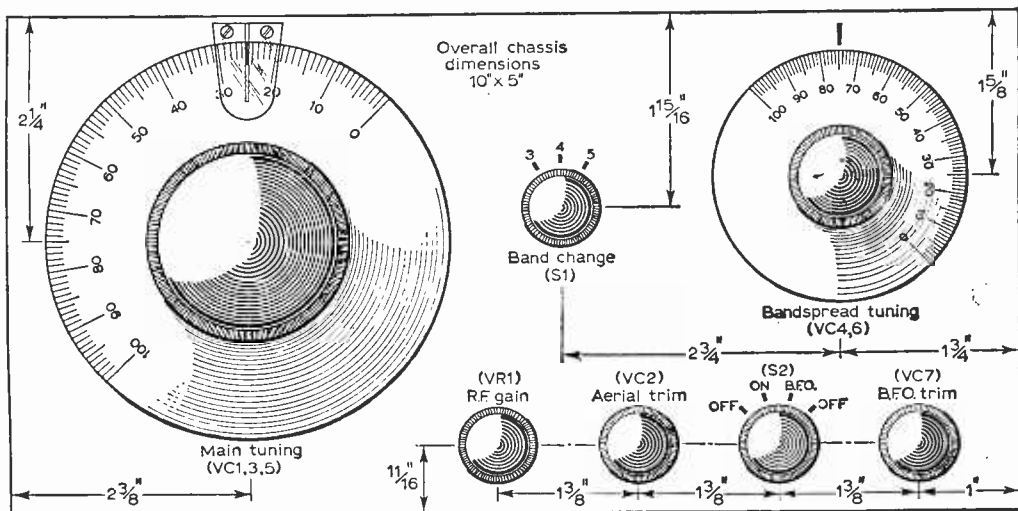


Fig. 2: Drilling details and control layout of the front panel.

aerial can be fed to the primary of the aerial coils, or a built-in telescopic aerial can be used, this being connected permanently to the aerial tuned circuit via a small capacitor.

The second stage is the mixer oscillator and the transistor (Tr2) is also an OC170. The white coils are used here and an output of nominally 1.6Mc/s is obtained at T1. The broadcast receiver is, there-

TABLE I
Frequency and Wavelength Coverage

Range	DIAL SETTING	
	100	0
3	1.67Mc/s 180m	5.3Mc/s 57m
4	5.0Mc/s 60m	15Mc/s 20m
5	10.5Mc/s 28m	31.5Mc/s 9.5m

Beat Frequency Oscillator

The b.f.o. unit uses an OC45 transistor (Tr3), with the appropriate b.f.o. transformer (T2). The swing of the trimming capacitor (VC7) is adequate to permit reception of all s.s.b. transmissions. The b.f.o. may be coupled by means of a 1pF capacitor from pin 2 of T2 to pin 2 of T1, but this should not be necessary, since the b.f.o. coil and the i.f. transformer are physically adjacent.

The b.f.o. is switched on and off by S2, which also serves as the on/off switch for the unit as a whole. A large capacitor, C8, is fitted to smooth out any fluctuations in the power supply, this latter item consisting of four pen-torch batteries in series, giving a 6V supply.

Mechanical Construction

The front panel, of 1/16 in. aluminium, size 10 in. x 5 in. is drilled as per Fig. 2, countersinking most of the 6B.A. holes as indicated.

The chassis, of 1/4 in. bakelite or perspex, size 9 in. x 4 1/2 in., is drilled as per Fig. 3.

The exact dimensions for the two transformers (T1 and T2) are not given, only the centres being indicated. This is because the drilling figures are

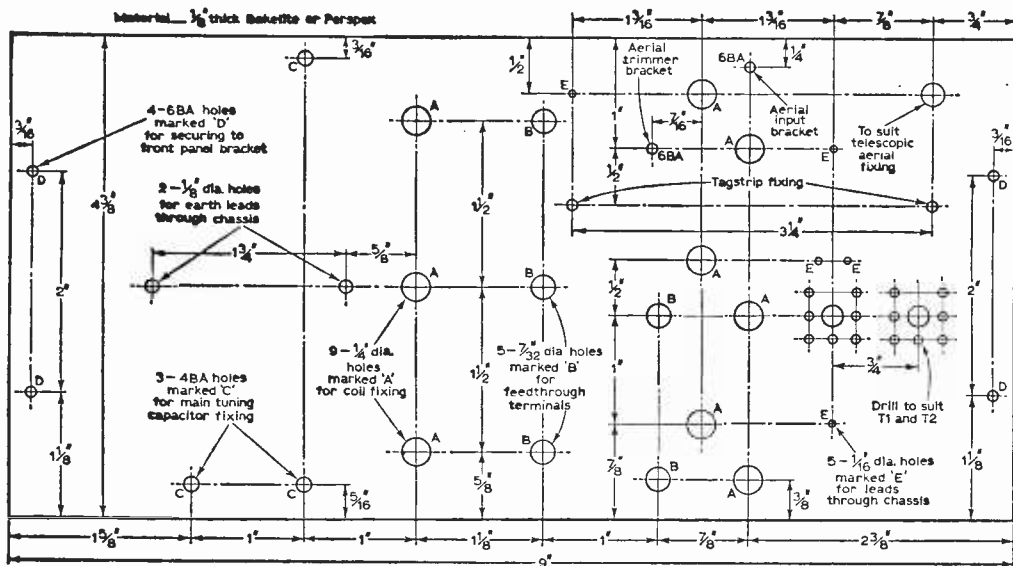


Fig. 3: Chassis dimensions diagram

rather awkward and the constructor would perhaps prefer to consult the information leaflet supplied with the components. All the transformer drillings, except the core adjusting hole, should be heavily countersunk from the underside of the chassis, as the component pins are rather short, being originally designed for use on rather thinner printed circuit boards.

The two supporting brackets are constructed from 20s.w.g. tin sheet as shown in Fig. 4, taking

care to make the bends in the two brackets in the reverse mode, so that the whole job is symmetrical when fastened together.

Finally, at this stage, the two small brackets for the aerial input and trimmer can be formed as per Fig. 5.

The Case

The converter may be housed in a metal case, size 10in. wide x 5in. high x 4 1/4in. deep (internal

COMPONENTS LIST

Resistors:

- | | |
|----------|----------|
| R1 8.2kΩ | R6 2.7kΩ |
| R2 1.2kΩ | R7 1kΩ |
| R3 1kΩ | R8 22kΩ |
| R4 1.2kΩ | R9 4.7kΩ |
| R5 10kΩ | R10 1kΩ |

All 10%, 1/4W carbon
VR1 2kΩ potentiometer

Capacitors:

- C1 0.01μF paper
- C2 0.05μF paper
- C3 0.01μF paper
- C4 2,000pF ceramic or mica
- C5 0.01μF paper
- C6 0.01μF paper
- C7 0.01μF paper
- C8 50μF electrolytic 12V
- C9 340pF silver mica
- C10 960pF silver mica
- C11 2,000pF silver mica
- C12 0.01μF paper
- C13 0.01μF paper
- VC1, 3, 5 3-gang variable 310pF each section (Jackson type E 3)
- VC2 25pF variable (Jackson type C801)
- VC4, 6 25pF split stator (Jackson type C808)
- VC7 15pF variable (Jackson type C801)
- TCl-9 30pF concentric trimmer (Philips)

Inductors:

- | | | |
|------------------------------|--|--------------------|
| L1 Blue, range 3 | } Denco transistor dual purpose coils | |
| L2 Blue, range 4 | | |
| L3 Blue, range 5 | | |
| L4 Yellow, range 3 | | } Blue=aerial coil |
| L5 Yellow, range 4 | | |
| L6 Yellow, range 5 | } White=oscillator coil (for 1.6Mc/s i.f.) | |
| L7 White, range 3 | | |
| L8 White, range 4 | } (for coverage of ranges see Table 1) | |
| L9 White, range 5 | | |
| T1 I.F. transformer 16/1.6 | | } Denco |
| T2 B.F.O. transformer 17/1.6 | | |

Switches:

- S1 Rotary type, 9-pole, 3-way; three wafers with screens (Denco)
- S2 Rotary type, 2-pole, 4-way (Minibank 'C')

Transistors:

- | | |
|-----------|----------|
| Tr1 OC170 | Tr3 OC45 |
| Tr2 OC170 | |

Miscellaneous:

Main tuning drive unit (Jackson Ball Drive 4489). Bandsread dial, 2in. dial calibrated 0-100 (Bulgin) with knob to suit. Five feedthrough connectors (Radiospares). Four 1.5V cells (Ever Ready U12).

dimensions), this giving a slightly recessed front panel. Drillings will be needed for the telescopic aerial, the external aerial and the output lead.

The best method of fixing the converter into this case is by two bolts through the back of the case screwing into two tapped brackets fitted to the back of the chassis. The constructor may have his own ideas on this subject, however, and the above ideas are offered only as a suggestion. It is, however, advisable to use a metal case if at all possible, so as to provide full screening of the converter circuits.

Mounting and Wiring-up

If not purchased complete, switch S1 should be made up with wafer layout as indicated in Fig. 6, and with screens (Fig. 7a) and spacings as indicated (Fig. 7b).

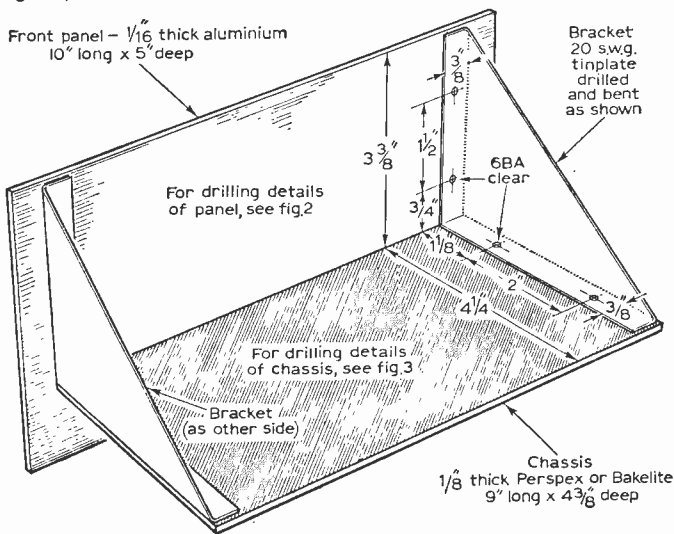


Fig. 4: The assembly of the front panel and chassis.

The first components to be mounted on the chassis are the two transformers T1 and T2, these being held in position by bending the can tags. Next, a 12-way tag-strip is mounted on the underside of the chassis using holes marked G (see Fig. 3). Finally, mount five feed-through terminals into the holes marked E1 to E5 (Fig. 8).

The assembled switch should now be mounted, but before doing so, it is advisable to fit earth tags on to either side of the corner holes in the screens and also to solder flying leads on to the 7, 8 and 9 o'clock contacts of the front and middle wafers (these are the pin 5 connections, Fig. 6), since these points may be difficult to get at later.

When the switch is mounted, refer to Fig. 6, and first connect the lower wipers to the appropriate feed-through terminals. Then mount all coils with pins uppermost (see layout diagram, Fig. 9), and complete all switch wiring, with the exception of the leads from the top wipers (tuning capacitor leads), and the aerial wiper on the rear wafer.

Next complete all the coil wiring, by commencing up appropriate pins (e.g. white coils, all pins 8 commoned, all pins 7 commoned, etc.).

Certain of the other components can now be mounted inside the coil compartments. These are:

- R1 from pin 8 of L4 through hole in screen 2 to pin 7 of L1.
- R6 and C6 from pin 7 of L4 to earth tag adjacent.
- R7 and C7 from pin 7 of L7 to earth tag adjacent.
- C3 from pin 8 of L4 to earth tag adjacent.
- C1 from pin 7 of L1 to earth tag adjacent.
- C9 from pin 3 of L7 } solder direct to screen 1 at nearest
- C10 from pin 4 of L8 } point.
- C11 from pin 6 of L9 }

Next, certain leads can be taken from the coil pins to points below the chassis and also on the screens (refer to Fig. 8 for tagstrip numbering).

These are:

- Pin 1 of L1 to earth tag adjacent.
- Pin 1 of L4 to earth tag adjacent.
- Pin 7 of L2 through hole F1 to tag 6 on tagstrip.
- Pin 7 of L5 through hole F3 to tag 8 on tagstrip.
- Pin 8 of L5 through hole F2 to tag 9 on tagstrip.
- Pin 8 of L8 through hole F4 to pin 2 of T1.

The main tuning capacitor and the bandspread capacitor can now be mounted. The top wipers on each switch wafer are wired to the appropriate tags on the main tuning capacitor and, in the case of the front and middle wafers, to the appropriate tags on the bandspread capacitor as well.

VR1, S2 and VC7 are mounted next, making sure that the spindle of VC7 does not touch the front panel.

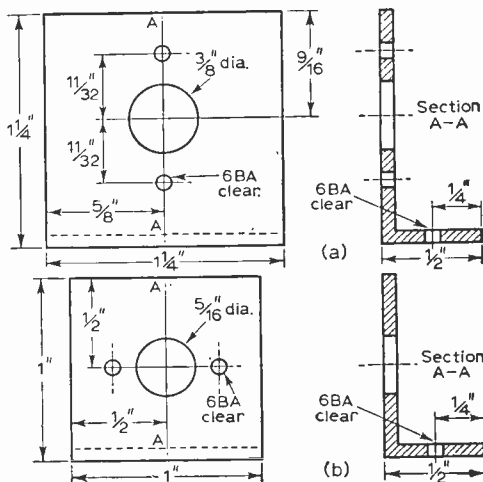


Fig. 5 (a) aerial trimmer bracket; (b) aerial input bracket.

The earth wiring is then fitted, using 20s.w.g. tinned copper wire. The earth tags on the bandspread capacitor are connected to screen 1 adjacent, soldering direct to the screen. The earth tags on screens 1 and 2 are wired together and the wiring continued to all earth tags on the main tuning capacitor, making use of holes C to run underneath the capacitor. The earth wiring is continued underneath the chassis to the appropriate tags on VR1, then on to the tagstrip, joining up tags 2, 3 and 12, and finally to the can tags of T1 and L10.

The underchassis components are now wired up as follows:

- Pin 3 of T1 to tag 10 on tagstrip.
- C4 and R5 across tags 8 and 10 on tagstrip.

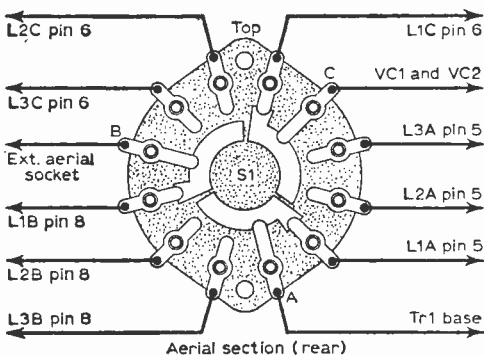
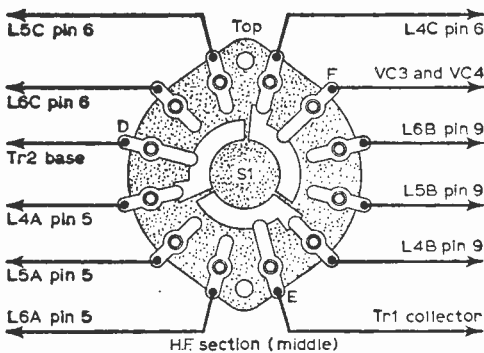
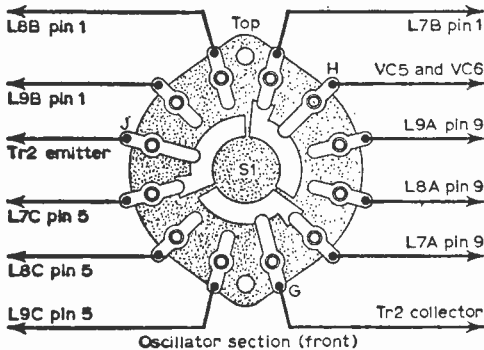


Fig. 6: Wiring of S1. Note: wafers viewed from rear.

- C5 across tags 10 and 12 on tagstrip.
- R4 across tags 7 and 10 on tagstrip.
- R2 across tags 7 and 9 on tagstrip.
- C2 and R3 across tags 1 and 3 on tagstrip.
- C8 across tags 7 and 12 on tagstrip.
- R10 and C13 across tags 11 and 12 on tagstrip.
- Wire lead from top of VR1 to tag 6 on tagstrip;
- Wire lead from contacts 2 and 3 on S2a to tag 7 on tagstrip.
- Wire lead from contact 3 on S2b to one contact of VC7 and continue on to pin 1 of T2.
- Wire lead from other contact of VC7 to pin 3 of T2.
- Wire R8 from pin 4 of T2 to pin 1 of T2.
- Wire R9 and C12 from pin 4 of T2 to tag 12 on tagstrip.

The transistors can now be wired in (see Fig. 1 for connections). All wires except the OC170 screens should be sleeved and the full length of lead wire should be retained.

Wiring points are:

- Tr1 Collector - feedthrough terminal E2.
- Screen - tag 2 tagstrip.
- Base - feedthrough terminal F1.
- Emitter - tag 1 tagstrip.
- Tr2 Collector - feedthrough terminal E3.
- Screen - use earth terminal on VR1.
- Base - feedthrough terminal F4.
- Emitter - feedthrough terminal E5.
- Tr3 Collector - pin 3 T2.
- Base - pin 5 T2.
- Emitter - tag 11 tagstrip.

TABLE 2
Tracking Points

Range	BAND END		TRACKING POINTS	
	L.F. (Dial 100)	H.F. (Dial 0)	L.F. (Dial 89)	H.F. (Dial 8½)
3	1.67Mc/s	5.3Mc/s	1.83Mc/s	4.5Mc/s
4	5.0Mc/s	15.0Mc/s	5.5Mc/s	13.5Mc/s
5	10.5Mc/s	31.5Mc/s	11.5Mc/s	28.5Mc/s

The coaxial aerial socket and the aerial trimmer VC2 are mounted on their brackets and fitted to the chassis with an extension spindle on VC2 coming out through a bush on the front panel.

The body of the coaxial socket is wired to pin 1 of L3 and the centre connection to the appropriate wiper on the rear wafer. The earth connection of VC2 is taken to tag 3 on the tagstrip and the other connection through hole F5 to the top wiper on the rear switch wafer.

The coaxial output lead is soldered across pins 4 and 5 of T1, pin 5 also being connected to tag 12 on the tagstrip. This output lead should preferably be clamped to the chassis to prevent jerking.

The nine concentric trimming capacitors may now be fitted into position. The "live" connection (outer connection) should be soldered either on to the appropriate switch contact or coil pin, whilst the earth connection (centre spindle) should be soldered directly on to the screen. Care must be taken to keep the top of the trimmers below the level of the top of the front panel, otherwise they will foul the case.

Finally, the batteries can be mounted (clamped to chassis underneath the main tuning capacitor) and the linking wires soldered. The positive battery terminal is taken to tag 3 on the tagstrip and the negative terminal to the wipers of S2A and S2B.

Knobs and dials are then fitted and the converter is ready for lining-up.

Telescopic Aerial

It will be noted that no exact details have been given for fitting the telescopic aerial. This is because there is a wide variety of suitable devices on sale, ranging from the truly telescopic (and rather expensive) type, to the cheaper semi-telescopic car aerial.

The general idea is that the aerial selected should have a tapped hole in its bottom section A corresponding bolt of some 1/4 in. length is fed up through hole M (Fig. 3) and tightened down with a nut, leaving enough thread to screw into the aerial. A solder tag is placed under the head of the bolt (i.e. underneath the chassis) and C14 is wired from this tag to the "live" tag of VC2.

A suitable hole is cut in the top of the can and fitted with a rubber grommet, making a good push fit for the aerial, which is screwed in when the converter has been fastened in its case.

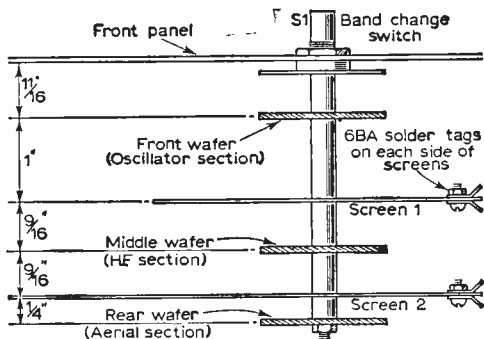
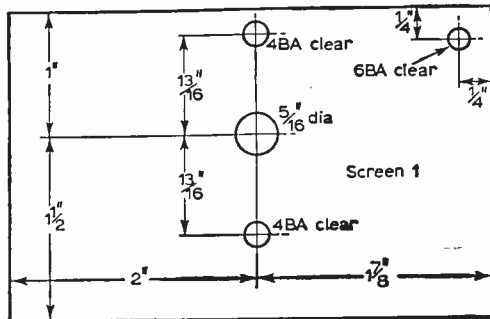
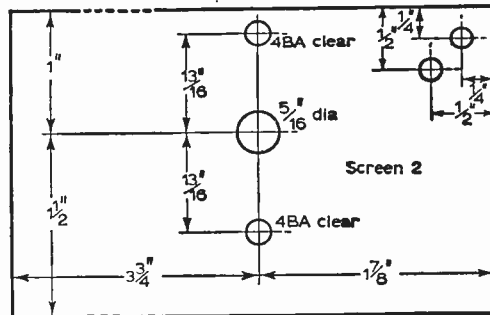


Fig. 7a (above): Showing the build-up of the switch.

Fig. 7b (right): Drilling details of S1 screens (viewed from rear).



Material for both screens — 20 swg. tinplate



Lining Up

Lining-up should preferably be done with the use of a signal generator although, as will be shown, it is possible to manage without such an instrument.

The output lead should be fitted with a terminal appropriate to the input socket of the main receiver and should be kept as short as is practicable.

The main receiver should be tuned to the selected frequency at the bottom end of the medium wave band. In the case of a mains-operated receiver or car radio this can certainly be the very end of the scale, since with the normal aerial removed there will be no pick-up. The case of a transistor portable is rather different, since the internal ferrite aerial cannot be disconnected. However, the lowest clear wavelength should be selected and any residual pick-up can be minimised by suitable orientation of the receiver.

Once this has been done the converter output lead is plugged in and the unit switched on. Range 3 is selected, with the main tuning capacitor fully meshed and the oscillator temporarily stopped by shorting across L7(b). The signal generator is fed into the aerial input socket via a 400Ω resistor (link generator chassis to converter earth) and adjusted between 1.5 and 1.6Mc/s (modulated) until a note is heard in the speaker. T1 is peaked and is now tuned to the input frequency of the basic receiver.

The generator is now fed in unmodulated and the b.f.o. switched on. With VC7 set in mid-position, T2 core is adjusted until a beat note is

heard and the centre position found where the note disappears.

Standard procedure is now used for the main lining-up. The b.f.o. is switched off, the shorting link on L7 removed, VC4-6 set to minimum capacity, VC2 set at half capacity and the generator used modulated.

Referring to Table 2, each band is lined up in turn, first setting the band-end limits by adjusting the oscillator core with the generator set to the low-frequency end of the band and then adjusting the oscillator trimmer as the top-end frequency is fed in.

When this has been done the generator is set to the lower tracking frequency and the main dial set to a reading of 89. The cores of all coils of the appropriate range are now adjusted for maximum signal. The generator is then set to the higher tracking frequency and the main tuning dial set to a reading of 8 1/2. The trimmers of all coils are adjusted for maximum signal. This process

is repeated until no further adjustment of cores or trimmers is required.

Lining Up Without a Signal Generator

After adjusting the main receiver to the frequency chosen, short out L7(b) coil as before and switch converter on with the b.f.o. also on. Set VC7 to mid-position and adjust the core of T2 until a loud rushing noise is heard in the speaker. This denotes that the b.f.o. is oscillating at the selected input frequency and the core of T1 can now be peaked, using this "noise" source.

The b.f.o. is then switched off and the shorting link removed. The band edges cannot be set accurately (although they can be altered at a later date when known stations are identified), so it is suggested that the oscillator cores and trimmers are set to mid-position. Some measure of lining-up can now be achieved by selecting reasonably strong transmissions near the 8½ and 89 dial settings and peaking cores of the aerial and h.f. coils at the higher setting and peaking trimmers associated with these coils at the lower setting, repeating the process until further adjustment makes no improvement.

Operating the Converter

The converter performance has been found to be very good when fed into a standard six-

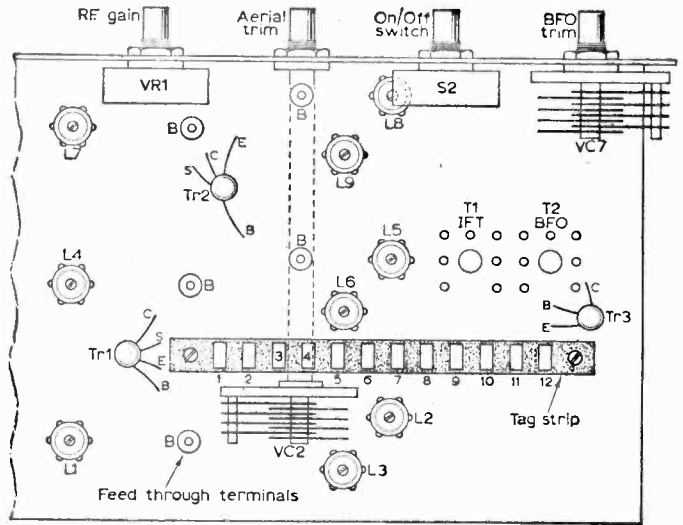


Fig. 8: Underchassis layout diagram.

transistor portable and exceptional when backed by a more sophisticated strip.

The r.f. gain control should be kept well down on the stronger stations to avoid overloading the main receiver. The bandspread tuning gives good results and the aerial trimmer is hardly needed but should be peaked when any change of aerial is made.

When an s.s.b. transmission is received the b.f.o. should be switched on and b.f.o. trimmer adjusted until the speech becomes intelligible. The r.f. gain control should be turned well down when doing this, otherwise distortion may occur.

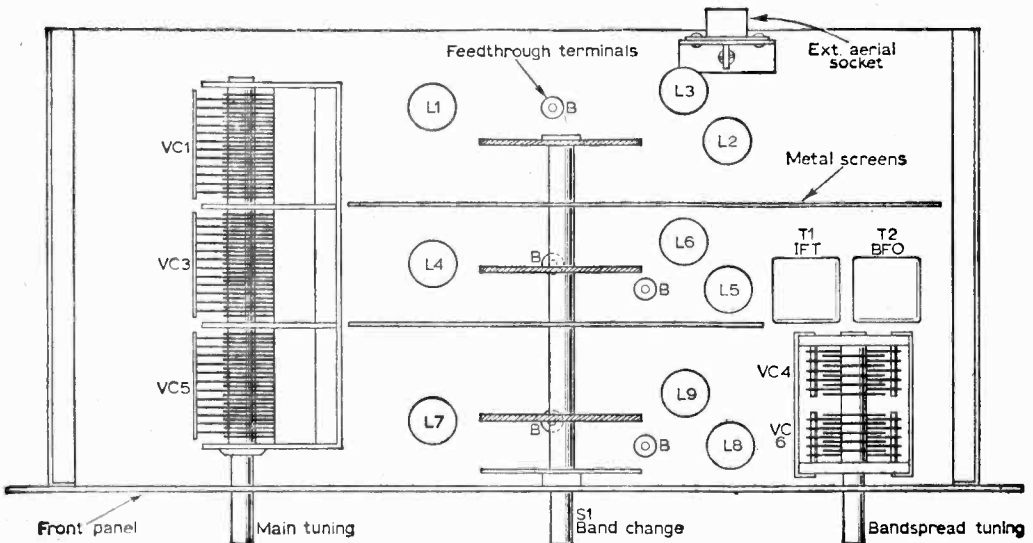
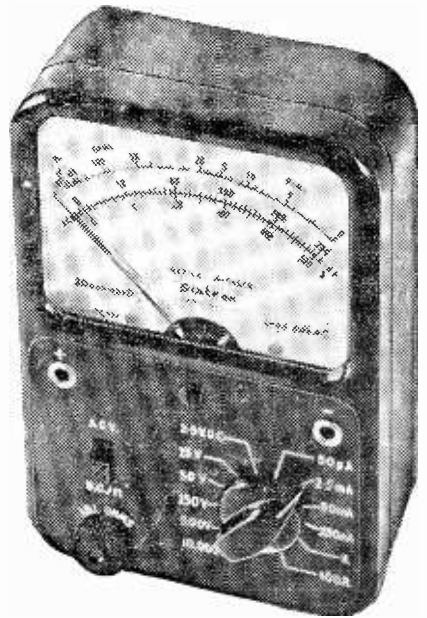


Fig. 9: Above-chassis layout of components.

Further Applications of the PRACTICAL WIRELESS "Sixteen" Multirange METER



ON the reverse side of the blueprint issued last month, featuring the P.W. "Sixteen" multirange test meter, details were given of typical tests and applications of such an instrument. This month, we follow up with a few more notes on applications to further illustrate the versatility of a basic multirange meter.

Capacitor Testing

The reactance of capacitors can be calculated from voltage and current tests when a suitable a.c. is applied. A circuit such as Fig. 1, making use of a double-wound transformer with tapped secondary for high-voltage capacitors and a low-voltage secondary for testing electrolytics, can be used for obtaining readings.

First measure the voltage across the capacitor, then place the meter, switched to the 25V a.c. range, across the variable resistor R1 to measure the current taken by the capacitor. If R1 is 500Ω, full-scale deflection represents 50mA.

In the low-voltage position R2 should be 100Ω, giving a 5V deflection on the 25V a.c. range, which represents 650mA.

To calculate reactance in ohms first consider the formula $X_c = \frac{10^6}{2\pi fC}$, where X_c is the reactance in ohms, f is in this case 50 cycles (mains supply), and C the capacitance in microfarads. X_c is also equal to E/I , the a.c. voltage across the capacitor divided by the current through it.

Combining the two formulae,

$$X_c = \frac{10^6 E}{2\pi f C I}$$

Transposing, we obtain

$$C = \frac{10^6 I}{2\pi f E}$$

With an applied frequency of

50c/s the factor $\frac{10^6}{2\pi f}$ becomes

3.18 if the conversion is to milli-

amperes, volts and microfarads. Thus $C = K \times I/E$.

The double-wound transformer affords isolation from mains supply, but direct connection to the mains can be used for this test if sufficient care is taken. If R1 (and R2) is made variable, compensation can be made for small differences in circuit capacitance, meter impedance, etc., by checking a good capacitor of known value. It is further advisable to check several, taking an average, to allow for normal tolerances.

The low-voltage winding of the transformer can be used to apply 3 to 7V to electrolytic capacitors of high working voltage, but is not suitable for low working voltage capacitors, which should be tested by bridge methods. In this test the readings will all be at the lower end of the scale.

Inductance Testing

Similar measurements can be taken for inductances of high value, such as transformer windings and loudspeaker fields, but accuracy is not so great

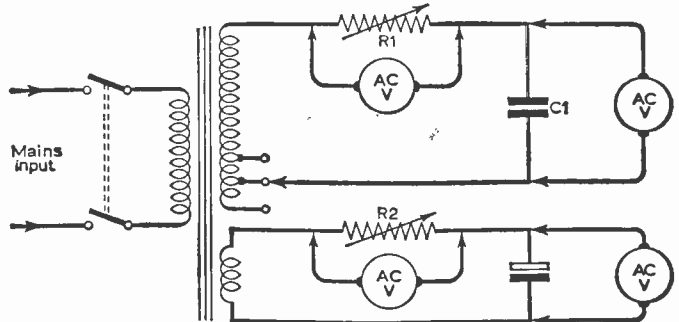


Fig. 1: A suitable circuit for calculating capacitor reactance.

as the current is limited not only by the inductance but also by the self-capacitance and resistance of the windings. In this case the inductance in henrys = $K \times E/I$.

It should be remembered that the inductance of an iron-cored coil or transformer winding decreases when d.c. flows through it, as in the case of a smoothing choke.

Alignment Procedures

The multimeter can be used in various ways to indicate output voltages, current and power for alignment and response checking.

Most obvious method is to measure the a.c. voltage across the secondary winding of an audio output transformer for sound level, as in Fig. 2. The loudspeaker is disconnected and its place taken by a resistor of equivalent impedance. (Note that this resistor must be of sufficient wattage to dissipate the expected power output.) Power output is

$$\text{equal to } \frac{V^2}{R} \text{ where } V \text{ is the indicated voltage and } R \text{ the equivalent resistance.}$$

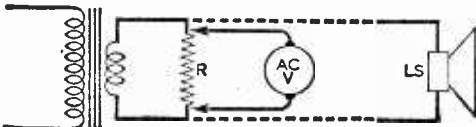


Fig. 2: Output voltage measurements.

Alternative methods include the measurement of detected signal voltage across the detector load, using a low d.c. milliamp or microamp range in series with a suitable resistor. The resistor acts as multiplier to the meter and as an isolating component in conjunction with the decoupling capacitor which should be fitted. (See also Fig. 4.) Another method is the measurement of a.g.c. voltage.

Indication of sensitivity on f.m. receivers is also taken at the detector stage in the manner illustrated in Figs. 3 and 4 on last month's blueprint.

Output measurement on transistorised portable radios presents a different problem as the output is in the region of a few milliwatts. Across a 50Ω loudspeaker an indication of perhaps half-scale on the 25V a.c. range may be obtained at full output, but where a 3Ω loudspeaker is used there may only be two or three volts available and readings will be too closely spaced at the lower end of the scale.

A better alternative method is to insert the multimeter in the battery supply lead to the receiver, switched to the 50mA range (250mA range for larger sets). As the current consumption is dependent on output power this gives a suitable indication for alignment purposes and a current of about 10mA would be expected under quiescent conditions, increasing to perhaps 35mA or more when fully loaded with the signal generator input. This gives an easily visible variation over the central portion of the scale.

For vision alignment either a.c. or d.c. conditions can be used, as in Fig. 3. The varying d.c. voltage across the video amplifier anode load resistor can be measured, with the disadvantage that both meter leads are then at high potential and that the signal being measured is unmodulated.

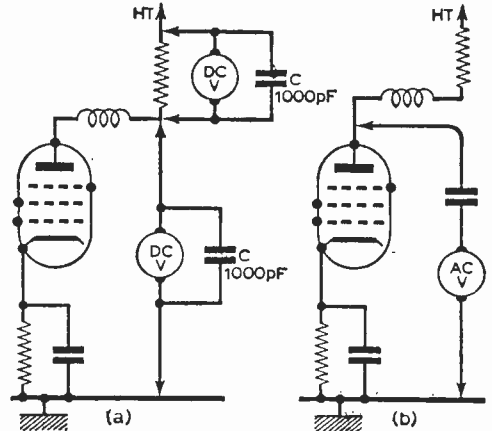


Fig. 3: Output measurements for vision alignment purposes.

With a negative-going video signal the reading is from minimum to maximum. If measured from chassis to anode the readings will commence at the "black-level" anode voltage and dip as resonance is approached during tuning. Adjust for maximum dip.

A modulated input can be measured as in Fig. 3(b). With a capacitor of about 0.25μF in series with the meter, switched to a.c. volts, the signal gives an indication from zero to maximum.

If signal levels are such that accurate indication cannot be obtained other methods may be used as, for example, inserting the meter, switched to a suitable mA range, in the anode lead of the video amplifier, or applying it, switched to microamps, with a series resistor (as r.f. stopper) across the vision detector load.

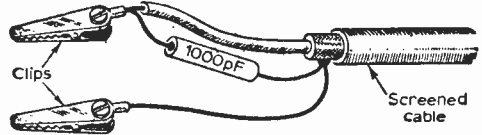


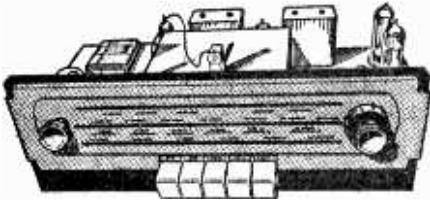
Fig. 4: A method of decoupling the meter which may be used with low currents and voltages.

A convenient measuring point is the modulating electrode of the cathode ray tube, where a d.c. varying in sympathy with the signal is to be found.

As a final stricture remember to decouple the meter, as near the point of application as possible, where the self-capacitance and inductance of the leads could cause instability in the circuit being tested. Fig. 4 shows the method employed for television testing, which lends itself to other applications where both current and voltage are low.

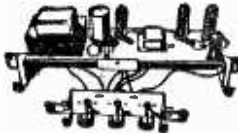
Coaxial cable is used to connect the prods or clips to the meter and a decoupling capacitor, 0.001μF, is fitted directly to the "live" prod and the other end soldered to the braided outer of the coaxial cable. This method is not suitable for high voltage or current measurements where normal, separate leads should be used.

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



Chassis size 15 x 9 1/2 x 3 1/2 in. high. New manufacture. Dial 14 1/2 x 4 in. in 2 colours, predominantly gold. 200-250 v. A.C. only. Pick-up, Ext. Speaker, Acc. E. and Dipole Sockets. Five push buttons—OFF, L.W., M.W., P.M. and Gram. Aligned and tested. O.P. Transformer. Tone Control. 1000-1900 Mc.: 200-550 Mc.: 88-98 Mc/s. Valves E280 rect.; ECH81, EF83, EA8C30, EL84, EOC83. Speaker 8 x 5 in. and cabinet to fit chassis (table model), 47/8 (post 5/-). 10 x 6 in. ELLIPTICAL SPEAKER 25/- to purchasers of this chassis. TERMS: (Chassis) £8.10.0 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. 8.5 v. 0-15 Mc/s; M.W.: 190-475 Mc.; V.H.P. 87-100 Mc/s; Gram. position. Otherwise similar to above chassis. Price £15.15.0 (curr. paid). TERMS: £8.10.0 down and 6 monthly payments of £2.4.0.

PUSH-PULL AMPLIFIER £55.00
(5/- Carr.)



Brand new 200/240 A.C. mains. Bass, treble and vol. controls, with valves E280, EOC83 and 2 EL24 giving full 8 w. Chassis 12 x 3 1/2 x 3 1/2 in. With o.p. trans. for 2-3 ohm speaker. Front panel (normally screwed to chassis) may be removed and used as "flying panel". Stereo version 2 x 4 w., same price. Fixed panel. Tone & Vol. Controls.

TAPE RECORDER AMPLIFIER



Type TR3. Fully built high gain, low noise, printed circuit. Attractive grey and gold front panel 13 x 1 1/2 in. Height 3 1/2 in. overall. Front to back 3 1/2 in. Vol. and on/off tone. Mike, radio and ext. speaker jacks. Valves, magic eye, EOC83, ECL82, E280. Mains trans. Ready to bolt to B.S.E. Deck. Complete with switch water wired. Our Price ONLY £8.15.0 (5/- Packing and Carr.). Also available for Collaro Deck at 5/- extra.

THE "REGENT" 6-TRANSISTOR AND DIODE PORTABLE

COMPLETE KIT FOR ONLY

£5.17.6 (post 5/-)



500mw push-pull output. Ferrite rod aerial. Car aerial socket and coil. M.W. and L.W. full coverage. Operates on two 4.5v. cells. Printed circuit board 8 1/2 x 2 1/2 in. All holes drilled and component positions marked. Instructions 2/6 for 15p. (refunded on purchase of kit). Size 9 x 3 1/2 x 7 in. 8 x 2 1/2 in. P.M. high quality speaker. Attractive Vynair covered cabinet, two-tone. Two batteries 6/8 the pair (Ever Ready 126). Mullard transistors OC44, 2 x OC45 OC81D and 2 x OC81. Top grade Weymouth Radio coils and transformers. Alignment service if required 17/6 (inc. post). Write for list of prices. All parts supplied separately. Built in two hours.

6-TRANSISTOR PORTABLE—Fully Built



The "SCALA" for only £7.10.6, curr. paid. 8 1/2 x 2 x 3 1/2 in. high. (choice of colours). Retine M.W. and L.W. Ferrite aerial. Battery 2/6 extra. Printed circuit. Nicely styled. A professional job. 3 1/2 in. speaker. Fully tunable M.W. and L.W. Superhet circuit.

100 mF. + 200 mF. ELECTROLYTIC. New 270 v. (350 v. surge). 4in. x 1 1/4 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 6d. (stamps will do) for 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 3371 CLORED SATS.

"REALISTIC" 'SEVEN'



7 Transistor Superhet. 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 3/6. Data and instructions separately 2/6. Refunded if you purchase the parcel.

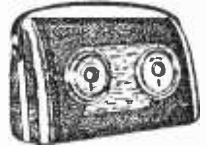
Any parts supplied so parcel



4 TRANSISTOR MINATURE PUSH-PULL AUDIO AMPLIFIER

PRINTED CIRCUIT. 5in. x 2in. x 1 1/2 in. over transformers. Output for 3-ohm speaker. Suitable for microphone, record player, guitar and radio input. 9-12 volt battery required. Frequency range 100 cps. to 25 Kcps. Push/pull output single ended. Instruction sheet provided. Fully wired ready for use. Two types available. 1 watt output, 35/-, 1 1/2 watts 41/-, P. & P. 2/6.

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 200 hours use. Weight under 4 lb. With carrying handle, 12 x 7 in. high x 4 1/2 in. at base tapering to 2 in. at top. Brand new, fully guaranteed. 3 push buttons. Superhet circuit, 5in. L.S.

5 WATT AMPLIFIER

Our price ONLY 58/- (post 5/-); a few hundred only; valves EF91 and EL84 with metal rectifier; 6 x 4 x 1 1/2 in. high (5in. over EL84). Mains trans. and o.p. with vol. and tone controls; on-off; co-ax. input.

SPECIAL REDUCTIONS ON GRAMOPHONE AMPLIFIERS

1 1/2 watt type. Save 4/8. With 5in. speaker. Baffle 12 1/2 x 6 in. 200-240 v. A.C. EL84 and Rectifier. Tone and Volume. On/off switch. Two knobs. Ready to play. Useful for Stereo. 45/-, post 5/-.
4 watt type. Save 20/-. Valves UY85, UY80 and UL84. 200-240 v. A.C. Covered baffle 13 1/2 x 7 1/2 in. (6in. speaker), 3 front controls; bass, treble, on/off/vol. 54/-, post 5/-. Double wound mains transformer.
2 1/2 watt type. Save 20/-. 2 1/2 watts. EOC83, ECL82 and E280. Control volume, bass and treble. On/off switch. 200-240 v. A.C. O.P. trans. 81s 12 x 3 1/2 x 5 in. over valves. Suitable for microphone input and for Guitars. 55/-, post 5/-.

STEREO CONVERTER UNIT



Converts existing Radiogram to play stereo records. Chassis 6 1/2 x 2 1/2 x 4 in. overall height. Mains and O.P. trans. Metal Rect., ECL82 valve and all screws, panels, etc. Moulded front enclosure, fully built, brand new, only extras needed, speaker and stereo cartridge. Full instruction leaflet. Limited quantity at 39/8 (5/6 P. & P.) Stereo Cartridge, 25/-.

TOP QUALITY RECORDING TAPE (Guaranteed)

		(1/- per tape, six or more post free).		
4in.	600ft.	12/6	6 1/2 in.	1200ft. 17/6
5in.	800ft.	11/3	5 1/2 in.	1800ft. 35/-
5in.	900ft.	17/-	7in.	1200ft. 15/-
5in.	1200ft.	30/-	7in.	1800ft. 19/6
6 1/2 in.	800ft.	11/8	7in.	2400ft. 32/6

BATTERY ELIMINATOR

For 4 Low Consumption Valves (96 ranges) 90v. 15mA and 1.4v. 125mA. 46/- (4/- post). 200-250v. A.C. Also for 250mA. 1.4v. and 90v. 15mA at 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 ins. LOUDSPEAKER

Three ohm. Ceramic magnet of latest type. BRAND NEW. **42/6** (post 3/6)

HEATER TRANSFORMER

Mains input giving 6.3v. 2 amp. Size 2 1/2 x 1 in. (2 1/2 in. over winding), 5 1/8 in. dia. Loss 10% for 12, or 20% for 80. P. & P. 2/- for 1 to 6, post free more than six.

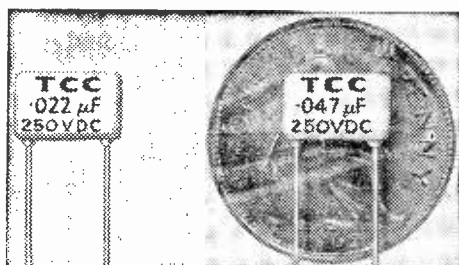
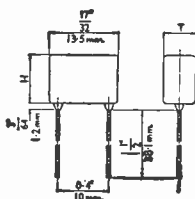


MINIATURE METALIZED POLYESTER CAPACITORS

Ideally suitable for printed wiring panels and transistorised circuits.

Incorporating a new dielectric material and of unique construction, they are of small physical size and meet the requirements of H.5 D.E.F. 5011 Specification. The windings are virtually non-inductive and the wire terminations are soldered direct to the metal electrodes eliminating contact resistance and ensuring the minimum possible inductance.

Cap. μ F	Dimensions		T.C.C. Type No.
	H.	T.	
0.01	$\frac{1}{16}$ " 9mm	$\frac{7}{32}$ " 5.5mm	PM X1
0.022	$\frac{1}{16}$ " 9mm	$\frac{7}{32}$ " 5.5mm	PM X2
0.047	$\frac{1}{16}$ " 9mm	$\frac{7}{32}$ " 5.5mm	PM X3
0.1	$\frac{7}{32}$ " 11mm	$\frac{1}{4}$ " 7.2mm	PM X4



Cap Tolerance $\pm 20\%$

Insulation
Resistance:
10,000 megohms

Rating—Working:
250V. D.C. at 85°C.

Test:
400V. D.C. for 2 secs. at
20°C.

Terminations:
22 s.w.g. solder coated
parallel wires for side
mounting.

Power Factor:
 ≤ 0.01 at 1,000 cps.
20°C.

Finish:
Insulated—special non-
cracking heat resisting
thermosetting compo-
und providing good
insulation and good pro-
tection against the in-
gress of moisture.

Temperature Rating:
Suitable for working at
 $\pm 85^\circ\text{C}$. without de-
rating.

THE TELEGRAPH CONDENSER CO. LTD.

Radio Division NORTH ACTON · LONDON · W.3 · Tel: ACOrn 0061 · Telex: 261383
(also at) CHESSINGTON, SURREY :: BATHGATE, SCOTLAND

What READERS SAY About . . .

THE COMMON



CORE SERIES

"... Wish to congratulate you for publishing one of the best-ever series dealing with this complex subject..."

"... As a lecturer I am finding these of great assistance and congratulate you on publishing such excellent books..."

"... Your books seem to explain things much more easily. I wish they were on sale when I had to learn radio..."

"... I have all the previous sets, namely: 'Basic Electricity', 'Basic Electronics' and 'Basic Synchros & Servomechanisms' and will mention that it's truly one of the best I've studied..."

BASIC ELECTRICITY—IN FIVE PARTS BASIC ELECTRONICS—IN SIX PARTS

As used by Industry, and the Armed Forces of the Commonwealth

COUPON - SEND NOW!

OR ASK YOUR BOOKSELLER

To THE TECHNICAL PRESS LTD.
112 Westbourne Grove, London, W.2.

NAME _____

Please send me your FREE prospectus describing the COMMON-CORE SERIES.

ADDRESS _____

wiring for SOUND

GETTING THE BEST FROM AUDIO EQUIPMENT

BY R. HINDLE

HOW can one get the best out of one's sound reproducing equipment? Ideally, one room in the house should be earmarked as the "music room", and equipment should be carefully built therein to give the very best results when sitting in normal listening position, the room treated with curtains and soft furnishings to give acceptable acoustic conditions.

Descriptions of such music rooms have been seen and occasionally one can visit a demonstration room lavishly provided for by some knowledgeable architect. These as often as not just make us realise that hi-fi in that sense is not for us. We have to fit in with more normal budgets, not to mention the aesthetic but less technical aspirations of one's wife and family.

Typically, the average household has two rooms in which listening is concentrated. In the author's case these are the lounge, providing the best surroundings for listening, and the family living room, a utility room in constant use.

Speaker Extensions

The simplest and perhaps the most satisfactory solution from a technical point of view is for both radio and gramophone equipment to be in one of the rooms. Generally speaking the lounge would be chosen because the piece of furniture needed to house this equipment to today's standard must be large, long and low—not a piece for the family room. Besides, though the lounge is less often used, when it is occupied the best possible reproduction is needed there.

Under these circumstances an extension speaker will probably be provided in the family room—the best quality that can be afforded, of course, in order to do justice to the amplifier. At this stage it is not proposed to deal with the provision of a mono speaker output from a stereo record—would anyone really be happy to do this anyway?—and it is assumed that the amplifier provides a mono output.

The connection between amplifier and extension speaker is not just a simple matter of using any old piece of flex or bell wire. Almost invariably the extension speaker will have a low impedance input, the speaker transformer in the main amplifier serving both local and extension speaker. This is advisable because an extension at low impedance is less likely to pick up interference and mains hum than would an extension at the high impedance (primary) side of the speaker transformer.

The low impedance connection has the disadvantage, however, that unless the cable used to

connect the extension speaker is carefully chosen, or else the cable run is very short, the impedance of the cable can be comparable to the speaker impedance itself (perhaps only 3Ω) and consequently there will be a loss of audio power in the cable. A cable impedance equal to the speaker impedance will attenuate available speaker power to a half the total available. Also it should be noted that the speaker impedance varies with frequency and therefore if the cable impedance is low it is likely to introduce amplitude distortion.

Modern amplifiers generally have a high degree of negative feedback taken from the secondary of the output transformer and such amplifiers are sensitive to reactive load. It is difficult to design an amplifier which will be stable with an appreciable capacitive load but inevitably an extension lead introduces a capacitive component. Unless care is taken, therefore, an extension speaker might well result in amplifier instability.

The answer to all these problems, attenuation, amplitude distortion and instability, is a low loss cable of low capacitance. Fortunately, electronics workers dealing with the other end of the frequency spectrum—the television engineers—have developed just the cable for the job. Television coaxial lead-in cable is ideal for speaker connections.

It is an odd thought that knowledgeable workers will take every precaution at the v.h.f. end of the scale but will fail to appreciate the equivalent precautions necessary when working at audio frequency. In practice, coaxial cable has many useful applications in audio work. It can be unsightly for long extension speaker leads unless care is taken and ideally it should be run under the floorboards. Avoid joining pieces of cable if possible, because, sooner or later, a joint is likely to introduce noise; if a joint must be made use a proper connector.

Switching Circuits

Assuming that the main speaker system (adjacent to the amplifier) when used alone is properly matched to the amplifier, connecting an extension speaker, whether in series or in parallel, will cause a mismatch. The popular types of amplifier using a normal degree of feedback are not very sensitive to changes in load and a reduction in effective load caused by wiring an extension speaker across the main speaker is unlikely to cause trouble.

However, it is desirable that the volume at both speaker positions should be similar. The extension speaker should have an impedance similar to the main speaker or else the available power will not be evenly divided between the two.

Some kind of built-in switching is highly desirable. It should be possible to mute the speaker at both ends and also the circuit should be so arranged that if both speakers are muted (or the local speaker muted and the remote speaker disconnected) the amplifier is not running without load.

