

PRACTICAL 16 WIRELESS

DECEMBER
1960

EXTRA
inside!

SPECIAL
16-PAGE
SUPPLEMENT

**The P.W.
Constructor's
Guide**



**Mains-operated
Model Control
Transmitter**

WIDE RANGE SIGNAL GENERATOR

MODEL SWO-300 150 kc/s, 300 Mc/s

The Model SWO-300 is an outstanding instrument specially designed to cover the wide frequency range from 150 kc/s-300 Mc/s, which covers all the requirements of equipment in general use.

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 5in.

FULLY GUARANTEED Only £14.19.6 P. & P. 5/6.



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 4000 ohms. Only 15/- P. & P. 2/6.

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

HOOVER ROTARY TRANSFORMERS

12 v. input, 500 v. output at 85 mA. or 6 v. input, 250 output at 75 mA.



Only **10/6** EACH P. & P. 2/-.

POCKET MULTI-METER, BRAND NEW. 2,500 o.p.v. Multi range 0-30/120/300/1,200 v. A.C. ditto D.C. 0-1K., 0-1 megohm; 400 Micro-A., 12 mA., 300 mA. -00 to +64 db 5 ranges; 3in. x 4 1/2in. x 1 1/2in. Large clear dial. Leads supplied. Our Price 70/-. p.&p. 2/6.

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.

1 mA METER, 2in. round, 17/6. P. & P. 1/6.



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.

NEW!

SUPER MINIATURE EARPHONE FOR TRANSISTOR CIRCUITS



Here is a really sensitive dynamic earphone of exceptionally fine quality. This lightweight miniature earpiece is convenient and comfortable to wear. The Practically invisible cord is connected to the earphone. Provides clear reproduction of music as well as speech. Fully guaranteed and supplied complete with transparent ear insert, 3 feet cord, sub miniature plug and socket.

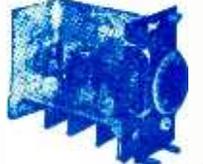
Model CR.5 Crystal Earpiece, high imp. . . 8/- P.&P.
Model MR-4 Magnetic Earpiece, low imp. . . 7/- 1/-

PORTABLE TRANS/RECEIVER SETS

Consisting of trans-receiver covering 7.4-9 Mc/s. range up to 10 miles. Complete with 5 valves, headphones, microphone, junction box and 8ft. telescopic aerial. Only requires 120 v. and 3 v. dry battery.

ONLY 60/- Per Set P. & P. 4/- Batteries 20/- per Set

TWO FOR £6 Post Free.



R.F. CONVERTERS
 R.F.24. 20-30 Mc/s. switched tuning 22/6.
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 R.F.27. 65-85 Mc/s. variable tuning 29/6.
 Circuits supplied. P.&P. 3/6 on ea.

TWO TRANSISTOR POCKET RADIO with Miniature Speaker

Anyone can build it!



This powerful pocket radio gives reception over the entire broadcast band. Complete with all parts, including 2 transistors, exclusive ferrite rod, miniature speaker tuning condenser, plastic case, wiring diagram, and step by step instructions. Size 4 x 3 x 1 1/2in. **ONLY 27/6.** P.&P. 1/6. Battery 1/- extra.

SPARE VALVE KIT

Here's a gift for all Set owners! Case contains 1 12G 4 ARP12 & 1 ATP4 valves. Only 10/- P. & P. 2/6



U.S.A. WHIP AERIALS. 12ft. 12/6. P. & P. 2/6.

CRYSTAL DIODES 6/- per doz. P. & P. 1/-

A.C.C.U.M.U.L.A.TORS. 2 volts 16 A.H. (unspillable). Ideal for 6 and 12 volts supply, etc. Brand new. Original cartons. Size 4in. x 7in. x 2in. 5/6 each. P. & P. 1/6. 3 for 15/-.

P. & P. 3/6. 6 for 27/6. P. & P. 5/-

PRECISION 1% RESISTORS Manufactured by Electrothermal. We offer the following values: 100K, 500K, all $\pm 1\%$ 1 watt, 1/2 each; 20/- per dozen.

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 1/2in. x 3 1/2in. x 1 1/2in. Bargain price 5/- each. P. & P. 1/6. Two for 8/- P. & P. 2/6.

VARIABLE TRANSFORMERS Input voltage 230 v. continuously variable output from 0-260 v. Supplied complete. Model B.5 Current rating 5 amps. £9. Model B.10 Current rating 10 amps. £18.5.0 Model B.20 Current rating 20 amps. £32.10.0

ALL FULLY GUARANTEED.



POLICE - AIRCRAFT - HAM RECEIVER 1392

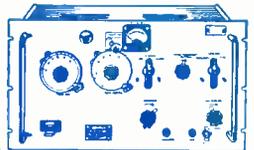
Frequency range 90-150 Mc/s. I.F. freq. 5 Mc/s. Complete with tuning meter, 14 valves: 2-2-B, 3-1-F, B.F.O., A.G.C., Audio, Crystal controlled with separate R.F. and oscillator tuning, R.F. and Audio controls, B.F.O. tone control, Oscillator and Audio signal fully metered. Power requirements 250 v. H.T., 6.3 v. L.T. Complete with circuit diagram.

PRICE COMPLETE

ONLY

£6.5.0

Carriage 15/-



Callers: 87 TOTTENHAM COURT ROAD, LONDON, W.1
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Radio Society of Great Britain

**ROYAL HORTICULTURAL
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Wednesday to Saturday
NOVEMBER 23rd to 26th
11 a.m. to 9 p.m. Admission 2/-

- **HOME CONSTRUCTION DO-IT-YOURSELF FEATURES**
Kits of parts to build Receivers, Transmitters, Television, Test Gear, Tape Recorders, Aerials, Hi-Fi Amplifiers, Transistor Equipment
- **LATEST COMMUNICATION RECEIVERS OF THE WORLD**
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12.30**

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Famous TV & Film Actor Radio Amateur

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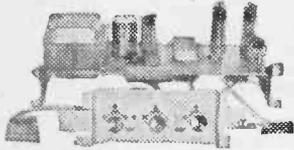
**Win a £120
HALLIGRAFTER SXIII
World Famous
Communications Receiver**

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Further details from **P. A. THOROGOOD, G4KD,**
35 GIBBS GREEN, EDGWARE, MIDDLESEX

HARVERSON SURPLUS CO. LTD.

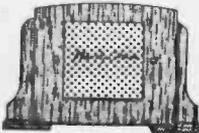
MONAURAL AMPLIFIER



This amplifier as illustrated, made by a leading manufacturer. Mullard valves—ECC83, EL84 x EL84, EZ80. Bass Treble and Volume on remote panel. Elegant Knobs. OUR PRICE one month only £4.16.6 plus P. & P. 3/6.

EXTENSION SPEAKER

An attractive cabinet 8 x 6 x 2in. fitted with 3 ohm 5in. speaker complete with lead, a few only. 19/6 P. & P. 2/6.



STEREOPHONIC AMPLIFIER £5.10.0

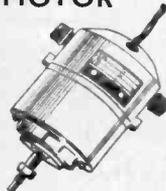
Complete with 2 Loudspeakers

Plus 4/6 P. & P.

This is a compact amplifier embodying the latest features and giving a high standard of reproduction, with ample volume. Supplied complete with valves (ECL82, ECL82, EZ80), panel, knobs, etc., and two specially selected 3Ω matched loudspeakers. We only have a few, and we will never be able to repeat this offer at such a low price! Don't risk disappointment! Order now!

1/6 H.P. MOTOR

140 Watt (Approx. 1/6 H.P.). Series wound, 220/250 volt 50 cycle motor. Off load 14,000 rev/min. on load 8,500 rev/min. Ideal small saw, sewing machine, etc. P. & P. 3/- 30/-



CONDENSER/RESISTOR PARCEL

50 mixed P.F. Condensers and 50 mixed Resistors. An assortment of useful values. All popular sizes—all new—a must for the serviceman and constructor. ONLY 10/- P. & P. 1/-.

RECTIFIERS FOR BATTERY CHARGERS

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

TRANSISTOR BARGAINS

ALL MULLARD FIRST GRADE

OC71	8/-
OC72	12/-
OC72 Matched Pair	25/-
OC45 Green Spot	15/-
OC45 Blue Spot	15/-
OC44	15/6
SB305 Semi Conductor	10/6
OA41 Diode	3/6

★ Postage on all the above 6d.

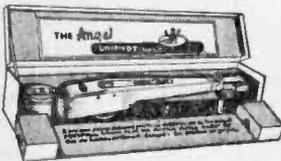
YOU ARE INVITED!

Spend a day browsing around our premises at **83 HIGH ST., MERTON, S.W. 19** (one minute South Wimbledon Tube).

We have a wealth of components, valves, chassis, tape decks, autochangers, amplifiers, F.M. tuners, record players, tape recorders, cabinets, and a whole host of other things we just don't have the space to describe. Please come and look for yourself. We will be pleased to see you, and there's no obligation to buy.

BARGAINS IN GRAM & TAPE EQUIPMENT

THE WORLD FAMOUS E.M.I. ANGEL TRANSCRIPTION P.U. (Model 17A)



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

PICK-UP CARTRIDGE BARGAINS

STUDIO P	17/6
ACOS HIGH G.	17/6
E.U. POWER POINT	12/6
RONETTE	18/6
G.C.Z.	16/6

P. & P. 1/-.

RECORD CHANGERS

GARRARD	RC 98 Mk. 4H.	4-speed autochanger	£16.10.0
	RC 120/D Mk.2	" "	£9. 0. 0
	RC 120 Mk.4D	" "	£9. 0. 0
	RC 120 Mk.4H	" "	£9. 0. 0
	RC 121 Mk.1	" "	£11.0. 6
	RC 121 Mk.4H	" "	£11.0. 6
	RC 121/40 Mk.2	" "	£11.0. 6

COLLARO	RC 54	4-speed autochanger	... £6.19. 6
	RC 594	" "	£7.19. 6
	Conquest	" "	£6.12. 6
	Challenger	" "	£7.19. 6

B.S.R.	Monarch UA8	4-speed autochanger	£6.19. 6
	TUB	4-speed single player less pick up	£2.10. 0

NOTE: Any of the above with Stereo Cartridge and Fittings, 16/- extra. Carriage and ins. on each of above 5/- extra.

TAPE DECKS

LATEST B.S.R. MONARDECK (single speed) 3 1/2 in. per sec., simple control, uses 5 1/2 in. spools.....£9.19.6 plus 5/6 carriage and insurance (tapes extra).
 COLLARO STUDIO DECK piano key controls, pause control, space for additional head, uses 7 in. spools, with counter.....£14 plus 6/- carriage and insurance (tapes extra).

WE HAVE A LARGE RANGE OF READY-BUILT RECORD PLAYERS AND TAPE RECORDERS (BOTH STEREO AND MONAURAL) AT BARGAIN PRICES

83 HIGH STREET, MERTON, S.W.19

CHerrywood
3985/6/7

MIDGET GRAM AMPLIFIER READY-BUILT with Speaker



A 2½ watt gram amplifier, fitted with bass, treble, and vol./on-off controls. Supplied complete with 6 x 4in. 30 speaker, valves (UY85, UF89, UL84), knobs, etc., all mounted on an attractive baffle board, size 10½ x 7½ins.

OUR PRICE ONLY **49/-** P. & P. 3/-

HARVERSON T.R.F. EASY FOUR KIT



All parts and theoretical wiring diagram only.

OUR PRICE **£4.0.0.** Plus P. & P. 3/6



HARVERSON SUPERHET 4 KIT

A medium and long wave superhet, incorporating two i.f. stages modern B9 valves (UCH81, UBF89, UCL83, UY85), built-in ferrite rod aerial. All you need supplied, from theoretical wiring diagram to last nut and bolt (main components ready mounted), including an attractive contemporary styled cream plastic cabinet with gold trimmings. Size 11½ x 4½ x 6½in. **PRICE £6.12.6.** Post 3/6

AM/FM RADIOGRAM CHASSIS

★ By famous manufacturer. ★ 220/250 volts A.C. ★ Coverage 1000-1900 m, 200-500 m, 88-98 Mc/s. ★ Tuned by 5 "Piano Keys"—Off, LW, MW, FM and Gram. ★ Sockets for P.U., Ae, E, Extn. Spkr. and Dipole. ★ Tuning and tone controls fitted. ★ Valves, ECH81, EF89, EABC80, EL84, ECC85 and EZ80. 50 Only at ridiculous price of **12 gns.** plus 8/6 P. & P.

TAPE RECORDER

★ CONTEMPORARY Red and White Tygan Cabinet. Size 13½ x 14½ x 9½ inches.
★ B.S.R. DECK.
★ MAGIC EYE tuning.
★ INPUTS for RADIO and MIKE.
★ VOLUME and TONE Controls.
This instrument has to be seen and heard to be believed. Complete with ACOS Xtal Mike. **ONLY 18 gns.** P. & P. 8/6

GUARANTEED VALUE		★ NEW and BOXED		★ PROMPT DESPATCH		★ POST 6d. per valve extra					
ACHLDD	EB041 8/9	EF91 5/6	KLL32 8/-	PL81 11/9	U76 7/8	IVU111 2/3	5Z4M 9/6	6K9G 7/-	7B6 9/9	12K80T18/-	80FL1 11/9
AC/P	7/-	EFB89 9/-	8/9	KT2 4/6	PL82 8/-	U191 10/6	W21 11/9	6A7 10/6	6K6GT 6/8	12Q7GT 7/-	3515GT 9/8
AC/P4	9/9	EBF89 9/-	8/8	KT24 4/6	PL83 11/-	U339 11/9	W76 7/-	6ASG 8/6	6K7GT 5/8	12R7 6/8	35W4 7/8
AC/P4	7/-	EB121 9/2	EL32 4/3	KT32 9/3	PK25 11/9	X403 15/6	W77 8/-	6AC7 6/-	6K8GT 9/9	12R7 6/8	35W4 7/8
AC/PEN	EB131 8/2	EL33 13/-	K139G 8/-	PK30 7/-	PY50 10/6	W229 10/6	W29 9/9	6A5 5/3	6K25 18/6	12R7 6/8	35ZAGT 7/8
DD	25/9	EC81 7/-	EL33 24/6	K136 28/-	PY81 8/-	U801 28/-	X22 16/9	6AK5 6/-	6L1 14/6	12R7 6/8	35ZAGT 7/8
AC/PEN 6/-	EC81 7/6	EL41 9/8	KT53 10/3	PY82 6/8	UABC80 9/6	X41C 16/9	6A15 8/-	6L00 7/8	7H7 8/8	12R7 6/8	35ZAGT 7/8
ACVP1/59/3	ECC82 7/-	EL42 9/8	KT61 9/8	PY83 8/-	UAF42 8/9	X101M 11/8	6A35 11/8	6L00 9/4	7Q7 8/8	12R7 6/8	35ZAGT 7/8
ATP4	3/8	EC83 8/6	EL81 15/6	KT63 7/-	PZ30 18/6	UBC41 8/8	Y83 8/6	6A6 4/6	6L7G 7/-	12R7 6/8	35ZAGT 7/8
AZ1	9/3	EC84 9/3	EL84 8/6	KT66 16/-	PEN4DD 16/-	UBF80 8/9	Z21 9/9	6A5 7/-	6L18 10/3	12R7 6/8	35ZAGT 7/8
AZ31	11/2	EC85 9/-	EM84 8/9	KT84 21/-	25/-	UC84 10/-	Z309 7/-	6AT5 8/-	6L19 14/8	12R7 6/8	35ZAGT 7/8
B36	14/-	ECF80 11/3	EM80 9/3	KTW61 6/-	PEN4VA 14/-	UCF80 15/6	Z359 7/-	6A16 9/9	6L19 14/8	12R7 6/8	35ZAGT 7/8
CBL31	22/9	ECF82 12/3	EM81 8/6	KTW63 7/-	25/-	UCF80 15/6	Z359 7/-	6A16 9/9	6L19 14/8	12R7 6/8	35ZAGT 7/8
OC83	22/9	ECI421 22/-	EY51 9/3	KTZ41 3/3	PEN25 5/6	UCI42 9/9	LA5GT 5/8	6B84 7/-	6L19 14/8	12R7 6/8	35ZAGT 7/8
CL34	11/6	ECI42 9/-	EY36 3/3	MM41 6/6	PEN46 6/6	UCH81 9/9	LA7GT 11/9	6B85 7/8	6L19 14/8	12R7 6/8	35ZAGT 7/8
CL33	18/-	ECI81 8/6	EZ40 7/-	ML4 8/-	PEN38222/-	UCL82 15/6	IC2 11/-	6B66 22/-	6A7GT 7/8	10P9 14/6	20P2 25/-
CY31	15/9	ECI80 9/3	EZ41 7/-	MS4 16/-	PEN220A 9/9	UCL83 11/8	IC5GT 11/8	6B16 8/6	6B87 7/-	10P11 8/8	20P2 25/-
CV73	5/9	ECI82 9/9	EZ80 6/8	MS4/5 7/-	PEN4D5 9/9	UF41 8/6	LD6 11/9	6B16 8/6	6B87 7/-	10P11 8/8	20P2 25/-
CO6A	9/-	EF22 8/-	EZ81 6/8	MS4/7 7/-	25/-	UF89 8/6	HL5GT 10/-	6B16 8/6	6B87 7/-	10P11 8/8	20P2 25/-
DAF96	8/8	EF36 4/6	EZ90 7/-	MV5/PEN 9/3	PEN4A 14/6	UL41 9/8	HL4 9/8	6B16 8/6	6B87 7/-	10P11 8/8	20P2 25/-
DF96	8/8	EF37A 14/-	EL148 1/9	9/3	PM12M 7/8	UL44 25/-	LLD3 3/-	6C4 8/9	6B87 7/-	10P11 8/8	20P2 25/-
DH63	11/6	EF39 5/3	FC13 6/-	MX40 16/-	PM2M 7/8	UL44 25/-	LLD3 3/-	6C4 8/9	6B87 7/-	10P11 8/8	20P2 25/-
DI101	11/6	EF40 13/6	FW4/5009/3	N37 18/6	QP21 4/6	UL46 25/-	LS3 8/9	6C5GT 6/-	6B87 7/-	10P11 8/8	20P2 25/-
DK96	8/6	EF41 9/3	OTIC 25/6N7	18/8	R16 25/-	UL54 3/6	LS5 7/-	6C6 4/6	6B87 7/-	10P11 8/8	20P2 25/-
DL96	8/6	EF42 10/3	LZ32 11/-	N39 28/-	SP41 2/9	U06 18/8	LS4 9/9	6C31 7/-	6C5 6/5	6B87 7/-	10P11 8/8
DL145	9/6	EF92 3/9	H30 4/6	OZ4 5/-	SP41 2/9	U08 26/-	LS5 6/-	6C6 4/6	6B87 7/-	10P11 8/8	20P2 25/-
DM70	7/-	EF080YL H03	9/3	P61 3/3	SP47 9/9	UY1N 11/9	IT4 6/6	6D6 4/6	6B87 7/-	10P11 8/8	20P2 25/-
DN41	16/6	6/8	HL23DD 8/6	PCF80 8/6	SP47 9/9	UY21 11/9	2C26 1/8	6C16 9/9	6B87 7/-	10P11 8/8	20P2 25/-
EA50	1/3	EF54 5/6	HL22 6/-	PCF90 9/4	T41 22/-	UY41 7/-	2P 25/-	6F6G 7/6	6L1208 8/8	30F1 9/9	955 3/3
EABC80	8/6	EF55 9/9	HL41 3/3	PCF82 11/6	TD13C 7/6	UY83 6/6	2X2 4/6	6F6M 1/1	6L1208 8/8	30F1 9/9	955 3/3
EAF42	9/6	EF80 7/-	HN309 23/-	PCF82 11/6	TD233 17/6	VP130 3/3	3A4 6/6	6F1 13/6	6L1208 8/8	30F1 9/9	955 3/3
EB34	1/9	EF85 7/-	K40N 8/6	PCI83 13/6	TP22 7/8	VP23 6/6	3A8GT 5/8	6F13 13/6	6L1208 8/8	30F1 9/9	955 3/3
EB41	8/-	EF98 11/6	KP35 8/-	PI35 16/6	TP25 25/-	VF41 8/6	LD4 4/6	6F15 13/6	6L1208 8/8	30F1 9/9	955 3/3
EB38	8/8	EF89 8/-	KK32 20/6	PI36 14/6	U10 9/9	VP133 1/8	304 7/8	6F17 11/6	6L1208 8/8	30F1 9/9	955 3/3
					U14 8/-	VR22(PM 3Q5GT 9/-	6P33 16/6				
					U16 8/-	2A) 2/9	384 7/-				
					U16 11/9	VR105/30 3V4 8/-	6H6GT 2/8				
					U17 11/9	VR116 7/8	4D1 2/9				
					U22 7/8	VR116 3/9	5R4GY 9/-				
					U25 13/-	VR150/30 5U4G 6/3	6J6 6/6				
					U26 11/9	7/-	5V4 10/9				
					U37 25/-	VC120A 3/3	3Y3G 7/8				
					U45 14/-	VC39MU 5Y3GT 7/6	6K7G 3/9				
					U50 7/8	12/14 8/6	5Z4G 8/6				

SPEAKER FRET

Super quality heavily woven fret, 54 inches wide. Usual price 50/- per yard. P. & P. 1/-
OUR PRICE 19/6 per yard.

CYCLINDRICAL CHANNEL TURRET TUNERS

New purchase offered at still lower price. I.F. 33-38 Mc/s. Complete with PCC84 and PCF80 valves and 5 sets of Coils for 5 Band I channels and 8, 9, 10 Band III. New and unused. Value over £7.
OUR PRICE, Post paid **32/6**

MINIATURE AMPLIFIER



Miniature amplifier, size 3½ x 2½ x 4½ins. 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 I.F. TRANS & COILS

A pair of midget 465 kc/s I.F. transformers, plus LW and MW coils. OUR PRICE 10/- per set. P. & P. 1/9.
Set of I.F. transformers for transistor superhet. 9/-.

COSSOR C.R.T. SNIP

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.

CLYNE RADIO LTD



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18 TOTTENHAM COURT ROAD, W.1
99 CHEAPSIDE, LONDON E.C.2

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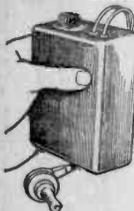
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CADY UNIVERSAL TEST METERS

These pocket-size multi-range test meters are excellent quality and cover all the most useful ranges (A.C. Volts, D.C. Volts, resistance and current). Supplied complete with test prods. Instruction book and batteries. Model A.10 (2,000 ohms per volt), £4.17.6. Model B.20 (10,000 ohms per volt), £6.10.0. Plus P. & P. 3/6 on each. Fully detailed and illustrated leaflet available on request.

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 wonderful volume. No fiddly tuning! 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 32/6, plus 1/6 P. & P. Battery 3/- extra. Ardent type deal-aid earpiece complete with cord and plus 12/6 extra. Parts price list and Easy Lay-out Plans 2/- post free. Callers welcome to hear this set demonstrated at any of our branches. Our reputation is your guarantee.

RECORD PLAYERS

Full range at usual competitive prices. Interesting H.P. facilities. E.M.L. 4-SPEED STEREO/MONAU-RAL SINGLE RECORD UNIT. Complete with Stereo Head and Sapphire Styl. Brand New and Fully Guaranteed. ONLY £6.19.6 plus 3/8 P. & P.

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LATEST GARRARD MODEL 210. 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 10/ fms., plus 3/6 P. & P.

LATEST B.S.R. UA14. 4-speed. Attractive appearance. Wired for stereo. Fully guaranteed. £7.19.6, plus 3/8 P. & P.

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COLLARO CONQUEST. 4-speed, wired for stereo. Brand new. £7.19.6, plus 3/8 P. & P.

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The latest "Pifco" Instrument Bit Soldering Iron With Integral Stand and built-in Spot-light for illuminating work, 200/250 v., ONLY 22/6. P. & P. 1/6. SOLDER. New tin of 1 lb. reels, 18 S.W.G. 50/50 at 8/6 only, plus 1/- P. & P.

TRANSFORMER SPECIAL. Superior quality half-shrouded drop Euro type. Ex-equi, but guaranteed O.K. Input 200/250 v. Output 350-0-350 v. at 80 mA, 6.3 v. at 3 amps, 5 v. at 2 amps. ONLY 9/6, plus 2/6 P. & P.

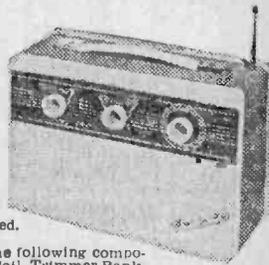
LOUDSPEAKERS. EX. CHASSIS. As new guaranteed perfect by leading manufacturers. 6in. 10/6; 8in. 13/6; also 10in. with O.P. transformer (5,000 ohms), 17/6.

THE "WAVEMASTER" 7-TRANSISTOR LUXURY PORTABLE

400 MILLIWATTS OUTPUT

To build yourself. Medium and Long Waves—Push-Pull Superhet A.V.C. Perfect Car Radio reception. Size 10in. x 6in. x 4in. at base tapering to 4in. at top. Very attractive two-tone grey Vynide covered cabinet with black and gold printed esutcheon plate, cream and gold knobs, handle and cabinet fittings. ★ Weight—complete with long-life 7½ volt battery—4½lb. ★ Mazda high-grade transistors throughout. ★ High-Flux 7in. x 4in. Elliptical speaker. ★ Slow motion tuning. ★ Co-axial socket at rear for direct connection to Car Radio Aerial. ★ Improved reception by use of seven-section plated telescopic aerial disappearing into Cabinet when closed. 34in. above Cabinet when fully extended.

Construction simplified by Bakelite chassis board with the following components already mounted: I.F. Transformers (3). Oscillator Coil, Tunmer Bank, Output Transformer, Interstage Transformer, Aerial Brackets and Earth Bar. SPECIAL INCLUSIVE PRICE for all required components, full assembly instructions—nothing more to buy—£10.19.6 plus 3/6 P. & P. Alignment service available. Full assembly instructions and individually priced parts list, all of which are available separately. 2/6, post free.



The "Practical Wireless" Pocket Superhet. All items available. Send stamp for price list.

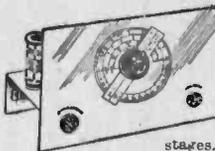
SUPER PERSONAL PORTABLE

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 43/- 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.L.R.5 balanced armature headphones, 7/6 post.



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 valves. 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 for point-to-point wiring diagram and price list.



Have you tried the famous American Piezodynamic "BRAND FIVE" Recording Tape.

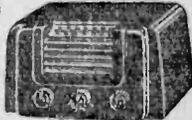


An enthusiast's must!

High Quality Acetate Base:
5* 800ft., 16' 5* 900ft. 18/6; 5* 1,200ft. 23/6; 7* 1,200ft. 25/-; 7* 1,800ft. 35/-; Extra Quality Mylar Dupont:
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

"FAMILY FOUR"

Our supersensitive T.R.F. Receiver for home construction. Covers Long and Medium Wavebands. It 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.



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 sensitive receiver that will fit any car. Comprehensive 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.



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

Send stamp for comprehensive list of equipment to build yourself also our current competitively priced valve list.

