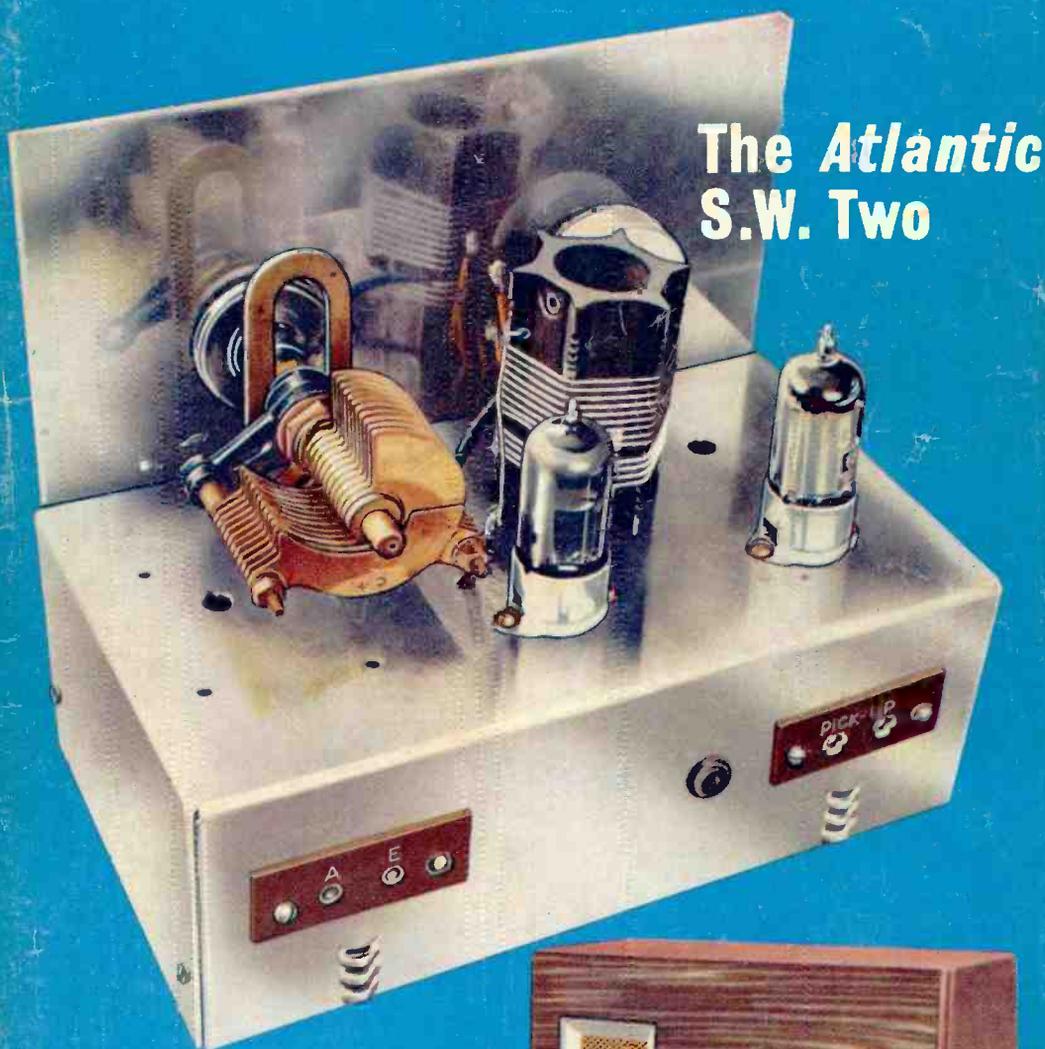


AUGUST
1962

Practical 2/- **WIRELESS**



**The Atlantic
S.W. Two**

**The Consort
TRF Receiver**



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

A.C. ONLY. Chassis size 15 x 6½ x 5½ in. high. New manufacture. Dial 14½ x 4½ in. In 2 colours predominantly gold.
 PICK-UP. Ext. Speaker. Ae, E. and Dipole Sockets. Five push buttons—O.F. L.W., M.W., F.M. and Gram. Aligned and tested. O.P. Transformer. Tone Control. 1,000-1,900 M.; 200-500 M.; 88-99 Mc/s Valves EZ80 rect., ECH81, EF89, EABC80, EL84, ECC85. Speaker and cabinet to fit chassis (table model). 47/6 (post 2/6). 9 x 6 in. ELLIPTICAL SPEAKER, 20/-, to purchasers of this chassis.
 TERMS:—(Chassis) £5 down and 4 Monthly Payments of £2. and 1 of £13.0.
 Cheap Room Dipole for V.H.F.. 12/6. Feeder 6d. yard Circuit diagram 2s. 6d.



THE "CANTATA" 6-TRANSISTOR AND DIODE PORTABLE

COMPLETE KIT FOR ONLY **£7.19.6** (post 3/6)



500mW push-pull output. Ferrite rod aerial. Car aerial socket and coil. L.W., M.W., F.M. coverage. Operates on 110-240 v. 4.5v. cells. Printed circuit board 8½ x 2½ in. All holes drilled and component positions marked. Instructions 2/6 for 16p. (refunded on purchase of kit). Size 9 x 3½ x 7½. 8 x 2½ in. P.M. high quality speaker. Attractive Vynair covered cabinet. two tone. Two batteries 5/6 the pair (Ever Ready 126). Mullard transistors OC44, 2 x OC45, OC81D, and 2 x OC31. 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.

BUILD YOUR OWN RECORD PLAYER
 Special summer offer, price £11.5.0 carr. paid

Fully built 2 valve amplifier
 B.S.R. 4-sp. autochanger, case 17 x 15 x 8½ in. Assembled in 15 mins. Similar cabinet for tape recorder with plain board only £3, carr. paid. Attractive colours.
 or with 3 valve amplifier 15/- extra

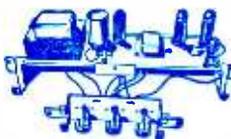
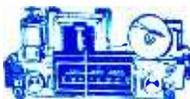
AUTOMATIC RECORD CHANGERS—LATEST MODELS. 4 SPEED. CRYSTAL CARTRIDGE. All 5/- extra carr. B.S.R. UA14, £7.10.0. Garrard Siltline, Mono. £8. Stereo, £8.5.0. Motor Board for UA8, UA20, UA14. Siltline, 5/-, post 1/6 or 3/6 post paid when purchased with Autochanger. Motor Board for Collaro C60, 4/-, post paid.

TELEFUNKEN STEREO AMPLIFIERS. 2 ECL82—2 x 2½ watts, 12 x 9 x 2½ in. piano keys. £7, post paid.



6 TRANSISTOR PORTABLE—FULLY BUILT. The "SCALA" for only £7.19.6, carr. paid. 8½ x 2 x 5½ in. high. Choice of colours Rexine. M.W. and L.W. Ferrite aerial. P.P.4 battery 2/3 extra. Printed circuit. Nicely styled. A professional job. 3½ in. speaker.

SELF-POWERED VHF TUNER CHASSIS. Covering 88-95 Mc/s. Mullard permeability Tuner. Dims. 10½ x 4 x 5½ in. high. ECC85, EF91 and 2 diodes. Metal Rectifier. Mains transformer. Fully wired and tested. Only £7.10.2 (carr. pd.). Attractive Vynair Cabinet 20/- Room dipole 12/6. Feeder, 6d. yd.



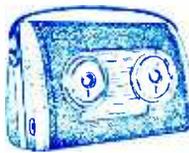
PUSH-PULL AMPLIFIER £55.0
 (5/- Carr.)

Brand new 200-240 A.C. mains Bass, treble and vol. controls. With valves EZ80, ECC83 and 2-EL84 giving full 8 w. Chassis 12 x 3½ x 3½ 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.

THIS SUPERB SET FOR £10

6-transistor radio covered in sponge clean Duracour fabric, in latest two tone shades. M.W. and L.W., ferrite rod, provision for car aerial. 2-colour scale. With PP9 battery giving 300 hours use. Weighs under 4 lbs. With carrying handle. 12 x 7½ in. high x 4½ in. at base tapering to 2½ in. at top. Brand new, fully guaranteed, £10. Carr. paid. Worth £16.



SUPERIOR GRAMOPHONE AMPLIFIER

Valves 6Y85, 6F80 and UL84. Mains trans. 200-240 a.c. Covered baffle 13½ x 7½ in. (6½ in. speaker) or 11 x 7½ in. (8 x 3 in. speaker). 3 front controls bass, treble, on-off/vol. Special summer offer 65/- (post 4/-) either type. Rexine cabinet to fit, with carrying handle, and lid (detachable) 14 in. or 12 x 8½ x 5½ in. 16/- extra.

GRAMOPHONE AMPLIFIER With 5in. SPEAKER Baffle 12½ x 6 in. ECL82 and Rectifier, Tone and Volume. On/off switch. Two Knobs. Ready to play. Useful for Stereo. Special summer offer. 45/- (post 4/-).

TEST LEAD KIT. Leads, Prods, Terminals, Clips, in case, 10/-, post paid.

TAPE, TOP QUALITY BOXED. 5½ in.—950 ft., 15/- 1,200 ft., 17/6; 7½ in.—1,200 ft., 17/6; 1,800 ft., 28/6. (all plus 1/6 post, 2/- for 2).

ANOTHER SPECIAL SUMMER OFFER

Brand new tape recorder, two tone beige case, "gold" trimmings. Magic eye, monitor, ext. speaker sockets. With 5½ in. tape and milke. Fully guaranteed. Price usually £191 gns. Very high gain with low noise. Price for one month £18, carr. paid.

COLLARO STUDIO TAPE TRANSCRIBER, 3 MOTORS, 3 SPEED. 14, 3½ and 7½ I.P.S. Push buttons, £10.17.6 (10/- carr.) incl. spool.

3-VALVE AMPLIFIER (inc. RECT.)

2½ watts. ECC83, ECL82 and EZ80. Controls, volume, bass and treble. On/off switch. Mains and O.P. trans. Size as for Push-Tu 1 Amp. Suitable for microphone **95 -** P. & P. 5/- in/out and for Guitar.

Also acts as telephone amplifier using pick-up coil, price 14/- Chassis 12 x 3½ x 3½ in. Picked front panel. Price includes handsome walnut finish polished speaker cabinet, 13 x 7½ in. (acia containing high quality 3 ohm P.M. speaker 5½ x 4½ in (20/- less without cab and speaker).

BATTERY ELIMINATOR

For 4 Low Consumption Valves (96 range), 90v, 15mA and 1.4v, 125mA, 45/- (2/6 post), 200-250v. A.C. Also for 250mA, 1.4v, and 90v 15mA at same price.

3-VALVE AMPLIFIER (inc. RECT.)



4 watts. Valves ECC83, EL84 and EZ80. Controls, volume, bass and treble. Or/Off switch. (Chassis size 6½ x 3 x 2½ in. 6½ in. round or 7 x 4 in. elliptical speaker. Not suitable for microphone input. A.C. only Special summer offer. 50/- (4/- post)

CHASSIS, BATTERY RADIO. Valves DK96, DF96, DAF96, DL96. Two Short Wavebands 16 to 49 M. and 25 to 75 M. Size 10½ x 4½ x 5½ in. £4.16.0, carr. paid. MW and SW. £5, carr. paid. Or as Kit 75/-.

ITEMS AVAILABLE ON ITEMS OVER £5

Send 6d. (stamps will do) for 20 page illustrated catalogue. All New Goods. Delivered by return. (C.O.D. 2/- extra)

ALL ITEMS GUARANTEED 12 MONTHS VALVES 3 MONTHS—CLOSED SATURDAY.

GLADSTONE RADIO

"SCALA," CAMP RD., FARNBOROUGH, Hants.

Farnborough 3371 and 247 New Road, Copnor, Portsmouth.

Tel: Mitcham 6202

Open Daily to Callers

R S T

All Valves Brand New
and Fully Guaranteed

211 STREATHAM ROAD, MITCHAM, SURREY

Special 24 Hour Express Mail Order Service

AC2PEN	ECC88	17/6	EY86	8/6	PCF80	9/6	U12	9/1	UY85	7/1	SZ4GT	12/6	6LD20	14/1	12J7GT	8/6
ECC91	4/1	EZ35	6/1	PCF82	7/1	U14	9/1	VMS4B	12/6	6A7	9/1	6P25	10/6	12K7GT	5/1	
AC2PEN	ECCF80	8/6	EZ40	7/1	PCF84	16/1	U22	8/1	VP4	15/1	6A8G	8/6	6P28	17/6	12K8GT	10/1
DD	ECCF82	8/6	EZ41	7/1	PCF86	15/1	U24	21/1	VP4A	17/6	6A8GT	13/6	6Q7	6/6	12Q7GT	6/6
ACTP	ECH3	21/1	EZ80	7/1	PCL82	9/6	U25	12/6	VP4B	17/6	6A8B	9/6	6Q7GT	8/6	12SA7	8/6
ACVP1	ECH21	22/1	EZ81	7/1	PCL83	12/6	U26	10/1	VR10530	7/1	6AJ8	9/6	6SA7	7/1	12SK7	6/1
AZ1	ECH42	9/6	EZ90	7/1	PCL84	10/6	U27	8/1	VR15030	7/1	6AK5	5/1	6SG7	7/1	12SQ7	8/6
AZ31	ECH35	10/1	E1148	2/1	PCL85	16/1	U31	9/1	VU39	9/1	6AK8	7/6	6SH7	6/1	12SL7	8/1
B36	ECH81	8/1	FC2	21/1	PEN4A	17/6	U35	17/6	VU111	2/6	6AL5	6/1	6SK7	6/6	12SN7	10/1
C1C	ECH83	8/6	FC2A	21/1	PEN4B	17/6	U37	17/6	VU120	2/6	6AM5	5/1	6SK7	5/6	12D3	12/6
CBL31	ECL80	9/1	FC1	15/1	PEN4DD		U43	8/6	W61	11/1	6AM6	4/1	6SL7GT	6/1	14H7	10/1
CCH35	ECL81	10/1	FC13	21/1		25/1	U45	10/1	W76	5/1	6AN5	7/6	6SN7GT	5/6	14R7	10/1
CL33	ECL82	9/6	FC13C	21/1			U47	12/6	W77	4/1	6AQ5	6/6	6SQ7	8/6	14S7	15/1
CY1	ECL83	12/1	FW4/500	9/1	PEN4VA		U50	7/6	W81	6/1	6AQ8	9/1	6U4GT	10/1	19AQ5	8/1
CY31	EF6	21/1	FW4/800	9/1	PEN36C	21/1	U52	4/1	WB1M	6/1	6AT6	6/1	6U5G	7/6	19B6G	21/1
D77	EF9	1/1	GZ30	10/6	PEN45	10/1	U76	7/6	X17	8/6	6AU6	9/1	6V6	4/6	20D1	10/1
DAC32	EF22	14/1	GZ32	10/6	PEN45DD		U78	4/6	X18	9/1	6BBG	3/1	6V6GT	8/1	20F2	17/6
DAF91	EF36	4/1	GZ33	19/3		25/1	U191	15/1	X41	15/1	6BA6	6/1	6X4	4/6	20L1	17/6
DAF96	EF37	8/1	GZ34	13/6	PEN46	5/1	U251	12/6	X61	12/6	6BE6	6/1	6X5	7/6	20P1	25/1
DC990	EF37A	8/1	GZ37	19/3	PEN453DD		U281	18/1	X61M	22/6	6BG6G	17/6	6X5GT	8/6	20P3	25/1
DF33	EF39	4/1	HABC8010/1			27/6	U282	19/6	X65	12/6	6B6E	6/1	6X6	15/1	20P4	22/1
DF91	EF40	15/1	HL41DD	8/6	PENDD4020		U301	22/6	X76	12/6	6B16	6/1	630L2	10/1	20P5	25/1
DF92	EF41	8/1	HL92	8/6		25/1	U329	12/6	X76M	12/6	6BQ7A	12/6	785	12/6	21B6	12/1
DF96	EF42	10/1	HL133DD		PL33	15/1	U339	15/1	X78	21/1	6BR7	12/6	786	10/1	25A6	8/1
DF97	EF50A	4/1		10/1	PL36	15/1	U403	10/1	X79	21/1	6B87	12/6	787	8/6	25L6	8/1
DH63	EF50E	3/6	HN309	22/6	PL38	21/1	U404	10/1	Y61	10/1	6B8V6	7/1	788	8/1	25Y5	8/1
DH77	EF80	5/1	IW4/35010/1		PL81	12/1	U801	29/1	Y66	9/6	6BW7	5/1	7C5	8/1	25Z4	7/6
DK32	EF85	5/1	IW4/50010/1		PL82	8/1	UABC80	7/1	Z63	7/6	6BX6	5/1	7C7	8/1	25Z5	8/1
DK91	EF86	10/6	KT33C	8/1	PL83	10/6	UAF42	8/6	Z66	10/1	6C4	3/6	7D3	15/1	25Z6	8/1
DK92	EF89	9/1	KT36	17/6	PL84	9/1	UB41	7/6	Z77	4/1	6CSGT	8/1	7D5	15/1	27SU	17/6
DK96	EF91	4/1	KT55	17/6	PL820	18/1	UBC41	8/6	Z152	5/1	6C6	6/6	7D6	15/1	30C1	9/6
DL33	EF92	4/1	KT61	9/6	PX24M	12/6	UBC81	10/6	ZD17	8/1	6C9	12/6	7D8	15/1	30F5	10/1
DL35	EF95	7/6	KT66	15/1	PM4	15/1	UBF80	8/6	ZD152	8/1	6CD6G	32/1	7H7	7/6	30FL1	10/6
DL92	EF97	12/6	KT76	10/1	PX25	25/1	UBF89	7/6	OZ4	5/1	6CH6	10/1	7K7	8/6	30L1	9/6
DL93	EF98	10/1	KT81	15/1	PY31	15/1	UBL21	21/1	IA7	11/6	6D2	4/1	7Q7	10/1	30L15	11/6
DL94	EF183	18/1	L63	5/1	PY32	12/6	UCC84	10/6	IC1	8/6	6D6	5/6	7Y4	7/6	30P4	21/1
DL96	EF184	14/1	LN152	9/1	PY80	7/6	UCC85	7/6	IC2	9/1	6E5	10/1	8D3	4/1	30P12	10/1
EAS0	EK32	8/1	LN309	12/6	PY81	7/6	UCF80	13/6	IC3	9/6	6F1	10/6	98V6	12/6	30P16	9/6
EABC80	EL2	21/6	LZ319	12/6	PY82	7/6	UCH21	21/1	IC5	10/6	6P6	6/9	10C1	12/6	30P11	15/1
EAC91	EL3	21/1	MKT4	17/6	PY83	8/6	UCH42	9/6	ID5	8/6	6F11	10/1	10C2	17/6	30P13	12/6
EAF42	EL6	21/1	MS48	17/6	PZ30	18/6	UCH81	8/1	ID6	10/1	6F12	4/1	10F1	15/1	35LGT	8/6
EB34	EL32	4/6	MVSPEN		QS1950	10/1	UCL82	10/1	IH5	9/6	6F13	10/1	10F3	15/1	35V4	7/6
EB41	EL33	10/1		17/6	QS15015	10/1	UCL83	13/6	IL4	5/1	6F14	10/1	10F9	12/6	35Z3	11/6
EB91	EL34	15/1	MVSPENB		R2	10/1	UF41	7/6	ILN5	4/6	6F15	12/6	10LD11	15/1	35Z4	7/6
EBC3	EL35	10/1		17/6	R3	10/1	UF42	7/6	IN5	9/6	6F19	12/6	10LD12	10/1	35Z5	8/6
EBC33	EL37	17/6	MU14	9/1	R12	8/6	UF80	7/1	IR5	7/6	6F23	10/6	10P13	15/1	40SUA	15/1
EBC41	EL38	21/1	MX40	15/1	R16	17/6	UF85	7/6	IS4	8/1	6F33	5/6	10P14	19/1	41STH	21/1
EBC81	EL41	10/1	N18	8/1	R19	19/1	UF86	12/6	IS5	7/6	6H6	2/1	10P18	15/1	42	12/6
EBF80	EL42	10/1	N37	14/1	R20	19/1	UF89	6/6	IT4	4/1	6J5	4/6	11D3	23/6	50C5	10/1
EBF83	EL81	12/6	N78	17/6	S130	7/6	UL41	8/6	IU5	5/9	6J5GT	4/6	11D5	23/6	50L6	8/6
EBF89	EL84	6/6	N108	18/1	SP41	3/6	UL44	21/1	3A4	5/1	6J6	3/6	12A6	6/6	50CD6G	36/6
EBL1	EL85	10/1	N308	20/1	SP61	3/6	UL46	14/6	3A5	10/6	6J7	5/1	12A8H	9/1		
EBL21	EL90	8/6	N339	30/1	SU2150	25/1	UL84	7/1	3Q4	8/1	6J7GT	7/6	12AT6	7/6	53KU	12/6
EBL31	EL91	4/1	N369	10/6	SU2150A		UL85	7/6	3Q5	9/1	6K7	2/1	12AT7	5/1	75	8/1
ECC34	EL95	10/6	OD3	5/1	T41	15/1	UM80	10/6	354	7/1	6K7GT	8/6	12AU7	8/6	78	7/6
ECC35	EM80	8/6	OZ4	5/6	TDD4	12/6	UR1C	15/1	3V4	8/1	6K8	5/1	12AX7	7/6	80	9/1
ECC40	EM81	8/6	P2	10/1	TDD13C		UU6	19/1	5U4	4/1	6K8GT	9/6	12AU6	17/6	85A2	12/6
ECC81	EM84	9/6	PABC80	13/1			UU8	21/1	6K25	18/1	6K25	18/1	12BA6	7/6	185BT	30/1
ECC82	EM85	10/1	PCC84	9/1		17/6	UU9	7/6	5V4	7/9	6L1	13/1	12BE6	7/6	305	9/6
ECC83	EM85	8/6	PCC85	9/6	TH41	27/6	UY1N	12/6	5Y3	8/6	6L6	7/6	12BH7	10/1	807BR	5/1
ECC84	EM85	8/6	PCC88	15/1	TY86F	12/6	UY21	15/6	5Y3GT	8/6	6L8	10/1	12C8	8/6		
ECC85	EM85	8/1	PCC89	9/6	U10	9/1	UY41	7/6	SZ4	9/6	6L19	17/6	12J5GT	4/1		

METAL RECTIFIERS

RM1	5/3	14RA	1-2-8-2	17/6	(FC31)	14A97	25/1	
RM2	7/6	16RC	1-1-16-1	8/6		14A100	27/1	
RM3	7/9	14RA	1-2-8-3	19/1	(FC31)	16RD	2-2-8-1	12/1
RM4	14/1	18RA	1-1-16-1	6/6	(FC116)	16RE	2-1-8-1	8/6
RM5	19/6	18RA	1-2-8-1	11/1		18RA	1-1-8-1	4/6
14A86	17/6	18RD	2-2-8-1	15/1	(FC124)			

SPECIAL OFFER

EABC80 6/1, EAC91 4/1, EB91 4/1, EBF89 8/6, ECC81 5/9
ECC85 8/1, ECC91 4/1, ECH81 8/1, EBC33 4/6, EF39 4/1,
EF50 3/6, EF80 5/1, EF85 5/1, EF91 4/1, DF91 4/1, EL84 6/9,
PCC89 9/6, PL84 9/1, UABC80 7/1, UBF89 7/6, UF41 7/6,
UL41 8/6, UBF89 6/6, UL84 6/1, UY85 7/1, W81 6/1,
OZ4 5/1, 5U4 4/1, 6AQ5 6/6, 6BA6 6/1, 6BE6 6/1,
6D2 4/1, 6K7 2/1, 6K8 5/1, 6L6 7/6, 6Q7 6/6, 6SL7 6/6,
6SN7 5/6, 6V6 4/6, 8D3 4/1, 807 5/1, 12AT7 5/1, 12A8H 9/1,
12BA6 7/6, 12BE6 7/6, 12K7 5/1, 12Q7 6/6.

TERMS OF BUSINESS C.W.O. or C.O.D.
3/2 PACKING CHARGE ON ALL C.O.D.
ORDERS. POSTAGE 6d. PER VALVE

OBSOLETE VALVES A SPECIALITY.
QUOTATIONS GIVEN ON ANY TYPE
NOT LISTED

TECHNICAL TRAINING in radio television and electronics

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

EXAMINATION COURSES FOR:—

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

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

British Institution of Radio Engineers, etc. C. & G. Telecom. Technicians' Cert.

LEARN AS YOU BUILD

Practical Radio Servicing Course

A basic course in radio electronic and electrical theory backed by thorough practical training. You build radio receivers, signal generator and multimeter.



Post this Coupon TODAY!

for FREE book on careers in Radio, and full details of other I.C.S. Courses

INTERNATIONAL CORRESPONDENCE SCHOOLS

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

Please send book on _____

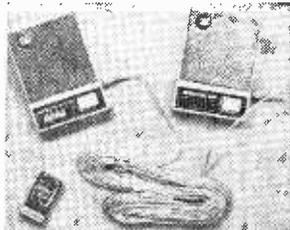
Name _____ Age _____
(Block Letters Please)

Address _____

Occupation _____ 8.62

INTERNATIONAL CORRESPONDENCE SCHOOLS

HANDY TWO-STATION TRANSISTORIZED INTERCOM & BABY ALARM



Fully Guaranteed Fantastic Value Complete 6 gn. with battery and 60ft. of wire. An intercom system both calling and conversing operated from a single battery. Ideal Baby Alarm. S.A.E. for further details.

ALL DIRECTIONAL STUDIO CRYSTAL MICROPHONE

MODEL MIC-70 A professional microphone with 380 pickup, using a new variable "D" shock mounted crystal cartridge for added power and sensitivity. Smooth response (50-12,000 cps.) and natural reproduction. Size 7in. high x 3in. wide. Complete with shielded cable. Lavalier cord and tin stand holder. 69/6 complete



FULL RANGE HIGH FIDELITY! 12in. Mechanical Two-way Loudspeaker Model CR.12AE

This speaker embodies two reproducing cones mounted coaxially with power coming from the same voice coil. The larger cone reproduces the lower frequencies and the small cone gives you efficient high frequency reproduction. Due to the double cone construction, velvet smooth cross-over is possible and brings you the finest in high fidelity music reproduction. Specification: Freq. response: 30 to 16,000 cps. Resonant freq.: 45±10 cps. Capacity: 10-20 watts Sensitivity: 102 db/w. Voice coil impedance: 16 ohms Mechanical crossover freq.: 1800 c.p.s. Diameter: 12in. Depth: 3in. Voice Coil diameter: 2in. Baffle opening diameter: 11in. ONLY **£8.8.0** P. & P. 4/-



SF-20 RADIO EARPHONES

Hi-impedance 2,000 ohms-general use headset. Black and Ivory plastic case and electro-magnetic units with adjustable headband for comfortable fit. Individual listening for all types of applications. Individually packed, with flexible cord attached. 14/6, post paid.



NEW! "STEREO-STHETHO" HEADPHONES



Freq. response 40-16000 cps. Impedance 50 ohms. Equipped with two individual transducers and cord sets for true stereo reproduction. Extremely sensitive, the sound is carried through plastic tubes tipped with removable earpieces. Ingenious hinge device permits adjustment to any desired spacing. Weight less than 2 ozs. May also be used for monaural listening. 27/6



TAPE SPLICER & CUTTER. Model T.635 Cuts 2 rounded indentations in the tape splice, leaving the edges of the tape which contact parts of the recorder entirely free of adhesive. As little as 1in. tape need be removed. Complete with instructions, 18/6. P. & P. 1/6.

BUDGET UNIVERSAL TEST LEAD KIT IN PLASTIC CASE

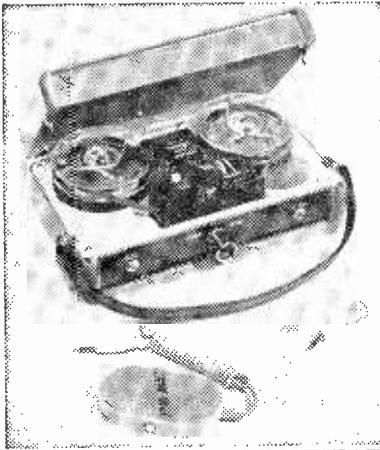


Consists of 4ft. long x 1in. dia. red and black plastic handle pin prods with heavy duty 37in. rubber leads with 5000v. breakdown insulation terminating 2in. long x 1in. dia. plastic grip banana plugs. 3 sets of interchangeable terminals are included (spade lugs, phone tips, alligator clips), all slip directly on to banana plugs. 9/6. P. & P. 1/6.

Relda Radio

See opposite page for addresses

NEW! Transistorised Tape Recorder



FOR ONLY **£6.19.6** P. & P. 4/-

Consists of three transistor amplifier, record/play, volume control, miniature speaker, forward-stop-rewind-switch, reel of tape and spare reel, motor, attractive coloured case, Mic. 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.

RELDA METER SENSATION!

10,000 o.p.v.
Multi-Tester in
Semi-assembled
KIT FORM

Only **69/6**

IN ECONOMICAL
SEMI-ASSEMBLED
KIT FORM

Save at least **£4!**

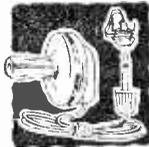
Results comparable with similar built-up recorders selling at around 12 gns.
Order Early—delivery in strict rotation. S.A.E. for more details.

Ranges: D.C. Voltage: 0-0.50-120-600-1,200 v. (10,000 o.p.v.) A.C. Voltage: 0-6-30-120-600-1,200 (10,000 o.p.v.)
D.C. Current: 0-120µA, 0-12-300 mA. Resistance: 0-20K, 0-2 Meg. (150 ohm, 15K at centre scale.)
Capacitance: 0.005 to 15µF (at A.C. 0 v.)
Diodes:—20 ± 83db (500 ohms 1 mW., odbm—0.775 v.)
Accuracy: D.C. voltage and current ±2% f.s. A.C. Voltage ±4% f.s. Resistance: ±3% of total scale length.
Size: 4 1/2 in. x 3 1/2 in. Complete with test leads, battery and instructions.
Few only available—rush your order now whilst stocks last!

MINIATURE EARPHONE

A really sensitive dynamic earphone of exceptionally fine quality. Provides clear reproduction of music as well as speech. Fully Guaranteed and complete with transparent ear insert. 3 feet cord, sub-miniature plug and socket.

CR-5 High imp. crystal Each 8/-
MR-4 Low imp. magnetic Post 1/-



GREATEST TRANSISTOR SET VALUE YET KNOWN

A 5 stage medium waveband radio which can be built in one hour. No aerial or earth required. This set has the appearance of sets worth 7 to 8 gns. and works as well as sets 4 times the price, remember the saving is not in the parts used but by you making it yourself. Complete in case. Size 5 1/2 x 3 1/4 x 1 1/2 in., genuine 2 1/2 in. speaker, tuning condenser, volume control with switch, **37/6** P. & P. 2/6
etc. All parts sold separately.



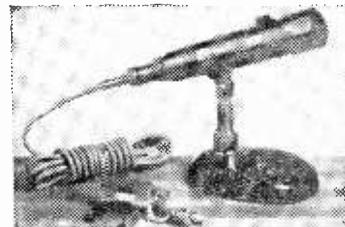
COMPLETE STOCK PURCHASED FROM BANKRUPT DISTRIBUTOR 'ANGEL' ALL-TRANSISTOR RADIO



These sets were originally marketed at £8/19/6, this great saving comes to you because of our bulk purchase. The Set will speak for itself—made in Japan, complete with telescopic antenna for really pulling in those stations, carrying case, dynamic earpiece, battery, beautiful presentation carton.

ONLY **89/6** P & P 2/6

3-WAY SLIM CRYSTAL MICROPHONE



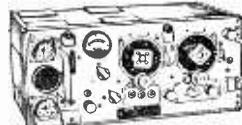
MODEL 100C

May be hand-held, stand mounted (either floor stand or desk stand) or suspended by lavalier cord. Responses 60-10,000 cps. Built in on/off switch. Output level -52 db. Omnidirectional head. Clips on or off standard stand adaptor per-
Satin chrome finish.

ONLY **39/6**

mitting tilting for multi-angle use. Supplied complete with 7 ft. of shielded cable, lavalier cord. Brand new Floor Stand and Base, suitable for above, 35/-, Carriage Paid.

WIRELESS SET No. 19



This most famous Army Trans/Receiver covers 2-9 Mc/s. (150-37 metres in two bands and 230-240 Mc/s V.H.F.). Has an intercom. amplifier. Designed for 12 and 24 volt operation. Uses a 6 valve superhet receiver, 1 P.F. being 465 Kc/s, and a 6 valve transmitter designed for voice and C.W. operation.

Incorporates test and tuning meter for voltages, aerial loading and current tests. Panel Controls: Frequency tuning, P.A. tuning, Gain control, MCW, CW, R/T switch, Het-tone netting, on-on, Quench, aerial—AVC-LT-HT—Drive tests, Supplied complete with valves and instruction book.

SET ONLY **65/-**

Carriage 10/-

LIMITED NUMBER ONLY
Don't be disappointed—
Order Now

PORTABLE RADIO-PHONES

Consisting of trans-receiver covering 7.4-9 Mc/s. Range up to 6 miles, depending upon obstruction and elevation. On test the receiver astounded us for we heard 65 short wave stations—one as far away as Russia. Complete with 5 valves, headphones, microphone, junction box and 6ft. telescopic aerial. Operates from standard 120 v. and 3 v. dry batteries.

ONLY **60/-** EACH

P. & P. 4/-

TWO FOR **£6** post free

(Batteries 20/- per set extra.)

MAIL ORDERS TO
(DEPT. P.), 32a COPTIC STREET,
LONDON, W.C1



CALLERS WELCOME AT
87 TOTTENHAM COURT ROAD,
LONDON, W.1. MUS 9606

★ VALVES ★

by return of post

THE MOST COMPREHENSIVE COMPETITIVE VALVE LIST IN THE COUNTRY

10% DISCOUNT
SPECIAL OFFER TO PURCHASERS of any SIX VALVES marked in black type (15% in dozen). Post: 1 valve, 6d., 2-11, 1/-.

NEW LOW PRICES GUARANTEED 3 MONTHS

FREE TRANSIT INSURANCE. All valves are new or of fully guaranteed ex-Government origin. Satisfaction or Money back (Guaranteed on Goods if returned unused within 14 days.

02A	5/-	6J9GT	4/-	12K8KT	9/8	1D75	9/9	EM30	7/8	SP41	2/6
1A5GT	5/-	6J6	4/-	12Q7GT	6/-	DF91	8/8	EM81	8/8	SP61	2/6
1A7GT	11/-	6J7	8/8	12K47	7/-	DF96..	7/8	EM84	9/-	SU25	16/-
1C5GT	9/-	6J7G	4/8	12S67	5/-	DF97	8/8	EM95	10/-	SU2150	4/6
1D5	9/8	6J7G	7/8	12S77	3/8	DH63	6/-	EN31	16/-	T41	7/8
1HG5T	9/8	6K6GT	6/8	12K77	6/8	DM75	11/-	ET61	6/-	TDD4	7/8
1L4	3/3	6K7	5/8	12B17GT	7/8	DK91	5/8	EZ86	7/8	U14	8/-
1LD5	3/8	6L6	2/8	13D3	9/-	DK92	7/-	EY86	5/8	U23	6/8
1LN5	4/8	6K7GT	4/8	1487	14/8	DK96	7/8	EZ35	6/8	U24	18/-
1NG5T	9/8	6K8GT	8/8	13A25	7/8	DL33	8/-	EZ41	7/-	U25	11/8
1R5	5/6	6K25	7/8	19B8	10/-	DL35	8/-	EZ20	6/8	U28	8/8
1S4	8/-	6L1	12/8	20D1	9/8	DL65	6/-	EZ81	6/8	U31	7/-
1S5	4/8	6L6G	8/8	20F2	9/8	DL75	6/-	FW4/500	8/-	U33	14/-
1T4	3/8	6L15	9/-	20L1	10/-	DL2	9/-	FW4/800	8/-	U35	12/8
2A3	6/8	6L19	11/-	20F1	8/8	DL91	8/8	EJ35	7/-	U37	26/-
2A7	9/8	6L1D3	8/8	20P3	12/8	DL92	6/-	EZ32	8/8	U60	16/-
3A4	4/8	6L1D2	6/8	20P4	18/-	DL94	6/8	GZ34	12/8	U52	4/8
3A5	9/-	6LD20	7/8	20P5	15/-	DL96	7/8	HL1ADD	U76	5/8	
3A6	4/8	6N7	7/8	25A6G	8/8	EABX80	6/8	H309	8/8	U78	5/-
3A7	7/-	6N8	8/8	25B6G	8/8	EB30	4/8	HV30	10/8	U81	12/8
3Q5GT	8/-	6P25	8/8	25L6T	7/8	EAF43	8/-	HVR2	10/8	U82	18/-
3S4	8/-	6P28	12/8	25Y50	8/-	EB41	3/-	IW4/350	7/8	U82	15/-
3S4	8/8	6Q76	6/-	25Z4G	7/-	EB91	3/-	IW4/600	7/8	U301	15/-
3LAGY 12/8	6Q76	8/8	30	25Z5	8/-	EB33	4/8	KL22	8/8	U309	6/8
ET4	8/-	6R7G	8/8	30Z6G	8/8	EB34	4/8	K23	6/8	U309	8/8
6Q4G	4/8	6S47	5/8	30C1	7/-	EB37	7/8	K138G	7/8	U339	11/-
5V4G	7/8	6S47	4/8	30C15	11/8	EBF80	7/8	K738	12/8	U301	18/-
5Y3G	5/8	6S17	3/-	30F5	8/-	EBF83	9/8	K744	7/8	UACB0	8/8
5Y3GT	5/8	6S17	3/8	30L1	9/8	EBF89	8/8	K745	8/8	UAF42	7/8
5Y4G	11/-	6S17GT	6/8	30L15	6/8	EBJ21	12/8	K761	8/8	UB41	7/8
5Z4	11/-	6S17GT	6/8	30L15	17/8	EBL51	17/8	K763	9/8	UBC41	7/8
5Z4G	7/8	6S27	5/8	30P4	9/8	EC91	4/8	K776	8/8	UBC81	9/8
5Z4GT 11/-	6S27	3/8	30P12	7/8	ECJ31	7/8	K7W61	5/8	UBF80	7/8	
6A8	4/8	6VGT	10/8	30P16	8/8	ECJ32	4/8	K7W62	5/8	UBF89	7/8
6A8	4/8	6VGT	8/8	30P19	17/8	ECJ33	4/8	K7W63	5/8	UBL21	14/8
6A7	10/-	6VGT	6/8	30P11	9/8	ECJ34	9/-	K7Z3	5/8	UC34	14/8
6A8G	8/8	6X2	7/8	30P115	13/-	ECJ35	6/-	L68	2/8	UC45	7/-
6A8GT 13/8	6X4	5/-	35L6GT	8/8	ECJ40	14/-	LN152	7/-	UCF80	15/-	
6A85	7/-	6X6G	5/-	35T	25/-	ECJ41	5/8	M74	7/8	UCH42	7/8
6A87	8/8	6X6GT	5/8	35W4	6/8	ECJ42	6/-	N37	11/-	UC42	7/8
6A95	3/-	6Y8G	7/8	35Z4GT	6/8	ECJ43	6/8	N78	13/8	UCM1	14/8
6A97	7/8	7A7	8/8	35Z6GT	8/8	ECJ44	8/-	N108	18/-	UCJ82	8/8
6AK5	5/-	7B6	9/-	41	7/8	ECJ45	7/8	N152	8/8	UCJ83	8/8
6AL5	3/-	7B7	7/8	42	7/8	ECJ49	16/-	P41	4/8	UP41	7/8
6AM5	5/-	7C5	7/8	50C5	8/8	ECJ51	4/8	P42	2/8	UP42	7/8
6AQ5	6/-	708	7/8	50C16	13/-	ECJ50	6/8	P43	2/8	UP43	7/8
6AT5	6/8	7H7	7/8	50L6GT	8/8	ECJ52	8/8	P44	2/8	UP44	7/8
6AU5	7/8	7K7	9/8	50ZK U	10/8	ECJ21	12/8	PCV84	6/8	UP86	14/8
6B7	8/8	7Q7	9/8	53K U	10/8	ECJ55	7/8	PCV85	6/8	UP89	7/-
6B8G	3/-	7H7	1/8	61SPT	11/8	ECJ42	3/8	PCV88	18/-	U141	11/-
6BA5	5/8	787	9/8	62BT	7/8	ECJ81	7/8	PCV89	9/8	U144	11/-
6BE5	5/8	7V7	7/8	75	6/8	ECJ83	8/8	PCJ189	13/8	U148	9/8
6B4G 15/-	7Y4	6/8	79	78	6/8	ECJ80	8/-	PCJF80	7/-	U184	7/-
6BH8	6/-	724	7/-	80	6/8	ECJ82	9/8	PCJF82	7/8	UM80	9/8
6BJ4	6/-	8D3	3/-	83	9/8	ECJ84	11/8	PCJF84	18/-	URIC	8/8
6BR7	7/8	10C1	11/8	185BT	19/8	ECJ86	10/8	PCJF86	12/8	U116	12/8
6BRW6	7/8	10C2	14/8	803	19/-	EF22	7/-	PCJL82	7/8	U17	9/8
6BW7	5/8	10C4	8/8	807(A)	5/8	EF36	3/8	PCJL83	10/8	U18	17/-
6CX6	4/8	10F1	5/8	808	7/8	EF49	4/8	PCJL84	7/8	U19	11/-
6D4	3/8	10P9	10/8	813	55/-	EF49	12/-	PCJL85	11/8	U21	11/-
6C5	6/8	10P18	10/-	832	14/-	EF41	8/-	PCJL86	11/8	U41	6/-
6C8	3/8	10L14	7/-	866A	11/8	EF42	7/8	PEN45	8/8	U85	6/8
6C9	11/-	10L18	7/8	954	2/-	EF50-BR2	PN46	5/-	VP41	5/8	
6C9G 10/8	10D11	11/8	958	2/8	USA	3/-	PL33	8/8	VR105	6/8	
6D5	7/8	10D12	9/8	9001	4/-	EF54	3/8	PL36	9/8	VR159	6/8
6D2	8/8	7C5	7/8	9002	4/-	EF55	4/8	PL37	9/8	VR161	6/8
6D3	6/8	10P14	9/-	ATP4	2/8	EF85	6/8	PL41	8/8	W76	4/8
6D6	4/8	10P18	7/-	AZ31	8/-	EF86	9/-	PL42	6/8	W81	7/8
6F1	4/8	12A6	1/8	AZ41	11/-	EF89	6/8	PL43	6/8	X61M	11/8
6F9	9/8	12A8S	9/-	B36	7/8	EF91	3/8	PL44	8/-	X63	3/8
6F12	9/8	12A7G	7/8	C1C	9/8	EF92	6/8	PL45	6/8	X65	11/8
6F13	6/8	12A77	5/8	CB11	28/8	EF98	3/8	PL46	8/8	X66	11/8
6P14	9/8	12A2U	6/8	CB12	21/8	EF183	14/-	PX25	9/8	X76M	11/8
6P15	9/8	12A27	6/8	CCJ35	14/8	EF184	12/-	PY31	8/-	X78	21/8
6P16	9/8	12A26	6/8	CL33	9/8	EF182	4/8	PY32	10/-	X79	18/8
6P17	12/8	12B18	7/8	CU31	9/8	EL33	7/8	PL33	6/8	X81M	6/8
6P23	6/8	12B28	7/8	D77	3/8	EL35	7/-	PY81	6/8	X83	6/8
6P24	12/-	12B27	9/8	D152	5/8	EL41	8/-	PY82	6/-	Z83	4/8
6P25	13/-	12C8	6/8	DA30	12/8	EL42	8/8	PY83	7/-	Z88	9/8
6F32	6/8	12E1	17/8	DA32	9/8	EL43	11/-	PY88	9/8		
6F33	6/8	12A7T	9/-	DAF91	4/8	EL43	11/-	PZ30	9/8		
6J5	4/8	12K7GT	4/8	DAF96	7/8	EL84	4/8	RL1	11/8	Z719	4/8
6J6	3/-	12K8	11/-	DET19	2/8	EL91	4/-	RI19	11/8	ZD152	4/8

Tubes

HIGHEST QUALITY—
COMPARE OUR PRICES

Carr. & Ins. 12/6.

GUARANTEED	NEW TYPES
6 Months	MW 31/74
12 Months	£4-0-0
	MW 36/84
	£5-0-0
	CRM 178
	MW 43/64
	£6-0-0

MOST MULLARD, MAZDA, COSSOR, EMITRON, EMISCOPE, BRIMAR, FERRANTI TYPES. PROCESSED IN OUR OWN FACTORY

12in.	£2. 0. 0	£3. 5. 0
14in.	£2.10.0	£3.15.0
15/17in.	£3. 5. 0	£4.10.0
21in.	£3.15.0	£5.15.0

SPECIAL TEMPORARY OFFER. Due to huge bulk special purchase we are offering MW 31/74 Tubes at the unrepeatable price of 29/-, MW 36/24 ditto, 30/-, P.P. 12/6. The above are guaranteed for 6 months.

RECORDERS. "Verdik" 4 Track Collaro 3 speed Transcription Deck. Superior reproduction, Streamlined Portable Case. Complete with Mike. Market value approx. £45. OUR SPECIAL PRICE 29 gns.

CO-AX. standard and low loss, 25 yds., 12/8, 50 yds., 22/6, 100 yds., 42/8. Co-ax Plug 1/3. Wall outlet boxes 3/8.

4-SPEED RECORD PLAYERS. Latest Turntable, together with lightweight Star Galaxy dual sapphire crystal turnover pick-up head. Amazing value (pick-up only 19/-), £3.10.0, Carr. 3/-.

PORTABLE RECORD PLAYERS. Takes all sizes Record, all speeds, amplifier, auto-change, Garrard new "Slimline" Gram. In two-tone Case. All absolutely new, 14 gns.

MIRROR GALVANOMETERS. Ever-shed and Vignoles, 45 second swing, high sensitivity, heavy gunmetal cases, with spares, in transit case, each, £3.10.0.

P.M. SPEAKERS. 3 ohm, pot makes. Performance guaranteed. 64in., 8in., 8", 5in. 7 x 4in., 11/8.

13 CHANNEL T.V.s
Table Models, Famous Makes. Absolutely Complete. These sets are unequalled in value due to huge purchase direct from source. They are untested, and not guaranteed to be in working order. Carr. etc., 15/-.
12in. £2.19.0 14in. £4.19.0

TRANSISTOR PORTABLES. 6 + diode lightweight, approx. 1lb., slightly larger than pocket set, but much greater volume, better quality, complete battery, amazing sensitivity worth £11. Our price only £7.10.0.

P.M. TUNER KITS. Well-known make. Comprising P.M. Tuning Head, guaranteed tone drift. Frequency coverage 88-100 mc/s. Oa81 balanced diode output, Magic Eye Tuning, Two I.F. Stages and discriminator, £26.9s.

P.V.C. CONNECTING WIRE. 100 yds., 30 mil; special Price 7/8. 300 yds., 30 mil; special price, 15/8. 25ft. Coil, 1/8. 5 Coils different colours, 4/- Connecting flex. Prices as above.

TRANSISTORS. Red spot 3/6 ea. White spot 4/6 ea. Yellow spot 2/9 ea. Germanium diodes 8d. ea., 8/- doz. TAG STRIPS. From 3 way to 12 way. Mixed parcels of 25-30. The best and cheapest way to buy!

4 watt AMPLIFIERS
Further delivery of these excellent units to hand complete with 6F5 amplifier, 60P3 output, and U9 rectifier. Easily converted into high gain unit, complete with good quality, 5in. speaker in attractive two tone bakelite case easily converted for guitars, record players, baby alarms, mic. amplifiers. 19/- Carr. Packing, etc. 7/8.

ASSAULT CABLE. 1,000 yds. Covered Steel Telephone Wire. Ideal for gardening. 9/-, P.P. 4/-.

AVO METER. 40. Universal Standard test model, limited quantity, £3.10.0.

12 VOLT Blowers, ex-Gov., 19/6.

VOLUME CONTROLS. 5k to 2 Meg; from 3/3 to 5/8 each.

TRANSISTOR INTERCOM. High sensitivity, complete with batteries, usually 29. DISCOUNT PRICE £27.10.0.

B.B.C./I.T.A. TUNERS
Famous makes complete with PCF80, PCU84 valves. 3M 1/4 I.F. Fantastic value 19/-

CONDENSERS. 25 Mixed, Electrolytic. Many popular sizes. List Value 25. Our Price 10/-.

GET 15. G.E.C. High Power, Contact cooled, manufacture matched pr Transistor with Push-Pull Input & Output Transformers. Knock out price 29/-.

NEW SPEAKER CABINETS, covered in attractive Rexine, Gold Metal trim, 1 1/2". Or complete with 7 x 4 speaker, 19/-, P.P. 1/6.

UA20 Autochangers. Latest B.B.R. 10 mixed records. Brand New Unrepeatable, £2.10.0. Also UA14. A Proven Choice £7.10.0 P.P. 4/-.

"GARRARD" Slimline. Very latest Contact Autochanger. Just released. Amazing value, £2.10.0. Also available, Garrard Model 209, £27.1.6, P.P. 4/-.

100 RESISTORS 6/6

100 CONDENSERS 10/-
Miniature Ceramic and Silver Mica Condensers 3 pF to 5,000 pF. LIST VALUE OVER 25.

IVORY/GOLD KNOBS 1" Diameter, half price 1/8, 5 for 4/6; 1 1/8 3/8 for 5/-.

Silver Holders. B76, 6d. ea., with Screen 8d. ea. B94, 6d. ea. with Screen 8d. ea.

Post: 2 lbs. 3/4, 4 lbs. 2/6, 7 lbs. 3/8, 15 lbs. 5/- etc. No C.O.D. ALL ITEMS LESS 5% AND POST FREE IN DOZENS. LIST OF 1000 SNIPS, 6d

TECHNICAL TRADING CO.

STERN'S MULLARD DESIGNS

Designed by MULLARD—presented by STERN'S strictly to specification

MULLARD "5-10" MAIN AMPLIFIER

For use with the MULLARD 6-valve pre-amplifier with which un-distorted power output of up to 10 watts is obtained. We supply SPECIFIED COMPONENTS, AND NEW MULLARD VALVES, including PARMEKO MAINS TRANSFORMER and choice of the latest Ultra-Linear PARMEKO or the PARTRIDGE Output Transformer. COMPLETE KIT OF PARTS (PARMEKO Output Trans.)

Alternatively we supply ASSEMBLED and TESTED. **£10.00** **£11.10** Incorporating Partridge Output Transformer £1.6.0 extra.

MULLARD'S PREAMPLIFIER TONE CONTROL UNIT

Employing two EF86 valves, and designed to operate with the MULLARD MAIN AMPLIFIERS, but also perfectly suitable for other makes.

PRICE COMPLETE KIT OF PARTS **£6.6.0** ASSEMBLED AND TESTED **£8.0.0** Supplied strictly to MULLARD'S SPECIFICATION and incorporating:

- Equalisation for the latest R.I.A.A. characteristics.
- Input 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.

THE MULLARD "510/RC" AMPLIFIER

The popular and very successful complete "5-10" incorporating Control Unit providing up to 10 watts high quality reproduction. Only Specified Components and new MULLARD VALVES are supplied including PARMEKO MAINS TRANSFORMERS and choice of the latest PARMEKO or PARTRIDGE ULTRA-Linear Output Transformers.

KIT OF PARTS **£11.10.0** OR ASSEMBLED AND TESTED **£13.10.0** H.P. Dep. £2.6.0, 12 months at 17/0. Dep. £2.14.0 12 months at 19/10 ABOVE incorporating PARTRIDGE OUTPUT TRANS. £1.6.0 extra



THE MULLARD "33/RC"

THE IDEAL AMPLIFIER FOR A SMALL HIGH QUALITY INSTALLATION PROVIDING EXCELLENT REPRODUCTION OF UP TO 3 WATTS OUTPUT. COMPLETE KIT **£7.10.0** OR ASSEMBLED AND TESTED **£8.19.6** (plus 6/6 carriage and insurance) H.P. Terms: Deposit £2.0.0 and 6 months at £1.0.0. Complete to MULLARD'S SPECIFICATION including Mullard valves and a PARMEKO OUTPUT TRANSFORMER.

STERN'S INTER-COMM BABY ALARM

A small versatile Unit employing the new MULLARD ECL86 valve and designed to provide two (or three) way conversation up to extreme distances. Operates from A.C. mains 200 to 250 Volts.

PRICES . . . MASTER UNIT AND ONE EXTENSION **£6.17.6** ASSEMBLED AND TESTED **£8.0.0**

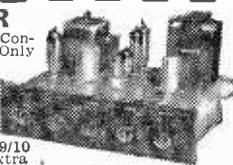
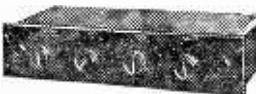
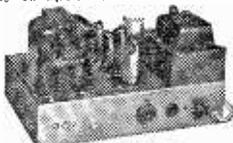
Consists of a MASTER UNIT, size only 8 1/2 x 5 1/2 x 6 in. and ONE EXTENSION (a second extension may be added to any time). The Master Unit incorporates switching and power supply and with the chassis completely isolated from the mains is operated in absolute safety. Cases covered in quality leatherette.

A BULK PURCHASE OF MARCONIPHONE TAPE RECORDING EQUIPMENT ENABLES US TO OFFER THE MODEL MTR/1 PORTABLE TAPE RECORDER

FOR ONLY **£26.0.0** (Carr. & Ins. 10/- extra)



Deposit £5.4.0, 12 months of £1.18.2. The list price of the MTR/1 is £44.2.0. It is a 3-Speed Twin Track Recorder incorporating the latest Collaro "Studio" Tape Deck and operates at 11, 31 and 7 1/2 in./sec. Speeds. It incorporates a "Pause" Control, a safety interlock device which ensures that a recorded tape cannot be accidentally erased and a low level output socket so that the output may be fed into an external high fidelity amplifier for monitoring purposes or for high quality reproduction on playback.



PRICE REDUCTIONS

(a) THE KIT OF PARTS to build both the "3-10" Main Amplifier and the 2-valve PRE-AMP CONTROL UNIT H.P. Dep. £3.7.0 and 12 months at £1.2.9 **£15.15.0**
 (b) The "5-10" and the 2-stage PRE-AMP both ASSEMBLED and TESTED H.P. Dep. £3.16.0 and 12 months of £1.7.8 **£18.18.0**
 With Partridge Output Transformer £1.6.0 extra.

RECORD PLAYERS

The Latest Models are in stock many at reduced prices. Send S.A.E. For Illustrated Leaflet.

THE NEW GARRARD "AUTO-SLIM" 4-speed Autochanger with Crystal Pick-up **£8.10.0**

COLLARO "JUNIOR" 4 SPEED SINGLE RECORD PLAYER with separate Crystal Pick-up Carriage and Insurance 5/- Above Pick-up separately for £1.6.0.

THE NEW COLLARO C60 4-speed Autochanger unit with Studio "9" Pick-up **£7.19.6**

The E.M.I. 4-speed Single Record Player with Crystal Pick-up **£6.9.6**

B.S.R. MODEL UA14 A 4-speed mixer Autochanger with Crystal Pick-up **£7.19.6**

Available incorporating the B.S.R. STEREO Pick-up, plays L.P. and 78 Records **£8.13.10**

GARRARD MODEL TA/MK.II 4-speed Player fitted high output Crystal Pick-up **£8.10.0**

GARRARD MODEL RC210. Autochanger 4-speeds. High output. Crystal Pick-up **£9.19.6**

Carriage and Insurance on each above 5/- extra.

SPECIAL CASH OFFER

This very attractive PORTABLE AMPLIFIER CASE WITH P.M. SPEAKER ALL for ONLY **£8.7.6** (Plus 7/6 Carr. & Ins.)

together with a good quality GRAM AMP-LIFT unit and a matched P.M. SPEAKER

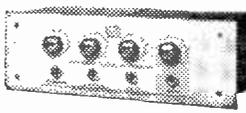
The Amplifier consists of a 2-stage design incorporating 3 modern B.V.A. valves and has separate BASS and TREBLE CONTROLS. The Portable Case will also accommodate almost any make of Autochanger and is attractively finished in Mushroom Grey Rexine.



WE ALSO SUPPLY SEPARATELY (a) THE 2-stage (plus Rectifier) AMPLIFIER **£4.2.6**
 (b) THE PORTABLE CARRYING CASE **£3.17.6**
 (c) 6in. P.M. SPEAKER 13/6. Carriage and Insurance 4/- extra.

MULLARD FOUR CHANNEL MIXER UNIT

Sell powered with Cathode follower output. Incorporates Two inputs for MICROPHONES One for CRYSTAL PICK UP and a fourth for RADIO or T.P.E. Complete Kit of Parts **£8.8.0** Assembled and Tested **£10.0.0**



TERMS: Deposit £2 and 12 months at 15/-. Alternatively Model L.L.C. provides for one microphone Input matched for moving coil or Ribbon Mike. £1.17.0 extra.

The TOHPHONIC



TRANSISTOR BATTERY OPERATED INTERCOM 89/6 P. & P. 4/-

Including PP3 battery and 25 yards lead with plugs. A completely Portable Intercom with 101 uses being ideally suitable for being battery operated. It is completely safe. Two-way calling system and volume on/off switch. The units are housed in attractive plastic cabinets (black/white) with chrome stands. It is extremely economical operating on one 8-volt battery. Replacement price being 2/6.

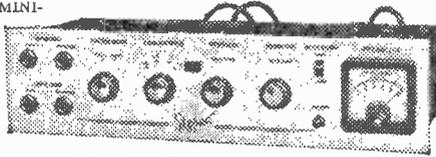
STERN RADIO 109, FLEET ST., PREMIER RADIO 23, TOTTENHAM COURT RD., LONDON W.1.
 TELEPHONE FLEET ST. 5123 LONDON, E.C.4. TELEPHONE MUSEUM 3451
 MAIL ORDERS and all POSTAL ENQUIRIES to 7-9 TUDOR PLACE, TOTTENHAM COURT RD., LONDON, W.1. MUSEUM 4128/9

Stereophonic Sound by Stern's

THE "STP-1" STEREO TAPE PREAMPLIFIER

DESIGNED TO OPERATE WITH

- BRENELL MK.V TAPE DECK incorporating similar 4-TRACK MINI-FLUX TAPE HEADS.
- PUSH FULL OSCILLATOR CIRCUIT
- 4-SPEED EQUALISATION
- FERROXUBE OSCILLATOR TRANSFORMER
- SENSITIVE METER FOR SIGNAL LEVEL
- SEPARATE GAIN CONTROLS IN EACH CHANNEL
- MULLARD VALVES INCORPORATED



COLLARO "STUDIO" TAPE DECK incorporating the latest 4-TRACK REUTER TAPE HEADS.
OVERALL SIZE CASE 13 1/2 x 3 1/2. FRONT PANEL (Choice of Black or White) 14 x 3 1/2.

PRICE
28.0.0

Including separate Power Supply Unit.
Deposit £5.12.0, 12 months at £2.1.0.

COMBINED PRICE SCHEDULE

THE "STP-1" PREAMPLIFIER is offered

- WITH TAPE DECKS AS FOLLOWS:
- BRENELL Mk. V 4-TRACK MODEL..... **£67.0.0**
Deposit £13.8.0, 12 months at £4.18.5.
- COLLARO "STUDIO" 4-TRACK MODEL..... **£45.0.0**
Deposit £9.0.0, 12 months at £3.6.7.

THE MULLARD "10+10" STEREO AMPLIFIER

(described below) with the "STP-1" PREAMPLIFIER and one of the TAPE DECKS provide a COMPLETE STEREOGRAPHIC INSTALLATION. WE OFFER... The "10+10", the "STP-1" and the

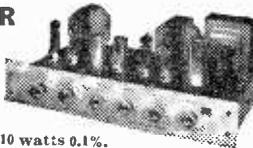
- (a) BRENELL Mk.V 4-TRACK DECK **£87.0.0**
Deposit £17.8.0, 12 months at £6.7.8.
 - (b) COLLARO "STUDIO" 4-TRACK DECK..... **£65.0.0**
Deposit £12.12.0, 12 months at £4.16.0.
- Please enclose S.A.E. with all enquiries.

STEREOGRAPHIC RECORD PLAYER UNITS ARE AVAILABLE FROM STOCK

MULLARDS "10 PLUS 10"

STEREO AMPLIFIER

A high fidelity design based on the famous Mullard "5-10". Provides up to 10 watts (per channel) Superb reproduction. Frequency response flat to within 3 db from c/s. to 60 Kc/s at 10 Mw. Total Harmonic Distortion at 10 watts 0.1%.



- (a) ASSEMBLED COMPLETE AMPLIFIER, including CONTROL UNIT (as Illustrated)..... **£21.0.0**
Deposit £4.4.0, 12 months at £1.10.10.
 - (b) A complete KIT OF PARTS..... **£18.10.0**
Deposit £3.14.0, 12 months at £1.7.2.
- We also supply the assembled MAIN AMPLIFIER only (excludes control unit) for operation with our DUAL CHANNEL PREAMPLIFIER, this provides for a more versatile or elaborate installation and would be essential if a low output Magnetic Pick-Up, such as the Decca, is to be used.
- (a) THE ASSEMBLED MAIN AMPLIFIER with the ASSEMBLED DUAL CHANNEL PREAMPLIFIER **£30.0.0**
Deposit £6.0.0, 12 months at £2.4.0.
 - (b) A complete KIT OF PARTS for both Units..... **£26.0.0**
Deposit £5.4.0, 12 months at £1.13.5.
- Illustrated and Descriptive Brochure available. Please enclose S.A.E.

DUAL CHANNEL PREAMPLIFIER

Incorporates two Mullard 2-valve Preamplifiers combined into a Single unit enabling it to be used for both STEREOGRAPHIC or MONAURAL operation. It is designed primarily to operate with our range of MULLARD MAIN AMPLIFIERS but will also operate equally well with any make of Amplifiers requiring an input of 250 mv/volts.



- COMPLETE KIT **£12.10.0**
- H.P. £7.10.0 & 12 mths. at 18/4.
- ASSEMBLED AND TESTED **£15.0.0**
- H.P. £3.0.0 & 12 mths. at £1.2.0

STEREO "TWIN THREE" AMPLIFIER with specially designed PORTABLE CASE

A most compact portable design consisting of TWIN CHANNEL AMPLIFIER based on the latest design by MULLARD LTD., incorporating top grade Output Transformers, and the new audio Triode-Pentode Valves Mullard E.C.L.86. Separate Bass and Treble controls. Suitable for use with Crystal Pick Ups, and capable of genuine high quality reproduction up to 3 watts per channel. An attractive and contemporary portable case in two tone colours. The unique feature of the design is the loudspeaker mounting. Two 8 x 5in. p.m. elliptical loudspeakers are separately baffled and mounted in the lid, which is detachable, allowing for each speaker to be individually positioned.



- PRICE for the ASSEMBLED AMPLIFIER, Two 8 x 5in. ROLA SPEAKERS and PORTABLE CASE **£14.0.0**
- Deposit £2.16.0, 12 months at £1.0.6.

"TWIN-THREE" Assembled and Tested..... **£7.15.0**

- 8 x 5in. ROLA LOUSPEAKERS (3 ohms) each. **£1.1.0**
- PORTABLE CASE..... **£5.0.0**

A CHOICE OF SINGLE RECORD PLAYERS and AUTOCHANGERS is available from Stock (Send S.A.E. for details)

BRAND NEW!—ROLA CELESTION

- 6in. x 4in. P.M. Loudspeaker, 3 ohm. V/Coil..... £18/6
- 7in. x 5in. P.M. Loudspeaker, 3 ohm. V/Coil..... £1.1.0
- 10in. x 6in. P.M. Loudspeaker, 3 ohm. V/Coil..... £1.10.0
- 6in. dia. P.M. Loudspeaker, 3 ohm. V/Coil..... £1.8/6
- 10in. dia. P.M. Loudspeaker, 3 ohm. V/Coil..... £1.7/6

Please enclose extra 1/- to cover postage.
AN ATTRACTIVE CORNER FITTING CASE for the 6in. x 5in. and 10in. x 6in. LOUSPEAKER is AVAILABLE for..... £2.10.0 (Size 20in. high x 10in. x 7in. deep).
Please enclose S.A.E. with all Enquiries.

ARMSTRONG RADIOGRAM CHASSIS

FULL RANGE IN STOCK. Please enclose S.A.E. or leaflets.

STEREO 12 Mk. 2 £43.10.0

(ILLUSTRATED)

Deposit £3.14.0, 12 months at £3.3.10.



The most complete chassis ever produced, combines AM and FM Tuners, Stereo Control Unit and two High Fidelity Amplifiers in one compact unit. Provide a true Hi-Fi unit for both mono and stereo. Other features include: inputs for tape recording, play back, pick-ups and stereo radio (s. could this come about); separate wide range bass and treble controls and balance control.

STEREO 55 **£32.15.0** Deposit £3.15.0, 12 months at £2.7.8

A junior version of the Stereo 12 Mk. 2 providing ten watts output, five watts from each amplifier and covering the VHF and Medium wavebands.

JUBILEE Mk.2 **£30.12.0** Deposit £6.0.0, 12 months at £2.4.9

A Hi-Fi mono chassis giving eight watts push-pull output and covering VHF, medium and long bands. Tape recording and play back inputs.

AF208 **£22.18.0** Deposit £4.18.0, 12 months at £1.13.0

An AM/FM chassis providing 5 watts output and covering the full VHF and medium wavebands. Tape recording and playback inputs.

TVB VHF TUNER **£21.18.0** Deposit £4.14.0, 12 months at £1.11.7

A self-powered high-fidelity tuner of outstanding design, incorporating features which are normally found only in the most expensive tuners. The full VHF band (87-100 Mc/s) is covered and a matching output control enables the output to be varied between 0 and 500 mV.

STERN RADIO PREMIER RADIO

MAIL ORDERS and all POSTAL ENQUIRIES to



BUILD A HIGH QUALITY TAPE RECORDER LIKE THIS FOR £35.0.0

FOR THIS WE SUPPLY

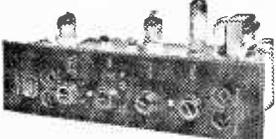
- ★ Complete Kit of Parts to Build the HF/TR3 Tape Amplifier. *Rola/Celestion 10 x 6in. p.m. Loudspeaker.*
- ★ The New Collaro "Studio" Tape Deck.
- ★ Portable Carrying Case (as illustrated).
- ★ ACOS Crystal Microphone and 1,200ft. Spool Tape.

Deposit £7.0.0 and 12 months at £2.11.4

ALTERNATIVELY WE SUPPLY THE COMPLETELY ASSEMBLED £39.10.0 and GUARANTEED TAPE RECORDER FOR

H.P. Terms: Deposit £7.18.0 and 12 months of £2.17.11.

