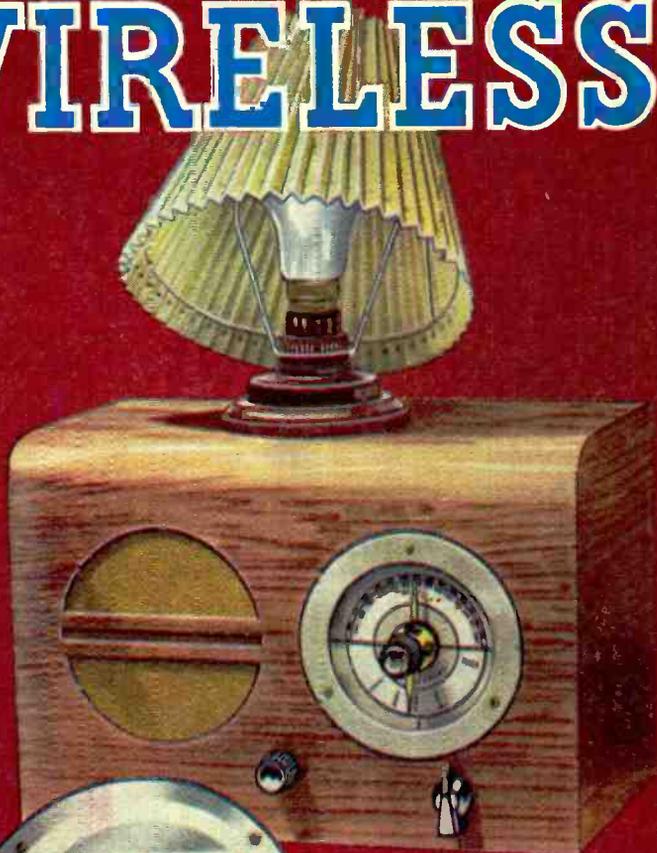


# PRACTICAL <sup>1/6</sup> WIRELESS

JANUARY  
1961

COMBINED  
RADIO  
AND  
TABLE  
LAMP



## contents

REFLEXING TRANSISTORS  
TRANSCRIPTION  
RECORD PLAYER  
CIRCUITS FOR ACORN VALVES  
USING PORTABLES  
IN THE CAR  
S.W. LISTENERS LOG  
ETC., ETC., ETC.

**NEW! TRANSISTOR RADIOS**



With **MINIATURE SPEAKER**. Simple instructions enable anyone to build this miniature radio. Gives reception over the entire broadcast band. Each kit is supplied with all latest miniature parts including

- ★ two transistors
- ★ ferrite pod
- ★ speaker
- ★ coloured plastic case
- ★ step by step illustrated instructions. Size 4 x 3 x 1/2 in.

P. & P. 1/6.  
Battery 1/4- extra.

ONLY **27/6**

**MINIATURE EARPHONES**



CR-5 High imp. ... 12/6 Post  
MR-4 Low imp. ... 10/6 1/-

**WALKI/TALKI INTERCOM**



Boys! They're terrific! Two coloured hand terrific units. Fits neatly into palm of your hand. No batteries or soldering required, simply connect twin wire between the two units, and talk into microphone or listen on one and listen to speaker or talk on the other. Ideal for intercom from house to house, room to room, tent to tent, etc., operates anywhere even up to 200 yards.

Complete with 25 ft. of wire.  
ONLY **17/6** per Set. P. & P. 1/-



**POCKET VOLT TEST METER**  
Two D.C. ranges: 0-250 v. and 0-25 v. Complete with test prods. and leather case. Very limited quantity. Only 12/6. P. & P. 1/6.

**MICROPHONES. BRAND NEW.** Throat magnetic 4/6; Throat carbon 3/6; No. 8 carbon with switch 6/8; No. 7 moving coil 7/6. Tannoy power mikes only 5/-. Crystal mike 22/6.

**HI-FI HEADPHONES**

These miniature HI-FI phones use high quality permanent magnetic speakers with regulated voice coil. The soft rubber ear moulds give correct spacing for optimum acoustic load. Each unit has a built-in miniature HI-FI transformer to ensure the finest music and voice reproduction. Supplied free is a small transformer unit which steps impedance up to 2000 ohms. Only 15/-. P. & P. 2/6.

**HOOVER ROTARY TRANSFORMERS**

12 v. input. 500 v. output at 65 mA. or 6 v. input. 250 output at 75 mA.  
Only **10/6** EACH P. & P. 2/-

**COMPLETE HEADPHONE & MICROPHONE ASSEMBLY.**

A must for every constructor and "Ham", consists of moving coil padded headphones and "press to talk" microphone. 10/-. P. & P. 3/6.



**OSCILLOSCOPE MODEL 74**

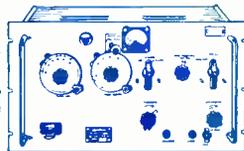
This basic scope represents one of the finest buys we have ever made! Contains Brilliance, Focus, Gain and 2 speed time base controls. Separate X plate terminals. Signal Generator modulated at 2 frequencies over 150-255 Mc/s. Complete with 12 valves, VCR 139A tube, internal A.C. power pack, and complete circuit and technical details.

ONLY **97/6** Carr. 12/6.

**VHF RECEIVER 1392**

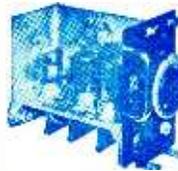
15 valve superhet covering 95-150 Mc/s which includes police, aircraft and amateur bands. Complete with slow motion tuning, tuning meter, circuit diagram, etc. Here is your opportunity to explore the VHF bands on a really sensitive receiver offered at a fraction of original cost.

ONLY **£6.5.0** Carr. 15/-



**R.F. CONVERTORS**

Undoubtedly the most useful Govt. surplus units ever released. The R.F. units will extend the frequency range of your receiver to enable you to receive amateur, TV and V.H.F. stations.  
R.F.24. 20-30 Mc/s. switched tuning 22/6.  
R.F.25. 40-50 Mc/s. switched tuning 8/6.  
R.F.37. 65-85 Mc/s. variable tuning 29/6.  
Circuits supplied. P. & P. 3/6 on ea.



**COMMUNICATION RECEIVER AR-8SD**  
340 kc/s—32 Mc/s

Universally recognised as the finest communication receiver ever produced for Amateur, Military and Laboratory use. Now our exclusive purchase enables you to obtain this "Rolls Royce" of Receivers at the lowest price ever! Supplied complete and ready for immediate use.

ONLY **£39.10.0** Carr. 50/-

**CONTROL BOX - B.C. 602.**

Complete push-button control box. 4 position and on/off with dual coloured indicators for instant channel check. In black crackle case 5 1/2 in. x 3 1/2 in. x 1 1/2 in. Bargain price 5/- each. P. & P. 1/6. Two for 8/-. P. & P. 2/6.



**VARIABLE TRANSFORMERS**

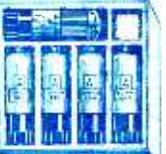
Input voltage 250 v. continuously variable output from 0-260 v. Supplied complete. Model B5 Current rating 5 amps. £9. Model B10 Current rating 10 amps. £13.5.0 Model B20 Current rating 20 amps. £32.10.0 ALL FULLY GUARANTEED.



**SPARE VALVE KIT**

Here's a gift for all 38 and 18 Set owners! Case containing 4 ARP.2 & 1 ATP.4 valves. Only 10/- P. & P. 2/6.

**A.C. CUMULATORS.** 2 volts 18 A.H. (unspillable). Ideal for 6 and 12 volts supply, etc Brand new. Original cartons. Size 4 1/2 in. x 2 1/2 in. 5/6 each. P. & P. 1/6, 3 for 15/-. P. & P. 3/6, 6 for 27/6. P. & P. 5/-.



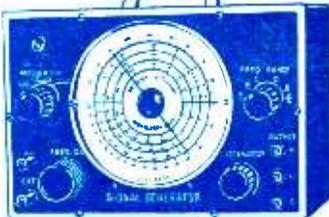
**WIDE RANGE SIGNAL GENERATOR**

MODEL SWO-300 150 kc/s—300 Mc/s

**Specification:**

- Frequency Range: 150 kc/s-150 Mc/s on fundamentals (6 bands). 150 Mc/s-300 Mc/s on harmonics.
- Calibration Accuracy: within ± 1 per cent.
- Modulation: Internal and external.
- Attenuation: To -40db.
- Output: Facilities for high and low.
- Power Supply: Internal 230 v. A.C.
- Size 7 x 10 x 5 in.

ONLY **£14.19.6**  
Carriage 5/6  
FULLY GUARANTEED



Callers: 87 TOTTENHAM COURT ROAD, LONDON, W.1  
Mail Orders: (DEPT. P), 32a COPTIC STREET, LONDON, W.C.1  
Telephone: MUSEum 9607

Tel: Mitcham 6201  
Open Daily to Callers



All Valves Brand New  
and Fully Guaranteed

211 STREATHAM ROAD, MITCHAM, SURREY

Special 24 Hour Express Mail Order Service

OZ4	5/9	6CH6	12/-	10C2	27/10	32	13/6	CCH35	21/-	ECL83	12/6	H23DD		PCL82	11/6	U251	17/6
1A5	6/-	6ESGT	10/-	10F1	26/2	35A5	18/6	CL4	12/6	EF9	21/-	HL41	10/6	PCL83	12/6	U281	20/-
1A7	14/6	6F1	15/6	10F3	17/6	35L6GT	10/6	CL33	18/6	EF22	17/6	HL41	12/6	PENA4	17/6	U282	22/6
1D5	14/-	6F6	6/9	10F9	12/6	35W4	8/-	CY1	15/9	EF36	7/6	HL41DD		PENB4	17/6	U301	22/6
1D6	10/-	6F7	15/-	10LD3	12/6	35Z3	10/-	CY31	15/9	EF37	8/6			PEN4DD		U329	17/6
1H5	10/6	6F12	4/9	10LD11	15/-	35Z4	7/6	D41	12/6	EF37A	8/6	HL42DD				U339	19/6
1L4	6/-	6F13	17/6	10P13	21/-	35Z5	9/6	D42	12/6	EF39	4/-			PL33	18/6	U403	11/6
1LNS	5/6	6F14	17/6	10P14	20/-	40SUA	15/-	D63	3/6	EF40	15/-	HY90	13/6	PL38	23/9	U404	10/6
1NS	10/6	6F15	14/9	11D3	17/6	41STH	23/6	D77	5/6	EF41	9/3	IW4/350	10/-	PL81	14/9	U801	29/6
1RS	9/-	6F17	12/-	11D5	17/6	43	15/-	D152	6/-	EF42	10/6	IW4/500	10/-	PL82	8/-	U4020	15/6
1S4	8/6	6F33	5/6	12A6	6/6	50C5	15/-	DAC32	10/6	EF50(E)	3/6	KBC32	9/6	PL83	10/6	UABC80	8/6
1SS	9/-	6H6	2/6	12AH8	10/-	50C6	15/-	DF91	7/6	EF50(A)	4/-	KF35	8/6	PLB20	21/-	UAF42	9/6
1T4	4/-	6J6	7/6	12AT7	8/-	50C6G		DF33	10/6	EF80	6/-	KL32	10/6	PM2A	12/6	UB41	9/6
1U5	10/-	6J7GT	9/6	12AU7	9/-	501GGT	21/-	DF92	7/6	L185	6/6	KLL32	11/6	PM2HL	14/-	UBF41	9/6
2D21	8/6	6K7G	3/-	12AX7	9/6	61RT	17/6	DF96	9/6	EF86	11/-	KL35	9/6	PM22A	13/6	UBF80	9/6
2X2	5/-	6K7GT	10/6	12BA6	9/-	61SPT	17/6	DF97	9/6	EF89	10/-	KT2	10/6	PM24M	21/6	UBF89	9/6
3A5	12/6	6K8GT	12/6	12B8E	9/6	62BT	17/6	DF99	4/9	EF91	4/9	KT32	10/6	PM202	16/6	UC85	10/6
3D6	14/6	6K25	19/6	12E1	17/6	75	12/6	DH76	7/6	EF92	5/6	KT33C	10/6	PY31	16/6	UCH42	9/6
3Q4	8/-	6L1	15/6	12I7GT	9/6	77	12/6	DH77	8/3	EF93	5/6	KT36	28/6	PY32	15/6	UCH81	9/6
3Q5	10/6	6L6	7/6	12K7GT	8/6	78	12/6	DH107	13/6	EF95	15/-	KT41	22/6	PY80	8/-	UC182	12/6
3S4	8/-	6L18	12/6	12K8GT	12/6	80	10/-	DH179	7/6	FL31	12/6	KT44	13/6	PY81	7/6	UC183	13/6
3V4	9/-	6L19	21/6	12Q7GT	8/6	85A	12/6	DK91	9/-	FL32	5/6	KT55	22/6	PY82	8/-	UF41	9/6
5R4GT	9/-	6L34	10/-	12SA7	8/-	150B2	12/6	DK92	9/6	EL33	12/6	KT63	8/6	PZ30	18/6	UF80	9/6
5U4G	9/-	6/30L2	10/-	12SC7	8/-	150B3	15/-	DK96	10/6	EL35	12/6	KT66	17/6	QP25	14/6	UF85	9/6
5Y4	8/-	6LD3	9/6	12SG7	8/6	185BT	32/-	DL33	9/-	EL37	18/6	KT71	9/-	QP210	17/6	UF89	8/6
5Y3GT	8/6	6LD20	15/6	12SH7	4/-	303	7/6	DL35	12/6	EL38	23/9	KT74	12/6	QP121	12/6	UL41	8/6
5Z3	10/-	6N7GT	7/6	12SJ7	4/-	304	7/6	DL92	8/6	EL41	10/6	KT76	12/6	R10	21/-	UL44	24/6
5Z4G	10/-	6M1	10/6	12SK7	8/-	305	7/6	DL94	9/-	EL42	10/6	KT101	25/-	R19	19/6	UL46	21/6
6A7	18/6	6M2	10/6	12SQ7	11/6	328	7/6	DL96	9/6	EL84	7/-	KTW62	7/6	SD6	8/6	UL84	9/6
6A8	10/-	6P1	17/6	12SN7	17/6	329	7/6	EAS0	2/-	EL85	10/6	KTW63	7/6	SP4	14/6	U06	20/11
6A8B	9/-	6P25	19/6	12Z3	15/-	807	7/6	EABC80	7/6	EL90	8/6	KTZ41	8/-	SP41	3/6	U07	15/6
6A18	9/6	6P28	26/-	13D3	12/6	955	4/-	EAC91	7/6	EL91	5/-	KTZ63	10/6	SP42	12/6	U08	26/6
6AK5	8/6	6Q7GT	10/6	14H7	12/6	5763	17/6	EAF42	10/-	EM80	10/-	L63	4/9	SP61	3/6	UY21	15/6
6AK8	7/6	6SA7GT	7/6	14R7	12/6	9002	7/6	EB41	7/6	EM81	10/-	LN309	15/9	T41	22/6	UY41	7/6
6ALS	6/-	6SG7	10/6	14S7	21/-	9003	7/6	EB81	5/-	EM81	10/-	LZ319	12/6	TDD4	17/6	UY85	7/6
6AMS	5/-	6SH7	6/6	15A2	17/6	AC4/PEN		EBC33	4/-	EY81	10/6	MH4	8/6	TDD13C		VP28	17/6
6AM6	4/-	6S17	5/6	15D2	23/9	AC5/PEN		EBC41	9/6	EY84	10/6	MHD4	17/6	TH41	23/9	VP17	17/6
6AN5	7/6	6SK7	7/6	19AQ5	10/6	AC6	21/6	EBF80	9/6	EY86	9/6	MHL	10/-	TP22	17/6	W76	7/6
6AQ5	8/3	6SL7GT	6/6	19BGG6		ACTP	32/-	EBF89	9/6	EY91	9/6	MKT4 (S/7)		TP35	17/6	W77	5/6
6AQ8	9/3	6SN7GT	5/6			ACHL	12/6	EBL21	22/-	EZ35	7/6			TP15	17/6	W78	5/6
6AT6	8/3	6U4GT	11/6	20D1	24/6	AC2/PEN		EBL31	21/6	EZ40	7/6	MS48	17/6	U14	15/9	W81	6/-
6BA6	10/-	6U5	7/6	20D2	23/-	ACTH1	34/9	EC90	9/6	EZ41	7/6	MSP4	17/6	U16	10/-	W142	9/6
6B7	10/-	6U7	7/6	20F2	26/6	ACVP1	17/6	EC91	9/6	EZ80	7/6	MU14	9/6	UB18/20	10/-	W719	7/6
6B8	4/-	6V6G	5/-	20L1	26/6	ACV2	17/6	EC92	10/-	EZ81	7/6	MX40	17/6	U22	10/6	W727	7/6
6BA6	7/6	6V6GT	8/-	20P1	26/-	ACV1	17/6	ECC32	10/-	EZ90	7/6	N18	8/-	U24	29/6	X18	11/6
6BE6	7/6	6X4	5/-	20P3	23/-	ACVP2	17/6	ECC33	5/-	FC2	21/-	N19	8/-	U25	14/6	X61M	21/9
6BG6G	21/6	6X5GT	5/-	20P5	22/6	AC2/PEN	21/-	ECC34	15/-	FC13	17/6	N37	18/6	U26	12/6	X65	23/9
6B96	7/6	7B7	8/-	25L6GT	9/6			ECC35	8/-	FC13C	21/-	N78	17/6	U31	9/6	X66	21/6
6BR7	15/-	7C5	8/-	25Y5	10/-	AC2/		ECC40	21/-	FW4,500		N108	18/6	U33	21/-	X78	21/6
6BW6	8/6	7C6	8/-	25Z4	9/6	PENDD21/-		ECC81	8/-	FW4,800	10/-	N142	9/6	U35	21/-	X79	21/6
6BW7	6/6	7D5	15/-	25Z5	9/6	AZ1	15/6	ECC82	9/6			N147	18/6	U37	25/-	Y61	10/6
6BX6	6/6	7D6	15/-	25Z6	10/6	AZ31	15/6	ECC83	9/6	GZ30	10/6	N150	10/6	U45	21/-	Y63	9/6
6BY7	7/6	7D8	15/-	27SU	17/6	AZ31	15/6	ECC84	9/6	GZ32	11/6	N153	11/6	U47	21/-	Z21	12/6
6C4	6/6	7H7	8/-	30	13/6	B36	21/-	ECC85	9/6	GZ34	13/6	N309	11/6	U50	8/6	Z63	7/6
6CSGT	8/-	7K7	10/6	30C1	21/6	B65	8/6	ECC91	5/6	N329	10/6	N329	10/6	U52	7/6	Z66	19/6
6C6G	6/6	7Q7	11/6	30F5	11/6	B152	8/6	ECF80	12/6	N727	7/6	N729	8/6	U76	7/6	Z77	4/9
6C9	12/6	7R7	12/-	30FL1	10/6	B309	9/6	ECF82	12/6	H63	9/6	H63	9/6	U78	7/6	Z152	8/6
6C10	12/6	7S7	10/6	30L1	11/6	B329	9/6	ECH21	22/-	HBC90	9/6	P2	10/6	U142	8/-	Z719	7/6
6CD6G	27/6	7Y4	7/6	30P4	22/-	B339	9/6	ECH42	10/-	HL92	6/6	PCC84	9/6	U145	15/6	ZD152	9/6
6D1	8/-	8D3	4/-	30P12	11/6	B719	9/6	ECH81	9/-	HL133DD		PCC89	10/6	U147	7/-		
6D2	5/-	9BW6	14/9	30P16	10/-	C8L1	17/6	ECH83	12/6			PCF80	10/6	U153	9/6		
6D3	15/-	10C1	18/9	30PL1	15/-	C8L31	21/-	ECL80	9/-	HL23	12/6	PCF82	9/6	U191	20/-		

METAL RECTIFIERS

RM1	6/-	1B8A	1-1-8-1	4/6	16RE	2-1-8-1	8/6
RM2	8/-	1B8A	1-1-16-1	6/6	18RA	1-2-8-1	11/-
RM3	9/-	1B8C	1-1-16-1	8/6	14A86		17/-
RM4	16/6	14RA	1-2-8-2	18/-	14A97		23/6
RM5	22/-	14RA	1-2-8-3	21/-	14A100		24/-

SPECIAL OFFER

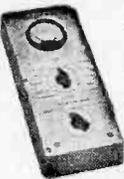
IT4 4/-, 6K8 8/-, 6K7G 3/-, 6V6G 5/-,  
EBC33 4/-, EF39 4/-, EF80 6/-, EF91 4/9  
6X5G 5/-, 5U4G 4/6

TERMS OF BUSINESS C.W.O. or C.O.D.  
2/9 PACKING CHARGE ON ALL C.O.D.  
ORDERS. POSTAGE 3d. PER VALVE

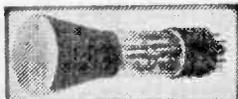
OBsolete VALVES A SPECIALITY.  
QUOTATIONS GIVEN ON ANY TYPE  
NOT LISTED.

**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 19/6, plus 2/6 post and insurance.



**Building a Scope**



3in. oscilloscope tube Americanmade Type No. 3FP7, Octal base 8.3 v. 0.8 amp heater, electrostatic deflection. Brand new and guaranteed, 15/- each, plus 1/6 post and insurance. Complete with circuit diagram.

**Suppressor Condenser**

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

**Welding Transformer**

Output 2 1/2 volts by high and low switch. Continuous rating 250 amps. Intermittent for spot welding exceeds 2,000 amps. Unused slightly soiled, but perfect working order. £3.10.0 plus 3/6 carriage.

**TV Workshop Aids**

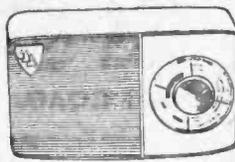
**E.H.T. SEALER.** Apply with soldering iron. Stops corona discharge, etc. 2/6 per stick.  
**POLYTHENE TAPE.** 2in. x 10 thou. for E.H.T. insulation up to 25 kv. 5/- per 12ft. roll.  
**SPONGE STRIP.** 1/4in. x 1/4in. For sealing or cushioning. 9d. per foot.  
**ANTI-STATIC SCREEN CLEANER** For TV tubes and screens. Perspex or glass. Delays accumulation of dust. 3/- per tube.  
**CELLULOSE CEMENT.** Specially prepared for radio gluing of metal, glass, ceramic, wood, fabrics. 4/6 per tin.

**1960 ALL Mains Amplifier**



Undoubtedly finest value obtainable in amplifiers—powerful three valve circuit ideal for dances, parties, etc. Complete with valves, mains, transformers, volume and tone controls, but less chassis, speaker and cabinet. Price only 29/6, plus 2/6 post and ins. Data free with parts or available separately 1/6.

**TRANSISTOR LOUDSPEAKER RADIOS**

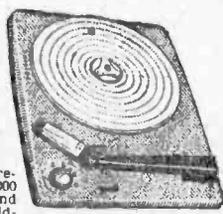


To build yourself—anyone can do it! Pocket 4 uses three transistors and a diode, complete cost 52/6 plus postage and insurance.

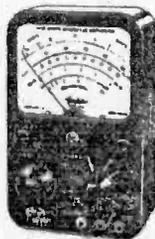
Pocket 5, much louder, uses four transistors and diode, complete cost 67/6, plus 2/6 postage and ins. Each complete to last out and bolt with proper cabinet, with proper tuning condenser and miniature loudspeaker. Batteries available (10d. extra) and solder (1/3) are definitely only other items needed. Our circuits are completely portable and do not need any aerial, also SERVICE AT MODERATE CHARGES IS AVAILABLE SHOULD YOU GET INTO DIFFICULTIES. Demonstrations gladly. Money back guaranteed. S.A.E. for additional details.

**PHILIPS TRANSCRIPTION UNIT**

Philips AG 2009 Record Player, 4 speed. Ideal for the enthusiast. Pick-up arm wired for stereo, fine adjustment on all four speeds. Continuously variable pick-up weight (2.12ms.). Supplied with Philips Hi-Fi crystal type AG3016 for micro-groove and 78 r.p.m. Frequency response 30-15,000 c/s. Pick-up lifting and lowering device. Individually balanced heavy turntable. Mutine switch. Can be used with any amplifier or radio set. Complete with monoaural pick-up £10.10.0, or 2 m/s. deposit and 20 fortnightly payments of 10/- Available also with stereo head, diamond or sapphire stylus. Prices on request.



**The Taylor Meter Model 127A**



A pocket size meter but with a big scale and a sensitivity of 20,000 Ohms per volt D.C., therefore an ideal unit for television servicing—robustly made and complete with leads and prods—20 ranges as follows: D.C. current 30 micro-amps. to 1 amp. D.C. voltages—0-1,000 volt in seven ranges (25 KV) with external probe, optional extra. A.C.—0.2, 2, 500 in six ranges. Ohms—0-20 meg. Ohm in three ranges (self-controlled). Volts A.C.—0.2, 2, 500 in six ranges. Price £10 or 10/- deposits and 23 fortnightly payments of 10/-. Non-callers add 3/- carriage and insurance.

**Connecting Wire**

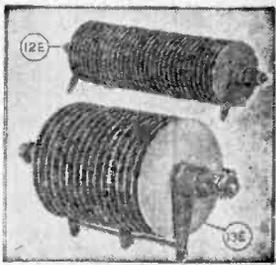


P.V.C. covered in 100ft. coils—2/9 a coil or four coils different colours. 10/- post free.

**Yaxley Switches**

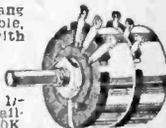
1 Pole 3 Way	1/6
1 Pole 5 Way	2/-
1 Pole 12 Way	3/-
2 Pole 2 Way	2/6
2 Pole 4 Way	2/-
2 Pole 5 Way	2/6
2 Pole 6 Way	2/6
2 Pole 8 Way	3/6
2 Pole 12 Way	4/6
3 Pole 3 Way	1/6
3 Pole 8 Way	3/6
4 Pole 4 Way	3/-
6 Position Shorting	2/6
6 Pole 3 Way	2/-
6 Pole 3 Way	3/6
8 Pole 2 Way	2/-
9 Pole 3 Way	2/6
12 Pole 2 Way	2/-

**Rectifier Bargains**



Selenium rectifier tube 12,500 v. A. half-wave easily rebuilt into full wave or multiple type, contains 30 35 mm. discs. Price 9/6, plus 1/6 post. Type 13, 35 volt 9 amp. easily rebuilt into six full wave charger rectifiers suitable for 6 or 12 volt batteries 3 amps. contains 24 84 mm. discs. Real bargain at 19/6, plus 1/6 post.

**Morganite Potentiometers**



Single and 3-gang types available, standard size with good length spindle, all new and boxed. Single types, 1/- each, values available: 5k, 10k, 25k, 50k, 100k, 250k, 1 meg., 2 meg. Gang type 3/- each—values available: 5k+5k, 10k+10k, 1 meg. ± 1 meg., 2 meg. ± 2 meg.

**Hi-Fi Snip infinite Wall Baffle**



Nicely veneered and polished, corner fitting (attaches to picture rail). Takes up no floor space. Gives really fantastic results with only low-price 8 in. speaker fitting for tweeter. Only 45/- each carriage and insurance 3/6.

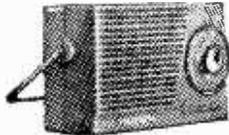
\*\*\*\*\*  
**THIS MONTH'S SNIP**  
 \*\*\*\*\*  
 ★ Transistor Portable/Car Radio undoubtedly one of the best Superhet Transistor Sets being offered in component form with printed circuits  
 ★ and very easy to follow instructions for alignment—service facilities should you get into difficulties with construction or alignment.  
 ★ Uses 5 first grade Transistors giving a 500 MW push pull output, full tuning over medium and long waves from internal Ferrite aerial but with car aerial attachment. Slow motion and fine tuning, High flux elliptical speaker complete with fine 2 tone cabinet. Offered this month only! Special introductory price of 98.19.6 7/6 post and ins.  
 \*\*\*\*\*

**Crystal Mike by Acos**



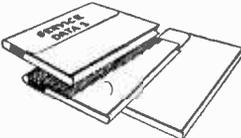
Model 39/1, this is ideal for tape or general amplifiers, complete with screened lead, 39/6, plus 1/- post.

**Transistor Set Cabinet**



Very modern cream cabinet, size 6 1/2 x 3 x 1 1/2 in. with chrome handle, tuning knob and scale. Price 7/6, plus 1/6 postage and packing.

**TV Service Sheets**



200 sheets covering the most popular post-war Televisors by leading makers—Cossor, Ekco, Ferguson, Flye, etc. Giving circuit diagram, component values, I.F. frequencies, etc. £2, post free.

**Miniature Microphone**

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



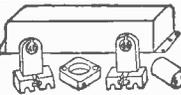
**Speaker Bargain**



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

**"Dim and Full" Switch**

Particularly useful for controlling photoflood lamps which have only a short life at full brilliance. This toggle switch has three positions, the first position puts two lamps in series at half brilliance for setting up, the second position is off and the third position full brilliance for the operation shots. Also useful for controlling night lights, heaters, etc. etc. Price 3/9 each, post 9d. Circuit diagram included.



**Fluorescent Light Bargain**

Kit of parts comprising: choke, two lampholders, starter holder and starter. 40 watt, 19/6, 90 watt, 23/6. Plus 2/- post and insurance.

**Components for Transistor Sets**

Parts for "Practical Wireless" Pocket Transistor Radios available. Send for lists. Sub-miniature Electrolytics, 1 mid 18V, 2.5 mid 8V, 4 mid 8V, 8 mid 8V, 5 mid 12V, 10 mid 8V, 25 mid 6V, 3 mid 3V, 50 mid 3V, 20k mid. All 1/9 each. Transistor Ferrite Rod Aerial with medium and long wave coils with circuit. Price 7/6. Oscillator Coil and set of 3 I.F. transformers for transistor set with circuit. Price 23/6. Midget 3in. P.M. Loudspeaker for transistor set. 3 ohm or 80 ohm coil. Price 18/6. Midget 20k pF + 17k pF two-gang Tuning Condenser with trimmers, 4 spindle drilled and tapped. Price 9/- plus 1/- post. Push-pull Output Transformers, for transistors OC78, etc. Sub-miniature. Price 8/6, plus 1/- post. Push-pull Input Transformer to match the above Output Transformer, 3/6. 0.0005 mid Single Tuning Condenser. Solid dielectric 1in. spindle for transistor or crystal set. 3/9; ditto with spindle tapped 6 BA, 4/- Fully Tested Transistors. Set of six for Superhet includes matched pair, Mullard 23.10.0, ditto unbranded, 45/-; suitable as mixers, 12/6 each. Suitable as I.F. amplifiers, 12/6, suitable for R.F. and Regen. circuits, 6/8; matched pairs for Push-pull Output, 16/- per pair. High gain for single ended output, 7/6. Ordinary white spot, 3/9; red spot, 3/6. Resistors, miniature quarter watt type for transistor sets. All popular values, 5d. each. Miniature ceramic condensers 6d. each. .04 Midgets 9d. each. .1 Midgets 1/- each.

**Another Battery Charger Bargain**  
Components Would Cost More

Car Battery Charger—ready-made high output battery charger in stove enamelled sheet steel louvered case. New, complete and ready to work. Rated at 12 v. 5 amps, and variable rate selector for trickle charging. Also a meter to show charging rate. Suitable for 230/250 A.C. mains. Special snip price of 65/-, plus 3/6 post and ins.



**Motor Snip**

Miniature motor 2 1/2 in. long x 1 1/2 in. diameter, laminated poles and armature, separate windings for reversing. Operates off 20-30 D.C. or off A.C. mains through stepdown transformer. Original cost at least £3 each. Snip price for one month only 8/6, plus 1/6 postage and insurance.



**Component Storage Drawers**

Stout board construction these drawers are ideal for small parts. Supplied complete with simple erection instructions—1/6 each or 12 drawers each 6 x 2 1/2 x 6 1/2 in. 13/6, post 2/-.

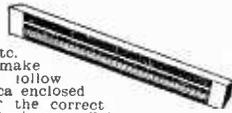


**Band III Convertors**

Suitable Wales, London, Midlands, North, Scotland, etc. etc. All the parts including 2 EP80 valves, coils, fine tuner, contrast control, condensers and resistors. (Metal case available as an extra.) Price only 19/6, plus 2/6 post and insurance. Data free.

**INFRA-RED HEATERS**

Make up one of these latest type heaters ideal for bathroom, kitchen, bedroom, etc. They are simple to make from our easy to follow instructions—uses silica enclosed elements designed for the correct infra-red wavelength (3 microns). Price for 750 watt element and instructions 15/6, plus 2/6 post and insurance.



**SPECIAL THIS MONTH**

**Twin Twisted Lighting Flex**—equivalent 14/36. Rubber insulated, cotton covered, 12.6 per 100 yard coil.

**Moving Coil Meters**  
0-500 microamp ..... 2in. flush ..... 17/6  
250-0-250 microamp 2 1/2in. surface 27/6  
750 microamp ..... 2 1/2in. surface 17/6  
5-0-5 milliamp ..... 2 1/2in. flush ..... 17/6  
0-30 milliamp ..... 2 1/2in. flush ..... 17/6  
0-100 milliamp ..... 2 1/2in. flush ..... 15/-  
0-300 milliamp ..... 2 1/2in. flush ..... 15/-  
0-500 milliamp ..... 2 1/2in. flush ..... 15/-

**Unbreakable Mains Lead** type of lead fitted to electric razors makes fine lead for test meters and any other devices where subject to continuous bending. Twin figure eight construction. Soft green p.v.c. covered. Normally costs 2/- per yard. Three 6in. leads for 2/-.

**Filament Transformer**, 6.3 v., 1 1/2 amp. 6/6.

**4.3 Amp Dropper**—tappings marked 200/220/250, 3/6.

**Auto-Transformer**, totally enclosed primary 200-250, secondary 110-120v., 200 w., normally 27/6. Price 19/6, plus 3/- post.

**Output Transformer**—standard pentode—4/6, multi ratio, 6/6.

**Bi-metal Strip** with heavy duty contact—ideal for thermostat, fire, lamp, etc., 2/6.

**Neon Lamp**—midget wire ended, ideal mains tester, etc., 2/-, ex-Govt., 1/6.

**5 amp. 12 v. full-wave Charger Rectifier**, normal price 17/6. Price 10/-, plus 1/6 post and ins.

Install those extra points. 3.029 twin flat T.R.S. cable. Big purchase enables us to sell this at 45/- per 100 yds., carriage 6/6.

**Head Phones**, DLR5. Ideal crystal sets, etc., 8/6, plus 2/- post.

**STOP FREEZE UPS!**

Wrap our heater wire around the pipes in your loft, to prevent freeze-ups. Complete heater wire suitable for up to 50ft. of pipe. 10/- post free. With instructions.

**Cold Cathode Valve CV413**. Voltage regulator or trigger switch—unused but ex-equipment, 2/6 each.

**Tag Panels**, ideal for constructors, experimental circuits, etc., 3 of each of 12 different types, 5/-, post 1/6.

**Belling Lee 2BA** fully insulated terminals for mounting through metal panels, 1/6 each.

**Terminal Heads**, insulated 4BA, 2/- doz. 6 1/2 in. 350 v. Small tubular metal cased condensers made by Dubilier, 2/6 doz.

**50 Assorted Resistors**. Well mixed and useful values 1 and 1/2 watt, 5/- for 50. Ditto, but 1 watt. 6/6 for 50.

**Mains Transformer**. Standard 230 v. input 250-0-250 at 80 mA., 6.3 v. at 5 A., 12/6, post 1/6.

**Toggle Switch**. Standard metal body type with round duty fixing ring and on/off indicating plate, 1/3 or 12/- doz.

**Metal Rectifier**. 250 v., 60-80 milliamps, ideal for mains set or instrument or to replace that expensive valve, 4/6.

**Screened Cable**. Rubber covered flexible with metal braiding, ideal for microphone or gramophone extensions, 4d. per yd., 30/- per 100 yds.

**ELECTRONIC PRECISION EQUIPMENT LTD.**

★ Orders received by post are despatched from our warehouse Dept. 7, 66 Grove Road, Eastbourne, and to save time, please post your order to this address. Please include enough for postage. Callers, however, should use one of the following addresses:  
 Electronics (N.P.) Ltd., 520 High Street North, Manor Park, E.12  
 Electronics (Ruislip) Ltd., 4-6 Windmill Hill, Ruislip, Middx.  
 Electronics (Croydon) Ltd., 26 London Road, Croydon.  
 Electronics (Finbury Park) Ltd., 29 Strand Green Rd., Finbury Park, N.4.  
 Phone: Ilford 1011  
 Phone: RUISLIP 5780  
 Phone: CRO 6558  
 Phone: ARCHWAY 1049  
 Half day Thursday  
 Half day Wednesday  
 Half day Wednesday  
 Half day Thursday

# RETURN-OF-POST

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

## JASON FM TUNER KITS

Three Jason F.M. Tuner kits with variable tuning are now available to the home constructor. Brief details are given here and our illustrated list is available free.  
**MOST IMPORTANT:** We take great pains to see that every item needed is included in our kits and also that all items are entirely suitable in every way. This should be borne in mind when comparing prices.  
 Hire Purchase Terms are available on any kit.  
**INSTRUCTION MANUALS.** All our kits include the instruction manual, but this can be supplied separately if required. Data Publications booklet describing FMT1, 2, and 3, 2/10; J.T.V.2, 3/10; Mercury 2, 3/10. All post free.

### STANDARD TUNERS

**FMT1.** Supplied complete with a chassis-panel assembly fitted with a gold hammer finished panel and glass dial. Four EF91 valves are used and an external power supply is required. Complete kit £8.19.6. Power Pack Kit £2.12.6.  
**FMT2.** This is a new version of the FMT1 and is supplied with a complete cabinet-chassis assembly which can be mounted in a cabinet or stood on a shelf. The circuit employs four EF90 valves and the power supply can be built into the cabinet if desired. Complete Kit less power supply £8.9.6. Kit with power supply £10.9.6.

### FRINGE TUNER

**FMT3.** This is a fringe tuner using the same cabinet assembly as the FMT2 described above. The tuner is fitted with variable AFC and uses five EF90 and one ECC81 valves. Kit less power supply £10.9.6. Kit with power supply £12.7.6.

### F.M./TV SWITCHED TUNERS

Kits for two new Jason F.M./TV Sound switched tuners are now available. Both incorporate the latest "Fireball" Turist Tuner which gives switch positions for the three BBC Programmes as well as BBC and ITA TV Sound. A.F.C. is fitted to ensure freedom from drift.  
**JTV2.** This tuner is complete with power supply in a cabinet which can be used either for shelf or cabinet mounting. Complete kit £15.17.6.  
**MERCURY 2.** This is similar to the JTV2 but has no provision for a power supply. It is mounted on a small chassis with printed front panel and is intended for cabinet fixing. Complete kit £11.7.6.  
**IMPORTANT.** When ordering JTV2 and Mercury 2 kits it is essential to give the TV channels and F.M. stations required on the tuner.

## NEW ILLUSTRATED LISTS

NOW READY

Illustrated lists are available on LOUD-SPEAKERS, TAPE DECKS, TEST GEAR, RECORDING TAPES, GRAMOPHONE EQUIPMENT. Any will be sent free on request.

### BLANK CHASSIS

The very latest blank chassis for the home constructor. Packed flat for easy and safe posting. These are made in bright tin-plate and have the top plate and four side channels packed flat complete with nuts and bolts assembly. The top plate is completely flat for easy drilling before assembly. Earth connections can be made directly by soldering. Available in the following sizes: 7 x 5 x 2in., 4/9, post 1/3. 10 x 5 x 2in., 5/3, post 1/4. 10 x 7 x 2in., 6/-, post 1/6. 14 x 5 x 2in., 7/3, post 1/6. 14 x 10 x 2in., 8/9, post 1/4.

### MULLARD CATHODE RAY TUBES

**ALL AT NEW REDUCED PRICES**  
**RADIANT SCREEN.** The very finest picture tube available. **LUMENAR.** Built to the same high standards as the Radiant Screen tube, but using reclaimed glass bulbs. Every other tube is brand new.

FULL 12 MONTHS GUARANTEE ON EITHER TYPE		Hire Purchase	
		12 mthly.	pmts. of
12" MW31/74	Radiant Screen	Deposit	12/16.0
14" MW36/24, MW36/44	..	..	13/8
14" AW36/20, AW36/80	..	..	13/8
17" MW43/89, MW43/80	..	..	14/4
17" AW43/80	..	..	15/-
	Lumenar	£2. 2.0	15/8
12" MW31/74	..	£8. 2.8	12/6
14" MW36/24, MW36/44	..	£8. 2.6	12/6
14" AW36/20, AW36/80	..	£8.10.0	13/-
17" MW43/89, MW43/80	..	£9. 0.0	13/8
17" AW43/80	..	£9.10.0	14/4

ALL CARRIAGE AND INSURANCE FREE

## GRAMOPHONE EQUIPMENT

ALL LATEST MODELS ALL POST FREE

### RECORD CHANGERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
<b>COLLARO Conquest</b> (Studio O PU)	£7.19. 6	£1.12. 0	12 of 12/3
<b>GARRARD RC210</b> (GC8 PU)	£9.19. 6	£1.19. 6	12 of 15/-
<b>B.S.R. U414 Monarch</b> (TC8 PU)	£7.15. 0	£1.11. 0	12 of 12/-
<b>B.S.R. U45 Monarch</b> (TC8 PU)	£7. 5. 0	£1. 9. 0	12 of 11/4
<b>B.S.R. U414 Monarch</b> (TC8 Stereo/LLP/78)	£8.18. 0	£1.16. 0	12 of 13/6

### SINGLE RECORD PLAYERS

<b>GARRARD TA GC8 PU</b>	£8.10. 0	£1.14. 0	12 of 13/-
<b>B.S.R. TU9 (TC2 PU)</b>	£4.10. 0	£1. 5. 0	3 of £15.0
<b>COLLARO RP594</b> (O P or T PU)	£9.18. 9	£1.18. 9	12 of 15/-
<b>E.M.I.</b> (Acos Stereo/Mono PU)	£6.15. 0	£1. 7. 0	12 of 10/8

### TRANSCRIPTION UNITS

<b>COLLARO TRP 594</b> (TX89 PU)	£18.18. 3	£2.16. 3	12 of £1.0.4
<b>COLLARO 4T/200</b> (TX88 PU)	£18.13. 0	£3.15. 0	12 of £1.7.4
<b>COLLARO 4TR/200</b> Motor only	£18.18. 8	£2.15. 3	12 of £1.0.5
<b>GARRARD 4HF</b> (GC8 PU)	£18. 9. 9	£3.15. 9	12 of £1.7.0

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

## STEREO COMPONENTS

Morganite ranged potentiometers as specified for the Mullard circuits. Lot/Anti-Log, 500k, 1 meg., 2 meg. Log/Log, 250k, 1meg., 2 meg. Lin/Lin, 500k, 1 meg. All 10/8 each.  
**Denso Chassis for the Mullard circuits.** All drilled with printed front panel. Three Valve Stereo Amplifier Chassis, £21/-. Seven watt Stereo Amplifier Chassis, 24/6. Stereo Pre-Amplifier Chassis, 24/6. Set of switches for Pre-Amp, 34/8. Pick-up cartridges, B.S.R. TC8S £2-4.11. Ronette DC284, £3.19.6. Both are turn-over types for Stereo, LP and 78 records. List of all components for Mullard Stereo Designs is available.

## LATEST TEST METERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
<b>AVO Model 8</b> with leather carryin case	£23.10. 0	£4.14. 0	12 of £1.14. 6
<b>AVO Model 7</b> with leather carryin case	£27. 9. 0	£5. 8. 0	12 of £2. 0. 4
<b>AVO Model 7</b> with leather carryin case	£19.10. 0	£3.18. 0	12 of £1. 8. 8
<b>AVO Model 7</b> with leather carryin case	£23. 8. 0	£4.12. 0	12 of £1.14. 6
<b>AVO Multimeter</b> with leather carrying case	£9.10. 0	£1.18. 0	12 of 14/4
<b>AVO Multimeter</b> with leather carrying case	£11. 9. 0	£2. 5. 0	12 of 17/-
<b>TAYLOR Model 127A</b>	£10. 0. 0	£2. 0. 0	12 of 15/-
<b>CARY A-10</b>	£4.17. 6	£1. 7. 6	3 of £1. 6. 8
<b>CARY B-20</b>	£3.10. 0	£2. 0. 0	3 of £1.13. 4

Full details of any of the above supplied free on request.

## TAPE DECKS

	Cash Price	Deposit	Hire Purchase Mthly/Pmts.
<b>B.S.R. D12</b>	£3.19. 6	£1.14. 6	12 of 13/7
<b>COLLARO STUDIO</b>	£12.19. 6	£2.12. 6	12 of 19/5

All components in stock for the Mullard Tape "C" Pre-Amplifier Kit. Fully detailed list available.

# WATTS RADIO (MAIL ORDER) LTD

54 CHURCH STREET, WEYBRIDGE, SURREY.

Telephone: Weybridge 4556

PLEASE NOTE: POSTAL BUSINESS ONLY FROM THIS ADDRESS

# SERVICE

## RECORDING TAPE

### DOUBLE PLAY

B.A.S.F. 300ft (3'), 14/-; 600ft (4'), 25/-; 1200ft (5'), 45/-; 1800ft (5 1/2'), 58/-; 2400ft (7'), 77/6.

BRAND FIVE. 1200ft (5'), 37/6; 2400ft (7'), 60/-.

EMITAPE 100. 400ft (3'), 17/-; 1200ft (5'), 45/-; 2400ft (7'), 80/-.

SCOTCH BOY 200. 400ft (3'), 17/-; 1200ft (5'), 45/-; 2400ft (7'), 80/-.

TELEFUNKEN. 1200ft (5') in plastic container. 40/-; 1800ft (5 1/2') in plastic container. 50/-; 2400ft (7'). 75/-.

### LONG PLAY

B.A.S.F. 210ft. (3'), 9/-; 850ft. (5'), 28/-; 1200ft. (5 1/2'), 35/-; 1800ft. (7'), 50/-.

BRAND FIVE. 900ft (5'), 18/6; 1200ft (5 1/2'), 23/6; 1800ft (7'), 35/-.

EMITAPE 99. 99/3 250ft (3'), 9/6; 99/3N 250ft (3 1/2'), 9/6; 99/9 950ft (5'), 28/-; 99/12 1200ft (5 1/2'), 35/-; 99/18 1800ft (7'), 50/-; 99/9. 99/12 and 99/18 available in Emitape. 2/6 extra.

SCOTCH BRAND 150. 300ft. (3 1/2'), 9/6; 900ft (5'), 28/-; 1275ft (5 1/2'), 35/-; 1800ft (7'), 50/-.

ALL TAPE POST FREE!

## TAPE ACCESSORIES

BIB Tape Splicer. 18/6. Post 9d.

WEARITE De-fluxer. 50/-, Post 1/3.

Full tape list including special offers of standard tapes available free.

## LOUDSPEAKERS

	Cash Price	Deposit	Hire Purchase Mthly/Pmnts.
<b>GOODMANS</b>			
Axiom 110. 10" ..	£5. 0. 0	£1.10. 0	3 of £1. 6. 8
Axiom 112. 10" ..	£8.10. 0	£1.14. 0	6 of £1. 6. 0
Axiette. 8" ..	£6.12. 1	£1. 7. 1	6 of £1. 0.10
Axiom 300. 12" ..	£11. 5. 9	£2. 5. 9	12 of 16/8
Axiom 400. 12" ..	£16. 1. 0	£3. 4. 0	12 of £1. 3. 7
Axiom 60 Bass. 12" ..	£9.12. 9	£1.18. 9	12 of 14/6
Treble Tweeter ..	£6. 4. 0	£1. 5. 0	6 of 19/10
CX5000 Cross-over unit	£1.19. 0	—	—
<b>WHITELEY</b>			
HF1016. 10" ..	£7.12. 3	£1.11. 3	6 of £1. 3. 6
HF1013. 10" ..	£4.15. 0	£1.10. 0	3 of £1. 5. 0
HF16 8" ..	£6.10. 6	£1. 6. 6	6 of £1. 0. 8
TS16. 8" ..	£6. 8. 9	£1. 3. 9	6 of £1. 0. 0
T10 Tweeter ..	£4. 4. 0	£1. 4. 0	3 of £1. 3. 4
T35 Tweeter ..	£1.13. 3	—	—
CX3000 Cross-over unit	£1.10. 0	—	—
CX1500 Cross-over unit	£1.18. 3	—	—

## OUTPUT TRANSFORMERS

**GILSON**  
W0696A, W0696B, 50/6, post 2/-, W0710, W0710/SK, 55/6, post 2/-, W0892, 82/3, post free; W0767, 27/-, post 1/6.

**PARTRIDGE**  
P3667, 52/6, post 2/-; P4014, 98/6, post free; P4131, 60/-, post free; P3591A, 99/-, post free; P5202, P5203, 95/-, post free.

**PARMEKO.** P2641, 27/-, post 1/6. P2643, 41/3, post 2/-.

**ELSTONE.** OT3, 25/-, post 1/6; OT/ML, 45/-, post 2/-.

## AMPLIFIER KITS

We have full stocks of all components for the Mullard 510, Mullard 2 and 3 valve Pre-Amplifiers, GEC 912 Plus. Fully detailed list on any of these sent upon request. Instruction Manuals. Mullard. All Mullard Audio Circuits in "Circuits for Audio Amplifiers", 9/5. GEC 912. 4/6. All post free.

## HIRE PURCHASE TERMS

are available on any item. Repayments may be spread over 3, 6 or 12 months. Details as follows: Three months: Deposit 6/- in the £. Service charge 5 per cent but minimum charge of 10/-, Six and Twelve months: Deposit 4/- in the £. Service charge 10 per cent, but minimum charge 20/-.

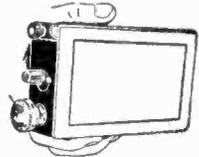
## TERMS OF BUSINESS

Cash with order of C.O.D. We charge C.O.D. orders as follows: Up to £5, minimum 2/6. Over £5 and under £5. 1/6. Over £5 and under £10, 1/6. Over £10, no charge. Postage extra on CASH orders under £3 except where stated.

## BE TRANSISTOR-WISE ! BE POCKET-WISE !

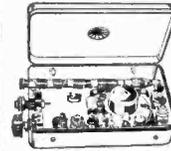
### "RECO" TRANSONA-3 (3 transistors)

M/L waves. Ferrite rod aerial. Tuning condenser. Home, Light and Radio Luxembourg too. Complete kit with easy-build plans and "Sonotone" miniature earpiece. 55/-, With "Min. speaker." 49/6. Post etc. 2/6.



### NEW! "RECO" PUSH-PULL SIX KIT

(6 Ediswan transistors and 2 diodes)



£6/19/6, post etc. 2/6. (Case 6 1/2 x 4 1/2 x 1 1/2 in. approx.)

### "RECO" TRANSGEN-3

(3 Ediswan transistors)

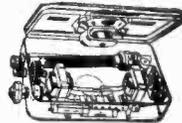


M/L waves and T.B. High-gain ferrite rod aerial. XA104 (Ediswan) RF stage. On test (50 miles London) tuned in Home, Light, Third, AFN, Radio Luxembourg and many others at good headphone strength. A really fine transistor kit complete with easy-build diagrams, and "Sonotone". min. earpiece 69/6. If reception conditions warrant a 3in. speaker may be fitted under speaker grille. (Case as P.P.S.)

### "RECO" PUSH-PULL FOUR

(4 Ediswan transistors)

M/L waves with 2 S/W coils free upon request. 3in. HIGH-GRADE speaker affording fine tonal quality. Ferrite rod aerial. Bias sensitivity volume control. Complete kit with easy-build diagrams £5/19/6. Post etc. 2/6. Uses 4 1/2 v. flashlamp battery.



### "RECO" PUSH-PULL FIVE

(5 Ediswan transistors)

M/L waves and T.B. Indoors or outdoors this brilliant radio brings Home and Continental stations to your finger tips. 3in. Golden - Tone Speaker. 6in. Ferrite Rod Aerial. EDISWAN XC101's (350 mw). Push-pull output stage. Gleaming pale blue styrene case with speaker grille in red. Complete kit with easy-build diagrams £5/19/6. Post etc. 2/6. Dorset customer writes:—"Makes fine car radio."

### "RECO" SUPER TRANSGEN-4

(4 transistors)

As Transgen-3 but with 3in. speaker. Complete kit £4/19/6. Post etc. 2/6. (XA104, XB113, XC101, XC101).

### "RECO" AMAZON-3

(3 transistors)

Medium waves with 2 S/W coils upon request. Tonal quality above average. Sensitive reflex circuit. Complete kit with super B.A. reproducer and attractive plastic case 45/-, post etc. 2/6. All transistors used in our kits are EDISWAN FIRST GRADE.

Overseas customers please add 3/6 extra for post. Circuits only and parts price list 2/6 for 6.

## AFTER SALES SERVICE

# Radio Exchange Company

27 HARPUR STREET, BEDFORD.

(Opposite Co-op). Phone 2367.

Closed Sat. 1 p.m.

# BENTLEY ACOUSTIC CORPORATION LTD.

38 CHALCOT ROAD, CHALK FARM, LONDON, N.W.1.

Telephone: PRIMROSE 9090

FOR IMMEDIATE DESPATCH PHONE PRIMROSE 9090 AND ASK FOR "CASH ON DELIVERY SERVICE. ALL POST ORDERS CLEARED SAME DAY AS RECEIVED. PLEASE ENQUIRE FOR ANY TYPE NOT LISTED WITH S.A.E.

OZ4	5/-	6F6G	7/-	9D2	4/-	30PL1	10/6	DF96	8/6	EF39	5/6	HN309	24/7	PL83	9/-	U404	8/6	X109	17/3
IA3	3/-	6F11	17/3	10C1	13/-	30PL13	12/6	DF97	9/-	EF40	15/-	HVR2	20/-	PL84	12/8	UB80	29/10	XCR1.5	6/6
IA5	6/-	6F12	4/6	10D2	26/6	35A5	2/3	DH63	6/6	EF41	9/-	HVR2A	6/-	PL80	18/7	U4020	16/7	XF1	18/6
IA5GT	12/-	6F14	11/6	10D2	26/6	35L6GT	9/6	DH76	5/-	EF42	10/6	KF35	8/6	PM28	12/6	UAB30	9/6	XF12	9/6
ID6	10/6	6F15	15/3	10F9	11/6	35Z3	10/6	DH101	28/6	EF50(E)	5/-	LK35	8/6	PM12	6/6	UAF42	9/6	XF34	17/6
IG6	17/6	6F16	9/6	10LD3	8/6	35Z4GT	6/-	DH107	13/11	EF54	5/-	KT2	5/-	PM24M	21/3	UBC41	8/6	XG1.5	6/6
IHS5GT	10/6	6F17	12/6	10LD11		35Z5GT	9/-	DK32	12/-	EF73	10/6	KT33C	10/0	PX4	10/6	UBC81	11/4	Y63	7/6
IL4	3/-	6F23	10/6		15/11	43	10/-	DK40	21/3	EF90	6/-	KT36	29/10	PX25	5/9B	UBF80	9/6	Z63	7/6
ILD5	5/-	6F32	10/6	10P13	15/-	50CS	10/-	DK91	6/6	EF85	6/-	KT41	12/6	PY31	16/7	UBF89	9/6	Z66	17/6
ILN5	5/-	6F33	7/6	10P14	19/3	50C06DG		DK92	9/-	EF86	10/6	KT44	12/6	PY32	11/6	UBL21	23/3	Z77	4/6
INS5GT	10/6	6G6	6/6	12A6	5/-		36/6	DK96	8/6	EF89	9/-	KT61	12/6	PY80	7/6	UCC84	14/7	Transistors and diodes	
IR5	6/6	6H6GT	3/-	12AC6	15/3	50L6GT	9/6	DL33	9/6	EF91	4/6	KT63	7/6	PY81	8/6	UCC85	9/-	GD3	4, 5,
IS4	9/-	6J5G	5/-	12AD6	17/3	53KU	19/11	DL66	17/6	EF92	4/6	KT66	15/-	PY82	7/6	UCF80	16/7	GD3	4, 5,
IS5	6/-	6J6	5/6	12AE6	13/11	72	4/6	DL68	15/-	EF97	13/3	KT88	24/7	PY83	8/6	UCH21	23/3	6, 8	4, 5,
IT4	3/6	6J7G	6/-	12AH7	8/-	77	8/-	DL82	46/5	EF98	13/3	KT'W61	6/6	PZ30	19/11	UCH42	9/6	OA70	4/-
IU5	6/-	6J7GT	10/6	12AH8	12/6	78	6/6	DL92	7/1	EF183	18/7	KT'W62	7/6	QP21	7/1	UCH81	9/6	OA73	4/-
2P	26/6	6K7G	5/-	12AT6	7/6	83	9/-	DL94	7/6	EF184	18/7	KT'W63	6/6	QP25	14/6	UCL82	11/6	OA79	4/-
2X2	4/6	6K7GT	6/-	12AT7	6/-	83	9/-	DL96	7/6	EK32	8/6	KTZ41	8/6	QS150/15		UCL83	19/3	OA81	4/-
3A4	6/-	6K8GT	10/6	12AU6	23/3	35A2	15/-	DM70	7/6	EL32	5/-	KTZ63	7/6		10/6	UF41	9/6	OA86	6/-
3A5	10/6	6K8G	6/6	12AU7	6/6	150B2	15/-	EB0-	20/-	EL33	12/6	L63	6/6	R12	9/6	UF42	12/6	OA95	5/-
3B7	12/6	6K25	19/11	12AV6	17/6	161	10/6	EAS0	2/-	EL34	15/-	MH4C	7/6	R18	14/6	UF80	10/6	OA95	5/-
3D6	5/-	6L1	23/3	12AX7	7/6	185BT	33/2	EBC80	9/-	EL48	26/6	MH4	7/6	R19	19/11	UF85	9/6	OA110	25/-
3Q4	7/6	6L6G	8/-	12BA6	8/-	185BTA	33/2	SAC91	4/6	EL49	9/-	MHLD6	12/6	RK34	7/6	UF86	17/11	OA120	4/6
3Q5GT	9/6	6L6M	9/6	12BE6	9/-	304	10/6	EAF42	9/-	EL42	10/6	ML4	8/6	S130	15/-	UF89	9/6	OC16	54/-
3S4	7/6	6L7GT	7/6	12BH7	21/3	305	10/6	EB34	2/6	EL81	12/6	MS48	23/3	SP4(7)	14/6	UL41	9/6	OC19	54/-
3V4	7/6	6L8	13/-	12E1	30/-	807	7/6	EB41	8/6	EL83	19/11	MU12/14	8/-	SP41	3/6	UL44	26/6	OC2	87/-
5R4GY	17/6	6L19	23/3	12J5GT	4/6	956	3/6	EB91	4/-	EL84	7/6	N37	23/3	SP42	12/6	UL46	14/6	OC26	44/-
5U4G	6/6	6LD3	8/6	12J7G	9/6	1821	16/6	EBC3	23/3	EL85	13/11	N78	19/11	SP61	3/6	UL84	8/6	OC28	25/-
5V4G	10/6	6LD20	15/11	12K5	17/11	5763	12/6	EBC33	5/-	EL86	17/3	N108	23/3	SU25	26/6	UM4	17/3	OC35	48/-
5Y3GT	6/6	6N7	8/-	12K7GT	5/6	7475	7/6	EBC41	8/6	EL91	5/-	N308	20/7	SU61	9/-	UM8-	15/3	OC44	26/-
5Z3	12/6	6P25	12/6	12K8GT	14/-	9002	5/6	EBC81	8/6	EL95	10/6	N339	15/7	T41	23/3	URIC	9/6	OC45	23/-
5Z4G	9/-	6P28	26/6	12Q7GT	5/-	AC/PEN		EBF80	9/-	EM34	9/6	P61	3/6	TDD4	12/6	UU6	19/11	OC65	22/6
6A7	10/6	6Q7G	6/6	12SA7	8/6	S-pin 23/3		EM71	23/3	TH41	23/3	PBC80		TH41	26/6	UU7	16/7	OC66	25/-
6A8G	9/-	6Q7GT	11/-	12SC7	8/6	7-pin 15/-		EBF89	9/6	EM80	9/-		13/11	TH233	33/2	UUB	26/6	OC70	14/-
6A8B	9/-	6R7G	10/-	12SG7	7/6	AC2PEN/		EBL21	23/3	EM81	9/-	PCC84	8/-	TH232	20/-	UU9	7/6	OC71	14/-
6AC7	4/-	6SA7GT	8/6	12SH7	8/6	DD	12/6	EBL31	23/3	EM84	10/6	PCC85	2/6	TP22	15/-	UY21	18/7	OC72	17/-
6AG5	5/6	6SC7	7/6	12S17	8/6	AC6PEN	7/6	EC52	5/6	EN31	37/-	PCC88	10/6	TP25	15/-	UY29	13/11	OC73	20/-
6AK5	8/-	6SG7GT	8/-	12SK7	6/-	AC7P	33/2	EC54	6/-	EY51	9/-	PCC89	11/6	TP2620	33/2	UY41	7/6	OC75	15/-
6AL5	4/-	6SH7GT	8/-	12S7G	11/6	ATP4	8/6	EC70	12/6	EY83	16/7	YB6F	13/3	UY85	7/6	OC76	15/-	OC76	15/-
6AM6	4/6	6S17GT	8/-	12SR7	8/6	AZ1	18/7	EC92	13/3	EY84	14/4	PCF82	10/6	UJ2/14	8/6	VMS4B	15/-	OC77	21/-
6AQ5	7/6	6S18GT	6/6	12TA	10/6	AZ31	10/-	EC93	5/6	EY86	9/-	PCF86	15/6	U16	10/6	VP(7)	12/6	OC78	17/6
6A7G	7/6	6S19GT	6/6	12U7	27/10	13/11	11/6	ECC33	8/6	EZ35	6/-	PCL82	10/6	U18/20	8/6	VP4	15/-	OC78D	17/6
6AU6	10/-	6SN7GT	5/6	18	23/3	B36	15/-	ECC34	24/7	EZ40	7/6	PCL83	10/6	U22	8/-	VP2B	14/6	OC81	18/-
6AV6	12/6	6SQ7GT	9/-	19AQ5	10/6	BL63	7/6	ECC35	8/6	EZ41	7/6	PCL84	12/6	U24	29/10	VP4B	23/3	OC170	35/-
6BBGT	5/-	6SS7GT	8/-	19H1	10/6	C1	12/6	ECC40	23/3	EZ80	7/6	PCL85	16/7	U25	17/11	VP13C	7/6	OC200	54/-
6BA6	7/6	6U4GT	12/6	20D1	15/3	CIC	12/6	ECC81	6/-	EZ81	7/6	PEN4A	2/6	U26	10/6	VP23	6/6	OC203	58/-
6BE6	6/-	6U5G	7/6	20F2	26/6	CBLL	26/6	ECC82	6/6	FC2A	24/7	PEN4B	26/6	U31	9/6	VP41	6/6	TJ1	40/-
6BEG6	23/3	6U7G	8/6	20L1	26/6	CBLL31	23/3	ECC83	7/6	FC4	15/-	PEN4DD		U33	26/6	VR105	8/6	TJ2	45/-
6BH6	8/-	6V6G	7/6	20P1	26/6	CKH35	23/3	ECC94	9/-	FC13	26/6	PEN25	4/6	U35	26/6	VR150	7/6	TJ3	50/-
6B16	6/-	6V6GTG	8/-	20P3	23/3	CX506	6/6	ECC85	8/6	FC13C	26/6	PEN25	4/6	U37	26/6	VT61A	5/6	TP1	40/-
6BQ7A	15/-	6X4	5/-	20P4	26/6	CL33	19/3	ECC88	18/-	FW4/500		PEN40DD		U43	9/6	VT501	5/6	TP2	40/-
6BR7	15/-	6X5GT	6/-	20P5	23/3	CV63	10/6	ECC91	5/6		8/6		25/-	U45	9/6	W61M	26/6	TS1	10/-
6B57	25/-	6,30L2	10/-	25A6G	10/6	CY1	18/7	ECF80	10/6	FW4/800		PEN44	26/6	U50	6/6	W76	5/6	TS2	12/6
6BW6	6/-	7A7	12/6	25L6GT	10/6	CY31	18/7	ECF82	10/6		8/6	PEN45	26/6	U52	6/6	W81M	6/6	TS3	15/-
6BWX	6/-	7B6	21/3	25Y5	10/-	D1	3/-	ECH3	26/6	GZ30	9/-	PEN45DD		U54	19/11	W107	18/7	TS4	24/-
6B6E	6/-	7B7	8/6	25Y5G	10/-	D15	10/6	ECH21	23/3	GZ32	10/-		26/6	U76	6/-	W729	19/11		
6C4	5/-	7C5	8/-	25Z4G	9/6	D63	5/-	FCH35	6/6	GZ33	19/11	PEN46	7/6	U78	5/-	X24M	24/7		
6C5G	6/6	7C6	8/-	25Z5	9/6	D77	7/6	FCH42	9/-	GZ34	14/-	PEN383	23/3	U107	16/7	X41	13/-		
6C6	6/6	7D6	10/6	25Z6G	10/-	DAC32	10/6	ECH81	9/-	H63	12/6	PEN45DD		U191	16/7	X61C	12/6		
6C9	13/6	7H7	8/-	25T5G	19/11	DAF91	6/6	ECH83	13/11	HABCO			33/2	U201	16/7	X61M	26/6		
6C10	9/6	7H7	12/6	26/6		DA96	6/6	ECL80	9/-			PEN1DD		U251	15/6	X61P	9/6		
6C16G	36/6	757	9/6	8C1	8/-	DDA2	13/11	ECL82	10/6	HL2	7/6	4020	33/2	U281	19/11	X65	12/6	1-PL81	
6CH6	9/-	7V7	9/6	10F5	6/-	EDT25	7/6	ECL83	19/3	HL23DD	7/6	PL33	19/3	U282	22/7	X66	12/6	2-EF80	
6D3	19/11	7Y4	7/6	30FL1	10/-	DF33	10/6	EF9	23/3	HL41DD		PL36	12/-	U301	23/3	X76M	14/-		
6D6	6/6	8D2	3/6	30LL1	3/-	DF66	15/6	EF22	14/-	HL42DD	19/3	PL38	26/6	U329	14/-	X78	2/3	All nin. valves £3 post free	
6E5	12/6	8D3	4/6	30L15	11/6	DF70	15/-	EF36	4/-			PL81	10/6	U339	16/7	X75	23/3		
6F1	26/6	9B8W6	15/3	30P12	7/6	DF91	3/6	EF37A	9/-			PL87	7/6	U401	16/7	X101	13/2		

ALL ITEMS OFFERED ARE NEW FULLY GUARANTEED, AND PRODUCTS OF ONLY THE BEST MANUFACTURERS WHO DO NOT STOCK JAPANESE GOODS, NOR ANY DISMANTLED FROM USED SETS.

**VOLUME CONTROLS** | **METAL RECTIFIERS** Full List with ratings free for S.A.E.

All with Long spindle and Double-pole Switch 4/6 each | DRM1B 13/- RM-1 5/3 1A486 17/6 14B130 35/- 14RA 1-2-8-3 21/-

10 K 25 K 50 K 100 K | DRM2B 15/6 RM-2 7/6 1A497 25/- 14B261 11/6 (FC31) | 16RD 2-2-8-1 12/-

1/2 mg. 1/4 mg. 1 meg. 2 meg. 10 meg. | DRM3B 15/6 RM-3 7/5 1A4100 27/- 14RA 1-2-8-2 17/6 | 16RE 2-1-8-1 8/6 | 18RA 1-1-16-1 11/-

JUST OUT: MIDGET SILICON RECTIFIERS. OUTPUT 120 VOLTS AT 1/2 AMP TWO IN SERIES GIVE 240 VOLTS AT 1/4 AMP. NO LARGER THAN A RESISTOR 1/6 EACH

Standard Can | **ELECTROLYTIC CONDENSERS** | 32 mid., 350 v. 2/6 | 8 x 8 mid., 450 v. 3/-

16 x 8 x 8 500 v. 4/- | 60 x 250 mid., 275 v. 9/6 | 200 mid.,

★ POST HASTE ★

**JASON F.M. TUNER KITS**

We are the Authorised Jason Dealer and the whole kit is as supplied by them. You can therefore safely return to Jason for alignment without them rejecting it for non-standard components.

We can also align for the standard charge, to our kits only.

- FMT1** is the standard variable tuner for cabinet mounting, unpowered. Supplied complete with four EF91 valves ... .. £7.10. 0  
Hire purchase Deposit £1.10.0 and 6 monthly  
Instruction book, 2/6 extra.
- FMT1** Power pack kit with ready drilled chassis ... £2.14. 0
- FMT2** is a new tuner in a modern case, green, which can be used for shelf or cabinet mounting, and has space for power supplies if required. Supplied complete with four EF80 valves ... £8.12. 6  
Hire purchase Deposit £1.14.6 and 6 monthly
- FMT2** With power. Complete kit ... .. £10.14. 0  
Hire purchase Deposit £2.4.0 and 8 monthly  
Instruction book 2/6 extra.
- FMT3** is the fringe version and should be used when farther than 70 miles from the transmitter. Supplied complete with 6 valves ... .. £10.12. 6  
Hire purchase Deposit £2.6.6 and 8 monthly
- FMT3** With power. Complete kit ... .. £12.13. 0  
Hire purchase Deposit £2.13.0 and 8 monthly  
Instruction book 2/6 extra.

**NEW JASON SWITCHED TUNERS**

The **JTV/2** and **Mercury 2** are both of the pre-set station type with the addition of BBC and ITA sound. They use the latest "Fireball" turret and the A.F.C. ensures freedom from drift. The **Mercury 2** is for cabinet mounting with external power supplies. The **JTV/2** has the same tuning heart, with power supplies mounted in a case. This again can be used for shelf or cabinet mounting. The **JTV/2** cannot be supplied less power.

- JTV/2** Complete with valves and book ... .. £16.14. 9  
Hire purchase Deposit £3.14.9 and 12 monthly £1. 3.10
- Mercury 2** Complete with valves and book... .. £12. 0. 0  
Hire purchase Deposit £2.8.0 and 8 monthly £1. 6. 6
- Power pack Kit for Mercury 2** with drilled chassis £2. 14.0  
Instruction book for all switched tuners, 3/6.

**REQUIRED CHANNELS MUST BE SPECIFIED FOR SWITCHED TUNERS**

All Jason kits can be supplied less valves. To find the cash price deduct 7/6 for each valve.

A more detailed list can be sent upon request.  
**ALL JASON TUNERS ARE ON DEMONSTRATION**

**GRAMOPHONE EQUIPMENT**

All these units are brand new and boxed

	Cash	Deposit	Mthly	pmts.
<b>B.S.R. Monarch TC8H,</b> cartridge, UA14 ...	£7. 5.0	£1. 9.0	6	£12.8
<b>COLLARO Conquest O</b> cartridge ... ..	£7.15.0	£1.11.0	6	£14.0
<b>GARRARD TA/Mk.2,</b> GC8, cartridge ...	£8.10.0	£1.14.0	6	£16.0
<b>GARRARD 4HF, GC8,</b> cartridge ... ..	£18. 9.9	£3.19.9	12	£16.7
<b>PHILIPS AG2009, AG3016</b> cartridge ... ..	£10.10.0	£2. 2.0	8	£13.6

For further information please write for manufacturers' list.

★ POST FREE ★

**COLLARO STUDIO DECK.** 3 speed, 3 motors, 7in. spools. Pause control, space for third head, piano keys, counter.  
List price £17.10.0. **OUR PRICE** £13.10. 0  
Hire purchase Deposit £3.0.0 and 12 monthly 19. 3

**TAPE AMPLIFIER** for Studio deck, with two printed circuit boards, control and input panels, mains and output transformers, complete with knobs and plans, EF86, ECC83, EM84, EZ80, OA81 and two EL84, 4 watts output. Magic eye, Radio and Mic inputs, Mixing and Superimposing facilities, EX L.S. socket, low level output, tone control. Can be used as amplifier.  
**CASH PRICE** £11.12. 6  
Hire purchase Deposit £2.6.6 and 8 monthly £1. 5. 9

**TAPE RECORDER CASE** to house the above deck and amplifier. Two-tone Grey... .. £5. 5. 0

**E.M.I. Speaker** to fit case 10 x 5in. ... .. £1. 5. 0

**1200ft. Brand Five tape 25/-;** Crystal Mic Stan Kelly Screened Jack Plugs, 4/6 each. Spare 7in. tape spool 4. 6

The above recorder complete to **PERSONAL SHOPPERS ONLY** for ... .. £35. 0. 0  
Hire purchase Deposit £7.0.0 and 12 monthly £2.11. 4  
This machine is a first-class job and normally sells for £41. 0. 0

**SEND FOR MAKER'S ILLUSTRATED LEAFLET**

**B.S.R. Monardeck TD2** 3 1/2 i/s, 5 1/2in. spools.  
List price £12.12.0. **OUR PRICE** £7. 9. 6

**FERRODYNAMICS "BRAND FIVE"**

**Magnetic Recording Tape.** Made in U.S.A. Fully guaranteed. High Grade Acetate base and boxed.

- |                          |      |                       |      |
|--------------------------|------|-----------------------|------|
| 600ft. 5in. Standard     | 16/- | 1200ft. 7in. Standard | 25/- |
| 900ft. 5in. L. play      | 18/6 | 1800ft. 7in. L. play  | 35/- |
| 1200ft. 5 1/2in. L. play | 23/6 |                       |      |

**SEND FOR MANUFACTURERS' LEAFLET**

Also stocked **SCOTCH BOY, EMITAPE** and **BASF.**  
LIST ON REQUEST.

**TRANSISTORS**

- |                          |                 |                          |
|--------------------------|-----------------|--------------------------|
| <b>OC44 Mixer</b> ... .. | List price 26/- | <b>OUR PRICE</b> 12/-    |
| <b>OC45 I.F.</b> ... ..  | List price 23/- | <b>OUR PRICE</b> 12/-    |
| <b>OC71 Audio</b> ... .. | List price 14/- | <b>OUR PRICE</b> 8/6     |
| <b>OC72 Audio</b> ... .. | List price 17/- | <b>OUR PRICE</b> 8/6     |
| <b>OC78 Audio</b> ... .. | 17/-            | <b>OC78D Driver</b> 17/- |
| <b>OC75 Audio</b> ... .. | 15/-            | <b>OC71</b> ... 25/-     |

The above transistors, which are offered below the list price, are all as supplied to set makers, and are not sub-standard. The last four types are at Mullard list price. Matched pairs of OC71 and OC72 can be supplied at no extra cost.

**"PRACTICAL WIRELESS" POCKET SUPERHET**

**OSMOR** set of Ferrite rod, IFTs and Osc. Coil, 32/6; **REPANCO** TT9, 12/6; **TT10**, 12/6; **J.B. Gang**, 11/-; **ARDENTE** volume control, 10/6; **Wavechange**, S.W.V., 3/9; **CELESTION** 2 1/2in. L.S., 26/9; **OA81** diode, 4/-.

**"TRANS TONIC"**

**TRANSISTOR KIT by BRAYHEAD**

A new educational kit to build four radio receivers. M. and L. wave, and three short-range transmitters. Comprehensive instructions. **NO SOLDERING REQUIRED.** Send for **BRAYHEAD** leaflet. Complete kit ... £5.4.8.