This being so, one might just as well arrange matters so that there is less likelihood of mismatch. An additional advantage is that by wiring in this way there will be no change in power in one speaker when the other is switched on or off. Figure 1(a) gives the wiring. It will be seen that when a speaker is muted, a resistance is brought into use to dissipate the power that would otherwise drive that speaker. The resistance in each case must equal the nominal impedance of the speaker (i.e. a 15Ω resistor for a 15Ω speaker etc).

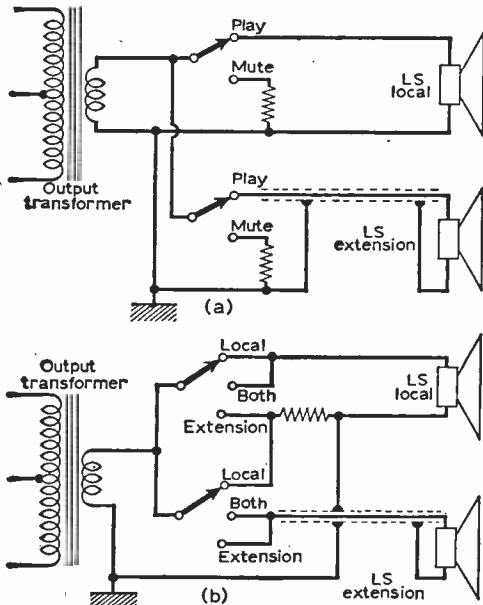


Fig. 1: Switching circuits for extension speakers.

Assuming that the two speakers have similar impedances as recommended above, this circuit results in a permanent division of available audio power into two equal parts, one part fed to each room. In practice a reduction of audio power by a factor 2 is not very noticeable to the ear.

However, if the equipment is being designed or bought with such a distribution system in mind the fact that only half audio power is available at each location should be borne in mind.

It will be seen that two separate switches are provided, one for each speaker. Consequently the switch for the extension speaker could conveniently be moved to the extension speaker end of the cable, fitting it on to the speaker cabinet itself for local control. If the switch control is to be entirely at the amplifier end a single three position switch might be preferable, providing main speaker only, extension speaker only or both speakers.

This should be wired as in Fig. 1(b). It will be noted that only one resistor is used, brought into circuit when either one speaker is connected. This connection prevents the muting of both speakers or open circuits in case the extension speaker is disconnected.

It will be realised that either of these methods of wiring results in halving the impedance presented to the amplifier and this should be borne in mind if various output impedances are provided for. However, the usual type of amplifier will be quite happy under these circumstances.

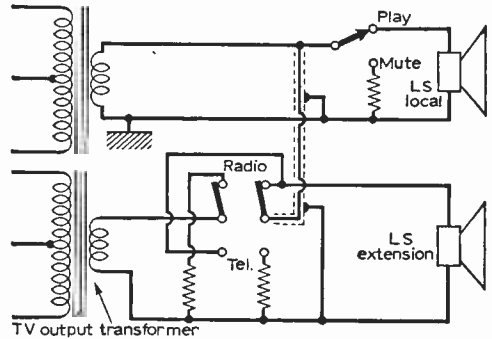


Fig. 2: Utilising a television loudspeaker as an extension speaker.

The extension speaker could, perhaps, be the television speaker if impedances are compatible. In this case care must be taken to see that the television output stage cannot be switched on without a load. A modification of Fig. 1(b) given in Fig. 2 is suggested. The switch disconnects the TV output transformer from the speaker when this is in use as an extension but at the same time inserts a resistive load to prevent the TV output being open circuited.

Two separate resistors are shown but if the load needs of the amplifier and the TV are similar (the latter will probably be of the order of 3Ω) a single one will suffice, the two points of the switch to which the separate resistors are connected being thus connected together and the single resistor being from this connection to the earthy lead.

Volume Control

The amplifier will be adequately provided with volume control but there may be a need for a local control at the extension speaker end. A resistive potentiometer type of control can be fitted as at Fig. 3, but not without introducing new

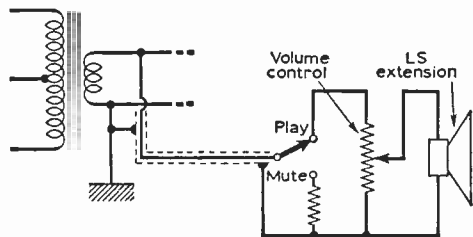


Fig. 3: Volume control for the extension speaker.

problems. When the volume control is set for full volume the potentiometer resistance is in parallel with the speaker and therefore to avoid power loss (and also possible amplitude distortion) the resistance must be appreciably higher than the speaker impedance.

On the other hand, at low volume levels the potentiometer resistance becomes the amplifier extension load and if this is appreciably higher than the speaker impedance the amplifier will be presented with a mismatch! One must compromise. A potentiometer total resistance of not less than four times the speaker nominal impedance is suggested and, in round figures, 50Ω for a 3Ω speaker and

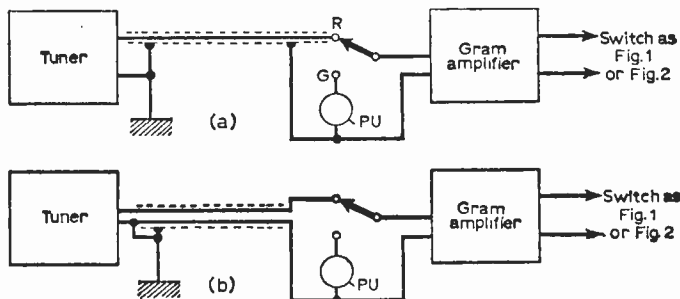


Fig. 4: Inter-wiring between separate tuner and amplifier.

100Ω for a 15Ω speaker are sizes likely to be available.

More elaborate circuits can be developed to minimise variation in load but are probably not worth the trouble except as nice little technical problems to solve.

A Personal Problem

The problem actually facing the author, when the line of thought that resulted in this article was generated, was somewhat different to those already dealt with. The habits of the family were such that in the living room the normal form of entertainment called for was television and radio, with only very occasional call for gramophone reproduction, whereas in the lounge the gramophone is most frequently used and only occasionally is radio used.

This being so it seemed wrong to install the radio in the lounge, requiring a visit to that room whenever a change of programme was required in the living room, or alternatively the provision of a complex remote control system.

The problem thus became as follows: radio equipment was to be installed in the living room and gramophone equipment was to be in the lounge. How should these be interconnected so that the occasional facility should be provided in each room to use the equipment fitted in the other, and would such a scheme be an acceptable and cheaper alternative to any duplication of equipment?

Using the Main Amplifier

The first temptation was to provide only a tuner and speaker in the living room and to bring into use for radio the main and comparatively expensive amplifier in the lounge equipment. The tuner output would then be permanently wired by means of a coaxial cable into the lounge equipment where there would be the usual radio-gram switch, and

on the output side of the amplifier would be one of the switch versions given in Fig. 1.

This arrangement is given schematically in Fig. 4(a). There would be complications to the radio-gram switching if stereo gramophone reproduction was provided, but that is another story.

Using this arrangement some precautions have to be taken. It is desirable that the tuner audio output should be reasonably high so that the risk of appreciable pick-up of interference is minimised: a cathode follower output would be preferred. The outer screen of the coaxial should be connected to the tuner chassis at one end and the amplifier chassis at the other; it should connect to an earthed point only at one end—presumably at the tuner end.

A better scheme to avoid hum pick-up would be to use a twin core screened cable in place of the single core of the usual coaxial cable. The outer sheath in this case is connected to a good earth at only one point, the earth return signal lead being carried by one of the cores as in Fig. 4(b).

However this lead from tuner to gramophone is arranged, there will be the need for an additional and separate coaxial lead back from the gramophone amplifier to the extension speaker.

Self Contained Radio

The main objection to the above scheme is the need to go to the lounge to switch on when radio is needed in the living room. The disadvantage of such action in reverse was not considered to be serious because the need for radio in the lounge was less frequent.

Of course, the system could be elaborated. It would not be difficult to arrange for mains to be switched on a both equipment positions by operating one switch at either end, using the well-known changeover switch technique found in practically every house to switch on or off a light, say, from the top of bottom of the stairs. The tuner could be switch tuned and the switch could be relay-operated so that remote control of tuning would be practicable.

At this stage one begins to wonder if it would not be better to duplicate the radio equipment at the gramophone end.

Finally, it was decided to provide a separate amplifier for the radio in the living room so that the radio there was self-contained and could be completely operated from that room. Provision was to be made to feed signals between rooms only to allow the radio output to be heard in the lounge and to allow gramophone reproduction to be heard in the living room.

The Method Adopted

The method of connection finally decided upon is given in Fig. 5. A radio/gramophone switch is wired between output transformer and speaker at each end. If the living room equipment is switched to radio and the lounge equipment is switched to

—continued on page 931

TEST GEAR accessories

Part 1

BY C. MACKAY

MANY of the cheaper type of test instruments are sold today without any form of accessories such as test leads, dummy aerials for signal generators, diode detector probes for use with oscilloscopes, signal tracers, etc., or cathode follower probes. Often they are not even available as an extra, although they may be absolutely essential for the correct operation of the instrument.

The constructor, too, is often faced with a similar problem after having built an expensive piece of apparatus and then not being able to complete it properly.

TEST LEADS

A large number of the problems associated with test leads are matters of individual requirements and, accordingly, the experimenter must use his own ingenuity.

However, it should be said that there must be available a large number of test leads of all types. Good, well-insulated components and flex (preferably not solid core wire) should be used throughout. Remember that it is definitely a mistake to make leads too long, since they invariably manage to form the most unbelievably complex knots as

well as acting as most efficient aerials for picking up mains hum and other forms of interference.

THE DUMMY AERIAL

When the front end of a receiver is being aligned with the aid of a signal generator the impedance of the source must be the same as that of the aerial. To make this so a matching network called a dummy aerial unit is placed between the signal generator and the receiver.

The circuit of such a dummy aerial unit constructed by the author is shown in Fig. 1.

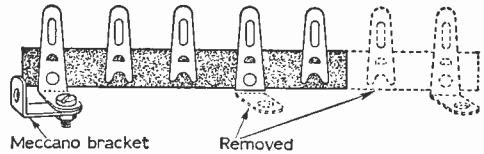


Fig. 2: The dummy aerial tagstrip.

The unit was constructed in a small coil-screening can made by Denco (Clacton) Ltd. It is normally supplied with their Maxi-Q range of coils but is also available separately.

The can is cylindrical, 1 7/16 in. in diameter, 2 3/8 in. high, with a screw-on lid. The size of the can is unimportant and a different type can be used equally well.

CONSTRUCTIONAL DETAILS

It is advisable to construct the coil first. The original was made out of a short length of insulated spindle extension rod about 1 1/2 in. long and 1/4 in. in diameter. On it are wound 40 turns of 28s.w.g. wire so as to occupy 1 in. of the former. The coil is then made tight and the whole component covered in polystyrene cement or some similar substance.

Now we start in the screening can. A tagstrip on which the components will be mounted is to be bolted vertically to the underside of the lid of the can as follows:

First drill a hole about 1/4 in. in diameter in the centre of the lid, then drill two 6B.A. holes to suit the coaxial socket used.

The tagstrip is a seven-way type, three contacts having "earth" bolt holes. At one end only a two-tag section is sawn off, leaving a five-way tagstrip. The central earth tag has the bolt hole section either bent up double or removed (see Fig. 2).

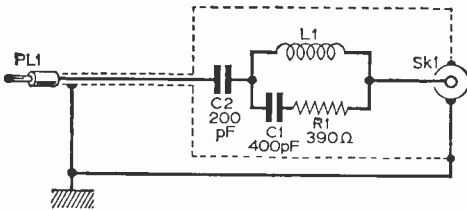


Fig. 1: The circuit of the dummy aerial unit.

COMPONENTS LIST FOR DUMMY AERIAL UNIT

- R1 390Ω carbon composition 1W
- C1 400pF midget ceramic
- C2 200pF midget ceramic
- SK1 coaxial socket
- PL1 coaxial plug
- L1 40 turns 28s.w.g. on 1/4 in. former (see text)

Miscellaneous:

- One 7-way tagstrip, 2 yards coaxial cable.
- Screening can (Denco (Clacton) Ltd.). Nuts and bolts, etc.

To the third and now only remaining earth bolt hole is attached a right-angled bracket of the Meccano type (may be bought in any good toy shop).

The tagstrip bracket assembly is then bolted under one coaxial socket bolt and wired up as follows (see Fig. 3):

The tags are numbered as in Fig. 3, tag 1 being earthed.

First take a short length of wire and join tag 2 to the central connector of the coaxial socket. Wire R1 between tags 2 and 3, C1 between tags 3 and 5, C2 between tags 4 and 5 and L1 between tags 2 and 5.

CONNECTIONS FOR OPERATING

A hole is now drilled in the main part of the can in the centre of the base to take the connecting cable to the signal generator. This cable, with a coaxial plug attached, is passed through the hole in the can. The inner of the cable is soldered to tag 4 and the outer of the cable to earth (tag 1). The two halves are now carefully screwed together, taking care that no components touch the side of the can.

The unit is now ready for use.

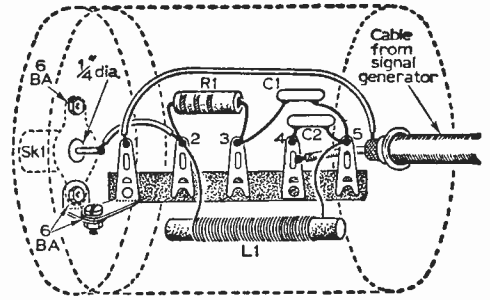


Fig. 3: Wiring and mounting the tagstrip bracket.

WARNING

If the above unit is to be used with "live" chassis equipment the signal generator should be isolated from the mains and the chassis of the generator must not be earthed. Care should also be taken to ensure that the "live" chassis to be tested has the neutral side of the mains connected to the chassis.

Part 2 appears next month

Wiring for Sound

—continued from page 929

gram (the usual state of affairs) the signals at each end pass to the local speaker without involving the coaxial leads.

However, the radiogram switch at each end has a second bank of connections whose purpose is seen to be to switch in a resistance dummy load into the circuit of the equipment not being called upon to deliver a signal. In the case of the switch positions referred to above these resistive loads are applied at the remote end of each coaxial cable.

Thus the switching is comparable to that in Fig. 1 in that in all permutations of switching a half of the output power of each equipment—radio and gramophone—is fed to each room whether it is used there or not. At each end the signal not in use at any time is dissipated in the resistance at that end.

Thus it follows also that the load is a half of what it would be if the switching had not been introduced. This and the halving of power should be remembered when connecting up the other equipment.

Looking again at Fig. 5 it will be seen that both

ends can take radio simultaneously, in which case the resistors are in parallel and across the gramophone output. The gramophone equipment need not be switched on, of course. Similarly, both ends can take gramophone.

The final permutation permits each end to take the signal from the remote end, thus feeding the the gramophone output to the living room and radio output to the lounge, in which case the resistors are applied as load to the local ends.

The important point to realise is that all these permutations apply comparable loads at each end (it is assumed and it should be so arranged that the nominal speaker impedances at both ends are the same) and consequently there will be no apparent change in reproduction at either end when the switch is operated at the other.

Little need be said about the methods of construction. The switch can be mounted at each end at a suitable position and the wiring could be supported by the switch. It would be preferable, however, to make up a unit on a little aluminium chassis containing the switch sockets to take the two coaxial terminations and connections for the speaker and output transformer connections. ■

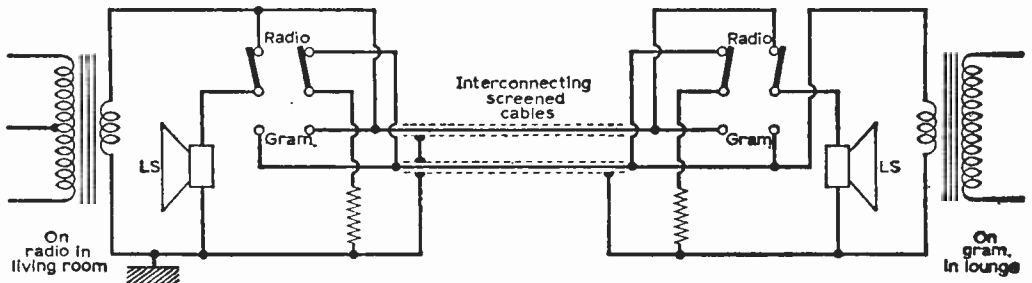
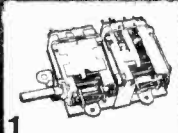


Fig. 5: The radio/gramophone interconnections.

Just a few of our BARGAINS



1



3



2



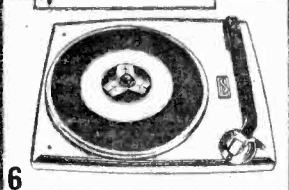
5



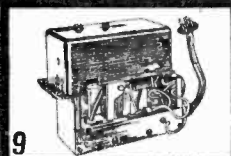
4



7



6



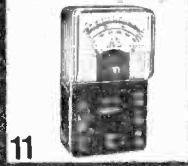
9



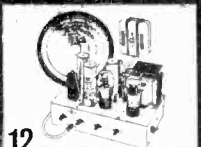
8



10



11



12

FREE GIFT OFFER
 Electric Soldering Iron
 with the
 Pocket Multi Meter
 See item No. 11 for
 further details

**RADIO & T.V.
 COMPONENTS
 [ACTON]
 LIMITED**

SHOP HOURS
 9 a.m.—6 p.m.
 Early Closing
 WEDNESDAY

1. **A.M. F.M. PERMEABILITY TUNER FOR ALL TRANSISTOR OPERATION.** Size 2½ x 2½ in. approx. By famous manufacturer. A.M.—I.F. 470 Kcs. F.M.—I.F. 10.7 Mc/s. A.M. coverage from 1820 Kc/s-925 Kcs. F.M. coverage 108 Mc/s-88 Mc/s. Circuit diagram 2/6. FREE with Tuner. 25/-, 1st, 2nd, 3rd A.M. I.F.'s, 12/6 set, 1st, 2nd, 3rd and 4th P.M. I.F.'s, 12/6 set. V.H.F. Osc. choke, 1/-, A.M. I.F. trap, 1/6, A.F. 1/4 and A.F. 1/5, 5/- each. All the above are the R.F. end of an A.M./P.M. receiver car radio, etc. The above six items purchased together, £2.10.0.

2. **TRANSISTORISED POCKET RADIO** with printed circuit, mini-circuit, high gain ferrox slab aerial. No aerial or earth required. To build yourself for completely personal listening. 4½ x 3½ x 1½ in. Luxembourg in favourable areas. Only 21/-. P. & P. 2/6. All parts available separately.

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. 1/2, 0-50, 0-100, 0-250, 0-500. Milliamps 0-10, 0-100. Ohms ranges 0-10,000, 0-100,000, 10/6. 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. 6/6. Coverage 100 Kc/s to 100 Mc/s on fundamentals and 700 Mc/s to 200 Mc/s on harmonics. Case 10 x 6½ x 2½ 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 millivolts. C.W. and mod. switch, variable A.F. output. Magic eye as output indicator. Accuracy 3 per cent.

5. **SIGNAL GENERATORS.** Cash £5.5.0. P. & P. 6/6. Coverage 120 Kc/s to 84 Mc/s. Case 10 x 6½ x 4½ in. Size of scale 6½ x 3½ 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 millivolts. C.W. and mod. switch variable A.F. output and moving coil output meter. Accuracy ± 2 per cent.

6. **STAAR 45 9 v. BATTERY RECORD PLAYER** complete with pick-up and deck. A completely portable player. Head protected by plastic dome with a brush which cleans the stylus as it rises into playing position. 45 r.p.m. Auto on-off switch governed motor, attractive two-tone grey finish, £2.9.6. P. & P. 2/-. P.

7. **50 MICRO-AMP METER** movement by world famous manufacturer. Size 3 x 2½ in., 25/- plus 1/- P. & P.

8. **ALTITUDE METER.** 270 degree scale. 3in. diameter. Would make ideal car rev.-counter. £1 plus 2/- postage and packing.

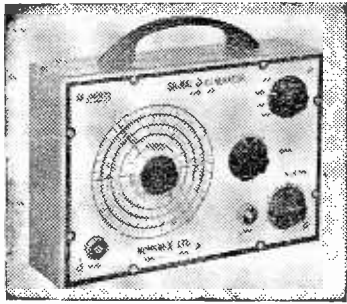
9. **CHANNEL TUNER I.F. 16-19 Mc/s.** Continuously tunable from 174-216 Mc/s. Valves required—PCF80 and PCC84 (in series). Cover BBC and ITA ranges. Also Police, Fire and Taxis, etc. Brand new by famous maker. 10/-. P. & P. 3/-. P.

10. **B.S.R. MONARCH UA14 WITH FUL-PI 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 brown. Dimensions: 12½ x 10½ in. Space required above baseboard 4½ in. below baseboard 2½ in. Fitted with Ful-PI turnover crystal head, £5.19.6. P. & P. 6/6.

11. **POCKET MULTI-METER.** Size 3½ x 2½ x 1½ in. Meter size 2½ x 1½ 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 mA. Resistance 0-100K Ω. Complete with test leads, battery and full instructions, 35/-. P. & P. 2/6. **FREE GIFT** for limited period only. 30 watt Electric Soldering Iron value 15/- to every purchaser of the pocket multi-meter.

12. **8-watt PUSH-PULL 4 VALVE AMPLIFIER** plus METAL RECTIFIER. A.C. mains 200-250 v. Size 10½ x 6½ x 2½ in. 4 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. Noise level 40 dB down all hum. Output transformer tapped for 3 and 15 ohms speech coils. For use with 8td. or L.P. records, musical instruments such as guitars, etc. Suitable for small halls. £3.19.6. P. & P. 6/6. Crystal mike to suit, 15/-. P. & P. 2/-. 5in. P.M. Speaker to suit, 12/6. P. & P. 2/-. P.

**21b HIGH STREET
 ACTON, LONDON, W.3.**
 ALL ENQUIRIES S.A.E.
 GOODS NOT DESPATCHED OUTSIDE U.K.



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

£7.18.6

with test lead and battery.
 Post and Packing 3/6 extra.

H.P. £2 deposit and 22/- monthly.

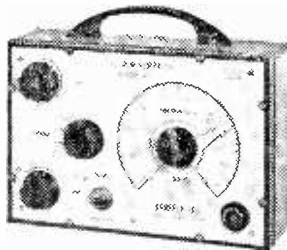
NOMBEX INSTRUMENTATION

Wide-range Transistorised
AUDIO GENERATOR—Model 63
 Range 10—100,000 c/s.

- ★ Laboratory Standard Specification
- ★ Sine and Square Wave
- ★ Direct Frequency Calibration
- ★ Accuracy and Low Distortion
- ★ Calibrated Output Voltage
- ★ Battery Operated and Compact

£15.0.0 complete with test lead

Battery 2/3. Post and Packing 3/6.
 H.P. £4 deposit and 41/- monthly.



Wide-range Transistorised
C.R. BRIDGE—Model 62
 6 Ranges: 1Ω to 100MΩ
 1pF to 100μF

- ★ Visual null indicator
- ★ Power factor check
- ★ Electrolytic leakage test
- ★ Battery operated

£7.2.3

including battery.
 Post and Packing 3/6 extra.
 H.P. 35/- deposit and £1 monthly.

Trade and Export Enquiries Invited

NOMBEX LTD. Instruments Division 71

ESTUARY HOUSE, CAMPERDOWN TERRACE
 EXMOUTH, DEVON. Phone: 3515.

S.A.E. for full technical leaflets

YOUR CAREER in RADIO?

Big opportunities and big money await the qualified man in every field of Electronics today—both in the U.K. and throughout the world. We offer the finest home study training for all subjects in radio, television, etc., especially for the **CITY & GUILDS EXAMS**, (Technicians' Certificates); the Grad. Brit. I.R.E. Exam; the **RADIOAMATEUR'S LICENCE**; P.M.G. Certificates; the R.T.E.B. Servicing Certificates; etc. Also courses in Television; Transistors; Radar; Computers; Servo-mechanisms; Mathematics and Practical Transistor Radio course with equipment. We have **OVER 20 YEARS'** experience in teaching radio subjects and an unbroken record of exam. successes. We are the only privately run British home study College specialising in electronic subjects only. Full details will be gladly sent without any obligation.

To: **BRITISH NATIONAL RADIO SCHOOL, Dept. 3**
RADIO HOUSE, READING, Berks.

Please send **FREE BROCHURE** to:

NAME Block

ADDRESS Caps.

..... Please

2 64

BRITISH NATIONAL RADIO SCHOOL

EXPRESS ELECTRONICS

32 SOUTH END CROYDON SURREY
 TEL. CRO 9186

VALVES NEW TESTED AND GUARANTEED FOR THREE MONTHS

1C1	4/9-6RE5	7/-12A17	6/8-DH142	8/8-EF91	4/-1P183	7/-
1C2	7/8-6BH6	5/9-12AN7	6/8-DH150	10/-EP92	5/6-PY33	10/6
1C3	6/6-1B3P	5/9-12AR5	8/6-DK91	8/8-L41	9/8-PY81	8/6
1F1	8/6-6BR7	8/9-12RH7	10/8-DK96	8/6-EL84	7/-PY82	7/8
1F3	2/9-BW6	6/6-12K8GT11	10/8-DK92	5/8-EM85	10/-PY83	7/6
1FD1	6/6-6BW7	7/-12Q7GT	7/8-DL84	6/-EY51	7/6-R19	6/6
1FD9	4/-6D2	4/-12RN7	6/-DL96	6/8-EY81	10/-185A1	9/6
1F10	6/6-6E12	4/-16A5	9/-EB81	4/-EZ40	5/8-U52	7/6
1F11	6/6-6H8GT	2/-19A05	9/8-EB41	7/8-EZ90	8/-U78	7/6
1F11	6/-6J7GT	7/8-2516GT	7/8-EB80	8/6-EZ81	6/8-U78	5/-
1R5	4/9-6K7G	5/8-30C1	7/8-ECC81	4/-HVR2	8/6-U142	7/8
1R5	4/-6K8G	6/-30L1	7/8-ECC82	6/9-KT30C	6/-UR41	8/6
1T4	2/9-6Q7G	5/8-3516GT	7/8-ECC83	6/9-KT96	13/8-U7H12	8/6
1U5	5/8-6SL7GT	6/-38W4	8/6-EC84	6/8-N17	5/8-UP41	8/6
3Q4	5/8-6RN7GT	7/8-35Z4GT	8/-ECC85	7/8-N18	5/8-UL41	8/6
3R4	5/8-6V6G	7/8-5783	6/8-EP80	6/8-N19	6/-UY41	7/8
3V4	6/-6X4	5/-80	6/-ECP82	7/8-N709	7/-W17	3/6
6X3GT	6/-6X5G	5/8-DAF91	4/-ECH42	8/-PCL84	7/8-W76	4/8
6Z4G	7/8-7Y4	6/-DAF96	6/8-EB181	10/-PCL90	7/8-W142	8/6
6AK6	5/8-8D3	4/-DC90	12/6-ELC80	8/6-PCL82	6/8-X17	4/9
6AL5	4/-9D7	9/6-DF91	3/-ECL82	7/8-PCL82	6/9-X142	9/6
6AM6	4/-12AD6	11/8-DF96	6/8-EP41	9/-PCL84	9/-X150	9/-
6AT6	5/-12AI18	10/-DH76	7/8-EP80	8/-PL81	9/8-Z77	4/-
6BA6	6/-12AT7	4/-DH77	5/-EF86	9/-PL82	7/-ZD17	4/-

ASK FOR RESISTOR AND CAPACITOR COLOUR CODE FREE WITH EVERY PURCHASE

High Stability Resistors ±w 5% 50Ω to 1M. 9d. Midget Ceramics 500 v., 9d. Coax. Super Quality 1in., 6d. Yd. Plug 9d. Sockets 9d. Silicon H.T. Rects. 250 v. 300 mA. 1in. x 1in. 5/6. Contact Cooled 250 v. 50 mA 6/8. 35 mA 3/8.
NEW TRANSISTORS BY MULLARD. OC19, OC28, OC66, 25/-; OC44, OC45, 5/-; OC70, 6/-; OC71, 5/-; OC72, 6/-; OC72 Matched pair, 12/-; OC74, OC75, OC78, 7/8; OC81, 6/-; OC81 Matched pair, 12/-; OC170, OC171, 7/8.

VALVES MATCHED IN PAIRS

EL34 27/8, EL84 15/-, N709 15/-, 6V6G 15/-, 6BW6 14/- per pair. Push-Pull O.P. Transformer for above 3/15Ω 14/8. P. & P. 1/6. 12in. P.M. Speakers 3Ω 24/8. Baker's "Selhurst" 12in. 15Ω 15W Stalwart 80/- 12in. Stereo Model 28.15.0.

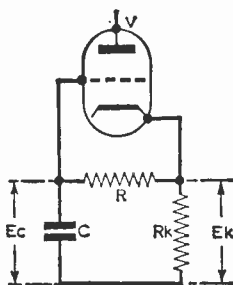
SETS OF VALVES

DK91, DF91, DAF91, DL92 or DL94. ... 18/6
 DK96, DP96, DAF96, DL96. ... 28/-
 EK41, EK7, EK7, RV6, 5/4 or 6/8. ... 18/6
 1R5, 1T4, 1R5, 3R4 or 3V4. ... 18/6
 ECH42, EF41, EBC41, EF41, EZ40. ... 37/8
 ECH42, EF41, EBC41, UL41, UY41. ... 35/-
 Postage and packing 6d. Over 21 post free. C.O.D. 4/-

Circuit Operation

To understand the operation of the circuit, a simplified diagram is shown in Fig. 2. Here the valve *V* is effectively a cathode-follower, where, for sharp cut-off valves, the voltage E_k developed across the cathode resistor R_k is nearly equal to the voltage E_c developed across the capacitor C . The small difference existing between grid and cathode, $E_k - E_c$, depends on the actual valve characteristic, but it has a finite value and capacitor C is consequently charged very slowly from this small potential difference.

Fig. 2: A much simplified version of the circuit shown in Fig. 1 to illustrate the basic method of operation of the timer.



The important thing is that this voltage across R is substantially independent of other potentials and so the current through R has a constant value $(E_k - E_c)/R$. The capacitor is therefore charged at a constant rate and the voltage rises across it linearly with time. This arrangement overcomes the difficulties experienced with the simple C and R circuit which has an exponential charge curve and requires bulky components for a long delay.

The actual operation of the whole circuit of Fig. 1 is rather more involved than the simple explanation given above, but the basic theory obtains. The valve acts as a rectifier to the a.c. mains supply, developing a d.c. voltage across the variable control $VR1$ and the relay coil RLA , smoothed by the electrolytic $C2$. The grid "follows" the cathode potential so that, when the switch $S1C$ moves to the "Time" position and removes the $10k\Omega$ shorting resistor from capacitor $C1$, this latter begins to charge by virtue of the small grid-cathode potential existing across $R3-R4$.

As the charge proceeds, the grid moves progressively away from the cathode potential, and after a certain interval, determined by the setting of $VR1$, sufficient valve current flows to operate the relay. Contacts $RLA-1$ then open, extinguishing

the lamp, while contacts $RLA-2$ close, shorting out the resistors $R3, R4$ and clamping the relay fully.

To reset the operation, the switch $S1$ (which has three poles) is moved to the centre position, discharging $C1$ through $R1$, and breaking the anode supply to the valve. The relay then drops out, in readiness for the next charging cycle.

Construction

There is nothing critical about the layout of this circuit, and no details need be given therefore of the actual mechanical arrangements. The timer is easily assembled in a small case and builders will suit themselves on the details of appearance. *It must be noticed, however, that the "earth" line is NOT chassis, and that the case, if metal, must be isolated from this negative line, being earthed back through the mains supply third pin. Particular care should be taken to ensure that the case of capacitor $C2$ is insulated from the chassis, especially if it is of the type where the case and negative terminal are commoned.*

The Function Switch

The three-pole, three-way switch $S1$ is a standard wafer type, not a midget variety however, and if a ceramic wafer can be obtained so much the better. This switch gives three positions as indicated in the diagram, namely FOCUS, RESET and TIME. In the FOCUS position, the lamp is connected directly across the mains, and is used in this position when setting up and focusing of the enlarger is necessary.

In the RESET position, the lamp is extinguished, the charging capacitor shunted by the $10k\Omega$ resistor $R1$, and the valve anode supply is broken.

When switched to TIME, the lamp will light, and remain lighted for the duration of the charging cycle after which it will extinguish and remain so until the following exposure is prepared. Provided that about one second is allowed to elapse while the switch is at the RESET position, the following timing will be unaffected by the period at which the reset is actually switched.

The Post Office type 3000 relay has a 2000Ω coil and two pairs of contacts, one pair normally open ($RLA-2$) and one pair normally closed ($RLA-1$). The pair $RLA-2$ should close just before the pair $RLA-1$ open. The lamp contacts $RLA-1$ should preferably be of the "heavy duty" type, although two "light duty" pairs have been used by the writer for many months without adverse effect.

COMPONENTS LIST

Resistors:

R1	$10k\Omega$	R4	see text
R2	$100k\Omega$	R5	22Ω
R3	see text		
	All 10%, $\frac{1}{4}W$ carbon		
VR1	$15k\Omega$ wire-wound potentiometer (Colvern CLR 3001)		

Capacitors:

C1	$1\mu F$ paper 350V
C2	$8\mu F$ electrolytic 450V

Switches:

S1	3-pole, 3-way wafer switch (Oak-NSF)
S2	S.P.S.T. toggle switch
S3	D.P.S.T. toggle switch

Miscellaneous:

RLA	P.O. type 3000 relay, 2000Ω coil. Two sets of contacts; one normally open, one normally closed
T1	Heater transformer, Primary 200-250V. Secondary 6.3V 0.3A
VI	12AU7 or ECC82

Setting Up

The timing ranges are determined by the values of R4 and R3, the latter being shorted out by switch S2 for the lower range.

With the unit connected to the mains supply and S2 closed, set the control VR1 to a maximum, that is, all resistance in circuit. Try a resistor of value between 2.2M Ω and 3.3M Ω for R4 and on switching to TIME, check for a period of about 10 seconds, using a stop watch or the second hand of a

watch. When a value has been found that will give a maximum of about 10 to 12 seconds, the rest of the scale can be calibrated down to a lower limit of about 0.5 second. Note that the extreme lower part of the scale will be indeterminate, the lowest consistent timing being obtained with about one-eighth travel of the control in circuit.

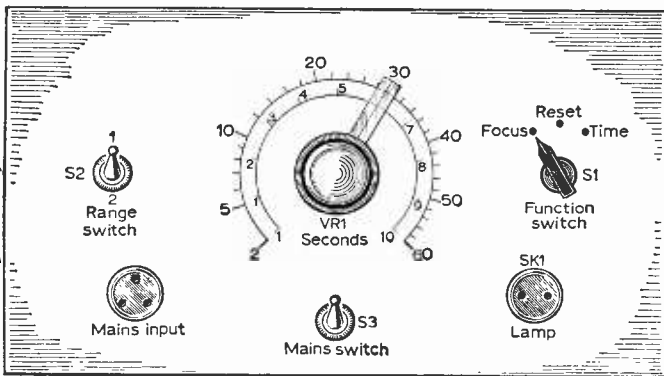
Now connect a further resistor of about 6.8 to 10M Ω in series with the value for R4 already used, and with the control again at maximum, check the timing to get a value of about 60 seconds. When this has been done, the rest of the scale can be calibrated as before; this time a lower limit of about 3 to 5 seconds will be obtained, so that there

Extending the Range

For longer timings, C1 may be increased to 2 μ F or higher, but an electrolytic should not be used here, only paper of 350V working or higher, and of best quality. Similarly R3 and R4 may be increased to give higher ranges.

All resistors may be $\frac{1}{2}$ W rating, though higher ratings may be used if readily to hand. The valve should be of a type such as the 12AU7 (ECC82) using a B9A base, or the 6SN7 or equivalent in the octal series. The two triode sections in these valves are strapped across to make a single triode. ■

Fig. 3: A suggested layout of controls for the front panel of the instrument.



INTERESTED IN TV?

Then you cannot afford to miss PRACTICAL TELEVISION!

- ★ Regular articles on servicing and fault finding
- ★ Monthly commentary and hints on TV DX reception
- ★ Articles on amateur TV transmitting
- ★ Colour TV explained plus other informative articles

SPECIAL IN FEBRUARY!

Converting the Convertibles

All you need to know to make the "dual-standard"
sets ready for 625

MAKE SURE OF YOUR COPY-FEBRUARY ISSUE OUT ON JANUARY 22nd 2/-

A MEDIUM WAVE RECEIVER

An inexpensive
two-valve circuit

By D. G. HARDING

THIS receiver was designed to give enough power to operate a loudspeaker and yet use few inexpensive and readily available components. It is therefore ideal for beginners to construct.

Fig. 1 shows the front view of the receiver, but the front panel can be omitted if desired. In the prototype it was found that a slow-motion drive was not required as there was good separation between the stations. This set is quite sensitive and

it will pick up Radio Luxembourg and many other Continental stations as well as local stations.

Circuit Detail

The circuit (Fig. 2) is very simple and uses only two valves. V1 (Z63) is the r.f. amplifier and detector. V2 (6J5) is used as the a.f. output valve.

To increase sensitivity, regeneration has been used. By this system some of the r.f. signal at the anode of V1 is inductively coupled back to the grid circuit by L2. The amount of regeneration is determined by the position of VR1, which controls the gain of this stage. No volume control has been used as the regeneration control can be used to decrease or increase the volume.

Power Requirements

The power requirements of this receiver are 6.3V at 1A and 250V at 40mA. This means that a small transformer can be used.

Chassis Layout and Wiring

Fig. 3 shows the chassis layout of the main components. All transformers and other major components should be bolted down before wiring commences.

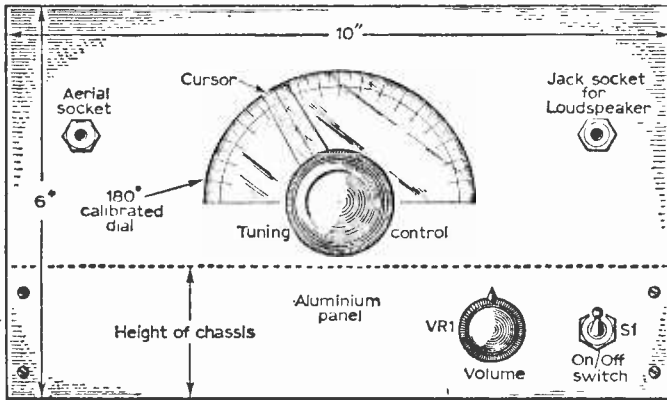


Fig. 1: A view of the front of the receiver.

Resistors: COMPONENTS LIST

- R1 1MΩ
- R2 15kΩ
- R3 47kΩ
- R4 33kΩ
- All 10%, 1/2W
- VR1 0.5MΩ potentiometer

- R5 47kΩ
- R6 47kΩ
- R7 15kΩ
- R8 150Ω

Capacitors:

- C1 0.001μF paper
- C2 100pF mica or ceramic
- C3 100pF mica or ceramic
- C4 0.01μF paper
- C5 0.01μF paper
- C6 25μF electrolytic 25V
- C7 16μF electrolytic 350V
- C8 16μF electrolytic 350V
- VC1 500pF air-spaced variable
- TC1 5-40pF trimmer

Inductors:

- L1, 2 See text and Fig. 4
- L3 L.F. smoothing choke 10-15H 60mA

Transformers:

- T1 Small pentode output transformer: 7-8,000Ω to 3Ω
- T2 Mains transformer. Tapped primary. Secondaries 0-250V 60mA; 6.3V 1A

Valves:

- V1 Z63 or EF36
- V2 L63 or 6J5

Miscellaneous:

- MRI Selenium rectifier DRMIB or DSM1 (Brimar)
- S1 S.P.S.T. toggle switch
- Chassis 10in. x 6in. Two octal valveholders.
- Terminal strip. Jack socket.

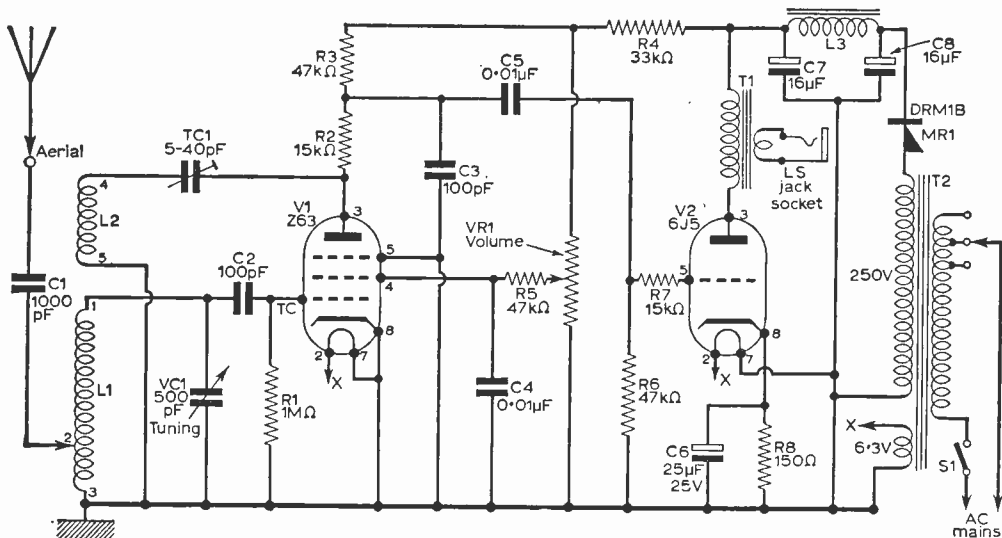


Fig. 2: The simple, two-valve circuit.

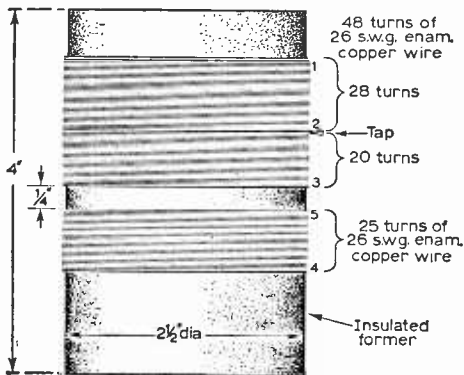
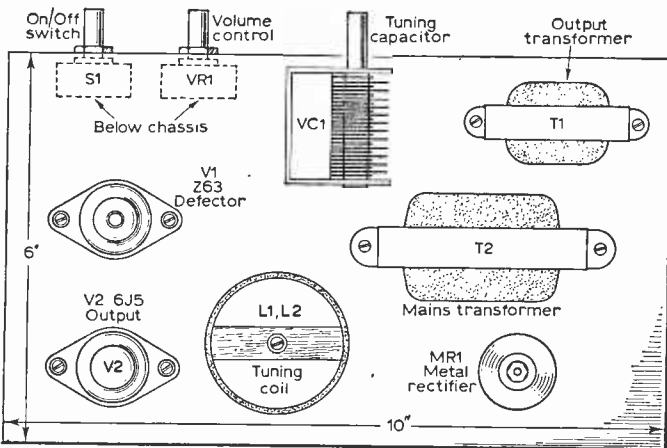
The wiring is straightforward and should present no difficulties but a point worthy of note is that the electrolytic capacitors must be connected the right way round with the red tag connected to h.t.+ and the black tag connected to h.t.—.

Coil Data

The coils used in the prototype were wound on a former 2½ in. in diameter. At the time of construction a 2½ in. custard powder

Fig. 3 (right): The layout of the major components on the chassis.

Fig. 4 (below): Winding details of the coils.

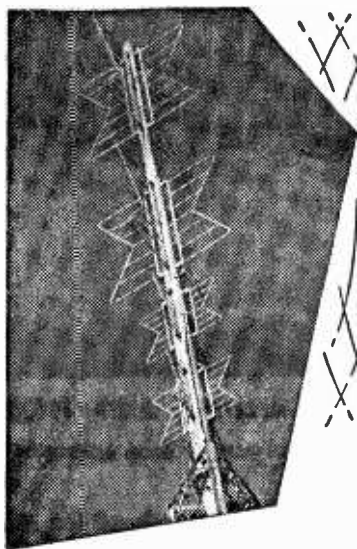


carton was used as this was the only former available. L1 is wound at the top of the former and consists of 48 turns of 26s.w.g. tapped at 28 turns from the start. L2 consists of 25 turns of 26s.w.g. enamelled wire spaced ¼ in, from L1 (see Fig. 4).

Alignment

A good aerial and earth are required to operate this receiver. When both of these have been connected the set may be switched on.

With the regeneration control VR1 set about midway, VC1 is now rotated until a station is received. There may be violent oscillations and if this happens VR1 must be turned anticlockwise. The trimmer TC1 is now carefully adjusted so that smooth regeneration can be obtained at all positions of VR1: If the set is aligned correctly there should be good volume and little distortion.



On Your Wavelength

By THERMION

how flexible this method of recording is help to promote confidence in the minds of these members of the public when it appears a question of conviction or acquittal may depend upon a tape replayed in court? It would seem not.

This psychological aspect is, I submit, extremely important. Before such a system is adopted in courts of law it is essential that it be demonstrated to the public at large that it is, beyond all reasonable shadow of doubt, proof against interference.

Mains Connections

The need for rationalisation of colour coding for mains leads has been accepted by many countries, but the implementation of international agreements takes time. In the meanwhile a great variety of electrical appliances have been imported into this country and quite often the mains connections are at variance with our method of coding, i.e. red-live, black-neutral and green-earth.

Dangerous situations can arise particularly in the case of equipment of German origin since in that country it was common practice until recently to use the red lead for earthing purposes.

Before putting any imported equipment into service the obvious course is to examine the mains lead connections at the appliance itself, and to change these over if necessary in order to conform with British practice. If this cannot be easily performed, a suitable label bearing the identification of the three conductors should be tied to the plug end of the cable; this will be a future reminder, to other users, if not to you.

To Earth, or Not to Earth!

The use of double insulation for portable appliances is becoming increasingly common. For those not familiar with this term, it describes a method of construction where any exposed metal work is completely insulated from the remainder of the assembly—this protective insulation being quite separate from and additional to the functional insulation associated with the current carrying parts.

Such appliances require only a two-core cable, no earthing connection being needed. Vacuum cleaners, shavers and clocks are typical examples. The 1963 Amendments to the Regulations for Electrical Equipment of Buildings issued in December last year by the Institution of Electrical Engineers extend further the list of domestic appliances that now may use the double-insulation method of construction.

Familiarity with double-insulated appliances must not, of course, blind us to the vital importance of properly earthing the outer metalwork of all apparatus having only single insulation.

I SEE that an eminent Q.C. has proposed that statements made to the police by accused persons should be tape recorded, and that this recording should be played back in court and used as evidence, in place of the normal written and signed statement.

While I can appreciate that this suggestion is put forward as being in the interest of the individual concerned in a charge, I admit being a little worried about the implied immunity from interference which one supposes is the chief reason that has prompted this recommendation. It has been stated that special recorders without erase or rewind facilities would be employed and that the tape itself would be enclosed in a plug-in cassette; in this way the recorded tape would be completely inaccessible and so could not be cut and edited or otherwise tampered with. Nevertheless there would still remain the possibility of complete erasure if the cassette was brought near a strong magnetic field, although such a possibility is not, maybe, a serious objection since the presentation in court of a blank tape would prove highly embarrassing to the police.

As a further guard against electronic tampering it has been suggested that the original recording could embody a coded signal possibly at supersonic frequency, but this would complicate the equipment somewhat.

What is Your Verdict?

Assuming all these technical problems can be solved so that the security of the recording is no longer in doubt, will it be easy to convince the public that this is so? Remember that tape recorders are widely used by all kinds of people nowadays, and the creation of unusual sound effects by tape trickery is now a common pastime for many amateurs. Will this "inside" knowledge of recording techniques and the appreciation of

PRACTICAL CIRCUITS FOR ELECTRIC GUITARS

GUITAR AMPLIFIER, PRE-AMPLIFIER AND PICK-UP

ELECTRIC plectrum guitars employ magnetic pick-ups which are usually situated just beneath the steel strings. Acoustic instruments, i.e. those with a normally shaped hollow body, can easily be converted for electric operation by fitting suitable "pick-ups". The more modern version of the plectrum guitar may have a solid body and therefore the sound must be produced entirely by means of a magnetic pick-up and amplifier. These observations apply also to Hawaiian guitars constructed from solid wood.

Magnetic Pick-ups

However, the principle of electrical operation for both plectrum and Hawaiian guitars is the same: the steel strings are made to interrupt a magnetic field, thus creating small electric currents which can be amplified in the same way as those from a gramophone pick-up or a tape recording head. The construction of sensitive magnetic pick-ups is somewhat tedious and it is cheaper in the long run to purchase these ready made. Excellent pick-ups with a high degree of sensitivity can be obtained from most large musical instrument dealers.

Control

As with any device which transforms mechanised vibration to alternating electric currents, subsequent amplification is usually required. The signals produced by such devices can also be modified electrically: this means that various forms of tone control can be applied and other effects introduced before or during amplification.

The position of the pick-up(s) relative to the strings and the bridge, for instance, has considerable effect on the harmonic content of the output and therefore the overall tone. To make the most of this two, and sometimes three, pick-ups are employed, as shown in Fig. 1. The pick-up nearest the bridge produces a thin, hard tone, the one nearest the fret board a deeper and more mellow effect. In addition to this variable electrical tone control may be applied as well as

suitable volume control and/or fixed attenuation for "solo to rhythm" playing.

Control Circuits

Electrical circuits may be employed for the modification of an acoustic plectrum guitar or

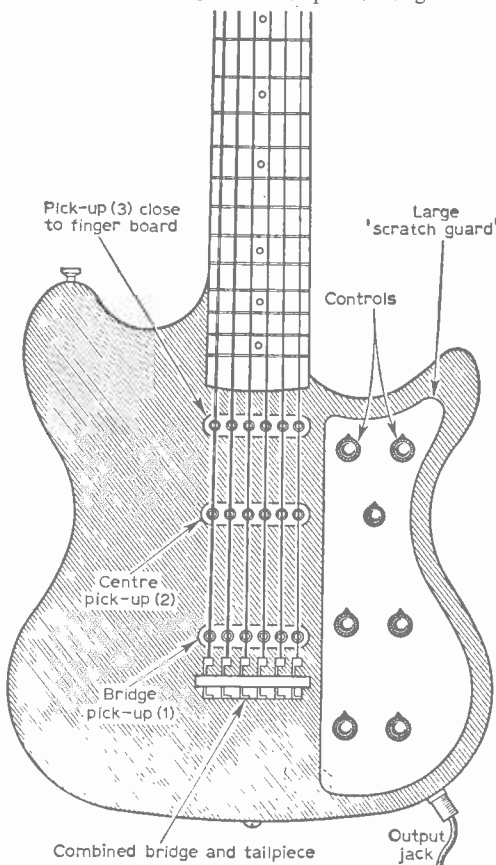


Fig. 1: The layout of controls and pick-ups on a modern guitar.