HF/TR3 MKII TAPE AMPLIFIER (Mullard Type "A" design)



A very high quality Amplifier incorporating 3-speed treble equalisation by the latest FEROCUBE POT CORE INDUCTOR, FOR COLLARO-TRUVOX-BRENELL WEARITE Tape Decks, has GILSEN Output Transformer. Includes separate Power Supply Unit. **KIT OF PARTS £13.13.0**
Deposit £2.15.0 12 months at £1.0.0.

ASSEMBLED and TESTED £17.0.0
Deposit £3.8.0, 12 months at £1.4.11.

ADD "HI-FI" TAPE RECORDING TO YOUR EXISTING AUDIO INSTALLATION WITH MULLARD TYPE "C" TAPE PRE-AMPLIFIER-ERASE UNIT

The "Hi-Fi" link to add full tape recording facilities to High Fidelity home installations. Incorporates FEROCUBE POT CORE PUSH PULL OSCILLATOR and 3-speed treble equalisation by FEROCUBE POT CORE INDUCTOR FOR WEARITE-COLLARO-TRUVOX OR BRENELL TAPE DECKS. Includes separate power Supply Unit.



KIT OF PARTS £14.0.0 Deposit £2.16.0
12 mths. at £1.0.6
OR ASSEMBLED £17.0.0 Deposit £3.8.0
12 months at £1.4.11
(Excluding power unit £11.15.0 and £14.10.0 respectively.)

SPECIAL "COMBINED ORDER" PRICES

- For Constructors with their own cabinet—WE OFFER—
- (a) COMPLETE KIT to build the HF/TR3 Amplifier together with the COLLARO "STUDIO" DECK **£26.0.0**
Deposit £5.4.0. 12 monthly payments of £1.18.2
 - (b) As above but with the HF/TR3 supplied ASSEMBLED and TESTED **£29.10.0**
Deposit £5.18.0. 12 monthly payments of £2.3.4
 - (c) COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENELL Mk. V TAPE DECK **£42.0.0**
Deposit £3.8.0. 12 monthly payments of £3.1.7
 - (d) As above but with HF/TR3 supplied ASSEMBLED and TESTED **£45.10.0**
Deposit £9.2.0. 12 monthly payments of £3.6.9
 - (e) THE ASSEMBLED AND TESTED HF/TR3 AMPLIFIER with the WEARITE MODEL 4A DECK, incorporates Wearite Head Lift Transformer etc. Deposit £12.12.0. 12 monthly payments of £4.8.9.
(Carriage and Insurance on each above is 10/- extra.)

- (a) The COLLARO "Studio" Deck with the Model "C" Preamplifier and POWER SUPPLY UNIT ASSEMBLED AND TESTED **£29.10.0**
Deposit £5.18.0. 12 monthly payments of £2.3.3
- (b) As above but the TYPE "C" Unit and POWER UNIT supplied as COMPLETE KIT OF PARTS Deposit £5.6.0. 12 monthly payments of £1.18.10 **£26.10.0**
- (c) THE BRENELL Mk. V Deck with the Model "C" PREAMPLIFIER and POWER UNIT. ASSEMBLED AND TESTED **£46.0.0**
Deposit £9.4.0 and 12 months at £3.7.4
- (d) As above but the Model "C" PREAMPLIFIER and POWER UNIT supplied as a COMPLETE KIT OF PARTS **£43.0.0**
Deposit £6.12.0. 12 monthly payments of £3.3.1
- (e) THE WEARITE MODEL "4" DECK with ASSEMBLED and TESTED Model "C" PREAMPLIFIER and POWER UNIT incorporating WEARITE HEAD LIFT TRANSFORMER, Etc. Deposit £12.2.0 and 12 months at £4.8.9.
(Carriage and Insurance on above is 10/- extra.) **£60.10.0**



The MODEL HFG/2R PORTABLE TAPE RECORDER (Original Price £33.0.0) FOR ONLY 22 gns.

H.P. Dep. £4.14.0. 12 months £1.13.9
Crystal Microphone £1.0.0 extra. (Carr. and Ins. 10/- extra) Incorporates THE LATEST GARRARD "MAGAZINE" TAPE DECK and a HIGH QUALITY AMPLIFIER which is entirely based on the very successful MULLARD TYPE "A" DESIGN and specifically developed to operate the GARRARD DECK. PRICE INCLUDES SUPPLY OF THE GARRARD TAPE MAGAZINE and 4in. SPOOL OF DOUBLE PLAY TAPE. Comprises a Twin Track Recorder operating at 3 1/2 in/sec. speed and providing up to 1 hour 10 mins. playing time. Truly "portable", weighs only 22 lbs. Outstanding features are excellent performance and simplicity of operation

4in. SPOOL OF DOUBLE PLAY TAPE. Comprises a Twin Track Recorder operating at 3 1/2 in/sec. speed and providing up to 1 hour 10 mins. playing time. Truly "portable", weighs only 22 lbs. Outstanding features are excellent performance and simplicity of operation

THE 'ADD-A-DECK' Incorporating GARRARD TAPE DECK and MODEL HF/G3P PRE-AMPLIFIER

Supplied on ONE CHASSIS (as illustrated) READY FOR USE **18 Gns.**
(Carr. & Ins. 10/- extra.)
Price includes Garrard Magazine and a 4 in. Spool Double Play Tape



H.P. Deposit £3.16.0, and 12 months of £1.7.9. Provides complete tape recording facilities and designed to operate through the pick-up sockets of the standard type of RADIO RECEIVER, or an AMPLIFIER, from which really first class reproduction is obtained. It consists of a Twin Track Deck connected up to the Pre-amplifier and operates at 3 1/2 in/sec. speed providing up to 1 hr. 10 mins. playing time.

THE TRUYOX "SERIES 80" TAPE EQUIPMENT

- MODEL D82 TAPE DECK** Incorporating Twin Track Heads. Deposit £5.5, 12 months of £1.18.7 **£26.5.0**
- MODEL D84 TAPE DECK** With Four Track Heads and Track Switch for Mono/Stereo operation. Deposit £6. 12 months of £2.2.11 **£29.8.0**
- MODEL PD82 TAPE DECK** Complete Twin Track Recorder-Preamplifier Unit. Deposit £8.8, 12 months of £3.1.7. **£42.0.0**
- MODEL PD84 TAPE DECK** Complete Four Track Mono Recorder-Preamplifier Unit incorporating outlets for Stereo reproduction. Deposit £9.4, 12 months of £3.7.6. **£46.0.0**

The PD82 and 84 comprise two self-contained units to add full tape facilities to existing sound reproducing installations (Hi-Fi equipment, radiograms, record reproducers or good radio receivers) DESCRIPTIVE LEAFLETS READILY AVAILABLE

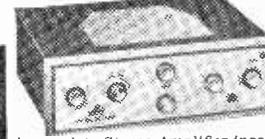
THE JEMCO MODEL MT-955 MULTIMETER

50,000 ohms per volt — D.C.
5,000 ohms — A.C.
A truly efficient Meter for the amateur or professional man, having features found normally in more expensive Types. Ranges: D.C. volts 2.5-10-50-250-1K A.C. 2.5-10-50-250-1K D.C. Current 100µA-10mA-100mA-500mA 10 amps Resistance 4 Ranges up to 20 meg. Add D.B. 0-46 Size 7 x 5 1/2 x 3 1/2 in. PRICE, including Full Test Kit **£12.19.6** p. & p. Lead Kit



! SPECIAL OFFER!

WE HAVE A LIMITED QUANTITY OF HMV Model 544 STEREO AMPLIFIERS and OFFER THEM FOR **£18.18.0** Deposit £3.18.0 12 mths. £1.7.8 LIST PRICE £27.6.0. Size 11 1/2 x 10 x 4 1/2 in. high.



A complete Stereo Amplifier incorporating All Controls, Suitable for Crystal or Ceramic Stereo Pick Ups producing 4 watts peak output per channel from input of 200 mV/Volts. Operates with 15 ohm Loudspeakers and has power available for Radio Tuning.

109, FLEET ST., LONDON, E.C.4.
TELEPHONE FLEET ST. 5812-3
23, TOTTENHAM COURT RD., LONDON W.1.
TELEPHONE MUSEUM 3451
7-9 TUDOR PLACE, TOTTENHAM COURT RD., LONDON, W.1. TELEPHONE MUSEUM 6128/9.

AUDIOTRINE HI-FI TAPE RECORDER KIT

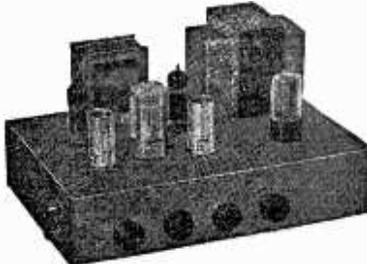
REALISM AT INCREDIBLY LOW COST. CAN BE ASSEMBLED IN AN HOUR
 The Recorder incorporates the latest Collaro Studio Tape Transcriber. The Audiotrine High Quality Tape Amplifier with negative feedback equalisation for each of 3 speeds. High Flux P.M. Speaker, extra 100 Tape Spool, a Reel of Best quality Tape and a handsome Portable carrying Cabinet with latest attractive two-tone polychrome finish, size 14 1/2 x 15 x 8 1/2 in. high, and circuit as shown. If purchased individually approximately £40. Performance equal to units in the £60-£80 class. S.A.E. for leaflet.



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, 5Y3. 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 60 D.B. 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, GUITARS, etc. OUTPUT SOCKET with plug provides 300 v. 30 mA. and 6.3 v. 1.5 a. For supply of a RADIO FEEDER UNIT. Size approx. 12.9-17 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. (Or factory built 51/- extra). If required louvred metal cover with 2 carrying handles can be supplied for 18/9. TERMS ON ASSEMBLED UNITS. DEPOSIT 24/6, and 9 monthly payments of 24/9. Send S.A.E. for Illustrated leaflet detailing Ready-to-assemble Cabinets. Speakers, Microphones, etc., with cash and credit terms.



25 1/2

GNS. Carr. 17/6

ONLY 3 PAIRS OF SOLDERED JOINTS PLUS MAINS

H.P. TERMS. Deposit £2.13.9 and 12 monthly payments of 44/-. Cash price if settled in 3 months.

BRADMATIC RECORDING HEADS. High Impedance Record/Playback 22/-, Low Impedance Erase. 12/6

PICK-UP ARMS. Complete with latest Accos/hi-fi Turnover head and rest. Only 29/11.

CRYSTAL MICROPHONES. Hand type NP110 14/9, R.T.C. 18/9, Accos Mic 40 25/9, Accos Mic 45 29/9, Stikic type Accos 39-1 39/9, BM3 with neck band and heavy table stand 59/9. Lapel type 35/9.

COLLARO JUNIOR 4-speed Single Player Unit and Crystal Pick-up with hi-fi Turnover head. Only 23-19.6.

COLLARO CONQUEST 4-SPEED AUTO-CHANGER, with high fidelity pickup, latest ventilated steel case. 200-250 v. 50 c.p.s. A.C. mains. Our price £8.19.6. Carr. 5/6.

COLLARO RC 457 4-SPEED MIXER AUTO-CHANGERS. Turnover Studio Pick-up head, for 200-250 v. A.C. £7.18.6. Carr. 4/6.

B.S.R. UA8 4-speed AUTO-CHANGERS with hi-fi turnover head. £6.19.9. Carr. 4/6.

GLEA MINIATURE 2-3 WATT GRAM AMPLIFIER. For use with any single or auto-change unit. Output for 2-3 ohm speaker. For 200-250 v. A.C. mains. Size 11 1/2 x 2 1/2 x 4 1/2 in. Controls: Vol. and Tone with switch. Only 59/9.

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

A complete set of parts for the construction of a stereo amplifier giving 5 watts high quality output on each channel (total 10 watts). Sensitivity is 50 millivolts, suitable for all crystal stereo heads. Ganged Bass and Treble Control give equal variation of "lift" and "cut". Provision is made for use as straight (monaural) 10 watt amplifier. Valve line-up ECC83 ECC83, EL84, EL84, E261. Outputs for 2-3 ohm speakers. Point-to-Point wiring diagrams and instructions supplied. Send S.A.E. for leaflet. **8 Gns.** Full constructional details and price list 2/6. Carr. 10/-

Kit can be assembled, ready for use, 59/6 extra.

R.S.C. BATTERY CHARGING EQUIPMENT

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

Assembled 6/12v. 4-5 amps. Fitted Ammeter and variable charge rate selector. Also selector turned steel case with stoved blue hammer finished. Fused and ready for use with Carr. 5/- mains and output leads. Terms: Deposit 13/3 and 5 monthly payments 13/9. 6/12 v. 3a., all facilities as above. Only 59/9, carr. 3/9.

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

BATTERY CHARGER KITS Consisting of Mains Transformer, F.W. Bridge, Metal Rectifier, latest ventilated steel case. Fuses, Fuse-holders, Grommets, panels and circuit. Carr. 3/8 extra.

6v. or 12v. 1 amp.	24/9
As above, with Ammeters 32/9	
6v. 2 amps.	25/9
6v. or 12v. 2 amps.	31/6
6v. or 12v. 2 amps. including Ammeter.	42/9
6v. or 12v. 4 amps.	49/9
6v. or 12v. 4 amps. with Ammeter and variable charge rate selector.	59/9

CHARGER AMMETERS.
 0-25 a., 0-3 a., 0-4 a., 0-7 a., 0-25 a., 0-30 a. 9/6.

PARMICO POTTED CHOKES
 200 mA. 2 H 200 ohms .. 16/9
 120 mA. 3 H 200 ohms .. 16/9
 120 mA. 8 H 10 ohms .. 13/9

SOLDERING IRONS. 230-250 v. 30 watts. First quality. For Radio work, 19/9. Spare elements and bits available.

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

Interleaved and Impregnated. Primaries 230-250-250 v. 50 c/s. Screened TOP SHROUDED DRO THROUGH

250-0-250v. 70mA, 6.3v. 2a. 0-5-6.3v. 2a	17/9
350-0-350v. 80mA, 6.3v. 2a. 5v. 2a	17/9
250-0-250v. 100mA, 6.3v. 2a. 6.3v. 1a	21/9
250-0-250v. 100mA, 6.3v. 3.5a. C.T.	19/9
250-0-250v. 100mA, 6.3v. 4a. 5v. 3a	25/9
300-0-300v. 130mA, 6.3v. 4a. 6.3v. 1a. for Mullard 510 Amplifier	29/9
300-0-300v. 100mA, 6.3v. 4a. 5v. 3a	26/9
350-0-350v. 100mA, 6.3v. 4a. 5v. 3a	26/9
350-0-350v. 150mA, 6.3v. 4a. 0-5-6.3v. 3a	29/9

FULLY SHROUDED UPRIGHT OUTPUT TRANSFORMER
 250-0-250v. 60mA, 6.3v. 2a. 0-5-6.3v. 2a. Midget type 21-3-3in. 17/11
 250-0-250v. 100mA, 6.3v. 4a. 5v. 3a. 27/9
 300-0-300v. 130mA, 6.3v. 4a. 5v. 3a. 27/11
 1a. for Mullard Amplifier
 350-0-350v. 100mA, 6.3v. 4a. 5v. 3a. 33/9
 350-0-350v. 150mA, 6.3v. 4a. 5v. 3a. 35/9
 425-0-425v. 200mA, 6.3v. 4a. C.T. 5v. 3a. 55/-

MIDGET MAINS Primaries 200-250 v.
 0-15 v. 1 a. 12/9; 0-9 v. 2 a. 11/9
 250-0-250 v. 60 mA, 6.3 v. 2 a. 12/11
 Both above size 2 1/2 x 2 1/2 in.

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

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

CHARGER TRANSFORMERS
 All with 200-250 v. 50 c/s Primaries:
 0-9-15 v. 1 a. 12/9; 0-9 v. 2 a. 14/9; 0-9-15 v. 3 a. 16/9; 0-9-15 v. 5 a. 19/9; 0-9-15 v. 6 a. 25/9; 0-9-15 v. 8 a. 28/9.

AUTO (Step up/Step down) TRANS.
 0-10-120-230/250 v. 50-80 ohms 13/9;
 250 watts 33/9; 150 watts 27/9

MICROPHONE TRANSFORMERS
 120:1 high tone, clamped, 6/9; 120:1 Potted. Mu-metal screened, 9/9.

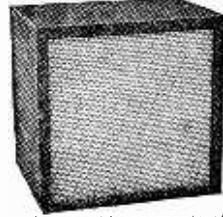
R.S.C. (Manchester) Ltd. MAIL ORDERS to 29 Moorfield Rd., Leeds 12. Terms: C.W.O. or C.O.D. No C.O.D. under £1. Postage 2/9 extra under £2. 3/9 extra under £5. Trade Supplied. S.A.E. with all enquiries please.

BIRMINGHAM: 6 Great Western Arcade, Birmingham (Half day Wed.)	SHEFFIELD: 13 Exchange St. Castle Market Bldgs., Sheffield (Half day closing Thurs.)	HULL: 51 Savile St. Hull	LIVERPOOL: 73 Dale St. (8 mins. Lime St. or Exchange Stn.)	BRADFORD: 56 Morley Street (Above Alhambra Theatre), Bradford (Half day closing Wednesday)	LEEDS: 5-7 County (Mecca) Arcade, Briggate Leeds 1	MANCHESTER: 8-10 Brown St. (Market St.) Manchester 2 (No half day)
--	--	------------------------------------	--	--	--	--

SENSATIONAL STEREO OFFER ONLY 4 GNS. carr. 5/-

A complete set of parts to construct a good quality Stereo amplifier with an undistorted output total 6 watts. For A.C. mains input of 200-250 v. Including pair matched 6in. output control, Bass and Tone Controls. Preset balance control, speakers. Sensitivity 230 m.v. Ganged Vol. and Tone Controls. Preset balance control. Full instructions and point-to-point wiring diagrams supplied. Stereo Pick-up Head 18/9 extra with above only.

12in. 10 WATT HIGH QUALITY LOUD-SPEAKER IN POLISHED WALNUT FINISHED CABINET



GAUSS 12,000 lines, Speech coil 3 ohms or 15 ohms. Only £4.19.6

Terms: Deposit 11/3 and a monthly payments of 11/3.

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

A highly sensitive Push-Pull high output unit with self-contained Pre-amp. Tone Control. Stages. Certified performance. 6 valves compare equally with most expensive amplifiers available. Hum level 7 db. down. Frequency response ±3 db. 30-30,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used EP86, EP86, EOC83, 807, 807, GZ33. Separate Bass and Treble Controls are provided. Minimum input required for full output only 12 millivolts so that ANY KIND OF MICROPHONE OR PICK-UP IS SUITABLE. The unit is designed for CLUBS, SCHOOLS, TIRATHES, DANCE HALLS or OUTDOOR FUNCTIONS, etc. For use with Electronic ORGAN, GUITAR, STRING BASS etc. For standard or long-playing records. OUTPUT SOCKET PROXIES L.T. and H.T. for a RADIO FEEDER UNIT. Extra input with associated vol. control is provided so that two separate inputs such as Gram, and 'Mike' can be mixed. Amplifier operates on 200-250 v. 50 c/s. A.C. Mains and has output for 3 and 15 ohm speakers. Complete Kit of parts with fully punched chassis and point-to-point wiring diagrams and instructions. If required perforated cover with carrying handles can be supplied for 18/9. The amplifier can be supplied, factory built with EL34 output valves and 12 months guarantee, for 14 Gns.

Jason FMT1 V.H.F./FM Radio Tuner design. Total costs of parts including valves. Tuning dial, Escutcheon, etc. £6.19.9.

LINEAR L45 MINIATURE 4/5 WATT QUALITY AMPLIFIER. Suitable for use with any record playing unit, and most microphones. Negative feedback. 12in. Separate Bass and Treble Controls. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Three miniature Mullard valves used. Size of unit only 7.5-5.1in. high. Guaranteed for 12 months. Only £5.19.6. Send S.A.E. for illustrated leaflet. Terms: Deposit 22/6 and 5 monthly payments of 22/6.

13in. 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.

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



230-250 v. 50 c/s. Output for 2-3 ohm speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis (with bassettes) and instructions. Exceptional value at only £4.15.0, or assembled ready for use 25/- extra, plus 4/6 carr. or deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.

A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolt input is required for full output so that it is suitable for use with the latest high fidelity pick-up heads, in addition to all other types of pick-ups and practically all 'mikes'. Separate Bass and Treble Controls are provided. These give full long-playing record reproduction. Hum level is negligible being 7 db. down 15 db. of Negative feedback is used. H.T. of 300 v. 25 mA. and L.T. of 6.3 v. 1.5 A. is available for the supply of a Radio Feeder Unit, or Tape-Deck pre-amplifier. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Chassis is not alive. Kit is complete in every detail and includes fully punched chassis (with bassettes) and instructions. Exceptional value at only £4.15.0, or assembled ready for use 25/- extra, plus 4/6 carr. or deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.

11 Gns.

Carr. 10/-
with EL34 output valves and 12 months guarantee, for 14 Gns.

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

WE STOCK ARMSTRONG RADIOGRAM CHASSIS, GOODMAN'S and W.B. SPEAKERS. I.P. or Credit Terms available. No carriage charges on Mail Orders for above.

LINEAR TAPE PRE-AMPLIFIER Type LP/1. Switched Negative feedback equalisation. Positions for Record 1in. 3in., 4in. and Playback. EMI4 Record-er as the link between a Collaro Tape Transcriber and a high fidelity amplifier, but suitable for almost any Tape Deck. Only 9 gns. S.A.E. for leaflet.

R.S.C. PORTABLE GUITAR AMPLIFIERS. (For 200-250v. A.C. Mains)

Junior 5 watts High quality output. Separate Bass and Treble "Cut" and "Boost" controls. Sensitivity 15 m.v. Twin inputs. High Flux 6in. Loudspeaker "built-in". Handsome, strongly made Cabinet (size approx. 14 x 14 x 7in.) finished in attractive and durable polichrome, and fitted carrying handle. Terms, Deposit £1 and 9 monthly payments of £1. Carr. 10/-

£8.19.6

Senior 10 watts High Fidelity output Separate Bass and Treble "Cut" and "Boost" controls. Twin separately controlled high gain inputs so that two instruments such as Guitar and String Bass can be used at the same time. Two loudspeakers are incorporated, a high Flux 12in. for Bass notes and a 7 x 4 in. elliptical for Treble. Cabinet is well made and finished as Junior model. Size approx. 18 x 18 x 9in. **15 Gns.** I.P. Terms. Deposit 34/9 and 9 monthly payments of 34/9. Carr. 10/-

Super Hi-Fi 15 Watt. All facilities as 10 watt. Cabinet size 20 x 15 x 13ins. Terms: Deposit £2.11.6, and nine month payments of 5/15. Cash 22 gns. Carr. 12/6. 4 tremolo units on half page ad.

R.S.C. BATTERY TO MAINS CONVERSION UNITS

Type BM1. An all-dry battery eliminator. Size 5 1/2 x 4 1/2 in. approx. Completely replaces battery supplying 1.4 v. and 90 v. where A.C. mains 250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 v. and 90 v. This includes low consumption types. Complete kit with diagrams. 35/9, or ready to use, 46/6. 200-250v. A.C. mains input. 9v. fully smoothed output for Transistor Radios. Pocket (PP3/4) size 19/8. Larger size, 29/8.



Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 120 v. 90 v. and 60 v., 40 mA. and 2 v. 0.4 A. to 1 amp. Fully smoothed. Thereby completely replacing both H.T. batteries and L.T. 2 v. accumulators when connected to A.C. mains supply 200-250 v. 50 c/s. **SUITABLE FOR ALL BATTERY HI-FI DECKS.** Complete kit of parts with diagrams and instructions, 49/9, or ready for use, 59/6.

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

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. Especially recommended for Audiotron Loud-speaker systems, £5.19.6. Suitable legs with brass ferrules, 25/- per set of 4. **R.S.C. CORNER CABINET FINISHES.** Polished walnut veneer finish. Pleasing design. Standard Model, size 27 x 18 x 12 in. for 8 or 10in. speaker, £4.11.9.

SENIOR MODEL. Size 30 x 20 x 12in. for 12in. Speaker. Suitable Speaker systems below. Only 7 gns.

AUDIOTRON HI-FI SPEAKER SYSTEMS. Consisting of matched 12in. 12,000 line, 15 ohm high quality speaker; cross-over unit (consisting of choke, condenser, etc.) and Tweeter. The smooth response and extended frequency range ensure surprisingly realistic reproduction. Standard 10 watt rating £5.19.6 or Senior 15 watt, £7.19.6.

4 x 4 in. SPEAKERS. 10in. W.B. "Stentorian" 3 or 15 ohms type HF1012 10 watt. hi-fidelity type. Recommended for use with our All Amplifier, £4.12.9. 12in. R.A. 3 ohms to 12,000 lines, 59/6. **HI-FI CRYSTAL PICK-UP HEADS.** (Cartridges.) Acos, Standard replacement for Garrard, B.S.H. and Collaro, 19/8. Acos Stereo/Monaural 49/8. Ronette Stereo/Monaural 59/6.

R.S.C. EQUIPMENT CABINET. Dimensions and outer appearance identical with Standard Bass Reflex Cabinet. Top hinged Bass board adjustable. Will take Tape P.M. or A.M./F.M. Unit. Only 6 gns. **SUPERBET FEEDER UNIT.** Design of a high quality Radio Tuner (specially suitable for use with our Amplifier). Delayed A.V.C. Controls are Tuning, W/C, and Vol. Only 250 v. 15 mA. H.T. and L.T. of 6.3 v. 1 amp. required from amplifier. Size approx. 9 x 6 x 7in. 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.

Brand new, individually checked and guaranteed VALVES

AL60 6/-	EB34 1/6	ESU208 6/-	PL36 10/6	VR99 8/-	6A17 3/-	6V6GT 5/-	80 5/6	8020 10/-
AR8 5/-	EB91 3/9	EY51 8/-	PL81 9/-	VR105/305/6 6/-	6AK5 5/-	6X4 9/-	81 9/-	9001 3/-
ARDD5 2/-	EB33 7/-	EY86 8/-	PL82 8/-	VR150/30 6/-	6AK7 6/-	6X5GT 5/-	82 8/-	9002 5/6
AR3 3/-	EB41 7/9	EY91 3/6	PL83 10/-	VT4C 25/-	6AM5 5/-	6Y6G 6/-	83 8/-	9003 6/-
AR4 3/6	EB90 5/-	EZ40 7/-	PT15 10/-	VU39 6/-	6AM6 4/-	6Z4 5/6	84 8/-	9004 2/6
AR12 3/-	EC52 8/-	EZ41 6/9	PT25H 7/6	W31 7/-	6AQ5 7/-	7B7 7/6	85A1 9/-	9006 2/6
AR21 5/6	EC70 10/-	EZ80 6/-	PX4 19/-	X66 8/-	6AT6 5/-	7C6 7/3	85A3 15/-	Cathode Ray Tubes
AR24 3/6	EC90 20/-	EZ81 6/9	PX25 9/-	X66 8/-	6B8G 2/6	7E8 7/6	89 6/-	ACR1 15/-
AR34 4/-	EC91 3/-	FW4/500 6/6	PY80 6/9	Y65 4/-	6C4 2/6	7Q7 7/1	7-pin 2/6	ACR11 15/-
ARTH2 7/-	ECC81 5/6	G120/1B 9/-	PY81 7/-	Y66 8/-	6C5 6/-	7V7 5/-	250TH 8/-	CV955 15/-
ATP4 2/9	ECC82 6/6	GL450 10/-	PY82 8/-	Z31 6/-	6C6G 3/-	7Y4 6/-	350B 8/9	(091) 55/-
ATP7 5/6	ECC83 7/-	GL464A 10/-	PY83 7/3	IA3 3/-	6C8G 5/-	7Z2 4/6	393A 15/-	E4103/B4 25/-
AUI 5/-	ECC84 7/-	GU20/21 40/-	PZ1-35 9/-	IASGT 5/-	6D6 4/-	8D2 2/6	705A 15/-	3F27 25/-
AU4 5/-	ECC85 8/-	GZ32 9/-	QP21 6/-	ICSGT 7/6	6F5 5/3	9D2 3/-	715B 60/-	5B1 35/-
AW3 4/-	ECC91 4/-	H63 7/-	QP25 5/3	ID8GT 6/-	6F6G 4/-	12A6 2/6	717A 8/6	5C1 42/6
AZ31 8/-	ECC82 8/6	H63 7/-	Q575/20 6/9	IE7G 7/6	6F7 5/-	12A7 5/6	801 6/-	5F27 45/-
BS4A 5/6	ECC82 8/6	HL23 6/-	Q595/10 6/9	IG6GT 6/-	6F5GT 5/9	12A7 5/6	803 22/6	5F7A 25/-
BT45 15/-	ECC81 7/9	HL23DD 8/-	Q5108/45 3/6	ILD5 5/-	6F8G 5/-	12A8 7/-	807 807B 6/-	7B7 40/-
BT9B 20/-	ECC80 8/-	HVR2 12/6	QV04/7 7/6	IR5 6/-	6F12 4/6	12A9 9/-	807 807B 6/-	12DP7 60/-
BT83 22/6	ECC82 9/-	KRN2A 19/-	R3 10/-	IS5 5/9	6F17 5/-	12AU6 9/-	807 807B 6/-	VCRX258 45/-
CV54 5/-	EF22 7/-	KT32 8/-	R10 7/6	IT4 4/-	6G6G 2/6	12AU7 6/-	807 807B 6/-	(with scanning coil) 45/-
CV264 20/-	EF36 3/6	KT33C 4/-	R3/10 4/-	IS5 5/9	6H6M 1/6	12AU6 9/-	807 807B 6/-	VCR138 30/-
CV4014 8/-	EF39 4/-	KT44 6/3	R3/10 4/-	IS5 5/9	6J5 3/6	12AU7 6/-	807 807B 6/-	VCR139A 35/-
CV4015 7/1	EF50 2/6	KT63 5/1	RE21 25/-	IW4 4/-	6J5 3/6	12B8 7/6	810 80/-	
CV4025 10/-	EF54 3/3	KT76 10/-	RE21 25/-	IW4 4/-	6J5 3/6	12K8M 7/6	810 80/-	
CV4046 40/-	EF55 5/3	KT76 10/-	RK34 2/6	2A3 5/-	6J7G 5/-	12Q7GT 3/6	815 40/-	
CY31 7/6	EF70 4/-	KTW62 7/6	RK34 2/6	2A3 5/-	6K6GT 6/-	12Q7GT 4/6	816 30/-	
D41 3/3	EF73 6/-	KTZ41 6/-	RT23 10/-	2A5 6/-	6K7G 2/3	12SA7 7/6	829A 30/-	
D77 4/3	EF80 5/6	MH4 3/6	SP1 4/-	2A6 7/6	6K7GT 4/9	12SCT 4/-	832 35/-	Photo Tubes
DA30 12/6	EF85 6/6	MH41 5/-	SP13C 4/6	2C34 2/6	6K8G 5/9	12SG7 4/-	832A 35/-	CMG8 9/-
DAF70 35/-	EF86 7/1	ML4 4/-	SP41 2/6	2C42 25/-	6K8GT 8/3	12SH7 3/-	843 7/4	CS16 12/6
DAF91 6/-	EF89 7/9	ML6 6/-	SP61 2/-	2C46 30/-	6K8M 8/6	12S17 5/-	866 10/-	Special Valves
DAF96 7/6	EF91 3/6	MS/PEN 6/-	SU2150A 2X2 4/-	3A4 5/-	6L5G 6/-	12SK7 3/6	872 20/-	2J31 45/-
DD41 4/-	EF92 3/6	MS/PEN 6/-	T41 7/-	3B7 5/-	6L6 9/-	12SL7 5/9	930 80/-	4J31 45/-
DE75 15/-	EF95 5/-	OB3 7/1	TP25 15/-	3B24 5/-	6L6 9/-	12SK7 3/6	872 20/-	4J50 45/-
DET19 3/6	EL32 3/9	OC3 5/6	TT11 3/-	3E29 5/-	6L7G 4/6	12SN7 5/9	954 4/6	5D21 43
DET20 2/-	EL33 8/-	OD3 6/-	TT15 25/-	(829B) 60/-	6L6 9/-	12SR7 6/-	955 2/6	723A 50/-
DF39 4/-	EL35 6/-	OZ4 5/-	TZ20 16/-	3Q4 6/-	6L34 4/6	12S7 5/9	954 4/6	726A 27/6
DF72 7/6	EL41 8/-	PCC84 7/-	U12/14 8/-	354 5/-	6N7G 5/9	12T8 6/-	955 2/6	ACT6 160/-
DF91 3/3	EL42 8/-	PCC85 8/-	U17 5/-	3V4 6/-	6N7GT 6/-	20A2 17/6	958A 5/-	CV193 30/-
DF96 8/-	EL84 7/-	PCF80 7/-	U18 6/6	4E27 60/-	6Q7G 6/-	21B6 9/-	1616 3/-	CV980 3/-
DK96 7/3	EL85 10/-	PCF82 8/-	U27 8/-	5B/254M 30/-	6R7 6/-	25L6GT 7/9	1619 5/-	ESU77 200/-
DL92 6/-	EL91 4/6	PCL82 8/6	U28 5/-		6S7G 4/6	35L6GT 8/-	1626 4/6	KR/6 4
DL94 6/-	EM80 8/-	PCL83 11/-	U34 8/6	5Y3GT 6/-	6S7GT 5/9	35Z4GT 7/-	4043 13/6	LS7B 30/-
DL96 8/-	EM84 9/-	PCL84 9/-	UL11 5/-	5U4G 5/-	6S7GT 5/9	37 4/-	4063 8/-	WL417A 15/-
EA50 1/6	EN31 15/-	PEN45 4/6	UL12 5/-	5V4G 5/-	6S7GT 5/9	37 4/-	4064 10/-	
EABC80 7/3	EP37A 7/-	PEN46 5/1	UL41 7/-	5Y3GT 6/-	6S7GT 5/9	37 4/-	4065 8/-	
EAC91 3/6	EP71 6/6	PEN65 6/6	UL84 7/6	5Z4G 8/-	6S7GT 5/9	37 4/-	4066 10/-	
EAC91W 7/6	EP72 5/1	PEN220A 3/-	UL9 5/6	5Z4G 8/-	6S7GT 5/9	37 4/-	4067 8/-	
			UY41 6/-	6AB7 4/-	6SN7GT 4/6	75 5/6	4120 4/-	
			UY85 6/6	6AC7 3/-	6S7GT 4/6	76 5/6	4120 4/-	
			VP23 3/-	6AG5 3/-	6S7GT 4/6	77 6/-	4120 4/-	
			VP41 5/6	6AG7 6/-	6V6G 4/6	78 7/-	4120 4/-	

AND MANY OTHERS IN STOCK, INCLUDING CATHODE RAY TUBES AND SPECIAL VALVES. All U.K. Orders below 10/-, 1/- P. & P. 2/6 over 10/-. Orders over £3, P. & P. free. C.O.D. 2/6 extra. Overseas Postage extra at costs.

BRAND NEW ORIGINAL SPARE PARTS FOR AR88 RECEIVERS.

Please write your requirements.
TANNOY LOUDSPEAKERS, 7.5Ω imp., in wooden case. New 19/-. Carr. 5/-.
HIGH RESISTANCE HEADPHONES (CHR), 12/6. P. & P. 2/-.
LOW RESISTANCE HEADPHONES (D.L.R.), 8/-. P. & P. 2/-.
TELEPHONE HANDSET. Standard G.P.O. type. New 12/-. P. & P. 2/-.
CONNECTORS FOR TCS RECEIVER, with original plugs on both ends. New £1.17.6. P. & P. 2/6.
R.109 RECEIVER. Covering 2-8 Mc/s. 6 v. D.C. with set of spare valves and carrier. Brand new in original packing case. £6.18.0 including delivery in U.K.
R.109A RECEIVER. Covering 2-12 Mc/s. £7.18.0.
"CONNECT AND FORGET—CANNOT OVERCHARGE"—"ESS-TRON" AUTOMATIC BATTERY CHARGER. Charging rate 4 amps. The charging rate automatically adjusts itself to the charge in the battery. Automatic current and voltage control. Patented application of magnetic amplification to battery charging. Indicator lights show battery fully charged, receiving charge, incorrectly connected or faulty cells. Mains voltage 200/250 v. Built for 6 or 12 v. batteries. Measurements 7 x 5 x 5 1/2 in. Weight 8 1/2 lbs. Price £6.19.6. P. & P. 3/6.

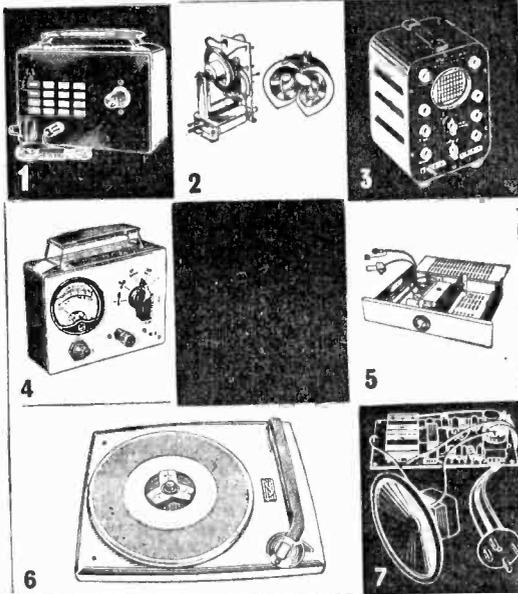
MARCONI RECEIVER TYPE CR 100/2. Tested & aligned. £32.10.0. Carr. £1.
TRC-I RECEIVERS. American made for crystal operation. 70-100 Mc/s. Exceptionally high class. 110 v. A.C. operation. £18.10.0. Carriage £1.
TELESCOPIC MAST. 34ft. Consisting of 6 sections of steel tubing of such internal and external dia. that the smaller sections may be collapsed with the largest section. Immediate erection. Absolutely complete with brackets, guys, pegs, spikes etc., £12.10.0. Carr. 18/-. As above but 20ft., £7.10.0. Carr. 18/-.
MULTI-TESTER. CR. 0-6-30-120-600-1,200v. A.C./D.C. 0-120 μA, 0-300 mA, A.C./D.C. 0-30,000 Ω, 0-3 MΩ, 10,000 Ω/v. 3 1/2" x 4 1/2" x 1". Very clear, large scale. Price £4.10.0. P. & P. 3/6.
COMPLETE SET OF STRONG AERIAL RODS (American). Screw-in type MP49, 50, 51, 52, 53, total length 15ft. 10in. Top dia. 0.185in. Bottom dia. 0.615in., together with matched aerial base, MP37 with ceramic insulator. Ideal for car or roof insulation, £2.10.0. Post free.
53 TRANSMITTER SPARES. Full range. Price list on application.
DYNAMOTORS DM 21 FOR BC 312 RECEIVER. Brand New, £2.10.0. P. & P. 4/-.

AERIALS—11ft. long, 2ft. long when folded, 15/-. P. & P. 2/-.
CRYSTAL CALLIBRATORS No. 10. Frequency range 1.5 to 10 Mc/s. Together with working instructions, lead and spare valves. £4.10.0. P. & P. 3/-.
COMPLETE V.F.O. UNIT from TX53. Freq. range in 4 switched bands from 1.2-17.5 Mc/s. Two V.T. 501s, as oscillator and buffer, 807 as driver, two 5130s as voltage stabilizers. Output sufficient to drive two 813s in parallel. Slow motion drive directly calibrated in Mc/s. Provision for crystal control, metering of buffer and driver stage. Power requirements 400 v. and 6.3 v. D.C. Can also be used as low power transmitter. In excellent condition with valves and circuit diagram. £5. P. & P. 15/-.
R.209 RECEPTION SET. A 10-valve high-grade Superhet Receiver with facilities for receiving R/T (A.M. or F.M.) and C.W. frequency 1 Mc/s-20 Mc/s. Hermetically sealed. Built on miniature valves and incorporating its own vibrator power supply unit driven by a 6 v. battery (2 point connector included). The set provides for reception from rod, open-wire or dipole aerial with built-in loudspeaker or phone output. Dimensions: Length 12in., width 8in., depth 9in. Weight 23lb. In as new, tested and guaranteed condition, £23.10.0, including special headphone and supply leads. Carr. £1.
CARBON INSET MICROPHONE, G.P.O. type, 2/6. P. & P. 1/6.

P.C. RADIO LTD.
 170, GOLDHAWK RD., W.12
 Shepherds Bush 4946

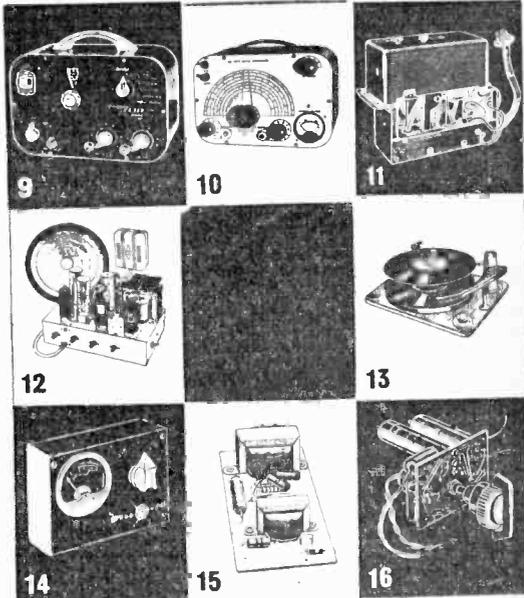
CHECK with these

BARGAINS



- 1. TRANSISTORISED POCKET RADIO with PRINTED CIRCUIT, MINI-EARPIECE, HIGH GAIN FERROX SLAB AERIAL—NO AERIAL OR EARTH REQUIRED.** This wonderful little set to build yourself gives you completely personal listening. Luxembourg obtainable in favourable areas! Twin coloured case $4\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{1}{2}$ in. 21/-. P. & P. 2/6. (All parts sold separately).
- 2. LINE E.M.T. TRANSFORMERS, Built-in line width control.** 14kV. Sean coil 90in. deflection on ferrite yokes. Frame O.P. transformer p. 18kV smoothing condenser, suitable for 14in., 17in. or 21in. tubes. With circuit diagram, 29/6 plus 4/6 P. & P. Suitable Focus Magnet (state tube). 10/- plus 3/- P. & P.
- 3. OSCILLOSCOPE for D.C. and A.C. APPLICATIONS.** Push-pull X amplifier; Fly-back suppression; Internal Time-base Scan Wave form available for external use; pulse output available for checking TV line O/P Transformers, etc. Provision for external -1/P and C.R.T. Brightness Modulation. A.C. mains 200/250 v., £18.18.0. P. & P. 8/- or £4.13.0 deposit, plus P & P 8/- and 12 monthly payments of 26/8. FULL 12 MONTHS' GUARANTEE INCLUDING VALVES and TUBE.
- 4. A.C./D.C. POCKET MULTI-METER Kit.** 2in. moving coil meter, scale, calibrated in A.C./D.C. volts, ohms and milliamperes. Voltage range A.C./D.C. 0-50, 0-100, 0-250, 0-500. Milliamperes 0-10, 0-100. Ohms range 0-10,000, 0-100,000 Ω /6, P. & P. 2/- Wiring diagram 1/-, free with parts.
- 5. CHANNEL TUNER.** Will tune to all Band 1 and Band III stations. Complete with P.C.C.84 and P.C.F.80 valves (in series) I.F. 16-19 or 33-38. Can be modified as an aerial converter (instructions supplied), 22/6, plus 4/- P. & P. HEATER TRANSFORMER to suit above, 200-250 v., 6/-, plus 3/- P. & P.
- 6. STAAR 45, 9 VOLT BATTERY RECORD PLAYER.** Complete with pick-up and deck. A completely portable record player. Head is protected by a plastic dome, with a brush which cleans the stylus as it rises into playing position. 45 r.p.m. Automatic on-off switch, governed 9 v. motor, attractive 2 tone grey finish, £2.14.6, P. & P. 2/6.
- 7. TRANSISTORISED AMPLIFIER** can be used with the STAAR 45, output 1 watt. Size $4\frac{1}{2} \times 2\frac{1}{2}$ in., printed circuit, tone and volume controls, 4 transistors. By altering 2 resistors, 2 watt output can be obtained. Push-pull output, complete with 3in. moving coil speaker. Built and tested. 49/8, P. & P. 2/-.
- 9. SIGNAL GENERATORS.** Cash £7.5.0 or 30/- deposit and 6 monthly payments of 21/6, P. & P. 5/6. Coverage 120 kc/s to 84 Mc/s. Case $10 \times 6\frac{1}{2} \times 4\frac{1}{2}$ in. Size of Scale $6\frac{1}{2} \times 3\frac{1}{2}$ in. 2 valves and a rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent, modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch variable A.F. output and moving coil output meter. Accuracy ± 2 per cent.

- 11. CHANNEL TUNER L.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/-.
- 12. 8-watt PUSH-PULL 5 VALVE AMPLIFIER.** A.C. mains 200-250 v. Size $10\frac{1}{2} \times 8\frac{1}{2} \times 2\frac{1}{2}$ in. 5 valves. For use with all makes and types of pick-up and mike. Negative feed back. Two inputs, 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 6 per cent total distortion. Noise level 40 db down all hum. Output transformer tapped for 3 and 15 ohms speech coils. For use with 8in. or L.P. records musical instruments such as guitars, etc. Suitable for small halls, £3.19.8. P. & P. 6/-. Crystal mike to suit 15/-, P. & P. 2/- 8in. P.M. speaker to suit 12/6, P. & P. 2/-.
- 13. B.S.R. MONARCH UAS WITH FUL-FI HEAD.** 4-speed, plays 10 records, 12in., 10in., or 7in. at 16, 33, 45 or 78 r.p.m. Internixes 7in., 10in. and 12in. records of the same speed. Has manual play position; colour brown. Dimensions: $12\frac{1}{2} \times 10\frac{1}{2}$ in. Space required above baseboard 4 $\frac{1}{2}$ in. below baseboard 2 $\frac{1}{2}$ in. Fitted with Ful-Fi turnover crystal head £8.19.6, P. & P. 6/6. With Stereo Head £7.19.6, P. & P. 5/6.
- 14. TRANSISTOR TESTER.** For both P.N.P. and N.P.N. transistors incorporating moving coil meter. In metal case, size $4\frac{1}{2} \times 3\frac{1}{2} \times 1\frac{1}{2}$ in. Scale marked in gain and leakage. 19/6, P. & P. 3/-.
- 15. PUSH-PULL OUTPUT STAGE** inclusive of transistors with input and output transformers to match 3 ohms speech coil, suitable for use with the POCKET RADIO. Kit of parts, including transistors. 19/6, P. & P. 2/- Wiring diagram 1/6, free with parts.
- 16. PORTABLE AMPLIFIER.** On printed circuit for A.C. Mains 200/250 v. Size 4×3 in. with tone and volume control. Complete with Valves: ECL82 and E280. Output 2 watts, 39/6, P. & P. 3/-.



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

21B HIGH STREET, ACTON LONDON, W.3.

ALL ENQUIRIES S.A.E. GOODS NOT DISPATCHED OUTSIDE U.K.

What! A TV in a Caravan?



output, which must have cost at least £10 to make, for only 17/6, plus 4/6 post and insurance.

The J.B. Tangential Air Conditioner



The displacement caused by the new Tangential fan is quite amazing, but what is more amazing is the almost complete absence of noise.

Stand the J. B. Air-Conditioner on a window ledge near an open window, and you can have either extraction of bad air, or input of clean, new air, depending upon which way You turn it.

In addition to a fan for moving the air, the unit also contains a heater and control switch, wired such that 500, 1,000 or 2,000 watts of heating may be used.

The total building cost of this air-conditioner is £7.10.0, but is offered at a specially low price during the summer months, this price namely £6.10.0, plus 5/- carriage and insurance. The case is very nicely finished in hammered enamel, and when assembled, the unit is indistinguishable from those selling at £12 and more.

Don't miss this special summer offer.

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 17" long and adjustable over a range 0 to 350 F. The contacts are rated at 15 amps, 230 volts, and the adjustment spindle, 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 £3 or £4 each, these are offered at only 12/6 plus 2/6 postage and insurance.

Introducing the J.B. Range of Transistors

- Try these, you will be very pleased—
- J.B1. All wave mixer (replaces OC45 etc.) .. 6/6
 - J.B3. I.F. Amplifier (replaces OC44 etc.) .. 4/6
 - J.B4. A.F. Driver (replaces OC81D etc.) .. 5/-
 - J.B6. Output matched pair (replaces OC81 etc.) .. 13/-
 - Special offer set of six matched for superhet .. 25/-
 - Special offer set of four matched for Amplifier (1 watt) .. 17/-

Transistor Components

Send S.A.E. for our new price list. Just printed.

"A jolly fine set but deserving a better case."



The most up to date Superhet portable of its type. It uses a transfiler in conjunction with Philco R.F. transistors and Mullard output transistors. Complete hide case, £7.15s.

If you have already built and want to change your case, then return the plastic case with a postal order for £1 or if you wish to retain the plastic case then send 26/-, plus 1/6 Post and ins. for the hide case only. AGENTS WANTED TO BUILD OUR COMPANION PORTABLES. SEND S.A.E. FOR FULL DETAILS.

Oscillating Unit 12A



Aircraft Radio Receiver. Type CW 0460 48 D

This is part of the equipment RU19, American made equipment for the Navy. It is a 5 valve receiver with a really beautiful precision tuning mechanism. Brand new in original packing but less coil units. Limited quantity only, £5 each.



CLOSED CIRCUIT TV

If you feel like taking a day out we invite you to our studio here at Eastbourne and will demonstrate 405 and 625 systems, as well as under water and other types of installations. We have equipment for sale or loan, and will be glad to discuss any proposals which you may have. You will be interested to note that a transistorised camera for working direct into a domestic TV receiver can now be purchased for little more than the cost of a good photo camera.

The 'Good Companion' Mk.11 using Transfilers

In the "de-luxe" cabinet as illustrated it costs £10.9.6 to build—but what a set! Scan these pages you will find nothing to compare with its specification. It uses transfilers instead of I.F. transformers, has variable feedback as well as all the usual features. A.V.C., Push-pull output, Ferrite Aerial Slow Motion Tuning, etc. etc., and is a very powerful Medium & Long Wave set, conservatively rated at 750 mw. Every component used is by a famous maker, such as American Philco MADT R.F. transistors—Mullard A.F. transistors—Jackson Brother's tuning condensers—Rola-Celestion loudspeaker—Dudlier—R.C.C.—Morganite resistors and controls. Also full after sales service available.

You will definitely be doing the right thing if you buy a Good Companion.



This is a comment which many constructors have voiced and therefore we now offer a De Luxe version of the Pocket Companion. This uses a solid hide case of very pleasant red with gold lettering and our Pocket Companion now has the 15 guinea look.

Yaxley Switches

All new and unused and in first class condition

- 1 pole, 2 way 1/6; 1 pole, 3 way 1/6
- 1 pole, 4 way 1/9; 1 pole, 5 way 2/6
- 1 pole, 7 way 1/3; 1 pole, 9 way 3/4
- 1 pole, 11 way 2/4; 1 pole, 12 way 3/3
- 2 pole, 2 way 2/-; 2 pole, 4 way 2/6
- 2 pole, 5 way 3/6; 2 pole, 6 way 3/6
- 2 pole, 12 way 5/8; 3 pole, 3 way 2/6
- 3 pole, 6 way 3/6; 3 pole, 12 way 8/3
- 4 pole, 2 way 2/-; 4 pole, 3 way 3/4
- 4 pole, 4 way 3/6; 4 pole, 5 way 4/6
- 4 pole, 6 way 5/8; 4 pole, 11 way 10/6
- 4 pole, 12 way 11/6; 5 pole, 3 way 3/6
- 5 pole, 5 way 7/-; 5 pole, 12 way 14/6
- 6 pole, 2 way 2/6; 6 pole, 3 way 3/6
- 6 pole, 6 way 8/6; 6 pole, 11 way 16/6
- 6 pole, 12 way 17/6; 8 pole, 2 way 3/6
- 6 pole, 4 way 4/6; 8 pole, 6 way 11/6
- 8 pole, 12 way 23/6; 12 pole, 2 way 3/6
- 12 pole, 3 way 16/6; 12 way rader 3/6
- 6 pole, 6 way, shorting 3/6

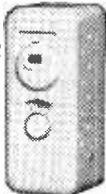
Big stocks of most types
Special prices for quantities.

Philco Record Player Cabinet



Two tone, covered with high grade rexine, fitted with rubber feet. The front is particularly nice being made of tygan with a horizontal gold bar. Size approximately 14in. wide, 8in. deep, 16in. long. Will take BSR or similar record player or tape deck and amplifier. Must have cost at least £3 each, our special snip price 35/- each, carriage and insurance 6/6.

"Coolerstat"



Works in reverse to normal—for switching fans, freezers, air conditioning etc. By famous Fulin Company. One of the best available. For controlling room temperature between 30°-90°F. Switch 15 amps. Regular price over £3, we offer standard model at 22s. 6d, or with Neon on/off indicator at 27s. 6d. Do not miss this unrepeatable bargain.

Power Unit

A useful source of D.C. for experimenting energising instruments, electro plating, reactivating batteries etc. This power unit can be made in a few hours and due to the availability of the rectifier valve at a very low price, we can supply the complete kit of parts with ABC instructions, fits into any box for 9s. 6d, plus 1s. post and insurance.

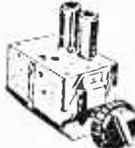
Building A 'Scope ?



3in. oscilloscope tube. American made type No. 3PP7, 6.3 v, 0.8 amp. heater, electrostatic deflection, brand new and guaranteed with circuit diagram of scope, 15/- each, plus 2/6 post and insurance.

Last of these
Brayhead
Turret Tuner

(complete with hand 1 and Band 3 coils. New but removed from unused equipment. Less valves 15/- each or with valves 25/- each. Post 2/6 (Knobs 3/6 extra).



Fishing Rod from Dinghy Mast

Tabular aluminium not separate sections. extends like telescope from 15ins. to 9ft. 6/8 each.

Transfilters

These ceramic devices save alignment problems and improve performance. Use instead of L.F. transformer. Complete with circuit, 8/6 each.

Miniature Microphone

American made. Dynamic type, real bargain at 2/6, plus 6d. postage.



Blueprint Receiver
The International SW2

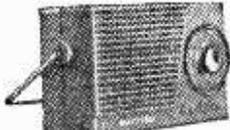
All components to make up this receiver as described in the April issue are available. Price 39/6, plus 2/6 postage and insurance. Note this price does not include cabinet, baking tin or headphone.

A.C./D.C. Multimeter Kit

Ranges: D.C. volts 0-5, 0-50, 0-100, 0-500, 0-1,000 A.C. volts 0-5, 0-50, 0-100, 0-500, 0-1,000 D.C. milliamps 0-5, 0-100, 0-500, Ohms 0-50,000 with internal batteries, 0-500,000 with external batteries Measures A.C./D.C. volts, D.C. current and ohms. All the essential parts including metal case, 2in. moving coil meter, selected resistors, wire for shunts, range selector, switches, calibrated scale and full instructions. Price 24/6, plus 2/6 post and insurance.



Transistor Set Cabinets

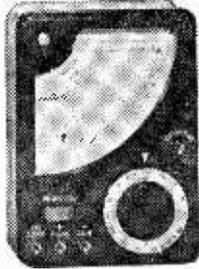


Very modern cream cabinet, size 3 1/4 x 1 1/4 x 1 1/4 in. with chrome handle, tuning knob and scale. Price 7/6, plus 1/6 postage and packing. Special quotations for quantities.

MULTI-METER BARGAINS!

MODEL 200H (illus. on right). 20,000 ohms per volt, 20 ranges comprising A.C. volts, 5 ranges up to 1,000V D.C. volts, 6 ranges up to 2.5KV, C.C. current, 3 ranges up to 26 ohms, resistance, 2 ranges up to 6 meg. capacity 2 ranges up to 0.1, decibels -20 to +22. Scale cornerwise to the equivalent of 4 in. movement is a pocket size instrument measuring 4 1/2 x 3 1/2 x 1 in. Complete with test prods, battery and operating instructions, price £6.19.6, post free.

MODEL EPI0K. Similar in size and appearance to 200H except that this is 10,000 ohms per volt and maximum D.C. volts 1,200 instead of 2.5K, also no capacity range. Price £5.19.6. Post free.

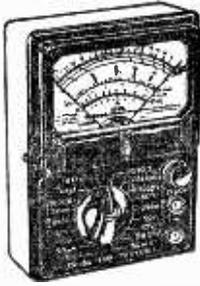


ALL METERS BRAND
NEW AND FULLY
GUARANTEED

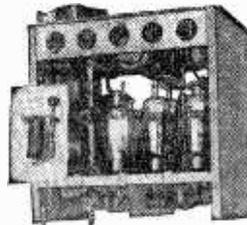
MODEL TP55. (illus. on left). 20,000 ohms per volt, D.C. volts, 5 ranges up to 1,000 A.C. volts, 5 ranges up to 1,000 resistance, 2 ranges up to 10 meg., capacity 2 ranges up to 0.1 decibels -20 to +26. One switch control really beautifully made precision instrument, size only 3 1/2 x 5 1/2 x 1 1/2 in., price only £5.19.6. Post free.

MODEL TP10. Similar in size and appearance to TP55, but sensitivity 2,000 ohms per volt, price £3.19.6. Post free.

MODEL UI. A robust instrument of 1,000 ohms per volt sensitivity. A.C./D.C. volts up to 1,000 D.C. current up to 500, resistance up to 200K, size 5 1/2 x 3 1/2 x 2 1/2 ins. complete with test prods, single switch control, large easily read scale, price only £2.19.6. Post free.



Building An Amplifier?



Here is a buy for you! Modulator Unit Type 20. Contains parts ideal for building a large output amplifier and already set out in metal case. To name a few:- Four high output valves Type KT44. Driver valve Type MH41. Iron cored choke for up to 200 milli-amps. Dozens of wire wound and carbon resistors, paper and mica condensers.

- Terminals and tag panels, etc. etc.
- Three other items of interest to everybody and well worth the price asked for the unit are:-

 1. Transformer Reference 10K/143. This can act as auto transformer to convert 230 to 110 or 230 to 460, and also as a filament transformer 230 to 6.3 or 230 to 12.6 volts.
 2. Miniature Circuit Breaker. For breaking 10 amps A.C. reset by pushing knob.
 3. Steel Case. With heavy gauge chassis, already cut out and fitted valve holders etc.

Price for complete unit is 18s. 6d., carriage 5/-.

Portable Tape Recorder for only

£6.19.6



You'll be really thrilled at its performance. Superior to many selling at £12 to £15. Supplied as sub-assemblies which go together in about an hour. Three transistor amplifier with centre switch-forward-stop-rewind with microphone input record volume control etc. Complete in most modern carrying case in two-tone and with microphone reel of tape and spare reel. Nothing else to buy. Do not miss this bargain! Only 28.19s. 6d., plus Post & Ins. 5/-.

Making An Extension Speaker?



The cabinet illustrated, although intended for T.V. makes ideal extension speaker. Only needs fabric on front. Size 16 x 16 x 14in. deep. Could be cut through middle to make two stereo cabinets. Bargain at only 9/6, plus 4/6 post.

Parcel of Electric Switches and Switch Plugs

All bakelite types, suitable for normal housewiring. Parcel comprises 6 oblong 1 way 5 amp, 4 oblong 2 way 5 amp, two 5 amp 3 pin switch socket. Value easily 25/-, yours for 10/-, plus 2/6 postage etc.

Parcel of Mica Condensers

50 all very useful valves. Total list price over 25 and yours for 5/-, plus 1/6 post.



Lens system for direct TV
Infra-Red Binoculars

See in the dark for night hunting etc. You get 2 complete optical systems (could be used for T.V. camera) and 2 casen cells. Part of the Tabby equipment. Unused, believed in good order, but no guarantee at this silly price of £2.17.6, plus 10/- carriage.

ELECTRONIC PRECISION EQUIPMENT LTD.

post orders are dealt with from Eastbourne, so for prompt attention please post your orders to 66 Grove Road, Eastbourne, marked Department 7. Callers may use any one of the Companies below.

268 London Road, Croydon. Phone: CRO 6558 Half day Wednesday

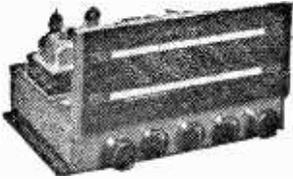
29 Stroud Green Rd., Finsbury Park, N.1. Phone: ARCHWAY 1049 Half day Thursday

520 High Street North Manor Park, E.12. Phone: ILFORD 1011 Half day Thursday

42-46 Windmill Hill, Ruship, Middx. Phone: RUSS 5780 Half day Wednesday

John Bull 248 High Street, Harlesden, N.W.10. Phone: ELGAR 4444 Half day Thursday

ARMSTRONG AF208 AM/FM RADIOGRAM CHASSIS



★ Full VHF Band (87-108 Mc/s) and Medium Band, 187-570M) ★ 7 Valves ★ 5 Watts Output ★ 15db Negative Feedback ★ Separate wide range Bass and Treble Controls ★ 2 Compensated Pick-up Inputs ★ Frequency Response 30-22,000 c.p.s. 4-20 ★ Tape Record and Playback Facilities ★ Continental Reception of Good Programme Value ★ For 3, 7 and 15 ohm speakers. Send S.A.E. for leaflet.

PRICE £22.18.0 Carr. Free

LATEST "EMI" 4 SPEED SINGLE RECORD PLAYER

Acos Hi-Fi Pick-up for L.P. and/or 78, 7, 10 and 12in. records. Silent motor, heavy turntable, auto stop. Complete on Base-plate.

Special offer £6.5.0. post free.

SINGLE-PLAYER BARGAIN

Ready-built, complete with BSR TU9 4-speed gram pick-up unit. Handsome portable case. 3-watt amplifier with 2 valves and speaker. List price £12.12.0 OUR PRICE £8.19.6. Fully guaranteed in manufacturer's sealed cartons.

SUMMER SALE PRICES

New Boxed VALVES 90-day Guarantee

024	5/-	6K7G	5/-	EA8C80	8/-	PCL82	10/-
1R5	6/-	6K8G	5/-	EB91	4/-	PCL84	10/-
1R5	6/-	6L9G	5/-	EB401	8/-	PL1	10/-
1T4	3/-	6X7M	5/-	EB83	8/-	PL3	8/-
2X2	2/-	6A7G	6/-	EP80	9/-	PY80	7/-
3S1	7/-	68N7	5/-	ECH42	9/-	PY81	8/-
3V4	7/-	6V6G	5/-	EU81	9/-	PY82	7/-
3Q5	7/-	6X4	5/-	EP85	6/-	PY83	8/-
5U4	6/-	6X5	6/-	EP89	8/-	QP25	7/-
5Y3	6/-	12A17	6/-	EL52	5/-	SP41	3/-
5Z4	6/-	12A17	6/-	EL84	7/-	SP61	3/-
6AC7	4/-	12AX7	7/-	EY81	9/-	12Z	7/-
6AM6	4/-	12BH7	7/-	EY86	9/-	12BC41	8/-
6AT6	6/-	12K7	5/-	EZ40	7/-	12BC81	9/-
6BA8	7/-	12K8	14/-	EZ60	7/-	12BP89	9/-
6BE5	5/-	12Q7	5/-	EZ81	7/-	12CH81	9/-
6BW6	7/-	25Y3G	9/-	EU148	1/-	12CL82	10/-
6C4	5/-	35L5	9/-	HAB8010	9/-	12CL83	12/-
6D6	5/-	35Z4	5/-	HVC12A	5/-	12FR9	9/-
6E8	4/-	807	5/-	KT33C	8/-	12L41	9/-
6H6	3/-	954	4/-	KTY	6/-	12Y41	7/-
6J5	5/-	DAF96	8/-	MU14	7/-	12Y85	7/-
6J6	5/-	DF96	8/-	PCC84	8/-	12YU9	7/-
6J7G	6/-	DK96	8/-	PCF80	8/-	12YR150	7/-
6K6	5/-	DL96	8/-	PCF82	8/-	12Y81	6/-

SETS OF VALVES

DK96, DF96, DAF96, DL96, 8/- each or 29/6 set. 1R5, 1T4, 1R5, 3S4 or 3V4 19/6

NEV ELECTROLYTICS TUBULAR

1/350V	2/-	50/350V
2/350V	2/3	100/25V
4/450V	2/3	250/25V
8/450V	2/3	500/12V
16/450V	3/-	500/12V
32/450V	3/9	8+8/450V
25/25V	1/8	8+16/450V
50/25V	2/-	16+16/450V
80/50V	2/-	32+32/350V

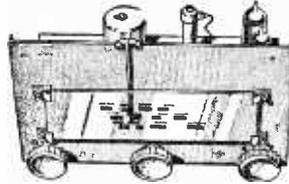
FAMOUS MAKES CAN TYPES

5/8	16/450V	5/-
3/4	32/350V	5/-
3/4	100/270V	5/6
3/4	2,000/5V	5/6
3/4	5,000/5V	5/6
3/4	32+32/350V	5/6
3/8	32+32/450V	6/-
3/8	32+32+32/350V	7/-
3/8	50+50/350V	7/-
4/8	64+120/350V	11/6
4/8	100+200/275V	12/6

COMPLETE RADIO £4.19.6 post free



4 Mullard valves, 5in. speaker, frame aerial, 4 pre-set stations, 1 long, 3 med. wave, superhet circuit. BRAND NEW. Size 9 x 6 x 5 1/2 in. high. Tested by us ready for use. 200/250 v. A.C.-D.C. Mains.



DE LUXE MODEL as above but with illuminated dial. Fully tunable over Medium and Long Wave. 5 inch speaker. Bargain £5.19.6, post free. Tested by us before despatch.

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 a. Rectifier 6.3 v. 1 a. 5 v. 2 a. or 4 v. 2 a. 22/8, ditto, 350.0-350 ..	29/6
MINIATURE 200 v. 30 mA, 6.3 v. 1 a. ..	15/8
MIDGET, 220 v. 45 mA, 6.3 v. 2 a. ..	17/8
SMALL, 220.0-220, 50 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 1/2 amp. ..	7/6
Ditto, tapped sec. 2, 4, 6.3 v., 1 1/2 amp. ..	8/6
Ditto, sec. 6.3 v., 3 amp. ..	10/6
GENERAL PURPOSE LOW VOLTAGE, 2 amp. 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 24, 30 v. ..	22/6
AUTO TRANSFORMERS, 150 v. ..	22/8
0.120, 200, 230, 250 v., 500 w. ..	32/8
MULLARD "510" Mains transformer ..	80/6

O.P. TRANSFORMERS. Heavy Duty 50 mA. 4/6. Multiratio, push-pull 7/6. Ditto, 10 w., 15/8. Miniature, 384m etc., 5/8. L.F. CHOKES 15/10H, 60/65 mA, 5/-; 10 H. 85 mA, 10/8; 10 H., 150 mA, 14/6

TELEVISION REPLACEMENT Line Output Transformers from 45/- each, New Stock

and other timebase components. Most makes available. S.A.E. with all enquiries.