**WE PAY ALL POSTAGE AND INSURANCE**  
**ALL ORDERS DESPATCHED SAME DAY**  
**MONEY WILL BE REFUNDED IF REQUESTED**

**SURBITON PARK RADIO**

(Established over 30 years)

**48 SURBITON ROAD**

**KINGSTON UPON THAMES, SURREY**

Telephone: KIN 5549

Hours: 9 a. m. to 6 p. m. 1 pm. Wed.

We do not close for lunch  
Open all day Saturday

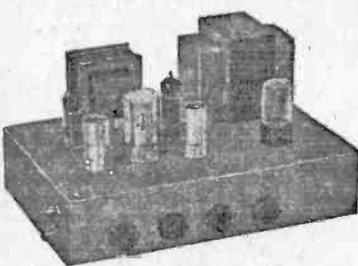
## R.S.C. HI-FI TAPE RECORDER KIT

**REALISM AT INCREDIBLY LOW COST, CAN BE ASSEMBLED IN HALF AN HOUR** The Recorder incorporates the Latest Collaro Studio Tape Transcriber. The Linear LT452 High Quality Tape Amplifier listed 12/20, High Flux P.M. Speaker listed 307, empty Tape Spool, a Reel of Best Quality Tape listed 22/8, and a Handsome Portable carrying Cabinet with latest attractive two-tone polychrome finish, size 18 x 13 x 9 in. high, listed 44/10.0, and circuit. Total cost if purchased individually approximately 240. Performance equal to units in the 260-280 class. S.A.E. for leaflet.

## HIGH FIDELITY 12-14 WATT AMPLIFIER TYPE A11

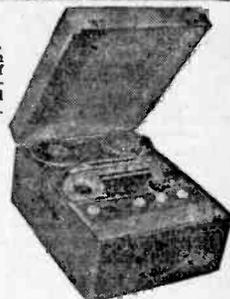
**PUSH-PULL ULTRA LINEAR OUTPUT "BUILT-IN" TONE CONTROL PRE-AMP STAGES**

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 cut-price manufacture. **DIVIDUAL CONTROLS FOR BASS AND TREBLE "Lift" and "Cut."** Frequency response  $\pm 3$  D.B. 30-30,000 c/s. Six negative feedback loops. Hum level 80 D.B. down. **ONLY 23 millivolts INPUT** required for **FULL OUTPUT**. Suitable for use with all makes and types of pick-ups and microphones. Compare 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. 12-9-7in. For A.C. mains 200-250 v. 50 c.p.s. Output for 3 and 15 ohms speakers. Kit is complete to last nut. Chassis if fully punched. Full instructions and point-to-point wiring diagrams supplied. **Only 8 Gns. 10/-** (Or factory built 45/- extra).



**25 1/2**

GNS.  
Carr. 17/6



**H.F. TERMS. Deposit 25.7.6 and 12 monthly payments of 2 gns. Cash price if settled in 3 months.**

**TELEVISION RECTIFIERS.** 250 v. 200 mA. small size. **Only 6/9 each.**  
**RE-ENTRANT SPEAKERS.** Tannoy, 8 watt, 7.5 ohms. **Only 22/8 each.**  
**Parmeko Horn Type.** 10 watt, 15 and 200 ohm matching. 59/6. B.C.A. 20 watt, 15 ohms or 200 ohms. 8 gns.

**COLLARO RC457 4 SPEED MIXER AUTO-CHANGERS.** Turnover Studio Pick-up head, for 200-250 v. A.C. 27/18.6 Carr. 4/8.

**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. Power pentode output. Valve line-up 6K7, 5F61, 6Y80. Selectivity and quality excellent. Simple to construct. Point-to-Point wiring diagrams, instructions and parts list, 1/9. maximum building costs 24/18.6, inc. attractive Walnut veneered wood cabinet 12 x 8 1/2 x 5 1/2 in.

**D.C. SUPPLY KIT.** 12 v. 1 a. consisting of a partially drilled metal case, mains trans. F.W. Bridge Rectifier, 2 fuseholders and fuses. Change Direction switch, variable speed regulator and circuit. For 200-250 v. A.C. mains. Suitable for Electric Trains. Limited number available at 33/6.

If required louvred metal cover with 2 carrying handles can be supplied for 18/9. **TERMS ON ASSEMBLED UNITS. DEPOSIT 24/3, and 9 monthly payments of 24/3.** Send S.A.E. for illustrated leaflet detailing Ready-to-assemble Cabinets, Speakers, Microphones, etc., with cash and credit terms.

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

A complete set of parts for the construction of a stereophonic amplifier giving 5 watts high quality output on each channel (total 10 watts). Sensitivity is 50 millivolts, suitable for all crystal stereo heads. **Control Bass and Treble Controls** give equal variation of "left" and "cut". Provision is made for use as straight (monaural) 10 watt amplifier. Valve line-up ECC83, ECC83, EL84, EL84, E281. Outputs for 2-3 ohm speakers. Point-to-point wiring diagrams and instructions supplied. **Send S.A.E. for leaflet. Full constructional details and price list 2/8.** **8 Gns. Carr. 10/-**

**DEAF AID EARPIECES.** High impedance complete with lead. 15/6. **MICROPHONE INSERTS.** Crystal type. 6/9.

## R.S.C. BATTERY CHARGING EQUIPMENT

### ASSEMBLED CHARGERS

6 v. 1 amp. .... 19/9  
6 v. or 12 v. 1 amp. .... 29/9  
6 v. 2 amps. .... 29/8  
6 v. or 12 v. 2 amps. .... 38/9  
6 v. or 12 v. 3 amps. with ammeter. .... 59/9  
Above ready for use. With mains and output leads. Carr. 3/6.



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

Fitted Ammeter and variable charge rate selector. Also selector plug for 6 v. or 12 v. charging. Louvred steel case with splayed blue hammer finish. Fused and ready for use with Carr. 5/- mains and output leads. **Terms: Deposit 13/3 and 6 monthly payments 13/3.**

**ASSEMBLED CHARGER**  
6 v. or 12 v. 2 amps.

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

### HEAVY DUTY CHARGER KIT

6/12 v. 6 amps. variable output. Consisting of Mains Transformer 0-230-250 v. F.W. Bridge Selenium Rectifier; Ammeter, Multi-Position Switch with Knob; Panels, Plugs, Fuses, Fuseholder and circuit. 59/9. Carr. 4/6.

## R.S.C. MAINS TRANSFORMERS

**FULLY GUARANTEED**

We can quote for special types singly or in any quantity.

Interleaved and impregnated. Primaries 200-250-250 v. 50 c/s. Screened **TOP SHROUDED DRUM TYPE**  
250-0-250 v. 70 mA. 6.3 v. 2 a. 5 v. 2 a. 17/9  
350-0-350 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a. 18/9  
250-0-250 v. 100 mA. 6.3 v. 2 a. 3 v. 1 a. 19/9  
250-0-250 v. 100 mA. 6.3 v. 3.5 a. C.T. 18/9  
250-0-250 v. 100 mA. 6.3 v. 3 a. 5 v. 3 a. 25/9  
300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 25/9  
350-0-350 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 25/9  
350-0-350 v. 100 mA. 6.3 v. 4 v. 4 a. C.T. 25/9  
6.3 v. 3 a. .... 25/9  
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. 29/9  
**FULLY SHROUDED UPRIGHT**  
250-0-250 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a. .... 17/11  
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 29/9  
300-0-300 v. 130 mA. 6.3 v. 4 a. 5 v. 3 a. 28/9  
350-0-350 v. 130 mA. 6.3 v. 4 a. 6.3 v. 1 a. .... 29/9  
for Mullard 510 Amplifier. .... 35/9  
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. 35/9  
425-0-425 v. 200 mA. 6.3 v. 4 a. C.T. .... 49/9  
6.3 v. 4 a. C.T. 5 v. 3 a. .... 49/9

**FILAMENT TRANSFORMERS**  
All with 200-250 v. 50 c/s. Primaries 6.3 v. 1.5 a. 5/8; 6.3 v. 2 a. 7/8; 0-4-6.3 v. 2 a. 7/8; 12 v. 1 a. 7/11; 6.3 v. 3 a. 8/11; 6.3 v. 6 a. 17/8; 12 v. 1.5 a. twice. 17/6.  
**OUTPUT TRANSFORMERS**  
Midget Battery Pentode 661 for 354, etc. .... 3/9  
Small Pentode, 5000  $\Omega$  to 3  $\Omega$  .... 3/9  
Small Pentode 7/8,000  $\Omega$  to 3  $\Omega$  .... 3/9  
Standard Pentode 5,000  $\Omega$  to 3  $\Omega$  .... 5/8  
Standard Pentode 7/8,000  $\Omega$  to 3  $\Omega$  .... 5/6  
10,000 to 3  $\Omega$  .... 5/6  
Push-Pull 10-12 watts 6V8 to 30 or 15  $\Omega$  .... 18/9  
Push-Pull 10-12 watts to match 6V8 354, etc. or 15  $\Omega$  .... 19/9  
Push-Pull EL84 to 3 or 15  $\Omega$  .... 18/9  
Push-Pull 15-18 watts. 6L6, KT68 .... 22/9  
Push-Pull for Mullard 510 Ultra Linear .... 29/9  
Push-Pull 20 watts, "sectionally wound 6L6, KT68, etc. to 3 to 15  $\Omega$ ." 47/8

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

### BATTERY CHARGER KITS

Consisting of Mains Transformer. F.W. Bridge. Metal Rectifier, well ventilated steel case. Fuses. Fuse-holders. Grommets, panels and circuit. Carr. 3/6 extra.  
6 v. or 12 v. 1 amp. .... 24/9  
As above, with Ammeter. 32/9  
6 v. 2 amps. .... 25/9  
6 v. or 12 v. 2 amps. .... 31/6  
6 v. or 12 v. 2 amps. inclusive of Ammeter .... 42/9  
6 v. or 12 v. 4 amps. .... 53/8  
Ammeter and variable charge rate selector. 59/9.  
**CHARGER AMMETERS.**  
0-1.5 a. 0-3 a. 0-4 a. 0-7 a. 0-25 a. 0-80 a. 8/9.

### ELIMINATOR TRANSFORMERS

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

### SMOOTHING CHOKES

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

### CHARGER TRANSFORMERS

All with 200-250-250 v. 50 c/s Primaries:  
0-9-15 v. 1 a. 11/9; 0-9-15 v. 2 a. 14/9; 0-9-15 v. 3 a. 16/9; 0-9-15 v. 5 a. 19/6; 0-9-15 v. 6 a. 23/8; 0-9-15 v. 8 a. 28/8.

### AUTO (Step up/Step down) TRANS.

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

### MICROPHONE TRANSFORMERS

120:1 high grade, damped. 8/9; 120:1 Potted, Mu-metal screened. 9/9.

**R.S.C. A12 STEREOPHONIC AMPLIFIER KIT**

A complete set of parts to construct a Stereo amplifier with an undistorted output total 6 watts. For A.C. mains input of 200-250 v. Outputs for matched 2-3 ohm speakers. Sensitivity 130 m.v. Ganged Vol. and Tone Controls. Preset balance control. Full instructions and point-to-point wiring diagrams supplied. Only good quality components and latest high grade valves used. Exceptionally realistic reproduction can be obtained at ample volume for the home, as can be demonstrated in typical surroundings at our County Arcade premises. A really sensational offer.

**4 Gns.**

**STEREO EQUIPMENT OFFER.**  
Comprising A12 Kit, 2 matched 8in. L/Speakers, £6.19.6 and Acos T/0 Stereo head Carr. 7/6 with sapphire stylus suitable most pick-ups.

**PICK-UP ARMS** complete with Hi-Fi turnover crystal head. Acos GP54. Limited number brand new. Perfect at approx. half price. Only 35/6.

**ACOS CRYSTAL MICROPHONES.** Mic40 stand or desk. Listed 45s. Only 27/8. 39-1 Stick type. Listed 55s. Only 39/6.

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

A highly sensitive Push-Pull high output unit with self-contained Pre-amp. Tone Control Stages. Certified performance figures compare equally with most expensive amplifiers available. Hum level 70 db. down. Frequency response -3 db. 30-30,000 c/s. A specially designed sectionally wound ultra linear output transformer is used with 807 output valves. All components are chosen for reliability. Six valves are used EF86, E188, EOC85, 807, G233. Separate Bass and Treble Controls are provided. Minimum input required for full output is only 12 millivolts so that ANY KIND OF MICROPHONE OR PICK-UP IS SUITABLE. The unit is designed for CLUBS, SCHOOLS, THEATRES, DANCE HALLS or OUTDOOR FUNCTIONS, etc. For use with Electronic ORGAN, GUITAR, STRING BASS, etc. For standard or long-playing records. OUTPUT SOCKET PROVIDES L.T. and H.T. for a RADIO FEEDER UNIT An extra input with associated vol. control is provided so that two separate inputs such as Gram and 'Mike' can be mixed. Amplifier operates on 200-250 v. 50 c/s. A.C. Mains and has output for 3 and 15 ohm speakers. Complete kit of parts with fully punched chassis and point-to-point wiring diagrams and instructions. If required cover as for A8 can be supplied for 18/9. The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6. TERMS: DEPOSIT 31/9 and 9 monthly payments of 61/9.

**11 gns.**

Carr. 10/-  
The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6. TERMS: DEPOSIT 31/9 and 9 monthly payments of 61/9.

**FULL RANGE OF LINEAR AMPLIFIERS ALWAYS IN STOCK.**

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

Type BM1. An all-dry battery eliminator. Size 5 1/2 x 4 1/2 x 2in. approx. Complete kit replaces battery supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 v. and 90 v. This includes late type low consumption types.



Complete kit with diagrams. 39/9, or ready to use. 46/9.

**R.S.C. 3-4 WATT A7 HIGH-GAIN AMPLIFIER**  
For 200-250 v. 50 c/s. Mains input. Appearance and specification with exception of output wattage, as A5 amplifier. Complete kit with diagrams. 23.15.0. Carr. 3/6.

**R.S.C. BRADFORD, MANCHESTER and LEEDS**

**LINEAR L45 MINIATURE 45 WATT QUALITY A.M.P.L.I.F.I.E.R.** Suitable for use with any record playing unit, and most microphones. Negative feedback 12 db. Separate Bass and Treble Controls. For A.C. mains input of 200-250 v. 50 c/s. Output for 2-3 ohm speaker. Three miniature Mullard valves used. Size of unit only 7-5-5 1/2in. 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.

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



Mains input of 200-230-250 v. 50 c/s. Kit is complete in every detail and includes fully punched chassis (with baseplate) with blue hammer finish and point-to-point wiring diagrams and instructions. Exceptional value at only £4.15.0, or assembled ready for use 25/- extra, plus 3/6 carr., or deposit 22/6 and 5 monthly payments of 22/6 for assembled unit.

**R.S.C. PORTABLE GUITAR AMPLIFIER**

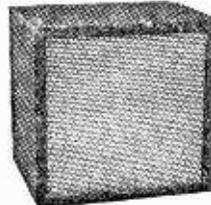
Junior 5 watts High Quality output. Separate Bass and Treble 'Cut' and 'Boost' controls. Sensitivity 15 m.v. Twin inputs. High Flux 8in. Loudspeaker 'built-in'. Handsome, strongly made Cabinet (size approx. 14 x 14 x 7in.) finished in Polichrome, and fitted carrying handle. H.P. Terms. Deposit £1 and 9 monthly payments of £1. Carr. 7/6.  
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 m. elliptical for Treble. Cabinet is well made and finished Polichrome. Size approx. 18 x 18 x 13in. H.P. Terms. Deposit 34/9 and 9 monthly payments of 34/9. Both models for 200-250 v. Carr. 10/- A.C. mains. **15 gns.**

**SPECIAL TRANSISTOR OFFER.** T51 Brimar. Brand new. Perfect. 3 for 10/9

Type BM2. Size 8 x 5 1/2 x 2 1/2in. Supplies 120 v. 90 v. and 60 v. 0.4 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 RECEIVERS** normally using 2 v. accumulator. Complete kit of parts with diagrams and instructions. 49/9, or ready for use. 59/6.

**COLLARO JUNIOR** 4-speed single player units and Hi-Fi crystal pick-up with turnover head. 23.19.6.  
**B.S.R. U.A.S. 4-SPEED AUTO-CHANGERS** with Stereo/Monaural pick-up head. 27.19.6. Carr. 5/-  
No C.O.D. under £1. Post 1/8 extra under £2. 2/8 extra under £5. Trade supplied. S.A.E. with all enquiries. Mail Orders to 25-31 Moorfield Road, Leeds 12. Callers to 5 and 7 County (Mecca) Arcade, Briggate, Leeds 1, and 8-10 Brown Street (Market Street), Manchester 2, or 56 Morley Street (next to Majestic Ballroom), Bradford.

**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. Carr. 5/-. Terms: Deposit 11/3 and 5 monthly payments of 11/3.  
**15in. 20 WATT HI-FI LOUD-SPEAKERS IN CABINETS.** Size 18 x 18 x 18in. Finish as above. Terms: Deposit 17/9 and 9 monthly payments of 17/9. Only £7.19.6. Carr. 8/6.

and 5 monthly payments of 11/3.  
15in. 20 WATT HI-FI LOUD-SPEAKERS IN CABINETS. Size 18 x 18 x 18in. Finish as above. Terms: Deposit 17/9 and 9 monthly payments of 17/9. Only £7.19.6. Carr. 8/6.

A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolts input is required for full output so that it is suitable for use with the latest high fidelity pick-up heads, in addition to all other types of pick-ups and practically all 'mikes'. Separate Bass and Treble Controls are provided. These give full long-playing record equivalent. Hum level is negligible being 70db. down. 10db. of Negative feedback is used. H.T. or 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 finished in Polichrome, and fitted carrying handle. H.P. Terms. Deposit £1 and 9 monthly payments of £1. Carr. 7/6.

**AM F.M. RADIOGRAM CHASSIS** for 200-250 v. A.C. mains only. 3 wavebands. V.H.F., Medium and Long. Built in Ferrite rod aerial. Attractive glass dial size 16in. long by 4in. high. Valve line up EF85, ECH81, EOC85, EA8C80, EL84, E280. High quality output of up to 4 watts. Overall size 16 1/2in. x 4 1/2in. x 5 1/2in. Only £12.9.6. Carriage 10/-

**PLESSEY DUAL CONCENTRIC 12in. 15 ohms HIGH FIDELITY SPEAKER** (12,000 lines) with built-in tweeter (completely separate elliptical speaker with choke, condensers, etc.) providing extraordinarily realistic reproduction when used with our A5 or similar amplifier. Rates 10 watts. Price only £5.19.6.

**HI-FI CRYSTAL PICK-UP HEADS.** (Turnover type with sapphire stylus). HGFS9. Standard design for Garrard and B.S.R. B.S.R. Pul-5, Garrard GC2, 19/9. B.S.R. Stereo/Monaural 39/11

**P.M. SPEAKERS.** 2-3 ohm, 2in. Perdio 21/8. 5in., 17/9. 6in., 16/9. 8in., 19/9. 8 x 5in. 25/8. 10in. 26/9. 10 x 8in. 29/9. 12in. 29/11. 10in. W.B. 'Stentorian' 3 or 15 ohms type HF1012 10 watts. hi-fidelity type. Recommended for use with our A8 Amplifier. £4.10.9. 12in. Plessey 3 ohms 10 watts (12,000 lines). 59/8.

**TWEETERS.** Plessey 3in 19/9, 15n 25/9.  
**GL3A 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. 50 c/s. A.C. mains. Over-all size 1 1/2 x 2 1/2 x 2in. Controls: Vol. and Tone with switch. Guaranteed 12 months. Only 59/6.

**SUPREKET FEEDER UNIT.** Design of a high quality Radio Tuner Unit, completely suitable for use with any of our Amplifiers. Delayed A.V.C. employed. The W.Ch. Sw. incorporates Gram position. Controls as Tuning, W.Ch. and Vol. only 220 v. 15 mA. H.T. and L.T. of 6.3 v. 1 amp. required from amplifier. Size of unit approx. 9-6-7in. high. Simple alignment procedure. Point-to-Point wiring diagrams, instructions and priced parts list with illustration. 2/6. Total building cost £4.15.0. For descriptive leaflet send S.A.E.

THE WORD **MAXI-Q** IS THE REGISTERED TRADE MARK  
 OF DENCO (CLACTON) LIMITED  
 IT IS ALSO A GUARANTEE OF  
 WORKMANSHIP & TECHNICAL PERFORMANCE

OUR RANGE OF PRODUCTS IS SO GREAT THAT WE NOW HAVE TO REQUEST THE AMOUNT OF 1/4d. FOR OUR GENERAL CATALOGUE AND TO SAVE YOU POSTAL ORDER POUNDAGE CHARGE WE REQUEST SEND 1/4d. IN STAMPS.

### MODULATED TEST OSCILLATOR MTO. 1

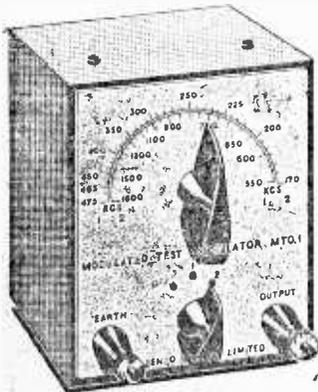
- ★ Provides a modulated signal suitable for I.F. alignment, also trimming and tracking R.F. circuits.
- ★ Frequency is continuously variable from 170-475 kc/s and 550-1,600 kc/s.
- ★ Suitable for the alignment of transistor receivers.
- ★ Operates from a single 9-volt grid-bias battery (not supplied) which is housed within the unit.
- ★ The case is manufactured from steel and is finished in silver hammer. The front panel is gloss black bearing white lettering. Dimensions are 5 1/16in. x 4 1/16in. x 3in.
- ★ Supplied with full operating instructions.

PRICE £3/17/6

PLEASE SEND S.A.E. WITH ALL ENQUIRIES

**DENCO (CLACTON) LTD.**  
 (DEPT. W.W.)

357/9 OLD ROAD, CLACTON-ON-SEA, ESSEX



#### STOP PRESS

Components for the "BRIMAR CRYSTAL CONTROLLED F.M. TUNER". Completely punched aluminium Chassis and gold hammer finished Front Panel, 10/10. BX/IFT. 1 (L5, L6), 7/6. BX/IFT. 2 (L7, L8), 7/6. BX/RDT (L9, L10, L11), 12/6. BX/L3 (L3), 4/3. BX/L1-2 (L1, L2), 2/9. BX/L4 (L4), 2/3.

## 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 £20 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 ATTER YOUR NAME!

A.M.I. Mech.E.  
 A.M.I.C.E.  
 A.M.I. Prod.E.  
 A.M.I.M.A.  
 L.I.O.B.  
 A.F.R.Ae.S.  
 B.Sc.

A.M.Brit.I.R.E.  
 City & Guilds  
 Gen. Cert. of Education  
 Etc., etc.

### 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

# CLYNE RADIO LTD



162 HOLLOWAY ROAD, LONDON, N.7  
18 TOTTENHAM COURT ROAD, W.1  
99 CHEAPSIDE, LONDON E.C.2

## THE COMPONENT SPECIALISTS

NORTH 6295/6/7  
MUSEum 5929/0095  
MONarch 6860

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

**OPEN:** Tottenham Court Rd., and Cheapside: 9 a.m. to 6 p.m. Mon. to Fri., Sat. 1 p.m. Holloway Rd.: 9 a.m. to 6 p.m. daily. Thurs. 1 p.m. Sat. 5.30 p.m.  
Our Advantageous H.P. and Credit Sale Terms are available on any single item over £5. Your enquiries invited. Please print your name and address

### LIMITED IMPORT QUOTA ONLY! OUTSTANDING BUY!

#### MODEL U.I. MULTI-RANGE TESTMETER

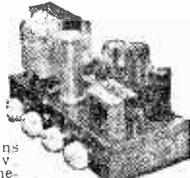


Ideal for amateurs and service engineers. Incorporates 5in. rectangular meter. Ranges: A.C. & D.C. voltage, 0-10-50-250-500-1000 v. D.C. current 0-100-500-1000 v. 0-1 mA (used at 0-10 v. range). Resistance 1-2000 ohms (centre 24 ohms), 100-200,000 ohms (centre 2.4 k.). Sensitivity 1000 ohms per volt A.C. & D.C. Size 5 x 3 x 2 1/2 in. Wt. 22 ozs. only. Fully guaranteed. Supplied complete and ready to use with test leads, at the very low price of **ONLY 79/6** P. & P. 3/6.

(Bona fide trade enquiries invited).

### THE R.C. 3/4 WATT AMPLIFIER

Compare the advantages. Triebler base AND middle controls. For crystal or magnetic pick-up. A.C. Mains 200/250 v. Valve line-up: 6V6GT, 6X6GT, metal 6X5GT. Negative feedback. Built on stove enamelled steel chassis, measuring only 3 x 4 x 1 1/2 in. Four engraved cream knobs are included in the price of the complete kit with all necessary practical and theoretical diagrams at £4.5.0 only, plus 2/6 p. & p. Instruction Book fully illustrated for 1/- post free. This amplifier can be supplied assembled, tested, and ready for use at £5.5.0—plus p. & p.



### NEW! THE "PAGEBOY" 2-TRANSISTOR "POCKET PORTABLE"

Completely portable—No External Aerial or Earth Req'd. An amazing little receiver with built in aerial, and small enough to be held in the palm of the hand. Medium wave reception at wonderul volume. No hidden condenser tuned! Supplied with drilled chassis and colour coded components. Easily assembled with the aid of the easy-to-follow assembly instructions provided. Total cost of all necessary components, including transistors, wiring wire and even solder. **ONLY 92/6**, plus 1/6 P. & P. Battery 1/2 extra. Ardente type deaif earpiece complete with cord and plugs 12/6 extra. Parts price list and Easy Lay-out Plans 1/- post free. Callers welcome to hear this set demonstrated at any of our branches. Our reputation is your guarantee.



### RADIO JACK

Covers local medium wave stations variably tuned. Compact self contained unit requiring only connection to aerial (no power supplies req'd.) for 1st class reception when used in conjunction with your tape recorder or high gain amplifier. All necessary parts available at a special inclusive price of **ONLY 19/6**, P. & P. 1/6.

### PLATE LAYERS

Full range at usual competitive prices. Interesting H.P. facilities. **COLLARO JUNIOR** 4-speed turntable and pick-up complete with crystal cartridge and sapphire styl. **SPECIAL OFFER** at only **75/6** plus 2/6 P. & P.



### JUST ARRIVED!

**LATEST GARRARD MODEL 310**. Four-speed manual or automatic. 10in. and 12in. records of same speed can be mixed in any order. wired for stereo. attractive white colour scheme. Price 101/6, plus 3/6 P. & P.  
**L.A.T.O.N. H.S.K. 414**. 4-speed. Attractive appearance. Wired for stereo. Fully g'reed. £7.19.6. 3/6 P. & P.  
**B.S.R. U.A.S STEREO/MONAURO** Four only at £7.19.6. plus 3/6 P. & P. Brand new. Guaranteed.  
**COLLARO CONQUEST**. 4-speed, wired for stereo. Brand new. £7.19.6. P. & P. 3/6.

### A CONSTRUCTOR'S MUST

The latest "Plico" Instrument Bit Soldering Iron With Infrared Stand and built-in Spot-light for illuminating work. 200/250 v. **ONLY 22/6**, P. & P. 1/6.  
**LIGHTSPEAKERS. EX. CHASSIS**. As new guaranteed perfect, by leading manufacturers. 5in. 9/6; 6in. 10/6; 8in. 13/6; also 10in. with O.P. transformer (5,000 ohms). 17/6.  
All 3 ohm speech coil, also 8in. available, in attractive cloth covered cabinet, ideal for extension speaker. 22/6. Each item plus 1/6 p. & p. Complete list of new speakers on request.

Have you tried the famous American Ferrodynamics "BRAND FIVE" Recording Tape. An enthusiast's must!

High Quality Acetate Base: 5" 600ft., 16/-; 5" 900ft., 18/6; 5" 1,200ft., 23/6; 7" 1,200ft., 25/-; 7" 1,800ft., 35/-; Extra Quality Mylar Dupont: 3" 300ft., 13/-; 5" 1,200ft., 37/6; 7" 1,800ft., 44/-; 7" 2,400ft., 60/- Each on plastic spool. All post free.

### BRAND NEW—NOT SUB-STANDARD

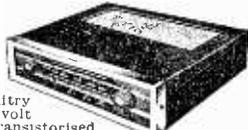
**"PRACTICAL WIRELESS" POCKET SUPERHET** All required components for the Pocket Superhet as described in November issue now available at special inclusive price of £9.15.6 complete, including Printed Circuit. All items available separately. send stamp for list.



### PRINTED CIRCUIT CAR RADIO

(for Home Construction)

We are proud to be able to offer this New type car radio employing up-to-the-minute circuitry special 12 volt valves and transistorised output stage. The highest degree of sensitivity is assured by the incorporation of Permeability Tuning and a tuned R.F. Stage. Covers Medium and Long Wavebands. **NO VIBRATOR PACK IS REQUIRED.** This is a really complete receiver that will fit any car. Comprehensive assembly instructions are provided with all necessary components, including valves and transistor at a Special New Low Inclusive Price of **ONLY £11.19.6** plus 3/6 P. & P. Instruction booklet with itemised price list, full description dimensions, etc., available separately at 3/6 post free.



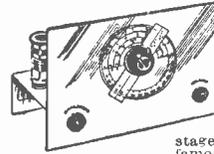
### SUPER PERSONAL PORTABLE

A wonderful little set that you can take anywhere. Ideal for camping, picnics, etc. Detachable aerial rod supplied. Covers Medium waveband 200-500 metres. Can be built in approx. 1 hour. All necessary components available at the following **SPECIAL INCLUSIVE PRICES:** 1-valve version **ONLY 35/-** plus 2/- P. & P. Super 2-valve version **ONLY 41/-** plus 2/- P. & P. Send for point-to-point wiring diagram and parts price list 2/- post free. Extra for use with the above D.H.5 balanced armature headphones. 7/6 pair.



### 1 VALVE SHORT-WAVE RADIO

World-wide coverage at most reasonable cost. Covers 40-100 metres with the coil supplied. Can be extended to cover 10-100 metres. Provision is also made for the addition of two extra valve stages. Employs the famous Acorn-type 954 valve. All necessary components can be supplied complete with full assembly instructions at **ONLY 35/-** plus 2/- p. & p. Send 2/- for point-to-point wiring diagram and price list.



### TO BUILD YOURSELF

We are the experts in this field and have no less than 45 different items for the home constructor including Portable Radios, Jason Tuners, Test equipment etc. etc., even an electronic organ. Send stamp for comprehensive list of equipment to build yourself also our current competitively priced valve list.

### "FAMILY FOUR"

Our supersensitive T.R.F. Receiver for home construction. Covers Long and Medium Wavebands, is housed in very smart plastic table cabinet in Brown or Black. For A.C. mains 200/250 v. Comprehensive assembly instructions provided, including practical and theoretical diagrams, which are easy to follow and will enable you to complete this receiver which will be the envy of your friends. **ALL NECESSARY COMPONENTS ARE BEING OFFERED FOR LIMITED PERIOD ONLY** at the **REMARKABLE PRICE OF ONLY 79/6**, plus 2/6 P. & P. Instruction book available separately if you wish to study before purchase at 1/6 post free.





**DE LUXE TAPE RECORDER CABINET**



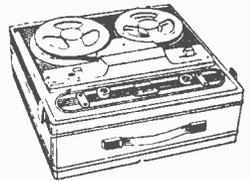
Beautifully made Tape Recorder Cabinet. Size: 13 x 10½ x 7in. Covered in two-tone coloured rexine cloth. Stylish design. Carrying handle and detachable lid. Easily adapted to Record Player Cabinet.. P. & P. 4/6.

**29/9**

**TAPE RECORDER**

29 gns. NOW 18 gns.

FAMOUS MANUFACTURER UNREPEATABLE VALUE



Huge purchase allows us to offer at this amazing price. Beautifully styled rexine covered cabinets. Colours: Red. Grey Black. Storage space for 4 tapes, mike and lead, incorporating latest B.S.R. deck. LOOK AT THESE EXPENSIVE FEATURES: Record playback switch and rewind with interlocking device to prevent accidental erasure. Tone and volume controls. Superimpose and electronic eye. Small overall size 14½ x 14½ x 7½in. Lightweight, 21 lbs. 5½in. standard tape. Fully guaranteed. Terms: Carr. and Ins. 12/6. Mike 27/6 extra. Tapes 19/9.

**The "STUDIO TWIN"**

40 GNS. NOW ONLY **29** GNS.

Quality Twin Speaker Tape Recorder at amazing low price. 7in. Standard reels. Latest Studio 3-speed Deck. 1½, 3½, 7½ I.P.S. Includes Twin Track reverse counter. Pause control and magic eye recording indicator. Volume and tone control, superimpose switch. Two matched speakers. 3 watts output. Attractive cabinet in Beige. Size: 19 x 13 x 8in. Fully guaranteed. Ins. and Carr. 12/6. Mike 27/6 extra. Tapes 25/-.



**DE LUXE TAPE RECORDER**

31 gns. OUR PRICE **22** gns.



Beautifully styled rexine covered cabinet in Red/Beige, with carrying handle. Size: 14½ x 13 x 9½in. Storage space in lid for tapes and mike. Speed 3½in. per second. Compact set using latest 5-valve amplifier with 4 stage amplification, and separate valve for Bias osc. 2 controls. Contains 7 x 4in. elliptical speaker, and incorporating B.S.R. Tape Deck. 5½in. standard tape. Fully guaranteed. Ins. and Carr. 12/6. Terms.

**TAPE RECORDER AMPLIFIER**

Compact, well designed 5-valve amplifier. Output 3.5 watts. Valve line up, ECC83. Double triode first audio amplifiers. ECL82 triode pentode further audio amplifier and output valve. 6BW6 bias and erase oscillator. EMB4 record level indicator. EZ80 H.T. rectifier. Input for mike, radio and gram. Controls: record, playback volume and on/off playback tone. Dia: 8½ x 3 x 4½in. Ins. and Carr. 4/6. Terms. Extras: Knobs 2/6 per set. Beautiful Perspex dial plate. Complete with sockets for mike, radio and superimposed switch. 3/6.

**£7.19.6**

**RECORD PLAYER CABINET R.P.9 19/6**

Exceptional offer. A lightweight portable player Cabinet in two-tone Rust and Cream. Famous manufacturer. Size: 14½ x 11½ x 6in. Complete with moulded deck board of attractive design. Takes B.S.R. TU9 single player; 2 control amplifier; 5in. round speaker. P. & P. 4/6.

**EXTENSION SPEAKERS 19/9**

5in. P.M. Speakers fitted into polished cabinets. Standard matching to any receiver. (Complete). Switch and Flex included. P. & P. 3/9.



**17" TV's**

ONLY **17½** gns.

**MODERN CHASSIS, MODIFIED**

Complete 17in. tube. VALVES — SPEAKER — KNOBS. Tuned ITV/ BBC. Ready to use. Fully guaranteed tubes 12 months, valves three months. Cabinet to fit, £1.11.6 if ordered with set. Salvage Set, tube, cabinet, despatched separately. Carr and ins. on set, £1.5.0; on cabinet, 8/6.

**RECORD PLAYER CABINET R.P.2.**

Made by famous manufacturer. In polka dot cloth with clipped lid and carrying handle. Size 16 x 14½ x 8½in. deep Carr and Ins. 4/6 Takes B.S.R. Monarch Auto-changer £6.19.6; 7 x 4in. Elliptical speaker 15/9. Our M.D2 portable amplifier 79/6.



only **59/6**

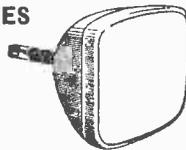
VALVES SALVAGED. Over 100 types to be CLEARED at 9d. each.

**REPLACEMENT, REBUILT TV TUBES**

**12 MONTHS' GUARANTEE**

Terms available over 10 weeks

Carr. and Ins. 15/-



21" TUBE £8.10.0  
 17" TUBE £7.10.0  
 12" 14" 15" TUBES £5.10.0

**£2** ALLOWED ON OLD TUBE  
**£1** ALLOWED ON OLD TUBE

**BAKELITE CABINETS 2/9**

Brand new. Colour brown. Attractive design. Size: 12 x 7 x 5½in. Ideal small receivers, converters, etc. P. & P. 3/9.

**TELEPHONE SETS 7/9**

Ex W.D. Wireless remote control unit. E.M.K.11 (ZA11954). Including morse tapper, switches, jack plugs, etc. Less phone. Ins. and Carr. 3/6.

**DUKE & CO.** (LONDON) 621/3 Romford Rd. Manor Park, E.12. I.L.F. 6001/3.

SEND FOR FREE CATALOGUE



# Stern's "fidelity" TAPE RECORDERS

**BEFORE YOU BUY  
—YOU SHOULD  
HEAR THESE**

**RECORDERS. THEY ARE COMPARABLE  
TO THE MUCH HIGHER-PRICED MODELS**

There are no better value-for-money Tape Recorders on the market—if you can't call and hear them, send S.A.E. for fully descriptive leaflets.

**MODEL CR3/S** Incorporates the New COLLARO "STUDIO" TWIN TRACK 3-speed Deck H.P. Terms: Deposit £7.18.0 and 12 months of £39.10.0

**MODEL CR3/T** Incorporates the very popular 3-speed COLLARO MK. IV "TRANSCRIPTOR" Deck which has both upper and lower tape tracks. H.P. Terms: Deposit £9.10.0 and 12 months of £39.9.8.

**MODEL TR3/MK. VI** Incorporates the New £49.10.0 TRUVOX MK. VI TWIN TRACK 3-speed Tape Deck H.P. Terms: Deposit £9.18.0 and 12 months of £3.12.7.

All prices quoted provide for the COMPLETE RECORDER including CRYSTAL MICROPHONE and 120 ft. Spool of Tape.

Each Model incorporates the highly successful HF/TR3 Amplifier (described opposite) thus ensuring truly "Hi-Fi" record and playback facilities.

## TAPE AMPLIFIERS and PRE-AMPLIFIERS PRESENTED FROM MULLARD DESIGNS

### MODEL HF/G2A-D

A complete self-contained Tape Recorder chassis incorporating Loudspeaker and comprising the Model HF/G2A Amplifier connected to the Garrard Tape Deck. Operates at 3 1/2 in./sec. speed and supplied fully tested and ready for immediate operation, designed for easy fixing into a portable case or cabinet only four fixing screws being required.

**PRICE £25.0.0** (Including a 4 in. spool of Long Play Tape.) Terms, Dep. £5.0.0, 12 months £1.18.8.

Alternatively we offer Complete Kit of Parts to build the HF/G2A Amplifier with the ASSEMBLED AND TESTED GARRARD TAPE DECK for **£22.0.0** Terms, Deposit £4.8.0, 12 months £1.12.3.

The model HF/G2A is available separately for  
(a) COMPLETE KIT OF PARTS £11.0.0  
(b) ASSEMBLED £12.15.0



### MODEL HF/G2P-D

THE IDEAL "LINK" TO ADD FULL TAPE RECORDING FACILITIES TO HIGH QUALITY HOME INSTALLATIONS. RADIOGRAMS, etc. Comprises the HF/G2P Tape Pre-amplifier fitted to the Garrard Tape Deck, operates at 3 1/2 in./sec. speed, connects into the tape input channel or pick-up sockets of existing Amplifier or Radio Chassis. COMPLETE WORKING UNIT, containing 4 in. spool of Long Play Tape.

**PRICE £23.15.0** Terms, Dep. £4.15.0, 12 months £1.14.10.

Alternatively we offer Complete Kit of Parts to build the HF/G2P Pre-amplifier with the ASSEMBLED AND TESTED GARRARD DECK for **£20.15.0** Terms, Dep. £4.3.0, 12 months £1.10.5.



Model HF/G2P-D Contains the Model HF/G2A-D Unit (described opposite). A small robust recorder with outstanding performance. Truly portable, weighs only 22 lbs. Twin Track operates on 3 1/2 in./sec. speed.

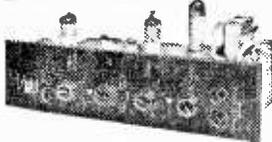
**PRICE £29.15.0** H.P. Terms, Deposit £8.0.0, and 12 months at £2.3.7.

The pre-amplifier Model HF/G2P is available separately for  
(a) Complete Kit of Parts £9.10.0  
(b) Assembled £11.5.0.

### MODEL HF/TR3 TAPE AMPLIFIER

(Mullard Type "A" design) A very high quality Amplifier incorporating 3-speed treble equalisation, using the latest FEROXUCUBE POT CORE INDUCTOR. FOR COLLARO-TRUVOX-BRENELL-WEARITE or MOTEK Tape Decks, has GILSEN Output Transformer. Includes separate Power Supply Unit.

**£12.15.0** OR **£16.10.0**  
KITS OF PARTS ASSEMBLED  
H.P. Deposit £3.6.6 and 12 months at £1.4.2.



### MULLARD TYPE "C" TAPE PRE-AMPLIFIER—ERASE UNIT

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

**£14.0.0** H.P. £3.8.0 Deposit and 12 months £1.4.11. OR ASSEMBLED **£17.0.0**



(Excluding power unit £11.15.0 and £14.10.0 respectively).  
(a) COMPLETE KIT to build the HF/TR3 Amplifier, together with the COLLARO "STUDIO" DECK. As above but with HF/TR3 supplied ASSEMBLED AND TESTED **£25.10.0** **£29.0.0**

(c) COMPLETE KIT to build the HF/TR3, together with the Mk. IV COLLARO "TRANSCRIPTOR" TAPE DECK AND POWER UNIT **£30.15.0**

(d) extra II we are required to wire up Deck Switch Banks. As above but HF/TR3 supplied ASSEMBLED AND TESTED **£34.10.0**

(e) extra II we are required to wire up Deck Switch Banks. COMPLETE KIT to build the HF/TR3, together with the NEW TRUVOX MK. VI TAPE DECK... **£36.0.0**

(f) As above but HF/TR3 supplied ASSEMBLED AND TESTED **£39.10.0**

(g) COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENELL Mk. V TAPE DECK... **£41.10.0**

(h) As above but HF/TR3 supplied ASSEMBLED AND TESTED **£45.0.0**

(i) THE WEARITE 4A DECK with assembled and tested HF/TR3 Amplifier including WEARITE Head Lift Transformer. **£55.0.0**

H.P. Deposit £11.0.0, and 12 months £4.0.8. Carriage and Insurance on each above is 10/- extra. Attractive PORTABLE CASE is available to accommodate the TRUVOX or COLLARO TAPE DECKS and we offer it, together with ROLA/CELESTION 10 x 8 in. LOUDSPEAKER—ACOS CRYSTAL MICROPHONE—and 120ft. SPOOL E.M.I. TAPE—ALL FOR £9.10.0. Carriage and Insurance 5/- extra.

## FOR THE HOME CONSTRUCTOR SPECIAL "COMBINED ORDER" PRICES

- (a) The COLLARO "STUDIO" TAPE DECK and our Mullard Type "C" PRE-AMPLIFIER and Power Unit Assembled and Tested. **£29.10.0**  
H.P. Deposit £5.18.0 and 12 months £2.3.3.
- (b) As above but TYPE "C" PRE-AMPLIFIER supplied as complete KIT OF PARTS. **£26.10.0**
- (c) The COLLARO MK. IV TAPE DECK and the MULLARD TYPE "C" PRE-AMPLIFIER and Power Unit assembled, tested. **£35.0.0**  
H.P. Deposit £7. and 12 months £2.11.4.
- (d) As (c) but Type "C" as COMPLETE KIT OF PARTS. **£32.0.0**
- (e) The TRUVOX MK. VI DECK and the assembled Type "C" Pre-amplifier and Power Unit. **£40.0.0**  
H.P. Deposit £8.0.0, and 12 months £2.18.3.
- (f) As above but Type "C" as complete KIT OF PARTS. **£36.10.0**
- (g) The BRENELL MK. V DECK and the assembled Type "C" PRE-AMPLIFIER and POWER UNIT. **£46.0.0**  
H.P. Deposit £9.4.0, and 12 months £3.7.6.
- (h) As (g) but Type "C" as complete KIT OF PARTS. **£43.0.0**
- (i) THE WEARITE 4A DECK with TYPE "C" assembled and tested. **£56.0.0**  
H.P. Deposit £11.4.0, and 12 months £4.2.1.  
(Carriage and Insurance on above quotes 10/- extra.)

EACH OF THE ABOVE CAN BE SUPPLIED IN A PORTABLE CASE THUS FORMING A COMPLETE PORTABLE PRE-AMPLIFIER. (FULL DETAILS ON REQUEST)

FULLY DESCRIPTIVE LEAFLETS ON ALL OF ABOVE ARE AVAILABLE—BUT PLEASE ENCLOSE S.A.E. AND STATE WHICH LEAFLET IS REQUIRED.

# STERN RADIO LTD.

# STERN'S MULLARD DESIGNS

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

## COMPLETE KIT OF PARTS— MULLARD "5-10" MAIN AMPLIFIER

For use with the MULLARD 2-valve pre-amplifier with which undistorted power output of up to 10 watts is obtained. We supply SPECIFIED COMPONENTS and NEW MULLARD VALVES, including PARMERKO MAINS TRANSFORMER and choice of the latest Ultra-Linear PARMERKO or the PARTRIDGE Output Transformer. PRICE COMPLETE KIT (PARMERKO Output Trans.)

Alternatively we supply ASSEMBLED and TESTED. ABOVE INCORPORATING PARTRIDGE OUTPUT TRANSFORMER, £1.6.0 EXTRA



## MULLARD'S PRE-AMPLIFIER 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 KITS OF PARTS £6.6.0 ASSEMBLED AND TESTED £8.0.0

Supplied strictly to MULLARD'S SPECIFICATION and incorporating:

- Equalisation for the latest R.L.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.



## COMPLETE MULLARD "5-10" 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 PARMERKO MAINS TRANSFORMERS and choice of the latest PARMERKO or PARTRIDGE ULTRA-Linear Output Transformers.

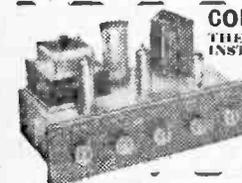
KIT OF PARTS £11.10.0 OR ASSEMBLED and TESTED £13.10.0

HIRE PURCHASE (Assembled Amp. only). DEPOSIT £2.14.0. 12 months at 19/10. ABOVE INCORPORATING PARTRIDGE OUTPUT TRANS. £1.6.0 extra



## COMPLETE MULLARD "3-3"

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 £8.19.6 (plus 6/6 carriage and insurance) H.P. Terms: Deposit £2.0.0 and 8 Months at £1.0.0. Complete to MULLARD'S SPECIFICATION including Mullard valves and a PARMERKO OUTPUT TRANSFORMER.



## STEREO "3-3" MAIN AMPLIFIER

Comprises two MULLARD 3-3 Main Amplifiers on one chassis. Operates with MULLARD STEREO PRE-AMPLIFIER. Output power 6 watts. Inputs for Crystal Pick-up and Radio Tuner. KIT OF PARTS £10.0.0 OR ASSEMBLED £11.15.0

## COMPLETE STEREO AMPLIFIER

Meets the many requests for a low priced but good quality Stereophonic Amplifier. Output power is 4 watts and suitable for Crystal Pick-ups. KIT OF PARTS £8.10.0 OR ASSEMBLED £10.10.0

## !! RECORD PLAYERS !!

THE LATEST MODELS ARE IN STOCK, MANY AT REDUCED PRICES

SEND S.A.F. FOR ILLUSTRATED LEAFLET

B.S.R. MONARCH UA8 4-speed mixer Autochanger with Crystal Pick-up. £6.19.6

THE NEW COLLARO MODEL RP594 4-speed Single Record Player. Studio Cartridge. £9.18.9

THE COLLARO "CONQUEST" 4-speed Autochanger Studio Pick-up. £7.10.0

THE COLLARO 4-speed Single Record Player. Studio Pick-up. £6.9.6

THE NEW B.S.R. Model UA12 in Stock. A4 "SPEED" MIXER AUTOCHANGER. £8.7.6

U.A.B. also available incorporating the B.S.R. STEREO Pick-up, plays L.P. and 78 Records. £10.10.0

GARRARD MODEL TAMM.H 4-speed Player fitted high output Crystal Pick-up. £8.10.0

GARRARD MODEL RC.240. Autochanger 4 speeds. High output. Crystal Pick-up. £10.10.0

Carriage and Insurance on each above. 5/- extra.

H.P. TERMS AVAILABLE ON EQUIPMENT OVER £9.

DESCRIPTIVE LEAFLETS AVAILABLE FOR ALL EQUIPMENT. PLEASE SEND S.A.F.

Dept. P.W. 109 FLEET ST., LONDON, E.C.4

Telephone: FLEET STREET 5812/1/4

## PRICE REDUCTIONS

(a) The KIT OF PARTS to build both the "5-10" Main Amplifier and the 2-valve PRE-AMP CONTROL UNIT. £15.15.0

(b) The "5-10" and the 2-stage PRE-AMP both ASSEMBLED and TESTED H.P. Dep. £8.16.0 and 12 months at £1.7.5. £18.18.0

(c) THE KIT OF PARTS to build the DUAL-CHANNEL "3-3" AMPLIFIER and the DUAL-CHANNEL PRE-AMPLIFIER CONTROL UNIT. £21.10.0

(d) THE DUAL-CHANNEL "3-3" AMPLIFIER and the DUAL-CHANNEL PRE-AMPLIFIER CONTROL UNIT BOTH ASSEMBLED and TESTED. H.P. Terms: Deposit £5 and 12 months at £1.6.8. £25.0.0

(e) THE KIT OF PARTS to build one "5-10" MAIN CHANNEL and the DUAL-CHANNEL PRE-AMP CONTROL UNIT. £21.10.0

(f) ONE "5-10" AMPLIFIER and the DUAL-CHANNEL PRE-AMPLIFIER both ASSEMBLED and TESTED. H.P. Terms: Deposit £7.4.0. 12 months at £2.12.0. £31.0.0

(g) TWO "5-10" AMPLIFIERS and the DUAL-CHANNEL PRE-AMPLIFIER CONTROL UNIT BOTH ASSEMBLED and TESTED. H.P. Terms: Deposit £7.4.0. 12 months at £2.12.0. £36.0.0

Prices quoted are subject to £1.6.0 extra for Partridge Transformer.

## STEREO PRE-AMPLIFIER

This model incorporates two Mullard 2-valve Pre-Amplifiers combined into a single unit. It can be used for both STEREO-PHONIC or MONAURAL operation. It is designed primarily to operate with our MULLARD MAIN AMPLIFIERS but will also operate with Amplifiers requiring an input of 250 mvolts.

COMPLETE KIT £12.10.0 OR ASSEMBLED AND TESTED £15.0.0

H.P. Dep. and 12 months at £1.2.0

MODEL 1.L. one microphone input matched for moving coil or Ribbon Mike. £1.17.0 extra.

range of MULLARD MAIN AMPLIFIERS

equally well with any make of Amplifiers requiring an input of 250 mvolts.

## MULLARD FOUR CHANNEL MIXER UNIT

Self powered with Cathode follower output. Incorporates Two inputs for MICROPHONES. One for CRYSTAL PICK UP and a fourth for RADIO or TAPE.

Complete Kit of Parts £8.8.0 Assembled and Tested £10.0.0

TERMS: Deposit £2 and 12 months at 15/-.

## Mk.11 "Fidelity" FM TUNING UNIT

An attractively presented Unit incorporating MULLARD PERMEABILITY TUNING HEART and corresponding Mullard valve line up. FOR THE £10.10.0 ASSEMBLED £14.5.0 CONSTRUCTOR

## A SPECIAL CASH OFFER!!

This very attractive PORTABLE AMPLIFIER CASE together with a good quality GRAM AMPLIFIER and a matched P.M. SPEAKER. For ONLY £8.7.6 (Plus 7/6 Carr. & Ins.)

The Amplifier consists of a 2-stage design incorporating 3 modern B.V.A. valves and has separate BASS and TREBLE CONTROLS.

The Portable Case will also accommodate almost any make of Autochanger and is attractively finished in Mushroom Grey Rexine. WE ALSO SUPPLY SEPARATELY: (a) The 2-stage (plus Record) AMPLIFIER £4.2.6 (b) THE PORTABLE CARRYING CASE £3.17.6 (c) 6-in. P.M. SPEAKER 18/9 Carriage and Insurance 4/- extra



# EASY AS A.B.C. TO BUILD

The new, exciting De Luxe "Gold Star" Pocket Radio in beautiful moulded plastic case—This model is a highly sensitive, self-contained set covering all medium waves. Uses modern miniature "button-base" valve and specially designed high efficiency coil. Exceptionally easy to build from our step-by-step plans—the case is supplied ready drilled! Size of radio only 4 1/4 in. x 2 1/4 in. x 1 1/4 in. —and batteries fit inside. We can supply all parts including case, detachable aerial, instruction book, wire, screws, etc., for only 37/6, plus 2/6 Post and Packing. C.O.D.

**37/6**



2/- extra. (Parts sold separately. Priced parts list 1/6.)



Our engineers have designed a novel Wrist-Watch Radio using latest Transistor Techniques. Size only 1 1/4 in. x 1 in. x 1 1/4 in. —"Feather-weight"—yet gives clear, crisp, personal-phone reception over all medium waves. Tiny battery inside lasts months—costs 6d. No snags, anyone can build it in an hour or two using our pictorial step-by-step simple plans. All parts supplied (including case and strap) for only 29/6 (add 2/6 Post, etc.). C.O.D. 2/- extra. All parts sold separately. Priced parts list 1/6. Send Now!

Can Be Built for 47/6. Build this exceptionally sensitive high efficiency personal phone radio. Uses unique assembly system and can be built by anyone without any radio knowledge whatever in 45 minutes. Handsome black-crackle steel case with specially made black and gold dial with stations printed. Size of radio only 6 1/4 in. x 5 1/4 in. x 3 1/4 in. Covers all medium and long waves. H.T. consumption only 1 to 1.5 mA. Ideal for Bedroom, Garden, Holiday, etc. BUILD THE "SKY-ROMA" NOW! Total building cost—everything down to the last nut and bolt, 47/6 (Postage, etc., 2/-)—with full set of clear, easy-to-follow plans. (Parts sold separately. Priced parts list and plans 1/6.) C.O.D. 2/- extra.

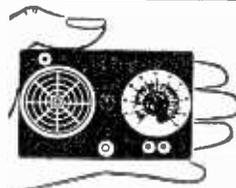


**47/6**



The sensational "Silver-tone" model! A highly compact self-contained miniature "button-base" valve pocket radio at absolute "rockbottom" building cost! Covers all the medium waves with the very latest circuitry bringing in stations from all over Europe—without fuss. Easy as A.B.C. to assemble, using our step-by-step instruction manual. Size only 4 1/4 in. x 2 1/4 in. —a fascinating little pocket radio. We can supply all the parts including beautiful two-tone case, detachable aerial, instruction book, screws, wire, etc., for only 29/6 (plus 2/- post and packing). C.O.D. 2/- extra. (Parts sold separately. Priced parts list 1/9.)

**29/6**



**29/6**



This amazing "Tiny-Tim" model—no larger than a match box—costs nothing to run—ever! No batteries! Will never run down or burn out. Uses the latest TRANSISTOR TYPE GERMANIUM DIODE, receives local stations anywhere—without extra aerial. Clear, Crisp Tone. No snags, anyone can build it within an hour using our step-by-step instruction book, etc., for only 17/6, plus 2/- Post and Packing (C.O.D. 2/- extra). (Parts sold separately. Priced parts list 1/8.)

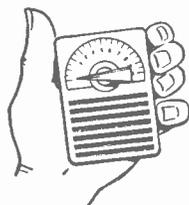
**17/6**

Anyone could build this beautiful precision Pocket Radio in an hour or two. No knowledge whatever needed. Our simple pictorial plans take you step-by-step. Remarkably sensitive—covers all medium waves. Inc. Luxembourg, Home, Light. Size only 2 1/4 in. x 3 in. x 3 1/4 in.—Not a Toy! But a Real, Personal-phone Valve Radio with Detachable Aerial! IDEAL FOR BEDROOM, GARDEN, etc. We supply ALL parts necessary, together with plans, etc., for the special price of 39/6, plus 2/6 post and packing. (C.O.D. 2/- extra.) BUILD YOURS NOW! (All parts sold separately. Priced parts list 1/9.) Send Today! Money refunded if parts not returned intact within 7 days.

**39/6**

Choice of beautiful wainut veneered cabinetry or ivory bakelite. This is the lowest possible price consistent with high quality. No radio knowledge whatever needed. Can be built by anyone in 2-3 hours, using our very simple, easy-to-follow diagrams. The terrific new circuit of the "Ocean-Hopper" covers all medium and long waves—razor-edge selectivity and exceptionally good tuning. Price also includes ready drilled and punched chassis, set of simple-to-follow plans—in fact everything! Parts tested before despatch! Uses standard octal-base valves. (Low running costs—approximately 18 watts.) Size 12 in. x 6 in. x 5 in. Build this long-range powerful midget NOW! TOTAL BUILDING COST INCLUDING PLANS, ETC., 107/6. (Post and Packing 3/6.) Parts sold separately. Priced parts list and plans 1/8. C.O.D. 2/- extra.

**107/6**



**45/-**

TWO-TRANSISTOR POCKET SET. Can Be Built for 45/-. BUILD THE "SKY-ROMA" NOW! VEST-POCKET TWO-TRANSISTOR RADIO which gives a superb performance and is highly sensitive. Weight receiver covering all medium waves, working entirely off a "penlight" battery. SPECIAL STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS. Total building cost including case, transistors, etc.—everything down to the last nut and bolt—ONLY 45/- with plans. (Postage, etc., 2/- (C.O.D. 2/- extra).) (Parts sold separately. Priced parts list and plans 1/6.) RUSH YOUR ORDER TODAY!

**CONCORD ELECTRONICS** Dept. PW26  
210, Church Road, Hove, Sussex

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

FURTHER HUGE PURCHASES DIRECT FROM SOURCE

# 13 CHANNEL TV'S

TABLE MODELS. FAMOUS MAKERS. Complete with all valves and tubes. Unequaled in value. They are untested and not guaranteed to be in working order.

AMAZINGLY POPULAR-IDEAL SECOND SETS

**12" - £3.19.** (p. & p. 12/6)

**14" - £6.19.** (p. & p. 15/-)

**17" - £9.19.** (p. & p. 17/6)

**12" 5 CHANNEL TV'S 45/-** (p. & p. 12/6)

**14" 5 CHANNEL TV'S 85/-** (p. & p. 12/6)

## ★ STAAR RECORD PLAYERS

Huge quantity (Autochangers). S.A.E. enquiries.

★ **Record Players** Carriage 4/-

COLLIER CONQUEST 4-speed 4/546... £5 19 0  
EMI 4-speed Stereo... £6 19 0  
B.B.R. (U48) AUTOCHANGERS... £8 18 0

## ★ 4-SPD. RECORD PLAYERS

Latest B.B.R. 4-SPD Turntable, together with light weight Star Galaxy dual aperture crystal turnover pick-up head. Truly amazing value **£3.10.0** Carr. 3/-.

GALAXY PICKUPS, as above, only 19/6.

## External/Internal ITV Converters with power pack

Hammered finish. Very compact! Gain and Trimming controls. Listed at 27/7. **OUR PRICE 39/-**

## ★ TRANSISTORS

REDSPOT Now only 8/6. WHITE SPOT 4/6  
General purpose, famous make. 8d. 8/- doz. GEX44 type, 3/8.

## ★ DIODES

General purpose, famous make. 8d. 8/- doz. GEX44 type, 3/8.

## ★ VALVES BY RETURN OF POST

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

C24	5/6	8A8M5	3/6	6J7GT	7/9	6X50G	5/6	12K7GT	5/6	43	7/6	DAF91	5/3	EC081	5/9	EM4	8/8	PA1	4/3	TH30C	12/6	UF49	6/9
LA50T	5/6	8A05	8/7	6J9	8/6	6X3GT	5/6	12K5GT	5/6	505	9/6	DAF96	7/6	EC099	5/6	EM80	9/3	P81	2/3	U14	8/6	UF50	9/-
LA70T	11/9	8A76	7/6	6N5GT	7/47	10/6	12K3	12/6	60CDBG	5/6	DF34	9/8	EC083	7/6	EM81	9/3	PARC8011-	U18	8/6	UF85	9/-		
IC50T	9/8	6U6	7/9	6K7	5/9	7B5	12/6	12Q7GT	5/6	8/8	DF91	4/6	EC084	8/9	EM84	9/8	PC084	7/6	U28	8/9	UF86	14/6	
LD5	9/8	6B7	9/6	6K7G	2/3	7B6	9/6	12G2G	6/7	60L0GT	9/3	DF96	7/9	EC085	8/3	EM85	10/8	PC085	9/3	U28	15/6	UF87	7/6
LD6	9/8	6B9G	3/6	6K7GT	6/7	7B7	9/6	13H87	4/8	53KUK	10/8	DF98	6/7	EC086	9/8	EM86	16/-	PC086	10/8	U28	15/6	UF88	14/6
LB50T	9/8	6B48	6/7	6K8	10/7	7G5	7/6	13H7	5/6	54KUK	8/9	DF98	5/6	EC087	9/8	EM87	16/-	PC087	10/8	U28	15/6	UF89	14/6
LL4	9/8	6B26	6/7	6K8G	12/6	7G3	7/6	12K7G	5/6	61SPT	11/7	DF77	7/7	EC088	9/8	EM88	16/-	PC088	10/8	U28	15/6	UF90	14/6
LL5	9/8	6B6GG	12/6	6K8GT	10/7	7E7	9/6	18N7GT	8/6	75	8/7	DKR32	11/9	EC089	9/8	EM89	16/-	PC089	10/8	U28	15/6	UF91	14/6
LLN5	4/6	6B18	6/7	6K26	7/8	7H7	7/6	12R7	5/6	87	7/6	DK91	6/7	EC042	8/8	EM36	6/7	PCL82	8/6	U35	8/9	UM80	9/6
IN50T	9/8	6B36	6/7	6L1	12/6	7K7	8/7	12Y4	9/6	79	7/6	DK92	8/8	EC081	8/8	EZ40	6/8	PCL83	11/6	U37	26/8	U06	12/6
1R5	6/7	6B27	8/7	6L4	9/6	7Q7	10/6	19A05	7/6	83	9/6	DL33	8/9	EC082	10/7	EZ80	6/8	PEN25	4/6	U30	6/7	U08	25/-
1R4	8/6	6B18	7/9	6L6G	7/8	7R7	10/6	19B6615	7/6	90AV	4/6	DL35	9/8	EC083	14/8	EZ81	7/6	PEN26	4/6	U32	6/7	U09	21/-
1T21	4/6	6B28	5/6	6L7G	7/8	7V7	7/6	20D1	9/6	11726	10/6	DL82	8/8	EF32	12/7	GT10	7/6	PEN46	5/8	U79	6/8	U07	11/6
2D4	4/6	6C4	3/8	6L18	8/7	7Y4	7/6	20F2	9/6	1852T	16/7	DL91	6/8	EP96	3/8	G232	8/6	PEN47	5/8	U79	6/8	U08	11/6
3A4	5/6	6C5	5/6	6L19	12/6	7Z4	7/6	20L1	13/6	723A	8/9	DL92	6/7	EP99	4/8	G234	12/6	12/6	U191	9/8	U09	6/8	
3D6	4/6	6C6	4/6	6L23	8/6	8D3	3/6	30P1	11/6	807A	5/7	DL94	7/7	EF40	13/6	G237	10/6	PL33	9/7	U24	9/8	VP4A	9/6
3Q4	7/6	6C9	9/8	6L12	7/8	10C1	11/6	30P3	12/6	807B	5/6	DL96	7/8	EF41	8/8	HA11D	D98	PL36	11/7	U28	15/6	VP4B	9/6
3Q5GT	8/9	6C6DG	18/6	6L12D	8/6	10C2	13/6	30P4	17/6	808	5/6	DL98	8/8	EF42	8/8	HV82	7/6	PL37	14/6	U30	14/6	VP4C	9/6
3N4	6/7	6C8H6	8/3	6N7	9/6	10F1	10/6	30P5	15/6	854	2/6	DL99	8/8	EF43	8/8	IP80	7/6	PL38	14/6	U30	14/6	VP4D	9/6
3V4	7/6	6D1	9/8	6P1	14/6	10F1	10/6	30P6	15/6	855	3/6	EA01	4/9	EF50-UR2	2/6	K732	6/8	PL82	7/6	U32	12/6	VP4E	9/6
5B4G	9/8	6D2	3/9	6P25	9/7	10F9	10/6	30P7	15/6	856	2/6	EA42	8/6	EF54	2/6	K733	6/8	PL83	7/6	U33	11/6	VP4F	9/6
5V4G	9/8	6D6	4/9	6P28	12/6	10L14	8/6	30P8	15/6	857	3/6	EB04	7/7	EF56	6/8	K744	9/8	PM80	9/8	U34	11/6	VP4G	9/6
5V3G	9/8	6D6	4/9	6P28	12/6	10L14	8/6	30P9	15/6	858	3/6	EB05	7/7	EF57	6/8	K745	9/8	PM81	9/8	U34	11/6	VP4H	9/6
5V3GT	9/8	6D6	4/9	6P28	12/6	10L14	8/6	30P10	15/6	859	3/6	EB06	7/7	EF58	6/8	K746	9/8	PM82	9/8	U34	11/6	VP4I	9/6
6V4G	11/6	6F8M	7/6	6S47	5/9	10P14	9/6	30P11	15/6	860	3/6	EB07	7/7	EF59	6/8	K747	9/8	PM83	9/8	U34	11/6	VP4J	9/6
5Z4	11/6	6F12	3/8	6S67	4/9	10P18	8/6	30P12	15/6	861	3/6	EB08	7/7	EF60	6/8	K748	9/8	PM84	9/8	U34	11/6	VP4K	9/6
5Z4G	9/8	6F13	3/8	6S77	4/6	12A4	8/6	30P13	15/6	862	3/6	EB09	7/7	EF61	6/8	K749	9/8	PM85	9/8	U34	11/6	VP4L	9/6
6Z4GT	11/6	6F14	3/8	6S87	4/6	12A47	8/6	30P14	15/6	863	3/6	EB10	7/7	EF62	6/8	K750	9/8	PM86	9/8	U34	11/6	VP4M	9/6
6A7	10/6	6F15	3/8	6S87	4/6	12A48	8/6	30P15	15/6	864	3/6	EB11	7/7	EF63	6/8	K751	9/8	PM87	9/8	U34	11/6	VP4N	9/6
6A6G	9/8	6F16	3/8	6S87GT	4/6	12A48	8/6	30P16	15/6	865	3/6	EB12	7/7	EF64	6/8	K752	9/8	PM88	9/8	U34	11/6	VP4O	9/6
6A6GT	13/6	6F33	3/8	6S87GT	4/6	12A47	8/6	30P17	15/6	866	3/6	EB13	21/6	EF65	6/8	K753	9/8	PM89	9/8	U34	11/6	VP4P	9/6
6A8B	9/3	6G6	6/7	6S97	4/6	12A47	8/6	30P18	15/6	867	3/6	EB14	21/6	EF66	6/8	K754	9/8	PM90	9/8	U34	11/6	VP4Q	9/6
6A7C	4/3	6G6	6/7	6S97	4/6	12A47	8/6	30P19	15/6	868	3/6	EB15	21/6	EF67	6/8	K755	9/8	PM91	9/8	U34	11/6	VP4R	9/6
6A7G	8/7	6G5G	2/8	6T5G	8/3	12B6E	6/6	30P20	15/6	869	3/6	EB16	21/6	EF68	6/8	K756	9/8	PM92	9/8	U34	11/6	VP4S	9/6
6A7J	8/7	6J3GT	3/9	6V6G	5/6	12B17	10/6	30P21	15/6	870	3/6	EB17	21/6	EF69	6/8	K757	9/8	PM93	9/8	U34	11/6	VP4T	9/6
6A15	8/9	6J6	4/7	6V6GT	8/9	12C5	8/6	30P22	15/6	871	3/6	EB18	21/6	EF70	6/8	K758	9/8	PM94	9/8	U34	11/6	VP4U	9/6
6A15	8/9	6J7	7/8	6K3	8/9	12P1	12/6	30P23	15/6	872	3/6	EB19	21/6	EF71	6/8	K759	9/8	PM95	9/8	U34	11/6	VP4V	9/6
6A15	8/9	6J8	5/8	6K4	5/6	12J5GT	3/6	42	7/6	DA32	2/6	EC03	6/9	EM33	8/6	N13	10/6	T41	7/6	UF41	8/6	2158	5/3

Post: 2 lbs. 1/6, 4 lbs. 2/-, 7 lbs. 2/9, 15 lbs. 3/6, etc. No C.O.D. ALL ITEMS 5% & POST. FREE IN DOZENS.

# TECHNICAL TRADING CO.

(Callers always welcome). LIST OF 1000 SNIPS 6d. P.O. BOX 21 (W) 350-352 FRATTON ROAD, PORTSMOUTH.

www.americanradiohistory.com

# TUBES

REGUNTED TUBES have new Guns, Getters, Aquadac Coatings, Bases, etc.

Carriage and Insurance 12/6	TOP QUALITY GUARANTEED		12 MONTHS BRAND NEW TYPES
	6 MONTHS REVAUCUED	12 MONTHS REVAUCUED	
CRM92-17, MW22-18	£1-10	£3	MW31/74
12KPA, 121K, C12B, CRM121, CRM121A, CRM121B, CRM122, CRM123, MW31-14C, MW31/16, MW31/15, MW31/74	£2	£4	£4-15
141K, 7201A, C14FM, CRM141, CRM142, CRM143, MW36-24, MW36-44, 17ASP4, 171K AW36/21 C17FM, CRM171 CRM172, MW43-64, MW43-69	£2-10	£4-10	MW36/84
64in. 18/-, 8in. 19/-, 10in. 22/6, 12in. 25/6, 7 x 4in. elliptical, 19/-; 9 x 6in. elliptical, 22/6; 10 x 6in. elliptical, 23/6; 8in. Stentorian 18-7-15 ohms HF1012, 99/9; 12in. Chased Plate, 27/6	£3	£5-5	MW48/64
MW43-80, MW41-1	£4	£6-10	£6-15
AW53-80, CRM21E, MW53-20, MW53-80			

PLEASE NOTE: Many other types not listed available. S.A.E. enquiries.

## SPECIAL OFFERS

★ **U48 Stereo Changers**  
B.S.R. famous Monarch autochangers, fitted with quality stereo cartridge. Truly amazing value. **£6.19.0**

★ **Mains Amplifiers**  
3 valve (10F3, 10P14, U09), 3 watt, 8in. loud-speaker, in two tone cases with control knobs. Ideal for record players, P.A. work, etc. **49/-**

★ **Loudspeakers**  
TOP MAKES—MANUFACTURER FRESH  
24in., 18/-; 8in., 15/6; 10in., 19/6; 12in., 22/6; 7 x 4in. elliptical, 19/-; 9 x 6in. elliptical, 22/6; 10 x 6in. elliptical, 23/6; 8in. Stentorian 18-7-15 ohms HF1012, 99/9; 12in. Chased Plate, 27/6

★ **3 PM SPEAKERS Surplus 3 ohm**  
Tested, top makes, performance guaranteed.  
6in. 9/- 8in. 11/- 7x1 13/- 10in. 13/-

## ★ RECTIFIERS

For Chargers, selenium, full wave, 12 volt, 3-4 amperes; 6/6; (Curr. 1-7); 250 v. 80 mA. 5/-; RMI, 6/6; RMP, 8/-; RMS, 9/-; RM4, 15/6; RMS, 21/-; 14A36, 17/-; 14A97, 23/-; 14A100, 25/-; 16HCL1-16-1, 7/9; 18RA1-16-1, 7/9; 18LD2-2-1, 1/8; 14RA1-2-2-2 17/-; 14RA1-2-2-3, 20/-

## 100 RESISTORS 6/6

## 100 CONDENSERS 10/-

Miniature Ceramic and Silver Mica Condensers. 8 pF to 10,000 pF. LIST VALUE OVER 25/-

## ★ PL81 VALVES ALL GUARANTEED 8/6

PL81 VALVE 4/6 EY51 SHORT ENDS 4/6

## TAPE RECORDERS

Limited quantity. Famous make. B.S.R. Decca. Beautifully finished portable cases, good fittings, excellent reproduction, with reel of 21 gns. tape, Unrepeatable.

## 1 Watt Transistor Stage

Pair of GET15 1 watt Power Transistors (listed 56/-) Pair of Full INPUT AND OUTPUT TRANSFORMERS, 4 Transistor Amplifier circuit. **45/-**

www.americanradiohistory.com

FOR BARGAINS

**M.S. RADIOPOST CO.**

MAIL ORDER SPECIALISTS

Please quote Dept. M.O.P.W.

36 WINCANTON RD., HAROLD HILL, ROMFORD

**MINIATURE ROTARY TRANSFORMER. H.T.** 11 volt. 11 volts input, 310 volts 30 m.a. Output. Will give approx. 120 volts at 30 m.a. from a 6 v. input. 4in. long x 2in. dia. Weight 14 lbs. Current consumption underload approx. 2 amps. 17/6 each.

**ROTARY TRANSFORMERS**  
**TYPE HT. 31** Input: 11.5 volt. Output: 250 volt at 120 m.A. **TYPE HT. 32.** Input: 11.5 volt. Output: 100 volt at 65 m.A. **HT.31.** Ex-Units but tested, 35/- ea. **HT.32.** New in cartons. 20/- ea.



**MINIATURE AMERICAN LEAD ACID ACCUMULATORS.** 36 volts 20 m.A. 4 x 1 1/2 x 2 1/2 in. 3/6 each.

**PANEL FUSEHOLDER ASSEMBLY** ZA/US 1054 American pattern. Will take standard cartridge fuses. New 2/6 each or 8/- pkt. of 3



**HYSTERESIS MOTORS.** By Smith's Aircraft Instruments. Type: HM2/1/D. Drag Cup. 2 r. 400 cycles, 40/- ea. New. Type: HM/14/L. 115 v. 400 cycles, 50/- ea. New. Type: HM/12/10. 115 v. 400 cycles, 50/- ea. New.

**TERMS:** C.W.O. or 7 days approved accounts. All our goods are guaranteed new or in working order. Money refunded in full if not absolutely satisfied. Orders despatched same day. **NO POSTAL OR PACKING CHARGES.** C.O.D. 1/6 extra. Carriage extra Ireland and countries outside U.K.

**AMERICAN SEALED RELAYS.** Brand new and in Makers original packaging. Type A. SIGMA Type 5R-761 SPDT. 5,000 ohms. Solder Lug connections. size: 2 1/4 x 1 1/4 x 1 1/4 in. 22/8, each. Type B. HUGHES Pt. No. ME-5002. DPDT. 10,000 ohms. Solder Lug Connections. Size: 2 x 1 1/4 x 1 1/4 in. 21/-. Type C. R.C.A. MHX-110. 250 ohms. 4 pole D.T. 1 1/4 x 1 1/4 in. dia. 26.5 v. D.C. 10/6. R.C.A. MHX-84. 300 ohms. 4 pole D.T. 1 1/4 x 1 1/4 in. dia. 26.5 v. D.C. 10/6, each. COMAR C-3519. 400 ohms. 30.5 v. D.C. SPDT. 3 amps. Size: 2 x 1 1/4 x 1 1/4 in. Solder Lug connections. 15/- each.