REFERENCES 1 AND 2

- Electronic Music and Musique Concrète*, by F. C. Judd, A.Inst.E. (Neville Spearman Limited).
Radio and Electronic Hobbies, by F. C. Judd, A.Inst.E. (Museum Press).



CONTROL CIRCUITS DESCRIBED BY F. C. JUDD

incorporated in home-constructed Hawaiian guitars (Refs. 1 and 2).

The control system of Fig. 2 is for tone and volume control with a single pick-up and the few components can be mounted on the "scratch guard" or an extension of it. A rhythm switch has also been included (S1).

Component details are given in the circuit and so long as screened interconnecting leads are used where indicated there should be no problems with induced hum. As an extra precaution against this the underside of the scratch guard or an extension of it may be lined with thin aluminium or tinplate which must be earthed to the common earth of the output lead. (Note: The output lead to the amplifier must, of course, be screened.)

Control for Three Pick-ups

The circuit of Fig. 3 is for three pick-ups, although this could be modified for two if required. It provides for independent volume and tone control over each pick-up, either of which may be selected by the ganged switch S1, S2 and S3.

A "rhythm switch" S4 and S5 has also been included. This brings a fixed attenuator into

circuit, thereby reducing the output automatically for "rhythm" or chord playing. This control system does, of course, require more space but with careful layout can be built into a large "scratch guard" as in Fig. 1.

Tremolo Control

In *Practical Wireless*, February, 1961, the author described an electronic tremolo unit which could also serve as a guitar preamplifier.

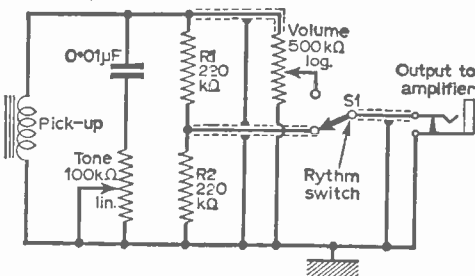


Fig. 2: A tone and volume control circuit. (Note: reducing the value of R2 will reduce the output.)

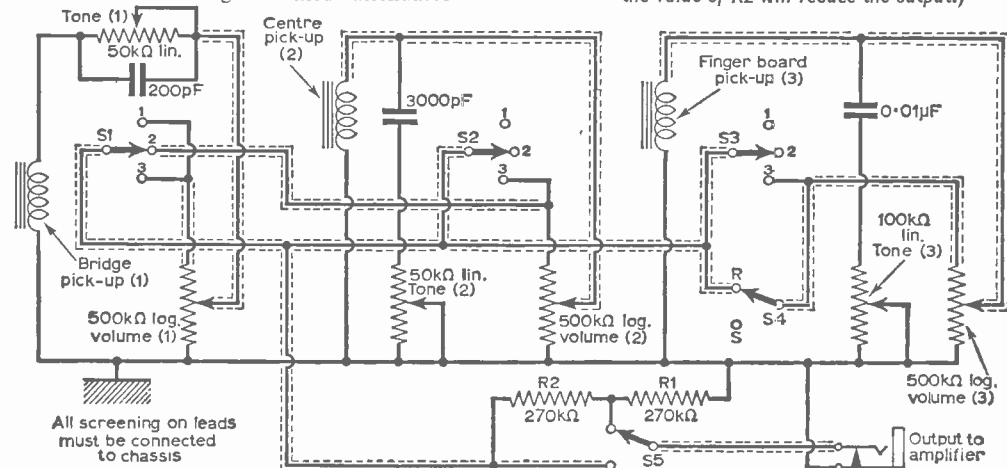


Fig. 3: The control circuit for three guitar pick-ups.

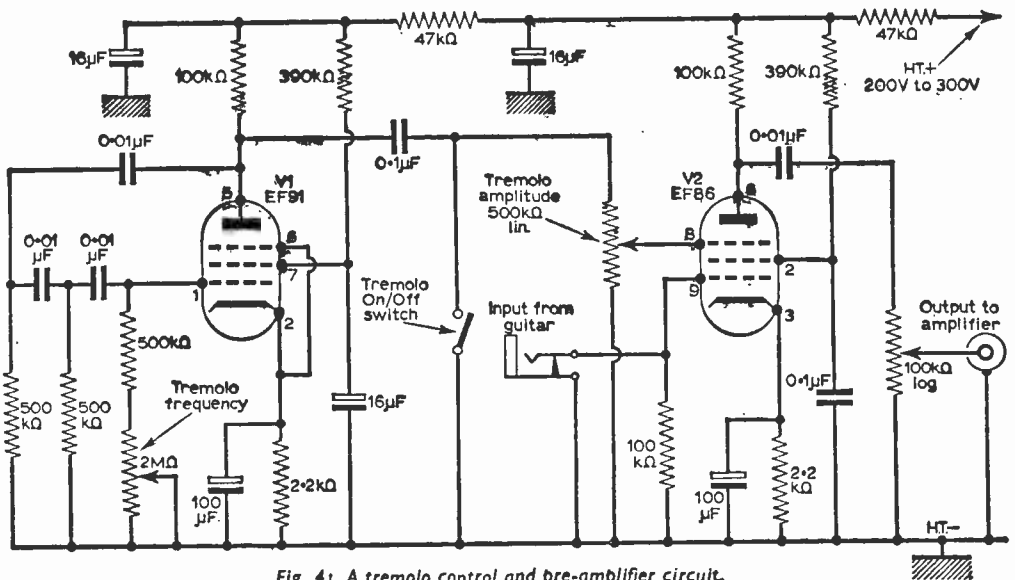


Fig. 4: A tremolo control and pre-amplifier circuit.

One of the greatest problems with electronic tremolo is the familiar "thump" caused by harmonics from the tremolo oscillator, which operates on a fundamental frequency of 6 to 10c/s. The circuit shown in Fig. 4 is a much modified version of the one which appeared in the *Practical Wireless* article mentioned above. (Those who have already built this unit could modify it quite easily to the new circuit.)

The tremolo oscillator V1 employs the familiar phase shift circuit and almost any modern h.f. pentode will operate—viz.: EF91, EF80, etc. The

pre-amplifier V2 must be an EF86 because the tremolo signal is applied to the suppressor grid (G3).

The tremolo amplitude is controlled by VR2, but remember that beyond a certain point "thump" might be apparent due to excessive level. Tremolo frequency is controlled by VR1 and the output from the pre-amplifier by VR3. Because of the high gain of V2 the output voltage from the pre-amplifier is quite considerable. The gain

—continued on page 961

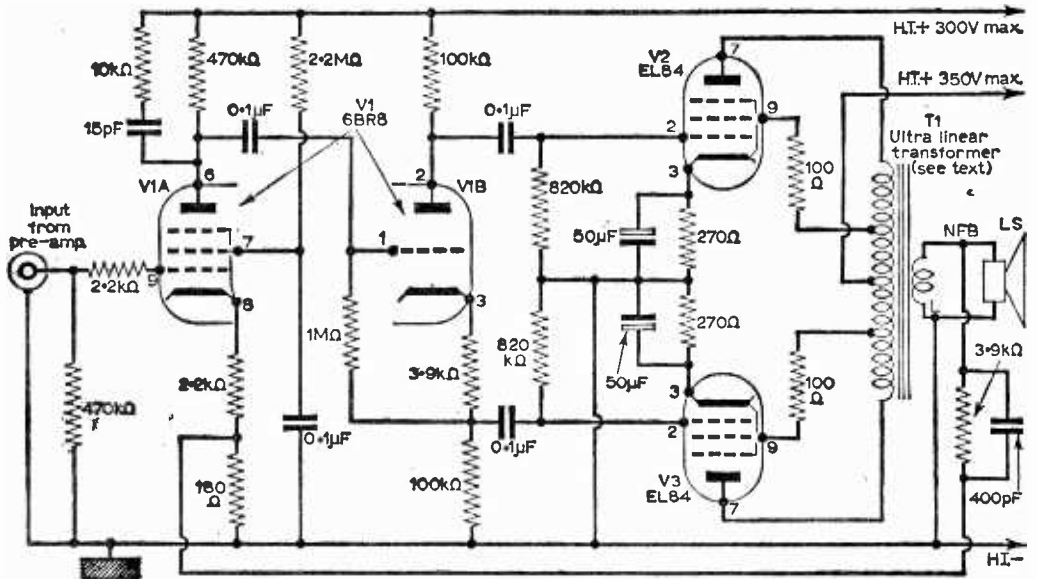


Fig. 5: A power amplifier circuit for electric guitars.

A DOOR INTERCOM

A simple yet versatile piece of equipment

By P. HENDERSON

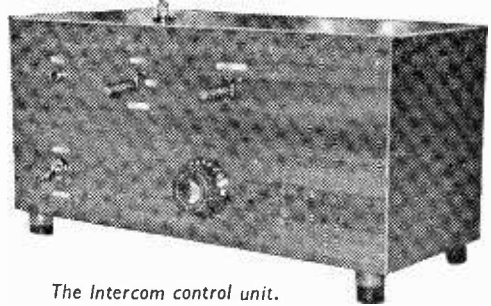
THIS unit was designed for an upstairs flat to avoid tiring journeys up and down stairs in order to answer the door to callers. It allows for two-way conversations between the living room of the flat and callers at the front door, by way of an amplifier unit and an extension loudspeaker unit, the latter being installed outside the front door. An additional facility is provided, namely that the door can be unlocked from upstairs when required.

The Amplifier Unit

The basic unit is a two-stage high-gain amplifier, using a 6SH7 resistance coupled to a 6V6 in a simple manner as shown in Fig. 1. The switch S1 connects the unit to any number of separate extensions as well as to the front door. In the prototype for example, there is an extension to the garage-

workshop. A relay RLA with a high impedance coil that is actuated from the h.t. line of the amplifier through a suitable ballast resistor when the "press-to-talk" switch S3 is closed, controls the changeover from "Listen" to "Talk". This relay is equipped with two sets of changeover contacts.

Resistors R6 and R7 act as "ballast" for the relays RLA and RLB respectively; their values must be determined by experiment. The connections to and from the relay contacts should be carried out using screened cable to minimise hum pick-up. No feedback is incorporated in the ampli-



The Intercom control unit.

fier, and the unit is quite stable after the addition of the 0.002μF mica capacitor C9 across the primary of T2. The design of the amplifier cabinet is not critical. As very little heat is liberated during the quiescent period, only a fair degree of ventilation is required. The power unit is shown in Fig. 2.

Extension Leads

For the door extension, three-core wire is used, two cores feeding the speaker, and the remaining core, together with one of the speaker leads as

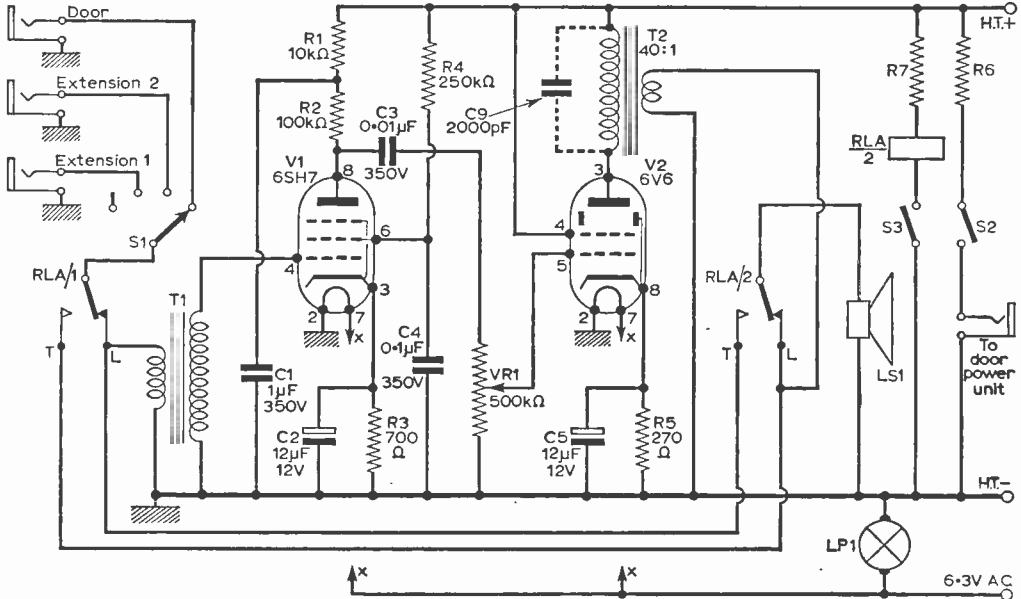


Fig. 1: The two-stage amplifier circuit.

common, supplies the feed from S2 to the relay RLB in the l.t. power unit. See Fig. 3 and Fig. 4. All other extensions require only twin feeds.

Door Loudspeaker

In the author's installation, a surplus Tannoy speaker unit was pressed into service. This speaker is mounted outside the front door in a suitable position in its original case. However the terminals on the outside are ignored as they feed a transformer and a capacitor, both of which are *not* used in this unit now.

The supply to the speaker is connected directly to the speaker leads, and the speaker itself is

When the door bell rings, one closes the switch S5, and the current is fed to the heaters of the 5Y3 rectifier. This being a directly heated valve, h.t. is applied to the amplifier after a delay of only five seconds or so. A neon indicator V5 connected to the h.t. line indicates when the h.t. is applied, and one can then speak.

A similar neon (V4) is used to indicate that the mains is switched on to the unit; alternatively, a 6.3V dial lamp can be wired into the heater circuit.

Remotely Controlled Door Lock

Although knowing who is at the door is a great help, it is still often necessary to go downstairs to open the door to allow the caller to enter. This unit allows a modified Yale type lock unit to be unlocked from upstairs (or any other distant position) as well. A Yale type lock is installed in the usual way, if not already fitted, but the lock case is altered as shown in Fig. 5.

A small hole is cut in the case, and a short length of screwed rod is connected to one of the "legs" of the lock mechanism, and the other end is connected to the solenoid plunger.

The solenoid itself is made from a car indicator arm solenoid. The original windings are removed, and 8oz. of 20s.w.g. enamelled copper wire wound on to the original former. Two cardboard or formica "cheeks" will be needed to contain all the new wire within the length of the

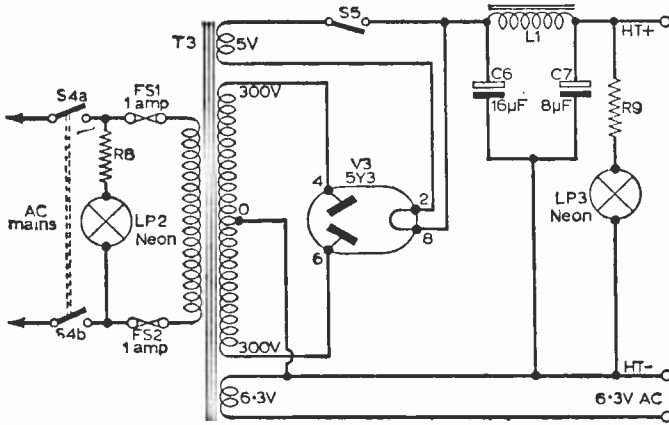


Fig. 2: The power pack circuit.

enveloped in a polythene bag to make it more weatherproof. Although the Tannoy's impedance is actually 7Ω, the mismatch does not appear to cause trouble, as callers are clearly heard even at considerable distances from the speaker.

Method of Operation

In the "Listen" position, the loudspeaker outside the front door acts as a microphone and feeds its signal to the primary of T1 through contacts RLA/1 in the "L" position. The signal is amplified, the gain being controlled by VR1, in the usual manner. The output transformer T2 conveys the audio signal to the amplifier loudspeaker LS1 by way of contacts RLB/2 in the "L" position.

An elliptical loudspeaker is used in the author's main control unit. This loudspeaker is mounted facing upwards, and one speaks down to it, with very satisfactory results.

When one wishes to know who a caller is, the press-to-talk switch S3 is closed, and so relay R1A is energised and the contacts "1" and "2" are set to the "T" position. The loudspeaker LS1 in the amplifier now acts as a microphone, and its output is fed to the primary of T1, and the signal from the amplifier is fed to the door loudspeaker LS2 through the output transformer and S1.

Each morning the mains switch S4 is switched on and the heaters of the 6SH7 and the 6V6 are thus supplied with current. The unit is left in this state ready for use, all day, as consumption is quite small, and the unit is then always ready for immediate use.

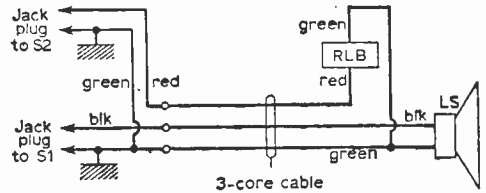


Fig. 3: Interconnecting wiring for the door extension.

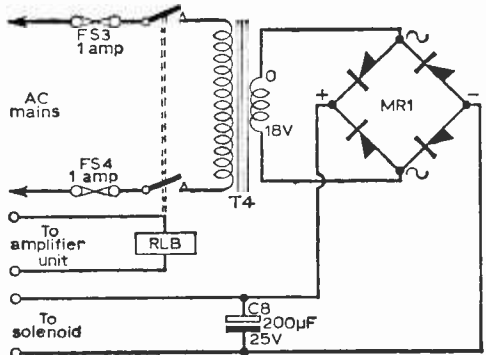


Fig. 4: Wiring between S2 and the l.t. power unit.

former. The ends of the windings are taken to a small connecting block. The remote end of the solenoid is screwed to the inside of the door, using washers to space the solenoid off the door so that the solenoid plunger and lock mechanism is free to move and does not bind.

The solenoid is energised by a l.t. supply unit, as shown in Fig. 4. This unit supplies sufficient d.c. to energise the solenoid, ensuring a certain and small withdrawal of the lock tongue.

The supply from the l.t. unit to the solenoid is carried out in mains type twin 3/029 in order to minimise volt drop due to the heavy current drawn by the solenoid. The lead is carried up the inside

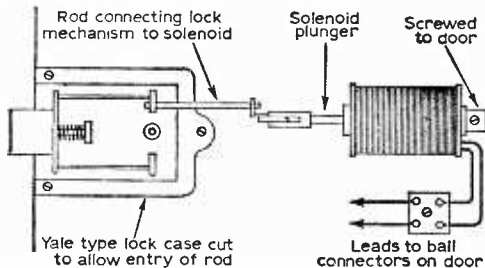


Fig. 5: Modifications to the Yale lock.

COMPONENTS LIST

Resistors:

- R1 10kΩ
- R2 100kΩ
- R3 700Ω
- R4 250kΩ
- R5 270Ω
- VR1 0.5MΩ carbon potentiometer
- R6 (ballast for RLB)
- R7 (ballast for RLA)
- R8 (see LP3)
- R9 (see LP3)

Capacitors:

- C1 1μF paper 350V
- C2 12μF electrolytic 12V
- C3 0.01μF paper 350V
- C4 0.1μF paper 350V
- C5 12μF electrolytic 12V
- C6 16μF electrolytic 450V
- C7 8μF electrolytic 450V
- C8 200μF electrolytic 25V
- C9 2,000pF mica

Transformers:

- T1 Microphone or miniature output transformer, 60 : 1
- T2 Pentode output transformer with 3Ω secondary
- T3 Mains transformer. Secondaries: 350-0-350V 80mA; 6.3V 3A; 5V 2A.
- T4 Mains transformer. Secondary: 15 to 18V 10A

Switches:

- S1 Rotary switch, single pole, number of ways to suit extensions required
- S2 Toggle switch, single pole on/off
- S3 Push button switch, single pole
- S4 Toggle switch, 2 pole on/off
- S5 Toggle switch, single pole on/off
- FS1-4 1A fuse
- L1 Smoothing choke 10-20H 80mA
- MR1 Bridge rectifier 20V 10A
- RLA P.O. type relay, with high impedance coil. Two sets of changeover contacts.
- RLB P.O. type relay, with high impedance coil. Double pole make-break contacts

Valves:

- V1 6SN7
- V2 6V6
- V3 5Y3

Lamps:

- LPI 6.3V lamp
- LP2, 3 Neon indicator, mains type with resistors (R8, R9) included
- LS1 Loudspeaker unit 3Ω
- LS2 "Tannoy" or similar loudspeaker unit 3Ω

Miscellaneous:

Jack sockets. Three I.O. valveholders. Sufficient p.v.c. insulated twin 3/029 for solenoid supply. Two 4 oz. reels of 20 s.w.g. enamelled copper wire. Connector block. Other sundry items for solenoid unit and door contacts as detailed in text.

edge of the door frame (see Fig. 6(b)) and each core supplies its own brass contact strip, as shown.

The supply is picked up from these two strips by a pair of small spring-loaded balls in brass cases used as ball and socket door catches. These are fitted as near to the outside face of the front door as shown in Fig. 6(a). The holes to accommodate the catches are drilled well into the door frame, so that small holes may be drilled from the inside of the door to meet them.

Wires are soldered to the rear of the ball holders as in Fig. 6(c) and the leads are lead through the communicating holes, and the leads connected to the connecting block to complete the supply circuit.

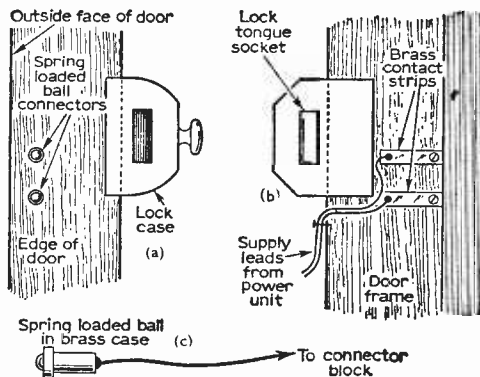


Fig. 6(a): The spring-loaded ball contacts.

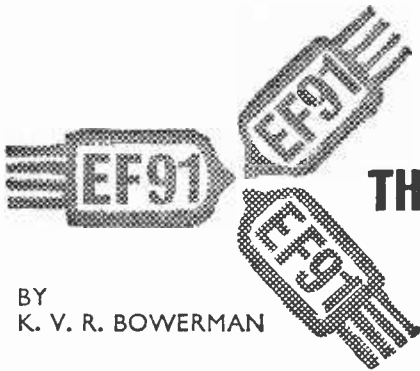
Fig. 6(b): Fitting the solenoid supply lead.

Fig. 6(c): Wiring to the ball contact holders.

It will be appreciated that the supply to the solenoid will cease when the door has been pushed so far open, and the balls lose contact with the brass strips, but this is of no consequence, as by then the tongue of the lock will be well clear of its socket on the door frame.

When S2 on the amplifier is closed h.t. current energises RLB in the l.t. supply unit, switching on the mains supply to the transformer T4. This transformer supplies about 10A and 15-18V to a 10A bridge rectifier. (The 200μF capacitor is not essential, but does eliminate the a.c. hum from the solenoid.)

The complete l.t. unit is situated as near to the door as possible so as to keep the supply lead short.



THE VERSATILE EF91



BY
K. V. R. BOWERMAN

ONE of the cheapest and most efficient pentode valves obtainable is the EF91. This valve has a large number of "aliases", among them 6AM6, 8D3, 6F12, Z77 and CV138, and it can be obtained for as little as 1s. 9d. from advertisers in this magazine.

Designed as a high-slope r.f. pentode, the EF91 is, in fact, far more versatile than this might suggest. It operates well at any frequency and appears to be quite tolerant about operating conditions, and consequently, lends itself well to every kind of circuit. E.M.I. even used it in early television receivers as a sound output valve.

The purpose of this article is to give two examples of simply constructed equipment, quite suitable for beginners, which work extraordinarily well and cost very little to make. If you have a well-stocked "junk box", so much the better.

EF91 Switched Superhet

The first piece of equipment to be described is a switched superhet receiver for a.m. Three stations can be selected and, in the prototype, these were the Light Programme on 247m., the Home Service on 330m., and the Third Programme on 464m. Of course, any three stations in the medium waveband can be brought in as required. A modification described later enables one long wave station to be substituted for one of the medium wave stations, if necessary.

The Superhet Circuit

Five EF91 valves are used in the receiver shown in Fig. 1(a).

The r.f. signal appears across the ferrite rod winding and is tuned by TC1 alone, or TC1 plus TC2, or TC1 plus TC2, plus TC3, depending on which station is required. The tuned signal is fed to the control grid of V1.

V2, strapped as a triode, acts as the local oscillator. The oscillator coil L2 is tuned by TC4, or TC4 plus TC5, or TC4 plus TC5 plus TC6, depending on which station is required. The oscillator signal is fed via the very small capacitor C2 to the control grid of V1, this latter valve thus acts as a mixer. This system, unconventional though it may be, nevertheless works extremely well.

A number of complex signals now appear at the anode of V1, including the i.f. The i.f. transformer,

T1, selects the required signal and feeds it to the grid of V3. This valve operates as a straightforward, conventional, i.f. amplifier. The amplified i.f. signal now finds its way via C8 and R7 to the grid of V4.

Strapped as a triode, V4 is wired as a "leaky grid" detector, mainly because this is simple to set up and is very sensitive.

The detected audio signal now appears across the volume control VR1, the slider of which is connected to the control grid of V5. This valve operates as an output pentode and drives the loud-speaker via T3.

The power pack is very simple (Fig. 1b). One secondary on T4 supplies the heater current, and another supplies the half-wave rectifier MR1. Choke L3 and the two electrolytic capacitors, C13 and C14, provide adequate smoothing and regulation.

C9 serves to remove any residual i.f. signal from the audio circuits. R12 and R13 may not be required, but can be fitted if there is a tendency to i.f. instability; their function is to broaden the tuning of the i.f. transformers so that they do not give too "peaky" a response which can lead to oscillation in the very high gain EF91 valves.

Construction

The chassis illustrated (Fig. 2) is considerably larger than necessary but was used merely because it happened to be on hand. Obviously a smaller chassis can be employed, so long as the components fit fairly well without overcrowding.

Layout is not critical, provided grid and anode leads are kept well away from each other and as short as practicable.

First, mark out the chassis and drill as necessary. Next, mount the valveholders (with a solder tag under one bolt on each), then the i.f. transformers, mains transformer, choke (if used), smoothing capacitors, rectifier and output transformer (Figs. 2 and 3).

Now fit the volume control, station selector switch and on/off switch.

The wiring can now be started. Solder the heater wiring first, tucking the "hot" lead well into the corners of the chassis. Next, wire the bias resistors and by-pass capacitors, together with the chassis returns for the heater and any other earth wiring on the valveholders. Don't forget to earth

PICK-UP ARM COMPLETE



NOW ONLY 49/6

Transcription type. Wired for stereo and complete with LP78 stereo mono turn-over cartridge. (Originally 69/7. Save 19/8 at this low price.)

A MINIATURE TAPE RECORDER IN KIT FORM ONLY

£3.19.6



Exclusively offered complete with all accessories. No extras to buy. Consisting of three transistor amplifier, record-play volume control, miniature speaker, forward-stop-rewind switch, reel of tape and spare reel, motor, attractive coloured case, mike and earphone sockets, pick-up coil mike, earphone and carrying handle supplied. Standard battery operated. Simple to put together in less than one hour. Brand new and guaranteed.

Simple to put together in less than one hour. Brand new and guaranteed.

£4.19.6

AUTOMATIC SOLDERING IRON S.F.1.



30 watt. First in the country that feeds solder automatically. Easy one hand action, lightweight and extremely robust. Gives you a third hand. Tip and solder are replaced at the exact spot needed, any required amount of solder can be automatically fed to the tip by adjustable feed roller. Standard A.C. mains. Fully guaranteed.

SPECIAL 1964 OFFER ONLY 39/6

R.F. FIELD INDICATOR



RF.40. Designed for checking the radiation from a transmitting antenna. The sensitivity can be controlled by adjustment of panel control, the antenna length or by increasing distance from the radiator. Freq. range 1-250 Mc/s. 200µA D.C. Meter. Complete as an illustration with instructions. Price 69/6.

Illustration with instructions. Price 69/6.

MT.1000 TAPE RECORDER



The smoothest performing battery model available, uses 4 transistor plus diode push-pull amplifier with built in speaker stop/record/play back/rewind switch, volume control, speed control, pause switch. Size only 7 1/2 x 6 1/2 x 2 1/2 in. Attractive two-tone case. Complete with mike, earphone, batteries, tape and instruction manual. ONLY £8.19.6.

Complete with mike, earphone, batteries, tape and instruction manual. ONLY £8.19.6.

3-WAY SLIM CRYSTAL MICROPHONE



MODEL 100C. May be hand-held, floor stand or desk stand mounted or suspended by lavaliere cord. Response 60-10,000 cps. Built in on/off switch. Output level—52dB. Omni-directional head. Clips on or off standard stand adaptor permitting tilting for multi-angle use. Satin chrome finish. Supplied complete with table stand, cable and lavaliere cord. PRICE 48/-

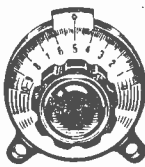
stand adaptor permitting tilting for multi-angle use. Satin chrome finish. Supplied complete with table stand, cable and lavaliere cord. PRICE 48/-

SE. 1 STEREO HEADPHONES



For use across the speaker output terminals of any amplifier and supplied complete with control box including permanent connection and immediate switching from headphone to loudspeaker reproduction. The SE.1 Stereo Headphones give you an exciting new experience in Stereo listening. Supplied complete with leads, control box and instructions. PRICE 6 1/2 Gns. S.A.E. for leaflet.

VERNIER DIALS



Precision vernier dials with approx. 8 to 1 ratio. Accurately centred metal insert for 1/8 in. shaft. Reads counter clockwise 0-100 in 1/50°.

Model T.501 1 1/2 in. dia. 12/8.
Model T.502 2 in. dia. 14/-
Model T.503 3 in. dia. 16/-

SA.80 INTEGRATED STEREO AMPLIFIER



x 4 watt. The perfect choice for a low cost Hi-Fi stereo system. Dual pick-up and tuner inputs. Tone control. Independent volume controls. 15 ohm speaker output. Supplied complete for only £9.10.0

9V BATTERY CHARGER AND AC ELIMINATOR MODEL LA.6P

A "MUST" for every transistor set owner. Save those batteries by running your transistor set direct from A.C. mains. Reactivate all your old P.P.S. 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.



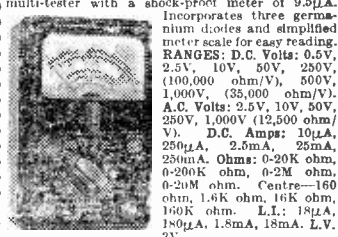
NOW ONLY 24/6

H402 ULTRA SUB-MINIATURE TRANSISTOR COIL SET.

Smallest 2 gang variable condenser 1 1/2 in. square x 2 in. deep. 3 L.F.s and Osc. Coil 1/2 in. square x 2 in. high. Ferrite rod with medium wave coil ready wound. All supplied with suggested 6 transistor set circuit and parts list. Matched coils shielded and impregnated high Q 455 Kc/s. all slug tuned. Tuning dial and knob fits securely on shaft. ONLY 24/6 complete.

REDA EXCLUSIVE!!!

100,000 O.P.V. MULTI-TESTER MODEL EP.100K.



A handy size high sensitivity multi-tester with a shock-proof meter of 9.5µA. Incorporates three germanium diodes and simplified meter scale for easy reading.

RANGES: D.C. Volts: 0.5V, 2.5V, 10V, 50V, 250V, (100,000 ohm/V), 500V, 1,000V, (35,000 ohm/V). A.C. Volts: 2.5V, 10V, 50V, 250V, 1,000V (12,500 ohm/V). D.C. Amps: 10µA, 250µA, 2.5mA, 25mA, 250mA. Ohms: 0-20K ohm, 0-200K ohm, 0-2M ohm, 0-20M ohm. Centre—100 ohm, 1.6K ohm, 16K ohm, 160K ohm. L.L.: 18µA, 180µA, 1.8mA, 18mA, 1.8V, 3V.

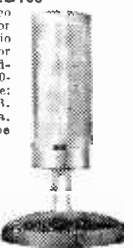
Decibels: minus 20dB—plus 62dB. Size: 5 1/2 in. x 3 1/2 in. x 2 1/2 in.

ORIGINALLY £14.14.0.

OUR PRICE £6.19.6 COMPLETE

STEREO DYNAMIC MICROPHONE MODEL SM.D100

A truly revolutionary new stereo dynamic microphone. Ideal for the tape recording and audio enthusiast who has an eye for quality and value. Brief specification—Frequency response 50-15,000 c/s. Output impedance: 20K ohms. Sensitivity: -60dB. Size: 8 1/2 in. high, Mike 2 1/2 in. dia. Base 4 1/2 in. dia. Mike can be removed from table stand and used with floor stand if desired. Supplied complete with table stand and 10ft. of screened lead in display carton.



Price **9 1/2 Gns.**

S.A.E. for leaflet.

SUBSTITUTION BOXES

Fully calibrated complete with insulated leads Model O.M.G. RESISTANCE BOX. Provides 24 standard values at 1 watt, 15 ohms to 10 meg. Price 37/8. Model O.M.B. CAPACITANCE BOX. Provides 8 standard values from 0.001 to 0.22 mfd. at 600 volt working. Price 29/8.

NEW! 1 mA PANEL METER—CLEAR PLASTIC WITH PANEL LIGHT 35/-

EDGEWISE PANEL METERS

Size 3 1/2 in. w. x 1 1/2 in. h. x 3 1/2 in. d. 0-200 µA. 69/8; 0-1 µA. 59/8. All boxed and fully guaranteed.



NOW ONLY 24/6 With the RA30 RADIO AMPLIFIER

Designed for use with transistor radios, valve radios, car radios, amplifiers, where quality reproduction of sound is required. Plugs into carpiece output socket of nearly all miniature sets. The cabinet is finished in beige leather with contemporary gold baffles at each end. Complete with 12ft. extension cord fitted with miniature plugs, individually cartoned and guaranteed. Size: 9 1/2 in. x 3 1/2 in. diameter.

MAIL ORDERS TO (DEPT. P), 32a COPTIC STREET, LONDON W.C.1.



CALLERS WELCOME AT 87 TOTTENHAM COURT ROAD, LONDON W.1. MUS 9606

GUITARS



BASS GUITAR For the Electric Bass Guitar only the best loudspeakers are good enough. To handle the very heavy transients that occur when a bass guitar is used with a large amplifier we find a 3in. diameter voice coil is necessary together with a high flux magnet and these are the basis of our 15in. and 18in. speakers, Models 153 and 183.

The 15in. Model 153 in a 10 cu.ft. enclosure performs very well but, of course, the 18in. is even better!

PRICES POST FREE 15in. Model 153 — 18 gns. 18in. Model 183 — 24 gns.

LEAD GUITAR For the Electric Lead Guitar the speaker must combine good bass and middle with an extended high note response to do justice to the strong overtones. We find that an aluminium wound voice coil and a dual cone assembly with a very powerful magnet are required for the best results and these are built into our 12in. and 15in. loudspeakers, Models 122/17A and 152/17A.

PRICES POST FREE 12in. Model 122/17A — £12.17.6. 15in. Model 152/17A — £17.17.0.

RHYTHM GUITAR For an Electric Rhythm Guitar the conditions are not quite so exacting as regards extremes of frequency range but a high efficiency over the middle range is essential. We find that a copper voice coil and a single cone give the best results and these are the features of our 12in. and 15in. speakers, Models 122/17 and 152/17.

PRICES POST FREE 12in. Model 122/17 — £11.17.6. 15in. Model 152/17 — £16.16.0.

SERVICE All our heavy duty speakers are fitted with multi-strand tinsel flexible leads to the most stringent Post Office specification to give very long life and all speakers are guaranteed for 12 months. We will be pleased to supply full specifications on request.

Manufacturers' enquiries direct to:—

FANE ACOUSTICS LIMITED

HICK LANE BATLEY YORKSHIRE

If in difficulty, customers other than trade may purchase from us direct where at present there is no local stockist.

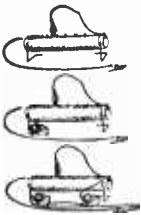
Sole Distributors to the wholesale and retail trade:—

LINEAR PRODUCTS LIMITED ELECTRON WORKS ARMLEY LEEDS 12

GoyMatch

COMPACT HIGH EFFICIENCY TUNERS —FOR ALL RX'S AND TX'S!

A range of special units will "match anything to anything!" Peak up your R.F. performance by many 'S' points



*Type 1. General purpose tuner for receiving and transmitting + 1/6 P/P. **10/-**

*Type 2. Medium wave tuner for receiving, also peaks up over H.F. range. + 2/- P/P. **45/-**

Type 3. H.F. band tuner for receiving — a MUST for the serious short wave operator, covers 1.4 to 30 Mc/s. + 1/6 P/P. **39/6**

*Type 4. As type 1 but with built-in series var. capacitor, for receiving. + 1/6 P/P. **15/-**

Type 5. As type 1 but with built-in series var. capacitor for transmitting. + 2/- P/P. **20/-**

* These Units are illustrated

Only the PRICE is low!

SEND FOR FULL DETAILS

Use the RF40 Field Indicator/phone monitor, 69/6, post free

PARTRIDGE ELECTRONICS LTD.

7 Sowell Street, Broadstairs, Kent Thanet 62535

The AMATEUR RADIO HANDBOOK

Third Edition

Contents include Fundamentals, Valves, Semiconductors, H.F. Receivers, V.H.F./U.H.F. Receivers, H.F. Transmitters, V.H.F./U.H.F. Transmitters, Keying and Break-in, Modulation, Single Sideband, Frequency Modulation, Propagation, H.F. Aerials, V.H.F. Aerials, Noise, Mobile Equipment, Power Supplies, Interference, Measurements, Operating Technique and Station Layout, the R.S.G.B. and General Data.

Bound in maroon linson buckram - - 544 pages
700 diagrams and 100 half-tones

PRICE 34/- (Postage and packing 2/6)
(\$5.50 post paid U.S.A. and Canada)

Obtainable from leading booksellers or

(Dept. P.W.2)

RADIO SOCIETY OF GREAT BRITAIN

28 Little Russell Street, London, W.C.1

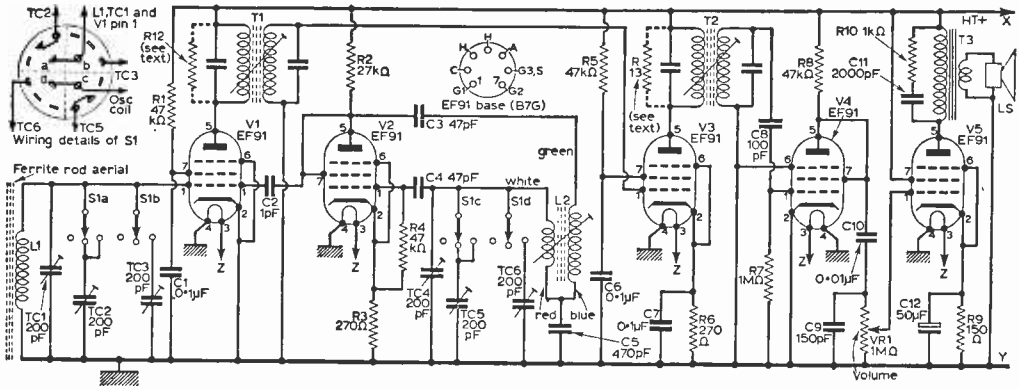


Fig. 1a (above): The superhet circuit.

Fig. 1b (right): The power supply circuit for the superhet receiver.

COMPONENTS LIST
SWITCH-TUNED SUPERHET (Fig. 1)

Resistors:

R1	47kΩ	R8	47kΩ
R2	27kΩ	R9	150Ω ½W
R3	270Ω	R10	1kΩ
R4	47k	R11	100Ω 2W
R5	47k	R12	47kΩ
R6	270Ω	R13	47kΩ
R7	1MΩ		

All 10%, ½W unless otherwise stated
VR1 1MΩ potentiometer

Capacitors:

C1	0.1μF paper
C2	1pF silver mica
C3	47pF ceramic
C4	47pF ceramic
C5	470pF silver mica
C6	0.1μF paper
C7	0.1μF paper
C8	100pF silver mica
C9	150pF silver mica
C10	0.01μF paper
C11	2,000pF paper
C12	50μF electrolytic 50V
C13	32μF
C14	32μF

} electrolytic 300V

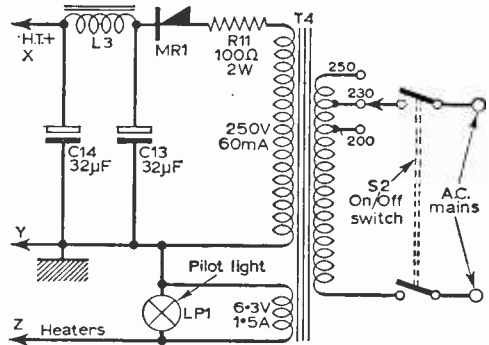
TC1, 4 200 + 200pF double trimmer
TC2, 5 200 + 200pF double trimmer
TC3, 6 200 + 200pF double trimmer

Inductors:

L1	Ferrite rod aerial, with m.w. winding (Teletron)
L2	Oscillator coil, m.w. (Weymouth HO3)
L3	Smoothing choke 10-20H 80mA

Transformers:

T1, 2	I.F. transformer, 465 kc/s
T3	Pentode output transformer, 3Ω secondary
T4	Mains transformer. Secondaries: 0-250V 60mA; 6.3V 1.5A
S1	4-pole, 3-way wafer switch
S2	Toggle switch, d.p.s.t.
LP1	6.3V 0.5A pilot lamp
MR1	Metal rectifier 250V 75mA
VI-5	EF91



the centre spigot of each valveholder. For earthing large components, the writer found it convenient to run a "busbar" of 18s.w.g. tinned copper wire between two tags along the length of the chassis. The by-pass capacitors can then be lined up quite neatly, as can be seen. The screen and anode resistors should be soldered next, as close as possible to the tags on the valveholders.

Now mount the oscillator coil as close to the tags of V1 valveholder as it will go. Carefully solder the components associated with the oscillator circuit. Don't overheat the solder tags on the oscillator coil otherwise the polystyrene former will melt. Finally, run the h.t.+ line.

The next problem is to mount the ferrite rod and the three double trimmers. All these components are on top of the chassis and must be immediately above the station switch and oscillator coil. On the chassis illustrated, the trimmers are along one end. It may be considered more convenient to have them along the back of the chassis so that they can be adjusted while the set is in its cabinet.

The ferrite rod is secured to a strip of insulating material (such as Perspex or Paxolin), and this, in turn, is mounted on a simple bracket made from a strip of aluminium. Wiring of the rod, trimmers and switch, should now be carried out as shown.

Finally, connect the pilot light, speaker lead, speaker and mains lead—but do not plug in yet (see Testing and Alignment). The speaker frame, one side of the speech coil and the speaker transformer clamp should all be connected to chassis.

Testing and Alignment

Before plugging in, test between the positive terminal of C14 and chassis with an ohmmeter set to a high resistance range. The needle should give a kick as the capacitor charges and then sink back to infinity (or at least 2mΩ). If the needle swings over to zero and stops there, there is a short on the h.t.+ line and the wiring should be carefully checked to find the fault. If all is well, however, plug in the mains lead and switch on. The pilot light and valveheaters should light up.

Set meter to 300V d.c. range and again apply it between the positive tag of C14 and chassis. The h.t. line voltage should be between 220 and 250V.

This is not critical but if much above 250V, increase the value of R11. If all is well, proceed with the alignment, which is given below in numbered steps:

- 1 Switch on and allow set to warm up. Unscrew all trimmers. Set volume control three-quarters towards full volume. Set S1 to position 1.
- 2 Temporarily attach about a yard of wire to act as a "throw-out" aerial to the "hot" tag of TC1.
- 3 Using a screwdriver of insulating material (a piece of ebonite or Tufnol rod filed to a screwdriver point is ideal), slowly screw in TC4 until the Light Programme is heard faintly.

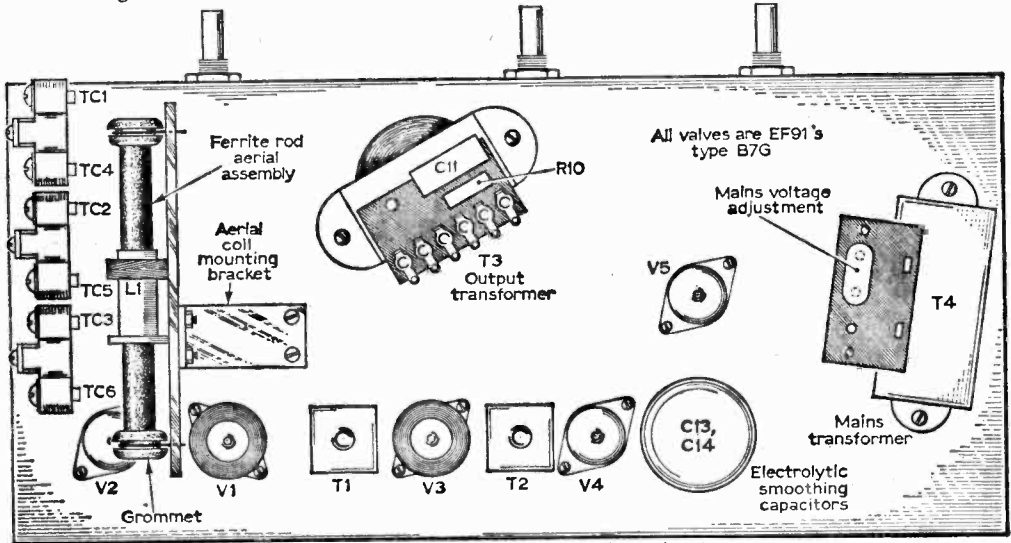


Fig. 2: The layout of components above-chassis.

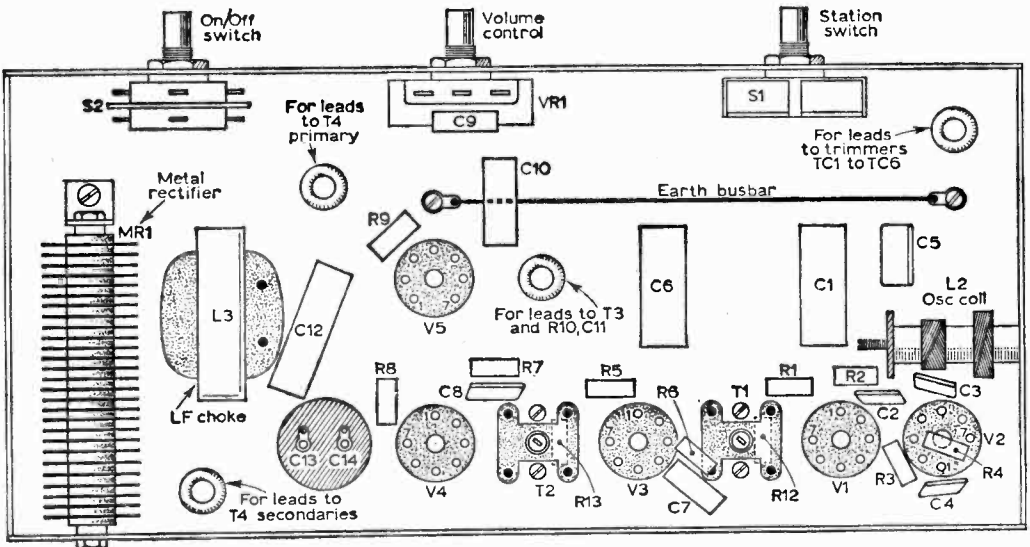


Fig. 3: An underchassis view of the receiver.

NOW! ANOTHER PURCHASE of the year's keenest TAPE RECORDER BARGAIN!



A 24 gns. Tape Recorder offered at the bargain price of only 15 gns. plus 10/- carr. Supplied in 3 Units already wired and tested. A modern Circuit for quality recording from Mike, Gram or Radio, using latest B.S.K. Twin Track Monardeck Type TD2. Mascie-ere recording indicator. Ext. spkr., switch super-impose and straight-through amplifier facilities, etc.

- 2 tone Cabinet and 8" x 5" Speaker \$3.10.0
- Wired Amplifier complete with 4-Valves, front Panel, Knobs £5.12.6
- B.S.R. Monardeck Type T.D.2 Accessories—Mike, Tape, Screened Lead Plugs, etc. £7.7.0
- COMPLETE KIT comprising items above \$15.0.0

Leaflet, circuits, instructions, 2/- post free.

NEW BRITISH RECORDING TAPE

Famous Manufacturer. Bulk purchase, genuine recommended Tape Bargain. Unconditional Guarantee. Filled Leader & Stop Folts (except 3in.).

Standard (PVC base)	Long Play (P.V.C. base)	D'ble Play (Mylar base)
3in. 150ft. 3/8	225ft. 4/9	300ft. 6/6
5in. 600ft. 11/6	900ft. 15/-	1200ft. 25/-
7in. 850ft. 14/6	1200ft. 17/6	1800ft. 32/6
9in. 1200ft. 17/6	1800ft. 22/6	2400ft. 42/6

Post and Packing—3in. Reels. 6d. Each additional Reel, 3d. 4in. to 7in. Reels 1/- Each additional Reel, 6d.

EMPTY TAPE REELS (Plastic): 3in. 1/3, 4in. 2/-, 5in. 2/-, 7in. 2/3.

PLASTIC REEL CONTAINERS (Cassettes): 3in. 1/3, 5in. 1/3, 7in. 2/-, 9in. 2/3.

Condensers—Silver Mica. All values 2/- to 1,000pF. 6d. each. Dittos. Ceramite 9d. Tub. 450V T.C.C. etc. 0.001 mFd to 0.01 and 0.1250V etc. 9d. 0.02-0.1500V. 1/- 0.25 Units 1/6. 0.5 T.C.C. 1/9, etc. etc. Close Tol. S/Micas—10%. 5pF-500pF 9d. 600-5,000pF. 1/- 1% 2pF-100pF. 9d. 100pF-500pF. 11d. 575pF. 5,000pF. 1/6. Resistors—Full Range 10 ohms-10 meg ohms 50p. 4 and 1W. 3d. 1W. 6d. (Midget type modern rating) 1W. 6d. 2W. 9d. Hi-Stab. 5% 1W. 1/6. 10 (ohms-1 meg). Other values 9d. 1% 1W. 1/8, etc. etc.

JASON FM TUNER UNITS.

Designers-approved kits of parts. FM1. 5 gns. 4 valves. 20/- FM2. 27. 5 valves. 35/- JTV MERCURY 10 gns. JTV £13.19.6. 3 valves. 23/6. NEW JASON FM HANDBOOK, 2/6. 48 hr. Alignment Services. 2/6. P. & F. 2/6.

TRIMMERS. Ceramic (Compression Type)—30pF. 50pF. 70pF. 9d.; 100pF. 150pF. 1/3; 250pF. 1/6; 500pF. 1/9.

PHILIPS. Bee Hive Type (conc. air spaced)—2-8pF. 1/-; 3-30pF. 1/-

KNOS—Modern Continental types. Brown or Ivory with Gold Ring; 1" dia. 9d. each; 1 1/2" 1/- each; Brown or Ivory with Gold Centre. 1" dia. 10d. each; 1 1/2" 1/3 each.

LARGE SELECTION AVAILABLE. METAL RECTIFIERS. STC Types—RM1. 4/9; RM2. 5/6; RM3. 7/6; RM4. 16/-; RM5. 21/-; RM4B. 17/6.