FULL WAVE BRIDGE SELENIUM RECTIFIER: 2.5 or 12 v. 1 1/2 amp., 8/9; 2 a., 11/6; 4 a., 17/6. 2 a., 12 v. 1 1/2 amp., 11/6. Tapped input 200/250 v. for charging at 2, 6 or 12 v., 1 1/2 amp., 15/8. 2 amps., 17/8; 4 amps., 22/8. Circuit included.

4 AMP CAR BATTERY CHARGER with amp meter Leads, Fuse, etc., for 6 v. or 12 v., 69/9

BOOKS list S.A.E.

- 40 Circuits for Germanium Diodes 3/-
- "W.W." Radio Valve Data, 6/6
- High Fidelity Speaker Enclosure, 5/-
- Valve and TV Tube Equivalents, 9/6
- TV Fault Finding, 5/-
- Quality Amplifiers, 4/6
- Radio Valve Guide. Books 1, 2, 3 or 4, 5/- each.
- Transistor Superhet Receivers, 7/6
- Practical Radio Inside Out, 3/6
- Master Colour Code Chart, 1/6
- Transistor Controlled Models, 7/6.

C.R.T. BOOSTER TRANSFORMERS

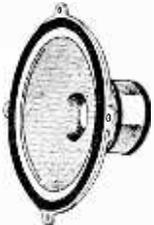
For Cathode Ray Tubes having heater cathode short circuit and for C.R. Tubes with falling emission. Full instructions supplied. Type A. Optional 25% and 50% Boost. 2V or 4V or 6.3V or 10.8V or 13.3V. Mains input. 10/6.

- LOUDSPEAKER P.M. 3 OHM. 2 1/2, 3, 4in., 19/6.
- 5in. Rola, 17/6; 8in. Plessey, 19/6; 7in. x 4in. Rola, 18/6; 6in. Rola, 18/6; 10 x 6in. 27/6; 10in. Rola/30/-; 4in. Tweeter, 25/-; 12in. R.A. 30/-; 13 1/2 in., Double Cone E.M.I. 45/-.
- STENTORIAN HP1012, 10in. 3 to 15 ohms, 10 w., 85/-

BAKER SELHURST LOUDSPEAKERS

Details S.A.E.

- 12in. Baker 15w. Stalwart 3 or 15 ohms, 45-13,000 c.p.s. 90/-
- 12in. Baker Stalwart, Foam Suspension, 15 ohms, 40-13,500 c.p.s. 26
- 12in. stereo, Foam Suspension, 12w., 35-16,000 c.p.s. 26.17.6
- 12in. Baker Ultra Twelve, 20 c.p.s. to 25 kc/s, £17.10
- 15in. Auditorium, 35 w., Base, 20 c.p.s. to 12 kc/s, £18



TWIN GANG TUNING CONDENSERS. 365 pF miniature lin. x 1 1/2 in., 10 v., 500pF Standard with trimmers, 9/-; midget, 7/6; with trimmers, 9/6. SMALL 3 gang 500 pF, 17/- SINGLE 25 pF, 50 pF, 75 pF, 100 pF, 160 pF, 5/6. Solid dielectric 100, 300, 500 pF, 3/6.

CONDENSERS. New stock. 0.001 mfd. 7 kv; T.U.C.S. 5/8; 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, 0.5/500 v., 1/9, 0.1/350 v., 9d. 0.1/2,000 v. 0.1/1,000 v., 1/9; 0.1 mfd., 2,000 volts, 3/6.

CERAMIC CONDS. 500 v. 0.3 pF to 0.01 mfd., 9d SILVER MICA CONDENSERS. 10% 5 pF to 300 pF, 1/-; 600 pF to 3,000 pF, 1/3. Close tolerance. (+ 1 pF) 1.5 pF to 47 pF, 1/8. Ditto 1% 50 pF to 815 pF, 1/9; 1,000 pF to 5,000 pF, 2/-.

465 kc/s SIGNAL GENERATOR

Total cost 15/-. Uses B.F.O. Unit, ZA 3039 ready made. "POCKET SIZE" 2 1/2 x 4 1/2 in. Slight modifications required, full instructions supplied. Battery 8/6 extra 69V 14V. Details S.A.E.

Wavechance Switches.

- 8 p. 4-way 2 water long spindle .. 6/6
- 2 p. 2-way, or 2 p. 6-way long spindle or 4 p. 5-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 wafer, 2 p. 6 wafer, 3 p. 4 wafer, 4 p. 3 wafer, 5 p. 2 wafer, 1 wafer, 8/6; 2 wafer, 12/6; 3 wafer, 16/-; additional wafers up to 14, 3/6 each extra.

Toggle Switches, s.p., 2/-; d.p., 3/6; d.p.t.c., 4/-; Ex. Govt. S.p.d.t., 1/-.

CRYSTAL MIKE INSERT

6/6 Precision engineered. Size only 1 1/2 in. dia. x 1 in.

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

Valveholders. Pax. int. oct., 4d. EA50 6d. B12A, CRT, 1/8. Enrl. and Amer. 4, 5, 6 and 7 pin, 1/-, MOULDED Mazda and Int. oct., 6d.; BTG, B8A, B8G, B9A, 9d. BTG with can, 1/6. B9A with can, 1/8. Ceramic EF50, BTG, B8A, int. oct., 1/-; BTG, B9A cans, 1/- each.

THE ORIGINAL RADIO COMPONENT

Our written guarantee with every purchase.

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

August, 1962

Volume Controls 80 ohm COAX
 Cable
 Semi-air spaced 1in.
 Stranded core 6d.yd.
 5 K ohms to 2 Meg. 40 yds. 17/6
 No. sw. D.P. sw. 60 yds. 25/-
 3/- Fringe Quality 1/- yd.
 Linear or Log Tracks Air spaced.

TELESCOPIC CHROME AERIALS, 13in. extending to 43in., 8/6 ea. Coax Adaptor Plug, 1/6 ea.
TRIPLE XERS Bands I, II, III ... 12/6
COAX PLUG 1/- LEAD SOCKET, 2/-
PANEL SOCKETS 4/6 **OUTLET BOXES** 4/6
BALANCED TWIN FEEDER yd. 6d. 80 or 300 ohms.
DITTO SCREENED per yd. 1/6. 80 ohms only.
WIRE-WOUND POTS, 3 WATT. Pre-set Min. TV Types. All values 10 ohms to 25 K, 3/- ea.
 30 K, 50 K, 4/- (Carbon 30 K, to 2 meg., 2/-).
WIRE-WOUND 4 WATT Pots. Long spindle. Values, 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.
TRIMMER, 1000 pF, with knob, 2/-.
RESISTORS, Preferred values, 10 ohms to 10 meg., 1 w., 4d.; 1/4 w., 1 w., 6d.; 1 1/2 w., 8d.; 2 w., 1/-.
HIGH STABILITY, 1/2 w., 1/-, Preferred values, 10 ohms to 10 meg., 5% to 10% to 10 meg. Ditto 5%, 100 Ω to 5 meg., 8d.
 5 watt 1/2
 10 watt 1/2
 15 watt 1/2
WIRE-WOUND RESISTORS 1/2
 25 ohms-10,000 ohms 1/2
 12.5K to 50K 10 w ... 3/-

AMERICAN "BRAND FIVE" PLASTIC RECORDING TAPE
 Double Play 7in. reel, 2,400ft. 80/- Spare
 5in. reel, 2,000ft. 37/6 Plastic
 Long Play 7in. reel, 1,800ft. 35/- Reels
 5in. reel, 1,200ft. 23/6 3in. 1/6
 5in. reel, 900ft. 18/6 4in. 2/-
 Standard 7in. reel, 1,200ft. 35/- 4in. 2/-
 5in. reel, 900ft. 18/- 7in. 2/6
 "Instant" Bulk Tape Eraser and Head Defluxer, 200/250 v. A.C., 27/6.

CRYSTAL SET BOOKLET, 1/-
CRYSTAL DIODE G. A. 2, GEX34, 4/-, OA81, 3/-
HIGH RESISTANCE PHONES, 4,000 ohms, 15/- pair.
SWITCH LEANER. Fluid squirt about, 4/6 tin.

HIGH GAIN TV PRE-AMPLIFIERS BAND 1 I.B.C.
 Tunable channels 1 to 5. Gain 18db. ECC84 valve. Kit price 28/6 or 49/6 with power pack. Details 6/- (PCC84 valves if preferred).
BAND III I.T.A.—Same prices.
 Tunable channels 8 to 13. Gain 17 dB.

Paxolin Panels, 10 x 8in., 2/-
Miniature Contact Cooled Rectifiers, 250V 50mA 7/6; 250V 30mA, 8/6; 250V 85mA, 9/6; 200mA, 21/-; 300mA, 27/6.
TV etc., Silicon Sub-Min. Rectifier, 125V, 300mA, 6/6; 250V, 300mA, 14/6.
Selenium Rect., 300V 85mA, 5/-
Coils Wairite "P" type, 3/- each.
Osmor Midget "Q" type, adj. dust core, from 4/- each. All ranges.
Teleton D.W.R. L. and Med. T.R.F. with reactions, 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, 8 x 1in., 3/-; 8 x 5/16in., 3/-.
H.F. Chokes, 2/6. **Osmor QCI**, 6/9.
T.R.F. Coils, AHF 7/- pair; HAX, 3/-.
Repanco D.R. 4/-, DRX1, 2/6.
Radio Screwdriver, 5in., 6d.
Neon Mains Tester Screwdriver, 5/-.
Solder Radiograde, 4d. yd., 1lb, 5/-.
Black Craquel Paint. Air drying, 3/- tin.

Aluminium Chassis, 18 s.w.g. Plain undrilled, 4 sides, riveted corners, lattice fixing holes, 2 1/2in. sides, 7 x 4in., 4/8; 9 x 7in., 5/8; 11 x 7in., 6/8; 13 x 9in., 8/6; 14 x 1 1/2in., 10/6; 15 x 1 1/2in., 12/6; 15 x 1 1/2 x 3in., 16/6.
Aluminium Panels, 18 s.w.g., 12 x 12in., 4/6; 14 x 9in., 4/-; 12 x 8in., 3/-; 10 x 7in., 2/3; 8 x 6in., 2/-.

6 TRANSISTOR RADIO MED. & LONG WAVE KIT
 First class components to make a 6 transistor 2 wave band superhet chassis. Ideal for portable or table radio. All parts including BVA transistors ferrite aerial, printed circuit, 8 1/2in. x 2 1/2in., but EXCLUDING speaker and cabinet. Simple instructions 1/6 (Free with kit).
 Speakers, 35 ohm, 7 x 4in. 25/- extra or 3 1/2in. round 19/6 extra. **£4.50**

TV Plug-in "V" Aerial 16/6
JACKS. English open circuit, 2/6. Closed circuit, 4/3. Grundig type, 3 pin, 1/8.
JACK PLUGS. English, 3/-; Screened, 4/-; Grundig, 3 pin, 3/6.
Wirewound Ext Speaker Control, 10 Ω 8/-.
ALADDIN FORMERS and cores, 4in., 8d.; 4 1/2in., 10d., 0.3in. FORMERS 5937 or 8 and cans TV1 or 2, 2 1/2in. sq. x 2 1/2in. x 1 1/2in., 2/- with core.
LOW MOTION DRIVERS 61, 2/3.
SOLOID IRON, 25W, 200V or 230V, 24/-.

JASON FM TUNER COIL SET, 29/-
 H.F. coil, aerial coil, oscillator coil, two i.f. transformers 10.7 Mc/s, detector transformer and heater choke. Circuit and component book using four 6AM6, 2/6. Complete Jason FMT.1 Kit. Jason chassis with calibrated dial, components and 4 valves, £8.5.0.

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

LINE CORD, 0.3A 60 ohms per foot, 0.2A 100 ohms per foot, 2-way, 1/- per foot; 3-way 1/- per foot.

MIKE TRANS. 50-1, 3/8; 60-1, potted, 10/6.
 P.V.G. Conn. Wire, 3 colours, single or stranded, 2d. yd. sleeving, 1.2mm, 2d.; 4mm, 3d.; 6mm, 5d. yd.
SPEAKER FRET, Cloth cloth, 17 x 25in., 5/-; 25 x 35in., 10/-. Teflon, various colours, 12in. wide, from 10/- ft.; 26in. wide, from 5/- ft. Samples, 8.A.E. Expanded Metal, Gold, 12 x 12in., 6/-.

I.F. TRANSFORMERS 7/8 pair
 465 kc/s slug tuning miniature can 1 1/2 x 1 1/2 in. High Q and good band width. Data sheet supplied.

"REGENT" 4 VALVE "96" RANGE VALVES KIT PRICE £6. 6. 0. carr. 4/-



PRINTED CIRCUIT BATTERY PORTABLE KIT
 Medium and long wave. Powerful 7 x 4in. High Flux Speaker. T.C.C. Printed Circuit and condensers. Components of finest quality clearly identified with assembly instructions. Osmor Ferrite Aerial Coils. Resine covered attache case cabinet. Size 12in. x 8in. x 4in. Batteries used B126 (L5512) and AD35 (L5040), 10/9 extra. Instructions 9d. (free with kit), 2/-.

MONARCH RECORD PLAYER



Build It Yourself using 4-SPEED BSR MONARCH AUTOCHANGER
READY BUILT 3W. AMPLIFIER HANDSOME PORTABLE CASE. HIGH FLUX LOUD-SPEAKER, FULL INSTRUCTIONS SUPPLIED.
 Total Price **£12.10.0**
 Carr. and Ins. 5/-.

RECORD PLAYER BARGAINS
 Post 2/- each
 4 Speed Autochangers:
 Collaro C60 £7.18.6
 BSR, U.A.14 £7.10.0
 BSR, U.A.12 Stereo/Mono £8.5.0
 Garrard "Autoslim" £7.19.6
 4 Speed Single Players:
 Garrard Mk. II £8.0.0
 Model 45P £6.17.6
 Garrard 4 HF transcription, £17.19.6
 All Sapphire Stylus available from 6/-.

ARDENTE TRANSISTOR CONTROLS
 Type D3035, 7.3 CT; Push Pull to 3 ohms for OC72, etc., 1 x 1 x 1in., 9/6.
 Type D3034, 1.75 CT; Push Pull Driver for OC72, etc., 1 x 1 x 1in., 9/6.
 Type D3038, 11.5 : 1 Output to 3 ohms for OC72, etc., 1 x 1 x 1in., 9/6.
 Type D167, 18.2 : 1 Output to 3 ohms for OC72, etc., 1 x 1 x 1in., 12/-.
 1 x 1 x 1in., 10/-
 Type D230, 4.5 : 1 Driver Transformer, 1 x 1 x 1in., 8.5 : 1 Driver Transformer, 1 x 1 x 1in., 10/-.

ARDENTE TRANSISTOR VOLUME CONTROLS
 Type VCI545, 5K with switch, dia. 0.7in., 8/6.
 Type VCI760, 5K with switch, dia. 0.7in., 10/6
 Dead air ear piece xtal or magnetic, 7/6.

WEYRAD
COILS AND TRANSFORMERS FOR A 2-WAVE TRANSISTOR SUPERHET WITH PRINTED CIRCUIT AND FERRITE ROD AERIAL
 Long and Medium Wave Aerial—RA2W. On 8in. rod, 7/18in. diameter, 208pF tuning, 1/2H. Car Aerial Coil, 1/-.
 Oscillator Coil P50/1AC. Medium wave. For 176pF tuning, 5/4.
 1st and 2nd I.F. Transformers—P50/2CC, 170 kc/s, 1/18in. dia. by 1in. high, 5/7.
 3rd I.F. Transformers—P50/3CC, to feed diode detector, 6/-, Spare Cores, 6d. each.
 Driver Transformer—LFD12, 1.5/8 in. x 1 x 1in., 9/6. Wavechange Switch 3/6.
 Printed Circuit—PCA. Size 2 1/2 x 8 1/2in. Ready drilled and printed with component positions, 9/6. Volume Control 4/6.
 7 x 4in., 35 ohm Speaker, 25/-.
 3 1/2in. round 35 ohm Speaker, 19/6.
 24 Fixed Resistors, 10/6.
 16 Fixed Condensers, 21/-.
 Tuning Gang with trimmers, 12/6.
 Constructor's Booklet 2/-.

NEW MULLARD TRANSISTORS
 Audio OC71 8/- R.F. OC48 3/6
 OC72 7/6 OC45 3/6
Sub-miniature Electrolytics (15V)
 100F, 2 1/2 x 4 1/2, 5uF, 8uF, 16mf, 25uF, 50uF, 100uF, 2/6. Diodes OA70, OA81, 3/- GEC34, 4/-.

B.B.C. Pocket 2 Transistor, M.W. and L.W. Radio Kit, 22/6.
 Miniature earpiece, 7/6. Batt. 2/3.

"P.W." POCKET 6 TRANSISTOR KIT MK.II WITH LATEST OSMOR MODIFICATIONS. ALL PARTS, PRINTED CIRCUIT AND NEW CABINET, OSMOR DESIGNED KIT, £8.15.0.

COMPONENT SHOP SPECIALISTS

337 WHITEHORSE ROAD WEST CROYDON

Telephone: THO 1665
 (Export welcome. Send remittance and extra postage).

P. and P. charge 1/-, over £3 post free.

C.O.D. 2/-.

FREE THIS BOOK WILL INTEREST YOU!

LEARNING the PRACTICAL WAY

Radiostructor
EQUIPMENT-COURSES

A NEW-PRACTICAL WAY of UNDERSTANDING

Radio • Television • Electronics

Including: Transistors; VHF/FM; Hi-Fi equipment; Computers; Servo-mechs; Test Instruments; Photo-electrics; Nucleonics, etc.

FOR ... Your Career ... Your Own Business ... An Absorbing Hobby

Radiostructor—an organisation specialising in electronic training systems offers a new self-instructional method using specially designed equipment on a "do-it-yourself" basis.

You learn by building actual equipment with the big kits of components which we send you. You advance by simple steps, performing a whole series of interesting and instructive experiments—with no complicated mathematics! Instructional manuals employ the latest techniques for showing the full story of electronics in a practical and interesting way—in fact—you really have fun whilst learning! Post the coupon below, now, for full details.—

RADIOSTRUCTOR
LEADS THE WORLD
IN ELECTRONICS TRAINING

POST NOW

To RADIOSTRUCTOR (Dept. G82)
READING, BERKS.

Please send brochure, without obligation, to

★ Name _____

Address _____

62

★ BLOCK CAPITALS PLEASE
(We do not employ representatives)

Practical Wireless

Vol. XXXVIII No. 666 AUGUST, 1962

Editorial and Advertisement
Offices:

PRACTICAL WIRELESS

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

© George Newnes Ltd., 1962

Phone: Temple Bar 4363

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

SUBSCRIPTION RATES

including postage for one year

Inland - - - -	£1.9.0 per annum
Abroad - - - -	£1.7.6 per annum
Canada - - - -	£1.5.0 per annum

Contents

	Page
Editorial	289
Round the World of Wireless	290
The Consort TRF Receiver ...	292
A Phase Shift Oscillator ...	295
An Audio Distribution System	297
A Compact Converter... ..	303
Power Rectifier Circuits ...	306
On Your Wavelength	311
Books Reviewed... ..	312
Servicing Tape Recorders ...	313
The Atlantic S.W. Two	316
Faults in Transistor Output Stages	320
Electronic Process Timer ...	325
The Alpha Three	329
Short Wave Listeners' Log ...	333
Letters to the Editor	334
Trade News	337
Noisy Volume Controls	341
Club News	346

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."

THE RADIO SHOW

THE Radio Show this year will be held at Earls Court, London, as in previous years. The dates of the show are 22nd August to 1st September and, at the time of writing, it seems that this year's show will be one of the best yet, at least so far as attendances are concerned. However, we are of the opinion that the Radio Show could be made to have much more appeal for the amateur radio constructor, even if such enthusiasts form a minority of the visitors to Earls Court. The home constructor market is usually very poorly represented, and there seems no reason to suppose that the situation will be any different this year. As most exhibitors know, the majority of visitors to the Radio Show are mainly interested in the possibility of seeing various celebrities at the stands of the BBC and ITV companies rather than in viewing the new models in radio and TV sets brought out by manufacturers. It seems to us that there is scope for the inclusion of a small section in the Radio Show for the amateur radio enthusiast since there are many firms which cater particularly for this market.

As usual, there will be a PRACTICAL WIRELESS stand at the Radio Show and the number of this stand will be announced later. We shall be pleased to welcome readers and discuss their problems.

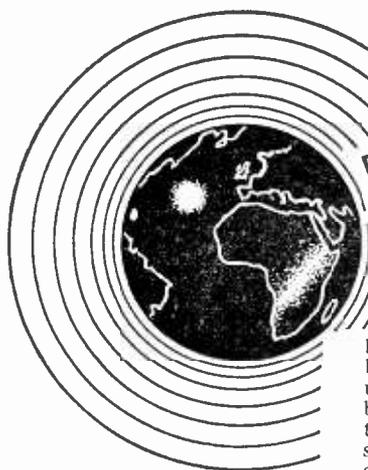
PRE-RECORDED TAPES

The advantages of tape recording are well known to most readers and include long life with little change in the characteristics of the recording during its life, compared with disc records which, even with the most expensive equipment on the general market, wear noticeably with each playing. From the moment when tape recorders first made their appearance, record manufacturers have been interested in the possibilities of selling tape records in the same way as disc records are sold. Naturally, this was not possible at first for several reasons; one was the small number of tape recorders in use outside laboratories and studios and similar establishments. However, the tape recorder is rapidly gaining in popularity, mainly because of the ease with which recordings may be made in the home.

Another reason for the lack of tape records or pre-recorded tapes in the early days of the domestic tape recorder was the public's unfamiliarity with the machines, which it must be admitted were expensive and needed regular professional servicing to maintain their high performance—both disadvantages in the mind of the public.

There are now over one million tape recorders in this country ranging from miniature types for outdoor work to those of professional quality. The market for tape records is thus rapidly expanding and a leading manufacturer of disc records has recently announced a new range of pre-recorded tapes in addition to its present range. No doubt other concerns will follow suit and increase the number of recordings available so that it becomes worthwhile to build up a tape library. We think that in the very near future, pre-recorded tapes will achieve a much greater popularity than they have so far attained.

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



ROUND THE WORLD
of

WIRELESS

NEWS AT HOME AND ABROAD

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of April, 1962, in respect of wireless receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland. The numbers include Licences issued to blind persons without payment.

Region	Total
London	647,503
Home Counties	595,804
Midland	429,979
North Eastern	461,056
North Western	397,425
South Western	351,951
Wales and Border Counties	203,274
Total England and Wales	3,085,994
Scotland	330,698
Northern Ireland	107,118
Grand Total	3,524,810

New Development for Hospital Radio

THE cost of hospital ward radio installations may well be cut substantially as a result of successful experimental work carried out for Dereham Hospital, Norfolk, by Hadley Telephone & Sound Systems Ltd., of Smethwick, Staffs.

In this hospital the development of new techniques has led to the doubling of patients' listening facilities without any increase in the number of bed-head units.

A method of operating two of the stethoscope-type headsets from each-bedhead point has

been devised. This has been done by employing a single driver unit, mounted in and protected by the control unit, and splitting the acoustic outlet by means of a special bifurcator so that two—or even more—patients' headsets may be served by the same driver unit.

More CENTO aid for Pakistan

PAKISTAN is to have further considerable installations of Marconi high-frequency radio communications equipment as CENTO aid.

At Pipri, outside Karachi, a 30kW ISB transmitter type HS51 and its associated drives (type HD20 and HD51) are to be supplied.

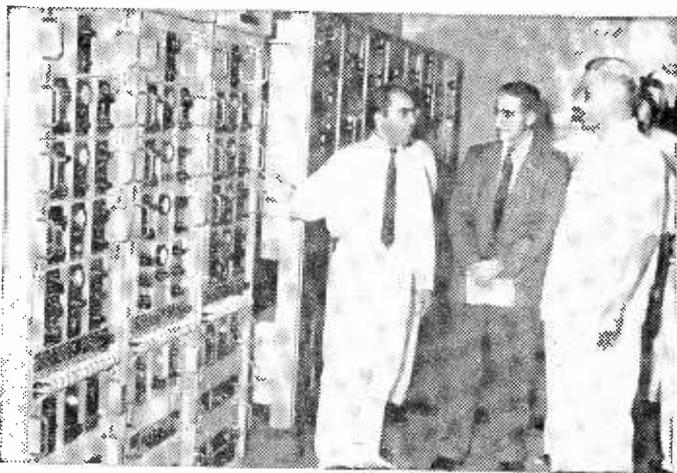
Ghaggar, the Pakistan Posts and Telegraphs Departments receiving station five miles from

Pipri, at which three Marconi dual diversity H.F. receivers have been installed, is to have a two-channel single-path ISB receiver type HR21.

In Karachi, at the overseas radio trunk exchange two 2-channel transistorised radio telephone terminals with 5-band split-privacy facilities, will be added to the present complement of terminals.

Rawalpindi transmitting station, where a 10kW ISB transmitter is already installed, will have a 3½kW ISB transmitter together with an amplifier to raise the output to 30kW; associated drive assemblies and a coaxial feeder switching unit are also included in the order.

Dacca, in East Pakistan, is also to have two 2-channel radio telephone terminals with 5-band split-privacy facilities.



The illustration shows three Marconi HD 51 drive units, part of a previous large CENTO order for Pakistan, being inspected in July 1960 by (right) Mr. F. M. Khan, the present Pakistan Minister of Railways and Communications, (centre) Mr. M. M. Husain, Chief Engineer, Pakistan P. and T. Department, and (left) Mr. M. W. Rizvi, Deputy Chief Engineer (Construction) of the Pakistan P. and T.

VHF R/T System for Sunderland Harbour

EXISTING port services available to shipping using Sunderland Harbour are to be supplemented by a two-channel VHF radio-telephone system which will be supplied and installed by Associated Electrical Industries Ltd. The new equipment will be installed at the Pilot House and will enable ships to obtain pilotage and port information directly. The order has been placed by the River Wear Commissioners with Marine Department of AEI Telecommunications Division, Woolwich, S.E. London.

Orion Computer

THE Swedish telecommunications group, Telefon AB L. M. Ericsson, of Stockholm, have placed an order, valued at about £400,000, with Ferranti Ltd. for an Orion data processing system. It is the third Orion to be ordered by a Swedish company and the sixth Ferranti computer sold in the Swedish market.

The equipment specified makes the Ericsson system the biggest of 15 Orion orders so far announced by Ferranti.

The work to be undertaken by Orion is, among other things, to integrate a production and stock control system. Ericsson's are one of the large companies within the telecommunication field. The highly technical nature of its activities and the physical size of the organisation—it employs more than 16,000 people at its 23 Swedish factories alone and more than 20,000 more in its foreign subsidiaries and associated companies—make the project very complex. To determine a general plan for the integration of the main routines several years' work is required.

Batteries

ARRANGEMENTS have been made by the Ever Ready Co. (G.B.) Ltd. to market the full range of Mallory batteries and cells. Stocks of all types have been delivered to Ever Ready sales areas throughout the U.K.

Mallory batteries now handled by Ever Ready will cover the hearing aid, commercial and industrial fields.

New BBC Beckley Station

THE VHF sound transmitters at the BBC's new transmitting station at Beckley, near Oxford, were brought into service on Monday, 28th May. This station is one of several combined television and VHF sound broadcasting stations which are being built to extend and improve the coverage of the BBC's services. The television transmitter is already in operation.

As the service area of the VHF sound transmitters includes parts of the BBC's Midland and West Regions the Beckley station transmits both the Midland and West of England Home Services in addition to the Light Programme. the Third

sound service to a quarter of a million people and provide improved reception for a further quarter of a million people in an area which includes Oxford, Bicester, Witney, Swindon, Wantage and Aylesbury.

Microwave Radio Links for Norway

A SUBSTANTIAL contract has been awarded to Marconi's by the Royal Norwegian Air Force for the supply and installation of two microwave radar links for incorporation into Norway's defence system as part of the N.A.T.O. Infrastructure programme.

The contract, which is to the approximate value of £500,000, was obtained in the face of



G8KU is seen here operating one of the stations of the Scarborough Amateur Radio Society during National Field Day, June 2nd/3rd.

Programme and Network Three on the following frequencies:

Midland Home Service, 93.9Mc/s.

West of England Home Service, 95.85Mc/s.

Light Programme, 89.5Mc/s.

Third Programme and Network Three, 91.7Mc/s.

Horizontal polarisation is used, which means that receiving aerials should be mounted horizontally.

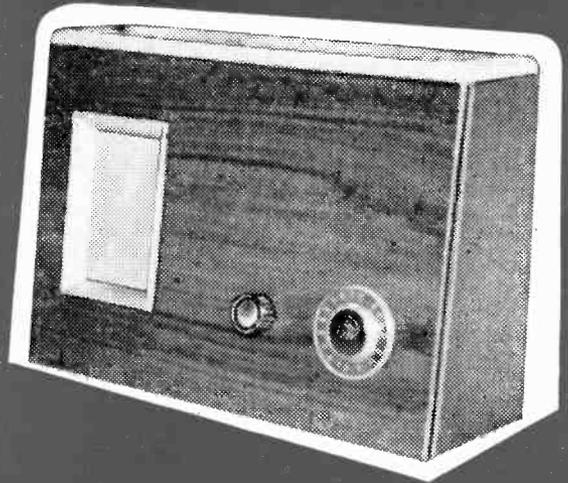
The Beckley station, which is designed to work unattended, receives its sound programmes by radio, the West of England Home Service from Wenvoe or Rowridge and the other three services from Sutton Coldfield. It will extend the BBC's VHF

intense competition. No details of the equipments or their intended locations can be given on security grounds but it can be said that they are intended to carry complex search and height-finding radar signals from the radar heads for display and processing at control centres. The radar stations themselves will be operated by remote control over the links.

This follows on the completion of previous important contracts from the Norwegian Ministry of Defence which include a £1,000,000 order in the autumn of 1958 for two high-power, long-range radar control and reporting stations and supplementary equipment.

THE CONSORT

TRF RECEIVER



By B. Lewisham

IN this TRF receiver, a regenerative circuit is used to increase sensitivity and sharpen tuning so that the detector valve can be brought to its most sensitive operating point (the edge of oscillation) if required.

Considerable thought has been given to beginners' requirements and they will find this set an easy and inexpensive way of tackling mains equipment—perhaps for the first time. Chassis work has been kept small deliberately and a "baffle-mounting" plan adopted partly to simplify construction and partly to obtain the desired slimmess.

Valves

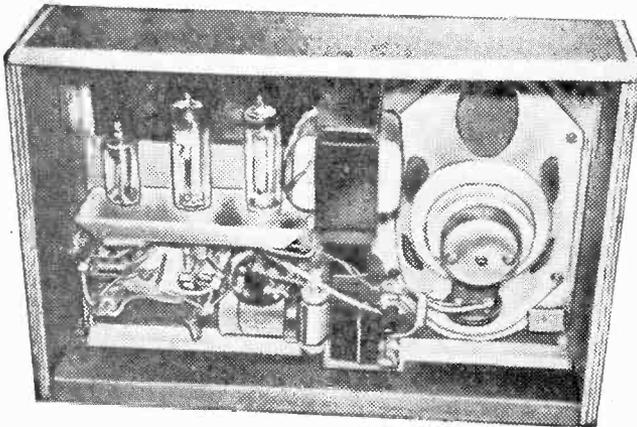
The valves used are: ECF80 (triode-pentode), EL84 (output valve), EZ80 (valve rectifier). Shock hazards are removed by fitting a mains isolating

transformer and thus no danger to life results from handling metal parts when the receiver is switched on. Complete safety is also provided when the set is switched off due to the use of a double-pole mains switch that breaks both mains connections.

The Circuit

Referring to Fig. 1, it will be seen that a simple grid leak detector is used, signals being conveyed to L1 via TC1 and selected as required by VC1.

Provision for tuning over the medium waveband only is given in the original but other ranges can be covered by fitting extra coils and a miniature rotary wave-change switch. The extra circuitry required for incorporating a long waveband range, for example, is given in Fig. 2. Space can be obtained by repositioning, or fitting a miniature type of output transformer, etc.



Detection

The cathode and grid of V1A perform the demodulating process, R1 acting as the diode load—the two electrodes perform effectively as a diode valve. The resultant audio signal, together with unfiltered R.F., pass to the anode via the screen and suppressor grids, the latter being connected internally to the cathode of V1A.

The positive potential required for the screen grid is obtained from a potential divider connected across the power supply

A view of the interior of the completed set.

Fig. 2 (right)—A modification to the circuit of Fig. 1 to include long waves.

and reaches the grid via a winding on L1. The R.F. accompanying the audio signal thereby circulates in this winding which if correctly phased can cause positive feedback and oscillation. By making the screen feed voltage variable, the feedback can be controlled and made to increase sensitivity. Potentiometer VR1 performs this service and allows the detector to be brought to the threshold of oscillation without seriously affecting the setting of VC1.

R.F. also appears at the anode of V1A where it is not wanted, but a filter comprising capacitors C3 and C4 in association with an R.F. choke prevents it from reaching the grid of V1B where only audio signals are required. Omission of this choke would seriously affect operation.

The pentode section of V1 also amplifies the audio signals and thus performs two operations simultaneously. The triode section of V1 operates as a conventional A.F. voltage amplifier before presenting the signals to the output valve, V2.

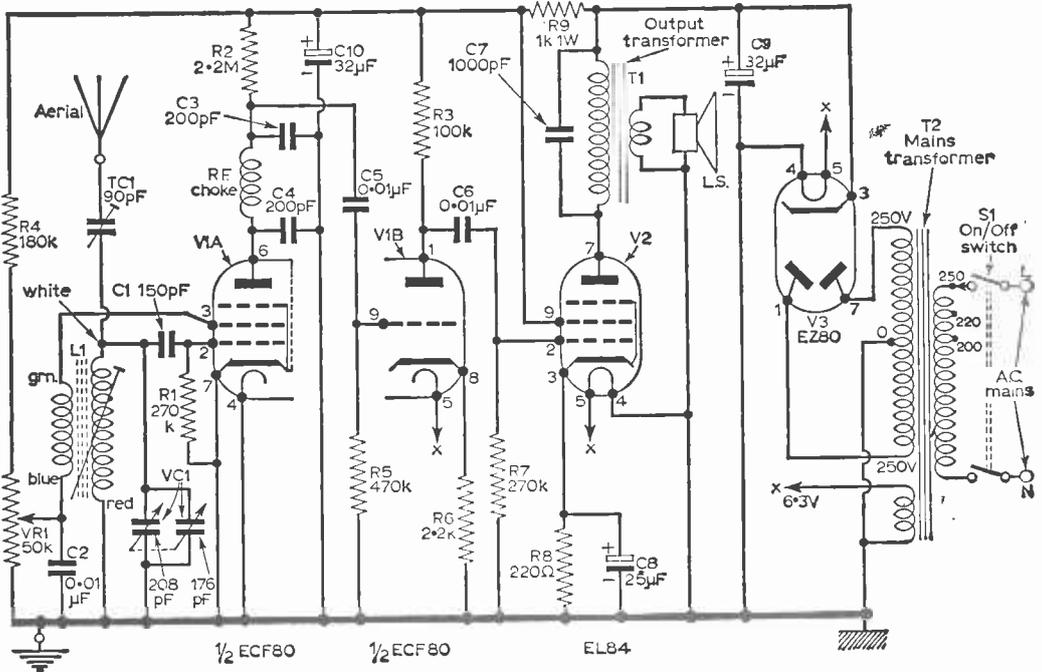
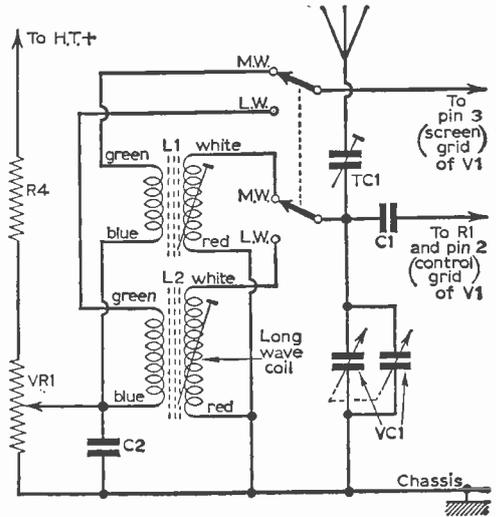


Fig. 1—The circuit.

The anode of V2 is fed with relatively unsmoothed H.T. and permits use of a low wattage resistor for R9. The reservoir capacitor, C9 is large enough (32 μ F) to ensure that hum from the mains is removed. The value of C10 can actually be increased to 50 μ F with the particular type of rectifier valve specified.

The Power Supply

The full-wave rectification adopted is considerably more efficient than the half-wave type usually

fitted to simple receivers. The cost is approximately equal for both types and space differences are negligible. Half-wave rectification is not recommended for use here.

A fuse may be fitted if desired by connecting the secondary centre tap of T2 to chassis via a 0.15A torch bulb instead of direct as shown in the diagram. This will provide safety should a fault such as a heater/cathode short circuit develop in V3 which would cause a heavy flow of destructive current.

Mechanical Details

As may be seen from Fig. 3, the "chassis" consists of a simple rectangle of aluminium (5in. \times 4in.) and this carries the tuning capacitor, the potentiometer VR1, with integral on/off switch, the R.F. choke and the tuning coil together with a narrow aluminium shelf (top surface 5in. \times 2in.) which carries the three valves. This valve shelf is bolted to the rectangle where shown by means of 6B.A. nuts and bolts. The weight is negligible and supporting stays are not required.

The tuning capacitor is air-spaced being a miniature type intended primarily for transistor applications (Jackson "00" type—208pF+176pF). It has lower maximum capacitance values than are usually required for valve receiver tuning circuits. Here, the two sections are connected together (in parallel) to provide sufficient capacitance to cover most of the medium waveband. There is some restriction at the low frequency end of the band but this is not important. A conventional air dielectric single gang capacitor (nominal value 500pF) or even a solid dielectric type could be used instead provided it is not too large physically.

An iron cored type of tuning coil is desirable due to the reduced value of tuning capacitance used. The specified coils are remarkably simple to fit, only a single 6B.A. bolt being required. Also the core extension is brought out on a brass threaded rod which fractures less easily than in the type where the adjusting slot is integral with the core material.

Location of Parts

The miniature mains transformer is mounted directly on to the inside of the front panel as are also the output transformer, reservoir and smoothing capacitors and elliptical loudspeaker. Prior to fixing these items, a sheet of metal foil is glued to the inside of the panel, but if this is omitted care should be taken to ensure that all metal component casings are connected to the chassis.

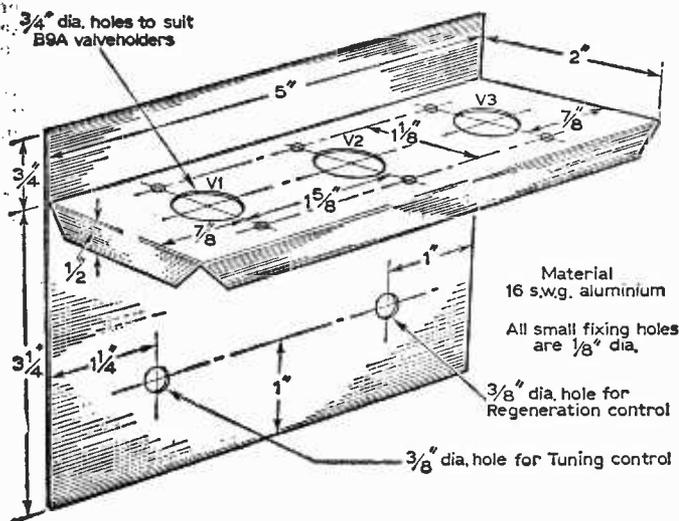


Fig. 3—The main drilling details of the chassis.

COMPONENTS LIST

Resistors (all $\frac{1}{2}W$ except R9 and all 10%):

R1	270k	R6	2.2k
R2	2.2M	R7	270k
R3	100k	R8	220 Ω
R4	180k	R9	1k 1W
R5	470k		

VR1 50k pot., preferably wire-wound, with double-pole mains switch

Capacitors:

C1	150pF mica
C2	0.01 μ F ceramic or paper
C3	200pF ceramic or mica
C4	200pF ceramic or mica
C5	0.01 μ F mica or paper 250V
C6	0.01 μ F mica or paper 250V
C7	1000pF ceramic
C8	25 μ F 25V electrolytic
C9	32 μ F electrolytic 350V
C10	32 μ F electrolytic 350V
VCI	miniature tuning condenser (see text)
TC1	60-100pF trimmer

Tuning Coils:

Weymouth HA3 (see text)

Transformers:

T1	tapped mains primary; secondaries 250V-0-250V 60mA, 6.3V 2A
T2	40:1 ratio for 3 Ω speech coil

Loudspeaker:

7in. \times 4in. elliptical

Valves:

V1 ECF80 V2 EL84 V3 EZ80

Miscellaneous:

R.F. choke (Osrom QCI); aluminium sheet for chassis (5in. \times 4in. and 6in. \times 3in.); three B9A valveholders; two control knobs; loudspeaker fabric; metal foil; plywood, etc.

The locations of the larger components provides balance of weight (the heaviest items are mounted centrally) so that the receiver is made stable. The balance will be lost if the loudspeaker and transformers are transposed; longer interconnecting leads will also become necessary.

Use of $\frac{3}{4}$ in. thick plywood permits these components and also the chassis to be screwed to the panel without the front being defaced. If desired, or where space is needed, a 3in. square loudspeaker may be used in place of the elliptical model shown. A volume control can be fitted by replacing R5 by a 500k potentiometer and feeding the triode grid from its slider. In the prototype, VR1 was found to perform this function adequately however.

(To be continued)

A Phase-Shift OSCILLATOR

PURE WAVEFORM AND GOOD FREQUENCY STABILITY

By A. Foord

A SMALL inexpensive audio oscillator is always useful in the home constructor's workshop, whether it is used for experimental work, a Morse practice oscillator, or for modulating an R.F. signal generator. The oscillator to be described has been used at one time or another for all the above applications, and also as a signal source for a resistance/capacity bridge. The oscillator uses a single transistor in a phase-shift network, and gives an excellent sine wave output.

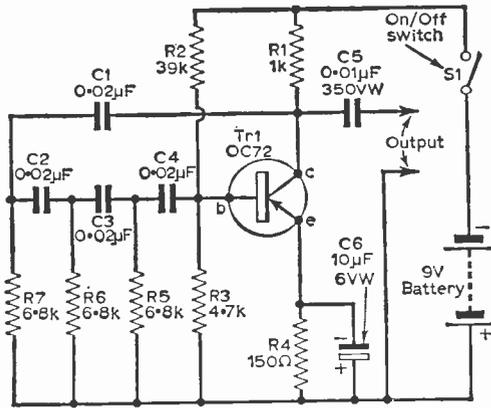


Fig. 1—The phase-shift oscillator circuit.

The Circuit

As can be seen from Fig. 1, a fairly conventional arrangement is used. The collector of Tr1 is coupled into a phase-shift network C1, C2, C3, C4, and their associated resistors. The network feeds back into the transistor base. The circuit will oscillate at a frequency for which the phase-shift network shifts the signal phase by 180°. The values in the phase-shift network were experimentally determined to give a nominal frequency of 1kc/s. The output of the oscillator was taken directly from the collector of the transistor via a capacitor C5. Deriving the output voltage in this manner results in a small change in frequency as the output load resistance is varied. Greater frequency stability could be given by making R1 a potential divider and tapping the output as shown in Fig. 2. This method, although giving greater frequency stability, would give a much

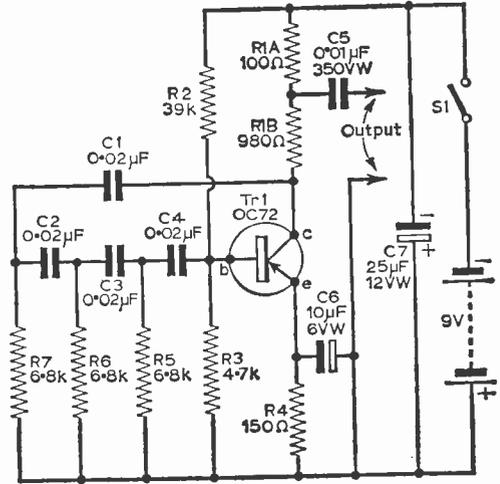


Fig. 2 (above)—A low output circuit with high frequency stability.

reduced output; and it was felt that the high output given by coupling directly to the collector more than outweighs the small loss in frequency stability.

An improvement in long-term stability may also be achieved by connecting a 25µF capacitor between the positive and negative rails, as shown in Fig. 2. This prevents frequency shift due to increasing internal resistance in the battery as it ages. Again, such alterations in frequency are small. Nevertheless, the constructor who requires high frequency stability and only a low output can use Fig. 2. For all normal uses the circuit of Fig. 1 is recommended.

In the circuit of Fig. 1 the transistor takes 5mA at 9V, and it was thought that this current justified the use of the stabilising components R2, R3, R4, C6.

COMPONENTS REQUIRED FOR THE OSCILLATOR OF FIG. 1

R1 1k	R5 6.8k
R2 39k (see text)	R6 6.8k
R3 4.7k	R7 6.8k
R4 150Ω	C4 0.02µF
C1 0.02µF	C5 0.01µF 350V
C2 0.02µF	C6 10µF 6V elec.
C3 0.02µF	
Tr1 OC72	
S1 On/off switch	
9V battery	

Setting up the Oscillator

When the oscillator has been wired up it is necessary to make sure that R2 has a value which causes the transistor to give maximum output—R2 brings the transistor to the correct operating point. Its value is not critical but varies from transistor to transistor.

To find the "best" value of R2 it should temporarily be replaced by a 50k potentiometer in series with a 12k limiting resistor. Initially set the potentiometer to its maximum value and connect the oscillator to an amplifier or a pair of high resistance headphones. The potentiometer should slowly be reduced in value until oscillation commences. It should then be adjusted until the output is at maximum. The value of the potentiometer and series resistor can be measured and replaced by the nearest standard value. The writer found that this value varied between 27k and 47k for the transistors he tried, while 39k suited the transistor he finally used.

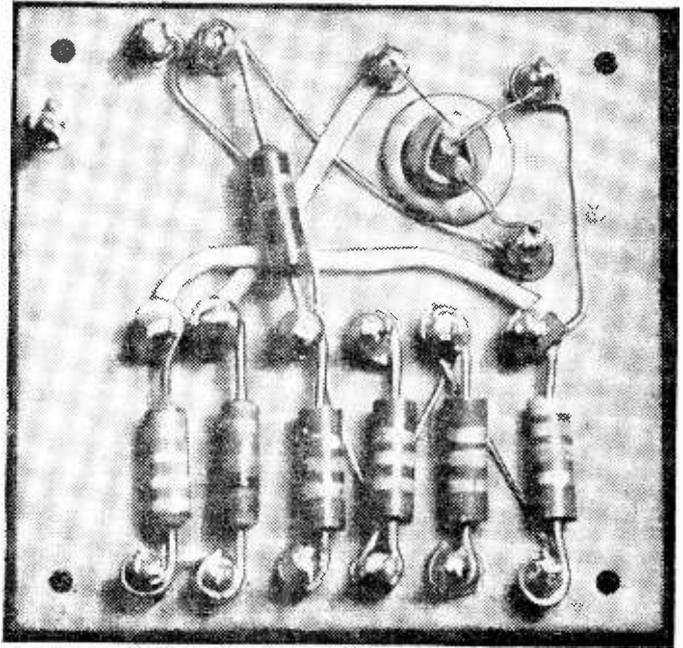
Since all the components used are only accurate to 20% in the case of resistors, and 25% for the capacitors, the circuit may run at frequencies removed from the nominal 1kc/s. If this occurs, the frequency may be adjusted by altering the value of R5, R6 or R7. Increasing these will lower the frequency and vice versa.

Performance

The oscillator gave a reliable output with supply voltages of 6V to 9V. It is not recommended that the supply voltage is increased much above 9V in case the maximum limiting collector voltage for the transistor is exceeded. Oscillation begins immediately the supply is connected. If used for Morse practice, the oscillator could be switched by inserting a key in series with the battery.

For output loads of 10M to 18k there was little change in output. As was to be expected, below 18k the output dropped. Nevertheless, the unit still oscillated right down to a 100Ω load.

The writer used the circuit of Fig. 1 and the layout of Fig. 3. By working on both sides of a 1/8 in. thick piece of paxolin the author made



The completed oscillator.

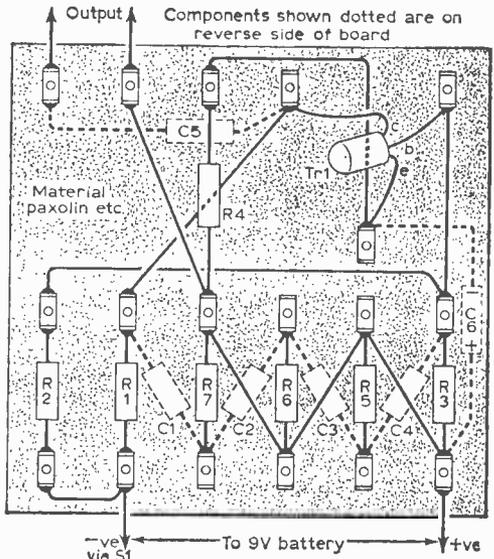


Fig. 3—The wiring diagram of the oscillator shown in Fig. 1.

COMPONENTS REQUIRED FOR THE OSCILLATOR OF FIG. 2			
R1A	100Ω (see text)	R4	150Ω
R1B	980Ω (see text)	R5	6-8k
R2	39k (see text)	R6	6-8k
R3	4-7k	R7	8-8k
C1	0-02μF	C5	0-01μF 350V
C2	0-02μF	C6	10μF 6V elec.
C3	0-02μF	C7	25μF 12V elec.
C4	0-02μF		
Tr1	OC72		
S1	On/off switch		
9V battery			

his unit 2in. x 2in. Turret lugs were used to hold the components, while the transistor was mounted in a grommet. Care should be taken when wiring-in the transistor not to overheat it when soldering is carried out or bend its leads nearer to the base than 2mm.

AN AUDIO DISTRIBUTION SYSTEM

PLANNING A MULTIPLEX
RADIO/AUDIO INSTALLATION
FOR A SMALL FLAT

by M. L. Michaelis

THIS article discusses some practical factors arising during the planning of a multiplex radio/audio installation for several rooms of a flat, using the installation built by the author into his own home as a typical illustration. The reader will be able to design his own installations as far as details are concerned, and thus, as no two constructors are likely to have exactly the same wishes and requirements in this respect, no hard-and-fast building plans will be given here.

Radio and Amplifier Units for the Sub-Stations

Virtually any home-built or purchased units may be used, if necessary with minor modifications which will become apparent in the course of reading further. Sufficient excellent articles have appeared and are appearing in this journal regarding radio units, feeders, amplifiers, etc., and the constructor can take his pick out of these.

It is advisable to make sure that all units feeding the "distribution line" have sufficient audio power output, at least the power of a single EL84 output valve (about 6W). This is because many loudspeakers can be switched in parallel on to the "line", in various rooms.

Output Transformers

A study of the circuit-sketches of the author's installation shows that an arbitrary number of loudspeakers and output transformer secondaries of feeder units can be switched in parallel on to the distribution line, according to the particular combination of sub-stations in the various rooms listening or supplying a programme at any time. This may seem to be taking matters very liberally with impedance-matching, which theoretically is true, but practice shows the matter to be far less critical than might be expected, and the author found absolutely no need for any complicated multiplex-matching system.

It is merely necessary to see that all feeder-units are fitted with output transformers which have secondaries for 15Ω tapped at as many lower impedances as possible. The best combination of tapplings for all units is then found by trial and

error in the completed installation. If already-existing equipment is to be included into an installation of the type discussed in this article, but such equipment already has only a 15Ω output transformer, then *do not* change it before trying it in the finished installation, for it may prove perfectly satisfactory. Only if purchasing new transformers for new equipment should ones with multi-tap secondaries be obtained. As already mentioned, this question of matching will be found to be surprisingly non-critical, provided the output power of the feeder units is adequate.

Distribution Cable

The central feature of the type of installation under discussion is the elegant solution to the problem of connecting cables. A single 3-core mains power cable, and nothing else whatsoever, is used to connect the units in the various rooms. This cable carries mains, audio and aerial and earth connections. No screened leads whatsoever are used on the long-distance runs.

The cable can be chosen of the flat white plastic insulation type, used sometimes for modern power-wiring. This can be installed very neatly and unobtrusively on walls or skirtings, and thus removes one of the major objections which may otherwise be raised against other forms of versatile music installation—namely, that bunches of unsightly cables so often accumulate. For reasons to be explained below, the current rating of the 3-core cable used should not be less than 15A. In other words, lighting cable is likely to be unsatisfactory, and proper power-cable must be used. A cable of too small a current rating will introduce undue hum in some or all of the speakers installed, and it is thus a question of how far the constructor is willing to compromise in this direction, if he wishes to save on possible cable expenses.

Compromises Involved

The installation discussed in this article is definitely *not* recommended for the hi-fi specialist who always desires to take tone quality to perfection. This is because of the two necessary

compromises made: (a) the introduction of slight background hum on account of the simple type of wiring used and (b) the slight increase of distortion (only noticeable on very-low-distortion amplifiers, as it nevertheless remains less than the inherent distortion of normal output stages) on account of the free-and-easy matching arrangement of the several units on to the one distribution line.

However, the performance of the author's installation illustrating this article is so good that many uninitiated laymen have pronounced it as "real hi-fi", and praised it warmly. This is because such important corrections which can be made with *reasonable expense* have been made, for example, the bass-reflex loudspeaker unit at the living room station is fitted with a variable hum-bucking control (see Fig. 4). It is just here, where really good bass response is present, that even slight residual hum can be most irritating. The circuit in Fig. 4 is very effective in reducing it.

corrected by means of lengths of resistance wire connected in series with the stronger loudspeakers, but do not take this too far, as it wastes audio power available, and causes loss of bass response. Regarding design for the bass-reflex cabinet for the living-room unit, the author refers readers to the article on this subject by J. B. Dance, which began in the January 1962 issue.

Built-in loudspeakers of units used may certainly be used as loudspeakers for sub-stations concerned, provided modifications are undertaken to install such switching as S5/S6 and S9/S10.

Distribution-Line Outlet Plugs

It is advisable to fit a non-interchangeable 3-pin mains plug and socket at each sub-station, for connection on to the line. The three wires from each sub-station, as shown in the diagrams, are wired on to the corresponding plug. Use a plug and socket of different type or size from other power-points installed in the rooms for normal use, to avoid any accidental wrong connections.

The distribution cable and the outlet plugs must be considered as mains wiring, which must be carried out with the usual care and attention to proper insulation and installation in compliance with local regulations. If necessary, an electrician should be consulted.

The Author's Workshop Terminus

Fig. 1 shows the author's arrangement at the one terminal end of the installation, which is situated in his experimental workshop. It is seen that the mains is fed into the whole installation here, and a master switch and master fuse are also situated here.

A 1:1 ratio mains-isolation transformer feeds mains power on to the distribution line. The expense of the isolation transformer is an unfortunate but a necessary item and it must not be omitted under any circumstances. The expense can be reduced by designing the installation so that the wattage rating of this transformer need be no higher than really necessary. This is the reason why the author feeds his installation at the workshop-end with the mains-input. Here, the equipment having the highest consumption of any of the sub-stations was intended to be installed, and could thus be fed prior to the isolation transformer, as shown in Fig. 1. This reduces the necessary rating of the isolation transformer, and also reduces the mains-supply currents on the line itself to a minimum, which reduces background hum. The constructor should feed his mains input with master switch and fuse into the line at the particular sub-station which is to receive the

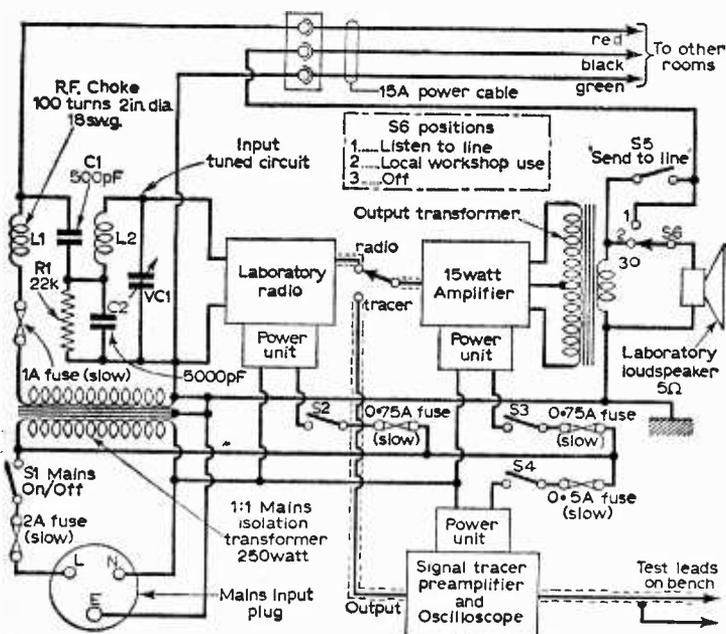


Fig. 1—The main terminal station—in the author's installation, the equipment shown above was in his laboratory or workshop.

The hum-bucking control is variable, as the degree of compensation required will depend slightly upon the exact switch-function positions set at all other stations in the other rooms.

Loudspeakers

The choice of loudspeakers is not critical. Any moving-coil speakers may be used. The author uses various 3Ω to 5Ω units, though there is nothing against using 15Ω units. It is desirable, however, not to mix loudspeaker impedances, i.e. keep either to all 5Ω units, or all 15Ω units. Different sizes may be used, but not too greatly different. Slight differences in loudness may be

equipment of highest total consumption.

It is seen that the mains feed on to the line, subsequent to the isolation transformer, is via an R.F. Choke. This is because the same line wire is used for aerial feed, and otherwise the R.F. would be unnecessarily shunted. The capacity of the distribution line cable is of course high, and thus the R.F. losses are necessarily high. This is a necessary compromise in this installation, and is minimised in its disadvantageous effects by means of feeding on to the line from the aerial proper via a step-down R.F. Transformer (Fig. 4), and using a type of coupling known as "bottom-end capacitive" for the input tuned circuits of the radio units at the sub-stations. This type of coupling is inherently highly capacitive and low-impedance, which largely matches the characteristics of the line as aerial feeder. If already existing radio units are to be used, the input tuned circuits must be modified for this form of aerial connection. L2 and VC1 and L4 and VC2 are the coil and tuning capacitors present. C2 in Fig. 1 and C4 in Fig. 2 are inserted, various values being tried for best results. Take care to use really high-insulation capacitors of 1,000V rating for C1 (Fig. 1) and C3 (Fig. 2), to block the mains voltage safely.

The rest of the installation in Fig. 1 is self-explanatory. Note the arrangement of the loudspeaker switching, to enable independent local use of all units in the workshop, independent of and without affecting the rest of the installation in other rooms, or to enable a programme fed from another sub-station to be listened to in the workshop, or to feed a programme from the workshop radio or signal tracer on to the line and out

to the other rooms, with or without the workshop speaker running. An identical arrangement of switching, with the same functions, is used at the study sub-station, in Fig. 2.

The Author's Study Sub-station

This is largely self-explanatory in Fig. 2, details being more a function of the author's particular wishes than of general importance. It is seen that mains is drawn from the line via an R.F. choke, again to avoid shorting R.F. on the line. Remember that these mains R.F. chokes have to carry mains current at mains voltage and proper insulation and wire of adequate diameter must be used. The sub-station here contains a small neon lamp to show whether power is on at the master switch in the workshop. The same form of input coupling is used on the radio unit as on the workshop radio. Note R2 here and R1 in Fig. 1. These are to prevent modulation hum and exact values needed should be found by experiment. Incidentally, the type of installation discussed in this article is prone to severe modulation hum if the normal precautions are not taken as mains and aerial feed go on one and the same wire. Thus all H.T. rectifiers in all units throughout the installation *must* be shunted with capacitors of 0.01µF to 0.1µF and suitable voltage rating. Such modifications need to be incorporated in all existing equipment if not already present. All new equipment should be built with mains transformers having an earthed electrostatic screen between primary and secondary.

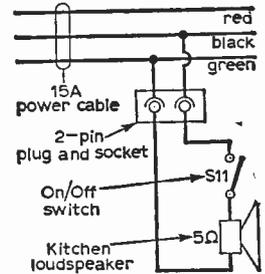


Fig. 3—A simple type of sub-station—this is the scheme used in the kitchen of the author's flat.

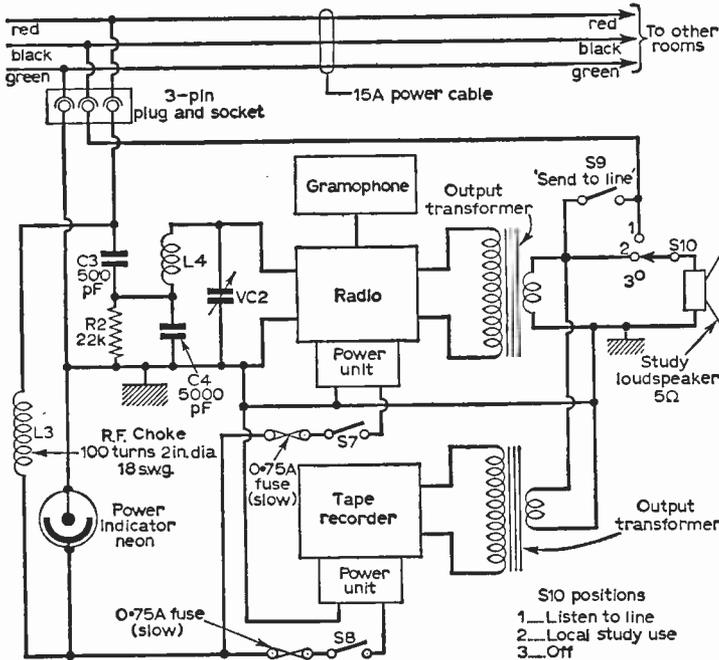


Fig. 2—The arrangement of the sub-station in the author's study.

Kitchen and Bedroom

It is undesirable to install any ordinary type of loudspeaker in the tropical atmosphere of a kitchen or the cold and damp atmosphere of many bedrooms. Both loudspeakers should be of the "tropicalised" types, especially the kitchen unit.

The master switch in the workshop can be fitted with a time-switch so that any programme can be switched into the bedroom and listened to in bed, the installation being

switched off automatically at the pre-set time. Alternatively, two-way switching can be installed the same as for passage lights.

The Living-room Unit

Nothing but a good amplifier in a bass-reflex cabinet and a few ancillary items shown in Fig. 4 are installed in the living-room. VR1 introduces a compensating voltage at mains frequency to cancel hum due to the voltage drop along the green wire of the line due to mains current and loudspeaker wiring being common on this wire. The hum to be cancelled is kept to a small value from the start by keeping the voltage drop on "green" low —i.e., using substantial 15A cable, as already specified. Hum due to running mains and audio in the same cable unscreened is fully negligible as the impedance is far too low in this installation for this form of capacitive pick-up. Thus, screened cable is not needed.

R3 serves two important purposes. It ensures that the audio line is not completely unloaded when all loudspeakers are off, which could otherwise cause peak voltages

in feeder units which may be switched on. Also it, keeps the impedance low even if nothing but the living-room unit is receiving audio. Otherwise capacitive hum starts up as soon as the last of all other loudspeakers is switched off.

The aerial connection is fed on to the line in the living-room simply because the outlet from the communal aerial of the block of flats is situated in this room. The author uses an ordinary long and medium wave coil as the R.F.

transformer. The long-wave section forms the primary, with many turns, connected to the aerial. The medium-wave section forms the secondary feeding the line. The two sections are slid about on the former to give the optimum coupling by experiment. This arrangement of aerial coupling is also the most effective in ensuring that mains voltage is kept off the aerial proper, especially if C5 is made of really good insulation quality, as it should be. ■

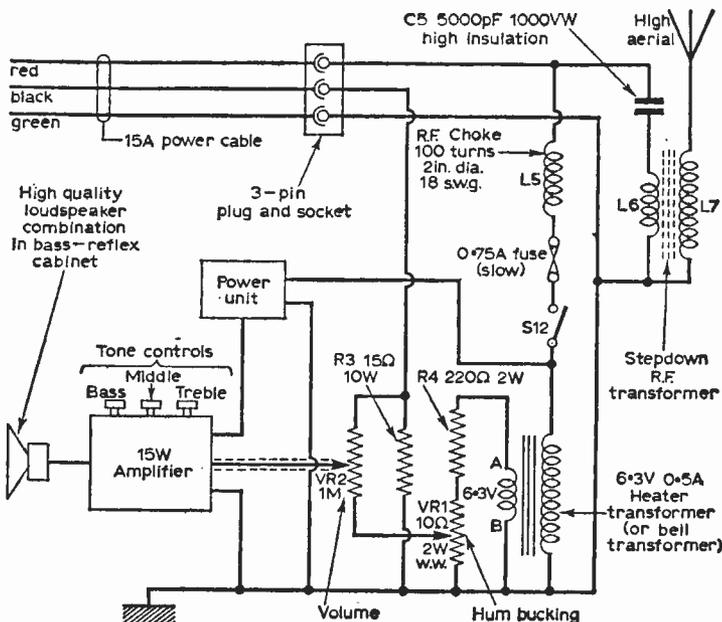


Fig. 4—The second terminal station—in the author's installation, the equipment shown above was in the living room of his flat. The connections to the winding AB of the heater transformer must be reversed if minimum hum is obtained when the slider of VR1 is at the chassis end of the element. Resistor R4 must be reduced in value if minimum hum is obtained with the slider of VR1 at the top or near the top. Conversely, R4 must be increased in value if minimum hum is obtained too near the bottom position of the slider of VR1.

Intercommunication in Coventry Cathedral

UNOBTRUSIVE intercommunication for Coventry Cathedral has been installed by AEI Ltd. Four "Silent Call" AEI Centenary Neophone telephone instruments, in which the bell is replaced by a lamp fitted inside the translucent handset, have been provided for the Precentor, the Provost and the organist in the chancel and for the electricians' platform at the main entrance. They will enable calls to be made or received during a service without distracting the congregation. The four "Silent Call" telephones are

extensions from a ten-line private automatic exchange installed by AEI in the cathedral.