**SENSITIVE RELAY.** Miniature type. 250 ohms. DPDT. 12 v. D.C. 2 oz. Overall size 1 x 1 1/4 x 1 in. Has adjustable armature tension spring. Will operate on less than 1 m/a. Suitable for all model Radio control. Brand New. 15/8 each.



**MINIATURE DYNAMIC SPEAKERS**  
 A must for all Build-it-yourself. Hams. As supplied with all current transistor Kite. Can also be adapted for home phones or Intercom. 3in. diameter. Resistance 70 ohms. ONLY 5/- each.

**8 FOOT WHIP AERIALS.** Supplied in two sections. No. 1 and 2. ZA/26800 and 26286. Each section collapsible down to 1ft., with retaining wire through each section. Ideal also for radio control, fishing rod or pennant mast. 7/6 complete. New.

**PLESSEY E.H.T. CONCENTRIC CONNECTORS**

Type available. Plugs: CZ  
 64662/64665/64666. Sockets: CZ  
 64647/64659/64661. New and unused. For Radar Stations, TV Link-ups and Atomic research applications. 8/6 pair or 5/- each



**AMPLIFIER FIELD TELEPHONE** No. 1. Single stage amplifier designed to extend the working range of Telephone Types 'F' and 'L'. Complete with working instructions, spare valve and Canvas carrying case. New. 27/6 each.

**OPERATORS or INSPECTION LAMPS**



Type No. 6A. ZA 12645. Takes M.E.S. bulb. Ideal for Aircraft. Car dash, Map or T/X inspection. 3/8 each. New and unused.



**CAMERA MOTORS**  
 Fractional Horse Power. 24 volts. Beautifully constructed throughout and fully governed. Ratio 2 1/2 in. to 1 in. Size: 3 x 1 1/4 x 1 1/4 in. Brand New and in New original sealed cartons. ONLY 12/6 each.

**DRAYTON COMPACT CAPACITOR START AND RUN MOTOR.** Type RQG. Beautifully constructed to stringent Ministry spec. Fully reversible and made to operate on 200/250 v. A.C. 50 cycles. 1.75lb. oz. Torque at 2,250 r.p.m. Condenser req.: 8 mfd., 350 v. A.C. Size: 2 1/2 in. dia., 2 1/4 in. width, 1 x 1 in. spindle. Only 35/-



**THE PEMBRIDGE COLLEGE OF ELECTRONICS**  
*offers training in*  
**RADIO TELEVISION AND ELECTRONICS**

**ATTENDING COURSE**

Full-time One Year Course in Radio and Television. College course in basic principles for prospective servicing engineers.

Next course commences 3rd January, 1961.

This course is recognised by the Radio Trades Examination Board (R.T.E.B.) for the new Servicing Certificate examinations.

**HOME-STUDY COURSES**

A. Radio and Television Servicing

- (1) Introductory course.
- (2) Basic course covering R.T.E.B. Intermediate Radio and Television Servicing Certificate examination.

B. Courses in Radio, Telecommunications and Mathematics up to City and Guilds Telecommunication Technicians' Final Certificate.

C. Constructional kits.

For details, write to:

**The Principal, P.10.  
 THE PEMBRIDGE COLLEGE  
 OF ELECTRONICS  
 34a Hereford Road, London, W.2.**

PCU

# HARVERSON SURPLUS CO. LTD.

## 83 HIGH STREET, MERTON, S.W.19. CHerrywood 3985/67

### MONAURAL AMPLIFIER

This amplifier is made by a leading manufacturer. Mullard valves—ECC83, EL84 x EL84, EZ80. Bass, treble and volume on remote panel. Elegant knobs. OUR PRICE £4.16.6. P & P 3/6.

### MINIATURE AMPLIFIER

Miniature amplifier, size 3 1/2 x 2 1/2 x 4 1/2 in. Ideal for record player, etc. Controls, volume/on-off, bass and treble. Supplied ready built, less valves (UY85, UF89, UL84), and mains transformer, at the give away price of 14/- P. & P. 2/6.

### MIDGET GRAM AMPLIFIER READY-BUILT with Speaker

A 2 1/2 watt gram amplifier, fitted with bass, treble, and vol./on-off controls. Supplied complete with 6 x 4 in. 3 1/2 speaker, valves (UY85, UF89, UL84), knobs, etc. Wiring diagram supplied

49/- P. & P.

### HARVERSON SUPERHET 4 KIT

A medium and long wave superhet, incorporating two I.F. stages. Modern B9 valves (UCH81, UF89, UCL83, UY85), built-in ferrite rod aerial. All new we supplied, from theoretical and point to point wiring diagrams, to last nut and bolt (main components ready mounted), including an attractive contemporary styled cream plastic cabinet with gold trimmings. Size 1 1/2 x 4 1/2 x 6 1/2 in. PRICE £6.12.6 Post 3/6

### EMI ANGEL TRANSCRIPTION P.U. (MODEL 17A)

A Pick-up for the connoisseur originally priced at £17.10.0. £4.10.0. P. & P. 5/-  
The last remaining few offered at

FOR ILLUSTRATIONS OF ABOVE ITEMS SEE DEC. ISSUE

### SLOW MOTION TUNERS

500-500 Twin gang condensers with geared slow motion drive. 3/6 each. 36/- per doz. P. & P. 6d.

### WIRE WOUND POTS

12 Wire wound Colvern Pots—all different values. 10/6 P. & P. 9d.

### RECTIFIERS FOR BATTERY CHARGERS

12 v. 1 A. 4/3 12 v. 4 A. 12/6  
12 v. 2 A. 7/- 12 v. 5 A. 14/6  
12 v. 3 A. 10/- P. & P. 6d. each.

### DON'T MISS OUR SPECIAL OFFER SEE PAGE 807

### TRANSISTOR BARGAINS

ALL MULLARD FIRST GRADE

OC71	8/-
OC72	12/-
OC72 Matched Pair	25/-
OC45 Green Spot	15/-
OC45 Blue Spot	15/6
OC44	10/6
5B305 Semi Conductor	3/6
OA41 Diode	3/6

\* Postage on all above 6d.

### SPECIAL OFFER DON'T MISS THIS!

MULLARD OC.76 10/6

MATCHED PAIR £1.0.0

Post and packing 6d.

### THIS MONTH'S BARGAIN! SUPERHET CHASSIS

Complete and ready for your cabinet, 4 valve superhet chassis, complete with valves, ferrite aerial, dial and knobs. Valve line up—UCH81, UF89, UCL83, UY85. Long and Medium wave coverage.

PRICE £4.19.6 P. & P. 3/6.

COSSOR C.R.T. SNIP 4  
108K 10-inch. New and boxed, 15/-, plus 6/- P. & P.  
75K 10-inch. New and boxed, 15/-, plus 6/- P. & P.

ION TRAP MAGNETS  
To suit the above, 2/9 each. P. & P. 3d.

### SPEAKER FRET

Super quality heavily woven fret, 54 inches wide. Usual price 50/- per yard. P. & P. 1/-  
OUR PRICE 12/6 per yard.

### TRANSISTOR RECORD-PLAYER CASE

A few only—Transistor record player cases in light grey cloth—complete with motor board. Size: 12 x 8 x 6 in. 18/6 each. P. & P. 1/9.

GUARANTEED VALVES	NEW AND BOXED	PROMPT DESPATCH	POST 6d. per valve extra
ACBLDD	EB041 8/9	EF91 5/6	KLL32 3/4
ACBP	7/-	EBF90 9/1	EF91(BVA) 4/8
ACFP4	7/-	EBL21 2/6	EL32 4/8
ACFPEN	EBL21 2/6	EL32 4/8	KT32 9/3
AD	25/0	RC81 7/1	EL38 13/-
ACPEN	6/1	OC81 7/1	KT30C 8/-
ACVPL89	3/3	OC83 8/6	KT36 28/-
ATP4	3/8	OC84 8/6	KT36 28/-
AZ1	9/3	OC84 8/6	KT36 28/-
AZ31	11/2	OC85 9/-	KT36 28/-
B36	14/-	OC85 9/-	KT36 28/-
CB131	22/0	OC85 9/-	KT36 28/-
OC135	22/0	OC85 9/-	KT36 28/-
CL4	11/0	OC85 9/-	KT36 28/-
CL38	18/-	OC85 9/-	KT36 28/-
UCY31	15/0	OC85 9/-	KT36 28/-
CV78	9/0	OC85 9/-	KT36 28/-
CS84	3/-	OC85 9/-	KT36 28/-
DAF96	8/0	OC85 9/-	KT36 28/-
DP96	8/0	OC85 9/-	KT36 28/-
DF93	11/0	OC85 9/-	KT36 28/-
DL101	11/0	OC85 9/-	KT36 28/-
DL91	9/3	OC85 9/-	KT36 28/-
DL98	8/6	OC85 9/-	KT36 28/-
DL143	9/3	OC85 9/-	KT36 28/-
DM70	7/-	OC85 9/-	KT36 28/-
DN41	10/6	OC85 9/-	KT36 28/-
EA50	1/3	OC85 9/-	KT36 28/-
EAB30C	8/6	OC85 9/-	KT36 28/-
EAF42	9/0	OC85 9/-	KT36 28/-
EB84	3/-	OC85 9/-	KT36 28/-
EB81	3/-	OC85 9/-	KT36 28/-
EB83	8/6	OC85 9/-	KT36 28/-
PL81	11/0	OC85 9/-	KT36 28/-
PL82	11/0	OC85 9/-	KT36 28/-
PL83	11/0	OC85 9/-	KT36 28/-
PL84	11/0	OC85 9/-	KT36 28/-
PL85	11/0	OC85 9/-	KT36 28/-
PL86	11/0	OC85 9/-	KT36 28/-
PL87	11/0	OC85 9/-	KT36 28/-
PL88	11/0	OC85 9/-	KT36 28/-
PL89	11/0	OC85 9/-	KT36 28/-
PL90	11/0	OC85 9/-	KT36 28/-
PL91	11/0	OC85 9/-	KT36 28/-
PL92	11/0	OC85 9/-	KT36 28/-
PL93	11/0	OC85 9/-	KT36 28/-
PL94	11/0	OC85 9/-	KT36 28/-
PL95	11/0	OC85 9/-	KT36 28/-
PL96	11/0	OC85 9/-	KT36 28/-
PL97	11/0	OC85 9/-	KT36 28/-
PL98	11/0	OC85 9/-	KT36 28/-
PL99	11/0	OC85 9/-	KT36 28/-
PL00	11/0	OC85 9/-	KT36 28/-
PL01	11/0	OC85 9/-	KT36 28/-
PL02	11/0	OC85 9/-	KT36 28/-
PL03	11/0	OC85 9/-	KT36 28/-
PL04	11/0	OC85 9/-	KT36 28/-
PL05	11/0	OC85 9/-	KT36 28/-
PL06	11/0	OC85 9/-	KT36 28/-
PL07	11/0	OC85 9/-	KT36 28/-
PL08	11/0	OC85 9/-	KT36 28/-
PL09	11/0	OC85 9/-	KT36 28/-
PL10	11/0	OC85 9/-	KT36 28/-
PL11	11/0	OC85 9/-	KT36 28/-
PL12	11/0	OC85 9/-	KT36 28/-
PL13	11/0	OC85 9/-	KT36 28/-
PL14	11/0	OC85 9/-	KT36 28/-
PL15	11/0	OC85 9/-	KT36 28/-
PL16	11/0	OC85 9/-	KT36 28/-
PL17	11/0	OC85 9/-	KT36 28/-
PL18	11/0	OC85 9/-	KT36 28/-
PL19	11/0	OC85 9/-	KT36 28/-
PL20	11/0	OC85 9/-	KT36 28/-
PL21	11/0	OC85 9/-	KT36 28/-
PL22	11/0	OC85 9/-	KT36 28/-
PL23	11/0	OC85 9/-	KT36 28/-
PL24	11/0	OC85 9/-	KT36 28/-
PL25	11/0	OC85 9/-	KT36 28/-
PL26	11/0	OC85 9/-	KT36 28/-
PL27	11/0	OC85 9/-	KT36 28/-
PL28	11/0	OC85 9/-	KT36 28/-
PL29	11/0	OC85 9/-	KT36 28/-
PL30	11/0	OC85 9/-	KT36 28/-
PL31	11/0	OC85 9/-	KT36 28/-
PL32	11/0	OC85 9/-	KT36 28/-
PL33	11/0	OC85 9/-	KT36 28/-
PL34	11/0	OC85 9/-	KT36 28/-
PL35	11/0	OC85 9/-	KT36 28/-
PL36	11/0	OC85 9/-	KT36 28/-
PL37	11/0	OC85 9/-	KT36 28/-
PL38	11/0	OC85 9/-	KT36 28/-
PL39	11/0	OC85 9/-	KT36 28/-
PL40	11/0	OC85 9/-	KT36 28/-
PL41	11/0	OC85 9/-	KT36 28/-
PL42	11/0	OC85 9/-	KT36 28/-
PL43	11/0	OC85 9/-	KT36 28/-
PL44	11/0	OC85 9/-	KT36 28/-
PL45	11/0	OC85 9/-	KT36 28/-
PL46	11/0	OC85 9/-	KT36 28/-
PL47	11/0	OC85 9/-	KT36 28/-
PL48	11/0	OC85 9/-	KT36 28/-
PL49	11/0	OC85 9/-	KT36 28/-
PL50	11/0	OC85 9/-	KT36 28/-
PL51	11/0	OC85 9/-	KT36 28/-
PL52	11/0	OC85 9/-	KT36 28/-
PL53	11/0	OC85 9/-	KT36 28/-
PL54	11/0	OC85 9/-	KT36 28/-
PL55	11/0	OC85 9/-	KT36 28/-
PL56	11/0	OC85 9/-	KT36 28/-
PL57	11/0	OC85 9/-	KT36 28/-
PL58	11/0	OC85 9/-	KT36 28/-
PL59	11/0	OC85 9/-	KT36 28/-
PL60	11/0	OC85 9/-	KT36 28/-
PL61	11/0	OC85 9/-	KT36 28/-
PL62	11/0	OC85 9/-	KT36 28/-
PL63	11/0	OC85 9/-	KT36 28/-
PL64	11/0	OC85 9/-	KT36 28/-
PL65	11/0	OC85 9/-	KT36 28/-
PL66	11/0	OC85 9/-	KT36 28/-
PL67	11/0	OC85 9/-	KT36 28/-
PL68	11/0	OC85 9/-	KT36 28/-
PL69	11/0	OC85 9/-	KT36 28/-
PL70	11/0	OC85 9/-	KT36 28/-
PL71	11/0	OC85 9/-	KT36 28/-
PL72	11/0	OC85 9/-	KT36 28/-
PL73	11/0	OC85 9/-	KT36 28/-
PL74	11/0	OC85 9/-	KT36 28/-
PL75	11/0	OC85 9/-	KT36 28/-
PL76	11/0	OC85 9/-	KT36 28/-
PL77	11/0	OC85 9/-	KT36 28/-
PL78	11/0	OC85 9/-	KT36 28/-
PL79	11/0	OC85 9/-	KT36 28/-
PL80	11/0	OC85 9/-	KT36 28/-
PL81	11/0	OC85 9/-	KT36 28/-
PL82	11/0	OC85 9/-	KT36 28/-
PL83	11/0	OC85 9/-	KT36 28/-
PL84	11/0	OC85 9/-	KT36 28/-
PL85	11/0	OC85 9/-	KT36 28/-
PL86	11/0	OC85 9/-	KT36 28/-
PL87	11/0	OC85 9/-	KT36 28/-
PL88	11/0	OC85 9/-	KT36 28/-
PL89	11/0	OC85 9/-	KT36 28/-
PL90	11/0	OC85 9/-	KT36 28/-
PL91	11/0	OC85 9/-	KT36 28/-
PL92	11/0	OC85 9/-	KT36 28/-
PL93	11/0	OC85 9/-	KT36 28/-
PL94	11/0	OC85 9/-	KT36 28/-
PL95	11/0	OC85 9/-	KT36 28/-
PL96	11/0	OC85 9/-	KT36 28/-
PL97	11/0	OC85 9/-	KT36 28/-
PL98	11/0	OC85 9/-	KT36 28/-
PL99	11/0	OC85 9/-	KT36 28/-
PL00	11/0	OC85 9/-	KT36 28/-
PL01	11/0	OC85 9/-	KT36 28/-
PL02	11/0	OC85 9/-	KT36 28/-
PL03	11/0	OC85 9/-	KT36 28/-
PL04	11/0	OC85 9/-	KT36 28/-
PL05	11/0	OC85 9/-	KT36 28/-
PL06	11/0	OC85 9/-	KT36 28/-
PL07	11/0	OC85 9/-	KT36 28/-
PL08	11/0	OC85 9/-	KT36 28/-
PL09	11/0	OC85 9/-	KT36 28/-
PL10	11/0	OC85 9/-	KT36 28/-
PL11	11/0	OC85 9/-	KT36 28/-
PL12	11/0	OC85 9/-	KT36 28/-
PL13	11/0	OC85 9/-	KT36 28/-
PL14	11/0	OC85 9/-	KT36 28/-
PL15	11/0	OC85 9/-	KT36 28/-
PL16	11/0	OC85 9/-	KT36 28/-
PL17	11/0	OC85 9/-	KT36 28/-
PL18	11/0	OC85 9/-	KT36 28/-
PL19	11/0	OC85 9/-	KT36 28/-
PL20	11/0	OC85 9/-	KT36 28/-
PL21	11/0	OC85 9/-	KT36 28/-
PL22	11/0	OC85 9/-	KT36 28/-
PL23	11/0	OC85 9/-	KT36 28/-
PL24	11/0	OC85 9/-	KT36 28/-
PL25	11/0	OC85 9/-	KT36 28/-
PL26	11/0	OC85 9/-	KT36 28/-
PL27	11/0	OC85 9/-	KT36 28/-
PL28	11/0	OC85 9/-	KT36 28/-
PL29	11/0	OC85 9/-	KT36 28/-
PL30	11/0	OC85 9/-	KT36 28/-
PL31	11/0	OC85 9/-	KT36 28/-
PL32	11/0	OC85 9/-	KT36 28/-
PL33	11/0	OC85 9/-	KT36 28/-
PL34	11/0	OC85 9/-	KT36 28/-
PL35	11/0	OC85 9/-	KT36 28/-
PL36	11/0	OC85 9/-	KT36 28/-
PL37	11/0	OC85 9/-	KT36 28/-
PL38	11/0	OC85 9/-	KT36 28/-
PL39	11/0	OC85 9/-	KT36 28/-
PL40	11/0	OC85 9/-	KT36 28/-
PL41	11/0	OC85 9/-	KT36 28/-
PL42	11/0	OC85 9/-	KT36 28/-
PL43	11/0	OC85 9/-	KT36 28/-
PL44	11/0	OC85 9/-	KT36 28/-
PL45	11/0	OC85 9/-	KT36 28/-
PL46	11/0	OC85 9/-	KT36 28/-
PL47	11/0	OC85 9/-	KT36 28/-
PL48	11/0	OC85 9/-	KT36 28/-
PL49	11/0	OC85 9/-	KT36 28/-
PL50	11/0	OC85 9/-	KT36 28/-
PL51	11/0	OC85 9/-	KT36 28/-
PL52	11/0	OC85 9/-	KT36 28/-
PL53	11/0	OC85 9/-	KT36 28/-
PL54	11/0	OC85 9/-	KT36 28/-
PL55	11/0	OC85 9/-	KT36 28/-
PL56	11/0	OC85 9/-	KT36 28/-
PL57	11/0	OC85 9/-	KT36 28/-
PL58	11/0	OC85 9/-	KT36 28/-
PL59	11/0	OC85 9/-	KT36 28/-
PL60	11/0	OC85 9/-	KT36 28/-
PL61	11/0	OC85 9/-	KT36 28/-

Easy-to-build kit-sets of



highest quality at lower cost

**AMATEUR TRANSMITTER Model DX-100U**  
Covers all amateur bands from 160-10 metres. Self-contained including Power Supply Modulator and V.F.O. £78.10.0

**"HAM" TRANSMITTER Model DX 40U**  
from 80-10 m. Power input 75 w. C.W., 60 w. peak C.C. phone. Output 40 w. to aerial. Compact and self-contained. Prov. for V.F.O. £29.10.0

**VAR. FREQ. OSCILLATOR VF-1U**  
From 160-10 m. Ideal for our DX-40U and similar transmitters. Price less valves £8.19.6 £10.12.0

**R.F. SIGNAL GENERATOR, Model RF-1U**  
Up to 100 Mc/s fundamental and 200 Mc/s. on harmonics and up to 100 mV. output on all bands. £11.11.0

**AUDIO SIGNAL GENERATOR Model AG-9U**  
10 c/s to 100 kc/s. switch selected. Distortion less than 0.1% 10 v. sine wave output metered in volts and dB's. £19.3.0

**VALVE VOLTMETER Model V-7A**  
Measures volts to 1,500 (D.C. and R.M.S.) and 4,000 pk. to pk. Res. 0.1Ω to 1,000 MΩ. D.C. input impd. 11MΩ. Complete with test prods leads and standardising battery. £13.0.0

**Portable 2 3/4 in. SERVICE 'SCOPE 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 circuit. Case 7 1/2 x 4 1/2 x 12 1/2 in. long. Wt. only 10 1/2 lb. £18.19.6

**5 in. OSCILLOSCOPE Model O-12U**  
Has wide-band amplifiers, essential for TV servicing, F.M. alignment, etc. Vertical freq. response 3 c/s. to over 5 Mc/s. without extra switching. T/B covers 10 c/s to 500 kc/s. in 5 ranges. £34.15.0

**RES.-CAP. BRIDGE Model C-3U**  
Measures capacity 10pF to 1,000μF resistance 100Ω to 5 MΩ and power factor. 5-450 v. test voltages. With safety switch. £7.19.6

**SINGLE CHANNEL AMPLIFIER, MA-12**  
10-12 watt Hi-Fi amplifier. Extremely low distortion and wide frequency range £9.19.6

**"GLOUCESTER" EQUIPMENT CABINET**  
4 1/2 x 30 x 21 in. deep. Mk. I houses Record Player Stereo Amplifier, F.M. Tuner, records, etc. Mk. II will house a Tape Deck in addition. Left in the white for finish to personal taste.  
Mk. I ... £15.18.6 Mk. II ... £17.8.6

**"CHEPSTOW" EQUIPMENT CABINET**

Ideal cabinet for small rooms or armchair operation. Houses Record Player F.M. Tuner and Stereo Amplifier. £10.10.0

**"PACKAGED DEALS" of Hi-Fi**  
Equipment including TAPE DECKS (Collaro or Truvox), RECORD PLAYERS (Collaro or Connoisseur) and DECCA fits PICK-UPS.

Write in to see how these deals save you further money.



F.M. TUNER



S.33



S-38



DX-40



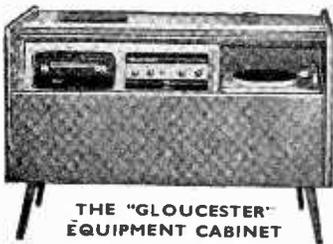
UXR-1



OS-1



SSU-1



THE "GLOUCESTER" EQUIPMENT CABINET

**GRID DIP METER Model GD-1U**  
Coverage from 2 Mc/s. to 250 Mc/s. Complete set of plug-in coils provided. £9.19.6

**TAPE RECORDING/PLAYBACK AMPLIFIER Model TA-1**  
Monaural (TA-1M) £15.14.0. Stereo (TA-1S) £22.4.0  
Conversion unit from mono. to stereo. £6.0.0.

**SHORT-WAVE TRANSISTOR PORTABLE Model RSW-1**  
Extending aerial, leather case, 2 short-wave bands Trawler and Medium. £20.18.6

**6-TRANSISTOR PORTABLE Model UXR-1**  
Pre-aligned I.F. transformers, printed circuit. 7 x 4 in. high-flux speaker. Real hide case. £14.18.6

**DUAL-WAVE TRANSISTOR RADIO UJR-1**  
This sensitive headphone set is a fine introduction to electronics for any youngster. £2.16.6

**HI-FI F.M. TUNER**  
Tuning range 88-108 Mc/s. For your convenience this is available in two units sold separately as follows: Tuner Unit (FMT-4U) with 10.7 Mc/s i.f. output (£32.2.0, inc. P.T.). I.F. Amplifier (FMA-4U) complete with cabinet and valves (£10.10.6). £13.12.6

**HI-FI 16W STEREO AMPLIFIER Model S-88**  
10mV. basic sensitivity (2 mV. available, £1 extra). Ganged controls. Stereo/Monaural gram. radio and tape recorder input. Push-button selection. Two-tone grey metal cabinet. £25.5.6

**6-W STEREO AMPLIFIER Model S-33**  
3 watts per channel. 0.3% distortion at 2.5 w/chn, 20dB N.F.B. Inputs for Radio (or Tape) and Gram. Stereo or Monaural, ganged controls. Sensitivity 100 mV. £11.8.0

**TRANSCRIPTION RECORD PLAYER RP-1U**  
4-speed A.C. motor. Ronette Stereo/Mono pick-up. Complete with plinth. £12.10.0

**HI-FI SPEAKER SYSTEM Model SSU-1**  
Ducked-port bass reflex cabinet "in the white" Twin speakers. With legs £11.12.6. £10.5.6

**"COTSWOLD" HI-FI SPEAKER SYSTEM KIT**  
Acoustically designed enclosure "in the white" 26 x 23 x 15 1/2 in., housing a 12 in. bass speaker with 2 in. speech coil, elliptical middle speaker and pressure unit to cover the full frequency range of 30-20,000 c/s. Complete with speakers, cross-over unit, £19.18.6 level control, etc.

**COMPLETE MATCHED STEREO OUTFIT**  
Includes record player, amplifier and twin speaker systems (pedestal speaker legs optional £4.14.0 extra). £42.10.0

**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. £17.19.6

**STEREO HEAD BOOSTER USP-1**  
Ideal for boosting tape-head output and low output pick-ups (e.g. Decca fits). £5.19.6

Prices include free delivery UK  
Deferred Terms  
available on orders over £10

Please send me FREE CATALOGUE (Yes/No) \_\_\_\_\_  
Full details of model(s) \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

PWL

# DAYSTROM LTD.

## DEPT. P.W.1, GLOUCESTER, ENGLAND

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

# Practical Wireless

VOL. XXXVI, No. 647, JANUARY, 1961

Editorial and Advertisement  
Offices:

## PRACTICAL WIRELESS

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

© George Newnes Ltd., 1961

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

### SUBSCRIPTION RATES

including postage for one year

Inland . . . . . £1.3.0 per annum  
Abroad . . . . . £1.1.6 per annum  
Canada . . . . . 19s. per annum

## Contents

	Page
Editorial . . . . .	773
Round the World of Wireless . . . . .	774
Radio Construction for the Beginner—A . . . . .	776
A 4-Watt Amplifier . . . . .	779
Circuits for Acorn Valves . . . . .	782
On Your Wavelength . . . . .	787
Using Portables in the Car . . . . .	788
A Simple Signal Generator . . . . .	791
Electronic Smoothing . . . . .	795
A Reliable Radiogram . . . . .	796
Reflexing Transistors . . . . .	798
Combined Radio and Table Lamp . . . . .	800
A Transcription Quality Record Player . . . . .	802
Club News . . . . .	806
A Mains Capacity Tester . . . . .	809
Conversion of the P.W. A.C. "Coronet" 4 to Radiogram . . . . .	813
Trade News . . . . .	821
Transistor Transformers . . . . .	825
Letters to the Editor . . . . .	826

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 to 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 our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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

## THE REPORT OF THE BBC

THE report of the BBC for 1959-60 was published in October and caused much comment in the daily press. Naturally, most comment was on the future of television in this country, but the remarks concerning the plans for sound broadcasting are worthy of the same attention. The report states that "Reception conditions in the medium waveband have continued to be unsatisfactory. Listeners in many parts of the United Kingdom have experienced serious interference with reception caused by foreign stations. A meeting of the Administrations of the countries of the European area was held at Geneva to consider the position, but it was decided that it would be useless to attempt to re-plan the medium-wave band at present". The meeting came to the conclusion that no improvement could be achieved until more countries had developed V.H.F. services and V.H.F. receivers were in more general use by the listening public.

The problem of interference on the medium-wave band has been serious for a number of years and it is evident that little can be done to alleviate matters until all countries abide by the international agreements. As the report suggests, the solution so far as each country is concerned is to use V.H.F. networks for local broadcasting. At present, it is estimated that only one household in every five has a V.H.F. receiver. The V.H.F. sound broadcasting network in this country affords first-class reception of all the BBC programmes and about 97 per cent of the population of the U.K. is now within range of this service. The coverage of the service in certain "difficult" areas will be provided or improved by building low-power satellite stations.

In view of the large coverage of the V.H.F. service and of the quality reception which is possible, it seems strange that the present number of potential listeners is so small. The explanation must be that most listeners are not at all critical of the sound which they hear from their radio sets. Surely no one with a critical ear could fail to prefer the results from a V.H.F. receiver after a comparison with a medium-wave set. Although the most commonly quoted virtue of a V.H.F. receiver is the freedom from interference, there are several other advantages: a greater signal-to-noise ratio which enables a greater dynamic range to be employed, and the possibility of an increased frequency range—"possibility" because it seems that this factor is only rarely exploited to best advantage.

It seems to us that more education of the public is needed so that the advantages of radio on the V.H.F. services are made more widely known than they are at present. The BBC has continued, in co-operation with the radio industry and trade, to organise demonstrations and exhibitions in various parts of the country in order to make the public aware of the existence of the V.H.F. service and to demonstrate its advantages. The BBC report states that its demonstrations have made a significant contribution to the recent increases in the numbers of V.H.F. receivers in use—this number is now estimated to exceed 3½ millions. However, it is evident that before the service becomes as popular as it deserves to be, it will have to be "sold" to the public much more effectively than hitherto.

Our next issue, dated February, will be published on January 6th

# Round the World of Wireless

## POTENTIAL AND CURRENT NEWS

### Broadcast Receiving Licences

THE following statement shows the approximate number of Broadcast Receiving Licences in force at the end of September, 1960, in respect of wireless receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland. The numbers include Licences issued to blind persons without payment.

Region	Total
London Postal .. .. .	757,556
Home Counties .. .. .	710,853
Midland .. .. .	521,469
North Eastern .. .. .	574,488
North Western .. .. .	491,141
South Western .. .. .	425,077
Wales and Border Counties	255,645
<b>Total England and Wales ..</b>	<b>3,736,332</b>
Scotland .. .. .	431,588
Northern Ireland .. .. .	138,323
<b>Grand Total .. .. .</b>	<b>4,296,246</b>

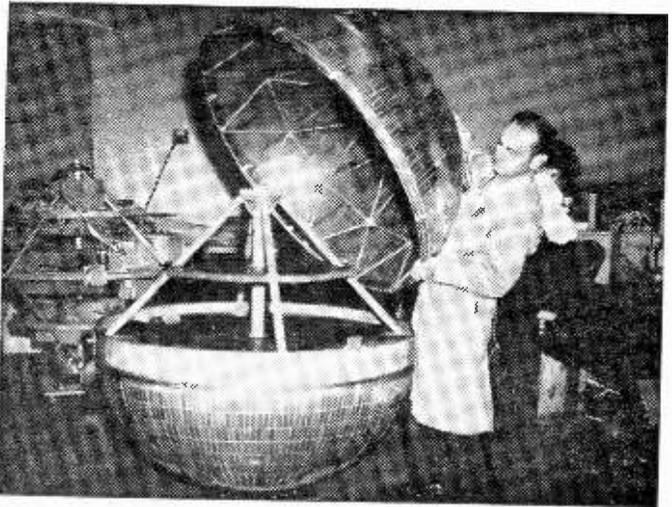
### Contract

A SUBSIDIARY of the Solartron Electronic Group Ltd.—Solartron Laboratory Instruments Ltd.—has received contracts totalling £250,000 for the supply of oscilloscopes to the Admiralty and Ministry of Aviation. Before the contract was received, a number of this firm's oscilloscopes were, and still are, in service use under various arduous conditions.

### Mobile Channels

RECOMMENDATIONS for increasing the number of V.H.F. channels for mobile radio users have again been made by the Mobile Radio Committee in its fourth Report recently approved by the Postmaster General. Last year the Committee drew up a programme for reducing the width of channels in the low band to 25kc/s; now the same channel width is to be adopted as standard for the high band during the 5-year changeover period specified in the Fourth Report. The Committee has also revised the distribution of high-band channels amongst the various categories of users, and a diagram showing the new allocations is included in the Report.

The Report was published by H.M. Stationery Office on 30th September.



Technicians of Philco Corporation, which built the Courier communications satellite now in orbit, are here seen trying out a dummy structure for size. They are checking the fit of parts mounted on the 500lb sphere to determine the exact location of the 38 "black boxes" making up the satellite's "payload". Using similar satellites it is hoped to establish world-wide communications systems.

### National Hall, Lagos

THE complete sound reinforcement and simultaneous interpretation system for the National Hall, Lagos, Nigeria, has been supplied by a British firm—Standard Telephones and Cables Limited. The National Hall is the meeting place of the Legislative Assembly of the Federation of Nigeria, now an independent State within the British Commonwealth. The Hall has a ground floor and balcony and will ultimately seat 2,000 people. The design of the ground floor has been modified and resembles that of the British House of Commons. The whole assembly is divided into eight loudspeaker zones above which there are sixteen microphones. Mr. Speaker and the Clerks also have microphones and a local loudspeaker.

### Radio Hobbies Exhibition

DISPLAYS and demonstrations of equipment of interest to all amateur radio enthusiasts were given at the 1960 International Radio Hobbies Exhibition which was held at the Royal Horticultural Society's Old Hall in London from 23rd to 26th November, 1960. The exhibition was opened by Mr.

Brian Rix and the special feature of this year's show was a number of rooms equipped as amateur radio stations. The station of the Radio Society of Great Britain, who sponsor the exhibition, was on the air continually throughout the show, keeping in touch with radio amateurs all over the world.

### International Apprentice Competition

THE only second prize won by a British apprentice in the engineering section of the International Apprentice Competition at Barcelona recently was gained by P. Stacey of Marconi's. Mr. Stacey, who is 18 years old, won second place in the Junior Milling section of the competition. Another Marconi apprentice, R. A. Squirrel (19) took third place in the Senior Draughtsmanship competition. With three other Marconi entrants they competed against representatives from six other countries, using the continental metric system with which they were unfamiliar.

### Radio Show Dates

THE National Radio and Television Exhibition is to be held at Earls Court, London, next year, from Wednesday, August 23rd to

Saturday, September 2nd, with a preview for overseas and other special visitors on Tuesday, August 22nd. It will mark the Silver Jubilee of television programmes which were first seen at "Radiolympia" in 1936.

The Exhibition is organised by Radio Industry Exhibitions Ltd., of which Mr. F. W. Perks remains chairman and also chairman of the organising committee. It will be the 28th National Radio Show.

#### Prize for Paper

THE first prize in the Student Apprenticeship Class of the Engineering Industries Association Group Apprenticeship Competition for 1960, for his paper on "A Random Observation Work Study" has been awarded to Mr. Allen J. Coleman, aged 22.

#### Hungarian "Hams"

THE organisation of Hungarian radio "hams" has celebrated its 10th anniversary with an exhibition of amateur radio equipment in the Budapest House of Technique. There are 50 amateur radio clubs in Hungary with approximately 400 short and ultra-short transmitter receivers and a total of nearly 3,000 members.

#### Bulgarian Bird-song

THE recent expedition to Bulgaria of the British Ornithologists' Union was an unusually difficult assignment for magnetic recording tape. One of the expedition's main objects was the recording of native bird-song. Among the special equipment designed and built for this expedition was a parabolic sound reflector, fitted with a gun-sight which could be aimed at a distant bird to pick up its cry and no other sound. The party used thousands of feet of tape for recording bird-song and Bulgarian folk music. Excellent recordings of a wide range of sounds were made, often in extremely difficult conditions of rain and mud.

#### New British Standard

SAFETY Requirements for Radio (including Television) Transmitting Apparatus. (British Standard 3192: 1959.)

This British Standard has been prepared under the authority of the Telecommunication Industry Standards Committee, and details the requirements for the design and construction of apparatus defined in Section I of the standard, for its installation and its electrical performance so far as it is necessary

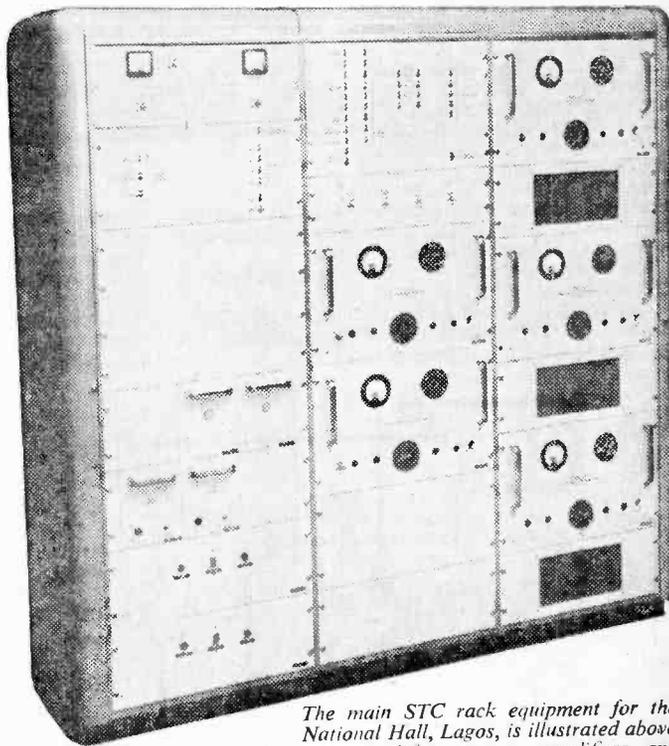
to provide the highest practicable degree of safety in operation. By safety is meant the personal safety of personnel against electric shock (including radio frequency burns) and other harmful effects, prevention of danger to personnel or to property through overheating or fire and, where apparatus includes a cathode-ray tube, protection from flying glass. Section 2 of the Standard lays down in broad outline the general principles of design, while Sections 4, 5, and 6 give the detailed requirements for safety from shock, fire risks and danger from flying glass respectively. Section 3 gives the general conditions of test under "normal" conditions and under "fault" conditions.

#### Dryden Hill

THE BBC has chosen a site at Dryden Hill, near Galashiels, for its new station in South-East Scotland. The site has been approved by the Postmaster General and legal negotiations for its acquisition are in progress.

The station will transmit BBC television, and also the Scottish Home Service, the Light Programme, and the Third Programme, with Network Three, on V.H.F. The station will be provided with a 750ft mast, and will serve an area with a population of nearly 100,000 people, some 70,000 of whom have not hitherto been within range of BBC television or of the V.H.F. sound services. This area will extend to Lauder, Duns, Selkirk, Hawick, Jedburgh, and Coldstream. The frequencies to be used for the V.H.F. sound services transmitters, which will be horizontally polarised, will be as follows: Light Programme 89.1Mc/s; Third Programme and Network Three 91.3Mc/s; Scottish Home Service 93.5Mc/s.

Work on the site will be started as soon as possible, but the construction of the building, the installation of plant, and the design and completion of the mast and aerials will necessarily take some time so that it is not yet possible to give a completion date.



The main STC rack equipment for the National Hall, Lagos, is illustrated above and incorporates microphone pre-amplifiers, power amplifiers and "patching" panels to enable the equipment to be connected up as required for particular occasions.

# Radio Construction for the Beginner

No. 4—EMPLOYING A TRANSISTORISED CIRCUIT

By D. B. Kidd

**T**HE receiver described in the last instalment introduced an amplifying device, the transistor, which produced a magnified image of the "programme" detected by the crystal diode. A valve, given a substantially higher voltage supply, could have performed the same job.

### The Transistor

The transistor merely made the output much louder; it did not improve the receiver's performance in any other way. A crystal receiver, even if carefully designed, has very broad tuning, and although it may receive a fair number of stations at reasonable volume, especially after dark, it is rare that sufficient separation is obtained for much enjoyment.

### Regeneration

The set described, therefore, was no more than an amplified crystal set with all its limitations retained.

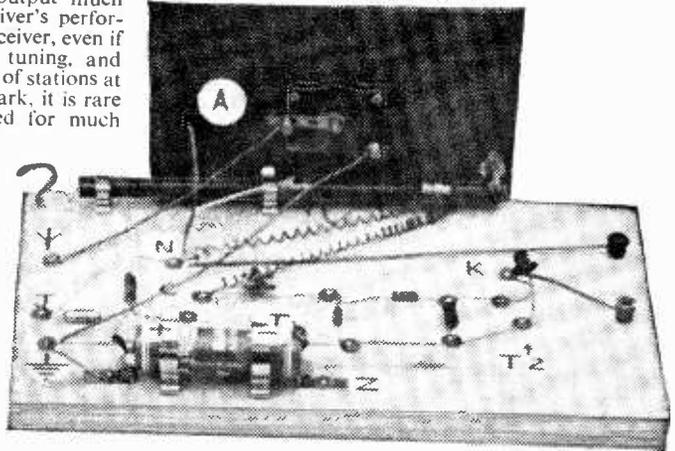
This receiver, the final one of the series, is superior in many ways. Firstly it employs two stages of amplification instead of one and therefore gives much louder output. Secondly, it employs *regeneration*, that is, "feed-back" of part of the signal output to the input, and this permits good separation of stations. Thirdly, as a result of regeneration, the set is sensitive. Loudspeaker reception may be expected on at least one station and headphone reception may be expected without an aerial or earth.

The way in which the set works may be understood by studying the theoretical circuit in Fig. 1.

The signal is picked up by the aerial and passed, as usual, to the tuning circuit which consists of the coil, L1, and the tuning condenser, C1.

As L1 is wound on a long piece of ferrite, there is additional pickup of signal magnetically and this normally adds to the amount derived electrically from the aerial.

The signal is applied via the fixed condenser, C2, to the base of the first transistor, T1. It is fed from the tapping, X, on the tuning coil. Notice that this



A rear view of the Receiver

tapping embraces fewer turns between itself and the earth line (positive) than the aerial terminal does. This is the reverse of the situation met in the previous two receivers and occurs because the electrical requirements of a transistor are much different from those of a diode. The purpose of C2 is simply to stop direct current from the battery flowing through the coil to the base of T1, and thus upsetting the biasing arrangements for it. A condenser used in this way is termed, aptly, a "blocking" condenser.

The transistor T1, which must be of a special type, amplifies the signal which then emerges at the collector terminal marked "Q" on the diagram. Part of this magnified signal passes through C3 (which also "blocks") and part passes along with the direct current of the battery to the upper (negative) line.

### Reaction Coil

Notice that on its way it is caused to pass through coil L2 (called a "regeneration" or "reaction" coil) which is also wound on the ferrite rod and thus passes back, in magnetic form, part of its message to the starting point again. This "feed-back", as it is called, has the effect of "pushing the incoming signal from behind". The result is as

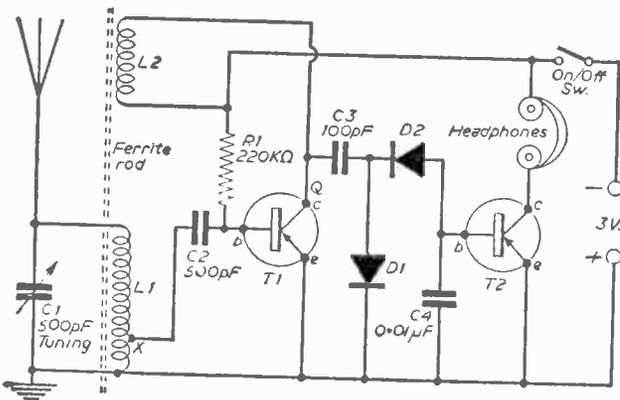


Fig. 1.—The transistor circuit.

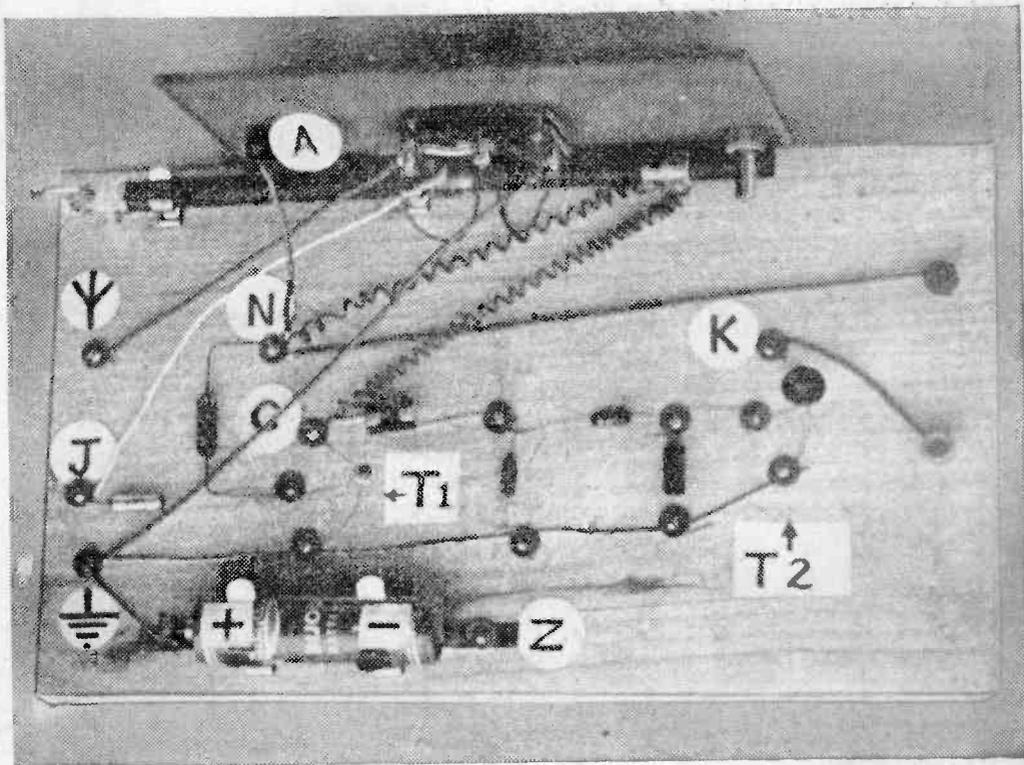


Fig. 2.—A view of the component board, showing the layout of parts.

though the signal voltage were much greater. It also creates the effect of the tuning circuit possessing much less "friction" and thus enables it to work more efficiently at its job of selecting one station from many.

The detecting is done by two crystal diodes (D1 and D2) instead of the single diode previously used. The arrangement C3+D1+D2 has been called an "electron pump". If the reader imagines the wires as tubes, C3 as a piston in a closed cylinder and D1 and D2 as inlet and outlet valves respectively, he will see the close similarity between this arrangement and the old-fashioned force-pump once used on fire-engines.

The remainder of the circuit functions as in the last receiver, using the same kind of transistor. Because T2 receives some direct current from the arrangement, no biasing is normally necessary. However, care must be taken to place the diodes in the directions shown, otherwise the set will refuse to work efficiently.

#### Components

The components required are as follows, a tuning condenser, a 3V battery, tool-clips, wire, audio-type transistor, 0.01 $\mu$ F fixed condenser, pointer knob, a crystal diode, socket-type wander-plugs, and an on/off switch, all as described in the last instalment. In addition, this receiver requires one fixed condenser of 0.0001 $\mu$ F (100pF), one fixed condenser of 0.0005 or 0.00047 $\mu$ F (500 or 470pF), another crystal diode similar to the first, one 220k resistor, one piece of ferrite rod at least 5in. in length, and one surface-

barrier transistor, type SB 305 or equivalent. This may be either new or "surplus".

The receiver as shown in the photograph also contains the following three items, but these may be improvised. The three extras are one small tuning knob, about 1½in. length of ¼in. diameter brass spindle, one brass bush, with a grub-screw—to fit into the spindle.

#### Construction

The reader should be able to follow the layout of the parts from the illustration. Because of the many components involved, one wire has been removed so as not to confuse the reader. This missing wire runs from the negative contact-spring of the battery (bottom-centre of the board) to the unoccupied terminal of the on/off switch (left side of the panel), passing over the first transistor on its way. (From "A" to "Z" in the illustrations.)

Having plugged all old holes in the board and repaired the surface as previously described, the battery-clips, contact springs, and 14 screws and washers may be arranged as shown. The two socket-type wander-plugs on the right of the board act, as before, as headphone terminals.

After the contact springs have been proved to press firmly on the battery tip and base, the battery should be laid aside until a later stage is reached.

It may be noticed that five of the wires (two of them twisted) run to the ferrite rod. These wires should be left until last as they will be described in detail.

The other components and wires should now be fitted, not forgetting the "missing" wire from battery to switch already referred to. The washers should be in the burnished state previously described and the screws really tightly turned down.

The layout follows roughly the theoretical diagram, but to help identify the parts, the following identification points are given.

The condenser connected to point "J" on the board, between aerial and earth terminals, is the  $0.0005\mu\text{F}$ . Its other end goes to the base of the SB305 transistor. The component between point "N" on the board and the base of the SB305 is the 220k resistor. The condenser to the right of point "C" on the board (collector of the SB305) is the  $0.0001\mu\text{F}$ . The two diodes are the next components to the right. The one

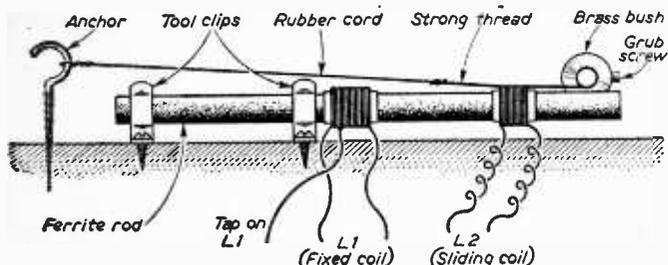


Fig. 3.—Details of the mechanism of the regeneration control.

shown vertical has its red (+) end downwards towards the positive line. The one shown horizontal has its red (+) end towards the left. The component further right and arranged vertically is the  $0.01\mu\text{F}$  condenser. Point "K" marks the collector of the audio transistor (T2). Notice that a wire joins the positive (left hand) contact spring to the earth terminal. The aerial terminal is connected directly to one screw of the tuning condenser and the earth terminal directly to the other.

#### Connecting the First Transistor

The signal received is amplified twice, as previously explained, once before detection and once after. The signal after detection is at a comparatively low frequency and an ordinary transistor, such as was used in the last receiver, will suffice. Before detection, however, the frequency is that of the "carrier", not of the "message", and may be a thousand times greater (on the ordinary broadcasting band).

For such frequencies a special transistor called a radio-frequency (R.F.) transistor is required. This is usually more expensive but is connected into circuit in just the same way. The R.F. transistor used in this receiver is of a special sort called a "surface-barrier type", and is chosen because it will work effectively at a low voltage. Although a 3V battery is specified, the receiver will still function at half a volt or so. *More than 3V may destroy the transistor!*

The three wires which emerge from the base of a surface-barrier type transistor are arranged, not in a straight line, but in a curve. Looking upwards at the base with the wires towards the observer and with the middle wire turned uppermost, the emitter appears to the left, the base in the centre, and the collector to the right. The emitters of both transistors join the positive line on the board.

#### The Ferrite Rod

At the start of the series the writer promised that no component acquired for one receiver would be useless for a later one. This promise has been kept. When a long piece of ferrite rod has been obtained, the small piece acquired earlier may still be used by grinding or carefully filing one end of each till flat then gluing tightly end to end, using a strong pottery-glass or an epoxy-resin adhesive. The two pieces should be held in line under pressure until the adhesive is hard. Provided the layer of glue is thin, the combined rod works just as well as a normal long one.

#### The Coils

A layer of Sellotape is wrapped round the mid-point of the rod and thin enamelled coil-wire (approximately 34s.w.g.) is wrapped round in a "bunch" leaving a 6in. free length at the start. Eight turns are wound on, then a "tapping" loop is twisted in the wire (as previously described) and winding recommenced in the same direction. After a further forty turns have been wound, the coil is ready and the turns are anchored securely by a further layer of Sellotape, leaving 6in. free at the end. After cleaning the enamel from the tips of the two wires and the tapping-loop, the constructor should join up to the screws as described below.

The beginning of the coil to the tuning-condenser, on the same screw as the wire leading to the earth terminal. The end of the coil to the other tuning-condenser terminal, on the same screw as the one leading to the aerial terminal. The tapping loop to point "J" on the board.

The total number of turns (48) may be varied according to the reader's taste but the tapping loop should always be about  $\frac{1}{4}$  of the total number from the beginning. This completes coil L1 shown in Fig. 1.

Coil L2 consists of five turns (provisionally) of the coil-wire wrapped round a sleeve of Sellotape. This sleeve is made by wrapping Sellotape round the end of the rod fairly tightly with the sticky side outwards.

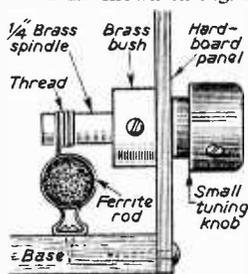


Fig. 4.—The fittings for the regeneration control knob

When the sleeve is five layers thick, each layer directly on top of the last one it is complete. The five turns of wire are anchored by a further layer of tape, sticky side inwards. The two free ends of the wire, after cleaning at the tips, go to points "N" and "C" on the board.

#### Adjusting

After aerial and earth leads and headphones have been connected and the battery placed in its clips, the set can be switched on with the ferrite rod held in the hand and coil L2 as far to one end of the rod as it will go. On pressing the switch a slight hiss

(Continued on page 790)

# A 4-Watt Amplifier

FOR RECORDS OR RADIO

By K. F. Perry

THE instrument described here depicts a simply-made but highly efficient audio amplifier that comprises only two valves, excluding the rectifier, and which is capable of providing four watts with high-quality reproduction from a gramophone pick-up or radio source. Provided a suitable speaker (preferably housed separately) is used, a wide frequency range is available due to the use of adequate tone controls. With the bass control turned to "full bass" trouble from surface noise was experienced in the prototype on some L.P. recordings showing that a good low frequency response was obtainable. Consequently, care was taken to ensure adequate smoothing of the supplies and also to prevent A.C. currents circulating in the chassis, the latter point

being accomplished by employing a "negative bar" to which all chassis returns are made.

### Alternative Uses

Whilst the amplifier may be constructed exactly as shown—as a separate unit—it can alternatively form the "back end" of a radio receiver, as a 2-valve T.R.F. or superhet tuner section will provide sufficient drive in most cases. Or again, where a receiver is in use which employs a simple L.F. valve feeding an output pentode, it might be possible to remove the L.F. valve completely, and to substitute V1 (Fig. 1) and the associated circuitry so improving the receiver. Similar reasoning applies in respect of audio amplifiers already in existence that do not perform so well as they might. Satisfactory results cannot be guaranteed, however, if this sort of thing is done and in any case a valve that is the same or direct equivalent as that specified for V1 is essential.

Generally speaking, however, the arrangement is a very flexible one and as only two valves are used, only a small chassis is needed, although the chassis layout (Fig. 3) shows the amplifier complete with the power pack section included. Where a separate power pack is envisaged the chassis could be reduced to approximately 7in. x 5in., when the front panel (see Fig. 4) also could be reduced in width so shortening the wiring to advantage. A point in favour of a separate power supply is of course that it is nearly always available for use with other equipment, thereby effecting considerable financial economy.

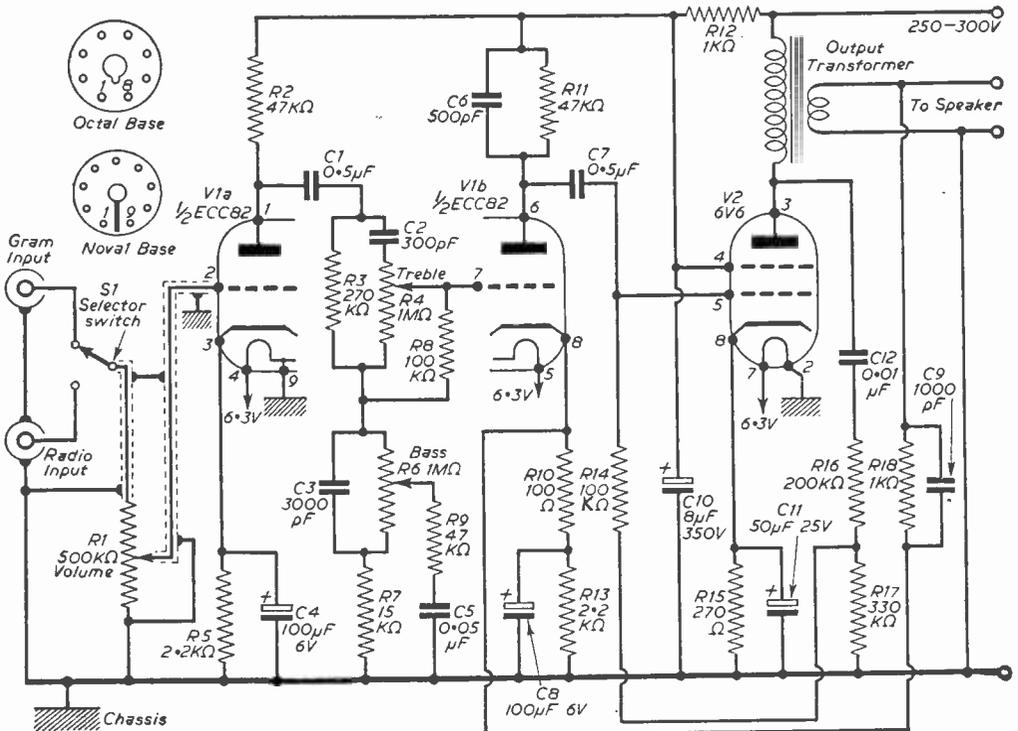


Fig. 1.—The circuit diagram of the amplifier stages.

**COMPONENTS LIST**

- |                        |          |
|------------------------|----------|
| R1 500k Pot and Switch | R10 100Ω |
| R2 47k                 | R11 47k  |
| R3 270k                | R12 1k   |
| R4 1M                  | R13 2.2k |
| R5 2.2k                | R14 100k |
| R6 1M                  | R15 270Ω |
| R7 15k                 | R16 200k |
| R8 100k                | R17 330k |
| R9 47k                 | R18 1k   |

- |                                   |            |
|-----------------------------------|------------|
| C1 0.5μF                          | C6 500pF   |
| C2 300pF                          | C7 0.5μF   |
| C3 3000pF                         | C9 1000pF  |
| C5 0.05μF                         | C12 0.01μF |
| C4 100μF, 6V electrolytic         |            |
| C8 100μF, 6V electrolytic         |            |
| C10 8μF, 350V electrolytic        |            |
| C11 50μF, 25V, electrolytic       |            |
| C13 } 32 x 32F, 350V electrolytic |            |
| C14 }                             |            |

V1 - ECC82    V2 - 6V6    V3 - EZ80  
 Mains transformer—Mains input Secondary 275-0-275V at 80mA, 6.3V at 2.5A  
 L.F. Choke—10H, 100mA. One I.O. and Two noval valve bases,  
 One rotary selector switch (or 2-pole, 2-way type).  
 Four control knobs. Hardboard, wire, solder, etc.  
 Output transformer 10k: speech coil impedance.  
 Chassis (see text) 2in deep.  
 Two flush mounting co-axial sockets.

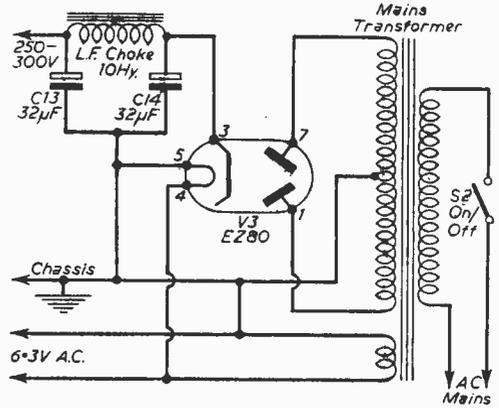


Fig. 2.—The circuit of the power-pack.

**The Circuit**

From Fig. 1 it will be seen that V1a—which is one half of a ECC82—takes the input from the volume control potentiometer, R1, and operates as a preamplifier feeding into a tone control network that couples into the grid circuit of V1b. The tone controls—R4 and R6—permit a wide range of control of “top” and “bass” respectively, the bass register being favoured somewhat in design. The amount of top however, can be arranged to suit individual taste by changing the value of R8 and, for example, should more top be required R8 should be

Mains Input and Speaker sockets are on rear flange of chassis

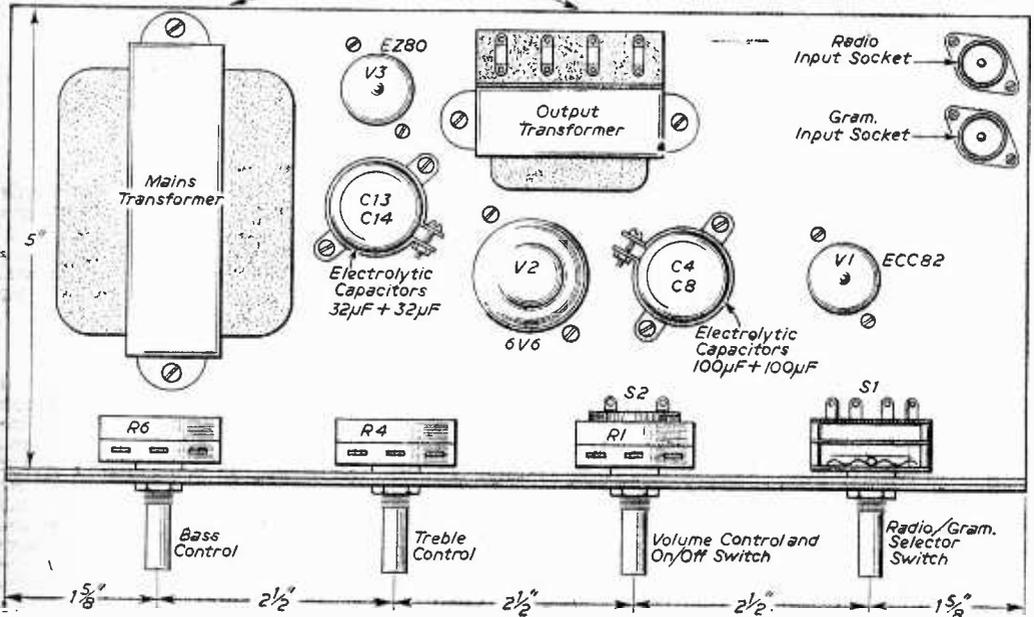


Fig. 3.—The above-chassis layout.

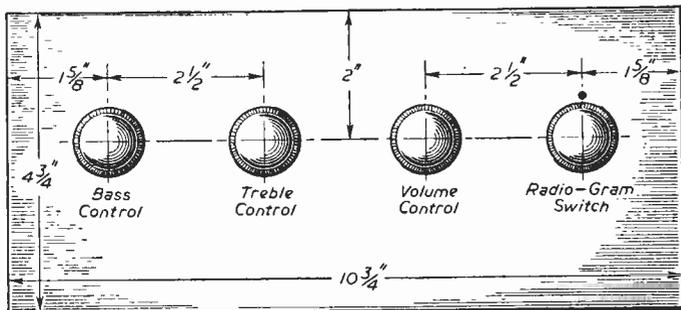


Fig. 4.—The front panel.

increase in value or even removed completely from circuit and vice versa.

Feedback is taken from the anode of the output pentode and also from the secondary of the output transformer, which should be a large and efficient component where possible. If desired R16 and R17 can be combined into a preset potentiometer, R14 being connected to the slider so that optimum operating conditions can be obtained.

#### The Power Supply

This is a full-wave rectified arrangement (see Fig. 2) and the valve specified will supply the amplifier with ease and will not be overloaded if a simple tuner is also fed from it. The mains transformer must be chosen to suit the case, however, and if no tuner is required to be used with the amplifier, then a transformer with a secondary current rating of 60mA will be sufficient, whilst with a tuner included a rating of 80mA is desirable. In either case the secondary voltage should be approximately 275-0-275V as too low an H.T. rail voltage will give poor results.

#### Constructional Notes

The positions of the larger components are shown in Fig. 3 which is the above chassis view. The L.F. choke can be mounted sub-chassis directly beneath the mains transformer (provided this is not one of the "drop through" variety) as can also the small electrolytics, C10 and C11 which should for preference be tag-ended items. The use of a 5-way tag strip will also be found beneficial although most of the smaller components, resistors, etc., can be suspended in the wiring with ease.

Construction is considerably simplified by employing a front panel upon which are mounted the various controls at a convenient height and this panel may be made of hardboard, plywood, etc.

When all the major components are in position a stiff copper wire should be run across the underside of the chassis from the input sockets and all chassis returns should be made to this "negative bar" during the subsequent wiring operation. Screened lead—television coaxial cable will do excellently—is essential in the grid circuit of V1a or there will be troublesome hum evident during usage.

If used in conjunction with a good quality speaker that is capable of reproducing the available range of frequencies and with high-grade ancillary equipment, this small amplifier will give a remarkably good account of itself and not until the volume control is turned to approximately three-quarters maximum travel will distortion be evident: before then, however, the output will be in excess of that needed in the average size room.

## MAKING SMALL CASES FOR RECEIVERS

By E. J. Wotton

**O**BTAINABLE at many surplus stores is a form of plastic material often described as Waverite off-cuts, as opposed to the very hard type used for table tops. This is ideal to make the boxes required to house small radio sets and amplifiers. It is easy to cut and plane, and holes can be reamed and made with a square awl.

#### Cutting the Material

After deciding the size required, ensure that the top and bottom are true rectangles and that both are exactly the same size. This can easily be done by cutting the two pieces a little over size and pasting together face to face with a piece of tissue paper between, and leaving to dry overnight. After checking, soaking in warm water will separate them.

The best way of marking is by using a sharp pointed scribe and an ordinary set square. When gripping the material in the vice jaws it is necessary to use either fibre or wood faces on the jaws. These can be easily made.

The sides can now be prepared and again accuracy

is called for. The two longer sides must be exactly the length of the top and the bottom, while the two shorter sides are twice the thickness of material shorter than the short sides of the top and bottom. The ends must be square. Several suitable adhesives are available which will join the material being used.

#### Assembly

If the chassis is to be mounted in the box, it should now be fixed to the top with the controls protruding. Then apply a little adhesive to the underside edges of the top and also the edges and ends of the four sides. Place these in position and temporarily secure them with Sellotape. When the adhesive has set, attach the bottom with small pieces of Sellotape and carefully file the edges and corners flush, lightly rounding them at the same time. Short pieces of matchstick can be glued inside each corner for extra strength. The back can then be removed attaching when necessary with a Sellotape "hinge" and short piece as a catch.

# CIRCUITS FOR ACORN VALVES

## RECEIVERS, SIGNAL GENERATOR AND WAVEMETER

By L. V. Nixon

**S**URPLUS acorn valves may be obtained at exceedingly low cost, and give excellent results in short wave and ultra-short wave (V.H.F.) receivers. Though such valves are particularly intended for V.H.F. use, they operate equally well at lower frequencies. They can thus be employed in general coverage S.W. receivers, and even in receivers for the long and medium wave broadcast bands.

### The 954 and 955 Valves

The 954 pentode and 955 triode will be found suitable for many circuits, and pin connections for these are shown in Fig. 1. The valve is viewed from the top, or longer end, in both cases. Both valves have 6.3V 0.15A heaters, and can thus be operated from a standard 6.3V transformer. Normally the anode voltage should not exceed 250V, and a maximum of 100V may be used on the 954 screen grid (G2). The valves operate well with much lower voltages.

If holders are used, the valves should be inserted and withdrawn with care, or the seal may be cracked. Leads may be soldered directly to the pins, and this is sometimes preferable. Excess heating of the pins near the seal may also cause it to crack, so ready tinned connections should be soldered to the ends of the pins. If the iron is at the correct temperature, it should not be necessary to hold it in contact with the pin more than a second or so. Heater leads may be of thin, twisted flex. For the other connections, 22s.w.g., or 20s.w.g. may be used. Very stout wires may impose strain on the pins, unless carefully shaped to avoid this.

### 954 Detector

The 954 will operate effectively as a detector from 10 to 2000m. using the circuit shown in Fig. 2. An H.T. line providing 200V will be sufficient. Any standard A.F. amplifier may follow the detector.

Reaction is controlled by adjusting the screen grid voltage, as this is very convenient from the point of view of S.W. working. The position of the cathode tap on the coil also influences reaction. This tap should be as near the earthed end of the coil as possible, providing sufficient reaction may be obtained. For most S.W. coils, a tapping point  $\frac{1}{2}$  to 1 turn from the earthed end of the coil will do well. It is not difficult to try this tapping at various points, before finally soldering it.

Connections for typical coils are shown in Fig. 3. For the S.W. ranges, ribbed or tubular formers can be used. Leads are numbered to agree with Fig. 2.

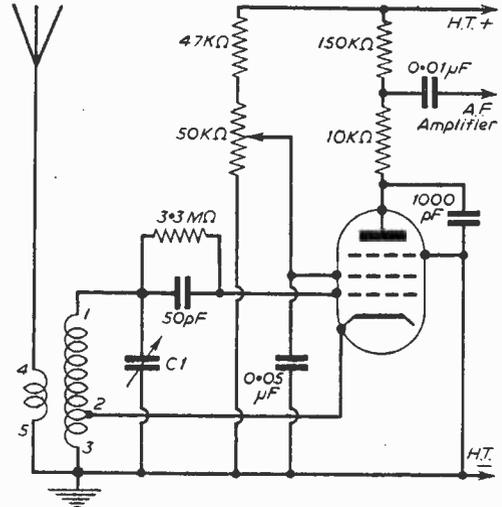


Fig. 2.—A detector circuit using a 954 acorn valve.

The tuned windings may be of 20s.w.g. or similar wire, with 28s.w.g. or similar wire for the aerial coupling windings. The number of turns on the latter can usually be about one-quarter to one-third the number on the tuned winding.

For V.H.F. use, the coils are best wound on ribbed ceramic formers, or can be self-supporting. Fairly stout wire is preferable—about 18s.w.g. To keep leads short, the ends of the tuned portion of the coil can be attached directly to the tuning condenser. Points 4 and 5 can be supported by terminals on an insulated strip, or by stand-off insulators.

In Fig. 2, a simple aerial is used, taken to point 4. In this case, point 5 is connected to the chassis or earth. If a dipole is available, its twin feeder is connected to 4 and 5, as shown in Fig. 3. Good results can be achieved with a simple short aerial, but a dipole does give better signal strength for the band for which it is cut.

### Circuits for Short Wave Only

If the circuit is used for S.W. only, C1 can best be about 100pF or 150pF. For general coverage, inclu-

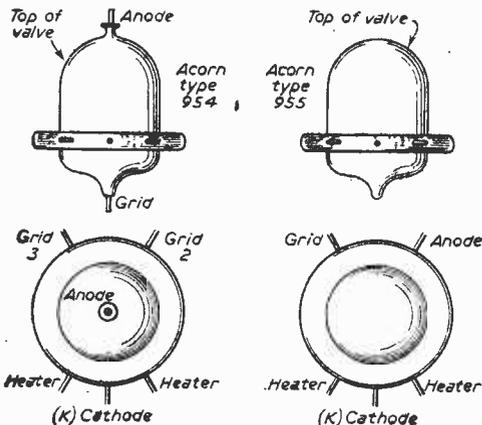


Fig. 1.—The 954 and 955 valves, showing pin connections.

ding long and medium waves, a larger condenser is preferable, and 300pF to 500pF can be used. For V.H.F. use, a smaller condenser is better, and it may be 25pF or 50pF.

Using 16s.w.g. wire, and winding self-supporting coils with an inside diameter of about  $\frac{1}{2}$ in., 4 turns

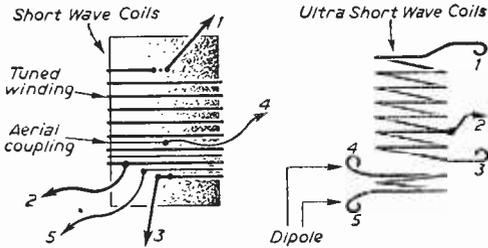


Fig. 3.—The coil windings for S.W. and ultra-S.W. tuning.

will permit 2m working, with 6 turns for about 2 to 4m, and 10 or 12 turns for 4 to 6m.

Using 20s.w.g. wire on 1in diameter formers for S.W. coils, about 6 turns will do for 10 to 20m. For 18 to 35m, about 14 turns may be used, and for about 34 to 60m, 28 turns of 24s.w.g. will suffice. These coils may be used with 100pF or 150pF tuning condenser.

The exact ranges covered will depend on layout, etc., but efficiency will in any case be maintained, as the circuit does not have to be aligned with a second tuned circuit, and therefore need not cover any particular waveband.

For S.W. purposes, plug-in coils are convenient. But a single fixed coil, or wavechange switching, may be used instead. The simplicity with which almost any waveband can be tuned is one of the great advantages of a circuit such as that in Fig. 2. The 50k potentiometer is carefully adjusted, as tuning proceeds, to keep the detector almost on the verge of oscillation.

**V.H.F. Detector**

A regenerative or super-regenerative detector which will work at very high frequencies is shown in Fig. 4.

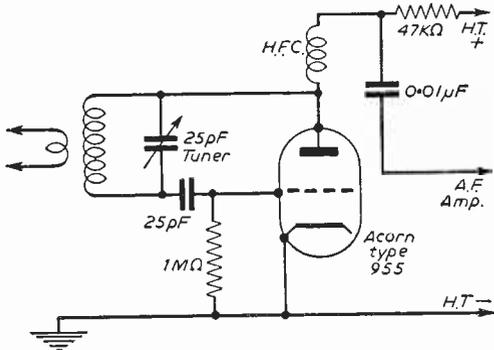


Fig. 4.—A V.H.F. regenerative detector circuit.

This type of circuit may be operated with controlled regeneration, by drawing H.T. current from a potentiometer. In these circumstances, it is very sensitive, and will not cause interference, if not allowed to oscillate.

For maximum sensitivity with such a circuit, however, super-regeneration is usually employed. For this method, the H.T. voltage is increased so that the valve oscillates, and rectified R.F. causes grid blocking, so that the valve is drawn in and out of oscillation. So that this arises at above audible frequency, the grid leak may be reduced to 100k or so, and other values may also be tried instead of the 25pF fixed condenser.

A super-regenerative detector is extremely sensitive, when working correctly, but must not be coupled directly to the aerial, as interference will be caused. A regenerative detector, kept just below oscillation point, is sensitive, but does not cause interference, and may be coupled to the aerial. With simple V.H.F. circuits of this type, the degree of aerial coupling will considerably influence results. With a self-supporting aerial winding, coupling can easily be adjusted.

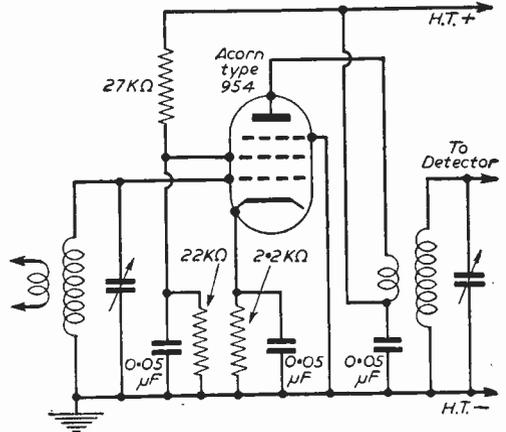


Fig. 5.—A 954 valve may be used as an H.F. stage.