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IA3	3/-	6F6G	7/-	9D2	4/-	30PL1	11/6	DF96	8/6	EF40	15/6	HVR2	20/-	PL84	12/8	U801	29/10	X109	17/3				
IA5	6/-	6F11	17/3	10C1	13/-	30PL13	12/6	DF97	9/-	EF41	9/-	HVR2A	6/-	PL820	18/7	U4020	16/7	XD(1.5)	6/6				
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IC5	12/6	6F13	11/6	10D2	12/-	35L6GT	9/6	DH76	5/-	EF50(A)	7/-	KL35	8/6	PM12	6/6	UAF42	6/6	XYF34	17/6				
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ID6	10/6	6F15	15/3	10F9	11/6	35Z3	10/6	DH101	28/6	EF54	5/6	KT2	5/6	PM24M	21/3	UBC81	8/6	XSG(1.5)	6/6				
IG6	17/6	6F16	9/6	10LD3	8/6	35Z4GT	6/6	DH107	13/11	EF73	10/6	KT33C	10/-	PX4	10/6	UBC81	8/6	Y63	7/6				
IHSGT	10/6	6F17	12/6	10LD11		35Z5GT	9/-	DK32	12/-	EF80	7/-	KT36	29/10	PY1	16/7	UBF89	9/6	Z63	7/6				
IL4	4/6	6F23	10/6		15/11	43	10/-	DK40	21/3	EF85	10/6	KT44	12/6	PY2	11/6	UBL21	23/3	Z66	17/6				
ILD5	5/-	6F32	10/6	10P13	15/-	50C5	10/-	DK91	6/6	EF86	10/6	KT61	12/6	PY80	7/6	UCC84	14/7	Z77	4/6				
ILN5	5/-	6F33	7/6	10P14	19/3	50C6DG		DK92	9/-	EF89	9/6	KT63	7/6	PY81	8/6	UCC85	9/-	Transistors					
INSGT	10/6	6C6	6/6	12A6	5/-	36/6	36/6	DK96	8/6	EF92	4/6	KT66	15/-	PY82	7/-	UCF80	16/7	and diodes					
IR5	6/6	6H6GT	3/-	12AC6	15/3	50L6GT	9/6	DL33	9/6	EF97	13/3	KT88	22/6	PY83	8/6	UCH21	23/3	GD3, 4, 5,					
IS4	9/-	6J5G	5/-	12AD6	17/3	53KU	19/11	DL66	17/6	EF98	15/6	KTW61	6/6	PZ30	19/11	UCH42	9/6	6, 8	4/-				
IS5	6/-	6J6	5/6	12AE6	13/11	72	4/6	DL68	15/6	EF98	13/3	KTW62	7/6	QP21	7/-	UCH81	9/6	OA70	4/-				
IT4	4/6	6J7G	6/-	12AH7	8/7	78	6/6	DL92	7/-	EK32	8/6	KTW63	6/6	QPS2	14/6	UCL82	11/6	OA73	4/-				
IU5	6/-	6J7GT	10/6	12AH8	12/6	78	6/6	DL94	9/-	EL32	5/-	KTZ41	8/6	QS15Q15		UCL83	19/3	OA79	4/-				
2P	26/6	6K7G	6/-	12AT7	6/-	83	15/-	DL96	8/6	EL33	12/6	KTZ63	7/6		10/6	UF41	9/-	OA81	4/-				
2X2	4/6	6K7GT	10/6	12AU6	23/3	85A2	15/-	DM70	7/6	EL34	15/-	L63	6/6	R12	9/-	UF42	12/6	OA86	6/-				
3A4	6/-	6K8GT	6/6	12A07	6/6	150B2	15/-	EAS0	2/-	EL38	26/6	MH4(C)	7/6	R18	14/-	UF80	10/6	OA91	5/-				
3A5	10/6	6K8C5	19/11	12AV6	12/8	161	10/6	EABC80	9/-	EL41	9/-	MHL4	7/6	R19	19/11	UF85	9/6	OA95	5/-				
3B7	5/-	6L1	23/3	12AX7	7/6	185B7	33/2	EAC91	4/6	EL42	10/6	MHLD6	12/6	RK34	7/6	UF86	17/11	OA210	25/-				
3D6	7/6	6L6G	8/-	12BA6	8/6	185BTA	33/2	EAF42	9/-	EL81	12/6	ML4	8/6	S130	15/-	UF89	9/-	OA211	40/-				
3Q5GT	9/6	6L6M	9/6	12BE6	9/-	304	10/6	EB34	2/6	EL83	19/11	MS4B	23/3	SP4(7)	14/6	UL41	9/-	OC16	54/-				
3S4	7/-	6L7GT	7/6	12BH7	21/3	305	10/6	EB41	8/6	EL84	7/6	MU1/12, 8/3	SP41	3/6	SP42	12/6	UL44	26/6	OC19	54/-			
3V4	7/6	6L18	13/-	12E1	30/6	807	3/6	EB91	4/-	EL85	13/11	N37	19/11	SP42	12/6	UL46	14/6	OC26	44/-				
5R4GY	17/6	6L19	23/3	12J5GT	4/6	956	3/6	EBC3	23/3	EL86	17/3	N78	19/11	SP61	3/6	UL84	8/6	OC28	60/-				
5U4G	6/6	6LD3	8/6	12J7GT	9/6	1821	16/7	EBC33	5/-	EL91	5/-	N108	19/11	SU25	23/6	UM84	17/3	OC35	48/-				
5V4G	10/-	6LD20	15/11	12K5	17/11	5763	12/6	EBC41	8/6	EL95	10/6	N308	20/7	SU61	9/-	UM80	15/3	OC44	26/-				
5Y3GT	6/6	6N7	8/-	12K7GT	5/6	7475	7/6	EBC81	8/6	EM34	9/6	N339	15/3	T41	21/3	URIC	9/-	OC45	23/-				
5Z3	12/6	6P25	12/6	12K8GT	14/-	9002	5/6	EBF80	9/-	EM71	23/3	P61	3/6	TH4	26/6	UU6	19/11	OC65	22/6				
5Z4G	9/-	6P28	26/6	12Q7GT	5/-	AC/PEN		EBF83	13/11	EM80	9/-	PABC80		TH233	33/2	UU8	26/6	OC70	14/-				
6A7	10/6	6Q7G	6/6	12S47	8/6	5-pin 23/3		EBF89	9/6	EM81	9/-		13/11	TH232	20/7	UU9	7/6	OC71	14/-				
6A8G	9/-	6Q7GT	11/-	12S7	8/6	7-pin 15/-		EBL21	23/3	EM84	10/6	PCB84	8/-	TP22	15/-	UY1N	18/7	OC72	17/-				
6A8B	9/-	6R7G	10/-	12S7	7/6	AC/PEN		EBL31	23/3	EN31	37/-	PCCB8	9/6	TP25	15/-	UY21	13/11	OC73	20/-				
6AC7	4/-	6S47GT	8/6	12S7H	8/6	AC/PEN	7/6	ECS2	5/6	EY51	9/-	PCCB8	11/6	TP2620	33/2	UY41	7/6	OC75	15/-				
6AG5	5/6	6S7	7/6	12S7H	8/6	AC/PEN	33/2	EC70	12/6	EY84	14/6	PCCF80	8/6	TY86F	13/3	UY85	7/6	OC76	15/-				
6AK5	8/-	6S7GT	8/-	12S7K	6/6	ATP4	5/-	EC92	13/3	EY86	9/6	PCCF80	10/6	U12/14	8/6	VMS4B	15/-	OC77	21/-				
6AL5	4/-	6S7HGT	8/-	12S7R	8/6	AZ1	18/7	EC32	5/6	EZ35	6/6	PCF86	15/-	U16	10/6	VP(27)	12/6	OC78	17/-				
6AM6	4/-	6S7GT	8/-	12Y4	10/6	AZ31	10/-	ECC33	8/6	EZ40	7/-	PCL82	10/-	U18/20	8/6	VP4	15/-	OC78D	17/-				
6AQ5	7/6	6S7GT	8/-	12Y4	10/6	AZ31	10/-	ECC33	24/7	EZ41	7/-	PCL83	11/6	U22	8/-	VP28	14/6	OC81	18/-				
6AT6	7/6	6S7GT	8/-	14S7	27/10	AZ41	13/11	ECC34	24/7	EZ42	7/-	PCL84	12/6	U24	29/10	VP48	23/3	OC170	35/-				
6AU6	10/6	6S7GT	8/-	18	23/3	B36	15/-	ECC35	8/6	EZ80	7/-	PCL85	16/7	U25	19/11	VP13C	7/6	OC200	54/-				
6AV6	12/8	6S7GT	8/-	19AQ5	10/6	BL63	7/6	EC40	23/3	EZ81	7/-	PCL85	16/7	U25	19/11	VP13C	7/6	OC203	58/-				
6BBGT	5/-	6S7GT	8/-	19H1	10/-	CI	12/6	ECC81	6/-	FC24	24/7	PEN4A	12/6	U26	10/6	VP41	6/-	TJ1	40/-				
6BA6	7/6	6U4GT	12/6	20D1	15/3	CIC	12/6	ECC82	6/6	FC4	26/6	PENB4	26/6	U31	26/6	VP105	8/6	TJ2	45/-				
6BE6	6/-	6U5G	7/6	20F2	26/6	CBL1	26/6	ECC83	7/6	FC13	26/6	PEN4DD	26/6	U35	26/6	VR150	7/6	TJ3	50/-				
6BG6G	23/3	6U7G	8/6	20L1	26/6	CBL31	23/3	ECC84	9/-	FC13C	26/6		26/6	U37	26/6	VT61A	5/6	TJ4	40/-				
6BH6	8/-	6V6G	7/-	20P1	26/6	CCH35	23/3	ECC85	8/6	FW4/500		PEN25	4/6	U43	9/-	VT501	5/6	TP2	40/-				
6B16	6/-	6V6GTG	8/-	20P3	23/3	CK506	6/6	ECC88	18/6		FW4/800	8/6	PEN4D	25/-	U45	9/-	W6M1	26/6	TS1	10/-			
6BQ7A	15/-	6X4	5/-	20P4	26/6	CL33	19/3	ECC91	5/6				PEN44	26/6	U50	6/6	W76	5/6	TS2	12/6			
6BR7	15/-	6X5GT	6/-	20P5	23/3	CV63	10/6	ECC90	10/6	GZ30	9/6	PEN45	19/11	U52	6/6	W8M1	6/6	TS3	15/-				
6BS7	25/-	6/30L2	10/-	25A6G	10/6	CY1	18/7	ECC92	10/6	GZ32	10/6	PEN45DD	U54	19/11	W107	18/7			TS4	24/-			
6BW6	8/6	7A7	12/6	25L6GT	10/6	D1	16/7	ECH21	23/3	GZ33	19/11		26/6	U76	6/-	W229	18/7						
6BW7	7/-	7B6	21/3	25Y5	10/6	D15	10/6	ECH35	6/6	GZ34	14/6	PEN46	7/6	U78	5/-	X24M	24/7						
6BX6	7/-	7B7	8/6	25Y3G	8/6	D63	5/-	ECH42	9/-	H63	12/6	PEN383	23/3	U107	16/7	X41	26/6						
6C4	5/-	7C5	8/6	25Z4G	9/6	D77	4/-	ECH81	9/-	HABC80		PEN453DD	U191	16/7	X41	26/6							
6C5G	6/6	7C6	8/6	25Z5G	9/6	D77	4/-	ECH81	9/-	HABC80			33/2	U201	16/7	X61(C)	12/6						
6C9	13/6	7H7	8/-	27SU	19/11	DAF91	6/-	ECL80	9/-	HL2	7/6	PEN/DO	U251	14/-	X61M	26/6							
6C10	9/-	7H7	12/6	28D7	7/6	DAF96	8/6	ECL82	10/6	HL23DD	7/6		40/20	33/2	U281	19/11	X63	12/6					
6C6DG	36/6	7S7	9/6	30C1	8/-	DD41	13/11	ECL83	19/3			PL33	19/3	U282	22/7	X65	12/6						
6CH6	9/-	7V7	8/6	30F5	7/6	DET25	7/6	EF9	23/3	HL41DD		PL36	12/-	U301	23/3	X66	12/6						
6D3	19/11	7Y4	7/6	30FL1	10/-	DF33	10/6	EF22	14/-			PL38	26/6	U329	15/3	X76M	14/6						
6D6	6/6	8D2	3/6	30L1	8/-	DF66	15/6	EF36	4/-	HL42DD		PL81	10/6	U339	16/7	X78	21/3						
6E5	12/6	8D3	4/6	30L15	11/6	DF70	15/-	EF37A	8/-			PL82	7/6	U403	16/7	X79	21/3						

ALL ITEMS OFFERED ARE NEW, FULLY GUARANTEED, AND PRODUCTS OF ONLY THE BEST MANUFACTURERS. WE 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 13/6	RM-1	5/3	14A86	17/6	14B130	35/-	14RA 1-2-8-3	21/-	18RA 1-1-16-1	6/6
10 K 25 K 50 K 100 K	DRM2B 15/6	RM-2	7/6	14A97	25/-	14B261	11/6	(FC31)		(FC116)	
± mg. ± mg. 1 meg. 2 meg.	DRM3B 15/6	RM-3	7/9	14A100	27/-	14RA 1-2-8-2	17/6				

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.



Versatile Wire



Single-strand 18-gauge with P.V.C. covering which makes it rustproof. Extra strong, will stand tremendous strain. Ideal for gardening, clothes lines, indoor aerials, etc. etc. Also being steel alloy and having a resistance of approximately 1 ohm per yard this can be used for electrical work, soil heating, wrapping round water pipes, etc. New on drum containing 3,000ft. Price 8/6, plus 3/6 carr.

Welding Transformer



Output 2/3 volts by high and low switch. Continuous rating 230 amps. Intermittent for spot welding exceeds 2,000 amps. Unused lightly 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 20ft. roll.
- SPONGE STRIP.** 1in. x 1in. 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 your self—anyone can do it! Pocket 4 uses three transistors and a diode, complete cost 42/6 plus postage and insurance.

Pocket 5, much louder, uses four transistors and diode, complete cost 55/-, plus 2/6 postage and ins. Each complete to last nut and bolt with proper cabinet, with proper tuning condenser and miniature loudspeaker. Batteries available (30d. extra) and solder (1/-) 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

Phillips 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 AC319 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. Muting switch. Can be used with any amplifier or radio set. Complete with monaural pick-up £10.10.0, or 2 gns. deposit and 20 fortnightly payments of 10/-. Available also with stereo head, diamond or sapphire styli. Prices on request.

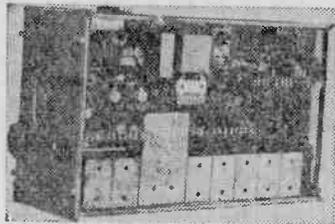


The Taylor Meter Model 127A



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 50 micro-amps. to 1 amp. D.C. voltages—0-1,000 volt in seven ranges (25 KV.) with external probe, optional extra. Volts. A.C.—0-2,500 in six ranges. Ohms—0-20 meg. Ohm in three ranges (self-controlled). 3 1/2 in. movement. Price £10 or 10/- deposit and 23 fortnightly payments of 10/-. Non-callers add 5/- carriage and insurance.

Self-contained, 3 1/2 in. movement. Price £10 or 10/- deposit and 23 fortnightly payments of 10/-. Non-callers add 5/- carriage and insurance.



Breakdown Unit

Receiver Type 3085. Over 30 lbs. of useful spares including metal rectifiers, transformers, pot meters, switches, valve holders, resistors, coils, coil formers, knobs, pvc plugs, sockets, slow-motion drives, trimmers, etc., etc. Must have cost £100 ea. Slightly soiled but most parts usable. 15/- plus 10/- carriage.

Connecting Wire

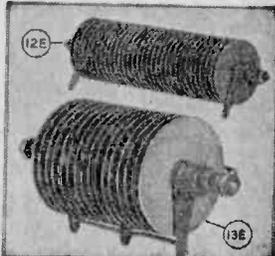


P.V.C. covered in 100ft. coils—2/9 a coil or four coils different colours, 10/-, post free.

Yaxley Switches

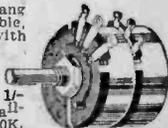
1 Pole 3 Way	1/6
1 Pole 5 Way	2/-
1 Pole 12 Way	3/-
2 Pole 2 Way	2/6
2 Pole 4 Way	2/-
2 Pole 6 Way	2/6
2 Pole 8 Way	3/6
2 Pole 12 Way	4/6
3 Pole 3 Way	1/6
3 Pole 6 Way	3/6
4 Pole 4 Way	3/-
6 Position Shorting	2/6
6 Pole 3 Way	2/6
6 Pole 4 Way	3/6
8 Pole 2 Way	2/-
9 Pole 3 Way	2/6
12 Pole 2 Way	2/-

Rectifier Bargains



Selenium rectifier type 12, 500 v. & A. half-wave easily rebuilt into full wave or multiple type, contains 30 36 mm. discs. Price 8/6, plus 1/6 post. Type 13, 36 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 2-rang 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.

Crystal Mike by Acos



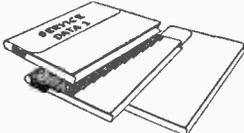
Model 39/1, this is ideal for tape or general amplifiers, complete with screened lead, 39/6, plus 1/- post.

Chassis Assembly



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

TV Service Sheets



150 pages covering the most popular post-war Televisions by leading makers—Cossor, Ekco, Ferguson, Pye, etc. Giving circuit diagram, component values, I.F. frequencies, etc. £1, post free.

Miniature Microphone

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



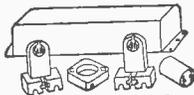
Speaker Bargain

12 in. 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 photofood 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 3/6 each, post 9d. Circuit diagram included.



Fluorescent Light Bargain

Kit of parts comprising: choke, two lamp holders, starter holder and starter, 40 watt, 19/8, 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 6V., 4 mid 6V., 8 mid 6V., 5 mid 12V., 10 mid 6V., 25 mid 6V., 30 mid 3V., 50 mid 3V., 200 mid. All 1/8 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. Mid-let 3in. P.M. Loudspeaker for transistor set, 3 ohm or 80 ohm coil. Price 18/6. Mid-let 208 pF + 176 pF two-band Tuning Condenser with trimmers, 1 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, 8/6. 0.0005 mid Single Tuning Condenser. Solid dielectric fin. spindle (or transistor or crystal set, 3/9; ditto with spindle tapped 6 BA. 4/-). Transistors tested. Set of six for Superhet includes matched pair, Mullard 23.10.0, ditto unbranded, 45/-; suitable as mixers, 9/6 each. Suitable as I.F. amplifiers, 8/6; suitable for R.F. and Regen. circuits, 6/6; 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.

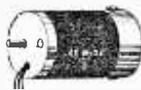
Another Battery Charger Bargain
Components Would Cost More

Car Battery Charger—ready-made high output battery charger in stove enamelled sheet steel with louvred 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 winding for reversing. Operates off 20-30 v. D.C. or off A.C. mains through stepdown transformer. Original cost at least £3 each. Snip price for one month only 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/-.



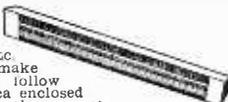
RI155 for Spares

These are less valves but otherwise reasonably complete—ideal for spares—prices £2 to £4 depending on condition—carriage 7/6.



INFRA-RED HEATERS

Make up one of these latest type heaters, ideal for bathroom, kitchen, bedroom, etc. They are simple to make and 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 2 1/2 in. flush ... 17/6
250-0-250 microamp 2 1/2 in. surface 27/6
750 microamp 2 1/2 in. surface 17/6
5-0-5 milliamp 2 1/2 in. flush ... 17/6
0-30 milliamp 2 1/2 in. flush ... 17/6
0-100 milliamp 2 1/2 in. flush ... 15/-
0-300 milliamp 2 1/2 in. flush ... 15/-
0-500 milliamp 2 1/2 in. flush ... 15/-

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

Filament Transformer, 6.3 v., 11 amp, 6/6.

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

Auto-Transformer, totally enclosed primary 200-250, secondary 110-120V., 150 w., normally 27/6. Price 17/6.

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—mid-let wire ended, ideal mains tester, etc., 2/-, ex-Govt., 1/8.

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

Install those extra points. 3029 twin flat T.R.S. cable. Big purchase enables us to sell this at 45/- per 100 yds., carriage 8/6.

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

Goodmans Multi Ratio Output Transformer, 6 watt, 8 ratios, from 12-1 to 72-1. Centre tapped for push-pull, 7/6, plus 1/-.
Ditto, unbranded, 6/6, post 1/-.

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, 0.1 MFD, 350 v. Small tubular metal cased condensers made by Dubilier, 2/6 doz.

50 Assorted Resistors. Well mixed and useful values 1/2 and 1 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 dolly, 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 (M.P.) Ltd.,
520 High Street North,
Manor Park, E.12
Phone: Ilford 1011
Half day Thursday
- Electronics (Ruisslip) Ltd.,
42-46 Windmill Hill,
Ruisslip, Middx.
Phone: RU1SLIP 5780
Half day Wednesday
- Electronics (Croydon) Ltd.,
266 London Road,
Croydon.
Phone: CRU 6558
Half day Wednesday
- Electronics (Finsbury Park) Ltd.,
29 Stroud Green Rd.,
Finsbury Park, N.4.
Phone: ARKCHWY 1049
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 £6.19.6. 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 £3.9.6. 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" Turret 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 £15.17.8.

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 £11.7.8.

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 tinplate 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., 4/8. 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., 8/8. post 1/9.

MULLARD CATHODE RAY TUBES

ALL AT NEW REDUCED PRICES
RADIANT SCREEN. The very finest picture tube available. **LCMENA-R.** Built to the same high standards as the Radiant Screen tube; but using guaranteed glass bulbs. Every other part is brand new.

Type	Radiant		Hire Purchase	
	Screen	Deposit	12 mthly.	pymts. of
12" MW31/74	£9. 0.0	£1.16.0	13/8	
14" MW36/24, MW36/44	£9. 0.0	£1.16.0	13/8	
14" AW36/20, AW36/80	£9.10.0	£1.18.0	14/4	
17" MW43/69, MW43/80	£10. 0.0	£2. 0.0	15/-	
17" AW43/80	£10.10.0	£2. 2.0	15/8	
	Lumear			
12" MW31/74	£8. 2.6	£1.12.6	12/6	
14" MW36/24, MW36/44	£8. 2.6	£1.12.8	12/6	
14" AW36/20, AW36/80	£8.10.0	£1.14.0	13/-	
17" MW43/69, MW43/80	£9. 0.0	£1.16.0	13/8	
17" AW43/80	£9.10.0	£1.18.0	14/4	

ALL CARRIAGE AND INSURANCE FREE

GRAMOPHONE EQUIPMENT

ALL LATEST MODELS
ALL POST FREE

	Cash Price	Deposit	Hire Purchase	Mthly/Pmnts.
RECORD CHANGERS				
COLLARO Conquest (Studio O PU)	£7.19. 6	£1.12. 0	12 of	12/3
GARRARD RC210 (GC8 PU)	£9.19. 6	£1.18. 6	12 of	15/-
B.S.R. UA14 Monarch (TC8 PU)	£7.15. 0	£1.10. 0	12 of	12/-
B.S.R. UA8 Monarch (TC8 PU)	£7. 5. 0	£1. 8. 0	12 of	11/4
B.S.R. UA14 Monarch (TC8S Stereo/LP/78)	£8.18. 0	£1.16. 0	12 of	13/6

	Cash Price	Deposit	Hire Purchase	Mthly/Pmnts.
SINGLE RECORD PLAYERS				
GARRARD TA3 (GC8 PU)	£8.10. 0	£1.14. 0	12 of	13/-
B.S.R. TU9 (TC8 PU)	£4.10. 0	£1. 5. 0	3 of	£1.5.0
COLLARO RP594 (O, P or T PU)	£9.18. 9	£1.18. 9	12 of	15/-
E.M.I. (Acos Stereo/Mono PU)	£6.15. 0	£1. 7. 0	12 of	10/6

TRANSCRIPTION UNITS

	Cash Price	Deposit	Hire Purchase	Mthly/Pmnts.
COLLARO 4T/200 (TX88 PU)	£18.13. 0	£3.15. 0	12 of	£1.7.4
COLLARO 4TR/200 Motor only	£13.18. 3	£2.15. 3	12 of	£1.0.5
GARRARD 4HF (GC8 PU)	£18. 9. 9	£3.15. 9	12 of	£1.7.0

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

STEREO COMPONENTS

Morganite ganged potentiometers as specified for the Mullard circuits. **LOG/ANTI-LOG.** 500k. 1 meg. 2 meg. **LOG/LOG.** 250k. 1 meg. 2 meg. **LIN/LIN.** 500k. 1 meg. All 10/6 each. Deco Chassis for the Mullard circuits. All drilled with printed front panel. Three Valve Stereo Amplifier Chassis. £24/6. Stereo Pre-Amp. 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.

LATEST TEST METERS

	Cash Price	Deposit	Hire Purchase	Mthly/Pmnts.
AVO Model 8	£28.10. 0	£4.14. 0	12 of	£1.14. 6
AVO Model 8 with leather carrying case	£27. 8. 0	£5. 8. 0	12 of	£2. 0. 4
AVO Model 7	£19.10. 0	£3.18. 0	12 of	£1. 8. 6
AVO Model 7 with leather carrying case	£23. 8. 0	£4.12. 0	12 of	£1.14. 6
AVO Multimeter	£9.10. 0	£1.13. 0	12 of	14/4
AVO Multimeter with leather carrying case	£11. 9. 0	£2. 5. 0	12 of	17/-
TAYLOR Model 127A	£10. 0. 0	£2. 0. 0	12 of	15/-
CABY A-10	£12.19. 6	£2.17. 6	3 of	£1. 6. 8
CABY B-20	£6.10. 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/Pmnts.
B.S.R. TD2	£8.19. 6	£1.16. 6	12 of	13/7
COLLARO STUDIO	£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 4546

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

RASF. 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"), 9/8; 99/9 850ft (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 TAPES POST FREE!

TAPE ACCESSORIES

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

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

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

LOUDSPEAKERS

	Cash Price		Hire Purchase	
	Deposit	Mthly/Pmnts.	Deposit	Mthly/Pmnts.
GOODMANS				
Axiom 110. 10" ..	25. 0. 0	£1.10. 0	3 of £1. 6. 8	
Axiom 112. 10" ..	28. 10. 0	£1.14. 0	6 of £1. 6. 0	
Axilette. 8" ..	26. 12. 1	£1. 7. 1	6 of £1. 0. 10	
Axiom 300. 12" ..	21. 5. 9	£2. 5. 9	12 of £1. 16/8	
Axiom 400. 12" ..	21. 5. 9	£3. 4. 0	12 of £1. 3. 7	
Audiom 60 Bass. 12" ..	29. 12. 9	£1.18. 9	12 of 14/8	
Trebax Tweeter ..	26. 4. 0	£1. 5. 0	6 of 19/10	
CX5000 Cross-over unit	£1.18. 0			
WHITELEY				
WF1016. 10" ..	27. 12. 3	£1.11. 3	6 of £1. 3. 6	
WF1012. 10" ..	24. 15. 0	£1.10. 0	6 of £1. 5. 0	
WF10 8" ..	26. 10. 6	£1. 6. 6	6 of £1. 0. 8	
TR16. 8" ..	26. 3. 9	£1. 3. 9	6 of £1. 0. 0	
T10 Tweeter ..	24. 4. 0	£1. 4. 0	3 of £1. 3. 4	
T359 Tweeter ..	£1.13. 3			
CX3000 Cross-over unit	£1.18. 0			
CX1500 Cross-over unit	£1.18. 3			

OUTPUT TRANSFORMERS

GILSON
W0896A. W0696B. 50/6, post 2/-. W0710. W0710/8K. 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.

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

ELLISON. OPT64. 20 watt P-P Multi-ratio, 30/-, 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. 1/6. Full Instruction Manuals. Mullard "All Mullard Audio Circuits in "Circuits for Audio Amplifiers", 9/5. GEC 912. 4/6. All post free.

HIRE PURCHASE TERMS

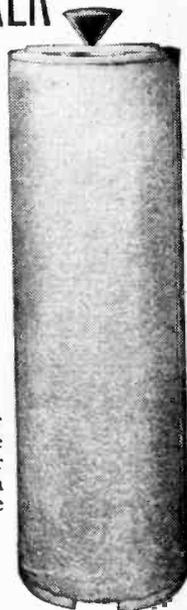
are available on any item. Repayments may be spread over 3, 6 or 12 months. Details as follows: Three months: Deposit 6/- in the £. Service charge 5 per cent but minimum charge of 10/-. Six and Twelve months: Deposit 4/- in the £. Service charge 10 per cent. but minimum charge 20/-.

TERMS OF BUSINESS

Cash with order or C.O.D. We charge C.O.D. orders as follows. Up to £3. minimum 2/6. Over £3 and under 25. 1/6. Over 25 and under £10. 1/6. Over £10. no charge. Postage extra on CASH orders under £3 except where stated.

UNUSUAL SINGLE SPEAKER SYSTEM

A CONCRETE COLUMN



An inexpensive column speaker constructed from a concrete pipe and fitted with a good 8in. or 10in. unit has attracted much interest and admiration because of its clean open sound.

The absence of cabinet resonance produces bass of unusual crispness normally associated with larger and more expensive speakers. Easily assembled and decorated.

A complete kit of wooden fixtures for the 8in. model, including absorbent wadding and diffusing cone is available at a price of £3.15.0. Suitable concrete pipes can be purchased from builders' merchants at about 12/6.

Recommended unit type 8/145 £6.19.11 inc. P.T.

Descriptive leaflet including details of Column for 10in. units free on request from

Wharfedale
WIRELESS WORKS LTD
IDLE BRADFORD YORKS

Grams: Wharfedale, Idle, Bradford.