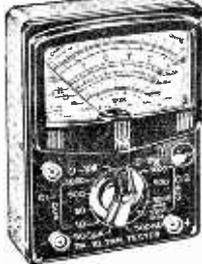
Conventional telephones have been supplied for other extensions in the organ blower chamber, choir vestry, Provost's vestry and assembly area and in the roof for use by television and radio outside broadcasting crews. A special direct communication link has also been provided by AEI to assist in tuning the organ. It provides contact between an operator at the keyboard and the tuner as he makes adjustments to the pipes.

SUPERB COMMUNICATION RECEIVERS

AMERICAN AR88 RECEIVERS. Fresh release of these renowned sets. 14 valves, 6 wavebands, covering 500 Kc/s-32 Mc/s. Incorporate every possible refinement and have internal A.C. mains pack for nominal 115/230 v. Thoroughly reconditioned, immaculate in appearance, and in perfect working order. **ONLY £35** (add carriage 30/- and 50/- deposit on returnable transit case). S.A.E. brings illustrated leaflet.

MARCONI CR. 100/8 COMMUNICATIONS RECEIVER. Covers 60 Kc/s to 30 Mc/s. Complete with all valves, makers instruction manual, and internal A.C. Power unit for 200/250 volts. **BRAND NEW IN ORIGINAL TRANSIT CASES.** Aerial tested before despatch. **ONLY £35** (carr. etc. 40/-). S.A.E. for full details.

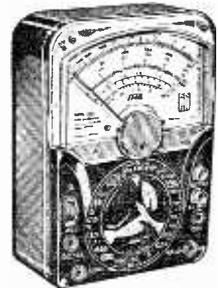
TEST METERS FOR EVERY PURPOSE & POCKET



2,000 O.P.V. MODEL TP-10. Reads A.C. & D.C. Volts up to 1,000; D.C. Current to 500mA; Resistance to 1 Meg; Capacitance to 1µF; Decibels from -20 to +36; Output jack for Audio Measurements. Size 3 1/2 in. x 5 in. x 1 1/2 in. **£3.19.6**



20,000 O.P.V. MODEL TP-5S. 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 1/2 in. x 5 1/2 in. x 1 1/2 in. **£5.19.6**



30,000 O.P.V. MODEL 500. Volts 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 1/2 in. x 6 1/2 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.

AMPLIFIER TYPE A413. Ex R.A.F. For normal A.C. Mains use. 574 Rectifications with 6V6 output. Input and output jack sockets, gain control, fully fused. 800 ohms output transformer easily changed for 9 ohms type. Standard rack mounting size 19" x 7" x 6". Used, good condition. **ONLY 59/6** (carriage etc. 10/6).

AMERICAN HALLICRAFTERS 6 VOLT VIBRATOR PACK. Output 300 volts D.C. at 170mA. Designed to run Communications Receivers from 6 volt car battery. Size 6 1/2 in. x 6 1/2 in. x 7 1/2 in. Complete with 2 valves 6X5, and instructions, in makers cartons. **BRAND NEW & UNUSED. ONLY 29/6** (carr. etc. 3/6).

12 VOLTS 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. from Car battery. **ONLY 32/6** (post 2/6).

B.C. 221 FREQUENCY METERS. The famous American crystal controlled, portable frequency measuring standard. Coverage 125 Kc/s-20 Mc/s. With original calibration book. Perfect order. Illustrated details on request. **ONLY £16.**

PCR COMMUNICATION RECEIVERS

Manufactured by **Pye & Philips**. One of the Army's most versatile and sensitive sets. RF stage and 2 of I.F., using 6 British I.O. type valves. Large 180 degrees illuminating and Calibrated Dial. Flywheel Tuning with locking device. Aerial Trimmer, Tone and Vol. Controls. Band Switch from panel jacks for speaker or phones. In black metal case, size 17in. L x 8in. H x 10in. D. Model PCR covers 6-18 Mc/s. 200-550 metres and 850-2,000 metres and has internal 5-in. speaker. **REME** reconditioned as new. **£6.19.6.** Model PCR3 has similar L & M waveband coverage. Short wave 6-22 Mc/s. but no speaker. Used but excellent condition **£5.19.6.** Every receiver aerial tested before des. Add 10/6 carr. all models. 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

"P.W." 6 TRANSISTOR PERSONAL RECEIVER



Designed by the technical staff of *Practical Wireless*; easy to build, using printed circuit and 1st Grade Matched Transistors and Diode. Full Medium and Long Wave coverage to internal speakers. All parts sold separately (new components only) enabling you to buy as required and full detailed price list will be sent on request. Constructional details 1/6.

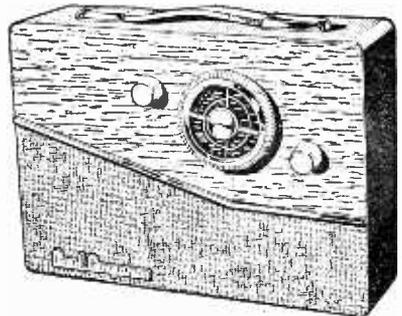
Newly designed **OSMOR** Cabinet and reduced price. **TOTAL COST INCLUDING BATTERY AND CABINET NOW £8.10.0.** "P.W. TROUBADOUR 7" Parts List, S.A.E.

THE "GOOD COMPANION" Mk. II

Using transistors, the latest manufacturing technique to ease alignment difficulty.

THE FINEST COMBINED PORTABLE AND CAR RADIO YET DESIGNED FOR THE HOME CONSTRUCTOR

- ★ 750mw output.
- ★ 6 transistors and 2 diodes.
- ★ Full Medium and Long Wave coverage.
- ★ Quality speaker.
- ★ Brilliantly styled 2-tone cabinet, size 11 x 8 x 3in.
- ★ Very fine tuning with calibrated dial.

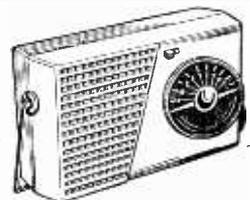


★ Latest printed circuit. ★ Internal high gain aerial with car aerial socket. Easy to follow construction data (available separately 3/6). All parts sold separately and full illustrated details will be sent on request. **Total Cost £9.19.6**

With alternative luxury cabinet using 7 x 4in. speaker. **£10.19.6.** Either type, plus 5/- post and ins. (Battery 3/6 extra).

"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.

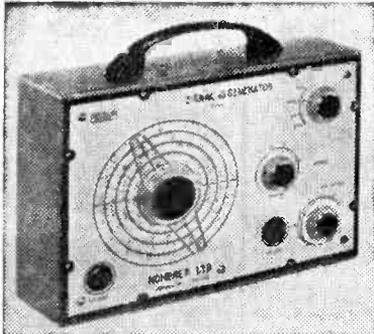


HARRIS ELECTRONICS 138 Gray's Inn Road, London, W.C.1
(Phone TErminus 7937)
(LONDON) LTD

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.

The new NOMBREX

TRANSISTORISED WIDE-RANGE
SIGNAL GENERATOR 27
220 kc/s to 220 Mc/s.



RETAIL £7.10.0 Post and Ins. 3/6
Battery 2/-

CASH WITH ORDER. REGRET NO C.O.D.
NOW IN QUANTITY PRODUCTION
ALL ORDERS IN STRICT ROTATION

Trade and Export Enquiries Invited

CHECK THESE FEATURES!

COMPACT!
Only 6 1/2" x 4 1/2"

PORTABLE!
Weight 2 lbs.

ACCURACY!
Under 2%

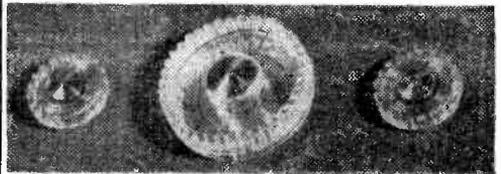
ECONOMY!
9v. Battery

DIRECT Calibration

S.A.E. for full technical leaflet.

H.P. Terms:
Send £2 deposit
pay balance
21/- per month

GIVE YOUR RADIO A PROFESSIONAL FINISH



SET OF LUSTRE CRYSTAL PLASTIC KNOBS, PUSH-ON TYPE, SUITABLE FOR ANY RADIO OR RADIOGRAM.
Diameters: Large 2 1/2in., Small 1 1/2in.

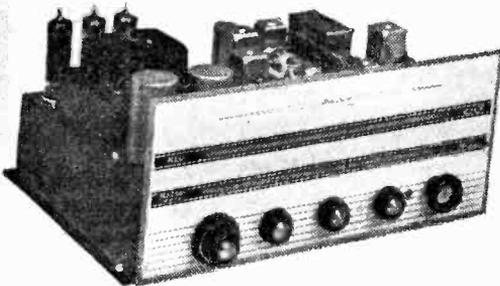
- | | | |
|--|---|------|
| LIST | | |
| 47/48 | Three knobs, as illustrated, for direct drive tuning, with attractive red centre discs | 7/8 |
| | As above, with cursor dial for slow-motion | 5/6 |
| 48/48 | Tuning scale, diameter 2 1/2in., lustre gilt finish, printed MW and LW stations and wavelengths in red and black | 2/8 |
| 49 | Above knobs, with smart gold lustre centres, extra per set | 1/- |
| RADIO CASE TRIMMINGS AND COMPONENTS | | |
| 51R | Case handle brackets, red plastic, to suit 1in. flexible handle, 4 BA x 1in. fixing | 2/3 |
| 51G | Brackets as above, but brilliant gilt lustre finish pair | 2/8 |
| 52R | Speaker escutcheon grille, red plastic, 5 1/2in. x 3 1/2in. | 3/6 |
| 52G | Grille as above, but attractive gilt lustre finish. | 4/8 |
| 59 | Feet for case, black plastic, 1 1/2in. x 1 1/2in. | 1/- |
| 55G | Personal set escutcheon, 4 1/2in. x 3 1/2in. brilliant gilt finish | 3/- |
| 54 | Tuning knob for above, edge control, 200-500M and long | 1/8 |
| 35/37 | Set of 4 Miniature Osc./I.F. Transistor Transformers, High gain. High Q, 9/16in. diam. | 23/- |
| 38/40 | Pair of Matched Driver and Output Transformers, Class B output, 500mW, 1in. x 1 1/2in. x 1 1/2in. | 18/- |
| 51x | transistor Basic components, as previously advertised, still available, 55/-, Circuit diagrams and manual, 2/6. Send S.A.E. for full list of transistor components. Trade and export enquiries invited. Prompt despatch. No C.O.D. under £2 in value. Please include postage. | |

NOMBREX LTD.

Instruments
Division 33

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

The least expensive way to high fidelity is an *Armstrong* chassis



An Armstrong chassis is more than just a radio-gram chassis. It is a carefully designed combination of tuner, control unit and amplifier in one compact unit which can be used as the basis of a complete high fidelity system. A system which can include tape recording and playback as well as radio and record reproduction.

ARMSTRONG WIRELESS & TELEVISION CO. LTD. WARTLERS RD. LONDON N.7. NORTH 3213

STEREO 12 MK.2 £43.10.0

8 watts push-pull output from each channel, 16 watts total. VHF, with automatic frequency control, medium and long bands. A hi-fi system on one compact chassis.

STEREO 55 (Illustrated) £32.15.0

A junior version of the Stereo 12 Mk. 2, 5 watts per channel, 10 watts total, VHF and medium bands. Inputs for tape, pick-ups and possible future stereo radio.

JUBILEE MK.2 £30.12.0

A mono chassis of 8 watts push-pull output and covering VHF, medium and long bands. Separate tone controls. A.F.C. Pick-up and tape inputs.

AF208 £22.18.0

An AM/FM mono chassis of 5 watts output covering VHF and medium bands. An inexpensive version of the Jubilee Mk. 2.

Post this coupon or write for catalogue or call at our showroom for full demonstration and professional advice on your installation. Open 9-5 including Saturdays.

NAME _____ PAC

ADDRESS _____

A COMPACT CONVERTER for short waves

A. Sydenham

SOONER or later newcomers to the radio hobby experiment with the short wavebands and this may be done either by (a) constructing a separate short wave receiver, or (b) building a converter that will change the signals and make them suitable for feeding into an existing receiver via the aerial socket. Of these, method (b) is the one considered here.

Operation

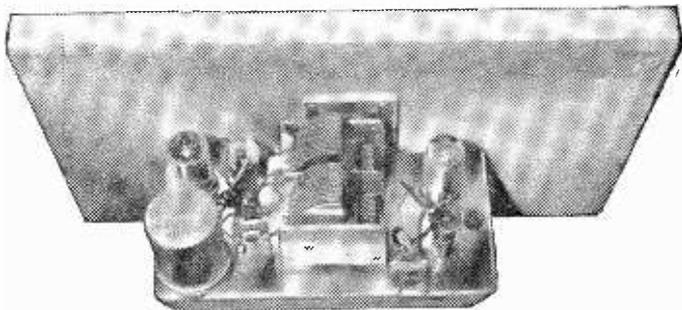
A popular short waveband is that covering 5-15Mc/s (20m-60m). By converting the signal frequencies to say 1.5Mc/s (200m) and feeding them to a standard broadcast receiver not equipped for short wave reception it is possible to increase one's listening horizon as the short wave transmissions will be heard via the receiver's loudspeaker. If the broadcast receiver used is a superhet, two changes of frequency occur and the "double superhet" principle is in use.

Not all enthusiasts have access to the mains supply, however, but fortunately, a useful converter can be constructed and operated successfully from dry batteries. A practical circuit incorporating suitable components is presented here and depicts a recently constructed S.W. unit that is entirely independent of the mains supply. It is small physically and the chassis top plate measures only 6in. x 3in.

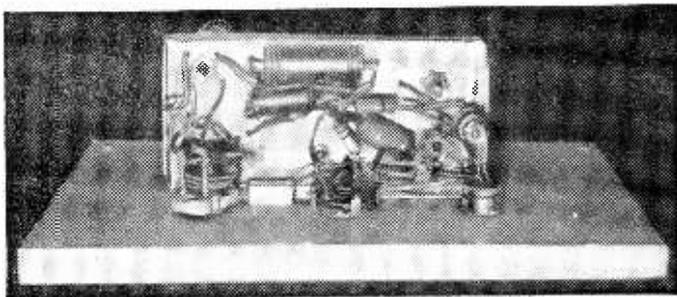
Aerial Connection

Switching is incorporated to make the aerial bypass the unit immediately it is switched off; it is reconnected when the unit is switched on the next time. This means that the converter and receiver

THIS INSTRUMENT WILL PROVIDE
SHORT WAVE LISTENING ON A
MEDIUM WAVE RECEIVER



Above and below chassis views of the complete unit; less its case.



may be left permanently connected once set up, the latter performing normally when the former is not in use.

The converter may be used to feed a mains receiver provided it is fitted with aerial and earth sockets and is not of the A.C./D.C. variety. It has not been tested in conjunction with transistorised or TRF receivers for, as might be expected, the sensitivity is considerably lower than that obtainable from a mains driven set. Suggested modifications to help improve sensitivity are included.

The Circuit

This is illustrated in Fig. 1. When S1/S2/S3 is set to position 1, the aerial is connected to V1 via L1 which is tuned by one section of a twin gang capacitor, VC1. The selected signal appears again at pin 2 of V1 and is fed to the frequency changer, V2. The signal grid circuit of V2 is untuned in the interests of simplicity and to permit the use of a twin gang capacitor. Nevertheless sufficient signal is developed across R2.

Valve V2 is oscillator and mixer and 1.5Mc/s signals appear at the anode of the valve where they are developed across L3 which is tuned precisely to this frequency. To enable a suitable match to be made to the aerial coil of the subsequent receiver with which the converter is used, the low impedance winding associated with L3 is employed and the coil is in fact a standard medium wave coil used in reverse.

R.F. Amplifier

Although the above represents the working of the basic circuit, several finer points of interest exist. It might be argued that V1 could be omitted and the aerial coil connected direct to the signal grid of V2, and although this is true, benefits of slight extra gain would be lost and, furthermore, a sensitivity adjustment would scarcely be practicable. Here, the R.F. amplifier can be used beneficially as a variable gain device by feeding its screen grid from a potentiometer connected across the H.T. supply.

The oscillator circuit is of interest, too, since variable trimming is provided and consists of VC3 arranged as a panel control. This permits manual

LIST OF COMPONENTS

Resistors (All $\frac{1}{2}$ W, 10%):

R1 10k R2 2.2M R3 33k
R4 15k VR1 250k pot.

Capacitors:

C1 0.01 μ F ceramic or paper
C2 100pF silver mica
C3 50pF silver mica
C4 100pF silver mica
C5 1000pF silver mica
C6 0.01 μ F ceramic or paper
C7 4 μ F 200V elec.
VC1/VC2 300pF, twin gang tuning
VC3 trimmer (see text)
TC1, TC2 30pF or 50pF trimmers (may be present on VC1/VC2)

Coils:

L1 Denco Blue (see text)
L2 Denco White (see text)
L3 Denco Yellow, range 2

R.F. Choke (RFC): Denco RFC5

Valveholders: B7G ceramic (two)

Dial and Drive: Muirhead type or Eddystone 843

Valves: V1 DF91 V2 DK92

S1/S2/S3: 4-pole, 2-way rotary switch (see text)

Chassis: 6in. x 3in. x $\frac{1}{2}$ in.

Batteries: 67.5V H.T. and 1.5V L.T.

Miscellaneous: Control knobs, coaxial cable, stand-off insulator, tag strip, hardboard, length of $\frac{1}{2}$ in. quadrant, etc.

control of oscillator frequency within limits and also acts as a fine tuner giving a bandsread effect. Any small air-spaced type of variable trimmer

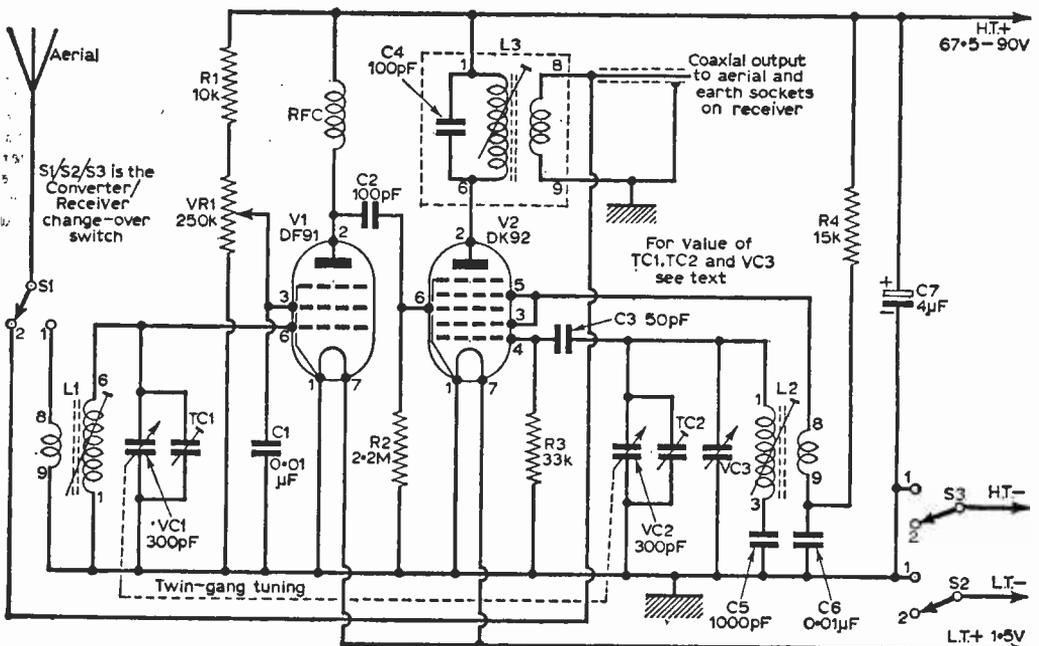


Fig. 1—The circuit of the converter.

may be used, and a plentiful supply is often present in surplus apparatus. The total number of vanes should not exceed four, unwanted ones being removed, since a large capacitance value is undesirable. The control spindle should be fitted with a small scale calibrated 0-10. The general bandspreading is mechanical and consists of an RF27 Muirhead drive, but other suitable types such as the Eddystone 843 may also be used.

Grid Wiring

Connecting g2 and g4 of V2 together was found empirically the most reliable method of operation; sometimes g4 is separately fed via a 33k resistor and decoupled in the usual fashion.

TABLE I

Metres	Mc/s	Padder (C5)	Range No.
57-180	1.67-5.3	340pF	3
20-60	5.00-15.00	1000pF	4
9.5-28	10.50-31.50	2000pF	5

The signal and oscillator coils are not screened but it is desirable that L3 should be screened to prevent unwanted self pick-up at 1.5Mc/s. Note that a fixed capacitor is connected across the main winding of L3 instead of a trimmer, this being quite satisfactory since the coil can be brought to resonance by means of its core, and the capacitor may thus be contained within the coil can. The coils are supplied individually packed in round aluminium screw lid containers which may be used for screening.

The inclusion of C7 is particularly beneficial when the H.T. battery exhibits considerable inherent resistance such as occurs towards the end of its life; it is important that it should be connected as shown in the diagram on the converter side of S3, otherwise the H.T. battery will discharge even when the unit is not in use.

Rotating S1/S2/S3 to position "2" switches off the converter and breaks both H.T. and L.T. feeds, and allows C7 to discharge via R1 and VR1. Simultaneously, the aerial is disconnected from L1 and reconnected to tag 8 on L3 so that the broadcast receiver can function normally. In the prototype, a 4-pole, 2-way miniature rotary switch is utilised for S1, S2 and S3, the spare tags being ignored.

Switching of the earth lead is unnecessary when coaxial cable is used between the converter and receiver, the two chassis being automatically inter-connected via the outer braiding. For this reason *A.C./D.C. apparatus must not be used with the converter.*

The prototype covers the 5-15Mc/s band, but alternatives are possible by changing L1 and L2 for coils from another range. The value of padder capacitor will also require alteration. Suitable coils can be chosen from the Denco range as shown in Table 1.

The coils are wound on colour-coded formers, and for L1, Blue is required, with White for L2.

(Continued on page 319)

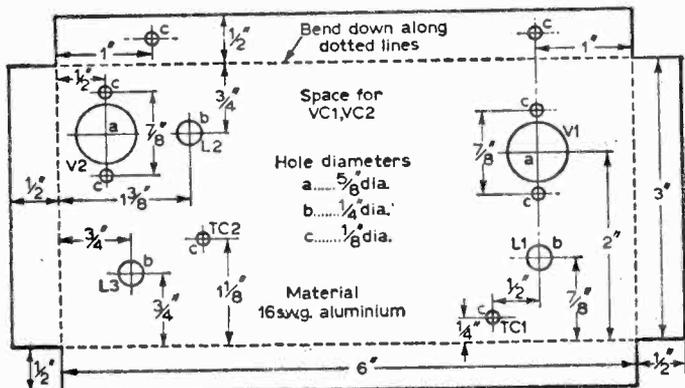
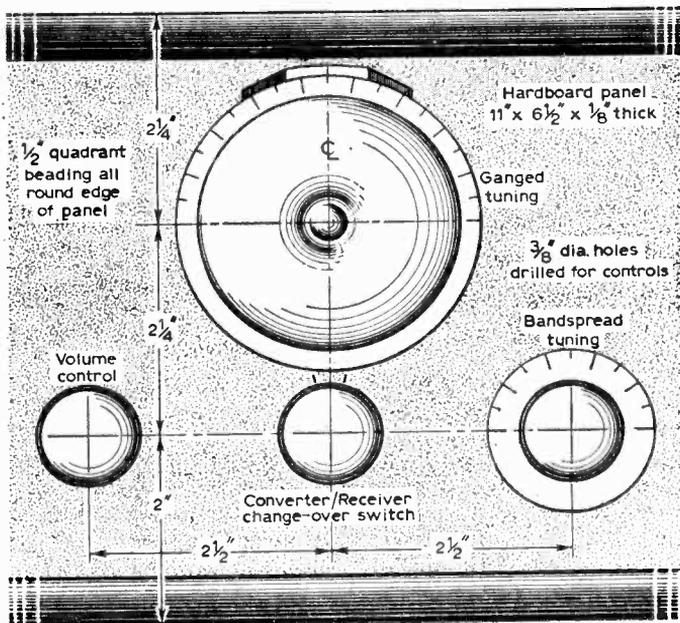


Fig. 2 (above)—The drilling dimensions of the chassis.

Fig. 3 (below)—The layout of controls on the front panel.



POWER Rectifier Circuits

A SURVEY OF PRINCIPLES OF PRACTICAL IMPORTANCE, AND USES OF THESE CIRCUITS

By L. N. Nash

common and uncommon

(Continued from page 258 of the July issue)

THE centre tap of a full-wave voltage-doubler circuit serves merely to feed the mid-point voltage D.C. output. If the centre tap on the transformer is omitted altogether, the circuit degenerates to the familiar *full-wave bridge* circuit. Fig. 16a shows the circuit of Fig. 15 (last month) with the centre tap of the transformer omitted. In Fig. 16b, the circuit of Fig. 16a has been rearranged into the conventional full-wave bridge circuit.

The full-wave bridge circuit has the advantage over the conventional full-wave H.T. rectifier circuit that it does not need a centre-tapped transformer winding.

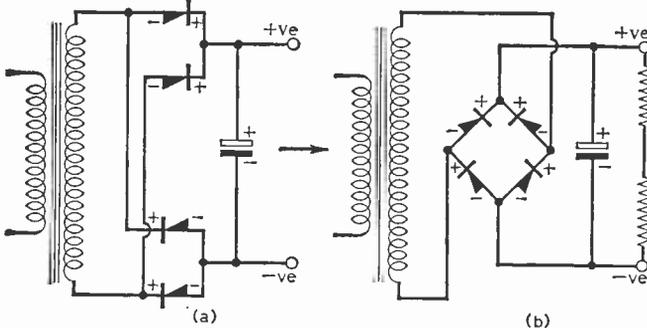


Fig. 16a—The circuit of Fig. 15 (last month) with the centre tap of the transformer omitted.

Fig. 16b—The circuit of Fig. 16a rearranged to show that it is in fact equivalent to the full-wave bridge rectifier circuit.

The important new point to be stressed here concerning the bridge rectifier circuit, of which probably only few constructors are aware, is that any conventional bridge rectifier circuit necessarily embodies the availability of a second D.C. output at half of the main output voltage, directly from a centre-tap of the transformer winding, without any further alteration of the circuit. This second output is already D.C., without the addition of any further rectifiers, as the circuit has returned to the full-wave voltage-doubler arrangement as soon as the centre-tap is present. The two outputs are inherently well decoupled from each other, i.e.,

loading of the one affects the other far less than if the half-voltage were obtained from the full output by means of an external resistance-bleeder across the output.

However, voltages other than *exactly* half of the main output of the Bridge *cannot* be obtained from the bridge circuit by appropriate choice of a different position for the transformer winding tapping, as such measures would amount to unequal voltages for the two sections of each component fundamental full-wave circuit, which the previous discussion under that heading has shown to lead to unequal current sharing, and consequent possible destruction, of the individual rectifiers. Nevertheless, it is of course perfectly admissible to feed a rectifier circuit of either polarity and any

desired voltage whatsoever through a separate rectifier from a suitable tapping in the transformer winding, quite regardless of what rectifier circuitry may or may not be already connected—provided that no conflicting chassis-connections arise, and provided that the total loading of all circuits connected does not overload the transformer. Fig. 18 shows a hypothetical example of a multiplex circuit of this nature, representing just one of numerous possibilities.

Once the constructor is familiar with the basic principles involved, and the important practical points to watch, he will easily be in a position to devise his own peculiar rectifier circuits to meet his particular requirements from occasion to occasion.

Uses of Television Booster Diodes in New Fields

Fig. 19 shows a very interesting and instructive rectifier circuit used by the author for feeding a Geiger-Counter apparatus, supplying positive H.T. for valve amplifiers and positive EHT for the Geiger Tube. The same circuit is usable for feeding H.T. to amplifiers and EHT to the CRT of an oscilloscope, for which purpose constructors could use this circuit directly in most cases, without any modification except in minor details.

It is seen that the basic circuit is the full-wave voltage doubler of Fig. 17, but with the very un-

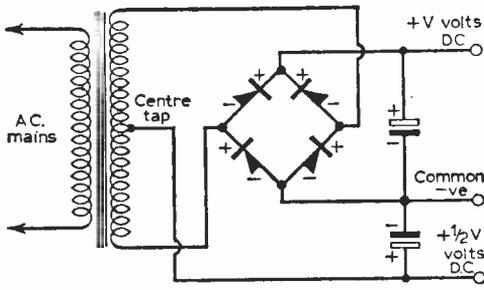


Fig. 17—A circuit to show the relation between the full-wave voltage doubler circuit and the bridge rectifier circuit. In any bridge rectifier circuit, a second D.C. output is available from the centre tap of the transformer winding without any alteration of the circuit. The output voltage from the centre tap is half of the main output voltage.

usual feature that the *negative* fundamental full-wave-circuit is used for the H.T. section, giving nevertheless a positive output voltage w.r.t. (with respect to) chassis. This results in the very unconventional circuit appearance that the main H.T. output is taken via the smoothing-choke direct from the transformer centre-tap, whereas the common H.T. rectifier anodes are taken to chassis. This measure is necessary in order to ensure that the positive polarity to supplement the H.T. output to give the desired positive EHT voltage w.r.t. chassis.

Transformer

A perfectly conventional ordinary mains transformer winding of 400-0-400V is used, and any good mains transformer of reputable make is usable for this circuit. The basic requirement for the transformer is simply that its H.T. winding can tolerate earthing at other than its effective centre-tap without breakdown, and this condition has, in the author's experience, been satisfied by all mains transformers of reputable manufacture. A transformer of doubtful origin should preferably not be used for this circuit, but at least it should first be tested by connection to the mains via a 100W lamp or low fuse in series with the primary, and simultaneous earthing of the core and one end of the H.T. winding. All secondaries should be left open-circuit. If the lamp does not light and the fuse does not blow within 24 to 48 hours of continuous subjection to this test, the transformer may be deemed satisfactory for the circuit of Fig. 19. This time may be considered as sufficient for any corona or glow discharge within the transformer windings to effect a final breakdown, if this is due to take place, and thus at least other

components will be saved compared to the same breakdown in a final circuit after up to 50 operating hours.

It must be stressed, that with a good transformer of reputable manufacture no serious danger exists, and the author's circuit is in periods of non-stop operation of a week or more at a time, with perfect reliability.

The constructor should avoid the use of miniaturised transformers for this circuit, as insula-

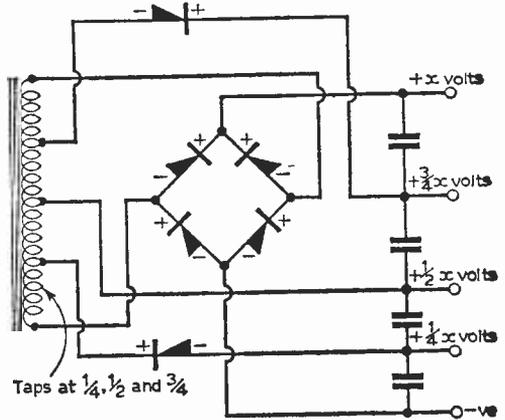
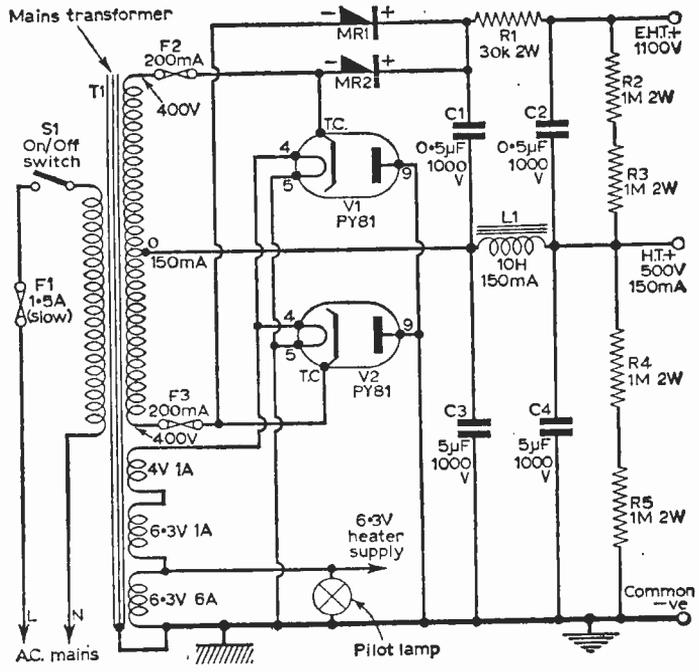


Fig. 18 (above)—A multiple rectifier circuit for obtaining several outputs of varying voltages.

Fig. 19 (below)—A special power supply circuit which was used to feed Geiger counter apparatus. (MR1, MR2—E500C5)



tion is there not as generous as in mains transformers of conventional size, and it is advisable (if it can be identified) to use the end of the H.T. winding which is innermost, i.e. closest to the primary, for earthing in the above described soak-test for a doubtful transformer. In all these experiments it should be remembered that one is dealing with very high peak voltages at low impedance, which could prove immediately lethal if passed through the human body. *It is thus essential to make all connections and disconnections only when*

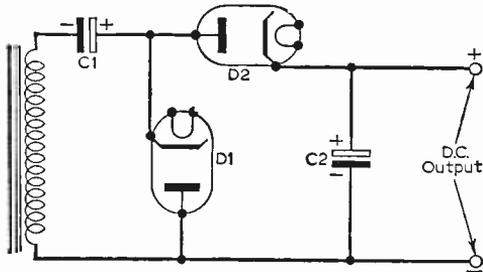


Fig. 20—Cascade voltage doubler circuit.

the mains is switched off and disconnected, and after all condensers have thereafter been shorted with a heavily insulated screwdriver.

It should also be remembered that, under unfavourable circumstances, the voltages involved can flash across up to a tenth of an inch of air or more. This danger is vastly increased if sharp spikes of solder are left on connections. If these spikes cannot be avoided, they must be filed off carefully after the joints have cooled. Loose ends of strands of wire lead to the same dangers.

The constructor of modern times must work with television and oscilloscope equipment, etc., and thus it is pointless to say one should avoid the use of high voltages on account of their dangers. A healthy respect and understanding for high voltage must be developed, and a clean, careful methodical way of working. This experience should first be gained in the use of equipment at normal voltage. A constructor who is still continually receiving small electric shocks from such equipment would be ill-advised to start working with EHT-circuitry, as his experience or methods of working, or both, are then obviously still inadequate. This point cannot be stressed too strongly in a practical magazine of this nature, and the author is convinced that repeated warnings can serve only a good purpose in preventing accidents.

High Internal Impedance

Modern television EHT generators using the line-output stage are much less dangerous, in spite of the vastly greater voltage, because of the very high internal impedance. But such circuits are generally inconvenient and prohibitively expensive in other applications which do not require the whole magnetic line-timebase circuits anyway. Thus it is not possible to avoid using low-impedance EHT circuits sooner or later. Nevertheless, where the expense is justified, the author definitely recommends the use of line-timebase type EHT circuits. Such have high cost, poor regulation and poor

voltage stability without special refinements, and even they could easily give a lethal shock so that the same precautions mentioned above are still needed.

Returning to the circuit of Fig. 19, the unusual choice of rectifiers merits some discussion. It is seen that a pair of PY81 television booster-diodes are used as H.T. rectifiers. Here we have high current and high peak inverse voltage requirements, which previous discussion in this article has shown to be best met by the use of valves. The choice of valve for the author's circuit then fell on a booster diode type because of the high heater-cathode voltage rating of these valves compared to conventional H.T. rectifier valve types. The PY81 booster diode is rated at 5kV peak between heater and cathode, a very useful value in unusual rectifier circuits, and the mean anode current is well in excess of 100mA peak rating, enabling at least 200mA D.C. to be drawn from a full-wave pair, a value comparable to the larger full-wave rectifier valves of conventional type. The PY81 is thus already a great favourite in the author's special designs. The heater-cathode voltage rating is so high that all valves in even the most complex circuits may be run from a single heater winding, even for circuits of moderate EHT in the region of 1kV to 2kV D.C. output! Furthermore, one side of this heater supply may be earthed if desired. A disadvantage is the unusual heater voltage of 17V, which the author normally obtains from a couple of 6.3V windings and a 4V winding all in series.

Feeding Other Valves

On account of the permissibility of earthing one side of the heater supply, other valves may be fed from the same heater supply or tappings thereon. In such cases one side *must* be earthed, as otherwise the EHT voltage could be impressed across the heater-cathode path of the amplifier valves as well, causing immediate breakdown. Earthing one side of the heater supply also removes the EHT voltage strain from the heater winding on the transformer; thus it is advisable to earth one side of the PY81 heaters as a matter of course in all cases, as shown in Fig. 19.

The EHT supplement, in the form of a conventional fundamental positive full-wave circuit of positive output w.r.t. the centre-tap of the transformer windings, is fitted with a pair of high-voltage metal rectifiers in Fig. 18. These form the simplest solution here, and are of reasonable price on account of the low current-drain required on the EHT output.

The Cascade Voltage Doubler

Fig. 20 shows another form of half-wave voltage doubler, which is used far less frequently. This circuit is included here on account of one advantage, namely the fact that one pole of the A.C. input and the D.C. output are common, which is not the case for the conventional voltage doubler. Thus, the cascade voltage-doubler is the only practicable circuit for doubling the mains voltage direct without a transformer, keeping a common neutral/earth line.

(To be continued)

"CODAR CLIPPER" ALL BAND RECEIVERS 10-2000 METRES

LISTEN TO AMATEURS, AIRCRAFT, SHIPPING, SHORT, MEDIUM, LONG WAVE BROADCAST STATIONS THROUGHOUT THE WORLD.

THE MINI-CLIPPER

The ORIGINAL and finest one valve all band receiver. Outstanding performance. New first grade components ensure top efficiency. Low loss air spaced tuners, high gain polystyrene plug in coils. Satin Silver metal panel with engraved dials, grey pointer knobs. Provision for adding 2 transistor amplifier stage. Chassis ready punched. Total building cost, all parts, one coil 20-60 meters, wire solder full plans, 36/6. P. & P. 2/6. Other coils 10-2000 meters and electrical bandsread available. Parts sold separately. Plans and parts list, 2/-.

NEW LOW PRICE **36/6**

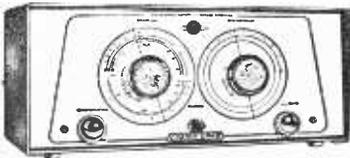


THE SUPER CLIPPER '88/6

This world-famous hybrid receiver has achieved remarkable success. Tremendous performance with Hi-gain valve detector PLUS two Ediswan transistor amplifiers which are supplied assembled, only 3 wires to connect. Large precision dial, 7 x 4in., with 2 pointers, bandset and bandsread, dual slow-motion drivers, air spaced variables. Punched chassis 8 x 5 1/2in. Batteries last months. Covers 10-2000 metres (5 coils). Total building cost including chassis, valve, 2 transistor stages, 2 coils 20-60 and 55-190 metres. Step-by-step pictorial plans, nuts, bolts, wire 88/6. P. & P. 2/6. Plans only, 2/6. THE CLIPPER. As above but one transistor stage, 79/6. P. & P. 2/6. Optional Front Panel, Silver Hammer finish, all holes, 6/9.



THE NEW CR45 ★ NEW STYLING TOP PERFORMANCE



Previously produced exclusively for Export, the de-luxe version of this famous ALL BAND receiver is now also available for the home market. Superb new styling, satin silver front panel, frequency calibrated scales, grey and silver trim knobs, perspex disc cursors. High gain circuit with ECC81 duotriode, EL84 output, EZ80 full wave rectifier. Power output 3 1/2 watts for 2/3 ohm speaker. 3 Planetary vernier slow motion drives, separate electrical bandsread. Covers 10-2000 metres (5 Coils). World wide reception. For A.C. supply 200-250 volts (Export version 105-120 volts). Total building cost all parts, valves, front panel, ready punched chassis, 2 coils, 20-60 and 55-190 metres, wire, solder, instruction manual, P. & P. 3/6. Optional extra. CR45 Cabinet 12 x 5 x 7in., slide flap for easy coil changing, Silver grey finish, 27/6.

£6.19.6

No technical knowledge required to build these fine receivers. Send 3d. stamp for illustrated leaflets, testimonials, etc. Now available the NEW 1962 CR 66 A.C. SUPERHET COMMUNICATION RECEIVER.

CODAR RADIO COMPANY, 24 CHAPEL ROAD, FISHERGATE, PORTSLADE, BRIGHTON G31RE

Canadian Distributors: JAYCO ELECTRONICS, TWEED, ONTARIO.

G31PA

NEW! DO-IT-YOURSELF TRAINING TECHNIQUE in RADIO & ELECTRONICS

You LEARN while you BUILD...

SIMPLE...PRACTICAL...FASCINATING... 1st stage receiver

ANNOUNCING—after many years of highly successful operation in the U.S.A. and in Europe—the latest system in home training in electronics is now introduced by an entirely new British training organisation. AT LAST—a comprehensive and simple way of learning —by practical means—the basic principles of radio and electronics, with a minimum of theory. YOU LEARN BY BUILDING actual equipment with the components and parts which we send you. You advance by simple steps using high quality equipment and performing a whole series of interesting and instructive experiments. No mathematics! INSTRUCTION MANUALS and our teaching staff employ the latest techniques for showing clearly how radio works in a practical and interesting manner. You really have fun whilst learning! And you end by possessing a first rate piece of home equipment with the full knowledge of how it operates and—very important—how to service and maintain it afterwards. A full library of magnificent illustrated textbooks are included with the Courses. IN FACT for the 'Do-it-Yourself' enthusiast, the hobbyist, or those wanting help with their radio career training, or to set up their own full or part-time servicing business—then this new and exciting instructional system is exactly what is needed and it can all be provided at very moderate cost. Easy payments available. Post the coupon now, for full details. There is no obligation.

BUILD YOUR OWN • RADIO EQUIPMENT • TEST GEAR • HI-FI INSTALLATION—AND LEARN AS YOU DO IT

RADIOSTRUCTOR

FREE- POST TODAY

BRITAIN'S LEADING RADIO TRAINING ORGANISATION

Test equipment supplied

LOTS OF INSTRUCTIVE EXPERIMENTS AT HOME!

No Mathematics!

Basic receiver

Serviceing commercial receivers

Amplifier, oscillator and detector circuits

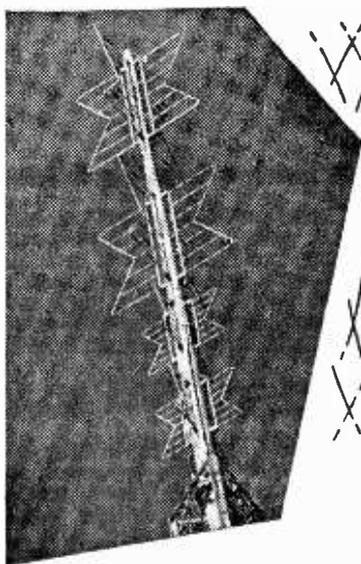
Power supply circuits

To: RADIOSTRUCTOR (Dept. G107), Reading, Berks.

Name
Address.....
.....

BLOCK CAPS PLEASE

(821) We do not employ representatives 8-62



On Your Wavelength

By THERMION

Those Electronic Games

MY recent comments on the apparent lack of interest in this branch of our hobby had failed to produce any material comment from readers and I was beginning to think that there must be some big snag in the subject when I received a letter from Cpl./Tech. White of the R.A.F. who has summed up the position very clearly, I think. He suggests that the expense of making this type of equipment is probably the biggest snag, but makes the point that the majority of our readers are more interested in making normal radio sets and experimenting with improvements and "gadgets", and that only very advanced students dabble in the electronic games aspect, or conditioned reflex "robots",—and that these enthusiasts are few and far between, and are probably not interested in ordinary radio and as a result are not numbered among our readers. I must agree that I think this is true, but it would be very interesting to know that it is not, and to hear from some ordinary type of reader (as distinct from an advanced student) who has managed to make some progress in this field and I am sure that his activities and results would interest others.

To those who wrote, many thanks.

Artificial Troposphere

I have received a very interesting letter following on my comments in the December issue on the effects of various activities in space carried out in the name of "research". The letter comes from one of our readers in Germany who says:

"Regarding radiations emitted from atomic explosions remaining and accumulating in space, this is in principle not to be disputed. If not complete, then at least partial continuous accumulation is scientifically established. That such an accumulation could disturb ordinary wireless communications, if it reaches sufficient intensity, is also quite true. The question thus boils

down to asking whether this sufficient intensity is likely to be reached, and here the answer seems to be a pretty definite "No". The following reasoning should make this point of view clear. The sun itself is simply nothing else but one colossal atomic hydrogen bomb, and has used exactly the same energy-producing processes for countless centuries, as man has only learned to produce on earth in recent years. The nuclear intensity of the sun corresponds to the explosion of many thousands of atomic bombs per second, of the largest size man has yet made. Yet all this radiation from the sun has succeeded in producing through the ages, as regards radio-communication, is our well-known ionosphere, and its well-known effects on shortwave radio, etc. Admittedly, the sun is about ninety million miles distant, but nevertheless, the discrepancy between the rate of release of atomic energy of the sun and from man-made devices is so great that the man-made contribution to a radiation-belt screening the earth is vastly smaller than that present due to the sun anyway. Furthermore, space itself is so vast, that colossal amounts of radiation can accumulate in it without any appreciable rise of local intensity. The dangers of atomic-bomb fallout are of a different nature. Here we have unstable atoms of debris thrown into the atmosphere, which drift with the weather, to be washed down later in rain somewhere. The unstable atoms in this rain will then explode later, giving *new production of local radiation*. But this unstable atomic debris in the air will not disturb radio-communication any more than an ordinary fog does to which this debris is analogous."

Any comments?

Remote Controls

The increasing use of remote controls for television receivers brings to mind the complete absence of any devices of this nature for ordinary radio. I think I have mentioned before, there was at one time on the market an extremely simple, but very efficient little device which enabled one to switch a radio (battery or mains operated) on or off from any room in the house, and the only power required to operate it was a small torch battery. It consisted of a small solenoid, the plunger of which operated a star wheel which alternately opened and closed a simple "on/off" switch contact mechanism, and this was inserted between the power supply and the set with extension leads from the actual control to a simple push (bell type) switch. This device was quite cheap, and I had a switch in each room in my house and used it for a considerable period, but I cannot now remember why it was discarded. I am sure it did not go wrong or breakdown, and I am sure many listeners would be glad to see some device of this nature now on the market.

BOOKS REVIEWED

CABINET HANDBOOK—by G. A. Briggs. 112 pages. Published by Wharfedale Wireless Works Limited, Idle, Bradford, Yorkshire.

YET another book by G. A. Briggs makes its appearance. This time Mr. Briggs writes about almost every aspect of cabinet design and construction. The presentation follows the author's usual inimitable style in which a wealth of technical information is presented in an easily readable form which includes numerous detailed explanations. The descriptions are enlivened in many instances by humorous references which add to the appeal of the work and not as might be thought detract from it. For instance, the author recounts how when testing a guitar and amplifier in the open air, scores of people were entertained in the village of Idle "as the guitar could be heard half a mile away".

As well as dealing with the acoustic design and performances of cabinets, the author also discusses the actual construction and the following list of chapter headings will give some idea of the coverage of the book:—Material; Plywood; Adhesives; Veneering; Machines; Assembly; Polishing; Mesh; Resonance; Absorbents; Home Equipment; Cabinet Design; Treble Enclosures; Electric Guitars; and Room Treatment. This is a book which can be recommended to all hi-fi enthusiasts.

RADIO CONTROLLED MODELS—by R. H. Warring. 134 pages. Published by Museum Press Ltd. Price 16s.

ENTHUSIASTS of radio controlled model building must combine knowledge of electronics and mechanics to pursue their hobby, as apart from the problem of transmitting a signal to a suitable receiver on the model, some mechanical method must be used to change the electrical action in the receiver to a physical movement of the controls of the model. Therefore a large part of the interior of the model must be devoted to batteries, receiver and actuator (the device for converting the action of the receiver relay into mechanical movement) and in most cases this means designing both the mechanical and electrical equipment on a very small scale to fit into the limited space available.

It is here that the constructor with no previous knowledge of this kind of work usually comes unstuck and it is at this point also that this book will prove invaluable in making unnecessary the time-wasting, and often heart-breaking experiences of experimenting with various control systems which the enthusiast will have to make when no such guidance is at hand. The disposition of the equipment about the model is of great importance (especially in model aircraft), the correct use of the batteries to run the controls also; these and all the other finer points, which would only occur to the average constructor after a good deal of trial and error, are dealt with in detail in this publication and it will save a great amount of

wasted effort if referred to before any building begins.

The fundamental facts of radio control are dealt with but the author quickly moves out of theory after the first chapter, into descriptions of practical equipment. Transmitters, receivers and actuators each have a separate chapter devoted to them and then various refinements of the basic systems (such as multi-channel equipment etc.) are dealt with.

FUN WITH ELECTRONICS—by Gilbert Davey. 64 pages. Published by Edmund Ward Limited. Price 12s. 6d.

THE definition of the word "fun" must, of course, depend largely on the fun-maker, as one person's way of amusing himself would not suit a thousand others. But to the young beginners in amateur radio and electronics in general—for whom this latest work of Gilbert Davey has been published—this book will, at first sight, prove a disappointment. Mr. Davey has secured the admiration of thousands of boys through his series on television and his articles and books dealing with the world of amateur radio, but in this book many will find that the practical side of electronics has been neglected rather and too much space has been devoted to descriptions of commercial equipment, which combined with the frequent reference to manufacturers' data, detracts from the idea that is suggested by the title, which is to have "fun with electronics".

However, the book includes several designs suitable for young radio enthusiasts, with clear and concise descriptions of the construction of receivers, amplifiers, etc. In chapters of a practical nature, the author ensures that the reader does not simply put the components together without knowing why or how they work—all constructional detail is preceded by an explanation of the theory involved. This is what makes Gilbert Davey so popular—his ability to explain "what makes it tick" without baffling his pupils with scientific jargon.

As stated before, there are several chapters which describe commercial equipment, such as tape recorders, car radios, amplifiers etc., and to some—especially to those beginning to take an interest in hi-fi—this information will prove very useful, as much of the field of electronics, by virtue of the complexity of the circuits involved and the expense of components, is outside the knowledge and the pocket of the amateur constructor, who must then, necessarily, turn to manufacturers' equipment. Therefore, the chapter describing tape recorders, for example, will prove valuable to anyone contemplating buying one as these instruments are difficult to make for the amateur without much experience of construction to make. The same applies to the chapters on record players and on loudspeaker enclosures.

The book ends with an interesting chapter describing the uses of electronics in industry, the services, science and education.

SERVICING TAPE RECORDERS

RECORDING AND PLAYBACK EQUALISATION

By T. S. Smith

(Continued from page 227 of the July issue)

LET us recapitulate a little and have another look at the diagrams on pages 52 and 53 of the May, 1962, issue. Fig. 6 showed how a constant current recording is made so that the magnetic induction on the tape is equal over the audio spectrum. Fig. 7(b) showed how the output on replay would rise with frequency to a peak due to the tape signal passing through a replay amplifier with a flat frequency response, as in Fig. 7(a).

The article last month made clear why the output rises at a constant rate of 6dB/octave to a maximum and why the output falls as the frequency is further increased. The whole point in question, therefore, is how to achieve an output which is flat over the greater part of the A.F. spectrum. A typical frequency response characteristic is shown again in Fig. 16.

From a study of this, it becomes obvious that two things must happen. Firstly, the lower frequencies up to the peak (often known as the "turnover point") must be boosted, and the higher frequencies after the turnover point must also be boosted. These things are carried out partly during the recording process and partly during the replay operations. For example, on 'record', a considerable treble boost or lift is applied to the amplifier at a frequency and magnitude depending on the tape speed and the exact characteristics of the heads.

The curve in Fig. 17 shows such treble lift on a recording amplifier, while the curve in Fig. 18

shows what the replay response would be like by using treble boost on record and zero bass lift on playback. At around 3,000c/s. the bass falls as before (Fig. 16) at the rate of 6dB/octave, but there is a definite indication of treble lift and the response is approximately flat from about 3,000c/s to 10kc/s. It is still far from perfect, of course, and would sound thin and lacking in lower frequencies.

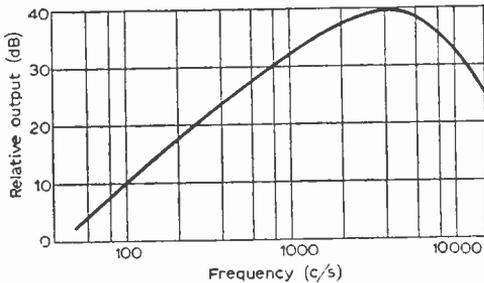


Fig. 16—A typical frequency response characteristic with the bass falling at the rate of 6dB/octave.

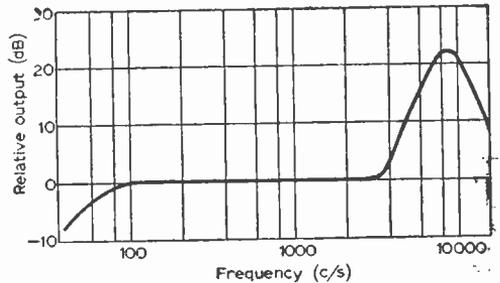


Fig. 17 (above)—How the record amplifier response is given a boost at the high-frequency end to avoid the treble falling too rapidly after the turnover point. (see Fig. 16).

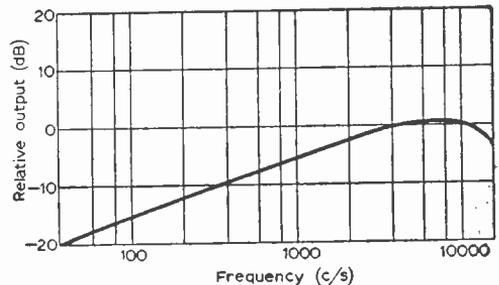


Fig. 18—The replay characteristics on a flat amplifier from a tape which has been recorded with treble boost, as at Fig. 17.

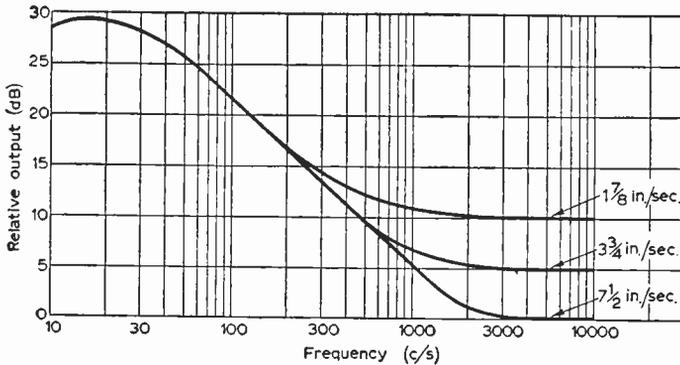


Fig. 19—Three degrees of bass boost corresponding to different tape speeds. Such boost is usually applied to the replay amplifier.

In Fig. 19 are shown three degrees of bass lift on playback corresponding to the three indicated tape speeds. In a similar pattern, three degrees of treble lift when recording are given by the curves in Fig. 20, while the curves in Fig. 21 reveal the overall frequency response characteristics at the three tape speeds of $1\frac{7}{8}$, $3\frac{3}{4}$ and $7\frac{1}{2}$ in./sec. These, of course, are created by making the recordings according to the patterns in Fig. 20 and replaying them with the responses of Fig. 19.

This, then, is equalisation, and the curves in Figs. 19, 20 and 21 relate to a tape amplifier circuit designed by Mullard Limited and described in their leaflet TP421 under the title "3W Tape Amplifier Circuit".

Treble Boost Circuit

The treble is usually boosted in the coupling following the microphone amplifier or pre-amplifier of the recording channel. Quite a reasonable amount of boost is needed as may be seen from Fig. 20, and this is invariably accomplished by a resonant circuit consisting of an inductor and parallel-connected capacitor (sometimes the capacitance is contributed by that of the winding of the inductance).

In Fig. 22 is given the circuit of a pre-amplifier which is often the first stage in the recording channel (this could also be the first stage in the playback channel which, on "playback", would have the head switched into circuit instead of a microphone or radio). The pre-amp stage is usually designed to accept either a microphone signal or a signal from the detector circuits of a radio receiver. When the signal is coupled to the "mic" jack, it is applied direct to the control grid of V1, across R1. This is because full gain is necessary on the low-level microphone

signal, but when the signal is applied to the "radio" jack, attenuation occurs due to the potential-divider network R2 and R3. This constitutes a form of "level" equalisation, as distinct from frequency equalisation, which is the prime subject of this article.

The amplified A.F. is developed across the anode load resistor R4, and from here it is fed through C2, R5 and R6 to the resonant circuit L1/C1. Now, at frequencies away from resonance, the signal level applied to the voltage amplifier is dependent on the ratio of R5 to R6. The network C1/L1 as far as the signal is concerned is low impedance, meaning that the bottom end of R6 can be considered almost as connected to chassis. Let us suppose that R5 and R6 are of equal value and that C2 is sufficiently high to avoid low frequency attenuation. Then, off resonance, half the signal at the anode of V1 will be fed to the voltage amplifier.

What happens at resonance? Since the circuit is parallel-tuned, the impedance across its terminals (A-B) rises sharply at resonance to a value governed by the "goodness value" (i.e., "Q") of the tuned elements. Let us suppose that L1/C1 is tuned to 8kc/s and that at that frequency the impedance across A-B in series with R6 causes the ratio R5:R6 to rise from half to three-quarters. In this event, then, the voltage applied to the

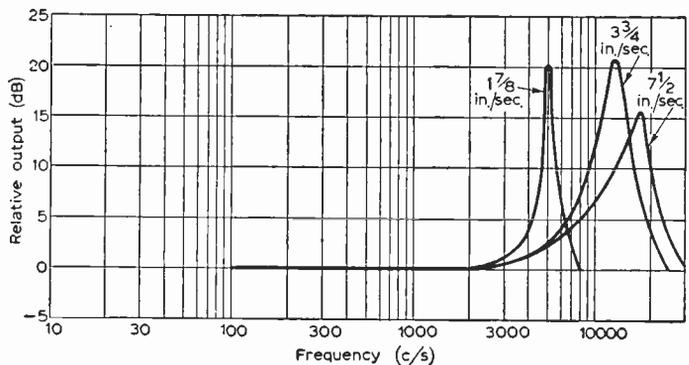


Fig. 20—Three degrees of treble boost, showing how the boost frequency is related to tape speed.

amplifier would also rise from half to three-quarters—but only at resonance. In this way, therefore, the boost is applied in the recording response at the required frequency.

Correction for Different Speeds

As shown by the curves at Fig. 20, top boost has to come in at frequencies to suit the tape speed (and also the characteristics of the head), and

therefore, on multi-speed recorders, some means of switching the recording equalisation is required.

This is simply accomplished on the resonant type of circuit by switching in the appropriate parallel capacitor, as shown in Fig. 23. The values given are taken from the Mullard amplifier referred to in the foregoing text, and L1 is wound on a Mullard Ferroxcube pot core, Type WF816. This gives high efficiency (Q) and excellent equalisation at the lower tape speeds. The frequency of resonance of any tuned circuit is equal to

$$f = \frac{1}{2\pi\sqrt{L.C}}$$

where C is in microfarads and L in Henrys.

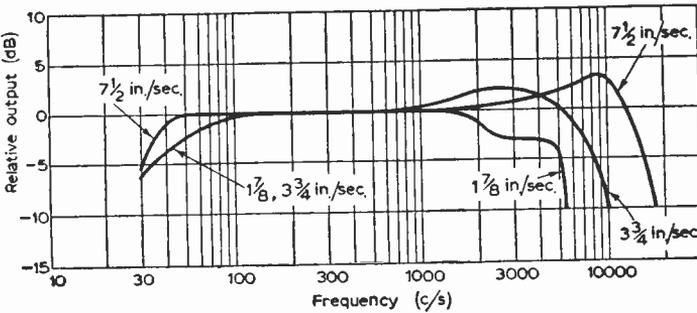


Fig. 21—When the bass boost of Fig. 19 is applied to the replay amplifier, and the treble boost of Fig. 20 is applied to the record amplifier, the resultant overall response is as shown here.

In certain cases, L is made adjustable with a dust-iron core, and misadjustment here should be suspected if there occurs a distinct loss of treble which is definitely not caused by head misalignment or other more obvious defects. In a case such as this, however, it would be as well to check the replay channel on a test tape or tape record and if "top" were then present, then the trouble would almost certainly lie in the record channel.

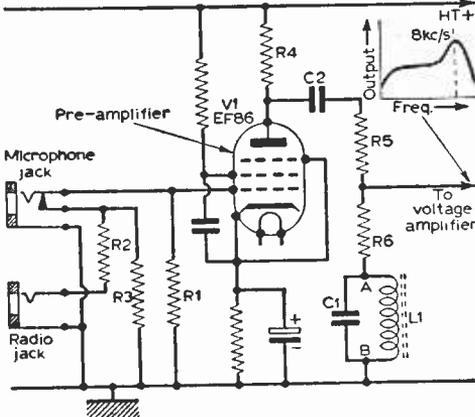
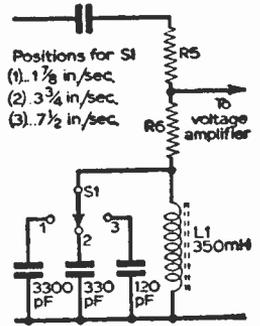


Fig. 22—The pre-amplifier (or microphone amplifier) stage of a record amplifier with treble boost introduced in the coupling circuit by the tuned circuit L1 and C1.

Fig. 23—How the capacitive element of the resonant circuit is switched to give treble boost at the frequency to suit the tape speed.



Bass Boost for Playback

Now is the time to look at the bass boost circuitry used in the playback channel. Such a circuit is given in Fig. 24 and, as with the recording channel, the bass equalisation follows the pre-amplifier — in this case, the replay head amplifier. Instead of an inductor, a capacitor is used in the coupling network, which is C1 in the circuit. What happens is that the capacitor has a low impedance at high frequencies and an increasing impedance as the frequency is decreased. Thus, a potential divider is formed by R1 in one arm and by R2 and Xc in series in the other arm, and the output voltage (that applied to the voltage amplifier) is that which occurs across R2 and Xc in series.

Now, at the high-frequency end of the A.F. spectrum, Xc contributes but little to the bottom arm of the potential divider, and the output voltage is almost proportional to the ratio of R1 to R2. However, at decreasing frequencies Xc adds to R2 progressively, thereby producing an alteration in the overall ratio. (To be continued)

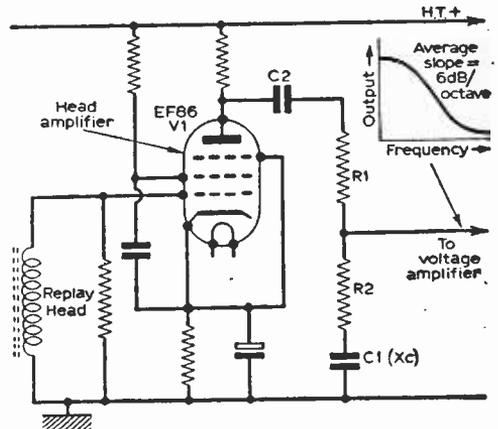
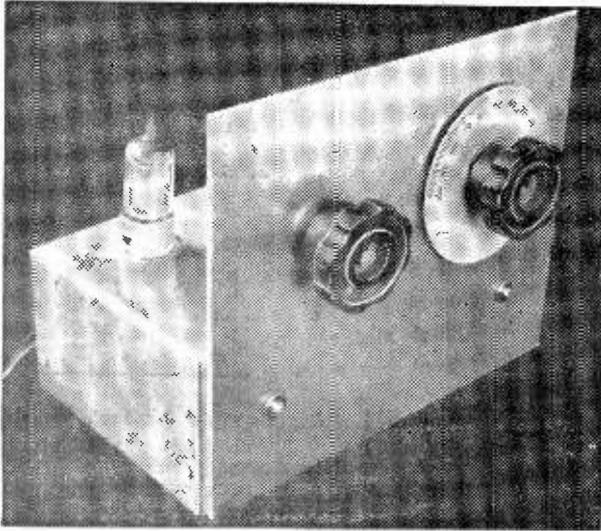
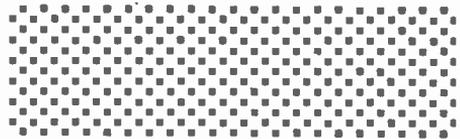


Fig. 24—How the bass boost is applied to the replay pre-amplifier coupling network.



the AT S.



THIS is a very simple receiver, and thus suitable for beginners. If used as a single-range receiver, it will cover approximately 15m to 40m, and this includes those bands most generally used for long distance reception. The set also works well on other wavebands, over the range 9m to 200m, and can easily be wired to take plug-in coils.

Circuit

The circuit is shown in Fig. 1, and none of the component values is critical. The tuning capacitor, VC1, is shown as 160pF, but 100pF to 200pF may be fitted, with some change in band coverage. Current is obtained from a mains power pack, and the phones are isolated from H.T. and mains voltages. The receiver will be safe, if the power pack is arranged as described. Consumption is

quite low, and it may be possible to take supplies from an amplifier or receiver. If so, the safety precautions mentioned for the power pack should be observed.

Regeneration in the detector is controlled by VR1 and this gives high sensitivity. Reaction is obtained by a cathode tap on the coil, and this is an effective and very satisfactory method. The second valve acts as an audio amplifier, with bias developed across R5, which is 10M. C3 should be a mica condenser, to avoid upsetting working conditions.

Coil Windings

For a single, fixed coil, a waveband of about 15-40m is most generally satisfactory, as mentioned. This coil is thus recommended. But if it is wished to tune other wavebands, it is quite easy to wind further coils for these. Ribbed plug-in coils, with a chassis mounting holder to suit, may be easily obtained, and as many coils can then be wound as wanted.

For the 15-40m coil, a ribbed former about 1½ in. to 1¾ in. in diameter, and at least 2 in. long, will be required. The windings are shown in Fig. 2. There is no need to adhere to the exact wire gauges, turns spacing, or other details. Changes in these, or in the coil diameter, will modify the band coverage, but results should be just as good.