**H.F. Stage**

A 954 valve as amplifier will isolate a regenerative or super-regenerative detector from the aerial, and may be wired as in the circuit shown in Fig. 5. The aerial coil and aerial tuning condenser should be the same as those in the detector stage. Ganged tuning may be arranged if the coils are carefully constructed. If separate tuning condensers are employed each circuit can be tuned independently, so that discrepancies due to the coils or layout and wiring are no longer of importance.

The aerial and detector circuits should be separated, or screened from each other, to avoid instability. This is usually easy to arrange.

The 954 may be used as an untuned amplifier by replacing the aerial tuned circuit with a suitable H.F. choke, or 100k resistor. This will still provide isolation of the detector from the aerial, but gain is less than with a tuned stage. A simple aerial may be coupled to the 954 grid through a very small fixed or pre-set condenser. A dipole cannot be coupled to the untuned stage.

The H.F. stage in Fig. 5 may be used with the detector in Fig. 2. If the circuit in Fig. 4 is used as a super-regenerative detector, the stage in Fig. 5 should be added, to avoid radiation of interference from the aerial, as explained.

### Signal Generator

Acorn valves of the types mentioned can be usefully employed in other equipment, as well as receivers. A self-modulating signal generator, producing an A.F. output, and modulated or continuous wave R.F. outputs between 10 and 2000m, can be constructed from the circuit in Fig. 6.

Here, the radio frequency is determined by the coil and tuning condenser, and if the 0.5m control is set near zero value, an unmodulated, or C.W., output is obtained. As this control is adjusted towards its maximum value, grid blocking causes the valve to go in and out of oscillation at audio frequency. This

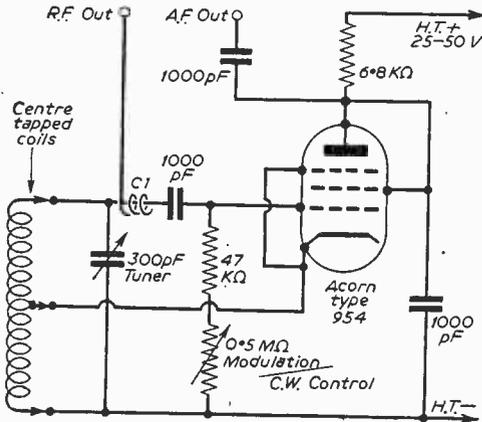


Fig. 6.—A self-modulated oscillator or signal generator.

provides a modulated radio frequency output, or a simple A.F. output, at the circuit points indicated.

C1 has a very small capacity, and can be made by looping insulated wire round the tuning condenser lead. A high voltage supply is not required, 25V to 50V or so being adequate.

With a 500pF tuning condenser, four air-cored coils will cover approximately 20 to 2000m. They may be wound as follows:

1. 7 turns of 20s.w.g. space wound on a 1½ in. diameter former.
2. 32 turns of 26s.w.g. enamel wire close wound on a 1 in. diameter former.
3. 120 turns of 32s.w.g. enamel wire close wound on a 1 in. diameter former.
4. 280 turns of 34s.w.g. silk covered occupying 1 in. on a 1½ in. diameter former.

If the generator is not required to work over long waves, the large coil is unnecessary. A 300pF tuning condenser will then be sufficient. The generator frequency can be checked, and its dial calibrated by tuning in known stations with a receiver, and tuning the generator to the same frequency. Tune the generator from a low wavelength (or high frequency) towards a higher wavelength (or lower frequency) until its note is heard, to avoid confusion from harmonics.

### V.H.F. Wavemeter

A surplus 955 will conveniently act as a detector for a wavemeter operating up to 300Mc/s and higher frequencies. A circuit for this application is shown in Fig. 7. As the cathode current is very small, and long running will probably be unnecessary, a 4½V dry

battery may be used for the heater supply.

For average purposes near 10Mc/s to 100Mc/s, a 50pF or similar tuning condenser will be satisfactory. For regular use at frequencies above 100Mc/s, a smaller capacity is more convenient, though 50pF may be fitted.

The coils may be about 1 in. in diameter, and wound with 22s.w.g. or similar wire. With the 50pF condenser, 28 turns will cover about 6 to 12Mc/s. For about 12 to 24Mc/s, 12 turns may be used, with 5 turns for about 24 to 48Mc/s. The number of turns on the smallest coils will be much influenced by the layout, length of wiring, and minimum capacity of the tuning condenser. However, 1 turn about 1½ in. in diameter should do for about 50 to 100Mc/s. For about 100 to 200Mc/s, a ½ in. hairpin loop may be used.

The meter shown in Fig. 7 can be a 500µA or similar instrument. A more sensitive instrument will increase the sensitivity of the wavemeter.

The wavemeter can be calibrated from a signal generator, grid dip meter or receiver. When a R.F. signal is present (as in a generator or oscillator circuit) the wavemeter is tuned for maximum indication on the 500µA meter. With the simpler type of receiver, the 955 need not be operating, as the wavemeter will act as an absorption frequency meter, and pull the receiver detector out of oscillation. To avoid coupling in reactance, which would to some extent modify tuning, the coupling to the wavemeter should always be as loose as possible.

### Power Supply

Detector and R.F. stages such as those shown can draw current from the amplifier or the broadcast receiver used to provide A.F. amplification. They may also be incorporated in complete S.W. or V.H.F. receivers. If this is so, it is only necessary to allow 2 to 3mA for the 954, and up to 7mA for the 955, according to circuit details, so even a small power pack will suffice.

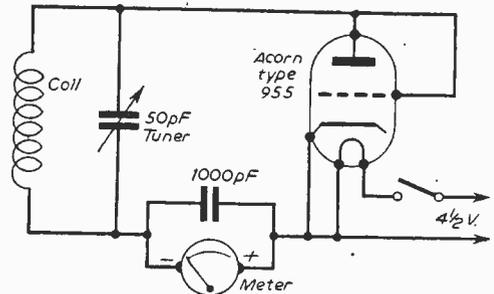
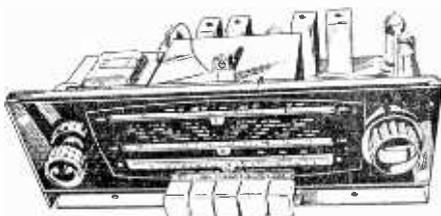


Fig. 7.—A wavemeter for use up to 300Mc/s.

The circuit in Fig. 6 is feasible for either mains or battery running. If a mains supply is chosen, the transformer will require a 6.3V winding for valve heater. If the H.T. winding provides a high voltage, such as 200V, this may be reduced by using two fixed resistors as a potential divider. For around 180V to 250V the divider may consist of 47k and 10k resistors in series, the 10k resistor being returned to H.T. negative, and H.T. being derived from the junction of the resistors.

If hum is introduced from the heater at some frequencies, a 0.05µF or similar condenser can be wired from each heater pin to the chassis

**BRAND NEW AM/FM (V.H.F.) RADIOGRAM CHASSIS AT £13.6.8 (P. & P. 10/-)**



Tapped input 220-225 v. and 226-250 v. A.C. ONLY.  
 Chassis size 15 x 6 1/2 x 5 1/2 in. high. New manufacture. 12 mths.' guarantee.  
 Dial 1 1/2 x 4 in. in black and yellow.  
 Pick-up. Extension Speaker. Ae. E., hd Dipole sockets. Five "piano" push buttons—OFF L.W. M.W. P.M. and Gram. Aligned and tested. With all valves and O.P. Transformer. Tone Control Fitted.  
 Covers 1,000—1,900 M.; 200—500 M.: 88-98 Mc/s.  
 Valves EZ80 rect., ECH81 EF89, EABC80, EL84, ECC85.  
 Speaker and Cabinet to fit chassis (table model). 57/6.  
 10 x 6 in. ELLIPTICAL SPEAKER. 20/- to purchasers of this chassis.  
**TERMS:**—(Chassis) £4.16.8 down + 10/- carr. and 6 Monthly Payments of 30/-, or with Cabinet and Speaker £5.10.0 down and 7 Monthly Payments £1.13.6.  
 Some slightly tarnished but unused chassis at £10 (carr. 10/-).

**BATTERY ELIMINATOR.** Converts your Battery Set to Mains. For 4 Low Consumption Valves (96 range). 90 v. 15 mA. and 1.4 v. 125 mA. 42/6 (2/6 post). 200-250 v. A.C. Size 5 1/2 x 3 1/2 x 2 1/2 in. Also for 250 mA. 1.4 v. and 90 v. 15 mA at same price. Specify which, or give Valve line-up.

**THE "CABY" TEST METERS**

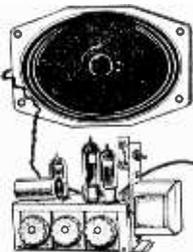
In moulded case. Prices include Test Prods., Batteries, Instruction Book. FULLY GUARANTEED. Also measure db. Accuracy: A.C. 3 per cent D.C. 2 per cent.

- A-10 **£4.17.6**
- B-20 **£6.10.0**



A.10—2K ohms/v. on A.C. and D.C. volts (10, 50, 250, 500 and 1000 v.); 10K and 1M ohms; 1 mA, 25 mA and 250 mA. D.C. Size: 5 1/2 x 3 1/2 x 1 1/2 in. Weight 17 ozs.

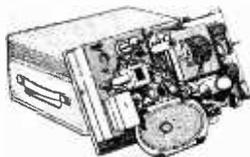
B.20—10K ohms/v. on 0.5 v. and 2.5 v.; 4K ohms/v. on 10, 50, 250, 500 and 1000 v.; A.C. and D.C. Resistance. 2K, 200K, 2M and 20M-ohms.; D.C. current, 100 microA, 2.5 mA, 25 mA, 250 mA. Size: 5 1/2 x 3 1/2 x 2 1/2 in. Weight, 24 ozs.



**3-VALVE AMPLIFIER (INC. RECT.).** Capable of giving 4 watts. Mains and output transformers. Valves ECC83, EL84, and EZ80, 3 Controls, volume, bass and treble. On/Off switch. Fully guaranteed. (Chassis size 6 1/2 x 3 x 2 1/2 in.) 6 1/2 in. round or 7 x 4 in. elliptical speaker, state which. Not suitable for microphone input.

**67/- (3/- p. & p.)**

**TAPE RECORDER ASSEMBLED TO B.S.R. MONARDECK**



**A QUALITY ARTICLE.** Valves EZ80, ECC83, ECL82, DM70. Acos Crystal "mike". 850ft. Tape and extra spools. 3 1/2 in./sec. Mike and Radio inputs: Vol. on/off tone. Ext. L.S and Monitor. Fast forward and reverse. Cannot be accidentally erased. Magic Eye Indicator. 7 x 4 in. Speaker. Four separate chassis assembled to base of the Monardeck to fit into cabinet of 14 x 11 1/2 x 7 in.

PRICE for Recorder and Deck Assembly, as above (without Cabinet), £16.10.0 (10/- p. & p.). Cabinet £3 (5/- carriage).

Enquiries invited for any of the parts.

See additional advertisement on page 812.

**GLADSTONE RADIO** 58A HIGH STREET, CAMBERLEY, SURREY. Tel. 22791  
 Also at 247 New Road, Portsmouth, Hants., and 56 Stokes Croft, Bristol  
 Camberley closed Saturdays. Portsmouth and Bristol closed Wednesdays.

**"READY TO USE" ITA CONVERTER**



Separate gain controls. Valves PCF80 and PC84. Switch position ITA (1)—ITA (2)—BBC. Bakelite moulded cabinet. 8 1/2 x 4 x 6 in.

Selling last 500 at 70/- (p. & p. 3/-).



**LISTEN WITHOUT INTERFERENCE.** Fully built V.H.F./F.M. Set for £8.8.0 (3/- post). Covers 88-95 Mc/sec. Wired, aligned and tested. Mullard permeability tuner and 4 valves (ECC83, ECL82 and two EF91), with mains transformer. Cheap room dipole. 10/-, 300 ohm twin feeder. 6d. yd. Available as self-powered tuner chassis at £7/10/0 (p. & p. 3/-).



**GRAMOPHONE AMPLIFIER** with 5in. SPEAKER. On Fabric-covered Baffle 12 1/2 x 5 1/2 in. Mains and Output Transformers. EZ40 and EL41. Tone and Volume Controls.

On/Off switch. Plenty of Volume. Fully Guaranteed. Two Knobs supplied. Ready to play. Useful for Stereo.

**ONLY 57/-, post 3/-**

**BEREC BATTERY RADIO IN MAKER'S CARTON.** Valves DK96, DF96, DAF96, DL96. Requires Ever Ready battery B103 or battery elim. for converting to mains operation—see adjacent item. Two Short Wavebands 2.5 to 7 Mc/s and 6.5 to 17 Mc/s. Cabinet 12 x 7 1/2 x 6 in. **ONLY £5 (2/6 p. & p.);** MW and SW £5.4.0 (plus 2/6 p. & p.); LW and MW £6 (plus 2/6 p. & p.). Available as kits at 10/- less each.



**AUTOMATIC RECORD CHANGERS COLLARO CONQUEST** with manual play also. 4-speed. A.C. mains 200-250 v., see illus.

**£7.10.0 (5/- P. & P.)**

R.S.R. UAS 4-speed auto-changer. £6.10.0 (5/- carr.) or with Stereo Head. £6.12.6 (5/- carr.).

All with Crystal Turnover Head.



**ALL ITEMS GUARANTEED 12 MONTHS—B.V.A. VALVES 3 MONTHS**

Send 6d. (stamps will do) for our illustrated catalogue of the above items and others. All New Goods. Delivered by return. Terms:—One-third down and balance plus 7/8 in four equal monthly payments. Postage with down payment (C.O.D. 2/- extra).  
**SEE SPECIAL TERMS FOR AM/F.M. CHASSIS.**

Posted Orders to Camberley Please.

# COMPACT HI-FI

by *Armstrong*

## STEREO 55 (illustrated) 32 GNS. TUNER-AMPLIFIER CHASSIS

An outstanding new Armstrong chassis combining AM and FM Tuners, a Stereo Control Unit and two High Fidelity 5 watt Amplifiers in one compact unit. In all its functions the Stereo 55 is designed for mono as well as stereo use so that up to 10 watts output is always available.

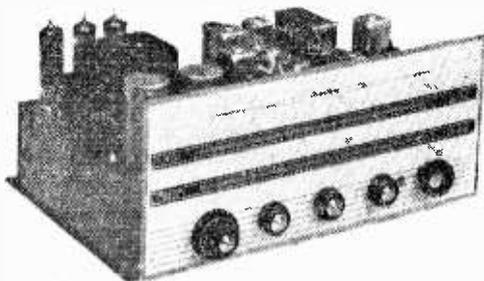
Full VHF and medium bands. ● Inputs for tape recording and playback. ● Alternative pick-up inputs. ● Booster unit available for low output pick-ups. ● Input for possible future stereo radio. ● Separate bass and treble controls and dual volume control for ease of balancing. ● Free instruction booklet with every model.

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

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

PJS



## STEREO 12 Mk. 2 42 GNS.

A new and improved version of the famous Stereo-Twelve. A total of 16 watts output is available from the two 8 watts push-pull amplifiers. VHF, with automatic frequency control, and medium and long bands. Inputs for recording and playback and for stereo radio if required in the future. Booster unit available for low output pick-ups, both mono and stereo.

The name ARMSTRONG is the registered trade mark of ARMSTRONG WIRELESS & TELEVISION Co. Ltd. WALTERS ROAD, LONDON N.7. Tel.: NOR 3213

## SPECIAL ANNOUNCEMENT

To Constructors of

“Practical Wireless”

Transistor

“POCKET SUPERHET”

Osmor beg to announce that a printed circuit for this excellent receiver is available, thus ensuring easy construction and complete success.

Information and price list on request to:

**OSMOR RADIO PRODUCTS LTD.**  
418, BRIGHTON ROAD, SOUTH CROYDON, SY.  
CRO. 5140/9.

## SPECIAL FOR THE “HAMS” RADIO STATION

*Illustrated*

$\frac{1}{4}$  inch detachable bit  
soldering instrument  
List No. 70

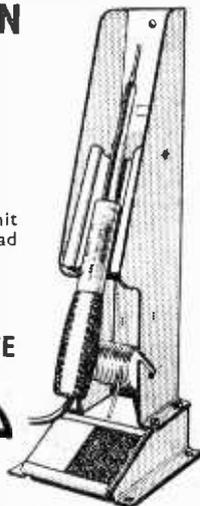
Combined Protective Unit  
with Wiper/Abrasion Pad  
and Solder Reel  
List No. 700

Apply SALES & SERVICE

**ADCOLA**  
(Regd. Trade Mark)

**GAUDEN ROAD  
CLAPHAM HIGH ST.  
LONDON, S.W.4**

Telephones:  
MACaulay 4272 - 3101

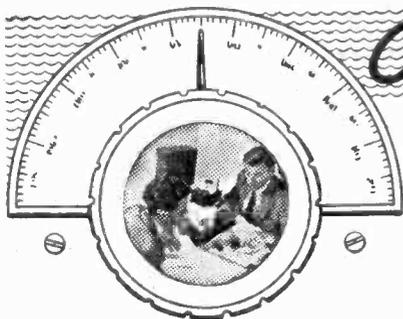


British & Foreign  
Patents, Registered  
Designs, etc.

Telegrams:  
“SOLJOINT, LONDON”

# On Your Wavelength

BY THERMION



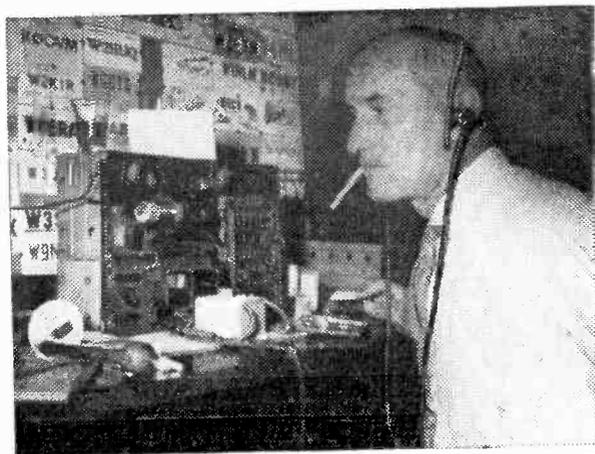
Mr. C. A. Bradley, seen here in his "shack", has been a radio enthusiast ever since the "good old days".

It is always interesting to me to see photographs of readers' dens, and I like to compare the equipment which is being used in the various dens. It is interesting to see how one reader will make do with a home-made receiver with a minimum of controls, whilst another will have a most elaborate converted ex-Government or American communications receiver.

It reminds me of my early days, before I got my "ticket", when I used to spend many hours listening to the amateurs in order to gain experience in amateur techniques. There was a fully-fledged amateur a street away from me and I used to hear him call C.Q. every evening, and when he listened I tuned over the band and could hear dozens of amateurs all over the world calling in answer to his C.Q. call, but he never came back and worked any of them. I wondered what he could be listening on, or whether his aerial was no good. After a week I could stand it no longer so one evening I walked round to his house and introduced myself as a local listener and asked him if he had heard all the replies to his calls. He looked

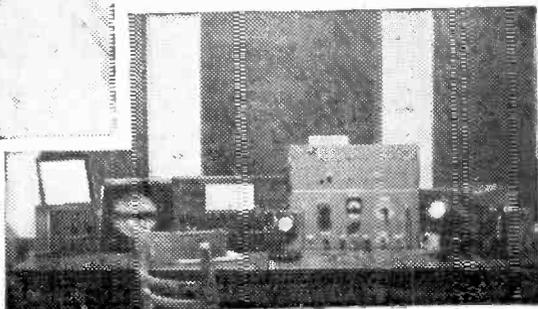
astounded and said he had not heard one of them, and I was astonished to see a well-known American communications set and it was true that it gave such a crowded response over a narrow band that he was in fact unable to hear the many replies. My home-made set spread the band over a much wider scale, and I must confess that he sold his set and made the one I eventually described in these pages.

I am showing you this month some more dens and readers may like to compare the individual "stations".



This amateur station on Tobago (VP4WD), whose operating position is shown, is the first and only one on this island.

(Right) This illustration shows B. G. Taylor's station at Bathgate.



# USING PORTABLES IN THE CAR

## HOW TO USE A PORTABLE WITH AN EXTERNAL AERIAL

**T**HE popularity of using an ordinary battery portable radio in a car is for ever increasing. Most of the latest portables with low-consumption valves and push-pull transistorised output stages, coupled with highly sensitive loudspeakers, give sufficient volume to mask the small ambient noise in the modern car. The modern portable is highly versatile, and as it does not represent a fixture in any particular place it is usually covered by the wireless licence taken out for the main receiver of the house. With a car radio, a separate licence is required, and as the set is fixed in the car it cannot easily be used for other purposes. Nevertheless, it must be understood that the modern car radio is comparable in terms of volume and quality to the household mains receiver, and this coupled with better selectivity and sensitivity will always put it well above the ordinary battery portable.

### Car Radios Without an Additional Aerial

One of the disadvantages of the portable in a car is that of directivity of the internal aerial. The set can be orientated on the back window-ledge or under the dashboard for maximum pickup, but on turning a corner the signal fades. This is aggravated to a large extent by the screening of the car itself, for although a certain amount of signal passes through the metal shell, it is severely attenuated by the time it gets to the aerial. This means that the portable needs to be highly sensitive to receive the signal at any distance in excess of 40 to 50 miles from the transmitter.

In addition to this, the fact that the volume control has to be almost fully advanced to secure reasonable reception and sufficient volume makes the set highly responsive to interfering signals generated by the car itself. The signal-to-noise ratio is considerably impaired when any portable is subjected to these conditions. Vast improvement in the signal-to-noise ratio is possible, however, by operating the set on the rear window-ledge. The glass of the rear window allows unrestricted passage of signal, and the set is sufficiently removed from the engine to prevent most interference, unless, of course, the engine happens to be in the rear of the car, in which case the portable may well be directly over the sparking plugs!

Operation under the dashboard of a car with the engine in the front is virtually impossible, as the internal aerial picks up far more signal from the ignition system of the car than from the required station.

### Using an External Aerial

Both the screening and directivity problems can be resolved by operating the portable from an

By Gordon J. King, Assoc. Brit., I.R.E.

ordinary car-type aerial. This, of course, also results in a marked improvement of signal-to-noise ratio. The car aerial can be coupled via a coaxial socket on the receiver, so that it is a simple matter to disconnect the aerial when the set is to be used under normal portable conditions.

### Coupling the Aerial

The ease with which an external aerial can be coupled to a portable depends on the type of aerial to be used and the kind of aerial circuits employed in the set. The frame aerial or ferrite rod aerial contained in the portable represents not only the signal pick-up medium, but also the tuned circuits for the first stage. Thus, if an external

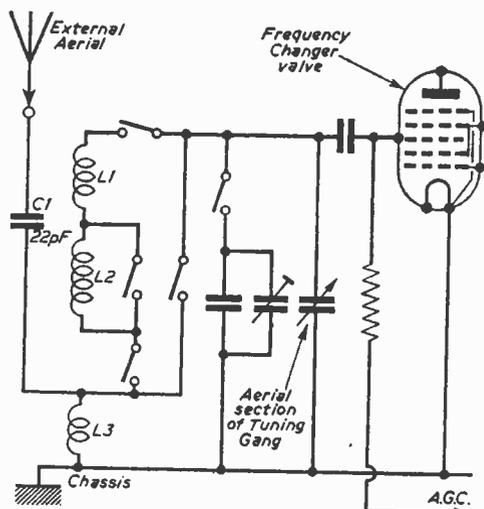


Fig. 1.—Method of coupling throw-out aerial to the portable radio.

aerial is simply connected direct to the tuned circuits, the capacitance and inductive loading introduced by the aerial is bound to detract from the available signal transfer owing to detuning of the aerial circuits themselves.

In this respect it often happens that the connection of an external aerial would appear not to improve the general reception over that of the internal aerial by any marked degree. Improved pick-up is possible, however, by retrimming the set's aerial circuits, provided the loading of the external aerial does not totally swamp the elements of the internal tuner circuits.

One method of coupling an external aerial to a portable with a frame aerial is shown in Fig. 1.

L1 is the L.W. frame aerial and L3 is the M.W. frame aerial, while L2 is a L.W. loading coil. The external aerial is coupled to the top of the M.W. aerial section through C1. It will be noted that C1 is a relatively low value capacitor, and the reason for this is that the loading due to the external aerial can never be greater than 22pF, even with a short-circuit between the external aerial socket and the receiver chassis. In practice, of course, the capacitive loading is considerably

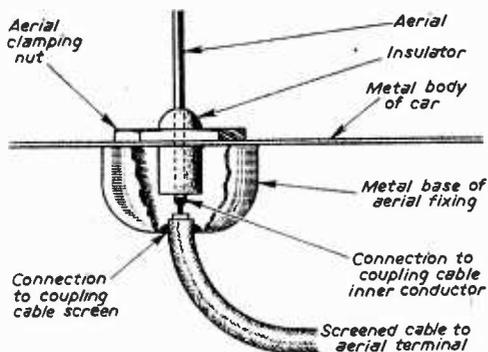


Fig. 2.—The car aerial connected to the portable via a screened cable.

less than this when a reasonably efficient aerial is used.

This type of coupling is most suitable for a long-wire type of aerial, since the impedance of the aerial circuits at the point of connection is relatively high and thus corresponds to its terminal impedance. It would be of little use for a car aerial to be coupled via a form of coaxial cable which itself is of low impedance. If a simple "throwout" aerial is used for car reception, then owing to the large pick-up which would occur throughout the whole of its length, considerable car interference would be injected into the set, and there would be little improvement of the signal-to-noise ratio.

### Low Impedance Coupling

In order to obtain the best signal-to-noise ratio, the lead coupling the aerial to the set inside the car—right up to the point of connection to the aerial—should be "dead" so far as signal pick-up is concerned. This is accomplished by the use of a screened cable, such as coaxial (Fig. 2). The outer screen of the cable should make good connection with the metal body of the car, while the inner conductor should be adequately connected to the aerial element. Using this method of connecting, and provided a suitable coupling is available in the portable, the effect of unwanted interfering signals on the connecting cable will be very small indeed, and the only signals which will be injected into the set will be those actually picked up by the aerial. The frame or ferrite rod aerial in the set will also contribute to the general reception, but this should be small compared with the signal directed by way of the external aerial. Indeed, this is essential if the interference generated by the car itself is to be minimised.

### Transistor Portables

Another method of aerial coupling in a transistor portable is shown in Fig. 3. Here connection is made direct to the transistor base, and being of relatively low impedance provides a fairly reasonable signal transfer via a screened lead.

Possibly one of the most successful methods of introducing an external signal is shown in Fig. 4. Although the circuit is based around a transistor set with a ferrite rod aerial, it is perfectly suitable for valve-type receivers with either a ferrite rod or frame aerial. The aerial signal is applied to L2 which is also wound on the ferrite rod along with the M.W. and L.W. coils, L1 and L3. The number of turns on L2 governs both the degree of signal transfer and the impedance of the aerial input circuit relative to the actual aerial circuits. The position of L2 on the ferrite rod can also be rather critical from the point of view of maximum signal transfer.

The aerial coupling coil is best wound on a former of suitable internal diameter for sliding on to the ferrite rod, giving a reasonably tight fit. The coil can be close-wound with approximately 20 turns of 24s.w.g. enamelled copper wire. The winding is then simply connected across a coaxial socket, the outside connector of which should also be connected to the chassis of the receiver, as shown in the diagram.

### Optimum Signal Transfer

Adjustment of the position of the coupling coil on the ferrite rod to provide optimum signal

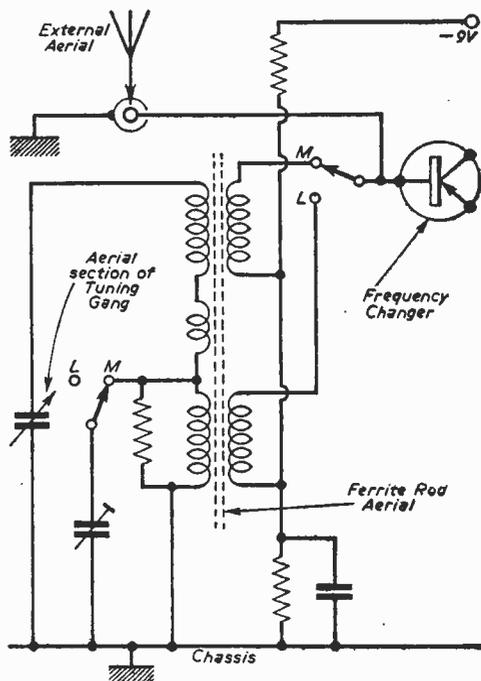


Fig. 3.—A low impedance input is obtained at the input circuit of the portable.

transfer is best accomplished by first turning the set to a very weak signal at the high-frequency end of the M.W. band without an external aerial. After

mise setting for the coil, giving the best overall results, will need to be obtained. Adjustment should be carried out on the actual aerial it is intended to use with the portable, preferably with the aerial in position on the car, and with the portable in the car, coupled to the aerial through screened cable.

It should also be noted that slight retrimming of the aerial circuits will give improved results after the coupling coil has been fixed. However, it is not advisable to retrim with the external aerial connected as this may result in impaired sensitivity when the aerial is removed and the set resumes its original role as a portable. Nevertheless, for extended use as a car radio it could pay to retrim on the external aerial provided one is prepared to retrim again when the set is no longer to be used in the car.

On some receivers more or less than 20 turns may be required on the aerial coil to secure maximum signal transfer. This is a matter for experiment, as no hard-and-fast rules can be given in this connection. Twenty turns represent the average required, though it may not be the optimum number for all receivers, and this may prove important if the set is to be used in areas of poor signal strength.

#### Frame Aerial Receivers

On frame aerial portables, the coupling coil should consist of three or four turns of similar wire wound round the existing aerial windings. If this is not possible, the coil can be wound, in slots, round the edge of a piece of stiff card of dimensions to match the frame aerial. The card should then be securely fixed so that the coil is as close as possible to the frame aerial. This arrangement is usually suitable for those portables in which the frame aerial is in the lid or rear cover of the set. Again, it may pay to experiment with the number of turns, as the optimum number is somewhat related to the size of the frame aerial.

Remember, it may well be necessary to fit the normal suppression devices on the car to avoid the pick-up of undue electrical interference from the ignition system, dynamo, windscreen wipers, etc.

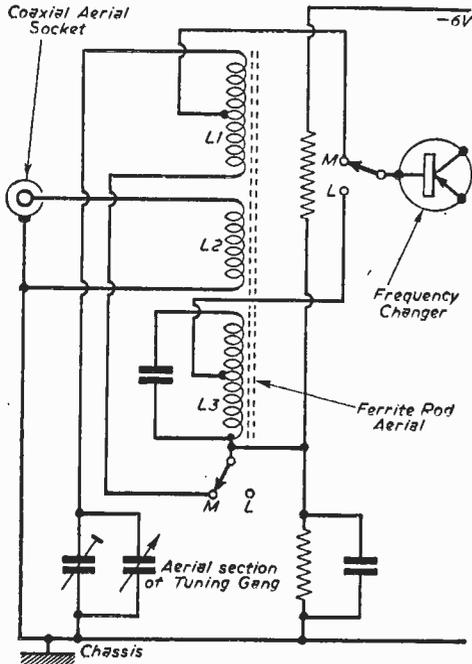


Fig. 4.—A coupling coil (e.g. L2) using either ferrite rod or frame aerial.

connecting an external aerial, the position of the coil should be adjusted for the best volume of the weak signal originally tuned. It may be found, however, that the position established for the M.W. signal will not correspond for all other signals on the M.W. and L.W. bands. In this case a compro-

## RADIO CONSTRUCTION FOR THE BEGINNER

(Continued from page 778)

should be heard in the phones, indicating that the receiver is connected up correctly. When the sleeve of L2 is slid slowly along the rod towards the middle where L1 is fixed, a point should be reached where loud whistles are heard. If this does not happen, slip the sleeve off the end of the rod and replace it the other way round. This should bring success when the previous operation is repeated. If there is still no such effect, it indicates (everything else being in order) that the surface-barrier transistor has a low gain. Transistors vary greatly, especially if bought as "surplus". The number of turns on the movable sleeve must be increased and the experiment repeated.

When "whistling" is achieved, the tuning knob should be turned until the loudest local station is received. The turns of L2 can now be adjusted until this programme is still undistorted when L2 has travelled about one inch towards the middle of the rod.

(To be continued)

### LAST MINUTE CHRISTMAS GIFTS

No need to rush out to the shops. Here's one you can arrange now . . . in a few moments . . . in the comfort of your own armchair. A year's subscription for PRACTICAL WIRELESS is the ideal gift for friends who are radio enthusiasts.

But hurry! You must send now to make sure that first copies arrive in time for Christmas. Simply send your friends' names and addresses, together with your own and remittance\* to cover each subscription, to The Subscription Manager (G.3.), "Practical Wireless", Tower House, Southampton Street, London, W.C.2. An attractive Christmas Greetings Card will be sent in your name to announce each gift.

\* RATES (INCLUDING POSTAGE) FOR ONE YEAR (12 ISSUES):—U.K. £1.3.0. OVERSEAS £1.1.6. CANADA £0.19.0. U.S.A. \$3.00.

# A SIMPLE SIGNAL GENERATOR

A DUAL-VALVE CIRCUIT By P. R. Rodgers

THE signal generator to be described employs one 12AT7 (ECC 81) double triode and every effort has been made to economise on components without making a great sacrifice in performance. No separate audio oscillator has therefore been included as this would have necessitated the use of a further valve, but the R.F. signal can be modulated with an audio frequency signal derived from a neon bulb circuit. The modulating signal is not a sine wave, but this is not likely to limit the number of useful applications to which the instrument can be put. Circuits of the type shown in Fig. 1 have been operated satisfactorily at frequencies up to at least 200Mc/s with a small value of tuning condenser.

### Feedback

The tuning condenser, C6, forms a resonant circuit with whichever coil is selected by the switch S2, feedback occurring through the cathode coupling to V1(a) and then through C5 to the grid of V1(b). If the grid of V1(b) becomes more positive at any time, both cathodes become more positive and therefore the anode current through V1(a) falls; the

anode of V1(a) becomes more positive and this positive pulse is fed to the grid of V1(b). The feedback is therefore positive.

The output voltage is taken from the variable resistor R3. The output impedance is quite low, as it is taken from the cathodes. The condensers C1 and C2 must be good quality components able to withstand the full mains voltage.

### Audio Modulation

When S1 is closed, a small current flows from the H.T. line to charge C3. The large value of R1 keeps this current very small. When C3 is charged so that the voltage across it is about 130V, the neon strikes and the condenser loses some of its charge through the neon. The neon is extinguished when the voltage across it falls to about 100V, but it strikes again when the voltage rises. The voltage across the neon can therefore be made to alternate at any desired audio frequency by selecting suitable values for R1 and C3. Almost any small neon designed to work at about the voltages mentioned above is very suitable for the circuit. The audio frequency voltage across the neon is applied to the grid of V1(a) through the D.C. blocking condenser C4. The resistor R2 serves to provide a D.C. path between the grid and cathode and to keep the grid bias at its correct value. The audio voltage modulates the R.F. signal in V1(a). The modulation is approximately a triangular wave and with the values shown in Fig. 1 will have a frequency of about 1kc/s.

### Frequency Coverage

Four coils (L1 to L4) are shown in Fig. 1, but more (or fewer) coils could be used to cover different ranges as desired. Any make of R.F. or aerial coils intended for radio receivers and designed to resonate with the 500pF condenser C6, can be used to cover the ranges required, but it is quite easy to construct suitable coils. If commercially made coils are used, any winding other than the tuned winding may be removed. It was found convenient to mount any high frequency self-supporting coils (16s.w.g. tinned copper wire) directly on to the ceramic switch, but the larger coils were mounted separately and as near to the switch as possible. All of the wiring

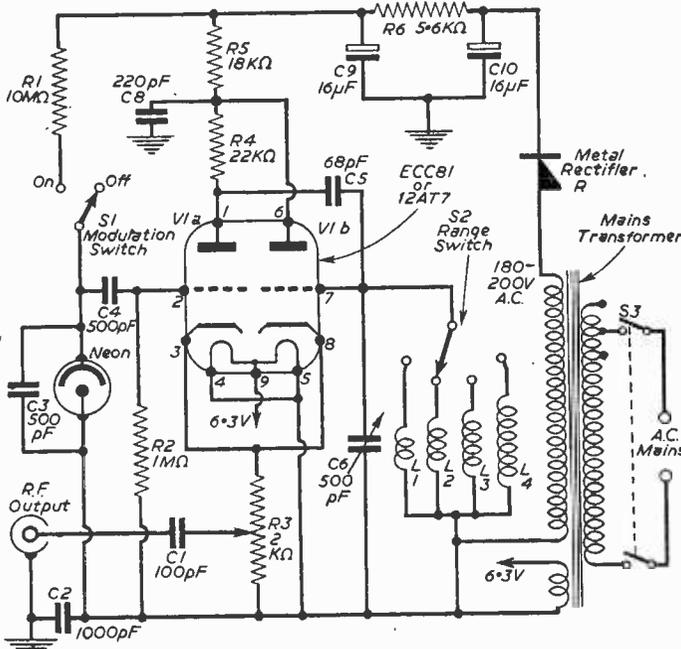


Fig. 1.—A circuit for operation at up to 200Mc/s. (There is no C7 in this circuit.)

connected to the coils should consist of fairly thick rigid wire (16s.w.g.).

If very high frequency coverage is required, a variable condenser with a maximum capacitance of 50pF or less should be used. Conversely if the constructor is mainly interested in very low radio frequencies, C6 may consist of a 1,500pF condenser. This value is most easily obtained by using a three gang 500pF component and connecting the three sections of the condenser in parallel.

The problem of coil design is very similar to that of radio receiver coil design, but is even simpler because only a single tuned winding is required.

#### Calibration

The variable condenser C6 was connected to a slow motion dial. The output voltage from the generator was fed into a communications receiver together with the output from a receiver crystal calibrator. The receiver was tuned until one of the harmonics of a 1Mc/s signal from the crystal calibrator could be heard; the particular harmonic being received could easily be identified from the receiver tuning. The signal generator was tuned to approximately the same frequency and the tuning was altered until a beat note was heard. The frequency of the zero beat then gave one calibration point on the generator. (As the generator is tuned, the beat note becomes lower and lower in frequency until it disappears altogether but returns on the other side of the zero beat. At zero beat the frequency of the generator and of the harmonic from the crystal calibrator are very accurately matched.)

The process is then repeated for the other harmonics of the 1Mc/s crystal which fall within the range of the signal generator. After this, the 100kc/s points on the generator scale may be marked by the use of the 100kc/s crystal (or the 1Mc/s crystal with the multi-vibrator) in the calibrator. The dial can thus be calibrated at every 100kc/s throughout all ranges.

The method of calibration described above is very accurate, but other methods are possible. Reasonable accuracy can be obtained by direct calibration against a good quality communications receiver. Alternatively a heterodyne frequency meter may be used.

If the constructor does not wish to go to the trouble of calibrating the dial of the instrument directly, it is probably best to use a calibration graph of frequency against the dial reading. The graph is prepared by one of the methods of calibration described above.

Calibration is much easier if C6 is one of the "straight line frequency" condensers. On any one range, equal amounts of dial rotation will then alter the frequency by the same amount. The calibration graph is a straight line if such a condenser is used.

#### Power Supplies

The 12AT7 valve requires a heater supply of either 6.3V at 0.3A or 12.6V at 0.15A. A metal rectifier is used so that no heater supply is required. Any metal rectifier which will handle 5m3 or more at 250V is suitable. At such small H.T. currents a smoothing choke is quite unnecessary and the resistor R6 is an adequate substitute for a much heavier and more expensive choke.

#### The Instrument Case

A small plastic or wooden case from an old radio receiver is an ideal container for the instrument, especially as it is probable that the tuning condenser could be utilised for C6—possibly with the same dial.

Although, for simplicity, no audio frequency output is provided, this should not usually matter when small receivers are being tested. A fault in the audio side of a receiver can usually be traced by using a 50c/s voltage from the heater line of the receiver. Alternatively touching the grid terminal of a receiver audio amplifier stage with a screwdriver will produce a click if, and only if that stage is functioning.

FRIDAY, JANUARY 13th, 1961

## A FILM SHOW

(in collaboration with Muliard Ltd.)

CAXTON HALL, WESTMINSTER  
at 7-30 p.m.

Send for your free tickets now marking your envelope "Caxton Hall" in the top left-hand corner and enclosing a stamped addressed envelope (at least 3½ in. x 6 in.) for the tickets.

The films to be shown are "Conquest of the Atom", "The Invisible Force", and "Particles Count".

The demand for tickets is great; order yours NOW.

## 5,000,000A ARC

A CAPACITOR bank of 390,000μF—2,000 capacitors of almost 200μF 6,000VW each—is being built for a Boeing Aircraft wind tunnel in Seattle, USA. The capacitors contain 200 acres of aluminium foil and will fill a room 35ft x 35ft x 25ft. In this huge bank will be stored 7,000,000 joules of electricity. It can be discharged in a few milli-seconds, creating the highest-current arc ever known, 5,000,000A.

Because there is no device capable of switching and carrying such a current, a piece of steel piano wire will be vaporized near the arc electrodes, releasing metal ions. These ions will close the circuit between the electrodes, allowing the capacitors to discharge. The speed of discharge must

be very high. Since all inductances in the current path slow up the speed of discharge, special engineering is being employed to keep the inductive reactance very low and to carry the huge current.

The enormous energy released by the arc heats the air in the arc chamber to 18,000deg F, creating air pressure near 30,000lb/sq. in. This pressure ruptures a plastic diaphragm which permits a high-energy shock wave to rush through the test section of the wind tunnel. This shock wave is followed by a hypersonic flow of air past the model to be tested. Before each shot, the wind tunnel is pumped out to a high vacuum to increase further the pressure differential that creates the air flow.



# BARGAIN OFFERS

for the Constructor!

## TAPE RECORDER

Manufacturers' brand new, current production offer. Latest 5-valve circuit based on Mullard's famous design. Magic eye level indicator. Volume and tone controls. T.C.C. printed circuit already wired. Only power pack and controls to assemble and wire. Valves EP86, ECC83, EL84, 6X4 and EZ80. A sensitive quality recorder at Special Unit Prices.

Wired printed circuit, power pack components, controls and knobs, etc. . . \$25.150 p. & p. 2/6  
 B.S.R. Monarch Tape Unit \$8.19.8 p. & p. 1/-  
 Bargain reduction for complete kit \$16.10.0 carr. 5/-

Attractive two-tone Cabinet and 9 x 5in. speaker at special discount price: \$8.3.0. p. & p. 4/6 illustrated Handbook with full details, 2/6 post free. Collaro Studio Tape Deck can be supplied with modified circuit as alternative for approx. \$5.10 extra



## TRANSISTOR PORTABLE

Famous manufacturers 6 x 1 design based on Mullard and G.E.C. developments. Printed circuit, 6VA 1st grade transistors, XA102, XA101 (2), OA70, XB103, XC101 (2) or equivalent. Quality components only supplied to ensure best results at attractive price.

Set of 6 BVA Transistor and Diode 70/- p. & p. 6d  
 Printed Circuit, 11's (3), osc. coil, Driver Transistor, Ferrite rod aerial . . . . . 51/6 p. & p. 1/6  
 Resistors, Condensers, Twin Gang and Volume Control . . . . . 37/6 p. & p. 1/6  
 7 x 4in. Quality 35 ohm matching Speaker . . . . . 25/- p. & p. 1/6

or  
 Complete Kit at special offer ONLY \$8.19.8 post free Handbook and Circuit details . . . 2/- post free



## RE-GUNNED TV TUBES

New Heater, Cathode and Gun Assembly fitted to all tubes. Reconditioned virtually as new. Now 12 months' guarantee to highest standards—as used by our own Service Dept.

12in. £5. 14in. £5.10.0 17in. £6. etc.  
 Mullard and Masda types ex-stock Carr. and Ins. 10/-  
 10/- Part Exchange allowance on your old tube.

## JASON FM TUNER KITS

STANDARD MODEL (FMT1) as previously extensively advertised. Complete Kit 5 gns. Set of 4 spec. valves now only 20/-.

MODEL (FMT2). Attractively presented shelf mounting unit in enclosed Metal Cabinet with Built-in Power Supply. Complete Kit £7 Set of 5 spec. valves, 37/6. P. & P. 2/6.

LATEST MODEL—JTVE. Switched Band 1-2-3 AM/FM Unit with AFC. Kit £12.19.8. P. & P. 2/6.

NEW JASON COMPREHENSIVE FM HANDBOOK. 2/6. 48 hr. Assignment Service, 7/6. P. & P. 2/6.

## TRANSISTORS - BVA INT GRADE

REDUCED PRICES		GEC	
Masda	Mullard	9/6	9/6
XA101 14/8	OC70	12/6	GET13 12/6
XA102 15/-	OC71	15/-	GET15 12/6
XA103 18/-	OC44	23/6	Newmarket "Goldtop" V1510P 15/-
XB102 10/-	OC45	21/-	
XC101 10/8			

Germanium Diodes, OA70 2/9, GEX34 4/-, OA81 8/6

## RECORD PLAYER BARGAINS

All brand new latest 4-speed Models.

**SINGLE PLAYERS—B.S.R. (TU9) 90/-;** Collaro Junior, 90/-; Garrard TA Mk.2 with GCS Head, £7.19.8; Garrard 4HF Transcription Unit, £18, carr. 3/6.

**AUTO CHANGERS—B.S.R. (UA8), £8.19.6;** UAS stereo, £7.19.8; UA14, £7.19.6; Collaro Conquest, £7.19.8.

**GARRARD RB210 4-speed Autochanger Model** with latest features and GCS Plug-in Head only 10 gns, carr. 4/6.

Latest Garrard Transcription Autochanger Model "A" £18.19.6 with balanced P.U. Arm. Carr. 5/-.

**E.M.I.—4-speed Single Player with Auto Stop-Start Dual Turnover Cartridge** for Stereo and Monaural L.P. and 78—Bargain Buy at £6.19.6.

## AUTO CHANGER RECORD PLAYER KIT

A.C. Supply 200-250v

Attractive 2-tone cabinet—famous B.S.R. Monarch 4-speed, full mixer, 10-record gram unit. Pul-0 steel pick-up with dual stylus for Std. L.P. recordings. 2-valve amplifier with quality neg. feedback circuit, volume and tone control. Fully isolated from mains by double-wound transformer, NOT the live chassis type as often offered in cheap commercial models.

A recommended buy while stocks last!

Ready wired 2-valve Amplifier, complete with 6in. high flux speaker . . . £8.19.6 p. & p. 2/6  
 Two-tone cabinet 18 x 13 x 5in. £3. 3.0 p. & p. 3/6  
 B.S.R. Monarch UA8 100v. £5.19.8 p. & p. 4/6  
 Complete 3 unit kit, special Bargain price £12.19.8 carr. 7/6

Simple assembly, a screwdriver only required.



## SPECIAL OFFER!

Superior type Art. Leather covered Portable Case—well-known Manufacturer's Surplus—in attractive Tan and Fawn with non-tarnish gilt fitted with latest Collaro Junior 4-speed Record Player Unit with Turnover Xtal Cartridge and dual sapphire stylus for 78 and LP records. Ready mounted and wired complete with Mains Lead and detachable screened PU lead. A.C. Mains 200/250v. Size 15 x 11 1/2 x 5 1/2 in. An ideal unit for Tape or Amplifier use.

**BARGAIN BUY—only £5.19.8 p. & p. 4/6d.**



## 7 VALVE AM/FM RADIOGRAM CHASSIS

Valve Line-up: ECC85, ECH81, EF89, EABC80, EL84, EM81, EZ80.

Three Waveband and Switched Gram position. Med 200-500 m., Long 1,000-2,000 m., VHF/FM 88-95 Mc/s. Phillips Continental Tuning insert with permeability tuning on FM and combined AM/FM IF transformers, 450 K/s and 10.7 Mc/s. Dust core tuning all coils. Latest circuitry including AVC and Neg. Feedback. Three watt output, sensitivity and reproduction are of a very high standard. Chassis size 13 1/2 x 6 1/2 in. Height 7 1/2 in. Edge illuminated glass dial 11 1/2 x 3 1/2 in. Vertical pointer. Horizontal station names. Gold on brown background. A.C. 200/250 v. operation.

**Aligned and tested ready for use £13.10.0. Carr. & Ins. 5/-.**

Complete with 4 Knobs—walnut or ivory to choice. Indoor FM Aerial, 3/6 extra.

Three ohm P.M. speaker only required. Recommended quality speakers.

10in. Rola (Heavy Duty) . . . . . 30/-  
 8in. Goodman special cone . . . . . 21/6. Post & Pkg. 1/6.

As previously announced fresh supplies are now being received, but we regret some slight delay may be experienced in fulfilling orders for this popular item.



## RECORDING TAPE BARGAINS

EMI 1st grade.	Brand new sealed boxes.	Standard	Long Play
3in., 175ft. . . . . 7/-	250ft. . . . . 9/-		
5in., 600ft. . . . . 19/-	850ft. . . . . 25/-		
6 1/2in., 850ft. . . . . 25/-	1,200ft. . . . . 31/6		
7in., 1,200ft. . . . . 31/6	1,800ft. . . . . 45/-		
SPECIAL PURCHASE. Famous manufacturers, 1st grade tape, in sealed white boxes.			
	Standard	Long Play	
5in., 600ft. . . . . 15/-	850ft. . . . . 19/6		
5 1/2in., 850ft. . . . . 16/6	1,200ft. . . . . 22/6		
7in., 1,200ft. . . . . 21/-	1,800ft. . . . . 28/6		
Plastic Tape Regis. special offer. Manufacturers surplus. 3in. 2/8, 5in. 3/-, 3/8, 7in. 3/6, 3/6.			

ONLY A FEW ITEMS ARE LISTED FROM OUR COMPREHENSIVE STOCK  
 WRITE NOW FOR FULL BARGAIN LISTS, 3d.



## RADIO COMPONENT SPECIALISTS

70 Brigstock Road, Thornton Heath, Surrey

Terms: C.W.O. or C.O.D. post and packing up to 4lb 7d.; 1 lb; 1/1; 3 lb. 1/6; 5 lb. 2/-; 10 lb. 2/9.

Phone: THO 2188. Hours 9 a.m.—6 p.m. 1 p.m. Wed. Open all day Saturday. By Thornton Heath Station.

The decision is yours. To be a success in your chosen career; to qualify for the highest paid job . . . to control a profitable business of your own. ICS home-study courses put your plans on a practical basis; teach you theory and practice; give you the knowledge and experience to take you, at your own pace, to the top.

Choose the **RIGHT** course :

RADIO & TELEVISION ENGINEERING  
INDUSTRIAL TELEVISION

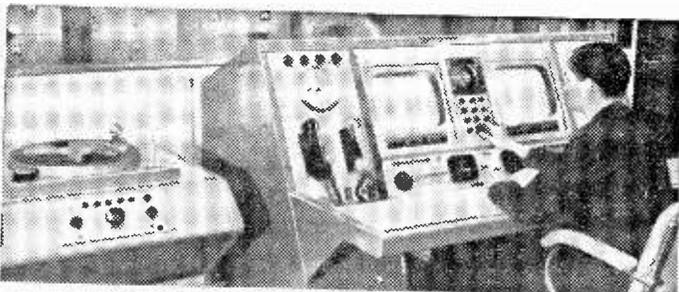
RADIO & TELEVISION SERVICING  
RADIO SERVICE AND SALES

VHF/FM ENGINEERING : ELECTRONIC  
COMPUTERS & PROGRAMMING

ICS provides thorough coaching for professional examinations:

Brit. I.R.E., City and Guilds Telecommunication Technicians, C. & G. Radio & TV Servicing (R.T.E.B.); C. & G. Radio Amateurs.

*Technical  
Training  
in Radio,  
Television  
and  
Electronics  
Engineering  
with*



**THERE ARE ICS COURSES TO MEET YOUR NEEDS AT EVERY STAGE OF YOUR CAREER. FILL IN AND POST THIS COUPON TODAY.**

You will receive the FREE 60 page ICS Prospectus listing examinations and ICS technical courses in radio, television and electronics PLUS details of over 150 specialised subjects.

**LEARN AS YOU BUILD**

*Practical Radio Courses*

Gain a sound up-to-professional-standards knowledge of Radio and Television as you build **YOUR OWN** 4-valve T.R.F. and 5-valve superhet radio receiver, Signal Generator and High-quality Multi-meter. At the end of the course you have three pieces of permanent and practical equipment and a fund of personal knowledge and skill. ICS Practical Radio courses open a new world to the keen Radio amateur.

Other ICS courses include:  
MECHANICAL, MOTOR,  
FIRE, ELECTRICAL &  
CHEMICAL ENGINEERING,  
FARMING, GARDENING,  
ARCHITECTURE &  
WOODWORKING.  
SELLING & MANAGEMENT,  
ART. PHOTOGRAPHY,  
etc., etc.

*PLEASE STATE ON COUPON  
SUBJECT YOU ARE  
INTERESTED IN . . .*

**INTERNATIONAL CORRESPONDENCE SCHOOLS**  
(DEPT. 172), INTERTEXT HOUSE, PARKGATE RD., LONDON, SW11

PLEASE SEND FREE BOOK ON.....

NAME .....

ADDRESS .....

.....

OCCUPATION..... AGE.....

1/61

# ELECTRONIC SMOOTHING

A PRACTICAL CIRCUIT By J. B. Dance

If it is necessary to remove virtually all of the hum from a power supply, it is often easier to accomplish this by the use of a simple valve circuit than by means of a number of large smoothing chokes and condensers. It can be arranged that the valve circuit removes not only the hum but also any variations in the output voltage of the power pack owing to small changes in the mains voltage, providing that these variations do not last more than about a second. Such changes (usually a fraction of a volt), continually occur as the load taken from the power station alters. The amount of hum ripple can be made very much less than that which is present in the output of an ordinary power pack, but the circuit has the disadvantage that the regulation is not good owing to the resistor included in the power supply (R3 in Fig 1).

### Electronically Smoothed Circuits

Electronically smoothed circuits are very useful for supplying oscillators, etc. which require a very smooth stable H.T. supply at a comparatively small current.

The circuit to be discussed is shown in Fig. 1. If the voltage from the power pack increases slightly, the increase will reach the grid of the smoothing valve via C1 and will increase the anode current in this valve. This increased current causes an increased voltage drop in R3 which, if the circuit values are chosen correctly, causes the output voltage to remain constant.

The resistor values are chosen so that the valve gain is unity. The phase of the voltage is changed by the valve, however, and can therefore be combined with the input voltage from the power pack to give a smooth output voltage. The two alternating components, which are 180 deg out of phase, completely cancel each other leaving smooth D.C. Alternatively it can be said that the whole of the alternating current from the power pack passes through the valve and none through the external load.

Variations in the voltage from the power pack are fed to the grid of the valve via the D.C. blocking condenser C1 and the resistor R2. It is important that C1 and R1 should be fairly large in order that the time constant C1.R1 shall be large enough to enable any comparatively slow variations of the supply voltage to be smoothed out. A good quality paper condenser should be used for C1; an electrolytic condenser is not suitable. R1 provides the D.C. path between the grid and cathode and cannot be increased much above the value shown.

A sudden increase in the value of the load current tends to produce a positive voltage on the grid of the valve for a short time; R2 prevents damage to the valve by limiting the value of the grid current during this time. It is almost essential to use a further smoothing condenser (C2) across the output of the circuit in order to reduce the output impedance of the circuit.

If desired, the amount of smoothing in the power pack, feeding the additional smoothing unit shown in Fig. 1, can be less than in a normal power pack. For instance, a single smoothing condenser without any choke is usually adequate.

### Adjustment

The value of the resistor R4 is chosen to provide a suitable bias voltage for the valve. The value can be calculated from the recommended bias voltage and the normal anode current taken by the valve by means of Ohm's Law. If the best possible results are required, it is advisable to use a variable resistor for R3 which can then be adjusted to provide the smoothest output. Adjustment of R3 alters the amplification of the circuit and enables it to be made exactly unity so that the out of phase alternating currents in

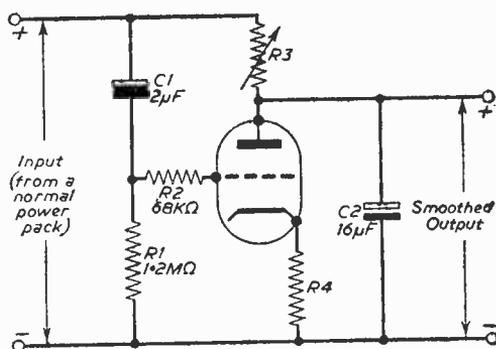


Fig. 1.—A circuit for electronic smoothing; the value of R3 and R4 depend on the valve chosen.

R3 and in the valve exactly cancel each other out.

The value of R3 can be calculated from the value of R4 together with the mutual conductance and amplification factor of the valve, but these quantities may not be known very accurately and better results can usually be obtained by adjustment of R3 experimentally to give the least possible hum in the output. The circuit does, of course, remove the harmonics of the hum as well as the fundamental mains frequency. It is convenient to use an oscilloscope for detecting the hum during the adjustment, but this is by no means essential; an audio amplifier is quite satisfactory.

The following equation gives the value of R3 fairly accurately, but it is not exact:—

$$R3 = 1/gm + R4$$

where gm is the mutual conductance of the valve used.

(Continued on page 830)

# A Reliable Radiogram

AN ECONOMICAL AND EFFICIENT ARRANGEMENT

By A. Sydenham

(Continued from page 709 of the December issue)

IT is advisable to make all leads long enough to permit inter-chassis movement so that if necessary either unit may be removed and connected up outside of the main cabinet for repairs, testing, etc.

When the gram unit is in position, a tag strip will be found at the rear, and this is illustrated in Fig. 9. Four thin, coloured leads are already taken off into the pick-up arm but two of them will not be connected at the head, these being coloured yellow and blue. These are only used when a stereo cartridge is used. Check that the black and red leads do in fact connect to the turnover cartridge and, if so, solder the "outer" of one of the lengths of coaxial cable to tag (3) and the "inner" to tag (4). Fit a coaxial plug at the far end of this cable and plug it into the socket provided on the amplifier chassis.

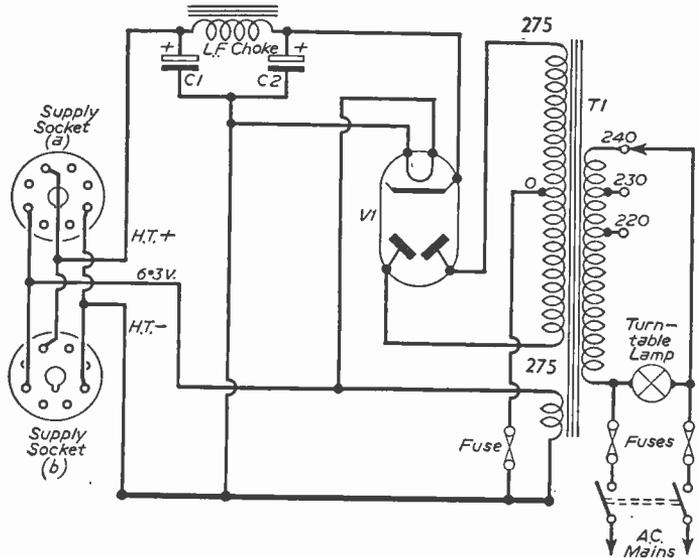


Fig. 6.—The power-pack.

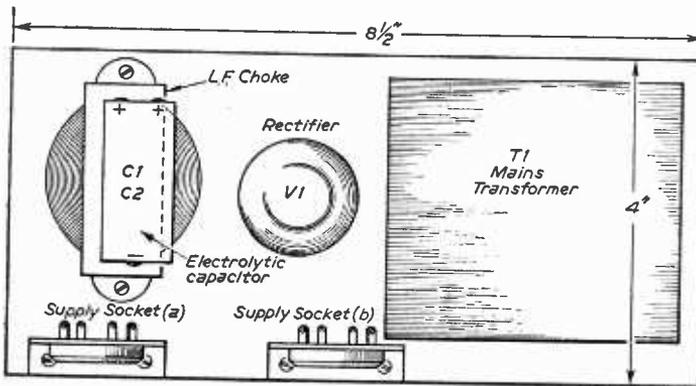


Fig. 7a.—Layout of the power-pack.

However, this is not so important with a switch-tuned feeder as with one that tunes over a whole band. Before adjusting T1 or L5 an attempt should be made to obtain some sort of signal transmission upon which to work by adjusting the aerial and oscillator coil trimmers, the medium wave-band being chosen in preference to the long. The volume control should be well advanced, and once a signal is heard, even if only weakly, it should be

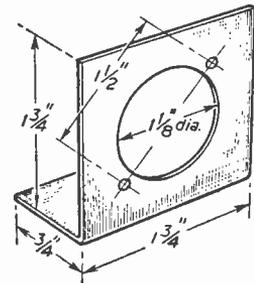


Fig. 7b (right).—Dimensions of the brackets for the supply sockets on the power-pack chassis.

## Setting Up the Tuner

This will present no difficulties if a signal generator is available, but without one the procedure is likely to be a little more tedious. In this case the best that can be done is to bring the various tuned circuits into line with each other although the precise value of I.F. is likely to be unknown.

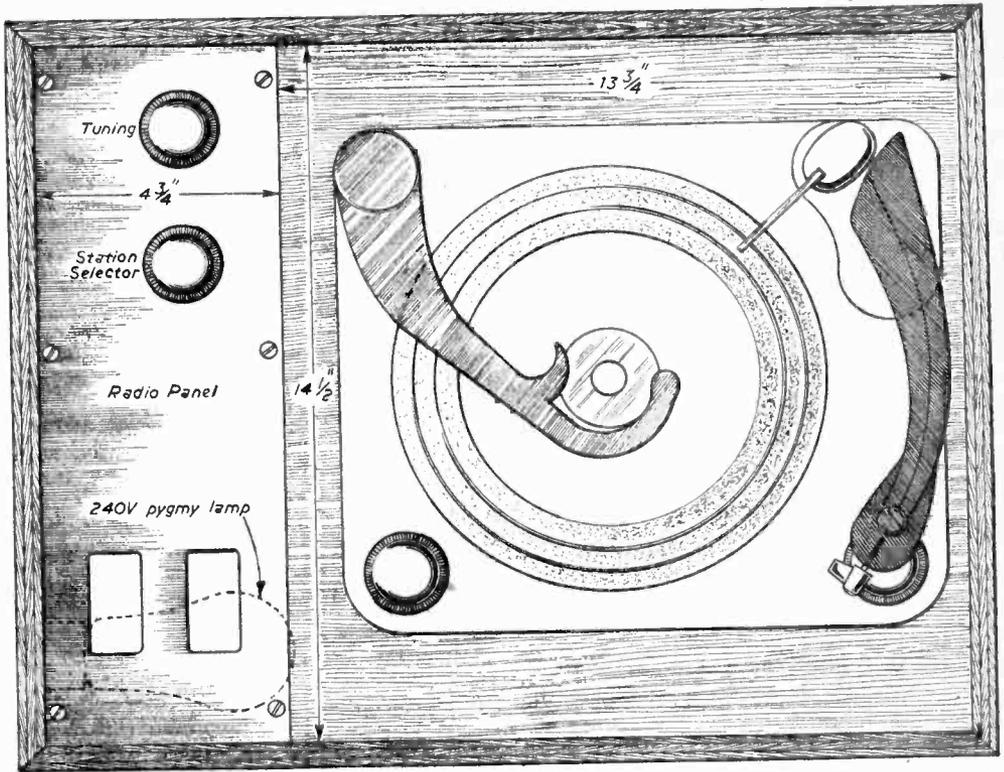


Fig. 8.—Layout of the gram unit.

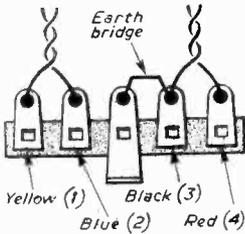


Fig. 9.—Pick-up connections for the UA8.

versa. The tuner is then switched to the other waveband and the desired transmission tuned in by means of the appropriate aerial and oscillator  
(Continued on page 818)

"peaked up" by means of the cores of L5 and T1. As this is carried out, it will be found that the volume control has to be backed off considerably. The next step lies in identifying the transmission if possible from which one can soon learn which way to turn the trimmers for the transmission desired. For example, should the Welsh Home service be coming through and one wishes to receive the West Home service on 1,500kc/s for this band, then the trimmers across L1 and L3 must be unscrewed and vice

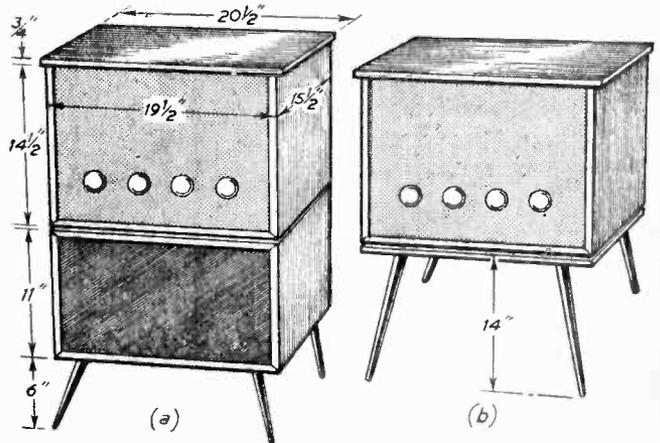


Fig. 10a (left).—The cabinet arrangement described in the text.

Fig. 10b (right).—An alternative cabinet arrangement.

# REFLEXING TRANSISTORS

## HOW TO USE FEWER TRANSISTORS

By F. G. Rayer

**I**N order to reduce the number of transistors in a receiver, it is possible to arrange the circuit so that a single transistor performs more than one function. Usually, the reflexed transistor is connected to operate as both R.F. and A.F. amplifier, or be in both I.F. and A.F. stages. It is difficult to obtain results quite equal to those which would be achieved with separate transistors in each stage, but reflexed circuits are extremely useful, despite this.

### Reflex Circuits

When expensive transistors are used, the saving in cost can be considerable. There is also a slight reduction in current drain from the battery. For these reasons, reflex circuits are quite popular. With some receivers, it is possible to re-arrange one stage, to obtain both R.F. (or I.F.) amplification, and A.F. amplification from a single transistor. This gives an improvement in reception almost equal to that which would result from adding another transistor. A typical example of this kind arises when an I.F. stage transistor is made to function as first A.F. amplifier as well, to give an extra stage between the detector and driver or output stage.

In straightforward superhet and TRF receivers, it is often possible to reflex one transistor. But if the receiver already has a reflex circuit, it is not usually feasible to obtain extra gain by also using a reflex arrangement with another stage, because the two separate functions of a reflexed transistor must take place at different frequencies.

### Reflex I.F. Stage

A popular type of I.F., detector and A.F. circuit, without reflexing, is shown in Fig. 1. Here, the OC45 acts as the I.F. amplifier, followed by a diode detector, and OC71 as the A.F. amplifier.

Fig. 2 shows a circuit in which a single transistor is arranged to act as both I.F. and A.F. amplifier, and the circuit changes and method of operation will become clear if this is compared with Fig. 1.

In Fig. 2, the signal from the I.F. transformer is applied to the transistor base, exactly as in Fig. 1. The next I.F. transformer, and diode, are also similarly wired, except that the transistor collector is only by-passed for intermediate frequencies, by the  $0.05\mu\text{F}$  condenser. The audio signal, obtained from the  $5\text{k}\Omega$  volume control slider, is returned to the transistor base through the coupling condenser and I.F. transformer secondary. This audio signal, after amplification, is available at the  $8\mu\text{F}$  condenser the collector circuit forming the A.F. load.

The  $0.01\mu\text{F}$  condenser wired to the emitter is an I.F. by-pass for the transformer secondary. As the transistor is also working at audio frequency, the  $470\Omega$  resistor requires a large by-pass condenser of about  $32\mu\text{F}$  to  $100\mu\text{F}$ .

When using a reflex circuit of this kind, values have to be so chosen that the transistor can give a reasonable performance on both frequencies. For example, reducing the value of the  $1\text{k}\Omega$  collector resistor would increase the I.F. gain, but also reduce the A.F. gain, as the A.F. load would become too small. In the same way it may be necessary to modify the base potential divider resistor values. The  $1\text{k}\Omega$  emitter resistor in Fig. 1 has also been changed to  $470\Omega$  in Fig. 2, in the interests of A.F. performance.

In some cases there may be no point in changing values, except to by-pass the emitter resistor with a larger condenser, and re-arrange the wiring. Usually, the coupling and decoupling condenser values are not critical. However, unnecessarily large values should not be used for by-passing at intermediate frequencies, as these condensers are in parallel with the audio frequency part of the circuit, and thus tend to reduce high frequencies.

### T.R.F. Reflex Circuit

With a simple T.R.F. receiver, it is usually possible to make one transistor act as R.F. and A.F. amplifier. One circuit for this purpose is shown in Fig. 3. Here, the H.F. choke prevents R.F. passing. After

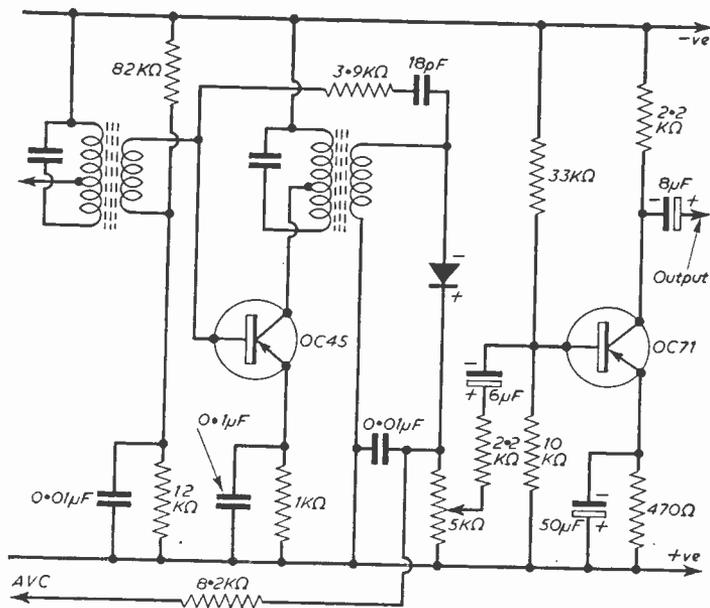


Fig. 1.—An I.F. detector and A.F. amplifier circuit before reflexing.

detection, the audio signal is returned to the transistor base through the aerial coil winding, and the amplified audio signal passes through the H.F. choke, and is available across the 2.2k collector resistor.

With such circuits the transistor must, of course, be capable of acting as R.F. amplifier. An audio frequency transistor which will not operate at radio frequencies cannot be used. It may be necessary to modify the values of the 47k and 10k resistors, to suit the transistor, for maximum efficiency. Emitter bias may also be applied in the normal way, (as in Fig. 1) if small size and maximum economy are not essential.

In Fig. 3, the detector stage is not tuned. If space is available, efficiency may be increased by tuning this stage, as in Fig. 4. It may be feasible to use a ganged condenser (300pF to 500pF maximum

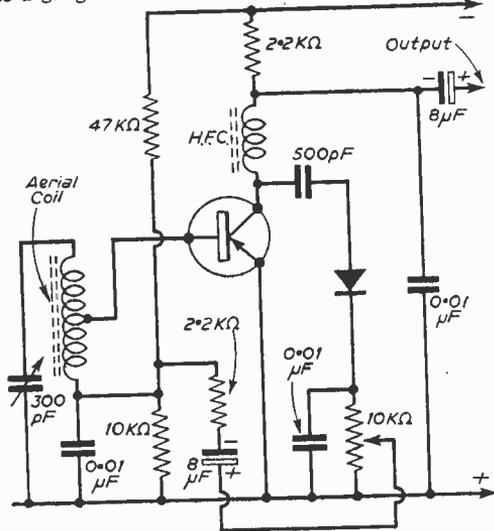


Fig. 3.—A simple T.R.F. receiver circuit reflexed to enable one transistor to act as R.F. and A.F. amplifier.

capacity each section), and a coil to match the aerial coil, or ferrite rod aerial. But in very small receivers this will be impossible. It is then either necessary to use an untuned stage, as in Fig. 3, or to employ small pre-sets, or core-tuned coils for the required stations.

**Stability**

If stray coupling exists at radio frequency or the receiver intermediate frequency, the reflexed stage may oscillate. To avoid this difficulty, a careful layout is necessary. In addition, the circuit should be adequately by-passed. In Fig. 2, the 0.05μF and second 0.01μF condensers serve to keep intermediate frequencies out of other parts of the circuit, while the 1k resistor wired to the 6μF condenser also helps prevent feedback of I.F. to the transistor base.

In Fig. 3, the 0.01μF condensers and 2.2k resistor in the volume control circuit perform a similar function in maintaining stability.

Other reflex circuits work in a similar manner, though various methods of coupling may be used. Normally, any R.F. type transistors may be used with success in the circuits in Figs. 2 and 3. Should it be necessary to adjust the base voltage, to obtain

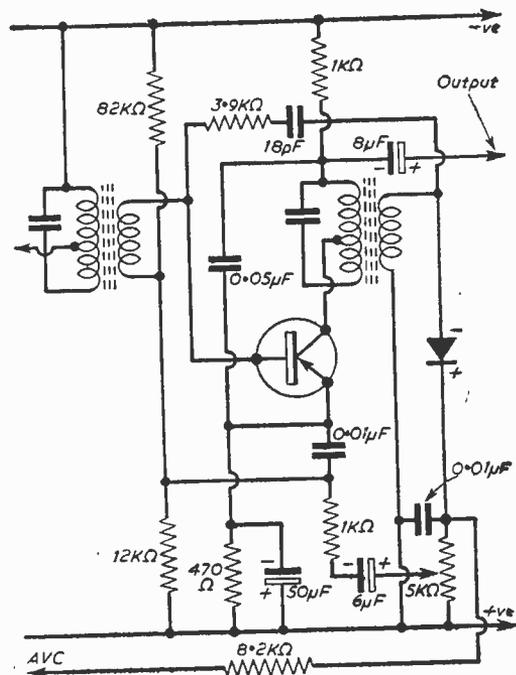


Fig. 2.—The I.F. stage reflexed to provide A.F. amplification.

best results, then it will usually be sufficient to change the value of one of the resistors only (e.g., 47k or 10k in Fig. 3).

With T.R.F. designs, care is necessary to avoid stray coupling between the aerial coil (or ferrite rod winding) and the H.F. choke or detector coil. Such

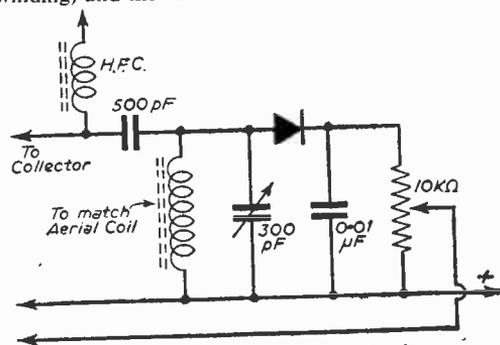


Fig. 4.—The tuned detector circuit.

coupling will cause ordinary R.F. instability. This can be checked by temporarily disconnecting the reflex circuit, and using phones to listen to the signal available across the volume control. If oscillation is present, this is due to a bad layout of the R.F. components—not to the reflex circuit. But oscillation only begins when the reflexing is introduced, this shows that insufficient by-passing has been employed, or that a bad layout is providing feedback of R.F. here. This simple test is thus worth making if the circuit gives trouble when first tested.