TUB-ELECTROLYTICS-CAN

- 25/25v. 50/12v. 1/9; 8+8/450v. 4/6;
- 50/50v. 100/125v. 2/-; 32+32/275v. 4/6
- 8/450v. 4/350v. 2/3; 50/50/350v. 6/6
- 18+16/450v. 5/6; 60/250/275v. 12/6
- 32+32/450v. 6/6; 100+200/275v. 12/6

SPECIAL BARGAIN

1/2 Meg. VOL. Controls DP. Sw. 4" flatted spindle. Famous MFR. 4 for 10/-, post free.

RECORD PLAYER CABINETS 59/6 Carr. & Ins. 5/-

Contemporary style, rexine covered cabinet in two-tone maroon and cream. Size 13 1/2" x 8 1/2" x 8 1/2", fitted with all accessories including baffle board and Vnair fret. Space available for all modern amplifiers and auto-changers etc. (Newt record player mounting board 11 1/2" x 12 1/2" supplied).

2-VALVE 2 WATT AMPLIFIER. EZ80 and Twin stage EC182 with vol. and neg. feedback tone control. A.C. 200/250V with knobs, etc., ready wired to fit above cabinet. £2.17.6. P. & P. 1/6. 7" x 4" Speaker and trans. 22/-, P. & P. 2/-.

COMPLETE R/PLAYER KIT. As illus. BSR UA14 Unit. New Bargain Price Now Only £11.10.0. 7/6 carr. Double wound mains Tr. no live chassis!



YGAN FRET (Contemp. pat.). 12 x 3in. 2/-; 12 x 18in. 3/-; 12 x 24in. 4/-, etc.

XPANDED ANODISED METAL. Reactive gilt finish 1/2 in. x 1/2 in. anodized brass 4/8 sq. ft. Multiple of 1/2 n. cut. Max. size 4ft. x 3ft., 47/6, ins carr.

NAMELED COPPER WIRE—h. reels 14g-20g. 2/6; 22g-28g. 3/-; 1g-34g 3/8; 35g-38g. 4/3; 39g-40g. 6. 3/6.



1940

MULLARD "3-3" HI-FI AMPLIFIER. 3 VALVES 3 WATT

3 ohm and 15 ohm Output. A really first-class Amplifier giving Hi-Fi quality at a reasonable cost. Mullard's latest circuit. Valve line ups: EF86, EL84, EZ81, Extra HT and LI available for Tuner Unit addition. This is the ideal companion Amplifier for FM tuner units.

TECHNICAL SPECIFICATION—
 Pres. Response: + or - 1 dB 40 c/s-25 Kc/s. Tone controls: Max. Treble Cut 12 dB at 10 Kc/s. Max. Bass Boost 14 dB at 80 c/s. Sensitivity: 100 Mv for 3 w. output. Output Power (at 400 c/s): 3 w. at 1% total harmonic distortion. Hum and Noise Level: At least 70 dB below 3 w.

Bronze Escutechon, Printed Vol. Treble. Bass. On-Off, supplied with each Kit.
 Recommended Speakers—WB. HF 1012. £4.7.6. Goodmans AXIOM 10. £6.5.0. 8in. AXIETTE £5.5.0 or AUDIOM 51 £8.10.0.

DE-LUXE RECORD PLAYER KIT

Incorporating 4 Sp. Garrard Auto-Slim unit and Mullard latest 3 w. amplifier (EUL 86 and EZ 80), vol. bass and treble controls, with 8" x 5" 10,000 line speaker. Contemporary styled 2-tone cabinet, charcoal-grey and off-white with matching blue relief. Size 17 1/2" x 16" x 8"

COMPLETE KIT £13.19.6
 Carr. and ins. 10s.
 Cat. & Const. details 2/6 (free with kit).

BARGAINS — 4-SP. PLAYER UNITS

Single Players	carr. 3/6
K.M.I. stereo/Mono	£5.10.0
K.M.I. Junior '955'	£3.7.6
Auto-changers	carr. 5/-
BSR UA16	£8.19.6
BSR UA14	£6.10.0

TRANSISTOR COMPONENTS

Midget I.P.'s—465 Kc/s 7^{1/2}in. diam. 5/3
 Osc. Coil M. & L.W. 5/9
 Midget Driver Trans. 3.5-1/ 6/9
 Midget Output Trans. Push-Pull—3 ohms 6/9
 Elect. Condensers—Midget Type 1 mfd.-50 mfd. ea. 1/9, 100 mfd. 2/-, 12V.
 Condensers 150 v. working: .01 mfd. .02 mfd. .03 mfd. .04 mfd. .05 mfd. .1 mfd. 1/- .25 mfd. 1/3; .5 mfd. 1/6, etc. Midget Tuning Condensers. 3/6. "OO" 208 pF and 176 pF. 8/6. ditto with trimmers, 9/6. JTB. 220pF and 105pF conc. auto motion 19/8. 365pF single 7/8. sub. Min jin. Dalemin 100 pF. 300pF. 500pF. 7/- each.
FERRITE AERIALS. M. & L.W.
 car aerial coil 9/3.
 Midget Vol. Control with edge control knob, 5 K/ohms, with switch 4/9; Ditto less switch 3/9.
 Speakers: P.M.: 3in. Plessey 7/6 ohms 15/8. 2 1/2in. Continental 8 ohms 13/6. 7 x 4in. Plessey 35 ohms 23/6.
 Ear Plug Phones—Min. Continental type 3H. lead, Jack plug and socket. High Imp. 8/- Low Imp. 7/6.
 Brand New. Mfrs. 1st grade. 1 OC44 & 2 OC45. 16/6. 1 OC81D & 2 OC81. 15/6. All above and OAS1. 32/6. Post Free.

7 VALVE AM/FM RADIOGRAM CHASSIS

Valve line-up ECC85, ECH81, EF89, EABC80, EL84, EM81, EZ80. Three Waveband and Switched Gram positions. Med. 200-550 m. Long 1,000-2,000 m. VHF/EM 88-95 Mc/s. Philips Continental Tuning Insert with permeability tuning on FM and combination AM/FM (F. transformers, 480 Kc/s. and 10.7 Mc/s. Dust core tuning all coils. Latest circuitry including AVC and Neg. Feedback. Three watt output. Sensitivity and reproduction of a very high standard. Chassis size 13 1/2 x 6 1/2 in. Height 7 1/2 in. Edge illuminated glass dial 11 1/2 x 3 1/2 in.

Vertical pointer. Horizontal station names. Gold on brown background. A.C. 200/250v. operation. Magic-eye tuning. Cct. diagram now available.

Aligned and tested ready for use £13.10.0 Carr. & ins. 7/6.

Complete with 4 Knobs—walnut or ivory to choice. Indoor FM aerial 3/6 extra. 3 ohm P.M. Speaker only required. Recommended Quality Speakers 10in. Elac H/1D, 30/-; 13 1/2 x 5in. E.M.L. "Fidelity", 85/-; 12in. B.A. with cone. Treeter. 42/6. Carr. 2/6.

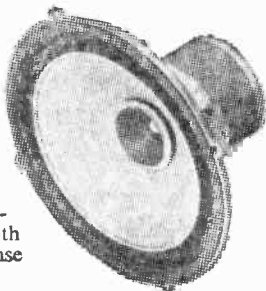
BONDACOUST Speaker Cabinet Acoustic Wadding (lin. thick approx.) 12in. wide, any length—1/6 ft., 4/-, yd. **TINNED COPPER WIRE**. 16-22g. 2/6 3/4. **FRSN MULTICORE SOLDER**. 50/10 4d per carr. Cartons 2/6 etc.

We manufacture all types Radio Mains Transf., Chokes, Quality O/P Trans., etc. Enquiries invited for Specials. Prototypes for small production runs. Quotations by return. Send for detailed bargain lists. 3d. stamp.

RADIO COMPONENT SPECIALISTS
 70 Bristolock Rd., Thornton Heath, Surrey. Hours: 9 a.m.-6 p.m., 1 p.m. Wed. THO 2188. Terms C.W.O. or C.O.D. Post and Packing up to 1 lb. 8d.; 10. 1/3; 3lb. 2/3; 5lb. 2/9; 8lb. 3/6.

Praise for the
**WHARFEDALE
 SUPER 10/RS/DD**

The following letter is typical of many received praising the performance of the new Wharfedale Super 10/RS/DD and the Golden 10/RS/DD both of which have a remarkably wide and smooth response as the response curve indicates.



16 Grant House,
 Albion Avenue,
 LONDON, S.W.8.

Dear Mr. Briggs,

I feel I must write to you to say how pleased I am with my converted W10 Speaker (now a Super 10/RS/DD) which I received safely on Saturday.

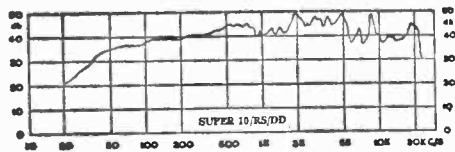
The treble response is a delight to hear and even my poor quality records sound better, no doubt due to the absence of peaks in the middle and upper register. My pressure unit tweeter has now been dispensed with as it certainly cannot compete with the treble in your unit.

Being lucky enough to live within good range of Wrotham, I was able to put it through tests with various transmissions including the Proms, and we all have been most impressed—the bass improvement is also exceptionally good.

Yours sincerely,

Geo. H. Hunter.

Impedance 10/15 ohms only. 1in. dia. centre pole. Flux density 16,000 oersteds. Max. input 10 watts rms or 20 watts peak. Frequency range 30–20,000 c/s. Aluminium voice coil. Roll surround and double diaphragm. Axial response curve. Mic. distance 12in. Input 4v. at 1,000 c/s.



PRICES: SUPER 10/RS/DD £10.18.8 including P.T.
 GOLDEN 10/RS/DD £7.17.5 including P.T.
 Descriptive Leaflet on request



WHARFEDALE WIRELESS WORKS
IDLE BRADFORD YORKSHIRE
 Grams: 'Wharfedel' Idle Bradford
 Phone: Idle 1235/6

ADAMIN-
 by LITESOLD



These new ADAMIN micro soldering instruments supplement the well-known LITESOLD models for special applications and still further extend our very comprehensive range of specialised soldering equipment.
 Bit sizes now 1/16in. to 1/8in.

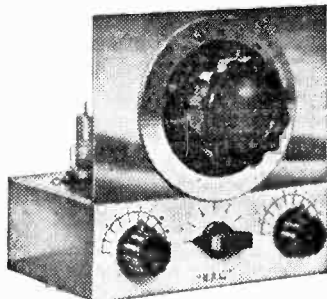
**A POPULAR ADAMIN
 MAINS MODEL**

The C10L (shown on bench stand) is probably the smallest mains voltage model in the world. Bit dia. 3/32in., length 7in., weight 1/2oz. (less flex). Heats in 30 secs.

Brochure No. S10 sent free on request.

Sole proprietors and manufacturers:
LIGHT SOLDERING DEVELOPMENTS LTD
 28 Sydenham Road, Croydon, Surrey
 Phone: CROydon 8589 Grams: Litesold Croydon

**FAMOUS 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, Farms, etc.

**NEW 1964 RANGE NOW READY
 ONE-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.

- 4 If nothing is heard even when TC4 is screwed all the way from "fully out" to "fully in", give TC1 one turn clockwise and repeat 3.
- 5 As soon as the Light Programme is heard, remove the temporary wire aerial and adjust TC4, then TC1 for maximum signal, if necessary swinging the set round to orientate the ferrite rod towards the transmitter.
- 6 Switch S1 to position 2. Slowly screw in trimmer TC5 until the Home Service is heard.
- 7 Adjust TC5 then TC2 for maximum signal.
- 8 Switch S1 to position 3. Slowly screw in trimmer TC6 until the Third Programme is heard.
- 9 Adjust TC6 then TC3 for maximum signal.

Note that the Light Programme on 247 metres is not receivable in some localities. In these areas the long wave (1,500 metres) station must be brought in. This can be done by using a dual wave ferrite rod and an extra oscillator coil. The wiring modifications are shown in Fig. 4. the same principles in setting up apply.

Cabinet

The cabinet will, of course, depend largely on the shape and size of the chassis. The writer converted an old table receiver cabinet in somewhat crude fashion, see picture.

If the set is to do service in the kitchen it is usually possible to find a small space in a cupboard and build the set into that. Or a simply constructed cabinet made from 5-ply, carefully painted or covered with plastic material, often gives a surprisingly professional-like finish.

EF91 Push-pull Gramophone Amplifier

The circuit shown in Fig. 5 uses four EF91 valves and gives good volume and quality from a crystal pick-up. It is, of course, not in the hi-fi class, but it is ideal for "pop" records and gives reproduction well up to the standard of most "pop boxes". A simple top-cut tone control helps to get rid of surface noise on old records.

The Circuit Stage by Stage

The signal from the pick-up is fed through screened cable to the input terminals (these can conveniently be incorporated in a coaxial socket). The signal appears across VR1, which is the volume control. The slider of the volume control is connected directly to the grid of V1 which acts as a voltage amplifier. VR2 and C1 together form a simple tone control.

R2 and C4 provide automatic bias for V1, and R1 is the screen feed resistor. C5 forms the coupling between V1 and V2.

V2, strapped as a triode, is the phase-splitter. The anode load is split between R7 and R6, R6 being in the cathode line, and two equal signals but 180° out of phase appear, one at the "bottom" end of R7, the other at the "top" end of R6. These out-of-phase signals are fed via the coupling capacitors C7 and C8 to the control grids of V3 and V4.

The anodes of V3 and V4 are fed via the centre-tapped primary of T1, which is a push-pull output transformer.

The power pack shown for the switched superhet is quite suitable for this amplifier.

COMPONENTS LIST	
Additional Parts for L.W. Operation	
(Fig. 4)	
C5a	47pF silver mica
TC3a	100pF ceramic
TC6a	100pF ceramic
L1a	Ferrite rod aerial, with l.w. and m.w. windings
L2a	Oscillator coil, l.w. (Weymouth HO1)
S3	3-pole, 2-way wafer switch

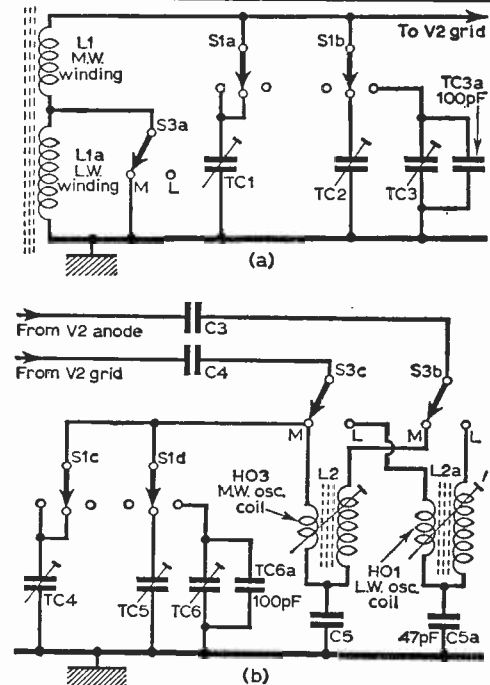


Fig. 4: The circuit modifications necessary to incorporate long waves.

Amplifier Construction

A chassis as small as 8in. x 10in. x 2in. should comfortably accommodate all components. Note that if the mains transformer is mounted on the same chassis as the choke and/or the output transformer, then the cores should be orientated at right angles to one another or separated by a metal screen (or screened by mounting one item under the chassis and another on top).

All earth connections should be made to an earth bus bar of thick copper wire (not less than 18s.w.g.) and this should be connected to chassis at one point only (the coaxial input socket). Heater wiring should be by closely twisted flex tucked well into corners of the chassis. All signal wiring up to the input to V1 must be in screened cable.

Testing

Test the power supply as for the superhet receiver then, after allowing the valves to warm up, turn the volume control up to full volume and

**COMPONENTS LIST
PUSH-PULL AMPLIFIER (Fig. 5)**

Resistors:

- | | |
|----------|-------------|
| R1 470kΩ | R7 27kΩ 5% |
| R2 160Ω | R8 27k 5% |
| R3 47kΩ | R9 470kΩ 5% |
| R4 47kΩ | R10 470k 5% |
| R5 1MΩ | R11 100Ω ½W |
| R6 160Ω | |
- All ±10%, ½W except where otherwise stated
- VR1 1MΩ carbon potentiometer, log
VR2 0.5MΩ carbon potentiometer, linear

Capacitors:

- | |
|---|
| C1 2000pF paper |
| C2 8μF electrolytic 300V |
| C3 8μF electrolytic 300V |
| C4 25μF electrolytic 25V |
| C5 0.1μF paper |
| C6 25μF electrolytic 25V |
| C7 0.1μF paper |
| C8 0.1μF paper |
| C9 50μF electrolytic 50V |
| T1 Push-pull output transformer. 7000Ω primary, 3Ω secondary (Radiospares multi-tapped) |
| VI-4 EF91 |

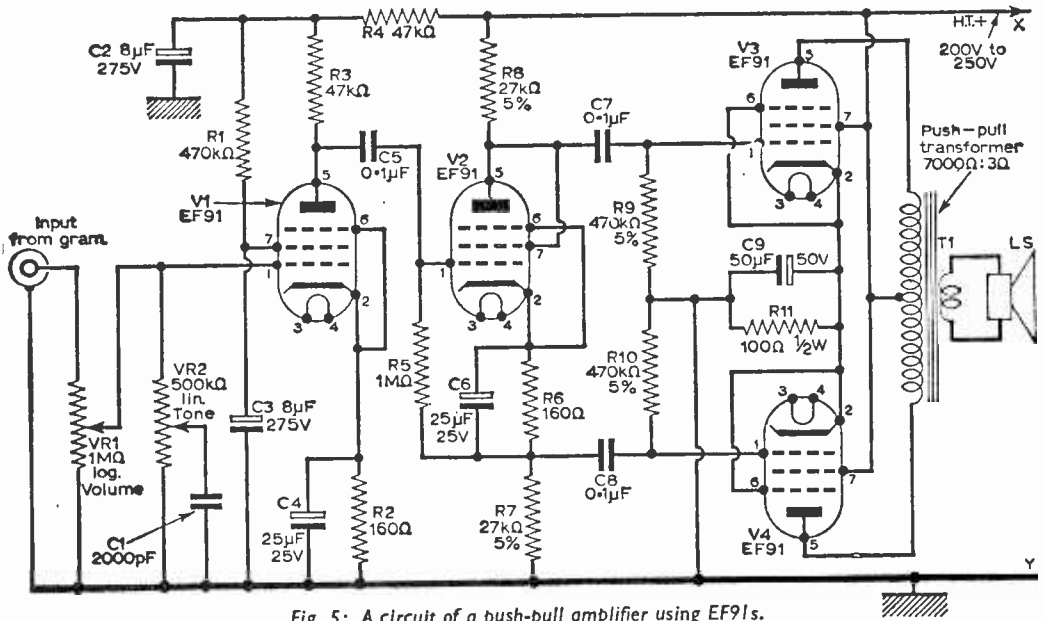


Fig. 5: A circuit of a push-pull amplifier using EF91s.

briefly touch the centre pin of the coaxial socket with a finger. A loud hum should issue from the loudspeaker. If this is reduced nearly to zero as the volume control is operated, and if the character of the hum is altered by the setting of the tone control, then all is well and the pick-up can be connected to the input.

Other Applications

It will be seen from the foregoing what a splendid little valve the EF91 is. One would be

hard put to it to find an application for which it could *not* be used!

The author has made a morse practice oscillator and a "valve voltmeter" type of alignment aid using these valves.

Other uses could be in photo-electric relay circuits as an amplifier, as a microphone pre-amplifier, or in a pre-amplifying mixer circuit for tape recorders.

The valve has also been used very successfully in v.h.f. f.m. applications described in this magazine.

THE "PRACTICAL WIRELESS" FILM SHOW

The "Practical Wireless" Film Show which is held annually and to which readers of P.W. are invited, is to be held, as before, at Caxton Hall, Westminster. The date and time of the Show, which is arranged in collaboration with Mullard Limited, is the 31st January, 1964, at 7.30 p.m.

The programme will appeal to all readers of "Practical Wireless" and of especial interest will be the illustrated talk on colour, 625-line and u.h.f. television, which will form the first part of the programme. After a break for refreshments, the programme will continue with a film entitled "Ultrasonics".

Tickets may be obtained free on request from these offices. A stamped addressed envelope must be enclosed with all applications for tickets.

HOME CONSTRUCTORS LOOK!

AT THIS OUTSTANDING 1964 RANGE OF TRANSISTOR RADIOS



THE SKYROVER
7 TRANSISTOR
PORTABLE
RECEIVER

THE SKYROVER
De Luxe
7 TRANSISTOR PORTABLE



GENERAL SPECIFICATION FOR BOTH MODELS

7 transistor and 2 diode superhet—6 waveband portable receiver, covering the full Medium Waveband (180-576 M) and Short Waveband (3.1-94 M) and in addition 4 separate switched Band Spread Ranges on 13M, 16M, 19M, and 25M bands—with manual Band Spread Tuning for accurate Station selection. I.F. frequency 470 Kc/s. Output 500 MW. 5in. Ceramic Magnet P.M. Speaker. Telescopic and internal Ferrite Rod Aerial. All Mullard Transistors and Diodes. The coil pack and tuning knob is completely factory assembled, wired and tested. The remaining assembly can be completed in under three hours from our detailed and easy to follow instructions. Operates on four 1.5V torch batts. (U2 or equivalent).

THE SKYROVER. Individual Details—controls: Waveband Selector, Volume Control with on/off switch, Tuning Control with easy to read Dial Scale. In attractive plastic cabinet, size: 10 x 6½ x 3½in., with metal trim and carrying handle.

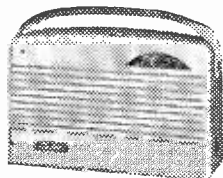
THE SKYROVER De Luxe. Tone Control Circuit is incorporated with separate Tone Control in addition to Volume and Tuning Controls and Waveband Selector. In sturdy wood cabinet, size: 11½ x 6½ x 3in., covered in washable material with plastic trim and carrying handle. Also Car Aerial socket.

MAY BE BUILT FOR £10.19.6
All Parts Sold Separately.

MAY BE BUILT FOR £12.19.6
All Parts Sold Separately.

Circuit diagram and data for each set 2/6 extra, free if all parts bought. Four U2 batteries 2/8 extra. Four Leak-Proof Batteries 8/4 extra. Add 5/- P. & P. on each set.

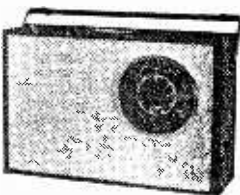
THE 'REALISTIC 7'



A fully transistorised Portable Receiver made to the highest professional standards—is now available to the home constructor. Comprises 7 Mullard Trans. OC44, 2 OC45's, OC71, OC81D, and 2 OC81's plus OA70 Crystal Diode. Delivers 350 milliwatt output to 4in. high flux speaker—I.F. frequency 470 Kc/s.—fully tunable over medium and long wavebands. All components mounted on single printed circuit board, size 5½ x 5½in. Attractive two-tone plastic cabinet with carrying handle—size 7 x 10 x 3½in., with easy to read dial and socket for car and aerial, choice of Red/Grey, Blue/Grey or all Grey, 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.)

AND REALISTIC 7 De Luxe



A "De Luxe" version of the well proven "Realistic 7" is now available, with the same specification as the standard model PLUS a restyled superior wood cabinet covered in attractive washable materials, with chrome trim and carrying handle, AND ALSO a full vision circular tuning dial (externally mounted) to further improve this wonderful set.

Only £10.0 extra
P. & P. etc. as Standard Model.

READY BUILT BARGAINS!

2 TRANSISTOR POCKET RADIO COMPLETELY BUILT

Ready made as illustrated—complete with personal ear-piece, telescopic aerial, battery and carrying case! Wonderful value and performance—full medium waveband coverage—built in 2½in. speaker gives full tone reproduction. Works on single PP3 9 v. battery. In attractive plastic case—size only 4 x 2½ x 1in. All accessories included in the price.

WIRECOMP'S PRICE COMPLETE 42/- Post Free

ALSO 6 TRANSISTOR POCKET RADIO FULLY BUILT

Wonderful performance. Tunable over full medium waveband. Built-in 2½in. speaker. In attractive plastic carrying case—size 4 x 2½ x 1½in. Operates on single PP3 9 v. battery. Supplied complete with personal earpiece, leather carrying case and battery.

WIRECOMP'S PRICE COMPLETE 79/6 P. & P. 2/6



THE 'SPRITE'



A unique Wirecomp offer. The Sprite is a Six transistor superhet Miniature Pocket Radio of Commercial Quality—offered to you in three main pre-assembled units—which together with simple wiring—enable you to build it in only one hour! Fully tunable over Long and Medium wavebands. Uses Printed circuit and High sensitivity internal ferrite rod aerial. I.F. frequency 470 Kc/s. Transistors: 3 Philco 206's, 2 Mullard OC81M, OC81DM and OA90 diode. 3 inch speaker. Works on single PP3 battery. Supplied with the complete R.F. and I.F. stages, Driver and Output stages, ready built and mounted on the printed circuit; for final assembly you only have to fit the wave-change switch, tuning condenser and drive volume control, earphone socket and aerial rod. In very attractive plastic case, size 4 x 2½ x 1½in.

MAY BE BUILT FOR 79/6 All parts sold separately Real Calf Leather Case, wrist strap and Personal Earphone with case and battery, 12/6 extra. P. & P. 3/6 extra. (Data and instructions 2/6 free if all parts bought.)

SPECIAL WIRECOMP OFFERS TO THE READERS OF "PRACTICAL WIRELESS"

SPEAKERS 6 x 4in. 3Ω 8/9 5in. Round 3Ω 8/9
B.S.R. UA 14 Autochangers £5-19-6
COLLARO Studio Tape Decks £10-12-6
Post FREE

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.

SOUND

TWO COLOUR
GLOSSY SLEEVE



CASTLE & CONTRAST FX RECORDS

MFX-1 14 EFFECTS. Police Car - Police launch - Lion roar - Aircraft - Building falling - Road drills - Ship's siren - Storm at Sea - Railway trains - Central Line Tube Train, etc.

MFX-2 12 EFFECTS. American Police Car sirens (5) - Car crash - Glass breaking - Foot-steps (8) - City and Waterloo tube train - Hammering - Sawing - Applause - etc.

AFX-1 15 WILD ANIMALS. Jungle background - Lions roaring - Tigers - Elephants - Puma - Rattlesnake - Alligator - Bell Bird - Chimps - etc.

TFX-1 11 BRITISH RAILWAY TRAINS. Main line arrival - departure - Express steam and Diesel (with whistles) - Goods trains - Tube Train - Trains over points, etc.

EFX-1 ELECTRONIC MUSIC. Two compositions - 'Cosmos' and 'Vortex' - Electronic sound effects - space ships, etc. - 15 separate tracks in all.

All Castle records as above (except LFX-1) are now available as pre-recorded tapes. PRICE 18/6 each post free.

Direct Mailing from:

F. C. JUDD (Sound Recording) LTD

174 MAYBANK ROAD, SOUTH WOODFORD, LONDON, E.18 (BUC 9315)

COPYRIGHT FREE 45 rpm EP RECORDS

EFFECTS **8/-** EA.
POST FREE

MFX-3 HORSES & DOMESTIC ANIMALS.

Trotting - Jumping - Galloping - Cows - Cats, and complete Fox Hunting calls and horns.

HMX-1 HAUNTED HOUSE & MYSTERY.

Electronic Mystery Music (2) - Violent Storm (authentic) - creaking - clocks - shrieks - and electronic ghost and spook sounds, etc.

MPX-1 MILITARY PARADES & WARFARE

SOUNDS. Guards' bands - March past - parade, etc. - Warfare sounds - Low level air attack - Bombing - Artillery - Machine gun, rifle and mortar fire, etc.

SPECIAL

LFX-1 SOUNDS OF LONDON. A narrative linked record of famous London Sounds - Bow Bells - the River Thames - Petticoat Lane - the West End - Big Ben - St. Paul's - Fleet Street, etc., etc. **Price 11/-** Post Free

All FX separately tracked. Timing on reverse of sleeve.

All Castle records as above (except LFX-1) are now available as pre-recorded tapes. PRICE 18/6 each post free.

SCOOP! HI-FI 10-watt AMPLIFIER

£7.10.0 complete. Carr. 5/6.

Branded Manufacturer's Model (cartoned). Very latest high efficiency valves. Push-pull output. Separate bass-treble controls, dual input for 'mike'. 3 or 15 ohm speakers. High sensitivity. Fully guaranteed.

SCOOP! 10in. SPEAKERS by W.B. of MANSFIELD.

Our price only 42/-. P.P. 1/10.

SCOOP! A FIRST-CLASS 2-WAVE BAND 6 TRANSISTOR SUPERHET CHASSIS

by world famous manufacturer. Fully built, tested, aligned, boxed, guaranteed. Our price only £4.4.0, suitable speaker, 35 ohms, 10/6. A cabinet can be supplied for 22/6 only. Hurry while stocks last. P.P. 2/3.

SCOOP! RECORD PLAYER AMPLIFIER.

2 valve A.C. mains, 3 watt output. Ready built, tested, guaranteed, complete with valves, output transformer and speaker. Our price 50/- only. Product of national manufacturer. P.P. 1/6.

SCOOP! B.S.R. MONARCH U.A.14 AUTOCHANGERS.

Brand new and wired for stereo. Note our price, £5.10.0 only. P.P. 5/6.

SCOOP! A SHORT WAVE RECEIVER

Speech and music from all over the world. Covering 40-100 metres. Conversion for 10-100 metres if required. This is not a toy but a receiver fully built, tested and guaranteed. Our price 62/-; in Kit form, 42/-. P.P. 2/3.

SCOOP! TOP QUALITY RECORDING TAPE (Guaranteed).

5½in., 850ft. Our price 10/- only. P.P. 1/-.

SCOOP! HIGH FIDELITY SPEAKER ENCLOSURES,

as advertised elsewhere at £5.5.0; Our price £4.5.0. Beautifully polished and veneered. Size 23½in. high by 11½in. deep by 13in. wide. Carr. 7/6.

SCOOP! PERSONAL RADIO—Built in Ferrite Rod Aerial.

Medium wave only. Wonderful volume. Size 2½ x 3½ x 3½in. Fits in the palm of the hand. In kit form only 32/-. complete in every detail. P.P. 1/9.

SPEAKERS—Remember we can supply any type, make, or model, our prices 5/- to 50/-.

Please send for lists.



L.K. ELECTRONICS

27 OLD BOND STREET, LONDON, W.1.



The cheapest, the best, the quickest service

If not advertised It is still in stock

Simpler Electronic MUSIC

~~~~~  
 A Guide for the Creative Tape Enthusiast  
 By Lloyd Brunt  
 ~~~~~

At one time or another most of us have felt the desire to be creative and, with an interest in sound, music is often the most satisfying outlet. Our mind perhaps first turns to a musical instrument, but most instruments are expensive and require many years of study for complete mastery.

The only other course, then, seems to be electronic music. Again the big problem is money, and electronic computers, and the other complex circuits connected with this form of composition are not the easiest things to obtain and understand!

Frustrated in this way, the author looked around for something within the reach of anyone with a limited budget and a small amount of talent. The only equipment necessary would be that which the ordinary tape recording amateur would possess, and the method that which even the least experienced person could easily master.

The idea devised is simple, yet can give pleasing results, even at the first attempt. A signal varying in frequency within the audio range is recorded in a continuous stream on to ordinary magnetic recording tape. The tape is then cut into lengths varying from about 1 to 5 in., and the pieces thoroughly mixed. A blank tape is also cut into varying lengths and kept separate from the recorded tape.

The pieces are then joined together on an editing block with, say, two recorded pieces and a blank, five recorded pieces and a blank, the length and the number of recorded insertions being left entirely to the whim of the individual.

On the author's first attempt, when a reasonable length was composed, it was found to give an amusingly jig-like tune, and after some substitution, a pleasant melody was compiled.

A problem that must be solved before any "composing" can begin is from where to obtain the varying signal. A signal generator, covering the whole audio range is the obvious and probably the most convenient answer, but it is not essential. The author found that by recording the tuning-in signal transmitted before the beginning of the day's programme on Network Three, several different frequencies were obtained. But this method limited the notes to the number of tape speeds, and was therefore unsatisfactory.

An alternative, using the same transmission was found. The tape recorder is set to "record" but left in the "pause" position. The take spool is then turned by hand at varying speeds. As any speed can be obtained by this method it is found that when the tape is played back at a constant speed many varying notes are obtained, and with care and a little practice any frequency is attainable.

The more musically minded may wish to be more precise and not compose "by accident". If a few basic rules of composition are adhered to, and the notes sorted into groups by the length and pitch, a passable piece of music can be easily compiled. It may even be possible to put together existing musical works by careful following of the score, but the author found that even to set out "Ba Ba Black Sheep" took a great deal of time and patience.

It was found that the quickest way to join the tape was by using "jointing tape" and that the weld joint took much too long to dry for this sort of editing. Leader-tape was first used between the notes but was later discarded in preference of blank tape because of the unnatural pause the former gave.

It must also be noted that the tape must remain the same way up unless used on a single track or twin channel tape recorder as inversion will cause the note to appear on the lower track and therefore disappear upon playback. This inversion was found to give a pleasing stereophonic effect on the author's twin channel recorder but it may be guarded against by using a tape with the manufacturer's name printed along its length, the inversion of the name indicating that the note is inverted.

If you are fortunate enough to have two tape recorders, the edited tape should be re-recorded on to a continuous length as a tape that is so edited will not play very smoothly. Two tape recorders may be used to obtain a rhythm by loading one with a continuous loop arrangement while adding the other notes to the arrangement.

This by no means exhausts the possibilities of this type of recording and these notes are only intended as a guide; echo, superimposition, addition of everyday sounds, are just a few of the numerous extensions which will suggest themselves to the operator. A person with imagination and patience could produce some really worthwhile results even with the simplest of equipment. ■

JOIN THE PRACTICAL GROUP

PRACTICAL TELEVISION	... .. 2/-
Every Month	
PRACTICAL MOTORIST	... .. 1/9
Every Month	
PRACTICAL HOUSEHOLDER	... .. 1/6
Every Month	

NEON RELAXATION OSCILLATORS

A PRACTICAL UNIT COVERING AN AUDIO RANGE OF 500-2000 c/s

BY M. J. BUNCE

ONE of the simplest types of oscillator available is the neon relaxation oscillator. Operation of this circuit depends upon the charging of a capacitor via a resistor and its subsequent discharge via a neon tube which is caused to "strike" when the voltage across the capacitor reaches a certain value.

The Simplest Circuit

In Fig. 1 we have a neon which will fire at 200V. Across it is a capacitor Cx. The neon and capacitor are connected to 200V d.c. through resistor Rx. On switching the apparatus on, Cx is slowly charged through Rx until the p.d. across the capacitor reaches 200V, whereupon the neon will fire and discharge Cx. Immediately afterwards the capacitor charges up again and the process is repeated.

Component Values

The frequency of the pulses is entirely dependent upon the component values used in the circuit. If, for example, Rx is increased, the charging time of the capacitor would be delayed somewhat, and the frequency would be lower. By using a variable resistor, the frequency may be varied continuously. A word of warning may not be out of place here. If Rx is reduced to a minimum of 5kΩ, the neon may arc across and be damaged. It is usual, therefore, when using a variable resistor as Rx, to include a fixed resistor of not less than 5kΩ in series with the variable component.

Type of Waveform

The waveform produced can be seen from Fig. 2. The sloping part of the waveform represents the capacitor charging and the vertical stroke is where the neon fires. For obvious reasons this is called a sawtooth wave. The ideal shape is indicated in Fig. 2(a), but as a capacitor charges exponentially the slope has a distinct curve in it. This can be seen if the oscillator is used in conjunction with an oscilloscope.

Power Requirements

The consumption of such an oscillator is small indeed. 200-250V d.c. at 15-30mA is ample for such a device. Smoothing is a relatively simple matter (Fig. 3). Two 2μF electrolytic capacitors are all that is required, in conjunction with a resistor of 5.6kΩ or possibly two 4μF electrolytics with a 4.7kΩ resistor. A full-wave rectification system is not essential and if an isolating transformer is used

Fig. 1 (right): The simplest circuit for the oscillator.

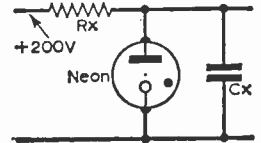


Fig. 2 (below): The ideal and actual waveforms produced.

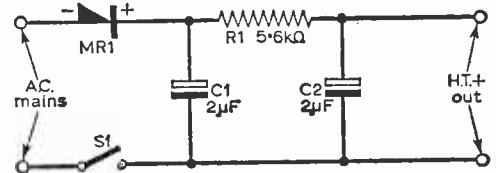
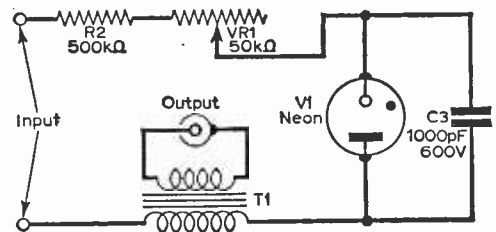


Fig. 3 (above): The h.t. supply circuit.

Fig. 4 (below): A practical circuit for the oscillator.



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.
- Operates from 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 9x8 1/2 x 4 1/2.

- A** Motor and pick-up deck..... (2/8 P. & P.) **39/6** ONLY **79/6**
B Ready-built 4-transistor amplifier, complete with volume control and L-speaker (2/- P.&P.) **35/-** the complete pkgs. (plus 5/- P. & P.) or any unit sold separately.
C Portable two-tone case with handle, and expanded metal fret. (2/6 P. & P.) **5/-**

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	Diameter in inches	Gauss in lines	Imped. in ohms	Price	Diameter in inches	Gauss in lines	Imped. in ohms	Price	Diameter in inches	Gauss in lines	Imped. in ohms	Price
2	7000	80	8/-	3 1/2	9500	50	10/6	4	9500	35	11/8	5	8500	3	9/6
2 1/2	7000	35	8/8	4	6000	3	8/-	5	6000	3	8/-	5	9500	3	10/8
2 1/2	7000	50	8/8	4	7000	3	8/8	5	6000	5	8/-	5	9500	5	10/8
2 1/2	7000	80	8/8	4	7000	25	11/8	5	7000	3	8/8	5 1/2	10000	3	11/8
2 1/2	8500 (E.M.I.)	3	8/8	4	6000	35	10/8	5	7000	5	8/8	6 1/2	7000	3	11/-
2 1/2	7000	35	8/8	4	7000	35	11/-	5	7000	3	9/-	6 1/2	8500	3	11/8

Elliptical Size	Gauss in lines	Imped. in ohms	Price	Elliptical Size	Gauss in lines	Imped. in ohms	Price	Elliptical Size	Gauss in lines	Imped. in ohms	Price	Elliptical Size	Gauss in lines	Imped. in ohms	Price
5 x 3	6000	3	7/8	5 x 3	8000	25	11/-	7 x 3 1/2	9500	3	10/8	8 x 2 1/2	8500	5	9/8
5 x 3	7000	3	8/-	6 x 4	6000	3	8/8	7 x 4	7000	3	10/-	8 x 2 1/2	9500	3	10/-
5 x 3	8000	3	8/8	6 x 4	7000	3	9/-	7 x 4	8500	3	10/8	8 x 2 1/2	9500	4	10/-
5 x 3	6000	25	9/8	6 x 4	8500	3	9/8	8 x 2 1/2	6000	3	8/8	8 x 2 1/2	9500	5	10/-
5 x 3	7000	25	10/-	6 x 4	9500	3	10/-	8 x 2 1/2	7000	3	9/-	8 x 5	8500	3	9/8

ALLOW 2/- each Speaker for postage and packing, and please specify the exact requirements—the nearest available will be sent.

OVER 50,000 SOLD AND STILL THE DEMAND CONTINUES FOR OUR "HEAVENLY TWINS"

Ask for a demonstration in the shop.

"CAPRI"

Sensitive!
Super-selective!
Superb

Speaker!

NOW ONLY

79/6

(2/- P. & Pkg.)
Pocket Superhet
M.W. and
Droitwich I.W.
Size 4 1/2 x 2 1/2 x 1 1/2 in.

Constructional data 1/9 Post free.



The best and easiest transistor build-yourself sets available.

Send S.A.E. for FREE PARTS LIST

6 First Grade MULLARD Transistors Diode(s) and all components BRAND NEW

GUARANTEED

Choice of a dozen stations in daylight ...

THE "CONTESSA"

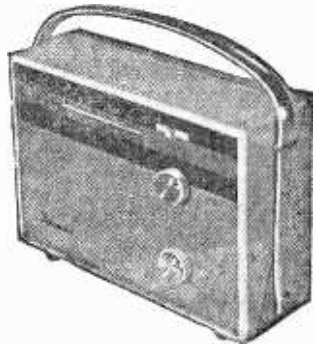
"QUEEN OF THEM ALL"

ONLY £9.19.6

(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 £9.19.6 (plus 3/6 P. & P.)

CAPRI Battery 79/6 (plus 2/- P. & P.) 2/6 extra.

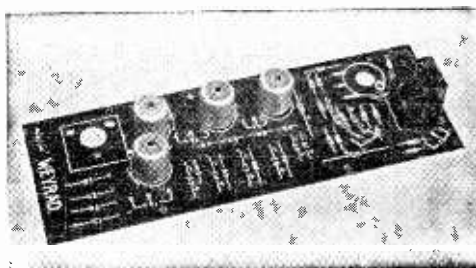
SELECTED BARGAINS

Beautifully geared AM/FM 2 Gang Condensers, 4/8; AM/FM IFT's 465 kc/s and 10.7 Mc/s, 4/8 pair; Magnavox Crystal Tape Recorder Mikes, 12/8; Double-tuned Transistor ferrox IFT's Q120, 470 kc/s, 5/6 pair; transistor sub min 7 mm coil set (4) 4/8, the set; Plessey-Brayhead turret tuners 34/38 Mc/s, valved 8/8 each; 3 watt Stereo Amplifiers, complete, ready to switch on 79/6; Senterlec rectifiers R3/2D-D3-2-1Y, 2/6 each. DIODES—OA70, OA79, OA90, CG46H, GD10, 2/- each.
 TRANSISTORS: Set of 6 (RF and LF) including 1 watt matched pair, heat sink and diode, 1/3 the set; OC45 4/6, PXA101 3/9, AF115 4/8. Substit. Germanium diode 1/3. M.1 diode 6d. each. Silicon diodes, 200 p.i.v., 200 mA, 1/- each, 400 p.i.v., 300 mA, 2/6 each.
 Please send STAMPED and ADDRESSED envelope with any enquiry. We regret no catalogues—our stocks move so 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/-.

WEYRAD

**6-TRANSISTOR 2-WAVE SUPERHET RECEIVER
MODIFICATIONS NOW AVAILABLE FOR 500 mW OUTPUT**

ROD AERIAL—RA2W 6 in. long, 3/8 in. diameter, connections to tags on Coils. For 208pF tuning capacity. Complete with Car Aerial Coil	12/6
OSCILLATOR COIL—P50/1AC M.W. covered with 176pF tuning capacity, L.W. by extra padder	5/4
I.F. TRANSFORMERS 1st and 2nd Stage—P50/2CC	5/7 (2 required)
3rd Stage—P50/3CC	6/-
DRIVER TRANSFORMER—LFDT4	9/6
OUTPUT TRANSFORMER—OPT1	10/6
PRINTED CIRCUIT—PCA1	9/6



In response to many requests we have redesigned the output stages to give 500 mW and to enable a standard 3 ohm Speaker to be used. Full details of the simple changes are given on a separate leaflet available on receipt of stamp.

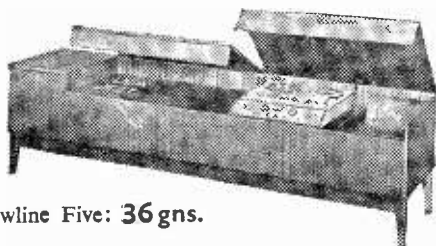
CONSTRUCTOR'S BOOKLET WITH FULL DETAILS	2/-
TRANSISTOR A.F. AMPLIFIER TYPE A.F.1—LOW IMPEDANCE INPUT, 3-TRANSISTOR, 500 mW OUTPUT, FULLY ASSEMBLED WITH VOLUME CONTROL	63/6

WEYMOUTH RADIO MANUFACTURING CO., LTD.
REGENT FACTORY, SCHOOL STREET,
WEYMOUTH, DORSET

HOUSING HI-FI?

This is one of a wide range of furniture for every hi-fi purpose—speakers, equipment, tapes and records. Soundly designed, superbly finished, sensibly priced. Send for illustrated catalogue and name of local stockist.

One of the Record Housing range of 25 models



Lowline Five: 36 gns.

RECORD HOUSING

(Dept. P.W.2), Brook Road, London N22.
Telephone: BOWes Park 7487/B

AMATEUR RADIO COMMUNICATION IS OUR BUSINESS!

HAMMARLUND Leading Short Wave Receiver manufacturers in the U.S.A. now make available their latest range through K.W. ELECTRONICS...

... presenting the HAMMARLUND HQ100A



General coverage 540 Kc/s-30 Mc/s in four bands. Band-spread facilities for amateur and other bands. BFO, Noise Limiter, "Q" Multiplier, 10 tubes. Provision for phones and loudspeaker (3 ohms). Complete with "S" Meter £80 (clock extra if required).

Other Models in Stock:

HQ145X	General Coverage and Band Spread, 11 tube double conversion superhet	£110
HQ180	General Coverage and Band Spread, 18 tube triple conversion superhet	£170
HQ110A	Amateur bands only, 12 tube double conversion superhet	£100
HQ170A	Amateur bands only, 17 tube triple conversion superhet	£140
HX50	Amateur bands, S.S.B. transmitter. 150 watts P.E.P. crystal filter. Voice control self-contained power supply	£175

The World at your fingertips

WRITE FOR DETAILS TODAY — EASY TERMS AVAILABLE

K. W. ELECTRONICS Ltd.

I HEATH STREET, DARTFORD, KENT

Tel: Dartford 25574, 21919. Cables: KAYDUBLEW, Dartford

COMPONENTS LIST	
R1	5.6k Ω 3W
R2	5k Ω 3W
VR1	50k Ω wire-wound potentiometer
C1	2 μ F electrolytic 250V
C2	2 μ F electrolytic 250V
C3	1000pF ceramic 600V
T1	Interstage transformer 1 : 1
S1	Toggle switch s.p.s.t.
MR1	Rectifier 250V 50mA
V1	Neon tube 200V

in series with the negative lead as shown in Fig. 4, no mains transformer is necessary.

Uses of Neon Oscillators

Neon oscillators may be found in old television sets, operating the timebases. Under these circumstances the lower portion of the waveform only is used to avoid distortion due to its exponential nature. In recent models gas-filled or "thyatron" triodes have been used instead. They are ideal as

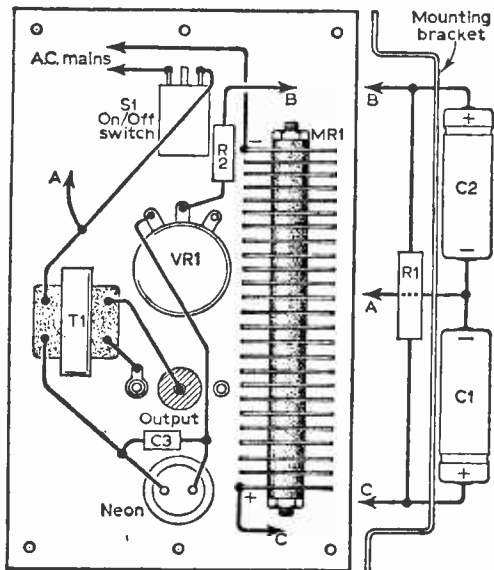


Fig. 5: Constructional details of the unit.

general purpose oscillators for testing radio receivers, amplifiers etc. They are of particular interest to readers possessing oscilloscopes.

A Practical Design

A practical general purpose oscillator which was built for less than £1, using surplus components and spares from the "junk box" will now be described. This oscillator was designed to operate at audio frequency in the range 500-2,000c/s.

The whole unit was made on a panel of 18s.w.g aluminium measuring 6in. x 4in. In the centre of

the panel a hole is drilled for a variable resistor (50k Ω). Above this a s.p.s.t. toggle switch is mounted, and below the 50k Ω variable, a coaxial socket (used for TV aerial sockets), is mounted. Below the coaxial socket, the neon is placed. This serves also as an indicator as to whether or not the unit is operating. The toggle switch (S1) controls the mains input and the 50k Ω variable (VR1) is a frequency control.

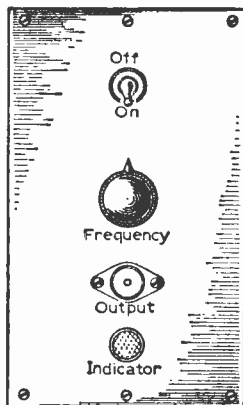


Fig. 6: The front panel layout of the unit.

The coaxial socket is for the output and the wiring is shown in Fig. 5. The underside view of front panel and mounting brackets are shown in Fig. 5. To avoid "live" output sockets an interstage transformer with a ratio of 1:1 was used as shown.

The output can be checked by connecting a loud-speaker with output transformer across the coaxial output socket. When using the oscillator into a high impedance input (i.e. mike socket on a tape recorder) always use screened coaxial cable to avoid hum pick-up. It is advisable to include a 60mA fuse in the negative lead in case the neon or the capacitor C1 should break down. Note that C3 must be a 600V working component to avoid leakage losses.

Practical Circuits for Electric Guitars

—continued from page 942

control VR3 must therefore be adjusted with discretion if an existing guitar amplifier is being used.

A Guitar Amplifier

Since all the tone controlling can be best effected at the guitar pick-ups, further tone controls are superfluous.

A combination of the control circuits given in this article, the tremolo/preamplifier of Fig. 4 and the power amplifier of Fig. 5, will provide a complete electric guitar amplification system.

The power amplifier employs a Brimar 6BR8 triode-pentode which functions as a first amplifier and phase splitter. The output stage uses two EL84's in ultra-linear push-pull, providing a maximum undistorted output of 10-12W. For guitar work this output can be taken up to peaks of 15W or so without appreciable distortion. The amplifier has negative feedback between the output and the cathode of V1A and it is most important that this is included and, of course, in the correct phase.

The output transformer in the original design was a Radiospares EL84 type which is supplied with wiring instructions for correct phasing of the negative feedback.

BOOKS REVIEWED

ELECTRONICS EXPERIMENTS AND PROJECTS

By Len Buckwalter; 128 pages, 5½ ins × 8½ ins. Price 25s.

ELECTRONICS FOR THE BEGINNER

By J. A. Stanley; 190 pages, 5½ ins × 8½ ins. Price 25s.

Both published by W. Foulshaw & Co. Ltd.

THESE two interesting American books have now been published in the U.K. and each contains an introductory chapter specially written for the English reader. This is a very sensible idea, since a novice is likely to be misled or confused by certain Americanisms, while it is also most important to draw attention to the difference in the legal position with regard to the use of transmitting apparatus in this country as opposed to the U.S.A. Thus the English reader is advised not to build the oscillator and simple transmitter described in these books, but to treat these particular articles purely as a theoretical study. However such qualifications hardly diminish the value of these books to beginners on this side of the Atlantic. Both authors have adopted a friendly conversational style, and this helps to create the right atmosphere between teacher and pupil.