Phone: Idle 1235/6

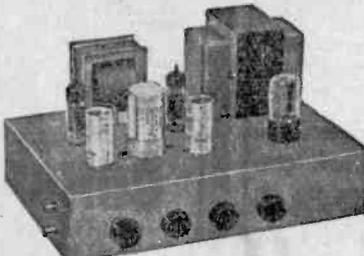
R.S.C. HI-FI TAPE RECORDER KIT

REALISM AT INCREDIBLY LOW COST. CAN BE ASSEMBLED IN HALF AN HOUR
The Recorder incorporates the Latest Collaro Studio Tape Transcriber. The Linear LT45X High Quality Tape Amplifier listed £12.12.0, High Flux P.M. Speaker listed 30/-, empty Tape Spool, a Reel of Best Quality Tape, listed 22/6, and a Handsome Portable carrying Cabinet with latest attractive two-tone polychrome finish, size 18 x 12 x 9 in. high, listed £4.10.0, and circuit. Total cost if purchased individually approximately £40. Performance equal to units in the £60-£80 class. S.A.E. for leaflet.

HIGH FIDELITY 12-14 WATT AMPLIFIER TYPE A11

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

Two input sockets with associated controls allow mixing of "mike" and gram, as in A10. High sensitivity. Includes 5 valves, ECC83, ECC83, EL84, EL84, 6Y3. High quality sectionally wound output transformer specially designed for Ultra Linear operation, and reliable small condensers of current manufacture. **INDIVIDUAL CONTROLS FOR BASS AND TREBLE "Lift" and "Cut."** Frequency response ± 3 dB 30-30,000 c/s. Six negative feedback loops. Hum level 60 D.B. down. **ONLY 23 millivolts INPUT required for FULL OUTPUT.** Suitable for use with all makes and types of pick-ups and microphones. Comparable with the very best designs. For **STANDARD or LONG PLAYING RECORDS** For **MUSICAL INSTRUMENTS** such as **STRING BASS, GUITARS, etc.** **OUTPUT SOCKET** with plug provides 300 v. 30 mA. and 6.5 v. 1.5 a. For supply of a **RADIO FEEDER UNIT.** Size approx. 12.9x7in. 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. Carr. 10/-** (Or factory built 45/- extra).



25 1/2 GNS.
Carr. 17/6



H.P. TERMS. Deposit £5.7.6 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 22/6 each.**
Parmeko Horn Type, 10 watt, 15 and 200 ohm matching, 59/6. R.C.A. 20 watt, 15 ohms or 200 ohms. **6 gns.**

PLESSEY 3-SPEED AUTO-CHANGERS
Brand new. Turnover sapphire still. Many exclusive features. For 200-250 v. A.C. mains. Very limited number. **At only 25.19.6.**

THE SKYFOR 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, 5P6L, 6V6G. Selectivity and quality excellent. Simple to construct. Point-to-Point wiring diagrams, instructions and parts list. 1/8. minimum building costs **£4.18.6.** inc. attractive walnut veneered wood cabinet 12 x 8 x 5 1/2 in.
D.C. SUPPLY KIT. 12 v. 1 a. consisting of a partially drilled metal case, mains transformer, 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 **33/9.**

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. Ganged 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, E231. Outputs for 2-3 ohm speakers. Point-to-point wiring diagrams and instructions supplied. **8 Gns. Carr. 10/-** (Or factory built 45/- extra).

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. 29/9
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 for plug for 3 v. or 12 v. charging. Louvred steel case with sanded blue hammer finish. Fused and ready for use with Carr. 5/- mains and output leads. **Terms: Deposit 13/3 and 5 monthly payments 13/3.** Only Carr. 9/9. **49/9**

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

R.S.C. MAINS TRANSFORMERS

Interleaved and impregnated. Primaries 240-230-250 v. 50 c/s. Screened **TOP SHROUDED "DROP" THROUGH**
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. 5 v. 1 a. 19/9
250-0-250 v. 100 mA. 6.3 v. 3.5 a. C.T. ... 19/9
300-0-300 v. 100 mA. 6.3 v. 4 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. 0-4 v. 4 a. ... 25/9
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. ... 29/9
FULLY SHROUDED UPRIGHT
250-250 v. 80 mA. 6.3 v. 2 a. 5 v. 2 a. 17/11
Midget type 2i-3-3in. ... 17/11
250-0-250 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 26/9
300-0-300 v. 100 mA. 6.3 v. 4 a. 5 v. 3 a. 26/9
300-0-300 v. 130 mA. 6.3 v. 4 a. 6.3 v. 1 a. ... 26/9
For Mullard 610 Amplifier ... 35/9
350-0-350 v. 150 mA. 6.3 v. 4 a. 5 v. 3 a. 35/9
250-0-250 v. 200 mA. 6.3 v. 4 a. C.T. 6.3 v. 4 a. C.T. 5 v. 3 a. ... 49/9

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

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

OUTPUT TRANSFORMERS
Midget Battery Pentode 66:1 for 384, etc. ... 3/9
Small Pentode, 5000 p to 3g ... 3/9
Small Pentode 7/8,000 p to 3g ... 3/9
Standard Pentode 5,000 g to 3g ... 3/9
Standard Pentode 7/8,000 p to 3g ... 5/9
10,000 p to 3g ... 5/6
Push-Pull 10-12 watts 6V6 to 3n or 15g ... 18/9
Push-Pull 10-12 watts to match 6V6 to 3-5-8 or 15g ... 18/9
Push-Pull EL84 to 3 or 15g ... 18/9
Push-Pull 15-18 watts, 6L6, KT86 ... 22/9
Push-Pull for Mullard 510 Ultra Linear ... 29/9
Push-Pull 20 watts, sectionally wound 6L6, KT86, etc. to 3 to 15g ... 47/9

All for A.C. Mains 200-250 v., 50 ccs. 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. including sleeve of Ammeter. 42/9
6 v. or 12 v. 4 amps. 53/9
6 v. or 12 v. 4 amps. with Ammeter and variable charge rate selector. 59/6.
CHARGER AMMETERS. 0-1.5 a. 0-3 a. 0-4 a. 0-7 a. 0-25 a. 0-60 a. 8/9.

ELIMINATOR TRANSFORMERS

Primaries 200-250 v. 50 c/s.
120 v. 40 mA. 5-0-5 v. 1 a. ... 15/9
90 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 300 ohms. ... 11/9
80 mA. 10 H 350 ohms. ... 11/9
60 mA. 10 H 400 ohms. ... 4/11

CHARGER TRANSFORMERS

All with 200-250 v. 50 c/s. Primaries;
0-9-15 v. 1 a. 11/6; 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. 23/9.

AUTO (Step up/Step down) TRANS.
0-110/120-230/250 v. 50-80 watts, 13/9;
0-110/120-230/250 v. 150 watts 27/9.

MICROPHONE TRANSFORMERS

120:1 high grade, sanded. 5/9; 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. Gained 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, and Acos T70 Stereo head with sapphire stylus suitable most pick-ups. **£6.19.6** Carr. 7/7

PICK-UP ARMS complete with Hi-Fi turnover crystal head. Acos GP54. Limited number brand new, perfect, at approx. half price. Only 29/11.

ACOS CRYSTAL MICROPHONES. M1c40 stand or desk. Listed 45/- Only 27/9. 50-1 Stick types, listed 5 gns. 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. Frequency response are used EF86, EF88, ECC83, 807, 807, CZ33. 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/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 for use as A8 can be supplied for 18/9. The amplifier can be supplied, factory built with 12 months' guarantee, for £13.19.6.

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 31/9.

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 2 1/2 in. approx. Completely replaces battery supplying 1.4 v. and 90 v. where A.C. mains 200-250 v. 50 c/s is available. Suitable for all battery portable receivers requiring 1.4 v. and 90 v. This includes latest low consumption types.

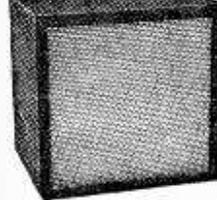


Complete kit with diagrams, 39/9, or ready to use, 48/9.

Type BM2. Size 8 x 5 1/2 x 2 1/2 in. Supplies 120 v. 90 v. and 60 v., 40 mA. and 2 v. 0.4 a. to lamp. 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, £7.19.6. Carr. 5/-. TERMS: C.W.O. or C.O.D. Open 9 to 6. Weds until 1 p.m. No C.O.D. under £1. Post 1/9 extra under £2. 2/9 extra under £5. S.A.E. with all enquiries. Mail Orders to 29-31 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 8 monthly payments of 11/3. 12in. 10 WATT HIGH QUALITY 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.

R.S.C. 45 WATT A5 HIGH-GAIN AMPLIFIER



A highly-sensitive 4-valve quality amplifier for the home, small club, etc. Only 50 millivolts input is required for full output so that it is suitable for use with the latest high fidelity pick-up heads in addition to all other types of pick-ups and practically all 'mikes'. Separate Bass and Treble Controls are provided. These give full long-playing record equalisation. Hum level is negligible being 7db. down, 15db. 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 alive. 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.

£8-19-6

R.S.C. PORTABLE GUITAR AMPLIFIERS
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 satin walnut, and fitted carrying handle. H.P. Terms. Deposit £2 and 9 monthly payments of £1. Senior 10 watts High Fidelity output. Separate Bass and Treble 'Cut' and 'Boost' controls. Twin separately controlled high gain inputs so that two instruments such as Guitar and String Bass can be used at the same time. Two loudspeakers are incorporated. a high Flux 12in. for Bass notes and a 7 x 4 in. elliptical for Treble. Cabinet is well made and finished satin walnut. Size approx. 18 x 18 x 18in. H.P. Terms. Deposit 34/9 and 9 monthly payments of 34/9. Both models for 200-250 v. Carr. 10/- **15 gns.**

SPECIAL TRANSISTOR OFFER. TS1 Brimar. Brand new. Perfect. 3 for 10/9

AM FM RADIOGRAM CHASSIS for 200-250 v. A.C. mains only. 4 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, ECC85, EAB80, EL54, E280. High quality output of up to 4 watts. Overall size 16in. x 4in. x 6 1/2in. Only £12.9.6. Carriage 10/-.

PLESSEY DUAL CENTRIC 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 A8 or similar amplifier. Rates 10 watts. Price only 25.19.6.

HI-FI CRYSTAL PICK-UP HEADS. (Turnover type with sapphire stylus). HGFS9. Standard replacement for Garrard and B.S.R. B.S.R. Ful-h. Garrard GC2 19/9. B.S.R. Stereo/Monaural 39/11 P.M. SPEAKERS. 2-3 ohm, 2 1/2in. Perdio 21/9. 5in., 17/9. 6in. 16/9. 8in., 19/9. 8 x 5in. 25/9. 10in. 26/9. 10 x 6in. 28/9; 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), 59/6. TWEETERS. Plessey 3n 19/9. 15n 25/9.

GLSA 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.p.s. A.C. mains. Over-all size 1 1/2 x 2 1/2 x 2 1/2 in. Controls: Vol. and Tone with switch. Guaranteed 12 months. Only 59/6.

SUPERBITE FEEDER UNIT. Design of a high quality Radio Tuner Unit (specially suitable for use with any of our Amplifiers). Delayed A.V.C. employed. (The controls are Tuning, W.Ch. and Vol. only 250 v. 15 mA. H.T. and L.T. of 6.3 v. 1 amp. required from amplifier. Size of unit approx. 9-6-7in. 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.

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

R.S.C. BRADFORD, MANCHESTER and LEEDS
(Leeds) Ltd.

COLLARO CONQUEST 4-SPEED AUTO-CHANGER with high fidelity Studio pick-up. Latest model. For 200-250 v. 50 c.p.s. A.C. mains. Our price £6.19.6. Carr. 5/6.

EASY AS A.B.C. TO BUILD

The new, exciting De Luxe "Gold Star" Pocket Radio in beautiful moulded plastic case—
37/6
 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 by ready drilled! Size of radio only 4 1/2 in. x 2 1/2 in. x 1 1/2 in.!



—and batteries fit inside. We can supply all parts including case, detachable aerial, instruction book, wire, screws, etc., for only 2/6 plus 2/6 Post and Packing. C.O.D. 2/- extra. (Parts sold separately. Priced parts list 1/6.)



AT LAST—
WRIST RADIO!

29/6

Our engineers have designed a novel Wrist-Watch Radio using latest Transistor Techniques. Size only 1 1/2 in. x 1 in. x 1/2 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 1/2 in. x 6 in. x 3 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.

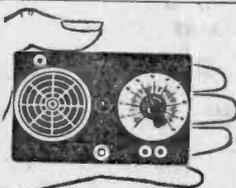


47/6

THE SENSATIONAL
POCKET RADIO!

29/6

The sensational "Silvertone" 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 1/2 in. x 2 1/2 in. x 1 1/2 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.)



THIS TRANSISTOR SET Can Be Built For Only 29/6. The "Sky-Scout" Pocket two-stage transistor set, size only 4 in. x 3 1/2 in. x 4 1/2 in. Covers all medium waves and works entirely of tiny "penlight" battery which costs 6d. and fits inside case. All parts tested before despatch. Can be built for 29/6, plus 2/- Post and Packing. INCLUDING CASE, TRANSISTOR, STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS, nuts, bolts, etc. (C.O.D. 2/- extra.) Parts sold separately, priced parts list and plans 1/6. VERY SIMPLE TO BUILD.

29/6

MATCHBOX SIZE RADIO!



This amazing "Tiny-Tin" model—no larger than a match box—costs nothing to run—ever! No batteries! No Valves! No electricity! 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 1/9.)

17/6

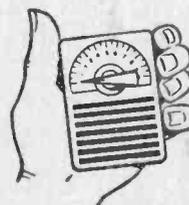
Choice of beautiful walnut veneered cabinet or ivory bakelite. This is the

107/6



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, has razor-edge selectivity and exceptionally good tone. Price also includes ready drilled and punched chassis, set of simple-to-follow plans—in fact everything! Parts tested before despatch! Uses standard coal-base valves. (Low running costs—approximately 18 watts.) Size 12 in. x 6 in. x 5 in. Build this long-range powerful midjet NOW! TOTAL BUILDING COST INCLUDING PLANS, ETC., 107/6. (Post and Packing 3/6.) Parts sold separately. Priced parts list and plans 1/9. C.O.D. 2/- extra.



45/-

TWO-TRANSISTOR POCKET SET. Can Be Built for 45/-. BUILD THE "SKY-G N O M E". VEST-POCKET TWO TRANSISTOR RADIO which gives a superb performance and is highly sensitive. Weight

under 7 ozs.—yet it is a THREE-STAGE receiver covering all medium waves, working entirely off a "penlight" battery. Every part tested before despatch! SPECIAL STEP-BY-STEP PLANS FOR ABSOLUTE BEGINNERS. Total building cost including case, transistors, etc.—everything down to the last nut and bolt—ONLY 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!



Anyone can 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

39/6

—covers all medium waves, inc. Luxembourg, Home, Light. Size only 2 1/2 in. x 3 1/2 in. x 5 1/2 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 returned intact within 7 days.

CONCORD ELECTRONICS
 210, Church Road, Hove, Sussex

Dept. PW25

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.)

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

TUBES

DIRECT FROM OUR FACTORY

Due to the increasing demand for our wide range of C.B.T.S. and our efficient handling methods we offer unbeatable value.

REQUIRED TUBES have new Guns, Getters, Aquadac Coating, Bases, etc.

TOP QUALITY GUARANTEED

6 MONTHS REYACUED	12 MONTHS RETURNED	12 MONTHS BRAND NEW TYPES
£1-10	£3	MWS1/74 £4-15
£2	£4	MWS36/24 £5-15
£2-10	£4-10	MW48/64 £6-15
£3	£5-5	£6-10
£4	£6-10	

Carriage and Insurance 12/6
CRM92, MW22-24, MW22-140, MW22-17, MW22-18
10KPA, 12K, C12B, CRM12L, CRM12A, CRM12B, CRM12C, CRM12D, MW31-140, MW31-18, MW31/18, MW31/74
141K, 7201A, C14FM, CRM141, CRM142, CRM143, MW36-24, MW36-44, 17ASP4, 171K, AW36/21, C17FM, CRM171, CRM172, MW43-64, MW43-69
7401A, AW43-80, C14BM, C17BM, CRM151, CRM152A, CRM152B, CRM153, CRM170, MW43-80, MW41-1
AW53-80, CRM212, MW53-20, MW53-80

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

STAAR GALAXY SPARES

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

★ **Record Players** Carriage 4/- ★
COLLARO CONQUEST 4-speed 4/46... 25 19 0
EMI 4-speed Stereo... 28 15 0
B.S.R. (A.S.D) AUTOCHANGERS... 28 15 0

★ **4-SPD. RECORD PLAYERS**
Latest B.S.R. TU9 Turntable, together with lightweight Staar Galaxy dual sapphire crystal turnover pick-up head. Truly amazing value. **£3.10.0** Carr. 3/-
at GALAXY PICKUPS, as above, only 19/6.

★ **External/Internal TV Converters with power pack**
Hammered finish. Very compact. Gain and Trimming controls. OUR PRICE **39/-** Carriage 2/6.

★ **TRANSISTORS** ★
RED SPOT Now only 3/6. WHITE SPOT 4/6
DIODES General purpose, famous make, 9/8. 8/- doz. GEX44 type, 5/9.

SPECIAL OFFERS

★ **Ua8 Stereo Changers**
B.B.R. famous Monarch autochangers, fitted with quality stereo carriage. **£6.19.0**
Truly amazing value.

★ **Mains Amplifiers**
3 valve (10F3, 10P14, U9). 3 watt, 8in. loudspeaker, in two tone cases with controls. Ideal for record players, P.A. work, etc. **49/-**

★ **Loudspeakers** ★
TOP MAKES-MANUFACTURER FRESH
2 1/2in. 18/-; 3in. 18/-; 3 1/2in. 18/-; 5in. 18/-; 6 1/2in. 18/-; 8in. 19/-; 10in. 22/8; 12in. 25/8; 7 x 4in. elliptical, 18/-; 9 x 6in. elliptical, 22/8; 10 x 6in. elliptical, 25/8; 8in. Stentorian 15 ohm H10, 70/-; 10in. Stentorian 37-15 ohm H1012, 89/8; 12in. Closed Field, 27/8.
STOP PRESS-8 x 1 1/2in. Hi-F speakers, 49/-

★ **PM SPEAKERS Surplus 3 ohm**
Tested, top makes, performance guaranteed.
6 1/2in. 9/-; 5in. 11/-; 7 1/2 x 4 1/2in. 13/-

★ **RECTIFIERS** ★
For Chargers, selenium, full wave, 12 volt, 3-4 amps 9/8; (Carr. 1/-); 250 v. 80 ma. 5/-; RML 6/8; RM2, 8/-; RM3, 9/-; RM4, 15/8; RM5, 21/-; 14A36, 17/-; 14A97, 22/-; 14A100, 22/-; 16C11-1/0-1, 7/9; 18R1-1-16-1, 7/9; 18R2-2-16-1, 14/-; 14R1-2-2-2 17/-; 14R1-2-2-3, 20/-.

★ **100 RESISTORS** 6/6
★ **100 CONDENSERS** 10/-
Miniature Ceramic and Silver Mica Condensers. 3 pF to 10,000 pF. LIST VALUE OVER 66.
VALVES ALL GUARANTEED 3 MONTHS
PL81 SOILED VALVE 4/6 EY51 SHORT ENDS 4/6

★ **TAPE RECORDERS**
Limited quantity. Famous make. B.B.R. Decks. Beaut. finished portable cases, good fittings, excellent reproduction, with real of 21Gns. tape. Unrepeatable.

★ **1 watt Transistor Stage**
Pair of GET15 1 watt Power Transistors (tested 50/-) Push-Pull INPUT and OUTPUT TRANSFORMERS, 4 Transistor Amplifier circuit. **45/-**

★ VALVES BY RETURN OF POST ★

100% DISCOUNT		SPECIAL OFFER TO PURCHASERS		NEW LOW PRICES GUARANTEED 3 MONTHS		FREE TRANSIT INSURANCE. All valves are new or of fully guaranteed ex-Government or ex-equipment origin. Satisfaction or Money back guarantee on goods if returned unused within 14 days.																			
O24	5/8	6A05	6/-	6J8	8/8	6X5GT	6/8	6X5	10/8	12K8	12/8	19/3	DP91	4/-	80C84	8/8	EM85	10/8	PC085	5/8	U36	11/4	UF96	14/6	
1A5GT	5/8	6A78	7/8	6K6GT	6/8	7A7	10/8	6X8	12/8	12K8	12/8	19/3	DP96	7/8	80C85	8/8	EN41	16/-	PC088	18/-	U31	7/8	UF98	7/8	
1A7GT	11/8	6A106	7/8	6K7	9/8	6X5	10/8	12G7	5/8	50L6GT	9/8	DH83	6/8	80C86	9/8	EX51	8/8	SMALL 8/9	PCF40	7/8	U38	8/8	UL41	7/8	
1C5GT	9/8	6B7	3/8	6K7G	2/8	7B8	8/8	12S6GT	6/8	53K10	10/8	DH78	9/8	80C87	8/8	ECH21	14/-	EY86	8/-	PCF83	7/8	U37	28/8	UL44	12/8
ID5	9/8	6B9Q	3/8	6K7GT	5/-	7B7	7/8	12S7	5/8	54K10	8/8	DH77	7/8	80C88	9/8	EC35	9/8	EZ35	6/8	PLC83	7/8	U43	8/8	UL48	9/8
LD6	9/8	6BA8	6/-	8K8	10/8	7G5	7/8	12S7K7	5/8	61SHT	11/8	DK52	9/8	80C89	8/8	EC43	8/8	EZ40	6/8	PLC83	11/8	U50	6/-	UL54	9/8
1H3GT	9/8	6B86	6/-	8K8G	5/8	7G3	7/8	12Y4	9/8	77	6/8	DK92	8/8	80C91	8/8	EZ41	7/8	PL84	9/8	U52	5/8	UM90	9/8	UL58	9/8
1L4	5/8	6B8G	12/6	8K8GT	10/8	7E7	9/8	14Y4	9/8	77	6/8	DK96	7/8	80C92	7/8	EZ40	7/8	EZ40	6/8	PCN25	4/8	U76	8/8	UL62	7/8
1LD5	3/8	6B8H	6/-	6K25	7/8	7H7	7/8	14Y7	14/8	78	7/8	DK98	7/8	80C93	10/8	EZ41	7/8	PCN45	7/8	PCN45	7/8	U78	8/8	UL70	12/8
1LN5	4/8	6B36	6/-	12L1	12/8	7K7	8/8	19AQ5	7/8	83	6/8	DL35	9/8	80C94	14/8	GT10	7/8	PCN48	5/8	U91	9/8	U77	9/8	UL74	9/8
1N5GT	9/8	6B7	3/8	6L8	9/8	7Q7	10/8	19B6G13	8/8	90AV	4/8	DL32	9/8	80C95	12/8	G232	8/8	PL33	9/8	U21	9/8	U79	8/8	UL78	9/8
1R5	6/-	6B36	7/8	6L8G	7/8	7H7	7/8	20F2	9/8	90B	11/8	DL31	8/8	80C96	10/8	G234	12/8	PL36	11/8	U22	15/8	U79	11/8	UL81	11/8
1R4	8/8	6B7	9/8	6L7	9/8	7H7	7/8	20F2	9/8	11736	9/8	DL32	9/8	80C97	10/8	G237	10/8	PL38	14/8	U23	11/8	U79	11/8	UL81	11/8
1R5	5/8	6B8	3/8	6L7G	7/8	7V7	7/8	20L1	13/8	185BT	16/-	DL34	8/8	80C98	14/8	HL14DD9/8	PL81	9/8	U301	14/8	U79	11/8	UL81	11/8	
1T4	4/-	6C4	3/8	6L18	9/-	7Y4	7/8	20P1	11/8	723A	29/-	DL34	8/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
2D21	4/8	6C5	5/8	6L19	12/8	7Z4	7/8	20P3	12/8	807A	5/8	DL34	8/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3A4	5/8	6C6	4/8	6L13	8/8	8D3	3/8	20P4	17/8	807M	5/8	DL34	8/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3D6	4/8	6C9	9/8	6LD12	7/8	10C1	11/-	20P5	16/-	808	15/-	EA80C	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3Q4	7/8	6C6DG	18/8	6LD20	8/8	10C2	13/8	25A6G	8/8	954	27/8	EA80C	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3Q5GT	8/8	6C8H	3/8	6N7	6/8	10C4	9/8	25L6G	6/8	956	29/8	EA80C	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3R4	6/-	6D1	8/8	6P1	14/8	10F1	10/8	25L9GT	9/-	5783	10/-	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
3V4	7/8	6D2	8/8	6P25	5/8	10F9	10/8	25Y5G	7/8	5905	10/-	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5V4G	9/8	6D3	12/8	6P28	12/8	10L14	8/8	25Z4G	7/8	9001	4/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5V4G	5/-	6D6	4/8	6Q7G	9/8	10LD3	3/8	25Z5	8/8	9002	4/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5V4G	9/8	6F1	6/8	6Q7GT	9/8	10LD12	9/8	25Z6	9/8	9003	4/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Y3GT	6/-	6F6G	3/8	6R7G	7/8	10P14	9/8	27S10	18/-	A231	9/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Y3GT	9/8	6F6M	7/8	6S7	4/8	10P18	3/8	30C1	7/8	B43	8/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Y4G	11/-	6F12	3/8	6S8G	4/8	10P18	3/8	30C1	7/8	B65	4/8	EB41	7/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Z4	11/-	6F13	9/8	6S8H7	4/8	12A8	6/8	30L1	7/8	CHL31	21/-	EB121	14/-	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Z4G	8/8	6F14	9/8	6S8J5	5/8	12A8H7	6/8	30L1	7/8	CH35	7/8	EB121	14/-	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
5Z4GT	11/-	6F15	9/8	6S8K7	5/8	12A19	9/8	30L1	7/8	CL33	18/-	EC52	3/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A7	10/-	6F18	9/8	6S17GT	6/8	12A78	7/8	30P18	3/8	CY31	9/8	EC90	9/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8G	9/8	6F19	9/8	6S7GT	4/8	12A77	5/8	30P18	3/8	D83	1/8	EC91	9/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A9GT	13/8	6A6	3/-	6S7Q7	6/8	12A7U7	6/8	30P18	3/8	D77	3/8	EC91	9/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8B	8/8	6E6	2/-	6S87	5/8	12A7X7	7/8	30L1	7/8	D152	6/8	EC92	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A7C	4/8	635	3/8	6S8GT	6/8	12A19	9/8	35W4	6/8	DA30	12/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8G	4/8	636	3/8	6S8G	6/8	12B28	8/8	35W4	6/8	DA30	12/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A9GT	3/8	635GT	3/8	6V0G	6/8	12B27	10/8	35Z4GT	8/8	DA30	12/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8S	6/8	636	4/8	6V8GT	6/8	12C8	3/8	35Z6GT	8/8	DA30	12/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A9S	6/8	637	7/8	6X4	8/8	12E1	12/8	36	4/8	DA96	7/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8S	6/8	637G	6/8	6X4	8/8	12J5GT	3/8	36	4/8	DA96	7/8	EC93	4/8	80C99	10/8	HL14	7/8	U309	12/8	U309	12/8	U79	11/8	UL81	11/8
6A8S	6/8																								



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 CR/3S Incorporates the New COLLARO "STUDIO" TWIN TRACK 3-speed Deck H.P. Terms: Deposit £7.18.0 and 12 months of £39.10.0 £2.17.11.

MODEL CR3/T Incorporates the very popular 3-speed COLLARO Mk. IV "TRANSCRIBTOR" Deck which has both upper and lower tape tracks. £47.10.0 H.P. Terms: Deposit £9.10.0 and 12 months of £3.9.8.

MODEL TR3/Mk. VI Incorporates the New £49.10.0 TRUVOX Mk. VITWIN TRACK 2-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 fitting into a portable case or cabinet only four fixing screws being required.

PRICE **£25.0.0** (Including a 4in. spool of Long Play Tape.) Terms, Dep. £5.0.0, 12 months £1.16.8.

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 £1.12.3.

The Model HF/G2A is available separately for (a) COMPLETE KIT OF PARTS £11.0.0 (b) ASSEMBLED £18.15.0



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 of pick-up or sockets of existing Amplifier or Radio Chassis. COMPLETE WORKING UNIT, containing 4in. 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/G2A-D Unit (described opposite). A small robust recorder with outstanding performance. Truly portable, weighs only 2 1/2 lbs. Twin Track operates on 3 1/2 in./sec. speed.