# COMBINED RADIO AND TABLE LAMP

## USING A 40W LIGHT BULB INSTEAD OF A MAINS DROPPER

By M. J. Dunn

**T**HIS receiver is of the A.C./D.C. variety—the chassis is “live” and the valve heaters are wired in series. However, an electric lamp is used in series with the heaters instead of the usual “mains dropper” and the power which is normally wasted in this component is made to serve a useful purpose. The lamp may, if required, be used without the radio but when the radio is working, the lamp must, of necessity, be in circuit.

### Choice of Bulb

During the design of the receiver, several bulbs of different ratings were examined but it was found that, for varying reasons, only 75W and 40W bulbs could be considered. The 75W lamp was thought to be too bright for general use and the 40W was therefore chosen. A lamp of this rating passes a current of about 0.16A which is near to the current taken by certain octal-based valves—0.15A.

The valves chosen were the 12SK7, 12SL7, 6G6 (or 12A6), all of which are readily available—as are suitable alternatives which will be mentioned later—and which have heater ratings of 0.15A.

The calculations may now be more closely examined, but without going into the minute details of working out as these were done by the simple application of Ohm’s Law to resistances operating in

series. It is required to supply a current of 0.15A through the heater chain of the three valves specified, and the total voltage across them will be 31.5. Assuming for the moment a mains supply of 245/250V, the situation is as follows: resistance of heaters 210Ω, resistance of 40W bulb (rated at 240V), 1440Ω, giving a total resistance of 1650Ω. With 245/250V mains, this will pass between 0.148–0.151A which is precisely what is required. For those on a lower mains supply voltage the use of a 40W bulb rated at 210V and on a supply of that value, in series with the same heater chain, will pass 0.159A. Now the tolerance allowed for running heaters is  $\pm 7$  per cent and this figure is within this tolerance. However, the current could be reduced by either using a 12A6 as the output valve or purchasing a 40W bulb with a slightly higher voltage rating. In practice this means that the constructor can go ahead with the 40W bulb of his district and always be within the tolerance limits for supplies between 210 to 250V.

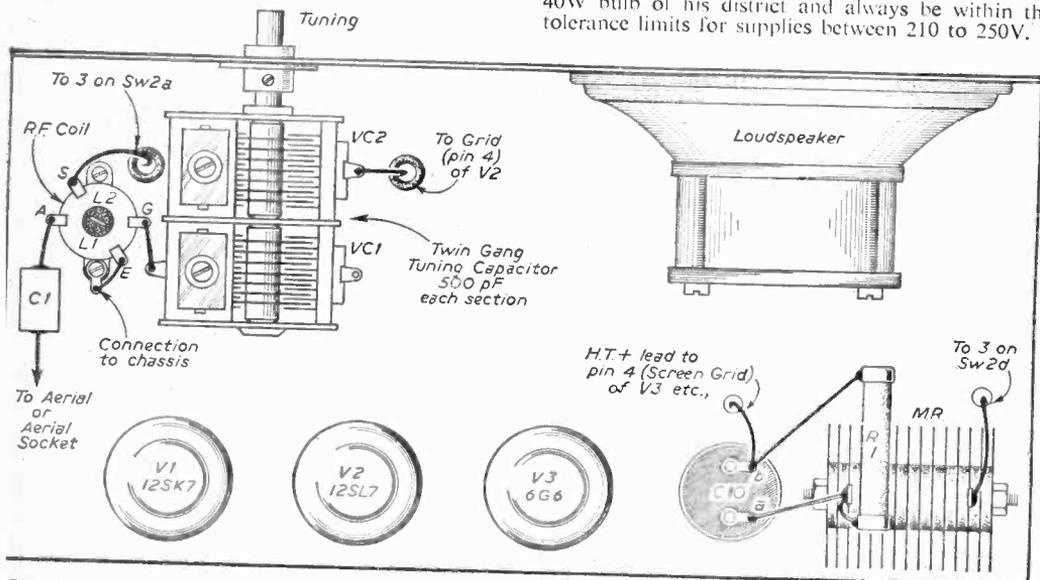
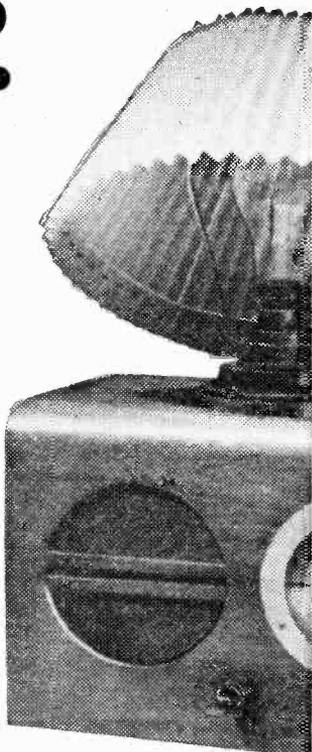
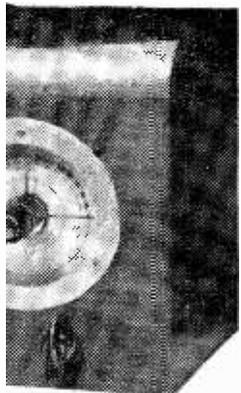
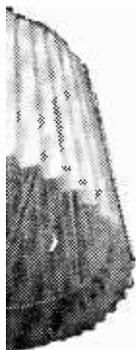


Fig. 1.—The above-chassis layout of components. (The theoretical circuit will be given next month.)

Alternative Valves

Having now disposed of the problem of describing the heater supply, a few words may be said about choice of alternative valves. For the first stage a 12SK7 has been specified, but a 12K7 would also be entirely satisfactory and being double ended would facilitate the grid connection to the coil as this is above chassis, the other one being below. It is not necessary to use a variable- $\mu$  R.F. pentode in the first stage and valves having a sharp cut-off characteristic are quite suitable so that one can also use a 12SJ7 (single-ended) or 12J7 (double-ended). These latter

two valves will afford some economy in H.T. current for the double triode, V2, a 12SL7 is more or less essential because the 12SN7 requires double the heater current and therefore cannot be used. A 6G6 was chosen for the output valve because of its low H.T. current consumption (15mA) and very cheap price at three shillings, but a 12A6 is perfectly suitable; having twice the heater resistance of the 6G6, there



The completed receiver.

is a very slight reduction of heater current. Because of the low power requirements of this set, it would be quite in order to use a general purpose triode such as the 12J5 as an output valve.

Conventional T.R.F. Circuit

A more or less conventional T.R.F. arrangement is used with one half of a double triode as an infinite impedance (cathode follower) detector, the other half giving a stage of A.F. amplification. The first stage of the receiver is a simple R.F. amplifier connecting an earth to the aerial terminal and will probably give excellent results in most cases and obviates erecting an aerial proper. It is important to regard the aerial coupling capacitor C1 as absolutely essential in an A.C./D.C. set and it should be exonerated from leakage. The signal appearing at the anode of V1 is passed to the grid of V2a via the R.F. transformer L3-4 and here it was found that anode decoupling by R4C4 was absolutely necessary to maintain R.F. stability. The wavechange switch of the two tuning coils will be explained separately under the description of the switch as a whole. The value of Rk at 100 $\Omega$  for V1 is nominal and can be altered to adjust

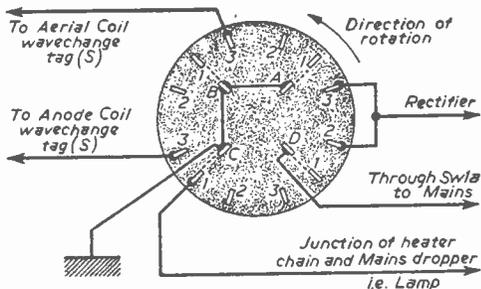


Fig. 2.—The wavechange switch and its connections.

the sensitivity of the set (providing the valve chosen for this position has variable characteristics); some constructors may wish to include a variable component between the lower end of R3 and chassis, especially in areas of very high signal strength.

The second stage employs an infinite impedance (cathode follower) detector with the output load in the cathode circuit. The anode is nominally connected direct to H.T.+, but some constructors may prefer to decouple and this can be effected with R6C6. C5 is an R.F. by-pass capacitor and shunts the rectified carrier present in the detector output, the audio component part of the signal going to the grid of V2a via the coupling capacitor C8. Infinite impedance detection is an excellent system as it imposes no load on the relevant tuned circuit and therefore preserves the high Q of the coil and gives excellent selectivity. Some might consider it a disadvantage that this kind of detector gives a stage gain less than unity, but this

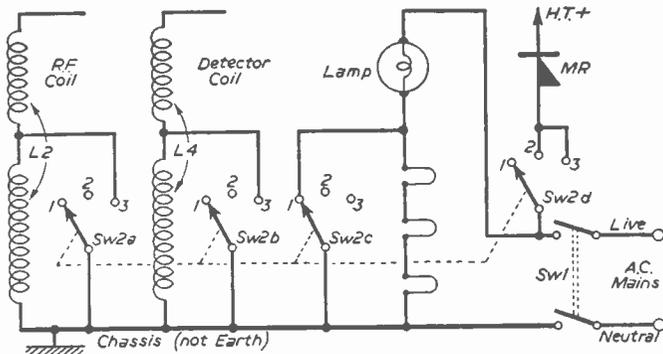


Fig. 3.—Coil and mains switching of the receiver.

is easily outweighed by the quality of the results. In the circuit under consideration, the 12SL7 is a high- $\mu$  triode and V2b gives a very satisfactory degree of audio amplification. Coupling from the anode of V2b to the grid of the output valve (V3) via C9 and the volume control Rv, is quite orthodox and requires no comment.

It was found that providing the layout of hot leads was sensibly carried out, the anode decoupling of both halves of V2 was not required in practice so that R6C6 and R7C7 can be omitted; their inclusion in the circuit is an academic requirement and a guide to anyone who wishes to include them for any reason.

(Continued on page 805)

# ~~~~~A TRANSCRIPTION~~~~~ QUALITY RECORD PLAYER

AN EASILY CONSTRUCTED UNIT WITH  
SEPARATE LOUDSPEAKERS

By C. J. Lee

**T**HIS record player is of modern design and of high quality. The first items to deal with are the two independent loudspeaker cabinets, the main cabinet being left until later. The reason for having two small independent loudspeaker cabinets is because it means that the constructor can at any time add another amplifier, thus making it a stereophonic player. The mounting of the motor and amplifier will be dealt with last of all. The constructor has a wide choice of suitable building materials, but the original was built of oak faced block board as this can be obtained in large sheets and cut to the required size. The two small loudspeaker cabinets, however, were built of mahogany.

## Constructing the Loudspeaker Cabinets

The two small loudspeaker cabinets are constructed of  $\frac{1}{2}$ in. thick mahogany wood. The original pair were 8in. units, but 10in. x 6in. elliptical speakers could be fitted if this is desired.

The construction can clearly be seen from Fig. 1. The cabinet is 15in. high (not including the small rubber feet), and 15 $\frac{1}{2}$ in. at its widest point. At the two points marked 'A' in Fig. 1, one edge of both of the side pieces, and both sides of the front panel, are planed to an angle of 67 $\frac{1}{2}$ deg. They are then fixed to the front panel, as in Fig. 1, with two pieces of batten screwed and glued in position to ensure a good strong joint.

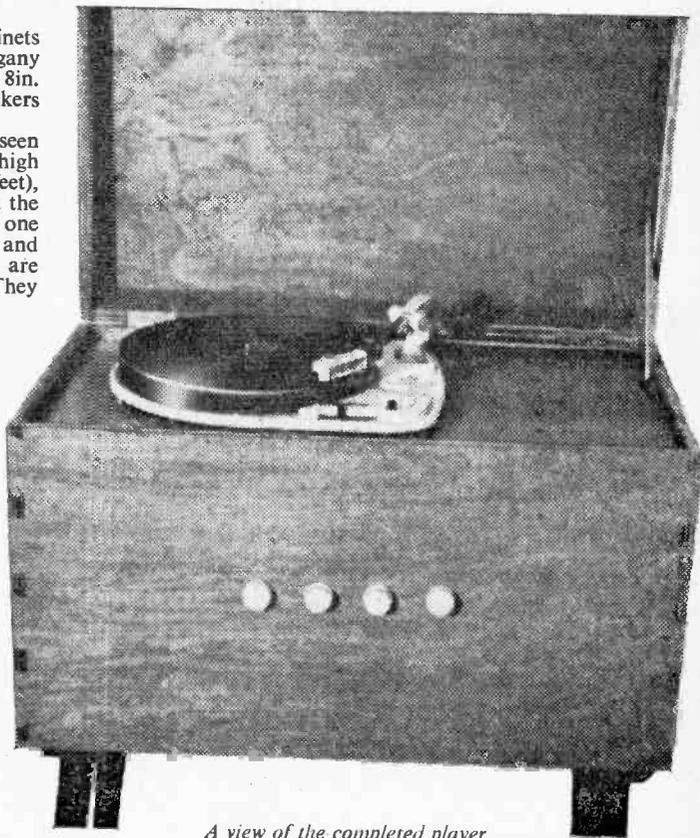
When this first stage of construction has been completed, proceed by cutting out the two back pieces, which are both a little over 14in. in length (leaving a little for planing). When cutting these, it should be remembered that side 'A', as indicated in Fig. 1, is 10in. wide, and side 'B' should only be 9 $\frac{1}{2}$ in. wide, thus allowing for the thickness of the wood when joining these two pieces together (Fig. 1). If this point is overlooked, the cabinet will not line up correctly. The two back pieces join at 90deg and are strengthened with a piece of batten which is 14in. long and an inch or so square, the size not being critical. This piece of batten is screwed and glued in position

and serves the same purpose as the batten used for the two side and the front at points 'A'.

A hole is now cut in the front panel, 6 $\frac{1}{2}$ in. in diameter for the loudspeaker. Any great increase in its size will cause much undue vibration when playing records.

The two loudspeakers can now be screwed into position as shown in Fig. 2 with a small piece of speaker fret placed in front of the loudspeaker first. When the loudspeakers have been mounted, the two back pieces which have been joined together can be fixed to the two side pieces which have been glued to the front panel, thus making one complete unit.

The top piece is now to be cut out. It is also  $\frac{1}{2}$ in. mahogany and the same shape as the cabinet. When it is glued on to the top of the cabinet, it should be planed smooth so that it forms a good fit. It should fit flush with the two back pieces but a  $\frac{1}{4}$ in. overlap is left over the front and the two side pieces to give the finished cabinet a professional appearance (Fig. 3).



*A view of the completed player.*

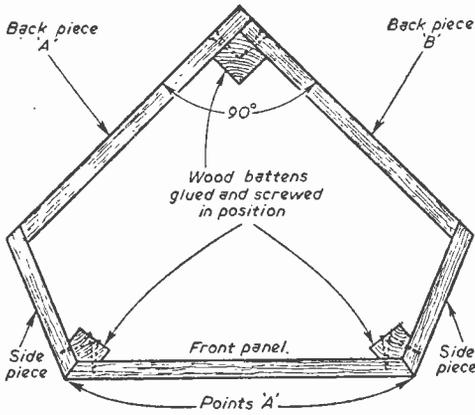


Fig. 1.—Details of the loudspeaker cabinet construction.

A piece of  $\frac{1}{2}$  in. plywood is cut and planed to a smooth surface so that it fits tightly inside the cabinet. This piece of plywood is pushed up inside the cabinet for about 4 in. at which point it should be secured in position with small angle brackets, its position being shown in Fig. 2. This piece of plywood completely seals off the loudspeaker. It will now be seen that there is a compartment between this piece of plywood and the bottom of the cabinet. This compartment is now to be filled with sand as indicated in Fig 2.

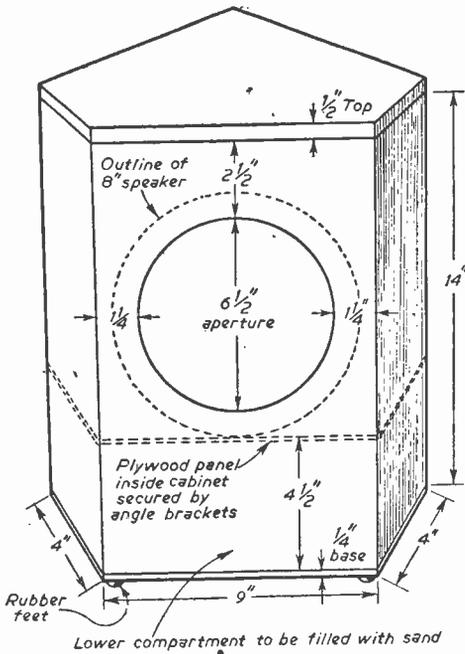
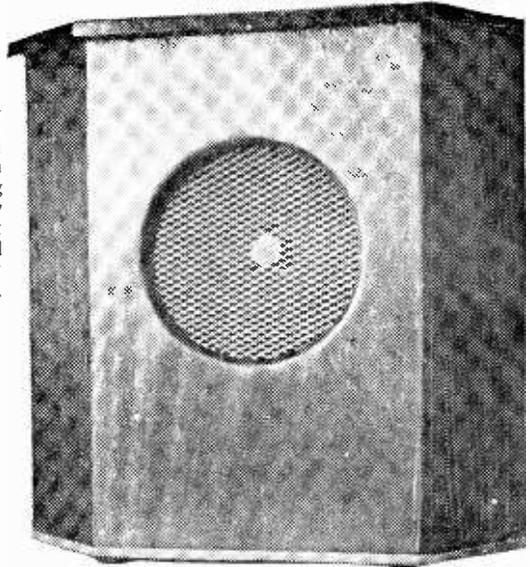


Fig. 2.—The position of the speaker in its cabinet.

Another piece of  $\frac{1}{2}$  in. plywood has to be cut, the same shape as the top but without the  $\frac{1}{4}$  in. overlap. This piece now forms the bottom of the cabinet and should be secured with screws. Assuming that the constructor has connected a lead to the loudspeaker, the cabinets have only to be stained or french polished to complete them.

**Constructing the Main Cabinet**

The front is first cut from  $\frac{1}{2}$  in. oak faced block board, the size being clearly seen from Fig. 4. It should be noted that the lid is constructed with the main cabinet and is sawn off later. This ensures a perfect fit and also simplifies the construction for amateurs. Dovetail joints are marked and cut along both ends of the front panel, (Fig. 4) the size of the dovetails being left to the constructor, smaller dovetails are recommended on the lid than those to be cut on the main body. When the dovetails



The additional loudspeaker.

have been cut on both ends of the front panel, the sockets can be marked and cut out on the two side pieces which are both 18 in. x 18 in. in size.

Next comes the back piece which measures the same size as the front, 30 in. x 18 in. The first thing to do is to gauge off 3 in. for the lid, and then from the same end, a further 3 in. as indicated in Fig. 6. This time, from the bottom edge another 3 in. is to be gauged off. It can now clearly be seen that there is a strip in the middle which is 9 in. wide. This 9 in. strip can be cut out and a piece of hardboard is substituted for it. (Fig. 6).

This piece of hardboard is substituted because it can easily be removed since it is only screwed on to two strips of wood, which are screwed to the sides of the cabinet. Dovetails are now cut on both ends of the back piece and they should be the same size as those cut on the front; the corresponding sockets should then be cut on the side pieces. When the joints have all been cut and cleaned out with a chisel

**COMPONENTS LIST**

One Garrard 4HF transcription motor. A suitable amplifier. Six small rubber feet (three for each cabinet). Two loudspeakers, 8in. or 10in. x 6in. units and two small pieces of fret to fit inside of the two small speaker cabinets. One piano hinge, about 2ft long, and two stays for the main cabinet.

**Timber for Speaker Cabinets**

Two pieces, 14in. x 10in. (back peices). Two peices 14in. x 6in. (side peices). One piece, 14in. x 10in. (front piece). One piece, 12in. x 12in. (top piece). All the wood is 1/2in. mahogany.

Two pieces of 1/4in. plywood, 12in. x 12in., cut as required, one piece for the bottom, the other to fit tightly inside the cabinet.

French polish, screws and glue, etc.

**Timber for the Main Cabinet:**

Five pieces of oak-faced block board of 3/4in. thickness, cut as required for the front, back, two sides, top of lid, motor board and the bottom board.

One piece of 1/2in. hardboard to screw into the back of the cabinet.

Four pieces of teak, 18in. x 2in. x 2in. for the legs, and two pieces of beech size 17in. x 3in. x 1/2in. thick.

Eight pieces of batten, as required for the motor board and bottom board mounting runners. Screws, glue, polish and four metal tips to fit on to the end of each leg.

The bottom board of the cabinet, is also 3/4in. oak faced block board. The reason for this thickness is because this board has to withstand the weight of the

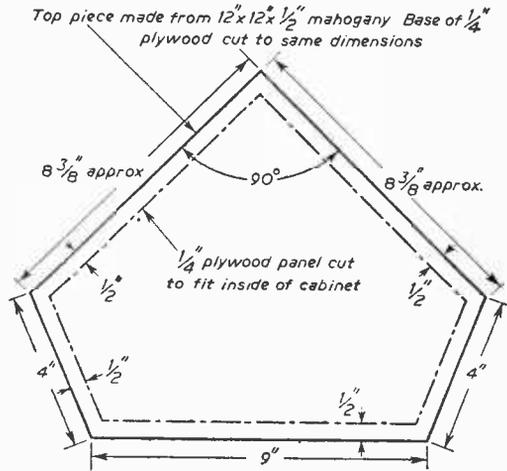
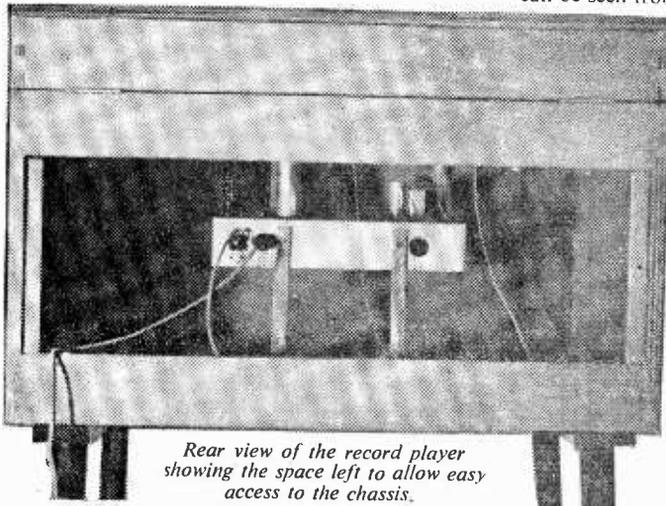


Fig. 3.—The top of the cabinet is made to overlap 1/2in. on all sides.

cabinet when it is finished. Referring back to Fig. 4, the bottom board may be seen as a dotted line. As can be seen from Fig. 6, the bottom board is secured by a rebate which is cut on all four sides of the bottom board, and also all the way round the actual cabinet. This rebate is cut so that when the bottom board is fixed in position, it draws level with the bottom of the cabinet. The motor board rests on runners which are 1in. square and are screwed and glued right the way round the cabinet. The motor board in the original was 1 1/2in. below the level of the top edge (Fig. 6).

**The Legs**

The four legs are the last of the parts required to construct the main cabinet. The originals were machined on a lathe and tapered from 1 1/2in. to 1 1/4in. They are glued into a piece of beech which measures 17in. x 3in. x 1/2in. Two such pieces of beech are needed, one for each end of the cabinet.

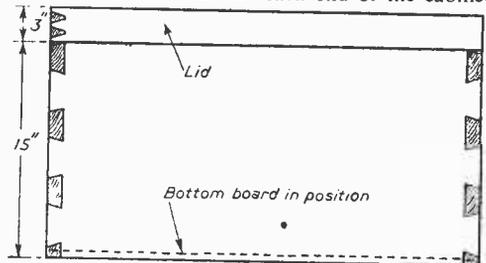


Rear view of the record player showing the space left to allow easy access to the chassis.

the five pieces can be glued together, that is the front, two sides and the two back pieces, making sure that the corners are right angles.

When the glue has set, the joints must be planed smooth and the lid can be sawn off, taking care to make sure that the saw does not cut "rigidly", or a bad fit will result. A suitable top of 3/4in. block board can then be glued on to the four sides of the lid and later planed down to obtain a good fit, but the lid however, should not be screwed on at this stage.

Fig. 4 (Right).—This shows the dovetail joints employed in the main cabinet.



When the legs have been turned, measure an inch down from the thickest end. From the top to this line, the leg should be reduced until it is only 1 in. in diameter (Fig. 7). This is repeated for all four legs. A hole is drilled at each end of both pieces of beech just under an inch in diameter to ensure a good fit (Fig. 7). The four legs are then glued into these holes and the piece of beech planed to the required angle which is illustrated in (Fig. 7). The two pieces of beech are then glued and screwed to the bottom of the cabinet, one at either end. A secure joint is essential here. Black oak stain and a coat of french polish completed the legs on the original model.

The lid can now be screwed in to position taking care to align it correctly and a suitable lid stay screwed on to one side of the cabinet. The cabinet can now be stained or french polished and the inside of the lid could be covered with baize so that the lid

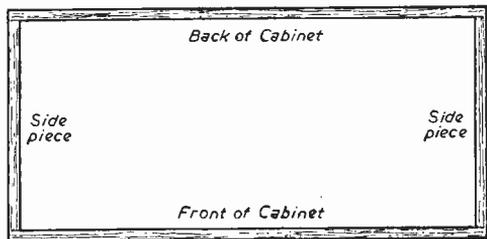


Fig. 5.—A plan view of the main cabinet.

does not produce any vibration if it is dropped accidentally. When the cabinet has been polished, the oak facing gives a pleasing appearance to the finished model.

**Mounting the Motor and Amplifier**

The player in the illustration is a transcription motor. Although a monaural amplifier was used, a stereophonic amplifier could be used instead, thus the reason for making two loudspeaker cabinets. The two loudspeakers would then be connected to their appropriate channel and placed about eight feet

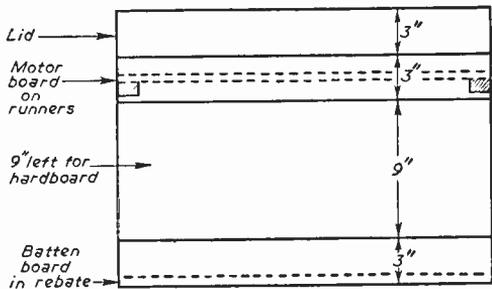


Fig. 6.—The motor board is supported by wooden runners.

The amplifier was mounted with the controls at the front, and with a well ventilated cabinet, the amplifier should not overheat. Incidentally the piece of hardboard that screws on to the rear should have a few holes drilled in it to help ventilation. Two strong brackets were used to support the amplifier as it was rather heavy because of the two trans-

formers. The amplifier was mounted so that a space to the right of the player was saved so that a VHF tuner could at any time be added.

**Mounting the Player**

The player is not difficult to mount. A suitably sized hole is cut out of the motor board and the player lowered on to its springs and with the aid of a

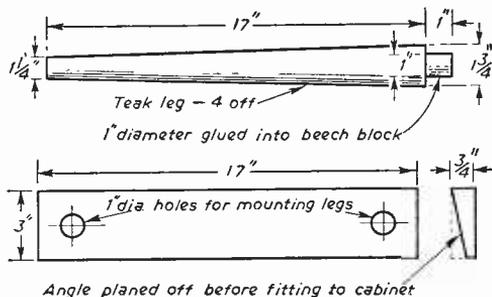


Fig. 7.—Details of the legs and their mounting board.

spirit level, the three screws are adjusted until the player is in a horizontal position. A word of warning would not be out of place here. When the author acquired his transcription motor a fault was apparent. The motor was mounted in the proper manner as directed in the instructions with the unit, but when the player was started, there was a noise coming from the motor instead of running silently as it should. The motor was examined and the fault traced. The three core lead taking the power to the motor was touching the motor board, but as soon as this lead was separated from the motor board, the noise disappeared.

The motor has only to be connected to the power supply and the pick-up to the amplifier, and the loudspeaker(s) to the amplifier(s) and the player is ready for use.

**Combined Radio and Table Lamp**

(Continued from page 801)

**Constructional Notes**

The final form of this set can be so very varied to suit individual requirements, existing chassis, cabinets and so forth, that comments on constructional details will be of a general rather than specific nature and mainly as a guide for the less experienced constructor. Neither need strict instructions be given about actual wiring-up. The important thing is to prepare a plan before starting so that nothing is omitted and of course it must be carried out so that connections left until the end are not inaccessibly buried beneath earlier wiring and components. The following plan is good advice for anyone requiring some guidance:

1. Mount all large and fixed components which require bolting to the chassis, including valve sockets, tag strips, etc.
2. Start wiring with all the routine connections, the "pipe-lines" of supply, starting with the heaters, continuing with chassis and H.T. connections, etc.
3. Leave the "signal path" until near the end.

(To be continued)

# Club News

## REPORTS OF CURRENT ACTIVITIES

### BRITISH INSTITUTION OF RADIO ENGINEERS

9 Bedford Square, London, W.C.1.

Meetings for December:

London—At the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1.

December 7th at 6.30 p.m.—“Flight Evaluation of Airborne Electronic Equipment”, H. G. Hinckley.

December 13th at 6.30 p.m.—“Objective and Subjective Requirements for Loudspeakers” F. H. Brittain.

Liverpool—Merseyside Section.—At the Adelphi Hotel.

December 14th at 7 p.m.—“V.H.F. Sound Broadcasting”, L. G. Dive (Associate Member).

Newcastle-upon-Tyne—North Eastern Section.—At the Institution of Mining and Mechanical Engineers, Neville Hall, Westgate Road.

December 7th at 6 p.m.—“Human Engineering”, S. C. Ramsay, B.Sc.

Southampton—Southern Section.—At Lanchester Building, University of Southampton.

December 14th at 7 p.m.—“Some New Piezo-electric Devices”, A. E. Crawford (Member).

Wolverhampton—West Midlands Section.—At the College of Technology, Wulfrune Street.

December 14th at 6.15 p.m.—Programme of Technical Films.

### BRITISH SOUND RECORDING ASSOCIATION

Hon. Sec.: S. W. Stevens Stratton, 40 Gairfield Way, Ewell, Surrey.

All meetings, unless otherwise stated, are held at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2. A lending library service of technical books and periodicals is available to all current members of the Association who are residing in the U.K. Full list of books and publications is available on request to the Association office. A library of tape recordings of talks on varied subjects is also available.

Future Events:

December 16th—“Magnetic recording in the Home Cinema” by D. O’C. Roe.

1961:

January 20th—“Modern Electrostatic Microphones” by F. W. O. Bauch.

February 17th—To be announced.

March 17th—“The Artist on the Record” by Roger Threlfall.

April 21st—“Recording Vision Signals on Tape” by P. E. Axon, O.B.E., M.Sc., Ph.D., M.I.E.E.

### CHILDREN AMATEUR RADIO CLUB

Hon. Sec.: C. Simpson, 2 Mead Street, High Wycombe, Bucks.

Club meetings are held on the last Thursday of each month at the British Legion, High Wycombe, at 8 p.m. The R.A.E. course which commenced at the High Wycombe College of Further Education recently has a class of 10 under the instruction of G3INZ.

Future Event:

December 29th.—“This or That.”

### CLIFTON AMATEUR RADIO SOCIETY

Hon. Sec.: C. Bullivant, G3DIC, 25 St. Fillans Road, London S.E.6.

The club meets every Friday at 8 p.m. at 225 New Cross Road, London S.E.14. Although attendances have been around the 30 mark recently there is still room for new members, and licensed amateurs, short-wave listeners and audio enthusiasts are welcome.

### DERBY AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: r. C. Ward, 5 Up-and-ans Avenue, Littleover, Derby.

All meetings are held in Room No. 4, 119 Green Lane, Derby, commencing at 7.30 p.m. unless otherwise stated.

Future Events:

December 7th—Surplus Sale.

December 9th—Annual Christmas Party

December 14th—Film Show.

December 21st—Open Evening.

1961.

January 4th—Surplus Sale.

January 11th—Open Evening.

January 18th—Film Show.

January 25th—Constructor’s Night. The third of these annual exhibitions. There are three classes: 1—Home Constructed; 2—Kit assembled; 3—Junior entries.

February 1st—Annual General Meeting.

### HALIFAX AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.

On December 6th, G3JGW entertained the club with “Where, When and What to Look For”.

Future Event:

December 20th—An Informal Evening.

### LIVERPOOL AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: H. James, G3MCN, 448 East Prescott Road, Knotty Ash, Liverpool 14.

On November 15th a Junk Sale was held and November 22nd was an Open Night. On November 29th, G3LRB and G3KYX gave talks on “Safety in the Shack”, G3LRB conforming with regulations and G3KYX dealing with the medical aspect.

### MITCHAM AND DISTRICT RADIO SOCIETY

Hon. Sec.: M. Pharoah, G3LCH, 1 Madeira Road, Mitcham.

The Club Contest was held on November 12/13th and 19/20th. The station was at 216 St. Helier Avenue, Morden, and the equipment was provided by G3LCH (transmitter) and G3OCA (receiver). Operators were G3KKQ, G3LSP, G3OCA and G3OFF. On December 2nd K. Frankcom, G3OCA, gave an interesting talk entitled “Round and about with a Camera”.

Future Event:

January 13th—“Life Boat Radio Equipment” by W. D. Pye.

### PETERBOROUGH AMATEUR RADIO SOCIETY

Hon. Sec.: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

All future meetings will be held at the Technical College on the first Friday in each month.

The mysteries of “Single Sideband” were explained by Mr. K. Pugh, G3HES, at the November meeting, held at Peterborough Technical College. Members took a keen interest in his recently-constructed all-band S.S.B. rig, and Mr. Pugh pointed out how he had built it on separate sub-chassis which were later bolted together.

Future Event:

January 5th—“Short-wave Receivers”.

### REIGATE AMATEUR TRANSMITTING SOCIETY

Hon. Sec.: F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey.

Recent activities have included a talk by G3VK on “R.A.E.N.”, a tour of Gatwick Airport, a Junk Sale, a visit to the BBC Studios at Maida Vale and a discussion on aerials for the S.W. listeners. The clubroom is at The Tower, High Street, Redhill.

Future Events:

December 10th, at 7.30 p.m.—Demonstration of members’ equipment.

1961:

January 21st—The Annual General Meeting.

February 11th—Annual Dinner to be held at Laker’s Hotel, Redhill.

### THE SLADE RADIO SOCIETY

Hon. Sec.: C. Smart, 110 Woolmore Road, Erdington, Birmingham 23.

The Club Station G3JBN at the headquarters, The Church House, High Street, Erdington, Birmingham 23, is available for the use of members for constructional purposes. Thursday evening meetings include informal discussions, operation of the club transmitter, and instructional Morse classes. A licences operator of G3JBN is always in attendance on Thursday evenings. Slow Morse transmissions are radiated on the air each Monday evening from station G3AYJ on 1.9Mc/s from 8 p.m. to 8.30 p.m.

Future Events:

December 16th—“Fun and Games”, organised by Mr. L. H. Blackwell and Mr. G. L. Turner (Members).

December 30th—“The Human Machine as a Radio Operator” a recorded lecture, illustrated with lantern slides by Mr. F. G. H. Charman, B.E.N. (G6CJ).

### WANSTEAD AND WOODFORD RADIO SOCIETY

Hon. Sec.: J. R. Seaman, 67 Beattville Gardens, Ilford, Essex.

Owing to the fact that many junior members have now joined the club a junior section is to be held every Thursday. Morse practice and lectures on fundamental radio principles, and a receiving session are the main features. No definite plans have yet been made for the future although a two or three page news-sheet is being started and a field day is being discussed.

### COURSE OF INSTRUCTION

#### MIDDLESEX COUNTY COUNCIL

Head of Institute: E. N. Fennell, B.Sc., Wesley Institute, Wesley Road, London N.W.10.

A Radio and Television course will be held on Mondays and Wednesdays between 7 and 9 p.m., recommencing January 9th 1961. Mr. Barnes will again be in charge and due prominence will be given to television topics in the classes. The course covers theory and some practical work. It is mainly intended for amateurs. Fees: 20/- per two terms, one evening; 25/- per two terms, two evenings. You may enrol by post to “Jeanville”, Brighton Road, Addlestone, Weybridge Surrey.

(Continued on page 810)

# ANNOUNCING . . .

## THE OFFER OF THE YEAR

### HARVERSON'S SUPER STEREO

The product of a world-renowned manufacturer, this stereo amplifier is composed of a number of compact "ready-built" units, only requiring interconnection. This system has the big advantage of being easily adaptable to fit any cabinet. Each unit is extremely well made from first-grade components, and all valves employed (ECL82, EZ80 range) are genuine Mullard. The comprehensive instructions supplied with each kit make the simple interconnection of units easy even for the novice.

#### THE KIT COMPRISES . . .

**TWO MIDGET AMPLIFIERS** each capable of 3W output. The reproduction is good, enabling you to get the best from both your stereo or monaural recordings. Both amplifiers are complete with well-designed output transformers providing perfect matching to standard 3-7Ω loudspeakers, and have remote bass, treble and volume controls. Size 5" x 2½" x 3" high (each amplifier).

**CONTROL UNIT**, this is a flying panel fitted with three 2-gang potentiometers, enabling the bass, treble and volume controls of each amplifier to be positioned in the most convenient place in your layout. These dual controls are equipped with attractive cream and gold knobs and an escutcheon is provided for the complete panel.

**SEPARATE POWER PACK** complete with valve rectifier, although of midget size (5" x 2" x 3½" high), provides power for complete amplifier equipment.

**ISOLATED MAINS TRANSFORMER** of robust construction is a separate unit and may be mounted independently.

**VOLTAGE SELECTION PANEL.** Consisting of a panel fitted with the "valve base" type of mains input selector and a channel output socket.

**ONE LOUDSPEAKER**, a good quality 5-inch speaker, specially selected for this equipment. (Note: The second speaker may be purchased for us for an additional 14/6.)

**CREAM DOUBLE PUSH BUTTON SWITCH** of attractive design gives positive on/off switching action.

**INDICATOR LIGHT.** This pilot light provides visual indication that the equipment is operating, and is complete with an attractive gold-finished escutcheon.

This kit, which is complete in every way, is exclusive to HARVERSON'S, who are proud to present it at the amazing price of . . . . .

PLUS 3/6 POST & PACKING

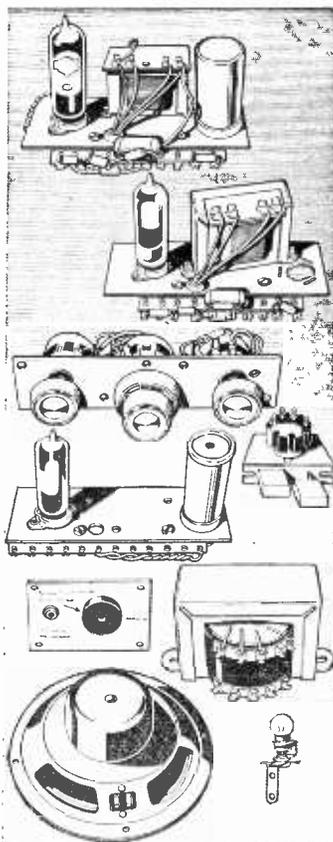
# 59'6

FOR MORE BARGAINS SEE OUR OTHER ADVERTISEMENT  
On PAGE 771

## HARVERSON SURPLUS CO. LTD.

83 HIGH STREET, MERTON, S.W.19

CHerrywood 3985/6/7



808



**"MINITEST"  
Model 127A**

**,000 o.p.v. POCKET SIZE!**

*Performance equal to a high priced instrument*

**OUTSTANDING FEATURES:**

- ★ Sensitivity 20,000 o.p.v. D.C. 1,000 o.p.v. A.C.
- ★ 20 Ranges.
- ★ D.C. Current 50µA, to 1 Amp.
- ★ D.C. Volts 0.3 v. to 1,000 v. (25 kV by probe).
- ★ A.C. Volts 10 v. to 1,000 v.
- ★ 3 Resistance Ranges from 0-20 megohms (self-contained).
- ★ Meter 40µA 3½" arc.
- ★ Accuracy D.C. 3%, A.C. 4%.
- ★ Dimensions 5½" x 3½" x 1½".

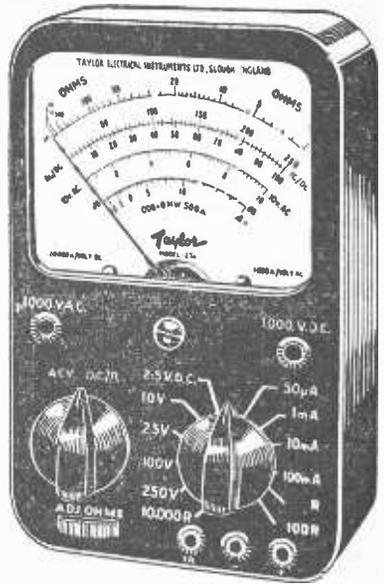
**PRICE: £10.0.0**

**Credit Sale Terms available**

9 monthly instalments of

£1.44

Complete with instruction Manual and interchangeable test prods and clips. High quality leather case, if required, £1.12.0.  
H.V. Probe for 25 kV ... £4.15.0



Write for ]  
fullest  
details to:

**TAYLOR ELECTRICAL INSTRUMENTS LIMITED**  
Montrose Avenue, Slough, Bucks. Tel: Slough 21381 Cables: Taylins Slough  
Member of the METAL INDUSTRIES GROUP OF COMPANIES

**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/-	DL92	5/11	PCF82	7/6
1R5	5/-	DL94	6/9	PCL82	7/6
1S5	4/6	DL96	6/9	PCL83	10/6
1T4	3/9	EB91	3/-	ECL84	7/6
3S4	5/11	EB94	7/6	PL38	10/9
3V4	6/9	EBF80	7/9	PL81	8/-
5U4G	4/3	EBL21	12/6	PL82	7/-
5Y3GT	5/8	ECC81	4/9	PL83	7/-
5Z4G	7/3	ECC82	5/9	PL84	9/6
6AM5	2/9	ECC83	6/3	PY32	10/3
6K7G	1/9	ECC84	8/-	PY80	7/-
6K8G	4/9	ECC85	7/9	PY81	6/3
6Q7G	5/6	ECC86	8/3	PY82	6/3
6V8G	4/9	ECC87	8/3	PY83	7/3
8V8GT	6/-	ECL21	12/6	U25	12/-
8X5GT	4/9	ECH42	7/6	U26	10/-
12K7GT	4/9	ECL80	7/-	UABC80	7/6
12K9GT	11/-	EF41	7/6	UAF42	8/6
12Z7GT	4/6	EF90	4/9	UBC41	7/-
36L3GT	8/6	EF95	5/6	UBF80	8/6
35Z4GT	5/3	EF96	5/6	UCC85	7/-
AZ81	8/9	EF98	6/9	UCH21	12/6
CL33	11/9	EF91	1/9	UCH42	7/6
DAC32	9/8	EL41	7/-	UCH81	8/-
DAF91	4/6	EL84	6/3	UCL82	10/-
DAF96	6/9	EY51	6/9	UCL83	13/-
DF33	9/8	EY98	7/6	UF41	7/9
DF91	3/9	EZ40	6/-	UF85	8/-
DF96	6/9	EZ41	6/9	UF89	6/6
DE77	6/-	EZ80	5/9	UL41	7/-
DK32	11/-	EZ81	6/6	UL84	7/-
DK91	5/-	EZ30	8/-	UY21	11/-
DK92	7/3	MU14	7/-	UY41	5/9
DK96	6/9	PCC84	7/3	UY85	6/3
DL83	8/6	PCC89	10/-	VP4B	8/9
DL85	8/6	PCF80	7/3	Z77	3/9

Postage 6d. per valve extra. Any Parcel insured Against Damage in Transit 6d. extra Any C.O.D. Parcel 2/6 extra. Office address, no callers.

**GERALD BERNARD**  
90 CARR MANOR AVENUE  
LEEDS 17

**SOLDER**

WITH THE  
NEW

**PRIMAX**

AND

**PRIMAXA**

SUPER EFFICIENT  
**SPOTLIGHT**  
SOLDERING GUNS



PRIMAX  
60 W SPOTLIGHT  
80/8 ea.

PRIMAXA  
100 W SPOTLIGHT  
110/8 ea.

Obtainable from:-

ALL GOOD WHOLESALERS AND RETAILERS—

Distributors:- **S. KEMPNER LTD.**

29 PADDINGTON STREET, LONDON W.1

TELEPHONE HUNter 0755

# A Mains Capacity Tester

## CHECKING DIELECTRIC INSULATION

By R. R. Staney

**T**HIS unit was designed to fulfil the need for a simple and effective means of testing most types of capacitor found in radio equipment. All components are obtainable on the surplus market and the total cost of the unit should not be much more than ten shillings.

### Uses of the Tester

Electrolytic and non-electrolytic capacitors of 150VW and above can be tested on the unit. Apart from indicating the two main faults likely to be found in old or surplus capacitors, the unit will enable the user, with a little experience, to assess the condition of capacitors.

If the neon is purchased without a series resistor the following simple test will determine the value required. The neon should be connected across the mains in series with a 0.5M resistor. If this value does not give a strong enough glow, lower values should be tried in steps of approximately 50k. If the neon glows too brightly with a bluish tinge, it should immediately be disconnected and a higher value tried.

### Wiring the Switches

The switches used in the unit are of the single pole changeover push type obtainable on the surplus market. It is important that S1 and S2 should be wired so that tags A and B on S1 and tags C and D on S2 (Fig. 2) are joined when the switches are depressed. A non-reversible mains plug should be used on the supply lead to the unit, and the "live" side should be taken to tag A on S1. If the switches are wired in this manner, the test leads will not be at mains potential until S1 is depressed.

### Housing the Unit

The layout of the components is not critical and individual constructors can build and house the unit to their own requirements. For those who would like to follow the author's layout, details are given below.

Fig. 2 shows the arrangement of components on the rear of the front panel, which measures 5½ in. x 2½ in. and is of ¾ in. plywood. The neon bulb is mounted in the position shown (in the prototype, a small home-made metal clip was used), and a hole cut or drilled in the panel so that the neon light can be clearly seen. If a wire-ended neon is used, these wires should be heat shunted when soldering to avoid cracking the glass seal. In the prototype, MR1 was mounted by means of small "L" brackets, and the smoothing capacitor is supported by its own wires, but a capacitor clip could just as easily be used.

Two wander plug sockets are mounted as shown for connecting test leads to the unit. Plastic panel mounting sockets are ideal as they must be well insulated from the wooden panel, otherwise the

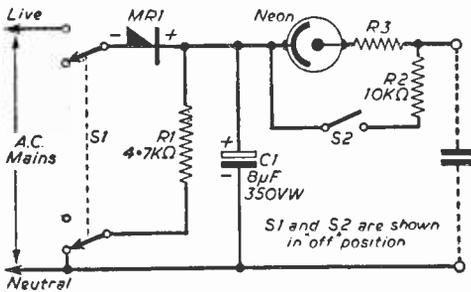


Fig. 1.—The circuit diagram (with S1 and S2 in the "off" position).

As will be seen from the circuit diagram (Fig. 1), the unit has a neon indicator in series with a source of D.C. supply and the capacitor under test. The D.C. supply is obtained through MR1, and smoothed by an 8μF electrolytic capacitor. This value is not critical, and if available a double electrolytic could be used with both halves connected in parallel to give 8μF or above. Experiments showed that a value as low as 4μF was quite satisfactory.

In the "off" position of S1, C1 is shorted through R1 thus discharging C1 and the capacitor under test through the neon indicator. In the "on" position, R1 is put out of circuit and the mains supply connected to the unit. By closing S2 the neon and its series resistor R3 are by-passed by R2. The object of this arrangement is to reduce the charging time required by high-value paper capacitors and most electrolytics under test.

### The Neon Bulb

The neon used in the prototype is of the type found in "mains testing" screwdrivers and panel mounting indicators. However, a ¼ or ½W pygmy neon bulb will be found equally satisfactory.

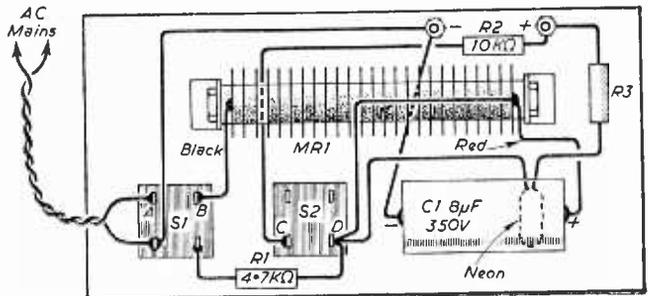


Fig. 2.—The component layout.

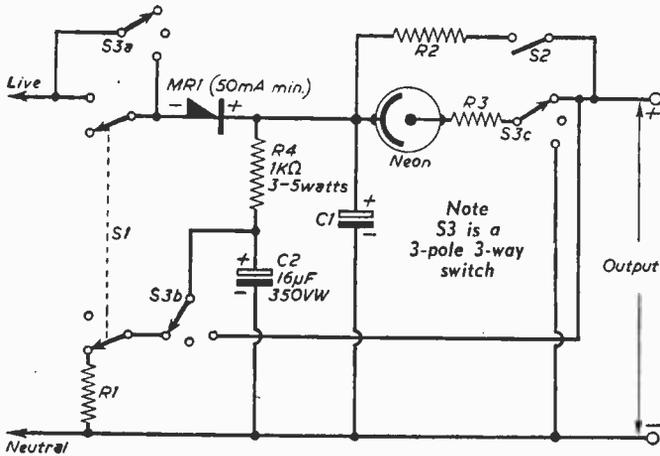


Fig. 3.—The circuit modified for a D.C. supply.

**COMPONENTS LIST**

R1 4.7k  $\frac{1}{2}$ W

R2 10k  $\frac{1}{2}$ W

R3 See text.  $\frac{1}{2}$ W

C1 8 $\mu$ F 350VW

S1 } See text.

S2 }

MRI Metal rectifier, 250V, 30mA.

Neon See text.

Two wander plugs and sockets.

Two bulldog clips.

smallest leakage through the panel will give an indication on the sensitive neon.

Two insulated test leads will be required, fitted with wander plug at one end, and bulldog clips at the other. The clips should be covered with large diameter plastic sleeving. In the prototype, the component panel was housed in a simple plywood box 2½ in. deep. This could be shallower if required as the actual depth of the mounted components is less than 1½ in.

**Using the Unit (Non-electrolytics)**

When S1 is depressed, with a good capacitor connected, there should be a flash from the neon as it charges and then no further indication until S1 is released, when a flash will occur as the capacitor under test discharges.

If a capacitor is short circuited the neon will glow continuously. If it is leaky, the neon will flash with a frequency depending on the amount of leakage. Reliable indications are given by the unit with capacitor values down to 500pF. (Short circuits, of course, are indicated whatever the value.)

**Using the Unit (Electrolytics)**

The procedure here is somewhat different, and although it may appear to be lengthy, in practice it is simple and quick. For convenience and ease of reference the procedure is given in a table. It

should be noted that with electrolytics, polarity should be observed when testing them on the unit. On the prototype, capacitors up to 300 $\mu$ F have been tested. Capacitors should be fully discharged before handling by depressing S2 while still connected to the unit. It is beneficial to electrolytics not in use to fully charge and discharge them several times in succession on the unit, as this helps to "form" them.

The tests should be carried out consecutively and in the order shown.

Action	Indication	Remarks
Depress S1.	(a) Neon lights. (May dim or go out after short period with low values.) (b) Neon does not light.	Not open circuited. Open circuited.
Depress S2. (Still keeping S1 depressed.)	(a) Neon goes out after a few seconds. (b) Neon does not go out. (c) Neon dims.	Good capacitor becomes charged. Capacitor short circuited. Capacitor leaky. (Degree of leakage indicated by amount of dimming.)
Remove one test lead and then release S1 and S2.	— — —	With a good capacitor fully charged this test determines whether it will hold charge
Reconnect test lead after approximately two minutes.	Neon lights for several seconds depending on capacity (e.g. 32 $\mu$ F—45 sec).	Shows that the capacitor has held its charge.

**CLUB NEWS** (continued from page 806.)

**LEEDS AMATEUR RADIO SOCIETY**

- Hon. Sec.: D. Dinsdale, 69 Spen Lane, Leeds 16.  
 Meetings are held at 4 Woodhouse Square, Leeds 3.  
 An interesting lecture on aerials was held on November 30th with Mr. A. R. Bailey, G3IBN as the speaker.  
 Future Events:  
 December 7th—Visit to Kirkstall Power Station at 7.30 p.m.  
 December 14th—Christmas Rag Chew, 1961.  
 January 4th—To be arranged.  
 January 11th—Junk Sale.  
 January 18th—Visit to G.P.O. Parcels Office at 7.30 p.m.  
 January 25th—Film Show.  
 February 1st—Transmitting Evening.  
 February 8th—Open Night.  
 February 15th—"Amateur T.V.," by D. Watson.  
 February 19th—Visit to Odeon Theatre at 10 a.m.  
 February 21st—Mullard Film Show at the Hotel Metropole.

**LLANELLY AND DISTRICT AMATEUR RADIO CLUB**

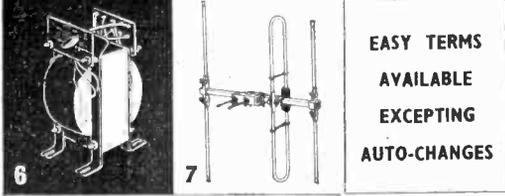
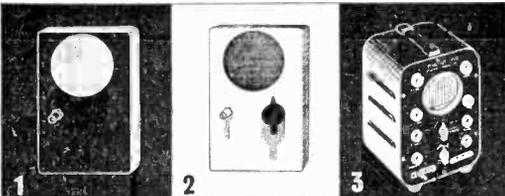
Hon. Sec.: H. J. Hughes, G3ITW, 20 Ethel Street, Northampton.  
 The Chairman of the club, Mr. Arthur Jenkins, GW3HIR, announces the opening of its headquarters at Bynea Steelworks, Llanelly. All interested radio amateurs and short-wave listeners should contact the Hon. Sec. for information on membership and club activities.

**NORTHAMPTON SHORT-WAVE RADIO CLUB**

Hon. Sec.: S. F. Berridge, G3ITW, 20 Ethel Street, Northampton.  
 Meetings are held every Thursday at Allen's Pram Works, 8 Duke Street, Northampton. Meetings are held at 7 p.m. and the annual subscription is 7/6 and 3/9 for those under 18 years of age. At the recent Annual General Meeting the following officers were elected. President: B. Sykes, G2HCG; Chairman: P. L. Hunt, G3FWB; Vice-Chairman: M. A. Perry, G2ANS. Hon. Sec.: S. F. Berridge, G3ITW; Hon. Treasurer: S. Haddon (re-elected). Committee Members: R. F. Perrett, G3HWE and C. F. Robinson, G3HZF. Junior Committee Members: A. J. Hazelwood and P. Crane.

# CHECK with these

# BARGAINS



**ORDERS BY POST WILL RECEIVE OUR PROMPT ATTENTION**

**EASY TERMS AVAILABLE EXCEPTING AUTO-CHANGES**

- 3-TRANSISTOR POCKET RADIO with MINIATURE SPEAKER, FERRITE ROD, PRINTED CIRCUIT and GERMANIUM DIODE.** The only 3 transistor radio available at the price. Build it in 1 evening! Tunable over M/L waves. Complete with easy-to-follow instructions and all components (less batteries obtainable anywhere 10d.). 22/6, P. & P. 1/6. (All parts available separately).
- 3-TRANSISTOR SUPER POCKET RADIO with MINIATURE SPEAKER.** Plus Germanium Diode and Printed Circuit. Size 3 1/4 x 4 x 1/2 in. Ferrite Rod Aerial. Two Surface Barrier Transistors and one Audio. Tunable over medium and long waves. To build yourself 35/6, P. & P. 1/6. Circuit diagram 1/6, free with kit. All parts of items 1 and 2 sold separately.
- DOUBLE BEAM "SCOPE" for D.C. and A.C. APPLICATIONS.** A high gain, extremely stable differential Y-amplifier (30 mV/C.M.). Provide ample sensitivity with A.C. or D.C. inputs. Especially suitable for measurements of utmost importance. Push-pull X amplifier; Fly-back suppression; Internal Time-base Scan Waveform available for external use; pulse output available for checking TV line O/P Transformers, etc. Provision for external—1/P and CRT Brightness Modulation. A.C. mains 200/250 v. £19.19.0, P. & P. 7/6 or 50/- deposit plus P. & P. 7/6 and 12 monthly payments of 35/4. FULL 12 MONTHS GUARANTEE INCLUDING VALVES and TUBS.
- A.C. D.C. POCKET MULTI-METER KIT.** 2in. moving coil meter, scale calibrated in A.C./D.C. volts, ohms and milliamps. Voltage range A.C./D.C. 0-30, 0-100, 0-250, 0-600. Milliamps 0-10, 0-100. Ohms range 0-10,000. Front panel, range switch, wirewound pot. (for ohms zero setting), toggle switch, resistor and rectifier. 19/6, P. & P. 1/6. Wiring diagram 1/-, free with kit.
- CHANNEL TUNER.** Will tune to all Band I and Band III stations. Complete with P.C.C.84 and P.C.F.80 valves (in series) 1.P. 16-19 or 33-35. Can be modified as an aerial converter (instructions supplied). 32/6, plus 3/6 P. & P.
- HEATER TRANSFORMER** to suit above, 200-250 v., 6/-, plus 1/6 P. & P.
- MAINS TRANSFORMERS.** All with tapped primaries, 200-250 volts, 0-160, 180, 200 v., 60 ma, 6.3 v., 2 amps, 10/6. 280-0-280 80 ma, 6.3 v., 2 amp, 6.3 v., 1 amp, 10/6. 350-0-350 v., 70 ma, 6.3 v., 1 amp, 6.3 v., 2 amp, 10/6. 250-250 v., 70 ma, 6.3 v., 2 amp, 10/6. P. & P. 3/-.
- WOLSEY 3-ELEMENT FOLDED DIPOLE.** 1.P.V. Aerial less mounting bracket for external use, complete with 12 yds. of coaxial cable, 15/-, P. & P. 3/6.
- CYLDON TURRET TELE-TUNERS 1 F 34/38 Mc/s.** Brand new complete with biscuit for channels 2, 4, 8 and 9. Less valves, 10/-, P. & P. 2/6. Pair of knobs to suit, 3/6. (Valves required P.C.C. 84 & P.C.F. 80).
- SIGNAL GENERATORS.** Cash £8.19.8 or 25/- deposit and 6 monthly payments of 21/6, P. & P. 5/-. Coverage 100 kc/s to 100 Mc/s on fundamentals and 100 Mc/s to 200 Mc/s on harmonics. Case 10 x 6 1/2 x 4 1/2 in.

Three miniature valves and Metal Rectifier. A.C. mains 200/250 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. Magic eye as output indicator. Accuracy  $\pm 2$  per cent.

**10. SIGNAL GENERATORS.** Cash £4.19.8 or 25/- deposit and 4 monthly payments of 21/6, P. & P. 5/-. Coverage 120 kc/s to 84 Mc/s. Case 10 x 6 1/2 x 4 1/2 in. Size of scale 6 1/2 x 3 1/2 in. 2 valves and rectifier. A.C. mains 230-250 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  $\pm 2$  per cent.

**11. BATTERY RECORD PLAYER AND AMPLIFIER.** 45 r.p.m. "Starr" motor. "Acos" crystal pick-up, 3 transistor push-pull amplifier, complete with transistors. Output 500 milliwatts, 49/6, P. & P. 3/6.

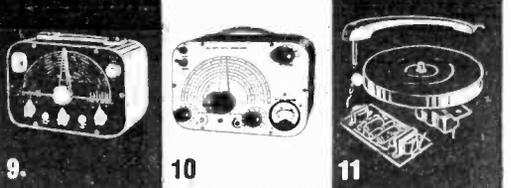
**12. 8-WATT PUSH-PULL AMPLIFIER COMPLETE WITH CRYSTAL MIKE AND 8in. LOUDSPEAKER.** A.C. mains 200-250 v. Size 10 1/2 x 6 1/2 x 2 1/2 in. 4 valves, H.F. pent., 2 triodes, 2 output pens and rectifier. For use with all makes and type of pick-up and mike. Negative feed back. Two inputs, mike and gram, and controls for same. Separate controls for Bass and Treble lift. Response flat from 40 cycles to 15 kc/s,  $\pm 4$  db; 4 db down to 20 kc/s. Output 8 watts at 5 per cent total distortion. Noise level 40 db down all burn. Output transformer tapped for 3 and 15 ohms speech coils. For use with 8in. or 1.P. records, musical instruments such as guitars, etc. £4.19.8, P. & P. 7/6 or 20/- deposit plus P. & P. 7/6 and 4 monthly payments of 23/-.

**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 1/2 x 10 1/2 in. Space required above baseboard 4 1/2 in., below baseboard 2 1/2 in. Fitted with Ful-Fi turnover crystal head. £6.19.8, P. & P. 5/- With Stereo Head £7.19.8, P. & P. 5/-.

**14. TRANSISTOR TESTER.** For both P.N.P. and N.P.N. transistors incorporating moving coil meter. In metal case, size 4 1/2 x 3 1/2 x 1 1/2 in. Scale marked in gain and leakage. 19/6, P. & P. 2/6.

**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. 1/6. Wiring diagram 1/6, free with kit.

**16. PORTABLE AMPLIFIER.** On printed circuit for A.C. Mains 200/250 v. Size 4 x 3 in. with tone and volume control. Valves: ECL82 and EZ80. 39/6, P. & P. 2/6.



**SATISFACTION GUARANTEED OR MONEY REFUNDED**

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

**23B HIGH STREET, ACTON, LONDON, W.3.**  
ALL ENQUIRIES S.A.E.  
GOODS NOT DISPATCHED OUTSIDE U.K.

# IS HALF YOUR TAPE RECORDER



## WASTED?

The performance of a portable tape recorder is severely limited by the space available for its internal loudspeaker.

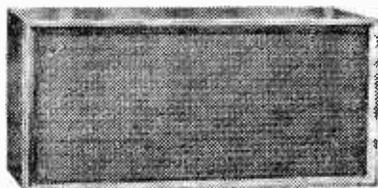
The connection of a high quality external speaker will reveal hidden detail in your recordings, and the Wharfedale PST/8 is an ideal choice.

This unique, patented enclosure design gives optimum results with Wharfedale 8in. foam surround units which are available in a range of impedances to suit all machines.

Descriptive literature sent free on request.

## WHARFEDALE PST/8

PRICE cabinet only  
£10.10.0 finished in  
walnut, oak or  
mahogany veneers.  
£7.10.0 in whitewood.



Recommended units 8in. Bronze/FS/AL £4.6.7  
inc. P.T. Super 8/FS/AL £6.19.11 inc. P.T.

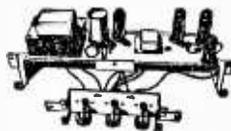
**Wharfedale**  
WIRELESS WORKS LTD  
IDLE, BRADFORD YORKS

Telephone: Idle 1235/6 Telegrams: "Wharfedale" Idle, Bradford

## Gladstone Radio

**PUSH-PULL AMPLIFIER £4.15.0** (3/- P. & P.)

Brand new 200-240 A.C. mains. Bass, treble and vol. controls on flying panel. Valves EZ80, ECC83 and 2-EL84 giving full 8 w. Chassis 12 x 3½ x 3½ in. With 6p. trans. for 2-3 ohm speaker. Suitable for Crystal Mike input.



**TWO-TONE BROWN RECORD PLAYER CABINET** (With Motor Board for Autochanger) and Gramophone Amplifier to fit Cabinet for £5.5.0 (5/- carr.). Size 17 x 15 x 8½ in. Brand New.

State which Board—B.S.R. or COLLARO.

### COMPLETE TAPE RE- RECORDER for only £19.19.0

B.S.R. deck. Two-tone leatherette case. Acos crystal mike. 850ft. tape, extra spool. On/Off Tone and Vol. 7 x 4in. Speaker. 1½ hrs. playing time. Single speed 3½ in./sec., fast forward and reverse, mike and radio inputs, ext. speaker socket; cannot be accidentally erased, 13½ x 12 x 8in. Weight 20 lbs. 12 months guarantee. Carr. 7/6 extra. Terms: £6 down and 6 monthly payments of 50/-.



**B.S.R. "MONARDECK" FOR TAPE SINGLE SPEED.** Our price only £8.10.0 including 850 ft. 1st grade tape, carr. pd.

**COLLARO STUDIO TAPE TRANSCRIPTOR 3 MOTORS. 3 SPEED. Push Button Controls. £12.10.0** (10/- carr.)

### AMPLIFIER FOR STEREO WORK



Beautifully finished wood cabinet with "gold" and brown dividing strip and "gold" finished fabric front. Size 13 x 7½ in. front to back 4½ in. 5in. P.M. speaker. ECL82 valve with metal rectifier. Vol. tone, on-off. 82/6 (3/- p. & p.).

**AMAZING OFFER!! BRAND NEW 6-12 VOLT D.C. REVERSIBLE MINIATURE MOTORS AT A FRACTION OF MAKER'S PRICE.**

Weight 2.1 ozs. Motor dimensions 1½ in. long. 1½ in. dia. Spindle 0.4in. long. .077in. dia. Consumption 0.72 watts off load. 7.68 watts on load. Speed 7,000 r.p.m. Switch. Centre off reverse by switching either side. General specification. These motors have a tremendous power-weight ratio, are extremely efficient. Can be used on 6 volts without great loss in power. Precision built in polythene housing. Self lubricating. With sintered bronze bearings. Easily mounted. Supplied Brand New and Guaranteed, 15/6, p.p. 1/6. Special price for quantities over 50.

FOR ADDRESSES SEE THE OTHER ADVERTISEMENT FOR GLADSTONE RADIO ON PAGE 785



transformer mounted on top. This will then leave space beneath the chassis for mounting a 100mA smoothing choke, to replace the first stage of resistance smoothing (2k wire-wound) in the original "Coronet." This will both improve the standard of smoothing, and minimise the voltage drop occasioned by the increased demand for H.T.; in actual fact, the H.T. voltage output to the anode and screen circuits of V1, V2 and V3 will be slightly increased, but this was found to have no harmful effects. The smoothing choke should be mounted so that its axis is at right angles to the laminations of the mains transformer mounted above the chassis, in order to obviate any danger of hum induction.

### Increased Power Supply

The existing GZ32 rectifier valve is well able to cope with the increased power supply, demands and, as can be seen from Fig. 8, the existing 30 $\mu$ F electrolytics are retained. H.T. for the new pre-amp and output stages is drawn from the junction of the smoothing choke and the 33k resistor, i.e., after the first stage of smoothing. It will be observed from the theoretical circuit (Fig. 8) that slight modifications have been made to the circuitry of the EBL31 valve. The original 0.25M potentiometer (volume control) has been removed, and a 220k fixed resistor wired in its place, between "bottom" of the diode filter and the cathode of the valve; thus this resistor now becomes the "load" across which audio voltages are set up. The 0.02 $\mu$ F capacitor, formerly wired between slider of volume control and 470k grid leak resistor, is now re-wired between the diode load resistor and the "Radio" position on the radio/gram changeover switch.

### Volume Control

A double section ganged volume control, of 0.5M, is mounted in the position vacated by the original "Coronet" volume control, and is wired between the rotor of the radio/gram switch and earth, while its slider is connected to the grid of the EBL31. The volume control thus acts as grid leak resistor for this valve, and the former 470k fixed resistor is no longer required. It is suggested that the section of the dual volume control nearest the chassis front panel be used for the feed to the EBL31 (i.e., Channel A). As dual volume controls with a combined on/off switch are in somewhat short supply, and also deeper in size than can be conveniently accommodated in the space available, it is assumed that a component without on/off switching will be used. This necessitates the provision and wiring in of a separate on/off switch, mounted either at some convenient point on the radiogram control panel, or actually in the mains lead of the receiver.

### Stereo Balance

The reason for the circuit modifications is that it will enable the circuit of the Channel B amplifier to be made identical; in particular, it ensures that the signals from each channel pass through an identical number of capacitors between input and output. Lack of attention to this point would result in undesirable phase discrepancies between the two channels, making proper stereo balance impossible.

The pre-amplifier stage must now provide separate amplification and bass-boost for the two channels, and so the 6J5 of the previous design is replaced by a 6SN7 valve, which is virtually two 6J5 valves in one envelope; each section being identical in circuit and component values to the single channel pre-amp previously referred to, with the exception of the fact that means are provided of altering the "gain" of Channel B in respect of Channel A, so that correct stereo balance can be obtained. For this purpose, the 100k resistor wired between input socket and grid of the first valve stage in Channel A, is replaced in Channel B by a 250k potentiometer, which may

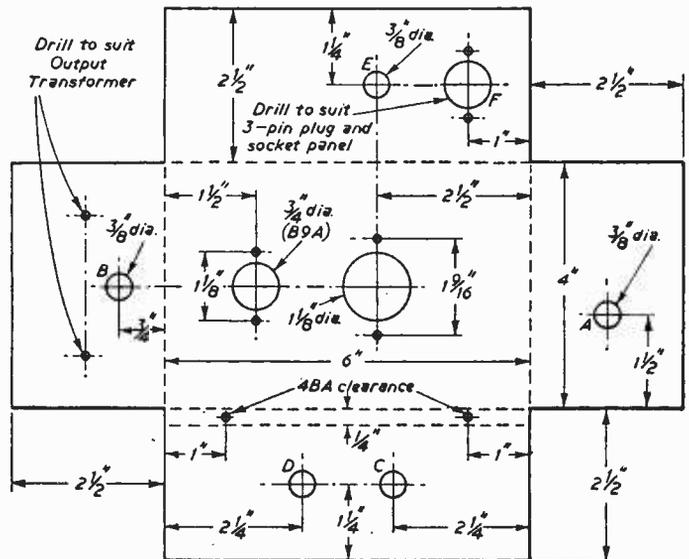


Fig. 9.—The drilling details for the additional stereo chassis.

be of the pre-set type. Once adjusted, it should not need further attention unless valves in the two channels age unevenly.

The outputs from the two sections of the 6SN7 are fed to the radio/gram changeover switch—this time, of course, both "poles" are utilised—when switched to "gram", the Channel A signal passes via the front section of the dual volume control to the EBL31 output stage of the "Coronet" chassis. The Channel B signal is fed through the rear section of the volume control, to the EL84 output stage, mounted on the pre-amp chassis. When switched to Radio a signal is fed only to Channel A for monaural reproduction.

**BUILD IT YOURSELF!**



**THE FAMOUS COSSOR**  
(Traveller's Friend) Transistorised

**£7.19.6** **POCKET RECEIVER**  
P. & P. 2/-  
in leatherette case

This set can be built for £7.19.6. Size 6 x 3½ x 1½ in. Weight 17 oz. This set covers medium waveband 190/500 metres intermediate frequency, 470 kc/s using 4 transistors (Ediswan) and 2 diodes on a printed circuit board, plus a 2½ in. moving coil speaker. Instruction book with point to point wiring diagram, 2/6 each. Batteries, PP4 (Ever Ready) 2/- each.



**"SUPER-THREE"**

Transistor Pocket Radio

Printed circuit technique using 2 Surface Barrier type transistors, one A.F. Trans and one Diode. Ferrite aerial, fully tunable on LW and MW. Uses 2 U16 1½ volt batteries. And easily assembled by the beginner.

Kit of Parts Complete

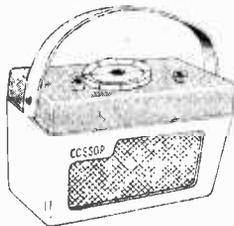
**39/6**

P. & P. 1/6

**COSSOR BATTERY PORTABLE SPECIAL**

**£6.19.6**

P. & P. 3/6



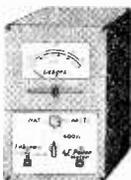
LIST PRICE 12½ gns

A printed circuit, 5in. speakers are features of this battery portable. An internal ferrite rod aerial for L and M Bands. A polythene wrapper provided to protect receiver. Width 10in., height 6½in., depth 5½in.

**LABGEAR OUTPUT METER**

**£2.19.6**

Complete Kit P. & P. 2/-



At last a Meter at the right price for the home constructor. An accurate Audio Power Output Meter. Two ranges 25mW to 1W and 1W to 10W. Accuracy 5% matched for 3. 15 600 ohms with inst. and tech. data. New 3-in. 0-1mA meter.

NOT GOVERNMENT SURPLUS

**TAPE RECORDERS THE "MAGNAPHONE"**

A first class tape recorder at a reasonable price. Separate Treble and Bass controls for replay, facilities for monitoring and mixing, 3-speed Collaro Studio deck, and many other refinements. Output 4 watts.

**£32.0.0**

Complete with crystal microphone with lead and jack plug, 5½in. reel of tape and spare reel and spare lead for recording from radio.

21/- P. & P. & ins.

**THE "VOGUE"**

Another fine recorder fantastically cheap. It also uses the famous Collaro Studio 3-speed tape deck. Separate inputs for microphone and gram. recording, tone control for replay. Output 3 watts.

**29 gns.**

Complete with microphone, reel of tape and spare spool.

21/- P. & P. & ins.

**RECORDING TAPE OFFER**

FAMOUS MAKE P.V.C. BASE ON PLASTIC SPOOL  
1800ft on 7in. spool .. 32/6 1200ft on 7in spool .. 21/-  
1200ft on 5½in. spool .. 22/6 850 ft on 5½in. spool .. 16/6

**YOUR EXISTING RADIOGRAM OR RECORD PLAYER CHANGED TO STEREO BY OUR STEREO ADAPTOR**

Tech. Data 2 valves EF80 and EL84. Switch control for Stereo and Mono Dual volume and tone control. Output 3 ohms, suitable for use with Acos GC/71, GP/73 and Garrard GC/10. Complete with wiring diagram.

Greatly Reduced

**£13**

P. & P. 2/-

LIST PRICE 18 gns.

**£2.19.6**

P. & P. 2/6

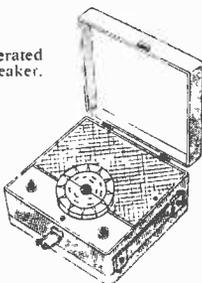
**COSSOR BATTERY PORTABLE**

**£7.7.0**

P. & P. 3/6

This extremely sensitive battery-operated set has a primed circuit and 5in. speaker. A frame aerial fitted in the lid gives high quality listening on L and M Bands.

LIST PRICE 13½ gns.