The grid winding of the 15-40m coil consists of 9 turns of 22s.w.g. tinned copper wire, turns being spaced to occupy about 1 in. The cathode tap is soldered on one-half turn from the earthed end of the winding. For aerial coupling, 4 turns of 26s.w.g. wire are used, this winding being about ¼ in. from the grid winding, as in Fig. 2. The ends of both windings are

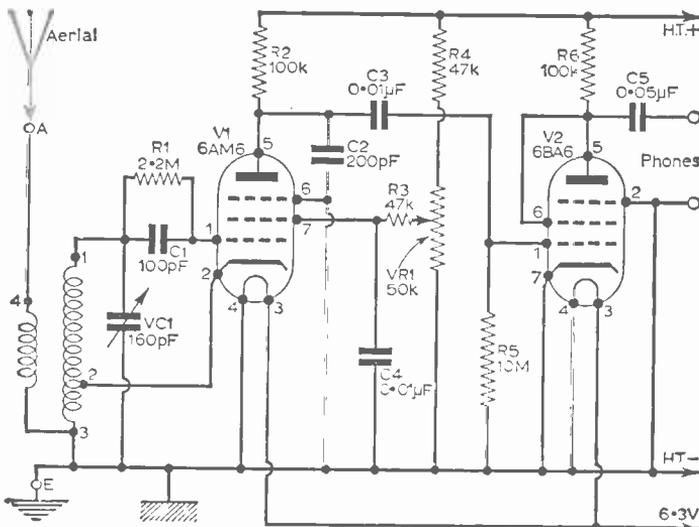
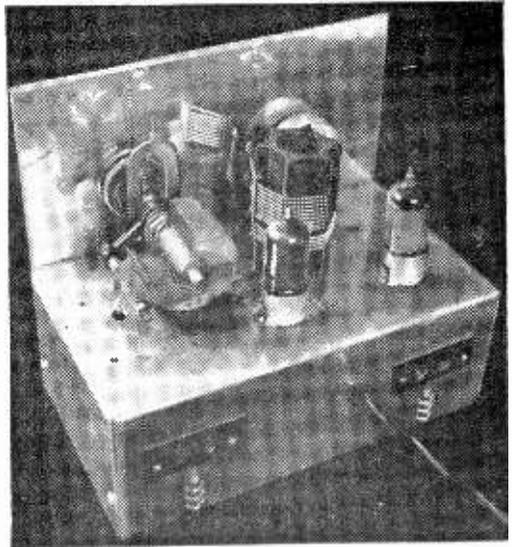


Fig. 1—The circuit diagram.

ANTIC N.TWO

by F. G. Rayer



joined, as indicated, this lead going to the receiver chassis.

Other Ranges

If required, other coils can be wound to give approximate bands as follows:—

9-15m 4 turns 20s.w.g. occupying 1in. space; tap at $\frac{1}{2}$ turn; aerial coupling, 2 turns.

30-60m 16 turns 24s.w.g. occupying $1\frac{1}{2}$ in.; tap at $\frac{1}{2}$ turn; aerial coupling, 6 turns.

60-110m 32 turns 24s.w.g. occupying $1\frac{1}{2}$ in.; tap at 1 turn; aerial coupling, 8 turns.

100-200m 55 turns 24s.w.g. occupying $1\frac{1}{2}$ in.; tap at $1\frac{1}{2}$ turns; aerial coupling, 12 turns.

Aerial coupling windings of coils covering 30 to 200m can be of 28s.w.g. or similar enamelled wire, with turns side by side, to save space.

Chassis and Panel

Fig. 3 shows the layout, the chassis being 7in. x 4in. and 2in. or $2\frac{1}{2}$ in. deep. The panel is 7in. x 6in. and is secured to the front runner of the chassis by means of two 6B.A. bolts. Fig. 3 will allow the valveholder holes to be suitably placed, and indicates the positions for valves.

Further details of the tuning drive will be seen in Fig. 5. The dial is slightly clear of the panel, some form of reduction drive is essential, and a small ball-drive of this kind is easy to fit. The projecting lug on the drive must be prevented from rotating, and this is arranged by passing a bolt through the panel, as in Fig. 3 or Fig. 5. A slotted bracket will allow the tuning capacitor to be mounted at the correct height, so that the whole turns smoothly.

The moving plates tag of the tuning capacitor is connected to a tag bolted to the chassis. Lead 1 from the coil is left long

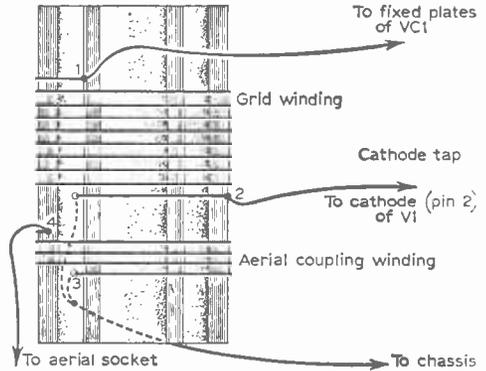


Fig. 2 (above)—The coil winding details.

Fig. 3 (below)—The above-chassis layout of components.

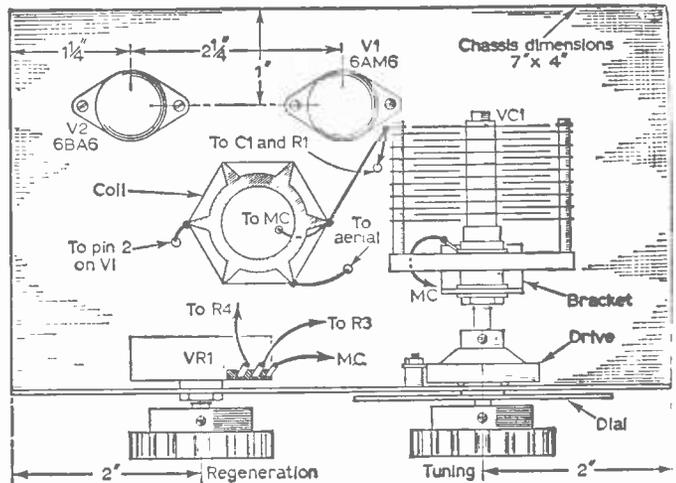
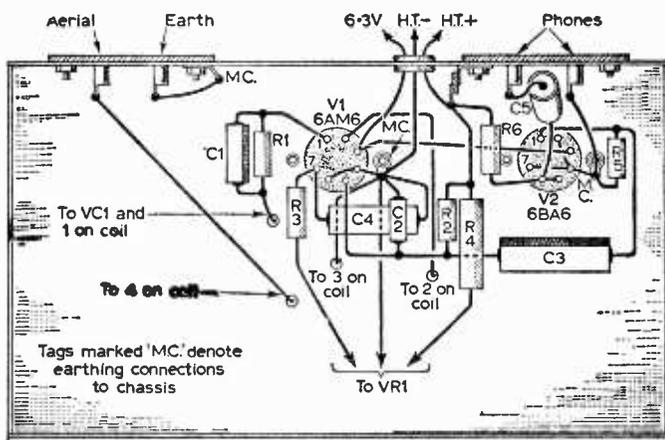


Fig. 4 (right)—The underchassis wiring diagram.



enough to reach the fixed plates, as in Fig. 3. An insulated lead also passes from this point, through the chassis, to R1 and C1.

Lead 4 of the coil is long enough to reach the aerial socket, and is covered with sleeving. The cathode tap goes to pin 2, as indicated. The remaining coil lead passes directly through the chassis to a tag.

Three leads are taken from the 50k potentiometer; all these may be passed through a single hole, provided they are correctly identified, or the lead marked 'M.C.' may be earthed to the panel at the potentiometer bush.

Wiring and parts underneath will be seen from Fig. 4. A tag is placed on each bolt holding the valveholders, and also on the bolt near the earth socket E. These points, marked M.C., are in good

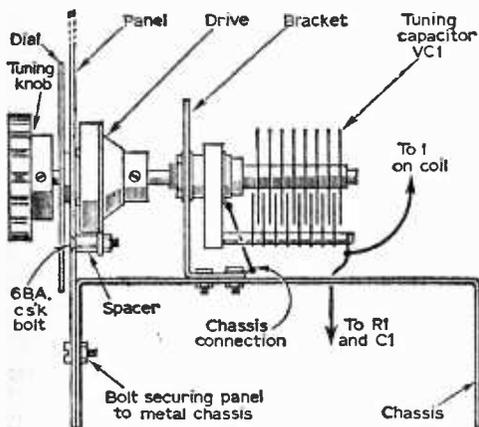


Fig. 5 (above)—The tuning drive mechanism.

COMPONENTS LIST

Resistors:

- R1 2.2M
- R2 100k 1W
- R3 47k
- VR1 50k
- R4 47k 1W
- R5 10M
- R6 100k 1W

Capacitors:

- C1 100pF mica
- C2 200pF mica
- C3 0.01µF mica
- C4 0.01µF 250V paper
- C5 0.05µF 500V paper

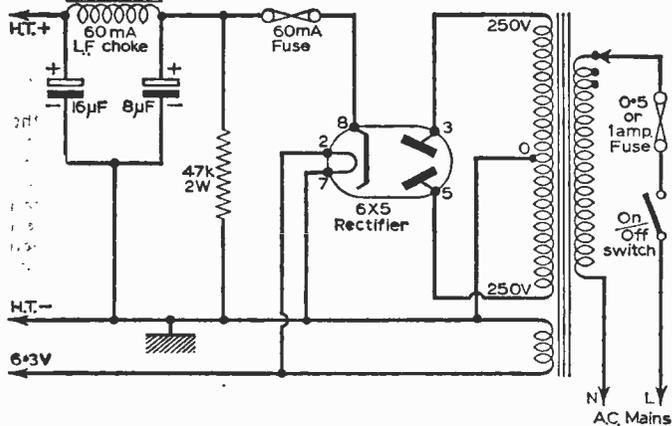
VC1 160pF S.W. tuning capacitor (see text)

Valves:

- V1 6AM6
- V2 6BA6

Miscellaneous:

Chassis—approximately 4in. x 7in. x 2½in.; panel—about 7in. x 6in.; two twin sockets for Aerial, Earth and Headphones; insulated tag strip; two BTG valveholders; condenser bracket; 6:1 or similar ball-drive; two 1½in. knobs; 2½in. or similar 0-100 or 0-180 dial; ribbed coil former about 1½in. x 2½in. long (or 1½in. diameter plug-in coil formers, and chassis socket—Eddystone).



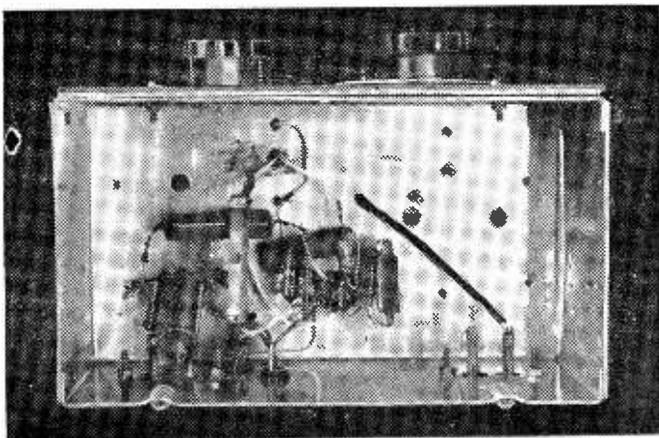
contact with the chassis. If the valveholders are of the type with a centre metal spigot, this is joined to the nearest M.C. tag.

A single tag, on a small tag strip, and insulated from the chassis, forms the H.T. positive junction point, for R2, R4 and R6. The three supply leads emerge through a grommet in the rear runner, and should be identified to make sure there is no error in connecting the receiver to its power pack. A lead from the chassis forms the H.T. negative connection, and is also the return for the heater circuit. Pins 3 on both holders

Fig. 6 (left)—The circuit of the power supply.

are joined, and the lead from this point is for the 6.3V supply. The remaining lead is for H.T. positive, as described.

The wires from R1 and C1 to pin 1 should be short, to avoid hum. For the same reason, the wires from C3 to R5, to pin 1 of the second holder, should be short, direct, and clear of the heater lead.



An underchassis view of the receiver

Power Supply

If a mains unit is to be constructed for the receiver, the circuit in Fig. 6 will be satisfactory, and can provide current for larger equipment, at a later date. The 6X5 requires 0.6A for its heater. Added to the 0.6A of the two receiver heaters, the total consumption is 1.2A, so a 1.5A winding will easily provide this current, and also current for a 6.3V, 0.3A indicator lamp, if wanted. A 6.3V heater winding with a higher current rating is also suitable.

The receiver requires a very small H.T. current, at 150V to 250V or so. For the receiver only, the smoothing choke may be replaced by a 5k resistor. However, the power pack is more useful for other purposes when a choke is used. The H.T. voltage will rise somewhat, with little or no current drawn, so a 47k bleeder resistor is fitted. The H.T. voltage can be reduced, if wished, by wiring a resistor

between the 60mA fuse, and choke. This fuse is merely to protect the rectifier and transformer, in the event of an H.T. short.

Current is drawn from a 3-pin plug, and the chassis of the receiver is earthed. If this earthing is effective, and a 500mA or other low-rating fuse is included in the mains circuit as in Fig. 6, mains voltages cannot be present at the receiver, even if the mains transformer were faulty.

If preferred, the power pack can be scaled down, to provide a supply of up to 10mA or so, at 150V to 200V. This can be arranged by using a small metal rectifier, and "feeder" type mains transformer. The earthing, and mains fuse should not be omitted, however.

The receiver must not be worked from an A.C./D.C. power circuit, in which the H.T. negative line is connected to one mains lead.

Operating Notes

Any kind of aerial can be used, including short indoor wires. Naturally a fairly efficient aerial will give best results with the weaker, more distant stations. If the aerial is at all long, a small condenser should be added in series with it, at the receiver. A 25pF pre-set trimmer is suitable, or the lead-in can be twisted for a few inches round another insulator wire, to form a small capacity.

Tuning will be very sharp and critical, especially with weak stations, and with loose aerial coupling. Reaction is also very critical, with weak distant stations. Powerful stations will be heard easily, and the exact setting of the reaction control will not then be very important, but, for weak stations, this control must be operated very carefully. It is slowly turned clockwise, from zero, until the set is just on the point of oscillation. Sensitivity is then extremely high, and very long distance reception is possible. The reaction control should be carefully adjusted, as necessary, while tuning. It must not be rotated too far, or the receiver will oscillate and sensitivity will be reduced. ■

A COMPACT CONVERTER *(Continued from page 305)*

Waveband switching could be fitted but would necessitate a larger chassis with consequently lengthened leads. Separate trimmers, TC1 and TC2, were used in the original, but these might well be an integral part of an existing twin gang capacitor. Use of a 500pF (nominal) type is possible for tuning, but high grade mica 1000pF fixed capacitors must be connected in series with each section to reduce the maximum capacitance value.

Constructional Notes

The dimensions of the small chassis with all necessary cutting and drilling details are shown in Fig. 2. The front panel carries all the variable

controls, and the dimensions of this are shown in Fig. 3. Hardboard or plywood may be used provided aluminium foil is glued firmly to the back to eliminate hand capacity effects later. Quadrant— $\frac{1}{8}$ in. or $\frac{1}{16}$ in.—should be cut and mitred to provide rigidity and also improve the appearance. The chassis and front panel may be fixed together by whatever is considered the simplest method. Coils L1 and L2 should be mounted direct and locked thumb tight only by means of the polystyrene locking nuts provided, but, for L3, the lid of the metal container supplied should be drilled and the coil mounted through it. The body of the tin can be screwed into position later.

(To be continued)

Faults in Transistor Output Stages

By J. Christy

HOW TO DEAL WITH DEFECTS IN THE AUDIO AMPLIFIER

INCORRECT operation of the audio amplifier, or output stages of a transistor receiver, will most probably cause unsatisfactory results. Reproduction may be distorted, or there may be lack of volume, or current consumption may be too high, so that the battery fitted in a miniature receiver has only a short working life.

Any of these defects can make the receiver disappointing, but fortunately troubles of this kind are among the easiest to cure. In many cases the fault may arise from nothing more serious than the use of resistors of incorrect value.

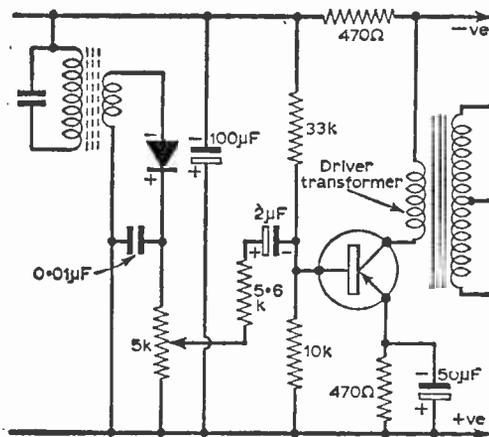


Fig. 1—A diode detector and class A driver stage.

Audio Check

It is fairly easy to check the audio signal which is being obtained from the earlier stages of the receiver. If this signal is strong, clear, and free from any objectionable distortion, then distorted reproduction from the loudspeaker is arising in the audio or output stages.

Previous stages, and the quality to be expected, can be checked by listening to the signal available from the diode detector with medium impedance headphones. To avoid upsetting the AVC action, and the direct-current working conditions, an isolating condenser of about $0.25\mu\text{F}$ to $0.5\mu\text{F}$ should be included in one headphone lead. The phones are then wired from the slider of the

volume control to the battery positive line. Speech and music should sound free from distortion, and really loud.

It is also possible to listen to the signal with an audio probe or tester, or amplifier. The usual care should be taken to avoid introducing hum, instability, or external voltages into the transistor circuit.

Driver Stage

Most circuits use a driver, followed by push-pull output stage. A typical driver stage, with values for an OC71 transistor, is shown in Fig. 1.

The phones and isolating condenser already mentioned form an easy means of checking this stage. Volume should be reduced, and the headphone lead transferred, with isolating capacitor, from the volume control slider to the driver collector. This should bring about a great increase in volume, and the quality of reproduction should still be satisfactory.

Distortion in this stage can be caused by incorrect base and emitter resistor values. If the stage is very noisy, and consumes more than about 1.5mA to 2mA , the 10k resistor value is probably too high, or the 33k resistor value too low. An error in reading the colour code could be suspected. Current may be checked with a meter between driver transformer primary and battery negative line.

If reproduction is distorted, the base voltage is probably too positive. A low value in the 10k position, or a high value in the 33k

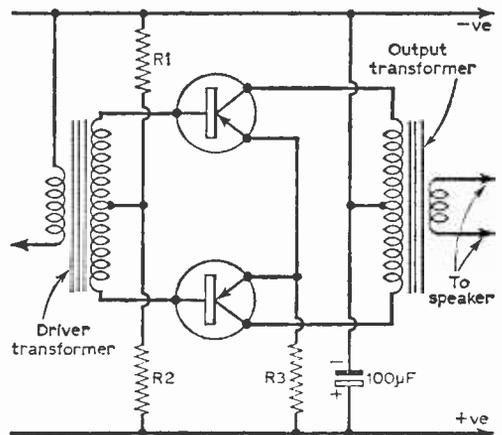


Fig. 2—A typical class B output stage.

position, could be responsible. Here, 47k and 10k values are often employed with a 1k emitter resistor.

It is relatively easy to check the values of the two base resistors, and the emitter resistor in this stage. Lack of volume may also be caused by a defective 50 μ F condenser. This may be checked, if necessary, by temporarily wiring a further condenser in parallel with the one already fitted. The exact value is not critical.

If these points are in order, the transistor must be suspected. Surplus or alternative transistors may need different resistor values, or have a high noise level, or introduce distortion when volume is attempted.

Class A Output Stage

A few receivers have Class A output stages, employing a single transistor. This transistor is often driven by an audio stage similar to that in Fig. 1, though resistance capacity coupling is probable.

If the driver stage is giving satisfactory results, as already described, the same tests can be applied to the Class A output stage. That is, base and emitter resistor values should be checked, and the emitter bypass condenser can be tested.

Fig. 3(a) illustrates the operation of a Class A stage, either driver or output. The transistor is conducting during the whole of the audio cycle, and there is little difference between the current with no signal, and the average current with a signal. Such stages thus pass a fairly high, steady current, even with no signal. If the base voltage is too negative, the waveform moves upwards, so that the shaded area representing current flow increases. This results in excess current, in the way previously described. If the base voltage is too positive, the waveform moves downwards, so that the current almost or completely ceases in the dips, causing the distortion mentioned.

Class B Output

Fig. 2 shows a popular type of Class B or push-pull output stage. The resistor values must suit the transistors. For OC72's, R1 might be 6.8k, R2 might be 220 Ω , and R3 might be 4.7 Ω . If other transistors are used it is almost certain that one or more of these resistor values will have to be changed for proper results.

The low value of R2 makes the transistor base voltage near positive, so that each transistor is passing only a small current, with no signal. The current taken by the pair may be about 2mA to 7mA, with no signal.

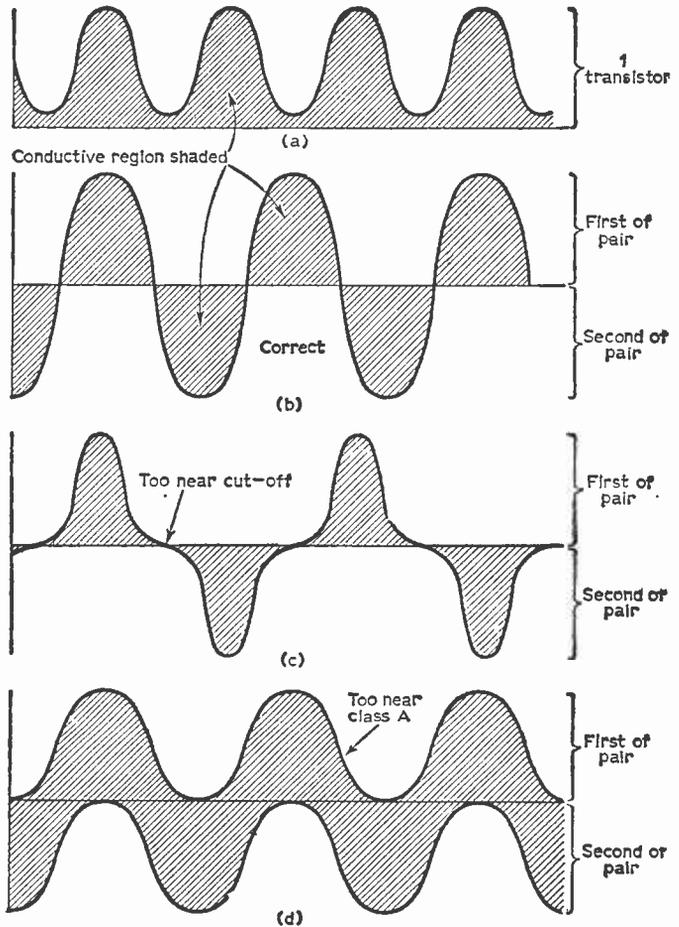


Fig. 3—Correct and incorrect operation of output stages.

When a signal is present, each transistor is driven by its own half of the transformer secondary. Ideally, each of the pair conducts similarly on different half-cycles, as in Fig. 3(b), combining to operate the speaker through the centre-tapped output transformer. (The ideal conditions shown are not wholly attained in practice.) With signal peaks, the pair will be drawing about 15mA to 25mA, the current depending directly on the volume.

If the base voltage is too positive, the pair will pass very little current, with no signal. When a signal is present, the output may be similar to that in Fig. 3(c). This cross-over distortion (lack of linearity) is very unpleasant, and sounds in some ways like a defective loudspeaker. The cure is to increase R2, or reduce R1 (see Fig. 2).

If the base voltage is too negative, each of the pair will work in a similar manner to a Class A amplifier. The way in which the signals combine may be represented by "D." The overall output is much reduced, and the no-signal current of the

pair is high. If R1 is increased in value, or R2 is reduced, this trouble will be removed.

R2 is frequently of very low value, perhaps 68Ω to 220Ω or so. The secondary of the driver transformer contributes to the resistance in series with the base, and this has some effect on results. If a driver transformer of different type to that specified for a circuit has been used, some slight change in the value of R2 may thus be necessary.

The emitter resistor R3 is sometimes omitted. This resistor can help to maintain operating conditions during changes of temperature. A typical fault of this kind arises when the receiver is left in a cold room, so that the drop in transistor temperature brings the transistors nearer the cut-off conditions shown in Fig. 3(c). If this happens, reproduction may sound distorted, but this may cease after a time, when the transistors have slightly increased their temperature.

output pair will not usually give best results with alternative transistors, unless they are of very similar type indeed.

If transistors such as the OC71 and OC72 are merely replaced by larger power transistors, such as OC81D and OC81, this will only cause a worsening of results, unless operating conditions are changed to suit.

Single-Ended Push-Pull

Circuits of this kind are also used in miniature sets, and one, with values for the OC71 and OC72's, is shown in Fig. 4. If this is examined, it will be seen that each transistor operates on half the supply voltage. Each transistor may be regarded as a separate amplifier, with its own base and emitter resistors. Output is obtained from collector and emitter, and the loudspeaker is coupled by the 100μF condenser.

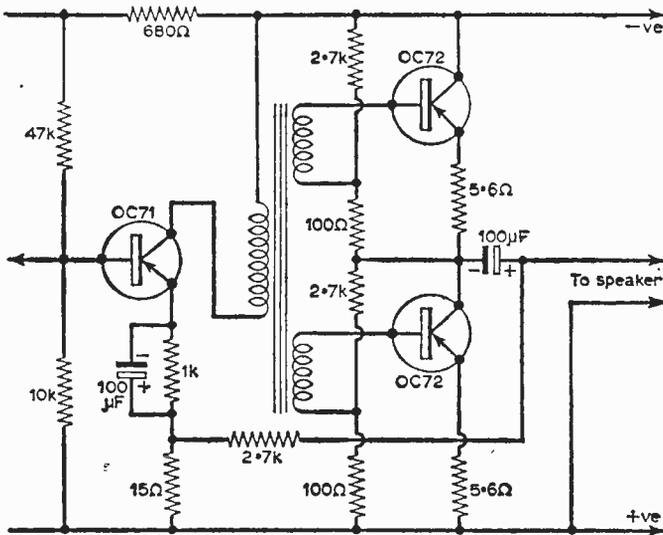


Fig. 4—A push-pull output stage without an output transformer.

Matched Pair

Both transistors are supplied by the same resistors R1, R2 and R3. They should thus have as nearly as possible the same operating characteristics.

For best results, it is thus wise to employ a matched pair, which have been selected by the maker, and boxed together. If two individual transistors of the same type are purchased, they may work together satisfactorily. Alternatively, they may really require slightly different base voltages. If so, the output from the pair will approximately resemble that obtained by adding the top of Fig. 3(b) to the bottom of Fig. 3(c), or the top of Fig. 3(b) to the bottom of Fig. 3(d).

Transformers

For best results, the resistance and ratio of both driver and output transformer should suit the driver and output transistors. This means that transformers intended for a particular driver and

For correct working, resistor values have to be provided as already explained. It is also necessary that the two separate halves of the driver transformer are connected in the correct phase. (This is automatically assured with the centre-tapped transformer in Fig. 2, unless actual wiring is incorrect.)

Fig. 4 also shows a typical negative feedback circuit. This is from the junction of the loudspeaker and 100μF condenser, through the 2.7k resistor, the feedback being developed across the 15Ω resistor. Note that the 100μF OC71 emitter condenser is in parallel with the 1k resistor, not from emitter to battery positive, which would short out the feedback circuit.

With all feedback circuits, the wrong phase will cause the amplifier to oscillate. Wrong phase may arise from connecting any transformer winding the wrong way round. With circuits like that in Fig. 2, feedback is often taken from

the output transformer secondary. Reversed connections here may thus cause oscillation.

Most amplifiers of this type will remain stable with the feedback circuit disconnected. An easy test can thus be made to see if any oscillation is caused by this circuit.

Resistor Tolerances

If correct working is to be assured, without any experiment, the base voltage must be within close limits, for the reasons described. This means that close tolerance resistors should be used. For example, the 100Ω and 2.7k resistors in Fig. 4 should be within 5% of the specified value.

If resistors of wide tolerance are used, the values may be correct, or they may be too far from the specified value, so that results are poor. Resistors of 5% tolerance have a gold marking. A silver marking indicates 10% tolerance, and such resistors may be used elsewhere. Resistors with no

(Continued on page 333)

See the whole range at



The Radio Show, Stand 15.



SB-10U

SINGLE SIDEBAND ADAPTOR, Model SB-10U. May be used with most AM transmitters. Less than 3 w. R.F. input power required for 10 w. output. Operation on 80, 40, 20, 15 and 10 m bands on USB, LSB or DSB £37.60

AMATEUR TRANSMITTER, Model DX-40U. Self-contained. 80-10 m. Power input 75 w. C.W., 60 w. peak, C.C. phone. Output 40 w. to aerial. Provision for V.F.O. £32.10.0

VAR. FREQ. OSCILLATOR, Model VF-1U. Calibrated 160-10 m. fundamentals 160 and 40 m. Ideal DX-40U and similar transmitters £11.2.0

R.F. SIGNAL GENERATOR, Model RF-1U. Gives accurate source of R.F. up to 100 Mc/s on fundamentals and 200 Mc/s on harmonics. Up to 100 mV output on all bands £11.18.0

AUDIO SIGNAL GENERATOR, Model AG-9U. 10 c/s-100 Kc/s, switch selected. Distortion less than 0.1%. 10 v. sine wave output metered in volts and dB's £19.19.6

VALVE VOLTMETER, Model V-7A. Measures volts to 1,500 (C.C. and RMS) and 4,000 pk to pk. Res. 0.1Ω-1,000 MΩ. D.C. input impeded. 11 MΩ. With test prods, leads and standardising battery. £13.0.0

PORTABLE SERVICE OSCILLOSCOPE, Model OS-1. Compact portable scope ideal for servicing and general work. Y amplifier sensitivity 10 mV/cm; response. 3 dB 10 c/s-2.5 Mc/s. Time base 15 c/s-150 kc/s. Printed circuits. Case 7½ x 4½ x 12½ in. long. Wt. only 10½ lb. £19.10.0

5in. OSCILLOSCOPE, Model O-12U. Wide-band amplifiers essential for TV servicing. F.M. alignment etc. Vertical freq. response 3 c/s-5 Mc/s without extra switching. T/B covers 10 c/s-500 Kc/s in 5 ranges £36.10.0

RES.CAP. BRIDGE, Model C-3U. Measures capacity 10 pF-1,000 μF, resistance 100Ω-5MΩ and power factor. 5-450 v. test voltages. Safety switch. £8.6.6

SINGLE CHANNEL AMPLIFIER, Model MA-12. 10-12 watt Hi-Fi amplifier. Extremely low distortion and wide frequency range £10.19.6

HI-FI EQUIPMENT CABINETS. Range available to meet various needs. Details on request. (MALVERN equipment cabinet illustrated bottom left) from £11.12.6 to £18.10.0

GRID-DIP METER, Model GD-1U. Coverage from 1.8 Mc/s to 250 Mc/s. Complete set of plug-in coils provided £10.9.6



MALVERN

TAPE RECORDING/PLAYBACK AMPLIFIER, Model TA-1. Monaural (TA-1M) £18.2.6

Conversion unit to Stereo £6.10.0

Stereo (TA-1S) £23.6.0

"PACKAGED DEALS" of Hi-Fi equipment including **TAPE DECKS, RECORD PLAYERS** and **DECCA ffs PICK-UPS.**

THE "MOHICAN" GENERAL COVERAGE RECEIVER, Model GC-1U.

Fully transistorised, including 4 piezo-electric transmitters. The very latest and an excellent portable or general purpose receiver for the Amateur and short-wave listener £38.15.0



GC-1U

AMATEUR TRANSMITTER, Model DX-100U. Covers all amateur bands. 160-10 m. 150 w. D.C. input. Self contained including power supply. Modulator, V.F.O. (illustration bottom right). £71.10.0

SHORTWAVE TRANSISTOR PORTABLE, Model RSW-1. Two short bands, trawler and medium £21.6.0

6-TRANSISTOR PORTABLE, Model UXR-1. Preamplified I.F. transformers, printed circuit, 7 x 4in. high flux speaker. Real hide case £14.3.0

HI-FI F.M. TUNER, Model S-33. Tuning range 88-108 Mc/s. Tuning Unit (FMT-4U) with 10.7 Mc/s I.F. output (£3.2.0 inc. P.T.) I.F. Amplifier (FMA-4U) complete with cabinet and valves £11.11.0. Total £14.13.0

6-W STEREO AMPLIFIER, Model S-33. 3 w/chl. inputs for radio/tape and gram. Stereo or Mono, ganged controls. Sensitivity 200 mV. £12.8.6

HI-FI 18W STEREO AMPLIFIER, Model S-99. Ganged controls. Stereo/Mono gram, radio and tape recorder inputs. Push-button selection. Printed circuit board construction £26.19.0

TRANSCRIPTION RECORD PLAYER, Model GL-58. Goldring-Lenco four speed unit. G.60 pick-up arm and infinitely variable speed adjustment between 33 and 80 r.p.m. with fixed speed at 16 r.p.m. Balanced turntable (3½ lb.). Stereo £19.12.6

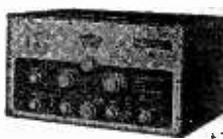
HI-FI SPEAKER SYSTEM, Model SSU-1. Ducted-port bass reflex cabinet "in white". Twin speakers. Pedestal model £11.15.0. Bookcase model £10.14.0

"COTSWOLD" HI-FI SPEAKER SYSTEM. Acoustically designed enclosure "in white". 26 x 23 x 15½. 12in. bass speaker with 2in. speech coil, elliptical middle speaker. Pressure unit covers the full freq. range of 30-20,000 c/s., complete with cross-over unit, level control, etc. £21.19.0

COMPLETE MATCHED STEREO OUTFIT. Includes record player, S-33 amplifier and twin SSU-1 speaker systems. (Pedestal speaker legs optional £2.2.0) £44.9.0

STEREO CONTROL UNIT USC-1. Luxury model with press-button inputs to suit any pick-up or tuner and most tape-heads. Output 1.3 v. R.M.S. per channel. Printed circuit construction £18.18.6

STEREO HEAD PREAMPLIFIER USP-1. Ideal for boosting tape-head output and low output pick-ups (e.g. Decca ffs) £6.17.6



DX-100U



F.M. TUNER



S.33



S.88



DX-40



UXR-1



OS-1



SSU-1

Deferred Terms available on orders over £10

Prices include free delivery UK

Please send me FREE CATALOGUE (Yes/No).....

Full details of model(s).....

NAME

ADDRESS

PWB

DAYSTROM LTD.

Dept. P.W.8, GLOUCESTER, ENGLAND

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

THE LINEAR L1/10

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

Full advantage has been taken of latest component miniaturisation developments to produce a 10-watt Hi-Fi push-pull amplifier incorporating tone control pre-amplifier stages within the measurements of 9 x 7 x 5 ins. In addition two high impedance input sockets are provided for microphone and gram., etc. With selector switch and vol. control, five B.V.A. valves are employed ECC83, ECC83, EL84, EL84, EZ81, H.T. and L.T. power supply point is included for a radio tuner.

FREQUENCY RESPONSE

± 1 d.b. 30-20,000 c.p.s.

MAXIMUM POWER OUTPUT

in excess of 14 watts.

SENSITIVITY

L.P. 220 m.v. for 10 watts. 78 r.p.m. 220

m.v. for 10 watts. Radio/Microphone 40

m.v. for 10 watts.

TREBLE LIFT CONTROL

+ 10 d.b. to -22 d.b. at 12,000 c.p.s.

BASS CONTROL

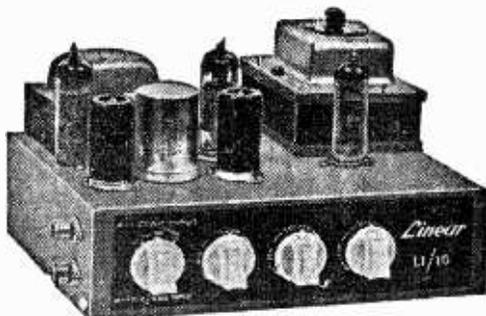
+ 14 d.b. to -10 d.b. at 50 c.p.s.

HUM LEVEL

Referred to maximum output and including integral pre-amp.—70 d.b.

NEGATIVE FEEDBACK

21 d.b. in main loop.



HARMONIC DISTORTION Less than 0.1% measured at 8 watts at 1000 c.p.s. Weight 10 lbs. Power consumption 90 watts. For 200-230-250 v. 50 c.p.s. A.C. mains. Outputs for 3- and 15-ohm speakers. Chassis finish stoved Gold hammer.

HIGHEST QUALITY Retail Price

MAXIMUM RELIABILITY **13**
AT A PRICE YOU CAN AFFORD **GNS.**

Send S.A.E. for descriptive literature

TRADE ENQUIRIES to

LINEAR PRODUCTS LTD.

Also Available—**THE L.45.A** compact High Quality 4.5 watt amplifier. Size approx. 7.5-5 1/2 in. high. Sensitivity is 28 millivolts so that the input socket can be used for either microphone or gram., tape, radio tuner etc. B.V.A. valves used are ECC83 EL84, EZ80. Controls are: Vol. Treble and Bass with mains switch. The Tone controls provide full compensation for long playing records. Output matching for 3 ohm loudspeaker. Retail price £5.19.6.

THE LT45 TAPE DECK AMPLIFIER. A complete unit (power pack and oscillator incorporated) ready for connection to A.C. mains. 3 ohm loudspeaker and practically any make of deck. Negative feedback equalisation adjustment by multi-position switch for 1 1/2, 3 1/2 and 7 1/2 in. per second. Retail price 12 gns.

DIATONIC 10-14 WATT. High Fidelity amplifier with integral pre-amplifier. Retail 12 gns.

CONCHORD 30 WATT. Hi-Fi amplifier with two separately controlled inputs. Retail 16 gns.

L50 50 WATT AMPLIFIER. Size approximately 14 x 10 x 8 in. Sensitivity 25 mV. Output for 3 and 15 Ω speakers. Retail price 22 gns.

L55 STEREO AMPLIFIER 5 + 5 watt 12 gns.

ELECTRON WORKS, ARMLEY LEEDS

SENSATIONAL NEW 1962 DESIGNS — BY CONCORD

LOW PRICES ★ PICTORIAL STEP-BY-STEP PLANS ★ EASY AS A.B.C.

THE NEW "LISBON" TRANSISTOR SET

This is a pocket 2-stage transistor set not much larger than a matchbox. Excellent clear reception covering all medium waves, works for months off a tiny 1 1/2 or 3 volt battery costing only 3d. Easy to build and an excellent introduction to transistor circuitry. Everything can be supplied down to the last nut and bolt incl. **PICTORIAL STEP-BY-STEP PLANS FOR ONLY 19/6**, plus post and packing 1/6. (C.O.D. 2/- extra). Parts sold separately, priced parts list 1/-.



THE NEW "VOLKSRADIO" ONLY 19/6

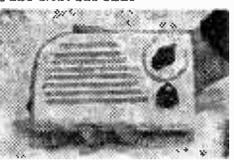
TAKE-OVER BID MAKES THIS FANTASTIC OFFER POSSIBLE—the beautifully compact "6-STAR VOLKSRADIO"

measuring 4 1/2 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 it in one or two hours using our simple A.B.C. plan. Complete set of parts ONLY 19/6, plus 2/6 P. & P. C.O.D. extra. (Parts can be bought separately). Money Back Guarantee.



OUR NEW 4-STAGE "MINUETTE"

Build this newly-designed "MINUETTE" 4-STAGE transistor set in very strong ready drilled ULTRA-MODERN CASE, size only 6 x 3 1/2 x 1 1/2 in. Uses three transistors and diode and SELF-CONTAINED LOUD SPEAKER. Very sensitive. Ideal for office, bedroom, holidays, etc. Months and months of listening off an 8d. battery. Can be built FOR ONLY 39/6, including PROPER CASE, miniature speaker, etc. **PICTORIAL STEP-BY-STEP PLANS** etc., plus post and packing 1/6 (C.O.D. 2/- extra). Parts sold separately, priced parts list 1/-.



THE NEW "SAN REMO" 5 STAR 29/6

This All Transistor Speaker Radio—The "San Remo" 5 Star covers all medium waves including "Home," "Light," etc. Reliable and lightweight—slips easily into the Pocket or Handbag—size only 4 1/2 x 2 1/2 x 1 1/2 in. Works for Months off 8d. Battery! Ideal for holidays, Camping, Bedroom, etc. Anyone can assemble it in an hour or two with our simple A.B.C. PLAN! Complete set of parts including miniature speaker—everything—only 29/6, plus 2/6 P. & P. (C.O.D. 2/- extra.) Parts can be bought separately.



CONCORD ELECTRONICS Dept. 14/6
210, Church Road, Hove, Sussex

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

A USEFUL AND ACCURATE
REPETITIVE TIMING UNIT

By E. McLoughlin

ELECTRONIC

PROCESS
TIMER*(Continued from page 230 of the
July issue)*

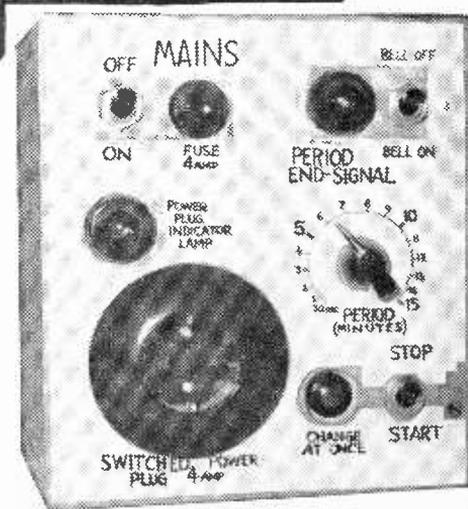
LAST month it was established that the exact value of R2 depended on the relay used and should therefore be found by experiment.

It is suggested that the constructor remove both valves and insert a variable resistor for R2 temporarily. R2 is then reduced until the relay energises, and is then slowly increased again until the relay just falls off again. Its value is then measured, and a fixed resistor 5 to 10% larger selected for R2. If, after the end of a period, the bell rings but does not stop again, then R2 is too small in value. If successive runs are all appreciably shorter than the first, then R2 is too high in value.

Power Supply

It is best not to use a mains transformer larger than necessary, as its low internal resistance would then cause unnecessarily high anode currents if S4 is held pushed-in too long. Constructors who have a larger transformer and wish to use it rather than purchase a new one, must protect the circuit by inserting a resistance between the cathode of V1 and the junction of R4, R5, R6 until a meter in series with Rly1 does not read more than 40mA when S4 is depressed and held depressed. About 100Ω will be roughly the value of this resistance; it will depend on the transformer and components used. It is highly advisable to check this point anyway.

When using the apparatus, do not depress S4 longer than necessary; once the bell rings or the relay has operated, release S4 at once. Do not use larger values for C2 and C3 than specified, as this very poor smoothing is fully deliberate. Firstly, it prevents excessive anode currents if S4 is depressed too long, and secondly it causes considerable hum to be amplified by V2 when the avalanche in V2 starts, thus gently shaking the Relay RL1 and preventing it sticking. The improvement in accuracy thereby is very noticeable.



The H.T. rectification is of normal voltage-doubler type with two metal rectifiers, with the centre connected to earth. This gives 350V H.T. and (-350)V as bias for V2. Check that the rectifiers are connected the proper way round. Remember that the voltage difference between the positive end of MR1 and the negative end of MR2 is 700 or more, and take appropriate precautions against shock or flashover. Use adequately insulated wire and good soldering. This is not only for safety, but also to prevent leakages which could

disturb such a long-period charge circuit. Take great care to connect the power plug correctly. Make absolutely certain that the earth-lead from the mains plug goes without interruption to the earth-pin on the power socket on the front panel, and that the same earth lead goes to the mains-transformer core. It would be very dangerous if the mains live lead were connected to the power-plug earth socket in error, as then the casing of any switched apparatus to be connected would be live at full mains voltage.

Critical Components

Two components in the circuit may cause difficulty in selection or supply. The first is C1. It is not necessary that the capacity value have any close tolerance, but the insulation must be really first class. Even a small leakage in C1 will cause erratic performance of the whole circuit. Thus, an electrolytic condenser is quite unsuitable for C1. A good modern metallised-paper condenser, preferably in a sealed, tropicalised, metal can, is ideal. Smaller ones may be connected in parallel, and, within limits, VR1 and R8 may be increased by the same factor as C1 is decreased, if only a smaller capacity-value is available for C1, or vice versa. Check the condenser to be used for C1 by charging it to its rated voltage. If it fails to

give a good healthy spark upon shorting it some hours later, its leakage is very probably too high.

The second component likely to cause some difficulty in supply is the trip-relay Rly2. This is a type often used in automatic corridor and staircase lighting in blocks of flats, and such a relay is used by the author. It has an energising coil for about 6V A.C., and each time the current is switched on in this coil the main contacts switch alternately on and off. This trip-relay is normally designed for its magnet to be operated from the bell-transformer circuit, and its contacts to switch mains lamps up to about 4A.

Regarding the main relay Rly2, any more or less equivalent type is suitable. The resistance is by no means critical, but the energising, current-value of 20mA should be maintained, otherwise the whole circuit requires drastic modification. If no 20mA relay is available, then any more sensitive relay can be used if it is fitted with an appropriate shunt to bring it to 20mA. The procedure for this is exactly the same as shunting a meter.

When adjusting the circuit, connect a voltmeter across R5 and a milliammeter in series with the anode connection of V2. Adjust R3 with series or parallel resistors (or by fitting one as a

(Continued on page 330)

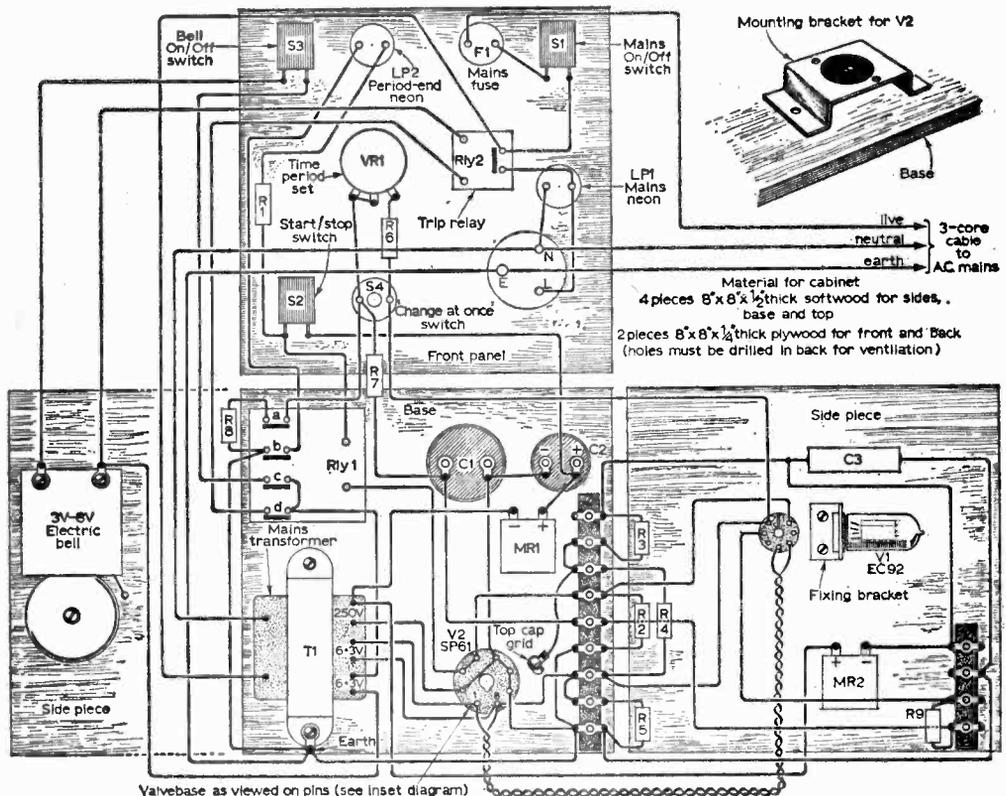


Fig. 3—The complete wiring diagram. The side and front panels have been lain flat to make the wiring clear.

CLYNE RADIO LTD



18 TOTTENHAM COURT ROAD, W.1
 162 HOLLOWAY ROAD, LONDON N.7
 9 CAMBERWELL CHURCH STREET, S.E.5

MUSEum 5929/0095
 NORTH 6295/6/7
 RODney 2875

All post orders etc. to 162 HOLLOWAY ROAD, LONDON, N.7

THE COMPONENT SPECIALISTS

NEW! NEW! The "AIR KING"

A New Six transistor luxury portable with the new "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!

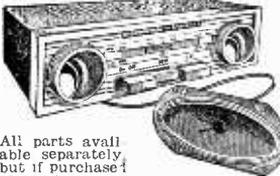
- ★ 500 milliwatt output to high flux 7 x 4in. high fidelity loudspeaker.
- ★ Six selected Mullard Transistors in latest super sensitive circuit, plus germanium diode. ★ Compact size—only 9 1/2 x 3 1/4 x 5 1/2in. (high).
- ★ Attractive three tone cabinet. Black, Dark Grey, and Silver Grey, with gilt 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. ★ Nothing more to buy. Cabinet included.

Special inclusive price for **£7.19.6** Plus P. & P. 4/-
 Alignment service available. Full assembly details and individually priced parts list, all of which are available separately, price 1/6, post free.

The "HIGHWAYMAN"

At last a quality Car Radio to build yourself, at an economical price. Look at these features—

- ★ Attractive styling. ★ Push-pull output. ★ 3 latest Mullard transistors plus valves type EBF 83 and ECH 83.
- ★ No Buzz, High Output and sensitivity. ★ Printed circuit (newest type). 7 x 4 High flux p.m. speaker.
- ★ Medium and Long Waves. ★ Push Buttons for fingertip control. ★ Extremely low Battery consumption (less than 1 amp). ★ Easy to fit any make car (Positive earth only). ★ 12 volt operation. ★ Compact size measures only 7 x 7 x 2" deep. ★ Easy assembly, supplied with dial and drive already mounted.



All parts available separately but if purchased at one time, the whole will be supplied at a special inclusive price of only

£10.19.6 Plus 4/- P. & P.

Parts list and comprehensive instruction booklet 2/6, post free. (Deducted from cost if complete parcel purchased later.)

NEW! NEW! The "CRUSADER"

Our new four transistor plus diode portable with big set quality!

- ★ Full Medium Wave coverage.
- ★ Completely self-contained.



- ★ Five inch P.M. Speaker.
- ★ Genuine high grade Mullard or Ediswan Transistors.
- ★ New components throughout.
- ★ Attractive two-tone blue/grey Vynide-covered cabinet size 8 x 5 1/2 x 3 1/2in. with adjustable carrying handle.
- ★ Eyeleted chassis simplifies construction.
- ★ Longer life with larger size PP7 battery.

SPECIAL FEATURES!
 SUPPLIED WITH JACK SOCKET FOR DIRECT CONNECTION TO CRYSTAL MICROPHONE FOR USE AS BABY ALARM WITHOUT ANY MODIFICATION! ALSO FOR DIRECT CONNECTION TO CRYSTAL PICK-UP FOR USE AS A GRAMOPHONE AMPLIFIER! SUPPLIED COMPLETE WITH RECESSED SOCKET FOR DIRECT CONNECTION TO CAR AERIAL!

All required components including full instructions, solder, battery, etc. at special inclusive price of **ONLY 95/-** Plus 9/- All parts available separately. P. & P. Itemised parts list and full assembly instructions 1/6 post free.

THE "BABYCALL"

At last! A Baby Alarm without untidy connecting wires. Can be used anywhere and transferred from room to room at will.



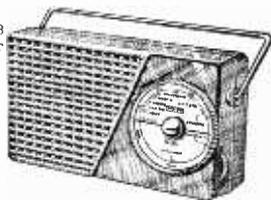
Consisting of two completely separate units—No extra wires or wiring between units—just plug the "receiver unit" into any mains socket in the house (or next door) and you will immediately receive "loud and clear" sounds that the remote microphone unit is picking up (from wherever it is plugged into). Operates by using the "house mains wiring" as the connecting link. Completely safe. Each unit is contained in an attractive modern "Slim line" type moulded cabinet. Handsome appearance, with Vynair front panel. TCC Printed circuit board, TCC Capacitors. No "live" chassis. High flux loudspeaker. Easy to assemble. Dimensions 10" x 4" x 4" (deep) Each Unit.

Complete Kit of Parts, including instruction booklet at special inclusive price of **£5.19.6**, plus 4/- postage and packing. Itemised parts list and full assembly details 1/6, post free.

N.B. This is a non-repeatable offer. Limited quantity only. Purchased complete from manufacturer. Worth Double !!

NEW! NEW! The "COURTESAN"

Our New 3 transistor plus 2 diode pocket receiver with full Medium and Long Wave Coverage.



- ★ No external aerial and earth required.
- ★ Latest 2T—75 ohm speaker.
- ★ First grade Mullard transistors.
- ★ Condenser tuning.
- ★ Volume control with on/off switch.
- ★ Easy assembly on pre-tagged circuit board.
- ★ Attractive red polystyrene cabinet measures 5 1/2 x 3 1/4 x 1 1/2" chrome handle, attractive gold and black dial.
- ★ Luxembourg, Hilversum, etc., guaranteed in reception areas.

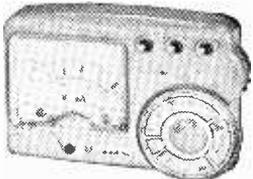
ONLY 63/- Plus 2/6 P. & P.

All parts available separately, itemised parts list and full assembly instructions 1/6, post free.

INEXPENSIVE TEST GEAR

Two Ideal Pocket Instruments for Amateur or Student

MODEL TI
 Size only 3 1/2" x 2 1/4" x 1 1/2" Meter Size 1 1/4" x 1 1/2"
 SENSITIVELY 255 micro-amps—1000 ohms per volt AC/DC DC Current 1.25, 250 m/a DC and AC volts 10, 50, 250 1,000 v. Resistance 50 ohm—100 K Battery 1.5 v-U12. Complete with test prods, battery and full instructions.



Outstanding Value at **57/6** Plus 2/6 P. & P.

MODEL TK.50

Size 5" x 3 1/4" x 1 1/4" 1000 ohms per volt. AC/DC DC Current 1-250 m/a DC and AC volts, 10, 250-500 and 1000 v. Resistance 0-10K, 0-100K. Complete with test prods, battery and full instructions. Outstanding buy at

63/- Plus 2/6 P. & P.



ALSO AVAILABLE: **MODEL 500**, 30,000 o.p.v. £8.19.6. 10% Deposit H.P.!

The "CLYMAX"



At last a 6-transistor pocket size superhet for Medium and Long Wave at a price you can afford. All required components

ONLY £6.16.6

Nothing more to buy! Plus 3/6 P. & P.

- ★ Completely self contained. No external aerial or earth required.
- ★ Full medium wave coverage, plus switched Light programme on Long Wave.
- ★ Push-pull output—250 milliwatts.
- ★ Matched set of latest type Mullard transistors.
- ★ Genuine 3in. P.M. Speaker.
- ★ High-Q Coils. ★ Ferrite rod aerial with high selectivity.
- ★ Size: 5 1/2 x 3 1/4 x 1 1/2in. Two-tone cabinet.
- ★ Precision etched printed circuit with components references clearly marked.
- Alignment service available. All parts available separately. Full assembly instructions and individually priced parts list. 2/- post free.

**AWKWARD SPOT?
MINIATURE COMPONENTS?**

Soldering is easier with the

NEW 15 WATT SOLO

electric soldering iron

- Ideal for transistorised and printed circuitry.
- $\frac{1}{4}$ in. diam. bit in $\frac{1}{8}$ in. diam. stem will reach normally inaccessible connections and components.
- Just the right amount of heat. Melts resin-coated solder within $1\frac{1}{2}$ minutes from cold.
- Spare parts easily replaceable—readily obtainable.
- Designed and made by the team responsible for the highly successful 25-watt Solon.
- 200-220V or 220-240V.

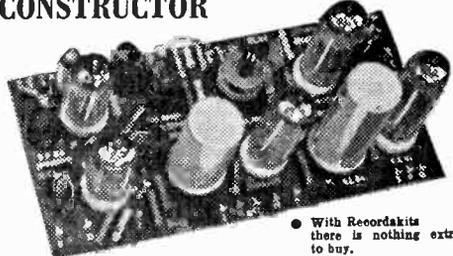
LIST PRICE 23/4d Obtainable from your usual electrical stockist, or electrical counter of your hardware store.



For further details, write to the local AEI Stock Depot, or to:

Associated Electrical
Distributions Limited
Distribution Equipment Sales Dept
145 Charing Cross Rd.
London WC2

ANOTHER QUALITY 4-TRACK MARTIN 'RECORDAKIT' FOR THE KEEN CONSTRUCTOR



To an outstanding successful range of kits is now added Recordakit 'D', designed for use with the Collaro 4-track Studio Deck. Like all Martin Recordakits, it is on a printed circuit base and complete with valves, controls, transformers, leads, etc., down to the last screw. Even the wire supplied is cut to length.

Amplifier 'D' as above, 12 gns. Speaker and Case assembly, 5 gns. With Deck, Case, Speaker and Amplifier 34 gns.

NEW MARTIN RECORDAKIT TAPE PRE-AMP KIT, For Collaro Deck—2 Track, 5 gns. 4 Track, 9 gns.

From radio and audio stockists. In case of difficulty send direct. For free Leaflet, cut out this ad. and send it with your name and address.

MARTIN ELECTRONICS LTD

155 High Street,
Brentford,
Middlesex.

- With Recordakits there is nothing extra to buy.
- Speed compensated.
- Designed to luxury recorder standards.
- Other Martin 'Recordakits' available for B.S.E. and 2-speed Studio Decks.
- Case and Speaker assemblies available with and without decks.

EXPRESS ELECTRONICS ROSENDENE LABORATORIES KINGSWOOD WAY, SELSDON, SURREY

VALVES NEW TESTED AND GUARANTEED FOR THREE MONTHS

1C1	7/8 6BA6	6/-	12AU7	6/9	DH17	6/-	6F86	9/-	FL51	12/6
1C3	5/- 6BE6	7/-	12AX7	6/8	DH142	6/8	6F91	6/-	FL52	7/-
1F1	8/- 6BH6	5/8	12BE6	8/6	DH150	10/-	6F92	5/8	FL53	7/6
1F3	7/6 6BJ6	5/8	12BH7	10/8	DK91	7/8	EL41	9/8	PY81	6/9
1FD1	8/- 6BR7	8/8	12K8GT11	-DK92	7/8	EL84	7/8	PY82	7/6	
1FD9	7/8 6BW6	7/8	12Q7GT	7/8	DK96	8/-	EM84	10/-	PY83	7/8
1I4	6/9 6BW7	7/-	18A5	9/-	DL92	7/8	EM85	10/-	SA1	9/6
1P1	8/- 6D2	4/-	25A6G	8/8	DL94	6/8	EY51	7/8	U37	11/8
1P10	7/8 6F12	4/-	25L6GT	7/8	DL96	8/-	EY81	10/-	U52	7/8
1P11	7/8 6HGQT	2/-	26Z4G	9/8	EB91	4/-	EZ40	7/8	U76	7/6
1R5	6/- 6J7GT	7/8	30C1	7/8	EBC41	10/-	EZ80	6/-	U78	5/-
1R6	6/- 6K7G	5/8	30L1	7/8	EBP80	8/8	EZ81	6/9	U142	7/6
1T4	7/8 6K8G	6/-	35L6GT	9/-	ECC81	6/-	HYR2	9/8	UBC41	8/8
1U5	5/8 6Q7G	6/8	35W4	8/8	ECC82	6/9	KT380	6/-	UCH42	9/8
3Q4	8/- 68L7GT	6/-	33Z4GT	8/-	ECC83	6/9	KT66	11/8	UF41	8/6
3R4	7/8 68NTGT	6/-	53KU	10/8	ECC84	7/8	N17	7/8	UL41	8/8
3V4	6/8 6Y8G	7/8	57G3	7/8	ECP30	8/8	N18	8/-	UY41	7/8
6U4G	7/8 6X4	5/-	80	6/-	ECP82	8/-	N19	7/8	W76	4/8
6Y3GT	5/8 6X5G	5/-	DAF91	7/8	ECH42	9/-	N709	7/-	W142	8/6
6Z4G	9/8 787	9/8	DAF96	8/-	ECH41	10/-	PCCB4	7/8	X17	7/8
6AK6	6/8 813	4/-	DCC90	12/8	ECL90	8/8	PCF80	7/8	X142	9/-
6AL5	4/- 12AD6	11/8	DF91	7/8	ECL92	9/-	PCF82	7/8	X150	9/-
6AM6	4/- 12AB8	10/-	DF96	8/-	EF41	8/-	PCL82	8/-	Z77	4/-
6AT6	6/- 12AT7	6/-	DH76	7/8	EF80	8/-	PCL84	9/-	ZD17	7/8

High Stability Resistors \pm W 5% 50 Ω to 1M, 9d. Midget Ceramics 500 v. 9d. Coax. Super quality \pm in., 6d. yd. Plug 9d. Sockets 9d. Silicon H.T. Rects. 250v. 800 MA 1in. x $\frac{1}{2}$ in. 17/8. Contact Cooled 250v. 80 MA 6/6. 85 MA 8/6.

NEW TRANSISTORS BY MULLARD. OC19, OC26, OC66, 25/-; OC44, OC45, 9/-; OC70, OC71, 6/-; OC72, 7/8; OC72 matched in pairs 16/-; OC74, OC76, OC78, OC81, 7/8; OC82, OC170, 9/8.

VALVES MATCHED IN PAIRS

EL84 17/-, N709 17/-, 6V6G 17/-, 6BW6 18/- per pair. Push Pull O.P. Transformers for above 3-15 Ω 14/6, P. & F. 1/6. 12in. P.M. Speakers 3 Ω 24/6. Baker's "Selhurst" 12in. 16 Ω 15W, 90/-, 12in. Stereo Model, 87.7.0.

SETS OF VALVES

DK91, DF91, DAF91, DL92 or DL94	18/6	ECH42, EF41, EBC41	
DK96, DF96, DAF96, DL96	27/6	EL41, EZ40	37/6
1C3, 1F1, 1FD1, 1P1	27/6	UCH42, UF41, UBC41	
1R5, 1T4, 1R6, 3R4, or 3V4	19/6	UL41, UY41	38/-

Postage and packing 6d. Over 6/1 post free. C.O.D. 2/6.



The P.W.

Alpha 3

PERSONAL TRANSISTOR SUPERHET

(Continued from page 206 of the July issue)

AFTER the oscillator coil and I.F. transformers have been mounted on to the panel (as described in last month's issue) the transistors are soldered into position.

The mixer and I.F. transistors must be of appropriate type, such as an OC44 for mixer and OC45 for the I.F. stage. A wide range of audio transistors will be satisfactory in the A.F. position. The OC71 is suitable and a red/yellow spot transistor was found satisfactory. Pieces of 1mm sleeving are cut about $\frac{1}{4}$ in. long and one piece is placed on each transistor lead. This will avoid short-circuits and hold the transistors at a convenient height. The emitter, base and collector leads must, of course, be passed through the correct holes, as shown by e, b and c in Figs. 3 and 4.

Wiring Up

Some 26s.w.g. tinned copper wire will be convenient for connections and 1mm sleeving is placed on all leads and the wire ends of components. Fig. 4 shows the underside of the panel (the tuning condenser and potentiometer are left until last).

The transistor leads are all left reasonably long and the soldered joints should be made quickly.

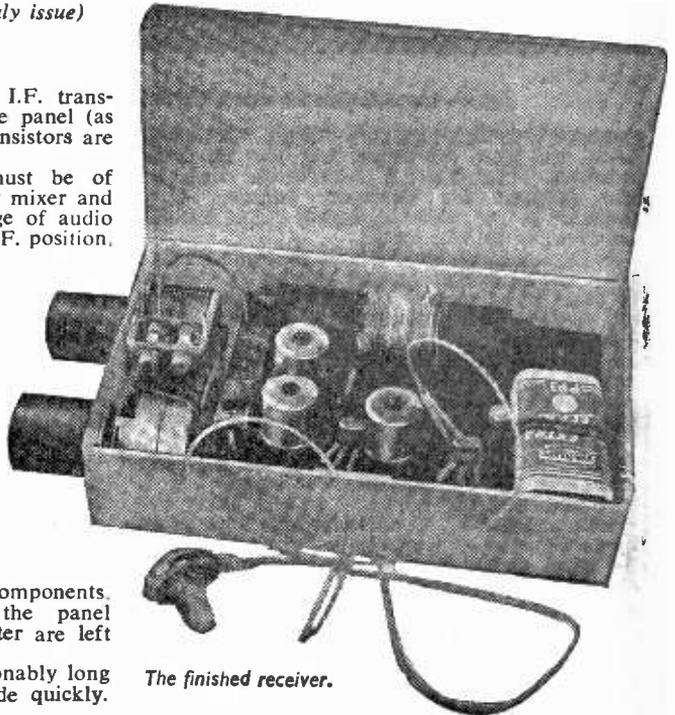
The same care to avoid overheating is also taken with the diode.

Lead "A" on the aerial is long enough to pass through a small hole to the earth line. Lead "B" passes through a second hole from the 0.05 μ F condenser to the aerial tapping. Lead "C" passes to the 50pF trimmer TC1, as in Fig. 3, a short lead subsequently passing to the front section of the gang condenser.

The collector lead of the A.F. transistor emerges through a second hole and one headphone lead is soldered to it, as in Fig. 3. The second headphone lead, through hole 'x' in Fig. 3 is soldered to a lead which is wired to the battery negative side of the circuit. A miniature 2-pin plug and socket could be used but is not really necessary when the earpiece can be accommodated in the case.

When all the wiring in Fig. 4 has been finished the tuning condenser and potentiometer can be connected. One switch tag is wired to battery positive; the other tag to the earth line, potentiometer slider and the frame of the tuning condenser. One outer tag of the potentiometer, shown in Fig. 3, is wired to the 0.25 μ F condenser at pin 5 of the I.F. transformer. One lead is then taken from each trimmer to the sections of the tuning condenser, as in Fig. 3.

After wiring has been checked the controls can be secured to the end of the case. Very small knobs are best avoided. The $\frac{1}{4}$ in. 4B.A. bolt is then inserted in the hole in the case and a nut is tightened to hold it firmly. A further nut is then run on to leave about $\frac{1}{4}$ in. clearance between panel and case. The panel is then dropped into position and held with a third nut.



The finished receiver.

The battery connections can be taken to suitable clips or they may be soldered. A meter may be added in circuit, when first trying the set, to ensure there are no short-circuits or to check the current flowing. This will be in the region of about 3mA to 5mA, depending on the actual battery voltage and transistors.

Alignment

This is similar to that of usual superhet circuits, though there are fewer adjustments. If a signal

down or fully open. If best volume is obtained with the aerial trimmer fully open, screw down the oscillator trimmer slightly, readjust the tuning knob to obtain the station again, then try setting the aerial trimmer.

Alignment at the high wavelength end of the band can be achieved by adjusting the oscillator coil core in conjunction with the tuning condenser for best volume, or by sliding the aerial winding along the slab, leaving the tuning condenser untouched. Hand-wound coils vary somewhat in inductance, but moving the winding on the slab will compensate for this.