With the absolute beginner in mind, it is very difficult to decide which volume should take precedence, for each provides in its own particular way a valuable initiation into the field of Electronics.

Whereas **Electronic Experiments and Projects** sets out to give an understanding of the elementary principles by means of simple experiments that can be performed on the table at home, **Electronics for the Beginner** deals with the building of equipment—not so much for finding out how things work, but rather more for the enjoyment the completed equipment will provide. Actually, to be more correct, this latter book should be entitled "Radio and Audio for the Beginner" because the equipment described is limited to radio receivers and audio amplifiers.

Electronic Experiments and Projects conducts the reader through a series of experiments, most being performed using a piece of perforated hardboard as a "breadboard". Only a small number of commonly available parts are needed and as all electrical connections are made by clips the only tool required is a small screwdriver.

The earlier experiments involve the use of simple home-made circuit elements of R, C and L. Simple tests with a crystal diode and a transistor demonstrate the action of these semiconductor devices. Then follow a variety of experiments (or perhaps the term "projects" is here more applicable) which put into operation the basic ideas. These devices range from a simple telephone and a radio receiver to electronic devices for detecting such quantities as light, moisture and heat. The book concludes with details of how to make a simple computer for multiplication and division.

The arrangement of each article follows a standard pattern with sub sections entitled Preparation,

Setup, Operation, Conclusion and Parts List. Each experiment is illustrated with a photograph of the complete breadboard set-up, a layout diagram and a circuit diagram.

The essentially practical character of **Electronics for the Beginner** is indicated by the first Chapter; this is devoted to tools and soldering. The second Chapter "Building a Trap for Radio waves" is not as one might suppose concerned with a high Q rejector circuit but deals with the construction of an aerial system. Next, a simple crystal receiver is fully described so that the reader is very soon equipped for "listening in".

But having whetted his appetite, the beginner is not allowed to proceed too far on the constructional side before being given some essential basic information regarding components and symbols and the art of circuit reading. Then he is better equipped to continue the exploration of the remainder of the book, and as his mood and fancy takes him, may direct his attention to the realms of world-wide radio or to hi-fi and stereo. The instructions for building the various equipments are clearly written, well illustrated and are well-nigh foolproof. For example, the wiring-up is in every case detailed wire by wire.—D.D.R.

TRANSISTOR INVERTERS AND CONVERTERS

By Thomas Roddam; published by Iliffe Books Ltd. 240 pages, 201 diagrams. Price 42s.

DOUBTS that have existed in this reviewer's mind concerning the desirability or logic of giving a fine distinction to the terms "inverter" and "converter" have not been entirely dispelled by Mr. Roddam in his excellent work dealing with transistor circuits for a.c. to d.c. or d.c. to a.c. conversion.

Why not simply use the term "converter" and qualify it by the adjectival use of "a.c. to d.c." or "d.c. to a.c." as the case may be?

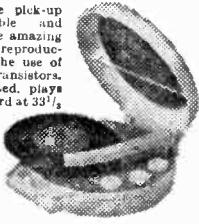
This is not, of course, a criticism that one can level at the author personally, since he is using words already generally established in electronic engineering, but I feel this opportunity of drawing attention to another unfortunate choice of terms must not be neglected.

The opening chapter of **Transistor Inverters and Converters** surveys all the present sources of electrical power and suggests that the omnipresence of a.c. is perhaps only transient, since in the future the distribution of power may be performed more effectively by d.c. mains circuits. This prospect, in addition to the existing quite considerable requirements for operating various types of apparatus from low-voltage d.c. supplies, gives a further emphasis to the relevance of this book. Having assured us of the indispensability of these devices the author commences his detailed discussion.

—continued on page 966

HAWAIIAN PORTABLE RECORD PLAYER

Uses a unique pick-up unit, turntable and speaker to give amazing volume and reproduction without the use of valves or transistors. Battery operated, plays up to 12in. record at 33 $\frac{1}{3}$ or 45 r.p.m. Separate fine speed and volume controls. 45 r.p.m. auto-stop. Plastic cabinet. Fully waterproof with carrying handle and record storage compartment. Size 9in. x 3 $\frac{1}{2}$ in. deep. Weight 2 lb. 9 ozs. PRICE **£5.19.6**



TRANS. RADIO TUBULAR SPEAKER



Booster Speaker. Plugs into ear-piece socket of most radios and tape recorders. Gives double the volume and a hi-fi stereo effect that will amaze you, size Approx. 9 x 2 $\frac{1}{2}$ in. PRICE **25/-** P. & P. 1/9

12 to 150v. VIBRATOR

100mA output, double choke smoothed, bridge rectified. Spare vibrator, fuse wire, battery clips, indicator bulbs. Absolutely Brand New in Maker's cartons. **30/-** 5/-

HOOVER ROTARY TRANSFORMERS

12v. Input, 500v. output at 85mA or 6v. input 250v. output at 70mA. P. & P. PRICE **9/11** 3/-



PORTABLE MAINS SOLDERING IRON



30 watts. Features removable handle that covers tip and barrel. Complete P. & P. with lead and plug. ONLY **12/6** 6d.

VARIABLE RESISTORS

3.3k wire wound linear potentiometer (illustrated). **2/9** P. & P. 6d. 60K Pots. **2/3** P. & P. 6d.



METER TEST KITS

Comprising insulated leads and test prods, insulated croc clips and meter terminal connectors. All contained in plastic hold all. **9/11** P. & P. Meter Test **4/11** P. & P. Prods **9d**

SPECIAL OFFER - CONSTRUCTORS' PARCEL

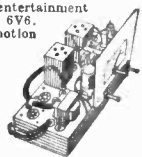
Any three transistors (not Mat Alloy). Any six Hichtab resistors (state value req.). Any four valve holders and one surplus item. Plus one portable mains soldering iron. All for **30/-** P. & P. 1/3



This month's bargain

SUPERHET RADIO CHASSIS

These well-made chassis were made for the Government for Forces entertainment with 6K8 6K7, 6Q7, 6V6. Choke smoothing slow-motion tuning printed scale. 200-550 metres. BRAND NEW. ONLY **5/76**



Cabinet with 8in. speaker **27/6** P. & P. 3/- to fit.

STREAMLINE MICROPHONE



Omnidirectional response 60-10,000 c/s. Output level 52 dB. Built-in on/off switch Provision for conversion to hand held, cord suspended or stand mike. Attractive satin chrome finish.

Microphone **35/-** P. & P. 1/6 Desk Stands **7/6** P. & P. 1/6

TRANSISTOR SALE

- Mullard OC 44 3/11 P. & P. 3d.
- Mullard OC 45 3/11 P. & P. 3d.
- Mullard OC 71 2/11 P. & P. 3d.
- Mullard OA 81 1/11 P. & P. 3d.
- Eidswan X20 Germanium diodes 1/11 P. & P. 3d.
- Transistor Holder 3 Pin 11d. each P. & P. 3d.

MICRO ALLOY TRANSISTORS

- Mat 100 7/9
- Mat 101 8/8
- Mat 120 7/9
- Mat 121 5/8

Above MAT's Postage Paid. Ferrite Siab Aerials, suitable for Transistor Sets. **3/-** P. & P. 6d.

RADIO HEADPHONES

Balance armature type **15/11** P. & P. 2/6

HIGH IMPEDANCE PERSONAL LISTENING EARPIECES

Suitable for all types of crystal sets and transistor sets. **5/11** P. & P. 6d. Complete with plug.

LEAD ACID ACCUMULATORS
(Unspillable)

2 volts 16 A.H. Brand new. Size 4 x 7 x 2in. 4/11 each, 3 for 12/6. P. & P. 3/-.



CRYSTAL SET

With ear-piece and headphones.

9/11 P. & P. 1/9



TEST SET 252

Range 20-88 mc/s in 4 bands. Vernier tuning. Optional pulse-output with the tuning 50 c/s mains operation. Noise generator. Strongly made, with metal carrying case. Contains many valuable components: 9 valves, full wave rectifier unit, 3 crystal. Meter. Mains transformer, numerous switches, 42/6 P. & P. chokes, condensers, etc.



HEAVY DUTY RF CHOKES ON STAND

Suitable for transmitting circuits. **4/11**

MOWING COIL HEADPHONES AND MICROPHONES ATTACHED. Suitable for 19 set. Not new. **5/11** P. & P. 2/3

THREE IMPORTANT RADIO BOOKS

22 Tested Circuits using Micro Alloy Transistors, 5/6. Tested Short Wave Receivers using mata, 5/6. Tested superhet circuit for short wave communication receiver using Mata, 6/6.

WAVEMETER CLASS D No. 1

Complete with wooden carrying case. Battery operation. Few only. Price 35/- plus 5/- P. & P.

COMPONENTS

MINIATURE WIRE WOUND RESISTORS. 6C, 60Ω and 100Ω. Ideal for use in test meters. **2/11** P. & P. 8/11 each

FULL WAVE HEAVY DUTY METAL RECTIFIERS. 250v.-100mA. **6/11** each

SMOOTHING CHOKES. 100mA, 10-20H resistance 450 ohms. Sturdy metal case. **4/11** P. & P. 2/6

SMOOTHING CONDENSERS. TCC metal enclosed block condenser, 4d, 24, 12in. with terminals. 8inFd. 360v working. Suitable for cross-over units. **3/11** P. & P. 1/6

MAIN TRANSFORMER. Mains standard primary 250, 0.250v, 80mA, 6.3v. volts at 4amps, 5 volts at 2 amps. Both tapped at 4v. **18/11** each P. & P. 2/6

As above 350, 0.350v. sec. **19/11** P. & P. 2/6

FILAMENT TRANSFORMERS. 250-250v. 60 c/s primaries. 6.3v. at 2amps. **6/11** P. & P. 1/3

PAXOLIN TAG STRIPS (14 tags). Double way. **1/3** each P. & P. 6d.

7 WAY TAG STRIP. **9d**, each P. & P. 3d. PANEL MOUNTING FUSE HOLDERS. Beautifully made, plastic, sturdy construction. **2/11** each P. & P. 6d.

ELECTROLYTIC CONDENSERS. 0.5mFd. TCC 500v. working. **1/-** each P. & P. 3d.

OCTAL MOULDED VALVE HOLDERS, 6d., 3 for 1/3. 8U7 valve holders, 9d., 3 for 2/-.

B7G valve holders, ceramic moulded with screening skirt, 9d., 3 for 2/-.

P. & P. on each 3d. CONDENSERS. Variable Condenser solid dielectric. 0.005mFd. **3/3** P. & P. 9d.

TRIMMERS. 0.750pF max. 9d. P. & P. 3d.

CONDENSERS. 60 mFd electrolytic reversible 12v. working. **1/3** P. & P. 3d.

1mFd CONDENSERS. 130v. working. Suitable as suppressors. **1/11** P. & P. 9d.

470PF 10% tolerance, 750 working. **7d.** P. & P. 3d.

MORSE KEYS

Morse Key assembly No. 3. Key with base cover and terminals. Complete with lead, jack plug, and connector.

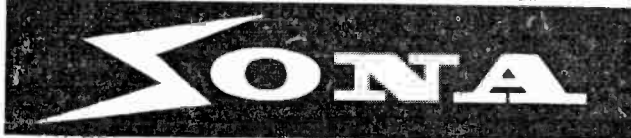


BRAND NEW **6/11** P. & P. 2/3

OPERATORS' UNITS

A host of valuable components (block condenser, jack plug sock et, etc.). ONLY **1/11** EACH P. & P. 1/8

PERSONAL CALLERS WELCOME AT OUR NEW BRANCH BELOW



FREE! FREE!

WITH ALL ORDERS OVER £3.00

YOU WILL RECEIVE A PORTABLE MAINS SOLDERING IRON.

TERMS:

Cash with Order. No C.O.D. Under £110.0.

TRADE SUPPLIED

SONA ELECTRONIC CO (DEPT PW2)
BRIGGATE HOUSE, 13 ALBION PLACE, LEEDS. TEL: 34703

"THE CONSTRUCTOR'S PARADISE"
BEAR HUDSON LTD.

63 GOLDHAWK RD, SHEPHERD'S BUSH, LONDON, W.12
 PHONE: SHE 2581
 Now open at 11 JERDAN PLACE, FULHAM, LONDON, S.W.6. Phone: FUL 3405

SPECIAL MICROPHONE OFFERS

"Planet" SUPER X-TAL MIKE

Fantastic value. Beautifully made modern styled crystal mike in strong plastic housing. With approx. 5ft. sheathed cable and miniature jack plug. Response 50 to 13,000 c/s. High impedance. Guaranteed. *List price 30/-.*



SPECIAL PRICE 12/6 LIST 30/-

TSL Mk. II "STUDIO SPECIAL" MOVING-COIL

Designed for professional quality reproduction



Grey plastic with plated metal

79/6

With improved diaphragm and coil assembly. Complete with fit. cable and non-slip base. In elegant "sound-flow" contoured case. Sensitivity—1mV per micro-bar at 1,000 c/s. Completely smooth response from 40 to 15,000 c/s. Output impedance—50K Ω. Pattern—spherical lobe.

TSL Mk. 2 THREE CHANNEL MIXER

The most popular low-priced mixer ever made! Can be used with any tape recorder. Complete with colour-coded plugs, modern controls. Gold hammer finished steel case. **47/6**



HLP.2 CROSSOVER NETWORK

For frequency base and treble speaker systems. Essential to perfect hi-fi reproduction. **47/6**

47/6

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

184 Tested Transistor Circuits using Modules. **2/6** Post free

185 Tested Shortwave Receiver Circuit using MATs **5/-** Post free

186 Tested Superhet Shortwave and Communication Receiver Circuits using MATs. **6/-** Post free

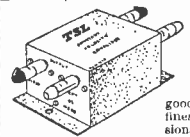
Send 6d. for full catalogue of Bernards Books. We stock the Parts You Need for the Circuits too!

SLIMLINE POCKET MICRO RECEIVER

So small, you can hide it in your hand, yet has fantastic power and sensitivity. With case, all parts and special earpiece come to... **49/6**

We supply all Sinclair designs.

MAKE YOUR CRYSTAL P.U. REAL HI-FI WITH THE TSL CONSTANT VELOCITY EQUALISER



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.S.R. Collaro, Garrard and Acos. With plugs for mono or stereo. 3 years' guarantee. Ready for use. **30/-** Thousands sold. **POST FREE**

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. feedback loops can be varied. Robust design using quality components means dependability at all times. Frequency response—23-25,000 c/s ±2dB. Separate bass and treble cut and lift controls. Output—3 or 15 ohms. With punched chassis, valves and instructions.

FANTASTIC VALUE AT THE PRICE!
 Complete kit of parts as described **£7.19.6** Built and tested 29.19.6

TRANSISTOR OPPORTUNITIES

OC.71—special offer, 3/9; OC.45, 5/6; OC.44, 6/-; OC.189, 8/-; MAT 100 or 120, 7/9; MAT 101 or 121, 8/6; ADT.140 with 500 Mc/s cut-off, 15/-.

Orders by post to BEAR HUDSON LTD., Dept. PW.2, 63 Goldhawk Rd., London, W.12

40,000 Readers CAN'T BE WRONG!

This is the approximate number of readers who have purchased and use our catalogue, and the number grows daily. The reasons are not hard to find, but to highlight a few: 200 Pages, over 800 Illustrations, over 5,000 Components described and priced (all except 14 actually in stock) backed with a By-Return Mail Order Service.



Post Coupon Today with P.O. for 4/- To include P. & P.

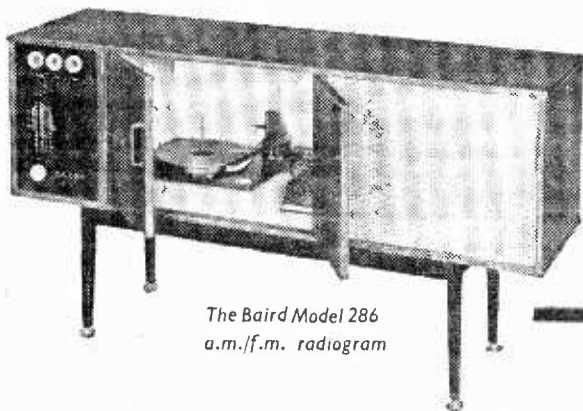
PLEASE WRITE YOUR NAME AND ADDRESS IN BLOCK CAPITALS

NAME

ADDRESS

HOME RADIO LTD., Dept. PW, 187 London Rd., Mitcham, Surrey

T rade N ews



The Baird Model 286
a.m./f.m. radiogram

Seven Watt Record Player

THE new Encore record player from Pam has been designed to give better-than-normal reproduction from a portable record reproducer. Its features include a new Monarch BSR-UA.15 four speed autochanger (taking all sizes of records) and a crystal pick-up.

The circuit of the Encore (Model 5206) delivers an output of 7W through a 6½ in. diameter speaker. Three controls atop the attractive cabinet give separate bass, treble and volume control of the output.

The price of the Encore record player, which is made by Pam (Radio and Television) Limited, 295 Regent Street, London, W.1., is 25 guineas.

Pam's new 7W record player

Tape Deck

A NEW tape deck made by Lorlin Electronic Co. Ltd., has recently become available in two or four track models. The deck employs three motors and can be operated at three different speeds. It can accommodate spools up to 7 in. in diameter and when running a tape-controlled brake tensions the tape evenly from beginning to end of the reel.

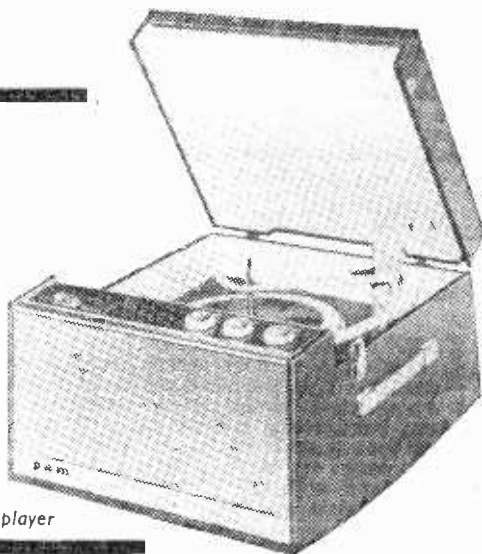
Two models of the tape deck (type SB.26) are available, costing 31 and 39 guineas. The manufacturers are Lorlin Electronic Co. Ltd., 23 Wardour Street, London, W.1.

A.M./F.M. Radiogram

BAIRD Television Limited have recently introduced a new radiogram, the model 286. The receiver on this model tunes over the whole of the medium waveband and to the Light Programme on long waves. F.M. transmissions are received from 88 to 100Mc/s.

The gram unit incorporates a four-speed autochange record deck which provides good quality reproduction through the 8 in. round loudspeaker, which is housed in a sound chamber at the right-hand side of the cabinet.

The price of the model 286 is 57 guineas and the makers are Baird Television Limited, Seymour Mews House, Wigmore Street, London, W.1.

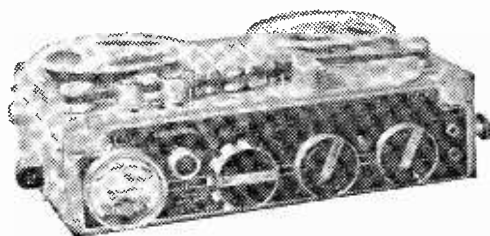


Professional Tape Recorder

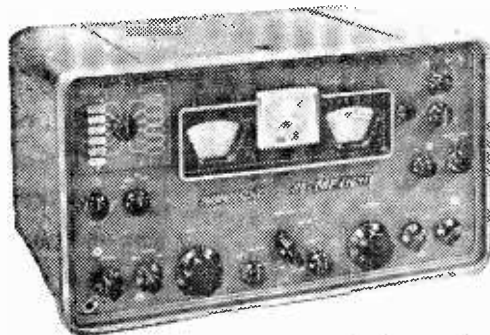
THE Nagra IINP is a Swiss-made portable tape recorder of professional standards and capable of studio quality performance.

The transistorised circuit operates from self-contained batteries or from a mains unit. The tape deck provides for a choice of three speeds, 3½ in.p.s., 7½ in.p.s. and 15 in.p.s., and at the highest tape speed the frequency response is 30c/s to 18kc/s.

The Nagra IINP tape recorder is manufactured by Kudelski of Switzerland and the U.K. agents are Livingston Laboratories Limited, 31 Camden Road, London, N.W.1. Its price?—£340.



This is the Nagra IINP portable tape recorder



The latest communications receiver from Hammarlund

General Coverage Receiver

THE latest general coverage receiver to come from the Hammarlund Manufacturing Company, is the type HQ-180AX, an improved version of the HQ-180A. This receiver features 11 fixed frequency crystals in addition to the v.f.o., six of which are plugged in on the face of the instrument, the remainder being reached through a hinged compartment in the cabinet. An unusual feature of the HQ-180AX is the facility for compensating for minor frequency variations of the crystals by means of a ± 3 kc/s vernier tuner control.

Complete technical data of this new communications receiver may be obtained from the U.K. agents for Hammarlund equipment, K. W. Electronics Limited, Vanguard Works, 1 Heath Street, Dartford, Kent.

BOOKS REVIEWED

—continued from page 962

First, the two principal circuit elements, the transistor and the transformer, are in turn closely examined and their characteristics analysed; they are then brought together in subsequent chapters where various forms of single-ended, push-pull, bridge, sine-wave and driven inverter (or converter) circuits all receive thorough attention.

Without doubt a valuable reference source for design engineers, this book will also be of great interest to many others who seek more than a mere surface knowledge of the subject.—F.E.B.

AUDIO AND ACOUSTICS

By G. A. Briggs, with James Moir; published by Wharfedale Wireless Works Limited, Idle, Bradford, Yorkshire. 168 pages, 8½ in. x 5½ in. Price 10s. 6d. (11s. 6d. post free).

MANY readers have seen, or have on their bookshelves, a book called **Sound Reproduction**. This, published originally in 1949, was an enlarged version of a booklet **Loudspeakers**, but covering a larger field. It was, in fact, the forerunner of the now well known series of audio books by G. A. Briggs. The author's unconventional style and his method of presenting facts and data in a most readable form caught the imagination of audiophiles and **Sound Reproduction** eventually went into three editions.

In 1962, when **Sound Reproduction** ran out of print, it was decided not to reprint again, or to bring out a revised edition, but (in the words of the author) "to divide and conquer and have two or three modest volumes instead of one huge tome running to several hundred pages."

Audio and Acoustics is the first in this programme of revision and, as the name suggests, concentrates mainly on the problems of acoustics. Although some of the material is taken from **Sound Reproduction** much of it is completely new and those who found the original book of value will certainly not be wasting their money in purchasing this new publication.

A very informative historical section deals with audio and acoustical developments, ranging from Edison's phonograph of 1877 to modern demonstration rooms and transistorised videotape recorders. This leads into chapters on the Ear, Resonance, Echo and Reverberation and Room Acoustics, all of which provide hard facts and food for thought. Other sections cover Free-field Sound Rooms, Transient Response, Stereo, Concert Halls and Studios and Live/Recorded Tests.

As the author points out, there is a growing interest in the acoustic aspect of sound, and in any audio set-up the real final link in an audio chain is **not** the loudspeaker system but the acoustics of the listening room. Therefore, this aspect requires more attention than that to which it is generally given.—W.N.S.

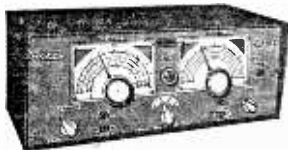
TOP QUALITY—LOW COST  **AMATEUR RADIO EQUIPMENT**

BUILD YOUR SHORT WAVE LISTENING STATION WITH CODAR-KITS.
CR 66 COMMUNICATIONS RECEIVER

THE FINEST SUPERHET KIT EVER OFFERED



Frequency Range 540 Kc/s to 30-Mc/s in four Band-switched ranges.



Electrical Bandsread. Coil Unit wired ready and I.F. Transformers factory aligned, no test equipment required. Temperature compensated trimmers. Regenerative I.F. stage for maximum gain and B.F.O. Panel aerial trimmer, separate speaker switch, 3 watts output for external 2-3 ohm speaker. Separate cathode follower for tape recording etc. Valve line-up—ECH81, EBF89, ECC81, EL84, EZ80, EM84 (Optional extra). For 200-250 volt A.C. Cabinet size 16 x 6½ x 8½ in.

Complete Kit with 17-page Instruction Manual Carriage 6/-. **£18.50**

Tuning indicator parts with EM84, 17/6.

H.P. TERMS AVAILABLE

CAN BE SUPPLIED READY BUILT, PRICE ON REQUEST.

"S" Meter conversion kit available

★ 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 52 changed to 58. On the L.F. Bands, unwanted noise and mush is cut out.



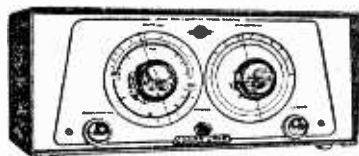
G3RIA writes . . . The results in conjunction with my Eddystone 888 are amazing. Signals are twice as strong with much higher signal/noise ratio. A First-class product well worth the money. The P.R.30 uses EF183 Frame Grid R.F. Amplifier and provides up to 20 dB gain. Features include vernier tuning, 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 for use, with all plugs, cables. 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** Carr. 3/6.

P.R.30X self powered with internal power supply for 200-250 volt A.C. Will provide 200 volts up to 25 M/a. and 6.3 volts 1 amp. for other accessories. **£7.2.0** Carr. 3/6.

THE NEW 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 bandsread.
- ★ 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 **£7.5.0** Carr. 4/6.

CR 45 Cabinet Silver Grey 12 x 5½ x 7 in. with sliding door for easy coil changing and detachable louvred rear panel **28/6**

Instruction Manual only 4/- post free. Extra coils 4/9 each.

CAN BE SUPPLIED READY BUILT. PRICE ON REQUEST.

★ THE MINI-CLIPPER

- ★ Miniature 1 valve short wave receiver.
- ★ Low loss polystyrene plug-in coils, factory aligned.
- ★ Air spaced ball bearing condensers.
- ★ Provision to add two-transistor amplifier.
- ★ Battery lasts months.

36/6



Can be built in one evening, ready to switch on, to bring the fascination of Short Wave listening at very low cost. Complete MINI-CLIPPER CODAR-KIT, valve, and one coil 25-75 metres, Instruction Manual 4 pages. 37/6, carr. 2/6. Extra Coils 4/9 each. Electrical Bandsread available. Instruction Manual only 2/-. post free.

★ THE SUPER CLIPPER

- ★ Peak Performance short wave battery receiver.
- ★ Large precision dial, dual slow motion drives.
- ★ Bandsread on all Bands.
- ★ High gain valve/transistor hybrid circuit.
- ★ 2 Mullard transistor amplifiers, pre-assembled and tested.
- ★ Low loss polystyrene plug-in coils, factory aligned.
- ★ Batteries last months.

88/6



Easy to assemble, this famous Short Wave Receiver brings a new world of listening pleasure to your finger tips. Complete SUPER-CLIPPER CODAR-KIT, valve, transistors, 2 Coils 20-60, 55-180 metres. Instruction Manual 7 pages. 88/6, carr. 2/6. Front Panel Silver Grey, 10 x 7 in. 6/9 extra if required. Extra Coils 4/9 each.

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, DENCO, ELECTRONIQUES, THORN, A.E.I. etc. 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.

G3HGQ

FANE HIGH FIDELITY LOUDSPEAKERS

Full Range of Heavy Duty Types for All Purposes

CAST ALUMINIUM CHASSIS. EXTREMELY ROBUST 2in. DIAMETER VOICE COIL ASSEMBLIES

Model	Coone	Frequency response c.p.s.	Impedance ohms	Main resonance c.p.s.	Power handling watts R.M.S.	Flux density gauss	Total flux Maxwells	Voice coil winding	Diam. of Chassis	Baffle Hole	Nett weight lbs	Retail Price
122/10	Single	25-5000	15	32 or 75	20	10,000	100,000	Copper	12in.	11in.	6lbs.	5 gns.
122/10A	Dual	10-15000	15	32 or 75	20	10,000	100,000	Aluminium	12in.	11in.	6lbs.	6 gns.
122/12	Single	25-5000	15	32 or 75	20	12,000	160,000	Copper	12in.	11in.	6lbs.	26.15.0
122/12A	Dual	30-15000	15	32 or 75	20	12,000	160,000	Aluminium	12in.	11in.	6lbs.	27.19.6
122/14	Single	25-5000	15	32 or 75	22	14,000	186,000	Copper	12in.	11in.	7lbs.	9 gns.
122/14A	Dual	30-15000	15	32 or 75	22	14,000	186,000	Aluminium	12in.	11in.	7lbs.	10 gns.
122/17	Single	25-8000	15	32 or 75	25	17,000	226,000	Copper	12in.	11in.	10½lbs.	£11.17.6
122/17A	Dual	30-17000	15	32 or 75	25	17,000	226,000	Aluminium	12in.	11in.	10½lbs.	£12.17.6
152/12	Single	25-3500	15	30 or 75	20	12,000	160,000	Copper	15in.	13½in.	8lbs.	12 gns.
152/12A	Dual	30-15000	15	30 or 75	20	12,000	160,000	Aluminium	15in.	13½in.	8lbs.	13 gns.
152/14	Single	25-3500	15	30 or 75	22	14,000	186,000	Copper	15in.	13½in.	9lbs.	14 gns.
152/14A	Dual	30-15000	15	30 or 75	22	14,000	186,000	Aluminium	15in.	13½in.	9lbs.	15 gns.
152/17	Single	25-4000	15	30 or 75	25	17,000	226,000	Copper	15in.	13½in.	12½lbs.	16 gns.
152/17A	Dual	30-17000	15	30 or 75	25	17,000	226,000	Aluminium	15in.	13½in.	12½lbs.	17 gns.

EXTRA HEAVY DUTY TYPES WITH 3in. DIAMETER POLE PIECES

153	Single	30-3500	15	40 or 75	40	14,000	375,000	Copper	15in.	13½in.	20lbs.	18 gns.
153	Single	20-3000	15	30 or 75	80	14,000	375,000	Copper	18in.	16½in.	22lbs.	25 gns.

AVAILABLE THROUGH ALL SOUND EQUIPMENT STOCKISTS

Manufacturers' enquiries to:
FANE ACOUSTICS LTD.
 HICK LANE : BATLEY : YORKS.

Sole distributors to Wholesale and Retail Trade:
LINEAR PRODUCTS LTD.
 ELECTRON WORKS : ARMLEY : LEEDS

CRYSTALS & COMPONENTS LTD

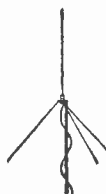
TEL: TEM 1189 2-4 EARLAM STREET, LONDON W.C.2.

Near Cambridge Circus. A few minutes' walk from Leicester Square or Tottenham Court Road Underground Stations
HOURS OF BUSINESS: 9 to 6. Saturdays 9 to 1. **OPEN ALL DAY THURSDAY**

SPECIAL OFFER—AMERICAN TBS RECEIVERS

60-80 Mc/s Crystal controlled, with 2 decibel meters for 115v. A.C. input. In Black crackle case. 19in. rack mounting. Not tested, not fully valved but all valves listed. In very good condition. £3.10.0 plus £1 carriage and packing. U.K. only

CRYSTALS
 NOW AVAILABLE OUR
 NEW CRYSTALS LIST. Send S.A.E.



U.H.F. AERIAL

On 10 feet collapsible mast. Spring loaded in 1 foot tubular sections. Complete with 12 feet co-ax lead and rubber covered plus. 3 steel pegs and nylon gags. Can be easily lashed to existing TV aerials for modification to new frequency. 12/6 plus 2/6 P. & P.

TERMS OF BUSINESS
CASH WITH ORDER

VARIABLE AIRSPACED CONDENSERS

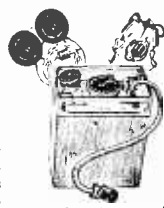
150 pFd with ¼in. spindle, 4/6 each. 75 pFd + 75 pFd with ¼in. spindle, 4/6 each. Postage on either type 1/- extra.

LT. TRANSFORMERS

Pri.: 240 volts. Output 6.3 volts 5 amps. 8/6, post 2/6. Pri.: 240 volts. Output 17 volts 1 amp. 9/6, post 2/-. Pri.: 240 volts. Output 6.3 volts. 2 amps. 5/-. post 2/-.

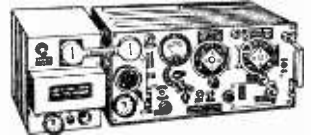
TYPE 38 TRANS/RECEIVERS

Brand new. Operating on 7.4 to 9 Mc/s. Trans/Receivers. Complete with headphones, throat microphone, junction box and aerial rods. Operate on 150 volts HT & 3 volts L/T dry batteries. Complete less batteries and not tested. 42/6 per set plus 6/6 post. Or £4 per pair plus 10/- post and packing.

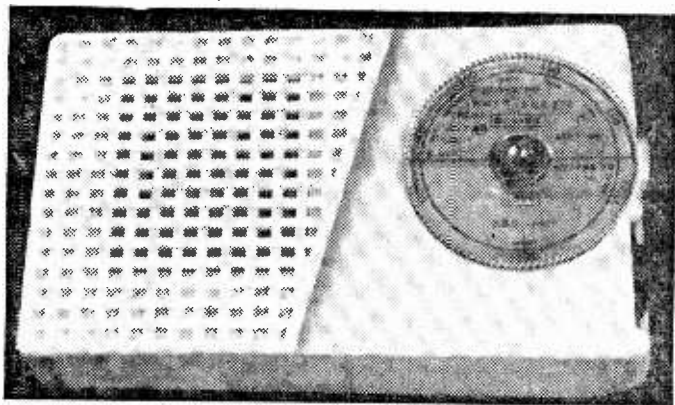


WIRELESS SET NO. 19

Complete with original power supply unit for 12 volts input. Transmitter/Receiver covering 2-8 Mc/s and V.H.F. 240 Mc/s. 6 valve superhet receiver and 6 valves in Transmitter. Using I.F. of 465 Kc/s. For voice and C.W. In good condition not tested. £4.17.6. Plus £1 packing and carriage. Microphone and headset for this set 17/6 plus 2/6 post and packing. 19 Set Variometers, 17/6 plus 2/6 post and packing Control box for 19 set, 10/- plus 2/- post and packing.



Long Waves for the M.W.



The receiver as it appeared originally.

Pocket Superbet

By J. G. Thompson

MODIFYING THIS P.W. TRANSISTOR DESIGN FOR L.W. RECEPTION

THE receiver described in the September, 1962, issue of *Practical Wireless* tunes medium waves only. However, it can quite easily be modified to include long waves if this is required. Two methods will be found satisfactory and either may be adopted.

The simplest arrangement is to add sufficient capacity to give preset tuning of the Light Programme on 1,500m, the original medium wave ferrite rod winding being used on both bands. Reception on the long wave band is then confined to 1,500m only. The second method is to provide a long wave loading coil and coverage is then about 1,100m to 1,750m, allowing reception of other stations in this band. In both cases the oscillator coil remains unchanged, the necessary extra capacity being switched in.

Preset Tuning

The circuit for this arrangement is shown in Fig. 1. When the switch is in the medium wave position medium wave reception is obtained as before. With the switch in the long wave position TC3 and C16 are in parallel with the medium wave aerial winding and the 180pF capacitor is across the oscillator coil. The usual tuning control acts as a fine tuning or manual trimmer.

The receiver is sufficiently sensitive for this arrangement to give adequate volume in very many localities. The set is, of course, intended for reception of the Light Programme only on this band as mentioned.

C16 and TC3 need to total about 1,750pF and

this can conveniently be obtained with a 1,600pF fixed disc capacitor and a 300pF or 500pF trimmer. VC1 provides 208pF and this allows further adjustment, since it is not very important where the Light Programme is found on the dial. It should, however, be possible to obtain 1,500m with the gang capacitor roughly half closed, this depending on the exact capacity of the 180pF oscillator capacitor and the coil core. On the long wave

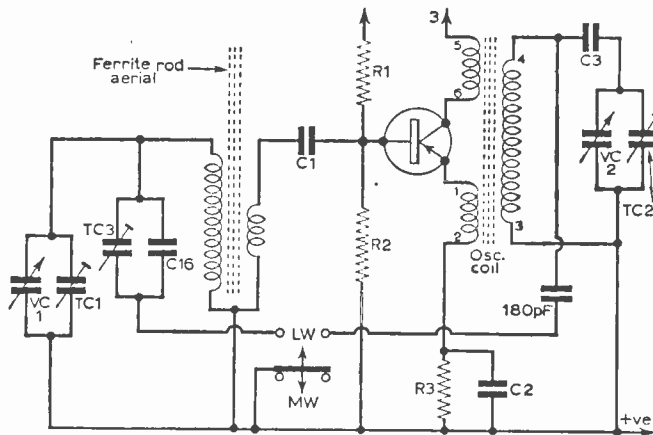
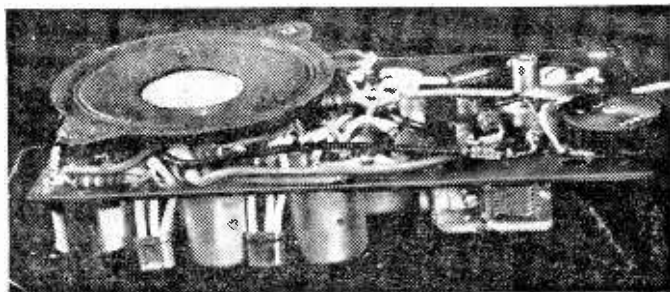


Fig. 1: Circuit modifications to receive the Light Programme on long waves.

band the position of the oscillator coil core has a great effect on frequency. If necessary slight readjustment may be made, followed by realignment on the medium wave band.

It is feasible to obtain 1,500m at a marked point on the dial by adjusting TC3 and C16 and by including a further trimmer in parallel with the 180pF capacitor. But tuning will still be restricted to the Light Programme only.

If a few small fixed capacitors are to hand values



The chassis of the prototype receiver.

may be selected to bring 1,500m within the swing of the gang capacitor. Capacitors can be tried experimentally by wiring them across VC1 and from pin 4 of the oscillator coil to the positive line.

Long Wave Tuning

This method gives normal tuning and allows reception of one or two other stations in addition to the Light Programme on 1,500m. The circuit is shown in Fig. 2.

The long wave loading coil, with TC3 in parallel, is in series with the existing medium wave coil. The base coupling winding is returned to a tapping on the long wave coil. The long wave coil is shorted out when the switch is in the medium wave position. With the switch in the long wave position the loading coil is in circuit and the 180pF capacitor and TC4 are in parallel with the oscillator coil.

It is important that the tapping is near the "earth" end of the long wave coil and that both medium wave and long wave coil turns are in the same direction when they are in series. The long wave section is slid on the free end of the ferrite rod.

Frequency coverage may be modified by adjusting TC4. TC3 is adjusted for best volume around

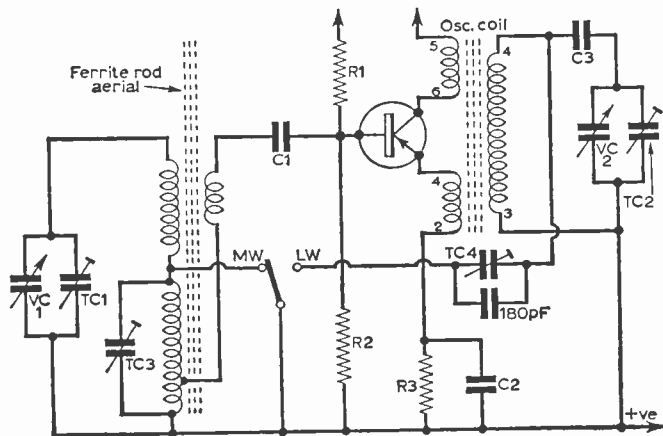


Fig. 2: The circuit for complete l.w. coverage.

1,200m. The receiver is then tuned to about 1,650m and the long wave winding is moved along the rod for best results.

Switch Mounting

A miniature slide switch can be positioned in the free space left near the oscillator coil, taking care that it clears the tuning control, as in Fig. 3.

The circuit in Fig. 1 requires two poles closed for long wave reception. A two-pole, two-way

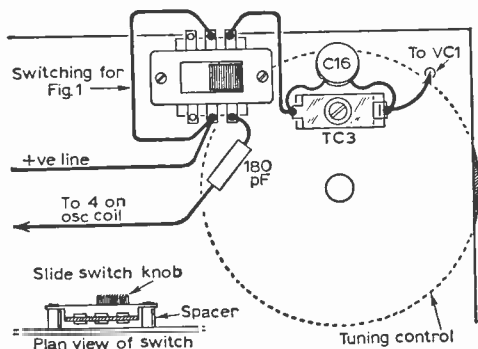


Fig. 3: Mounting details of the wavechange switch.

switch, as actually shown in Fig. 3, will thus be needed. The outer tags will have to be bent over to clear the case.

For the circuit in Fig. 2 a single pole two-way switch is sufficient. The switch shown in Fig. 3 may, of course, be used, but a single pole two-way switch will require less space as one set of contacts will be omitted. The centre tag goes to the positive line, exactly as in Fig. 3. One outer tag is wired to the junction of medium wave and long wave aerial coils. The remaining outer tag is connected to TC4 and the 180pF capacitor, which are returned to pin 4 of the oscillator coil.

The switch is held by 8B.A. or smaller bolts with countersunk heads, spacers (or extra nuts) being used so that it is just clear of the paxolin panel. Carefully measure the switch position, drill a small pilot hole through the case and enlarge this with a small file to match the switch slot.

After either of the modifications shown, slight retrimming and realignment will be necessary on the medium wave band because of the stray capacity of switch wiring, etc. ■

PCR COMMUNICATION RECEIVERS

Manufactured by Pye and Philips. One of the Army's most versatile and sensitive sets. RF stage and 2 of IF using 6 British I.O. type valves. Large 180 degrees illuminated and Calibrated Dial. Flywheel tuning with locking device. Aerial trimmer. Tone and volume controls. Band switch from panel jacks for speaker or phones. In black metal case, size 17" L x 8" H x 10" D. Model PCR2 covers 6-22 Mc/s, 200-550 metres and 850-2,000 metres. £5.19.6. Model PCR3. As PCR2 but has 2 Short Wave Bands, 2.0-7.0 Mc/s and 7.0-23.0 Mc/s and Medium Wave Band 190-550 metres. ONLY £8.8.0. Every receiver aerial tested before dispatch. Add 10/- carr. Both types used, but excellent condition. Designed to operate from bulky external power supply, but any set can be fitted with BRAND NEW COMPONENTS INTERNAL PACK for 200/250 v. A.C. at extra cost of £2. S.A.E. for illustrated leaflet.

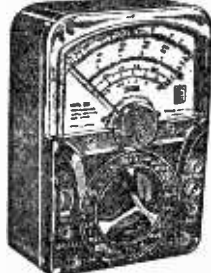
TEST METERS FOR EVERY PURPOSE & POCKET



2,000 O.P.V. MODEL TP-10
Reads A.C. & D.C. Volts up to 1,000; D.C. Current to 500 mA; Resistance to 1 Meg; Capacitance to 1µF; Decibels from -20 to +36; Output jack for Audio Measurements. Size 3 1/4 x 5 1/4 in. **£3.19.6**



30,000 O.P.V. MODEL TP-35
Reads voltage 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 0.1µF; Decibels from -20 to +36. Size 3 1/4 in. x 5 1/4 in. **£5.19.6**



30,000 O.P.V. MODEL 500 Volts up to 1,000; D.C. at 30,000 O.P.V. A.C. at 20,000; 12 Amps D.C. Current; 60 Megs Resistance; -20 to +56 dBs; Internal buzzer short circuit warning. Size 3 1/4 in. x 5 1/4 in. x 2 1/2 in. **£8.19.6**

All New Stock, with leads, prods and internal batteries, 6 months' guarantee backed by full service facilities. Details S.A.E.

DOUBLE BEAM OSCILLOSCOPE TUBES, TYPE CV-1536. Equivalent to COSSOR 96D (as used in Oscilloscopes by Cossor 339 series) and Hartley & Erskine (13 series). Listed £12. BRAND NEW IN MAKER'S CRATES. ONLY 25/- (carriage 5/-).

LAVOIE UHF WAVEMETER MODEL 105. Coverage 375/725 Mc/s. Complete with correct Calibration Chart. First-class condition. Battery operated and portable, size 11 x 8 x 7 1/2 in. ONLY £8.19.6 (carriage 7/6).

AMERICAN DESK TELEPHONE, complete with handset. Non-dial type but has internal bell. Ideal for extension or intercom. BRAND NEW. ONLY 30/- (post 4/-).

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 crystal. ONLY 15/- (post 1/6).

BC221 FREQUENCY METERS. The famous American crystal controlled frequency measuring standard. Coverage 125 Kc/s - 30 Mc/s. With original Calibration Book. Perfect order. Only £16.

MINIATURE MOTORS. Ideal for models. Operates on 3-6 volts D.C. Size 1 1/4 x 1 x 1 1/4 in. plus 1/4 in. spindle. BRAND NEW. 5/- or 6 for 25/-.

SPRAGUE CONDENSERS. Metal cased, wire end. New 0.01 mfd. 1,000 volt, and 0.1 mfd. 500 volt. 7/6 per dozen. Special quotes for quantities.

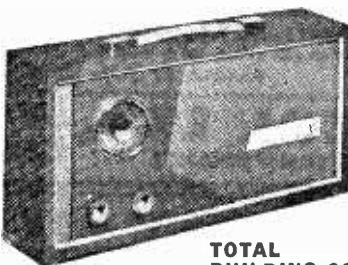
12 VOLT AMERICAN DYNAMOTORS. Deliver 220 volts at 100 mA. Size 5 1/2 in. x 3 1/2 in. diameter. Ideal for running Electric Shaver etc. for Car battery. ONLY 32/6 (post 2/6).

20- CONSTRUCTOR'S PARCEL. Assorted colours wiring wire, solder, resistors, condensers, volume controls, tag panel. ALL NEW (post 2/6).

RESISTORS. 100 assorted values our choice. NEW. 7/6.

CONDENSERS. 100 assorted mica and silvermica. NEW. 10/-.

P.W. "CELESTE 7" RECEIVER

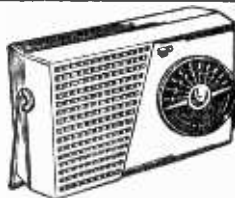


Build this latest P.W. seven transistor portable, as described in June and July issues. Medium and Long waves, with output of 1 watt from large 7 x 4 in. loudspeaker. Internal high gain aerial with ear aerial socket. All components sold separately—parts list S.A.E.

TOTAL BUILDING COST £9.19.6

"POCKET 4" TRANSISTOR RECEIVER

Uses miniature speaker, proper tuning condenser, and volume control. Built-in aerial makes unit efficient and portable. Ideal for the beginner. Full medium wave coverage. All components and case for only 42/6 (P. & P. 2/6). Ten-page constructional book free with parts or separately 1/6. S.A.E. for parts price list.



BATTERY CHARGER

6 v. or 12 v. at 3/4 amps. Fused and fitted with Ammeter and Voltage Selector. Louvred metal case finished attractive hammered blue. Ready for use with mains and output leads. ONLY 55/- (post 3/6).

PORTABLE A.C. VOLTMETER

First Grade Moving Iron with 6 in. Mirror Scale. Reads up to 150 volts A.C. 400 and 1200-2400 cycles. In substantial oak case with removable lid. Overall size 8 1/2 x 8 1/2 x 5 1/2 in. BRAND NEW. ONLY 25.

COSSOR TYPE 1085 DOUBLE BEAM OSCILLOSCOPES. A few only of these modern scopes, overhauled and in perfect order. ONLY £45. Further details on request.

PANEL METERS. 25 microamps D.C. 2 1/2 in. Proj.-circular 50/6 50 microamps. D.C. 2 1/2 in. Flush circular, 50/6. 100 microamps D.C. 2 1/2 in. Flush circular, 39/6. 40 amps D.C. 2 in. Proj. circular, 7/6. 500 volts A.C. 2 1/2 in. Flush circular, 26/- 500 volts A.C. 2 1/2 in. Flush circular, 25/-.

RECORD INSULATION TESTERS. Read up to 20 mega. at 500 volts pressure. Overhauled and in perfect order. ONLY 25.10.0

TELESCOPIC AERIAL. 8 sections 30 in. open, 5 in. closed, with 1/4 in. projection. Chromium plated and ideal for a variety of uses. ONLY 10/6.

TRANSISTORISED INSULATION TESTERS



Size 7 in. x 4 in. x 4 in. batteries and tests leads.

The latest technique for checking insulation of electrical circuits, appliances and components. One handed operation (no turning of generator), a Transistor D.C. D.C. converter being employed to supply the high potentials. Three Testing voltages, 100 250 and 500. To measure up to 500 megohms. Complete with leather carrying case. Internal ONLY **£17.10.0.** S.A.E. for illustrated details.

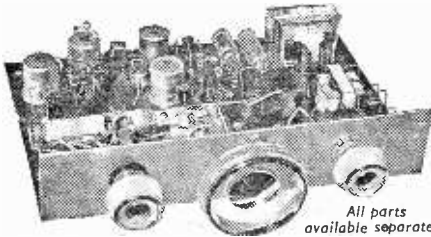
HARRIS ELECTRONICS (LONDON) LTD

138 Gray's Inn Road, London, W.C.1
Phone TERminus 7937

Please include carriage costs on all items.
(Open until 1 p.m. Saturdays). We are 2 mins. from High Holborn (Chancery Lane Station) and 5 mins. by Bus from King's Cross.

"NOMAD"

SEVEN TRANSISTOR TWO WAVEBAND BRAND NEW DESIGN FOR CAR RADIO AND GENERAL PURPOSE GIVING ONE WATT OUTPUT WHEN CONNECTED TO ANY STANDARD 3 ohm SPEAKER



All parts available separately

Size: 7 x 5 x 1 1/2 in. Building Plans 2/6 (Free with kit).

This versatile unit has been designed to fit into a variety of cases and all components, down to control knobs and battery clips, are supplied together with clear illustrated plans. It gives a superb performance with dozens of stations including Luxembourg when connected to a 9 volt battery and speaker.

ONLY **£6.19.6** COMPLETE P.P. 2/-.

TIMBER (LEATHERETTE) RADIO CABINETS

Attractive Grey with gilt grille, Ivory trim and carrying handle. (14 x 7 x 4 inches). BARGAIN AT 30/- Knobs 3/9.

TERRIFIC VOLUME !!

WITH THE

P.W. 6-TRANSISTOR

Medium and Long Wave Pocket Superhet
THE CONTINUED POPULARITY OF THIS FAMOUS SET IS PROOF OF ITS VERY HIGH QUALITY AND FINE PERFORMANCE

- 700 mW Push-Pull Output on 2 1/2 in. P.M. Speaker.
- Printed Circuit.
- Guaranteed first grade Miniature Components.
- High Q Internal Ferrite Rod Aerial.



BUILDING PLANS 2/- (Free with Kit) **£7.19.6** P.P. 2/- Complete.

The 'NORPAK'

MAINS POWER PACK KIT FOR TRANSISTOR RADIOS

Boosts and greatly extends life of all old batteries. In attractive two-tone plastic case. Assembled in an hour. Miniature Size 4 x 2 x 1 1/2 in. Normal output 9 v. 100 mA. Full Mains Transformer. Full wave germanium diodes. Cartridge fuse.