**CARTRIDGES**

- Collaro Studio O .. 18/-
- Collaro Studio P .. 18/-
- B.S.R. .. 18/-

**RECORD CHANGERS**

- B.S.R. UA8 comp. with latest "ful-fi" cartridge .. £6.19.6
- Stereo .. £7.19.6
- Collaro Conquest, 4-speed auto. .. £7.19.6
- Garrard RC 120, 4-speed auto. .. 9 gns.
- Collaro Junior, 4-speed Single Play Comp. with Arm and P.U. .. £3.15.0

P. & P. 3/6

**SPEAKERS**

- 3½in. SPEAKER .. 17/6
- 5in. SPEAKER .. 15/-
- 6½in. SPEAKER .. 16/6
- 8in. SPEAKER .. 17/6
- 6 x 4in. SPEAKER .. 15/-
- 8 x 5in. SPEAKER .. 19/6
- 10 x 6in. SPEAKER 25/-
- 12in. SPEAKER .. 32/6

P. & P. 2/6.

**THE LATEST MINIATURE EARPHONE FOR TRANSISTOR RADIOS**

This lightweight superbly made instrument enables you to listen in to your radio wherever you are. Ideal for all forms of travel, etc. Provides excellent reproduction and can be worn without any discomfort, complete with transparent earpiece, 3in. of fine flex, plug and socket.



Crystal earpiece as illus. High Imp. 10/- Usual price £1.1.0  
Magnetic " " " Low Imp. 10/- P. & P. 1/-.

**SUB-MINIATURE TRANSISTOR PARTS**

We can now supply all sub-miniature parts for the home constructor—transformers, coils, condensers, resistors—from our large stock of component parts.

**SEND S.A.E. FOR FREE PRICE LIST OR PAY US A PERSONAL CALL**

**WIRECOMP ELECTRONICS**

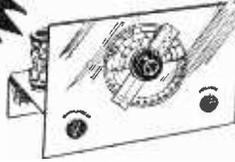
378 HARROW ROAD, LONDON, W.9  
TEL : CUNNINGHAM 9530  
Hours of business: 9 a.m. to 6 p.m. Open all day Saturday. Opposite Paddington General Hospital. Buses 18B and 36 pass the door.

# ENSURE SUCCESS WITH R.C.S.

## CONSTRUCTORS CORNER

Explore the world on short-wave radio (10-100m)

FOR ONLY **35/-**



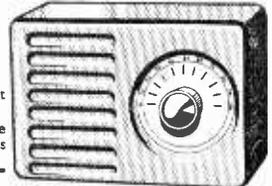
Construction price includes valve and one coil covering 40-100 m.  
 ● Can be converted to 2v. or 3v.  
 ● Receives speech and music clearly from all over the world.  
 Send 2/- for diagram and price list.

## IDEAL XMAS PRESENT!

EASY TO BUILD TWO STAGE TRANSISTOR SET  
 The set that looks like a Radio Set.

- Attractive Case
- Mini .0005 Tuner
- High Q Litz Coil
- Works for months off No. 8 Battery
- Simple to construct in 15 min.

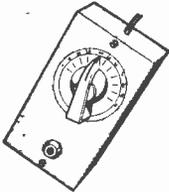
You can't go wrong. We guarantee good results  
 Total Building Costs. P.P. 1/6 **25/-**



Components Price List. Layout Plans 1/6 free with order.

## YOU CAN NOW BUILD THE R.C.S. TAPE TUNER

Will operate on all types of Recorder. Size 3 1/2 x 1 1/2 x 1 in. High impedance output, variable med. wave tuning. Triple wound Super-Hi-Q coil. Easily constructed from full instruction data and Layout Diagrams. Chassis and components colour coded.



All parts to Build. Post 1/6.

**30/-**

## CRYSTAL RECEIVER

Covers M/W Band

All components including case for **12/6**  
 Ideal for the beginner

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

## BUILD THIS AMAZING RADIO

POWERFUL PERSONAL PORTABLE

- ★ Sturdy metal case.
- ★ No holes to drill.
- ★ Detachable rod aerial.
- ★ All batteries self-contained.
- ★ Can be built in 1 hour.
- ★ Covers medium waves.
- ★ Loud clear tone.
- ★ Selective tuning.
- ★ All parts are sold separately.

FOR ONLY **35/-**

This delightful set is designed to give you a completely personal portable radio.

Bronze-finished case. Ideal for the beach, the bedroom, the office—in fact anywhere  
 Send 2/- for wiring diagram and components price list



Trade Enquiries Welcomed

**R.C.S. PRODUCTS (RADIO) LTD.** 11 OLIVER RD., LONDON E.17

Mail Order Only

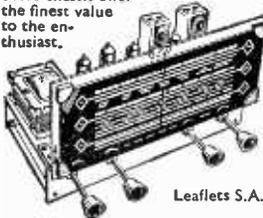
# KINGSMERE SUPPLIES LIMITED

Insured Post 1/-, over £2 Free. (Export extra.) Single valves, post 6d.

MAIL ORDER HOUSE

TERMS: Remit with Order or C.O.D. Cash refund guarantee!

Built to the highest specifications, these chassis offer the finest value to the enthusiast.



Leaflets S.A.E.

## ALL BRITISH RADIOGRAM CHASSIS. 3 WAVEBANDS 5 MULLARD VALVES

ECH81, EF89, EBC81, EL84, EZ80  
 Brand new and guar. A.C. 200/250v. Short - Medium - Long Gram. P.U. High Q dust core coils. Latest circuit technique. AVC and neg. feedback. 4 watts. Chassis size 13 1/2 x 6 x 7 in. Aligned and calibrated ready for use. Quality at Low Cost. Chassis isolated. H.P. Dep. £5 and five monthly of £1.

OUR PRICE **£9.9.0**

Matched Speakers, 5in., 6 1/2in., 8in., 17/6 ea. 10in. 25/- 12in. 30/-



The Brilliant Success of

Maranch

## BRAND NEW AND BOXED

with Template  
 4 SPEED  
 MODEL UA8

**£6.15.0**

STANDARD OR STEREO PICK-UP

GARRARD 4-SPEED HIGH FIDELITY UNITS  
 Autochanger RC210 £9.19.6  
 Single Player TA Mk.11 £7.19.6  
 Transcription 4 HF £16.19.6 } Price inc. plug-in, normal heads. Stereo hds. £2 ex.

## BRAND NEW

OZ4	6/-	6BA6	7/-
IR5	6/-	6BE6	7/-
IS5	6/-	6CA	5/-
IT4	5/-	6D6	6/-
2X2	2/6	6FG	7/-
3Q5	9/-	6G6	5/-
3S4	7/6	6H6	3/6
3V4	7/6	6J5	5/6
5U4	6/-	6J6	5/6
5Y3G	6/-	6J7G	6/6
5Z4G	9/6	6K6GT	5/-
6AC7	3/6	6K7G	5/-
6AG5	5/-	6K7M	7/6
6AL5	4/-	6K8G	6/-
6AM6	4/-	6N7M	6/-
6AT6	7/6	6Q7G	7/6
6B8G	5/-	6SA7M	6/-

## VALVES

6S17M	6/-
6SN7GT	6/6
6U5G	7/6
6V6G	3/-
6X5G	6/-
12A7T	6/-
12AU7	6/-
12AX7	6/-
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6
35L6	9/6
35Z4	6/6
807	5/-
954	1/6
956	2/6
12K7GT	6/6
12Q7GT	6/6
25Y5G	9/6

**Two Channel Tone Control**

Simultaneously tone control of the two channels is also required, and as the author was unable to find an advertiser offering dual section potentiometers of the desired 50k, a 2-pole, 3-way switch was fitted to the same dimensioned extension panel as described for monaural gram modification, and arranged so that three fixed settings of the top-cut could be switched into circuit as desired. With the switch fully anticlockwise, the 10k and 33k resistors are placed in series between the 0.02µF capacitor and chassis, thus giving minimum top-cut; when turned to the central position, the 33k resistor is cut out of circuit, giving medium top-cut, and in the fully clockwise position, the 0.02µF capacitor is wired direct to chassis, giving maximum cut. It is desirable that the resistors are of at least 10% tolerance, or better still 5%, otherwise serious discrepancies might arise between the effect of the tone control on the two channels.

By careful planning, both the 6SN7 and the EL84 stages can be easily accommodated on the same chassis size (6in. x 4in. x 2½in.) as the previous design; indeed it is a simple matter to modify the chassis of design A to conform to that for design B, and it may well be that some constructors will carry out modification A as a first step, before proceeding to the more ambitious design, and this procedure can be followed without difficulty. The drilling details are shown in Fig. 9, from which it will be seen that, apart from the necessary provision of a hole ¼in. in diameter, to accommodate the EL84 valveholder, hole B is now re-positioned somewhat nearer the chassis bend and, instead of carrying the gram input socket, is now a grommeted hole giving access for wires to the primary of the Channel B output transformer. Further holes are drilled in the rear chassis runner for fixing the output transformer, which is mounted horizontally on the outside of the chassis. A new input socket, of the three-pin type, is mounted behind hole F, which should be drilled to suit, and hole E is to accommodate the pre-set balance control.

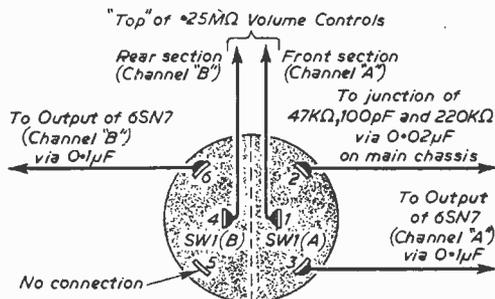


Fig. 10.—The radio/gram switch for the stereo unit. (Channel "B" is out of circuit when switch is on "radio".)

**Wiring Instructions**

As it is probable that only the more experienced constructors will undertake this modification, it is not proposed to give detailed point-to-point wiring instructions. The circuit diagram, read in conjunction with Figs. 10 and 11 should provide all

necessary information. Warning is again given to guard against possible short circuits when making connections in the single screened cable between the volume control, radio/gram switch, etc.

**Testing**

When the wiring has been completed and checked, and a loudspeaker connected to the output transformers of each channel, the "hum" test with a screwdriver blade can be carried out. This time, when the blade is presented to the live input

**Component List for "Stereo" Modification**

- Chassis (6in. x 4in. x 2½in.).
- 16s.w.g. Aluminium panel (5in. x 2½in.).
- International octal valveholder.
- B9A Valveholder.
- 3-pin chassis mounting plug and socket, with screening cover.
- 2-pole 2-way switch.
- 2-pole 3-way switch.
- Control knobs, to match existing "Coronet" type—2.
- 5-way tagstrip (centre tag earth).
- 2-way tagstrip (one end earth).
- 6B.A. solder tags—2.
- 18in. Twin twisted PVC flex (heater wiring).
- 12in. Single PVC flex, red (H.T. lead from "Coronet" to pre-amp).
- 18in. Single screened wire.
- ¼in. Rubber grommets—3.
- 8µF 350VW electrolytic capacitors—2.
- 25µF 25VW electrolytic capacitors—3.
- 0.05µF 450VW tubular capacitors—2.
- 0.02µF 450VW tubular capacitors—2.
- 0.1µF 450VW tubular capacitors—2.
- 6SN7 Valve.
- EL84 Valve.
- Output transformer (matching EL84 to 3Ω speaker).
- 3Ω P.M. loudspeaker (of size and type for reasonable match to existing "Coronet" receiver speaker unit).
- Dual pattern 0.5M potentiometer (volume control).
- 250k Linear potentiometer (balance control).
- Smoothing choke, rated to carry 100mA.
- Mains transformer, 250-0-250, 100mA, 6.3V, 4A, 5V, 3A.
- On/off switch (panel mounting "Toggle", or "Push Button" for insertion in mains lead).
- Nuts and bolts, connecting wire and sleeving as required.
- Resistors:
  - 1k ¼W—2.
  - 22k ¼W—2.
  - 68k ¼W—2.
  - 100k ¼W—1.
  - 220k ¼W—1.
  - 470k ¼W—2.
  - 10k (5-10 per cent tolerance) ¼W—2.
  - 33k (5-10 per cent tolerance) ¼W—2.
  - 10k ¼W—2.
  - 47k ¼W—2.

sockets, first one speaker and then the other should respond. If all is well, fit the 3-pin plug to the stereo pickup lead (live wires to the outer prongs, screen to the remaining prong), wire the mains supply to the gram motor, and all is ready for a trial run. It is recommended that an ordinary monaural L.P. record be first played. Turn up the volume control to a comfortable listening level, and carefully adjust the balance control until the sound appears to come from a point midway between the two speakers, which should be placed not less than four feet apart, facing into the centre of the room. If this effect cannot be obtained from a normal listening position, it is probably because the two speakers are out of phase. To correct this, switch off, and reverse the connections of one of the speakers to its relative output transformer, and repeat the test; it should now be possible to centralise the sound source. Now play a stereo record, and verify that left and right channels are being reproduced by their correct speakers; one of the demonstration records is ideal, as the spoken commentary will quickly establish the identity of the two channels. If the output is reversed, change over the pickup leads to the live input sockets.

For reasonable results, the speaker chosen for the additional channel should be as similar as possible to the original. If the "Coronet" was formerly operated with a small 5in. or 6½in. speaker it will be well worthwhile obtaining two new 8in. speakers.

#### Housing Cabinets

It is essential that the completed equipment be housed in suitable cabinet, either in a single extra wide console housing both speakers, or, of course, the modified "Coronet" and Channel A speaker can be housed in the traditional type of radiogram cabinet, and the Channel B speaker in a separate

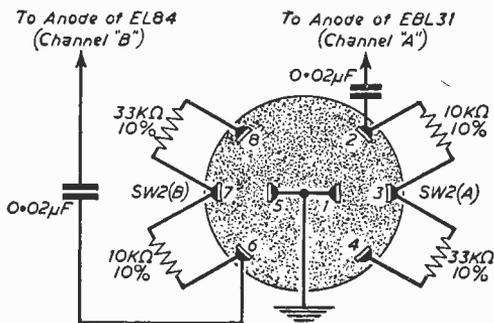


Fig. 11.—The three position top-cut tone control for simultaneous operation of channels "A" and "B".

cabinet, enabling the two to be placed at a convenient distance apart. Final adjustment of the balance control should be carried out with the equipment mounted in the cabinet.

The results obtained by the author have been very gratifying, and well up to the standard of commercially produced stereograms costing very much more than the overall cost of the "Coronet" and its modifications. Thus to anyone already possessing a "Coronet" receiver, the cost of an adventure into stereo will be quite reasonable. There is little doubt that many other receivers, both home constructed and commercially manufactured, could be adapted to stereo along similar lines; and the constructor of reasonable experience should have little difficulty in drawing up a design.

A list of components required for both modifications of the "Coronet" receiver is given; all components are easily obtained from advertisers in *Practical Wireless*.

## RELIABLE RADIOGRAM

(Continued from page 797)

coil trimmers, the cores of L5 and T1 being left as they are. During the whole procedure C3 should be set to approximately half capacity as mentioned earlier. Final slight adjustments are permissible to ensure optimum operating conditions. It should be appreciated that this is only a "rough and ready" method of alignment.

#### The Speaker Enclosure

This was constructed from thick plywood and the dimensions can be ascertained from Fig. 10(a). Two ports approximately 6in square are cut in the top and bottom of this cabinet to permit air to circulate freely to the equipment in the main cabinet above. In the front of the cabinet an aperture is cut for the speaker after first positioning the retaining bolts. Gold fret slightly larger than that actually required is then stretched taut over the whole front where ¾in quadrant is placed to retain it. The edges of the fret are trimmed away once the quadrant is fixed firmly, thus leaving a neat finish.

The necessary legs are easily obtainable at handicraft stores etc., either polished or plain and with or without brass ferrules, thus making possible a modern styling. The cabinet is comparatively simple to construct, and since only the wood at the sides and the quadrant is visible, finishing is soon accomplished.

Where a speaker is already available and separately housed the arrangement depicted in Fig. 10(b) can be adopted or, alternatively, a speaker may be built into the main cabinet as mentioned earlier.

#### GENERAL COMPONENTS LIST

One 4-speed Autochanger (BSR Monarch). One 240V pygmy bulb and holder.  
One equipment cabinet (The "Nordyck," by Record Housing Ltd.).  
One 10in. speaker unit (see text). Set of four legs. Cable, connecting wire, solder, tags, nuts and bolts, etc.

Note:—The coils in the receiver are Osmor type: L1 QA8; L2 QA9; L3 QA5; L4 QO6; and L5 QA12.

# HOME RADIO OF MITCHAM

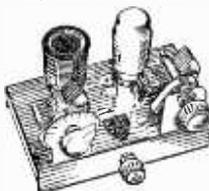
(Dept. P), 187 London Road, Mitcham, Surrey.  
 MIT 3282

Shop hours 9 a.m. to 6-30 p.m. Wed. 9 a.m. to 1 p.m.

## "P.W." POCKET SUPERHET

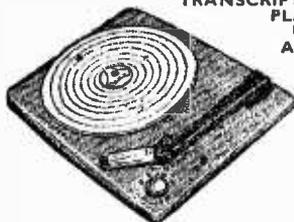
All components in stock for this super pocket Transistor Portable. Jackson 00 gang with screen and tapped spindle 11/-; Ardenite 5k volume control and switch 10/6; Ardenite switch wafer, 3/9; Rola 2½ in. speaker 27/6; miniature ¼ watt 10% resistors 4d. each; miniature electrolytics 3/- each, etc. FULLY DETAILED PRICE LIST ON RECEIPT OF S.A.E.

## NEVER MIND THE WEATHER—TOUR THE WORLD ON SHORT WAVES FROM YOUR ARMCHAIR



Music from Brazil, News from America, Sport from Australia, and hundreds of amateurs talking to each other across the world. Learn the Morse code and listen in to shipping, etc. You will make a host of new friends and never have a dull moment with the GLOBE-KING one valve Short Wave Set at your side. This scientifically designed set gives real long distance reception at a minimum cost. Only top grade components and new patented matched coils. Kit for set including three coils covering 10 to 100 metres. PRICE £3.19.6. Send s.a.e. for leaflet.

## TRANSCRIPTION PLAYER UNIT AG2009



Today's best value in 4-speed Transcription Units. Heavy, accurately machined turntable with generous bearings for steady running and freedom from wow. Adjustable pick-up weight and device for lowering and raising pick-up from record. Hi-Fi plug-in-crystal pick-up head for standard and L.P. records. PRICE £10.10.0, plus 2/- post. Additional plug-in head for stereo 30/-.

## "CIRCUITS FOR AUDIO AMPLIFIERS"

- ★ 2 and 3-valve pre-amplifiers.
- ★ Tape amplifiers and pre-amps.
- ★ Stereo amplifiers and pre-amps.
- ★ Electronic mixer.
- ★ 3, 10 and 20-watt amplifiers.

This exciting new book by Mullards covers all aspects of Hi-Fi Audio Design, including constructional data on 12 different designs. We stock all the parts for constructing these circuits, including ready punched chassis, printed front panels, Bulgin components, special switches, Elcom plugs and sockets, Panton plugs, Ferroxcube pot cores, etc. Book 8/6, post 1/-. Set of detailed price lists for the circuits, 6d.

## Super 128 page CATALOGUE



PRICE 2/-.

Post 9d.

## "EASY BUILD" TRANSISTOR AMPLIFIER

"Add-on" amplifier specially designed for use with the "Globe-King" 1000A, but suitable for boosting any small set. Ediswan Transistors—ready drilled chassis, first grade parts, complete to last nut and bolt.

PRICE £3.19.6 COMPLETE

## WE ARE STOCKISTS FOR THE FAMOUS HEATHKITS

## ARMSTRONG STEREO MK II—EVERYTHING ON ONE CHASSIS.

HERE IT IS, THE REAL ANSWER TO COMPACT HI-FI. This single unit comprises Sensitive AM tuner with ferrite aerial, High quality FM/VHF tuner Hi-Fi 16-watt push-pull mono amplifier, Hi-Fi stereo amplifier with 8 watts push-pull each channel. Independent Bass and Treble boost controls. Facilities for tape recorder, modern streamlined appearance and Armstrong precision engineering. PRICE 42 Gns., or H.P. terms.



T.C.C. CONDENSERS—GREAT NEWS A NEW DEAL FOR THE ENGINEER AND CONSTRUCTOR. T.C.C., the greatest name in Condensers, announce a wonderful new range. Better than ever, much smaller in size, higher ratings, AND PRICES SLASHED. Send today for the full list of these wonderful new condensers which are available from stock.

## PULLIN

## SERIES

100

## Multirange Test Set



Wide angle of vision and clear scales together with rugged printed circuit construction. Really accurate instrument with 21 ranges and sensitivity of 10,000 ohms per volt. Full details and full specification on receipt of s.a.e. PRICE £12.17.6, post paid. Or H.P. terms. Deposit £2.7.6 and 6 monthly payments of £1.15.0, or 12 monthly payments of 18/6.

## LATEST VALVE LIST

Hundreds of different valves of all makes in stock for immediate delivery, including our famous ELPICO range of brand new boxed valves which carry a full 12 months guarantee. Also all branded types such as Mullard, Brimar, Marconi-Osram, Mazda-Ediswan, etc. Send s.a.e. for full list.

## NYLON DRIVE CORD

Keep a handy reel of this by you always. Non-stretch and non-slip and having a high tensile strength. Supplied on 25-yard reels for only 4/6, post paid. Brand new and made by Suffix Ltd.

## TRANSISTOR AMPLIFIER

A fantastic new range of miniature Transistor Units. Transistor amplifier with 1 watt output and suitable for mic, gram, or guitar, £4.10.0, etc. Leaflet giving full details of these amazing new miniature assemblies will be sent on receipt of s.a.e.

## LOUDSPEAKERS

Brand new P.M. loudspeakers of good make. 3 ohms speech coil.

## ROUND

3in. 22/6, 5in. 17/6, 6in. 20/-, 8in. 21/-, 10in. 32/6

## ELLIPTICAL

7 x 3½in. 17/6, 8 x 5in. 22/6, 10 x 6in. 30/-, Please add 1/6 postage.

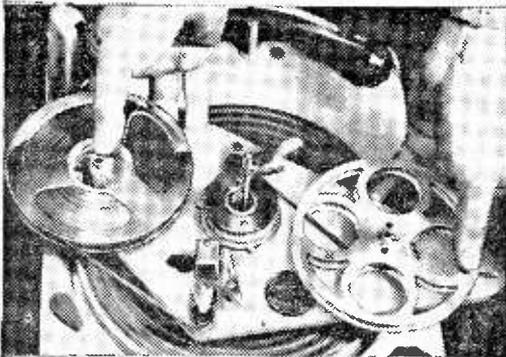
## HI-FI SPEAKERS

Celestion P44 12in., 3 or 15 ohms, £3.15.0. Goodmans Axiom 110, 15 ohms, 10in., £5.0.0. Stentorian HF1012, 3 or 15 ohms, 10in., £4.15.0. Stentorian T816 8in. high frequency unit, 15 ohms. Really puts "zing" into your reproduction, £6.3.5. Complete in handsome walnut cabinet £10.0.0. Please add 1/6 postage. Full range of speakers and tweeters by Goodmans, WB Stentorian, and Wharfedale, normally from stock. WB and Record Housing cabinets available from stock.

*New!* A TRULY REMARKABLE  
BRITISH INVENTION!

# Gramdeck

GRAMOPHONE TAPE RECORDER



**Turns any gramophone into a superb TAPE RECORDER! and back into a record-player in a moment!**

- ★ Plays at 7 1/2 per sec. or 3 other speeds.
- ★ Records direct from radio or microphone.
- ★ Erase and fast rewind.

**11 Gns.**

**YOURS FOR 13/- DOWN AND 18 FORTNIGHTLY SUMS OF 13/-.**  
Ready to Record, complete with Control Unit and 600 ft. of Twintrack tape. Special moving coil microphone extra.  
**EASY TERMS**

Gramdeck is an ingenious invention that instantly turns your gramophone into a tape-recorder and back into a gramophone at will! You simply slip it on to your turntable and you are ready to record direct-from-radio or microphone... the voices of your family phone... your favourite music... your favourite radio programmes... your favourite music—and you can instantly play it back through your own gramophone or radio with *Lifelike Fidelity*. Made by the people who make radar runs for Viscounts and Britannias, the amazing Gramdeck now brings full tape-recording facilities to every gramophone owner at little extra cost.

**As easy as putting on a Record**

"Real hi-fi results." "Better than many so-called hi-fi recorders..." These are typical comments of famous technical journals. Gramdeck enables any gramophone owner to add superbly good tape-recording facilities to existing equipment, at a fraction of the usual cost. Full details, photos, specifications, Easy Terms, etc., are given in the Gramdeck Book. Send for your FREE copy today.

*Free!*



**FREE BOOK—POST NOW!**

Please send me the Gramdeck Book—FREE and without obligation.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

# Gramdeck

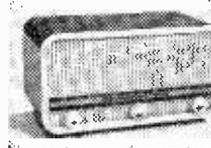
GRAMOPHONE TAPE RECORDER

(Dept. PA815), 29-31 WRIGHT'S LANE, LONDON, W.8

**GRAMDECK TURNS A TURNTABLE INTO A TAPE-RECORDER**

## LONDON'S NEW WALK-AROUND "Service with a Smile" SHOP!

Also 24 hr. Mail-Order Dispatch Service

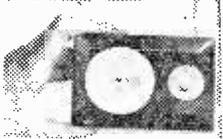


Only £5.10.0. Build this beautiful "Symphony" radio for only £5.10.0. Sturdy, exceptionally well finished cabinet with horizontal dial. Covers all medium and long waves. Good selectivity and very good quality reproduction. For A.C. mains 200/250 volts. All high quality parts, gold insert knobs, etc. No knowledge needed—our **SIMPLE CONSTRUCTION ENVELOPE** makes it as easy as A. B. C. All our parts tested.

**CAN BE BUILT FOR ONLY £5.10.0** including construction envelope and everything down to the last nut and bolt. Post and packing 4/- extra. C.O.D. 2/6 extra. (Parts sold separately. Components price list 1/-.)

Only £8.17.6 **BRAND NEW!** the latest 4-speed Autochanger. B.S.R. UA14, few only. Our Price £8.17.6. P. & P. 3/6. **BRAND NEW!** the B.S.R. 4-speed Autochanger, U.A.S. few only left. Our Price £6.19.6. P. & P. 3/6. **BRAND NEW!** the COLLARO Junior 4-speed record player. Our Price 75/-. P. & P. 3/6. **BRAND NEW!** COLLARO Conquest, 4-speed Autochanger. Our Price £7.19.6. P. & P. 3/6.

Only 35/- The "Coronet" 2-transistor radio is very sensitive, ideal for Office, Bedroom, Holidays, etc. Fits in the palm of your hand. Months' and months' listening off a 7d. battery. Can be built for only 35/- inc. everything. Our **SIMPLE CONSTRUCTION ENVELOPE** makes it easy as A. B. C. Post and packing 2/- ex. (C.O.D. 2/6 ex.) Parts sold sep. Components price list 1/-.



**ROBERTS ELECTRONICS OF LONDON (Dept. PW4)**  
398 HARROW ROAD, LONDON, W.9. Tel. CUNNINGHAM 0323  
Open 9.30 a.m. until 6 p.m. incl. Sats. (We don't close for lunch).  
Come and look around—no obligation. We also operate 24 hour Mail-Order Service.

**P.W. POCKET S/HET SET OF SIX SPECIFIED MULLARD TRANSISTORS 99/6**

**BUY NOW! BEFORE PRICES RISE**

Yellow Spot (for use as Red Spot up to max.)	2/9	XA102	..	..	22/-
Red Spot	3/6	XA101	..	..	21/-
White Spot	5/-	XA103	..	..	14/-
Green/Yellow	5/6	XA104	..	..	17/8
Red/Yellow	10/-	XB102	..	..	9/-
OC4	16/6	XB103	..	..	9/-
OC45	..	XC104	..	..	10/-
OC70	..	XC101	..	..	15/6
OC71	..	Matched pair XC101	..	..	30/-
OC72	..	Matched pair XC121	..	..	30/-
Matched pair OC72	..	TS1	..	..	4/3
OC75	..	TS3	..	..	12/6
OC71	..	GET3	..	..	8/-

**CRYSTAL DIODES, 1/-:** Mullard OA81, 4/-; OA70, 4/-; BRIMAR GD4 (GEX34), 4/-.

**TRANSISTOR HOLDERS, 1/3:** ARDENTE Sn min., 1/6; FERRITE ROD; 3 x 5/16in., 1/6.

**CONDENSERS:** Miniature, 0.01/150 v., 11d.; 0.1 mfd./100 v., 1/2; 0.04/150 v., 1/2; 0.005/200 v., 10d.; standard size 0.01/1,000 v., 8d. 0.1/500 v., 10d.

**Wire ended, 16 mfd./450 v., 2/4; 16-18/450 v., 4/-; 8-3/450 v., 2/9; 8-16/450 v., 2/9; 50 mfd./50 v., 1/9; 25 mfd./25 v., 1/9; 100 mfd./6 v., 2/3; Miniature, 25 mfd., 2/6; 50 mfd., 2/3; 8 mfd., 2/3; 2 mfd., 1/8.**

**SUB MINIATURE; 32 mfd., 25 mfd., 16 mfd., 8 mfd., 2 mfd. All 3/6; 100 mfd., 2/9.**

**TUNING CONDENSERS:** Solid, dielectric, 500pF (0.0005 mfd.) 4/-; 300 pF 3/9; 100 pF 3/-; Miniature, 500 pF, 5/-.

**RESISTORS:** All values 10% ± w., 6d.; 1 watt, 9d.

**REGANERS 1 V.A.V.E.:** Circuit and plans, 11d. Kit, 35/-.

**COILS:** Repanco DR2, 4/-; DRX1, 2/6; Teltron HAX, 3/-. All complete with circuits.

**H.R. HEADPHONES (for Crystal Transistor or Valve Sets):** Diploma, 7/6; IVALEK, 14/-.

**CONNECTING WIRE:** Six assorted colours. 1 yard of each colour, 1/9; 2 yds. of each colour, 2/9; 10 yds. of each colour, 10/6.

**WEARITE P COILS,** all types in stock, 3/-.

**P.W. TRANSISTOR SUPERHET**  
Send S.A.E. for full price list.

— ALL PRICES POST PAID —

**OAKFIELD RADIO—THE TRANSISTOR PEOPLE**  
121 Macclesfield Road, Hazel Grove,  
Stockport, Cheshire

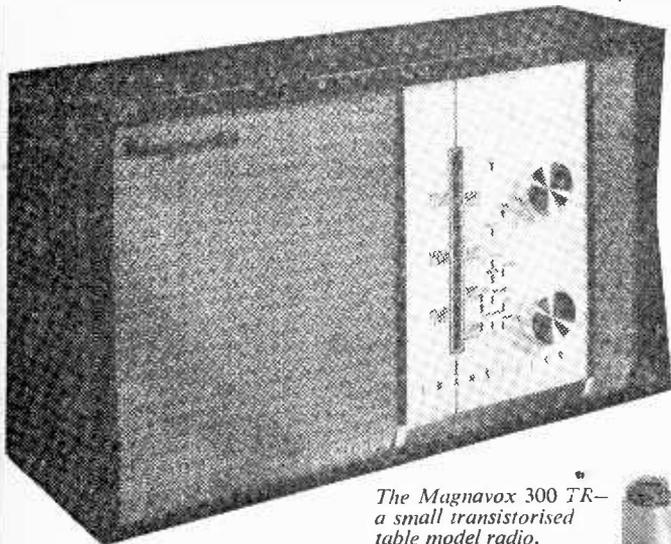
MAIL ORDER ONLY

# Trade News

## NEW PRODUCTS AND DEVELOPMENTS

### MAGNAVOX IN BRITAIN

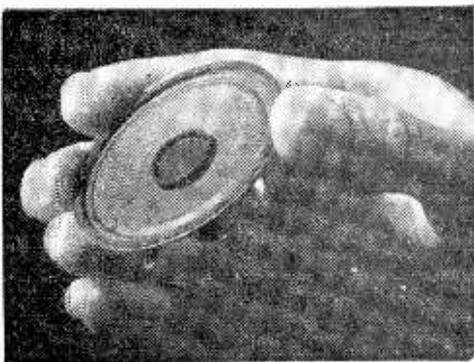
A well-known American company—Magnavox—has now entered the British market. Magnavox, who control the Collaro company, have begun distribution of radiograms, tape-recorders, record



*The Magnavox 300 TR—  
a small transistorised  
table model radio.*

players, transistor radios, and, in 1961, television sets. The policy of the company will be to select a limited number of dealers for their products, thus ensuring "steady stocks, stable prices and a high degree of dealer identity, associating with the public mind the quality dealer and the quality products".

The transistorised table model illustrated is battery-operated with long battery life and high output power. The cabinet is veneered with polished mahogany. *Magnavox Electronics Ltd., Ripple Works, By-pass Road, Barking, Essex.*



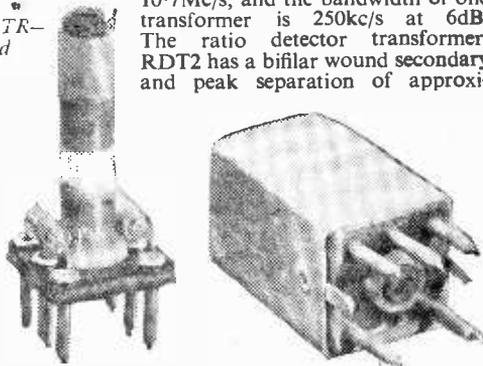
*The Plessey 2 1/2 in. loudspeaker.*

### 2 1/2 in. LOUDSPEAKER

A new miniature loudspeaker for use in modern transistorised receivers has been introduced by the Plessey Company Limited. The magnetic circuit uses a new constructional technique to enable the overall depth to be reduced to a minimum—a rod magnet is inserted into a split aluminium ring which is fitted into an accurately machined yoke. This design arrangement gives a compact, robust, unit without the use of magnet assembly bolts. The loudspeaker is available with a low impedance voice coil (8 to 10Ω) for use with a matching transformer or alternatively with high impedance coils for direct connection into transistor circuits. *The Plessey Co., Ltd., Ilford, Essex.*

### MINIATURE I.F. TRANSFORMERS

Miniature I.F. transformers and ratio detector transformers for 10.7Mc/s are announced by Denco. The I.F. transformer IFT15 is double-tuned with tapped primary and secondary. The unloaded Q of the windings is approximately 70 at 10.7Mc/s, and the bandwidth of one transformer is 250kc/s at 6dB. The ratio detector transformer, RDT2 has a bifilar wound secondary and peak separation of approxi-



*The Denco miniature components for 10.7Mc/s.*

ately 220kc/s. Both transformers are of miniature construction with polystyrene formers and polystyrene foil capacitors. *Denco (Clacton) Ltd., 357-9 Old Road, Clacton-on-Sea, Essex.*

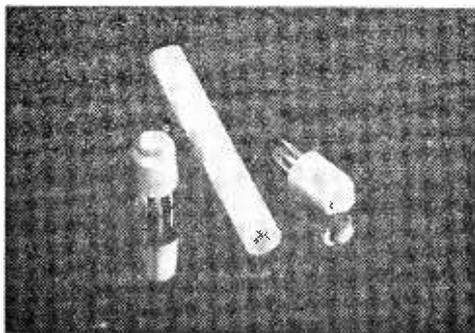
### LOW VOLTAGE TRANSFORMERS

To meet the increasing demand for safe working voltages in commerce and industry as recommended by the Factory Acts, Gresham Transformers Ltd., have developed a range of low voltage transformers complying with B.S. 794 of advanced design and yet economical in price. These transformers reduce the dangerous mains voltage to a safe value for use with such applications as electric drills, grinders, sanders, inspection lamps, soldering irons, etc. The

transformers are totally enclosed in a robust hot-tinned sheet steel case and can be adapted for floor mounting, wall fixing, or for indoor use as a portable unit. They can also be supplied "weatherproofed". *The Gresham Transformer Group, Twickenham Road, Hanworth, Middlesex.*

#### I.F. TRANSFORMER

A new subminiature I.F. transformer—the "Fidis"—has been produced by the French company Orega. The unit is particularly well suited for use in pocket-sized, printed-circuit, transistorised receivers, but



*Miniature I.F. transformers by Orega of France.*

may also be used in all receivers where space is at a premium. It measures  $\frac{3}{8}$  in. high and  $\frac{3}{8}$  in. in diameter. Soldering pins are fitted for conventional mounting methods on printed-circuits. The Q of the coils is high—about 150-160. *Orega, 106 rue de la Jarry, Vincennes (Seine), France.*

#### TAPE RECORDING ACCESSORIES

A new Tape Accessories Kit has been introduced by Multicore Solders Ltd., for recording enthusiasts. This Bib kit contains the already well known Tape Splicer, a reel of Scotch Splicing Tape on a dispenser, an additional supply of cutters and the Bib Tape Data Card Calculator. The Data Card provides information of tape spools, playing times for all



*The Bib Tape Accessories Kit.*

types of tape at four different speeds and in addition contains the recording times of nearly 50 orchestral works. In a packet affixed to the lid of the kit, there are 24 Tape Reel Labels which are, like the Splicer, available separately. The labels are self-adhesive and provide an instant identification of all recorded reels of tape. The surface is suitable for typing, or for pencil or ink and allows the titles, composer, artist, reel number, date, speed and type of tape to be noted. The Bib kit containing the five items retails at 28s. 6d., whilst the Splicer at 18s. 6d., and the Labels at 2s. 6d. are available separately if required. *Multicore Solders Ltd., Maylands Avenue, Hemel Hempstead, Hertfordshire.*

#### MICROPHONES AND ACCESSORIES

The complete range of Shure microphones and accessories is now available in the U.K. The series is very comprehensive and includes models for broadcasting, Professional recording etc. Ribbon, dynamic, controlled-magnetic, crystal and carbon elements are employed. Transistorised controlled-magnetic units



*The Shure model 43 "Commando" Series controlled-magnetic microphone.*

are also available for direct replacement of carbon microphones. Full details and supplies are obtainable from the U.K. representative for Shure Brothers—*Mr. J. W. Maunder, 95 Hayes Lane, Beckenham, Kent. (BEC 7413).*

#### TAPES FOR CHRISTMAS

Magnetic tape is growing in popularity as a gift, and for some weeks before Christmas, the most popular sizes of Philips tapes will be contained in a special pack. The pack is in bright colours and there is a space for the name and address of the recipient. *Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.*

#### VALVE MANUAL

A completely revised Valve Manual for use with the Taylor Valve Tester, Model 45C and earlier versions of this instrument, Models 45A; 46A; 47A and 45B has been published. The Chart is priced at 10s. post free and includes over 5,000 characteristics and settings. *Taylor Electrical Instruments Ltd., Monrose Avenue, Slough, Buckinghamshire.*

ACCURATE READINGS IN ANY POSITION

ADVANCED DESIGN-MINIMUM WEIGHT

ALL-ROUND RELIABILITY

# THE NEW SALFORD SELECTEST

**MODEL SUPER K:** 1 mA movement.  
39 self-contained ranges for measuring  
A.C., D.C. voltages and currents and resistance.

**MODEL SUPER 50:** 50 uA movement

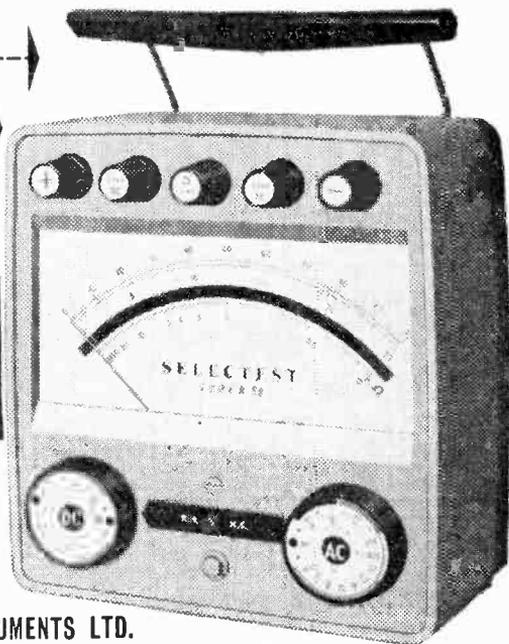
Send for leaflet No. S.K.50/6002/PT

**SALFORD ELECTRICAL INSTRUMENTS LTD.**

PEEL WORKS, SILK STREET, SALFORD 3, LANCs. Tel: Blackfriars 6688

London Sales Office: Magnet House, Kingsway, W.C.2. Tel: Temple Bar 4668

A Subsidiary of THE GENERAL ELECTRIC CO. LTD. OF ENGLAND



## CIRCUITS FOR AUDIO AMPLIFIERS

-a book every enthusiast will want!

This new Mullard publication is a practical manual for every audio enthusiast. In addition to describing twelve of the most popular Mullard circuits, it has introductory chapters on many of the theoretical and practical aspects of high quality sound reproduction.

Whether you are interested in disc or tape, monaural or stereo, you will find that "Circuits for Audio Amplifiers" gives just the sort of information you need.

This informative book costs only 8/6. The demand for it is high, so get your copy now from your local radio dealer.

# Mullard

MULLARD LIMITED • MULLARD HOUSE • TORRINGTON PLACE

LONDON W.C.1  
MVM423A



FOR VALVES AND SPARES FROM STOCK - RETURN POST



AZI	10/-	ECF82	10/6
AZ31	10/-	ECH42	9/6
DAF96	8/-	ECH81	9/-
DF96	8/-	ECL80	9/6
DK96	8/-	ECL82	10/6
DL96	8/-	EF41	9/6
DM70	7/6	EF50	4/-
EABC80	9/-	EF50SYL	7/-
EAF42	9/6	EF80	7/-
EA91	4/6	EF85	7/-
EBC33	6/9	EF86	12/6
EBC41	8/9	EF89	8/9
EBF80	9/9	EF91	5/9
EBF89	9/6	EF91(BVA)	
ECC81	8/-	EF92	6/-
ECC82	7/6	EK32	7/-
ECC83	9/-	EL32	4/6
ECC84	10/-	EL33	4/-
ECC85	9/6	EL41	9/-
ECC86	9/6		
ECC87	9/6		
ECC88	9/6		
ECC89	9/6		
ECC90	9/6		
ECC91	9/6		
ECC92	9/6		
ECC93	9/6		
ECC94	9/6		
ECC95	9/6		
ECC96	9/6		
ECC97	9/6		
ECC98	9/6		
ECC99	9/6		
ECC100	9/6		

EL84	9/6	PCF82	11/6	UBF80	9/-	ISS	6/6	6CSGT	6/6	6V6G	6/-	12SK7	6/-
EL91	4/6	PCL82	11/6	UCC84	10/11	IT4	5/6	6C6	5/-	6V6GT	7/9	12SL7	8/-
EM34	9/6	PCL83	13/6	UCC85	9/6	3D6	5/6	6D6	5/-	6X4	7/6	12SM7GT	
EM80	9/6	PL36	14/6	UCH42	9/6	3Q4	7/-	6C6H	8/6	6X5G	7/-		10/-
EM81	10/6	PL81	11/-	UCH81	9/6	3Q5GT	9/6	6F6G	7/-	6X5GT	7/-	15D2	7/9
EY51	9/6	PL82	8/6	UCL82	11/6	354	7/6	6F6M	7/6	630L2	12/6	25A6	9/-
EY86	10/6	PL83	9/6	UCL83	13/6	3V4	8/-	6F1	14/-	786	10/6	25L6GT	10/-
EZ40	7/6	PX25	12/6	UF85	9/-	4D1	3/-	6F15	14/-	787	8/6	25Y5	9/9
EZ41	7/6	PY80	7/6	UH89	9/-	5R4Y	8/6	6JSGT	5/-	7CS	8/-	25Z4	9/6
EZ80	7/6	PY81	8/6	UL41	9/-	5U4G	6/6	6J5M	6/6	7C6	8/-	25Z5	8/-
EZ81	7/-	PY82	7/-	UL84	9/-	5V4	11/6	6J6	5/6	7H7	8/-	25Z6	10/-
		PY83	8/6	UU6	10/-	5Y3G	8/-	6J7G	6/6	757	9/6	30FL1	10/6
		PEN4VA		UY1N	12/6	5Y3GT	7/6	6K7G	4/-	7Y4	8/6	30L15	23/3
GZ32	10/6			UY41	7/6	5Z4G	7/6	6K7M	6/9	10F1	12/6	30P4	15/-
HL23DD	8/6	PEN25	6/-	UY85	7/-	6A7	10/-	6K8G	6/6	10P13	23/3	30P12	12/6
HL42DD		PEN45	10/-	VP23	6/6	6A8G	9/-	6K7GT	5/9	12A6	5/-	30PL1	12/6
		PEN46	7/-	VR105/308/-		6AK5	5/-	6K8GT	10/-	12A8H	12/6	35L6GT	10/-
		PEN220A	4/-	VR150 307/6		6AL5	4/-	6L6G	8/-	12AT7	7/6	35Z4GT	8/-
		PEN44	12/6	VU39 (MU)		6AMS	7/6	6L6M	9/6	12AU7	8/-	35Z4GT	8/-
						6AM6	4/-	6L18	11/6	12AX7	8/-	35Z5GT	9/-
						6AQ5	7/6	6N7GT	7/6	12BA6	9/-	42	8/-
						6B7G	7/6	6O7GT	7/6	12BE6	9/-	50L6GT	8/6
						6B8A	7/6	6K7GT	9/6	12C6	9/-	75	10/6
						6BE6	7/6	6K7GT	6/-	12J7GT	10/6	80	8/6
						6BH6	9/-	6SL7GT	8/-	12K7G	6/6	80	8/6
						6B16	9/-	6SN7GT	7/6	12K8GT	13/6	142BT	3/6
						6B16	9/-	6SQ7	9/3	12K8M	13/-	21ODDT	4/6
						6B16	9/-	6U4GT	12/-	12Q7GT	6/6	21OVPT	3/6

**COMPONENTS FOR P.W. POCKET SUPERHET RECEIVER**

Repanco TT9 ... 12/6  
 Repanco TT10 ... 12/6  
 Transistor OC44 10/-  
 2 Bank 60pF trimmer ... 1/10  
 Diode OA81 ... 4/-  
 Battery PP4 ... 2/-  
 Resistances 3d. each  
 Send for Full Detailed List

**Osmor Ferrite Rod ... 10/-**  
 Osmor I.F. Trans. Osc. Coil 22/6 per set  
 Celestion 2 1/2in. Speaker ... 26/8

**SWITCHES, WAVE CHANGE SWITCHES, etc.**

3 pole, 4 way ..... 3/- ea.  
 4 pole, 3 way ..... 3/- ea.  
 1 pole, 4 way ..... 2/- ea.  
 1 pole, 12 way ..... 3/- ea.  
 2 pole, 6 way ..... 3/- ea.  
 4 pole, 4 way ..... 4/6 ea.  
 3 pole, 3 way ..... 3/- ea.  
 3 pole, 3 way, 3 bank ..... 2/3 ea.

Best Quality Recording Tape  
 1,200ft on 7in. spool... 21/-  
 850ft. on 5 1/2in. spool... 18/6  
 600ft. on 5in. spool... 13/9  
 200ft. on 3 1/2in. spool... 5/3

Collaro Junior Single 4-speed record player unit in cream, complete with pick-up fitted turnover cartridge. Special Price 75/- each. Post 3/6.

Garrard GC2 Crystal Cartridge. Black Moulded case complete with Standard and LP styli. Price 15/6.

**4BA Terminals, Red and Black, suitable for Battery Chargers, etc. 1/6 ea.**

PANL—Air-drying Paint Black Crackle (Crystalline Black), 3/- tin.

Tuning indicator Escutcheon, suitable for EM80 type of valves, 2/- each.

**TELEVISION TUBES REGUNNED, 12 MONTHS' GUARANTEE**

MW31/74 ..... £5.10.0  
 CRM152B ..... £6.0.0  
 MW36/24 ..... £5.10.0  
 CRM141 ..... £5.10.0  
 CRM123 ..... £5.10.0  
 MW43/69 ..... £6.0.0  
 CRM171 ..... £6.0.0

Carriage and insurance 10/- extra. Allowance on old tube if returned.

**METAL RECTIFIERS**

Alpha range of Guaranteed Bridge Rectifiers, suitable for Battery Chargers 6 and 8 volt output:

2 amp ..... 7/-  
 3 amp ..... 10/-  
 4 amp ..... 12/6  
 5 amp ..... 14/6

**CATALOGUE**

Our 1961 catalogue is now available. Please send 1/- in stamps for your copy. Trade catalogue also available. Please attach your business letter heading.

**Elstone Multi-Ratio Output Transformer, 10 watts, 23/-.**

Vesringhouse LW9 Rectifier, 250v, 250mA, 19/6.

WB Stentorian HF 1012, 10 watts, 95/- ea.

BSR Monarch UA8, Record Changer, £6.19.6.

Scott Recording Tape 150/18, 7" spool, 50/-.

Wireless World Radio Valve Data Book, 5/-.

Taylor Model 127A Multi-Meter, £10.0.0.

High Resistance Headphones, 4000 ohms, 13/6.

Repanco FS3 Ferrite Slab Aerial, 7/6.

Multicore Savbit Solder, 5/-.

Henley Solon Instrument Iron, Model 625, 24/-.

J.B. "O" Gang Condenser, 365pF, 1 gang, 7/6.

Belling Lee Diplexer, L1338, 11/-.

Output Transformer, 5000 3 ohms, 60mA, 5/9.

10" Elac loudspeakers, 25/-.

Collaro Conquest, with Studio Pick-up, £6.19.6.

Acos Crystal Stick Mic. 39/1, £1.19.6.

Deccamacic Amplifier with speaker, 85/-.

J.B. SLB Spin Wheel Drive Assembly, 27/6.

J.B. Solid Dielectric Conds., 0.005, 4/6 ea.

Ion Traps, Type IT6, IT9, BC11, 5/6 each.

TCC Visconal Cond. 0.001 20kV, 10/-.

Potentiometer SP5 for English Electric T40, etc. 13/6.

Erie 6 and 10 watt Wirewound Resistors, 2/- ea.

Semi-airspaced Co-axial Cable, 6d. yd.

Signal Lamp Fittings, Red, Green & Amber, 2/3 each.

3-way line cord. 0.2A, 100 ohms per ft., 1/9 yd.

Dropper Resistors for Ultra Twin 50, 53 ea.

TV Electrolytic 100-200 mfd, 275v, 7/6 each.

Car Radio Aerial (telescopic), 39/6 each.

Igranic type P50 Jack Plugs, 2/9 each.

Osmor Ferrite Rod, L & M wave, 12/9 each.

Repanco TT9 Interstage Transformer, 12/6.

Miniature I.F. Transformers, 465Kc/s, 9/- p.

Low Resistance Headphones, 120 ohms, 7 6 p.

Plastic Speaker Cabinets for 5" unit, white, 15/-.

Rectifier RM4, 250v, 275mA, 18/6.

Microphone Transformer 100-1 ratio, 12/-.

Elac 8" x 5" Loudspeaker, 25/6.

Garrard TA Mk.11, Single Player, £8.10.0.

TSL Crystal "Stick" Microphone MX3, 45/-.

Gelose 9010 Telephone Adaptor, 45/-.

Repanco Mini 3, 3 Transistor Kit, £7.10.0.

Pifco All-in-one Radio Meter, 32/6.

Repanco TT 10 Push-pull Output Trans., 12/6.

Linecord 3 way, 0.3A, 600 ohm per ft., 1/9 yd.

4" Square Tweeters, Elac or Plessey, 12/6.

100 Assorted Resistances 1/4 watt, 12/6 per 100.

Crystal Cartridge BSR Type TC8, 15/6 ea.

Diodes—OA81, GEX 34, OA70, etc., 4/- ea.

7" Plastic Tape Spool Emitape, 3/- each.

Charger Transformers 2v, 6v and 12v, 4A, 21/9.

Rectifiers, RM1, 5/9; RM3, 7/3; MI, 2/8.

12" Heavy Duty, 15 watt Speaker, 105/-.



103 LEEDS TERRACE  
 WINTOWN STREET  
 LEEDS 7

**TERMS:** Cash with order or C.O.D. Postage and Packing charges extra; as follows: Orders value 10/- add 1/-; 20/- add 1/6; 40/- add 2/-; £5 add 3/- unless otherwise stated. Minimum C.O.D. free and postage 3/-.

For full terms of business see inside cover of our catalogue. Personal Shoppers 9 a.m. to 5 p.m. Mon. to Friday; Saturday 10 a.m. to 1 p.m.

# TRANSISTOR TRANSFORMERS

## BASIC DESIGN CONSIDERATIONS

By H. B. Dempsey

**T**RANSFORMER coupled transistor amplifiers are usually dismissed on account of the bulk and cost of the transformer. The transformers illustrated show that these need not be bulky, the smallest has a core size of  $\frac{1}{8}$  in. x  $\frac{1}{8}$  in. x  $\frac{1}{8}$  in., while the others are  $\frac{1}{4}$  in. x  $\frac{1}{2}$  in. x  $\frac{1}{8}$  in.

### The Cost of Transformer

The cost of the transformer depends upon the cost of the core. For an output stage where a high impedance load is not required, the primary inductance can be low and expensive high mu-metals need not be used.

Experiments with normal size silicon iron cored transformers will often prove disappointing. This is due to the fact that the few milliwatts output are dissipated in magnetizing the core, the iron losses are of the same order as the transistor power. By using small laminations the core volume, and hence the iron losses, may be reduced. One source of such small laminations is to be found in high to low impedance headset adaptors.

For experimental work it is desirable to have a range of transformer ratios available and suggested ratios are:

Primary 20 tapped at 15.		
Secondary 5 tapped at 3.		
giving useful ratios of 10 : 1	5 : 1	
7.5 : 1	4 : 1	
6.6 : 1	3 : 1	

### Transformer Windings

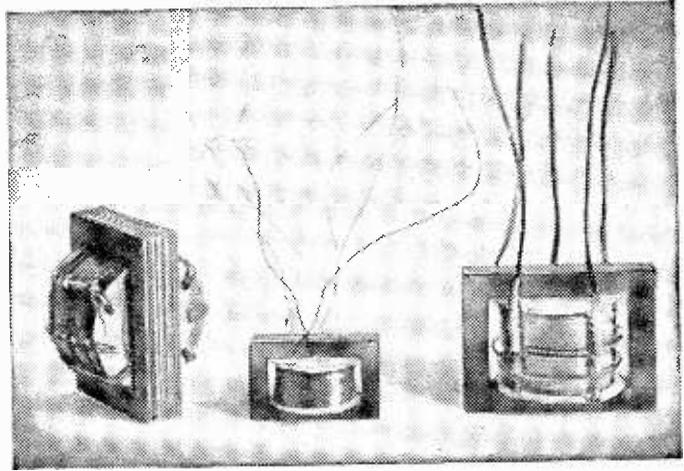
In the case of the larger transformers illustrated, a primary winding of 2000 turns tapped at 1500 with a 500 turn secondary is easily accommodated in the available winding space using 40 gauge wire. The smaller transformer has a 1250 turns primary and a 250 turns secondary, both wound with 46 gauge wire. 46s.w.g. enamelled copper wire proved to be the smallest size amenable to the method of winding used.

The bobbins were assembled on a mandrel of the same cross-section as the finished core, say  $\frac{1}{16}$  in. square and 1 in. long.

### Making the Bobbin

The stem of the bobbin was made by wrapping thin paper (0.002 in.) two or three times round the mandrel and applying an adhesive between each layer.

The cheeks were punched out of card (0.01 in. thick—cigarette packet) and the hole for the core chiselled out with a sharpened screwdriver blade,  $\frac{1}{16}$  in. wide, to give a push fit on the stem. The cheeks were fitted to the stem, spaced to the core length and stuck with an adhesive and the surplus stem length trimmed off with a razor blade. The finished bobbin was made a sliding fit on the mandrel.



Winding was speeded by mounting the mandrel in the chuck of a wheelbrace held horizontally in a vice, and having checked the gear ratio, a check was kept of the number of turns of the driving wheel.

At the appropriate points taps were made by looping the wire and pulling it through slits in the cheeks. Care must be taken to keep the flying leads so formed clear of the subsequent position of the core. The ends of the wires were strengthened by doubling a couple of times and twisting for an inch or so to provide a stouter connection.

The primary was wound first, random fashion, followed by the secondary. As the voltages encountered are low there is no advantage in insulating the two layers with paper.

### Driver and Output Transformers

Push-pull driver and output transformers have been wound bifilar fashion by the above method, winding the centre tapped secondary or primary from separate spools of the same wire, and laying them side by side. The start and finish of the windings in this case was carefully noted as the centre tap is formed by connecting the start of one to the end of the other.

The laminations were interleaved in the core. At the low direct current levels there is nothing gained by gapping it.

Radio-metal and mu-metal laminations are expensive. 50 pairs of E's and I's for the smaller transformer in radio metal cost 25s., providing enough for four transformers. A cheaper core could be made by using strip metal, about 18 in. long by  $\frac{1}{16}$  in. wide, by 0.01 in. thick, and winding it into the core space copying C-core practice, without the joint. The transformers described are in use as interstage coupling and output transformer to a 3 in. moving-coil loudspeaker in a three transistor T.R.F. reflex-receiver. Correct matching by means of transformers effectively doubles the stage gain compared with R-C coupling. In the case mentioned, the frequency range is adequate for the speaker in use, and the set gives a fair volume for a battery drain of 5mA at 4½V.

# 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 cover.

## CRYSTAL SET RECEPTION

**SIR,**—With reference to D. J. Connolly's letter (*PRACTICAL WIRELESS*, October issue), I should like to say that, although not a common occurrence, to pick up Moscow and Prague on a crystal set is not too out of the ordinary, provided, of course, that conditions are favourable.

I have heard Radio Moscow several times in the last year, chiefly, however, either early in the morning, when the local station has not commenced its broadcasting, or between eight and ten in the evening, when it would naturally be easier to receive stations at that distance.

However, with respect to Mr. Connolly's situation in Britain, it would appear from a map that I, in London, am better placed than he is for reception of Prague Radió, but I have never heard it, although we are about equidistant from Moscow. The latter station seems to be somewhere between 210 and 225m.—A. LEA (London, W.C.2).

**SIR,**—With reference to Mr. Connolly's letter in the October issue, it is not unusual for long range reception on a crystal set.

He does not say, however, whether he was using a medium or short-wave coil, a crystal proper, or a crystal diode.

Beginners may not be aware that they can get good results with a short wave coil and crystal diode and interesting experiments may be easily made.

I have often experimented with crystal circuits and have received at good strength Finland, Sweden, France, Germany, Belgium, Prague Radio and, of course, Moscow, which, unfortunately, is sometimes difficult not to receive such is the power (distorted) of the signal!—A. RADMORE (Wakefield, Yorkshire).

## A.C. OR A.C./D.C.

**SIR,**—In answer to F. R. Aldis's (September issue) attack on A.C./D.C. equipment, I would like to point out that although there are four areas in the UK with D.C. mains supply there are very few ships with A.C. mains. Many people join ships and have their own tape recorders, record players and receivers. Though some of the receivers are A.C./D.C. and can be used with the 220V D.C. supply, the other equipment cannot. The only solution is a rotary valve or vibrator converter which is very expensive and I have repaired too many for my liking.

There is only one ship's broadcast A.C./D.C. receiver with a good S.W. coverage and the only record player out in any number that is A.C./D.C. costs £12 more than the same model with A.C. only. Why this big difference for three valves and a couple of dozen components.

My opinion is that there is insufficient A.C./D.C. equipment, especially tape recorders (gramophones cannot be played in a rolling ship). There is not a single A.C./D.C. tape recorder reasonably priced.

The only danger with A.C./D.C. equipment is when people play with the "innards" when the set is switched on!—H. JORDAN (Bluff, New Zealand).

## MODULATION

**SIR,**—On studying the circuits of various transmitters, I find anode and screen modulation is most popular. This method of modulation requires a reasonably high power of audio. To avoid using up extra space, more money, power, etc., surely it is possible to modulate the R.F. from the V.F.O. or crystal at a low power stage and then feed this modulated C.W. to the succeeding stages? This system would appear to be much simpler than an entire A.F. amplifier and would generally be a highly efficient way of effecting modulation. It is not, as far as I can see, ever used, so would someone be good enough to point out the snag, which unfortunately I am unable to see?

Returning to anode and screen grid modulation, could anybody give me a rough idea of the audio power required to modulate to 100 per cent, 150W of R.F., also the maximum power obtainable from a pair of 807's in any push-pull, and the values of the three gangs of the tuning condenser of an ex-Government 38 Mk.II Walkie-Talkie?—J. R. MILLER (Crewkerne School, Crewkerne, Somerset).

## ONE VALVER

**SIR,**—Looking through the November edition of *PRACTICAL WIRELESS* I noticed Mr. K. Hamley's letter about the oddity of his valves running on 2V H.T. and 2V L.T. I also have had the same odd experience.

My radio, too, is a one valver, using 22.5V H.T. and 1½V L.T., with earphones, bringing in M.W. and L.W. stations very clear and loud. I was listening to the radio when I thought I would check the batteries, although the set was pulling in the stations at full power. When I tested the H.T. battery the voltmeter showed 2V. I was shocked when I found I was running the radio off 2V H.T. and 1½V L.T.—D. ILLINGWORTH (Leeds).

## TRANSISTORS v. VALVES

**SIR,**—I have been following, with great interest, your many letters on Transistors v. Valves. My own opinion is that for performance the valve is far ahead.

C.R.T. ISOLATION TRANSFORMERS

TYPE A: OPTIONAL 25% and 50% BOOST. 2 V. OR 4 V. OR 6.3 V. OR 10.5 V. OR 18.3 V. MAINS INPUT. 12/6

TYPE A2 HIGH QUALITY LOW CAPACITY 10/15 pF. OPTIONAL BOOST 25%. 50%. 75% MAINS INPUT. 16/8

TYPE B MAINS INPUT. MULTI OUTPUT 2, 4, 6.3, 7.5, 10 and 13 VOLTS. BOOST 25% AND 50%. LOW CAPACITY. 21/-

TRIMMERS. Ceramic. 30, 50, 70 pF. 9d.; 100 pF. 150 pF. 1/3; 250 pF. 1/8; 500 pF. 750 pF. 1/8.

RESISTORS. Preferred values. 10 ohms to 10 meg., 1 w. 4d., 1 w. 4d., 1 w. 4d., 1 w. 4d.; 2 w. 1/2. HIGH STABILITY. 4 w. 1%. 2/- Preferred values. 10 ohm to 10 meg. Ditto, 5%, 100 ohm to 5 meg., 9d.

5 watt } WIRE-WOUND RESISTORS { 1/3
10 watt } 25 ohms-10,000 ohms { 1/6
15 watt } { 2/-

12.5K to 50K 10 w. 3/3

AMERICAN "BRAND FIVE" PLASTIC RECORDING TAPE

Table with columns for tape type (Long Play, Standard), reel size, and price. Includes 'Instant' Bulk Tape Eraser and Head Defluxer.

O.P. TRANSFORMERS. Heavy Duty 50 mA, 4/6 Miniature, 384, etc., 4/8. Multitrate push-pull, 7/6. Push-Pull 10 w. 15/6. 20 w. 6K or 8K, 30/-.

L.F. CHOKES 15/10 H. 60/65 mA, 5/-; 10 H. 85 mA, 10/6; 10 H. 120 mA, 12/6; 10 H. 150 mA, 14/-.

Table of MAINS TRANSFORMERS with columns for model (STANDARD, MINIATURE, MIDGET, SMALL), power, and price.

ALADDIN FORMERS and core, 1in. 8d., 1in., 10d. 0.3in. FORMERS 5937/8 and Cans TV12, 1in. sq. x 2 1/2in. and 1in. sq. x 1 1/2in. 2/- ea., with cores.

SOLOIN Midget Iron 200/10v. or 220/40v. 25w. 24/-.

REMPLOY Instrument Iron. 220/40 v. 25 w. 17/6. MAINS DROPPER 3in. 1 1/2in. Adj. Sliders. 0.3 amp, 1000 ohms, 4/3. 0.2 amp, 1000 ohms, 4/3.

LINE CORD. 0.3 amp., 60 ohms per ft. 0.2 amp., 100 ohms per ft. 2-way, 6d. per ft. 3-way, 7/6. 17/6.

LOUDSPEAKER P.M. 3 OHM. 5in. Rols. 17/6. 8in. Pleasy, 15/6. 12in. Rols. 18/-; 9in. Rols. 18/8. 8 x 2in., 21/-; 10 x 2in., 27/6. 10 in. Rols. 30/-.

HEATER TRANS. 2.5 v. 4 1/2 amp. 7/6. Ditto, tapped sec. 2, 4, 6.3 v. 1 1/4 amp. 8/-.

Ditto, sec. 6.3 v. 3 amp. 10/6

CRYSTAL DIODE. G.E.C. 2/-; GEX34, 4/-.

HIGH RESISTANCE PHONES. 4,000 ohms, 15/- pr. MIKE TRANS. 50-1. 3/9 ea.; 100:1. Potted, 10/6.

SWITCH CLEANER. Fluid squirt about. 4/3 tin. TWIN BANG TUNING CONDENSERS. 15 pF. Miniature. 1in. x 1 1/2in. x 1 1/2in. 10/-; 0.0005 standard with trimmers, 9/-; less trimmers, 8/-; midget, 7/6.

SINGLE. 50 pF. 2/8; 100 pF. 100 pF. 50 pF. 5/6. Solid dielectric 100, 300, 500 pF. 3/6.

SPEAKER FRET GOLD CLOTH. 17in. x 2 1/2in., 5/-; 25in. x 4 1/2in., 10/-; Pyram 4 1/2in. wide, 10/-; 2 1/2in. wide 5/- tin. Brown or Red or Green.

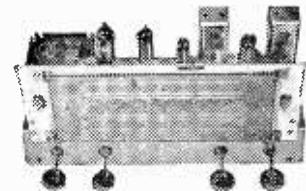
New and Boxed VALVES 90-day Guarantee. 1R5, 7/6; 6X6, 10/6; 6BE6, 10/6; 6BE7, 10/6; 6BE8, 10/6; 6BE9, 10/6; 6BE10, 10/6; 6BE11, 10/6; 6BE12, 10/6; 6BE13, 10/6; 6BE14, 10/6; 6BE15, 10/6; 6BE16, 10/6; 6BE17, 10/6; 6BE18, 10/6; 6BE19, 10/6; 6BE20, 10/6; 6BE21, 10/6; 6BE22, 10/6; 6BE23, 10/6; 6BE24, 10/6; 6BE25, 10/6; 6BE26, 10/6; 6BE27, 10/6; 6BE28, 10/6; 6BE29, 10/6; 6BE30, 10/6; 6BE31, 10/6; 6BE32, 10/6; 6BE33, 10/6; 6BE34, 10/6; 6BE35, 10/6; 6BE36, 10/6; 6BE37, 10/6; 6BE38, 10/6; 6BE39, 10/6; 6BE40, 10/6; 6BE41, 10/6; 6BE42, 10/6; 6BE43, 10/6; 6BE44, 10/6; 6BE45, 10/6; 6BE46, 10/6; 6BE47, 10/6; 6BE48, 10/6; 6BE49, 10/6; 6BE50, 10/6; 6BE51, 10/6; 6BE52, 10/6; 6BE53, 10/6; 6BE54, 10/6; 6BE55, 10/6; 6BE56, 10/6; 6BE57, 10/6; 6BE58, 10/6; 6BE59, 10/6; 6BE60, 10/6; 6BE61, 10/6; 6BE62, 10/6; 6BE63, 10/6; 6BE64, 10/6; 6BE65, 10/6; 6BE66, 10/6; 6BE67, 10/6; 6BE68, 10/6; 6BE69, 10/6; 6BE70, 10/6; 6BE71, 10/6; 6BE72, 10/6; 6BE73, 10/6; 6BE74, 10/6; 6BE75, 10/6; 6BE76, 10/6; 6BE77, 10/6; 6BE78, 10/6; 6BE79, 10/6; 6BE80, 10/6; 6BE81, 10/6; 6BE82, 10/6; 6BE83, 10/6; 6BE84, 10/6; 6BE85, 10/6; 6BE86, 10/6; 6BE87, 10/6; 6BE88, 10/6; 6BE89, 10/6; 6BE90, 10/6; 6BE91, 10/6; 6BE92, 10/6; 6BE93, 10/6; 6BE94, 10/6; 6BE95, 10/6; 6BE96, 10/6; 6BE97, 10/6; 6BE98, 10/6; 6BE99, 10/6; 6BE00, 10/6.

"REGENT" 4 VALVE



PRINTED CIRCUIT BATTERY PORTABLE KIT

Medium and long wave. Powerful output. 6in. high Flux Speaker. T.C.C. Printed Circuit and condensers. Components of finest quality clearly identified with assembly instructions. Osmofied with Ferrite Aerial and Coils. Rexine covered attache case cabinet. Size 12in. x 8in. x 4in. Batteries used B126 (L5512) and AD35 (L5040), 10/- extra. Instructions 9/- (free with kit). Mains Unit ready made for above 39/6. Sold separately.



1960 RADIOGRAM CHASSIS

THREE WAVEBANDS FIVE VALVES S.W. 16 in.—60 m. LATEST MULLARD M.W. 200 m.—350 m. ECH51, EF90, EB08, EL.W. 50 u.—2,000 m. EL84, E280. 12-month guarantee.

A.C. 200/250 v. 4-way Switch: Short-Medium-Long-Gram. A.V.C. and Negative feedback 5 watts. Chassis 1 1/2 x 5 1/2 x 4 1/2in. Glass dial, horizontal or vertical wiring, size 10in. x 4 1/2in. Aligned and calibrated. Isolated Chassis.

£9.10.0 Carr. & Ins. 4/6. MATCHED SPEAKERS FOR ABOVE CHASSIS. 8in., 17/6; 10in., 25/-; 12in., 30/-.

RECORD PLAYER BARGAINS



Table listing record player models and prices: 4 Speed Autochangers, B.S.R., U.A.S. £6.15.0; 4 Speed Autochangers, U.A.S. Stereo, £7.10.0; Collins Autograph, £7.19.6; Garrard Model 210, £10.10.0; 4 speed Single Players, KMI, £8.19.6; Garrard 1 A Mk. II, £8. 8. 0; Garrard 4 HF Transcriptions, £17.16.6

Volume Controls 80 ohm CABLE COAX

Long spindles. Guaranteed. Midget. 6K ohms to 2 Meg. No. Sw. D.P.S.W. 3/- 4/6 Linear or Log Tracks. LEAD SOCKET. 2/- PANEL SOCKETS 1/- OUTLET BOXES. 4/6 BALANCED TWIN FEEDER. 9d. 80 or 300 ohms. DITTO SCREENED per yd. 1/8. 80 ohms pre-set. WIRE-WOUND 25% 3 WATT. Pre-set Min. TV Type. All values 25 ohms to 25 K., 3/- ea. 30 K., 50 K., 4/- (Carbon 30 K., to 2 meg., 8/-). WIRE-WOUND 4 WATT Pots. Long Spindles. Values, 100 ohms to 50 K., 6/6; 100 K., 7/6.

ALUMINIUM CHASSIS. 18 s.w.g. undrilled. With 4 sides, fretted corners and lattice fixing holes, 2 1/2in. sides, 7 x 4in., 4/6; 9 x 7in., 5/9; 11 x 7in., 6/8; 13 x 9in., 5/8; 14 x 11in., 10/8; 15 x 14in., 12/6; 18 x 16 x 3in., 16/6.

HI-GAIN BAND. L.T.A. PRE-AMP KIT. Cascade circuit with valve EC64, Price 28/6. With Power Pack 49/6. Plans only. Band I BBC version, same prices.

CONDENSERS. New Stock. 0.001 mrd. 7 kv. T.C.C., 5/6, Ditto, 20 kv., 9/6, 0.1 mfd. 7 kv., 9/6. Tubular 500 v. 0.001 to 0.05 mfd. Bd., 0.1, 1/-; 0.25, 1/6; 0.5/350 v., 1/8; 0.1/50 v., 1/1000 v., 1/8; 0.01/2,000 v., 1/8; 0.1 mfd., 2,000 volts, 3/6. CERAMIC COND. 500 v., 0.3 pF. to 0.01 mfd., 9d. SILVER MICA CONDENSERS. 10% 5 pF to 500 pF, 1/-; 600 pF to 3,000 pF, 1/8. Close tolerance (+1 pF) 1.5 pF to 47 pF, 1/8. Ditto 1.5 pF 50 pF to 81 pF, 1/8; 1,000 pF to 5,000 pF, 2/-.

I.F. TRANSFORMERS 7 1/2 pair 485 Kcs Slus Tuning Miniature Can. 1 1/2in. x 1 1/2in. High Q and good bandwidth. By Pye Radio. Data sheet supplied. Weymouth Std. I.F. 485 Kcs. 12/6 per pair.

NEW ELECTROLYTICS. FAMOUS MAKES

Table of electrolytic capacitors: TUBULAR, CAN TYPES, values, and prices.

SELENIUM RECTIFIER. 300 v. 85 mA., 7/6. CONTACT COOLED. 250 v. 50 mA., 7/6; 60 mA, 8/6; 85 mA, 9/6; 300 mA, 21/-; 300 mA, 27/6. COILS Weaire, 'O' type 2/- each. Osmor Midget 'O' type adj. dust core from 4/-. All ranges. TELETRON. L. & M. T.R.F., with reaction, 3/6. FERRITE ROD AERIALS. M.W., 8/9; M. & L. 12/8. T.R.F. COILS. A/HF. 7/- pair. H.F. CHOKES. 2/6. FERRITE ROD. 5in. x 1/2in. dia., 2/6.

JASON F.M. TUNER COIL SET. 28/- H.F. coil, aerial coil. Oscillator coil, two I.F. trans. 10.7 Mc/s. Ratio Detector and heater choke. Circuit book usnr. 60 6AM6, 2/6. COMPLETE JASON F.M. KIT FMT1, with set of 4 Valves, £65.0. Details S.A.E.

FULL WAVE BRIDGE SELENIUM RECTIFIERS: 2 v. 12 v. 1 1/2 amp., 8/8; 2 v. 11/3; 4 v. 17/6. CHARGER TRANSFORMERS. Tapped input 200/250 v. no charging at 2.6 or 12 v., 1 1/2 amps., 15/6; 2 amps., 17/6; 4 amps., 22/6. Circuit included. VALVE and TV TUBE equivalent books, 9/6. TOGGLE SWITCHES. S.P. 2/-, D.P. 3/6. D.P.D.T. 4/- VALVE SWITCHES. 2 v. 2 water long spindle, 6/-; 2 p. 2-way, or 3 p. 2-way short spindle, 2/6; 2 p. 3-way, 4 p. 2-way, 4 p. 3-way long spindle, 3/8; 3 p. 4-way, or p. 12-way long spindle, 5/8; 6/6. VALVE HOLDERS. Fax. Int. Oct., 4d. EF50, EA50, 8d. B12A, CRT. J.A.S. Eng. Ltd. Inter. 4, 5, 6, and 7 pin. 1/-. MOULDED MAZDA and Int. Oct., 6d. B7G B8A, B9C, B9A, 9d. B7G with can., 1/6. B9A with can., 1/9. CERAMIC EF50, B7G, B9A Int. Oct., 1/-. 8in. x 5in. B7G, B9A, 1/5.

TELEVISION REPLACEMENT Line Output Transformers, 70/- each from stock. Most makes available and other Time Base components, S.A.E. with an enquiry.

OUR ONLY ADDRESS 337 WHITEHORSE RD., WEST CROYDON THO 1665. Buses 133 or 68

RADIO COMPONENT SPECIALISTS

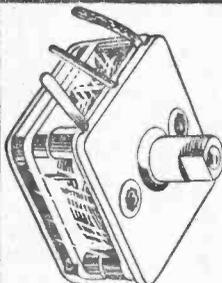
Postal service 1/-, over £2 free. (Export Extra) C.O.D. 1/6. (Wed. 1 p.m.)