If sensitivity improves as the oscillator core is unscrewed and it is too far out, this shows that the aerial inductance is too low. Moving the winding nearer the centre of the slab will compensate for this. On the other hand, if the oscillator coil core is too far in, move the aerial winding nearer the end of the slab.

Alignment is usually fairly easy and has a very great effect on the results obtained. If the aerial and oscillator alignment is much in error it may only be possible to hear the local station. If so, search for a station a little lower in wavelength and then adjust the trimmers to bring this up to best volume. Then find a station a little higher in wavelength and make small adjustments to the aerial winding or oscillator core. Results should then

begin to improve until full sensitivity is obtained throughout the whole tuning range.

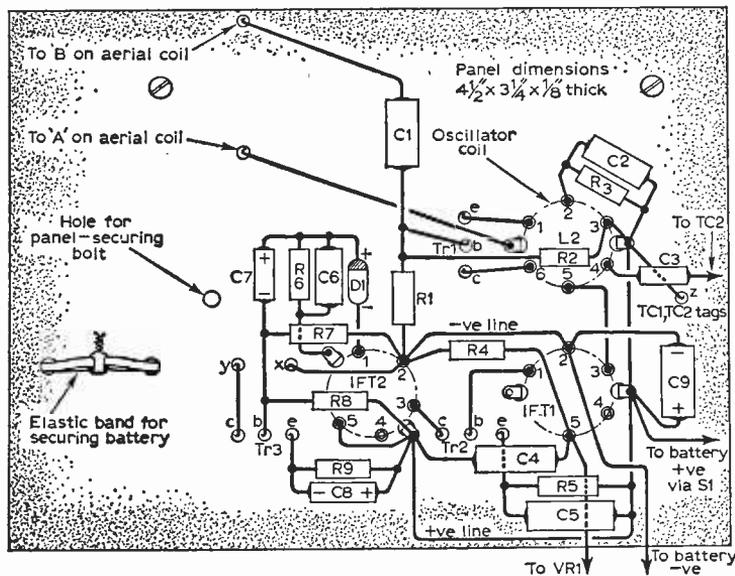


Fig. 4—The wiring on the rear of the receiver panel.

generator is available set it to 470kc/s, with modulation, and place the output lead near the mixer transistor. The two I.F. transformer cores are then adjusted for maximum volume. If a generator is not available, simply adjust the I.F. transformers for best results.

As the sensitivity control is turned up from zero there will be a considerable increase in volume. At some point around the halfway position the I.F. amplifier will commence to oscillate. This is intended, as sensitivity is then very great. The two I.F. cores are finally peaked up for maximum volume, when the sensitivity control is just below the oscillation point. This should be carried out while listening to a weak, distant station.

To align the aerial and oscillator circuits adjust the trimmers at a low wavelength and the oscillator coil core at a high wavelength. It is important that the trimmers have a fairly low minimum capacity. If trimmers with three plates are used it may be necessary to remove the screws and bend up the middle plate slightly to obtain a reasonably low capacity.

With the oscillator trimmer set at nearly minimum capacity a weak station should be tuned in. Adjustment of the aerial trimmer should then bring this station up to maximum volume, and the aerial trimmer should not be either fully screwed

ELECTRONIC PROCESS TIMER

(Continued from page 326)

trimmer) until anode-current of V2 commences when the voltage across R5 has risen to just under 50. In most cases, the specified value of 2.2M for R3 should prove correct, but check this. If anode current in V2 starts too early, then R3 is too large, and vice versa.

No chassis is used. A stout wooden cabinet, the exact carpentry details of which are left to the constructor's taste, is indicated in its rough proportions, as used by the author, in Fig. 3. This wiring diagram represents a suggested layout, as used successfully by the author. The exact layout is relatively unimportant in this circuit. What is important is meticulously good insulation throughout. If any trace of instability is observed, try connecting a grid stopper (10k 1W) at the grid-cap of V2, or, as an addition to R9, a similar grid stopper (10k 1W) direct on to pin 6 of V1. Both grid stoppers may be required in some cases.

MULLARD 3-3 HI-FI AMPLIFIER



3 Valves, 3 watt, 3 ohm, and 15ohm. Output. A really first-class Amplifier giving Hi-Fi quality at a reasonable cost. Mullard's latest circuit. Valve line up: EF86, EL84, EZ81. Extra HT and LT available for Tuner Unit addition. This is the ideal companion Amplifier for FM tuner units.

TECHNICAL SPECIFICATION— Freq. Response + 1db. 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 ohm) 3 w. at 1% total harmonic distortion. Hum and Noise Level: At least 70 db. below 3 w.

COMPLETE KIT (incl. Valves, all components, wiring diagram and special quality sectional Output Trans.). ONLY £8.19.6. ICarr. 5/-.

Complete wired and tested, 8 gns. **Bronze Escutcheon Panel, Printed Vol., Treble, Bass, On-Off, supplied with each kit.** Wired O/P socket power and additional smoothing for Tuner Unit. 10/6 extra. Recommended Speakers—WB HF102 95/-, Goodmans AX10M 110 £5, etc.

SPECIAL BARGAIN OFFER

"6 plus 1" . . . using 3 latest type surface Barrier Transistor
RADIO KIT Now only £6.19.6
Complete Kit carr. 2/6.

MANUFACTURERS SURPLUS BARGAIN OFFER. PRICE BARRIER SLASHED—A further bulk purchase of this popular kit enables us to pass on latest price reduction direct to Constructor. Kit is a modern, sensitive, quality Receiver with all latest circuit features and is complete with 7 X 3in. Speaker (3 ohms), and all circuit and assembly instructions, 6 BVA Transistors and Germ. Diode. Printed Cat. Med. and L.W. Ferrite Aerial and Car Radio Coupling. 500 MW Output. Attractive Gilt dial and Slow Motion Drive with "Clear Vu" Tuning Knob, etc. Contemp. two-tone Cabinets 8 x 5 x 3 1/4 in., as illustrated. 25/- extra.



COLLARO STUDIO TAPE RECORDER KIT

SPECIAL BARGAIN OFFER. Comp. Kit only £25.0.0
Carr. 12/6.

1 famous mfrs. surplus offer—Listed 42 gns. A quality Tape Recorder Kit based on Mullard (famous design)—EF86, ECC83, EL84, EM84 and Rectifier. Specially designed Kit for Collaro latest Studio Deck. Freq. response + 3db. 7Hz, per sec. Amp. and Power Pack straighter. Inter. unit wiring only required. Cabinets size: 18 x 16 x 6 in. finished in contemp. 2 tone blue Rexine with gilt Speaker Escutcheon. Magic Eye Indicator Circuit and Tech. H/Book, supplied free with kit. Send 2/6 now for full details of to-day's outstanding Tape Recorder Bargain.

Cabinet £3.15.- P. & P. 6/6.
Amplifier Kit £8.19.6. P. & P. 5/-.
Speaker 7 x 4 1/6. P. & P. 2/-.
If above items are purchased together.

£12.19.6 P. & P. 10/-

BARGAINS 4-SPEED PLAYER UNITS

Single Players Carr. 3/6
Garrard 4 S.P. £8.19.6
Garrard TA Mk.2 £7.19.6
Collaro "Junior" 75/-
B.S.R. Latest TU12 79/6
E.M.I. Junior '865' 89/6

Auto-Changers Carr. 5/-
Collaro "C 60" £7.15.0
B.S.R. (UA14) £7.10.0
Garrard "Auto-slim" £8.12.6
Garrard Model RC209 89/6



RECORD PLAYER CABINETS

Cabinet Price £3.3.0 Carr. & Ins. 5/-.



Contemporary style, rexine covered cabinet in two-tone maroon and cream. Size 18 1/2 x 13 1/2 x 6 in., fitted with all accessories including baffle board and anodised metal fret. Space available for all modern amplifiers and autochangers, etc. Uncut record player mounting board 14 x 13in. supplied.

2-VALVE 2-WATT AMPLIFIER Twin stage ECL82 with vol. and neg. feedback Tone control. A.C. 200/250 v. with knobs, etc. ready wired to fit above cabinet, £2.17.6.
6in. Spkr. & Trans., 22/- P. & P. 2/-.
Complete Kit, including UA14 Unit as illustrated, £12.19.6. carr. 7/6.
SINGLE PLAYER KIT— Similar spec. to Autochanger Kit except Player is 4-speed B.S.R. T.U.9. Single Record Player Unit. Attractive Contemporary Styled Cabinet. Size: 18 1/2 x 13 x 6 in., with splendid volume and reproduction. Bargain Price, £8.19.6 only. Carr. 5/-. All units ready wired. Simple screwdriver assembly only.

Condensers—Silver Mica. All values, 2Pf to 1,000Pf, 6d. each. Dillo. Ceramics 9d. Tub. 450V T.C.C. etc., 0.001 mfd. to 0.01 and 0.1/350V, 9d. 0.02-0.1/500V 1/-, 0.25 15in 1/6, 0.5 T.C.C. 1/9, etc. etc. Close Tol. 8/Micas—10% 5Pf-500Pf 8/-, 600-5,000Pf 1/-, 1% 2Pf-100Pf 9d., 100Pf-500Pf 11d., 575Pf-5,000Pf 1/6. **Resistors—** Full Range 10 ohms-10 meg-ohms 20% 1 and 4 W 3d., 1W 5d., (Midget type modern ratings) 1W 6d., 2W 9d., 1/2-1W 10d., 1W 5d., 1W 7d., 5W 10d., 1% 1W/16.

RECORDING TAPE—Reduced Prices

Famous American Columbia (CBS) Premier Quality Tape at NEW REDUCED PRICES. A genuine recommended Quality Tape—TRY IT! Brand new, boxed and fully guaranteed. Fitted with leader and stop foils.

5in.	Standard	Long Play	Double Play
5 1/2in.	800ft. 13/-	800ft. 17/6	1,200ft. 31/6
7in.	1,200ft. 18/-	1,200ft. 19/6	2,400ft. 37/6
	1,200ft. 21/-	1,800ft. 25/6	2,400ft. 47/6

P. & P. per reel 1/-, 6d. on each additional reel.
SPECIAL BARGAIN. 3in. mfrs. Tape 225ft. 4/9. P. & P. 6d.
3in. Message Tape, 150ft. . . . 3/9. P. & P. 6d.
Plastic Spool Containers . . . 3in. 1/3, 5in. 2/-, 5 1/2in. 2/-, 7in. 2/3
5in. 1/7, 5 1/2in. 2/-, 7in. 2/3

ENAMELLED COPPER WIRE— 1lb. reel, 14g.-20g 2/6; 22g-28g, 3/-; 30g-40g 3/9. Other gauges quoted. Erskin Multicore Solder 60/40 3d. per yard. 1lb. 2/6, etc.

Volume Controls— 5K-2Meg-ohms, 3in. Spindles Morganite Midget Type 1 1/2in. diam. Guar. 1 year. LOC or LIN ratios less Sw. 3/- DP Sw. DK98 9/- EY88 10/- PY32 12/- DL96 9/- EZ81 7/6 PY82 7/6 EC831 8/- G532 12/6 EC832 8/- E8181 9/6 U25 12/6

COAX 80 OHM CABLE High grade low loss Cellular air spaced Polythene—1in. diameter. Stranded cond. Famous mfrs. Now only 6d. per yard. Bargain Prices—Special Lengths—20 yd. 9/-, P. & P. 1/6. 40 yds. 17/6, P. & P. 2/-, 60 yds. 25/-, P. & P. 3/- Coax Plugs 1/- Sockets 1/- Couplers 1/3 Outlet Boxes 4/6.



NEW BOXED

174	8/-	ECC83	8/-	PC84	9/6
185	7/6	ECL82	10/6	PCF80	9/6
155	7/6	ECL80	10/6	PCJ83	12/6
384	7/6	EP80	8/-	PCL84	12/6
334	7/6	EP86	12/6	PL81	12/6
DAF96	9/-	EL84	3/6	PL82	9/6
DP98	9/-	EY51	9/6	PL83	10/6
DK98	9/-	EY88	10/-	PY32	12/6
DL96	9/-	EZ81	7/6	PY81	9/6
EC831	8/-	G532	12/6	PY82	7/6
EC832	8/-	E8181	9/6	U25	12/6

VALVES

All Guaranteed	
Brand New—BVA	1st Grade
OC4	10/6
OC7	10/6
OC81	7/6
2/OC81	15/0
XA102	10/-
YX01	9/6
XB103	7/6
XC101	8/6
OC45	21/6
OC81's (matched pair)	19/6

Send for detailed bargain lists, 3d. stamp. 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.

RADIO COMPONENT SPECIALISTS

70 Brigstock Rd., Thornton Heath, Surrey. Hours: 9 a.m.-6 p.m., 1 p.m.-10 p.m. THO 2188. Terms C.O.D. or C.O.D. Post and Packing up to 1lb. 9d., 1lb., 1 1/2, 3lb 2/3; 6lb., 2 1/2; 8lb., 3/6.

JASON FM TUNER UNITS

Designer-approved kits of parts.
FM11, 5 gns. 4 valves. 20/-
FM12, 27. 5 valves. 37/6.
JTV MERCURY 10 gns.
JTV 213.19.6. 4 valves.
32/6.
NEW JASON FM HAND-BOOK, 2/6. 48 hr. Alignment Service 7/6. P. & P. 2/6.

TYGAN FRET (contemp. pat.)
12 x 24in. 4/-, 12 x 18in. 3/-,
12 x 12in. 4/-, 18 x 24in. 6/-, etc.

Speaker Fret — Expanded bronze anodised metal fin. x 1in. diamond mesh, now 4/6 sq. ft., Multiples of 6in. cut max. width, 4ft.

Electrolytics All Types New Stock

TUBULAR	CAN TYPES
25/25V 1/8	8+8/450V 4/6
50/50V 1/8	8+18/450V 5/-
50/50V 2/-	32+32/350V 4/6
100/25V 2/-	50+50/350V 5/6
8/450V 2/8	60+250/ 6/6
16/450V 3/8	275V 12/6
16+16/45V 6/9	100+200/ 6/6
32+32/450V 6/6	275V 12/6

Transistor Components

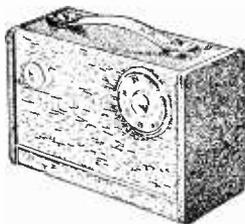
Midget I.F.'s—465 Kc/s. 9/16in. dia. 5/6
Osc. Coll.—M/W, 9/16in. dia. 5/3
Osc. Coll.—M. & L.W. 5/9
Midget Driver Trans. 3-5:1 6/9
Midget O/P Trans. P.P. to 3 ohms. 6/9.
Ferrite Aerial M. & L.W., Car aerial coil, 9/3.
Elect. Condensers—Midget Type 1 mid-50mfd ea. 1/9. 100 mfd. 2/-, 12V knob.
Condensers—.01 mfd. to .04mfd 9d., .05mfd. to .1mfd. 1/-, .25mfd 1/6.

Tuning Condensers— JB"OO" 208 Pf. +176 Pf 8/6, with Trimmers 9/6. Single 385Pf 7/6. Sub min. 1in. J.B. Dile min. 0001. 0003 or 0005 7/- each.
Midget Vol. Control—with edge control knob. 5K ohms with switch 4/9, less switch 3/6.
Speakers P.M.—2in. Plessey 75 ohms 15/6, 24in. Continental 8 ohms 13/6, 24in. E.M.L.I. 3 ohms 17/6. 7 x 4in. Plessey 35 ohms 23/6.
Ear Plug Phones—Min. Continental type. 3ft. lead, jack plug and socket. High Imp. 3/- Low Imp. 7/6.

MINISETS LTD. Hatherley Mews London E17

6-STAGE PORTABLE TRANSISTOR RADIO

- ★ All parts including transistors direct from manufacturers
- ★ Pre-assembled circuit board ensuring ease of construction
- ★ Full medium-wave coverage
- ★ After-sales service
- ★ Attractive two-tone case 9 x 6 x 4in.
- ★ Push-pull output, 350 milliwatts
- ★ 5in. high flux speaker
- ★ Built-in Ferrite Rod aerial No external aerial or earth required.
- ★ High performance, many stations received on test



Can be built for **£5.40** P.P. 3/-

- ★ Or with long-wave 8/- extra. Full instructions 1/6 (Free with order).

6-STAGE TRANSISTOR POCKET PORTABLE

Can be built for **£4.19.6** P.P. 2/6

- ★ Completely self contained no aerial or earth required
- ★ Push-pull output, 250 milliwatts
- ★ 3in. high flux speaker
- ★ Pre-assembled circuit board with simple instructions ensuring easy construction
- ★ High Q Ferrite Rod Aerial
- ★ After-sales service

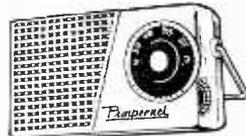


Can be supplied with long-wave 6/- extra. Full instructions, price list 1/6 (Free with order)

3-TRANSISTOR RADIO (plus 2 diodes)

Total building **70/-** P.P. 2/6

- ★ Pre-assembled circuit board, ensuring easy construction
- ★ Full medium-wave coverage
- ★ Attractive case 5½ x 3 x 1½in.
- ★ All components including transistors are brand new and direct from manufacturers
- ★ Ferrite Rod aerial coil, no external aerial or earth required
- ★ 2½in. high flux speaker direct from manufacturer
- ★ After-sales service



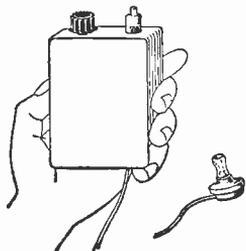
Send 1/6 for instructions, circuit and price list

2-TRANSISTOR RADIO (plus 2 diodes)

Ideal for personal listening

- ★ Built-in Ferrite aerial
- ★ Sensitive earpiece.
- ★ All parts including transistors direct from manufacturers
- ★ Pre-assembled circuit board and easy-to-follow instructions
- ★ After-sales service
- ★ Can be built for **50/-** P.P. 2/-

Full instructions, etc., 1/6 (Free with order).



RECONDITIONED TV SETS!

ALL MAKES ★ ALL FULLY SERVICED ★ ALL GUARANTEED ★ ALL GENUINE 13 CHANNEL SETS—NOT CONVERTED EARLY MODELS

14'' Fully guaranteed 3 months, including valves and tube.
from **£5 to £8.10.0**

Examples: G.E.C. 14' £5: McMICHAEL PORTABLE £8.10.0

17'' With 12 months' guarantee on tube, and 3 months' guarantee on valves and components.
from **£11.10.0 to £19**

Examples: Phillips 17' £11.10.0: Stella Semi-Slim £19

The examples given above are only intended to act as a guide. All sets vary in price between the prices given according to the make and model. As our stock continually fluctuates please send S.A.E. for our price list of quality sets available.

BUY WITH CONFIDENCE!

- ★ Carriage and Insurance 25/- extra.

REBUILT TV TUBES

All our TV Tubes are reprocessed to a high-standard and are covered by a 12 MONTHS' GUARANTEE. Each tube is fitted with a new, top-grade electron gun, which is identical with the original, ensuring exact plug-in replacement.

21", £6. 17", £5.10.0. 12", 14" and 15", £4.10.0

★ Each plus 10/- Carriage
£1 Refunded from the above price if you return your old tube.

PARK LANE RADIO LTD.

548 ROMFORD ROAD, MANOR PARK, LONDON E.12

★ Telephone: ILFORD 6044

1962 EDITION

RADIO AMATEUR'S HANDBOOK

36/- by The A.R.R.L. Post 2/6

ELECTRONIC ORGAN HANDBOOK, by H. Emerson Anderson, 40/-, Postage 1/-.

HANDBOOK OF ELECTRONIC TABLES & FORMULAS, by D. Herrington & S. Meacham, 15/-, Postage 9d.

SOLUTION OF PROBLEMS IN TELECOMMUNICATIONS & ELECTRONICS, by C. S. Henson, 27/6, Postage 9d.

RADIO COMMUNICATION, by J. H. Reyner & P. J. Reyner, 55/-, Postage 1/6.

CABINET HANDBOOK, by G. A. Briggs, 7/6, Postage 9d.

RADIO VALVE DATA. 7th Ed. Compiled by "WW", 6/-, Postage 10d.

VALVE & TELETYPE MANUAL No. 9, by Brimar, 6/-, Postage 1/-.

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.

Short-wave Listeners' Log

SEVERAL types of signals are used by amateur transmitters on the amateur bands, and the receiver needs to be operated accordingly, to obtain best reception. The systems most generally used are A.M. (amplitude modulation), C.W. (continuous wave), SSB (single sideband) and F.M. (frequency modulation). These signals can be heard with a communications receiver, or a receiver to which a beat frequency oscillator has been added.

Amplitude Modulation

This is most used, being the same as employed by medium wave and other broadcast stations. Any ordinary receiver will pick up A.M. signals. For such reception, no BFO is needed, and this is therefore switched off, if fitted in the receiver.

Some short-wave operators may listen exclusively to A.M. signals. This type of signal is, however, susceptible to interference, and may be useless during conditions when C.W. and SSB come through well. A.M. can give world wide results when conditions are reasonably good.

Continuous Wave

This method is used for Morse, the actual radiated wave being interrupted by keying. C.W. cannot be resolved with an ordinary superhet, as a BFO is required. For C.W. reception the BFO is thus switched on. The signal is tuned in as well as possible with the ordinary tuning control, and the BFO tuning knob is adjusted for best readability. Adjustment of the BFO tuning will change the audio pitch of the signal, and the BFO may be tuned above or below the carrier frequency, as required for least interference.

C.W. can be radiated by a very simple transmitter, and can get through interference better than A.M. C.W. may be heard with a TRF type set if reaction is adjusted until the set is oscillating.

Single Sideband

This method provides voice signals which have great ability to be heard through interference. SSB can be used when A.M. would be impossible, due to conditions.

An A.M. signal is a carrier with two sidebands, which carry the "voice" or audio part of the transmission. With SSB, the carrier and one sideband are eliminated at the transmitter, and only the other sideband is radiated. To make SSB intelligible, the carrier has to be re-inserted at the receiver. This can be done with a BFO.

When a SSB station is tuned in, there will be little or no carrier, and the signal will be quite unintelligible. After tuning for best volume, the R.F. gain must be reduced, so that the signal is weak, volume being restored by turning up the audio gain. The BFO is then switched on, and tuned so that its carrier occupies the frequency

which would be taken up by the station carrier, if that were present. The sound then becomes intelligible as speech.

If no adjustment of the BFO seems to produce speech, the BFO carrier is probably on the wrong side of the SSB signal. To correct this, tune the BFO through zero, then adjust it as before. If the receiver has an AVC in/out switch, the automatic volume control circuit may be switched off. If the signal is distorted, the SSB may be too strong at the second detector, so the R.F. gain should be reduced even more. The aim is to match the SSB signal to the carrier level produced by the BFO.

Expensive communications receivers have special detector circuits for SSB reception. A BFO is a one-valve oscillator, tunable over the receiver intermediate frequency.

Frequency Modulation

Narrow band F.M. is occasionally used. With A.M. the voice or audio signal changes the amplitude of the carrier. With F.M. the audio signal is made to vary the frequency of the carrier. The usual type of receiver will not have an F.M. detector, but it is possible to resolve F.M. signals by tuning the receiver to one side of the station. This is known as slope detection. No BFO is needed, but high selectivity is helpful. ■

Faults in Transistor Output Stages

(Continued from page 322)

tolerance marking have a 20% tolerance, and are not recommended.

Loudspeakers

Distorted results are more likely to be caused by wrong working conditions, than an actual speaker defect. If gentle pressure on the speaker cone moves it in and out, without any noise caused by the speech coil touching the magnet assembly, the loudspeaker is probably in order. Obvious defects, such as a loose cone, should be seen easily.

A 2Ω to 3Ω loudspeaker will frequently be used in circuits like that in Fig. 2. For the circuit in Fig. 4, a 35Ω or 75Ω unit will generally be employed.

If the speaker is suspected, the output may temporarily be taken to an external 2Ω or similar permanent magnet speaker. If distortion is still present, the receiver speaker is probably in order. But if distortion clears with the external speaker, the receiver unit must be suspected.

In making this test, it should be remembered that 2½ in. or similar midjet speakers, in a very small cabinet, cannot be expected to give quite such good reproduction as a large, external speaker, possibly with a much bigger cabinet. But the comparison is useful, despite this fact. ■

Letters to the Editor

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

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 IDEAL FUTURE TRANS-RECEIVER?

SIR,—I know that it's going to be a very long time before some such apparatus become prevalent on the scene, but this "bug" of micro-waves propagation not being suitable for trans-atlantic communication for example, due to the earth's curvature, has forced me into thinking that the only perfect way of overcoming this defect in our technical forum is to seriously consider "two-stage transmission". Not utilising wave propagation as we know it, but by producing, instead of oscillators, reservoirs, which can suitably build up and amplify a system of potentials to a pitch, whereby they would escape in the form of a flow of high energy "photons"—I mean similar types of packets of energy which "Quantum" visualised; in fact substitute in practice the quantum theory for the wave theory of electromagnetic propagation. These emitted photons must then, somehow, be controlled and measured after their emission, so as to cause them to "explode" at a preselected distance, and thus create secondary wave-radiation which, it is foreseen, will greatly increase the range of intelligible communication through the "ether". — K. R. CRASKE (Lincoln).

SERVICING TAPE RECORDERS

SIR,—As I am engaged almost wholly in the servicing of tape recorders I should like to comment on a point raised by Mr. T. S. Smith in his article in the June issue about this subject.

Mr. Smith states that "residual magnetism is a very real danger so far as tape recorders are concerned" and goes on to advocate the use of non-magnetic tools. This is quite unnecessary in practice, since any competent service engineer would automatically use a defluxer on all relevant parts (heads, guide posts, etc.) on completion of service.

It is also quite in order to check the D.C. resistance of a head winding so long as the head is du-fluxed afterwards. Magnetism can do no harm to a tape recorder's performance so long as it is removed before a tape is loaded.—J. POCOCK (Wolverhampton).

LOCAL STATION PICK-UP

SIR,—I found R. Ferguson's letter (June issue), most interesting. Experiencing the same problem with my recorder I was relieved to know that I did not in fact own a "freak" instrument. However I would be happy to hear of any information and ideas from fellow sufferers in the hope that this most annoying problem could be solved.

I personally have tried all types of screening, earthing, coaxial leads, aerial trimmers, etc., all to no avail. I'm quite unable to rid my machine of the "three-in-one" programme reception which insists on dubbing itself on to my tapes.—B. J. CLAXTON (Bridlington).

TEST TRANSMISSIONS

SIR,—I often receive signals on my short wave set from New York, Rome, Vienna, Berne, Tel-Aviv, Moscow etc., which are announced as "Test transmissions for receiver adjustment purposes", or something similar. Some of these transmissions are SSB, and I generally hear them between 8 and 16Mc/s. I wonder if anyone could tell me what the purpose of these transmissions is, and who they are intended for.—A. J. RICHARDS (Abermule, Montgomery).

A STRANGE FAULT

SIR,—I recently experienced a strange fault which might be of interest to other experimenters. It was in some experimental equipment I was using, and during the experiments I had reason to connect a resistor across another one in order to arrive at a different value. I then experienced trouble with the equipment under test, and could not find any logical reason for it. I changed the two resistors in parallel for one of equivalent value, and the trouble ceased. I then replaced the paralleled resistors by two others of the same value, and got the same trouble. Eventually it was found that the two resistors in parallel acted as a closed circuit which was being shocked into oscillation. I think it worth while now never to use this arrangement but always to make sure of using a single component to avoid this risk.—L. MENCE (Birmingham).

COPY OF P.W. WANTED

SIR,—I should like to know of any reader who would let me buy or borrow a copy of February 1954 PRACTICAL WIRELESS. I need this issue for the article on an electronic organ.—J. WATSON (227 Cemetery Road, Lidget Green, Bradford 7, Yorkshire).

UNIVERSAL AVOMETERS

Guaranteed perfect working order. Supplied complete with leads, batteries and instructions.
 Model "D" 36 range £9.19.8 each
 Model "7" 50 range £11.5.0 each
 Model "8" 20,000 ohm/volt model 15 Gns.
 Registered post 5/- extra.



R.C.A. AR.88 RECEIVERS

Model AR.88 D. Frequency coverage on 8 bands, 550 kc/s to 32 Mc/s, £25 each. Model AR.88 L.F. Frequency coverage on 8 bands, 75 kc/s to 550 kc/s and 1.5 Mc/s to 30 Mc/s, £32.10.0 each. Both models operate on 110/200/250 volt A.C. Supplied fully tested and checked and in excellent condition. Carriage 30/- extra.

AMERICAN C.B.S. TAPES

5in. std.	600ft.....	13/-
5in. L.P.	900ft.....	26/6
5in. D.P.	1200ft.....	32/-
5 1/2in. std.	600ft.....	16/-
5 1/2in. L.P.	1200ft.....	19/6
5 1/2in. D.P.	1800ft.....	37/-
7in. std.	1200ft.....	21/-
7in. L.P.	1800ft.....	29/6
7in. D.P.	2400ft.....	47/-

Brand new and guaranteed. Please add postage. S.A.E. for full list.



24 VOLT D.C. PUMPS

100 gph impeller type. Suitable for water. 15/6 each. P. & P. 2/8.

MINE DETECTORS No. 4A

Will detect all types of metals. Fully portable. Complete equipment supplied tested with instructions, 39/6. Carriage 10/6. Battery 8/6 extra.



PRECISION COMBINATION VOLTMETER/AMMETER FOR A.C. AND D.C.

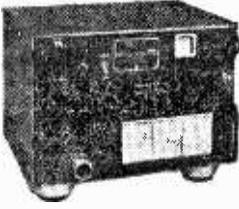
Two separate instruments housed in polished wood case. 6in. scales with knife edge pointers. Ranges:

Volts A.C. and D.C. 160-300-600v.
 Amps A.C. and D.C. 25-50-150-200A.

Supplied complete with all current shunts, leads and leather carrying case. Manufactured by Elliott Bros. Supplied brand new, £9.19.8 each. Carriage 7/6.

FIELD TELEPHONES TYPE "F"

Ideal for all inter-com systems, house, garage, office, building sites, etc. Generator bell ringing, 2-line connection. Supplied complete with batteries and wooden carrying case, fully tested, £4.19.8 per pair. Carr. 5/-.



COLLINS TCS RECEIVERS
 BRAND NEW! Superb short wave receiver covering 1.5 to 12 Mc/s on 3 bands. Circuit incorporates r.f. and a.f. gain controls, b.f.o., etc. Power requirements 225v. H.T. and 12v. H.T. Supplied brand new with circuit. £8.19.8 each. Carriage 7/6.

P.C.R. COMMUNICATION RECEIVERS

6 valves. Frequency coverage on 3 bands: 850-2,000 metres, 190-550 metres and 6-16 Mc/s. Super slow motion drive, AE trimmer, tone control, built in speaker. AS NEW £6.19.8 each. Carr. 7/6.
 P.C.R. 4 HX131VETS
 850-2,000 metres, 190-550 metres, 6-22 Mc/s. Output for phones or 3 ohm speaker. AS NEW £5.19.8. Carr. 7/6. Both above models can be supplied with internal power unit to operate on 200/250 v. A.C. at 39/6 extra or alternatively plug-in external power units are 35/-. Circuit and details are supplied with each receiver.



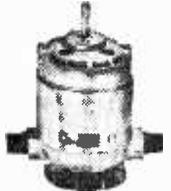
NATIONAL H.R.O. RECEIVERS

BRAND NEW! Senior model, table mounting. Complete with a full set of 9 coils covering 50 kc/s to 30 Mc/s. Supplied in original transit cases. £25. Carr. 20/-. Power units to operate direct from 200/250 volt A.C. 59/6 extra.



IKV.A. ISOLATION TRANSFORMERS

230v. pri., 230v. sec. Boxed, £5. Carriage 10/-.



JEMCO 20,000 OHM/VOLT TESTMETER

D.C. and A.C. volts up to 1,000v. Current up to 500 mA. Resistance up to 5 megohm. Decibels from -20 to +36 dB. Supplied brand new, guaranteed with instructions, leads and battery. 5 gns. P. & P. 2/6.



230/250 VOLT A.C. MOTORS

Size 4 1/2in. x 3 1/2in. dia., 90 watt rating, 5,000 r.p.m., 1 1/2in. drive spindle. Brand new, 22/6 each. P. & P. 1/6.



CT-53 SIGNAL GENERATORS

Precision Instruments covering 8.9 to 15.6 Mc/s and 30 to 300 Mc/s on 6 bands. Variable attenuator from 1 microvolt to 100 millivolts. Operation 110/200/250 volt A.C. Supplied in perfect working order complete with calibration charts. 19 gns. each. Carriage 10/6.

★ PRECISION A.C. & D.C. VOLTMETERS

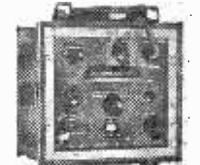
Two ranges, 160 and 320 volts. 8in. mirror scale with knife edge pointer. Housed in polished wooden case. Ideal for schools, labs., etc. Supplied brand new, £5.19.8 each. P. & P. 3/6.

7.5kV.A. AUTO TRANSFORMERS

0-115-230 volts. Brand new, boxed, £15. Carriage 10/-.

COLLARO STUDIO TAPE TRANSCRIPTORS

Brand new 1962 model, 3 speeds, 3 motors, digital counter, etc. Fitted with latest Bradmatic heads and interlock button. Supplied with spare spool, instructions and fixings. 10 gns. each. Carriage paid.



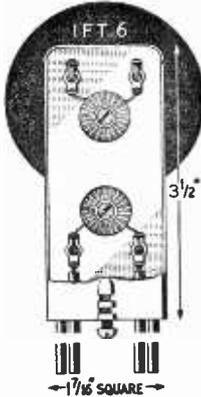
CLASS "D" WAVEMETERS Mk.II

Heterodyne crystal controlled frequency meter covering 1.5 to 8 Mc/s. 6 volt D.C. operation. Supplied brand new and complete with crystal, valves, spare vibrator, headset and instruction manual. 59/6 each. P. & P. 3/6.

GW. SMITH & CO (RADIO) LIMITED
 Phone: GERRARD 8204/9155
 Cables: SMITHEX LESQUARBS
 3-34 LISLE STREET, LONDON W.C.2

MAXI-Q
REGD.

I.F. TRANSFORMERS



IFT. 11/465 Kc/s and 1.6 Mc/s.
Miniature IF Transformers for 465 Kc/s or 1.6 Mc/s giving excellent performance at low cost. Coils are litz wound and permeability tuned with high-grade iron dust cores and silver mica condensers. Screening can 1½ in. x ½ in. sq. PRICE 6/6.

IFT. 11/10.7 Mc/s.
Nominal frequency 10.7 Mc/s. For IF stages of F.M. receivers and converters. The Q of each winding is 90 and the coupling critical. Construction and dimensions as above. PRICE 6/6.

IFT. 11/10.7/L.
As above but with secondary tap for limiter input circuits. PRICE 6/6.

IFT. 6A and B 465 Kc/s or 1.6 Mc/s.

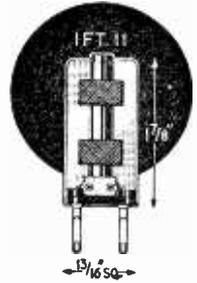
A superior IF Transformer for use in high quality receivers and tuners. Permeability tuned, litz wound coils, high-grade iron dust cores and silver mica condensers. Termination is made by four coloured flexible leads. Coupling is optimum at 465 Kc/s and slightly sub-optimum for increased selectivity at 1.6 Mc/s. IFT. 6A has all leads brought out at the bottom while IFT. 6B has a top screened grid lead. Screening can 3½ in. x 1 7/16 in. square.

PRICE: TYPE 'A', 9/—
PRICE: TYPE 'B', 9/4

IFT. 12/85 Kc/s.

A narrow band 85 Kc/s IF Transformer for use in double superhet communications receivers. The overall response of one transformer is approx. 3.5 Kc/s at — 6db. Dynamic resistance 500,000 ohms. Wound on a polystyrene former with iron dust core tuning and silver mica condensers. Screening can 2½ in. x 1½ in. square.

PRICE 16/—.



GENERAL CATALOGUE covering full range of components, send 1/6 in stamps. PLEASE SEND S.A.E. WITH ALL ENQUIRIES.

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

Stop Press: MULLARD "TWIN THREE-THREE" STEREO AMPLIFIER. Punched Aluminium Chassis and Hammered Gold printed front Panel 25/9d.

ALL IF. TRANSFORMERS ARE ALIGNED BEFORE LEAVING THE WORKS

**THE
PEMBRIDGE
COLLEGE
OF ELECTRONICS
OFFERS TRAINING
IN RADIO
TELEVISION
AND ELECTRONICS**

ATTENDING COURSE

(A) Full-time One Year Course in Radio and Television. College course in basic principles for prospective servicing engineers. Next course commences 4th September, 1962.

This course is recognised by the Radio Trades Examination Board (R.T.E.B.) for the Radio and Television Servicing Certificate examinations.

Provides excellent practical experience on valve and transistor radio receivers and all well-known makes of television receivers.

HOME-STUDY COURSES

(B) Courses in Radio, Telecommunications and Mathematics for the City and Guilds Telecommunication Technicians' Certificates.

To: The Pembridge College of Electronics.
(Dept. P11), 34a Hereford Road, London, W.2.
Please send, without obligation, details of
A___ B___ (Please tick)

Name _____

Address _____

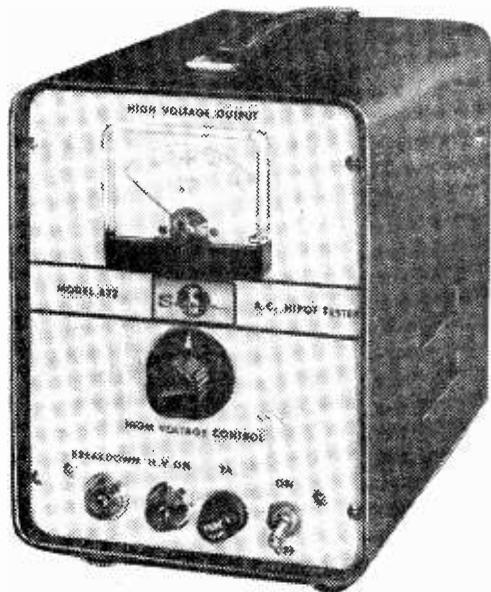
T rade N ews

7,500V A.C. HIGH-POTENTIAL TESTER

A 7,500V A.C. high-potential tester has been added to Raytheon Company's Sorensen range of products.

Designed to test and measure cable and equipment breakdown limits, the Sorensen 800 Series high-potential testers feature a direct-reading kilovolt meter and a continuous variable voltage over their entire output range of zero to 3,000 or zero to 7,500V A.C.

A "breakdown" current indicator lamp, precisely calibrated by a potentiometer for a predetermined load current, shows that point when the 10mA current is at or above the selected

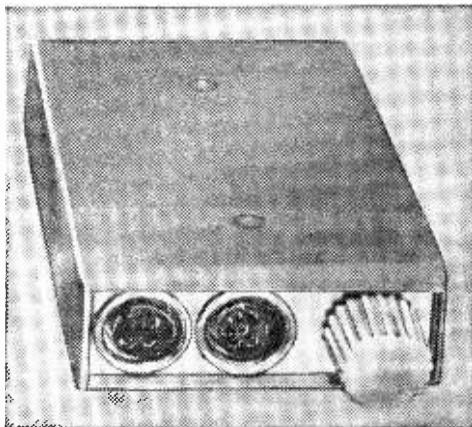


A 7,500V high-potential tester from Raytheon.

load, or flashes at breakdown, pinpointing the minimal limit of the tested object.

Incorporating an internal overvoltage protection circuit, the Sorensen air-cooled testers operate from a nominal input of 117V A.C., single phase, and are 6½in. wide, 8½in. high and 10½in. deep.

Full particulars on the Sorensen 800 Series portable A.C. high-potential testers may be obtained in Europe from *Sorensen-Ard, A. G., Eichstrasse 29, Zurich 3, Switzerland*. Inquiries from all other areas outside the U.S.A. should be addressed to *Raytheon Company International Sales and Services, Spring Street, Lexington 73, Massachusetts, U.S.A.*



A new pocket intercom amplifier from Amplivox Limited.

NEW POCKET INTERCOM AMPLIFIER

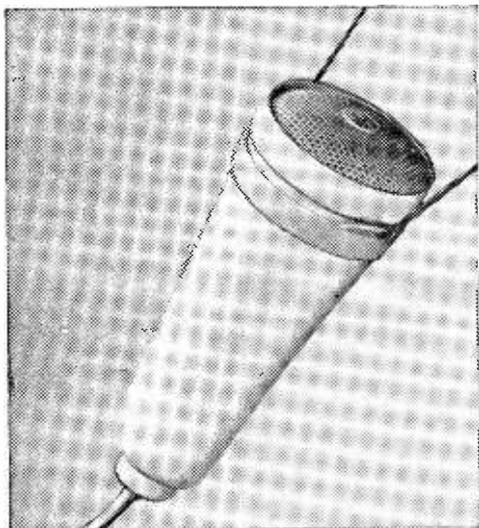
RECENTLY introduced by Amplivox is the Ampliphone Pocket Intercommunications Amplifier for multi-way communications over 2-wire lines, using boom microphone headsets. Special features have been included in this fully transistorised pocket or belt set to achieve superior speech intelligibility in high noise areas. Transmit and receive gain controls are provided and the amplifier is completely self-contained, operating from a 6V internal battery or, if necessary, from a central power supply. It is designed to work with ordinary magnetic, noise-cancelling magnetic or throat microphones.

Amplivox Limited, Beresford Avenue, Wembley, Middlesex.

NEW NECK MICROPHONE

A NEW Lavalier (neck) microphone, Model 4112, is to be introduced by Standard Telephones and Cables Limited. The first model was shown at the London Audio Festival recently.

The model 4112 is a small tubular omni-directional moving coil microphone of high quality, designed for use in broadcasting, commentaries and in public address systems. It weighs only 5oz and is provided with a light neck halter. Attachments are available enabling it to be used from a stand or as a table microphone.



A new microphone made by Standard Telephones and Cables Limited.

The frequency response of the new microphone is substantially uniform between 100c/s and 14kc/s and it has a sensitivity of -82dB referred to $1\text{V}/\text{dyne}/\text{cm}^2$ (0.1mV approximately).

The case is of strong alloy, with a perforated chrome plated steel front. It has a durable plastic diaphragm.

The microphone is made by *Standard Telephones and Cables Limited, Connaught House, 63 Aldwych, London, W.C.2.*

NEW RECORD PLAYER

A NEW inexpensive record player has recently been introduced by Pam Radio and Television Ltd.

The record player—model 5200—features a four speed auto changer and costs only 17 guineas. The two tone cabinet houses a 7in. x 4in. loudspeaker. There is a choice of colour schemes for the cabinet—navy blue and grey or red and grey.

The record player is manufactured by *Pam Radio and Television Ltd., 295 Regent Street, London, W.1.*

NEW AUDIOMETER TO BRITAIN

RECENTLY introduced by the Zenith Radio Corporation of Chicago, U.S.A., is a portable transistorised model of a diagnostic audiometer which can carry out major hearing tests.

This new model is now available in Britain for immediate use by specialists, nurses, industrial and safety personnel, as well as by hospitals, schools, and hearing and speech centres.

Battery-powered, the audiometer measures $10\frac{1}{2}$ in. wide by 7in. high by $6\frac{1}{2}$ in. deep. It weighs only

$8\frac{1}{2}$ lb including batteries, and the price is £150.

Known as the ZA-100-T, it is housed in a black vinyl and clear anodised aluminium cabinet. Battery-power also provides performance stability in both tone and volume output, a distinct advantage over vacuum tube models that are affected by even the small variations of electric line current that frequently occur.

The audiometer is capable of measuring frequencies from 125 to 8,000c/s for air conduction and from 250 to 4,000c/s for bone conduction.

It has temperature compensated circuitry which includes a transistorised thermistor stabilised Wien bridge oscillator. Also featured is a masking control calibrated in levels of total sound intensity above $0.0002\text{ dyne}/\text{cm}^2$, a continuously rotating frequency selector dial, and frequency accuracy within $\pm 3\%$.

Supplied with the new Zenith portable audiometer are two headphones with cushions, a headband, yokes and cord; a bone conduction receiver and a clear plastic dust cover. Further versatility of the ZA-100-T can be achieved through accessories consisting of a magnetic microphone for communication with the test subject, and a shoulder carrying strap as a replacement for the normal carrying handle, both available at a slight extra cost.

U.K. distributors for Zenith audiometers and hearing aids are the *United Mercantile Company Limited, 13-14 Queen Street, Mayfair, London, W.1.*



The model 5200 record player from Pam Radio and Television Ltd.

SURBITON PARK RADIO LTD

for POST HASTE—POST FREE SERVICE

F.M. TUNERS

JASON F.M. TUNER KITS

FMT1 Complete with valves	£6.17.6
Deposit £7/6 and 6 monthly	£1.1.8
FMT2 Complete less power	£7.17.6
Deposit £1/6 and 6 monthly	£1.4.4
FMT3 Complete with power	£9.15.0
Deposit £9/- and 6 monthly	£1.9.4
FMT3 Complete less power	£9.12.6
Deposit £8/6 and 6 monthly	£1.9.0
FMT3 Complete with power	£12.0.0
Deposit 48/- and 8 monthly	£1.5.6
Power Pack Kit ready drilled chassis	£2.12.6
The instruction book is included in all the above kits, but otherwise is 2/6	
JTV2 Switched TV sound, powered	£15.15.0
Deposit 48/- and 12 monthly	£1.1.6
Mercury 2 as above less power	£10.15.0
Deposit 48/- and 8 monthly	£1.4.0

The instruction book is again included, but otherwise 2/6.
REQUIRED CHANNELS MUST BE SPECIFIED FOR ALL SWITCHED TUNERS

Marriott Tape Heads, 4 Track Type L/R/P/S/7 and L/E/S/9, R/P/B and Erase with mounting bracket for Studio Deck. **PAIR COMPLETE**..... £4.40.
 Marriott list price is £8.14.0 with brackets.

ALL THE ABOVE HEADS ARE BRAND NEW, OBTAINED DIRECT FROM MANUFACTURERS.

ARMSTRONG RADIO CHASSIS

T4B VHT Tuner, self powered	£21.18.0
Deposit £4.5.0 and 12 monthly	£1.12.1
ST/3 Mk.2 AM/FM Tuner, powered	£27.16.0
Deposit £5.16.0 and 12 monthly	£2.0.4
APF08 AM/FM Radio chassis, bass and treble controls, P.U. inputs	
Single ended output stage	£22.18.0
Deposit £4.18.0 and 12 monthly	£1.13.0
Jubilee Mk.2 AM/FM Radio chassis with push-pull output stage	£30.12.0
Deposit £6.2.0 and 12 monthly	£2.4.11
Stereo 55 AM/FM Radio chassis, single ended output stage, on both channels. Separate tone and volume	£32.16.0
Deposit £6.15.0 and 12 monthly	£2.7.8
Stereo 12 Mk.2 AM/FM Radio chassis. Push-pull on both channels, separate controls	£43.10.0
Deposit £9.0.0 and 12 monthly	£3.3.3

Individual leaflets giving full description and technical specification available

Marriott, 2 Track Type DR/RP/1 R/P/B only, with mounting bracket for Studio Deck. Ideal 3rd head..... £1.7.6
M.S.S. 2 Track Type DR1 and DE1 R/P/B and Erase. Sets only. £1.2.6 pair.

MARTIN RECORDAKITS

We are able to offer for the first time, a proprietary range of Recorders in kit or assembled form. This enables you to take advantage of mass production techniques and prices, should you wish to assemble yourself. The components used are the finest available, with BVA valves, and the decks are the latest heads, etc.: The amplifiers are packed in special cartons with instructions which enable anyone to build. We are confident you will find these Recorders very good value; they have been built up to a standard and not down to a price.

B.S.R. TD3 Monardeck, latest model 5 1/2in. spools	CASH £29.9.0
Hire purchase deposit £1.19.0 and 6 monthly	£1.8.4
Tape Amplifier for B.S.R. deck, printed circuit ready wired, with ECC83, ECL82, EM85 and E281. Complete with all plugs, sockets, panels, knobs, etc. The whole amplifier mounts on to the deck, making a self-contained unit..... CASH PRICE	£8.8.0
Hire purchase deposit £1.14.0 and 6 monthly	£1.6.8
Cabinet for above including 7 x 4in. speaker	£4.4.0
Total kit as above	CASH £22.0.0
Hire purchase deposit £4.10.0 and 12 monthly	£1.12.1
The above recorder can be supplied complete with Mic: tape assembled and tested for..... CASH PRICE	£25.0.0
Hire purchase deposit £5.0.0 and 12 monthly	£1.12.8
Collaro Studio Deck , Very latest model 3 speeds	£12.10.0
Hire purchase deposit £2.10.0 and 8 monthly	£1.7.6
Tape Amplifier for Studio Deck, with ready wired printed circuit, control and input panels, mains and output trans, complete with knobs, plans, screws, etc., EF86, ECC83, EM84, E281, OA81 and 2 EL84, 3 watta output, Magic eye, track and Mic. inputs. EX 1/8 socket. Tone control. Can be used as an amplifier..... COMPLETE CASH	£11.11.0
Hire purchase deposit £2.7.0 and 8 monthly	£1.5.6

Cabinet for above including 9 x 6in. speaker	£5.5.0
Total kit as above	CASH £29.0.0
Hire purchase deposit £6.0.0 and 12 monthly	£2.2.2
We can supply the above recorder, complete with tape and Mic., in a DE LUXE cabinet, assembled for.....	£36.0.0
THIS MACHINE IS LISTED £41.0.0 BY MAKERS AND IS A VERY GOOD BUY.	
Hire purchase deposit £7.0.0 and 12 monthly	£2.11.4
Tape Pre-amplifier , for recording and playback, as above less output stage, with power supplies	£3.8.0
Hire purchase deposit £1.14.0 and 6 monthly	£1.5.8
Microphone for the above recorder, Acos MIC 40, 25/-, 8/- plus 4/6.	
Synchrotype 6in. 600ft. 15/- 6in. 900ft. 15/6	
Finest 6 1/2in. 850ft. 18/6 5 1/2in. 1200ft. 22/6	
Boxed 7in. 1200ft. 22/6 7in. 1800ft. 32/6	
Tape Recorder Speaker Cabinet , corner, 20 x 10in. High class finish in two-tone Grey "Vynal".....	£2.15.0
With 9 x 6in. high flux speaker	£4.0.0
BM3 Crystal Microphone, with table stand, and on/off switch, black and chrome finish, supplied complete with neck band, and input lead. VERY GOOD VALUE.	£2.10.0
DX29 Dynamic Moving Coil, with desk stand	£3.10.0

GRAMOPHONE EQUIPMENT

B.S.R. UA14 TCS/H cartridge	£7.15.0
Hire purchase deposit £1.11.0 and 6 monthly	£1.4.0
Garrard "Autoslim" 67/2 cartridge	£8.14.0
Hire purchase deposit £1.14.6 and 6 monthly	£1.8.8
Phillips AG1018 New semi-auto player	£13.10.0
Hire purchase deposit £5.16.0 and 8 monthly	£1.9.6

REGENCY

Resistors 2/8, Controls 9/-, Condensers 15/-, Knobs 2/6, Station dial 5/6, Jackson gang 8/-, Mullard OC45 10/- each, OCT2 Matched pair 16/-, OA71 3/-, Battery 1/-, Wave change switch 2/6, Repanco TT49, TT45, TT46, all 5/- each, R12 12/6, RFC1 2/6, 7 x 4 inch speaker 17/6, Groupboard 1/3, Complete kit (less cabinet) £6.12.6.
 Transistor Cabinet, in two tone "Vynal" 10 x 6 x 3 1/2in. for 7 x 4in. L/S. Ideal for REGENCY and WEYMOUTH circuits etc. £1.12.6

TRANSISTORS

MULLARD HAVE REDUCED THE PRICE OF MANY TYPES TO OC44 11/-, OC45 10/-, OC70 8/8, OCT1 8/6, OCT2 8/-, OCT5 8/-, OCT6 8/-, OCT8 8/-, OCT8 1/8-
ABOVE ARE THEIR NEW LIST PRICES. WHY BUY SURPLUS? MATCHED PAIRS ONLY. Mullard OCT2 at 16/- pair.

P.W. "POCKET SUPERHET" OSMOR PRINTED CIRCUIT VERSION

Osamor Rod Aerial, 8/6. L.F.T.'s and Osc. Coils, 22/-, Osamor Driver, 8/3, Osamor Output, 8/-, Set transistors and diode, 43/-, J.B. Gang, 12/6, Trimmers, 1/3 ea. Set condensers, 15/-, Set resistors, 5/-, Ardent volume control, 8/-, Switch, 3/6, Speaker, 17/10, Hardware 4/-, Printed circuit, 7/6, New case dial and knob, 12/8, Battery PF4, 2/-, Leaflet giving full illustrated details, 1/6.

ALL THE ABOVE COMPONENTS IF PURCHASED AT ONE TIME, £23.10.8. Osamor undertake to align this receiver for 10/-

"WEYRAD"

WEYMOUTH RADIO 4 Transistor Superhet using the P50 coils, as they advertise in this journal. P50/1AC Osc. Coil, 5/4, P50/3CC 1st and 2nd I.F.T.'s, 5/7 ea. P50/3CC 3rd I.F.T., 6/-, RAZW Rod Aerial, 12/6, LFDT4, Driver, 9/6, PCA1 Printed Circuit, 9/6, Instruction Book, 2/-, Set Resistors, 7/6, Vol. Control D.P., 5/6, Set Condensers, 20/-, J.B. Gang, 12/6, Beehive Trimmers, 1/3 ea. W.C, 3/6, Dial and Knob, 6/6, Battery PF11, 5/6, OA81 3/-, Set MULLARD transistors, 53/6, Car Aerial Coupling Coil, 1/-

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.

RETURN-OF-POST SERVICE -

● P.W. BLUEPRINTS

Kits and components for Regency, Mercury, Troubadour, Everest, Britanna Two, Short Wave Two, Citizen, Mini-amp and Tutor. Full lists available. Printed Circuit Panel for Mercury now available.

● LOUDSPEAKERS

GOODMANS: New Axlette 8 £5.5.1; New Axium 10 £5.16.8; Axium 12 10in. £8.14.0; Axium 201 12in. £9.15.0.
WHITELEY: HF 1016 10in. £7.16.0; HF 1013 10in. £4.17.6. All Goodmans and Whiteley units supplied. H.P. available.

● 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. All 10/6 each.

● TRANSISTORS

MULLARD. Reduced prices. Current production types, not rejects. All in makers' boxes. Postage 3d. on each transistor.
OC44, 9/3; OC45, 9/-; OC70 and OC71, 6/6; OC72, 8/-; OC72 Matched Pairs 16/-; OC78, 8/-; OC81, 8/-; OC170, 9/6; OC171, 10/6.

● 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, GEC 912 Plus. Detailed list on any of these sent upon request. Instructional Manuals: All Mullard Audio Circuits in "Circuits for Audio Amplifiers", 9/5. GEC912, 4/6. All post free.

● GRAMOPHONE EQUIPMENT

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

GARRARD AUTOSLIM (GC8 PU) ..	£7.19.6	£1.12.8	12 of	12/3
GARRARD AUTOSLIM De-luxe (GC8 PU) ..	£12.14.8	£2.11.8	12 of	18/8
GARRARD AUTOSLIM De-luxe (EV26A PU) ..	£13.12.9	£2.14.9	12 of	20/-
B.S.R. UA14 (TC8 PU) ..	£7.17.8	£1.12.8	12 of	12/1
B.S.R. UA14 Monarch (TC8 Stereo/1/F78) ..	£8.17.6	£1.18.6	12 of	13/5
SINGLE RECORD PLAYERS				
GARRARD TA (GC8 PU) ..	£8.2.6	£1.12.6	12 of	12/6
B.S.R. TU12 (TC8 PU) ..	£4.5.0	£1.5.0	3 of	£13.4
TRANSCRIPTION UNITS				
GARRARD HIF (GC8PU) ..	£17.19.6	£3.11.6	12 of	£18.5
PHILIPS AG1016 ..	£13.13.0	£2.15.0	12 of	£11.0

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

● "BRAND FIVE" RECORDING TAPE

Standard Play: 600ft. (5") 18/-; 1,200ft. (7") 25/-.
Long Play: 900ft. (5"), 18/6; 1,200ft. (5 1/2"), 23/6; 1,800ft. (7"), 35/-.
Double Play: 1,200ft. (5"), 37/6; 2,400ft. (7"), 60/- (All Post Free.)

● LATEST TEST METERS

			Hire Purchase	
			Cash Price	Deposit Mthly/Pmts.
AVO Model 8 Mark II ..	£24. 0.0	£4.16.0	12 of	£1.15. 2
AVO Model 7 Mark II ..	£21. 0.0	£4. 4.0	12 of	£1.10.10
AVO Multimeter ..	£9.10.0	£1.18.0	12 of	14/4
TAYLOR MODEL 127A ..	£10.10.0	£2. 2.0	12 of	15/6
CABY A-10 ..	£4.17.6	£1. 7.6	3 of	£1. 8.8
CABY B-20 ..	£8.10.0	£2. 0.0	3 of	£1.13.4
CABY M-1 ..	£2.14.0			

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.

● TAPE RECORDING EQUIPMENT

			Hire Purchase	
			Cash Price	Deposit Mthly/Pmts.
ALL CARRIAGE FREE ..	£8.19.6	£1.16.8	12 of	13/7
B.S.R. TD2 ..	£12.19.6	£2.12.6	12 of	19/-

MARTIN RECORDER KITS. 831V for Collaro Studio Deck, 11 gns. 8312M for B.S.R. Deck, 8 gns. Carrying cases available. H.P. Terms on Decks, Amplifiers and Cases, send for quote.
ARMSTRONG PA80-3. Price £16.16.0. Hire Purchase Deposit £3.8.0, and 12 monthly payments of £1.4.7.

● JASON F.M. TUNER KITS

We stock complete kits for FMT1, FMT2, FMT3, Mercury 2, and JTV2 at competitive prices. Send for list.

● **ILLUSTRATED LISTS** are available on **LOUDSPEAKERS! TAPE DECKS, TEST GEAR, RECORDING TAPES, GRAMOPHONE EQUIPMENT AMPLIFIERS.** Any will be sent free upon request.

● TERMS OF BUSINESS

Cash with order or C.O.D. We charge C.O.D. orders as follows. Up to £3, minimum of 3/2. Over £3 and under £5, 1/6. Over £5 and under £10, 1/8. Over £10, no charge. Postage extra on CASH orders under £3 except where stated. Postage extra on overseas orders irrespective of price.

WATTS RADIO (MAIL ORDER) LTD.

54 CHURCH STREET, WEYBRIDGE, SURREY

Telephone: Weybridge 4556

Please note: Postal business only from this address.

CLOSED FOR ANNUAL HOLIDAYS AUGUST 11th to 25th

SPECIAL FOR THE "HAMS" RADIO STATION

Illustrated

1/8 inch detachable bit soldering instrument
List No. 70

Combined Protective Unit with Wiper/Abrasion Pad and Solder Reel
List No. 700

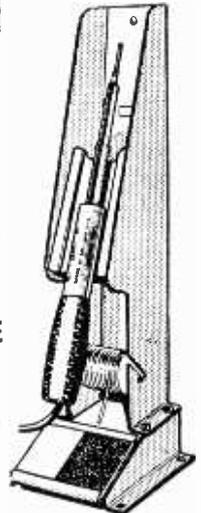
Apply SALES & SERVICE

ADCOLA

ADCOLA HOUSE
GAUDEN ROAD
LONDON, S.W.4

Telephones:
MACaulay 4272-3101

Telegrams:
"SOLJOINT, LONDON, S.W.4."

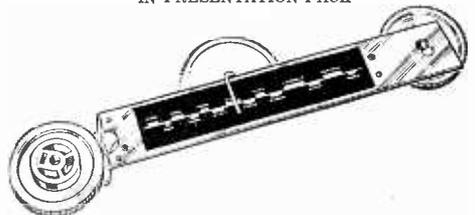


British & Foreign Patents, Registered Designs, etc.

New dial assembly 'Mercury Six'

for PLASTIC CASE and many other
Transistor Receivers

with instructions **14/6** (Postage 1/6)
IN PRESENTATION PACK



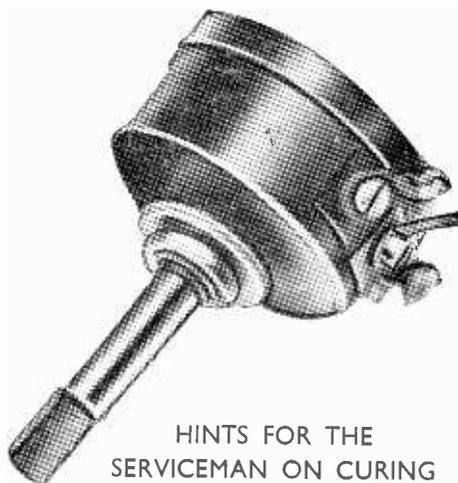
OSMOR RADIO
418 BRIGHTON ROAD, S. CROYDON

PLEASE SEND A-Z FREE INFORMATION

NAME

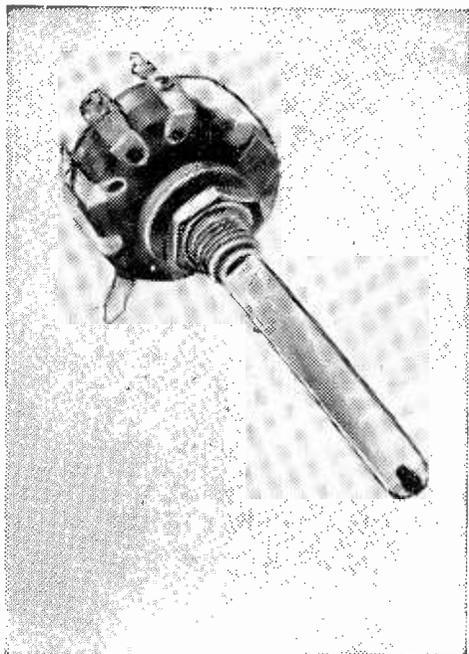
ADDRESS

Noisy Volume Controls



HINTS FOR THE
SERVICEMAN ON CURING
A COMMON FAULT

By E. Dexter



How often does a receiver come in for repair with the complaint that every movement of the volume control causes severe scratching and crackling! This is probably one of the most frequent faults in receivers, and thus it is felt that this article will throw some useful light on this subject.

It is probably not generally realized that the symptom of noisy operation is in very many cases not due to the volume control itself, which is often perfectly in order. Cleaning or greasing of the carbon track, or even replacement of the volume control, will thus effect a very temporary cure, and sometimes no cure at all, to the exasperation of the experimenter. It is thus necessary to understand clearly the factors involved, to be able to distinguish between faults originating in the volume control itself and faults from causes outside the volume control.

Faulty Volume Control

If a volume control is faulty in the true sense (i.e., if the slider or the track-ends make insecure connections at some or all positions), various forms of crackling and fizzing are likely. But these will be accompanied by similar simultaneous fluctuations of the programme material actually being amplified, and it is this latter observation which is indicative of the fact that the volume control itself need

cleaning or replacement. When no audio input is applied to a defective volume control of this kind, and all else is in order, crackling should be very weak or absent in most cases—unless, of course, the volume control defect interrupts a negative-feedback chain or other auxiliary circuit-refinement. Thus a study of the circuit of the particular receiver is a necessary preliminary in all cases.

D.C. Leakage

If a volume control is situated at the input to a sensitive audio amplifier, or even one or two stages of audio amplification, as in a simple domestic receiver, then any movement of its knob is likely to produce severe crackling if there is a direct current flowing in the carbon track. This current can be, and usually will be, far too small to damage the volume control, and the volume control will usually be completely faultless.

The reason why D.C. in the track causes "movement-crackling" is very simple indeed: D.C. in the track causes a standing D.C. voltage drop across it. In the circuit of Fig. 1 this would give V2 incorrect bias anyway, which would cause distortion, the degree of distortion being dependent on the volume level set, because the portion of this incorrect bias reaching the valve depends on the position of the slider of the volume control VR1. Thus a receiver with the arrangement of Fig. 1, having D.C. on the track of VR1, due to leakage of C1, would also give severe distortion under some or all conditions of normal operation.

But supposing the actual arrangement is that of Fig. 2, which differs from Fig. 1 only in that the blocking condenser C2 and grid leak R2 are present subsequent to the volume control, then the valve V2 receives no incorrect bias, even if C1 is leaking, and causes D.C. in the track of VR1. Thus distortion will certainly not take place. But every movement of the slider of VR1 is identical to an A.C. signal, because the momentary value of the D.C. voltage presented to C2 changes thereby and is passed on to V2, etc., for amplification. The effective frequency of this "artificial signal" depends on the speed at which the operator twists the knob of VR1 and, more particularly, on very slight irregularities of the track of VR1.

Track Irregularities

It must be emphasised that the slight track-irregularities just mentioned are entirely normal and virtually unavoidable in anything but the newest and smoothest of volume controls. They may represent random fluctuations of, say, $\pm 1\%$ of the resistance in rapid succession above and below the supposed value as the slider is moved. These fluctuations are not to be considered a fault and will produce no noticeable effects whatsoever under normal conditions and as long as no D.C. is flowing in the track.

But now suppose that, in Fig. 2 again, C1 is leaking such that 1V is dropped across the track of VR1. This will happen if the leak on C1 has some 300 times the resistance of VR1—i.e., about 150M, which can easily happen in practice!

Frequency

Suppose we have, for the sake of argument, one "irregularity cycle" of the magnitude (1%) taken as example above per degree of twist of the knob. Suppose the operator turns the knob at the rate
(Continued on page 345)

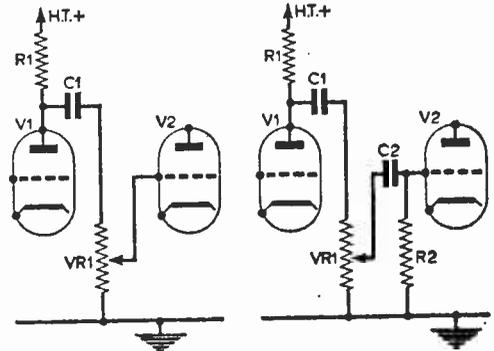


Fig. 1 (left)—Leakage in C1 would cause a direct current to flow in VR1 resulting in noisy operation and also V2 would be incorrectly biased to a degree dependent upon the setting of VR1—causing distortion.

Fig. 2 (right)—This circuit eliminates the incorrect biasing of Fig. 1, if C1 is leaky, but then VR1 will still be noisy in operation.