Runs Radio direct from mains.

Complete Kit with Plans

35/- Plus 1/6 P.P. (Ready assembled 45/-).

NORCOL LTD. 147 LONDON ROAD, YORKTOWN, ELECTRONIC COMPONENTS CAMBERLEY, SURREY Phone: CAMBERLEY 3743

VALVES SAME DAY SERVICE

NEW! TESTED! GUARANTEED!

SETS 1R5, 1S5, 1T4, 3S4, 3V4, DAF91, DF91, DK91, DL92, DL94 .. Set of 4 for 15/-
DAF96, DF96, DK96, DL96 .. 4 for 23/6

1A7GT 8/-	6SN7GT 4/-	DAC32 8/3	ECL80 6/3	PCC84 6/-	U37 17/-
1D5 6/6	6U4GT 9/6	DAF91 3/6	ECL82 7/6	PCC85 7/6	U47 8/6
1N5GT 8/-	6V6GT 6/6	DAF96 6/9	ECL86 9/-	PCC89 8/-	U50 4/6
1R5 4/9	6X4 3/9	DF33 6/9	EF39 3/9	PCF80 5/9	U78 3/9
1S5 3/9	6X5GT 5/6	DF81 2/6	EF41 6/6	PCF82 6/9	U191 11/-
1T4 2/6	7B7 8/-	DF96 8/-	EF42 6/6	PCF84 11/9	U21 9/6
3A5 6/9	7C5 7/9	DH76 3/9	EF85 5/-	PCF86 8/-	U282 14/6
3A4 5/6	7C6 7/6	DH77 4/9	EF86 6/3	PCF806 14/-	U291 9/-
3S4 4/9	7H7 5/9	DK32 8/-	EF89 4/-	PCL83 9/-	U301 12/6
3V4 5/6	7S7 25/-	DK40 15/6	EF91 3/3	PCL84 6/6	U801 17/6
5Y4G 4/6	7Y4 5/-	DK91 4/9	EF92 2/6	PCL85 8/6	UAB30 5/9
5Z4G 5/-	10C2 13/-	DK92 6/6	EF184 7/9	PEN4DD 19/6	UAF42 8/-
6A8G 6/9	10F9 10/-	DL33 7/3	EL33 7/6	PEN44 7/3	UBC41 6/11
6AL5 2/-	12AT6 4/9	DL35 6/9	EL41 8/6	PEN38C 8/-	UBC81 7/3
6AQ5 6/9	12AU7 3/9	DL92 4/9	EL42 7/9	PEN383 10/6	UBF80 6/-
6AT6 4/9	12AX7 4/9	DL94 5/6	EL84 5/6	PL36 8/9	UBF89 7/3
6BA6 8/-	12BKGT 8/3	DL86 6/-	EM80 6/9	PL38 16/6	ULB21 10/-
6BE6 5/3	12K8GT 4/9	EAB8C80 5/3	EM81 7/9	PL81 8/9	UC92 6/6
6BG6G 12/6	12Q7GT 4/3	EAF42 8/-	EM84 8/3	PL82 5/6	UC884 9/-
6BH6 5/-	12Z3 8/6	EB91 2/-	EM87 8/9	PL83 5/6	UC85 6/9
6BD6 5/6	19B36G 13/6	EB33 5/-	EM87 8/9	PL84 5/6	UC780 10/3
6CB6G 5/6	20P4 14/9	EB41 7/3	EY51 6/-	PL84 5/9	UCH42 7/6
6F1 6/9	20P5 14/9	EB81 6/9	EY84 7/-	PX4 9/-	UCH81 7/6
6F13 4/9	25L6GT 5/9	EBF80 7/3	EY86 6/-	PX25 7/9	UCL82 8/-
6F14 9/-	25U4GT 10/6	EBF83 7/9	EZ40 5/6	PY32 9/-	UCL83 9/-
6F23 9/6	30P11 9/6	EBC33 5/-	EZ40 5/6	PY33 9/-	UF1 7/3
6KT6 1/6	30L15 9/6	EB41 7/3	EZ80 4/6	PY80 5/3	UF42 5/-
6K8GT 4/-	30P11 9/-	EB81 6/9	EZ81 4/6	PY81 5/9	UF89 6/3
6K8G 4/3	30P13 9/6	ECC81 3/9	EZ82 8/6	PY82 5/9	UL41 7/-
6K9G 7/9	35A5 4/11	ECC82 4/9	EZ82 8/6	PY83 6/6	UL44 15/-
6L6 5/9	35Z4 7/9	ECC83 7/-	EZ82 8/6	PY83 6/6	UL46 8/9
6LD20 5/3	35Z4GT 14/11	ECC84 7/3	EZ82 8/6	U22 10/-	UL84 6/3
6P25 7/6	35Z4GT 14/11	ECC85 7/3	EZ82 8/6	U24 7/9	U07 7/6
6P28 9/6	AZ31 6/11	ECC86 6/3	EZ82 8/6	U24 7/9	U07 7/6
6Q7 4/9	B36 4/9	ECC87 6/3	EZ82 8/6	U24 7/9	UY21 8/6
6Q7GT 7/9	CH35 12/8	ECC88 6/6	EZ82 8/6	U24 7/9	UY41 4/9
6RTG 9/6	CI33 9/6	ECC89 6/3	EZ82 8/6	U24 7/9	UY85 4/3
6SL7GT 5/6	CY1 12/6	ECC90 8/3	EZ82 8/6	U24 7/9	VP1321 15/-
		ECC91 8/3	EZ82 8/6	U24 7/9	W7 3/9
		ECC92 8/3	EZ82 8/6	U24 7/9	W7 2/6
		ECC93 8/3	EZ82 8/6	U24 7/9	X63 6/6
		ECC94 8/3	EZ82 8/6	U24 7/9	
		ECC95 8/3	EZ82 8/6	U24 7/9	
		ECC96 8/3	EZ82 8/6	U24 7/9	
		ECC97 8/3	EZ82 8/6	U24 7/9	
		ECC98 8/3	EZ82 8/6	U24 7/9	
		ECC99 8/3	EZ82 8/6	U24 7/9	
		ECC100 8/3	EZ82 8/6	U24 7/9	

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

GETTING STARTED WITH TRANSISTORS

By L. E. Garner, Jr.

- How transistors began: learning to read electronic diagrams: how transistors work: amplifiers: oscillators: transistor types: diodes, photo transistors, rectifiers: transistor ratings: testing transistors. Postage 1/- 28/-
- RADIO SERVICING PROBLEMS** by W. A. L. Smith. 5/-, Postage 6d.
- AUDIO & ACOUSTICS** by G. A. Briggs. 10/6, Postage 9d.
- RADIO & TELEVISION REFERENCE DATA.** Compiled by J. P. Hawker. 10/6, Postage 1/-.
- FREQUENCY DIVIDER ORGANS** by A. Douglas. 25/-, Postage 9d.
- THE RADIO AMATEUR'S HANDBOOK** by A.R.R.L. 1963 ed. 36/-, Postage 2/6.
- ELECTRONIC ORGAN HANDBOOK** by H. E. Anderson. 40/-, Postage 1/-.
- UNDERSTANDING AMATEUR RADIO** by A.R.R.L. 18/-, Postage 1/3.
- RADIO SERVICING** by A. Marcus. 50/-, Postage 1/6.
- 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.

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

Mains Voltage Adjuster

BY V. E. HOLLEY

THIS simple piece of equipment makes it possible by a turn of a switch to vary the mains supply voltage by up to about 50V above or below normal. It will be especially useful to those who have to service receivers in areas where the supply voltage is not uniform and can also be used to compensate for lost volts during peak load periods.

This device consists essentially of an auto transformer arranged so that both the input and output windings can be varied at will as shown in Fig. 1 and a meter to indicate the output voltage.

Choice of Transformer

It will be seen at once that although the transformer is an indispensable part of the device, it does very little work, so that quite a large output is obtainable from a component of modest size.

An ordinary mains transformer as used in radio receivers is quite suitable and it does not matter if one or more of the secondaries is defective, so long as there are no shorted turns. The transformer must have a tapped primary and needs, of course, to be chosen with some regard to the output required. The following figures refer to the transformer used in the prototype and show how the maximum output current may be calculated.

Secondary ratings:

350-0-350V 120mA (700 x 0.12)	= 84 volt-amps
6.3V 2A	= 12 volt-amps
6.3V 4A	= 24 volt-amps

Total 120

Assuming a transformer efficiency of 80 per cent, this total may be increased to 150 when referred to the primary and it is deduced that the primary will be capable of 150 volt-amperes at the lowest input tapping of 200V; and that the maximum current which can safely be permitted to flow through it is $\frac{150}{200} = 0.75A$.

This figure however, relates to service in a radio receiver, where the poor form factor of the h.t. secondary current, caused by the presence of the rectifier and reservoir capacitor, contributes appreciably to the heating effect.

A further consideration is that the currents in the two sections of an auto-transformer winding are in exactly opposite phase, so that the current in the section which is common to both input and output circuits is limited to the difference between the input and output currents. Thus the full output current will flow only in that small portion of the

winding which is used to step the voltage up (or down) and its heating effect will be correspondingly small.

The result of all this is that the figure arrived at by calculation may be increased by about a third, and in fact, the transformer in the prototype unit becomes only faintly warm when a current of 1A is drawn continuously.

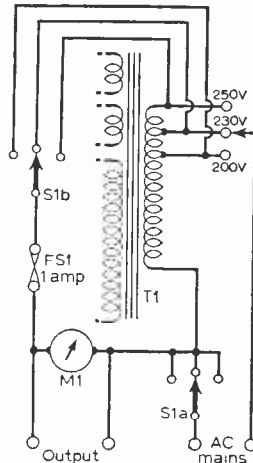


Fig. 1: The circuit of the unit.

Other Components

The 2-pole, 4-way rotary switch, S1, should be of the "make before break" variety. One pole (a) is used as a mains on/off switch in the input circuit and the other (b) to select the required output windings.

An a.c. voltmeter, reading to 300V, is needed to indicate the output voltage. High accuracy is not necessary and a cheap moving iron meter will be quite satisfactory.

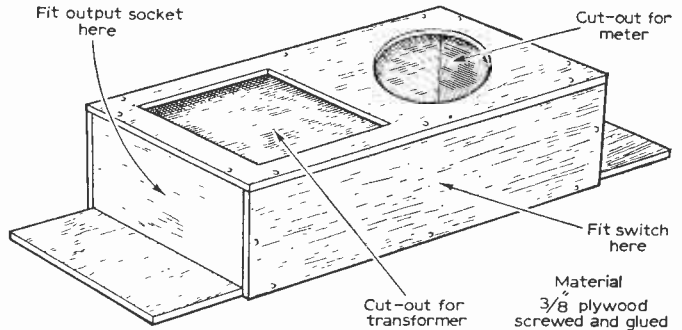


Fig. 2: Construction details of the case.

The cartridge fuse, FS1, in the output circuit should be of the anti-surge type, and its value should be chosen according to the maximum permissible output current.

Construction

The form of construction is unimportant. The prototype was built in a 3/4 in. plywood box 9 in. x 4 1/2 in. x 2 1/2 in. the bottom being extended at each

—continued on page 974

Testing Dry Batteries

By G. A. W. Partridge

DRY cells are used extensively as a portable power supply for valve and transistor radios. The cells which give approximately 1.5V each are made into batteries in order to produce the necessary electrical power.

After a certain length of time the cells cease to produce electricity and therefore have to be discarded and fresh batteries installed.

The usual idea, when a dry battery is under suspicion, is to simply test it with a voltmeter (Fig. 1). This is, however, not always satisfactory.

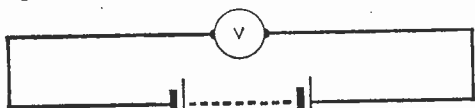


Fig. 1: The straightforward test for dry batteries.

For example, a radio battery was tested in this manner and gave a reading of 9V which was correct, but the radio barely functioned. The answer was that the battery had sufficient power to pass the tiny current necessary to operate the voltmeter but when it was called upon to pass about 25mA for the radio it could not do it.

In other words the e.m.f. (electromotive force) of the battery was still 9V but its p.d. (potential difference) was much less. The answer therefore, is to measure the p.d. and also the e.m.f.

What is the difference?

The e.m.f. can be taken as the battery's open-circuit voltage, and the p.d. is the voltage across the battery when a normal current is being drawn from it. The p.d. varies with this current so the battery should be tested while operating at normal load conditions. The p.d. and e.m.f. readings will

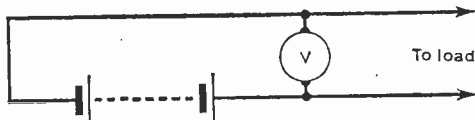


Fig. 2: Testing a battery's p.d.

therefore show up the condition of the battery (Fig. 2).

Another point that is overlooked is that a battery has an internal resistance. Actually the difference between e.m.f. and p.d. is the voltage necessary to overcome this resistance which can be calculated from:

$$r = \frac{E - V}{I}$$

- r = internal resistance.
- E = e.m.f. (open circuit) in volts.
- V = p.d. (closed circuit) in volts.
- I = current in amperes.

Here is an example taken from an actual test. A torch cell was found to have an e.m.f. of 1.4V. It was connected through a milliammeter to a small resistance and the current drawn was 240mA. The p.d. was found to be 1.1V. The internal resistance is:

$$r = \frac{E - V}{I} = \frac{1.4 - 1.1}{240/1000} = \frac{1.4 - 1.1}{0.24} = 1.3\Omega.$$

This cell is starting to deteriorate. The e.m.f. is low and the internal resistance rather high. A test on a good cell indicated an e.m.f. of 1.5 and an internal resistance of 0.37Ω.

A battery of cells will have a higher internal resistance if they are connected in series. For example a 6V dry battery will have four 1.5V cells connected in series. If each cell has an internal resistance of 0.4Ω then the total resistance will be 0.4 × 4 = 1.6Ω.

Large capacity batteries for low voltages and higher currents have their cells connected in parallel. The total internal resistance will then be:

$$\frac{1}{R} = \frac{1}{r} \times \text{The number of cells.}$$

A battery of ten cells, each with a resistance of 0.4Ω will give a battery internal resistance of:

$$\frac{1}{R} = \frac{1}{0.4} \times 10 = 0.04\Omega.$$

MAINS VOLTAGE ADJUSTER

—continued from the previous page

end so that the assembly could be fastened to the workshop wall. Details are given in Fig. 2.

Measurements will, of course, depend on the size of the transformer and meter. Connection to the mains should be by 3-core cable so that the exposed metal of the transformer can be earthed.

Operation

The prototype is operated from a supply which is nominally 240V but is frequently less. The mains voltage adjustment on the transformer is therefore usually set at 230V and voltages of 200, 220 and 240 are then available by operation of the switch.

In addition to providing supplies to receivers and amplifiers of varying voltage requirement, the unit is extremely useful for supplying a soldering iron. A high voltage can be used for quick heating, after which it can be reduced to normal or, if the iron is not to be used for some time, to sub-normal to keep it "simmering" ready to be brought quickly to working temperature when required.

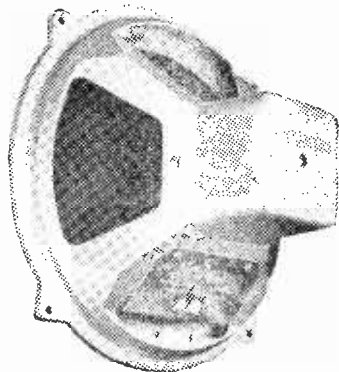
An indicator lamp, supplied from one of the 6V transformer windings could be fitted, if desired, but is not essential as the voltmeter serves the same purpose.

ONE WORD OF WARNING: The unit should not be left unattended for long periods when it is being used to compensate for a reduced supply voltage, because if the supply should return to normal, damage might be done to equipment connected to it.



Stentorian

MODEL H.F. 1016 'MAJOR'



This unit makes use of the high flux density available in the magnet system of the previous H.F.1016 unit. A curved diaphragm is used with a rigid centre section coupled to the voice coil. The rigid coupling and the design of the cone termination give a balanced response over the whole audio range. The unit is specially suitable for use in the smaller type of enclosure having a volume of approximately 1½ cubic feet.

Type	Flux Density	Price	Type	Flux Density	Price
8" H.F.816*	16,000 gauss	£6.0.0	T.816	16,000 gauss	£5.13.6
8" H.F.812*	12,000 gauss	£3.12.9	T.12 tweeter	16,000 gauss	£13.4.6
8" H.F.810	10,000 gauss	£2.14.3	T.10 tweeter	14,000 gauss	£4.8.3
6" H.F.610	10,000 gauss	£2.5.0 Steel £2.6.9 diecast	T.359 tweeter	9,000 gauss	£1.10.6

* These 2 speakers incorporate a universal impedance speech coil

Specification:

Chassis—die cast aluminium;
Cone—graded pulp cambric surround; Cone dia.—10 ins., Pole dia.—1 in.; Flux density—16,000 gauss; Total flux—64,000 maxwells; Impedance—15 ohms.

Price: £8.19.6 (inc. tax)

WHITELEY ELECTRICAL RADIO CO. LTD. MANSFIELD, NOTTS.

Telephone: MANSFIELD 1762-5

London Office: 109 Kingsway, London, W.C.2

WA3

and now

MARTIN AUDIOKITS

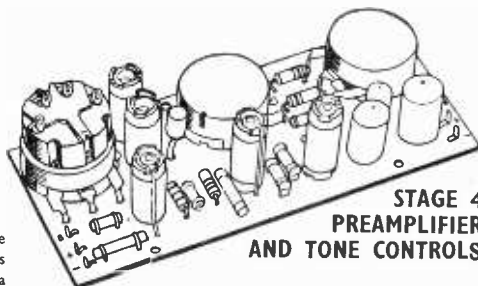
THE NEW WAY TO BUILD HI-FI

SAVES YOU SPACE, TIME & MONEY

THE RANGE SO FAR

- UNIT 1 5-stage input selector ... £2 7 6
 - UNIT 2 Pre-amp with vol. control ... £1 17 6
 - UNIT 3 3-Channel mixer Matching adaptors for same, each ... £3 19 6 8 6
 - UNIT 4 Pre-amp and tone control ... £3 2 6
 - UNIT 5 10 watt power amplifier ... £5 12 6
 - UNIT 6 Mains power supply unit ... £2 12 6
- Kits complete with knobs, instructions, etc. Escutcheons available to requirements.*

MARTIN AUDIOKITS comprise five basic transistorised kit designs and mains power pack. From them you can build a hi-fi assembly and then enlarge it by adding further units or you can add Audiokits to existing installations. You can eventually build a superb stereo assembly much of which will be units purchased originally. Care and thought have gone into these designs. Superb circuitry with simplicity of presentation bring fascinating new standards of building and performance.



STAGE 4
PREAMPLIFIER
AND TONE CONTROLS

- ★ FULLY TRANSISTORISED
- ★ EASILY MOUNTED
- ★ EASILY ENLARGED TO STEREO
- ★ COUPON BRINGS LEAFLETS

KITS FOR TAPE ENTHUSIASTS

MARTIN RECORDAKITS enable you to build a complete tape recorder (2 or 4 track) or pre-amp and deck assembly for use with hi-fi. LEAFLETS ON REQUEST.

TRADE ENQUIRIES INVITED

MARTIN ELECTRONICS LTD. 154-155 HIGH STREET, BRENTFORD, MIDDLESEX (LeWorth 5885/1161)

MARTIN ELECTRONICS, 154/5 HIGH STREET, BRENTFORD, MIDDLESEX

Please send details of MARTIN AUDIOKITS
Please send details of MARTIN RECORDAKITS

NAME.....

ADDRESS.....

BLOCK LETTERS.....

PW.2

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


Elegant Seven

COMBINED PORTABLE & CAR RADIO

The Radio with the STAR features

- ★ 7-transistor superhet. Output 350mW.
- ★ Two-tone grey wooden cabinet, fitted handle with silver coloured fittings. Size 7½ x 8½ x 3½in.
- ★ Horizontal tuning scale, size 1½ x 2½in, in silver with black lettering.
- ★ All stations clearly marked.
- ★ Ferrite-rod internal aerial.
- ★ I.F. 470 Kcs.
- ★ Operated from PP9 battery.
- ★ Full comprehensive instructions and point-to-point wiring diagram.
- ★ Printed circuit board, back printed with all component values.
- ★ Fully tunable over medium and long waveband.
- ★ Car aerial socket.
- ★ Full after-sale service.

FREE—limited period only —
30-watt **ELECTRIC SOLDERING**
Iron, value 15/-, to every purchaser of the parts for the "Elegant Seven".



ONLY £15.9.6



Plus 5/6 P. & P. Parts list & circuit diagram 2/6. FREE with parts. 4/- in. Speaker also available, 7/6 extra.

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.

VALVES FOR RADIO, TV AND AUDIO APPLICATIONS

All valves sold by us are first quality, unused and guaranteed for three months.

WHEN ORDERING BY MAIL, PLEASE ADD 2/6 IN THE £ FOR MINIMUM CHARGE 1/6.

0A2	8/-	8AH6	11/-	8BL7GT	5/-	8SA2	8/6	8E11	11/-
0A3	11/-	8AK5	5/-	8BN7GT	4/8	807	9/-	8E121	11/-
0B2	6/-	8AK6	7/-	8Q8GT	5/-	814	20/-	8E80	8/-
0B4	6/-	8A15	3/-	8I4GT	9/8	822	20/-	8E940	8/-
0C3	5/6	8A36	4/-	8V6	9/-	866A	14/-	8F74	6/6
0D3	5/6	8A25	6/-	8A36	4/-	884	10/-	8E955	6/6
1A7GT	8/-	8A86	6/-	8V6GT	5/6	954	5/-	8E988	10/-
1A7GT	7/-	8A86	5/-	8A4	4/-	955	3/-	8E980	7/6
115	7/6	8A87G	22/6	8X54	4/6	957	5/-	8E982	7/-
13BGT	7/-	8A76	4/-	8X5GT	5/6	958A	4/-	8E981	10/-
115GT	8/-	8A19	7/-	8V6GT	5/-	9670	10/-	8E985	10/6
1N3GT	8/-	8A56	6/-	8Z4	4/-	9674	10/-	8E982	8/-
1B5	5/-	8B7	5/-	10P11	7/-	6146	27/6	8E981	8/-
1B4	5/-	8B8	5/-	10P11	12/-	9602	5/-	8E983	7/6
1B2	6/6	8B8	4/8	12A18	11/-	9603	7/-	8E980	6/6
1P4	3/-	8B8B	5/-	12A18	7/-	AZ1	9/-	8E982	7/6
114	5/-	8B8B	7/-	12A17	5/-	AZ1	9/-	8E983	10/6
115	6/-	8B8	8/-	12A17	5/-	AZ1	6/6	8E980	10/6
1A2A	7/-	8BQ7A	8/-	12A17	6/-	C11	5/-	8E974	8/-
1X2B	7/-	8B17	11/6	12A17	10/-	C133	9/-	8E940	9/-
2W4	14/-	8B8B	6/-	12A18	9/-	C131	6/6	8E942	6/6
2D21	6/-	8B8G	9/-	12B26	5/-	DA132	8/-	8E940	5/6
2X2	3/-	8B8W	9/-	12B26	5/-	DA132	8/-	8E940	5/6
3A4	4/-	8C0GT	6/-	12B27	8/-	DA191	4/6	8E985	6/-
3B4	7/-	8C0	6/-	12B27	8/-	DA192	6/6	8E986	6/-
3B7	5/-	8C4	7/-	12K5	10/-	DA196	6/6	8E987	10/6
3B28	15/-	8C6G	5/-	12Q7GT	5/-	DF91	3/-	8E989	4/6
3D6	4/-	8C0D6A	12/6	12R17	3/-	DF96	6/-	8E989	5/6
3E29	50/-	18/-	12R17	10/-	DK32	8/-	8E988	10/-	
3E4	6/6	8C15	10/-	12R17	10/-	DK39	5/-	8E983	7/6
3Q3GT	7/6	8C86	7/3	19B36GT	10/-	DK92	6/6	8E984	10/-
3B4	5/-	8C14	14/-	20L1	14/-	DK96	6/6	8E984	10/-
3V4	5/6	8D4	15/-	20P1	14/-	DL32	7/-	8E986	8/-
8R46Y	9/-	8D84	15/-	25A1GT	8/6	DL96	12/6	8E983	8/3
1345	6/6	8E1	6/6	25A1GT	8/6	DL96	12/6	8E983	8/3
5U4GB	6/6	8F17	6/-	25Z3	7/6	EL30	6/-	8E986	8/-
5V4G	8/-	8J4	9/-	25Z6GT	8/6	EL30	6/-	8E987	10/6
5Y3G	4/-	8J5	5/-	28I7	7/6	EL30	6/-	8E987	10/6
5Y3GT	5/-	8J7G	6/-	30P5	8/6	EL30	6/-	8E987	10/6
5Z8	6/-	8K6GT	6/-	30P19	14/-	EL30	6/-	8E987	10/6
5Z4	9/-	8K7	5/-	25Z3	7/6	EL30	6/-	8E987	10/6
5Z40	7/6	8K8G	4/-	36L0GT	7/6	EL30	6/-	8E987	10/6
5Z4GT	8/-	8L6	9/-	35W4	5/-	EL30	6/-	8E987	10/6
6A6	6/-	8L6GT	6/-	35Z46	5/-	EL30	6/-	8E987	10/6
6A8G	6/-	8L8	6/-	35Z6GT	6/-	EL30	6/-	8E987	10/6
6A84	6/6	8M7	6/-	39Y5	8/6	EL30	6/-	8E987	10/6
6A87	4/-	8Q74	6/-	50E5	6/6	EL30	6/-	8E987	10/6
6A87	3/-	8I7	6/-	50E5	6/6	EL30	6/-	8E987	10/6
6A87	6/-	887G	5/-	50L1GT	8/6	EL30	6/-	8E987	10/6

Z & I AERO SERVICES LTD.,

Retail Shop: 85, TOTTENHAM COURT ROAD, W.1

Tel. LANgham 8403

Head Office and Warehouse now in new premises at: 44A WESTBOURNE GROVE, W.2.

Tel. PARK 5641-2-3.

Please send ALL correspondence and Mail Orders to the Head Office.

AUTOMATIC TELEPHONE DIALS, marked 0 to 9 only, reclaimed from equipment, good condition ... 12/6 P.P. 1/6

LOUDSPEAKERS: 3in. round 4.5Ω ... 12/6
3in. round 5Ω ... 12/6
Tweeters 5in., 3Ω ... 12/6 } P.P. 2/6

TANGENTIAL BLOWERS, 230V A.C. Electric motor, coupled direct to a blower rotor 2½in. dia., 5 7/8in. long. Rec. tangential air outlet 1½ x 7in. Suitable for ventilating interiors of electronic equipment. Can also be used as space heater when blowing the air through a fire bar element. ... 35/-, P.P. 7/6

MINIATURE COMPONENTS FOR TRANSISTOR RADIOS SET OF 3 I.F. COILS, prepared to 485 Mc/s ... 18/- P.P. 1/6

DRIVER TRANSFORMER for Push-pull Output, type TT45, Ratio 4.5 to 1-1. Bilhar wound ... 5/- P.P. 1/6

PUSH-PULL OUTPUT TRANSFORMER, type TT48, Ratio 4+4 to 1. For 3½" speech coil. Primaries bilhar wound ... 5/- P.P. 1/6

EDGEWISE VOLUME CONTROL, 3000Ω carbon track with switch. With enclosed switch, 5/3. With open switch, 4/-, P.P. 1/6.

SPECIAL OFFER OF HIGH STABILITY 1% RESISTORS 1000Ω, 1% perfect for making a decade box. Ten for 5/-, post paid.

TRANSISTORS

MULLARD					
OC28	17/6	OC71	5/-	OC78D	7/-
OC35	15/-	OC72	8/-	OC81	7/-
OC44	8/-	OC73	7/-	OC81D	7/-
OC45	8/6	OC73	8/-	OC139	12/-
OC70	5/-	OC78	8/-	OC170	8/-
R.C.A.	2N410 (I.P. 365 k/s)				4/3
	2N412 (540-1600 k/s mixer)				4/3
MICRO ALLOY V.H.F. TRANSISTORS					
MAT101 (60 Mc/s) 8/8		MAT121 (120 Mc/s) 8/8,			
SUBSTANDARD TRANSISTORS: These are perfectly suitable for most applications where maximum gain is not required.					
OC14	2/3	OC45	2/3		



AMATEUR RADIO SOCIETY OF CHESHAM AND DISTRICT

Hon. Sec.: M.A. Woof, G3SGO/T, "Copperkins", Copperkins Lane, Amersham, Buckinghamshire.

Prospective members are invited to attend any Club meeting, especially those interested in joining the R.A.E. course which is being run at the moment. It should be noted, however, that the club-night has been changed recently to Fridays.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

At the meeting for December 11th, members reviewed the events of 1963 as they appeared in members' photographs taken throughout the year. Later in the month on the 15th, members competed for the G5YY Trophy and on the 18th the Annual Christmas Party provided an enjoyable evening for all who attended.

The first day of the New Year was marked by a surplus sale.

LICHFIELD AMATEUR RADIO SOCIETY

Hon. Sec.: V. Hickman, 143 Main Street, Stonnall, Walsall, Staffordshire.

A full programme of lectures and social activities is helping to increase the membership of this Society. All meetings are held at the Swan Hotel in Lichfield on the first Monday and third Tuesday of each month.

MITCHAM AND DISTRICT RADIO SOCIETY

Hon. Sec.: A. L. Thurley, 50 Bruce Road, Mitcham, Surrey.

The meeting for December 6th was devoted to a film show arranged by G3LCH, the Society's Chairman.

The main event of the meeting on December 20th, was a constructional contest.

NORTHERN HEIGHTS AMATEUR RADIO SOCIETY

Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, Yorkshire.

The Society's third Annual Dinner was held on December 11th and this proved to be a most enjoyable event. This was followed a week later by a ragchew meeting.

The first meeting of the New Year was held on January 1st, when Mr. H. Makin gave a lecture entitled "The Building of a 10-80 Transmitter."

READING AMATEUR RADIO CLUB

Hon. Sec.: R. G. Nash, G3EJA, "Peacehaven", 9 Holybrook Road, Reading, Berkshire.

A session of questions and answers was the main event at the December meeting of this Club, when members met at the Palmer Hall in Reading on the 28th. However the competition for a Club badge design, was judged on the same evening.

SCARBOROUGH AMATEUR RADIO SOCIETY

Hon. Sec.: P. B. Briscombe, G8KU, "Roseacre", Irton, Scarborough, Yorkshire.

The meeting for December 12th was devoted to a review of the past year, in photographic slides, and on December 19th members, their families and friends, had an enjoyable time at the Society's Christmas party.

SPEN VALLEY AMATEUR RADIO SOCIETY

Hon. Sec.: N. Pride, 100 Raikes Lane, Birstall, Nr. Leeds.

Because of the Season's festivities only one meeting was held during December. This was on the 12th and was a film show.

STOURBRIDGE AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: R. A. G. MacIntosh, 50 Field Lane, Oldswinford, Stourbridge, Worcestershire.

On December 20th, members gathered in the Bell Hotel in Stourbridge for the usual Christmas informal get-together.

UXBRIDGE RADIO SOCIETY

Hon. Sec.: A. Duell, "Treetops", Bakers Wood, Denham, Buckinghamshire.

Activities currently under progress in this Society include an R.A.E. class (in preparation for the May examinations) and also a series of lectures on oscilloscopes and communications.

WEST KENT AMATEUR RADIO SOCIETY

R. Trevitt, 28 Dales Avenue, Tunbridge Wells, Kent.

On December 13th a group of members went out on a pre-arranged visit, and later in the month on the 20th, the Society's Christmas party was held.

WIRRAL AMATEUR RADIO SOCIETY

Hon. Sec. A. Seed, G3FOO, 31 Withert Avenue, Bebbington, Wirral, Cheshire.

On December 18th, members attended a lecture given by Mr. Roberts, (G3EFX), his subject being valves.

On January 1st the Society held a symposium under the title of "Why Amateur Radio Appeals to me."

TEST GEAR TECHNIQUES

An error in Fig. 9 of this article (page 429 of the September issue) has been pointed out by several readers. The cathode of V1 should have inserted a 300Ω resistor, and the grid 3 load, shown as 300Ω, should in fact be 500kΩ.

THREE-WATT AMPLIFIER

Two errors appeared in this article which was published in the November issue. In the circuit diagram and components list V2 is given as an EL86. This should be an EL84 as mentioned in the text. Also in the components list, the mains transformer is shown to have a rating of 8mA instead of the correct 80mA.

HELP FOR HOME BUYERS

When you are buying or selling property it is vitally important to know where you stand as far as the law is concerned. Ignorance or carelessness might cost you hundreds of pounds. There's sure to be a big welcome, then, for the new FREE LEGAL ADVICE SERVICE just announced by Newnes *Property Advertiser and Holiday Guide*. Every week, from now on, this paper will carry questions and answers on such topics as mortgages, insurance, surveying and general legal points. In addition any reader may have his own particular questions answered by a panel of experts simply by filling in a Query Coupon on the Legal Advice Page. Newnes *Property Advertiser and Holiday Guide*, which contains details of thousands of houses, flats, shops, business and holiday addresses, is on sale every Thursday, price 4d.

DEFINITELY THE LAST WORDS ON "LICENCES"

SIR.—I offer the following in reply to all those who seek "novice licences":

Enough, let's hear no more these weary tales,
 These jealous cries of Tired Tims and mental snails.
 Let their authors, miserable souls,
 Use up their leisure playing bowls.
 A curse on all these armchair critics
 Seeking complimentary tickets.
 Away ye parasites and infant bawlers,
 Spawn of Weirdies, Lids and Creepy Crawlers.

Let's hear, instead, the voice of men,
 Who though they fail will try again,
 And when they finally succeed
 Their Call Sign is a prize indeed.
 —GW3PHH.

MAGNETIC PICKUP

SIR.—I do not wish to criticize unduly, but I do think that the pre-amplifier described by Mr. Banthorpe in his very interesting article on a "Magnetic Pickup" in the July 1963 issue, is worthy of attention. The circuit as shown on page 274 will not work unless the transistors are chosen for their current gains (β).

Consider: the base current of Tr1 is $4.2/330\text{mA}$ assuming a V_{be} of 0.3V. This equals 0.013mA. In order that this stage should conduct properly and not "bottom", the voltage drop across the collector load ($22\text{k}\Omega$) should not be more than 3.5V approximately.

This means that the β of Tr1 should be less than $\frac{3.5}{0.013 \times 22} = 12.2$. If the β is greater than 14, Tr1 will "bottom". From the Mullard data, the average β of an OC71 is 40. Admittedly, at the low values of collector current used that β will be lower than this figure, but it cannot be guaranteed that it will be less than 12.

It can likewise be shown that if the current gain of Tr3 is greater than 9.5 this stage will be permanently "bottomed" which will make it insensitive to all but the positive peak signals—a very effective clipping device. Unfortunately, if the first stage is "bottomed" this will only be sensitive to negative peaks, so as a whole the circuit is rather insensitive.

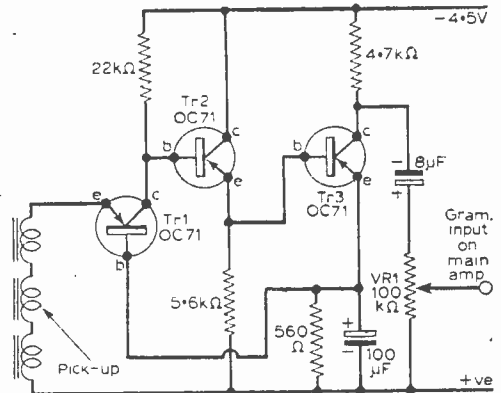
I enclose a somewhat better circuit. This has the advantage that the circuit is d.c. stabilised by negative feedback and is thus unlikely to "run

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

away". It is also tolerant of β in all stages. It should be noted that the method of biasing a transistor with a single resistor in the base lead, makes the circuit extremely critical since the value of the resistor depends upon β which is a variable parameter. The only advantage is a reduction in the number of components required. However, a method of overall d.c. feedback as shown, can have this advantage with none of the disadvantages of instability.—D. G. WHITEHEAD (Marple, Cheshire).

[The author of this article has read and agreed with Mr. Whitehead's observations and has suggested they should be published for the benefit of any readers who have built or are contemplating building the pre-amplifier.—Ed.]



The revised circuit of the Magnetic Pickup pre-amplifier.

IN DEFENCE OF THE HAM

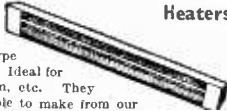
SIR.—After reading the letter from Mr. H. A. L. Wagner (December issue) in his self-appointed role of "picador of the air", like any tortured animal in the ring, I have been goaded into making this reply.

Practically everyone knows, of course, that the average licensed radio amateur, far from being a ham (a detestable misnomer, this) is more likely to be a professional of very high standing, and indeed the electronics and associated industries would look very sick without him.

Reading between the lines of Mr. Wagner's letter, it appears to me to be a strong case of "sour grapes", and your correspondent displays a great

Infra-Red Heaters

Make up one of these latest type heaters. Ideal for bathroom, etc. They are simple to make from our easy-to-follow instructions—uses silica enclosed elements designed for the correct infra-red wavelength (3 microns). Price for 750 watt element and metal casing as illustrated 18/6, plus 2/6 post and insurance.



Limited Quantity Only

Waterproof heater wire. 16 yds. length. 70 watts. Self-regulating temperature control. 10/-, post free.

Microphone Inserts

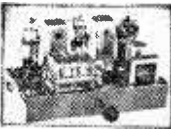
American made. Dynamic type. Real bargain at 3/6, plus 6d. postage.



Crysal type 5/6.

Beginner's Superhet

As supplied to many schools and colleges. A simple basic superhet—easy to understand and which can be progressively extended—ideal for students—components include—valves—metal rectifier tuning condenser—1.F. transformers, etc. In fact complete superhet except speaker. Price 23 plus 2/6 post and insurance. Data included tree or sep., 1/6.



Copper Clad Element

Plant this under a reflector to make ideal infrared heater, also suitable for building into convector, blower heater, drying cabinet, etc. 230/240 v., 1250 watts, 12 in. long but can be bent to almost any shape. 7/6, plus 2/6 post and insurance.

This fine cabinet less control knobs is available this month at a special snip price of 15/6, plus 4/6 post and insurance. Size is 13 1/2 in. x 9 in. x 4 in. and it is neatly covered in two tone l.c.l. fabric.

Cabinet Snip



Yaxley Switches

- | | |
|---------------------|---------------------|
| 1 pole, 2 way 2/- | 1 pole, 3 way 2/- |
| 1 pole, 4 way 2/3 | 1 pole, 5 way 2/6 |
| 1 pole, 7 way 3/- | 1 pole, 9 way 3/- |
| 1 pole, 11 way 3/- | 1 pole, 12 way 3/3 |
| 2 pole, 2 way 2/3 | 2 pole, 4 way 2/6 |
| 2 pole, 5 way 5/- | 2 pole, 6 way 3/6 |
| 2 pole, 12 way 5/6 | 3 pole, 3 way 3/- |
| 3 pole, 6 way 4/- | 3 pole, 12 way 8/6 |
| 4 pole, 2 way 3/- | 4 pole, 3 way 3/6 |
| 4 pole, 4 way 3/6 | 4 pole, 5 way 6/6 |
| 4 pole, 6 way 6/6 | 4 pole, 11 way 10/6 |
| 4 pole, 12 way 11/6 | 5 pole, 3 way 4/6 |
| 5 pole, 4 way 8/- | 5 pole, 12 way 14/6 |
| 6 pole, 6 way 9/6 | 6 pole, 3 way 4/6 |
| 6 pole, 12 way 17/6 | 6 pole, 11 way 18/6 |
| 8 pole, 4 way 6/6 | 8 pole, 2 way 6/6 |
| 8 pole, 4 way 7/6 | 8 pole, 6 way 11/6 |
| 8 pole, 12 way 23/6 | 12 pole, 2 way 8/- |
| 12 pole, 5 way 16/6 | 12 way fader 3/6 |

1 pole, 6 way incremental sliding, 3/6
Please add 1/- post and packing for all orders below 4/3.

Meter Bargains

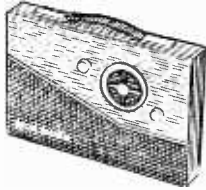
2in. Moving Coil 500 micro-amp. f.s.d. Brand new, 17/6, plus 1/- Packing and Insurance.

CABINET & PICK-UP

Made for a famous company intending to make a Battery Record Player but changing their minds. This is an extremely nice 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 CosmoCORD pick-up with crystal cartridge and sapphire stylus. Both items new and perfect. Only 19/6, plus 4/6 post and insurance.



GOOD COMPANION Mark III



The 6 transistor set with the incorporating all the latest requirements. Anyone who can solder can make it. Many thousands already in use all over the country. Pull 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 20R. Variable feed back gives excellent tone. ONLY £5.19.6 Plus 3/6 Post and Ins.

THIS MONTH'S SNIP

POCKET SIZED TAPE RECORDER

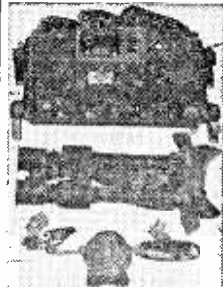


Smallest precision Tape Recorder—made—Push button control—will record and play back in your pocket—uses standard 1" tape and easy to replace batteries.

SPECIFICATION. Dimensions 6 1/2" x 2 1/2" x 1 1/2", weight 14 ozs. Recording time 12 mins., re-winding time 1 min. Magnetic erasing. Wow and flutter, within 2% and frequency response 300-12000 c/s (within 6dB)

Plus 2/6 Post and Ins. One month ONLY £6.19.6

Tabby Equipment



With details to make Closed Circuit TV Lens System. "See in the dark" equipment comprising 5000V power pack which contains ignition coil vibrator, etc. Control unit, interconnecting cables and Infra-red binoculars. Offered for one month only at the give away price of £3.19.6, plus 1/6- carriage. These are unusual, just as received from the Ministry, believed in good working order but sold without guarantee.

"CORONET" Mk. III

An excellent pocket size set using 3 MAT transistors for the oscillator and I.F. stages and 3 junction types including a matched pair for the output stage. It fully covers the medium-wave band and that part of the long-wave band to bring in B.C. Light. The circuit includes a highly efficient slab aerial and Plessey tuning condenser incorporating wave change switch. Overall size approximately 4 1/2" x 2 1/4" x 1 1/2". Supplied complete with carrying case. This two-wave pocket set is available whilst stocks last at the very low price of £3.12.6.

MULTI-METER BARGAIN



Model number EP10K. Extra wide scale fitted corner wise for compactness, extra accurate as it uses 1% components. Sensitivity 10,000 ohms per volt A.C. and D.C., ranges 1 A.C. voltage up to 1.2kV in 5 ranges. A.C. voltage up to 1.2kV in 5 ranges. D.C. current up to 300mA 3 ranges. Resistance up to 2 meg. Capacities .005 to .15 mfd and decibels. Complete with full instructions and test prods and battery for ohms range. A real bargain not repeatable once stocks cleared. Price 69/6. Carriage and insurance 5/-.

Electric Blanket Spares

We carry a good stock of elements, thermostats and switches etc. for Electric Blankets. Send S.A.E. for list.

Timer Kit

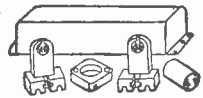
Special offer of all components except metal box to make mains operated interval timer for photography etc. 12/6 plus 2/6 post.

5000 mFd Condensers

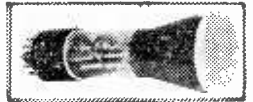
12 V., working—Plessey—perfect. 2/- each, 18/- doz.

Fluorescent Light Bargain

For pelmet or window lighting, etc. Kit of parts comprising: choke, two lamp holders, starter holder and starter. 40 watt, 18/6; 80 watt, 27/6. Plus 2/6 post and insurance.



Building A 'Scope



3in. oscilloscope tube. American made type No. 3EP7, 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.

Adjustable Thermostat



Suitable for Industrial or domestic purposes, such as controlling furnace oven, immersion heater, etc. Can also be used as a flamestat or fire alarm. Made by Sunvic these are approximately 17in. long and adjustable over a range 0 to 550 F. The contacts are rated at 15 amps, 230 volts, and the adjustment spline, which comes to the top, can be fitted with a flexible drive for remote control or just a pointer knob for local control. Listed at 23 or 24 each, these are offered at only 8/6, plus 2/6 postage and insurance.

Ice-Stat

This is a small thermostat which cuts on and off at around freezing point. Has many uses, one of which could be an ice warning device to be fitted under your motor car. Price 7/6, post 1/-.

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.

15 amp. Thermostat

Adjustable over a fairly wide range of temperatures but set for 70 F., suitable for wall mounting to control room heaters. Exceptional bargain at 9/6, plus 1/- post and insurance.

B29 Receivers

A fine receiver made by the famous Marconi Company. Covers the shipping bands 15 K/c to 560 K/c in four switch stages. Has vernier tuning and all refinements. Works off A.C. mains with internal power pack. These sets need servicing, but we are selling at less than spare parts value i.e., £5.0.0, plus 30/- carr.

ELECTRONICS (CROYDON) LTD
266 LONDON ROAD, WEST CROYDON, SURREY,
(Opposite SAVOY CINEMA)

TRANSISTORS			
Mullard	AF127	9/6	OC72 5/8
	OA2207	7/5-	20C72 16/-
AC107 14/8	OC16W	35/-	OC74 8/-
AD140 25/-	OC19	25/-	OC75 5/6
AF102 27/6	OC26	25/-	OC78 8/-
AF114 13/-	OC35	12/-	OC81 5/8
AF116 10/8	OC42	6/-	OC81M 8/-
AF116 10/8	OC44	5/-	OC82 10/-
AF117 9/8	OC44M	9/3	OC83 4/-
AF118 20/-	OC45	5/-	OC139 8/-
AF124 10/-	OC45M	9/-	OC170 9/8
AF125 10/8	OC70	6/8	OC171 10/8
AF128 10/-	OC71	4/3	
DIODES			
BY100 7/6	OA90	3/-	GEX34 4/-
OA70 3/-	OA91	3/-	GEX35 4/-
OA79 3/-	OA95	3/8	GEX36 10/-
OAB1 2/-	OA210	9/8	

SETS OF TRANSISTORS
 Set 1, Comprising OC44, 2x OC45, matched pair OC81 .. 32/6 set
 Set 2, Comprising OC81 Driver, matched pair OC81 .. 20/- set

VALVES			
DK96 7/9	PC84	7/8	PCL82 9/-
DAF6 6/9	PL82	7/6	6V6G 4/-
DF96 6/9	PY83	7/8	6K7G 2/-
DL96 6/9	UABC80	7/6	6AM6 3/8
EC81 5/-	UAF42	7/8	EB91 3/6
EC82 5/6	UBF90	7/8	1R5 5/3
EC83 6/-	UCH42	7/8	1T4 3/8
EC84 7/6	UL41	7/8	1S5 4/8
EC85 7/6	EY31	8/-	3S4 5/8
EC86 7/6	PL81	8/8	6KR8 4/9
EC87 7/6	PL36	9/8	6L6G 7/6
EC88 7/6	PCL83	9/8	6QZ7 5/6
EC89 7/6	PCF82	9/8	6X5G 5/-

METAL RECTIFIERS			
K3/25 6/9	K8/25	6/9	M3 2/10
K3/40 9/-	K9/40	8/-	B3/20 4/3

Contact Cooled Types

SILICON RECTIFIERS			
C2D 8/6	C3B	14/-	C3D 10/6

125v. 500mA 5/- 250v. 500mA 6/6

MICROAMMETERS
MILLIAMMETERS
 0-50 mA 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/-.

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 Autoslim, automatic, with GC8 Mono cartridge, £7.15.0.
 Garrard Autoslim, automatic, with EV26 Stereo cartridge, £8.10.0.
 Garrard Autoslim, de luxe, with GC8 Mono cartridge, £11.5.0.
 Garrard Autoslim 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.

MICROPHONES
 Acos Mic 39/1 £1 12 6
 Floor Stand Adaptor 12 6
 Acos Mic 45 12 6
 Table Stand 12 6
 Mic 109C £1.19.8
 Table Stand 7 6
 Acos Mic 40 19 6
 BM3 Microphone £2 5 0
 Floor Stands, MS4-3 sections £2 19 6
 Table Top Stand 8 0

MULTI-RANGE TESTMETERS
 Caby M1 £2 14 0
 Eagle B20 £6 10 0
 Eagle EP10K £4 12 6
 Model 200H £5 5 0
 Eagle EP50K £3 19 6
 Caby A19 £4 17 6
 Taylor 127A £10 0 0
 Eagle TK20A £2 9 6
 Eagle EP30K £6 19 6

American Recording Tape, standard play 5in. spool, 600ft., 9/8; 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.

AMPLIFIERS
 Transistor Amplifier 1 watt, 2 input points with sensitivities of 10 mV and 250 mV. Isolated 3 ohm speaker output, 42/-.
 Transistor amplifier 15 watt, operated from a 12v. battery, push-pull output, 2 separate controlled inputs, 15 μ s., 3 watt valve amplifier, controls: volume, treble, bass with on-off, valves EZ80, ECL86, £4.19.6.
 Amplifier 12 watt output to suit 3, 7 or 15 ohms speaker, 5 valves, EF86, 12AX7, 2 x EL84, E81, 15 μ s.

1964 CATALOGUE
 Now available, send 1/- in stamps for your copy. Trade Catalogue also available. Please attach your Business Letter heading.



ALPHA

RADIO SUPPLY CO.

103 LEEDS TERRACE

WINTOUN STREET

LEEDS 7

TERMS: Cash with Order or C.O.D. Postage and Packing Charges Extra. Single valves 3d. 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.

TELEVISION TUBES
REGUNDED
 21 in. 99/6 Guaranteed 1 Year Ins. and Carr. 10/6.
 17 in. 79/6 Add 10/- refundable on OLD TUBE (110° Tubes in stock.)
 15, 14, 12in. 59/6

EX-MAINTENANCE TESTED TUBES
 Satisfaction Guaranteed.
 15" -36/24, 14K P4, 141, 121, 31/74, and others. Carr. 5/-.

SPEAKERS 7/9 each
 6in. Bin. 7in. x 4in. Money back guaranteed. Enquire for other sizes. Ex. mfd. salvage. P.P. 1/3.

TV EXTRAS
AERIALS 25/-
 Indoor combined. Complete with 12ft. co-ax. and plug. P. & P. 2/6.
AERIALS 35/6
 Loft Combined BBC with 3 element ITA universal fitting.
 P. & P. 3/6.
 Co-ax Cable 6d. per yd. Plus 1/3 ea.
LEGS—Complete with fittings for any set, 35/6.



TELEPHONE 15/6 HANDSETS
 Per Pair
 G.P.O. standard pattern. House to Workshop, garage, inter-office, etc. Works off any small battery. P. & P. 4/6.

17" - £11.10.0

14" - £7.10.0

12 months' Full Written Guarantee.
 Channels for all areas.
 Demonstrations daily in our Shop.
 Personal collection advised.
 Carr. 14in., 20/-, 17in., 30/-.