PRICE **£29.15.0** H.P. Terms, Deposit £6.0.0, 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 FEROCUBE POT CORE INDUCTOR. FOR COLLARO-TRUVOX-BRENELL-WEARITE or MOTEK Tape Decks, has GILSEN Output Transformer. Includes separate Power Supply Unit.

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



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**
- (b) As above but with HF/TR3 supplied ASSEMBLED and TESTED. **£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**
- (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**
- (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) 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**

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.

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

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

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

- (a) COMPLETE KIT to build the HF/TR3 Amplifier together with the COLLARO "STUDIO" DECK. **£25.10.0**
- (b) As above but with HF/TR3 supplied ASSEMBLED and TESTED. **£29.0.0**
- (c) H.P. Deposit £5.18.0, and 12 months £2.2.6. COMPLETE KIT to build the HF/TR3, together with the Mk. IV COLLARO "TRANSCRIBTOR" TAPE DECK. **£30.15.0**
- (d) extra if we are required to wire up Deck (Switch Banks.) **£34.10.0**
- (e) As above but HF/TR3 supplied ASSEMBLED and TESTED. **£34.10.0**
- (f) H.P. Deposit £7.0.0 and 12 months £2.10.5. extra if we are required to wire up Deck (Switch Banks.) **£36.0.0**
- (g) COMPLETE KIT to build the HF/TR3, together with the NEW TRUVOX Mk. VI TAPE DECK. **£39.10.0**
- (h) As above but HF/TR3 supplied ASSEMBLED and TESTED. **£41.10.0**
- (i) H.P. Deposit £7.18.0, and 12 months £2.17.11. COMPLETE KIT to build the HF/TR3 AMPLIFIER with the BRENELL Mk. V TAPE DECK. **£45.0.0**
- (j) As above but HF/TR3 supplied ASSEMBLED and TESTED. **£45.0.0**
- (k) H.P. Deposit £9.0.0, and 12 months £3.6.0. COMPLETE KIT to build the HF/TR3 AMPLIFIER with the WEARITE 4A DECK with assembled and tested HF/TR3 Amplifier including WEARITE Head Life Transformer. **£55.0.0**
- (l) 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 6in. LOUDSPEAKER—ACOS CRYSTAL MICROPHONE—and 1200ft. SPOOL E.M.I. TAPE—ALL FOR £8.10.0, Carriage and Insurance 5/- extra.

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 PARMKO MAINS TRANSFORMER and choice of the latest Ultra-Linear PARMKO or the PARTRIDGE Output Transformer. PRICE COMPLETE KIT (PARMEKO Output Trans.) **£10.0.0**

Alternatively we supply ASSEMBLED AND TESTED **£11.0.0**

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 **£6.6.0** ASSEMBLED AND TESTED **£8.0.0**

KITS OF PARTS TO MULLARD'S SPECIFICATION and incorporating:

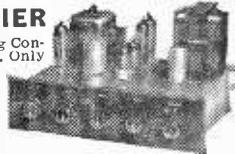
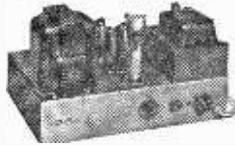
- Equalisation for the latest R.I.A.A. characteristics.
- Input for Crystal Pick-ups, and variable reluctance magnetic types.
- Input (a) Direct from High Imp. Tape Head. (b) From a Tape Amplifier or Pre-amplifier.
- Sensitive Microphone Channel. ● Wide range BASS and TREBLE Controls.

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 PARMKO MAINS TRANSFORMERS and choice of the latest PARMKO or PARTRIDGE ULTRA-Linear Output Transformers.

KIT OF PARTS **£11.10.0** OR ASSEMBLED AND TESTED **£13.10.0**

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



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. £3.16.0 and 12 months of £1.7.8 **£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 **£25.0.0**

H.P. Terms: Deposit £5 and 12 months of £11.8.

(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 **£25.0.0**

H.P. Terms: Deposit £5, 12 months of £11.8.

(g) KIT OF PARTS to build Two "5-10" MAIN AMPLIFIERS (incorporating Parmeko Output Transformers) and the DUAL-CHANNEL PRE-AMPLIFIER CONTROL UNIT **£31.0.0**

(h) TWO "5-10" AMPLIFIERS and the DUAL-CHANNEL PRE-AMPLIFIER CONTROL UNIT BOTH ASSEMBLED & TESTED **£36.0.0**

H.P. Terms: Deposit £7.4.0. 12 months £2.12.0

Carriage and Insurance 7/6 extra. 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 enabling it to 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 other Amplifiers requiring an input of 250 mV.



range of MULLARD MAIN AMPLIFIERS. COMPLETE KIT **£12.10.0** ASSEMBLED AND TESTED **£15.0.0**

H.P. £3 dep. and 12 months at £1.2.0 MODEL L.L. one microphone input matched for moving coil or Ribbon Mike. £1.17.0 extra.

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 CONSTRUCTOR **£10.10.0** ASSEMBLED **£14.5.0**

A SPECIAL CASH OFFER!!

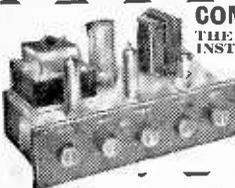
This very attractive PORTABLE AMPLIFIER CASE together with a good quality GRAM AMPLIFIER and a matched P.M. SPEAKER. For ONLY **£8.7.6** (Plus 7/6 Carr. & Ins.)



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 Rexine) AMPLIFIER **£4.2.6** (b) The PORTABLE CARRYING CASE **£3.17.8** (c) 6in. P.M. SPEAKER 18/9 Carriage and Insurance 4/- 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 AND TESTED **£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 PARMKO 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 8 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.E. FOR ILLUSTRATED LEAFLET
 - B.S.R. MONARCH UAS 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**
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 - The NEW B.S.R. Model UA12 in Stock. A4 "SPEED" MIXER AUTOCHANGER. **£8.7.6**
 - UA12 also available incorporating the B.S.R. STEREO Pick-up, plays L.P. and 78 Records. **£10.10.0**
 - GARRARD MODEL TA/MK.11 4-speed Player fitted high output Crystal Pick-up. **£8.10.0**
 - GARRARD MODEL RC/210. 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.E.

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ALTOBASS

STEREO 44

Stereophonic Amplifier Kit

There's everything you need in this new Altobass Stereo 44 kit—all the parts, easy-to-follow instructions, even a spanner! When completed this amplifier gives extremely high fidelity and realism.

Apart from its use as a stereo amplifier, it can be used as a two channel monaural amplifier giving 4 watts per channel through each speaker. Facilities are also provided for connecting to crystal or ceramic pick-ups, radio tuner or equalised tape.

- ★ Complete kit, even includes wire and spanner
- ★ Simple stage-by-stage instructions
- ★ Treble and bass controls

STEREO 44 £18.18.0

Send for illustrated leaflet giving full specification

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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 1/2 in. x 6 1/2 in. x 3 1/2 in., with carrying strap, indication being given on a 6 in. 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
150 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.	Resistance
750 v.			1,000 ohms.
1,500 v.			10,000 ohms.

ONLY £8.19.6 (carriage 3/6)

COMMUNICATIONS RECEIVER R1155. 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 OUTPUT STAGE**, for the above in black crinkle case to match receiver, enabling it to be operated immediately, by just plugging in, without any modification. With built-in 8 in. speaker, £8.10.0. 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.I.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., B.F.O., A.G.C., etc. Fitted with 2 in. square meter for Oscillator and Audio Signal checking. Size 19 in. x 10 in. x 10 in. 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 chamolais 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 Breast Microphones, with leads, etc. in fitted carrying cases. Supplied with 4 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 8 in. P.A.M. SPEAKER. In heavy black crinkle metal case. Can be used as normal 3 ohms extension. Size 11 in. x 10 in. x 6 in. NEW IN MAKER'S CARTONS. ONLY 45/- (post 3/6).

AMERICAN HALLICRAFTERS 6 VOLT VIBRATOR-PACK. 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 (cart. 3/6).

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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 in. spindle. BRAND NEW only 7/6.

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U27 8/-	5U4G 5/6	6N7G 6/6	12SR7 6/-	866A 10/-
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Special Built Power Pack for the above. 230 v. A.C. mains, including 6X5GT valve, £3.15.0. Carriage 5/-.

Transmitter/Receiver No. 22. 2 mc. to 8 mc. Built almost exactly as No. 19 set but much more economical in battery consumption. Complete in fully working condition with power pack for 12 v., Headgear and Microphone assembly and Key, £9.19.6. Carriage 15/-.

Brand new original spare parts for AR88 Receivers. Please write your requirements.

Low Resistance Headphones, brand new. Balanced Armature DLR, 7/6. P. & P. 1/-.

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S.C.R. 522 Receivers (BC624) 100-156 Mc/s., including all valves, 25/-, P. & P. 5/-.

H.T. Chokes made by Bendix Radio (U.S.A.), 3 Henrys 0.600A D.C. 25 ohms D.C. resistance 18,000 v. R.M.S. 60 cycle test £1.12.6. P. & P. 6/-. Ditto 10 Henrys 250 A. D.C. 90 ohms resistance 1,500 v. R.M.S. 60 cycle test 18/6. P. & P. 3/6.

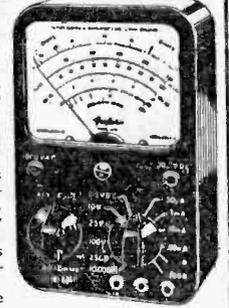
Throat Microphones T 30 (U.S.A.), 3/6. P. & P. 1/6.

Carbon inset Microphone, G.P.O. Type 2/6. P. & P. 1/-.

Transmitter Cabinet with door at back, 77in. high, 29in. wide, rack fitting type, £17.10.0. Carriage £1.

Variometers for W/S No. 19. Fully tested and working, 12/6. P. & P. 2/16

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Model 127A
Pocket size meter. Sensitivity 2.0, 0.0 o.p.v. D.C. 1,000 o.p.v. A.C. 2.0 ranges. D.C. current 50µA to 1 amp. D.C. volts 0.3 v. — 1,000 v. (25 kV by probe). A.C. volts 10 v. — 1,000 v. 3 resistance ranges from 0.20 megohms (self contained). Meter 40µA 3½in. arc. Accuracy D.C. 3% A.C. 4%. ohms 5%. Dimensions 5½in. x 3½in. x 1½in. weight 14 ozs. Price £10 complete with instruction manual, test prods and clips. Leather cast £1.12.0 extra.

Filament Transformers. Primary 0.190-210-230-250 v. 50 C. Sec. 1 2.5 v. C.T. at 10 amps.; 2.25 v. C.T. at 10 amps.; 3 10.5 v. C.T. at 11 amps.; 4,000 v. insulation. Price £2.19.0. P. & P. 5/-.

Primary 0.190-210-230-250 v., 50 C. Sec. 1 10 v. C.T. at 4.5 amps.; 2 10 v. C.T. at 4.5 amps., 4,000 v. insulation £1.16.0. P. & P. 5/-. Primary 230 v. 50/60 c. 67 v. amp. Sec. 1 6.3 v. 1-6 amps.; 2 6.3 v. C.T. 3 amps.; 3 6.3 v. C.T. 3 amps.; 4 6.3 v. C.T. 3 amps. £1.12.0. P. & P. 5/-.

Ferranti Transformer. Oil cooled, 20/19.5 K.V.A., 3 phase, 50 cycles. Primary 360/380/400/420/440 v. Secondary 2,700/2,900/3,100/3,300/3,500 v., 2.1 amp. Voltage regulation by simple switches on primary and secondary. Weight 1,150 lbs. Price £125.0.0. Carriage at cost.

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Rotary Transformer. 171 W 12 v. input, 1,600 v. 100 mA output, 30/-, P. & P. 7/6.

Insulation Test Meter. Testing voltage adjustable up to 6,000 v. D.C. Mains supply 180/250 v. in wooden case £25. Carriage 10/-.

Vibrator Unit. 12 v./160 v. 35 mA. Exceedingly well filtered and smoothed, excellent for car radios. New including 6X5G valve and vibrator, 17/6. P. & P. 5/-.

Moving Coil Round Hand Microphone No. 13. 2½in. dia. with press switch, 12/6. P. & P. 1/-.

Complete Set of Strong Aerial Rods (American). Screw-in type MP49, 50, 41, 52, 53, total length 15ft. 10in., top diameter 0.615in., bottom diameter 0.185in., together with matched aerial base. MP37 with ceramic insulator, ideal for car or roof insulator, £2.10.0, post free.

HRO Mains power pack, input 115/250 v. A.C.; output 250 v. 0.75 mA and 6.3 v. 3.5 amps. £3, inc. carr.

B.C.659 Transmitter Receiver. Frequency range 27-38.9 Mc/s, crystal controlled. 2 pre-set channels, together with power unit for 6, 12, or 24 v. D.C. Good condition, £5.10.0. Carriage 15/-.

Output Transformer in screening can give 9 different ratios 10 : 1 up to 120 : 1 for battery receivers or any high resistance pentodes used as output valves, 6/6. P. & P. 1/6.

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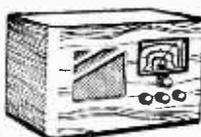
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Complete 17in. TUBE, VALVES—SPEAKER—KNOBS. Tuned ITV/BBC. Ready to use, fully guaranteed, TUBE 12 months, CHASSIS and VALVES 3 months. Cabinet to fit £1.11.6 if ordered with set. Salvage. Set—tube—cabinet despatched separately. Carr. and ins on set £11/5/0; on Cabinet 12/6.

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A.C. Five valve octal superhet.
3 waveband receiver. P.U. in attractive wooden cabinet. 9½ x 18½ x 11½in. Ins. & Carr. 4/6.



RECORD PLAYER CABINET

R.P.2



ONLY
59/6

Made by famous manufacturer. In polka dot cloth with clipped lid and carrying handle. Size 16 x 14½ x 8½in. deep. Carr. & Ins. 4/6.

EXTENSION SPEAKERS

19/9



Bin. P.M. Speaker fitted into polished cabinet. Standard matching to any receiver (2.5 ohms) Complete. Switch and flex included. P. & P. 3/9.

Contemporary EXTENSION SPEAKERS

19/9

Covered in smart two tone leatherette colour scheme. Beautifully made. Including Bin. P.M. speaker P. & P. 3/9.

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Bin. P.M. Repaired cone defect not affecting reproduction quality.

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As above but with output transformer.

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Highest quality. Fitted output transformer.

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Also 9 x 4in. at 19/9.

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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.

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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. Ample power output 3.5 watts. Small overall size 14½ x 14½ x 7½in. Lightweight, 21 lbs. Playing time 1½ hours. 5½in. standard tape. Terms: Carr. and Ins. 12/6. Microphone 27/6 extra. Tapes 19/9.



TAPE RECORDER AMPLIFIER

Compact, well designed 5-valve amplifier. **£7.19.6**

Output 3.5 watts. Valve line up—ECC83
Double triode first audio amplifiers, ECL82 Triode pentode further audio amplifier and output valve. 6BV6 bias and erase oscillator, EM84 record level indicator. EZ80 H.T. rectifier. Input for mike, radio and gram. Controls: record playback volume and on/off playback tone, sockets for mike. Radio P.U. and superimpose switch. Dim. 8½ x 3 x 4½in. ins. and carr. 4/6. Terms. Knobs 2/6 per set. Beautiful perspex dial plate.

RECTIFIERS 2/9

250 volt, 100mA. Full or half valve. Salvage, guaranteed. P. & P. 1/3.

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6 or 8 valve, latest type. Midget valve design. 12½ x 7½ x 2½in. P. & P. 1/9.

SOUND/VISION STRIP 2/9

I.F.'s 10.5/14 Mc/s and 16/19.5 Mc/s. 8 valve holders. P. & P. 2/6.



THE "STUDIO TWIN" Listed 40 gns. now only 29 gns.

This quality Twin Speaker Tape Recorder at this amazing reduced price. Two hours' playing time on 7in. 1,200ft. Standard reels. Latest Studio 3-speed Deck. 1½, 3½, 7½ I.P.S. Includes T twin Tracks Reverse counter, Pause control and magic eye recording indicator. Volume and tone control, superimpose switch. Two 7in. x 4in. matched speakers. 3 watts output. Attractive design cabinet in beige. Size 19in. x 13in. x 8in. Ins. and Carr. 12/6.
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B.S.R. MONARCH, 4-speed Autochanger

£6.19.6

T.U.9 B.S.R., 4-speed single player ...

99/6

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Covers all amateur bands from 160-10 metres. Self-contained including Power Supply £78.10.0
Modulator and V.F.O.

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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

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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

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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

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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. Vt. only 10 1/2 lb. £18.19.6

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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

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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
46 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

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

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Equipment including TAPE DECKS (Collaro or Truvox), RECORD PLAYERS (Collaro or Connoisseur) and DECCA ffs PICK-UPS.

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F.M. TUNER



S.33



S-88



DX-40



UXR-1



OS-1



SSU-1

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) £16.14.0. Stereo (TA-1S). Conversion unit from mono. to stereo. £6.0.0. £22.4.0

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-fal 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 (£3.2.0, 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. £11.8.0
Sensitivity 100 mV.

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
Ducted-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. £5.19.6 Decca ffs).

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Full details of model(s) _____

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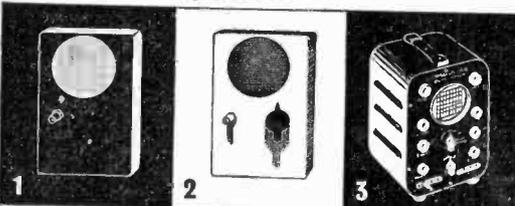
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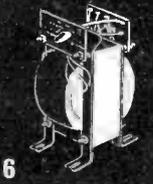
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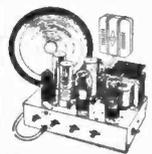


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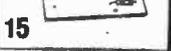
Three miniature valves and Metal Rectifier. A.C. mains 200/250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent; Modulated or unmodulated R.F. output continuously variable 100 millivolts. C.W. and mod. switch, variable A.F. output. Magic eye as output indicator. Accuracy ± 2 per cent.

- SIGNAL GENERATORS.** Cash $\pounds 4.19.6$ or 25/- deposit and 4 monthly payments of 21/8. 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 8 1/2 x 3 1/2 in. 2 valves and 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 and moving coil output meter. Accuracy ± 2 per cent.
- BATTERY RECORD PLAYER AND AMPLIFIER.** Comprising 45 r.p.m. "Barr" motor, "Acos" crystal pick-up, 3 transistor push-pull amplifier, complete with transistors. Output 500 milliwatts, 49/6. P. & P. 3/6.
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- 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. Intermixes 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. $\pounds 6.19.6$, P. & P. 5/-.
- 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.
- FUSE-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.
- PORTABLE AMPLIFIER.** On printed circuit for A.C. Mains 200/250 v Size 4 x 8 in. with tone and volume control. Valves: ECL39 and EZ80. 39/6. P. & P. 3/6.

- 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! Tuneable 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, PINS GERMANIUM DIODE and Printed Circuit.** Size 3 1/2 x 4 x 1 1/2 in. Ferrite Rod Aerial. Two Surface Barrier Transistors and one Audio. Tuneable over medium and long waves. To build yourself 39/6. 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 transistor operating conditions where maintenance of D.C. levels is of paramount 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. $\pounds 19.19.0$, P. & P. 7/6 or 50/- deposit plus P. & P. 7/6 and 12 monthly payments of 33/4. FULL 12 MONTHS' GUARANTEE INCLUDING VALVES and TUBES.
- 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. 0-50, 0-100, 0-250, 0-500. 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) I.F. 18-19 or 33-38. 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. 260-0-280 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. 3/6.
- WOLSEY 3-ELEMENT FOLDED DIPOLE.** I.T.V. Aerial less mounting bracket for external use, complete with 12 yds. of coaxial cable, 15/-; P. & P. 3/6.
- CYLDON TURRET TELETUNER I F 34/38 Mos.** 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 $\pounds 8.19.6$ or 25/- deposit and 6 monthly payments of 21/8. 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.



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Practical Wireless

VOL. XXXVI, No. 646, DECEMBER, 1960

Editorial and Advertisement
Offices:

PRACTICAL WIRELESS

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Contents

	Page
Editorial	677
Round the World of Wireless	678
An Etched Circuit T.R.F. ...	680
Mains Model Control Trans- mitter	683
Conversion of the P.W. A.C. "Coronet" 4 to Radiogram ...	685
The No. 10 Crystal Calibrator	691
Radio Construction for the Beginner—3	694
On Your Wavelength	699
Simple Guitar Microphone ...	700
A Two-valve General Purpose Amplifier	701
Pocket Superhet	704
A Reliable Radiogram	706
Inexpensive Pre-set Tuning ...	710
Current and Voltage Feeds ...	713
A Midget T.R.F. Receiver	717
Buying Radio Components by Post	721
Club News	726
Trade News	729
Letters to the Editor	733

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:

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OUR CONSTRUCTOR'S GUIDE

WITH this issue, we present a free 16-page pull-out supplement entitled *The Practical Wireless Constructor's Guide*. This valuable booklet has been devised by members of our technical staff to provide a handy source of information which is required by the amateur radio constructor when designing and constructing receivers, amplifiers, tuners, etc.

Many useful tables are set out for easy reference in this supplement including details of the frequencies used by the BBC for sound broadcasts—both on medium and long-waves and on V.H.F. A wavelength-to-frequency conversion table is also given which will interest particularly the enthusiastic short-wave listener. We receive many enquiries about wire gauges and therefore a table comparing the different systems—both British and American—is incorporated. Several pages are devoted to a comprehensive guide to the colour code used for resistors and condensers and reference to this section should prevent the occurrence of many wiring errors.

Many amateurs find difficulty in understanding circuit diagrams and a whole section of the booklet is devoted to radio components and their symbols. Illustrations of various parts are given side by side with the circuit symbols, and the beginner would do well to study this section with particular care.

A FILM SHOW

THE films to be shown at the film show which we announced last month are "Conquest of the Atom", "The Invisible Force" and "Particles Count". "Conquest of the Atom" deals with experiments which led to the achievement of nuclear fission. It begins with J. J. Thomson's work on electrons and positive particles, Rutherford's experiments that culminated in the splitting of the nitrogen nucleus, the splitting of the lithium atom by proton bombardment carried out by Sir John Cockroft and Dr. Walton, and continues with Sir James Chadwick's work and the eventual achievement of nuclear fission in 1938.

"The Invisible Force" is the story of magnetism and demonstrations are used to illustrate the ways in which early scientists found that magnetism existed and how, by fundamental research, industry has revealed more of the true nature of this force.

The third film—"Particles Count"—tells of the importance of counting and sizing of particles in many industrial processes. The development of electronic equipment that counts and sizes particles automatically is included and the film concludes with a comprehensive explanation of how the particle counting and sizing equipment operates.

The film show, which has been arranged in collaboration with Mullard Ltd., will be held at Caxton Hall, Westminster, on Friday, January 13th, 1961, at 7.30 p.m. Tickets are free and are now available from these offices. When applying for tickets, enclose a stamped addressed envelope (at least 3½ in. x 6 in.) and mark your envelope "Caxton Hall" in the top left-hand corner.

Our next issue, dated January, will be published on December 7th

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 August, 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	765,472
Home Counties	717,711
Midland	532,160
North Eastern	583,099
North Western	495,934
South Western	429,795
Wales and Border Counties	259,351
Total England and Wales	3,782,493
Scotland	439,117
Northern Ireland	129,725
Grand Total	4,351,335

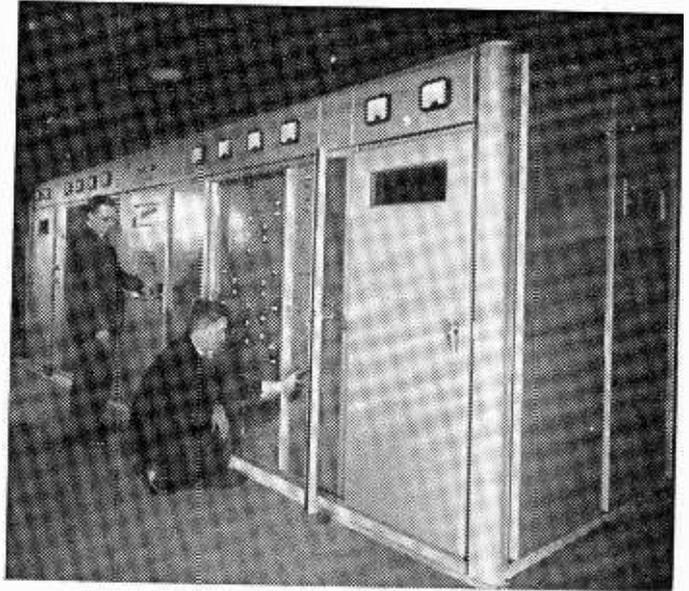
Automatic Landing System for Air Freighter

THE Short SC.5 Britannic, chosen as the R.A.F.'s strategic heavy freighter, will be the first transport aircraft in the world to be equipped with a fully automatic landing system suitable for passenger carrying aircraft. This equipment, which is based upon the system developed by the Ministry of Aviation Blind Landing Experiment Unit, will enable the 100 ton aircraft to land in all weathers, even in fog.

The system itself is being developed by Smiths Instruments, who have already prepared a comprehensive design study of every item of equipment. Also collaborating are Murphy, who are providing guidance equipment, and Standard Telephones, who are responsible for radio altimeter systems.

Electrical Engineers Exhibition Dinner

IN support of a recent call by the Prime Minister for increased efforts in the export field, the organisers of the National Electrical Engineers Exhibition held a dinner at Grosvenor House, London on October 13th. This event also marked the commencement of the campaign to attract buyers from home and



The above illustration shows one of four 100kW high-frequency radio transmitters ordered by the Government of Ghana from Marconi's. This is for installation in a new station at Tema, near Accra. The new station will give Ghana the most modern high-power short wave broadcasting system on the African Continent.

overseas to the 1961 Exhibition at Earls Court. The dinner afforded an opportunity for exhibitors to meet diplomatic and commercial representatives of overseas countries, executives in the industry and its associations, and senior representatives of large purchasing organisations.

Among those present were the High Commissioners for Australia, Ceylon, Ghana and Pakistan; the Ambassadors for Afghanistan, Burma, Chile, Czechoslovakia, Haiti, Honduras, Iceland and many others. The speaker was the High Commissioner for Australia, His Excellency The Right Honourable Sir Eric Harrison, K.C.V.O.

Transmitter for Brookman's Park

A NEW 50kW medium frequency sound broadcasting transmitter has been ordered by the British Broadcasting Corporation from the Marconi Company for use at the Brookman's Park station. The original Brookman's Park transmitter, built and in-

stalled by Marconi's 31 years ago, is still radiating the Light Programme, but because of its great age the operating costs are now rather high compared with a modern equipment of equivalent output power. The new Marconi transmitter will be capable of being operated by remote control.

Type BD228 which is to be installed is a new design, with simplicity of operation, reliability, high efficiency and economy of floor-space. The radio frequency stages, three in number, use only three valves to obtain the final output of 50kW. A driving power of 2W is used for the input to the first stage which is a tetrode mounted in a single ended circuit. This valve drives a triode which is followed by a triode final amplifier.

Surveillance Radars for Switzerland

TWO new air traffic control radar systems now being installed to cover Switzerland's major air routes will mark the

first use of microwave relay links for remote control of all operating functions. Designed and produced by the Raytheon Company for Radio Suisse S.A., the radars will serve and be operated from control centres at the Geneva-Cointrin and Zurich-Kloten airports.

Radar transmitter-receivers for Geneva-Cointrin will be located atop 5,500ft Mont le Dole 16 miles away. The radar pedestal weighing several thousand pounds, the giant 40ft wide aerial, and the microwave relay equipment will be taken up the last 1,500ft of the mountain by cable car. For the Zurich-Kloten installation a concrete structure 60ft high will be erected on a hill about seven miles away.

Installation of the radar system and microwave relay equipment will be supervised by engineering teams of Raytheon Canada Ltd.

Lord Chandos visits Canada

LORD CHANDOS, Chairman of Associated Electrical Industries Ltd., left London recently on a visit to Canada. In Western Canada he will see the site of the main dam on the Peace River power development project. A.E.I. has been connected with this scheme since its inception and the first surveys by the Wenner-Gren organisation. This project has received the approval of the British Columbian Government. In Toronto, Lord Chandos will see representatives of Associated Electrical Industries (Canada) Ltd.

A.E.I. is supplying generating equipment for a number of Canadian power projects. Included amongst these are a 220mW set for the Dominion's first big nuclear power station at Douglas Point.