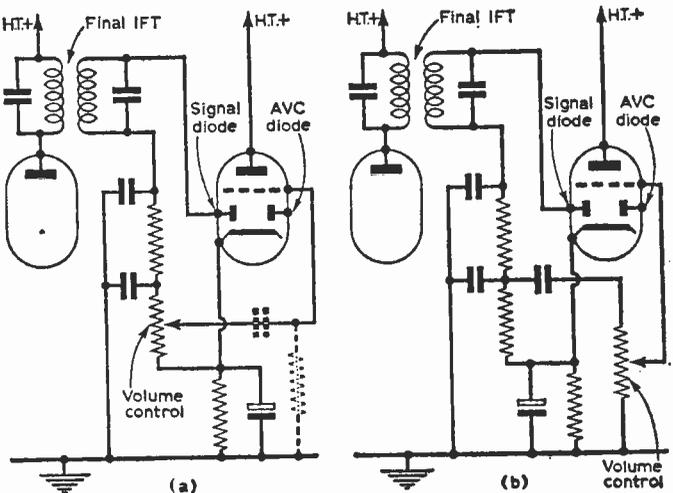


Fig. 3—A conventional double-diode-triode detector/amplifier circuit; (a) gives the incorrect, and (b) the correct wiring to avoid D.C. in the volume control track. Note that (a) is still incorrect even if an extra capacitor and resistor are included (shown dotted). This would remove distortion due to false bias of the triode section, but leave D.C. in the track of the volume control.

**SETTING A NEW STANDARD FOR DISCRIMINATING CONSTRUCTORS
HUNDREDS OF TESTIMONIALS PROVE THE EFFICIENCY OF OUR DESIGNS**

**THE SUPER SEVEN
EASILY THE BEST**

(7 Transistors plus 2 Diodes)

- ★ 2 R.F. STAGES.
- ★ Mullard and Surface Barrier Transistors.
- ★ Coverage of Medium, Long Waves, Trawler Band
- ★ Use as domestic radio, car radio or fit with strap for carry-about.
- ★ No aerial required except for use as car radio.
- ★ 3-inch speaker but will drive a larger speaker.
- ★ 400 milliwatts output stage.



May be built for **£6.9.6** plus 3/6 post, etc. SIZE: 7½ x 5½ x 1½ in.
PARTS PRICE LIST AND EASY BUILD PLANS 2/-

**THE EASY-BUILD-7
MED/L.W.**

Case as Super Seven.

Simple construction for beginners. 7 transistors plus 2 diodes. Performance will amaze you. May be built for ONLY £5.19.6. P.P. 3/6. Parts price list and building plans 2/-.

**NEW TRANSONA-6
(6 Transistors, plus 2 Diodes)
M/L & T. BAND**

400 Mw Mullard push-pull output Transistors. Powerful magnet 3in. high grade speaker. Push-pull transformers. This is a top performing receiver. Many stations listed in one evening including Luxembourg loud and clear. A pleasure to listen to. **FERRITE ROD AERIAL.** All parts sold separately, including pale blue gleaming polystyrene case with duo-diffusion grilles in red. Uses 9 volt battery. Sockets for car aerial.

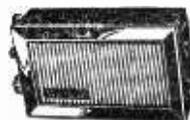


Total building cost **£4.19.6** P.P. 3/-, Size 6½ x 4½ x 1½ in. "Agreeably surprised with Trawler Band reception. Luxembourg as loud as local. Your easy build diagram helped a lot... my first attempt."—H. S., Penzance, Cornwall (poor reception area).
PARTS PRICE LIST AND EASY BUILD PLANS 1/6.

BEGINNERS POCKET 5

(MW/LW and TRAWLER BAND)
(5 Transistors, plus 2 Diodes)

Designed round supersensitive **FERRITE ROD AERIAL** and 3in. moving coil speaker. Attractive case in black with speaker grille in red. On test Home, Light, Radio Luxembourg and many Continental stations were received.



Total cost of all parts **£2.19.6** P.P. 3/-.

EASY BUILD PLANS AND PARTS PRICE LIST 1/6

THE MELODY SIX

- ★ Ferrite rod aerial.
- ★ 6 new type transistors and top quality components. Attractive case in blue and red with gold trim and carrying strap.
- ★ 3in. Speaker.
- ★ M.W/L.W.



£3.19.6

P.P. 3/-.

Components price list and plans, 2/-.

**BEGINNERS
PUSH-PULL FIVE**

(5 Transistors, plus Diode)

- ★ M/C Speaker, 2½in.
- ★ Ferrite rod aerial.
- ★ Tuning condenser.
- ★ Volume/oscillator control.
- ★ Case with speaker grille in red.
- ★ Fully tunable over med/long waves.
- ★ Simple assembly diagrams.
- ★ 250 Milliwatts output stage.



★ Can be built for **59/6** P.P. 3/-, or with 3in. speaker 68/-.

★ PARTS PRICE LIST, etc. 2/-.

AFTER SALES SERVICE

NAME AND ADDRESS
CAPITAL LETTERS PLEASE

RADIO EXCHANGE COMPANY

27 HARPUR STREET, BEDFORD

PHONE 2367

(Opposite Co-op)

10 a.m. to 1 p.m. SAT

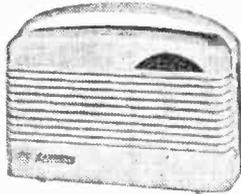
LASKY'S RADIO

"BUILD-YOURSELF" TRANSISTOR RADIOS

The "REALISTIC" SEVEN

STAR FEATURES ★★★★★

- ★ 7 Transistor Superhet. 350 Milliwatt output into 4-inch high flux speaker.
- ★ All components mounted on a single printed circuit board, size 5½ x 5½in. in one complete assembly.
- ★ Plastic cabinet, with carrying handle, size 7 x 10 x 3½in. in choice of colours:
- ★ Red/Grey, Blue/Grey, all Grey.
- ★ Easy to read Dial.
- ★ External Socket for car aerial.
- ★ I.F. frequency 470 K/cs.
- ★ Ferrite Rod Internal aerial.
- ★ Operates from PP9 or similar battery.
- ★ Full comprehensive data supplied with each Receiver.
- ★ All coils and IF'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

£6.19.6 Postage and Packing 4/6

Battery 3/9 (included free with complete parcel). Data and instructions separately 2/6, refunded if you purchase the parcel.

The New "ALBERTA 5" Mk. II

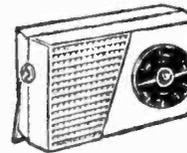
Now using printed circuit and supplied with miniature earphones for personal listening at no extra cost.

Push-pull, 200 milliwatts output. Five transistors and one diode. 2½in. moving coil speaker, ferrite rod aerial. Med. and long wave. Smart plastic Case. 4½ x 3½ x 1½in. overall.



CAN BE BUILT FOR 59/6 Post 3/6
All components available separately. Full details, circuit diagram. 1/6 post free.

THE "TORONTO 3"



Size 5½ x 3 x 1½in. Uses 3 transistors, plus germanium diode, ferrite rod aerial. Tunable over med. and long waves. Can be built for 32/6 Post 3/6

All components available separately.

★ REBUILDING CLEARANCE

SALE

at 42 Tottenham Court Rd., W.1.
LAST SIX WEEKS!
HUNDREDS OF BARGAINS!!

207 EDGWARE ROAD, LONDON, W.2.

Near Praed St. PADDINGTON 3271/2

33 TOTTENHAM COURT ROAD, W.1.

Nearest Stn. Gooch St. MUSEUM 2605

BOTH OPEN ALL DAY SAT. Early Closing Thurs. Mail Orders to Dept. P.W. Edgware Road.

HOME RADIO OF MITCHAM

(Dept. P), 187 London Road, Mitcham, Surrey. Mit 3282
Shop hours 9 a.m. to 6 p.m. Wed 9 a.m. to 1 p.m.

NOMBREX SIGNAL GENERATOR



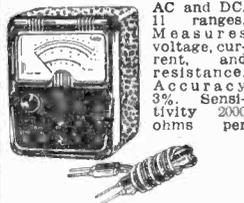
Completely portable transistor signal generator covering 200 kcs, to 220 mcs. in 8 ranges. Built to highest standards and the finest value in instruments available in the world. Accuracy better than 2% on all ranges. R.F. output modulated or unmodulated. Audio output at 1 kcs. Weighs under 2 lb. and size only 6½ x 4½ins. An essential instrument for all engineers and constructors. PRICE £7.12.0, complete with battery. Post and packing 3/6.

SUPER CATALOGUE
166 PAGES
600 ILLUSTRATIONS
5,000 DIFFERENT ITEMS
GET YOURS TODAY. 2/6, post 9d.

COMPONENTS STOCKED FOR P.W. BLUEPRINT DESIGNS

ELECTROVOICE Mains and Output Transformers

CABY MODEL M.I.



AC and DC. 11 ranges. Measures voltage, current, and resistance. Accuracy 3%. Sensitivity 2000 ohms per

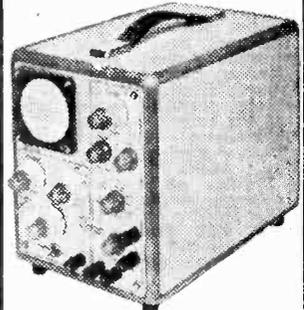
volt. Complete with test leads and prods. PRICE 54/-, post 1/6.

Stockists for HEATHKITS



HOLIDAYS AHEAD
Invest in this easy modern way of electric shaving. The UNIC shaver operates from a single U2 battery and will give you a quick, close shave anywhere. Ideal for holidays, camping, car rallies, etc. PRICE £2.19.6 complete.

Dartronic 381 Oscilloscope



A modern professional standard general purpose oscilloscope. 3" display tube completely enclosed in mu-metal shield. Completely self contained with power unit, time base, vertical and horizontal amplifiers, sync unit, etc. Many applications in industry, research, schools, servicing, etc. Send 3d. stamp for full specification and leaflet. PRICE £39.10.0, plus part carriage 3/6.

HI-FI ENTHUSIASTS

Have you tried CEIBALINE? This is the new super sound-absorbent material with self adhesive backing for lining speaker cabinets. Really wonderful results. PRICE 2/6 sq. ft., plus 1/6 postage on order.

(Continued from page 342)

of 250° in a second. The result is easily seen to be a spurious signal of about 250c/s fundamental, with harmonics, and some 2.5mV peak amplitude. This will be amplified by V2 and the following stages, giving a scratch or crackle, and may even produce this at great intensity if the gain following C2 is high.

Clearly this scratching noise will be independent of the position of the slider and will still be present undiminished even when no audio-signal proper is being applied. Furthermore, as no faulty contacts on the volume control are present, the audio-programme signals will not be in any way affected—i.e., although severe crackling takes place as the volume control is moved, the proper audio signals will nevertheless increase and decrease smoothly and as expected. All these symptoms, in contrast to those given above for a true faulty volume control, indicate D.C. leakage on to the track of the volume control. The source of this leakage must then be traced and removed.

Operating Conditions

An audio-volume control used in the conventional potentiometer arrangement dividing the actual audio signal voltage *must not have D.C. passing through its track under any circumstances.* This is an important fact which is probably not sufficiently realised. Failure to observe this condition produces noisy operation of the volume control at once or very soon after construction of the piece of apparatus in question.

Commercial Circuits or Proved Amateur Designs

If we are dealing with a commercial instrument, or with a properly designed amateur device, where no D.C. flows in the track of the volume control under normal conditions when all components used are faultless, then the cure for complaints of

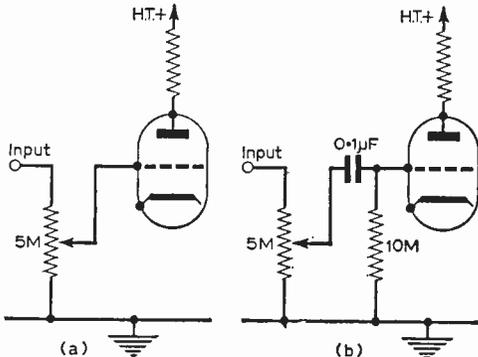


Fig. 4—Using high value volume controls—(a) gives the incorrect and (b) the correct wiring.

the nature here under discussion will amount to looking for a source of D.C. leakage.

The first step is to measure the D.C. voltage across the volume control's track, using a valve-voltmeter. If this is not zero, as it should otherwise be under faultless conditions, the fault is confirmed. The magnitude of the measured fault-voltage will give some idea of where it might be

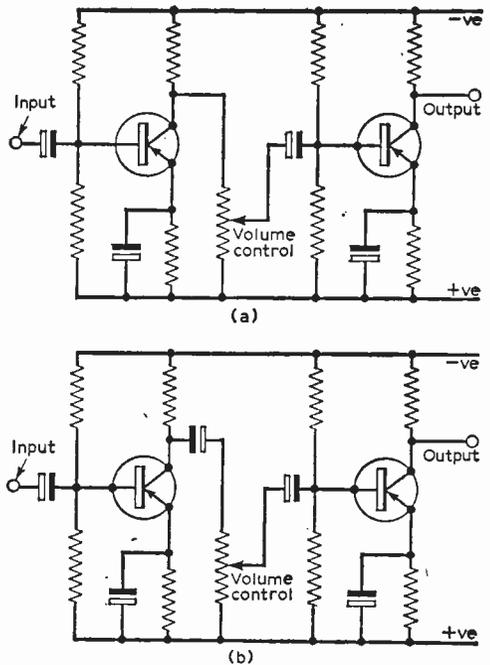


Fig. 5 (a) and (b)—Incorrect and correct circuit for interstage volume controls in transistorised circuits.

coming from. In simple circuits the possibilities are very limited anyway; the fault is most likely a leak in the coupling condenser from the anode of the previous valve. In the case of modern receivers, with all sorts of series-parallel equalisers and tone-equalisers, possibilities are more numerous, but a study of the circuit and a knowledge of the total leakage voltage across the track of the volume control, together with knowledge of any deviations of voltages at nearby points in the circuit (valve-voltmeter), will usually reveal pretty clearly which coupling condenser is leaking. This should then be unsoldered and tested or replaced. Note that, as in the numerical example given above, quite small leakages can produce severe faults of the type under discussion if the following gain is high.

Faulty Design in Amateur Circuits

Figs. 3, 4 and 5 give three typical examples of commonly-made errors in the design of amateur apparatus. Section "a" of each diagram shows the incorrect circuit in each case, leading to D.C. in the track of the volume control, giving noisiness sooner or later, and section "b" of each diagram shows the correct arrangement for the particular circuit in each case.

Fig. 3 shows a conventional double-diode-triode stage of a normal superhet. The diode load necessarily carries the rectified R.F. current, and if it is simultaneously used as the volume control, as in Fig. 3a, there is bound to be D.C. in the track. Thus, the arrangement of Fig. 3b should be used.

(To be continued)

Club News

REPORTS OF CURRENT ACTIVITIES

AMATEUR RADIO SOCIETY OF CHESHAM AND DISTRICT

Hon. Sec.: C. G. Stephenson, G3CLJ, 21 Lynton Road, Chesham, Buckinghamshire.

A front-page write-up and photograph in the local newspaper was the result of a visit from the press to the society's meeting on May 12th.

While work still goes on for a two-metre local link, the society held a Jumble sale on June 30th to raise funds for a second transmitter site.

CLIFTON AMATEUR RADIO SOCIETY

Hon. Sec.: C. Godsmark, G3IWL, 211 Manwood Road, London, S.E.4.

The club has planned five direction finding contests—two of them at night—for the summer months. Also two portable transmitting contests have been arranged for members.

CRAY VALLEY RADIO CLUB

Hon. Sec.: S. Coursey, G3JJC, 49 Dulverton Road, Eltham, London, S.E.9.

The club meets on every fourth Tuesday in the month at the Station Hotel, Sidcup, Kent and the meetings begin at 8 p.m.

The general meeting on May 22nd was followed by a film show. On June 26th Geoff Stone (G3FZL) talked about 'VHF'.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.

The first two-metre field day was held on May 6th. The direction finding event, held on May 16th, was a fixture in the D.F. League Table formed by the society this year to encourage members to take part regularly in these contests.

At the meeting on May 23rd, G3FUR gave a talk on "Receivers". A new trophy has recently been added to the society's collection, and will be awarded for the best piece of home constructed equipment exhibited at the Constructors' Night.

Future Event:

August 19th—Mobile rally.

DUDLEY AMATEUR RADIO CLUB

Hon. Sec.: D. Pratt, G3MHS, 23 Kent Street, Upper Gornal, Dudley, Worcestershire.

The membership of the club after being in existence for only 9 months has risen to 41.

On June 8th members attended a lecture by G8RF, and on 22nd June a Treasure Hunt was held.

EXETER AMATEUR RADIO SOCIETY

Hon. Sec.: S. Line, 46 Roseland Crescent, Heavitree, Exeter, Devon.

At the May meeting the result of the Short Wave Listeners' contest was announced, the winner being Clive Vicary with 616 points, followed by Barry Marshall with 377 points.

HALIFAX AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: G. Sunter, 24 Booth Fold, Luddendenfoot, Halifax, Yorkshire.

After the single sideband debate on July 3rd, members had a chance to examine a 160m. SSB rig brought along by G3NB1.

As usual, the second meeting of the month—July 17th—will be a ragchew night.

Future Event:

August 7th—Amateur television by G3EKE.

MORECAMBE AMATEUR RADIO SOCIETY

Hon. Sec.: K. J. Singleton, G3NLM, 8 Westmoor Grove, Heysham, Morecambe, Lancashire.

Meetings are held on the first Wednesday of each month at the Liberal Club, Balmoral Road, Morecambe. Visitors to the meetings are always welcome.

At the June meeting, a number of items of home-built equipment were shown, including an R/C Bridge built to the design in P.W. (January 1962 issue) and giving very accurate results, a multimeter a transistor power pack for mobile transmitters and receivers, a 12V top-band converter using ECH83's and an indication wavemeter and modulation monitor.

Future Events:

On one Sunday in July, the Society will be operating on top band under the calls G2FCL/A and G3GPH/M.

August 1st—Ragchew.

September 5th—Junk sale.

NORTHERN HEIGHTS AMATEUR RADIO SOCIETY

Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax, Yorkshire.

At the AGM all the retiring officials were re-elected. More recently members had a chance to show-off their equipment at the display of gear held on July 4th.

PLYMOUTH RADIO CLUB *

Hon. Sec.: R. Hooper, 2 Chestnut Road, Peverell, Plymouth, Devon.

At the Annual General Meeting H. Jones was elected president; E. Diggle and L. J. N. Kirkby were elected vice-presidents; A. Baker chairman; R. Hooper secretary and N. Stoneman treasurer.

PRESTON AMATEUR RADIO SOCIETY

Hon. Sec.: W. K. Beazley, 9 Thorngate, Penwortham, Preston, Lancashire.

The club station is now active under the call sign G3KUE.

On May 22nd, Norman Lowe gave a talk on "Dx working with indoor antennas." An illustrated tape lecture on semi-conductors was given on June 26th and on July 4th members visited the television transmitter at Winter Hill.

PURLEY AND DISTRICT RADIO CLUB

Hon. Sec.: E. R. Honeywood, G3GKF, 105 Whytcliffe Road, Purley, Surrey.

The Annual General Meeting was held on May 18th when M. Nisbet was elected chairman; M. Hubbard treasurer and E. R. Honeywood secretary.

The club operated two stations on June 2nd and 3rd as their part in N.F.D.

On July 6th Ian Wade, G3NRW talks about his trip to Moscow.

Future Event:

July 20th—R.S.G.B. tape recorded lecture.

READING AMATEUR RADIO

Hon. Sec.: R. G. Nash, G3EJA, 9 Holybrook Road, Reading, Berkshire.

The subject of the lecture given at the May meeting was "How to become a radio amateur". The following month's subject was "Transistors" and the talk was given by G8SC.

SLADE RADIO SOCIETY

Hon. Sec.: C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.

Future Events:

July 13th—R.S.G.B. Tape Recordings: "Experiments in Sound", "VHF Propagation".

July 27th—Lecture by K. W. Morris of the G.P.O. on the "Technical Aspects of STD".

WESSEX AMATEUR RADIO GROUP

Hon. Sec.: G. J. Fowle, 138 Surrey Road, Branksome, Poole Dorset.

The "Bournemouth Amateur Radio Society" has recently been dissolved and reformed as the "Wessex Amateur Radio Group". Meetings continue to be held at the old society's headquarters, i.e. Cricketers Arms, Windham Road, Bournemouth, Hampshire, on the first Monday of each month, commencing at 7.45 p.m.

On June 4th, "Railway signalling and communications" was the subject of the lecture. On June 9th, members visited Hurn aerodrome. Members visited the BBC transmitting station at Ramphisham Down on June 24th and on 2nd July heard a talk given by G8VB on "Transmitters".

Future Event:

July 22nd—Visit to the Science Museum, London.

YORK AMATEUR RADIO SOCIETY

Hon. Sec.: N. Spivey, G3GWI, 80 Melton Avenue, Clifton, York.

Two club meetings per week are to be held in future. On Tuesday evenings, instruction will be given in Morse and other matters related to obtaining an Amateur Transmitting Licence. On Thursday evenings the club's top band station, G3HWW, will be on the air, and once per month a special function will be arranged.

* (We were pleased to note in the report from the Plymouth Radio Club, that when asked how they came to learn of the society, new members invariably replied that they had seen it mentioned on the Club News page of Practical Wireless. The result of this publicity has been to double the membership of the club during the past year.—Ed.)

EDDY'S (NOTTM.) LTD.

116 ALFRETON ROAD
NOTTINGHAM

NEW VALVES

Guaranteed and Tested by Return Post

AC2/	EZ81	6/11	6F15	5/-
PENDD 7/6	HL13DD	6/6	6F33	6/6
CY31	KT33C	6/6	6J7G	5/-
DAF91	MU14	7/-	6K7G	1/11
DAF96	PCF82	8/6	6K8G	5/6
DF91	PCL82	8/6	6P25	7/6
DF96	PCL83	11/6	6P28	9/6
DK91	PCL84	9/6	6Q7G	5/11
DL96	PCL85	9/6	6SA7M	5/9
EB41	PL36	10/6	6S17M	5/9
EB91	PL83	7/6	6SG7M	4/9
EBF80	PY31	9/6	6SL7GT	6/6
EAC91	PY80	6/11	6SN7GT	4/3
EBC41	PY83	7/6	6U4GT	12/6
ECC35	PEN36C	8/-	6V6G	4/9
ECC85	111	PZ30	6X4	4/6
ECF82	7/11	TDD4	7C5	6/6
EF39	5/11	VP23	7C6	7/11
EF40	12/3	Z77	10F1	5/-
EF41	7/6	ID5	10P13	9/6
EF42	7/6	IR5	12A6	5/-
EF50	1/9	IS5	12AT6	7/6
EF86	8/11	IL4	12Q7	5/-
EF91	3/6	IT4	20D1	8/6
EF92	4/6	3A4	20P1	9/6
EF94	7/11	6AC7	20P3	9/6
EF95	6/11	6AG5	25L6GT	7/6
EF183	12/6	6BW7	30F5	6/11
EF184	12/6	6B8G	35L6GT	7/11
EL32	6/11	6BJG	80	6/11
EL91	4/6	6AU6	954	1/6
EZ40	5/11	6C4	955	3/6
EZ41	6/9	6CH6	956	2/6
EZ80	5/11	6F1	185BT	15/6

NIFE ACCUMULATORS. 1.25 v. Size 3 x 2 1/2 x 1/4 in. Weight 13 ozs. 2/11 each. P. & P. 2/-, one only add 9d. per cell.

THROAT MIKES. 2/- each. Post 10d. Could be used for electrifying musical instruments.

VIBRATORS. 12 volt, 4 pin, 5/11. 6 volt, 4 pin, 9/11. Post 1/6.

NEON MAINS TESTERS combined screwdriver, 3/6. Post 9d.

MORSE TAPPERS, plated contacts. Adjustable gaps, heavy duty, good quality, 2/11. Post 1/3.

LUXEMBOURG AERIALS. 3/11. Post 6d. No technical knowledge required.

V.H.F. AERIALS. 6/11. Post 10d., easy to fit. No technical knowledge required.

SPEAKER GOLD GRILLE. 6 1/2 x 4 in. 1/- each, 2 for 1/9. Post 6d.

VARIABLE CONDENSERS. .0005 small twin gang. Built-in slow motion drive. 7/11. Post and packing 1/6.

ALL ABOVE ARE NEW & GUARANTEED

VALVES EX. EQUIPMENT
EF80 9d. each, 5 for 2/6; 10F1 9d. each, 5 for 2/6; EB91 9d. each, 3 for 1/4; 6F1 9d. each, 3 for 1/6; EF36 9d. each, 3 for 1/6; EF37 1/- each, 3 for 2/3; EF37A 1/3 each, 3 for 2/11.

Any parcel insured against damage in transit for only 6d. extra per order. All uninsured parcels at customer's risk. Post and Packing 6d. per valve extra. C.W.O. or C.O.D. only. C.O.D. charge 3/- extra. S.A.E. with enquiries.

RADIO CLEARANCE LTD.

27 TOTTENHAM COURT RD., LONDON, W.1.

The oldest Component Specialists in the Trade

Telephone: MUSEUM 9188

TRADE ENQUIRIES INVITED

EST. 30 YRS.

INTRODUCING THE NEW

"CONTESSA"

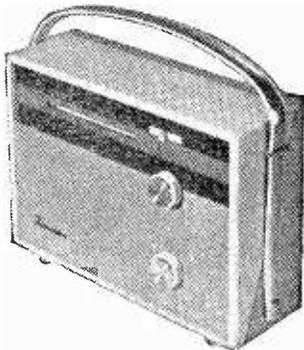
Mk III

THE BEST IS NOW EVEN BETTER!

A brilliant conception of the finest 2-band 6-transistor radio available.

★ Ultra-modern styling with a magnificent twin-tone cabinet fitted with fully expanded metal front and a slide-rule type waveband dial. GREATER OUTPUT using the latest high-efficiency Mullard Transistors and Diodes, incorporating an improved design, featuring different circuit constants.

MORE punch—MORE gain—MORE stations—SUPERB appearance—the NEW "Contessa" scores again!! SEE it—HEAR it—you will BUY it!



- Waveband coverage of 530 kc/s to 1,620 kc/s and 160 kc/s to 270 kc/s.
- Assured reception of at least a dozen stations in daylight!
- Large clearly-calibrated station-named dial.
- Internal high-gain Ferrite aerial.
- 5:1 ratio slow motion tuning.
- Fitted with the latest 12,000-line high-flux loudspeaker.
- Power of 600 milliwatts from the single-ended push-pull final stage.
- Specially designed aerial matching coil for use in a CAR.
- Only first-grade Mullard fully-guaranteed matched transistors and diodes are used.
- Tape recorder socket provided.
- Doubled tuned IF transformers for maximum gain and knife-edged selectivity.
- Fully drilled printed circuit panel marked with component numbers.
- The two-tone case outer measurements are 10 1/2 x 7 1/2 x 3 1/2 in. and weighs approx. 4 lb. when assembled.
- Battery lasts 4 months with normal usage.
- Book supplied with detailed assembly instructions, diagrams and circuitry.
- Anyone can build this set—everything supplied, just a soldering iron required.
- Cabinets available in two tone beige and two tone blue.
- Adjustable carrying handle.

Inclusive price for all associated components, cabinet and battery, complete in every detail: Or our BUY AS YOU BUILD SCHEME, any parts sold separately. Send for comprehensive descriptive Manual and Parts List, 2/10 post free. **£10.19.6** (Plus 3/6 P. & Pkg.)

You can hold Europe in the palm of your hand with—

THE "CAPRI"



A miniature pocket transistor Radio that REALLY works, retaining the most attractive features of the famous "Contessa." Six first-grade Mullard transistors plus diode are employed in a highly sensitive superhet MW and pre-set LW circuit embodying the most modern design practices. A special 2 1/2 in. high gauss loudspeaker provides surprising volume and a personal earpiece socket is also available. An attractive two-tone plastic case is supplied in two colours—ivory/red or ivory/blue, the full constructional details being furnished with each set of parts. The total measurements of the Capri are 4 1/2 x 2 1/2 x 1 1/2 in.

SEE AND HEAR A WORKING MODEL TODAY

Inclusive price for all associated components, case and constructional data, complete in every detail, or our BUY AS YOU BUILD Scheme, any parts sold separately. (3 volt battery 2/6 extra.) **£7.10.0** (Plus 2/- P. & Pkg.)

STAMPED and ADDRESSED ENVELOPE with any enquiry please. But regret no lists or catalogues—our stocks move too quickly! PLEASE ALLOW FULL POSTAGE AND PACKING CHARGES Terms of Business: CASH WITH ORDER OR C.O.D. ON ORDERS OVER 10/-.

RECEIVERS & COMPONENTS

SPEAKER REPAIRS, Cones/Flelds fitted. Clock Coils Wound. L. S. REPAIRS, Pluckley, Ashford, Kent.

NEW AND SURPLUS Valves, guaranteed, from 3/6. Also reclaimed Valves, perfect, from 1/6. Many bargains. S.A.E. for complete list. LEWIS, 46 Woodford Avenue, Ilford, Essex.

TO BE CLEARED

NEW WIRE ENDED ELECTROLYTIC CONDENSERS

20 for 3/-. Post Free.

Transistors—Mullard. OC44 6/6; OC45 6/-; OC71 5/6; OC72 8/-; OC81 7/-; AF14, 115, 116 and 117 9/6 each; OC71 (TS) 4/3; OC72 (TS) 7/6; XA116 (OC45) 4/3; PXA101 6/-. Red spot 3/3; Green spot (general purpose) 2/3; Yellow spot 2/6; Diodes 1/-. Matched sets OC81D, 2XOC81 1/6s.

Post 6d.

SOUND VISION, 137 MOULSHAM STREET, CHELMSFORD.

TRANSISTOR SETS. OC44. 2OC45. OC81D. 2OC81 35/8. OC44 9/-. OC45 8/6. OC71 6/3. XA102 9/-. XA101 8/6. XB103 8/3. Red Spot 3/8. White Spot 4/-. Diodes General 1/-. OA79 3/-. OA70 3/-. OA71 2/9. OA81 2/9. GEX3A 2/9. Ear pieces complete with plugs and jacks 100, 250 and high Z 7/9 each. Min Caps 1 to 32 MFD 1/9 each. P. and p. paid by CHAPPLE RADIO, 107 Neasden Lane, NW10.

R1392D. Owing to demand we have bought another batch, all air tested, crystal controlled, 95-155 Mc/s, £6.19.6. Carr. 7/6, mains power units, new, £4.5.0.

R107. 1.2-17.5 Mc/s, 120C or 100-250 A.C., New/Soiled, £15, or used £12.10.0. Carr. 30/-.

R109A Brand New. Crated 2-12 Mc/s, speaker 2 pairs of headphones. D(LR), spare valves, lamp, leads 0.15-250 voltmeter, Booklet 6V D.C., Power £6.19.6. Carr. 12/6. **CR200,** Marconi. 560 kc/s—15 kc/s. 100-250 V.A.C. exc. cond., £12.10.0. Carr. 18/6. **One only H.R.O. Table Model BRAND NEW,** 9 coils, 50 kc/s—30 mc/s, £25. Carr. 30/-.

One only, R308, 20-145 Mc/s, F.M. A.M. Speaker, mains power, £25. Carr. 30/-.

J. T. SUPPLY

309 MEANWOOD ROAD, LEEDS 7

COMPONENTS, VALVES, Tubes, etc. Write or phone for free list. ARION TELEVISION, 4 Maxted Road, Peckham, SE15 (New X 7152).

ANY KIT built and tested: Radios, Amplifiers, Test Gear, etc. Good workmanship, prompt return. Send details of kit and S.A.E. for quotation. Ready built: Good Companion £11/15/-, and Pocket Companion £8/19/6. R. J. DYMOKE, 16 Haycroft Road, Stevenage, Herts.

BRIAN E. HAMPSHIRE (R & T) LTD.
Dept. PWA, 23 NORTHCROSS ROAD, S.E.22.

6F13	EF80	EF91	6P25	10F1	Z77	25L6GT
EB91	6P28	6F1	EF50	L63	6F12	

SALVAGED. GUARANTEED 100% ALL AT ONE PRICE
£1 for 10, p. & p. FREE

RATES: 6/6 per line or part thereof, average five words to line, minimum 2 lines. Box No. 1/- extra. Advertisements must be prepaid and addressed to Advertisement Manager, "Practical Wireless," Tower House, Southampton St., London W.C.2.

RECEIVERS & COMPONENTS

(continued)

A.1 POST FREE BARGAINS. First grade Transistors, White spots 3/9. Red spots 3/-. OC44 9/-. OC45 7/3. OC71 5/-. OC76. OC200 6/-. Matched pairs two OC81 and OC81D 21/-. two OC44 and OC45 23/6. Reclaimed Valves all tested: EB91, EP50, EP91 9d. 10F1 1/-. 6F1 2/-. L63, 20D1 3/-. ECL80, PY81, PZ30, B36 4/-. PCF80, PL82, PL83, PY80, PY82, KT33C 4/6. PL38, N37, KT36 5/-. PCL83 6/-. PY32, 6K25 7/6, 185BT 12/6. 10% reduction on six, 25% on 12. **Loud Speakers:** 6in. x 4in. 5/6. 7in. x 4in. 8in. 6/6. 10% reduction on 12. 25k. 50k. w.w. Pots. S.P. switch 4/6 each. A.1. **RADIO COMPONENTS.** 14 The Borough, Canterbury, Kent.

Speakers, 8/9d., 6in., 8in., and 7 x 4in. Ex-Manufacture salvage. P. & P. 2/9d. T.V. Tubes, 15/-, 31/74, 124, 121. Ex-rental. Ideal spares, Carr. 10/-. Also 38/24. Very good condition, 35/-. Carr. 10/-. Set tested. Valves 9d. 6AL5, 6AM6, 6D2, 6F14, 8D3, 9D2, 7B, EB91, EF50, EF91, P61, SP61, etc. Post 9d. T.V. Sets, Complete for 25/-. Stamp for FREE list. Mail Order Only.

P.P. COMPONENTS LTD.,

623 Romford Rd. Manor Pk. London E.12.

"MEATHKITS" can now be seen in London and purchased on easy terms. Free brochure. **DIRECT TV REPLACEMENTS LTD.** Dept. P.W. 7/7, 138 Lewisham Way, SE14. Tideway 6666.

TRANSISTOR COMPONENTS. 7 x 4in. 35 ohm speakers, 25/-, 7 x 4in. 3 ohm. 10/6. **EATPICES.** 7 ohm, 150 ohm, 8/6. Xtal with Jack, 7/8, all complete with plugs. 4 pole 2 way switches 1 inch spindle, 2/6 each. Min. Caps, 15 v. wkg.—1, 2, 4, 5, 8, 10, 16, 32, 50 mfd, 64 mfd, 10 v., 100 mfd, 6 v., 100 mfd, 12 v., all at 1/10 each. Resistors mostly 10% small, 10 ohms to 10 meg., 3d. each. Ceramicon, most values in stock. 1 pfd to 5,000 pfd. Slide switches, DP/DT. 3/- each.

TRANSISTORS. OC44, OC45 7/6 each. A.F. Pack OC81D, 2 OC81, 18/6, set. G.E.C. 874, 4/6, S6, S7, good output transistors, 2/6 each. Red spots, 2/3, White spots, 2/6. OC76 3/6, OC71 12/6, OA81 Diodes 2/6. GEX 00 9d. Terms C.W.O. or C.O.D.

BROADWAY ELECTRONICS

92 Mitcham Road, Footing, S.W.17.

P.W. EVEREST TUNER. Coils and all components from stock. S.A.E. list. **AJAX ELECTRONICS,** 572 Fulham Road, London SW6.

MISCELLANEOUS

ELECTRONIC MUSIC?

Then how about making yourself an electric organ? Constructural 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 Swins.

Write NOW for free leaflet and further details to C. & S., 20 Maude Street, Darlington, Durham. Send 2d. stamp.

FOR SALE

100 BAYS of brand new adjustable Steel Shelving, 73in. high by 34in. wide by 12in. deep, stove enamelled dark green. Sent unassembled. Six-shelf bay £3/15/-. Sample delivered free. Quantity discounts. N. C. BROWN LTD., Eagle Steelworks, Lancs. Tel.: 69018.

BUMPER PARCEL

100 resistors, 100 condensers, 100 cartridge fuses, 3 mains droppers, 2 rotary toggle switches, 6 paxolin panels, 2 B.C. lamp holders, 1 small transmitter chassis less valves, 6 potentiometers, 20/-, post free, 3 ohm elac. speakers, 5" 7/8. 8" 9/-. 7" x 4" 10/6.

Thermistors, 2/6 each. **Car inspection lamp,** 10ft. lead with bulb and switch, 5/-. **High stab. resistors,** 6d. each. send S.A.E. for list.

20ft. telescopic masts, new 50/-, post free. **Electronic timer** 1 to 30 seconds. With heavy duty change over relay. Mains voltage, as used in photostat copiers, 35/- post free.

705. A valve with base, 3/6.

Electric porthole lamps, 17/6.

Twin telephone wire 200 yds. coil, 35/-.

Insulating sleeving, 6 mm. O.D. 1 yd. each 5 colours, 2/-.

E. R. NICHOLLS

33-35 CARRINGTON FIELD STREET, HIGHER HILLGATE, STOCKPORT

ASK your dealer for American Ferro-Dynamics "Brand Five" Recording Tapes—the best tape value!

Special offer

New Transistors. OC81, OC81D, OC71, 5/- each. 6 Transistors, 1 Diode, 28/- set. **Record Changers.** BSR UA4. £8.10.0. Garrard "Slimline". £7.19.6. Battery Operated (9 volt). £5.10.0. **Single Record Players.** BSR TU9. £3.5.0. **Complete Kits.** Autochange Record Player, Amplifier, Cabinet, Speaker, etc. £9.10.0. Single Player Kit. £6.19.6. Transistorised Autochange Kit, £10.19.6. **Printed Circuit Board.** Any size 1d. per sq. inch. Etching Solution, 3/- per pt. **Portable Cabinets.** Transistor Radio, 11 x 8 x 3in., complete with dial, etc. 19/6. Autochange Record Player, 49/6. Single Record Player, 45/6. **Amplifiers.** 3 valve, 3 watt, tone and Vol. 42/6. Transistorised, 1 watt, 3 ohm output, 45/6. **Mains Transformers.** 245 v. at 50 mA, 6.3 v at 1.5 amp, 10/9.

Money Back Guarantee if not satisfied.

FREE POSTAGE

—send for bargain list.—

W. G. BLYTHMAN (RADIO)
WHITBY, N. YORKS.

FOR SALE
(continued)

TRANSISTOR POCKET KITS. No Soldering. No Drilling. Medium and Long Wave. Complete with Assembly Tool. Earpiece kit. 3 Transistors, 2 Diodes. 6 Stage, 49/6 post 2/-. Batt. 1/-. Speaker Kit. 4 Transistors, 2 Diodes. 7 Stage, 75/- post 2/9. Batt. 2/3. **DATA: ELECTRONICS LTD.,** 6 Hillside Gardens, Edgware, Middx.

AMATEUR LICENCE Morse Course. The new Rhythm Method of teaching takes the drudgery out of learning Morse and is the quickest known!!! For full explanatory booklet: **S.A.E.,** G3CHS, 45 Green Lane, Furley, Surrey.

WANTED

WANTED: NEW valves and transistors any quantity. **S. N. WILLETS,** 43 Spon Lane, West Bromwich, Staffs. Tel: **WES 2392.**

NEW VALVES bought, state price. **A.D.A. MANUFACTURING CO.,** 172 Alfreton Road, Nottingham.

A PROMPT CASH OFFER for your Surplus Brand New Valves and Transistors. **R.H.S.,** Beverley House, Manville Terrace, Bradford 7.

WANTED VALVES

All types for prompt cash. Must be new. State quantity.

WILLIAM CARVIS LTD.
103 North Street, Leeds 7

WANTED: TEST GEAR. Meters, Valves, Components, Communication Sets, Amplifiers. **HUGGETS LTD.,** 2-4 Pawsons Road, West Croydon, Surrey.

WANTED! New Valves and Transistors, any quantity. Phone: Cherrywood 3955. **D. & B. TELEVISION,** 131-131a Kingston Road, South Wimbledon, SW19.

WANTED: T.C.S. Transmitters, Receivers, Connectors, Loading Coils etc. **GILFILLAN,** 98 Dominion Road, Worthing, Sussex. Tel: Worthing 8719.

NEW VALVES WANTED

Any type, any quantity

CASH PAID

R.S.T. 211 Streatham Road, Mitcham, Surrey.
Telephone: **MITCHAM 6202**

METAL WORK

METALWORK. All types cabinets, chassis, racks, etc. to your specifications. **PHILPOTT'S Metalworks Ltd.,** Chapman St., Loughborough.

SERVICE SHEETS

SERVICE SHEETS: Radio, TV, 5,000 models. List 1/-. S.A.E. enquiries: **TELRAY,** 11 Maudland Bk., Preston.

SERVICE SHEETS for all makes of Radio and TV, 1930-1962. Prices from 1/- with free fault-finding guide. Catalogue of 6,000 models 1/6. 125 Radio/TV sheets covering 370 popular models 20/-. S.A.E. enquiries **HAMILTON RADIO,** Western Road, St. Leonards, Sussex

WHY TOLERATE DELAY when we can supply your Radio or TV Service Sheet by return of post at 4/- each, plus postage List 1/-. Also Manuals for sale and hire. List 1/-. S.A.E. with inquiries, please. Mail orders only to **S.P. DISTRIBUTORS,** 44 Old Bond Street, London W1.

FAULTFINDER FILES, showing common faults that each receiver is prone to and other useful servicing information, 2/- each. List 9d., plus postage. Mail orders only. **S.P. DISTRIBUTORS,** 44 Old Bond Street, London W1.

SERVICE SHEETS, Radio and TV, 4/- each. List 1/-. All orders dispatched on day received. Also manuals for sale and hire. List 1/-. SAE please **SULTAN RADIO,** Pantles Chambers, Tunbridge Wells, Kent.

CIRCUIT INFORMATION

18 SET TRANSMITTER RECEIVER Description. Operation. Values. Diagrams. Tests etc. P.O. 5/-.

38 SET WALKIE TALKIE Alignment procedure. Faults. Components. Description. Diagrams etc. P.O. 5/-.

CAMPBELL

Everland Road, Hungerford, Berks.

SERVICE SHEETS; also Current and Obsolete Valves for sale. — **JOHN GILBERT TELEVISION,** 1b Shepherd's Bush Road, London, W.12. Phone SHE 8441.

SITUATIONS VACANT

A.M.I.Mech.E., A.M.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),** London W8.

HIGH GATE ACOUSTICS require Improver radio mechanic for transistors, tape recorders, grams, etc.; also for hearing aids. Good salary to right man. **MUS 2901, ext. 19.**

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.

SITUATIONS VACANT
(continued)

RADIO MECHANIC required for work on transistor kits. Good wages and prospects for capable person. **Savoy Electronics Ltd.,** 15 Maiden Lane, Strand, WC2. Phone: **TEM 5484.**

ENGINEERS REQUIRED, experienced in audio techniques and relay circuitry, for work on public address systems. Also VHF test engineer for television equipment. Write, giving details to **CLARKE & SMITH MFG CO. LTD.,** Hanworth Air Park, Feltham, Middx.

CENTRAL ELECTRICITY GENERATING BOARD SOUTH THAMES DIVISION VACANCY NO. 269

ELECTRICIAN (TELEPHONES) BRIGHTON DISTRICT

Duties consist of installation and maintenance of communications and remote control apparatus together with VHF radio equipment. Applicants must have basic knowledge and experience of automatic telephone exchange apparatus with the G.P.O. or a telephone equipment manufacturer. A knowledge of radio work would be an advantage but is not essential.

Rate of pay 5s. 8/4d. per hour for a 42-hour week. Good condition with generous holidays and sick pay scheme; optional Superannuation Scheme.

Applications stating age, training, experience etc., should be sent to the **District Communications Engineer, Brighton 'B' Power Station, Portslade-by-Sea, Sussex.**

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.

UNITED KINGDOM

ATOMIC ENERGY AUTHORITY ATOMIC ENERGY ESTABLISHMENT, WINFRITH

ELECTRONIC INSTRUMENT MECHANICS

Opportunities exist for men possessing a good basic knowledge of valve and transistor electronics to carry out fault diagnosis, repair, test and calibration in the advancing field of nuclear electronic instrumentation.

Applicants should have several years experience of electronic equipment servicing but a good basic knowledge, enthusiasm and ability to learn new techniques are equally important.

Much of the equipment is of new design and where appropriate, training will be given to successful applicants.

Married men living beyond daily travelling distance may be eligible for housing and this will be determined at time of interview. A lodging allowance is payable whilst waiting for housing. Working conditions are good and include sick pay and pension schemes.

An application form may be obtained by sending a post card quoting your name, address and the reference **EL/INST/NAT** to the Labour Department, **A.E.E. Winfrith,** Dorchester, Dorset.

(Continued on next page)

COURSES

COUNTY BOROUGH OF SOUTHAMPTON EDUCATION COMMITTEE

SOUTHAMPTON TECHNICAL COLLEGE

Principal: F. T. WEST, M.B.E., A.I.STRUCT.E., M.I.PROD.E., M.R.S.H.

Department of Electrical Engineering

Head of Department:

K. E. EVERETT, M.SC. (ENG.), B.SC. (HONS.), A.C.G.I., A.M.I.E.E.,
M.BRIT.I.R.E.

Places are now being allocated in the following full-time courses in the Department of Electrical Engineering from September 1962:

Communication Engineering of Electronics:

Three-year course leading to College Diploma which exempts from Graduateship Examination of British Institution of Radio Engineers. Minimum age 17 years.

Marine Radio and Radar:

Two-year course leading to the Postmaster General's First Class Certificate for Radio Officers and the Ministry of Transport Certificate in Radar Maintenance. Holders of these qualifications become qualified Radio and Radar Officials in the Mercantile Marine. Minimum age 16 years.

Further details and forms of application may be obtained from the Registrar, Southampton Technical College, St. Mary Street, Southampton.

City and County of Bristol
Education Committee

BRISTOL TECHNICAL COLLEGE
Principal: E. POOLE, B.SC. (ENG.), M.I.MECH.E.,
M.I.PROD.E.

SCHOOL OF MARINE RADIO AND RADAR

Lecturer-in-Charge:
F. E. BARLTROP (ex. A.S.T. Hamble)

MARINE RADIO OFFICERS

A full-time Course for prospective Radio Officers in the Merchant Navy, leading to 2nd and 1st Class P.M.G. Certificates and M.O.T. Radar Maintenance Certificate, is provided, and entry may be made in January May or September of each year.

Fees: P.M.G. Courses

Over 18 years of age, £23.10, per College year.
Under 18 years of age, £2, per College Year.

M.O.T. Radar, 25 per term.

A six-week Course of Pre-Sea Training is also held, and entry is normally made on completion of Radar Course.

Details from:

Registrar, Bristol Technical College,
Ashley Down, Bristol, 7.

BOOKS & PUBLICATIONS

FIND TV SET TROUBLES IN MINUTES from the great book "The Principles of TV Receiver Servicing". 10/6 all bookhouses and radio wholesalers. If not in stock, from Secretary, I.P.R.E., 20 Fairfield Road, London N8.

"PRACTICAL WIRELESS" 1954-1959 complete sets, lot or separate offers. Box 38.

EDUCATIONAL

WIRELESS. See the world as a Radio Officer in the Merchant Navy; short training period; low fees; scholarships, etc. available. Boarding and Day students. Stamp for prospectus. **WIRELESS COLLEGE,** Colwyn Bay.

Radio Television & Electronics

Learn at home with the world's largest home study organisation, Brit.I.R.E.; City & Guilds; P.M.G.'s certs., etc. Also Practical Courses with equipment. No books to buy.

Write for **FREE** prospectus stating subject to

I.C.S.

(Dept. 541), Intertex House,
Parkgate Road, London, S.W.11

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 132-page Guide Free. N.I.E. (Dept. 363), 148 Holborn, London EC1.

EDUCATIONAL (continued)

LEARN RADIO AND ELECTRONICS the new and practical way! Hosts of absorbing experiments carried out at home under expert guidance to teach you Radio in a new, enjoyable and interesting way. Construction, servicing and fault-finding on equipment made easy for the first time! No previous experience needed. No mathematics used. Free brochure from: Dept. 11, P.W. RADIO-STRUCTOR, Reading.

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

DON'T FUMBLE with Formulae. Master Mathematics quickly and easily the Understandable Way.

**1st lesson
and details
FREE**

The Dryden School of
UNDERSTANDABLE MATHEMATICS

11 F8 Dryden Chambers, Oxford St.
London, W.1.

Name

Address

"HOW AND WHY" of Radio and Electronics made easy by a new, non-maths practical way. Postal instruction based on host of experiments and equipment building carried out at home. New courses bring enjoyment as well as knowledge of this fascinating subject. Free brochure from: Dept. P.W. 12, RADIOSTRUCTOR, Reading.

The Incorporated Practitioners in Radio and Electronics (I.P.R.E.) Ltd., Membership Conditions booklet 1/-, Sample copy of I.P.R.E. Official Journal 2/- post free. Secretary, 20 Fairfield Road, London N8.



By repairing Radio and TV Sets as a job or as a spare time business. Our practical course will show you the way. No previous experience is required.

**SEND FOR
FREE BOOK
TODAY!**

RADIOSTRUCTOR
Dept. G77 READING, BERKS.

SOUND RECORDINGS

RECORDING TAPE. save up to 30% send for list. also 50 second-hand recorders in stock. E. C. KINGSLEY & CO., 132 Tottenham Court Road, London W1. EUS 6500.

The 'NORPAK'

MAINS POWER PACK KIT

FOR TRANSISTOR RADIOS

Saves battery costs, boosts and greatly extends life of old batteries.

Miniature Size—4 x 2 x 1 1/2 in. In attractive two-tone plastic case. Assembled in an hour. Normal output 9 v. 100 mA. (Adjustable) Full Mains Transformer. Full wave germanium diodes. Cartridge fuse.

Complete Kit with Plans **35/-** Plus 1/6 P.P. (Ready assembled 45/-).

P.W. 6 OWNERS!!

Convert your set to 7 transistors in

TWO MINUTES!!

with our preassembled extra stage.

COMPLETE **17/6** Plus 6d. P.P.

ANNOUNCING!

P.W. "MERCURY" 6 PRINTED CIRCUIT VERSION



£9.17.6

Plus 2/6 P.P.

All parts required

This exciting new Transistor Superhet gives superb performance on a 7 x 4 in. speaker housed in attractive two-tone cabinet with ferrite aerial. New extras.

For both of these fine kits every item down to the last nut and bolt is supplied together with detailed building plans. All parts sold separately. Send 1/6 for Building Plans (FREE with Kit).

PAY AS YOU BUILD SCHEME

AT NO EXTRA COST the above kits may be bought in 3 complete stages of 56/8 ("PW" 6) or 65/10 ("Mercury" 6) each plus 1/6 P.P. (state A, B, or C).

ALIGNMENT SERVICE

We Offer a very comprehensive service for both the above versions, including Fault Finding, at reasonable charges (write for details).

LATEST VERSION !!

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

- 250 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.



All parts required **£8.10.0** Plus 2/- P.P.

NORCOL LTD 147 LONDON RD., YORKTOWN, CAMBERLEY, SURREY Phone: CAMBERLEY 22760

If you have started or plan to start your own business you need . . .

RADIO AND TV RETAILER'S HANDBOOK

By F. X. Carus

Company formation, staff selection and training, window display and publicity, servicing facilities, stock selection and control, and management techniques are some of the important topics discussed with a down-to-earth approach.

A business investment for only 35s.

FROM ALL BOOKSELLERS

. . . or in case of difficulty 35s. by post from **GEORGE NEWNES LTD., Tower House, Southampton Street, London, W.C.2.**

NEWNES

RES/CAP. BRIDGE 38/-

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. PA)

Raleigh Mews, Raleigh Street, Nottingham

TRANSISTOR PORTABLE RADIO KIT. 25.17.6

plus post, 3/6. Covers medium and long waves, no aerial or earth required. No difficult alignment necessary. Build for your holidays now.

Red Spot Transistors, 2/3; White Spots, 2/3; Yellow/Green, 3/8; OC71, 6/-; OC72, 7/8; OC44, 7/8; OC45, 9/-, Sub-min. Electrolytics 2, 4, 8, 10, 16, 32, 50µF, 2/-; 100µF, 2/8; 250, 500, 1,000µF, 3/8, Terms: C.W.O. Post extra.

Send 10d. stamps for Notes.

MOORE'S EXPERIMENTAL SUPPLIES Dept. P

8 & 10 Granville Street, Sheffield 2 Phone 27461

VALVES SAME DAY SERVICE

NEW! TESTED! GUARANTEED!

SETS 1R5, 1S5, 1T4, 3S4, 3V4, DAF91, DF91, DK91, DL92, DL94 .. Set 4 for 19/6 DAF96, DF96, DK96, DL96 Set 4 for 27/6

OA2 11/6	6LD20 8/-	30P19 14/6	EBL21 13/6	EZ80 6/3	U50 6/-
1A7GT 11/6	6P1 7/-	30PL13 12/3	ECC40 13/6	EZ81 6/6	U62 4/6
1D5 7/6	6P25 8/-	35A5 15/9	ECC81 5/-	KT33C 7/8	U78 4/6
1HSGT 9/-	6P28 12/-	35L6GT 9/3	ECC82 6/3	KT41 11/6	U91 14/6
1NSGT 9/-	6Q7 6/-	3Z4GT 5/6	ECC83 7/-	KT44 11/6	UC81 17/-
1R5 9/-	6Q7GT 8/-	3Z5GT 8/3	ECC84 8/3	KT61 9/6	U91 16/6
1S4 8/-	6SL7GT 5/8	50CDG 27/3	ECC85 7/6	KT83 6/6	U301 17/-
1S5 5/3	6SN7GT 4/8	50L6GT 9/-	ECC89 7/8	MU14 6/6	U801 21/-
1T4 3/6	6U4GT 9/8	85A2 11/6	ECC92 8/6	N18 7/-	UABC80 6/6
1U5 5/8	6V6C 4/8	AZ31 9/6	ECH21 13/6	PC85 10/-	UAB2 8/3
3A5 9/-	6V6GT 7/-	B38 7/6	ECH35 7/3	PC97 10/-	UB41 8/6
3Q4 7/-	6X4 4/6	CL33 12/3	ECH42 9/6	PCC84 7/6	UBC41 7/8
3V4 10/-	6X5GT 5/6	CY31 10/-	ECH81 7/9	PCC89 9/3	UBF80 8/3
5U4 4/6	7B6 9/-	DAC32 9/-	ECH83 8/6	PCF80 7/9	UBF89 7/6
5Y4G 8/8	7B7 7/6	DAF91 5/3	ECL80 7/6	PCF82 8/-	UC84 13/8
5Y3GT 8/-	7C5 7/6	DAF96 7/6	ECL82 9/-	PCF86 14/-	UC85 8/6
5Z4G 6/-	7C6 7/6	DCC90 9/-	ECL86 15/-	PCL82 9/-	UCF80 14/6
6AL5 3/8	7H7 7/6	DF33 9/-	EP39 4/6	PCL83 10/6	UCH21 13/8
6AN6 3/8	7S7 9/-	DF91 3/6	EP40 11/6	PCL84 10/-	UCH42 8/-
6AQ5 6/8	7Y4 8/-	DF96 7/6	EP41 7/9	PCL85 10/6	UC81 8/9
6A76 6/-	10C2 16/6	DH78 4/8	EP80 4/8	PENAA 11/-	UCL82 9/8
6BA6 5/8	12A76 7/-	DH77 6/-	EP85 4/8	PEN98C 8/-	UCL83 13/3
6BE6 5/8	12A77 5/-	DH81 9/-	EP86 9/8	PL36 11/6	UF41 7/-
6BH6 5/8	12A7U 6/3	DK32 11/-	EP89 7/8	PL81 9/6	UF89 7/-
6BJ6 5/8	12AX7 7/6	DK61 6/-	EP91 3/6	PL82 7/6	UL41 8/-
6BR7 8/6	12K7GT 4/8	DK92 7/6	EP92 3/8	PL83 7/6	UL84 6/6
6BW8 9/6	12K8GT 9/6	DK96 7/6	EL33 9/6	PL84 8/6	30PL13 2/3
6CD96 27/3	12Q7GT 4/8	DL36 8/6	EL41 9/6	PX4 10/-	UR1C 8/8
6E6G 6/6	12S7GT 7/6	DL35 9/6	EL42 9/6	PX25 9/-	UY21 11/-
6F13 10/-	20P2 17/6	DL82 8/6	EL84 6/6	PY32 11/6	UY41 6/6
6F14 10/-	20L1 16/-	DL84 7/-	EM34 7/3	PY80 7/6	UY85 6/6
6F23 10/-	20P4 20/-	DL96 7/6	EM80 8/-	PY81 7/-	VP4B 9/6
6K7G 11/11	20P5 14/8	EABC80 5/6	EM81 8/-	PY82 6/6	VP41 5/-
6K8GT 9/6	25A6G 8/-	EAF42 8/6	EM84 9/6	PY83 7/6	VP132 16/6
6L1 10/-	25L6GT 7/6	EB91 3/8	EP91 3/6	T41 7/6	W76 4/8
	2524G 8/6	EB93 5/-	EY51 7/6	U22 7/3	W77 3/8
	30L15 11/-	EB41 8/-	EY86 7/6	U25 12/-	Z77 3/8
		EBF80 8/6	EZ40 6/8	U26 9/3	Z77 3/6
		FBF89 8/8	EZ41 7/6		

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

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

D. & B. TELEVISION

Cherrywood 3955
Dept. A.6 131 & 131A KINGSTON ROAD
SOUTH WIMBLEDON, S.W.19

Open Mon.—Sat. 10 a.m.—7 p.m. (Except Wed. 1 p.m.).
Nearest Tube Station South Wimbledon (Northern Line).
"COMPARE OUR PRICES"

FOR THE FINEST, FASTEST SERVICE IN THE COUNTRY
Your problems are our Business

LOOK! TRANSISTOR PRICES DOWN AGAIN.
MULLARD. OC44 9/-, OC45 8/-, OC71 5/-, *OC72 6/-, *OC76 7/-,
*OC77 12/-, *OC81 7/-, OC81D 6/-.
Complete set of 6 Mullard Transistors only 35/-. Comprising
OC44, two OC45's, OC81D, two OC81's. Matched Pair.
MULLARD DIODES: OA81 2/9, OA90 2/9, OA91 2/9,
G.E.C. Transistors: GET875 11/8, GET874 6/11, GET873 6/10,
*GET115 7/8, *GET114 4/8.
Complete Set of 6 G.E.C. Transistors comprising: GET 874, two
GET873's, GET114. Matched Pair GET114. Only 25/6.
COMPLETE SET 6 S.T.C. Transistors. Only 25/6.
(*Available in matched pairs, 1/- extra).

COMPLETE NEW RANGE OF TRANSISTOR COMPONENTS IN STOCK

THREE BRAND NEW * STAR * BARGAINS
Designed for quality and outstanding value.

* NEW * R.T.D. 6 Watt Monaural Amplifier,
using heavy duty, double-wound mains
Transformer. With separate rectifier wind-
ing. Valves: Rectifier, Driver and Output.
5 Controls: Switch, Volume, Base, Treble,
Middle, Heavy duty output Transformer.
METAL CHASSIS. All components brand
new. Ready built.....ONLY £5.5.0.
COMPLETE or all parts in kit form.
ONLY £3.15.0. P. & P. 3/6.



* NEW * FOUR VALVE, Inc. RECTIFIER, A.C. ONLY
MAINS RADIO, Medium and Long Wave.
Heavy Duty Mains Transformer. Metal
Chassis. Ferrite Rod Aerial. Extremely
attractive cabinet, two-tone grey. Splendid
Finish. Ready built for use. ONLY £8.0.0
Supplied with slow motion tuning, 10/-
extra.
Or, all parts in kit form. ONLY £8.5.0.
P. & P. 7/6. You will be delighted with
this purchase. All parts sold separately.



* NEW * Undoubtedly the best deal ever offered in Transistor
Radios. The most attractive professional finish ever in kit form.
6-Transistor Pocket Superhet. Using
the latest components from America.
Transistors. Printed circuit. First Grade
Transistors and Components. Ferrite rod
aerial long and medium wave bands.
Must be seen to be believed.
AT ONLY £6.15.0. P. & P. 3/6.
EASY TO BUILD. All parts sold separately.



Send 6d. for lists of transistor components, Speakers, Transformer s, etc.

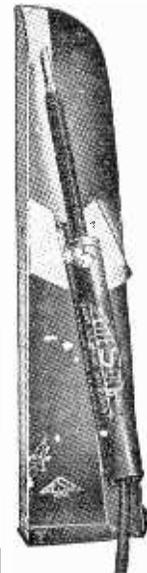
ALL VALVES ARE SOLD SUBJECT TO FULL GUARANTEE

CURRENT VALVE LIST

AZ31	8/6	ECC85	7/6	KT36	8/6	SP61	2/3	U8	14/6	7C5	7/3
B36	5/8	ECC80	8/-	KT61	8/3	U22	6/6	U9	6/3	7C6	7/6
OB131	20/-	ECH21	15/-	KT63	6/3	U24	10/-	UY41	6/-	7N7	9/6
OC835	12/6	ECH35	8/-	KTW61	6/8	U25	12/-	UY85	6/8	7Y4	7/3
CL43	10/-	ECH42	7/6	KTW63	5/8	U26	8/6	W77	4/-	10F1	4/6
D77	3/-	ECH81	7/6	L63	2/9	U31	7/-	Z77	7/-	10C1	10/-
DAF91	7/6	ECL80	7/3	PCC84	7/6	U37	17/-	5U4	4/9	10C2	13/-
DAF96	7/6	ECL82	9/9	PCO89	8/9	U50	5/6	5Y4	8/9	10P13	8/9
DF91	3/9	ECL83	11/9	PCF80	7/6	U52	5/-	5Y3	6/3	10P14	7/3
DF96	7/3	EF39	4/3	PCF82	7/9	U91	9/6	5Z4	10/-	12AT6	7/3
DE63	6/-	EF50	1/3	PCF86	14/6	U281	9/-	6AL3	3/-	12AT7	4/6
DE77	4/6	EF50	4/6	PCL82	7/-	U282	14/6	6AM6	3/-	12AU7	5/6
DK91	6/-	EF85	6/3	PCL83	9/9	U301	17/6	6AT6	5/6	12AX7	6/3
DK92	7/6	EF86	8/9	PCL84	7/6	U801	22/-	6BQ6	12/-	19BQ6	14/6
DK96	7/3	EF89	6/6	PCL85	15/-	U802	15/-	6BU6	7/6	20D1	8/6
DL91	8/3	EF91	3/-	PL33	8/-	UAF42	8/-	6C06	25/6	20F2	8/3
DL92	6/3	EF92	4/-	PL36	9/9	UB41	7/9	6D2	3/-	20L1	12/6
DL94	7/-	EL33	7/6	PL38	14/6	UBC41	7/9	6F1	4/6	20P1	9/6
DL96	7/-	EL38	12/-	PL41	8/-	UBF89	7/9	6F12	3/-	20P3	12/-
EAB30	7/3	EL41	7/9	PL42	6/6	UC84	12/6	6F13	6/6	30P4	10/6
EAF42	7/9	EL84	9/9	PL83	6/9	UC85	7/9	6F14	9/-	30P5	14/6
EB41	6/6	EM80	8/6	PL84	8/9	UCF80	14/6	6F15	9/-	278U	14/6
EB91	8/-	EM81	8/6	PY31	7/-	UCR21	12/3	6F33	6/3	30C1	7/6
EBC33	4/6	EM84	9/6	PY32	10/-	UCH42	7/-	6H1	12/-	30FL1	9/6
EB341	7/6	EX1	7/9	PY80	7/9	UCR81	8/6	6H1	12/-	30L1	7/3
EBP90	7/6	EY86	6/6	PY81	8/-	UCR83	12/6	6L6	9/9	30P4	11/3
EBF90	8/3	EZ40	6/3	PY82	6/-	UCL42	3/9	6L18	8/-	30P12	8/-
EBL31	20/-	EZ41	6/9	PY83	3/-	UL41	7/-	6L19	12/-	52K10	10/-
EOC81	4/6	EZ80	6/6	PY88	12/-	UL44	10/9	6SN7	4/6	53K10	10/-
EOC89	5/6	GZ32	8/9	PZ30	8/-	UL46	7/-	6V6	5/-	54K10	8/6
EOC83	6/3	GZ34	12/6	R18	10/-	UL47	6/6	6V4	10/-	185B7	14/6
EOC84	7/9	KT33C	6/-	SP41	2/3	UL84	7/3	6U4	5/-	185B7	14/6

We pride ourselves that we can obtain and supply any TV
spare. Please ask us for ANY components you may require we
are almost certain to have them.
TERMS: S.A.E. all enquiries. C.W.O. or C.O.D. 3/- extra.
Postage on Valves, 6d. each. C.R.T.s 12/6 inc. Insurance.
SATISFACTION ASSURED. RETURN POST SERVICE.

SOLDERING EQUIPMENT



PRECISION SOLDERING for the ELECTRONICS INDUSTRY

Comprehensive range—Robust & Reliable
- Light weight - Rapid heating - Bit sizes
3/32in. to 3/8in. - 'Permatic' or Copper
bits - All voltage ranges 6/7v. to 230/
250v. - Prices from 21/-.

- Also
- Plastic Cable Strippers
- Miniature Solder Pots
- Heat Guards
- Long Life Bits

Illustrated is the 25w. 3/16in. replaceable
bit model with safety shield.

ADAMIN— new range of pre-
cision micro-soldering instruments—
Have you had details?

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

SUPER 5 TRANSISTOR POCKET RADIO

INCORPORATING

Printed Circuit -

Miniature earpiece

Completely portable

No Aerial or Earth

is required

★ Size 4½x3½x1½in.

★ Output 200mW

★ 5 First quality transistors

★ Push-pull output

★ Fitted 2½in. high-flux moving coil speaker



ONLY
59/6
3/6 P. & P.

Complete with internal high-gain
ferrox aerial and twin tone case in
Red and Black. Med/Long wave.
Earpiece has sub-min jack and socket
with 3ft. fine cable. Almost invisible
in use. All parts available separately.
Circuit diagram 1/6.—Free with parts.

RADIO & TV LTD. (Dept. 5T)
21B HIGH STREET, ACTON, LONDON, W.3.