Insulation Tape 1/6 Roll, 75ft x 1/2 in. wide. Bargain. P.P. 9d.
No Dark Switch—8/9. Safety in the home. Don't get caught in the dark. Limited stock. P.P. 9d.
Portable Tape and Record Cabinets, 19/9. Size 13 1/2 x 10 1/2 x 8 in. Two tone P.P. 5/-.

DUKE & CO. (LONDON) LTD.
 621/3 Romford Road, Manor Park, E.12
 Liverpool St.—Manor Pk.—10 mins. Phone ILFord 6001/2/3

ERSIN MULTICORE SOLDERS

for a first class joint every time

Wherever precision soldering is essential, manufacturers, engineers and handymen rely on MULTICORE. There's a MULTICORE SOLDER just made for the job you have in hand. Here are some of them.

THE NEW HANDY DISPENSER

Easy to find in the tool box—simple to use. The solder is in a continuous coil which can be used direct from the handy free-standing dispenser—in fact, it is virtually a third hand for those tricky soldering jobs. Containing 15 feet 5-core 19 s.w.g. Ersin Multicore Savbit alloy. 2/6



PRINTED CIRCUIT & TRANSISTOR SOLDER

Designed for soldering High Temperature sensitive components. Plastic re-usable reel contains 250 feet of 60/40 High Tin Quality 22 s.w.g. ERSIN MULTICORE SOLDER with 5-cores of non-corrosive flux. Ask for Size 10. 15/- each.



For small users, the same specification is available on a 2/6d. reel.

BIB WIRE STRIPPER AND CUTTER

Strips insulation without nicking wire, cuts wire cleanly, splits extruding flux. 3/6 each



MULTICORE SOLDERS LTD
 MULTICORE WORKS, HEMEL HEMPSTEAD, HERTS. (BOXMOOR 3838)

deal of ignorance. He unmercifully criticizes the licensed amateur and yet praises the pirate operator to the full. The obvious reason why pirates "cut the cackle to a minimum" is the perpetual fear of being traced by the authorities because they are breaking the law.

Mr. Wagner states neither which system of emission nor which bands he operates, and he does not indicate the subject matters heard under discussion, but most of us are quite capable of exchanging technical data if the occasion arises. Conversely, by virtue of our licensing regulations, we are at liberty to discuss much more personal matters at any time—and we do! — REX TOBY (London, W.I.).

EVEREST PRAISE

SIR.—May I say a word of praise for the "Everest" tuner, which was described in the June and July 1962 issues of P.W.? As stated by the author, alignment needed plenty of patience, however once this has been mastered, it certainly does all that was claimed of it, and was well worth the cost of the crystal.—J. SMETHURST (Oldham, Lancashire).

A DIFFERENCE OF OPINION

SIR.—Mr. Hellyer in his article "Test Gear Techniques", published in the November issue of P.W., appears to be confused.

He says: "Mathematically, $NdB = 10 \log_{10}(P2/P1)$, where $P1$ is the input and $P2$ the output power."

This is perfectly correct. The bel is a ratio (logarithmic) of powers. This can be also written, of course, as: $NdB = \log_{10} \left(\frac{V1^2 \times R2}{R1 \times V2^2} \right)$ and, as the author states, if $R1 = R2$ then: $NdB = 10 \log_{10}(V1^2/V2^2)$, or: $NdB = 20 \log_{10}(V1/V2)$.

This however, is not equivalent to: $NdB = 10 \log_{10}(V2/V1)$. . . (a) and therefore cannot be termed as a voltage ratio or as a voltage decibel, which (a) would represent. As $V^2/R = P$ however, therefore: $20 \log_{10}(V1/V2)$ can be said to be again a ratio of powers. There is only one type of decibel—power. Anyone who speaks of the other types of decibels—voltage, resistance, current—either has no knowledge of what he is speaking, or is being deliberately misleading. — P. J. MCGOLDRICK (London, S.E.9).

SIR.—In reply to Mr. Goldrick's letter. This is an example of the academic versus practical controversy more often found in the pages of the "glossy" technical magazines. Mr McGoldrick is as right in his facts as he is rude in his conclusions.

While it is perfectly true that the bel is a logarithm to the base 10 of the ratio of two powers, it is also true that since the power ratio is also the square of the voltage or current ratio for a given load impedance, the power ratio in decibels can be stated as 20 times the logarithm to the base 10 of the voltage or current ratio $V1/V2$ or $I1/I2$. When

using this convenient measuring tool, we do not always state that the expression dB is a power ratio: this is understood. Engineers who regularly employ the dB as a means of response curve, bandwidth and sensitivity checks are quite familiar with its use. They are concerned with comparative voltages, but are well aware that the use of the dB is a mere convenience, not an absolute measurement. They know quite well that $20 \log_{10}(V1/V2)$ is a ratio of power, and do not speak of different types of decibel. In doing so, they are not intentionally misleading and could hardly do their work without knowledge of what they were saying.

A closer reading of page 646 of the November P.W. will show that this stricture was indeed put forward. Space prevented a fuller theoretical discussion in an article of this nature. It would have been quite proper to continue to the effect that voltage ratios are more correctly stated in *nepers*. But to bring in logarithms to the base "e" would have done nothing to improve the article, or clarify the subject. However, if a more technical (less misleading?) treatment is needed, the author will be happy to oblige.—H. W. HELLYER (Gilfach, Glamorganshire).

Sir—I would be grateful if any reader could sell or loan me . . .

- . . . the May and June 1957 issues of P.W.
- J. M. ROBERTSON, 38 Silverhill Drive, Denton Burn, Newcastle upon Tyne 5.
- . . . the circuit diagram or data of a Beethoven B106 television receiver.—S. STAFFORD, 25 Sithson Avenue, Bolsover, Derbyshire.
- . . . the manual of a Marconi Canadian receiver No. 52.—H. C. LOXLEY, 51 Guy Street, Warwick.
- . . . the June 1957 issue of P.W.—D. W. FROST, 6 Queen's Road, Harpurhey, Manchester 9.
- . . . the circuit and data of the a.m. test set, type 74.A.—G. H. PARK, 32 Stonefield Street, Moorside, Cleckheaton, Yorkshire.
- . . . the issues of P.W. giving the modification details of the No. 19 set.—J. AULESBROOK, 61 South Road, Beeston, Nottinghamshire.
- . . . the instruction book for a G.E.C. four-valve portable receiver, type BC.1255.—M. SELLARS, 9 Oaklea, Sherwood Road, Heath Grove, Buxton, Derbyshire.
- . . . the January 1961 issue of P.W.—A. Crabb, "Jara", Central Avenue, Hullbridge, Essex.
- . . . data for the No. 38 and No. 46 transmitter/receivers.—23861901 Tpr. HARGREAVES, A. W., Q.M. Troop, 2nd Royal Tank Regiment, Lisemally Camp, Omagh, Co. Tyrone, N. Ireland.
- . . . the September 1960, September and December 1961 issues of *Practical Television*.—R. F. DARBY, 5 The Firs, Bell Bar, Hatfield, Hertfordshire.
- . . . the August, September and October 1961 issues of P.W.—P. A. BLAKEY, Cox Hill, Boxford, Colchester, Essex.
- . . . the September 1956 issue of P.W.—M. A. FORRESTER, 58 Bede Avenue, Sherburn Road Estate, Durham.
- . . . details of the valve line-up and internal connections to the coil pack plugs of the receiver type M.C.R.I.—L. O. BEALING, Del Monica, 93 Alma Road, Bournemouth, Hampshire.
- . . . the September 1957 issue of P.W.—A. GUY, 27 The Drive, Lightcliffe, Halifax, Yorkshire.
- . . . the issues of P.W. dealing with the conversion of the R1155 receiver.—J. REED, 14 Firth Road, Rondebosch, Cape Town, South Africa.
- . . . the circuit and wiring diagram of the supply unit Mk.III No. 2.—S. M. MARGHALL, 18 Anne Way, Barking-side, Ilford, Essex.
- . . . the circuit and/or any other data for the R.107 Mk.I/I set. R. S. KING, 46 Maesteg Road, Cwmfelin, Maesteg, Glamorganshire.
- . . . information on the type of batteries used in an American Philco signal generator No. B76920.—H. C. CLARK, 63 Queensway, Moss Bank, St. Helens, Lancashire.

SERVICE SHEETS

SERVICE SHEETS. Radio and Television. 3/6, post paid. VEST AND EMERY, 17 Ha'lgarth Street, 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. 1963 List now available at 2/-. All orders despatched on day received. Also Manuals for sale and hire. List 1/-. S.A.E. please. SULTAN RADIO, 29 Church Road, Tunbridge Wells, Kent.

S.P. DISTRIBUTORS is now under New Management. Try our streamlined service. We supply **SERVICE SHEETS** for Radios, Televisions, Tape Recorders, Amplifiers, etc., etc., by RETURN OF POST at 4/- each plus postage. Send S.A.E. with inquiries. New 1963 List now available at 1/6, plus postage. Mail orders only please to S.P. DISTRIBUTORS, 44 Old Bond Street, London W1.

TRADE SERVICE SHEETS offered by retired engineer. If I haven't got it you won't get it. All 4/- each by return. Please include large S.A.E. Mail orders only. ETZIONI, 80 Merion Avenue, Stanmore, Middx.

S.E.S. SERVICE SHEETS for all TV, Radio, including Transistors, Tape Recorders, Echo Units, Amplifiers, Record Players and Autochangers, etc., also various domestic appliances. List 1/-. S.A.E. Mail orders only. SUN ELECTRICAL SERVICES, 38 St George's Road, Hastings.

SERVICE SHEETS for all makes of Radio and TV, 1925-1963. Prices from 1/- with free fault-finding guide. S.A.E. inquiries. Catalogue of 6,000 models, 1/6. 125 Radio/TV Sheets covering many popular models. 21/- Valves, modern and obsolete, Radio/TV Books. S.A.E. lists. HAMILTON RADIO, Western Road, St. Leonards, Sussex.

TELEVISION CHARTS 1/6; with layout details 2/6; Makers' Service Manuals from 3/6; TV type valves B7G, B8A, B9A 2/9; All by rapid return post service. Send s.a.e. for lists: Back issues PTV 1/6. All post paid: Send now to Shaw, 64 Standish Street, Burnley, Lancs.

SERVICE SHEETS, also Current and Obsolete Valves for sale. JOHN GILBERT TELEVISION, 1b Shepherd's Bush Road, London, W12. Phone: SHE 8441.

38 SET 5/-. 18 Set 2/6. R1155 10/-, T1154 5/-. Circuit Information. CAMPBELL AIRCRAFT LTD., Everland Road, Hungerford, Berks.

SOUND RECORDINGS

A UNIQUE BUY! Recording Tape, top brand, 5 1/2 in., 1,200ft., 19/6; Tin, 2,400ft., D.P., 28/8. 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, W1. EUSTON 6500.

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 Advertisements Manager "Practical Wireless," Tower House, Southampton St., London W.C.2.

RECEIVERS & COMPONENTS

NEW ELECTROLYTICS. 100+80MF 350V, working. 1 1/2 in. x 3 in. prong, 2/6 each; 1+134-16 275V working, 1 in. x 2 in. prong, 2/6; 100+200 275V working, 1 1/2 in. x 4 in. stand 3/6; 100+400 275V working, 1 1/2 in. x 4 1/2 in. stand, 3/6; 100+100 300V working, 1 1/2 in. x 3 in. stand, 3/-; 64+120 350V working, 1 1/2 in. x 4 1/2 in. stand, 2/6; 50+50 275V working, 1 in. x 3 in. print/cr. 2/6; 32+32 275V working, 1 1/2 in. x 2 in. stand, 3/-; 16 300V working, 1 in. x 1 1/2 in. w/e, 1/6; 100+300+100+16 257V working, 1 1/2 in. x 4 in. stand 5/-. Postage 6d. per cond. HOLLY ELECTRONICS, Holly House, Ford End, Chelmsford, Essex.

"HEATHKITS" can now be seen in London and purchased on easy terms. Free brochure DIRECT TV REPLACEMENTS LTD., Dept. PW/7.9, 126 Hamilton Road, West Norwood, SE27. Gipsy Hill 6166.

NEW VALVES GUARANTEED!

1D5	5/-	6X5G	4/6	PEN36C	5/-
114	1/11	7C5	5/-	PCL82	7/6
174	2/6	25L6GT	4/6	PCL83	7/6
1R5	4/11	C1C	5/-	PCL84	5/-
1S5	3/11			PCL85	8/6
6K7G	1/3	CY31	5/-	PENA4	5/-
6BW7	4/6	ECC85	5/-	R19	9/6
6X4	3/6	PEN46	2/6	TY86F	6/-

Cash with order only. Postage 6d. per valve. Any parcel insured against damage in transit 6d. extra.

A.D.A. MANUFACTURING Co.,
116 Alfreton Road, NOTTINGHAM.

WANTED: VALVES, TRANSISTORS, Etc.
Bought for Cash.

STOCK CLEARANCE: Valves, Condensers, Resistors, Transformers. Mainly only. Bargain lists. 98 Greenway Avenue, E17.



EXPERIMENTERS' BARGAIN
Transmitter SCR522, 100 to 150 Mc/s. Crystal controlled (no crystals). Receiver section, valves, 3 of 12SG7, 12CB, 12AH7, 12J5, 3 of 9003, 9002, 12H6, 30/- post paid. Transmitter, part stripped, valves, 6BS7, 3 of 12A6, 6C6, 2 of 832 includes modulation transformer, etc., 25/- post paid. Both units in rack, sent by rail for 50/-. Complete with all valves and in good clean condition. Includes No. 1 Converter, Valves, ARP3 Spares for 52 Receiver, Valves, ARP3 2/6, 12Y6 3/6, 12SC7 3/6, OZ4 5/-, post 1/- each, 6 or more post free. Vibrator Packs, 12 volts to 150 at 40 mA, 7/6 post 2/6. Reprinted handbook with all circuits, etc., 5/-, post free. Remote Control Units No. 1. Complete with chamois padded low resistance headphones to suit 52, Microphone Morse Key, Hand Generator and Bell, etc. Brand New at 27/6, post 7/6.

RECEIVERS & COMPONENTS
(continued)

No. 3 BUMPER PARCEL

- 6 Assorted ex-government valves.
- 6 Wander plug sockets—sorry no plugs.
- 6 pair of Brass instrument case safety hooks.
- 1 Electro magnetic counter 10 Imp. per sec.
- 3 Assorted Mains Dropper Resistances.
- 3 Yards of insulating sleeving.
- 1 Post Office telephone fuse box with fuses.
- 12 Assorted car bulbs, 6 volt and 12 volt.
- 3 M.E.S. panel lamp bulbs, 6 volt.
- 12 Sheets of carbon paper.
- 50 Tubular condensers assorted.
- 12 High stability resistors, assorted.
- 12 Assorted valve bases.
- 6 Valve retainers.
- 1 Clockwork timing mechanism intended for blowing up rockets?
- 1 12 Volt vibrator mallory, 4 pin.
- 24 Red bezels for panel lamps.
- 1 Telephone cords braided, 90in. long.
- 1 Speaker, 3 ohm.
- 2 Crystal adaptors.
- 4 doz. Cartridge fuses.
- 6 Transistor clips.
- 1 Pair test leads with prods and spades. (These need cleaning and oiling, new but bad storing)

20/- Post Free, Two Parcels for 35/-

Signal Generator Type 166. Made by Salford Electric, 5.5 to 65 Mc/s. With chassis leads, plugs, in original case. BRAND NEW. Free delivery. £7.10.0.

BREAKDOWN UNITS
Transmitter Receiver Control Box containing 7 instrument knobs, 4 toggle switches, 3 rotary switches, 20 small potentiometers, 2 Pleasner sockets, cases rough but components O.K. 6/- each, post paid or 2 for 10/-.

19" RACK FITTING CABINET.
34" high by 21" deep with telescopic drawer slides. Louvred sides, back and top. Brand new Swedish make, £4.0.0 only, plus B.R.S. delivery.

ECR 35 Tube with Screen and Base, with data. 25/-.

5UP7 Tube with Screen and Base, with data. 30/-.

20ft. Steel Telescopic Mast, 50/-.
High Stab Resistors, 6d. each.

MONITOR 56 is a high-speed triggered oscilloscope, comprising indicating Unit Type 248, Power Unit 675 and Follower Unit 68, with connecting cables. A minimum 30V is required to trigger. Amplifier has flat response to 1.5Mc/s. Indicator may be used with external Timebases and Signal Amps, at rear links. Valve heaters run continuously; H.T. only being switched ON/OFF on front panel. Valve functions: V1(a) V2, V3, V4(a), V5, V6, V7, V7T Trigger stage, V8, V9 Sawtooth Generator, V10, V11, V12 "X" plates paraphase amp, V13, V14 paraphase amplifier for signal (video) "Y" plates. Meter: use 5v. scale for x 20; 20v. for 5; 100v. for Direct; 500v. for divide by 5. With circuit and leads, probe, etc., £8, plus carriage 15/-.

A LIMITED NUMBER OF TRANSMITTERS AND RECEIVERS WITH FULL DETAILS. 19" Rack Fittings to Fit Swedish Cabinets. Send large envelope addressed for details.

Also a good range of Transformers.

E. R. NICHOLLS

Mail Order and Retail Shop:

46 LOWFIELD ROAD
OF SHAW HEATH, STOCKPORT
CHESHIRE.

RECEIVERS & COMPONENTS

(continued)

A.1. POST FREE BARGAINS. Oriental crystal microphone inserts 6/9 each. Acos type 8/- each. GEX25 diodes 1/3 each. Guaranteed set tested valves. EF80, EB91, 10F1 9d. each, 3 for 1/6. L83, ECL80, 2/- each. P230, EL38, PL33, PY31 2/8 each. PY81 3/-, KT36, B36, 20P1, 27SU 4/- each. N37, U281 4/3 each. ECC82 4/6, EB41, EBC41, ECC81, EL42, PL81, 6C13, 10C2, 6LD20, 20L1, EL33 5/- each. 30P4, 53KU, PL36, 8/6 each. PL82, PL83, PY80, PY82, PCF80 3/9 each. Send for full list of valves. **A.1. RADIO COMPONENTS,** 14 The Borough, Canterbury, Kent.

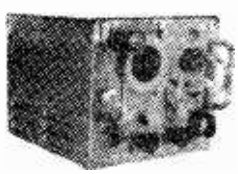
TRANSISTORS now half-price unmarked but tested packets of 16; unmarked untested packets of 40, duds suitable as diodes, packets of 80. All packets 10/- each, postage 1/-. Four packets post free. C.W.O. K. R. WHISTON (Dept. PWT), New Mills, Stockport.

DIRECT TV REPLACEMENTS LTD. largest stockists of TV Components in the U.K. 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, SE27.

CRYSTAL CALIBRATOR No. 7 Mk. I using 6 valves, a 1 Mc/s crystal osc. is used to synchronise 2 multi-vibrator osc. operating at 10 Kc/s and 100 Kc/s respectively. Harmonics of 10-100 and 1,000 Kc/s are available up to 20 Mc/s, far beyond this on any sensitive set. modulator also incorporated for receiving. In small Bakelite case with carrying handle, power 2 v. L.T., 80-120 v. H.T. Circuit and instructions supplied. **BRAND NEW, 70/-, Post 5/-.**



WAVE-METER INDICATOR Type 230. Using plug-in wave-meter boxes into a 7-valve sensitive amplifier and indicator unit, mains operated 100-250 volts. Power unit at rear on a small separate chassis supplying 350V. D.C. at 100mA full wave rectified and 6.3 volts 3 amps L.T. Each supplied new or as new with a V.H.F. or U.H.F. wave-meter box and all connectors in wooden transit case. Wave-meter boxes easily made to all frequencies. Containing coil tuned by variable condenser, output in series with diode to input socket on indicator unit. Price for this essential piece of equipment, only 50/-, carr. 7/6.



J. T. SUPPLY (Dept. H)
150 MEADOW LANE, LEEDS 11
CALLERS WELCOME

RECEIVERS & COMPONENTS

(continued)

EXCEPTIONAL VALUE: Picture Tubes, brand new. Mazda 19in., CME1901, Mullard 19in. AW47-90/91, £4/10/-; Mullard 23in., AW50/90, £6/10/-; carriage (insured), paid, 12 months' guarantee. Note: All brand new. We also supply most other sizes completely regunned at £4/17/6, guaranteed 12 months. TOMLINS, 156 Lewisham Way, New Cross, SE14. TTD 3857.

100% TUBES

Rescreened, rebuilt, £4.15.0. Guaranteed year, 70°, 60°, 110°. Carriage 12/6. Mullard, Mazda, etc. NEW Boxed Valves, 12 months' guarantee! PCC84, ECF80, PCL82, EF183, EF184, BY100, BY101, etc., 7/6 each. PL81, U25, EF86, ECL82-6, PCF80, U.191, PL83, etc., 9/- each. Lists Free.

PHILIP BEARMAN

43 Leicester Road, New Barnet.
Tel.: BAR 1934.

SPEAKER REPAIRS, Cones fitted. Satisfaction guaranteed. L. S. REPAIRS, Pluckley, Ashford, Kent.

FOR SALE

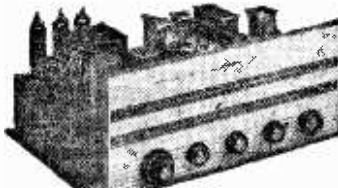
UNDERPILLOW SPEAKERS: Listen without disturbing others, 15 ohms, £2/11/6; timer unit, designed for whisker teaching, famous make, 3 on/off periods in 24 hours, 13A 200-240V. £6 13 3.—S.P. Ltd., York House, Huddersfield.

YOU COULD READ MORSE BY FEBRUARY

G By using the RHYTHM METHOD of Morse tuition a student, starting from scratch, has passed his Morse Test in just 13 DAYS by faithfully following the instructions given in this fantastic course. You could pass the test **NEXT MONTH.** For a *planoatory* booklet please send 6d. in stamps to: **S** GCHS, 45 GREEN LANE, PURLEY, SURREY

LOUDSPEAKERS: 6in. round, 7in. x 4in. elliptical, 3 ohm. Fully Guaranteed 7/6 Post Free. **THE HOUSE OF WAX.** 181-183 Lake Road, Portsmouth.

SPECIAL OFFERS — NO INTEREST TERMS



ARMSTRONG Stereo 55 Chassis Cash £89.18.0 or 59/- dpt. and 12 pmts. of 44/11 monthly.
ARMSTRONG AF208 Chassis Cash £21.4.0 or 42/- dpt. and 12 pmts. of 31/10 monthly.
GARRARD Autotonia Changer Cash £7.17.0 or 16/- dpt. and 12 pmts. of 11/9 monthly.
GARRARD AT8/EV26A Cash £15.5.5 or 25/5 dpt. and 12 pmts. of 18/4 monthly.
A. L. STAMFORD LTD. (Dept. J30)
Phone: RHU 5008
98 WEYMOUTH TERRACE, LONDON E.E.

FOR SALE

(continued)

250 "12 DRAWER UNITS." New ex-works, £4/15/-. carriage paid (mainland). Each drawer 5 1/2in. wide, 3in. high, 10 1/2in. long. Stove enamelled green, heavy gauge perfect steel. 12 dividers free. Catalogue free (Dept. Z4). **N. C. BROWN LTD.,** Eagle Steelworks, Heywood, Lancs.

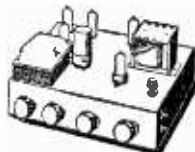
GOVERNMENT SURPLUS

Radio, Radar and Electronic Gear for Sale
SEND FOR FREE LISTS
SLATER

34 Lifford Street : Sheffield 9
Yorkshire.

EXCEPTIONAL Transistor Portable Tape Recorder, value £5/19/6, complete with crystal microphone, earphone, spools, tape, batteries, instructions, presentation box (extra tapes 100ft. 4/8). Ideal gift, £5/19/6. Satisfaction guaranteed. Postage, packing 2/6. **TOMLINS,** 156 Lewisham Way, New Cross, SE14.

GUITAR AMPLIFIERS WITH TREMOLO



Hi Fi 15 watts. Valves ECC83, ECC83, ECL84, EL84, EZ81. Four jack inputs. Six controls: two volume, bass, treble, tremolo speed, depth. Remote

plug, 3 and 15 ohm outputs. Real value. Kit £8, ready built £11. Similar 30 watt. Valves ECC83, ECC83, ECC83, EL34, EL34, GZ34. Kit £11, ready built £14. As above, less tremolo. 15 watt. Kit £7, Ready built £9.10.0, 30 watt, Kit £10, ready built £12.10.0.

Add carr. 7/6 any amplifier.
Send for free leaflet.

STROUD AUDIO

Paganhill Lane, Stroud, Glos.

TELEVISION SETS, hundreds of traded-in sets to be sold at a throw-away price, from 14in. to 21in.. **BUYER COLLECTS SINGLY OR IN LOTS.** **BISHER LTD.,** 18 Court Street, Haddington, East Lothian.

240WATT ELECTRIC POWER ANYWHERE



from 12 VDC CAR BATTERY
with **THE AMERICAN DYNAMOTOR UNIT**
Type 12, output 240/240 or 180 or 220 watts
Perfect for TELEVISION, POWER TOOLS and the
UNIVERSAL AC/DC ELECTRICAL EQUIPMENT, gives
wonderful results. Price ONLY £6.00 + car carriage
Send stamped envelope for full illustrated details
W. SCIENTIFIC PRODUCTS, CLEVELAND, OHIO

FOR SALE—High quality microphones for disposal—R.C.A. Type, L.M.I. 6203 (800 ohms) 250 ohms and 30 ohms. 1. Reconditioned £10 each. Secondhand, in working condition, £8 each. Also S.T. & C. 3-way Mixer Panels Type 6A for 30 ohms microphones £10 each. Write Box 0784 U.K. Advtg Co. Ltd., 25 Shaftesbury Avenue, W.1.

FOR SALE (continued)

GET PLASTERED!! FREE

POINTING TROWEL WITH EACH ORDER OVER 45/-

RESISTORS, Carbon 10-4 meg. 1-5 watt 2/- doz. DROPPERS, 15Ω-20K 1/6. POTENTIOMETERS, 10Ω-2 meg. 1/6. CONDENSERS, Ceramic (2-1000pF), 5/Mica (8.2-50,000pF), M/Mica 0.00002-0.1 nF, 3/- doz., Ppr Tube (0.001-0.5 mfd), 4/- doz., Block Ppr (0.001-8 mfd), 3/6, Metalpack (0.05-4 mfd), 6d. ELECTROLYTICS (2-8 mfd), 1/6; (9-200 mfd), 2/3; 201-14,000 mfd), 3/6. TRIMMERS, 1-6 gang, 5/- doz. SWITCHES, Water 1-3 gang, 2/3. Biscuits, 9d. Sliders, 2/3. Add-one D/P, 1/3. VALVE HOLDERS, 5/6. BSG, B9G, B9A, E4, E5, 6d. (or 3/6 astd. doz., inc. PC Types). TAG STRIPS, 1, 2, 3, 7 way, 1/6 doz. 9, 10, 11 way, 5/- doz. TENSION SPRINGS, 1-2-1-1 1/2 inch, 3/- doz., 3 inch 4d., 5 inch, 5d. SOCKETS, 2, 3, 4, 5, 6, 8-pin, 2/- 1/2 doz. COILS, Aladdin, 1/-, Wherite 1/6; Others 4/9 1/2 doz. Formers, 2d. BULBS, 9-110V astd., 4/6 1 doz. COND. CLIPS, 1-1 1/2 inch, 1/6 1/2 doz. VERT. 1-1 inch, 2/3 1/2 doz., 2 inch 6d. KNOBS, brown, 2/-, or astd., 3/6 doz. INSULATION BOARD, 288 sq. in. for 4/6. GROMMETS & SLEEVES, 1/- per 100. FELT WASHERS, 25 for 1/- 25 astd. CLAMPS & BRACKETS, 3/9. RECTIFIERS, 3/6. POCKET VOLTMETERS, 9/6. PULSE GENERATOR 1/6. VALVE VOLTMETERS (Less Mtr. Mvmt.). 7/6. BC-1094-A CONTROL UNITS, 75/-, 4-Valve MODULATOR UNIT, 1/1 1/2. AGC/E.U., 1/1. 5-WATT AMPLIFIER KIT, 85/6. S/W RADIO KIT 67/6. EP50's, 1/6. CONTROL UNIT No. 3 Mk. 1, 5/- 50 SELF TAP SCREWS, 2/3. SLEEVING, 1d. yd. TEST SET MICROPHONE & RECEIVER No. 4 227, 2 amp, 2 pin sw. Skts., 1/-. LARGE SELECTION OF ABOVE COMPONENTS (No. 240) GUARANTEED BARGAIN, 10/-, 7 TV POTS on Strip, 7/6. Dimmer Switches, 7/6. ALL COMPONENTS ARE NEW. Please add small amount for P. & P. S.A.E. for List. 1/- for Catalogue.

ALBATROSS ENGINEERING COMPANY
Dept. PW12 78-80 HIGH STREET, GOSBERTON,
SPALDING, Lincs. (Cos. 458)

GUARANTEED TRANSISTORS

2/- each, XA101, XA102, XB103, XB104, XA112, OC430.

3/6 each, GET16, GET20, GET 884, GET873, 250mW ZENER DIODES 4 volts to 22 volt, OC44, OC45, OC71, OC81D, OC81.

4/- each, OC170, OC171, AF117, XU611, GET671, GET672, GET 673, GET691, GET692, GET693, GET694, GET884.

5/- each, OC309, OC320, OC703, OC800, OC46, OC47, ORP60, and many more.

LARGE STOCKS of Mullard, Mazda, Bush, G.E.C., Impex, A.E.I.

Send 3d. stamp for full list.

B. W. CURSONS

78 BROAD STREET
CANTERBURY, KENT

FOR SALE (continued)

FANTASTIC BARGAIN OFFER!



ELECTRIC SOLDERING IRON

Lightweight but robust, firm Pistol Grip handle. 240V. A.C. Solid copper bit. Complete with 4ft. twin flex lead and 2-pin plug. Indispensable for every home handvman. A boon to model makers and a necessity for every wireless enthusiast. Offered to you at this new amazing price.

ONLY
9/6

P. & P. 1/-.

C. H. SERVICE, Dept. P.W.3

Lusted Hall Lane, Tatsfield, Kent.

WANTED

WANTED: TEST GEAR, Meters, Valves, Components, Communication Sets, Amplifiers, Letters only, HUGGETT'S LTD., 2-4 Pawson's Road, West Croydon, Surrey.

NEW VALVES WANTED

Any type, or quantity

CASH PAID

R.S.T. Valve Mail Order Co.
211A Streatham Road
Mitcham, Surrey
Telephone: MITCHAM 6202

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

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.

MISCELLANEOUS

KITS BUILT, Singles quantity. S.A.E. Leaflet. KINDER, 6 Hooker Road, Hartsea, Norwich, Norfolk.

YOUR KIT, Radio, Amplifier expertly assembled and aligned. Moderate charges, prompt attention. M JOHN-SON, Ivy Cottage, The Ridgeway, Astwood Bk, Redditch, Worcs.

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 Swing.

Write NOW for free leaflet and further details to C. & S., 20 Maude Street, Darlington, Durham. Send 2jd. stamp.

METAL WORK

METAL WORK. All types cabinets, chassis, racks, etc., to your specifications. PHILPOTTS METAL WORKS LTD., Chalmers St., Loughborough.

Cases, Chassis, Frames, etc., anything in metal. Send your drawings for quotation. 'One-off's' with pleasure. Trade enquiries welcomed.

Stove enamelled any professional finish.

Moss Watson

40 MOUNT PLEASANT STREET
OLDHAM, LANCs. MAIN 9400

SITUATIONS VACANT

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. W8.

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.

CITY AND GUILDS (Electrical, etc.) on "no pass—no fee" terms. Over 95% successes. For details of Electrical Engineering, Applied Electronics, Automation, etc., send for our 148-page handbook, free and post free. B.I.E.T. (Dept. 242A), 29 Wright's Lane, London. W8.

TV AND RADIO, A.M.Brit.I.R.E., City and Guilds, R.T.E.B. Cert., etc., on "no pass—no fee" terms. Over 95% successes. 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. W8.

RADIO ENTHUSIAST required for components shop—N London. TELE-RADIO CO., LTD., 18 Turnpike Lane, N.8.

EDUCATIONAL

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.C1.

RADIO OFFICERS see the world. Sea-going and shore appointments. Our many recent successes provide additional trainee vacancies during 1964. Day and Evening students. Grants and Scholarships available. Stamp for Prospectus. WIRELESS COLLEGE, Colwyn Bay.

**Radio
Television
& Electronics**

Learn at home with the world's largest home study organisation, Brit.I.R.E.; City & Guilds; R.T.E.B., etc. Also Practical Courses with equipment.

All books supplied.
Write for **FREE** prospectus stating subject to

I.C.S.

(Dept. 541), Intertext House, Parkgate Road, London, S.W.11

THE INCORPORATED PRACTITIONERS in Radio & 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.

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

DON'T FUMBLE with Formulae. Master Mathematics quickly and easily the Understandable Way.

**1st lesson
and details
FREE**

The Dryden School of UNDERSTANDABLE MATHEMATICS
10 C, Dryden Chambers, Oxford St., London, W.1.

Name.....
Address.....
.....
.....

Please mention
"Practical Wireless"
when replying to
Advertisements

BUSINESS OPPORTUNITIES

IF YOU are a Self-employed TV Service Engineer wishing to increase your profits by at least 25% and receive free technical information, send s.a.e. for details to BOX No. 55.

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. PU)
Raleigh Mews, Raleigh Street, Nottingham

Football Pool Computer

A Novel Circuit which is cheap to build. Forecasting made easy!

ANALOGUE COMPUTER
Multiplies and Divides by electrical analogue methods. Exceedingly simple circuit. Fascinating demonstration of computer principles.

Both above circuits for 3/6, post free.
Notches and Crosses Machine
Full circuit of our unbeaten machine. 3/6 post free.

MULTIMETERS
Circuit of 18,000 o.p.p. kit at 65/-, and details of other multimeters from 35/- on request. 1% High Stab. Resistors. Brand new AW 2/- Many special multimeter values. 100Ω, 1K, 10K, 100K, 1% 1W, 1/8 each.
Precision Wirewound Resistors 1W. 1Ω to 5K, 1%, 3/-; to 20K, 1%, 4/3; 1% add 3d. Your value would to order.

PLANET INSTRUMENT CO.,
25 DOMINION AVENUE, LEEDS 7

NEW VALVES!

Guaranteed Set Tested
24-HOUR SERVICE

1R5, 1S5, 1T4, 3S4, 3V4, DAF91, DF91, DK91, DL92, DL94, SET of 15-	DAF96, DF96, DK96, DL96, SET of 4, 23/-
0A2 4/6 DK96 6/-	PCF80 5/3
1D5 4/9 DL33 7/-	PCF82 6/6
1R5 4/6 DL35 6/3	PCL82 6/9
1S5 3/6 DL32 4/9	PCL83 8/6
1T4 2/3 DL94 5/6	PCL84 6/6
3S4 4/9 DL96 5/6	PL36 7/9
3V4 5/6 EB91 2/-	PL81 6/9
5V4G 4/3 EBC41 6/6	PL82 5/3
5Y3GT 4/3 EB980 6/3	PL83 5/3
5Z4G 6/9 EBL21 8/-	PL84 5/6
6K7G 1/3 ECC40 7/-	PY31 6/-
6K8G 3/6 ECC81 3/6	PY32 8/6
6AT7 4/3 ECC82 4/6	PY80 5/-
6E4 7/6 ECC83 4/6	PY81 5/6
6V6G 7/9 ECC84 5/6	PY82 4/11
6X5GT 5/- ECC85 6/3	PY83 5/9
12K7GT 3/6 ECP80 6/-	U25 8/6
12K8GT 8/6 ECP82 6/6	U26 10/6
12GT 3/6 FCC82 7/9	UABC80 5/6
12SN7GT 5/6 ECL80 5/6	UAF83 7/6
25L6G 4/9 EF41 6/6	UBC41 6/6
35L6GT 6/9 EF80 4/-	UBF80 6/-
35Z4GT 6/6 EF85 4/9	UCC85 6/6
AC/TP 18/6 EF89 5/9	UCH42 7/3
CL33 8/6 EF91 2/9	UCR81 7/3
DAC32 7/9 EL41 8/6	UCL82 7/9
DAF91 3/8 EL84 4/10	UCL83 8/6
DAF96 5/6 EY51 5/9	UF41 6/9
DF33 5/3 EY86 5/9	UF89 8/3
DF91 2/3 EZ40 5/3	UL41 6/11
DF96 5/6 EZ80 4/6	UL84 8/3
DH77 3/11 EZ81 3/9	UU8 11/8
DK31 4/8 FCC84 5/6	UY21 8/3
DK92 6/9 PCC89 7/9	UY41 4/6
	UY85 4/-

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

**NOW THREE LOW
COST COURSES TO
HELP YOU BECOME
AN EXPERT IN
RADIO,
ELECTRONICS, OR
TELEVISION**

Our now famous Electronic Course won instant acclaim when offered just over one year ago.

NOW WE ARE PROUD TO BE ABLE TO OFFER TWO NEW COMPANION COURSES IN RADIO AND T.V. FOR THE SAME REASONABLE COST.

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!

These are real home-study courses that have been printed in large volume and bound into one giant 8 x 11 1/2. Manual to reduce cost. Compares favourably with some courses costing ten times as much. By receiving all lessons at one time you save letter writing, additional postage, and other expenses.

Everyone can benefit from these practical courses. No old-fashioned ideas used here. Just straightforward easy to understand explanations to help you get ahead in radio, electronics or television.

Modern wireless and t.v. sets use complex circuits, but their function is based on surprisingly few principles. These principles can easily be mastered when explained clearly. That is the object of these courses: soon you will be well on your way to becoming a first-class radio, electronics, or t.v. technician.

More and more people are afforded every day to repair wireless sets, amplifiers, VHF/FM radios, televisions and electronic equipment. Are YOU prepared to get your share of the money to be earned?

Just clip the coupon indicating the course required. You must be convinced that this is the best value you have ever seen in electronic, radio and t.v. training otherwise you can return the manual (or have your money refunded if sent with order) after you have examined it in your own home in a period of seven full days.

The price? Only 36/- per course, plus postage. YOU CAN QUALIFY FOR A CERTIFICATE. Details sent with each course ordered.

FREE DATA HANDBOOK WITH EVERY ORDER

FREE TRIAL OFFER

TERMS ONLY 5/- PER WEEK!

To SIM-TECH TECHNICAL BOOKS Dept. WA6, West End, Southampton, Hants.

Send **ELECTRONICS COURSE**
RADIO COURSE
TELEVISION COURSE

for a full seven days' free trial. If not delighted I may return the course post paid without further obligation on my part. Otherwise I will pay cash or 3/- weekly until 3/6, plus 2/6 service charge, total 40/- is paid.

Tick here if enclosing full price (we pay postage). Same 7 day money-back guarantee. Postage charge 1/6 per course. Overseas customers please send full amount (including Ireland).

Name.....
Address.....
.....
City..... County.....

JAG ELECTRONIC CABINET MAKERS LTD

No. 9 Workshop, Grayes Place, Slough, Bucks.

CABINETS

We make a complete range of cabinets or will make to your own specification.

GRAM CABINETS

For single player £2
For autochanger £3

P. & P. 5/- per cabinet.

SPEAKER CABINETS

With sloping fronts, all colours. 5in. 9/-, 6in. 10/6, 8in. 15/-, 10in. 18/-, 12in. 25/-
P. & P. up to 8in. 2/6, 10in. 3/-, 12in. 3/6.
Trade enquiries invited for cabinets.

LINE OUTPUT TRANSFORMERS AND SCAN COILS

FERGUSON: 204, 206, 306 17/6 ea.
PYE: V4, V14, VT17 17/6 ea.
EKCO: 221, 231 35/- ea.
P. & P. 3/6 on each of above L.O.P.T.s.

FIREBALL TURRET TUNERS

All ex-equipment .. 17/6 ea. P. & P. 3/-

RECORD PLAYER AMPLIFIER AND SPEAKER

A compact 2w. amplifier with tone and vol. controls. Complete with valves (PCL82 and PY82), on board with o/p transformer and quality 6in. speaker. Crisp reproduction, absolutely ready to play. **ONLY 39/6.**
P. & P. 2/6.

SPEAKERS, ex-equipment, 5in. 5/-, 7 x 4in. 7/6, 8in. 7/6. P. & P. 2/- ea.

CONTEMPORARY TABLES

With formica wood grain or patterned top and black legs with adjustable ferules. Size 24in. long and 12in. wide. Ideal for TV or coffee table 30/- ea. P. & P. 3/6

VALVES

SURPLUS or EX-EQUIPMENT

EB91	2/-	PCF80	4/6	UCC84	7/6
EBF80	4/6	PCL82	4/6	UCF80	7/6
EFB89	5/-	PCL83	5/-	UF42	2/6
ECC81	3/6	PCL84	6/6	6C9	10/-
ECC82	3/6	PL33	7/6	6F1	3/-
ECC83	4/-	PL36	7/6	6F12	2/-
ECC84	5/-	PL38	10/-	6F13	5/-
ECF80	4/6	PL81	6/-	6F14	5/-
ECF82	5/-	PL82	4/6	6F15	6/-
ECH35	6/-	PL83	5/-	6L1	7/-
ECH42	6/-	PY31	6/6	6L18	6/-
ECL80	4/-	PY32	7/6	6P25	5/-
ECL82	6/-	PY33	7/6	6P28	8/-
EF80	2/-	PY80	3/6	10C1	10/-
EF85	4/6	PY81	3/6	10C2	10/-
EF91	1/6	PY82	3/6	10F1	3/-
EL33	5/-	PY83	6/6	10F13	6/6
EL84	4/6	PZ30	7/-	10P14	4/6
EY51	3/-	U24	6/-	20D1	4/-
EY86	4/6	U25	6/-	20F2	6/-
EZ80	4/-	U26	6/-	20L1	8/-
EZ81	4/6	U191	7/-	20P1	7/-
CZ32	5/-	U301	9/-	20P3	7/6
KT33C	4/-	U801	14/-	20P4	12/-
KT36	7/-	UAF42	5/-	20P5	7/6
PC84	4/6	UBC41	5/-	30P4	7/-

Many other types available Post 6d per valve.
All enquiries S.A.E. please
TERMS: C.W.O.

STAR DXER S.R.-40 £24.15.0

General purpose superhet communications receiver for A.C. mains. 220-240 volts, covering 550 Kcs to 30 Mc/s in four switched bands. Slide rule tuning dial, electrical bandspread, internal speaker, panel "55" meter, noise limiter, B.F.O., phone jack, ferrite and whip aerials. Handsome grey crackle Cabinet 13 1/2 x 8 1/2 x 5 1/2 in. Wt. 12 lbs. Full instruction manual. **BRAND NEW CURRENT MODEL.**
PCL-3 RECEIVERS. 3-wave bands, medium wave and 2 short wave, from 120-13 metres. Good condition, tested. 8 gns. Carr. 10/- A.C. mains internal power supply £2 extra.

SILICON RECTIFIERS. Type 1EA2 (4 x 1/2 in.) will handle 250 volts at up to 500 mA. Replaces any TV metal rectifier. 7/6.
AR-88 VIBRATOR PACKS. For 6 v. operation. Complete with vibrator and OZ4 rectifier. **BRAND NEW** in original cartons. 17/6. P. & P. 5/-.

MOVING COIL PHONES. Finest quality Canadian with Chamols ear muffs and leather covered headband. With lead and jack plug. Noise excluding, supremely comfortable. **BRAND NEW** 22/6 post 1/6.

AVO WIDE RANGE SIGNAL GENERATORS. Six turret operated ranges covering 50 Kcs to 80 Mc/s. For use on standard A.C. mains. Packed in original transit cases with accessories. Post-war type in new condition. £15. Carriage 10/- **REAL BARGAIN.**

CRYSTAL CALIBRATOR. As used in Canadian No. 52 set. Incorporates twin 1Mc/s and 100Kc/s crystal and a multivibrator circuit to give 1Kc/s marker dials. Requires 12V 1 amp. L.T. and 150V. H.T. Complete with 3 valves, circuit of 52 set and operational notes. **BRAND NEW 37/6, plus 2/6 P.P.**

ARSS SPARE VALVES. Complete Set of **BRAND NEW** individually boxed original valves (14). 50/-, plus 2/6 P. & P.

MULLARD CRYSTAL CALIBRATOR. In neat grey metal case 9 x 7 x 6 1/2 in. Gives 1 Mc/s, 100 Kc/s, and 10 Kc/s, marker pips and harmonics as selected, optional 400 c/s modulation. Complete 6 valves 11T4 (5), 1R5 (1), and 1 Mc/s 6T6 crystal. Requires 60 v. h.t. and 1.5 v. l.t. In original transit case. **BRAND NEW** £4.19.6, carr. 7/6.

MICRO-AMMETER. 0-500 uA. Made by R.C.A. Weston Westminster, and other famous American manufacturers. Circular 2 1/2 in. flush panel mounting. Dials are engraved 0-15, 0-500 volts. As used in the American version of the "19 SET". **TESTED AND GUARANTEED 15/-.**

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. Thursday). Open all day Saturday

PADGETTS RADIO STORES

OLD TOWN HALL,
KNOWLER HILL,
LIVERSEDGE, YORKS.
Telephone: Cleckheaton 2866

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.

JOHNSONS (Radio)

St. Martins Gate, Worcester

RADIO BOOKS

BASIC ELECTRICITY	
AUDIO & Acoustics by Briggs	11/8
MORE about Loudspeakers by Briggs	9/6
CABINET Handbook by Briggs	8/6
"P.W." RADIO & Television Ref. Data	11/6
ELECTRONICS Pocket Book by Haver	22/-
TESTED Short Wave Receiver Circuits using M.A.T.s	5/6
TESTED Short Wave S/het Receiver Circuits using M.A.T.	6/6
22 TESTED Circuits using M.A.T.s	5/6
AT A GLANCE Valve and T.V. Tube equivalents	4/-
OSCILLOSCOPE Book using an Oscilloscope	5/6
OSCILLOSCOPE Equipment	5/6
MULLARD Transistor Radios	5/6
MULLARD Ref. Transistor Circuits	13/6
EXTRA Equipment Tape Recorder	6/6
COIL Design and Construction	5/6
TRANSISTOR Circuits for Radio Control of Models	8/-
SERVICING Transistor Receivers	3/6
ELECTRONIC Novelties	5/6
ELECTRONIC Gadgets	5/-
RADIO Valve Data "Wireless World"	7/6
BEGINNER'S Guide to Radio	8/6
MODERN Transistor Circuits for Beginners	8/6
HOW to Receive Foreign T.V. programmes With Simple Modifications	5/-
All books include postage. List S.A.E.	

SELRAY BOOK CO.

60 HAYES HILL, HAYES, BROMLEY KENT. Tel. HURSTWAY 1818

ARMY SET TYPE 19Mk. III. Complete with one 6K8, four 6K7, one 6B8G and one 6V6 valves. The receiver side of the set is micro-amp meter. The valves and a few parts have been removed from the "B" set. Clean inside, soiled outer case. We are offering a first class receiver at the special price of 32/-, carriage 10/- **Less Valves. 12/6. Carr. 10/-.**

Bomb Computers. Stored soiled case, clean inside. Full of gears, etc. 24/-, Carr. 10/- **Valves Removed from TV Sets.** Tested as new. Three months' unconditional guarantee. **POST FREE.**

ECL80	2/-	10F1	1/-	PY80	5/-
ECC82	3/-	10P13	5/-	PY81	4/-
EY51	2/6	10P14	5/-	PY82	5/-
EBF80	4/6	20L1	3/-	PCF80	4/6
EB91	9/4	20L1	5/-	PCC84	4/6
EF91	8/4	20P4	8/6		
6F1	2/6	U281	5/-	EF50	1/6
6F1	1/-	U282	5/-	PL83	5/-
6F14	5/-	U329	5/-	PL33	4/-
6F15	5/-	KT36	5/-	PL38	8/-
6L1220	5/-	PL81	5/-	B36	4/-
10C2	5/-	PL82	5/-	N37	5/-

EF80 1/6 or 10/- per doz. Grade II, EF80 for 2nd purposes, 4/- doz.

New Valves Ex. Units. POST FREE.
6K7 1/6, doz. 12/-, 6K8 2/6, doz. 22/-, 6V6 2/6, doz. 22/-, 807 U.S.A. 6/-, P.P.3/250. (P.X.) 5/-, AC2PEN (PEN A.) 2/6, 5U4 3/-, 6SN7 3/-, 6V6GT 4/6, EF80 1/6, EF91 1/6, 6F2 2/-, 6Z4 5/6, 5Y3 4/6, 6X5 4/6, 6F50 1/6, 6/- doz.
AR12 1/6, 6 for 5/6, box of 50 19/-.

IT4. ART2 2/6, ART4 2/-, APP37 2/-, AR3 2/-.

P.M. Speaker all Perfect. Ex. TV Sets. POST FREE BARGAINS. All 3 ohms. Rola 6 x 4in. 5/-; Go-Go 6in. x 4in. 7/-; Special price for more than one speaker.

New Boxed 12 volt Vibrator Packs, with spare vibrator. Type P.C.R., 250 volts at 150 mA. 18/-, Carriage 7/6.
13 Channel 14in. TV Sets. Untested, 30/-, Carr. 10/-, 13 Channel 17in. sets, untested, 50/-, Carr. 10/-, Well packed sent at owners' risk.

TV Tubes, completely rebuilt and refaced. 12 months' guarantee. Sizes up to 17 inch. Special trade price of 75/-, Carr. & Ins. 7/6. Reclaimed Tubes. 14in., 30/-, Carr. 7/6. 6 months' guarantee.

FREE TO AMBITIOUS ENGINEERS

— THE LATEST EDITION OF ENGINEERING OPPORTUNITIES

Have you sent for your copy?
ENGINEERING OPPORTUNITIES is a highly informative 156-page guide to the best paid engineering posts. It tells you how you can quickly prepare at home for a recognised engineering qualification and outlines a wonderful range of modern Home Study Courses in all branches of Engineering. This unique book also gives full details of the Practical Radio & Electronics Courses, administered by our Specialist Electronics Training Division—the **B.I.E.T. School of Electronics**, explains the benefits of our Employment Dept. and shows you how to qualify for five years promotion in one year.

We definitely Guarantee
“NO PASS — NO FEE”

Whatever your age or experience, you cannot afford to miss reading this famous book. If you are earning less than £25 a week, send for your copy of **“ENGINEERING OPPORTUNITIES”** today—FREE.

WHICH IS YOUR PET SUBJECT?

Mechanical Eng.,
 Electrical Eng.,
 Civil Engineering,
 Radio Engineering,
 Automobile Eng.,
 Aeronautical Eng.,
 Production Eng.,
 Building, Plastics,
 Draughtmanship,
 Television, etc.

GET SOME LETTERS AFTER YOUR NAME!

A.M.I.Mech.E.
 A.M.I.C.E.
 A.M.I.Prod.E.
 A.M.I.M.I.
 A.I.O.B.
 A.F.R.Ae.S.
 B.Sc.
 A.M.Brit.I.R.E.
 City & Guilds
 Gen. Cert of Education
 Etc., etc.