Marconi Equipment for Indian Railways

AN order has been obtained by Marconi's Wireless Telegraph Co. Ltd. from Bharat Electronics of Bangalore, India, for the supply of a VHF multi-channel communications system for South Eastern Railways in India.

The equipment consists of sixteen HM 100 terminals and eight HM 150 repeaters, with aerials and ancillary gear. It will be used to provide communication over the route connecting Adra, Tatanagar, Chakradharpur and Garden Reach (Calcutta).

This is the first order received after the signing of an agreement between the two companies for the right of manufacture of Marconi HM 100/150 multi-channel equipment in India. The contract is for the supply and installation of the complete system including towers, diesel generators, telegraph equipment and teleprinters.

Ultra Anniversary Lecture

THE third Ultra Anniversary Lecture was given in the Recital Room of the Royal Festival Hall on October 12th. The speaker was Mr. G. W. A. Dummer, M.B.E., M.I.E.E., Superintendent, Technical Services Department, Royal Radar Establishment. Mr. Dummer's paper was entitled "The Changing Role of Electronic Components". The paper traced first the effect of constructional techniques on conventional components, then the effect of potted and printed circuits, and also the influence of war conditions on component design and construction.

New Factory Extension

THE extension to the Hainault, Essex factory of Advance Components Ltd. has recently commenced. This extension is part of the programme of con-

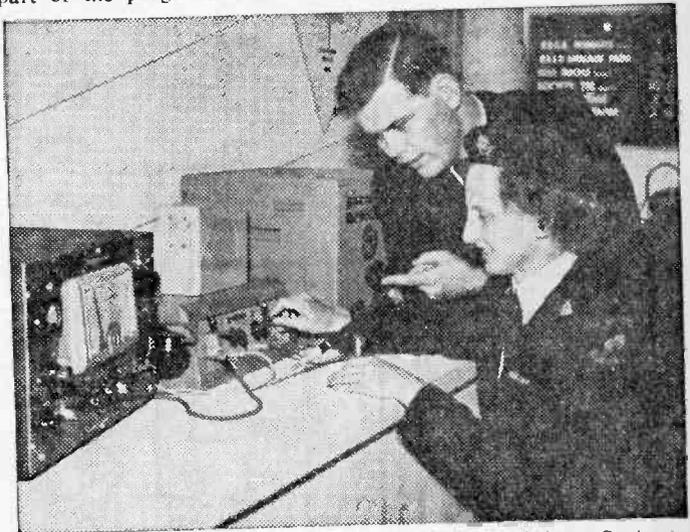
trolled expansion which brought the Company to Hainault from Walthamstow in 1956. The new buildings will increase the productive area by 50per cent and the office accommodation by about 25per cent. The work is in the hands of Architects, Ronald Ward and Partner, and the Building Contractors, K. Wager and Co. Ltd.

New British Journal

The world's first journal dealing specifically with cryogenics, the realm of low temperature engineering and research, has just been launched in Britain.

Called simply "Cryogenics", it will appear quarterly, publishing original papers on all aspects of cryogenic research and technology.

"Cryogenics" is edited jointly by three leading authorities: Dr. K. Mendelssohn, F.R.S., of the Clarendon Laboratory, Oxford; R. B. Scott, chief of the N.B.S. Cryogenic Engineering Laboratory, Colorado; and Professor L. Weil, of the Institut Fourier, Grenoble University. The first issue will contain nine original papers from Britain, America, France and the Netherlands, together with abstracts of each in French, German, Russian and English.



Miss Jane Blois is a staff officer in the British Red Cross Society's International Relations Department, and she has become the first woman member of the Society to volunteer for training as an amateur radio operator. Here, Mr. Alan Butcher, who represents the Radio Amateur Emergency Network, instructs Miss Blois in the use of the receiver/transmitter equipment installed at

B.R.C.S. H.Q.

AN ETCHED CIRCUIT T.R.F.

A DUAL VALVE CIRCUIT GIVING HIGH PERFORMANCE WITH A HOME-MADE PRINTED CIRCUIT

By J. G. Ransome

Circuit

The pentode section of the ECF80 is used as a conventional tuned R.F. amplifier. The screen grid resistor may be any value between 33k and 220k; the screen is at chassis potential to R.F. bypassed to chassis with a 0.01μF condenser. The 0.01μF cathode bypass condenser (C3) gives a small increase in gain, but may be omitted in places with high signal strength. Detection is effected by the crystal diode (X1) connected to L2. An alternative way of taking R.F. from the first stage is shown in Fig. 2. This will increase

THIS receiver, by the use of dual valves and circuitry, will give similar results to any 3-valve plus rectifier T.R.F. set and yet can be accommodated in a cabinet no more than 6in. x 10in. x 3½in. even though a large 5in. loud-speaker is used. A wide latitude in component values can be tolerated and this set makes an ideal "spares box special".

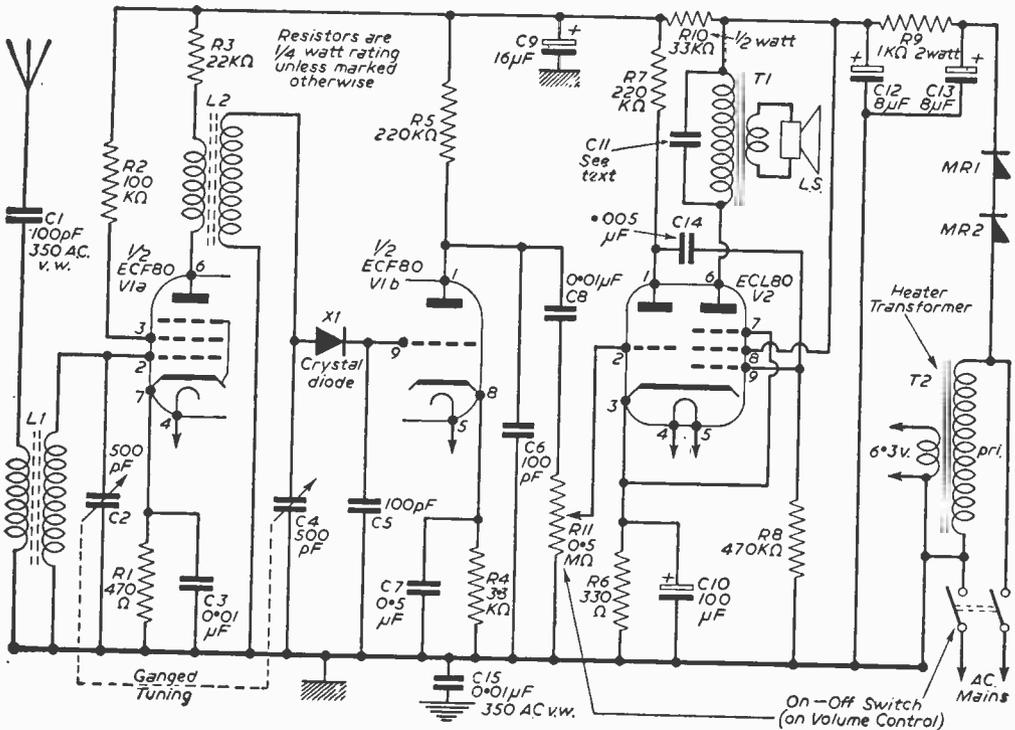


Fig. 1.—Theoretical circuit of the receiver.

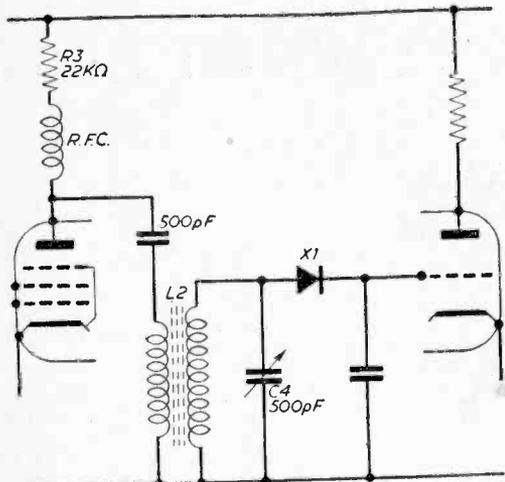


Fig. 2.—An alternative R.F. arrangement.

selectivity but involves two more components and the increase was not found to be worth the trouble in the original model. In any case, if the coils specified are used, then adequate selectivity will be obtained since they have a very good Q factor, giving a very remarkable performance in this circuit.

The detector output is taken to the grid of the triode section of the ECF80, which acts as a voltage amplifier. The crystal diode may be omitted if desired and the R.F. from L2 taken to the triode grid—the triode then acting as an anode bend detector. This reduces the output of the receiver, but this does not matter in high-signal areas. The cathode bypass condenser is essential and any value from 0.1μF may be used and R4 may be any value between 1.5k and 4.7k.

Output

The amplified signal from V2 is taken to the triode section of the ECL80. The anode supply for the triode is taken from the decoupled H.T. supply to avoid the effects of instability in the form of "motorboating." The very large value of the cathode bypass condenser is essential if the output stage is to remain stable under any condition. The output stage is of normal circuitry. The tone control condenser (C11) must be found by experiment to suit the constructor and a value of roughly 0.005μF should prove a good basis for experiment.

It must be emphasized that this receiver has all common metal points connected together which under certain circumstances may be connected to the "live" side of the mains. Therefore, the condensers C1 and C15 must be incorporated and they should be high-quality components and of

the voltage rating specified. The set should be completely enclosed in a fully insulated cabinet and the projecting spindles should have fully enclosing knobs, the grub screws of which should be sealed with wax.

COMPONENTS LIST

- R1—470Ω.
- R2—100k (47-220k).
- R3—22k (10-47k).
- R4—3.3k (1.5-4.7k).
- R5—220k (100-270k).
- R6—330Ω (250-400Ω).
- R7—220k (100-270k).
- C1—100pF 350V A.C. working (50-1000pF).
- C2, 4—500pF variable twin gang condenser (small).
- C3—0.01μF 150VW (0.01μF to 1μF).
- C5, 6—100pF 250VW (50-500pF).
- C7—0.5μF 100VW (0.1-1μF).
- C8—0.01μF 250VW.
- C9—16μF 350VW electrolytic (4μF or above).
- C10—100μF 12VW electrolytic (or greater).
- C11—tone control condenser (see text).
- C12, 13—8+8μF 350VW electrolytic.
- C14—0.005μF 350VW.
- C15—0.01μF 350VW A.C.
- MR1, 2—RM1 or equivalent.
- T1—to match ECL80 to loudspeaker.
- T2—6.3V heater transformer.
- L1—QA.11 (Osmor).
- L2—QH.F.11 (Osmor).
- Loudspeaker, copper bonded board 3½ in. x 6 in., solder, nuts, bolts, connecting wire, etc.

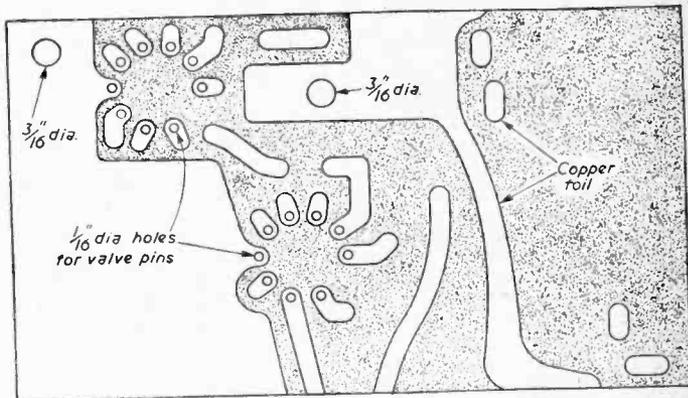


Fig. 3.—The circuit board template.

Preparing the Circuit

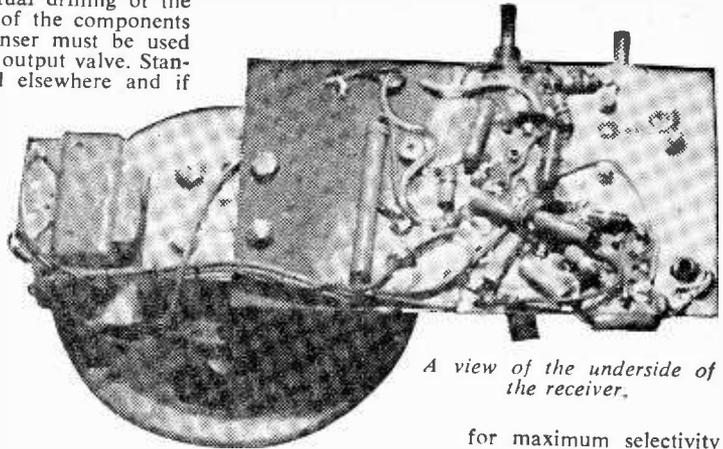
The diagram for the preparation of the etched circuit panel is given in Fig. 3. The light part indicates the copper that is to be left on the board. The etching is carried out as mentioned for the etched panel for the "Simplamp" in a previous issue (page 313 August 1960). The panel size is 6 in. x 3½ in. The circuit should be highly polished before soldering to enable good connections to be made

on the circuit board. The actual drilling of the panel will depend on the size of the components used. A midget tuning condenser must be used if the vanes are not to foul the output valve. Standard-size components are used elsewhere and if miniature components are used a useful reduction in size may be obtained. The loudspeaker used in the original really governed the size of the set and if a smaller unit is employed then a much smaller set may be constructed. The component layout is unimportant, but it is always advisable to keep leads as short as possible and this will be found to be quite easy with this type of baseboard. The components may be mounted either above or below the board according to the space available.

When all construction has been completed the receiver should be checked with the aid of the circuit diagram for shorts and proper connections; when this has been done the set should be connected to the mains and a good aerial connected to the aerial coil. When the set has warmed up the tuning condenser should be rotated and the local station tuned in. With the aid of a good well-insulated screwdriver, adjust the cores of the coils

for maximum selectivity consistent with adequate volume. It is then advisable to line the set up with the aerial that is to be used finally. It will be found that a long aerial will give a good signal but poor selectivity (the capacitance of the lead damps the tuner circuit) and a short aerial gives good selectivity but with less volume. An aerial of about 3-4ft. should give good results.

The component wiring diagram is given in Fig. 4, and although the component layout is not critical, the actual connections must be as shown.



A view of the underside of the receiver.

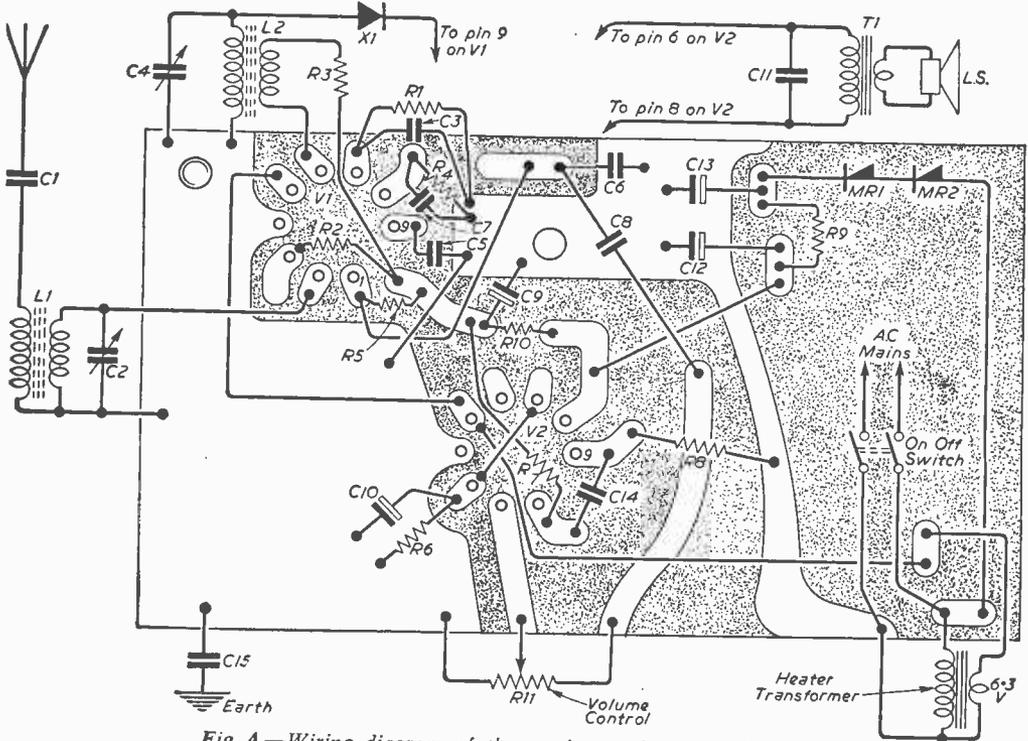


Fig. 4.—Wiring diagram of the receiver. (See note above.)

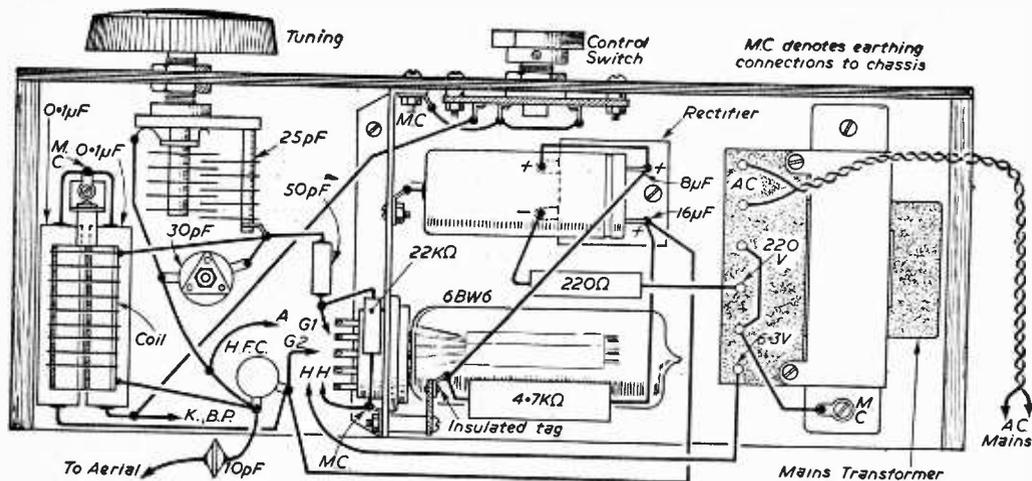


Fig. 3.—Layout and wiring plan.

to the panel with small bolts and spacing washers, an insulated rod being filed to match the rotor hole. A washer is placed under the knob. Inside, a small pin passes through a hole in the insulated rod to keep it in place.

H.T. Supply

A small vertical metal screen is bolted to the chassis and panel, to provide a mounting for the valveholder. All the mains power-supply components are to the right of this. The smoothing condenser capacity is not of much importance. The 220Ω and 4.7k resistors may be changed in value, if desired, to obtain an H.T. supply of around 175V to 200V when the valve is drawing current.

The radio-frequency part of the circuit lies to the left of the screen. Connections should be reasonably short and direct. The variable condenser can be about 15pF to 25pF. The 30pF trimmer is air-spaced and supported in the wiring.

It is essential that the coil should permit tuning to 27Mc/s, or approximately 11.1m. A suitable coil can be wound with 20s.w.g., or similar wire, on a ribbed former about $\frac{1}{2}$ in. in diameter. For this, ten turns, occupying about $\frac{7}{8}$ in. winding space, will be satisfactory.

The size of the coil can be changed, if required, provided the number of turns is adjusted to allow the model control band to be reached with both condensers about half closed. The variable condenser spindle carries H.T., and it must not be

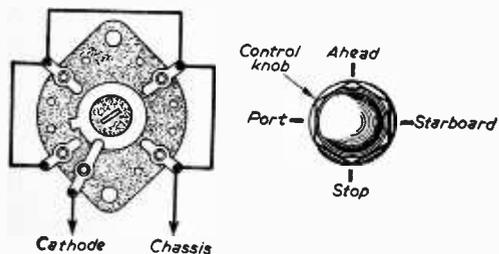


Fig. 2.—Control switch connections.

fixed to a metal panel. In addition, the condenser should be set back with a spare nut or washers to reduce hand capacity, and a large knob should be fitted, for the same reason, and to cover the live mounting bush and nut.

Referring to Fig. 3, (G1) is control grid, (K) is cathode, (A) is anode, and (G2) is the screen grid. This will allow other valves to be used. With the 6BW6, the beam-plates (BP) have a separate pin, but with many valves they are internally connected to the cathode. (H) denotes the heater tags.

Aerial and Adjusting

For indoor testing of equipment, no aerial is required. For outdoor working, a short rod, some 18in. to 2ft or so long, is attached to the insulated side of the case. The 10pF condenser in series with the aerial must not be omitted as it isolates the rod from H.T. voltages. The capacity of this item is in no way critical, but should be quite small.

Initially, the variable condenser is half closed, and the 30pF trimmer is rotated with an insulated tool to bring the transmitter into the permitted band. Further adjustment, to compensate for changes to the aerial, etc., can then be made with the panel control knob.

The transmitter can be tuned on to frequency by any of the usual methods. One of the simplest is to use a model-control frequency meter, with a bulb or milliammeter to indicate resonance, and tune for maximum indication. Or calibration can be taken from an accurate signal-generator, a receiver, or another model control transmitter.

The 27Mc/s model control band extends from 26.96Mc/s to 27.28Mc/s. It is essential that the transmitter be confined to this band, or interference can be caused to TV reception over a wide area, due to harmonics. Normally, when only one set of equipment will be in use, it is best to locate the signal at about the centre of the band. With normal operation and care, there should then be little danger of shifting frequency so much as to bring the transmitter outside the permitted band.

CONVERSION OF THE P.W. A.C. "CORONET" 4 TO RADIOGRAM

ADDITION OF "MONAURAL" OR "STEREO" PLAYING FACILITIES

By J. B. Willmott (A.I.P.R.E.)

construction of a completely new receiver, and it is a fact that the addition of gram facilities to most modern radio receivers, especially if they are of the A.C. only type, is quite a simple matter.

The A.C. "Coronet" 4.

Doubtless a great many readers will have constructed the design which formed the subject of a blueprint issued with the October 1953 issue (see page iii of the cover), the A.C. "Coronet" 4. This receiver, whilst simple to construct, provides a very high standard of performance, and in view of its excellent form of presentation with modern, large, illuminated tuning dial, it is particularly suited to installation in a console type of radiogram cabinet. *The principles employed in the modifications may be employed with other receivers of a similar type.* In this article, two methods of modification, so as to include gram facilities, are described. The first method comprises the inclusion of "monaural" gramophone reproduction, whilst a more ambitious conversion provides for the reproduction of the latest type

THE ever increasing popularity of gramophone records, and in particular of the modern L.P. and E.P. types, together with ready availability of reliable record playing units and a range of first class cabinet housings, has probably turned the thoughts of many home constructors towards the subject of record reproduction. Whilst there is much to be said for the popular type of portable record players, the traditional type of radiogram in a console cabinet is deservedly still popular, and not only is the standard of reproduction enhanced, but the addition to the furnishings of the room in which it is situated is generally viewed with approval. There have been numerous designs featured in *Practical Wireless* from time to time, both for simple gramophone amplifiers and complete radiograms. There will, however, be many readers not wishing to undertake the

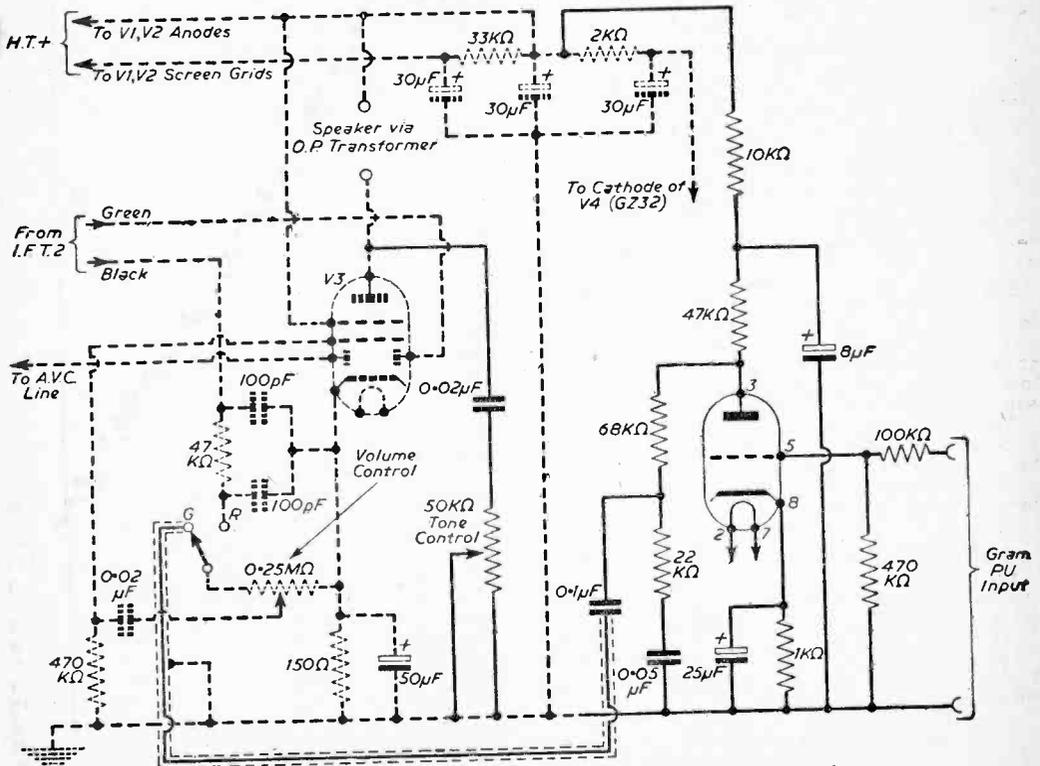


Fig. 1.—The original "Coronet" circuit (V3 stage) is shown by dotted lines and the additional wiring by continuous lines.

of "stereo" records; this of course calls for some major modifications to the existing "Coronet" chassis in view of the increased demands from the power supply section. Both modifications are, however, quite simple to carry out, and anyone who has successfully constructed the "Coronet" receiver, need have no fear of being unable to carry out the modifications and additions.

Addition of Monaural Gram Facilities

In the original "Coronet" design, the high-slope EBL31 double-diode-pentode valve, V3, provides the sole stage of audio amplification, and since the gain of the frequency changer, and I.F. amplifier stages is sufficient to ensure that an adequate signal is presented to the control grid of this stage after demodulation, the arrangement works very well. The output from a gramophone pick-up, even if of the sensitive crystal type, is insufficient to drive the stage satisfactorily, particularly when reproducing L.P. records, the output from which is lower than from the old type standard 78r.p.m. records. Therefore it is necessary to fit a stage of pre-amplification ahead of the EBL31 and, as the gain required is small, a single stage of triode amplification is ample. Also, as this stage is only to operate on gram, the opportunity can be taken to design the stage to provide the necessary bass boosting characteristic required to assist in faithful reproduction from records.

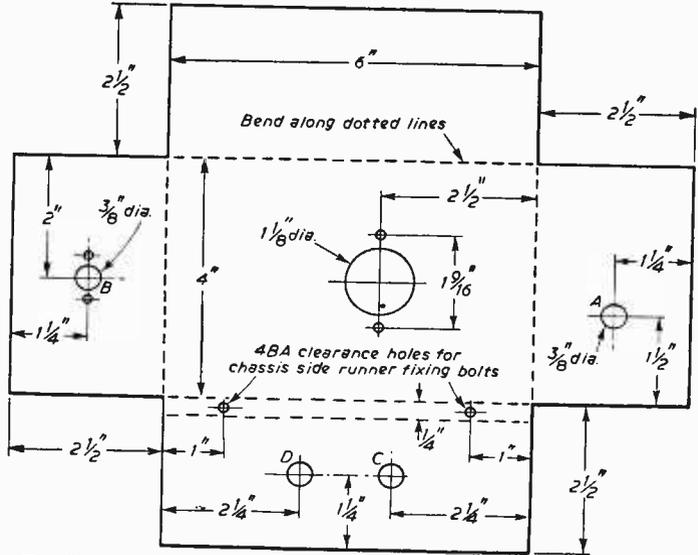


Fig. 2.—Additional chassis to be bolted to that of the "Coronet."

type, in order that background hiss on older records may be reduced, and this feature is also provided. Incidentally, this tone control also operates on radio, and will be found a useful addition, enabling much unwanted background noise to be minimised when listening to distant stations. Naturally, the provision of the radio/gram switch and tone control, calls for two additional control knobs, and in order to preserve the symmetry of the front panel layout, these are added to opposite sides of the existing chassis in such a manner that the control spindles are in line and equidistant from the existing ones.