# MICRO-MINIATURISATION

## FOR BUILDING THE SMALLEST TRANSISTOR SUPERHET EVER

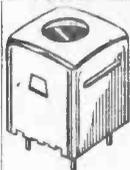
With these components you can build an unbelievably small six transistor superhet capable of receiving anything from 50 to 100 programmes under favourable conditions. Transistor arrangement — Converter, 2 I.F., Diode, Audio Driver and two in P.P. to give up to 300 mW. Aerial coil and Ferrite Rod Aerial available very shortly.

- FULL CIRCUIT DIAGRAMS AND CONSTRUCTIONAL DETAILS FREE.
- ILLUSTRATIONS SHOW ACTUAL SIZE OF COMPONENTS.
- TRADE ENQUIRIES INVITED.



### 2 GANGED TUNING CONDENSER

With built-in trimmers. Enclosed in polystyrene casing. Size 1" sq. x  $\frac{7}{16}$ " dp. **17/6**



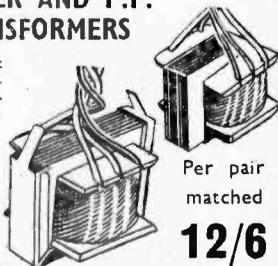
### I.F. TRANSFORMERS AND OSCILLATOR COIL

Set of 3 I.F.s and coil. Can size  $\frac{1}{2}$ " high x  $\frac{3}{8}$ " sq. Individually checked before leaving factory. Very high Q, better than 125. Complete set... **21/-**

### MATCHED DRIVER AND P.P. OUTPUT TRANSFORMERS

Driver—size  $\frac{7}{8}$ " x  $\frac{7}{8}$ " x  $\frac{1}{2}$ " in.  
Output—size  $\frac{1}{2}$ " x  $\frac{1}{2}$ " x  $\frac{1}{2}$ " in.  
300in. mW. Coloured leads.

**HIGH GAUSS MINIATURE LOUDSPEAKER**  
1 $\frac{1}{2}$ " in. diam. x  $\frac{1}{2}$ " in. deep  
M.C. speaker. 9,500 Gauss ensures remarkably good quality. **25/-**



Per pair matched **12/6**

FROM STOCKISTS EVERYWHERE!

# TSL

Details on application to:

**TECHNICAL SUPPLIERS LTD. HUDSON HOUSE, 63 Goldhawk Rd., London W12**  
Telephone: SHEpherds Bush 2581 and 4794



Solve that Circuit trouble!

**PIFCO**  
*Radiometer*

Not only circuit tests but everything electrical can be tested with this handy compact meter. Tests H.T. & L.T. Valves, components, electrical appliances and car lighting systems, etc. May be used on A.C. & D.C. mains.

See the Radiometer at your dealer or write for illustrated leaflet to:—

**PIFCO LTD.**  
WATLING STREET · MANCHESTER · 4

only **32/6**  
complete

### SOUTHERN RADIO'S WIRELESS BARGAINS

**ATTACHMENTS** for "18" Transreceivers. ALL BRAND NEW HEADPHONES. 15/6; HAND MICROPHONE, 12/6; AERIALS, 5/-; SET OF 6 VALVES 30/-.

**CONDENSERS.** 100 Assorted. Mica Tubular, etc., NEW, 15/-; **CONTACTOR TIME SWITCHES.** 2 impulses per sec., in case 11/6

**REMOTE CONTACTOR.** For use with above 7/6  
**LUFBRA HOLE CUTTERS.** Adjustable  $\frac{1}{4}$ " to  $\frac{3}{4}$ ". For Metal, Plastic, etc. 7/-

**MAGNETS.** Strong Bar Type. 2" x  $\frac{1}{4}$ " 1/6 each.  
**MORSE TAPPERS.** Midget Type, 2/9. Standard, 3/6. Heavy Type on Base, 5/6. ALL BRAND NEW.

**PACKARD-BELL AMPLIFIERS.** Complete BRAND NEW with Valves Relay etc., etc., 17/6 each.

**QUARTZ CRYSTALS.** Types F.T.241 and F.T.243, 2-pin,  $\frac{1}{2}$  Spacing. Frequencies between 5,675 Kc/s. and 8,650 Kc/s. (F.T.243) 20 Mc/s. and 38.8 Mc/s. (F.T.241), 54th Harmonic, 4/- each. ALL BRAND NEW TWELVE ASSORTED CRYSTALS, 45/-.

**HOLDERS** for both types, 1/- each. Customers ordering 12 crystals can be supplied with lists of frequencies available for their choice.

**QUARTZ CRYSTAL CASES** (F.T. 241/243)...10/6 per dozen, **RECORDING BLANKS.** New "Emidisc", ready for use. 13" 6/- each. Or 15 complete in metal case £4.

**RESISTANCES.** 100 Assorted useful values. New wire end, 12/6  
**SPECIAL OFFER. 12 ASSORTED METERS.** Slightly damaged, Mainly broken cases (perfect movements). Including 3 Brand New Aircraft instruments, 12 for 45/-.

**STAR IDENTIFIERS.** Type I-A-N Covers both Hemispheres, 5/6  
**TRANSPARENT MAP CASES.** Plastic. 14" x 10 $\frac{1}{2}$ ". Ideal for Maps, Display, etc. 5/6

**TRANSRECEIVERS.** Type "38", complete with 5 valves, etc. New condition, untested by us, but serviceable, no guarantee, 22/6 each.

**ATTACHMENTS** for Type "38" Transreceivers. ALL BRAND NEW. PHONES, 15/6; THROAT MICROPHONES, 4/6; JUNCTION BOXES, 2/6; AERIALS, No. 1, 2/6; No. 2, 5/-; WEBBING, 4/-; HAVERSACKS, 5/-; VALVES, A.R.P.12, 4/6; A.T.P.4, 3/6. Set of FIVE VALVES, 19/- the set.

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

Transistors are small, compact, and light in weight, and are obviously highly suitable for use in portable receivers, where small size is important, but the quality of the sound obtained from them is by no means as good as that obtained from their valve counterparts.

Another strong point in favour of the valve is that it is now being considerably reduced in size and weight. Many receivers using modern "button base" valves are as small as the more familiar transistor portable and certainly give more pleasing results.

I have heard the performance of many midge transistor receivers and I must say that I am rather disappointed, to say the least.—A. H. CARTER (Manchester).

### CORRESPONDENTS WANTED

**SIR**,—I am 16 years old and am very interested in radio in all its aspects, especially short wave. I would like to correspond with someone of my age.

Has anyone a design for a small transceiver for 6 to 8 miles.—F. LUGINBUHL (12 rue des Rossignols Sèvres, Seine-et-Oise, France).

**SIR**,—I am a regular reader of your PRACTICAL WIRELESS, and interested in radio technology. I have recently started a course of radio engineering and I would like to correspond with any beginner of experienced radio technician from anywhere and of any age.—U. DIN (c/o Shell Co. of E.A.L., P.O. Box 82, Kampala, Uganda, B.E. Africa).

### COMPONENT

**SIR**,—Referring to Mr. Bullen's letter in the October issue, I also had difficulty in obtaining a switch of the type I required but overcame it in the following manner. I purchased a "surplus" rotary switch with five wafers and carefully stripped this down. The inner rotating disc will be found in most cases to have a metal section on each side, and this can be removed by twisting the small locating lugs. It may then be cut if required, whilst the small clips situated round the edge of the outer discs are simply eyeleted in position. These also may be carefully removed by opening the eyelets with a penknife and carefully pushing them out. They can be reassembled in any desired pattern, the slips being tapped lightly with a hammer to close the eyelets and any desired pattern assembled. It is best to buy those switches which have the maximum number of clips round the edge to cover wastage due to damage, etc.—G. HENDRY (Wembley).

### LOUDSPEAKER DESIGN

**SIR**,—Mr. Pickering's remarks in the August issue are noted, and I must confess I had many thoughts on similar lines. Some time ago I bought a damaged speaker cheaply and used it as a source of experiment, my interest lying in better reproduction than one usually associates with the ordinary speaker. I did find that the material from which the cone is made played an important part, but was not the be-all and end-all of the problem. The method of attaching the cone to the speaker (usually a spider of paper) seemed to me to play a much greater part, whilst a free-edge cone was not so good—at least in my experiments. Could not some speaker manu-

facturer produce some data showing facts which have been collated during experiments to enable those of us who are interested to carry out our own lines of experiment.—A. BENTLEY (Bath).

### SIMPLE A.M./F.M.

**SIR**,—My main listening interest is in Luxemburg and I have a set which is used only for this. I recently heard an F.M. set and was impressed by the quality, but on looking into the matter find that the set is a bit complicated. I have been trying to adapt the medium-wave A.M. set to pick up the F.M. signals, but am faced with considerable difficulty.

Has any reader found a simple method of combining these two arrangements so that one set will tune to either the F.M. or the medium waves without complicated switching and circuit changes? I am sure other readers would be glad of details of a set on these lines.—G. PORTER (Melton Mowbray).

### MAINS DUAL-WAVE 2

**SIR**,—I have often found that simple methods generally function best, and this was recently borne out by the small mains two valve set in the October issue. I have a 4-valver which I thought was quite good and I used it in my den for general searching, etc. When I read the dual-wave set I thought it looked easy so I dug out the necessary parts from the spares box and quickly "lashed it together". Although it did not occupy much over an hour before I had it working, it seems to perform better than my 4-valver. Reaction is admittedly a little bit fussy, but no doubt use will overcome this, but it is remarkably sensitive and it is indeed hard to choose between the two sets. When the reaction is properly adjusted it is just as selective. Thanks for a really nice little job.—R. E. TURNBULL (Harrogate).

### TRANSISTOR HINTS

**SIR**,—I have a few transistors, which I use for small experimental sets, and units. After use in two or three different situations I found to my disappointment that the leads broke off at the base. I therefore thought of the following idea, which I would like to pass on to other enthusiasts who have had the same trouble themselves.

I slid wire insulation over the outer two leads. Then I made three pin holes in a piece of thick insulation and pushed the leads through, so that they projected about  $\frac{1}{4}$  in. To these I soldered three flying leads. The longer these leads are, the safer it is to solder, because the heat has further to travel to the transistor. — G. L. PATTERSON (Brighton).

### PUSH-PULL AMPLIFIER

**SIR**,—Recently, I made a push-pull hi-fi amplifier whose output valves had a common cathode resistor. However, I was told that greater output could be achieved with separate cathode resistors on the valves (EL84's).

The present cathode resistor (common) is 100Ω and by-pass a condenser of 50μF.

Could any of your readers give me the value of the separate cathode resistors that I require? I shall indeed be grateful.—J. HASKELL (Fort Bombay, India).

### RADIO MOSCOW

SIR,—I read with interest the letter of R. W. L. Limebear (December issue) with reference to Radio Moscow on 217m.

I agree that the signal strength is very good and this is because the transmitting station is located at Kaunas, Lithuania, in the U.S.S.R. The output is 150kW.

Incidentally, the other medium-wave station of Radio Moscow currently in use in their Winter Schedule, 227m, is located at Leipzig, East Germany.

I believe the Kaunas transmitter broadcasts a home service programme during the day time.

The short-wave stations of Radio Moscow broadcast direct from Moscow.

As regard Radio Luxembourg, the programmes are broadcast direct from Luxembourg and the excellent quality is due mainly to the output of the transmitter, 350kW.—P. J. KENNETT (Harrow, Middx.).

SIR,—May I inform reader Limebear (December, 1960) that Radio Moscow broadcasts are direct and not relayed. Moscow transmitters are the most powerful in the world and programmes can be heard at strength throughout the whole day. Voice of America, however, does employ trailers to relay her broadcasts and regularly announces their location and call sign. Radio Peking likewise can often be picked up on a small crystal set. Radio Luxembourg and Radio Eirean are examples of popular stations employing hardly enough power to bridge the ether. Interested listeners should not hesitate to write to radio stations sending reports of programmes heard and their views. The result is that a wonderful new field is opened with opportunities of stamp exchange and regular mailings of literature and friendly letters in English. Every letter received from Prague, Czechoslovakia, contains a free lottery ticket and amusing literature and aerial data can be had from Eddy Startz, Radio Happy Station, which beams our way every Sunday.—E. HAINES.

### CONSTRUCTOR'S GUIDE

SIR,—I have purchased the December issue of the PRACTICAL WIRELESS which contains the very useful "Constructor's Guide". I think, however, there is an error in line 5 page 15—"47 000pF—or—0.0047μF".

Should this not be 0.047μF?—P. L. PARKER (Ipswich).

(Mr. Parker is quite correct; 47,000pF=0.047μF—ED.)

### DRAIN PIPE EFFECT

SIR,—Your correspondent, C. E. C. (Boreham Wood) in the December issue, is almost certainly experiencing something that the Post Office have named "drain pipe effect".

Corroded joints in lengths of pipe, electric conduit, telephone wiring, etc., act as diode mixers because of rectification properties, and then reradiate the signal. The set, however selective, cannot separate the programmes once modulated in this way, and it is most common for the Home Service to modulate the Light rather than the other way round. This effect most often shows up when indoor or loft aerials are used.

The solution of course is not to pull the drain pipes apart, but to fit an aerial as clear of the building as possible. A little experiment shows the best arrangement.—S. J. BRAGMAN, A.I.P.R.E. (Ilford).

### GUITAR AMPLIFIER

SIR,—The following information is furnished in response to readers' queries:—

**Mains transformer:** secondary: 275V-0-275V at 100mA, 6.3V at 3A, and 5V at 2A. A standard H.T. secondary of 300V-0-300V is satisfactory.

**Smoothing choke:** The inductance of this is not too important, but the choke must be capable of carrying 50mA D.C. and its resistance should be about 250Ω. A discarded output transformer primary is ideal.

**Output transformer:** Push-pull 10-12W 6V6 to 3Ω or 15Ω.

Incidentally, if a mains transformer of 350V-0-350V H.T. secondary is used (this being a very common rating) it is suggested that a 500Ω 10W wire-wound resistor be inserted between the rectifier cathode and the H.T. and line, mounted above the power chassis on a small tag-strip for ventilation purposes.—B. L. PHILLIPS.

### VALVE BASE TROUBLE

SIR,—I was interested to read of the problem of G. Rich (December PRACTICAL WIRELESS). I am a technical representative in the plastic industry and am sure the valve holders are "tracking". The problem is fundamental and inherent in all moulding materials based on phenolic or cresylic resins and no matter what fillers are used, once a path is formed across the surface, a conducting carbon track is carved in the plastic.

Fortunately there are materials which do not form this carbon track, among them urea and melamine formaldehyde plastics (not, regrettably, used very often for ordinary valve bases but mainly for domestic electrical plugs, sockets and switches, etc).

Also there are, of course, the alkyd plastics which will only track under very severe conditions (very high voltage 2000V— and dampness), but I think Mr. Rich should change to a thermoplastic insulator or even go back to ceramic.—J. N. ALLEN (Manchester).

## ELECTRONIC SMOOTHING

(Continued from page 795)

### An Example

If a 6C4 valve is used, R4 should be about 820Ω and R3 about 1.3k. A 2k potentiometer should therefore be used for R3. The heater of this valve requires 6.3V at 0.15A.

The power pack voltage should not exceed about 320V, or the ratings of the valve may be exceeded. The resistor, R3, reduces the output voltage. In order to keep this reduction as small as possible and to keep the regulation reasonable, the output current taken from the circuit should be kept as small as possible. It should therefore be used to supply only the particular parts of the equipment which really do require a well-smoothed supply. The power supply for any other parts of the equipment should therefore be taken directly from the power pack. The heater supply for the valve used in the smoothing circuit can normally be taken from the same transformer winding as that which is used to supply the other parts of the equipment.

It has been found that the circuit shown will easily reduce hum and other ripple to less than a few millivolts. The ripple in the output of a normal power pack may be a hundred or a thousand times greater than this.



**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 \_\_\_\_\_

1/61

★ **BLOCK CAPITALS PLEASE**  
(We do not employ representatives)

**RECEIVERS & COMPONENTS**

**SPEAKER REPAIRS.** Cones/Fields fitted. Clock Coils Wound. L. S. REPAIRS. Pluckley. Ashford. Kent.

**SPARES - VALVES - TUBES**

1930-1960

Guaranteed Perfect, set tested, ex-working equipment. LOTS from £1. FOTs. Osc. Tr. Def. Coils, etc. cheap. TUBES, guaranteed 6 months. **FITTED FRAME.** Picture shown to callers. 9in., 9 1/2, 12in. 50/- 14in. 60/- 17in. 70/- **VALVES.** 3,000 types stocked. EF50, SP61, 1/-, EF91, EB91, 6H6, Z77, D77, 6J5, 2/-, EP40 UF42, 6F1, 6F13, 6AG5, UB41, 20D1, 3/-, 10F1, B36, 6V6, KT61, 6SN7, EL32, B36 6P25, 4/-, PCC84, PCF80, PL61, PL32, PY61, ECL80, PCL83, 6K25, EBC91, EY51, EL33, 5U4, 5/-, KT33C, 10P14, 10C1, UCH42, UL41, ECR35, HVR2, 7C5, 7Y3, 8/-, EL38, KT36, PY31, U22, U35, U281, U08, 7/6, PL38, PZ30, 20A1, 20P3, 18B7, U09, U24, U25, 10/-, U601, 20P4, 6CD8, 27S1U, U37, 12/6. Pre-war 4, 5 and 7 Pin, 5/- each. Postage 6d. "Constructor's Parcel," 2 lbs. assorted resistors, condensers, pots, etc., from modern TV, 7/6. Postage 2/6. Write or phone. Send S.A.E. for list or with enquiries. "ST. JOHN'S RADIO", 156 St. John's Hill, S.W.11. B.A.T. 9838

**RECLAIMED VALVES.** tested and perfect: huge stocks; all one price, 5/- plus 6d. postage each. Delivery by return LEWIS, 46, Woodford Ave., Ilford, Essex.

IT4	3/6	EB91	3/6	PCF80	7/6
IL4	1/9	EF91	3/6	PCC84	7/6
IR5	3/6	ECC81	5/-	PL81	8/6
IS5	3/6	ECC82	5/6	6K8G	5/-
DK92	6/6	ECH42	9/-	6SN7GT	4/-
DK96	8/-	ECL80	7/6	6V6G	4/6
DL92	6/6	EY51	7/6	12AH7	4/-
DL96	6/9	EY86	7/6	954	1/3
DL94	7/6	EF86	9/-	EF50	1/-

All Brand New and Boxed. C.W.O. Over 2000 Types. Available, Woodward, 16 Aubrey Road, Sherwood, Nottingham. 65504.

FOR coils for circuits in this issue contact AJAX ELECTRONICS, 572, Fulham Road, S.W.6

**ANNALIN**

**Modulation Transformers.** For TBS-6 Trans., New Boxed, 15/- post 3/-. For BC625, 7/6 ea., post 1/6. For 1443A, 2/- ea., post 1/6. Trans. 3/-, Chassis only. Less valves, xtals. Approx. 82 useful parts. No Gen. 5/- ea., post 2/-.

**Another Chassis.** With 16-B7G holders, mike trans., AF trans., 33 condensers, 70 resistors, 10 to 15 gtr. strips. Wonderful value. 5/- ea., post 2/-.

**Another Chassis.** With Potted output trans., 2-MO holders, 4-Cond. 3-Res. 3-RFC. Again very good value at 2/6 ea., post 1/8.

**Circuit Unit.** Variable tuned oscillator, output 48 Mc/s. Complete with 6P33 valve, cast all case. New. A must! only 7/6 ea., post 2/-.

**Xtals.** 4960 Kcs. British. 2 pin. 3/6, post 6d. **Hiams Trans.** 220-250 v. mains, 12 v. 4 A. 5 v. 4 A. out. Useful for Car Chargers. Trains etc. 15/-, post 2/6.

**Amplifier No. 165.** Complete with 3-EL32, 2-EF36, 4-AF trans., 1-mod. trans., An Intercom. amp., and Mod. unit. New. Boxed. £1, post 3/-.

**Periscope Prisms.** 3/- pr., post 1/8; 2 prs., 5/-, post 2/6.

**Chokes.** 10H, 60mA, 1K. 2/- ea., post 1/6.

**AF Transformers.** 1-200 ohm, 1/- ea., p. 11d. **Front Warning Thermostats.** Low voltage 1/8, post 7d.

**BC-624 R/cr.** 100-150 Mc/s. 11 valves, 32/6, carr. 5/-.

**BC-625 Trans.** 100-150 Mc/s. 7 valves, 32/6, carr. 5/-.

**BC-624 and 5.** in case, with top unit £3.5.0, carr. 7/6.

Mail Order (Mainland) only. C.W.O. only. Stamped addressed envelope for lists please. 25 ASHFIELD PLACE, OTLEY, YORKS.

**RATES:** 5/6 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.

**"WEYRAD" TRANSISTOR RECEIVER**

**LONG & MEDIUM WAVE P.P. O/P. ALL COMPONENTS AVAILABLE. TOTAL COST £5.17.6. CONSTRUCTOR'S BOOKLET, 2/-**

**AM FEEDER UNIT, SUPERHET AVAILABLE, DEC. Size 4 x 3 x 1 1/2. TOTAL COST OF COMPONENTS £5.10.0. CONSTRUCTOR'S BOOKLET, 1/9.**

Send S.A.E. for Shopping Lists. **WE ALSO STOCK "DEKTRON" TAPE AND RECORDING ACCESSORIES.**

**WESTHAM RADIO SUPPLIES**  
 Rear of 176, Abbotsway Road  
**WEYMOUTH, DORSET**

**COMPONENTS.** Valves, Tubes, etc. Write or phone for free list. **ARION TELEVISION.** 4, Maxted Rd., Peckham, S.E.15. (New X 7152.)

**AM/FM STEREO CHASSIS £20**  
 2.5W Transistor Hi-Fi Chassis 10cps to 150kc/s. Transformerless. £10.

Parts and Equipment made to order.

**BEL, Marlborough Yard, London, N.19**  
 Arc 5078

"HEATHKITS" can now be seen in London and purchased on easy terms. Free brochure. **DIRECT TV REPLACEMENTS LTD.,** Dept. PW/7/12 138, Lewisham Way, S.E.14, Tideway 6666.

Signa Relays SPDT 10,000 ohms, 1 mA, 15/- (1/6). 40m. American Whip Aerials with loading coil, effectively increasing height to 12ft., 35/- (3/-). Precision Infinitely Variable Speed Gearboxes, 0 to 6000 r.p.m. driven by 2 hp. 240 v. A.C. motor, £5 (15/-). American Amplifiers. Mike Input 2 x 2000 ohm output 24 v. Input uses 1-125J7 and 2-6V6, 7 x 3 x 3in., 12/6 (less valves) (2/6). Kurman Relays, SPDT 7000 ohms 3 amp contacts, 12/6 (1/6). Metal Rectifiers, 24 v. 12a. 20/- (3/6). 51t. P.O. Racks, angle iron sides 18in. wide, 65/- (10/-). 8.C.610 Whip Aerials 3 sections, 9ft. in canvas hoidal, 35/- (5/-). Heavy Insulated Bracket Mounts for above 25/- (5/-). BC-659 Transmitter Receivers crystal controlled 14 valves (less crystals and valves) 85/- (10/-). BC-659 Power Supply Unit, vibrator type for attachment to Tx Rx 6 v. or 12 v. input (less vibrator), 25/- (10/-). BC-659 Battery Box for attaching to Tx Rx for man pack use, 7/6 (5/-). 50 watt Power Amplifier rack mounting, 230 v. A.C. input (1-3MH, 2-PX-25, 1-150) with vic and meter, less valves 35/- (35/-). AVO Portable Geiger Counters for Beta or Gamma Ray detection, new less batteries £12.10.0 (10/-). Laboratory Mains Filter Units removes mains borne interference, 10/- (2/6).

**40 PAGE LIST OF OVER 1000 ITEMS IN STOCK AVAILABLE—KEEP ONE BY YOU**

American Operators Table, black crackle, 36 x 22 x 34in. Jack boxes and switches under, ideal for many uses. 75/- (15/-). Boeing Beehive 3pin. stand off insulators, 9/6 a doz. (2/6). Elliott 0/4V moving coil meters, 2000 o.p.v. 2 1/2in. dia. Power Units, 1200 v. 200mA smoothed from 200/250v. A.C. 1 cert. £6 (1/-). Amount in brackets is carriage England and Wales.

We have large quantities of "Bits and Pieces" that we cannot list—please let us have your enquiries, we can probably help—everyone answered.

P. HARRIS, ORGANFORD, DORSET

**RECEIVERS & COMPONENTS**

(continued)

**LEADER RADIO**

**REPANCO MINI-7**  
 The amazing new transistor set for the home constructor. Seven transistors, superb circuit, fully tunable over long and medium wave. Equal to any manufactured set. Kit complete with instruction data (excluding batteries)..... £10.10.0  
**THE TELETRON TAPEAK**  
 (Transistorised tuner)

Converts your tape recorder into a high quality Radio Receiver. Recording of Radio Programmes directly on tape. High sensitivity. £5.9.0. excluding P.P. battery. Carr. 2/6.  
**B.S. MONARDECK TAPE RECORDING DECKS**  
 Bargain, only £9.10.0, carr. 3/6, extending tapes  
**CRYSTAL MICROPHONES** for tape recorders and amplifiers in cream plastic case, 25/-, cart. 1/6.  
**FERRODYNAMIC RECORDING TAPES.** 5in. 600ft. 16/-, 3in. 600ft. 15/6. 5in. 1200ft. 23/6; 7in. 1200ft. 25/-, 7in. 1800ft. 35/-, post free  
**SPEAKERS:** WB STENTORIAN, 10in. 10 watt Hi-Fi. 3, 7 and 15 ohms speech coil, £4.12.6, carr. 2/-  
**ROLA** 2 1/2in., 28/10, other leading makes in stock.

S.A.E. with enquiries.

73 VISTA WAY, KENTON, HARROW, MIDDIX.  
 Phone: WGR 4512

**VALVES 1/- each (tested O.K.)**  
 Radio and TV List, stamp. 85. Charrminster Avenue, Bournemouth.

**CHEAP Valves, Components, Books.** Constructors' Kit, Crystal Set 8/6. Transistor Set 19/6. Short Wave Radio 22/6. List 3d. **HAMILTON RADIO (W.)**, 13, Western Road, St. Leonards, Sussex.

**POWER IN PACKETS.** We are now out of stock of the 6 Xtal units but would offer the remaining stock **LESS XTALS** at 47/6 plus p. and p. The 1 Xtal unit remains at 21/-, but hurry to obtain one of these, as these are going fast. CV.1397 crated remain at 6/6; these, too, are going fast. 3 ohm 8in. speakers at 10/-, 90 x 14v Hts. 10/9, 90 x 7 1/2 v. 6/6, 1 1/2 H.D. cells 1/6. **DIGGINS.** 129/133, Radnor Street, Manchester 15.

**RESISTORS—100 new, wire ended.** Assorted, 10 types, 7/6, box, post free. **COOKS OF BEDFORD,** 29, St. Mary's Street, Bedford.

**KINGSLAND**

**ELECTRONIC COMPONENTS**

**Stupendous Offers**

**150 ASSORTED RESISTANCES AND CONDENSERS.** 50 Assorted Resistances and Condensers. 6 Miniature Valve Holders, two Tag Strips. 40 Separate Contacts each, 3/9, p. & p. 1/9. Small Chassis, approx. 2 1/2 x 2 1/2 in., containing 2 Miniature Valves, Germanium Crystal Diodes, 12 Resistances and Condensers, 2/9.  
**BAHRAIN PACK.** Pair Throat Microphones, 150 Assorted Screws, 2ft. 2in. Screened lead wire socket, one 5 Henry 200 m. Choke, 3 Electrolytic Condensers, 6 Knobs, 3 Toggle Switches, 6 Octal Valve Bases, 1 Waveband Switch, 6 Coax. Plugs, 6 Assorted Coils, 6 Cartridge Fuses, 6 Potentiometers, 6 W.W. Multipliers, Festoon Lamp and Holder. Coil of Wire, 15/6, p. & p. 3/6.  
 New 115 v. Relays, 15 amp., 7/6, p. & p. 2/6. Instrument Rectifier with Circuits, 5/6, 6 v. or 12 v. Vibrators, 2/6 each, p. & p. 1/6. 6 Assorted Droppers, 5/-, p. & p. 1/8. Loaded Chassis, 7/6 and 5/-, p. & p. 4/6. Mike and Pick-up Transformers, Ideal for Baby Alarms, 4/6, p. & p. 1/-.  
 100 Assorted Resistances or Condensers or 50-50 8 1/2, p. & p. 1/8.  
 New headphones, low impedances, ideal for crystal sets, etc., 6/6, p. & p. 1/9.  
 6 Assorted Potentiometers, 5/-, p. & p. 1/9.

182 KINGSLAND RD., SROREDITCH, E.2. Tel. SHO 6572. Sorry U.K. only.

**RECEIVERS & COMPONENTS**  
(continued)

**TRANSISTOR BARGAINS.** — Brand new Mullard OC44 11/6. OC45 9/6. OC70 7/6. OC72 11/6. Equivalents:— OC44/45 9/-. OC72 6/6. OC71 5/-. New type 1V Transistors 3/6. Car Aerials 17/6. D. B. CARTER (ELECTRONICS) SOU 3007. 347. Ladypool Road. Sparkbrook. Birmingham 12.

**POST-FREE SUPPLIES**

**FEW LINES / CHEAP LINES**  
Very Latest B.S.R. UA20 4-speed Autochanger ..... £7.19.6  
UA8 with Stereo Cart. .... £7.7.0  
Garrard TA.Mk.II 4-Speed Single Player with Ronette Stereo/Monaural Cartridge, Only £8.19.6  
Gram Amplifiers complete with Valves, Speaker, Transformers, Knobs ..... £3.12.6  
Speakers, 7 1/2 x 5 1/2 in. .... 21/-  
Speakers, 5 in. .... 16/6  
Speaker Frt (TYGAN), ..... 1/6 3/4 ft.  
3-speed Tape Recorders, ..... Only 28 gns.  
VALVES with 12 months' guarantee: PL81, 10/6; U25, 12/-; EY86, 9/-.

Send for complete list and prices.  
OC45 Transistors, ..... Only 15/-  
Terms: C.W.O. POST FREE

**POST-FREE SUPPLIES**  
217 High Street, WATFORD, Herts.

**LOUDSPEAKERS** 6 1/2 in. 7/6, post 1/6. 8 in. 11/6 post free. Transistors and Components. Kits. Everything for the Constructor. Lists. S.A.E. H.R. MAIL ORDER. 16, Regent Parade, Harrogate.

**SERVICE ENGINEER'S** Spares. Valves. Resistors. Condensers, etc., also Taylor 65B Sig Gen, very little used. 11, Manton Close, Hayes, Middx.

**BROADWAY ELECTRONICS**  
92 MITCHAM ROAD  
TOOTING BROADWAY  
S.W.17. Telephone BALham 3984

**VALVES**  
ALL TESTED BEFORE DESPATCH  
All New and BOXED  
AC2PenDD 5/-, EBC33 5/-, EF36 3/6, EF39 4/6, EF50 3/-, EF54 3/-, EF86 10/6, EF92 5/-, EK92 6/-, EL32 6/-, EL84 8/-, EZ40 7/-, FW4/500 8/-, MH4 4/6, IL4 (suitable for 1 valve set) 3/6, IR5 5/6, IS5 5/6, IT4 6/-, TDD4 3/6, U16 6/-, UY41 7/-, VP4 3/6, MU14 7/-, 2X2 4/6, 3A4 5/-, 354 7/6, 3V4 7/6, 504G 7/6, 5Y3GT 8/6, 5Z4 8/-, 6C4 4/6, 6K7 3/6, 6K7GT 5/-, 6K3 6/6, 6J5 4/-, 6J7 5/6, 6L6 8/6, 6Q7 8/6, 6V6G 7/-, 6V6GT 8/6, 6X4 6/-, 6X5 7/6, 6X5GT 8/6, 7B7 9/-, 7C8 9/-, 7HT 9/-, 7S7 9/-, 7CS 9/-, 7Y4 8/-, 12K7GT 5/-, 12Q6GT 5/-, 35L6GT 9/-, 35Z4GT 6/-, 807 10/-, KT76 6/-  
Add 4d. per item Post and Packing

**SPECIAL OFFER:** White Boxed Tape. Acetate Base. 5 1/2 in. 850ft., 14/6; 5 1/2 in. EMI Type Spools, 2/9.  
Add 1/- Post and Packing.

**B.T.H. Ex-Relay Amplifiers, A.C./D.C. MAINS.** 210/250 v. Contains 8fn. 15 ohm Speaker. Three valves—10F1, 10P14 and U904. Cabinet size: 14 x 11 x 6 1/2 in. Attractive two-toned cabinet with Ivory Knobs. 30/-, plus 5/6 Carriage and Packing.

Assorted Miniature 1 watt Resistors (our selection). Preferred values 22 ohms to 10 meg. 35/- per gross.  
Assorted Ceramic Condensers (our selection) 1 pF to 5000 pF. 35/- half gross.

**FOR SALE**

**ANOTHER** New low-priced Tape Bargain! 1,800ft latest polyester on 7 1/2 in. reel. 32/6 p.p. 1/6. Also outstanding bargains in all other sizes 3in. to 8 1/2 in. S.A.E. for list (includes American Audio Tape, BASF etc) Over 30 mint condition secondhand Tape Recorders, and all new Recorders and Hi-Fi Equipment on NO INTEREST H.P. Terms. E. C. KINGSLEY AND CO. (Dept. P.W.), 132, Tottenham Court Road (near Warren St.) London W.1. EUS6500.

**ASK** your dealer for American Ferro-dynamics "Brand Five" Recording Tapes—the best tape value!

Caly Meters, A10. £4.17.6; B20. £8.10.0; with each 36 mixed resistors. 6d. Transistor Kit. £5.4.8. Transistor OC16. 27/-, Cartridge, TC8M. 18/6. Plastic Recording Tape: Famous Brand. 5in. 600ft. 15/-, Spare Plastic reels. 5in. and 5 1/2 in., 3/-; Contact cooled reel. 250v. 250mA. 13/6. 300mA 17/6.

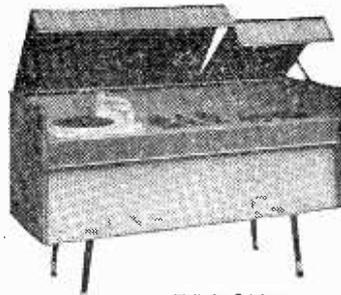
**DURHAM SUPPLIES**  
175 DURHAM ROAD, BRADFORD 8, Yorkshire.

**TRANSISTOR HEAT SHUNT.** Leaves hands free to solder. 2/6. 6 Hooker Road, Heartsease, Norwich. Norfolk.

**100 BAYS** Brand New Adjustable Steel Shelving, 72in. high x 34in. wide x 12in. deep; stove enamelled dark green, sent unassembled. Six shelf bay £3 15s. Sample delivered free. Quantity discounts. N. C. BROWN LTD., Eagle Steelworks, Heywood, Lancs. Tel.: 69018.

**BLANK CHASSIS MADE TO ORDER SAME DAY SERVICE**  
Metalwork Dept.  
**H. L. SMITH & CO. LTD.**  
287-289 Edgware Road, London W.2  
PAD. 5891-7595

**AMERICAN MAGAZINES.** Year's subscription 'Electronics World' 43/-; 'Radio Electronics' 39/3; 'Audio' 35/-. Specimens 5/- each. Full catalogue free. WILEN LTD. (Dept. 40), 9, Drapers Gardens, London, E.C.2.



Write for Catalogue  
**GPR** FOR STEREO OR MONAURAL 48in. Wide, Record storage. Control Panel 15 x 1 1/2 in. Deck 17 x 1 1/2 in. Tygan grille. Cash Price £22.10.0 or £4.10.0 dep. and 18 payments of 23/- monthly. Delivery 12/6. In Walnut and Mahogany.

**FOR SALE**  
(continued)

**THE CHEAPEST** in Britain. Collaro Studio Tape Deck £12; Tape Amplifier £10 10s.; B.S.R. Tape Deck £8 5s; Collaro Junior Four-speed Turntable and Pickup £3; Collaro Conquest Autochanger £6 5s.; B.S.R. UA8 Autochanger £6 10s.; Acos Microphone 40 24/-. Satisfaction guaranteed. Trade supplied. S. BENJAMIN, 2, Prince Charles Avenue, Bury-St-Edmunds, Suffolk.

**FANTASTIC OFFER:** Manufacturers' Surplus. Miniature Record-player Amplifiers, solled, tested, with valves only 28 6 carriage paid. 22, Birchall Road, Rushden.

**WANTED**

**WANTED** Service Sheets. No quantity too large. Highest prices paid. SULTAN RADIO, 29, Church Road, Tunbridge Wells, Kent.

**NEW VALVES WANTED**  
Any type, any quantity.  
**CASH PAID.**  
R.S.T., 211, Streatham Road, Mitcham, Surrey.  
Telephone: MITcham 6201.

**A PROMPT CASH OFFER** for your surplus Brand New Valves, Speakers, Components, Test Instruments, etc. R.H.S., 155, Swan Arcade, Bradford 1.

**WANTED VALVES**  
All types for prompt cash. Must be new. State quantity.  
**WILLIAM CARVIS LTD.**  
103 North Street, Leeds 7

**WANTED:** Valves—all types. Must be new. A. D. A. MANUFACTURING CO., 172, Alfreton Road, Nottingham.

**CABINETS, ENCLOSURES and EQUIPMENT by STAMFORD**

	Cash	Hire	Per Year
<b>SPEAKERS</b>			
Aziete .. ..	£6.12.1	26/5	6/4
Wb/HF1012 ..	£4.15.0	19/-	4/7
Golden 10in. ....	£8. 6/7	33/4	8/-
Axiom 300 .. ..	£11. 5/6	45/2	10/10
<b>MOTORS</b>			
Garrard 210 .. ..	£12.13.5	50/8	12/3
Garrard 4 H.F. ....	£18. 9/9	74/-	17/9
Garrard TA Mk II ..	£8.10.0	34/-	8/2
Collaro RF594 .. ..	£9.18.9	40/-	8/7
<b>CHASSIS</b>			
Armstrong 5b .. ..	£33.12.0	134/5	32/8
Armstrong Stereo 12 Mk.II	£44. 2.0	176/5	42/4
Armstrong Jubilee Mk.II.	£30. 9.0	121/10	28/3
<b>TUNERS</b>			
Dulcic FMT 2 .. ..	£24.13.4	99/8	23/7
Rocers Junior .. ..	£24.10.3	98/1	23/5
Armstrong ST3 .. ..	£28. 7.0	113/5	27/8

**A. L. STAMFORD** Dist. H29  
84/86/88 WEYMOUTH TERRACE  
OFF HACKNEY ROAD, LONDON. E.2.

## BOOKS &amp; PUBLICATIONS

**FIND TV SET TROUBLES IN MINUTES** from that great book "The Principles of TV Receiver Servicing," 10/6 all book houses and radio wholesalers. If not in stock from Secretary, I.P.R.E., 20, Fairfield Road, London, N.8.

## MISCELLANEOUS

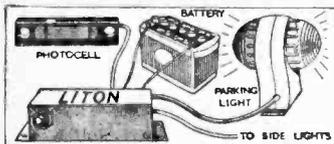
## -YOU READ MUSIC?

Then how about making yourself an electronic organ? Constructional data available—full circuits, drawings and notes. It has 5 octaves, 2 manuals and pedals with 24 stops—uses 41 valves. With its variable attack you can play Classics and Swing.

Write **NOW** for free booklet and further details to C. & S., 20 Maude Street, Darlington, Durham.

**SELL BY POST**—receive cash by post. Learn Mail Order Trading—unlimited trade expansion. Mail-methods Manual shows how. Details, S.A.E.—MAILMETHODS (M.14) CO., 170, Old Christchurch Road, Bournemouth.

### "LITON" AUTOMATIC PARKING LIGHT SWITCH



Controlled by a photocell, will turn your light on at dusk, off at sunrise automatically. Easy to build and fit. Kit of Parts, 52/6. Built and Tested 57/6. Mains PHOTOELECTRIC GARAGE DOOR OPENER, BURGLAR ALARM, etc. Kit: £4.12/6. Built: £5.10/0. Battery Model: Kit: 65/-. Built: 72/6. Photocells only 7/6, 12/6, and 25/-. Circuit and details of any project, 6d. stamp please. "ST. JOHN'S RADIO," 156 St. John's Hill, LONDON, S.W.11. BATtersea 9838

**HOW TO USE EX-GOV. LENSES AND PRISMS.** Nos. 1 and 2 2/6 ea. Lists free for S.A.E. H. W. ENGLISH, 469, Rayleigh Road, Hutton, Brentwood, Essex.

## SERVICE SHEETS

**SERVICE SHEETS, TV 4/- ea.** Radio 3/- ea. List 1/-. All orders dispatched on day received. Also Manuals for sale and hire. Mail orders only. **SULTAN RADIO, 29, Church Road, Tunbridge Wells, Kent.**

**FAULTFINDER FILES**, showing common faults that each receiver is prone to and other useful servicing information, 2/-. ea. List 9d., plus postage. **S.P. DISTRIBUTORS, 11, Old Bond Street, London, W.1.**

**SERVICE SHEETS, Radio, TV 5,000 models.** Lists 1/-. S.A.E. enquiries. **TELRAY, 11, Maudland Bk., Preston.**

## SERVICE SHEETS

**RADIO and Television**  
Over 100,000. S.A.E. for List.  
Large stock of obsolete Radio and Television Valves.

**JOHN GILBERT RADIO**  
20 Extension  
Shepherd's Bush Market, London W.12  
SHE 3052

**SERVICE SHEETS** for sale, all types from 1/- with free fault-finding guide. 125 Radio/TV sheets covering 370 popular models 20/-. S.A.E. Lists/Enquiries **HAMILTON RADIO (W), 13, Western Road, St. Leonards, Sussex**

**SERVICE SHEETS.** — We have the largest stock of Radio and TV Sheets in the country for sale at 4/- ea. Why tolerate delay in obtaining your supplies when we will dispatch by return? Radio and Television Service Sheet List 1/-. Also Manuals for sale and hire. List 9d. S.A.E. please. Mail orders only. **S.P. DISTRIBUTORS, 11, Old Bond Street, London, W.1.**

## 38 SET WALKIE TALKIE CIRCUIT INFORMATION

Alignment Procedure. Typical faults in Ex W.D. Sets. Component location diagrams. Circuit diagram. Complete Circuit description. Instructions for use, etc. P.O. 5/-. Address in block capitals, please.

**CAMPBELL**  
Laundry Lane, Hungerford, Berks.

## HANDICRAFTS

**JEWELLERY SIMPLY MADE.** Catalogue Free. Brooches, Ear-clips, Rings, Marcasite. **WEBBS HANDICRAFTS, 46, Burnway Hornchurch, Essex.**

## SOUND RECORDINGS

**TAPE/DISC transfer.** Fine U.S. tapes arrived (18000ft. 35/-). **UNIMIXER** units for quality work. Sound News, 10, Clifford Street, W.1. REG 2745.

## EDUCATIONAL

**TRAINING IN RADIO AND TELEVISION SERVICING.** Next full-time One Year course commences on 31st January. Recognised by R.T.E.B. for new Radio and Television Servicing Certificate examinations. Details from—**THE PEMBRIDGE COLLEGE OF ELECTRONICS, 34a, Hereford Road, London, W.2**

## ★ LEARN ★

### RADIO & T/V SERVICING

### for your OWN BUSINESS/HOBBY

by a new exciting no-maths system, using practical equipment recently introduced to this country.

FREE Brochure from:—

## RADIOSTRUCTOR

DEPT. G77, READING, BERKS, 7/12/60.

**LEARN RADIO AND ELECTRONICS** the new 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. **RADIOSTRUCTOR, 40, Russell St., Reading, Berks.**

DIAMOND



STYLI

FOR

DIAMONDS

Manufacturer's offer to users—send us your old stylus arm and we will trip with finest Transcription quality Diamond.  
To ensure best reproduction every Diamond is inspected for finish and radius with 500 magnification.

**FOR £1.0.0 ONLY**

Or we will supply complete with any stylus arm for £1 5s. 0d. Tax Paid and will despatch within 24 hours of receipt, post free.

**All Diamonds are Guaranteed for One Year**

(Sapphires also supplied 4/6 Tax Paid)

Mail Orders to:—Dasco, Frith Park, Tadworth, Surrey

## Radio Television & Electronics

Learn at home with the world's largest home study organisation, Brit.I.R.E., City & Guilds; R.T.E.B., etc. Also Practical Courses with equipment. No books to buy.

Write for **FREE prospectus** stating subject to

**I.C.S.**

Intertext House, Parkgate Road, (Dept. 541), London S.W.11

(continued on next page)

**EDUCATIONAL**  
(continued)

"HOW AND WHY" of Radio and Electronics made easy by a new, non-maths, Practical Way. Postal instruction based on hosts 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, 40, Russell Street, Reading, Berks.

**FREE FROM THE I.P.R.E.** Syllabus of famous radio and TV courses. Membership Conditions booklet, 1/- Sample copy The Prac. Radio Engineer, 2/- post free. Secretary, 20, Fairfield Road, London, N.8.

**RADIO AND TELEVISION SERVICING.** Home-study courses with special schemes of practical work are available from the Pembridge College  
(1) Introductory course for beginners.  
(2) More advanced course covering new R.T.E.B. Intermediate Certificate.  
(3) Advanced course covering new R.T.E.B. Final Certificate. (In preparation).  
Details from:—THE PEMBRIDGE COLLEGE OF ELECTRONICS, 34a, Hereford Road, London, W.2.

**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.

**SITUATIONS VACANT**

**SITUATIONS VACANT**  
(continued)

**RADIO AND TV SERVICING,** all aspects from basic principles. Guaranteed coaching for City and Guilds, R.T.E.B. Cert., Brit.I.R.E. etc. Study at home under highly qualified tutors. No books to buy. Write for FREE Prospectus, stating subjects, to:—I.C.S., Intertext House, Parkgate Rd. (Dept 541A), London, S.W 11.

**TELEVISION ENGINEERS**

Are you satisfied with your present position—Does it carry high wages and commission—is it permanent and pensionable—Are conditions of work good?

If you would like to work in the Wrexham area for a rapidly expanding, old established company with an excellent reputation offering all the above advantages—Apply in the strictest confidence to—

**MANAGER, SEEGERS LTD.,**

**Henblas Street, Wrexham.**

(Own staff know of this advertisement.)

**WANTED, RADIO ENGINEER,** preferably conversant with ex-Government communication and test equipment, for Paddington Area. Good salary. Contact Z AND 1 AERO SERVICES, 14, South Wharf Road, W.2 Tel.: AMB 0151.

**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, W.8.

**SITUATIONS VACANT**  
(continued)

**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, W.8.

**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 W.8.

**TEST ENGINEERS**

Required for varied and interesting work, (partly experimental) on high quality television and communications equipment.

Good experience in the use of measuring instruments is essential. Starting salary in the range of £750—£950 p.a. according to qualifications and experience, with excellent prospects of advancement.

The Company operates a Pension Scheme and Sports/Social Club.

Write, in confidence, to:

**The Manager  
Central Engineering Department  
BRITISH RELAY WIRELESS LIMITED,  
1-7 Croft Street, Deptford,  
London, S.E.8.**

**PUBLIC APPOINTMENTS**

**MEN** with knowledge of basic principles of Radio and Radar required in the Meteorological Office. After short initial training, those appointed will maintain and operate radio and radar equipment, including facsimile apparatus. There are vacancies in various localities in the United Kingdom and opportunities to serve overseas. Starting salary for Radio (Meteorological) Technicians is £670 (national) at 25 or over, rising annually to £795 subject to deduction for each year below the age of 25. These rates are subject to a small deduction at certain provincial stations and to a small increase in London. Good promotion prospects and allowances for overtime, night duty, etc. Applicants must be British subjects.

Applications to METEOROLOGICAL OFFICE, (M.O.10/R/M/T), Victory House, London, W.C.2, or any employment exchange quoting King's Cross 3208.

**"GLOBE-KING"**

**WORLD-FAMOUS KITS AND RECEIVERS** for the Radio Amateur and S.W. Listener. Catalogue Free, enclose stamp for Postage. Kits from 79/6 at your dealers, or direct from **JOHNSONS (RADIO)** ST. MARTINS GATE, WORCESTER



**A few excellent vacancies  
for men who can learn  
a skilled trade in today's R.A.F.**

You can learn a trade worth having, in today's R.A.F. Your training is very thorough and gives you a skill at your fingertips for life. Pay compares very well with the equivalent jobs outside, and, if you are single, there's nothing out of your pay-packet for food or rent. Leave is a month a year, you get the chance to travel and you work with a fine lot of people.

**Radar or Wireless Mechanics.** Suitable candidates are now being accepted for thorough training on the latest radar and wireless equipment and its maintenance, fault-finding and repair.

**Electrical or Instrument Mechanics.** There are vacancies for suitable applicants to be trained in the skilled trades of electrical and instrument maintenance.

For full information write to:  
**R.A.F. Careers Information Centre (PW 728a);  
Victory House, Kingsway, London, W.C.2.**

**TODAY'S TOP JOB IS THE R.A.F.**

**SELENIUM RECTIFIERS**

F. W. BRIDGE H.T. Types H.W.  
 6/12 v. 1 a. 3/11 150 v. 40 m.a. .. 3/9  
 9/12 v. 2 a. 6/11 250 v. 50 m.a. .. 3/11  
 9/12 v. 3 a. 9/9 250 v. 50 m.a. .. 4/11  
 6/12 v. 4 a. 12/3 250 v. 80 m.a. .. 5/11  
 6/12 v. 5 a. 15/3 250 v. 80 m.a. .. 11/9  
 6/12 v. 10 a. 25/9 CONTACT COOLED  
 6/12 v. 15 a. 35/9 250 v. 80 m.a. H.W.  
 24 v. 2 a. 14/9 F.W. (Bridge) 10/11.

**B.S.R. MONARDECK TAPEDECKS.**  
 Speed 3 1/2 in. per sec. High quality recording heads, 9 gms. Carr. 5/-  
 Suitable polished veneered walnut carrying case for above 39/6. (Space for amplifier.)

**EX-GOVT. CASES.** Size 14-10 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 postage.

**HIFI 10 WATT AMPLIFIERS**  
 Manufacturers' discontinued model but guaranteed unused and in perfect order. Fitted Mullard valves. Dual inputs for "mike" and gram. etc. Bass and Treble Controls. High sensitivity and quality. For £30-350 v. A.C. Carriage 7/6. £6-19-9.

**R.C.A. TRANSCRIPTION PICK-UPS.**  
 Variable reluctance type for 78 r.p.m. and L.P. records. Normal price approx. £14. Limited number, brand new, perfect, at £3-19-6.

**B.S.R. UAS AUTO-CHANGERS.** With Turn-over Crystal Head. £6-19-6, carr. 5/-.

**COLLARO CONTINENTAL DE LUXE MIXER AUTO-CHANGERS with TX88**  
 Transcription Pick-up. Very limited number at only £9-19-6, carr. 5/-.

**R.S.C. BRADFORD  
 and LEEDS  
 (LEEDS) LTD.**

**SPECIAL OFFER!**

**BRAND NEW CURRENT PRODUCTION TAPE RECORDERS BY LEADING MAKERS.**  
 89 GN Model 42 gms., Carr. 10/- 42 GN Model 29 gms. Carr. 7/6. 26 GN Model 17 gms., Carr. 6/6. All with manufacturers' guarantees.

**MULTI-METERS.** Ferranti Universal A.C./D.C. 59/6.

**CARY A10.** Basic Meter sensitivity 155 micro-amps. A.C. and D.C. ranges, £4-10-0.

**CARY R20.** Sensitivity up to 10,000 ohms per volt. A.C. and D.C., £6-10-0.

**TAYLOR MODEL £27A.** 20,000 ohms per volt. 20 megs. 20 ranges. £10. S.A.E. will bring descriptive leaflet for any of above except Ferranti.

**MICRO-AMMETERS.** 3/4 in. diam. 0-50 micro-amps. 39/6. 3/4 in. diam. 0-500 micro-amps. 59/6.

**RELAYS.** Carpenters' Type. Polarised. 2 times 9,500 turns at 1,685 ohms, 19/6. Miniature Moving Coil Differential Type. Single pole 2-way, or centre stable. Two coils each 350 ohms. Minimum operating current 140 micro-amps, nominal 400 micro-amps maximum 8 milli-amps. Two way contact current 100 mA at 50 v. A.C. or D.C. Size 1 1/4 x 1 1/4 in. approx. 19/6. Miniature Type G.C. 870 Sealed, wire ends, 4 c/overs, platinum M1095, 18/9.

TERMS: C.W.O. or C.O.D. No C.O.D. under £1. Post 1/9 extra under £2. 2/9 extra under £5. Open 9 to 6. Weds. until 1 p.m. Trade supplied. S.A.E. with all enquiries. Mail Orders to 29-31 Moorfield Road, Leeds 12. Callers to 5 and 7 County (Macca) Arcade, Briggate, Leeds 1. and 8-10 Brown Street (Market Street), Manchester 2. or 56 Morley Street (next to Majestic Ballroom), Bradford.

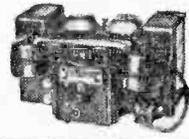
**SPECIAL OFFER EX-GOVERNMENT SELENIUM RECTIFIERS.**  
 12v 15 amp. with large square cooling fins. 19/9 each.

**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; 40 mA., 20 H., 800 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; 90 mA., 5-10 H., 250 ohms 2/11.

**EX. GOVT. MAINS TRANSFORMERS**  
 Primaries 200-250 v. 50 c.p.s. A.C.  
 250 v. 60 mA. 6.3 v. 2 a. 10/11  
 270-4-275 v. 100 mA. 6.3 v. 7 a. 5 v. 3 a. 21/9  
 300-0-300 v. 50 mA. 6.3 v. 2 a. 12/11  
 300-0-300 v. 100 mA. 6.3 v. 2 a. 5v. 2 a. 15/9  
 350-0-350 v. 160 mA. 6.3 v. 5 a. 5 v. 3 a. 27/9  
 10 v. 10 a. Parmeko Fully Shrouded 18/9  
 5-10 a. Parmeko Fully Shrouded 11/9  
 4+1 v. C.T. 6-83 amps, Parmeko 7/9

**2 VOLT ACCUMULATORS**  
 Varleys small size 4 x 3 1/4 x 1 1/4 in. 2 v. 14 A.H. brand new, 6/9 ea., 3 for 15/6.

**FIELD TELEPHONES**  
 With bell. Require only small battery. Suitable for office, factory, warehouse, or outside intercommunication. 59/6 each.



**VALVES SAME DAY SERVICE**  
 NEW! TESTED! GUARANTEED!

**SETS** IR5, IS5, IT4, 3S4, 3V4, DAF91, DF91, DK91, DL94 .. any 4 for 19/6  
 DAF96, DF96, DK96, DL96 .. .. .. .. 4 for 27/6  
 6K7G, 6K9G, 6Q7G, 6V6G, 6X5G, or 5Y3G .. .. .. 5 for 27/-

1A7GT 11/6	6L1 14/-	25Z4G 7/6	EBF89 8/9	EY86 7/9	PZ30 17/-
ID5 8/-	6L18 10/3	25Z6GT 9/6	EBL21 13/6	EZ40 6/9	T41 9/6
1H5GT 10/-	6LD20 8/-	30FL1 9/8	EC92 11/6	EZ41 7/-	U22 7/3
1N5GT 10/-	8P1 13/8	30PL1 10/-	EC881 6/3	EZ80 6/3	U25 13/-
1R5 5/6	6P25 9/-	35A5 4/9	EC882 5/2	EZ41 7/-	U26 10/6
1S4 8/-	6Q7G 8/-	35LGT 8/-	EC883 7/-	FWA/500 8/-	U50 6/-
1S5 5/3	6Q7GT 9/6	35Z4GT 6/-	EC884 8/9	GZ30 8/6	U52 4/6
174 4/-	6SL7GT 6/3	35Z5GT 8/6	EC885 8/3	GZ32 9/6	U78 4/9
1U5 5/9	6SN7GT 4/9	50L9GT 8/9	ECP80 3/6	HIC90 7/-	UABC80 7/9
3A5 9/-	6U4GT 11/-	AC/TH1 18/9	ECP82 8/6	KL39C 7/-	UAF42 9/-
304 7/-	6V6G 5/-	AZ31 9/8	ECH21 13/6	KT41 11/6	UBC41 7/9
3S4 6/-	6V6GT 6/6	B36 8/9	ECH35 6/3	KT44 8/-	UBF80 8/9
3V4 7/-	6X4 4/9	CL38 12/3	ECH42 8/9	KT61 10/3	UBF88 8/-
5U4G 1/6	6X5GT 5/-	DAC32 10/3	EC181 8/-	KT63 6/6	UC92 12/6
5V4G 8/-	7B5 9/-	DAF91 5/3	ECL30 7/3	MU14 7/6	UC84 12/9
5Y3GT 6/-	7B7 7/6	DAF96 7/6	ECL32 9/6	MX30 9/6	UC85 7/6
5Z4G 7/9	7C5 7/6	DCC90 9/-	EF39 4/8	N18 7/-	UCF90 14/6
6A15 3/9	7C6 7/6	DF33 10/-	EF41 8/3	PCC84 7/8	UGH21 13/6
6AM8 3/8	7H7 7/6	DF91 4/-	EF42 9/6	PCC96 11/-	UCH42 8/-
6A45 9/-	787 9/-	DF96 7/8	EF96 5/6	PCF90 7/6	UCH81 8/6
6AT8 6/9	7A1 7/-	DF96 7/8	EF95 6/-	PCF92 8/-	UC132 10/9
6BA8 8/-	10C1 11/6	DH77 6/9	EF96 9/-	PCL82 7/6	UC183 13/3
6BB6 5/9	10C2 17/6	DK32 11/6	EF98 7/9	PCL83 11/-	UF41 8/9
6BB8 3/9	10P13 14/6	DK91 5/6	EF91 3/6	PCL84 7/8	UF85 8/6
6B18 5/9	12A16 7/-	DK92 7/8	EF92 4/3	PEN44 11/-	UF89 7/-
6B17 8/9	12A17 5/-	DK96 7/6	EL33 10/-	PEN80 8/-	UY41 9/-
6B36 8/-	12A17 6/3	DL33 7/6	EL41 8/6	PEN45 7/6	UY84 7/6
6B37 5/6	12A17 7/-	DL35 10/3	EL42 8/-	PL38 11/6	URIC 8/-
6C9 9/-	12K7GT 5/3	DL92 7/-	EL41 12/-	PL81 9/-	UY21 11/3
8CD8G 28/9	12K8GT 11/6	DL94 7/-	EL44 7/-	PL82 7/-	UY41 6/6
8P1 13/6	12S7GT 4/9	DL96 7/6	EM34 8/6	PL83 7/6	UY85 8/6
8P6G 8/9	12Z3 7/6	EABC90 7/6	EM30 8/8	PL44 10/-	UY91 10/9
8P13 11/-	14S7 16/9	EAF42 8/-	EM31 3/6	PY32 11/-	VP48 9/6
8P14 16/6	20F2 17/6	EB91 3/9	EM84 10/-	PY80 7/8	VP41 5/-
8K7G 2/6	20L1 17/6	EBC33 5/-	EY51 7/6	PY81 6/6	W76 5/3
8K7GT 5/-	23A6G 9/-	EBC41 8/-	EY81 9/-	PY82 6/6	W77 4/6
8K8G 6/8	25L6GT 9/6	EBF90 8/-	EY84 10/-	PY83 7/9	Z77 3/6

**NEW EDITION  
 A BEGINNER'S GUIDE**

**TO RADIO**  
 7/6 F. J. CAMM Postage 6d.

- MULLARD REFERENCE MANUAL OF TRANSISTOR CIRCUITS.** 12/6. Postage 1/-.
- MODEL ANSWERS to C & G Exams. TELE-COMMUNICATION PRINCIPLES A & B** at 7/6 each. Postage 9d.
- USING TRANSISTORS.** By D. J. W. Sjöbbema. 15/-.. Postage 6d.
- THE RADIO AMATEUR'S HANDBOOK.** By ARRL. 1960 edition. 32/6. Postage 2/-.
- THE RADIO AMATEUR OPERATOR'S HANDBOOK.** A Data publ: 3/6. Postage 4d.
- MULLARD CIRCUITS FOR AUDIO AMPLIFIERS.** 8/6. Postage 1/-.
- COIL DESIGN & CONSTRUCTION MANUAL.** Bernard No. 160. 5/-.. Postage 3d.
- RADIO VALVE DATA.** Compiled by "VW" 6th Ed. 5/-.. Postage 9d.

**THE MODERN BOOK CO.**  
 BRITAIN'S LARGEST STOCKISTS of British and American Technical Books

**19-21 PRAED STREET, LONDON, W.2.**  
 ★ Phone: PADddington 4185  
 ★ Open 6 days 9-6 p.m.

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

THE MANAGEMENT WOULD LIKE TO WISH ALL OUR CUSTOMERS  
A VERY HAPPY CHRISTMAS & GOOD HEALTH & PROSPERITY IN 1961

GIVE A PRESENT THAT WILL REALLY BE APPRECIATED!

THE MIRACLE SUPER SIX PLUS 2 TRANSISTOR KIT—THE GREATEST OF THEM ALL

ANY PART SOLD SEPARATELY

Makes up to a portable transistor superhet embodying all the latest design developments including a self-oscillating mixer, two double-tuned IF stages, audio amplifier and a matched push-pull output stage. Also two germanium diodes are incorporated, additional to the six Mazda transistors, one as detector and the other to assist the AGC as a variable damping element.

**12 Good Reasons why the Miracle has no equal**

- ★ Printed Board engraved with component locations
- ★ Special provision for use as a CAR RADIO
- ★ Double-tuned IF Transformers
- ★ 6 First Grade Mazda transistors plus 2 Mazda hi-efficiency diodes
- ★ Hi-flux 5in. (12000 lines) 25-ohm loudspeaker
- ★ Full coverage Medium and Long wavebands
- ★ 3½in. tuning dial with 5:1 slow motion
- ★ Long life dry battery. 150/200 hours
- ★ Internal high-Q Ferrite Aerial
- ★ Push-pull matched output stage 400-milliwatts
- ★ 3½in. x 7½in. x 10in. attractive two-tone case—total weight approx. 4 lb.
- ★ Comprehensive Manual supplied—so easy to build

Our inclusive price for all components, cabinet and battery, complete in every detail.

**£11.10.0**

Plus 3/6 Regd. p.p.

INSTRUCTION MANUAL and CIRCUIT BOOK containing itemised list of all component prices. 3/6 post free. Any part sold separately.

ACCLAIMED BY OVER 10,000 PEOPLE THE FINEST TRANSISTOR KIT OBTAINABLE

**RADIO CLEARANCE LTD., 27, TOTTENHAM COURT ROAD, LONDON W.1.**

Telephone Museum 9188



**BAKELITE CABINETS**  
Sale Price 2/9

Brand New. Colour brown. Attractive design. Size: 12 x 7 x 5½ins. Ideal for small receivers, converters, etc. P. & P. 3/9.

**AMPLIFIERS. PORTABLE 49/6.** (Mk.D2A). 3 watts ECL82 valve. A.C. mains. Output transformer included (two controls). Latest circuit including negative feedback. Knobs 2/6 extra. P. & P. 3/6.

**TAPE AMPLIFIER. 77.19.6.** 5-valve amplifier, output 3.5 watt. Valve line up: 6CC88, ECL82, 6HW6, 6BM4, 6Z60. Input to Microphone, Radio and Gram. Controls: Record playback volume, tone, and OFF/ON. Size: 8½ x 8 x 4½ins. Ins. and Carr. 4/6.

**S/VISION STRIP. 2/8.** "Pressey" L.F.'s 10/6 Meis sound. 14 Meis vision. 8 Vholders (not included). Size: 8½ x 5 x 4½ins. Circuit incl. P. & P. 2/6.

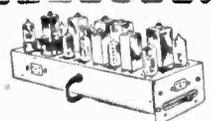
**S/VISION STRIP. 2/8.** Not tested. Complete sound and vision strip. 8 Valveholders (not included). L.F.'s 16-19.5 Meis. Size: 8½ x 4½ x 4½ins. Circuit incl. P. & P. 2/6.

**VALVES—SALVAGE—GUARANTEED**

9d. EACH. 1D6, 1D1, 6B8, 8D2, 9D2, 12Y4, 18, 78, 1208A, 2050, 3151, 7193-2C22, A16, D1, EA50, EB34, EF36, EF50-638PT, GTIC, KT24-ARP18, LP260, NGT2, PM202, QP21-VR35, SP41, SP61, T41, TT11, W21. Post extra, see below.

2/9 EACH. 2D21, 6BA6, 6C4, 6C8, 6D6, 6M1, 6P12-277, 6P13, 6P14, 6P15, 6Y5, 6K7, 10F1, DF06, DH81, EBC41, EF36, EF91-813, EF92, EL32, KT93C, KT91, KTW61, P61, PEN40, PEN40, PL33, U22, U31, UB41, U66, VP41, VP133. Post extra, see below.

7/8 EACH. 5U4, 5Y3, 6AR, 6CK4-EL41, 6J7, 6K8, 8S17, 6SN7, 6P28, 6V6, 4X5, 12AT7, 12K7-W76, 12K8, 12Q7-DH76, 20D1, 45U, B36, EBC33, EOC81, ECH35, EL3A, EZ40, KT30, PZ30, TH233, U24, UY411. Postage on 1, 9d.; on 3, 1/-; on 6, 1/6; on 12, 2/6.



**EXTENSION SPEAKER, 19/9**

In polished oak cabinet of attractive design. Complete, fitted with 8in. P.M. speaker for the highest quality, flex and switch. Ready for use. Ideal for kitchen or workshop, etc. Ins. and Carr. 3/9.



**CONTINENTAL EXTENSION SPEAKER 19/9** Ideal for "extra stereo" phonic speaker. Covered in smart 'two-tone leatherette' colour scheme. Contains 8in. P.M. Speaker, ready for use. P. & P. 3/9.

**8 in. P.M. SPEAKER. 5/9.** Limited quantity of these modern type speakers. They are tested and they have a slight cone fault that is repaired not affecting the quality. P. & P. 2/6.

5in. P.M., 6/8. As above, but fitted with O.P. Transformer. P. & P. 2/6.

5in. P.M., 9/9. Of highest quality, fitted with O.P. Transformer P. & P. 2/6.

**ELLIPTICAL SPEAKERS, 15/9.** 8 x 3in. and 7 x 4in. Brand New Specially made for Record and Tape Recorder Cabinet. P. & P. 2/9

**ELLIPTICAL SPEAKERS, 19/8.** Brand New. Ideal for record cabinets. 8 x 3in. P. & P. 2/9.

**HEATER TRANSFORMER 7/9.** 12 volt at 1½ amp. 0-200-250 volt primary. Post and packing 2/6.

**OUTPUT TRANSFORMER.** Our Price, 1/8. Salvage, guaranteed. Standard size. 2-5 ohm; matching pentode or tetrode output valve. Post and packing 1/8. 20 for 20/-; packing and carriage 5/6.

**FRAME OUTPUT TRANSFORMER 1/8.** To match our low impedance scanning coils. Post and packing 1/6.

**EY51 ISOLATION TRANSFORMER, 2/8.** 1-1 ratio. Suitable 6.3 tube as isolation transformer. Post and packing 1/8.

**350-0-350 VOLTS at 250 mA., 7/8.** 6.3 volt at 4 amp., 4 volt at 4 amp., 4 volt at 7 amp., 4 volt centre tapped at 1 amp. Primary 200-250 volt. 50 cycles. Post and packing 3/9.

**MAINS AUTO.** Our price 5/9. 0-205-225-246 volts at 300 mA. Isolated windings of 6.3 volt at 2-6 amp., 6.3 volt at 3-6 amp., 2 volt at 1-4 amp. Postage 3/9.

**MAINS TRANSFORMER.** Our price 5/9. Primary 200-250 volt. Secondary 300-0-300. 5 volt at 3.8 amp., 5 volt at 3 amp. Post and packing 2/9.

**REMEMBER**  
**PP COMPONENTS LTD.**  
of 219 ILFORD LANE, ILFORD, ESSEX

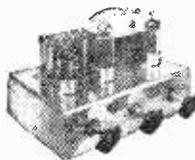
**STAMP FOR FREE CATALOGUE**  
Regret U.K. only - H.P. Terms available

# Premier RADIO

23 TOTTENHAM COURT ROAD, LONDON W.1  
and at 309 EDGWARE ROAD, LONDON W.2

TEL.: MUSEUM 3451/2  
TEL.: PADDINGTON 6963

## "THE MID-FI" A NEW DESIGN 4½ WATT AMPLIFIER KIT



MAY BE BUILT FOR **95/-** plus 3/- p. & p.  
A new circuit for the home constructor requiring good quality medium powered Amplifier for reproduction of Records of F.M. Broadcasts. For use with Loudspeakers of 3 or 15 ohms impedance. Technical Specifications: separate bass and treble controls. Valve line-up EF86, EL84, EZ80. Voltage adjustment for A.C. mains from 200-250 volt. Negative feedback. Size 7 x 5 x 2in., overall height 5in. Silver hammered finish Chassis. Instruction Book 1/-.

up EF86, EL84, EZ80. Voltage adjustment for A.C. mains from 200-250 volt. Negative feedback. Size 7 x 5 x 2in., overall height 5in. Silver hammered finish Chassis. Instruction Book 1/-.



### THE EASY SIX

6-Transistor Battery Portable  
MAY BE BUILT FOR **£9.15.0** plus 3/- p. & p.

Ever-Ready PP7 Battery extra 3/3

STAR FEATURES ★ Six Mullard Transistors ★ Internal Ferrite Rod Aerial ★ Provision for Car Radio Aerials ★ 5in. Loudspeaker ★ Printed Circuit, with component positions indicated ★ Pre-assembled Dial Assembly ★ 500 milliwatts push pull output. ★ Full medium and long waveband coverage ★ Attractive two-tone Blue/Cream Vynide covered Cabinet, dimensions 8½ x 6½ x 3in. Weight, 3 lb. with battery. Inst. book 1/6.



## THE PREMIER TR/2

Once again Premier is first with another magnificent offer. Introducing the "TR/2" the latest and cheapest addition to our range of popular Recorders.

- Star features:  
★ Latest BSR Tape Deck, with interlocking device to prevent accidental erasure.  
★ Single speed 3½in. per sec.  
★ Playing time 5½in. std. tape, 1½ hrs; L.P. tape, 2 hrs 8 mins.  
★ Volume on/off and tone control.  
★ Power output 3 watts.  
★ Input sockets for Microphone, Radio/Gram.  
★ Extension speaker socket. Size: 13½ x 9½ x 6in., weight 17 lb.

PRICE including Microphone, tape and spare pool  
**19 Gns.** Plus 15/- P. & P.

### SPECIAL BARGAIN OFFER

THE PERFECT STEREO SYSTEM:

Two DL7-35 power amplifiers; Original cost £91.0.0

one SP21 Stereo Control Unit.

**Our Price £71 Gns.**

Brief Specifications:

SP21 Power requirements 6.3V at 1.3A A.C., 250V at 5mA D.C. Dimensions 1½ x 9 x 4in. ORIGINAL PRICE £28.10.0  
DL735 Power output each amplifier, 54 watts peak. Valve line-up: GZ34, 2-EL34, ECC83, EF86. L.S. impedance 4, 8 or 16 ohms. switch selected. ORIGINAL PRICE 30 GNS.

## AERIALS

BAND I BAND II BAND III

Combined Arrays I and III  
1+3 Element Loft Mounting .. 38/8  
1+5 Element Loft Mounting .. 49/9  
1+3 Element Wall Mounting .. 45/3  
1+5 Element Wall Mounting .. 61/-  
1+3 Element Chimney M'ting. 57/10  
1+5 Element Chimney M'ting. 66/9

### Band I

Single Dipole Wall Mounting .. 24/7  
Single Dipole Chimney M'ting. 40/2  
X Aerial Chimney Mounting .. 62/3  
H Aerial Chimney Mounting .. 67/7

### Band III

8 Element Yagi Wall Mounting 33/-  
6 Element Yagi Wall Mounting 43/-  
9 Element Yagi Wall Mounting 56/-  
Chimney Lashing Mounting add 10/-  
Double 6 Array, only with clamp 83/-

### Band II

Single Dipole Wall Mounting .. 20/5  
Single Dipole Chimney M'ting. 29/9  
H Array Chimney Mounting .. 52/4

### REPAIR KITS

Band III Folded Dipole with Insulator, Complete .. 9/3  
Band I Insulator With Two 4 inch Dipoles For 1 or 4 inch Booms, Complete .. .. . 19/5  
6 inch Lashing Kit, 12/11. 7½ inch Lashing Kit. . . . . 14/8  
6 inch Wall Bracket With U Bolts. . . . . 7/10  
1-1½ inch Clamps, 3/10. 1-2 inch Clamps Universal . . . 5/4  
Bracket Repair Kit, J Bolts; U Bolts; 20ft Lashing Wire; Thimbles; Corner Plates . . . . . 6/-  
Insulators, All Types . . . . . (Enquire)  
Co-Ax. Semi Air Spaced, 7ft. 3d. . . . . Plugs, 1/2  
Soud 6d. for Lists. Please state Channel when ordering.  
Cash with Order. Post and Packing 3/- extra.

SATISFACTION OR MONEY BACK GUARANTEE

## WALKER & SQUIRES

PINNOX STREET, TUNSTALL, STOKE-ON-TRENT

Phone: Stoke-on-Trent 88781

## EXPRESS ELECTRONICS

ROSEDENE LABORATORIES

KINGSWOOD WAY, SELSDON, SURREY

VALVES NEW TESTED AND GUARANTEED

FOR THREE MONTHS

1C1	7/6	61W6	7/6	25A80	8/6	ECU82	7/6	PCC84	9/-
1C3	8/-	6BW7	7/-	25L6GT	8/6	ECU83	7/6	PCF80	9/-
1F1	8/-	6C10	9/-	25Y40	9/-	ECU84	9/6	PCF82	7/6
1F3	7/6	6192	3/6	30C1	8/-	ECF80	8/6	PCL82	8/-
1F31	8/-	6192	3/6	30L1	8/-	ECF82	8/6	PCL84	7/6
1F19	7/6	618GT	2/-	33L6GT	8/-	ECU42	9/-	PL81	9/8
1L4	6/9	617GT	7/6	35W4	8/6	ECH81	10/-	PL82	8/-
1P1	8/-	6K7G	5/6	35Z4GT	5/-	ECL80	8/6	PY81	8/6
1P10	7/6	6K8G	5/-	3763	7/6	ECL82	9/6	PY82	7/6
1P11	7/6	6K7GT	8/-	40	8/6	EF41	9/-	PY83	7/6
1K5	5/6	68L7GT	6/-	DAF91	7/6	EF90	8/6	R19	11/6
185	5/6	68N7GT	4/6	DAF96	8/-	EF86	9/-	TH41	15/6
1T4	7/6	6V86	7/6	DF91	7/6	EF91	3/-	U26	5/6
1U3	6/-	6X4	7/-	DF98	8/-	EF92	5/6	U52	7/6
3Q4	8/-	6X30	5/-	DH76	7/6	EL41	9/6	U76	7/6
381	7/6	6X3GT	6/-	DH77	7/-	EL44	8/6	U78	7/-
3V4	7/6	787	7/6	DH142	8/6	EM34	7/-	UBC41	8/6
5U4Q	7/6	7C5	7/6	DH130	10/-	EY31	7/6	UCH42	9/6
5Y3GT	7/6	787	9/6	DK91	7/6	EY81	10/-	UF41	8/6
5Z4G	9/6	818	3/6	DK92	7/6	EZ40	7/6	UL41	8/6
6AK5	6/6	12A4H	10/-	DK96	8/-	EZ80	6/-	UY41	7/6
6AL5	3/6	12A7T	5/-	DL82	7/6	EZ81	9/-	W76	6/8
6AM6	3/-	12A7	7/6	DL94	7/6	KT38C	9/6	W142	8/6
6AT6	7/6	12AX7	7/6	DL96	8/-	KT86	11/6	X17	7/6
6BA5	7/-	12BH17	10/6	EB91	3/8	N17	7/6	X142	9/-
6BE6	7/-	12CK6(T1)	10/6	EBG11	10/-	N18	8/-	X150	9/-
6BE7	8/9	12Q7GT	7/6	EBF90	8/6	N19	7/6	Z77	3/4
6BS7	10/6	16A3	9/-	ECC81	5/-	N37	10/6	ZD17	7/6

VOLUME CONTROLS MIDGET SIZE LONG SPINDLES, D.P. switch. 3/9. S.P. 3/3. Lens switch, 2/6. Values 10K to 2M. Pre set 2/6.