PRACTICAL EQUIPMENT

Basic Practical and Theoretic Courses for beginners in Radio, T.V., Electronics, Etc., A.M.Brit.I.R.E. City & Guilds Radio Amateurs' Exam. R.T.E.B. Certificate P.M.G. Certificate Practical Radio Radio & Television Servicing Practical Electronics Electronics Engineering Automation

INCLUDING TOOLS!

The specialist Electronics Division of B.I.E.T.

Now offers you a real laboratory training at home with practical equipment. Ask for details.

B.I.E.T. SCHOOL OF ELECTRONICS



POST COUPON NOW!

Please send me your FREE 156-page "ENGINEERING OPPORTUNITIES" (Write if you prefer not to cut page)

NAME

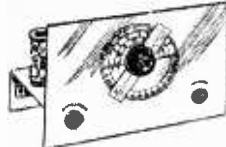
ADDRESS

SUBJECT OR EXAM THAT INTERESTS ME SE/21

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY
 (Dept. SE/21), 29 Wright's Lane, London, W.8

THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD

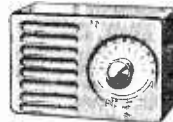
LISTEN TO THE WORLD on TELSTAR our 1-VALVE SHORT WAVE RADIO



Receives speech and music from all over the world. Price 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.C.S. TRANSISTORISED TAPE TUNER

Wonderful reproduction of all your favourite programmes. Covers full medium wave band. Special circuit incorporating ferrite rod aerial and tuning condenser gives COMPLETE STATION SEPARATION. Attractive case size 5.5 x 2 1/2 x 1 1/2 in. deep. NO EXTERNAL AERIAL OR EARTH REQUIRED. Chassis and components colour coded for easy construction. All parts supplied with step by step instructions.



ONLY **25/-** P. & P. 2/- (VT3 battery 2/6 extra.)

THE R.C.S. PERSONAL SET



An amazing little set, with built-in ferrite rod aerial bringing in medium wave at wonderful volume. Sturdy case. Size only 2 1/2 x 3 1/2 x 1 1/2 in. Fits into the palm of the hand. Drilled chassis colour coded for easy assembly. Total Building Costs (including earpiece) **30/-** P. & P. 2/-.

R.C.S. CRYSTAL RECEIVER

Covering medium wave band. Ideal for the beginner! All components including case. **8/6** P. & P. 1/6. (Suitable headphones 9/6). Easily converted to 1-transistor or 2-stage transistor receiver.



All parts available separately. Send S.A.F. for free layout plans and parts lists of any of the above sets.

R.C.S. PRODUCTS (RADIO) LTD.

11 Oliver Rd., London, E.17. (Mail Order only)
 Export Trade enquiries invited

BARGAIN OFFER!

AMPLIFIER. 3 watts, 2 valves, 6X4, ECL82. AC Mains. Mounted on board with 8in. speaker. Pilot light and Tone Control. **£3.10.0** complete. post 4/6.

CONNECTING WIRE. Stranded or Shgle. Various colours, our selection, 100ft., 4/.

ELECTROSTATIC Tweeter LSH75 with diagram, only 2/6 each.

SPEAKER CABINET. The HAYDON (17 x 15 x 8in.). Designed to take a 12in. heavy duty speaker. Made of 3/4in. wood. Ideal for bass guitar. Covered with Vynide and Vynair in contrasting colours. With strong carrying handle, 60/-, post 7/6 extra.

SPEAKER suitable for above cabinet. R.T.C. 15 ohm 15 watts. Heavy duty 12in., £5, post 4/.

STEREO Ronette S106, 25/-.

CARTRIDGES, Monaural. Acos GP59-5 high output, 15/-, Acos GP65-1G medium output, 15/-, to fit most Garrard, Collaro or B.S.R. pick-ups.

EARPIECES with cord and 3.5 mm plug. Crystal, 4/-; 180 ohms magnetic, 6/6; 80 ohm 2.5 plug, 4/-.

HIGH RESISTANCE PHONES: 4,000 ohms. Chinese, 11/6 pair
TRANSISTOR ELECTROLYTICS: 1µF, 2µF, 4µF, 5µF, 8µF, 16µF, 32µF, 50µF, 100µF, all 15 volt, 1/3 each.

BARGAINS IN TRANSISTORS. The latest Mullard M Series. OC44M, two OC45M, OC81DM. Two OC81M matched pair. Oa90 diode. Complete Set, 22/6. OC44, 3/6; OC45, 3/6; OC71, 2/6; OC72, 3/6; OA81, 2/3; GEC S6 Good AF General Purposes, 2/-. GET873 RF, 2/3.

TERMS: C.W.O.

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

(four minutes from Tooting Broadway Underground Station)

OSMOR

PRICE LISTS & INFORMATION ON
Various Designs in

Practical | Radio | Wireless | R.S.G.B.
Wireless | Constructor | World | Bulletin

SEND 6d. POSTAGE FOR



CIRCUITS

OSMOR LTD

418 BRIGHTON ROAD
S. CROYDON SURREY
Telephone CRO 5148



LOWEST
EVER
PRICES



5in. Std.	600ft.	...	8/6
7in. Std.	1,200ft.	...	12/6
5in. L.P.	900ft.	...	10/-
5½in. L.P.	1,200ft.	...	12/6
7in. L.P.	1,800ft.	...	15/-
4in. D.P.	600ft.	...	9/-
5in. D.P.	1,200ft.	...	15/-
5½in. D.P.	1,800ft.	...	22/6
7in. D.P.	2,400ft.	...	25/-

SPECIAL!!
"LAFAYETTE"
7in. Std. 1,200ft., 12/6
7in. L.P. 1,800ft., 15/-
7in. D.P. 2,400ft., 25/-

EXCLUSIVE TO
GEE'S!
AMERICAN
"SHAMROCK"
Professional quality
7in. L.P. 1,800ft., 15/6

SPARE SPOOLS, 4in.
5in., 5½in., 2/- each;
7in. 2/6; 8½in. 5/-

"GEE'S" ACCESSORY KIT, 1 "BIB"
Splicers, 1 Splicing Tape, 3 Leader Tapes
(3 colours), 10 Retaining Clips. Packed in
plastic container. PRICE 32/6. While stocks
last.

COLLARO "STUDIO" TAPE TRANSCRIP-
TORS. Brand new in original cartons. 3
speeds, 1, 3, 7 1/2 i.p.s. 3 motors, digital
counter, etc. Complete with instructions and
fixtures. A.C. 200/250 v. operation. SPECIAL
PRICE 10 GNS. Carr. paid.

P. & P. 2/- per order (over £3 post
free). Other types available. S.A.E.
for Bumper Tape and Accessories list.

Obtainable only from— Special discounts for quantities.
GEE BROS. (RADIO) LTD., Dept. P.W.
15 LITTLE NEWPORT ST., LONDON W.C.2
(Adjoining Leicester Sq. Tube) GER 6794/1453

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.

RIBBED GLASS. 3in. aerial insulators, 1/9 each. Shell ins 2in.
9d. each. P. & P. 2/- . Up to 12.

CERAMIC FEEDER SPREADERS. 6in. type F.S. 10d. each.
P. & P. 2/-.

CERAMIC "T" PIECES, Type AT. for centre of dipoles,
1/6 each. P. & P. 1/-.

2 METRE BEAM 5 ELEMENT W.S. YAGI. Complete in
box with 1-2½in. 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 yd. 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. 3½in. with 2½in. scale, 0-10 mA, 15/-; 0-100 mA, 15/-.
P. & P. 1/6.

THERMO, 2½in. round 0-2.5 amp, 7/6 each. P. & P. 1/6.

170-172 CORPORATION ST.

BIRMINGHAM 4

Telephone CEN 1635

SPEAKERS by GOODMAN'S
ELAC, PLESSEY, etc.

	P. & P.
4in. square	12/- 1/6
5in. round	12/- 1/6
7 x 4in. elliptical ..	13/6 1/6
8 x 5in. elliptical ..	16/6 2/-
10 x 6in. elliptical ..	23/6 2/-

18G STEEL CASES

Finished in superior quality
hammer grey with aluminium
removable panel on face.

Sloping Front:

4 x 4 x 4	10/6
8 x 5 x 5	16/-
12 x 6 x 6	25/6

Rectangular Small:

4 x 4 x 2½	8/6
6 x 4 x 3	10/-
8 x 6 x 3	12/6

Rectangular Standard:

10 x 7 x 7	27/6
12 x 7 x 7	34/-
14 x 7 x 7	37/6
14 x 8 x 9	47/6
16 x 8 x 9	52/6
16 x 8 x 11	57/6
19 x 8 x 11	64/-
19 x 10 x 11	66/-

P.P. extra.

OUR FAMOUS READPACKS!

- No. 1 100 resistors ¼w to 5w
10 ohm to 5 meg.
- No. 2 25 condensers 1pF to
1000pF 5% to 20%.
- No. 3 20 condensers 1000pF to
0.01mfd.
- No. 4 12 condensers 0.01mfd
0.1mfd.
- No. 5 25 Hi-stab resistors
1, 2 and 5% 10ohm-25meg.
- No. 6 10 ¼w Resistors 60ohm-
82K ohm.
- No. 7 4 Carbon controls, vol-
ume, tone, etc.

All at 8/6 each. POST FREE.

SWITCHES for MULLARD
circuits to specification
and "Mullard approved"

TR2 2V Pre-Amp.	12/9
TR3 3V Pre-Amp.	12/9
TR4 3V Pre-Amp. Lo/Pass Filt.	10/9
TR5 3V Pre-Amp. Hi/Pass Filt.	8/4
TR6 3V Tape Amp. Rec/Play	16/6
TR7 3V Tape Amp. Eqz.	7/4
TR84 Tape Pre-Amp Rec/Play	16/6
TR9 Tape Pre-Amp Eqz.	7/4
TR10 Stereo Pre-Amp Selector	18/6
TR11 Stereo Pre-Amp. Ch/E	9/6
TR12 Stereo Pre-Amp. Stereo Mono	9/6

P. & P. 1/- per switch.

TELE-RADIO (1943) LTD

189 EDGWARE ROAD, LONDON W2
PADDINGTON 4455

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 24 gns.

LEWIS radio

100(P24) Chase Side, Southgate
London, N.14, Pal 3733 7666

Send today for the two new
Lewis Catalogues

Designed to assist your choice of
cabinet and equipment.

THE New Lewis Radio Cabinet Catalogue—the most comprehensive ever prepared. THE unique 60 page equipment catalogue.

Please send your two new catalogues enclosed in P.O. for 3/6 which will be credited against any purchase I make.

Name.....

Address.....

BLOCK CAPITALS PLEASE

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 SUCCESSES

CHAMBERS COLLEGE

(Incorp. National Inst. of Engineering)

(Dept. 461), 148 HOLBORN
LONDON, E.C.1

WORLD RADIO & TV HANDBOOK 1964 22/-

By JOHANSEN. Postage 1/-.

Amateur Radio Call Book 1964 by R.S.G.B. 4/6. Postage 6d.

Electronics Pocket Book by Hawker. 21/-.

Postage 1/-.

How to Listen to the World 1964 ed. by Johansen. 14/6. Postage 1/-.

Radio and Electronic Hobbies by Judd. 21/-.

Postage 1/-.

Radio and TV Reference Data by Hawker. 10/6. Postage 1/-.

Wireless Servicing Manual, new ed. by Cocking. 25/-.

Postage 1/-.

Tested S'net Circuits for S'wave and Comm. Reers, using M.A.T.S. 6/-.

Postage 6d.

British Transistor Directory by Bradley. 8/6. Postage 6d.

UNIVERSAL BOOK CO.

12 Little Newport Street, London, W.C.2
(adjoining Lisle Street)

BBC · ITV · F.M. AERIALS



B.B.C. (BAND 1). Telescopic loft. 21/-. External S/D 30/-.

I.T.V. (BAND 3). 3 Element loft array. 25/-, 5 Element, 35/-. Wall mounting. 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). 3 Element. 21/-. Loft S/D. 19/8; "H". 30/-, 3 Element. 52/6. External units available. Coax. cable 8d. yd. Coax. plugs 1/3. C.W.O. or C.O.D. P.P. 3/-. Send 6d. stamps for illustrated lists. Band IV 425 Hnc Aerials also available.

K.V.A. ELECTRONICS Dept. (P.W.)
3B Godstone Road, Kenley, Surrey. CRO 2527

ULTRA VIOLET BULBS

Easy to use source of UV for dozens of practical and experimental uses.

12 volt 36 watt AC/DC SBC 6/6. P. & P. 1/-.
12 volt 60 watt AC/DC SBC 8/6. P. & P. 1/-.
Transformer to suit the above: Input 200-240 A.C. Output 12 Volt A.C. 36 watt. 16/6. P. & P. 2/6. Input 200-240 A.C. 12 volt A.C. 60 Watt. 22/6. P. & P. 3/6.

Set of 4 colours FLUORESCENT Paint. Red, Orange, Green and Blue in 1 oz. tins. Ideal for use with the above Ultra Violet Bulbs. 9/6. P. & P. 1/6.

BULB 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 CV2396 STROBOTRON FLASH-TUBE made by Ferranti, brand new. I.O. base. Price 15/-, P. & P. 1/-.

10 AMPERES PER SECOND

Very latest High Speed type ex P.O. guaranteed perfect. type No. 100B coil 2,300 ohms. for 48 volt D.C. operation (will work on 36 volt), overall size 4 x 1 x 1 in. Also available. 13/- 10A which can be used as an interesting accessory with our Strobe unit. Either type price 15/-, P. & P. 1/6.



VARIABLE VOLTAGE TRANSFORMER £4.10.0

Post Paid.
Input 230 v. A.C. Output 0-260 v. at 1 amp. Fully shrouded, new. Also available 2.5, 5, 8, 10, 12 and 20 amp. Write for details.

4,000 Ohm Headphones, brand new (imported). 12/6 each pair. P. & P. 1/6.

SIEMENS H.S. RELAY. Very latest type, sealed. H96E. 1,700 ohms plus 1,700 ohms single C/O contacts. Price 16/6 each, plus 1/-, P. & P.

24 v. D.C. 40 A.H. ACCUMULATOR, in metal case with leather carrying handle. New. Price 27/6, carriage 8/-.

9 r.p.m. GEARED MOTOR 24 v. D.C. (will operate from 12 v.). Double gear box. Consumption 200 mA. Size 3 1/2 x 2 1/2 ins. Weight 15 oz. Small. Powerful.

Fully suppressed. 32/6. P. & P. 3/6.

230 VOLT A.C. 10 AMP. 100 OHMS Type B16G 80 r.p.m., 26 lb. inch. 21.19.8. P.P. 2/-.

Type D16G 5 r.p.m., 17 lb. inch. 22.9.6., P.P. 2/6. Type D16G. 13 r.p.m., 1.45 lb. inch. 22.12.6. P. & P. 2/6.

LIGHT SENSITIVE SWITCH

Kit of parts, including ORP, 12 Cadmium 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.

MINIATURE UNISELECTOR SWITCH

3 banks of 11 position plus homing bank. 40 ohm coil 24-32 v. operation. Ex-equipment. Individually tested. 22/6, plus 2/6 P. & P.



MINIATURE LEAD ACID ACCUMULATOR. (Brand new.) 2 1/2 A.H. Size 4 x 1 1/2 x 1 1/2 in. Wt. approx. 1 lb. 10/6 for 3. P. & P. 1/6. 12V. 0.75 A.H. Size 4 x 3 x 1 1/2 in. Wt. approx. 2 lb. (can be used as double 6V.). 15/6 each. P. & P. 1/6.

TRANSISTORS

OC30	10/-	OC75	7/-	Get 573 12/6
OC41	7/-	OC76	6/-	Get 573 25/-
OC45	5/-	OC77	9/-	M/Pair
OC45	9/-	OC139	12/-	2N458 20/-
M/Pair		OC140	19/-	SB345 7/6
OC71	5/-	OC171	10/6	AF114 11/-
OC72	7/-	OC200	10/6	AF115 10/6
OC73	14/-	OC201	21/-	AF116 10/-
				AF117 9/6
				Get 105 10/-

SERVICE TRADING CO.

All Mail Orders also callers.
47-49 High Street, Kingston on Thames.
Tel: KINGSTON 9450

Personal callers only
9 Little Newport Street, London W.C.2
(off Leicester Square) Tel: GARRARD 666

HERE'S A LOW COST WAY TO GET INTO REALLY PROFITABLE T.V. SERVICING FAST?

Maybe you enjoy fixing electrical gadgets or the odd radio or two. Maybe you wish you could. In either case you are probably just the man who could benefit from a new revolutionary type of television training programme now being introduced for the first time.

Knowing that early success will usually spur a man on to greater achievement, we have made a point of teaching first how to make the easiest T.V. repairs. Since the easiest T.V. repairs are the ones most often found on service calls, you are ready to make money right after the first lesson. Then as you progress you will learn how to handle every kind of trouble found in all makes of T.V. sets.

Here are some of the items covered in the course:

1. Simple adjustments to correct poor pictures.
2. Circuit faults indicated by a poor pattern.
3. Finding bad valves by observing picture faults.
4. Antenna principles and practices.
5. Facts about the T.V. signal to help you in repair work.
6. All about Cathode Ray tubes.
7. How to tell what is at fault.
8. Explanation of television circuits.
9. U.H.F. converters and tuners.
10. Television test equipment and alignment.
11. Advanced trouble shooting by picture analysis.

This is a real home study course that has been bound into one giant 8 x 11 in., 192 page manual to reduce cost.

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!

The course features over 325 different line drawings, circuits, servicing charts and illustrations to simplify the text and make your study more enjoyable. Soon you will be well on your way to becoming a first-class television repair technician!

YOU TAKE NO CHANCES WHEN YOU DEAL WITH SIM-TECH

You must be convinced that this is the best value you have ever seen in television 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 period of seven full days.

The price? Only 38/- per course, plus postage and packing, 1/6.

FREE TRIAL OFFER

Terms only 3/- per week if you wish

To SIM-TECH BOOK COMPANY Dept. BT3, West End, Southampton, Hants.

Please send your Television Course for a full seven days' free trial. If not delighted I may return the course post-paid without further obligation on my part. Otherwise I will pay cash or 5/- weekly until 37/6 plus 2/6 service charge, total 40/-, is paid.

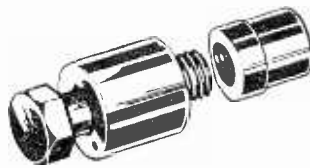
Tick here if enclosing full price of 37/6. (Same 7-day money back guarantee.) NOTE: Customers who send cash with order get in addition a 71-page book on TELEVISION FAULTS. (This offer closes April 30th, 1964).

Overseas customers please send full amount (including Ireland).

Name

Address

City County



The **PUNCH**
you need!

SOLE PUNCHES

Instant Type	...	...	...	6/10 ea.
3/8" 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 1/4" diameter Int. Octal...	...	...	...	13/4 "
1 1/4" " " " " " "	...	...	...	16/2 "
1 1/4" " " " " " "	...	...	...	18/10 "
1 1/4" " " " " " "	...	...	...	21/8 "
1 1/2" " " " " " "	...	...	...	24/4 "
2 3/8" " " " " " "	...	...	...	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

TRANSISTOR

PRICES DOWN

GREEN SPOTS 1/3 or 3 for 3/3.
RED SPOTS, down to 1/6 or 3 for 4/-.
WHITE SPOTS down to 2/- or 3 for 5/3.
MICRO-ALLOY MAT 100 7/9, MAT101 8/6, MAT120 7/9, MAT121 8/6.

BOOKS 22 Tested Circuits Using MATS, 5/-.

SHORT WAVE CIRCUITS using MATS 5/-.

SHORT WAVE SUPERHETS using MATS 6/-.

WIRELESS WORLD VALVE DATA 6/-.

COMPONENTS by REPANCO

DRX1 Dual Range CRYSTAL Set Coil with Circuit, 3/-.

DRR2 Dual Range Coil with REACTION with Valve and Transistor Circuits, 4/6.

FR2 FERRITE ROD AERIAL with Circuit, 12/6.

CHI R.F. Chokes, 2/6.

TT45 Driver Transformers, 5/-.

TT46 Output Transformers, 5/-.

TT49 4.5 to 1 Interstage Transformer, 5/-.

TT23 Driver for 10 Watt Amplifier, 22/6.

TT24 Output Transformer 10 W, 22/6.

XT50 Min. Double Tuned I.F.T., 6/9.

ALL REPANCO COMPONENTS AVAILABLE

TRANSISTOR HOLDERS 3 or 5 pin, 1/-.

ALL SENT POST FREE IN U.K. by

PETHERICK'S RADIO SUPPLIES

22 HIGH STREET

BIDEFORD N. DEVON
Tel.: Bideford 1217

Irongate (M.O.) LTD

CONSTANT VOLTAGE TRANSFORMER



DUAL VOLTAGE MAINS STABILIZER Will cut out mains interference with TV, Hi-Fi, stereo, tape recorder or any Laboratory equipment by providing perfectly stabilized voltage supply. ★ PERFECT PICTURE & RADIO RECEPTION

★ PREVENTS DAMAGE BY POWER SURGES AND CUTS
★ JUST PLUGS IN
★ ATTRACTIVE METAL CASE 8in. HIGH
Ex stock, Carriage free. ONLY £11.10.0

TRANSISTOR TESTER



FULLY PORTABLE

Measurement Ranges: Ico (Icbo) and the reverse current of diodes, PNP and NPN—0—50µA (1µA per scale). POWER—0—1mA (20µA per scale). 35—200 Ω (5 per scale). Bias current—1mA on PNP and NPN, (5µA on POWER).
 $a_{0.9-0.995}$ (from $\beta = \frac{a}{1-a}$)

Terminals: Spring Sockets and Screw Terminals. Meter: 4in. 50kΩ moving coil. Size and Weight: 5in. x 4in. x 3in., 2 1/2lb. Powered by pen-cells.

MODEL AT-1 ONLY £9.17.6 Post Free.

TRANSISTORIZED MEGOHMMETER

BATTERY OPERATED, 50v.,—1,000 Megohms. This most advanced insulation and continuity tester incorporates these outstanding advantages:

- ★ One-handed push-button operation.
- ★ 4in. A.C./D.C. Voltmeter with fine Zero adjustment.
- ★ Stable and accurate readings.
- ★ Easy-to-read scaling.
- ★ Metal case 7in. x 5in. x 3in.

Complete with probes and carrying case. Post Free. ONLY 22 Gns.

Irongate (M.O.) LTD

Dept. (PW.1) IRONGATE WHARF RD., PRAED ST., LONDON. W.2. PADDINGTON 2233/4

KEENER PRICES

★ VALVES ★

by return of post
THE MOST ATTRACTIVE COMPETITIVE VALVE LIST IN THE COUNTRY

All valves are new and unused unless otherwise advised

POST	3 MONTHS GUARANTEE	FREE TRANSIT INSURANCE
1 Valve 6d., 2-11. 1/-	In writing with every valve.	on Money bank Guarantee on Goods if returned within 14 days.
FREE for 12 or more valves.		

O24	4/8EK7	7/320D1	8/9DL82	9/9EZ40	5/8U18	7/8							
LA7GT	8/-	1/920F2	9/8DL92	4/9EZ41	6/-U92	5/9							
105GT	7/-	4/320L1	11/8DL94	5/8EZ80	4/9U24	12/6							
1D5	6/8EK5G	4/820P1	9/8DL96	6/8EZ81	4/8U25	8/9							
1D6	8/8EK6G	8/820P3	9/8EA30	7/3FW/500	7/8U25	7/8							
1H5GT	8/-	9/820P4	13/8EACB0	6/8GT1	9/8U31	6/9							
1L4	3/36L1	8/820P5	12/8EAC81	9/8G232	7/8U33	14/-							
1LD6	4/-	7/625AGV	7/8EAF42	7/8G234	10/8U35	12/6							
1LN8	4/86L8G	8/825LGT	6/-	EB34	1/3HABC90	9/6U37	23/3						
1N5GT	8/-	7/325V0	7/9EB41	4/8HL41DD	8/8U60	4/9							
1R5	4/86L19	12/825ZAG	6/9EB41	8/9HV82	6/8U82	4/9							
184	7/8DL8D0	5/825Z5	7/9EB38	5/9KT82	8/-	U76	5/8						
185	3/98M7	5/-	28Z8	8/-	EB041	6/8KT38C	4/-	U78	4/6				
1T4	8/98P1	12/827S0	1/78EB81	6/8KT38	14/-	U107	12/6						
1U5	5/32828	7/-	50C1	5/9EBF80	6/9KT44	6/8	U181	9/6					
2D21	3/36P28	9/380C15	9/8EBF83	6/9KT55	17/8U31	9/-							
3A4	4/-	6/6070	6/-	EBF59	7/6KT8	7/-	U282	12/6					
3A5	8/96Q7GT	7/930FL1	9/8EB21	9/-	KT63	4/8	U301	11/6					
3D8	4/-	8R70	6/-	30L1	5/8ECS2	4/3KT68	12/6	U309	5/6				
3Q4	6/92AT	5/830L15	9/8EC91	3/-	KT78	7/8	U329	9/6					
3S5	4/888C7	4/830P4	6/8ECS2	7/8	KT81	18/-	U339	9/6					
3V4	5/865G7	4/830P12	7/8ECS3	1/3	KT81	6/8	U341	8/9					
3R4GY	8/968H7	3/-	30P19	9/6ECS2	3/9KT68	5/8	U404	5/6					
5T4	7/988J7	5/-	30P1L	8/8ECS3	4/9	KT68	5/8	U801	16/6				
5U4G	4/988K7	4/830P13	8/8ECS4	9/-	KT753	5/8	UABC80	8/9					
5V4G	4/8874GT	5/830P4	8/8ECS5	5/9	L83	3/-	UAF42	7/-					
5Y3G	4/88N7GT	4/830P12	7/8ECS4	7/8	L82	5/8	U142	8/8					
6Y8GT	4/988S7	5/835W4	5/8ECS4	4/9	U141	6/8	U8C41	9/6					
5Y4G	8/888S7	3/835ZAGT	4/9ECS2	4/3	N37	10/8	U8C81	6/9					
8Z4	8/-	8U4GT	9/835Z5GT	6/8	ECC88	5/8	N78	11/8	U8F80	6/9			
8Z4G	7/-	8Z4G	4/8	4/1	6/8	ECC88	6/8	N108	13/-	U8F89	7/3		
5Z4GT	8/88YGT	6/8	4/8	4/1	6/8	ECC85	6/8	N152	8/3	U8L21	10/6		
6/30L2	8/83X4	6/8	4/8	50B5	6/8	ECC88	10/8	P41	11/8	U8C92	7/6		
6A8	3/88X5G	4/8	50C5	6/8	ECS80	6/8	P61	2/8	UCC84	9/6			
6A7	8/-	8X5GT	6/8	50L8GT	7/-	ECS82	7/3	PABC80	7/8	UCC85	6/9		
6A8G	6/8786	8/8	535K	9/6	ECS21	10/8	PC86	10/3	UCF80	11/9			
6A8GT	12/8787	6/8	81GT	17/8	ECS35	7/8	PC87	8/-	UCH21	9/-			
6AC7	3/-	7C5	7/3	62BT	18/8	ECH42	9/8	PC84	6/8	UCH42	8/9		
6AG5	2/6	7C6	7/-	75	4/8	ECH81	6/9	PC85	7/8	UCH81	8/8		
6AG7	5/8	7H7	5/8	78	4/8	ECH83	7/9	PC88	11/-	UCL82	8/8		
6AK5	4/9	7R7	15/-	80	5/8	ECL80	5/9	PC89	10/8	UCL83	9/8		
6AL5	6/8	7Y4	4/8	82	9/6	ECL81	3/8	PC89	13/8	UC189	10/8	U841	7/8
6AM6	2/9	7Z4	5/-	188BT	19/8	ECL83	9/8	PC84	6/8	UC82	6/8		
6AQ5	5/8	8D3	2/8	188BT	19/8	ECL82	9/8	PC82	6/8	U8F80	6/9		
6AT8	5/-	10C1	9/8	807(A)	8/-	EF22	6/6	PCF84	9/3	UF35	7/-		
6A06	6/-	10C2	12/8	807E	5/8	EF38	3/3	PCP86	6/8	UF89	6/8		
6A76	6/8	10P1	6/8	81C	4/8	EF37A	5/8	PCP82	8/8	UL41	6/9		
6B7	8/-	10P9	10/-	832	14/-	EF39	4/8	PCF84	8/8	UL44	14/-		
6B8G	3/-	10P18	10/8	866A	11/8	EF40	9/8	PC84	6/8	UL46	6/9		
6BA8	5/8	10LD11	12/6	954	3/8	EF41	6/8	PC85	8/8	UL84	6/9		
6BB8	5/-	10P13	8/3	955	2/3	EF42	5/8	PC86	9/8	UM80	8/8		
6B6G	13/-	10P14	6/8	982	5/8	EF50-BR13	3/8	PCN25	3/8	UR1C	6/9		
6BH6	5/8	10P18	6/9	1825	5/8	EF50-A	2/8	PCN45	7/8	UT8	6/9		
6BJ8	5/8	12A8	2/3	5763	7/8	EF54	3/3	PCN46	4/3	U07	8/8		
6BR7	8/-	12A8H	9/-	9001	3/-	EF80	3/8	PL33	6/8	U08	11/8		
6BR9	8/-	12AT8	6/8	9002	4/3	EF85	5/8	PL38	8/3	UY18	10/8		
6B86	6/8	12AT7	3/8	9003	5/8	EF86	6/8	PL38	15/-	UY21	8/8		
6BW7	5/-	12AU8	7/8	ATP4	8/-	EF89	5/8	PL1	7/9	UY41	5/8		
6C4	2/3	12AU7	4/3	AZ31	6/9	EF91	2/8	PL82	8/8	UY45	8/9		
6C5	5/8	12AV6	6/9	AZ41	6/8	EF92	2/8	PL83	5/3	VP48	9/-		
6C8	3/-	12AX7	5/8	B36	6/8	EF183	8/8	PL84	5/9	VP23	2/3		
8C9	10/8	10P1	6/8	C10	8/-	EF184	8/6	PL820	7/9	VP41	5/8		
8CD8G	15/8	12B8B	6/8	CH35	15/8	EF83	5/8	PC84	8/8	UL44	14/-		
6CH6	5/-	12BH7	7/-	CL33	9/-	EL32	3/8	PCX	6/8	UR105	5/8		
6D2	2/3	12C8	3/9	CY31	6/8	EL33	7/-	PX25	8/9	W76	4/9		
6D8	6/8	12E1	18/-	D77	2/3	EL34	9/8	PY31	6/-	X61	5/8		
6D6	3/8	12E8	6/8	DA50	11/8	EL35	7/8	PY32	9/-	X618	11/-		
6F1	8/8	12H5G	6/8	CF3	4/8	EL36	8/8	PE85	9/8	X83	6/8		
6F6	6/8	12J7GT	7/8	DAF91	4/8	EL41	4/8	EL41	5/8	X88	5/8		
6F8G	4/8	12K70T	4/8	DAF98	6/8	EL42	7/8	PY81	5/8	X88	7/8		
6F13	4/8	12K8	9/8	DF93	8/-	EL81	5/8	PY82	5/-	X76M	11/-		
6F14	9/8	12K8GT	9/8	DF99	2/9	EL84	5/8	PY83	6/-	X78	21/-		
6F15	6/8	12K9T	6/8	DF99	6/8	EL85	7/8	PY88	8/8	X79	21/-		
6F19	5/-	12MA7	6/8	DF97	7/8	EL81	2/8	Y800	6/8	X83	5/-		
6F32	4/-	12MGT	3/8	DH63	5/8	EL85	6/-	PZ30	9/8	X23	4/9		
6F33	4/-	12M7	3/8	DH76	4/8	EM34	8/8	R18	9/8	Z68	7/6		
6F16	1/8	12M7	5/8	DK32	8/8	EM80	8/8	R19	7/9				
6F15	4/8	12M7	6/8	DK32	8/8	EM81	8/8	SP41	2/-				
6F5G	4/3	12N7GT	6/8	DK92	6/8	EM83	8/8	SP41	2/-				
6F5GT	4/3	12MGT	8/-	DK96	7/3	EM85	8/8	SU25	18/-				
6F6	3/-	12M7	4/8	DL38	7/3	EM81	9/8	SD150	4/8				
6F7G	4/8	12D8	5/8	DL35	7/-	EY51	5/8	T41	6/8				
6F7GT	4/8	12H4G	7/8	DL83	6/9	EY88	9/8	TDD4	8/8				
6K6GT	6/-	12B86	14/-	DL76	8/-	EY88	9/8	U14	7/8				

TRANSISTORS & DIODES

GUARANTEED TOP QUALITY
Huge reductions. Red Spot standard I.F.F. type now only 1/6
White Spot R.F. 2/-
Mullard Matched Output Kits (OC81D and OC81S) 12/6
R.F. Kits (OC44, OC45) (C) 3 transistors 12/6
AF114 8/- OC44 3/8
AF115 7/6 OC45 3/8
AF116 7/6 OC72 3/8
AF117 7/- OC81 5/8
AF127 9/8 OC81D 5/6
OC26 12/6 OC82 8/6
OC36 14/- OC170 8/8
OC171 8/6

GERMANIUM DIODES
General Purpose miniature diodes. A.V.C. type, 8/6 to 8d.
Gold Bonded Ingot quality. Individually tested. 1/-
9/8 for

SILICON POWER RECTIFIERS
Guaranteed performance. Top Make. Tested 250 V working.
100mA 3/9 300mA 7/6
(3 for 9/6) (3 for 19/8)

3 VALVE AMPLIFIERS
Kit of new parts, consisting chassis, mains and output transformers, valves (P91, 6X6G, 6X4G) and all components. With full instructions for making high gain amplifier with separate bass and treble controls, negative feedback-lackets. Truly unusual value! 29/-

MAINS TRANSFORMERS
Excellent Quality Guaranteed. Upright mounting 250-0-250 V 9/6
60 mA. 6.3 V 3 A.
Ditto semi-drowned 9/6. Ditto upright 80 mA 12/6.

NEW SHOP SOUTHAMPTON

OPENING ON JANUARY 18, 1964

72 EAST STREET, SOUTHAMPTON

We look forward to seeing all our old customers in the area

With Widest Stocks. Keenest Prices: TV's, Radios, Valves, Transistors, Hi-Fi Equipment, Loudspeakers, Autochangers, Cables, Components, etc.

Tubes

HIGHEST QUALITY - COMPARE OUR PRICES

Carr. & Ins. 12/6	6 Months		12 Months		NEW TYPES MW 31/74 MW 36/84 CRM 172 MW 43/84 £6.0.0
	£2. 0.0	£3. 0.0	£2. 10.0	£3. 10.0	
MOST MULLARD, MAZDA, COSSOR, EMITRON, EMISCOPE, BRIMAR, FERRANTI TYPES, PROCESSED IN OUR OWN FACTORY	12in.	£2. 0.0	£3. 0.0	£4. 15.0	
	14in.	£2. 10.0	£3. 10.0	£4. 15.0	
	15-17in.	£3. 5.0	£4. 5.0	£5. 15.0	
	21in.	£3. 15.0	£5. 15.0	£6. 0.0	

BULK BARGAINS

12 POTS. Popular values. 5K to 2 Meg. Unused, mixed, preser. long sp. switched, etc. 4/6
CONDENSERS. 25 Mixed. Electrostatic. Many popular sizes. LIST VALUE 25. Our Price 10/-
100 RESISTORS 6/6
Excellent. Sizes 1.5 watt.
100 CONDENSERS 9/6
Miniature Ceramic and Silver Mica Condensers. 3 pF to 3,000 pF. LIST VALUE OVER £5.
25 TAG STRIPS 4/-
2, 4, 6 way etc. Unused.
100 HI STABS 9/6
1% to 5%. 100Ω to 3MΩ.
TELEPHONE C.O.D. ORDERS DISPATCHED THE SAME DAY.

VALUE!

4 watt AMPLIFIERS
Excellent amplifier with high gain preamp stage. 10P3 driving 10P14 output stage, complete with Sin. speaker, in attractive 2-tone case. Tone control, negative feedback, ready for immediate use, individually tested. Amazing volume and clarity. Ideal for guitars, record players, p.a. in small halls, baby alarms etc. Easily worth £5. Our price whilst stocks last. Carr. Packing, etc. 7/6. 45/-

ENQUIRIES WELCOMED
Quantity Prices or Quotes for Items not listed, particularly rare values.

Post: 2 lbs 2/-, 4 lbs 2/6, 7 lbs 3/6, 15 lbs 4/-, etc. (C.O.D. 2/- extra). ALL ITEMS LESS 5% AND POST FREE IN DOZENS.

RETAIL SHOP AND NEW HI-FI ROOM
350-352 FRATTON ROAD, PORTSMOUTH. (Tel. 22634)

ALL MAIL ORDER, RETAIL SHOP AND HI-FI ROOM
11 12 NORTH ROAD, BRIGHTON, Tel. 67999

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.

MINIATURE 'SCOPE

Features 2½ in. DG7/5 Tube. Level 2dB, 50 c/s to 2 Mc/s. 3½ Sec. to 80½ Sec. Sweep. High sensitivity. Fully portable scopes. Ideal for all transistor and valve design or servicing. 22 to 30 volt D.C. operated.

MODEL CT84

£16-10-0

CARRIAGE 7/6

DEAC RECHARGEABLE BATTERIES

- (a) 18 volt 100mA/H 4 x 1in. diameter. Brand new sleeved, 30/-.
 - (b) As above but 150mA/H, 35/-.
 - (c) 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 amateur, designers, repair shops, all domestic uses. Full details and specification in our catalogue.



- ★ PT34 1 Kohm/volt £2 5 0
- ★ MI 2 " " £2 9 0
- ★ THL33 2 " " (illus.) £3 15 0
- ★ EP10K 10 " " £4 9 0
- ★ ITI-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

SUBSTITUTION BOXES

- Capacitor Box. Provides 9 standard values from 0.001 to 0.22 mfd at 600 volt working. 29/6.
- Resistor Box. Provides 24 standard values at 1 watt. 15 ohms to 10 meg., 37/6.

Each box fully calibrated with insulated leads. Invaluable for service and design.

NOMBREX TEST EQUIPMENT

All transistor portable units supplied with full instructions.



LEAFLETS ON REQUEST

- ★ 150 Kc/s to 350 Mc/s generator. RF, Mod., AF. 8 ranges. Leads, batt., instructions. £7.18.6, P.P. 2/6.
- ★ Resistance/Capacitance Bridge. 1 pF to 100mF and 1 ohm to 100meg. leakage. PF Tests, with batt. and Instructions. £7.2.3, P.P. 2/6.
- ★ Power Supply. Gives any voltage 1 to 15 D.C. up to 0.1 amp. From Mains. £5.17.6, P.P. 2/6.
- ★ Audio/Generator, 10 c/s to 100,000 c/s. Sine and square wave. With batt. and Instructions. £15.2.3, P.P. 2/6.

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

TEST LEAD KIT

supplied in Pocket Pouch. Contains probes, leads, clips, etc. 8/6, P.P. 9d.

RECORDING TAPE

5in. 600ft. 12/6; 5in. 900ft. 15/-; 7in. 1,200ft. 18/6; 7in. 1,800ft. 25/-; 7in. 2,400ft. 27/6. Excellent quality.

100 Kc/s QUARTZ CRYSTALS

- 2 Pin: Octal or 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/-
- (Over 600 Frequencies in Stock for all purposes).

MAINS AND BATTERY RECORD AND TAPE DECKS

- All Decks Complete with Cartridges
- ★ BSR UA14 4-speed £5 19 6
 - ★ Garrard Autoslim £6 10 0
 - ★ Unpluggable Head Version £6 19 6
 - ★ Stereo Version £7 19 6
 - ★ SRP10 4-speed or GU7 £5 5 0
 - ★ Garrard AT6 with Stereo Cartridge £10 19 6
 - ★ Collaro-2-track Deck Studio £10 10 0
 - ★ 4-track Deck £13 19 6
 - P. & P. 3/6 any type above.
 - ★ 9 volt Star. 45 r.p.m. 39/6
 - ★ 45 or 33 r.p.m. Star 9V 92/6
 - ★ 45 r.p.m. Garrard, 6V 35/-
 - ★ 4-speed B.S.R., 9V 5 gns.
 - ★ Garrard 9V. 2-speed, 2-track Tape Deck £12 15 0
 - P. & P. 3/6 any of above.

STEREO AMPLIFIERS



Complete with full function pre-amplifiers and controls.

- ★ SA80 4+4 watts £9 10 0
- ★ SA150 7+7 watts £16 10 0
- ★ SA30015+15 watts £32 10 0

Each amplifier completely self contained and designed for Mono and Stereo output. Supplied complete with full manual. Leaflets on any type on request. (Full range of Speakers, Tweeters and Decks in stock, see catalogue).

STETHOSCOPE HEADSETS

Crystal and Magnetic 10/6 each.

CRYSTAL MICROPHONES

- Acos 39-1 Stick Microphone 32/6
- Acos 60-1 Stick Microphone 27/6
- Acos 40 Desk Microphone 15/-
- Acos 45 Hand Microphone 25/-
- Lapel/Hand Microphone 12/6
- MC24 Stick Microphone 25/-
- 100C Stick with Stand 39/6
- BM3 Stick with Stand 52/6
- Lapel/Hand Magnetic 12/6

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
 - *0/1mA (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.

HEADPHONES

2000 ohms 12/6. 4000 ohms 14/-.

BUILD A QUALITY TAPE RECORDER

- ★ Printed circuit. Recod/playback Amplifier Kits.
 - 2 Track 11 gns. 4 Track, 12 gns.
 - ★ Studio Deck.
 - 2 Track, £10.19.6 4 Track, £13.19.6
 - ★ Cabinet with Speaker 5 gns.
- Leaflet on Request.

- 5-Piece Hole Cutter for all chassis work. ½ in. to 1½ in. with pouch 49/6.
- Crystal Contact Microphone 12/6 P.P. 9d.
- 2K, ½-track Tape Head 15/- P.P. 9d.
- Telephone Recording Attachment 12/6 P.P. 9d.
- 4-Channel Transistor Mixer Unit 59/6 P.P. 1/6
- Tape Jack Radio Tuner 29/- P.P. 1/-

BOAC VHF POCKET RECEIVERS



- Complete units with CS 5A VHF Detector, 5—V6/8R (OC4A) Transistors, 3.9V. 450mA rechargeable Deac battery 2—OA91, OA 10 rectifiers, 1 Kohm stethoscope headset, moulded casing, etc.
- Complete Unit 35/- P.P. 2/- with Full Circuit OR DEAC BATTERY OR HEADSET 12/6, P.P. 1/6 15/- P.P. 1/-
- Unit less DEAC & HEADSET 12/6, P.P. 1/6.

FIELD STRENGTH METER

Five channels cover 1 Mc to 200 Mc/s. Fitted 200 microamp meter for CW or R.F. Indication and Earphone for A.F. Monitoring. Designed for checking all types of transmitters. Size 4 x 2½ x 2½ in. Complete. Ready to use, with instruction and telescopic aerial, 69/6. Post Free.

RUN YOUR RADIO OR AMPLIFIER FROM MAINS BATTERY ELIMINATORS AND CHARGERS

1. For PP3 or equivalent 9 volt. Pocket Radio Battery, 18/6, P.P. 1/-.
2. For PP4, PP7, PP9, 9 volt Portable Radio and Equipment. Supplies up to 300mA, 49/6, P.P. 2/-.
3. De Luxe version of No. 1 also charges PP3 type batteries. 24/- P.P. 1/-.

TYPE 38, TRANSMITTER RECEIVER

Complete with 5 valves. In new condition. These sets are sold without guarantee but are serviceable. 22/6 P.P. 2/6

7.4 to 9 Mc/s. Headphones 7/6 pair. Junction Box 2/6 Throat Mike 4/6. Aerial Rod 2/6

Henry's Radio Ltd

PADddington 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

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	PW3Ca	2/6
Midget Short Wave Two	PW3Ea	2/6
Simple S.W. One-valver	PW88	2/6
Pyramid One-valver	PW93	2/6
BBC Special One-valver	AW3E7	2/6
A One-valver for America	AW429	2/6
Short-Wave World Beater	AW436	3/6
Standard Four Valve S.W.	WM3E3	3/6
Enthusiast's Power Amplifier	WM3B7	3/6
Standard Four Valve	WM391	3/6
Listener's 5-Watt Amplifier	WM392	3/6

QUERY COUPON

This coupon is available until 7th February, 1964, and must accompany all queries in accordance with the notice on our "Letters to the Editor" page.

PRACTICAL WIRELESS, FEBRUARY, 1964.

BLUEPRINT SERVICE

WIRELESS PRACTICAL

AM 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 Star, 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 COST 79/6 P.P. 5/-
(BATTERY 3/9 EXTRA)
ALL UNITS SOLD SEPARATELY

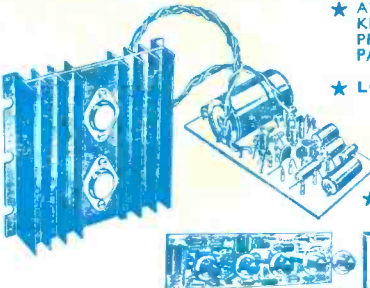
- ★ **READY BUILT AMPLIFIER WITH SPEAKER AND VOLUME CONTROL 35/- P.P. 2/-**
- ★ **TURNTABLE WITH PICKUP. 39/6 P.P. 2/6**
- ★ **TWO TONE CASE WITH HANDLE. 5/- P.P. 2/-**
- **EXCELLENT QUALITY AND VALUE** ●

TOT. £5

Fully Detailed Illustrated Leaflet on request. All parts sold separately. Guaranteed the Best Obtainable. Attractive Appearance. Reliable Design. Quality Performance.

...radio market. ...printed composite ...distrubuted build- ...s. Full tuning of ... long wave bands ...beatable sensitivity and ...vity. Excellent tone and ...ume with over 600mW push-pull output.
★ Clearly marked horizontal station dial with slow motion tuning. Two colour Blue or Beige cabinets with Gold handles, grilles and fittings. Size 10½ x 7½ x 3½in. includes car aerial sockets, recording sockets.
★ 6 Mullard Transistors and 2 Diodes.
UNBEATABLE FOR QUALITY AND VALUE

NEW LOW PRICES 10 WATT TRANSISTOR HI-FI AMPLIFIER AND PREAMPLIFIER



- ★ **AVAILABLE IN KIT FORM OR PREBUILT PANELS**
- ★ **LOW NOISE**
- ★ **LOW POWER REQUIREMENTS**
- ★ **MONO OR STEREO**

Circuits and details FREE on Request

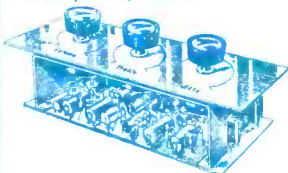
★ **CALL FOR DEMONSTRATION—ANY TIME** ★

PERFORMANCE EQUIVALENT TO VALVE AMPLIFIERS OF FOUR TIMES THE PRICE AND MANY TIMES THE SIZE

- ★ Power output 10 watts at 400 c/s. Second harmonic distortion 0.1%. Total harmonic distortion 0.25% at 10 watts. Signal to noise ratio at 10 watts 70 dB. Overall response within 3 dB 40 c/s to 20 kc/s.
- ★ 6-Transistor 10 watt power amplifier. 0.25 ohm output impedance for 3 ohms. 24 volt supply. 300mA average for 10 watts. 100mV into 33 k.ohm sensitivity. 1 dB, 40 c/s to 20 kc/s. Built £5.10.0 P.P. 2/6. Or Kit 99/6 P.P. 2/6. (Mains Unit 69/6 P.P. 2/6).
- ★ As above but 10 watts for 15 ohm speakers, 40 volt supply, 150mA average for 10 watts. 1 dB, 40 c/s to 20 kc/s. Built £5.19.6 P.P. 2/6. Or Kit £5.10.0 P.P. 2/6. (Mains Unit 69/6 P.P. 2/6).
- ★ Full function pre-amplifier and control unit on printed circuit. Size 9 x 2½in. Features 6 position input selector for microphones, tuners, tape, pick-ups—treble and bass controls — 12dB at 50 c/s and 12 kc/s—14dB at 50 c/s and 12 kc/s. Four-position filter and volume controls. 1.5mV to 300mV input sensitivity. Built £5.10.0 P.P. 2/- Or Kit 99/6 P.P. 2/-. (Front panel 8/6 extra).

7-TRANSISTOR RECORD/PLAYER/RADIOGRAM AMPLIFIER

- 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.



● **TWO VERSIONS AVAILABLE**
12.18 volt for 15 ohm speakers. (mains unit now 60/- extra).
9/12 volt for 3 ohm speakers (mains unit 49/6 extra).
● Size only 6 x 2½ x 2in.
Ideal for mains or battery, portable or domestic record player, grams, etc. Or car.
Built Ready To Use £5.19.6 P.P. 2/-
BOOKLET FREE ON REQUEST

TO BUILD YOURSELF

- Mini Ranger Personal Radio, 49/6
 - Ranger-3, Personal Radio, 49/6
 - Sinclair Slimline, Personal Radio, 49/6
 - Quinlet Micro Injector 27/6
 - Sinclair M/LW-5 79/6 P.P. 2/-
 - PW-6 Superhet £7 19 6
 - PW Celeste £9 19 6
 - PW Spinette £10 19 6
 - PW Shortwave 2 99/6 P.P. 2/6
- Leaflet and details on request

4-WAVEBAND COMMUNICATIONS RECEIVER

● 550 kc/s to 30 Mc/s.—BFO—AVC—Noise Limiter—Bandspread—“S” Meter—Telescopic Aerial—Full World Wide Coverage. 4 valve.
PRICE £24.15.0. With Full Instructions. **BRAND NEW IN CARTONS.** Detailed Leaflets on request.
● 9 valve version of above 40 gns., Details on request.

TRANSISTOR MINIATURE AMPLIFIERS

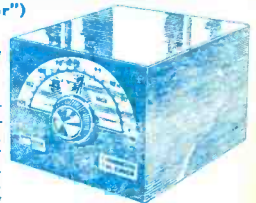
- ★ 3T 125mW 9 v. 30/80 ohm 39/6
- ★ 4T 250mW 9 v. 8/10 ohm 37/6
- ★ 5T 350mW 9 v. 12/16 ohm 57/6
- ★ 4T 1 watt 9 v. 3/5 ohm 59/6
- ★ 4T 1 watt 6 v. 3/5 ohm 92/6
- ★ 4T 1½ watt 12 v. 3/5 ohm 97/6

FM TUNER First Again

(As described in December 1963 Edition of "Radio Constructor")

- ★ 5-Transistor
- ★ 4 Diodes
- ★ Full coverage 87 to 105 Mc/s

★ **AFC and AVC**
Printed circuit design of high sensitivity and quality. Output for valve or transistor amplifiers. Size 3½ x 2½ x 4in. Simplified building instructions. All parts sold separately.



TOTAL COST £8.19.6 P.P. 2/6
Detailed Circuit Book on Request

BABY ALARM
Ready to use with microphone and battery. Fully portable. £5.10.0

TELEPHONE AMPLIFIERS
For use with all telephones. Gives speaker output. Battery operated. £5.10.0.

Henry's Radio Ltd.

303 EDGWARE ROAD, LONDON, W.2
PADdington 1008/9
Open Monday to Sat. 9-6. Thurs. 1 o'clock.