WEYRAD

IMPROVED COMPONENTS FOR THE 6-TRANSISTOR 2-WAVE SUPERHET RECEIVER

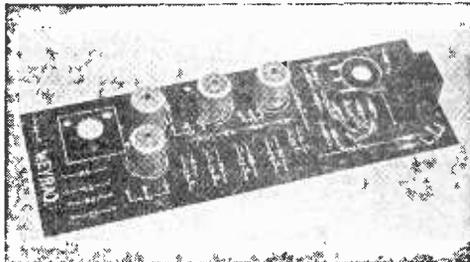
NEW ROD AERIAL AND DRIVER TRANSFORMER FOR SIMPLER ASSEMBLY AND HIGHER PERFORMANCE

ROD AERIAL—RA2W
6 in. long, 3/8 in. diameter, connections to tags on Coils. For 208 pF tuning capacity 12/6
Car Aerial coupling Coil 1/-

OSCILLATOR COIL—P50/1AC
M.W. covered with 176 pF 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 8/-
DRIVER TRANSFORMER—LFDT4
redesigned to reduce size and improve performance. Six spills for mounting and connections 9/6



PRINTED CIRCUIT—PCA1

Size 2 3/4 in. x 8 1/4 in. Ready drilled and printed with component positions 9/6
CONSTRUCTOR'S BOOKLET WITH FULL DETAILS AND FREE SCALE 2/-

TRANSISTOR A.F. AMPLIFIER TYPE A.F.1—LOW IMPEDANCE INPUT, 500 mW OUTPUT.
MATCHING 3 OHM SPEAKER. FULLY ASSEMBLED WITH VOLUME CONTROL 83/6

WEYMOUTH RADIO MANUFACTURING CO., LTD.
REGENT FACTORY, SCHOOL STREET,
WEYMOUTH, DORSET

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

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY (Incorporating E.M.I. Institutes)
(Dept. SE/21), 29 Wright's Lane, London, W.8

WHICH IS YOUR PET SUBJECT ?

Mechanical Eng.,
Electrical Eng.,
Civil Engineering,
Radio Engineering,
Automobile Eng.,
Aeronautical Eng.,
Production Eng.,
Building, Plastics,
Draughtsmanship,
Television, etc.

GET SOME LETTERS AFTER YOUR NAME !

A.M.I.Mech.E.
A.M.I.C.E.
A.M.I.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
Cert. of Education
Etc., etc.

PRACTICAL EQUIPMENT

Basic Practical and Theoretical 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. (Incorporating E.M.I. Institutes) 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)

THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD

D.C. SUPPLY KIT. 12 v. 1 a. consisting of a partially drilled metal case, mains trans., F.W. Bridge Rectifier, 2 fuses/holders 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 a.	.. 14/9
6/12 v. 1 a.	.. 3/11	H.T. TYPES H.W.
6/12 v. 2 a.	.. 6/11	150 v. 40 mA
6/12 v. 3 a.	.. 9/9	250 v. 50 mA
6/12 v. 4 a.	.. 12/3	250 v. 50 mA
6/12 v. 6 a.	.. 15/3	250 v. 60 mA
6/12 v. 10 a.	.. 25/9	250 v. 80 mA
6/12 v. 15 a.	.. 35/9	250 v. 250 mA
CONTACT COOLED.	250 v. 75 mA, F.W. (Bridge)	10/11
	250 v. 80 mA, F.W. (Bridge)	8/11
	H.W. 250 v. 60 mA	.. 5/11

TELEVISION RECTIFIERS. 250 v. 300 mA. Small size. Only 5/9.

B.S.R. MONARDECK TAPEDECK Speed 3 1/2 in. per sec. With high quality recording heads. £6.19.6. Carr. 5/-. Cab. to take Deck and amplifier. 39/6.

EX. GOVT. CASES. Size 14 x 10 1/2 in. High. Well ventilated. black crackle finished. undrilled cover. IDEAL FOR BATTERY CHARGER OR INSTRUMENT CASE OR COVER. COULD BE USED FOR AMPLIFIER. Only 9/9, plus 2/- postage.

LINEAR TREMOLO/PRE-AMP UNIT Type TPU1, with 3 controls, volume, amplitude and frequency. Inputs for guitar and microphone. Requires power supply of 250 v. 10 mA and 6.3 v. 1 a., available from any R.S.C. or LINEAR amplifier. The unit is merely connected to normal input socket of hi-fi amplifier or Guitar amplifier. Only 5 gu.

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

HI-FI 10 WATT AMPLIFIERS

Brand new. Manufacturer's discontinued line. Fitted latest Mullard valves. Dual inputs for "mike" and gram., etc. Bass and Treble Controls. High sensitivity and quality. Output for 3 ohm or 15 ohm speaker. For 230-250 v. A.C. **£7.19.9** Carriage 7/6.

THE SKYFOUR T.R.F. RECEIVER.

A design of 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. minimum building costs £4.19.6. inc. attractive Walnut veneered wood cabinet 12 x 6 1/2 x 5 1/2 in.

R.S.C. TRANSISTORISED GRAM AMPLIFIER.

Output 1 watt, for 3 ohm speaker. Transistors Mullard OC71, OC81D, OC81, OC81. Fitted Vol. Control with switch. Assembled and tested. Suitable for any normal crystal pick-up only 6/9

MULTI-METERS. CABY MI. Sensitivity 200 ohms per volt. A.C. and D.C. 54/- .A.10. Basic Meter sensitivity 155 micro-amps. A.C. and D.C. ranges £4.17.6 B.30. Sensitivity up to 10,000 ohms per volt. A.C. and D.C. £6.10.0

EX. GOVT. SELENIUM RECTIFIERS. 12v. 15 amp. F.W. (Bridge). Only 25/9.

EX. GOVT. SMOOTHING CHOKES. 200 mA. 3-5 H., 50 ohms, Parmeko 8/9; 100 mA. 5 H., 100 ohms 3/11; 150 mA. 10 H., 50 ohms 9/9; 80 mA., 20 H., 900 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.

EX. GOVT. MAINS TRANSFORMERS

Primaries 200-250 v.	50 c.p.s. A.C.	
250v. 60mA 6.3v. 2a	..	.. 11/9
250-0-250v. 60mA 6.3v. 2a.	..	.. 12/9
300-0-300v. 60mA 6.3v. 2a.	..	.. 12/11
3,500v., 5mA 2v. 2a.	..	.. 39/9
0-35-40-45-50v., 300mA 6.3v. 3a	..	.. 17/9
12v. 20a. (carr. 7/6)	..	.. 59/9

COMPLETE POWER PACK KIT, 19/11.

Consisting of Mains Trans., Metal Rectifier, Double electrolytic, smoothing choke chassis and circuit. For 200-250v. A.C. mains. Outputs 250v. 60mA. 6.3 v. 2a.

R.S.C. POWER PACK, 39/9.

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

EX. GOVERNMENT ACCUMULATORS.

Size 7 1/2 x 4 x 2 in., 2v. 16 A.H. brand new. 6/9 ea., 3 for 15/6.

R.S.C. BABY ALARM or INTER-COMM. KIT.

Complete set of parts with diagrams, etc. Housed in two cabinets of pleasing design. High sensitivity. For 200-250v. A.C. mains. Fully isolated. Only 79/6, carr. 5/-. Or assembled ready for use £5.15.0.

R.S.C. (Manchester) MAIL ORDERS to 29 Moorfield Rd., Leeds 12. Terms: C.W.O. or C.O.D. No C.O.D. under £1.
 Ltd. Postage 2/9 extra under £2. 3/9 extra under £5. Trade Supplied. S.A.E. with all enquiries please.

BIRMINGHAM:	SHEFFIELD:	HULL:	LIVERPOOL:	BRADFORD:	MANCHESTER:	LEEDS:
6 Great Western Arcade, Birmingham	13 Exchange St. Castle Market Bldgs., Sheffield	51 Staville St. Hull (Half day Thurs.)	73 Dale St. Liverpool 2	56 Morley Street (Above Alhambra Theatre), Bradford	8-10 Brown St. (Market St.) Manchester 2	5-7 County (Mecca) Arcade, Briggate Leeds 1



The PUNCH you need!

HOLE PUNCHES

Instant Type	...	...	...	5/6 ea.
3/8" diameter	...	...	...	7/8 ea.
1/2" diameter	...	...	...	7/8 ea.
1/2" diameter	...	...	...	8/3
1/2" diameter	...	...	...	8/7
1/2" diameter	...	...	...	9/6
Postage and packing 1/-				
1 1/2" diameter Inc. Octal	...	...	...	10/11 ea.
1 1/2" diameter	...	...	...	13/3
1 1/2" diameter	...	...	...	15/6
1 1/2" diameter	...	...	...	17/11
1 1/2" diameter	...	...	...	20/4
2 1/2" diameter	...	...	...	27/8
Postage and packing 2/3				
Complete set including postage and packing, £7.10.0				

Oliver & Randall Ltd
 Dept. 7
 40 PERRY HILL, LONDON, S.E.6
 Tel.: Forest Hill 3415

NEW VALVES!

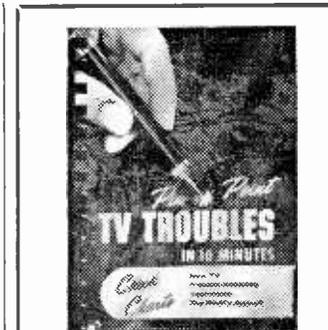
Guaranteed Set Tested
24-HOUR SERVICE

1R5, 1S5, 1T4, 3S4, 3V4, DAF91, DF91, DK91, DL92, DL94, SET of 4, 18/6.
 DAF96, DF96, DK96, DL96, SET of 4, 26/-

1D5	7/-	DL33	9/6	PC389	9/-
1H5	5/6	DL32	5/11	PC390	7/-
1S5	4/6	DL34	6/9	PCF82	7/6
1T4	3/3	DL96	6/9	PCL82	8/3
354	5/11	EB91	3/-	PCL83	10/-
3V4	4/9	EBC41	7/6	PCL84	9/9
5U4G	4/6	EBF80	7/9	PL35	10/9
5X3GT	5/9	EEL21	12/-	PL81	8/6
5Z4G	8/6	ECC4J	13/-	PL82	6/6
6AM6	2/9	ECC81	4/9	PL83	6/6
6K7G	1/9	ECC82	5/9	PL84	8/-
6K8G	4/9	ECC83	6/3	PY32	11/6
6GTG	5/6	ECC84	8/-	PY89	7/-
6V6G	4/-	ECC85	7/6	PY81	6/6
6V6GT	6/6	ECC80	7/3	PY82	6/-
6X5GT	5/6	ECH82	8/3	PY83	7/3
12K7GT	4/3	ECH21	19/-	U25	11/-
13K9GT	9/-	ECH22	7/9	UY4C80	5/-
12Q7GT	4/6	ECL80	5/9	UAF42	8/-
12SN7GT	7/3	EF40	11/-	UBC41	7/-
35L6GT	8/-	EF41	7/6	UBF80	8/-
35Z4GT	5/-	EF80	4/3	UCC85	7/-
AZ31	8/9	EF82	4/6	UCH21	11/6
CL33	11/-	EF85	8/6	UCH42	7/6
DAC32	8/6	EF89	6/9	UCH81	8/9
DAF91	4/6	EF91	2/9	UCL82	9/3
DAF96	6/9	EL41	9/-	UCL83	13/-
DF33	5/6	EL43	6/3	UY41	11/6
DF91	6/3	EX31	7/3	UP89	6/9
DF96	6/9	EX36	7/6	UL41	8/-
DH77	6/-	EZ40	6/-	UL44	6/6
DK32	10/6	EZ41	7/6	UY21	10/6
DK81	5/6	EZ30	5/9	UY41	5/6
DK92	6/9	EZ41	6/-	UY85	8/3
DK96	7/3	MU14	5/6	VP4B	8/6
DL33	7/6	PC84	8/9	Z77	2/9

Postage 6d. per valve extra. Any Parcel Insured Against Damage in Transit 6d. extra. Any C.O.D. Parcel 3/- extra. Office address: no callers.

GERALD BERNARD
 (Note new address—formerly of Leeds)
 83 OSBALDESTON ROAD,
 STOKE NEWINGTON, LONDON, N.16



For the man who has TV TROUBLES IN 10 MINUTES

Your most useful on-the-job "tool"! Quickly and easily pin-points the exact trouble in any TV set. Covers 70 symptoms. 700 trouble spots. Over 340 cross-indexed pages; 50 time-saving Check-Charts; 290 diagrams and photos; explanation of circuits and designs.

SEND NO MONEY!

Just mail coupon for free trial! After 7 days send only 5/- weekly or return book and pay nothing!

FREE TRIAL OFFER!
 Mail Coupon NOW!

Mail Order Division, 81M-TRCH BOOK COMPANY, Dept. WH.2, Catera Mill, West End, Southampton, Hants.

BUSH, TV Troubles 1/6d. plus 1/6d. postage for 7 day FREE TRIAL as per offer.

Tick here if enclosing full price, we pay postage: Same 7 day money back guarantee

Name _____
 Address _____
 City _____ County _____

Home Constructors LOOK!

TRANSISTOR
POCKET
RADIO

TRANSISTOR KITS 'JUNIOR MKII'

OUR IMPROVED
VERSION OF
THE 'JUNIOR'

NOW SUPPLIED COMPLETE WITH PRINTED CIRCUIT BOARD AND FREE GIFT OF MINIATURE EAR PIECE. An easy "first step" set for the young constructor. This miniature marvel with the BIG performance has an internal Ferrite rod aerial—5 transistors and 1 diode—separate medium and long waveband control—200 milliwatt push-pull output—2 1/2 in. moving coil speaker—unbreakable plastic case with carrying handle. Complete with full instructions. Circuit diagram 1/8, free if all parts bought. All parts sold separately.

£2.19.6

P. & P. 2/-

THE SUPER 'SONIC SIXTY' TRANSISTOR RADIO KIT

6 Mullard transistors, 1 diode, internal ferrite rod aerial, 7 x 4 high quality speaker, printed circuit, 500mW push-pull output, MW and LW calibrated direct drive assembly. Highly polished handsome walnut cabinet. Inst. Book 2/60 Complete kit, inc. Battery. All parts sold separately.

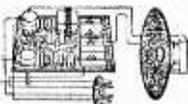
£8.19.6

P. & P. 4/6

TRANSISTOR AMPLIFIER COMPLETE WITH 3in. MOVING COIL SPEAKER

49/6

1 watt full transistorised Amplifier. Incorporates 2 power Transistors and 3 G.E.T. 114 Transistors in push-pull—complete with separate tone and volume controls on 2 1/2 x 4 1/2 in. printed circuit board. Operates from Ever Ready P.P.11 Battery. Suitable for use with the Star Galaxy Player.



THE PETIT FULMITER A.C. ELIMINATOR AND 9V. BATTERY CHARGER

18/6

P. & P.
1/6

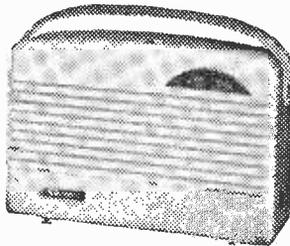
Converts your Miniature Transistor Set to Mains for the winter and charges your Battery for summer use outdoors; for use with all 9V Transistor Receivers (approx. same size as P.P.3 battery). Complete with flex.



Wirecomp's Finest Ever Value Offer—

THE 'REALISTIC 7'

FULLY
TRANSISTOR-
ISED PORTABLE
RECEIVER



This super set—made to the highest professional standards—is now available to the home constructor. Completes 7 Mullard Trans, OC44, OC45's, OC71, OC81D, and 2 OC81's, plus OA70 Crystal Diode. Delivers 350 milliwatt output to 4in. high flux speaker—150 frequency 470 Kcs.—fully tunable over medium and long wave-bands. All components mounted on single printed circuit board, size 5 1/2 x 5 1/2 in. Attractive two-tone plastic cabinet with carrying handle—size 7 x 10 x 3 1/2 in. with easy to read dial and socket for car aerial; choice of Red/Grey, Blue/Grey or all Grey. Complete with full instructions. All parts sold separately.

WIRECOMP'S PRICE **£6.19.6** including Free P.P.3 Battery — Value 3/9
P. & P. 4/6 extra. (Circuit diagram 2/6, free if all parts bought).

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.



TRANSISTORS AND DIODES

A set of Transistors comprising 1 OC44, 2 OC45, 1 OC81D, 2 OC81, 37/6, set.

OC73 16/-	OC75 8/-	OC77 12/-	Matched Pns. OA81 2/6	Red 3/9	Spot 3/6
OC35 18/-	OC78 8/-	2xOC72 16/-	OA35 3/-	White 3/-	Spot 5/-
OC36 21/6	OC81 8/-	2xOC78 16/-	OA91 3/-	GEX34 3/-	GEX35 3/-
OC44 6/-	OC84 8/6	Diodes OA95 3/6	OA95 3/6	GEX34 3/-	GEX35 3/-
OC45 6/-	OC170 9/6	OA5 6/-	Sundry types 8/-	PXA102 4/-	GEC SI 3/-
OC70 6/6	OC171 10/6	OA10 8/-	PXA102 4/-	GEC SI 3/-	XD201 1/-
OC71 5/-	OC201 31/-	OA70 3/-	Audio 3/6	XD201 1/-	
OC72 8/-	OC202 26/-	OA73 3/-			

PRACTICAL WIRELESS POCKET TRANSISTOR SUPERHET. The New Version in a re-designed Cabinet with Carrying Strap. Components Price List: Coil Set (Osc. and 3 I.F.'s), 22/-; Driver Transformer, Type PW/DT, 8/3; Output Transformer, Type PW/OT, 8/-; Ferrite Rod Aerial, Type PW/FR, 8/6; Printed Circuit Board, 7/6; 2 Gang Capacitor, Type "00", 12/6; Volume Control, Type V.C. 1545, 8/-; Switch, 3/6; Hardware (Screws, nuts, washers, spacers, battery clips, cable cradles, cable studs, cable strapping), 4/-; Transistors Type YC (Set of 6), Xtal Diode, Type GD9, 43/-; Speaker: Case, 12/6; Capacitors, 15/-; Resistors, 5/-; Trimmers, Type MT31/4A (3 required), 3/9. Constructional Leaflet and "Blown-up" Circuit Diagram. PRICE FOR THE COMPLETE KIT **£7.19.6.**

Our new 1962/63 48-page catalogue profusely illustrated is now available. Please send 1/- in stamps for your copy. Trade Catalogue also available for which please attach your Business Letter Heading.

AUTOMATIC RECORD CHANGERS

BSR Monarch UA14 **£6.19.6.**
Collaro C60 Studio **£8.19.6.**
Garrard Autoslim **£8.19.6.**
RECORD PLAYER CASES
Baseboard cuts suitable for a BSR UA14, available in red, turquoise, grey, and black/yellow, 63/- each. Amplifier and Loudspeaker to suit above, 65/-.

RECORDING TAPE

5in. reel, 600ft. Acetate **13/6.**
5in. reel, 900ft. P.V.C., **21/-.**
7in. reel, 1200ft. Acetate, **23/-.**
7in. reel, 1800ft. P.V.C., **37/6.**

All components for the Practical Wireless Circuits "Mini-amp", "Regency", "International Short Wave Two", "Mercury Six", "Britannic Two", "Citizen", "Tutor", etc. in stock. Send for detailed price lists.

TRANSISTOR TRANSFORMERS

Osmor Driver Transformer PW/DT, 8/3.
Osmor Output Transformer PW/OT, 8/-.
Weyrad Driver Transformer LFDT4, 9/6.
Repanco TT45 Driver Transformer, 5/-.
Repanco TT46 Push-pull Output Transformer 5/-.
Repanco TT47 Driver Transformer, 5/-.
Repanco TT49 L.F. Transistor Coupling Transformer, 5/-.
Ardenite D100 (TI079) Interstage Transformer, 12/-.

MULTI-RANGE TEST METRES

Pifco All-in-One Radio Meter, 32/6.
Test Master Model 200H, 20,000 ohms per volt, **£6.19.6.**
Caby Model A10, **£4.17.6.**
Caby Model B20, **£6.10.0.**
Taylor Model 127A, **£10.10.0.**

MICROPHONES

Acos Mic. 39/1; Stick Type 32/6. Table Stand for above, 7/6. Floor Stand Adaptor, 12/6. TSL Type M1 Dual Impedance Microphone with High (50,000 ohms) or Low (200 ohms), Matching, 84/-; TSL Stick Microphone MX3, 35/-; Acos Mic. 40, 19/6; Acos Mic. 45, 29/6. Microphone Model BM3, 45/-; Table Stand to suit above, 12/6.

SUMMER SALE OF RECORDING TAPE

ALL BRAND NEW, BOXED & GUARANTEED

"GEE'S" SUPER QUALITY P.V.C. TAPE



- 5in. Std. 800ft. 10/-
- 7in. Std. 1,200ft. 17/6
- 5in. L.P. 900ft. 15/-
- 5 1/2in. L.P. 1,200ft. 17/6
- 7in. L.P. 1,800ft. 24/-
- 6in. D.P. 1,200ft. 21/-
- 5 1/2in. D.P. 1,800ft. 30/-
- 7in. D.P. 2,400ft. 39/6

AMERICAN "CBS" TAPE

- 5in. Std. 800ft. (CIP-6) 18/-
- 5 1/2in. Std. 900ft. (CIP-9) 16/-
- 7in. Std. 1,200ft. (CIP-12) 21/-
- 5in. L.P. 900ft. (LP-9) 17/6
- 5 1/2in. L.P. 1,200ft. (LP-12) 19/6
- 7in. L.P. 1,800ft. (LP-18) 28/6
- 5in. D.P. 1,200ft. (CMXP-12) 32/-
- 5 1/2in. D.P. 1,800ft. (CMXP-18) 37/-
- 7in. D.P. 2,400ft. (CMXP-24) 47/-

P. & P. 1/6 per order. (Orders over £3 post free). Many other types available including "Scotch," "EMI," "BASF," "Triton," "Synchro-tape," etc. Send S.A.E. for our huge money-saving literature on Tapes and Accessories.

GEE BROS. RADIO LTD

15 LITTLE NEWPORT STREET, LONDON, W.C.2.

Telephone: GERrard 6794/1453

Adjoining Leloeester Square Tube Station Open 9-6 Mon.-Fri. 9-1 Sat.

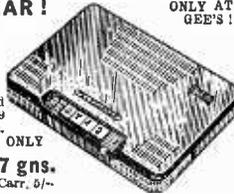
BARGAIN OF THE YEAR!

TELEFUNKEN HI-FI STEREO AMPLIFIER—LATEST MODEL

S82 With Balance Control

110/250 v. A.C. 5 watt undistorted output (10 watts nominal) size 12 9/16 x 2 1/2in., wt. 9lb. Complete with spec. and instructions.

ONLY 7 gns. Carr. 5/-



ONLY AT GEE'S!

POCKET TEST METER MODEL TK.60

4,000 O.P.V. FOR ONLY £4 Post Free



A pocket-size individual circuit tester with bakelite panel and metal cabinet. Complete with test leads, batteries and ready to use. Ranges: D.C. Volts: 10-50-250-1,000 v. (2,000 o.p.v.), D.C. Current: 250µA/10 mA/250 mA.

Resistance: 0-10 K ohms/0-1 M ohms (by 3V internal battery). Decibels: -20 to +22db (0dB — 0.775v — 600 ohms). Size: 4 1/2in. x 3 1/2in. x 1 1/2in.

Also available: MODEL TK.50

1,000 o.p.v. Ranges: D.C. mA: 1-250 mA, D.C. and A.C. Volts: 10-250-500-1,000 v. Ohms: 0-10K ohms, 0-100K ohms. £3.78.

"MINI-COM" TRANSISTORISED INTERCOM

Ideal for Nursery, Office, Home, Factory, etc., Comprises Master Station and Sub Station with 100ft. of twin connecting wire fitted miniature jack plugs. Complete with battery and ready to use. Size 4 x 2 1/2 x 1 1/2in. each unit. Attractive matching ivory cases with gold trim. 84/-, P. & P. 2/6.

H.R.O. COILS

Set of 8 different frequencies, 27, post paid; or individual frequencies, 20/- each plus 2/6 P. & P.

TELESCOPIC MICROPHONE FLOOR STAND

HEAVY 9in. dia. chromium base chromium stand with screw top. Extends to approx. 6ft. £215.0. Carr. 5/-.

12 VOLT D.C. AMPLIFIER

(Ardenite). As new, 15 watt push-pull output mike and gram inputs, tapped output transformer. £9.19.6. Carr. 10/6. (Haud microphone for above 30/- extra.)

BEAM PROJECTION EXPONENTIAL HORN

19in. long, 12in. square flare, 15 ohm speech coil also built-in 100 ohm line transformer. Complete with mounting bracket. Ideal for mobile use. Brand new. £8.10.0. Carr. 10/- Many other types of P.A. Speakers. S.A.E. for list.

AVO MODEL 7

This well-known test instrument, supplying 50 ranges of current, voltage and resistance tests. Complete with leads and batteries. Ready for use. Perfect order. ONLY £11.5.0. P. & P. 5/-.

AVO VALVE TESTER

Outstanding offer of this fine test instrument. Supplied in good condition. Equipment is in two parts valve panel with selector switches—and meter with voltage adjustment controls etc. 12 valve bases and 3 blanks. Very simple to operate, ONLY £5.19.6. Carr. 7/6 (Adaptors available for testing valves not listed). Data manual 40/- extra. Also complete instrument with data manual and latest type panels with B7G, B8A and B9A bases, £10. Carr. 7/6.

"There is no Virtue without Courage— No Reward without Labour"

Not simply a school motto but at B.N.R.S. a creed and a way of life. We owe to it all we have and are. If you are prepared to make it your motto and live up to it, we can help you get to the top. It will take time, it will take effort, it will take courage, and as if this were not enough, YOU WILL ACTUALLY BE CHARGED FEES!

If we haven't succeeded in putting you off, write for details, today, to:

Mr. J. SYKES

(M.I.E.E., M.Bric.I.R.E., M.I.N.)

Principal:

BRITISH NATIONAL RADIO SCHOOL
Red Lion Court, Stalbridge, Dorset.

Britain's premier Radio Correspondence School specialising in City and Guilds examinations.

NEW REPANCO TRANSISTOR COMPONENTS

- Push Pull Driver Transformer Type TT45 ... 5/-
- Push Pull Output Transformer Type TT46... 5/-
- Interstage Transformer Type TT49 ... 5/-
- Dual Range Ferrite Aerial Type FR2 ... 12/6
- 2.5 millihenry Choke Type CH1 ... 2/6

RADIO EXPERIMENTAL PRODUCTS LTD.

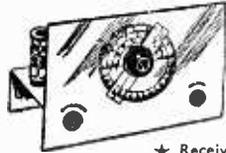
33 MUCH PARK STREET, COVENTRY

AN INSTRUCTIVE BOOK FOR BOYS FROM EDMUND WARD PUBLISHERS

Fun With Electronics

By Gilbert Davey, edited by Jack Cox. This book is a successor to *Fun With Radio* and *Fun With Short Waves*, in the "Learning with Fun" series for children. It goes into the practical uses of electronics and gives designs to make and buy as well as dealing with the wider aspects of electronics in industry, the services, and present day living. Quarto, 64 pages, many illustrations, 12s. 6d.

EXPLORE THE WORLD ON THIS I-VALVE SHORT-WAVE RADIO



Total Building Costs **35/-**

P. & P. 2/-

★ **Receives speech**

and music from all over the world. Construction 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.

PUT YOUR FAVOURITE PROGRAMME ON TAPE with the R.C.S. TAPE TUNER

Will operate on all types of Recorders. High impedance output. Variable Medium wave tuning. Triple wound Super Hi-Q coil. Chassis and components colour coded. Easily constructed from full instruction data and layout diagrams. Size 3 x 1 1/2 x 1 1/2 in.

Total Building Costs **30/-** Plus P. & P. 1/6.



"PERSONAL TWO"

For Private Listening.

An amazing little set, with built-in ferrite rod aerial bringing in medium wave at wonderful volumes. Sturdy case. Size only 1 1/2 x 3 x 4 in. Fits into the palm of the hand. Drilled chassis colour coded for easy assembly. Two transistors plus diode.

Total Building Costs **35/-** Plus P. & P. 1/6. Earpiece 7/6 extra if required. Send S.A.E. for **FREE** Layout plans and price list.

AMAZING RESULTS from the "OLIVER"

5-Stage Transistor Receiver

A highly sensitive receiver using top grade transistors and components Fully tunable over medium and long waves.

- Can be built in 1 hour.
- High flux moving coil speaker.
- Built in ferrite rod aerial.
- Specially designed coils for maximum signal strength.
- Volume on/off control.
- Eyeletted circuit board.
- Easy to follow building plans.

Send S.A.E. for **FREE** Layout plans and price list.

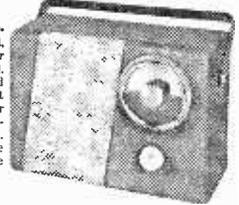


65/-

P. & P. 1/6

The "BOBETTE" 5-STAGE SUPER SENSITIVE TRANSISTOR PORTABLE

Simple to Build. All First Grade Components. A truly portable transistor radio giving full medium wave reception. Incorporates 5th. High Flux Speaker, push-pull output, first grade transistors. High-Q ferrite aerial, socket for car aerial, pre-tagged circuit board for easy construction. Attractive two-tone case.



Total Building Costs **£5.2.6** P. & P. 2/6.

CRYSTAL RECEIVER

Covering medium wave band. Ideal for the beginner! All components including case for **10/-** P. & P. 1/6. Easily converted to 1-transistor or 2-stage transistor receiver.

R.C.S. for MINI-SETS

All parts available separately. Constructional details on any one of our Mini-Sets, 1/6 each. (Supplied free with orders)

"THE REVILO"

5-STAGE POCKET TRANSISTOR PORTABLE

Two-tone contemporary case, with gold plated speaker grill and attractive dial. Size 5 1/2 x 3 1/2 x 1 1/2 in. No aerial or earth required—completely self contained. Genuine 3in. high Flux PM speaker. First grade transistors. Push-pull output—250 milliwatts. Volume control with on/off switch. Condenser tuning. Easy assembly on eyeletted circuit board.

Total Building Costs **£4.19.6** Socket for personal listening. Earpiece 7/6 extra if required. P. & P. 2/6.



Trade Enquiries Welcomed **R.C.S. PRODUCTS (RADIO) LTD.** 11 OLIVER RD., LONDON, E.17 Mail Order only

SOUTHERN RADIO'S WIRELESS BARGAINS

PORTABLE TEST METERS. (As featured in March 1961, issue, pages 1005 to 1010) 0-5000 ohms; 0-60mA; 0-15 v., 0-3 v., 12/6 each.

TRANSMITTER RECEIVERS. "Type 38" with 5 valves. New but untested. No guarantee, 25/- each. Post paid.

ATTACHMENTS FOR "38" TRANSMITTER-RECEIVER; Headphones 15/6; Throat Microphones, 4/6; Junction Boxer, 2/6; Aerials, No. 1, 2/9. No. 2, 5/3. Webbing, 4/-; Haversacks, 5/6; Valves—A.R.P.12, 4/6; A.T.P.4, 3/6. Set of five valves, 19/-. Postage on each item 1/6 extra (except valves). **TYPE "18" RECEIVING PORTION ONLY** with 4 valves. S.W. 6-9Mc/s, 35/- each.

ATTACHMENTS FOR "18" TRANSRECEIVER. Headphones, 15/6; Microphone 4a, 12/6; Aerials, 5/-; Morse Key, 6/6; Valves—A.R.P.12, 4/6; A.T.P.4, 3/6; A.R.8, 7/6; Set of six valves, 25/- Official booklet "19" T.R. Circuits, etc., 6/6 post paid. Postage extra (except valves) 1/6 each item.

QUARTZ CRYSTALS. Types F.T. 241/242 2-pin 3in. space. **FREQUENCIES:** (F.T.243) 5706 kc/s to 8625 kc/s. **FUNDAMENTAL** (F.T.241) 20 Mc/s to 38.9 Mc/s. (54th and 72nd Harmonics) 4/6 each. Lists available of frequencies stocked.

CRYSTAL BASES. F.T.241, F.T.243, 1/6 each.

CRYSTAL CASES. F.T.241/243, 10/6 per dozen.

DYNAMOTORS for attaching to B.C. SERIES COMMAND RECEIVERS. 28v. D.C. to 250v. D.C. 17/6.

VARIOMETERS for "19" Sets. NEW. 21/- each.

RECORDING BLANKS. New 13in., 6/- each or 15 complete in Tin, 6/4.

BOMBSIGHT COMPUTERS. Ex-R.A.F. Wealth of gears, motors, blowers, etc. Ideal for experimenters, £3.12.6, carr. paid.

RESISTANCES. 100 Assd. Useful values, new, 12/6 per 100.

CONDENSERS. 100 Ass. Mica Elec. Tub., etc. New 15/- per 100.

LUFBRA HOLE CUTTERS. Adjustable. 3in. to 3 1/2in., 7/9.

VISUAL INDICATORS (10Q4). Type 3 with 2 meter movements, 2 neons. New 12/-.

MAGNETS. Strong Bar, 2in. x 1/2in., 1/6 each.

POST OR CARRIAGE EXTRA, FULL LIST OF RADIO BOOKS, ETC., 3d.

SOUTHERN RADIO SUPPLY LTD.

11 LITTLE NEWPORT ST., LONDON W.C.2. GER. 6653

GZAK: This Month's Bargains

★ **SHADED POLE MOTORS** ★

230v. or 110v. operation. Ideal for fans, blowers or models.

One only, 12/6, plus 2/- p. & p. Or pair, £1, plus 2/6 p. & p.

★ **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/-.

Other lengths pro rata.

RIBBED GLASS. 3in. aerial insulators, 1/9 each. Shell ins 2in. 9d. each. P. & P. 1/6. Up to 12.

CERAMIC FEEDER SPREADERS. 6in. type F.S. 10d. each. P. & P. 2/-.

CERAMIC "T" PIECES. Type A.T. for centre of dipoles, 1/6 each. P. & P. 1/-.

2 METRE BEAM 5 ELEMENT W. S. YAGI. Complete in box with 1-2 1/2in. mast head bracket, PRICE 49/-. P. & P. 3/6.

SUPER AERIAL CABLE. 75 ohm, 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 ball race 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. 1/6. Also Flexible Couplers, 1/- each. B.I. 8 MFD. 1-200 v. D.C. Wkg. Capacitors, 12/6 each. P. & P. 2/-.

CHAS. H. YOUNG LTD.

THE COMPONENT SPECIALISTS

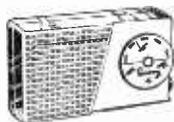
Dept. "P", 110 Dale End, Birmingham 4. (CEN 1635)

(No C.O.D. under £1 please). (By return service)

The SAVOY 4-TRANSISTOR POCKET RADIO

with moving coil speaker

**NO SOLDERING NO DRILLING
NO AERIAL REQUIRED**



4 transistors and two diodes in a 5 stage reflex circuit, push-pull output. Full medium wave. Size 5 1/2" x 3" x 1 1/2". Simple instructions and Assembly Tool provided.

75/- Battery 2/3 P/P 2/9 extra. All parts sold separately

or the SAVOY SUPER-3 Battery 1/- P/P 2/- extra

with 3 transistors and 2 diodes. Size 4 1/2" x 2 1/2" x 1 1/2"

SAVOY ELECTRONICS LTD.

15 Malden Lane, Strand, London WC2 (Back of Adelphi Theatre)

PADGETTS RADIO STORE
OLD TOWN HALL, KNOWLER HILL, LIVESLEDGE, YORKS.

Phone: Cleckheaton 2866.

Type 46. RXTX Walkie Talkie Set, complete with two ARP12, one AR3, one ARTP2, one APT4, one APP37 Valves. Less crystals, plug-in coil and send/receive switch, but otherwise the set is complete. The sets are in new condition. We have 1,500 sets to clear at the special price of 8/6. Post 3/6. No gen on the set at this price.

Complete TV Chassis for Spares. Less valves, 12in., four for 10/-. Carr. B.R.S. 7/6. 14in. Chassis, four for 15/-. Carr. 8/6.

P.M. Speakers all 3 ohms. Removed from TV sets, perfect condition. Rola 8 x 4in. 5/-, Goodmans 7 x 4in. 6/-. Philips 5in. round, 5/-; Rola, R. and A. Round, 3/6; 8in. Dish, 5/-; 8in. round, 6/-; 10in. round, 10/-. Post extra on any speaker, 2/-. Up to six can be sent for 3/6.

Germanium Diodes, 4/6 doz. Post Free.

New Valves, ex units. All post free. KT66 6/6, 807 USA 5/-, 6V6 3/-, 6V8GT 4/6, 6C4 2/-, V15030 4/-, 12A0M 2/-, EF91 1/9, EB91 1/6, EL91 1/6, 6J6 2/6, 6AQ4 3/-, EF50 1/8 or 6/- doz., 5U4 4/6, 5Z4 5/6, DH63 4/-, 954 1/6, 9001 9d. or 5/- doz. USA EF50 Red 2/6.

Valves Removed from T.V. sets. All post free. All tested on a millard valve tester and are 100% as new. They carry a three months guarantee. We also have a large stock of old type radio valves and other T.V. valves not listed.

ECL80 4/-, ECC82 5/-, EL38 4/-, EY51 2/6, EBF80 4/6, EB91 9d., EF91 9d., 6F1 1/-, 6F13 2/-, 6F14 5/-, 6LD 2/6 5/-, 6SN7 2/9, 6SL7 2/9, 6V6 2/6, 6C6 2/6, 6SS 7/2-, 10C1 2/-, 10C2 2/-, 10F1 1/-, 10P13 5/-, 10P14 5/-, 20D1 3/-, 20P1 5/-, 20L1 5/-, 20P4 8/-, 185BT 8/6, U25 5/-, U281 5/-, U282 5/-, U901 8/6, U329 5/-, KT66 5/-, PL81 5/-, PL82 5/-, EY81 4/-, PY82 5/-, PY90 5/-, PL98 5/-, PZ30 4/-, PCF90 4/6, PCC84 4/6, PL83 5/-, PL33 4/-, B36 4/-, N37 5/-, L63 3/-, 6J5 3/-, 27SU 5/-, U12 4/-, EF80 1/6. 10/- per doz. Grades 2, 6d., 4/- per doz.

TV Tubes Completely Rebuilt and Refaced. 12 months guarantee. Old glass not required, 12, 14, 15, 16 and 17in., any make. All the same. Special trade price of £5.15.0. Carr. and ins., 7/6.

Clydon Convertors. Complete, all types, coils fitted 2 and 10, 16/-, or less valves 10/- each. Post 2/-.

Perfect Reclaimed Tubes, 6 months' guarantee. 12in. 17/-, 14in. 30/-. Carr. and ins., 7/6.

Complete TV Sets Untested. 12in. 20/-, 14in. 30/-, 14in. 13-channel 50/-, 17in. BBC only 50/- Carr. BRS 10/-. Sent at owner's risk.

Clyston Magnets. CV2426, weight 3lbs. Very powerful, 5/-, Post 3/6.

FIRST-CLASS RADIO COURSES . . .

GET A CERTIFICATE!
QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification or learn Servicing and Theory. Let us show you how.

FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as A.M.Brit.R.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs' Exams., Gen. Cert. of Educ. London B.Sc. (Eng.), A.M.I.P.E., A.M.I.Mech.E., Draughtsmanship (all branches) etc., together with particulars of our remarkable Guarantee of

SUCCESS OR NO FEE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

FOUNDED 1885—OVER 150,000 SUCCESSES

NATIONAL INSTITUTE OF ENGINEERING
(Dept. 461), 148 HOLBORN LONDON, E.C.1

S. Africa: P.O. Box 8417, Jo'burg.
Australia: P.O. Box 4570, Melbourne.

2 METRES!

The thrills of 144 Mc/s can now be yours for only 39/6, complete kit! Tunable range 150-100 Mc/s, simplified construction, etc., write today for descriptive literature, also if a newcomer-beginner to Amateur Radio ask for free copy of the world-famous "Globe-King" kits and receivers—stamp to cover postage costs appreciated. Write now to makers:

JOHNSONS (Radio)
St. Martins Gate, Worcester

RADIO BOOKS

A BRILLIANT NEW Pictorial approach to understanding BASIC ELECTRICITY IN SIMPLE STRAIGHT-FORWARD WORDS and Clear Explanatory Pictures. The Reader is taken Step by Step from Picture to Picture.

LEARN WHILE YOU PAY FOR ONLY 2/6 PER WEEK
Write for FREE Illustrated Prospectus giving details of instalment plan.

BUMPER BOOK OF TRANSISTOR CIRCUITS FOR BOYS, 6/6.
ELECTRONIC NOVELTIES, Bradley 5/6.
ELECTRONIC GADGETS, Bradley 4/-.
SERVICING TRANSISTOR RECEIVERS
New and enlarged edition, Pettit, 8/-.
All above titles include postage.
SEND STAMP FOR LISTS.

SELRAY BOOK CO.
60 HAYES HILL, HAYES, BROMLEY KENT.
Tel. HURstway 1815

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 64 page equipment catalogue.
Please send your two new catalogues enclosed in P.O. for 2/6 which will be credited against any purchase I make.



The Lowboy
Price 24 gns.

This cabinet can accommodate every type, size and make of Hi-Fi equipment. The Lowboy is supplied in Walnut (as illustrated), or stripey Sapele mahogany and polished to a satin finish.
THE LARGEST RANGE OF CABINETS IN THE COUNTRY.

LEWIS radio

100 (P82) Chase Side, Southgate, London, N.14. Pal 3733/9666

BBC - ITV - F.M. AERIALS



B.B.C. (BAND 1). Telescopic loft, 10/6. External, 5/3d. 26/3.
IT.V. (BAND 3). 3 Element loft array, 24/- 5/- Element, 32/6. Wall mounting, 3 Element, 33/6. 5 Element, 41/3.
COMBINED B.B.C. + IT.V. Loft 1+3 Element, 41/3. 1+5 Element, 48/6. Wall mounting, 1+3 Element, 56/3. 1+5 Element, 63/6. Chimney and mast mounting units also available.

F.M. (BAND 2). Loft "H", 28/-, 3 Element loft, 52/6. S/D loft, 12/6. External S/D, 26/3. State channel when ordering. C.W.O. or C.O.D. P.P. 2/6. Coaxial cable, 8d. yd. Coaxial plugs, 1/3. Send 6d. stamps for illustrated lists.

K.V.A. ELECTRONICS (Dept.P.W.)
3B, Godstone Road, Kenley, Surrey.

MICROAMMETER 0-50 μA, 3" x 2 1/2"

Brand new Weston, scaled 0-3, 30, 300, real bargain, 22/6, post 1/6. Multimeter circuit and scale 9d. FREE with meter.
Shunt for 1MΩ 100 ohm meter. Ranges 10, 100, 1000MΩ, 1% accuracy, 8/6, post 3d.
Shunt for 500Ω x 500 ohm meter. Ranges 5, 50, 500MΩ, 1% accuracy, 8/6, post 9d.
Shunt resistors wound to order. Please state requirements.

Precision Wirewound Resistors. 1W, 1 ohm to 1K, 1% 2/9; to 5K 3/3; to 20K 4/- 1% add 3d. Your value wound to order.
New 1% High Stabs, 2/- each, all standard values, 100 to 10 MΩ.
Surplus 1% High Stabs. List on request. Ass. Hstabs 2% 2/- doz., 5% 1/3 doz.
V.W. Pots. 20, 1K, 5K, 7.5K, 1/6, post 9d.
3 1/2" twin gang 5K, 4/-, post 1/6.
TX Chassis. Small batt., 6 valve, 65 parts inc. mike tran., less valves, 2/6, post 1/9.
2% Condensers. 100pF, 1000pF, 0.01μF, 1/5; 0.1μF, 2/9; 1μF 3/6. Postage 8d.

PLANET INSTRUMENT CO.
25 DOMINION AVE., LEEDS 7

AVO METERS

MODEL 7 £11.10.0. MODEL 7 Mark II £12.10.0.
 Guaranteed perfect. Complete with leads and batteries.
 Registered post and packing 5/- extra.

"ERECON" PANEL METERS. Rectangular 4 1/4 in. (3in. barrel), 0-500µA. BRAND NEW (Japanese), 52/6.

PANEL METER. 0-500µA. (Surplus). Circular 2in. scale, 0-5, guaranteed good quality, 15/-.

SILICON RECTIFIERS. A modern marvel. Type 1EA2 (4 x 1in.) will handle 250 volts at up to 500 mA. Replaces any TV metal rectifier, 8/6.

H.R.O. RECEIVERS—SENIOR MODEL M.X. Complete with 9 coils from 50 Kcs—30 Mc/s. A superb communications receiver. Guaranteed in brand new condition, £25, carr. 30/-.
POWER UNIT 59/6, extra carr., 5/6.

R107 RECEIVERS, 1.2 Mc/s—17.5 Mc/s continuously, 3 wave bands. Completely self contained with speaker and power unit for A.C. mains and 12 v. battery operation. Guaranteed perfect. £13.10.0. Carr. 30/-.

PCR COMMUNICATIONS RECEIVER

Type PCR. Has self-contained speaker. Covers 850-2000, 200-650 and 10-50 metres.

AS NEW CONDITION.....£20.18.6

Type PCR-2. Requires external speaker. Covers 850-2000, 200-500 and 13-50 metres.

USED (Good condition).....£5.18.6

Carriage (any type) 10/6. Full details S.A.E. Any model fitted with **BRAND NEW INTERNAL POWER SUPPLY**, guaranteed ready for use on A.C. mains, £2 extra.

Moving Coil Phones. Finest quality Canadian, with Chamols ear muffs and leather-covered headband. With lead and jack plug. Noise excluding, supremely comfortable, 19/6, post 1/6.

We now stock **The Pocket 4**, a neat little job which can be made for 42/6. (Printed Circuit Version 52/6). and **The Good Companion** (a super job equal to the best). Easily constructed for only 29.18.6. Gladly demonstrated to callers.

CHARLES BRITAIN (RADIO) LTD.

11 Upper Saint Martins Lane, London, W.C.2

Temple Bar 0645.

Shop Hours 9-6 p.m. (9-1 p.m. Thursday)
 Open all day Saturday.

REGUN TUBES



21 in. ... 99/6

17 in. ... 90/-

15, 14, 12 in. 70/-

Terms available.
 Guaranteed ONE YEAR.

Ins., Carr., 12/6.

Add £1, refundable on receipt of your OLD tube.



Guaranteed VALVES Salvage

1/9d. Each
 6F1, 6L1, 6P25, 6P28, B36, EB41, EL52, KT33C, KTW61, N142, U22, U24, U31, U35, W76, W77.

2/9d. Each
 6L18, 7C6, 10F1, 10P13, 20D1, 20P3, ECL80, EF80, EF92, EY61, KT78, N146, LN122, PL33.

5/9d. Each
 6P6, 6V8, 16A8, 16A6, 17Z3, 1973, 20F2, 20L1, 20P1, 21A6, ECC82, EL33, EL42, KT63, N162, N163, N154, N309, N339, PL38, PL81, PL82, PL83, PEN46, PY80, PY81, PY82, PZ30, U153, U184, U251, U919, U929.

Postage
 1-7d. 8-1/6. 12-2/6.

DUKE & CO (London) Ltd

621/3 ROMFORD RD.
 MANOR PARK, E.12

ILFord 6001/3
 Stamp for FREE list.

COMPLETE TELEVISIONS

14 INCH ... £7.10.0
 17 INCH ... £11.10.0

- ★ Guaranteed 12 months.
 - ★ Ex Rental, and repossessed televisions.
 - ★ Any two selected channels (or more, extra).
 - ★ H.P. Terms—London area.
 - ★ Demonstrations daily.
 - ★ Legs—39/6, per set.
 - ★ Part exchange allowance on Radios, TV's, etc.
- Personal collection advised, special delivery by arrangement, B.R.S. (Ins., Carr., 30/-).

LOOK!

TRANSISTORS FROM 1/6 EACH

GREEN SPOT A.F. TRANSISTORS 3 volt type. Only 1/6.

YELLOW SPOT A.F. 6 volt 2/- each.

RED SPOT down to 2/6 each.

WHITE SPOTS down to 2/6 each.

YELLOW/GREEN now only 3/- each.

RED/YELLOW R.F. type 4/6 each.

MINIATURE DIODES 3 for 2/-, 7/- doz.

MULLARD TRANSISTORS

OC44 9/3, OC45 9/-, OC171 10/6, OC170 9/6, AF114 11/-, AF115 10/6, AF116 10/-, AF117 9/6, OC71 6/6, OC78 8/-, OC72 8/-.
 Matched pairs OC72 or OC81 16/- pair.
DIODES OA70, OA79, OA81, OA90, OA95 all 3/- each.

TRANSISTOR TRANSFORMERS by REPANCO. Interstage Type TT49 4.5 : 1 5/-, Driver Type TT45, 5/- each, Output Type TT46, 5/- each.

TRANSISTOR HOLDERS 1/- each.
J. B. DILECON CONDENSERS. .0001, .0002, .0003 or .0005 all 4/9 each.

REACTION CONDENSERS. .0001 3/-, .0003 3/9, .0005 4/-.

DRXI Crystal Set Coils 2/6.

Repanco DRR2 Coils 4/-.

ALL SENT POST FREE IN U.K. by

PETHERICK'S RADIO SUPPLIES

22 High Street, Bideford, N. Devon
 Tel.: Bideford 1217

S.A.E. WITH ALL INQUIRIES PLEASE

THE AMATEUR RADIO HANDBOOK 1962

by R. S. G. B., new edition, 34/-, postage 2/6.
 The Radio Handbook by Editors and Engineers, 88/-, postage 2/6.
 Single Channel Radio Control, by Waring, 3/6, postage 6d.
 The Cabinet Handbook, new edition by Briggs, 7/6, postage 1/-.
 The Radio Amateur Examination Manual by R.S.G.B., 5/-, postage 6d.
 Amateur Radio Call Book 1962 by R.S.G.B., 4/6, postage 6d.
 World Radio Handbook by Johansen, 15/6, postage 1/-.
 Servicing Transistor Receivers, a new edition by Pettit, 7/6, postage 8d.
 Radio and Electronic Laboratory Handbook by Scroggie, 55/-, postage 2/-.
 The Home Electrician, a new edition by Camm, 12/6, postage 6d.

UNIVERSAL BOOK CO.

12 Little Newport Street, London, W.C.2
 (adjoining Lisle Street)

What about that 12 w.p.m.

Morse Code Test?

You can only reach the goal by keen listening and constant practice with a Morse Key.

The CANDLER System

will help you as it has helped thousands of others over many years, and give you a sound basis.
 Send 3d. stamp for details of our Special Course for Amateur Transmitting Licence.

The CANDLER System Co.

Dept. PW, 52b ABINGDON ROAD,
 LONDON, W.8.

Candler System Co., Denver,
 Colorado, U.S.A.

H.A.C. SHORT-WAVE EQUIPMENT

AND

SHORT-WAVE KITS

Famous for over 25 years for...
 S.W. Receivers and Kits of Quality.

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, Hams, etc.

Improved designs with Denco coils:
 One-valve Kit, Model "C", Price 25/-
 Two-valve Kit, Model "E", Price 50/-
 New Addition: Model "K"
 Super sensitive "All Dry" Receiver.
 Special inc. price. Complete Kit, 77/-.

All kits complete with all components, accessories and full instructions. Before ordering call and inspect a demonstration receiver, or send for descriptive catalogue and order form.

POST THIS COUPON NOW!

"H.A.C." SHORT-WAVE PRODUCTS

(Dept. TH), 44 Old Bond Street,
 London W.1

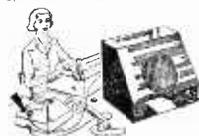
Please send me FREE and without obligation your 1962 literature.

NAME.....

ADDRESS.....

ALL-TRANSISTOR TIME SAVER
OFFICE OR HOME TELEPHONE PICK-UP AMPLIFIER

★ No more "holding on" wasting time waiting for your call to come through. When it does the amplifier can be switched off if required. No connections, just press the pick-up coil to back of phone as below. Fully Guaranteed. Housed in attractive Gold Finish Cabinet.



BUILT, TESTED, READY TO USE

£5.10.0
P.P. 2/6.

TRANSISTOR BABY-ALARM
 Very sensitive, **£5.10.0** P.P. 2/6.



MODEL TH-L33

2,000 ohms per volt AC/DC. Size 5" x 3½" x 1¼".
79/6
P.P. 1/6.

with test leads, battery and instructions.

0/10/50/250/500/1000 volts D.C.,
 0/10/50/250/500/1000 volts A.C.,
 0/500µA/10/250mA, D.C.

3 ranges resistance 0/10K/100K/1 Meg. Capacity and db ranges.

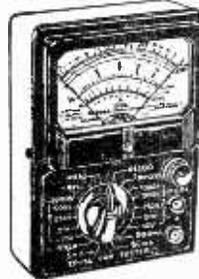


MODEL 500

30,000 ohms per volt multi-meter

£8.19.6
P.P. 2/-. Fully Guaranteed

8 Ranges D.C. volts to 1 kV.
 7 Ranges A.C. volts to 1 kV.
 5 Ranges D.C. current to 12 amps.
 3 Range resistance to 60 meg.
 Short circuit, Buzz test. Output meter, dB, etc., etc. Size 6½" x 4½" x 2¼". With Leads, Batteries and Instructions.



MODEL TP55
 A.C./D.C. voltage up to 1,000 in 5 ranges. D.C. current 4 ranges up to 500mA. 4 range resistance to 10 megs. Capacity, dB scales, etc. 20,000 ohms/volt Fully Guaranteed **£5.19.6** P.P. 1/6. With Test Leads, Battery

and Instructions. Size 5½" x 3½" x 1½"

1. 4-Transistor 2-way Intercomm. 2-way buzzing, 2-speakers, ready to use, 8 gns. P.P. 2/6.
2. Miniature 15 watt Solder Iron, ½ bit. Ideal for all printed circuit work, 29/6, P.P. 1/6.
3. New Model Control Book with 60 pages of transistor circuits, 7/6, P.P. 6d.
4. Complete Set of Meter Leads with Prods. Clips etc. with pouch, 8/6, P.P. 1/-.
5. Telephone Recording Coil to record conversations. For all amplifiers and recorders, 14/-, P.P. 9d.
6. Printed Circuit Kit, to etch your own circuits. Complete with boards and details, 19/6, P.P. 1/-.
7. Miniature 850 ohm Record/Playback Head, with mounting block, 12/6, P.P. 9d.
8. 4,000 ohm lightweight Headphones with leads. Very sensitive, 12/6, P.P. 1/-.
9. Transistor Pocket RF, IF Generator for Radio, TV etc. Fault finding, 52/6, P.P. 1/-.
10. 8-Range All Transistor Signal Generator, 200 kc/s to 220 mc/s: RF, AF, IF, HF, etc., £7.10.0, P.P. 3/6.
11. GS12C (Dekatron) Bi-directional 12 way indicator tube. Brand new, 25/-.
12. 4½-9 volt Tape Recorder Motor, governed. 12/6, P.P. 1/-.
13. 30 watt Pocket Solder Iron, with pocket pouch and mains plug, 18/6, P.P. 1/-.
14. 931A Photo Multiplier. Brand new, 60/-.
15. 1 Kc/s Transistor Audio Test osc., variable output, 39/6, P.P. 1/6.
16. Crystal Contact Microphone. Very sensitive. Ideal for Guitar, 12/6, P.P. 9d.
17. Practical Transistor Circuits. 40 circuits to build, 3/6.
18. Personal Earphones with leads, Jack plug and socket, 600 ohm, 10/6; 1000 ohm 12/6; Crystal 9/6; 8/10 ohm 9/6.
19. W/W Erase Head, FE7, 7/6, P.P. 6d.
20. Dynamic Microphone, 49/6, P.P. 1/6.
21. Extension Speaker Unit. Plugs into phone socket of most portables. Gives big set volume. Ideal for car use, 57/6, P.P. 1/6.

<p>Miniature Panel Meters 0/50µA (DC) 39/6 0/500µA (DC) 32/6 0/1mA (DC) 27/6 0/5mA (DC) 27/6 0/300 volts (DC) 27/6</p>	<p>Components We stock the largest range of miniature components in the country. Send 1/- stamp for new catalogues.</p>
<p>Brand New Boxed</p>	

22. 7-Section Telescopic Aerial, 12/6.
23. LA1 Ferrite Pot Core, 12/6, P.P. 6d.
24. FX1011 Miniature Ferrite Pot Core, 7/6, P.P. 6d.
25. Miniature Jack and Socket, 3/6, P.P. 6d.
26. No. 19 Set Crystal Calibrator with Handbook, 79/6, P.P. 2/-.
 27. New 2-way Intercomm with 2-way calling. Supplied with cable, battery, etc. Housed in moulded cabinets. 89/6, P.P. 2/-.
28. 9 volt 80 mA battery eliminator kit for larger portables, 35/-, P.P. 1/6.
29. Transistor Pocket Radio with speaker output. Complete in moulded cabinet with battery, earphone, carry case telescopic aerial etc., 99/6, P.P. 1/6.

LATEST ILLUSTRATED CATALOGUES NOW AVAILABLE 1/-.

Henry's Radio Ltd

PADDington 1008/9

5 HARROW ROAD, LONDON W2

Open Monday to Sat. 9-6, Thurs. 1 o'clock
TRADE SUPPLIED

PLEASE TURN TO BACK PAGE

TRANSISTOR PORTABLE TAPE RECORDER

FOR OFFICE, HOME OR TRAVEL
 ● Play/record up to 30 mins. ● Built-in speaker, volume control, batteries and play/record/rewind. ● Quality reproduction. ● Sturdy case 6 x 8½ x 2½ in.
£10.10.0
 P.P. 3/6.



Fully guaranteed

Supplied complete with microphone, tape, batteries and personal phone. (For monitoring), and full instructions. Built and tested.



CRYSTAL LAPEL MICROPHONE
 Ideal for portable tape recording, etc. 15/- P.P. 1/-.



4000 Ohm Headphones
 Lightweight very sensitive. 12/6. P.P. 1/-.

3/4 WATT 4 TRANSISTOR AMPLIFIER



● 1 watt peak output.

±3db 70c/s to 12 kc/s.

Output to 3 ohm speaker

9 volt operated.

Details on request.

Built and Tested **69/6 OR 62/6**
 P.P. 1/6 P.P. 1/6

A printed circuit high gain amplifier size 4 x 2½ x ¾ in. using Mullard OC71/OC81D and 2-OC81 Transistors. Ideal for Intercomm., Record Player, Tuner Amplifier or any application requiring a quality and reliable amplifier.



BATTERY RECORD PLAYER

● 6-7½ volt Garrard turntable with crystal pick-up. Plays 45 r.p.m. Ideal for above amplifier.

● 65/- P.P. 1/6.
 ● Suitable cabinet for amplifier and player 22/6.

BATTERY ELIMINATOR AND CHARGER

Replaces PP3 or T6003 9 volt batteries to run transistor radios from mains. Also charges to give 5 times normal battery life. Fitted neon indicator and supplied with full details. 29/6. P.P. 1/6.

TRANSISTORS

We can supply from stock 1st grade transistors, diodes, rectifiers. Silicon or Germanium. Matched sets at special reduced prices. Complete list on request.

Practical Wireless

BLUEPRINT

SERVICE

ALL OF these blueprints are drawn full-size and although the issues containing descriptions of these sets are now out of print, constructional details are available free with each blueprint except for the PW Monophonic Electronic Organ and the PW Roadfarer.

The Index letters which precede the Blueprint Number indicate the periodical in which the description appeared. Thus PW refers to PRACTICAL WIRELESS; AW to *Amateur Wireless* and WM to *Wireless Magazine*.

Send (preferably) a postal order to cover the cost of the Blueprint (stamps over 6d. unacceptable) to

PRACTICAL WIRELESS, Blueprint Dept., George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2.

SPECIAL NOTE

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.

Title	Number	Price	Title	Number	Price
CRYSTAL SETS					
Junior Crystal Set	PW94	2/-	A.C. Fury Four	PW20	2/6
Dual-wave Crystal Diode	PW95	2/6	Experimenter's Short Wave	PW30a	2/6
STRAIGHT SETS					
Battery Operated					
Modern One-valver	PW96	2/6	Midget Short Wave Two	PW38a	2/6
All-dry Three	PW97	3/6	Band-Spread Three (Battery)	PW68	2/6
Modern Two-valver	PW98	3/6	Crystal Receiver	PW71	2/-
SUPERHETS					
A.C. Band-pass Three	PW99	4/-	Signet Two (Battery)	PW76	2/6
A.C. Coronet-4	PW100	4/-	Simple S.W. One-valver	PW88	2/6
A.C./D.C. Coronet	PW101	4/-	Pyramid One-valver	PW93	2/6
The PW Pocket Superhet	—	5/-	<hr/>		
MISCELLANEOUS					
The PW 3-speed Autogram	—	8/-	BBC Special One-valver	AW387	2/6
The PW Monophonic Electronic Organ	—	8/-	A One-Valver for America	AW429	2/6
<i>(No constructional details are available with this blueprint)</i>			Short-Wave World Beater	AW436	3/6
The PW Roadfarer	—	5/-	<hr/>		
<i>(No constructional details are available with this blueprint)</i>			QUERY COUPON		
This coupon is available until 7th August, 1962, and must accompany all queries in accordance with the notice on our "Letters to the Editor" page.					
PRACTICAL WIRELESS, AUGUST, 1962					
<hr/>					
TELEVISION					
The PT Band III converter	—	1/6	Standard Four Valve S.W. WM383 3/6		
			Enthusiast's Power Amplifier WM387 3/6		
			Standard Four Valve WM391 3/6		
			Listener's 5-Watt Amplifier WM392 3/6		

Published on the 7th of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, London, W.C.2, and printed in England by WATMOUGHS LIMITED, Idle, Bradford; and London. Sole Agents for Australia and New Zealand: GORDON & GOTCH (A/sia), Ltd., South Africa and Rhodesia; CENTRAL NEWS AGENCY, LTD. East Africa; EAST AFRICAN STANDARD LTD. Subscription rate including postage for one year: Inland £1.9.0. Abroad £1.7.6 (Canada £1.5.0.). Registered at the General Post Office for the Canadian Magazine Post.

Redesigned 'Contessa' Mk. III

★ combined portable and car radio ★

- NOW WITH 600 mW MELLOWTONE OUTPUT ON MEDIUM AND LONG WAVES.
- NOW FITTED HORIZONTAL TUNING SCALE WITH ALL STATIONS CLEARLY MARKED.
- NOW SUPPLIED WITH SIX MULLARD TRANSISTORS AND TWO DIODES
- NOW FITTED RECORDING SOCKET AND CAR AERIAL SOCKET
- NOW SUPPLIED WITH TWO-TONE BEIGE OR TWO-TONE BLUE CABINET WITH GOLD FITTINGS.

GUARANTEED THE VERY BEST OBTAINABLE

- All parts sold separately ●

TOTAL COST
£10.19.6 P.P. 3/6.



OVERALL SIZE
10½ x 7½ x 3½ in.

- Detailed Leaflet on Request ●

The New "CONTESSA" 6 Transistor Portable Superhet Radio features simple printed circuit construction and fully illustrated building instructions, with all parts clearly marked and identified. Fitted with 8 inch Ferrite Aerial. Double IFT's and the latest in components and design. Full tuning of both Medium and Long Wave Bands with unbeatable Selectivity and Sensitivity. Clearly marked station dial and room filling "MELLOWTONE" push-pull output are standard features. FULL AFTER SALES SERVICE AND GUARANTEE.

★ ALL THESE EXTRA FEATURES AT NO EXTRA COST ★

"QUINET" MEDIUM AND LONG WAVE POCKET RADIO

PUSH-PULL SPEAKER OUTPUT

Size
5½ x 3 x 1½ in.
Red or Blue
with Gold
trim



Total Cost
£5.10.0 P.P. 2/-

A Five Transistor and Diode medium and long wave printed circuit loudspeaker radio. Features Mullard transistors and plainly marked printed circuit with carded components. Excellent results with full station separation guaranteed. Including Radio Luxembourg. Push-pull output up to 200 mW. Fitted 'Phone/Record socket and Car aerial socket. Full after sales service and guarantee.

"TRANSFIVE" PORTABLE RADIO

Medium and Long Wave Portable
8½ x 6½ x 3½ in.



£6.19.6

P.P. 2/6.

A simple to build 5-Transistor and Diode, Printed Circuit, Medium and Long Wave Portable. Features 5in. speaker. Car aerial socket, Mullard transistors and carded components. Building plans free on request. THE IDEAL PORTABLE. Full after sales service and guarantee.

"CAPRI" POCKET SIX. 6-TRANSISTOR MEDIUM AND LONG WAVE POCKET SUPERHET RADIO.

● SIZE 4½ x 2½ x 1½ in. REALLY POCKET SIZE. ●

The most compact 6-transistor and diode radio with speaker available to the home constructor. Features the latest in miniature components and circuitry. Supplied with Mullard transistors and two-tone moulded cabinets in red/white or Blue/white with gold fittings. All components are supplied in packets and clearly identified. A printed circuit is used with fully illustrated building instructions. Push-pull output coupled with a sensitive and selective circuit make the "CAPRI" hard to beat. Fitted Earphone/Record socket



- FULL AFTER SALES SERVICE AND GUARANTEE
- ALL PARTS SOLD SEPARATELY—DETAILED LEAFLET ON REQUEST

★ DESIGNED BY EXPERTS FOR THE HOME CONSTRUCTOR ★

TOTAL COST £7.10.0 P.P. 2/- (Battery 2/6).

"RANGER 3"

Size 4½ x 3 x 1½ in.



69/6 P.P. 1/6.

A Three Transistor Two Diode Personal Radio for Medium Waves and Amateur top band and shipping. Quality output on personal phone. Fitted air spaced tuner, vol. control. No aerial or earth. Luxembourg guaranteed.

"CARVERTER"

MOBILE TRANSISTOR SHORT WAVE CONVERTER.

As featured in the May Edition of Radio Constructor. Just plugs into the aerial socket of your car radio. Crystal controlled—covers amateur and short wave broadcast bands from 5 to 16 Mc/s.

Total cost with sprayed cabinet etc.

69/6 P.P. 2/-

Supplied complete with long life battery and 39/40 metre band crystal. Send 1/- stamp for full Booklet. No modifications to car radio at all.

"PW-6" SUPERHET RADIO

Medium and Long Wave Radio

Size
5½ x 3½ x 2 in.



£8.10.0 P.P. 2/-

Modified version of previously advertised "PW" Superhet. Now with new style Two Tone Cabinet. 1st grade components and transistors. Printed circuit. Features matched set of 6-Transistors. New 2½ inch quality speaker and new illustrated building instructions.

PW Troubadour.
PW Mercury.
PW Regency.
PW Minnette.
PW Mini-amp.
PW Citizen.
PW Superhet.
PW Shortwave. 2
PW Feeder unit.

All parts in stock for ALL PW Designs. Parts Lists on Request.

And the latest PW Designs.

Henry's Radio Ltd

PAddington 1008/9
5 HARROW ROAD, LONDON W2

Open Monday to Sat. 9-6 Thurs. 1 o'clock

Send 1/- Stamp for Latest Illustrated Price Lists.

← PLEASE TURN PAGE