The theoretical circuit of the original V3 stage is shown by the dotted lines on Fig. 1, whilst the additional pre-amp stage and interconnections is shown in continuous black lines. The valve used is a 6J5 (either metal or glass type can be used), and the entire pre-amp stage can conveniently be built on a small aluminium chassis measuring 6in. x 4in. x 2 1/2in. (this being a standard size, obtainable ready made from several advertisers in this magazine), which is then bolted to the side runner of the original "Coronet" chassis, on the volume control side of the latter. The tone control is mounted on a small aluminium panel, measuring 5in. x 2 1/2in., secured to the opposite (tuning control side) end of the "Coronet" chassis, utilising the existing bolts which fasten the dial assembly. All the necessary drilling dimensions are given in Figs. 2 and 3, and if these are followed exactly, there should be no difficulty.

The Pre-Amp Chassis

On the pre-amp chassis, the hole A houses the 2-pole 2-way radio/gram switch and hole B is for mounting a coaxial socket (this should be drilled to match the component obtained) which provides ingress for the signal from the gramophone pick-up. A solder tag should be provided

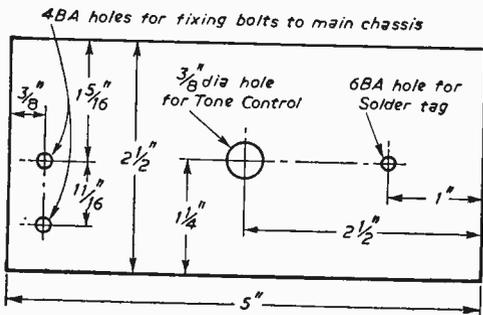


Fig. 3.—Tone control panel.

Additional Components

As the coil pack specified for the "Coronet" receiver does not provide for radio/gram change-over switching, a separate 2-pole 2-way switch is introduced for this purpose (actually only one pole is utilised in this modification, but a 2-pole 2-way is a standard component and more easily obtainable). It is also desirable to provide some form of simple "tone control" of the top-cut

on one of the fixing bolts of this socket (inside the chassis) to allow for an earth point for a single screened wire subsequently conveying the audio signal to the 6J5 grid. Hole C should be fitted with a rubber grommet, thus obtaining the route for a length of single screened wire conveying the signal from the diode filter bottom junction of the 47k resistor and the 100pF capacitor in Fig. 1, to the radio/gram switch. This, together with a further length of single screened lead, conveys the signal from the radio/gram switch to the "top" of volume control on the main "Coronet" chassis. The international octal type valveholder, which accommodates the 6J5 valve, should preferably be mounted with the locating spigot in the direction which is indicated in Fig. 4 below; this will assist in obtaining short and direct wiring. It should be noted that a 3-way tagstrip is mounted on the fixing bolt nearest the locating spigot, and a 2-way tagstrip on the other valveholder fixing bolt, as in Fig. 4. The hole D in the pre-amp chassis allows for the passage of leads conveying the heater and H.T. positive supplies from the main "Coronet" chassis, and this hole should also be provided with an insulating rubber grommet. The power drawn by the pre-amp is very small, only 0.3A heater current, and some 3-5mA H.T. The original power supply in the "Coronet" receiver is well able to cater for this, and the additional voltage drop across the main 2k smoothing resistor is of no consequence.

Additional Smoothing Stage

In order to obviate any danger of unwanted feedback, decoupling of the 6J5 anode is provided by the 10k resistor and 8μF capacitor as shown on the diagram, and these components, in addition to providing decoupling, also act as an additional stage of smoothing for the H.T. supply; this results in an extremely low "hum" level, a very useful adjunct if full enjoyment is to be obtained from the completed instrument.

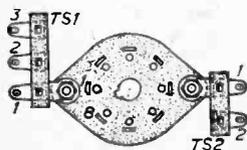


Fig. 4.—Tag strips mounted on the valveholder.

The reason for the inclusion of a 100k resistor between the "live" pick-up socket and the 6J5 control grid may not be immediately apparent; its purpose, in conjunction with the 470k grid-leak resistor, is to provide a fixed potentiometer network across the input circuit, and thereby obviate any possibility of the stage being overdriven, as might occur with a sensitive crystal pickup, particularly when operating on the older type of 78r.p.m. records.

The Tone Control

The tone control is of the simplest type, merely comprising a 0.02μF capacitor and 50k potentiometer, wired between the anode of the EBL31 output valve, and chassis. Wiring the pre-amp sub-chassis is straightforward, use is made of the tagstrips as shown in Fig. 5, and the wiring of the radio/gram changeover switch and tone control are clearly shown in Figs. 6 and 7; however, for

the benefit of the less experienced constructor, the following wiring sequence is suggested.

Wiring the Pre-Amp Unit

The position of individual capacitors and resistors is by no means critical, and provided that short and direct wiring is adhered to, there should be no difficulties.

1. (Referring to the "Coronet" blueprint). Run a length of twisted twin flex from pins 2 and 7 of V2 (the EF39 valve, marked "X" and "Y" on the blueprint, through hole D to pins 2 and 7 of the 6J5 valveholder.
2. Connect pin 1 of 6J5 to the earthed tag No. 1 of tagstrip TS1.
3. Take an insulated lead from the 30μF red tag (junction of 2k and 33k wirewound resistors, as shown on blueprint) through the hole D to pin 6 of the 6J5 valveholder. This is a "spare" pin, and used as a convenient anchoring point.
4. Next connect a 10k, 1/4W resistor between pin 6 and pin 4. The latter is again a "spare" pin, used for anchoring purposes.
5. Join a 47k, 1/4W resistor between pin 4 and pin 3.
6. Solder the positive end of the 8μF, 350VW electrolytic capacitor to pin 4, and the negative end to tagstrip TS1, tag No. 1 (Earth).

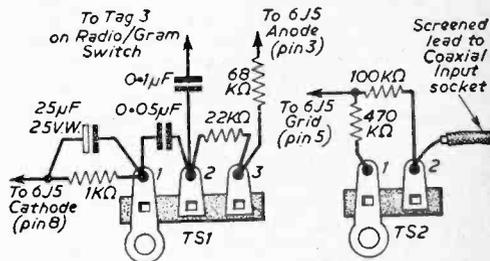


Fig. 5.—Wiring from the tag strips to the pre-amp sub-chassis.

7. Connect a 1k, 1/4W resistor and a 25μF 25VW electrolytic capacitor in parallel, between pin 8 of 6J5 and the tagstrip, TS1 (tag No. 1); making sure that the positive end of capacitor goes to pin 8 of 6J5, and the negative end to Earth.
8. Join and solder a 68k 1/4W resistor between pin 3 of the valveholder and tag No. 3 of TS1 (Fig. 5).
9. Connect 22k, 1/4W resistor between tags 2 and 3 of TS1.
10. Next a 0.05μF capacitor is soldered between tags 1 and 2 of TS1, if a component with a black band at one end is used, this latter end should be wired to tag 1.
11. Now connect one end of 0.1μF, 450VW capacitor to tag 2 of TS1 and the other end to tag No. 3 on radio/gram switch (Fig. 6).
12. The inner wire of a length of single screened lead is taken from the centre ("live") connection of the coaxial input socket and soldered to tag 2 of TS2 (Fig. 5).
13. Earth the outer braiding of the above screened lead, at the solder tag provided, to

one of the mounting bolts of the coaxial socket.

14. Connect a 100k, $\frac{1}{4}$ W resistor between tag 2 of TS2, and pin 5 of the valveholder.
15. A 470k, $\frac{1}{4}$ W resistor is now connected between tag 1 of TS2 and pin 5 of the valveholder.
16. Disconnect the lead attached to right hand tag of the volume control on the "Coronet" chassis (this is the lead which comes from the diode filter comprising a 47k resistor and two 100pF capacitors), and divert the same through hole C—using a single screened lead, the outer covering of which can conveniently be earthed to the common earth busbar of the "Coronet" chassis—to connect to tag 2 on radio/gram switch.
17. Using a further length of single screened lead, connect from tag 1 of the radio/gram switch, again through hole C, to the right hand tag of the volume control on the "Coronet" (i.e., the tag from which the former connection was removed). The outer screening of this lead should be bonded to the screening of lead 16 at any convenient point.

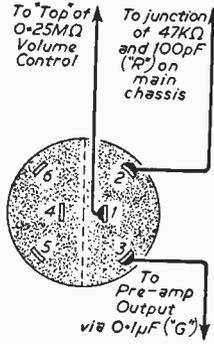


Fig. 6. — Wiring details of the radio/gram switch.

The above completes

the wiring of the pre-amp stage and the following two paragraphs describe the wiring in the tone control.

18. Connect one end of a 0.02 μ F, 450VWV capacitor to pin 3 of the EBL31 valveholder (V3) on the "Coronet" chassis and extend the other wire from this capacitor, with a length of insulated wire, to reach tag 3 on the tone control potentiometer (Fig. 7). This wire should take the shortest route practicable, and be kept pressed down to the underside of the chassis.
19. Finally connect tag 2 on the tone control to a 6BA solder tag mounted in the position shown in Fig. 3.

Testing the Completed Units

Having completed the assembly and wiring as above, make a thorough check of all the connections to ensure that no errors have been made. Insert a 6J5 valve in the pre-amp valveholder. Set the tone control potentiometer fully anticlockwise (minimum top-cut), the radio/gram switch clockwise (radio), and switch on by means of the combined volume control and on/off switch of the "Coronet" in the usual manner. The receiver should operate exactly as before the modifications were carried out, and the effect of varying the tone control can now be verified; advancing it in a clockwise direction should give the characteristic reduction in top-notes response and background noise. If, however, the receiver fails to operate, check that the radio/gram switch is correctly set, and that the wiring of this switch has been correctly carried out. Also ensure that there

are no accidental shorts between the inner wire of any of the screened leads and the screening braiding.

Assuming that all is well, it should also be possible to observe that the heater of the 6J5 valve is lighting up (unless of course a valve of the all-metal type has been used). Now turn the changeover switch to its anti-clockwise position (gram). Place a screw-driver blade on the centre contact of the coaxial input socket, and on turning up the volume control on the "Coronet," a loud hum should be heard from the speaker. If not, re-check the wiring of the pre-amp throughout, and make sure that the 6J5 valve is properly seated in its valveholder.

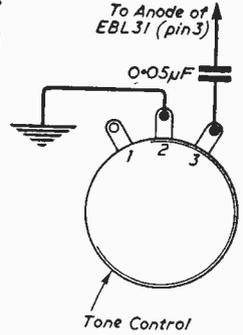


Fig. 7.—Tone control wiring.

Final Construction

All that now remains is to connect a suitable length of coaxial lead from the gram pick-up to terminate in a coaxial plug for insertion in the socket provided on the pre-amp chassis, the internal lead being connected to the centre spigot of the plug, and the external screening braid to the metal shielding.

(To be continued)

Component List for Monaural Modification

- Chassis (6in. x 4in. x 2½in.).
- Aluminium panel, about 16s.w.g. (5in. x 2½in.).
- International octal valveholder.
- Chassis mounting coaxial socket.
- Coaxial plug.
- 2-pole 2-way switch.
- 50k potentiometer, tone control.
- Control knobs (to match type already in use on "Coronet" chassis)—2.
- 3-way tagstrip (one end earth).
- 2-way tagstrip (one end earth).
- 6B.A. solder tags—2.
- 12in. Twin twisted PVC flex (heater wiring).
- 12in. Single PVC flex, red (H.T. lead from "Coronet" to pre-amp).
- 12in. Single screened wire.
- ½in. Rubber grommets—2.
- 8 μ F 350VW electrolytic capacitor.
- 25 μ F 25VW electrolytic capacitor.
- 0.05 μ F 450VW tubular capacitor.
- 0.02 μ F 450VW tubular capacitor.
- 0.1 μ F 450VW tubular capacitor.
- 6J5 Valve (glass or metal type).
- Nuts and bolts, connecting wire and sleeving as required.

Resistors:

- 1k $\frac{1}{4}$ W.
- 22k $\frac{1}{4}$ W.
- 68k $\frac{1}{4}$ W.
- 100k $\frac{1}{4}$ W.
- 470k $\frac{1}{4}$ W.
- 10k $\frac{1}{4}$ W.
- 47k $\frac{1}{4}$ W.

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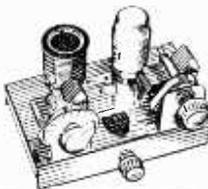


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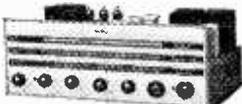


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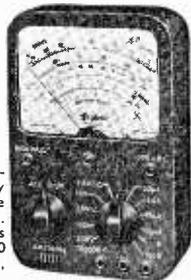
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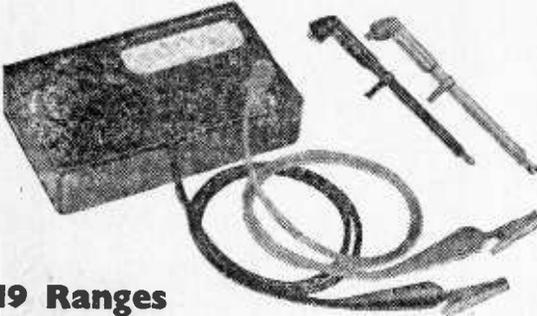
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0—1000 V.	
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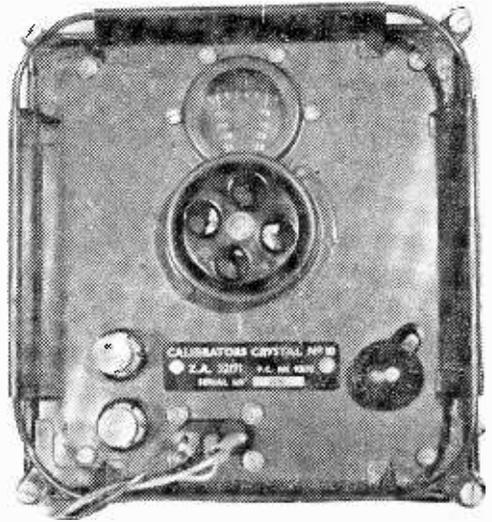
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The No. 10 Crystal Calibrator

MODIFYING A USEFUL EX-GOVERNMENT UNIT

By G. F. Upton



The No. 10 crystal calibrator.

THE No. 10 type of crystal calibrator is available at very reasonable cost, and it provides crystal-controlled and tunable outputs over the band of approximately 500kc/s to 30Mc/s. This allows home-constructed receivers to be calibrated, or the dial markings of commercially-manufactured receivers to be checked and corrected. The calibrator output can also be used to check the frequency of an unknown station, or to tune an uncalibrated receiver to a station of known frequency.

The calibrator employs three small battery valves (two 1T4 and 1R5), but is normally intended for an H.T. supply of around 250V to 300V. This can be obtained from the receiver H.T. line, the drain being some 10mA to 15mA. For ease in connecting up, the receiver can be fitted with a socket from which H.T. can be drawn.

Fig. 1 shows the usual filament circuit, with dropper resistor and 6Ω potentiometer so adjusted that a 12V supply is required. As this is normally not very convenient, the circuit can be modified for 3V running. A 3V (2-cell) dry battery may then be used, and will have a long life.

As the 1T4 in the tunable oscillator stage must retain its filament choke, it is not feasible to convert for 1½V running. However, the change to 3V can be made without disturbing any of the existing wiring or important parts, which would in any case be unwise, as the dial calibration might suffer. For 3V running, all filament chokes are left in circuit, but the dropper resistors are eliminated. The 6Ω and 30Ω resistors are by-passed by joining together the two points marked "X" in Fig. 1. The 22Ω resistor is then disconnected from the chassis at "Y" to avoid unnecessary current drain. The circuit is then effectively that in Fig. 2.

The calibrator should be carefully withdrawn from its case. The switch will then be seen in the position shown in Fig. 3. Very stout wire is employed for the L.T. circuit choke, so it can easily be

identified. A new lead is taken from it to the filament line to which the three smaller filament chokes are wired. This point is easily reached by withdrawing the neon modulator and valve at the end of the chassis. The 22Ω resistor can also be disconnected from its tag behind the sub-panel. This item is shown in dotted lines in Fig. 3.

The sub-panel should not be removed, because of the tuning dial coupling. Care should also be exercised not to bend the tuning condenser plates, or to move the sealed trimmer or coil core. If this were done, the dial readings would be modified, though the crystal frequency marker points would not be changed.

As the 30Ω filament chokes drop 1½V at 0.05A each, the unit is now ready for a 3V supply.

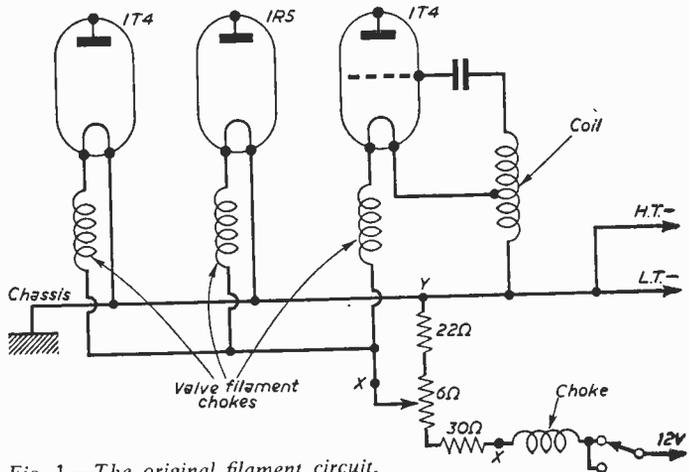
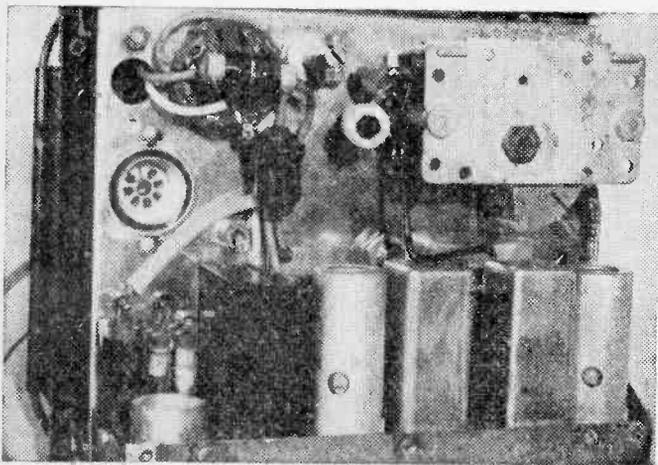


Fig. 1.—The original filament circuit.



View showing choke circuit wiring.

Fig. 2 shows the modified circuit and panel supply connector. The L.T. leads are taken to a 3V dry battery. The H.T. leads should be fitted with suitable plugs, so that current can be drawn from the receiver, as described.

Using the Calibrator

When the switch is set to 500kc/s the crystal-controlled oscillator and harmonic amplifier are in action. The signal is modulated at approximately one-second intervals by the neon, and will be heard at 500kc/s and multiples of 500kc/s, e.g., at 1Mc/s (1,000kc/s), 1.5Mc/s, 2Mc/s, 2.5Mc/s, and so on. With a sensitive receiver the harmonics can be heard up to about 30Mc/s.

T.R.F. receivers should be adjusted so that the detector is just oscillating, reaction being used for this. With communications type superhets, the BFO should be switched on.

The calibrator is coupled to the receiver by joining the terminal marked "Aerial" on the calibrator to the receiver aerial terminal or socket. The receiver R.F. gain should be kept reasonably low, but will have to be advanced somewhat when using the higher harmonics.

If frequent use is to be made of the calibrator, a 2-way switch may be connected as shown in Fig. 4, so that the receiver can be operated from its aerial, or the calibrator output, at will.

When the calibrator switch is set to "dial" the tunable oscillator signal is mixed with the crystal controlled signal. The harmonics then differ in frequency from the crystal controlled signal by the extent of the dial readings, which are in Mc/s to two decimal places, reading being possible to three decimal places. The way in which tunable calibrations can be made will soon become clear

when the unit is used with a receiver. Receiver and calibrator can be employed together in several ways, according to the purpose in view.

Receiver Calibration

With a home-constructed receiver, set the calibrator to 500kc/s. The fundamental is 600m, and may not be tunable on the receiver, but the second harmonic can easily be identified, as it falls on 1,000kc/s, or 300m. The receiver is slowly tuned down through each waveband. Each time the calibrator signal is heard the receiver tuning dial is marked. E.g., at 1Mc/s (1,000kc/s) (300m), 1.5Mc/s (200m), 2Mc/s (150m), 2.5Mc/s (120m), 3Mc/s (100m), and so on. This can be continued to about 30Mc/s if necessary.

The dial can now be turned to the reading giving 0.1Mc/s (100kc/s), 0.4Mc/s, 0.6Mc/s, and 0.9Mc/s. Signals will now be heard at these positions on the receiver, between the 500kc/s marks, and the dial can be calibrated accordingly. Other readings can then be chosen on the calibrator dial, so that the receiver tuning dial or scale can

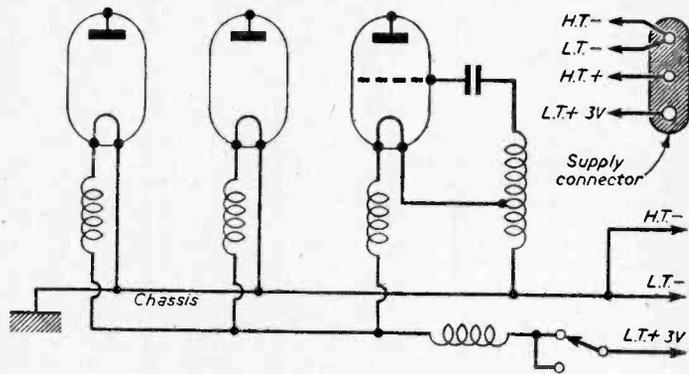


Fig. 2.—Circuit modified for 3V supply.

be marked in 0.1Mc/s divisions throughout the receiver tuning range. From about 2Mc/s, dial markings at this interval will be convenient. For lower frequencies, 10kc/s markings may be inserted, remembering that 10kc/s will be 0.01Mc/s. If the receiver is well made, and the dial well secured, a very high standard of accuracy can be expected.

With a ready-calibrated receiver, the crystal calibrator will probably reveal some error in dial markings. If the error is uniform throughout, it may be corrected by moving the pointer. Should the error change towards one end of the tuning scale, this indicates incorrect trimming or padding.

Station Location

To find a station of known frequency, the calibrator is set to this frequency, and its signal

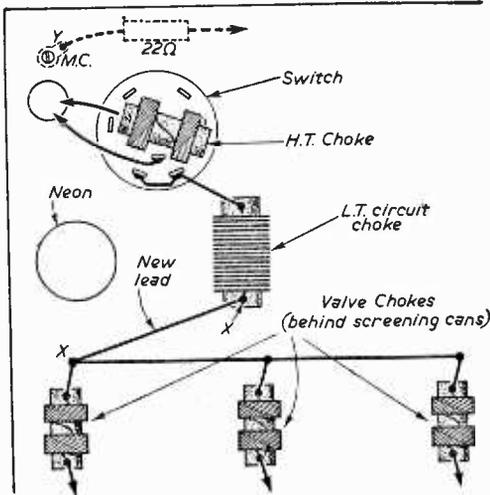


Fig. 3.—Internal connections.

tuned in on the receiver. The receiver is then switched from calibrator to aerial.

It is necessary that the receiver dial be marked with 500kc/s points, as described, since the calibrator tuning only locates the signal between these 500kc/s points. A direct-reading receiver dial is easiest to use, but with simple receivers a log of dial readings against frequencies can be made.

Frequency Determination

If a short wave or other station of unknown frequency is tuned in it will lie between known 500kc/s points, obtained as explained. The receiver is then switched to the calibrator, the latter is set for "dial" and the dial is turned until the calibrator tone is tuned in on the receiver. The station frequency can then be read off the calibrator dial.

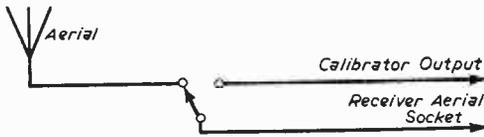


Fig. 4.—Receiver frequency check switch.

Band Calibration

In many cases it is only desirable to calibrate a receiver over certain bands. If so, the crystal marker signal will furnish a known point, without bothering with other harmonics in the way described for complete all-wave calibration.

For example, the 80m amateur band extends from 3.5Mc/s to 3.8Mc/s. With the calibrator set for 500kc/s crystal controlled output, its signal will be heard at 3.5Mc/s and 4Mc/s. As amateurs will be heard, it will be at once obvious which mark is 3.5Mc/s and which is 4Mc/s. The calibrator can therefore be switched to "dial" and

the 3.5Mc/s to 3.8Mc/s band marked up on the receiver with any desired degree of accuracy up to the limit provided by the equipment.

This method is convenient for those receivers having a single short wave band, or where there are gaps between wavebands. It is also suitable for calibrating bandspread dials, where a very small band may be tuned with great accuracy.

Battery Operation

In the original calibrator, three 47k resistors drop the H.I. to a suitable level. If these are eliminated the unit will function with a much reduced voltage, and it can then be used with a battery set, current being drawn from the receiver H.T. battery.

With this reduced supply there will, however, be insufficient voltage for the neon modulator to strike. The calibrator output will therefore be heard as a steady note, provided the receiver BFO is on, or reaction adjusted until the set oscillates when it is tuned through a station.

New East Anglian District Office

FOLLOWING the integration of the former district and branch office systems of Siemens Edison Swan Ltd. and W. T. Henley's Telegraph Works Co. Ltd. (both now part of A.E.I. Woolwich Group), a new District Office has been formed. Known as the East Anglian District Office, it represents the Woolwich Group in Norfolk, Suffolk, and the Northern half of Essex. It has been formed from the Colchester, Ipswich and Norwich Branch offices, which have been detached from the London District Office.

Mr. S. L. Crafford has been appointed manager of the East Anglian District Office. He joined W. T. Henley's Telegraph Works Co. in 1924 and in 1926 assisted in establishing Henley's sales promotion department, of which he subsequently took charge. Mr. Crafford was appointed to Henley's Colchester Branch Office in 1946. For the present he will continue to operate from the Colchester office in his capacity of East Anglian District Office Manager.

A past President of Colchester Engineering Society. Mr. Crafford is a member of Ipswich and District Electrical Association and sits on its management committee. He is also a member of Colchester Industries' Association.

Closing of Aeronautical Gallery

THE National Aeronautical Collection of the Science Museum has been closed to visitors from Monday, 3rd October, 1960.

The Collection is to be reorganised and installed in the new Centre Block of the Science Museum during 1961. Closing the collection a short period before the actual move to the Centre Block will enable preparations for the transfer to be carried out as far as possible within the general schedule of building operations for the expansion of Imperial College involving the area in which the Western Galleries stand.

Shortage of staff and preoccupation with the reorganisation will curtail the service available for answering queries and it is hoped that if queries are submitted they will be brief and of a specific nature.

Radio Construction for the Beginner

No. 3—A TRANSISTOR AMPLIFIER FOR THE CRYSTAL RECEIVER

By D. B. Kidd

SINCE many of the components will occupy different positions from those in the receiver built last month, it will be as well to remove all the components from the board with the exception of the aerial and earth screws, the two coil-core clips and the two headphone sockets. These six components may conveniently be left undisturbed.

Modification

The superfluous holes should be carefully filled as follows: a little plastic wood (or strong glue) is introduced into each screw-hole, using a scrap of wood or the finger tip. Next, a sharpened matchstick is driven deeply into each hole, using a light hammer. (If the matchstick breaks, no matter). After an hour or so, the adhesive should be dry and the matchsticks may then be sliced off level with the board by sliding a razor blade along the surface.

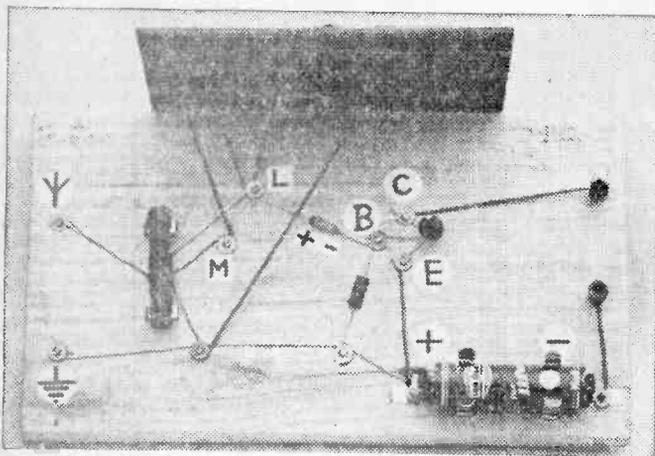


Fig. 1.—Plan view of the receiver.