### MATCHED PAIRS

EL84 17/-, 6V6G 17/-, 6BW6 18/- per pair. Push Pull O.P. Transformers for above 3-15Ω 14/6. 12" P.M. Speakers 3Ω 24/8. Baker's "Belhurst" 12" 16Ω 13W. 90L. P. & P. 2/6. 12" Stereo Model 27.7.0.

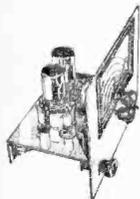
### SETS OF VALVES

DK91, DF91, DAF91, DL92 or DL94	19/6
DK96, DF96, DAF96, DL96	27/6
1C3, 1F1, 1FD1, 1P1	27/6
1R5, 1T4, 185, 384, or 3V4	19/6

Postage and packing od. Over £1 post free. C.O.D. 2/6

# CODAR "CLIPPER"

All Band Receiver, 10-2000 metres!



- Anyone can build this amazing radio in one evening. Listen to:
- ★ Amateurs, shipping, aircraft, short, medium and long wave stations throughout the world!
  - ★ Precision 7 x 4in. dial with two pointers, dual slow motion 8-1 and 48-1 ratios, complete with escutcheon
  - ★ Bandsread on ALL bands!
  - ★ Air-spaced tuning and regeneration condensers!
  - ★ Polystyrene iron-cored plug-in Coils!

Tremendous performance with latest circuitry using Hi-gain regenerative valve detector PLUS Transistor Booster Stages. Transistor stages are completely assembled, tested, in sealed cans, only 3 wires to connect! Chassis 8 x 5 1/2 in. all holes punched, ready for simple assembly with step-by-step instructions.

Uses small standard dry batteries which will last many months.

"CLIPPER" Kit, complete with all components, valve, one transistor stage, nuts, bolts, wire, 2 coils 20-60 and 55-180 metres.....79/6. P. & P. 2/- Extra transistor stage can be added at any time.

"SUPER CLIPPER" Kit, complete, two transistor stages.....88/6. P. & P. 2/- Optional Front Panel, 10 x 7 1/2 in., beautiful stoved Silver Hammer finish, dial aperture and holes punched, dial glass.....6/9. P. & P. 1/6.

Send 3d. stamp for Leaflet NOW

**CODAR (RADIO) CO.**

Colebrook Road, SOUTHWICK, Sussex

## A television course for you to study at home

Entirely new! Practical!  
Bang up to date!

### THE FAMOUS BENNETT COLLEGE OFFERS YOU THIS

An entirely new course of study based upon up-to-date techniques has now been prepared by The Bennett College.

The course is non-mathematical, and contains clear diagrams, starting from the very beginning (even including the basic principles of sound radio receivers, if desired) and covering all that you need to know!

This is what you've been looking for! A home-study course includes: production

of the signal, scanning and reproduction of picture from signal. Aerials, types and purpose. The cathode-ray tube. Time-base oscillators, and output circuits. Synchronisation. Video frequency amplifiers. The TV tuner, turret, incremental, etc. Television test gear. Television faults.

For more details, fill in the coupon below. Your studies cost little, the book you need is included in the cost.

-To THE BENNETT COLLEGE (Dept. A104 TV Sheffield)

Please send me details of the new TELEVISION SERVICING COURSE

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

AGE \_\_\_\_\_

## UNIVERSAL AVOMETER MODEL D

Just released by the Air Ministry, these famous AC/DC Test Meters are a "snip" for anyone requiring a First Grade General Purpose Instrument. Normal Avometer size, 7 1/4 in. x 6 1/2 in. x 3 1/2 in. with carrying strap, indication being given on a 5in. Mirror Scale. Thoroughly overhauled and complete with batteries and instructions. Provides 34 ranges of current, voltage and resistance, as follows:

D.C. Voltage	A.C. Voltage	D.C. Current	A.C. Current
1.0 mv.	7.5 v.	15 ma.	75 ma.
300 mv.	15 v.	30 ma.	150 ma.
1.5 v.	75 v.	150 ma.	750 ma.
3 v.	150 v.	300 ma.	1.5 amps.
15 v.	300 v.	1.5 amps.	7.5 amps.
30 v.	600 v.	3 amps.	15 amps.
150 v.	750 v.	15 amps.	
300 v.	1,500 v.	30 amps.	
1,500 v.			

ONLY £8.19.6 (carriage 3/6)

**COMMUNICATIONS RECEIVER RU155.** The famous Bomber Command receiver known the world over to be supreme in its class. Covers 5 wave ranges 18.0 to 7.5 Mc/s, 7.5 to 3 Mc/s, 1.500 to 600 kc/s, 500 to 200 kc/s, and 200 to 75 kc/s, and is easily and simply adapted for normal mains use. Full details being supplied. All sets thoroughly tested and in perfect working order before dispatch, and on demonstration to callers. Fitted latest type super slow-motion tuning assembly. Have had some use but are in excellent condition. ONLY £9.19.6. **A.C. MAINS POWER PACK (OF THE STAG),** fitted the above in black crackle case to match receiver, enabling it to be operated immediately, by just plugging in, without any modification. With built-in 8in. speaker. £6.10.0. **DEDUCT 10/- IF PURCHASING RECEIVER AND POWER PACK TOGETHER.** Send S.A.E. for illustrated leaflet, or 1/3 for 10-page booklet which gives technical information, circuits, etc., and is supplied free with each receiver. Add carriage 10/6 for Receiver, 5/- for Power Unit.

**V.H.F. RECEIVER TYPE R.1392.** A superb 15 valve superhet receiver covering 95-150 Mc/s (2-3 metres), being fully tunable over that range, with provision for Crystal Control. Has 2 stages of R.F., 3 of I.F., BFO, AGC, etc. Fitted with 2in. square meter for Oscillator and Audio Signal checking. Size 19in. x 10in. x 10in. Used, but in very good order, thoroughly air tested before dispatch. Power supply required, 240-250 volts at 80 mA. and 6.3 volts at 4 amps. Complete with valves and circuit diagram. ONLY 79/6 (carriage etc., 10/6).

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

**CANADIAN MOVING COIL PHONES.** Low resistance, fitted noise excluding chamolite ear muffs, and leather covered head band. Lead terminates to jack plug. Supremely comfortable. BRAND NEW. ONLY 19/6 (post 1/6).

**INTERCOM TELEPHONE SET.** Two pairs of Brand New Headphones connected to Braest Microphones, with leads, etc. in fitted carrying cases. Supplied with 41 volt battery, 10 yards twin wire, and full instructions for connecting to make super intercom. ONLY 27/6 (post 3/6). Extra Wire 3d. per yard.

**RCA 8in. P.M. SPEAKER.** In heavy black crackle metal case. Can be used as normal 3 ohms extension. Size 1 1/2 in. x 10 in. x 6 in. NEW IN MAKER'S CARTONS. ONLY 45/- (post 3/6).

**AMERICAN HALLCRAFTERS 6 VOLT VIBRATOR-PAK.** Output 300 volts D.C. at 170 mA. Designed to run Communications Receivers from 6 volt car battery. In grey metal case, size 6 1/2 in. H. x 6 1/2 in. W. x 7 1/2 in. D. Complete with 2 valves, 6X5, and instructions, in maker's cartons. BRAND NEW AND UNUSED. ONLY 29/6 (carr. 3/6).

**POWER UNIT TYPE 3.** Primary 200/250 volts A.C. 50 cycles. Outputs of 250 volts 100 mA. and 6.3 volts 4 amps. Fitted double smoothing, and 2 meters to read H.T. Current and Voltage. For normal rack mounting (or bench use) having grey front panel, size 19in. x 7in. BRAND NEW. ONLY 79/6 (carriage 7/6).

**10/- CONSTRUCTION PARCEL.** 10 yards each of 6 colours wiring wire, solder, 24 each assorted Resistors and Condensers.

**RESISTORS.** 100 assorted values. NEW, 10/-.

**CONDENSERS.** 100 assorted mica and silvermica. NEW 12/6.

**SPRAGUE CONDENSERS.** Metal cased, wire ends. New 0.01 mfd. 1,000 volt, and 0.1 mfd. 500 volt, 7/6 per dozen. Special quotes for quantities.

**MINIATURE MOTORS.** Ideal for models. Will operate on 3-6 v. D.C. Size 1 1/4 x 1 x 1 1/4 in. plus 1/4 in. spindle. BRAND NEW only 7/6.

## HARRIS ELECTRONICS

(LONDON) LTD.

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

(Phone TERminus 7937)

Please include carriage costs on All items.

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

**MORE BARGAINS FROM OUR EXTENSIVE STOCK**

**POTENTIOMETERS**

100 ohm, Burco w/w	3/6 ea.
400 ohm, 4 watt w/w	1/6 ea.
400 ohm, small Colvern w/w	1/6 ea.
600 + 600 ohm, new Instrument (Boxed)	2/- ea.
2K w/w, Ior CR.100	2/6 ea.
3K miniature pre-set	1/3 ea.
3K American w/w, with switch	2/6 ea.
3K Burco w/w, instrument	1/6 ea.
3K + 50 ohm Colvern tandem	3/- ea.
10K + 10K Morganite, ganged, carbon	2/- ea.
20K T.V. pre-set	7/- ea.
20K Colvern w/w	1/6 ea.
50K Transistor pre-set	6d. ea.
50K w/w, Instrument, good condition	1/9 ea.
1 meg. 1 in. with d.p. switch	2/6 ea.
2M miniature Deaf Aid	1/3 ea.
Battery charger Croc. clips	1/- ea.
Clarostat mains droppers 250-110V.	2/6 ea.
Small inspection lamps with on/off switch, lead and plug for dashboard	2/6 ea.
GPO Jack plugs	1/9 ea.
Bulgin Jack plugs	1/6 ea.
Ringin Generators	3/6 ea.
Mic. Transformers	1/- ea.
American Jack Sockets	1/- ea.
5A. Mains Plugs and Sockets	1/- ea.
New RCA Mains droppers c/w tapping panel, fuses and flex	2/6 ea.
New TV. IFT. Can Assemblies	6d. ea.
Slydlok fuses 5A New	2/6 ea.
Oscilloscope No. 11 with mains power unit. Beautifully finished 3in. CRT for 19in. rack. Good condition. Requires X & Y shift and time base modification. £12.10.0.	

**MICRO SWITCHES**

Press to make or press to break	2/6 ea.
Sensitive press to make	2/6 ea.
Press to make with reset	2/6 ea.
B. & L. miniature protective: 0.2A. and 0.4A. with cut-out on overload	1/6 ea.

**RELAYS**

Canadian (High grade) c/o. 1.5V. min	5/6 ea.
American 10 c.o. Coil res. 6,500 ohms.	4/6 ea.
American 12-24V. 4m. 4b. new	4/6 ea.
600 type 500 + 500 ohms. 1 c/o. 2m.	4/6 ea.
2000 type 500 ohm 2 c/o. 1b.	5/- ea.

**CAPACITORS**

250 mfd 25V. D.C.	6d. ea.
Miniature F.M. Ganged Tuning Caps	3/6 ea.
30 pf small ceramic trimmers	6d. ea.
35 pf air-spaced trimmers	9d. ea.

Slydlok fuses 30A New.	3/6 ea.
GEC Tuneons, new.	1/- ea.
Bulbs 6.2V. 0.2A.	6d. ea.
Bulbs 6.3V. 0.3A.	6d. ea.
Bulbs 6.5V. 0.3A.	6d. ea.
Bulbs 8V. 3W.	6d. ea.
R.109 Receivers with valves, good condition (unchecked)	50/- ea.
1/2in. ribbed coil formers	4d. ea.
Ringin Generators	3/6 ea.
Insulated terminals	6d. ea.
F & E Co-ax. plugs & sockets	2/6 Pr
Thermometers, new, boxed, 50-70°C	2/- ea.
Wheatstone Bridges	27/6 ea.

POSTAGE AND PACKING on all the above, 6d. except for Wheatstone Bridges, 3/6 each.

**super RADIOTECH limited**

38 MONMOUTH ST., UPPER ST. MARTIN'S LANE, LONDON, W.C.2

**BOOKS for CONSTRUCTOR**

A NEW PRACTICAL WAY OF UNDERSTANDING BASIC ELECTRICITY, 5 parts, 55/-, BASIC ELECTRONICS, 6 parts, 66/-, THE PICTURE BOOK WAY The Complete Set sent on payment of first instalment. LEARN WHILE YOU PAY Write for FREE Illustrated Prospectus

**COIL DESIGN AND CONSTRUCTION MANUAL.** How to make your own RF and AF Coils, Chokes and Transformers. Fully illus. 5/6 post free.  
**TRANSISTOR CIRCUITS No. 1.** Gregory, 2/10, post free. 32 pages, 8 circuits, 24 plans and illustrations. Full constructional details, suitable for beginners and advanced.  
**TRANSISTOR CIRCUITS No. 2.** Sinclair, 2/10, post free. 13 new projects including Transistors, FM Tuners, 1 watt Hi-Fi amplifier, several pocket radios and sub-miniature Transmitters.  
**TRANSISTOR CIRCUITS No. 3.** Sinclair, 2/10, post free. 11 projects using prefabricated circuit units, complete commercial receiver included.  
**PRACTICAL TRANSISTOR RECEIVERS.** Sinclair, 5/6, post free. 56 pages, 36 plans and illustrations. Over 50 different receivers described.  
**TRANSISTOR SUPERHET RECEIVERS.** By Sinclair, 8/-, post free. 92 pages, over 60 illustrations. Covering all aspects of Design, Servicing, and Construction. Includes 30 receiver circuits.  
**HIGH FIDELITY LOUDSPEAKERS ENCLOSURES.** 5/6, by Babam. 28 pages, 25 plans and illustrations.  
**ELECTRONIC NOVELTIES** by Bradley, 5/6.  
**ELECTRONIC GADGETS** by Bradley, 3/10.  
**RADIO CONTROL OF MODELS.** Sommerhoff, 5/6.  
**BOYS' BOOK OF CRYSTAL SETS AND SIMPLE CIRCUITS.** 2/10, post free. 36 pages, 29 illustrations and plans. The know how on constructing 12 different sets without any previous knowledge.  
**BEGINNERS' GUIDE TO RADIO.** Camm. Edition, 8/-.

All prices post free SEND STAMP FOR LISTS  
**SELRAY BOOK CO.**  
 80 HAYES HILL, HAYES BROMLEY, KENT

**THE PUNCH YOU NEED!**

**HOLE PUNCHES**

<b>One Minute Type</b>		
3/8" diameter	...	5/6 ea.
1/2" diameter	...	6/4 "
<b>Screw-up Type</b>		
3/8" diameter	...	6/8 ea.
1/2" diameter	...	7/2 "
3/4" diameter	B7G	7/8 "
1" diameter	B8A, B9A	7/8 "
1 1/8" diameter	...	8/- "
1 1/4" diameter	...	9/6 "
1 1/2" diameter	...	10/3 ea.
1 3/4" diameter	Int. Octal	10/11 "
2" diameter	...	13/3 "
2 1/4" diameter	...	15/6 "
2 3/4" diameter	B9G	17/11 "
3" diameter	Meter	27/8 "

Postage and packing 1/-

Post and packing 1/9

The above prices apply to orders received on or after 1st of January, 1961. For orders received prior to this date please send for price lists, or refer to our advert in previous issue.

**Oliver & Randall Ltd.**

Dept. P.W.

40, Perry Hill, London S.E.6  
 Tel.: BECKenham 8262

**Lyons Radio Ltd.**

3 Goldhawk Road  
 Shepherds Bush, London W.12  
 Telephone: SHEpherds Bush 1728

0/100 MICRO-AMMETERS. Flush panel mtg. 2 1/2in. dia., m/c. meters by Sangamo Western. scaled 0/100, price only 3/76.

**MAINS POWER UNITS.** Input 200/250v. A.C. Output: H.T. 325 v. smoothed D.C. at 160mA, L.T.: 6.3v. at 4A, twice. Size: 10 1/2in. high by 13in. deep by 7in. Special features include double filter ensuring negligible hum, Mansbridge type smoothing condensers throughout, separate switches and fuses for mains and H.T. with pilot light light indicator for each. Everything of top quality. 5U4 rectifier included, condition as new and unused. Truly remarkable value Price only 59/6, carriage 7/6.

**MAINS TRANSFORMERS.** Manufacturers surplus, Pri. 200/250v. 40/80cps. Sed. 350/0/350v. at 150mA, 6.3v. at 4A, twice. 5v. at 3A. Fully impregnated, inverted mtg. approx 6 x 3 x 3in. As new. Price only 19/6, post 3/6.

**SMOOTHING CHOKES.** Approx 10H. at 150mA, D.C. resistance 200 ohms, Wt. 6 lbs., fully impregnated, inverted mtg. Size approx. 4 x 4 x 3in. Highest class make, as new. Price only 7/6, post 2/9.

**TWIN SCREENED CABLE.** Each conductor 21A, composed of stranded tinned copper, wire, insulated and colour coded with outer screening. Known as Du Vinnet small. Price only 35/- per 100 yards, 20/- per 50 yds, 12/6 per 25yds. Carriage 5/-, 3/6, 2/6 respectively.

**EARPHONE INTERCOM.** Single earphones which also serve as microphones. Two connected together make a simple but amazingly efficient means of two-way communication. Self energising, no batteries reqd. Dozens of uses in the Home or Office and provide hours of fun for the youngsters. Ideal gift. Supplied ready for use connected with 38ft. twin flex. Extra flex add 3d. per yard. Price only 9/6, post 1/6.

# LASKY'S RADIO

## BARGAINS IN 4-SPEED AUTO-CHANGERS

- B.S.R. type UA8 . . . . £8.19.6
- B.S.R. UA8, stereo . . . . £7.19.6
- B.S.R. UA12, stereo . . . . £8.19.6
- B.S.R. type UA14 . . . . £7.19.6
- COLLARO Conquest, wired for stereo, with monaural p.u. . . . £8.19.6
- As above, stereo. . . . £7.19.6

Post on all above 5/-

## SINGLE PLAYERS

- Auto start and stop. Complete with pick-up and crystal cartridge.
- GARRARD 4SP . . . . £8.19.6
  - GARRARD TA Mk. II, wired for STEREO, plug-in head . . . £8. 9.0
  - E.M.I. 4-speed, wired for STEREO and fitted Acos stereo T.O. cartridge . . . . £8.19.6
- Post on all above 5/-
- B.S.R. TU9, non-auto Turntable and separate pick-up . . . . 79/6
- Post free.
- COLLARO JUNIOR 4-speed motor and separate pick-up with cartridge styl . . . . 75/-
- Post free.

## 3-SPEED TRANSISTOR PORTABLE RECORD PLAYER

CAN BE BUILT FOR £9.19.6

Carr. free



6 v. operation. For all L.P. and standard records. All components available separately.

**AMPLIFIER.** 300 milliwatts push-pull output, using two OC71 and two OC72 transistors. Fully assembled, 79/6. Knobs, 3/6 extra.

**LOUDSPEAKER.** 30 ohms, 7 x 4in elliptical, matched to Amplifier, 25/-.

**3-SPEED TURNTABLE.** 6 v., with rubber mat and speed adjustment, complete with t.o. crystal cartridge and two sapphire styl. 79/6.

**CARRYING CASE.** As illustrated, handsome two-tone finish, 17in. deep, 14in. wide, 5in. high. Well made and finished. 49/6.

Batteries extra.

## THE 'VANCOUVER' 3-TRANSISTOR POCKET RADIO

CAN BE BUILT FOR 39/6

Post 1/6



Uses 3 transistors plus germanium diode on printed circuit size 31 x 4 x 1in. and incorporates ferrite rod aerial. Tunable over medium and long waves. Extremely simple to build. Ideal Christmas gift. Circuit diagram and full instructions, 1/6 (free with parcel).

## THE 'EASY-SIX' 6-TRANSISTOR PORTABLE RADIO

CAN BE BUILT FOR £9.15.0

Post 3/-

500 milliwatts p.p. output. Full medium and long wave coverage. Uses six first-grade Mullard transistors, 5in. loudspeaker, internal ferrite rod aerial with provision for car radio aerial. The printed circuit with component positions clearly shown, plus pre-assembled dial makes construction very simple. The smart blue/cream Vyndie covered cabinet measures 81 x 64 x 3in. Uses PP7 battery (3/3 extra). **CIRCUIT DIAGRAM** and full step-by-step instructions, 1/6 (free with parcel).

## POCKET VOLT TEST METER

Two D.C. ranges: 0.250 v. and 0.25 v. Complete with leads and test prods in leather case. LASKY'S PRICE 12/6 post free.

LASKY'S 100-page COMPONENTS CATALOGUE, will save you pounds. Price 2/-, post 6d. Our latest 12-page Bargain Bulletin included free (separately, price 6d.).

207 EDGWARE ROAD, W.2 Near Praad Street PAD 3271/2  
Both addresses open all day Saturday.

42 TOTTENHAM COURT ROAD, W.1. MUS 2605  
All Mail Orders to Lasky's Radio, Dept. PW, 207 Edgware Road, London W.2

# NEW!

## DO-IT-YOURSELF TRAINING TECHNIQUE in RADIO & ELECTRONICS

You LEARN while you BUILD...

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

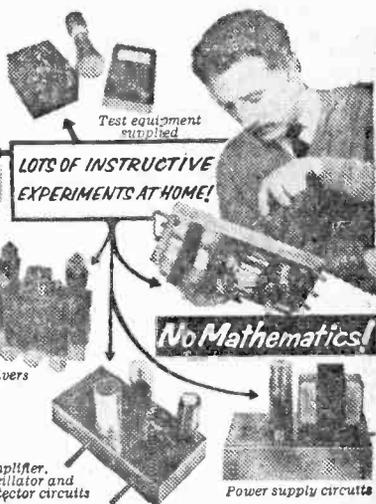
ANNOUNCING—after many years of highly successful operation in the U.S.A. and in Europe—the latest system in home training in electronics is now introduced by an entirely new British training organisation. AT LAST—a comprehensive and simple way of learning—by practical means—the basic principles of radio 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

BRITAIN'S LEADING RADIO TRAINING ORGANISATION

FREE-POST TODAY



LOTS OF INSTRUCTIVE EXPERIMENTS AT HOME!

No Mathematics!

Amplifier and oscillator circuits

Power supply circuits

To: RADIOSTRUCTOR (Dept. G107), Reading, Berks.  
Please send brochure, without obligation, to:

Name .....

Address .....

.....

(821) We do not employ representatives 1-61

**BLOCK CAPS. PLEASE**

**CANADIAN RECEIVER No. 52.** 1.75-16 Mc/s (19-170 m.) in three wavebands. R.F. Mixer, Sep. Osc., 2 I.F.'s, Det./A.V.C., 1st Audio, Output, BFO (10 valves), plus a 3-valve dual Crystal Calibrator. Controls: R.F. Gain, L.F. Gain, Crash Limiter, C.W. Filter, Variable Selectivity, slow and Fast Tuning and Osc. Vernier Tuning. Man or A.V.C. BFO pitch control. Internal 3in. speaker and valve check meter. Power supply required 180 v. H.T., 12 v. L.T. Data and Circuit supplied. A really excellent receiver. £8.19.6, carr. 15/6. Power Supply Unit. 59/6, carr. 5/6.

**GRAMOPHONE MOTORS.** A.C. mains. Gerrard AC-6. 78 r.p.m. For replacements. BRAND NEW. Boxed 35/-. Post 2/6.  
**CRYSTAL CALIBRATOR No. 10.** Good condition, tested, with instruction manual. ONLY 59/6. P. & P. 3/6.  
**MINIATURE 373 I.F. STRIPS.**—For F.M. tuner described in P.W. With 3 of EF91, 2 of EF92 and EB91. A fresh release enables us to offer these once again. BRAND NEW with circuit and full P.W. Reprint. 35/-. OB less valves 12/6. Post either 2/6.

**DEAF AID—MEDRESCO TYPE** (3 min. batt. valves). Complete with min. ktal earphone, earplugs and leather case. Brand New 35/- or with batteries £2 post free.

**R-1155-B,** with latest drive, first class condition. £9.19.6.  
Mains Power control. £8.10.0. Data book. 1/3 post paid.  
**Moving Coil Phones.** Finest quality Canadian, with Chamois ear-muffs and leather-covered headband. With lead and jack plug. Noise excluding, supremely comfortable. 19/6, post 1/6.

**GIANT COMPONENT PARCEL.** Contains 100 1 and 1 watt resistors, 50 Hi Stab resistors, wire-wound resistors, carbon and W/W pots, 100 capacitors, (mica, paper, Sprague, b'as, variable, etc.) valveholders, tag strips, metal rectifiers, sleeving, etc. All components are unused. GUARANTEED VALUE, 25/-, plus 2/6 post.

**CR100 COMMUNICATION RECEIVERS.** Covers 60 Kc/s—30 Mc/s in 6 bands. 1 valve, 2 R.F. and 3 I.F. stages. Crystal gate, BFO etc. Ready for 200-250 v. A.C. mains. 23 watts output for 3 ohms speaker. SUPERB CONDITION AND OUTSTANDING PERFORMANCE for ONLY £21. S.A.E. for illustrated details.

**RCA AR-88 SPEAKERS.** 3n 8in. P.M. speaker in heavy gauge black cracked steel cabinet 11 x 10 x 6in. with rubber feet. Super Quality unit. Brand New, for only 45/-. p. 3/6.

## CHARLES BRITAIN (RADIO) LTD.

11 Upper Saint Martin's Lane, London, W.C.2

TEMPLE BAR 0545.

Shop Hours 9-6 p.m. (9-1 p.m. Thursday).

Open All Day Saturday.

# SOLDERING EQUIPMENT

by



## PRECISION SOLDERING for the ELECTRONICS INDUSTRY

Comprehensive range - Robust & Reliable - Light weight - Rapid heating - Bit sizes 3/32in. to 3/8in. - 'Permagit' or Copper bits - All voltage ranges 6/7v. to 230/250v. - Prices from 19/6

- Also
- Plastic Cable Strippers
- Miniature Solder Pots
- Heat Guards
- Long Life Bits

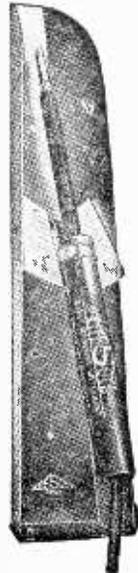
Illustrated is the 25w. 3/16in. replaceable bit model with safety shield.

ADAMIN—the new range of precision micro-soldering instruments—Have you had details?

Brochure No. S 10 sent free on request. Sole Proprietors and manufacturers:

LIGHT SOLDERING DEVELOPMENTS Ltd.

28 Sydenham Road, Croydon, Surrey  
Phone: CROYdon 8589 Grams: Litesold Croydon



## BENSON'S BETTER BARGAINS

**SWITCHES:** Wafer: 3 pole, 4 way, 4 bank, 1P6W6B, 4P2W2E, 1P7W3B, 1P11W2B, 4P2W5B, 8/6 each. Ceramic 2P4W1B, 2P5W1V, 1P1V, 8P3W2B, 4P3W1B, 3/8, STUD, 1P24W2B, 1P8W2B, 8/6; 1P19W2B, 5/6; 1P40W3B in brass case, 12/6. **TOGGLE:** DPST, 2/-; SPST, 1/6. **MORSE KEY** with buzzer, on board, wired for 4 v. battery, 9/6 (p.p. 1/6). **FUSEHOLDERS** twin, with cover, 1/6. **TELE "M"** intercom, sets, good condition, pair 85/-. post free G. B. **METERS** (10Q/4) with two centre-zero movements. 800 and 400  $\mu$ A, 8/6. **TRANSFORMERS.** Open, upright, input 200/250 v. Outputs:—250-0-250 v., 100 mA., 5 v. & 6.3 v. 3 A., 25/-; input 110/250 v. Outputs:—6 v., 2 A. twice, shrouded, 10/8. **MONITOR** 56, triggered oscilloscope, 230 v. A.C. input, with cables and circuit. Cathode probe unit extra, 17/6. £8.10.0. (Est. 15/-). **CR100** Noise Limiter assemblies with valve, 3/8. **NEW M.C. METERS,** 3 1/2in. round flush, 50  $\mu$ A, 70/-; 200  $\mu$ A centre zero, 50/-; 1 mA, centre zero, 45/-; 1 mA, 55/-; 2 1/2in. 1 mA, 22/6; 100 mA, 8/6; 2in. 300 mA, each 8/6; 2 1/2in. M.I., 20 v. A.C., 8/6; 300 v. A.C. 2 1/2in., 15/-; 100 v. A.C. 3 1/2in. 45/-. 150 v. A.C. M.I., 6in., in case 45/-. **VIBRATORS.** Mallory G6340 12 v. 4-pin, 7/8; 0 v. 3-pin reversible, 7/6. **R1155B,** good condition, tested with handbook, £8 (incl. 10/-). **DRIVES:** slow-motion automatic 200:1 ratio, scaled 0-100, 5/8. **R1155 S.M. "N"** type, new, 10/8. **VIBRAPAK** 6 v. D.C. to 250 v. 60 mA., smoothed case, 22/6 (p.p. 3/6), or 12 v. 22/6. **DYNAMOTORS** (post 3/6), 12 v. to 230 v. 80 mA., 11/6. 6 v. to 250 v. 60 mA., 11/6. **CHOKES.** LF 10H, 200 mA, 8/6; 100H, 60 mA, 8/6; 9H, 100 mA, 5/6; Ported 10H, 100 mA, 7/6; "C" 10H, 250 mA, 12/6; 5H, 400 mA, 10/6. **R.F.27,** good cond., 18/- (p.p. 3/6). **HEATERS:** strips, enclosed, 220 v., 100 watts, 3/8. fanned, 115 v., 200 w., 2/-; 230 v. 475 w., 5/-. **RELAYS,** co-axial, small, 12/24 v., with plug, 10/6.

**LIST AND ENQUIRIES** S.A.E. please. Terms, C.W.O. Postage extra. Int. despatch. Callers and post: W. A. BENSON (P.W.), 138 Rathbone Road, Liverpool, 5. SEP 8563. Callers: SUPERADIO (Whitechapel), Ltd., 118 Whitechapel, Liverpool 1. ROP 1130.

## TRANSISTORS

**RED SPOTS 3/- WHITE SPOTS 3/6**  
Yellow/Green Transistors 4/6. Red/Yellow Transistors 6/6 each.  
Germanium Diodes 1/- each, 3 for 2/6, 7/6 per doz.  
Mullard OA70, OA79 or OA81 Diodes 4/- each.

**Repanco Coils** Etc. with Circuits  
DRX1 Crystal Set Coil M. and L. 2/6 each.  
DRR2 Dual Range with Reaction, 4/-.  
FS3 M. or FS4 L. W. Slab Aerials 7/6 each  
FS2 M. and L. Slab Aerial 13/6 each. TT4  
Transistor Output Transformer 8/-. TT5  
Transistor P.P. Interstage Transformer 8/6.  
TT9 or TT10 Transformers (For P. W. Pocket Set) 12/6 each.

**Celestion C25.** 2 1/2in. 3 ohm Speakers 26/8.

**Reaction Condensers**  
.0001 3/-. .0003 3/9, .0005 4/-. Miniature Type in .0003 or .0005 4/-.

**Sub Miniature 15 volt Electrolytics**  
2 $\mu$ F, 5 $\mu$ F, 8 $\mu$ F, 10 $\mu$ F, 25 $\mu$ F, 50 $\mu$ F, 100 $\mu$ F, 250 $\mu$ F, 500 $\mu$ F or 1000 $\mu$ F all 3/- each.

ALL SENT POST FREE BY  
**PETHERICK'S RADIO SUPPLIES**  
22 High Street, Bideford, N. Devon.

## DO IT YOURSELF

Build your own electronic keyboard and play everything! Send for free leaflet. Guitar, cello, flute and trumpet are all easy. Write now.

**C. & S., 20 Maude Street, Darlington, Co. Durham**

## FIRST-CLASS RADIO COURSES . . .

GET A CERTIFICATE!

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification. Prepare for YOUR share in the post-war boom in Radio. Let us show you how!

### FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success-compelling qualifications as A.M.Brit.I.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs, Exams., Gen. Cert. of Educ., London B.Sc. (Eng.), A. M. I. P. E., A. M. I. Mech. E., Draughtsmanship (all branches) etc., together with particulars of our remarkable Guarantee of

**SUCCESS OR NO FEE**

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career.

FOUNDED 1885—OVER

150,000 SUCCESSSES—

NATIONAL INSTITUTE OF

ENGINEERING

(Dept. 461), 148 HOLBORN,

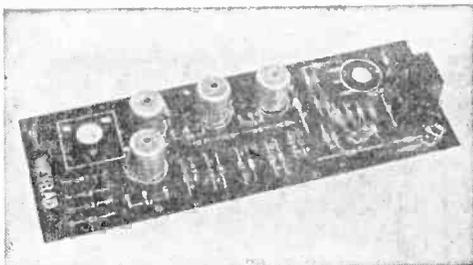
LONDON E.C.1

S. Africa: P.O. Box 8417, Jo'burg.  
Australia: P.O. Box 4570, Melbourne

# WEYRAD

## COILS AND TRANSFORMERS FOR A 2-WAVE TRANSISTOR SUPERHET WITH PRINTED CIRCUIT AND FERRITE ROD AERIAL

- LONG AND MEDIUM WAVE AERIAL—RA2W  
On 6 in. rod, 7/8 in. diameter, connections to 6-Tag Ring, 208 pF tuning ... .. 12/6
- OSCILLATOR COIL P50/1AC  
Medium wave in screening can. For 17 1/2 pF tuning condenser ... .. 5/4
- 1st AND 2nd I.F. TRANSFORMERS—P50/2CC  
470 Kc/s operation with 250 pF tuning in cans. 1/4 in. diameter by 3/4 in. high ... .. 5/7
- 3rd I.F. TRANSFORMER—P50/3CC  
Last stage transformer to feed diode detector. Size as P50/2 ... .. 6/-
- DRIVER TRANSFORMER—LFD2  
Upright mounting with six connecting tags—1 1/8 in. x 7/8 in. x 1 3/4 in. ... .. 9/6



PRINTED CIRCUIT—PCA1

Size 2 3/4 in. x 8 1/4 in. Ready drilled and printed with component positions ... .. 9/6

THESE COMPONENTS ARE APPROVED BY TRANSISTOR MAKERS AND PERFORMANCE IS GUARANTEED.

Constructor's Booklet with full details, 2/-.

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

### 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 incl. 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), 11 Old Bond Street, London W.1

Please send me FREE and without obligation your 1961 literature.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

### CABINETS & HI-FI EQUIPMENT

We can supply any Cabinet to your own specification



"Grosvenor" £19.19.0

This is only one example taken from our extensive range of stock cabinets. Write for our NEW 24 page fully illustrated catalogue on:

THE LARGEST RANGE OF CABINETS IN THE COUNTRY

Equipment is also our speciality and we now offer in a novel book form: A NEW EQUIPMENT COMPARATOR illustrating our range of radio chassis, speakers, tape decks, single players and autochangers.

SEND TODAY for a copy of these two books, which are absolutely FREE.

**LEWIS radio**

100 (P11) Chase Side Southgate, London. N.14 Pal 3733

### PADGETTS RADIO STORE

40 MEADOW LANE, LEEDS 11

Tel.: Cleckheaton 2866

RX and TX. Type SCR522. Complete with valves in the receiver, but less two valves in the transmitter. Type 832. Sets as new. 21/-, carr. 7/6.

Transmitter Type 1154. Model M. four-wave model, complete with all valves and meters. Good condition. 16/-, carr. 12/-.

Good Working TV Sets. 12in., BBC only, 6 channels, £2.15., carriage 12/- BUSH, PYE, ERCC etc.

U.S.A. Tube Unit with a 5CP1 tube, less valves. 10/- carr 7/6.

Metal Rectifier. 150 volts, 40 mA. 2/-, post 1/3: 20/- doz., post free.

Make Yourself a Car Heater. U.S.A. Blower motor 8/-, post 2/-, six or twelve volt.

Speakers removed from TV sets, 7 x 4in., 1G/-, 6in., 5/-. All tested 3 ohms P.M. and are as new. Post 2/- each.

Special Offer in New Valves. EF91, EF92, EL91, EB91, 3/- each: 27/- doz., post free.

Valves removed from TV Sets—all tested and are 100 per cent as new. Three months guarantee. These valves are from Rental TV Sets and a lot of them have been replaced and are as new.

EF90	2/6	KT83	5/-	6AL5	5/-
6SL7	2/6	ECL80	5/-	6K25	5/-
10P13	5/-	6AB8	2/6	10P14	5/-
10F1	3/-	EF90	2/6	185BT	8/6
10C2	3/-	EY51	5/-	L83	3/-
20P2	5/-	PF32	5/-	8J5	3/-
PY81	5/-	PZ30	5/-	KT38	5/-
PL82	5/-	U25	5/-	N37	5/-
20D1	5/-	PY80	5/-	8LD20	5/-
20L1	5/-	Z77	3/-	275U	5/-
20P1	5/-	6BX6	3/-	EBF90	5/-
PL81	5/-	Z152	3/-	DH77	5/-
EF50	1/9	8P25	5/-	6F15	5/-
VR150/30	4/-	6P1	3/-	6F13	5/-
VR85	1/6	5U4	5/-	3F14	5/-
VR91	1/-	PL32	5/-		
8H6	1/-	6P28	5/-		

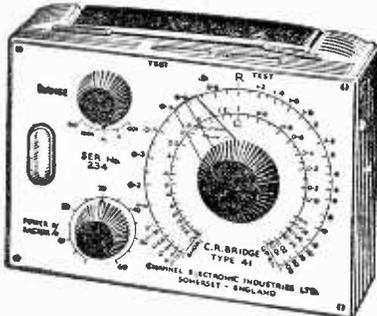
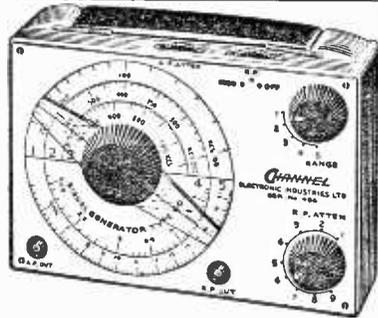
All Valves Post Free.

# GOOD COMPANIONS

## MINIATURE TRANSISTORIZED SIGNAL GENERATOR TYPE 40

- ★ Up to 20 Mc/s on fundamentals.
- ★ R.F. and Audio Output, Attenuated.
- ★ Accuracy better than 2%.
- ★ Miniature size only 4½ in. x 3½ in.

PRICE NET **£5.15.0.** Battery 2/6 extra  
Post (C.O.D. or C.W.O.), 2/6.



## MINIATURE TRANSISTORIZED R.C. BRIDGE TYPE 41

- ★ Capacitance 5 μF to 20 μF.
- ★ Resistance 5Ω to 20 MΩ.
- ★ Magic Eye Balance Indicator.
- ★ Calibrated Power Factor Check.
- ★ Miniature Size—Light Weight.

PRICE NET **£5.10.0.** Battery 3/3 extra  
Post (C.O.D. or C.W.O.), 2/6.  
TRADE ENQUIRIES INVITED

SEND S.A.E. FOR LEAFLETS, OR ORDER TODAY, FROM—

**CHANNEL ELECTRONIC INDUSTRIES LTD.** DEPT. P., DUNSTAN RD. BURNHAM-ON-SEA, SOM.

# IRISH READERS

Hundreds of Bargains in Radio and TV Components and Valves

Ask or Send for Free Lists

**SMYTH & LYNESS**

39 Montgomery Street (at May Street End), Belfast 1, N. Ireland.

## REPANCO "Kidset" Transistor Radio

- ★ DUAL WAVE PERMEABILITY TUNED
- ★ COMPLETE WITH BATTERY
- ★ ATTRACTIVE RED CABINET

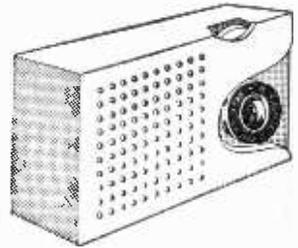
Assembled ready to work

**33/-**

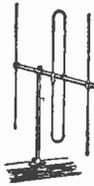
Lightweight Phones 17/6

Radio Experimental Products Ltd.

33 MUCH PARK ST., COVENTRY



## BBC - ITV - F.M. AERIALS



**B.B.C. (BAND 1).** Telescopic loft, 19/6. External S/D, 26/3.  
**I.T.V. (BAND 3).** 3 Element loft array, 24/-, 5 Element, 32/6. Wall mounting, 3 Element, 33/9-5 Element, 41/3.  
**COMBINED B.B.C. + I.T.V.** Loft 1+3 Element, 41/3. 1+5 Element, 48/9. Wall mounting, 1+3 Element, 56/3. 1+5 Element, 62/9. 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.** 0-50μA. 3 x 2½ in. brand new Weston, scaled 0-3, 0-30, 0-300, real bargain 22/6, post 1/3. FREE multimeter circuit.

**Multimeter kit for your 1mA meter.** Ranges 1v. D.C.; 10, 100, 1000 v. A.C. and D.C.; 1, 10, 100, mA 1 amp; Ohms. Comprises 7 x 1% Multipliers (6 x 1W); switches; pot; ready adjusted 1% shunts; rectifier; wiring diagram etc., 22/6, post 1/-.

**1,800 o.d.v. Multimeter kit.** Ranges 15, 60, 150, 300, 600 v. A.C. and D.C.; 3 v. D.C.; 6, 60, 600mA; Ohms. Comprises 7 x 1% Multipliers; 2 x 10%; switches; pot; ready adjusted 1% shunts; Salford rectifier, 500μA meter scaled 3/15/600; circuit; 48/6, post 1/6.

**Precision Wirewound Resistors.** 1 Watt 1 ohm. to 1K, 1% 2/9, 1% 3/-, 0.2% 4/3; to 5K 1% 3/3, 1% 3/6, 0.2% 4/9; to 20K 1% 4/-, 1% 4/3, 0.2% 6/-; to 100K 1% 4/3, 1% 4/6. Your value wound to order.

New list 1% Hstabs etc. S.A.E. enquiries please.

**PLANET INSTRUMENT CO.,**  
45, DOMINION AVE., LEEDS 7.

## MULLARD REFERENCE MANUAL OF TRANSISTOR CIRCUITS

12/6. Postage 1/-

Using Transistors by Slobbema, 15/-, postage 1/-.  
Hi-Fi Year Book with Cine Sound Supplement, 10/6, postage 1/-.  
Coil Design and Construction by Bernards, 5/-, postage 6d.  
Transistor Subnet. Receivers by Sinclair, 7/6, postage 8d.  
Using an Oscilloscope by Easterling, 6/6, postage 6d.  
Foundation of Wireless, 7th ed., by Scroggie, 15/-, postage 1/-.  
Correcting TV Picture Faults by Cura, 4/-, postage 6d.

## UNIVERSAL BOOK CO.

12 Little Newport Street, London, W.C.2 (adjoining Lisle Street)

**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)

**British Institution of Radio Engineers, etc.  
C. & G. Telecom. Technician's 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. 171J), Intertext House, Parkgate Road, London S.W.11.

Please send book on.....

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

Address .....

Occupation..... 1.61

**INTERNATIONAL CORRESPONDENCE SCHOOLS**



Dept. 8

152/153 Fleet St., London, E.C.4. Tel. FLE 2833

Business Hours: Weekdays, 9-6 Saturdays, 9-1

Stockists for

**AMPLIFIERS, V.H.F. TUNERS, HI-FI SPEAKERS BY ALL THE LEADING MANUFACTURERS**

**MIGHTY SIX TRANSISTOR PORTABLE**



Following the success of our recent Cossor transistor receiver, we are now introducing the MIGHTY SIX TRANSISTOR PORTABLE. A New Transistor portable Receiver. Build this mighty six transistor superhet battery portable. Circuit description: 6 Mullard transistors, OC44, 2-OC45, 1-OC81D, 2 matched OC81, 1-X1 diode, printed circuit, internal ferrite aerial, 5in. loudspeaker.

Assembled dial assembly, medium and long wave coverage, 500 M/W output, attractive blue/cream two tone cabinet, size 8½in. x 6½in. x 3in. Weight approx. 3 lb. Detailed point to point and theoretical diagram, including all components for easy construction. Only £9.15.0, plus 3/- post and pkg. E/ready PP7 battery 3/3. Instructions and circuit 1/6 post free.

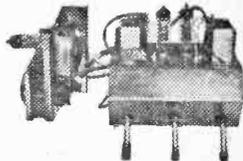
**PORTABLE BATTERY ELIMINATOR**

MADE BY COSSOR

Housed in two containers which are to replace AD35 and B126 Batteries. 37/6, plus 2/- P. & P. Only suitable for use with Dk96 Series valves.

**LIMITED NUMBER THIS STEREO OFFER!**

Compact Stereo amplifier, 3 watts each channel using 2-ECL82, 1-EZ80, separate balance and tone controls, volume and on/off switch channel reverse switch designed for crystal pick-up, separate power pack, including 2-6½ P.M. speakers in cabinets finished imitation Rexine. Complete and ready for use, £8.19.6. P. & P. 10/-.



**DECCA PORTABLE AMPLIFIER.** As supplied in famous DECCAMATIC III. Complete with small cream knobs. Full range tone and volume controls. Employs ECL82 valve, Metal Rectifier. Size 3 x 3½ x 8½in. Only 59/6 plus 2/6 P. & P.

**SPECIAL CELESTION 8 x 6in.** elliptical high flux loudspeaker to fit. 30/- plus 1/- P. & P.

**A SNIP FOR CONSTRUCTORS**

Build the Labgear Audio Output meter. Two ranges—25 milliwatts to 1 watt, 1 watt to 100 watts. Accuracy 5%. Input impedance 3, 15 and 600 ohms. Printed circuit. All components including O-IMA moving coil meter and silver hammertone enamel case. Kit complete with instructions 59/6, post and pkg. 1/6.

## WHAT DOES IT TAKE TO GET TO THE TOP?

### BRAINS or GUTS?

It is a moot point but after 21 years of helping young men to build fine careers in Electronics WE plump for GUTS. We truly believe that our success and the success of our pupils owes much to our school motto:

*"There is no virtue without courage,  
No reward without labour."*

If you are prepared to make it your motto and live up to it, we can help you to get to the top. It will take time, it will take effort, it will take courage, and on top of all this 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. Brit. 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.

## GAZAK: Season's Greetings

### AMERICAN "SIGNAL" MORSE KEYS

Type M100 with switch. This excellent, lightweight, fast key is currently priced in U.S.A. at \$6.85 (£2 10s.) and is offered at only 12/6, p. & p. 1/6. Makes an acceptable present for the enthusiast

### AERIAL EQUIPMENT

**TWIN FEEDER.** 300 ohm twin ribbon feeder, similar K25, 6d. per yard. K35B Telcon (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. Stranded 7/25, 140ft. 10/-; 70ft. 5/- P. & P. 2/-.

**RIBBED GLASS.** 3in. aerial insulators, 1/6 each P. & P. 1/6. **CERAMIC FEEDER SPREADERS.** 6in. type F.5. 10d. each or 9/- dozen. 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 x 2 1/2in. mast head bracket. PRICE 49/-. P. & P. 3/6.

**SUPER AERAXIAL CABLE.** 75 ohm 300 watts, very low loss, 1/8 per yard. P. & P. 1/6. 50 ohm, 300 watt coax, very low loss, 1/6 yd. or 20 yds. 27/6, P. & P. 1/9.

**HEADPHONES H.R. TYPE.** 4,000 ohms, very sensitive. ONLY 12/6 pr. P. & P. 1/6. C.L.R. Type (low res.), 8/6, P. & P. 1/6.

**ABSORPTION WAVEMETERS.** 3.00 to 35.00 Mc/s. in 3 switched bands, marked on scale. Complete with indicator bulb. A MUST for any Ham shack. ONLY 19/6, 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/-. Also Flexible Couplers 1/- each.

## 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)

## TRANSISTORS

Red Spots, 3/-; White Spots, 3/9; Yell/GR, 3/9; Ediswan XB104, 8/6; XA103 (4 Mc/s), 10/-; XA104 (6/8 Mc/s), 12/-; Mullard OC70, 14/-; OC71, 14/-; OC72, 17/-; OC44, 26/-; OC45, 23/-; OC170 (70 Mc/s), 35/-; Newmarket V15/10P (10 watt power), 15/-; Diodes, 1/- and 2/6; Mullard Diode, 4/-; Electrolytics (sub. min. 15 v.) 2, 4, 8, 50, 100 uf, 3/- ea.; Ardenne Trans. D239, 8/6; D240, 8/6; D131, 12/6; D132, 12/6; T1079, 12/-; D167, 12/-; Headphones L.R., 8/6; H.R., 17/6; Resistors 10% tol., 6d.; 5% tol., 1/-; Desk Mike, 31/6; Balance inserts (use as earpiece or speaker), 2/6; M.C. Earpiece (use Min. Speaker), 5/-; Westalite Contact Rectifier 250 v., 60 mA, 7/6; Transformer 250-0-250 v., 6 v. and 5 v., 15/-; 6 v., Vibrator Pack, 120 v., 60 mA, out, 12/6; Garrard Portable Record Player, cabinet, battery turntable 45 r.p.m. and pick-up; takes transistor amplifier, £3.10.0, plus carr, 3/3. Real bargain. Limited quantity.

**TERMS.**—Cash with order. Post extra, excess refunded. Morco Reflex Rx, best 2-transistor Receiver. Send 8d. stamps for notes.

**MORCO EXPERIMENTAL SUPPLIES**  
8 & 10 Granville Street, Sheffield 2  
Tel.: 27461

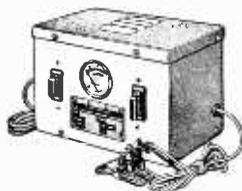
A 3d. stamp will bring you a copy of our latest

**RADIO & TELEVISION  
COMPONENT Catalogue**

**JAMES H. MARTIN & CO.**  
FINSTHWAITE, NEWBY BRIDGE  
ULVERSTON, LANCs.

## "HEXA"

### BATTERY CHARGERS



Suitable for 6 and 12 volt complete with ammeter, fuses, polarity marked crocodile clips on output leads. Fully guaranteed 12 months.

2 amp. ... ..	48/-
4 amp. ... ..	67/6
6 amp. ... ..	84/6

C.W.O. or C.O.D. carriage 4/6.

*Special terms to the trade*

**COMPLETE RANGE OF ACCESSORIES**

List on request to

**F. C. HILL & CO. LTD.**  
17 Bilston Street, Wolverhampton  
Telephone 22259.

## RES/CAP. BRIDGE 38/-

p. & p. 2/-  
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. GP)**  
Raleigh Mews, Raleigh Street, Nottingham

12in. SPEAKER and 5in. TWEETER by leading manufacturer, 75/-. This is less than half list price, 3 ohm.

**CUT PRICE TOOLS.** 5in. side cutters, 5/6. 5in. plated and nose tapered pliers, 5/6. 7in. flat-nosed tapered pliers, 8/6. Pocket neon testers with retractable screwdriver, 5/-; 7in. combination pliers, 8/-; 8in. Steel Block Pliers, 11in. blade, 10/6.

**FULL SIZE H/S TWIST DRILLS.** Set 7 1/4, 1/4in. in Wallet, 6/-. Smaller size sets. 4/-. Set 13, 9/6. Set 17, 1/16 to 1/16, 15/6. Bench Grinder 6" x 1" stone, 33/-

**NEW 12in. SPEAKERS, 12 watts.** Listed at £12/10/0. Our price £6/17/6.

**STUDIO C CATHODES, 21/-.**  
**PAXOLIN PANELS, 12 x 6 x 1in., 3/6.**  
**PAXOLIN TUBING, 1/4" x 3/16" x 72in., 17/6.**

**OUR FAMOUS TRANSFORMERS.** Input 200/250. Output tapped C to 30 v. 2 a. or 5, 11, 17 v 5 a. Each 24/6.

**F.W. METAL RECTIFIERS, 12/6 volt.** 1 a., 7/6; 3 a., 13/-; 4 a., 17/6; 6 a., 27/6; 24 v. 2 a., 23/6.

**FOGGLER SWITCHES DPDT, 3/6, SP 1/9.**  
**MICRO SWITCHES.** Make & Break, 5/6.  
**MAINS TRANSFORMER, & RECTIFIER.** Output 12 v. 1 a. D.C., 19/6; 30 v. 2 a., 33/6.

**NICKEL NIFE BATTERIES, 1.2 v. 2.5 a.** Size 3 x 2 x 1in. 6/-, or 3 for 16/-, 4 for 21/-, practically everlasting.

**EX WD MORSE KEYS, 3/6, 6/- and 8/6.**  
**RELAYS.** We hold large stocks. Any contact combination and operating coil voltage supplied from 3/-.

**KEY SWITCHES from 3/-.**  
**AMERICAN MADE P.V.C. TAPE.** Finest quality 800ft. reels 19/6.

**12 v. MINIATURE RELAYS, 1 1/4 x 1 1/4 x 1in. Wgt. 1oz. S.P.C.O. 9/3. S.P.C.O. and 3 make 10/6.**

**BENCH VICE with Clamp, 2 1/2" jaw, 15/6**  
All items guaranteed and post free  
Lists sent on request. Post orders only to

**RADIO & ELECTRICAL MART**  
P.O. BOX 9, G.P.O.,  
TUNBRIDGE WELLS, KENT

**EDDY'S (Nottm.) LTD.**

172 Alfreton Road, Nottingham

New or Surplus	Guaranteed	Valves by return	Post
1A7GT	11/9	6V6GT 6/-	ECC84 8/3
1C5GT	9/9	6X5GT 4/11	ECC85 7/11
1D5	7/6	7B7 7/6	ECH42 8/-
1H5GT	9/6	7C5 7/6	ECL80 7/-
1L4	3/6	7C6 7/6	ECL82 10/-
1NSGT	9/9	7H7 7/6	EF36 3/-
1R5	5/6	7S7 9/6	EF41 7/9
1S5	4/9	7Y4 7/-	EF42 7/6
1T4	3/11	12A6 5/3	EF80 5/-
3Q5GT	8/6	12AT6 7/6	EF86 9/9
3V4	6/9	12AT7 5/3	EF89 7/-
5U4G	4/9	12K7 5/3	EF91 3/6
5Y3G	5/9	12Q7 5/3	EL41 7/3
5Z4G	7/6	20D1 7/6	EL84 6/6
6A7	10/-	25L6GT 9/-	EL91 4/6
6AG5	4/-	35L6GT 9/-	EY51 7/11
6AQ5	7/6	35Z4 5/3	EY86 7/9
6AT6	7/6	35W4 6/9	EZ80 6/-
6BBG	2/11	807 3/9	EZ81 6/9
6BA6	5/11	DAF91 4/9	MU14 7/-
6B16	5/11	DAF96 6/11	PCL82 7/6
6C4	3/6	DF91 6/11	PEN25 4/11
6C6	4/9	DF96 6/11	PEN36C 8/-
6CH6	8/11	DL96 6/11	PL36 10/9
6HG6	1/11	DK91 5/11	PL81 8/9
6J5G	2/9	DK96 6/11	PL82 7/-
6J5M	4/3	EB34 1/6	PL83 7/-
6J7G	5/-	EB41 7/-	PY81 6/6
6K7G	5/3	EB91 3/9	PY82 6/9
6K8G	5/3	EABC80 7/6	PY83 7/-
6P2B	7/6	EAF42 7/6	U25 12/6
6Q7G	5/9	EB41 7/6	UBC41 7/3
6S17	6/-	EB33 5/-	UF41 7/9
6SN7GT	4/3	ECC35 6/9	UF42 6/9
6SA7M	5/9	ECC81 5/3	UY41 6/-
6SG7M	4/9	ECC82 5/11	UY85 6/3
6U4GT	10/6	ECC83 6/6	UCH42 7/9
6V6G	4/9		

**CAR RADIO KITS.** 7 Transistor Long and Medium 2 watts output. R.F. stage Aut. Gain control 10 gns. P. & P. 5/-, 6 or 12 v. (state which) supplied with full instructions. Size 7 1/2 x 7 1/2 x 2 1/2 in. Speaker Extra 17/11.

**VALVE FILAMENT TESTER.** Multi-purpose. Pocket size Batt. operated checks all valves. Pilot lamps, circuit continuity. Size 5 1/2 x 3 1/2 x 1 1/2 in. 29/11. Post & Packing 3/6.

**NIFE ACCUMULATORS.** 1.25 v. Size 3 x 2 1/2 x 1/2 in. 7 amp hrs. weight 13 ozs., 1/11 ea. P. & P. 1/6, one only add 9d. per cell.

**DYNAMOTORS.** 200 v. D.C. to 12 v., D.C. Ideal for train sets, etc., 19/11, P. & P. 2/6.

**RECTIFIER/STABILISERS.** for 1.4 volt valves. Midget 3/-. Post 6d.

**VARIABLE CONDENSERS.** 0.0005 small twin gang. Built in slow motion drive 8/11. Post & Packing 1/6.

**HEADPHONE CORDS.** High Quality 6ft. lengths. 1/11. Post 6d.

**VIBRATORS.** 12 v. 4 pin, 4/11, Post 1/-.  
**DIMMER SWITCHES.** Ideal for train speed regulators. 1/11, Post 9d.  
**GERMANIUM DIODES.** 8d. each, 7/- Dozen. Post 6d.  
**THROAT MIKES.** 1/-. Post 6d. Could be used for electrifying musical insts., etc.

**NEON MAINSTAY SCREW-DRIVERS.** 3/11, Post 9d.

**TUMBLER SWITCHES.** 250 volts 5 amps, 1/- each. Post 6d.

**POCKET RADIO.** 2 transistor with miniature speaker 2 wave bands, complete with all parts, wiring diagrams and full instructions, 27/6. Batteries 1/-. P. & P. 1/6.

**TRANSISTORS.** Red Spot, 3/9, White Spot, 4/3. Post 6d.

**JACK PLUGS.** Standard 1/11, Post 9d.

**LUXEMBOURG AERIALS.** Expanding. Complete and easy to fit. No technical knowledge required. Greatly improves reception, 3/11, Post 6d.

**All Above are New and Guaranteed** Any parcel insured against damage in transit for only 6d. extra per order. All uninsured parcels at customers risk. Postage and Packing 6d. per valve extra. C.W.O. or C.O.D. only. C.O.D. charge 3/- extra. S.A.E. with all enquiries.

**DID YOU KNOW**

**COYNE'S NEW**

**TROUBLE-SHOOTING SERIES TAKES HEADACHES OUT OF ALL SERVICING PROBLEMS?**



*Pin-Point*  
**TV troubles**  
 in 10 minutes

Find the exact sound or picture trouble in ANY TV set from 700 possibilities! Latest Edition now has 332 pages of solid, down to earth TV Service

line information; 300 diagrams, check charts, 31/6. Postage 1/-.

*Pin-Point*  
**Transistor troubles in 12 minutes**



Trouble-shoot every type of circuit in ALL transistorized equipment! 526 pages; hundreds of illustrations; 120 check charts. 47/6, postage 1/6.

**SIMPLE CHECK CHART SYSTEM SAVES TIME**

These amazing practical handbooks with **ENTIRELY NEW METHOD** show you how to find the trouble in ANY TV or transistor circuit. **FAST! INDEX** tells you where to look; famous **Check-Charts** help you to pin-point the exact trouble in minutes! These on-the-job books quickly pay for themselves in profitable new business and valuable time saved!

**SEND NO MONEY**

Just mail coupon for free trial. After 7 days send only low price or return books and pay nothing! If you keep both books send only 19/- after 7 days and £1 a month until a total of 79/- has been paid. If ordering one book, pay one half after seven days and the other half in 30 days.

**FREE TRIAL OFFER**  
**Mail Coupon Now for**  
**FAST RETURN SERVICE**

Mail Order Division, SIM-TECHBOOK COMPANY, Gater's Mill, West-End, Southampton, Hants.

- Rush 2-book PIN-POINT Series for 7-day FREE TRIAL per offer (postage free).
- I do not require both books, please send me the following book as per offer.
- TRANSISTORS, 47/6, plus postage.
- TV TROUBLES, 31/6, plus postage.

Name .....

Address .....

City..... County.....

Check here if enclosing full price; we pay postage. Same 7-day money-back guarantee.



**SEMICONDUCTORS**  
**AUDIO AMPLIFIER**  
**AND RADIO**  
**APPLICATION REPORTS**

**250 mW**

Class B push-pull using GET114 transistors operating from a 6V supply (SAR 5).

Class B push-pull transformerless output stage using GET114 transistors operating from a 9V supply (SAR 6).

**500 mW**

Class B push-pull using GET114 transistors operating from a 6V supply (SAR 7).

Class B push-pull transformerless output stage using GET114 transistors operating from a 9V supply (SAR 8).

**1W**

Class B push-pull using GET114 or GET115 transistors operating from a 6V supply (SAR 10).

Class B push-pull transformerless output stage using GET114 or GET115 transistors operating from a 12V supply (SAR 2).

**2W**

Class B push-pull using GET116 transistors operating from a 12V supply (SAR 11).

**3W**

Class B push-pull transformerless output stage using GET115 transistors operating from a 12V supply (SAR 12).

**RADIO RECEIVER**

6-transistor superhet operating from a 9V supply (SAR 13).

For copies of any of these Semiconductor Application Reports (SAR's) or for information on the wide range of G.E.C. transistors please write to:

**THE GENERAL ELECTRIC COMPANY LIMITED**

**Semiconductor Division**  
 School Street, Hazel Grove,  
 Stockport, Cheshire.

**MEDIUM  
LONG AND  
SHORT WAVE**

**SEVEN TRANSISTOR  
SUPERHET**

★ **PRE-BUILT UNITS** ★

— THE NEW EASY WAY TO BUILD A RADIO —

- Press Button Short, Medium and Long Wave Coil Pack: OC170 OSC-Mixer stage. Printed Circuit. Pre-aligned and Tested. 90 3 P.P. 1/6.
- Printed Circuit IF Strip, 2-OC169, Pre-aligned and Tested 92/6 P.P. 1/6.
- One Watt 4-Transistor Hi-Fi Amplifier. Printed Circuit, 92/6 P.P. 1/6.
- 8 inch Ferrite aerial with coils, 12/6. 176pF-176pF Tuner for above, 9/6.

**FULLY ILLUSTRATED BOOKLET SHOWING  
INTERCONNECTION OF ABOVE ... 2/6**

**ALL TRANSISTOR BABY ALARM**

**The "Baby Sitter"**



- ★ 100% Safe—Guaranteed
- ★ Fully Portable
- ★ No Mains—Battery Operated
- ★ Can be used over Any Distance
- ★ Battery life 3 to 4 months

USE IT AT HOME. TAKE IT ANYWHERE

Every Sound can be heard on large 5-inch Speaker  
COMPLETELY ASSEMBLED WITH  
BATTERY AND MICROPHONE **£5.10.0** P.P. 2/6

— **BE WITH YOUR CHILDREN ALL THE TIME** —  
(illustrated leaflet free on request)



**PERSONAL  
EARPHONES**

**ALL MAGNETIC &  
GUARANTEED**

- ★ **Single Personal Earphone**, medium impedance, as used on Ranger 2 and 3 etc. Complete with lead & eartip. 12/6, P.P. 6d.
- ★ **Single Personal Earphone**, low impedance, fitted with lead and sub-miniature Jack Plug .....19/6, P.P. 6d.
- ★ **Medium Impedance Earphone**, with lead fitted and Jack Plug.....19/6, P.P. 6d.
- ★ **Very High Impedance version** for Perdio, etc.....22/6, P.P. 6d.
- ★ **Jack Sockets**, 3/-; with Circuit Breaker Switch, 3/6; Jack Plugs, 3/-. (All sub-min.)



**VALVES**

TRANSMITTING  
RADIO AND TV  
VALVES, TUBES  
AND INDUSTRIAL  
TYPES.  
FREE LIST ON  
REQUEST.

**"STEREO 3-D"**

**STEREO RECORD PLAYER  
AMPLIFIER**

New high-gain circuit with full tone, balance and volume controls. Can be used with all types of records as well as stereo.

- ★ 2 WATTS PEAK PER CHANNEL
- ★ ECC83; 2-ECL82 VALVES
- ★ MAINS 110/250V A.C.

Complete with speaker sockets, calibrated dials, etc. **£5.7.6**  
**BUILT AND TESTED** P.P. 2/-

★★ **COLLARO 4-SPEED STEREO  
AUTO-CHANGER**, ideal for use with  
above amplifier.....£7.10.0. P.P. 3/6.

★★ 9 x 6in. large magnet Elac speaker, for  
use with STEREO 3-D. 37/- pair. P.P. 1/6.

**TRANSISTORS AND  
MINIATURE COMPONENTS**

We stock the largest range of components  
in the country for the home constructor.



**WE HAVE  
YOUR ITEM  
IN STOCK**

FREE LIST AND DATA ON REQUEST

**"DECCA" PORTABLE AMPLIFIER**

IDEAL FOR THAT PORTABLE RECORD PLAYER  
Complete with knobs; full range tone and volume  
controls. ECL82 valve.

**BUILT AND READY  
TO USE**

**59/6** P.P. 2/6

Size: 3 x 3 7/8 x 8 1/2 in.

9 x 6 in. CELESTION SPEAKER FOR USE WITH  
ABOVE ... .. 25/-, P.P. 1/-.



**CRYSTAL  
MICROPHONES**

(1) **ACOS 39-1** STICK MICROPHONE WITH STAND AND SCREENED LEAD, 39/6, P. & P. 1/6

(2) **ACOS 40** DESK MICROPHONE WITH FOLD-AWAY STAND AND SCREENED LEAD, 19/6, P. & P. 1/6

(3) **ACOS 45** (ILLUSTRATED) NEW STYLE HAND MICROPHONE WITH SCREENED LEAD, VERY SENSITIVE, 29/6, P. & P. 1/6



**QUARTZ  
CRYSTALS**

FOR  
TRANSMITTING,  
RADIO  
CONTROL,  
OSCILLATORS,  
ETC.

**FREE LIST ON  
REQUEST**

ALL TYPES FOR  
ALL PURPOSES



**TRANSISTORS**

From  
**3/6**  
EACH



SEND FOR NEW FREE LIST WITH  
DATA & USES. Fully Guaranteed.  
We Can Supply a Transistor for  
Every Need

**SPECIAL OFFER**

6 EDISWAN TRANSISTORS &  
TWO DIODES  
1—XA102 ONLY  
2—XA101 **57/6**  
1—XB103  
2—XC101 PER SET  
and 2 Diodes P.P. 1/-  
Equivalent Mullard Set 62/6  
P.P. 1/-

**HENRY'S (RADIO) LTD.**

5 HARROW ROAD, EDGWARE ROAD, PADDINGTON, LONDON, W.2

Opposite Edgware Road Tube Station, PADDINGTON 1008/9.

OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock

**SEE BACK PAGE**

# Practical Wireless

## BLUEPRINT

## SERVICE

ALL OF these blueprints are drawn full-size and although the issues containing descriptions of these sets are now out of print, an asterisk in the list below denotes that constructional details are available free with the blueprint.

The index letters which precede the Blueprint Number indicate the periodical in which the description 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
<b>CRYSTAL SETS</b>		
Junior Crystal Set	PW94*	2/-
Dual-wave Crystal Diode	PW95*	2/6

Title	Number	Price
<b>STRAIGHT SETS</b>		
<b>Battery Operated</b>		
Modern One-valver	PW96*	2/6
All-dry Three	PW97*	3/6
Modern Two-valver	PW98*	3/6

Title	Number	Price
<b>SUPERHETS</b>		
<b>Mains Operated</b>		
A.C. Band-pass Three	PW99*	4/-
A.C. Coronet-4	PW100*	4/-
A.C./D.C. Coronet	PW101*	4/-

Title	Number	Price
<b>MISCELLANEOUS</b>		
The PW 3-speed Autogram	—*	8/-
The PW Monophonic Electronic Organ	—	8/-

Title	Number	Price
<b>TELEVISION</b>		
The PT Band III converter	—*	1/6

Title	Number	Price
A.C. Fury Four	PW20*	2/6
Experimenter's Short Wave	PW30a*	2/6
Midget Short Wave Two	PW38a*	2/6
Band-Spread Three (Battery)	PW68*	2/6
Crystal Receiver	PW71*	2/-
Signet Two (Battery)	PW76*	2/6
Simple S.W. One-valver	PW88*	2/6
Pyramid One-valver	PW93*	2/6

BBC Special One-valver	AW387*	2/6
Short-Wave Two	AW429*	2/6
Short-Wave World Beater	AW436*	3/6
Standard Four Valve S.W.	WM383*	3/6
Enthusiast's Power Amplifier	WM387*	3/6
Standard Four Valve	WM391*	3/6
Listener's 5-Watt Amplifier	WM392*	3/6

### QUERY COUPON

This coupon is available until 6th January, 1961, and must accompany all queries in accordance with the notice on our "Open to Discussion" page.

PRACTICAL WIRELESS, JANUARY, 1961.

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. Subscription rate including postage for one year: £1.3.0. Abroad £1.6 (Canada 19s.). Registered at the General Post Office for the Canadian Magazine Post.

**SAVE POUNDS!**

EASY TO BUILD TRANSISTOR RADIOS  
★ IDEAL PRESENTS FOR CHRISTMAS ★

EASY TO FOLLOW  
ILLUSTRATED PLANS

# Continental "6"

**COMBINED PORTABLE CAR RADIO**  
EQUALLY SENSITIVE ON  
MEDIUM AND LONG WAVE BANDS

- SPECIFICATION**
- 425mW Push-Pull Output
  - 6 "Top-Grade" Ediswan Transistors
  - New Type Printed Circuit with all Components Marked
  - Full Medium and Long Wave Tuning
  - High "Q" Internal Ferrite Aerial
  - Car Radio Adaptation and AVC
  - Slow Motion Fingertip Tuning
  - "Hi-Fi" Quality Speaker
  - Size 9½ x 7½ x 3½in. Weight 4½ lb.

Wherever you are

"First Class in every way"



**ALL THE CONTINENTAL AND LOCAL STATIONS AT YOUR FINGERTIPS**  
CALL FOR DEMONSTRATION

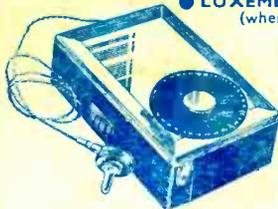
- ★ STEP BY STEP FULLY ILLUSTRATED INSTRUCTIONS
- ★ ALL COMPONENTS GUARANTEED
- ★ AFTER SALES SERVICE

**Total Cost of all Components**  
**£11.10.0** P.P. 3/6  
including Cabinet, Battery Transistors, Car Radio, AVC and all necessary items.

- ★ SIMPLE TO CONSTRUCT
- ★ NO TECHNICAL KNOWLEDGE REQUIRED
- ★ WORTH DOUBLE WHEN BUILT
- ★ EXCELLENT RESULTS ANYWHERE
- ★ DESCRIPTIVE LEAFLET FREE ON REQUEST

ALL COMPONENTS AVAILABLE SEPARATELY

★ **RANGER—3** ★ **PERSONAL POCKET RADIO**  
FULL TUNING OF MEDIUM WAVEBAND AND AMATEUR TOP BAND (120 metres to 500 metres)  
● LUXEMBOURG GUARANTEED (where normally receivable)



- ★ Full Station Separation
- ★ Calibrated Dial
- ★ Fingertip Control
- ★ 6 Months' Battery Life
- ★ Fitted Volume Control
- ★ 3 High Gain Transistors
- ★ Size 4½ x 3 x 1½in.

**TOTAL COST** with Personal Earphone, Battery, Transistors, etc.  
**79/6** P.P. 1/6

All parts sold separately and guaranteed

- NO EXTERNAL AERIAL OR EARTH
- AFTER SALES SERVICE

Continental as well as local stations—GUARANTEED!

★ **RANGER—2** ★ **PERSONAL POCKET RADIO**  
FULL TUNING OF MEDIUM WAVEBAND AND AMATEUR TOP BAND  
● LUXEMBOURG GUARANTEED (where normally receivable)

- ★ Full Station Separation
- ★ Two High Gain Transistors
- ★ 9 Months' Battery Life
- ★ Calibrated Dial
- ★ High Quality Output
- ★ 120 metres to 500 meters coverage
- ★ Size 4½ x 3 x 1½in.



**NO EXTERNAL AERIAL OR EARTH REQUIRED**

Total cost of all items with battery, transistors and personal earphone, etc.  
**65/-** P.P. 1/6

All components sold separately and Fully Guaranteed.  
● After Sales Service ●  
● Simple to Build ●  
Building Instructions and Prices FREE On Request



## SUPER-3

**PERSONAL POCKET RADIO**

- Medium Wave Tuning
- Three Transistors and Diode
- 9 Months' Battery Life for 45d.

Personal Earphone Output for Quality Listening

Total cost of all necessary items with earphone, battery and transistors, etc.  
**37/6** P.P. 1/6

(All parts sold separately)

- ★ Simple to Build
- ★ After Sales Service
- ★ Ideal for Beginners

BUILT-IN FERRITE ROD AERIAL

FREE Diagrams On Request

## PRACTICAL TRANSISTOR CIRCUITS

ALL TRANSISTOR CIRCUITS

No. 2

GADGETS RECEIVERS  
AMPLIFIERS TEST UNITS  
TRANSMITTERS

Now contains 40 Easy to build Transistor Circuits for the home constructor with diagrams and prices.

ONLY **3/6** POST FREE

## STOP PRESS!

ALL COMPONENTS IN STOCK

(including printed circuit) for

"PW" POCKET SUPERHET

AT COMPETITIVE PRICES

e.g.—SET OF SPECIFIED TRANSISTORS & DIODE

ONLY **60/-** P.P. 6d.

FREE LIST By Return Of Post

PLEASE

TURN PAGE

## HENRY'S (RADIO) LTD.

5 HARROW ROAD, EDGWARE ROAD PADDINGTON, LONDON W.2  
Opposite Edgware Road Tube Station, at the junction of Edgware Road and Harrow Road, Paddington, London. PADDington 1008/9 OPEN MON. to SAT. 9-6, THURSDAY 1 o'clock. (Open all day Saturday). TERMS: Cash with Order or C.O.D.

7 18