A final rub with fine sandpaper should leave a surface hardly distinguishable from the rest (except in colour) and capable of accepting another screw in due course if required.

If this procedure is repeated every time a new circuit is attempted, the board will last indefinitely, without any fear of slipping screws and consequent bad contacts.

This receiver, employing one transistor, will require eleven brass washers, which should be visible in the plan view (Fig. 1).

The selected washers should be carefully burnished on both faces, using the "flour" grade glass-paper mentioned before. It is as well to re-burnish any which were used before in the previous circuit (the aerial and earth screws for instance). Copper tarnish, too thin to be visible, has a fair resistance and is strongly rectifying in nature. This

latter fact, trivial under most circumstances, is quite important in receivers such as this, which detect the feeble signals from an aerial directly.

Layout

The screws and washers may now be fixed in position as shown in Fig. 1. It should be noted that the three labelled C, B and E in the illustration are not in a straight line, B being about half an inch to the left of the other two.

The materials required can now be listed:

One 0.0005 μ F, tuning condenser.

One crystal diode.

One 0.01 μ F fixed condenser.

One short length (at least 1 $\frac{1}{2}$ in.) of ferrite rod.

34-38 s.w.g. coil wire.

Pvc covered connecting wire.

Two spring tool-clips $\frac{3}{4}$ in. high.

One "Audio" transistor.

One on/off switch.

One 3V (No. 8) battery.

Four spring tool-clips, 1 $\frac{1}{2}$ in. high, with screws supplied.

Assembly

The first step in assembling is to fix the on/off switch to the panel. How this is done will depend upon the type used, but if it is of the toggle type, or of the table-lamp type illustrated, it will require a hole of $\frac{3}{8}$ in. diameter to be drilled in the panel, as for the tuning condenser.

The table-lamp type shown in the model was chosen for its cheapness and ease of fixing and connection, but it has the disadvantage of not indicating to the user its condition at any given moment, depression of the button giving "on" and "off" alternately. However, for its present purpose, this disadvantage is not very important.

The four large tool-clips are next mounted. Two of these are taken and screwed on to the board with their bases parallel and separated by about 1 $\frac{1}{2}$ in. These two clips hold the tubular battery firmly in just the same way that the two smaller ones hold the piece of ferrite rod.

The other two large clips are to provide the electrical contacts and for this purpose they should be modified

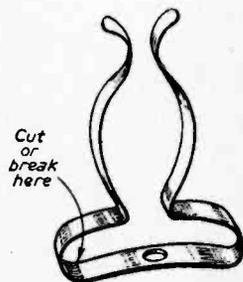
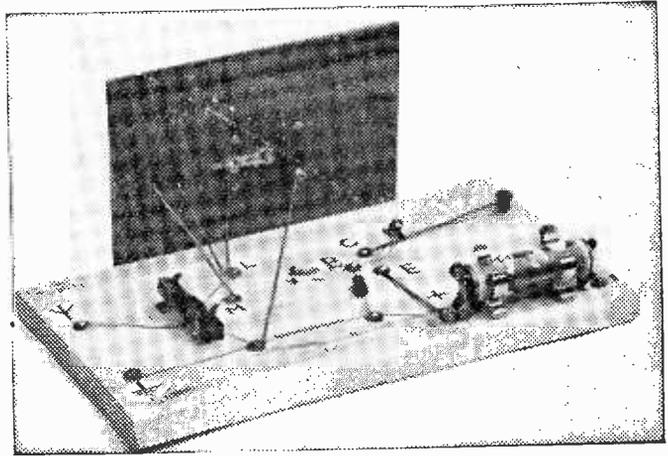


Fig. 2.—Preparing the spring clips.

slightly. Fig. 2 shows how this is carried out.

The clip is symmetrical and has a flat base with one central hole. The metal is to be severed at one end of the base portion at a point just before it starts to curve upwards.

This is best done with a sharp hacksaw blade, but as the spring is of tempered metal, it is quite simple to score it deeply with the edge of a file, then to bend it back and forth a few times until it breaks. The two smaller portions resulting are discarded; the larger parts—each with a base and fixing hole — are then smoothed with a file at the cut edge. They can now be secured to the board and Fig. 3 and the illustration show how they appear when fixed.



Rear view of the receiver.

Battery

The correct position of these two contact springs is best found as follows: the battery is inserted into the two spring clips with the brass "pip" (positive) pointing towards the earth screw (left) and the plain zinc end (negative) towards the lower headphone terminal (right). The battery is now moved within the clips until an equal length of case protrudes beyond them at each end. The two contact springs are then brought up to the battery, convex sides towards it, until contact is just made centrally at each end.

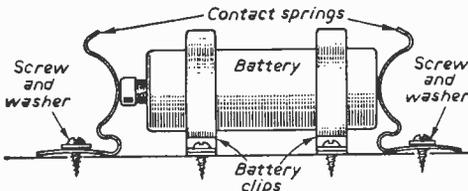


Fig. 3.—The method of clipping the battery.

With a pencil, a mark is now made on the base-board through each fixing hole.

The clips are screwed down tightly at the marked points, with a brass washer under each screw-head. The battery is removed from its clips and the contact springs are strained inwards so as to deform them slightly, near to the base. (It may be necessary to hold the jaws of each battery clip apart while doing this).

The battery is now replaced as before and the contacts tested. A firm but gentle pressure is quite sufficient, so excessive straining of the springs is not needed. It is as well, however, to make sure that the pressure is effective by burnishing the brass tip and zinc bottom of the battery (in the same manner as the washers) to produce a clean metal-to-metal contact.

The Coil

The aerial coil is wound more or less as in the previous set. This receiver is to have a choice of

two wavebands, in effect a nominal long and medium waveband.

If the reader has performed a few experiments as suggested in the last article, he will have formed his own ideas regarding the most interesting bands and should therefore be prepared to modify the following instructions accordingly.

Wind a sleeve of Sellotape, 1/4 in. wide, round the middle of the piece of ferrite rod. If all windings are confined to this area, it will make for economy of turns, especially those of the long-wave coil.

Leaving six inches or so for connections, start winding coil-wire on to the sleeve, trapping the first turn under the succeeding ones as soon as possible. Twenty turns are now wound on, using an even tension, then a loop about 3 in. long is twisted in the wire for the aerial "tapping", and winding is continued for another 40 turns (60 turns in all). Here, a second loop is twisted in the wire and winding recommenced until a further 140 turns have been laid (200 turns in all).

Wiring

Connections are made as follows: The start of the coil goes to the screw on the lower line, below the one marked "M". The first tapping goes, as already implied, to the aerial screw. The second tapping (at 60 turns) goes to the screw marked "M", and the finish of the coil to the screw marked "L".

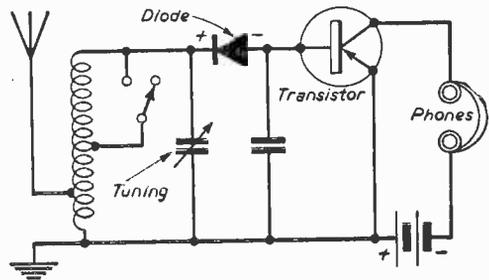
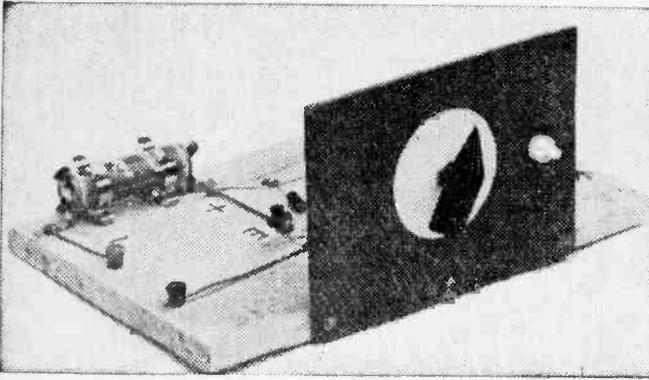


Fig. 4.—The circuit of the transistorised receiver.



A view showing the battery mounting.

The end of the coil can be anchored by a band of adhesive tape, bound very tightly round the core. It is as well to seat the core in its two clips before making the four connections and it is important to ensure that the ends of the wires (including the two "tapping" loops) are thoroughly free of enamel or other insulation where they pass under the washers.

The remainder of the wiring may now be completed. A length of wire just sufficient to reach from screw to screw should be used, with about $\frac{1}{2}$ in. extra, bared of insulation, to twist under the washer at each end.

Notice that there is no connecting wire between "L" and "B", the "pigtailed" of the crystal diode itself making the necessary contacts. Connections to the contact springs are made beneath the brass washers and not beneath the springs themselves.

Fixed Condenser

It now only remains to connect the fixed condenser by means of its own wires between "L" and the lower (earth) line and to clamp the three wires of the transistor into position. These three wires will have to be spread apart to fit under their respective washers, but must not be bent sharply near the point where they emerge from the transistor casing. There is no need to shorten the wires at all.

It is assumed that the reader has no previous experience of transistors, and the following brief remarks will therefore be helpful.

The transistor has three terminals (wires) called collector, base, and emitter. The collector is usually distinguished by a wider spacing or a spot of paint nearby, the base is invariably the middle wire, and the emitter the remaining one. This information should enable the reader to connect the transistor correctly on the board, using the initial letters "C", "B" and "E" as a guide.

Dangers

Transistors, although very robust and virtually everlasting, can be damaged by:

- (a) High temperature (principal causes: soldering irons and excessive currents).
- (b) Reversing the polarity of the battery.
- (c) Connecting the collector directly to the base.

Using a 3V battery and no solder (a) can be ignored. The correct direction of fitting the battery has already been given; care should be taken whenever a fresh battery is inserted. The only real danger is (c) and provided the components and wires are kept neat, covered, and generously spaced as shown, this

is fully taken care of.

The receiver is now ready to use. No power switch is provided; the insertion of the head-phone wander-plugs automatically switches on the supply. One or both plugs should be pulled out when the receiver is not in use so as to spare the battery. With normal use a new battery should not be needed for several months.

Loudspeakers

This receiver is little more than an amplified crystal set. It is not very selective but should give reasonable local station reception. Under favourable circumstances, a high-impedance loudspeaker, connected in place of the headphones, can be driven directly from it, loud enough for a quiet room.

Readers with a little knowledge of transistors will have noticed that there is no "biasing". (This means a small steady current through the base to make it work more efficiently.)

In fact, there is a small amount of current. This is produced by the crystal diode which rectifies the alternating current of the signal being received and passes it on to the base.

As an experiment, readers with a few resistors, the values of which they know, may safely try the experiment of connecting these one at a time between "C" and "B" to observe the effect of different biasing currents.

Bearing in mind danger (c), as described above, no resistor less than twenty thousand ohms (20k Ω) should be used. This figure allows a generous margin of safety.

The correct direction of the crystal diode has been indicated in Fig. 1 with the positive (+ red) end pointing leftwards towards the coil. Reversing the diode will do no harm, but will "switch off" the transistor so that little or nothing is heard.

The theoretical diagram of the receiver is given in Fig. 4.

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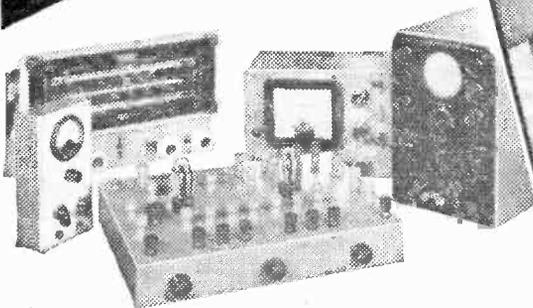
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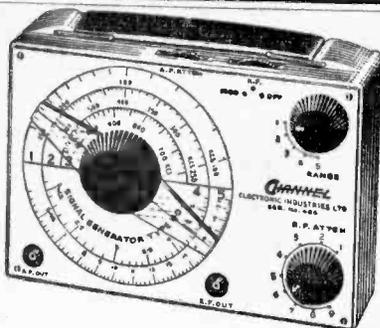
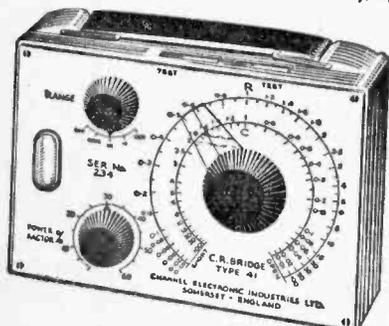
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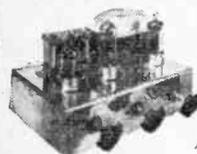
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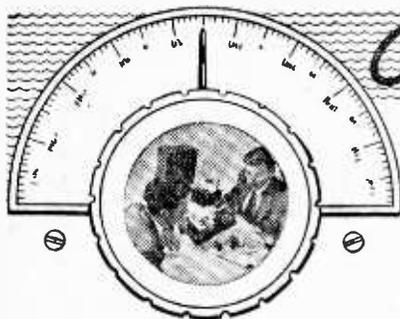
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On Your Wavelength

BY THERMION

Nothing New

ONE often hears the old saying that "there is nothing new under the sun". Radio is a comparatively new science, yet one is often coming up against ideas which were mooted many years ago. This was very forcibly brought home to me recently when I visited the home of a friend whom I had not seen for years, and he was one of the "older brigade" of constructors. During the evening we got round to talking about the modern developments of miniature radio, with special reference to the apparatus which is used in guided missiles. As you can guess the equipment used here is as compact as it is humanly possible to get it, and with the transistor as the "working" element, some remarkable units have been produced. I read some time ago in an American magazine that a new name has been coined for these miniature pieces of equipment, and various manufacturers in the States have their own adaptation of this group name. It would appear that a common term is a "module", indicating a complete stage, with its associated transistor(s), or in extreme cases, a complete powered unit.

I was talking about this arrangement to my friend, when he said "Of course, it's been done before", and I asked for more details. He went to one of his "radio cupboards" and brought out two boxes with a sly smile on his face, and from them he withdrew two valves. Holding them out to me he said "Here is a complete five-valve set, all in two glass envelopes". It transpired that these valves were manufactured in Germany in the 1920's, and in addition to the valve electrodes the glass envelope contained all the resistors and capacitors for a two H.F. or a three L.F. amplifier. Of course, in those days R.-C. coupling was used for H.F. amplification, and the resistors and the capacitors were chemically deposited on short lengths of glass tubing. The completed assembly was slightly larger than the valves of the day, but they were mounted on an ebonite or bakelite base and had only 4 or 5 pins. Thus, by using just those two valves, and plugging them into a valveholder, one automatically built a 5 valve set. To my mind these valves were perfect "modules". Perhaps some of my older readers will remember them, or have details of some other special development of this type.

Loudspeaker Design

Whilst on the subject of the old days, I would like to tell you about some loudspeakers which my friend showed me on this particular visit. The

one which fascinated me most was a Marconi design built into a wooden framework, and having a cone manufactured from ordinary stiff paper. As most readers know, the cone has to be held centred in a gap in the magnet assembly, and the apex of the cone, carries a small ring on which the speech coil is wound. This part of the cone has to be held rigidly centred, but at the same time capable of being moved backwards and forwards whilst remaining central in the gap. This is usually accomplished by what is known as a spider, acting in conjunction with the wrinkles round the periphery of the diaphragm. In the Marconi speaker referred to above, a long rod extended from the centre of the pole piece in the centre of the part carrying the gap, and attached to the top of the rod (that is, farthest from the apex of the cone) was a paper spider. The edge of the cone was free, and the spider was attached a short way down the cone. It was thus held by a single spider and not as in the modern speaker by more rigid means.

Gramophone Records

I am still receiving correspondence on the subject of records, and whilst there are many who agree with the remarks which I have made there are, of course, hundreds who disagree, many of them most violently. Why is it that when anyone agrees they are polite and write reasonable letters, whilst when anyone disagrees they sit down and write the most abusive letters. After all, one is entitled to one's own point of view, and whilst I do not suppose everyone is pleased with everything I write, there is no justification for writing abusive letters. One of the faults which I have recently come across in gramophone records has been pointed out to me by a musician friend. It appears that he has an electric organ in his home and in addition to playing with the radio he likes also to play with gramophone records, when they are to his liking. He tells me that he has found that many records which are of American origin and apparently taken from old 78 discs (I am referring now, of course, to L.P.'s), and that many of these are recorded or re-recorded at the wrong speed. When a disc is played, if it is not rotated at the same speed at which it was recorded, the frequency at which the reproduction takes place will be different and therefore the note will be sharp or flat (depending upon whether the disc is slower or faster). My friend finds that whilst he can play with, or accompany, most English discs, when he tries to play with those of American origin, he is unable to do so, and he asks me why motor manufacturers do not produce motors with a small adjustment for speed. In the old days, he says, he could adjust the speed of the motor until the piano or organ was in tune with the disc, but although he has a four-speed motor there is no adjustment and he is then unable to obtain the maximum enjoyment from his discs.

SIMPLE GUITAR MICROPHONE

"ELECTRIFYING" A GUITAR

By M. Dunn

A THROAT microphone, one of which is used in this construction, may be purchased very cheaply from any electrical supply firm and single units can be obtained for as little as one shilling. When one of these microphones is gently pressed against the soundboard of a stringed instrument, the sounds picked up may be fed into an amplifier. The simple device to be described will hold the microphone in position, and all that is required is a clothes-peg, a small quantity of hardboard, of $\frac{1}{4}$ in. x $\frac{1}{4}$ in. cross section, some felt or foam plastic about $\frac{1}{4}$ in.- $\frac{1}{2}$ in. thick, and some screws and glue. The form the device takes may be clearly seen in the diagram and the only critical measurement is the height. In the model made by the writer it was found that the thickness of the guitar belly was not consistent, and so this measurement should be made at the site where it is ultimately to be fixed if the reader's instrument is likewise uneven.

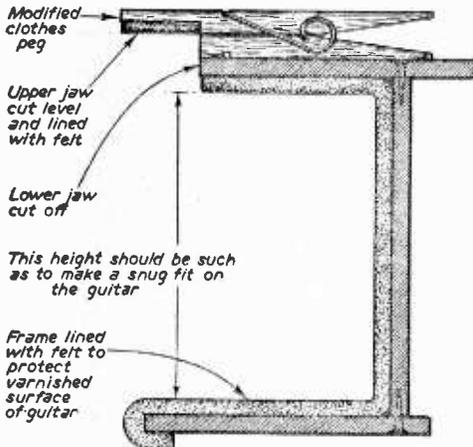


Fig. 1.—This simple framework is used to hold the throat microphone against the soundboard of the guitar.

The apparatus consists of a simple framework which slides friction-tight on to the belly of the guitar. On to the top member is mounted an ordinary wooden spring-type clothes-peg which has undergone a few simple modifications to suit its new job. The lower jaw is cut off completely and the gripping surface of the upper one is made flat and has a small rectangle of felt glued on to it.

The Framework

The writer made his frame from three short lengths of mahogany, $\frac{1}{2}$ in. x $\frac{1}{2}$ in. in section, gluing

and screwing the butt joints at the top and bottom as these must be strong and rigid. The whole of the inner surface is lined with a strip of felt or foam plastic to protect the instrument from scratches. When making the measurement for the height, the distance between the upper and lower felts should be made to be just less than the height of the guitar belly so that the finished article will push on neatly.

The clothes-peg is glued to the top of the upper limb so that the free upper jaw projects well forward. When fixed in position, the throat microphone is then slipped under and held down with firm but gentle pressure. It will be found that too much pressure will stop the microphone working and too little will give no sound pick-up. The clothes-peg spring was found to exert just the right degree of pressure.

Connecting the Amplifier

Most throat microphones are of low impedance and work best with a high ratio step-up input transformer which should be situated close to the amplifier. (These may be purchased very cheaply from advertisers in this magazine, if not already possessed.) With this arrangement it was found that the lead can consist of several yards of twisted flex with no evident hum pick-up.

The tonal quality is remarkably similar to that which issues from the very much more expensive instruments sold commercially. In view of the fact that this device can be made for five shillings or less, it is well worth while and not the least difficult. The output may be fed straight into a simple amplifier with quite pleasing results, but better still experiment with the variable controls of a tone correcting filter to produce a variety of different tone colours by emphasising or attenuating different frequencies present in the waveform.

Servicing Examinations - 1960

The Radio Trades Examination Board has recently announced the result of the TV Servicing Certificate Examination. Of the 642 candidates who sat, 298 qualified for the award of the Certificate, 96 were referred in the practical test, and 248 failed.

The interest in this examination is being maintained, and the total number of candidates who sat for this year's examination showed an increase of 179 compared with the corresponding figure for 1959.

As regards the Radio Servicing Examination, only the written paper in this test has so far been completed, and of the 1,715 candidates who sat, 1,253 were successful and thus qualified to take the practical test, which was conducted at various Centres on 22nd and 29th October, 1960. A further 330 candidates who were referred in the practical test in the 1959 examination will also be taking this year's practical examination, giving a total of 1,583 candidates.

A Two Valve General Purpose Amplifier

BUILD THIS UNIT FROM YOUR SPARES BOX

By R. Murray-Shelley

THE amplifier to be described will be found to be very useful for all purposes where a medium power, low distortion unit is required.

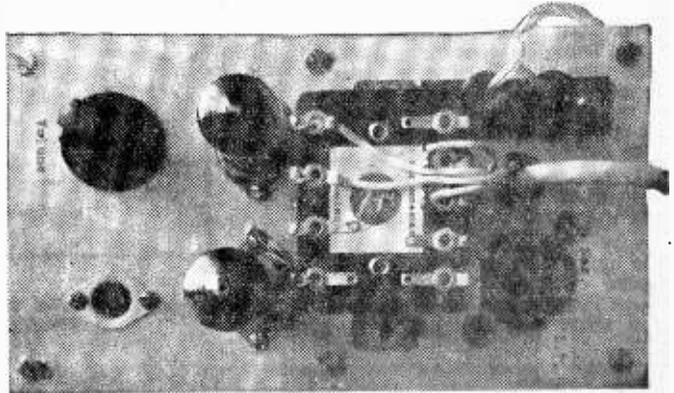
The Circuit

The circuit of the amplifier is shown in Fig. 1. Two modern high efficiency valves are used. The first stage employs an EF86 pentode valve working as a voltage amplifier at high gain. This valve is very suitable, giving high gain at a low noise level.

The EF86 is resistance/capacity coupled to the output stage, a single EL84. This valve was chosen in view of its high gain and excellent power handling ability. Use is made of negative feedback, and thus the amplifier is able to deliver some 3½W of power at a very low level of distortion.

Noise

The hum level of the amplifier is low. This is



Above chassis view of the amplifier.

mainly due to the use of large smoothing condensers in the power unit, and to decoupling of the first stage and of the screen grid of the output valve. Decoupling the screen of the EL84 not only lowers the hum level of that stage, but also, by lowering the voltage on the screen of the valve, lengthens valve life and stabilises the output stage.

Hum, and in particular, harmonic distortion, are also reduced by the use of negative feedback from the secondary of the output transformer to the cathode of the EF86. Negative feedback also, unfortunately, reduces the effective gain of the amplifier, though this tends to make the unit more stable.

No variable tone controls are included in the amplifier, since in the prototype a variable control of tone was not found to be necessary. In any case, the addition of negative feedback would to some extent cancel out any variation in frequency response which might be introduced by the tone control.

Power Supplies

The amplifier requires a power supply of 250V at 50mA and 6.3V at 1A. A power pack is not included in the basic circuit of Fig. 1, since many constructors already possess a suitable power unit. For those who do not possess such

Both valves are type B9A

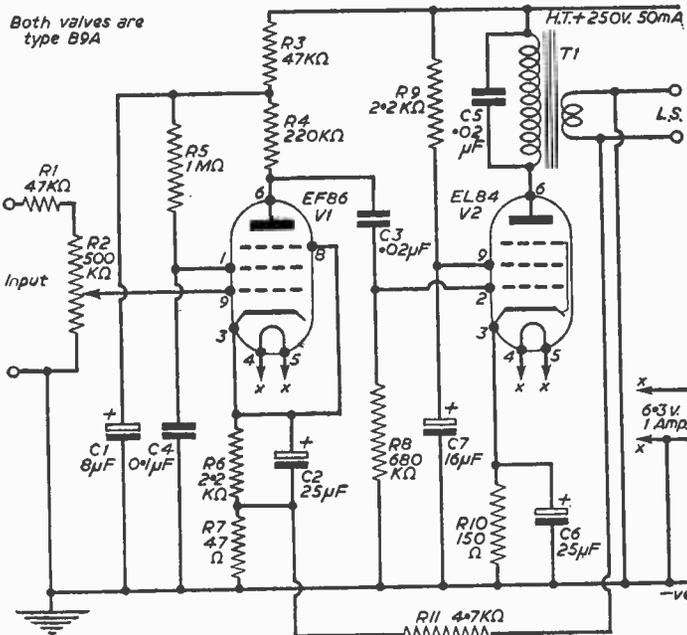


Fig. 1.—Theoretical circuit.

unit, a suitable circuit is given in Fig. 2.

An EZ80 rectifier is used, although there is no reason why an octal based rectifier such as a 5Z4, or a B7G based 6X4 could not be used instead. Most octal based rectifiers, however, require a heater voltage of 5, and this should be remembered when obtaining the mains transformer. If any valve other than an EZ80 is used, then the reservoir condenser, C1, should be reduced to 16 μ F capacity, as this is the maximum recommended value for most rectifier valves.

The Output Transformer

In the writer's case this was a comparatively inexpensive multi-ratio type which gives good results. A "high fidelity" component could no doubt be used to good effect and the best trans-

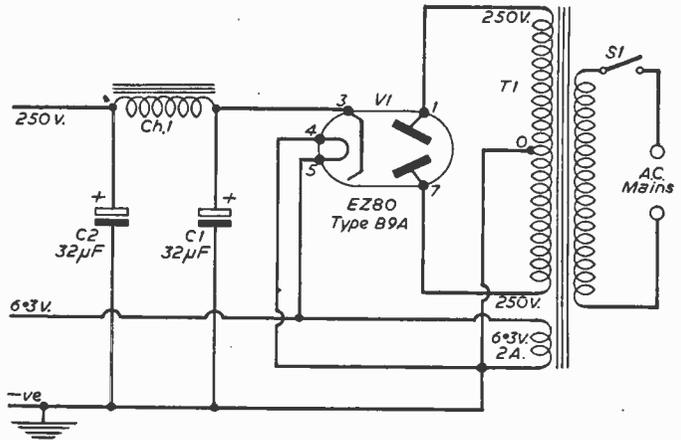
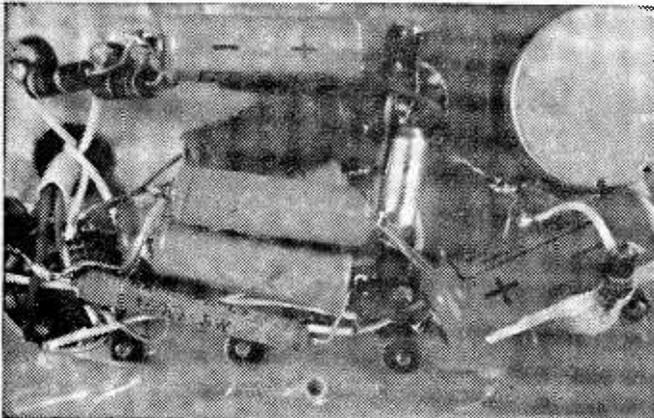


Fig. 2.—Theoretical circuit of a suitable mains unit for the amplifier.



Underside view.

former available to the constructor should be used. For a 3 Ω speaker, the transformer ratio should be as near to 40:1 as possible. For a speaker of 15 Ω impedance, the ratio should be about 15.5:1. The primary of the transformer should be rated at at least 40mA to avoid saturation of the core and subsequent distortion.

Construction

The prototype was built on a sheet of aluminium (16s.w.g.), size 7in. x 4in. This flat sheet was, in the writer's case, used to form one side of a wooden box. There is no reason, however, why a normal type of chassis should not be used. The

size of the chassis is really dependent on the size of the output transformer used. The wiring of the prototype tended to be a little cramped, and a larger chassis could be used with advantage.

Input connections are made via coaxial cable and a coaxial plug and socket. The output is taken via a socket strip and wander plugs. The power pack is built on a separate chassis to the amplifier, and power is fed into the amplifier by a flexible cable. A feature of the construction is a power output socket from which power can be taken to operate a feeder unit, etc. This socket can be of any type and its inclusion is, of course, entirely optional.

No particular precautions are necessary in building the amplifier. The grid and anode leads should be kept short, and the grid leads

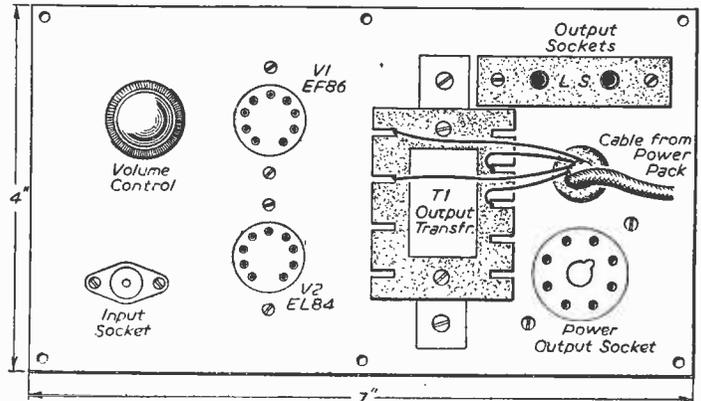


Fig. 3.—Chassis layout plan.

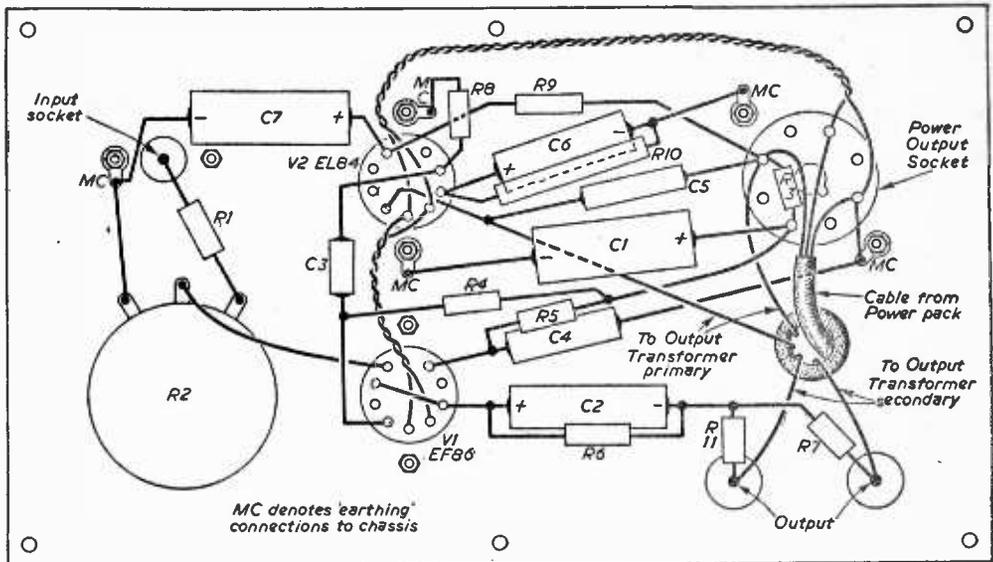


Fig. 4.—Wiring diagram of the amplifier.

should preferably be screened, particularly in the case of the EF86. Moulded or nylon loaded valveholders should be used in preference to paxolin types, as the latter tend to break down easily.

Oscillation

Owing to the types of valves used, no trouble should arise due to microphony or instability. If, on first switching on, the amplifier oscillates violently, switch off immediately, and reverse the connections to the secondary of the output transformer. This oscillation is caused by the application of positive instead of negative feedback.

The amplifier should never be operated without

a speaker being connected, as this will damage the output transformer, and possibly the output valve.

Component values are not particularly critical, though for preference, 10 per cent tolerance resistors should be used. All resistors are of $\frac{1}{4}$ W rating unless otherwise stated. The coupling condenser, C3, should be beyond question as regards leakage.

The input impedance of the amplifier is high, and therefore it should not be used with low impedance microphones, etc., unless a suitable matching transformer is also used.

In conclusion, this amplifier will be found to be very pleasing in its performance, and economical both to build and in its power requirements.

New Microscope Technique

THE basic technique for achieving the remote observation of images lies in the use of the image tube, but such tubes cannot work in the dynamic vacuum system of the electron microscope because the sensitive elements would be damaged by the residual vapour present.

Amorphous Selenium

In 1955, Dr. M. E. Haine, of A.E.I. Research Laboratories, proposed a system using amorphous selenium as the sensitive material. Amorphous selenium can be exposed to air without deleterious effects. Later Haine and his colleague P. A. Einstein built an experimental apparatus and showed that not only could an image converter tube be made to work within an electron microscope but, in addition, that a substantial degree of intensification could be obtained.

The operation of the intensifier relies on the increase in the conductivity of selenium with

electrons. The primary electron beam in the microscope falls on a layer of selenium supported on a thin plastic membrane, backed by a layer of evaporated aluminium held at positive potential. When the free surface of the selenium is scanned in a standard television raster from a low voltage electron gun, a signal appears on the backing layer which is proportional to the primary beam intensity at the position of the scanning spot. This signal is amplified and applied to a cathode ray tube scanning in synchronism. By this means the electron intensity image in the microscope is converted into a voltage signal which can be transmitted through a television system. The intensification of the image results from the fact that several thousand electrons are released inside the selenium film for every single high energy incident electron. Efficient collection of these electrons produces a signal of reasonable amplitude for further amplification.

*Practical Wireless***POCKET SUPERHET**

MOUNTING THE SPEAKER AND COMPLETE ALIGNMENT
DETAILS OF OUR LATEST BLUEPRINT RECEIVER

(Continued from page 611 of the November issue.)

FOUR $\frac{3}{16}$ in. 6B.A. countersunk headed bolts, with three nuts each, secure the speaker to the chassis. The heads of the bolts should lie nearly flush with the front of the speaker, or the back of the case will not fit. If the heads are very large, they should be filed down before inserting them. The holes in the speaker can also be countersunk slightly with a $\frac{3}{16}$ in. or similar metal drill. A washer will be required between speaker and the first nuts, or the nuts may not tighten completely.

A second nut is placed on each bolt, and adjusted so that the speaker will be 9mm above the level of the chassis. The four bolts are then threaded through the holes in the chassis, the output transformer, on its strip, is added, and the nuts are tightened.

A check should be made to see that no connections or bare joints

touch the speaker. The speech coil is then wired to the output transformer secondary. This is most readily achieved by soldering short lengths of thin flex to the speech coil tags before mounting the speaker. These may then be soldered to brown and purple tags of the transformer.

Testing the Receiver

If a meter is available, this can be included in one battery lead, when first connecting the battery. This will show if there are any short circuits, and

the circuit should be disconnected at once if the meter shows more than about 10mA.

The volume control must be rotated fully anti-clockwise to switch the set off, and a coloured dot may be painted to show this position. If the control is merely turned to minimum, the battery will still be on.

A current reading of approximately the value mentioned, and moderate volume from the local station, may be anticipated, and will show that wiring, etc., is correct. Full sensitivity and volume may then be expected when aerial, oscillator and I.F. circuits have been aligned. All these adjustments can be carried out with the set in its case, but a provisional check to see that the set is working properly is best made before fitting the chassis in place.

Alignment With Signal Generator

If a signal generator is available, adjust it to give a 465kc/s modulated output. The output lead of the generator is now coupled to the base lead of the 0C44 transistor. A direct connection is not normally required—it should suffice to hook an insulated lead from the generator round the insulated sleeving of the wire going from the 0.04 μ F condenser to transistor.

An insulated trimming tool which will engage with the slots in the adjustable cores should be made from a strip of paxolin at least $1\frac{1}{2}$ in. long. Wood is not suffi-

PRINCIPAL FEATURES

Six transistors and 1 diode in a superhet circuit

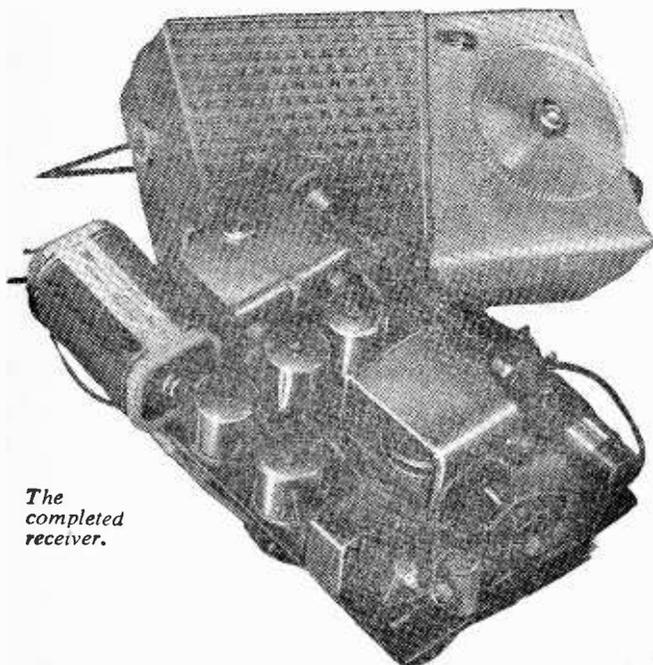
Long and medium Wavebands covered

Efficient AGC system

Long life battery

Professionally produced case available

Simple to align and operate



The completed receiver.

PRACTICAL WIRELESS CONSTRUCTOR'S GUIDE
WAVELENGTH-FREQUENCY CONVERSION TABLE

m.	kc/s.	m.	kc/s.
1	300,000	350	857.1
2	150,000	360	833.3
3	100,000	370	810.8
4	75,000	380	789.5
5	60,000	390	769.2
6	50,000	400	750
7	42,857	410	731.7
8	37,500	420	714.3
9	33,333	430	697.7
10	30,000	440	681.8
25	12,000	450	666.7
50	6,000	460	652.2
100	3,000	470	638.3
150	2,000	480	625
200	1,500	490	612.2
205	1,463	500	600
210	1,429	510	588.2
215	1,395	520	576.9
220	1,364	530	566
225	1,333	540	555.6
230	1,304	550	545.4
235	1,277	560	535.7
240	1,250	570	526.3
245	1,225	580	517.2
250	1,200	590	508.5
255	1,177	600	500
260	1,154	650	461.5
265	1,132	700	428.6
270	1,111	750	400
275	1,091	800	375
280	1,071	850	352.9
290	1,034	900	333.3
295	1,017	950	315.9
300	1,000	1,000	300
310	976.7	1,250	240
320	937.5	1,500	200
330	909.1	1,750	171.4
340	882.3	2,000	150

To convert kilocycles per second (kc/s.) to wavelengths in metres, divide 300,000 by the number of kc/s.

To convert wavelengths in metres to kc/s., divide 300,000 by the number of metres. One megacycle per second (Mc/s.) = 1,000,000 cycles per second. Thus 30,000 kc/s. = 30 Mc/s.

To make up the Constructor's Guide, detach the 8 extra pages and fold them along the line to the right of this page. Then, cut along the top of the book so formed to make up your 16 page Guide. If possible, you should staple the pages together at the fold.

Practical Wireless

CONSTRUCTOR'S GUIDE



- How to understand circuit diagrams
- Essential formulae and data including the colour code, Ohm's Law, etc.
- Hints on layout and construction

(Presented free with *Practical Wireless*, December, 1960)

PLEASE FOLD ALONG THE DOTTED LINE

PRACTICAL WIRELESS CONSTRUCTOR'S GUIDE
BBC M.W. AND L.W. WAVELENGTHS

Home Service

Wavelength	Frequency	Main Areas Served
434m	692kc/s	Lancashire, Yorkshire, Cheshire, Flint, Nottinghamshire, Derbyshire, Lincolnshire (Moorside Edge).
371m	809kc/s	Scotland (Westerglen, Burrehead, Redhous).
341m	881kc/s	Wales (Walsford, Penmon, Wrexham).
330m	908kc/s	London, S.E. England, Home Counties (Brookmans Park).
285m	1052kc/s	Cornwall, S. Devon, Dorset, Isle of Wight, S. Coast (Start Point).
276m	1088kc/s	Midland Counties and Norwich Area (Droitwich, Norwich).
261m	1151kc/s	(i) Northern Ireland (Lisnagarry, Londonderry); (ii) N.E. England, Scottish Borders (Stagslaw).
206m	1457kc/s	(i) Somerset, S. Gloucestershire (Cleveland); (ii) S. Hampshire, S. Wiltshire (Bartley).

Low-power transmitters have been brought into operation to provide a local service in certain areas not covered by the main stations. These are at Brighton, Bexhill, Redruth, and Folkestone (206m), Ramsgate and Barrow (202m), Cromer and Whitehaven (434m), Scarborough (261m), Barnstaple/Bideford (285m), Towyn (341m), and Dumfries (371m).

Light Programme

The main transmission comes from a high-power transmitter at Droitwich on 1500 m. (200kc/s) and is audible throughout the British Isles.

In addition, there is an auxiliary service on 247m (1214kc/s) having a restricted range, and serving: Moray Firth area of Scotland; Aberdeen; Edinburgh and Glasgow; parts of Northern Ireland; Tyneside; S. Lancashire and S.W. Yorkshire; London; Plymouth; Redruth, Cornwall.

Third Programme

464m (647kc/s)

(i) serving places up to about 100 miles from Daventry, Northamptonshire; (ii) local services in Aberdeen, Glasgow, Edinburgh, and Newcastle-on-Tyne.

194m (1546kc/s)

serving Belfast, Bourne-mouth, Brighton, Dundee, Exeter, Leeds, Liverpool, Portsmouth, Preston (Lancs.), Plymouth, Redruth, Southampton, Stockton, and Swansea.

PRACTICAL WIRELESS CONSTRUCTOR'S GUIDE

AMERICAN CONDENSER COLOUR CODE

All Values in pF ($\mu\mu\text{F}$)

Using the same colour code as on the previous page "C1" (below) will read:

Yellow, Mauve, Orange } = 47,000 pF—or—0.0047 μF
 4 7 000

with an assumed rating of 500V and a tolerance of 20%.

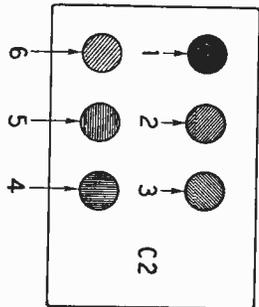
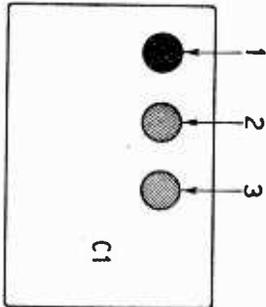
"C2" will read as follows:

First Row of Dots = First Three Figures.

Second Row of Dots = Number of Noughts, Tolerance, Voltage Rating (in order shown)

Value : Red, Red, Green, Yellow } = { 2,250,000 pF—or—2.25 μF .
 2 2 5 0000

Green } = $\pm 5\%$
 5
 Blue } = 600V
 6



CIRCULAR TYPE

USEFUL FORMULAE

Ohm's Law: $V = IR$ or $I = \frac{V}{R}$ or $R = \frac{V}{I}$

Power Dissipation: $W = IV = I^2R = \frac{V^2}{R}$

Resistors in Series: $R = R_1 + R_2 + R_3 + \dots + R_n$

Resistors in Parallel: $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}$

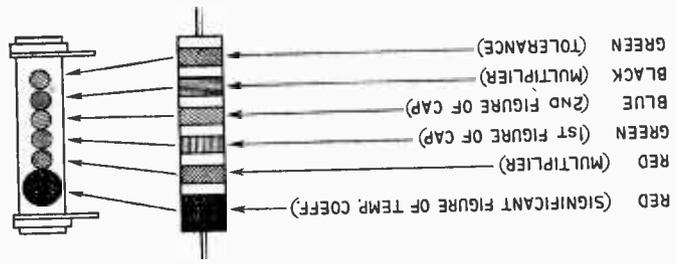
Capacitors in Parallel: $C = C_1 + C_2 + C_3 + \dots + C_n$

Capacitors in Series: $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots + \frac{1}{C_n}$

SIX BAND OR DOT CONDENSER COLOUR CODE

Colour	Temperature coeff.		Capacitance value	
	significant figure	value tol. *	multiplier	tolerance
Black	1.0	± 10%	10	± 20%
Brown	1.0	± 10%	10	± 10%
Red	1.0	± 10%	10	± 10%
Orange	1.5	± 0.25	10 ¹	± 2%
Yellow	3.3	± 0.35	10 ²	± 5%
Green	3.3	± 0.6	10 ³	± 10%
Blue	4.7	± 0.9	10 ⁴	± 10%
Violet	7.5	± 1.2	10 ⁵	± 10%
White	—	—	10 ⁶	± 10%

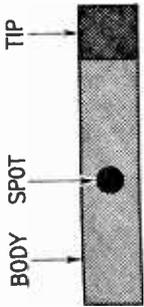
* or ± 40 parts per million per °C., whichever is the greater.



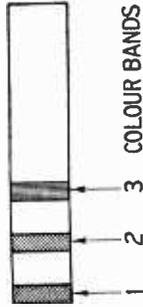
EXAMPLE OF APPLICATION OF SIX BAND OR DOT COLOUR CODE
Capacitor with Temperature Coefficient of -100 Parts per Million/°C., rated Capacitance 56 pF and Tolerance ±5%.

Stations	Frequencies (Mc/s)		Power (e.r.p.) kW (each programme)
	Light	Home	
Wrotham	89.1	93.5	120
Pontop Pike	88.5	92.9	60
Wenvoe	89.95	94.3 (Welsh) 92.125 (West)	120
Divis	90.1	92.3	60
Melrum	88.7	90.9	60
North Hessary Tor	88.1	90.3	60
Sutton Coldfield	88.3	90.5	120
Norwich	89.7	91.9	120
Blaen-plwyf	88.7	90.9	60
Holme Moss	89.3	91.5	120
Rowridge	88.5	90.7	60
Kirk o'Shotts	89.9	92.1	120
Sandale	88.1	90.3	120
Llandona (Anglesey)	89.6	91.8	3.9*
Llangollen (N. Wales)	88.9	91.1	6
Rosemarkie	89.6	91.8	6
Isle of Man (Douglas)	88.4	90.6	6
Orkney (1)	89.3	91.5	6
Thrumster (2)	90.1	92.3	6
Peterborough (2)	90.1	92.3	1-20*
Dover (3)	90.1	92.3	1-20*

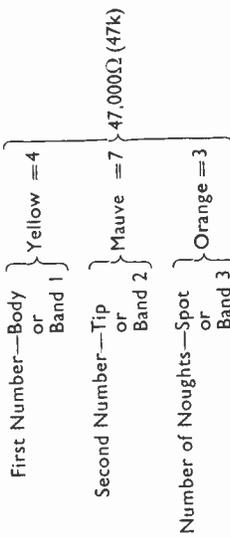
(1) Temporarily, Home only.
(2) Under construction.
(3) Projected.
* Directional aerial system.



- 0. Black
- 1. Brown
- 2. Red
- 3. Orange
- 4. Yellow
- 5. Green
- 6. Blue
- 7. Mauve
- 8. Grey
- 9. White



COLOUR BANDS



- A Gold Band at the extreme end indicates ±5% tolerance
- A Silver Band at the extreme end indicates ±10% tolerance
- No Band at the extreme end indicates ±20% tolerance
- A Salmon Pink Band indicates high stability

LAYOUT AND CONSTRUCTION

The material most often used for chassis is sheet aluminium or sometimes paxolin. Before securing components, fit them on to the drilled chassis to ensure that holds, connecting tags, etc., match one another. All components should be mounted close to the chassis and positioned so that any wiring is as short and direct as possible. The valves must always be placed into their holders only after all other construction is completed. Whenever possible, transistors should be mounted in sockets, but, where soldering is essential, a thermal shunt should be employed to prevent damage to the component.

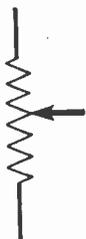
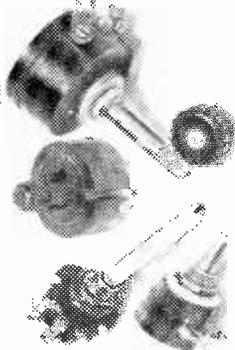
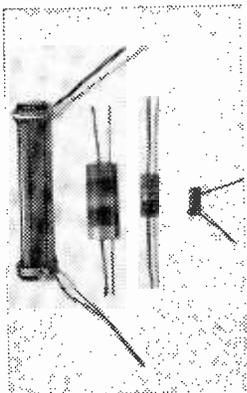
Always use cored solder (such as "Ercin Multicores"), containing a non-corrosive flux for making joints, and tin the soldering iron before commencing work. Where necessary, clean wires and tags, etc., otherwise "dry" joints will result. When soldering try to heat the surfaces to be joined and allow the solder to flow over them rather than carry it to the joint with the iron and thus lose the benefit of the flux.

PICTORIAL CIRCUIT GUIDE

THIS booklet has been designed to provide a useful source of information for amateur radio constructors. So that it may be of use to the beginner as well as the more advanced experimenter, this section has been especially compiled by members of our technical staff. The following pages contain illustrations of many radio components side-by-side with their circuit symbols thus making the interpretation of circuit diagrams easier.



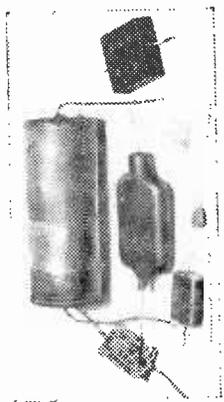
Fixed resistors.

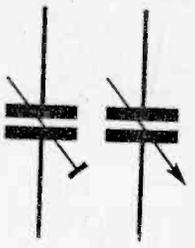


Variable resistors (potentiometers).

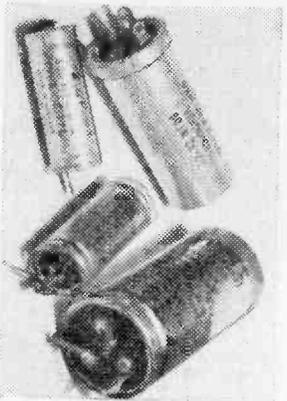
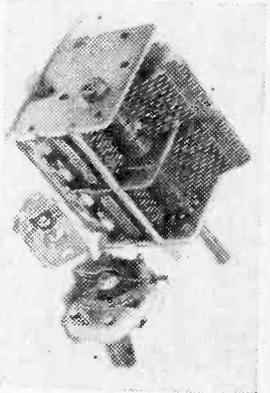


Capacitors (condensers).

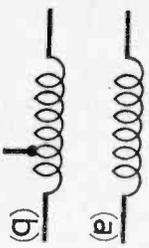




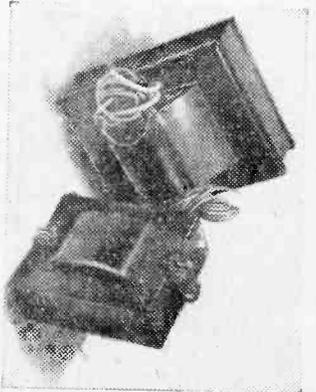
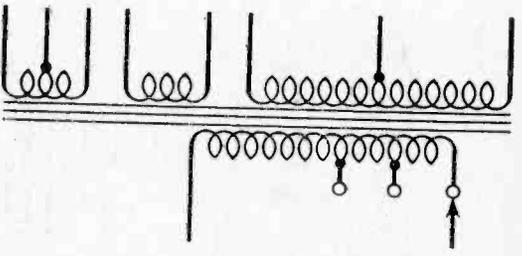
Variable capacitors—Trimmers and other pre-set capacitors are shown by a "hammer-head" instead of an "arrow-head".



Electrolytic capacitors—note the markings indicating polarity.



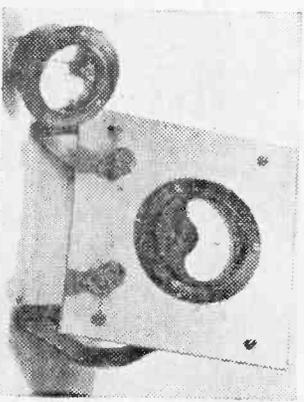
Air-cored coils or chokes—
(a) a single coil and
(b) a tapped coil.



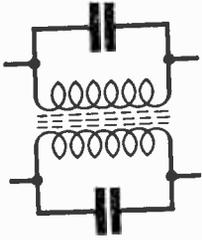
Typical mains transformers—used in the power supply sections of receivers and amplifiers.



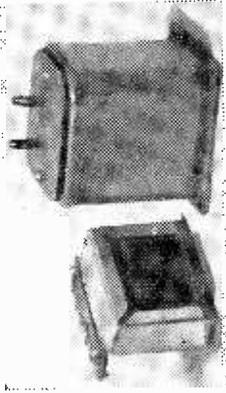
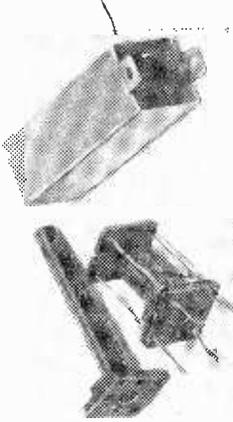
Simple meters—those used for servicing may have many refinements.



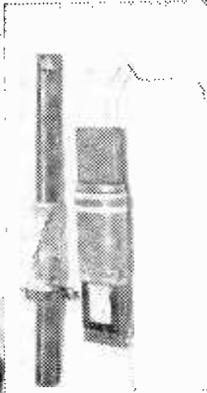
Do not forget that in *Practical Wireless* each month there are valuable articles on constructing receivers, amplifiers, etc.—all the information needed for you to build your own circuits is given. We are prepared to help you by post in your problems but you must comply with the rules of our query service and send a stamped addressed envelope and a query coupon from the current issue.



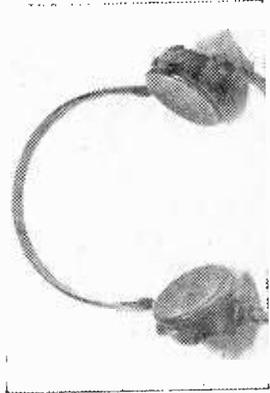
An I.F. transformer. Where trimmers are used they replace the fixed capacitors shown.



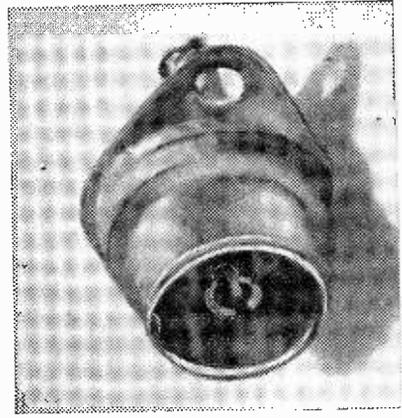
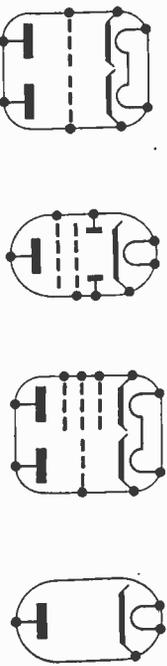
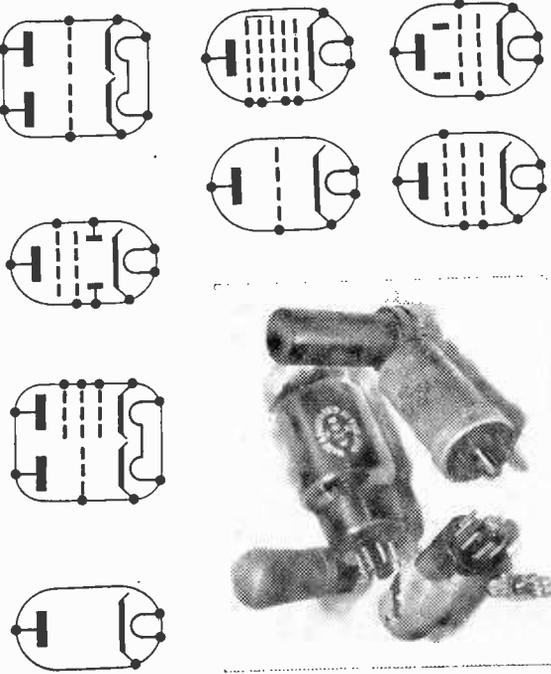
Iron-cored chokes—often for power circuits.



Ferrite aerials or iron-dust-cored coils.



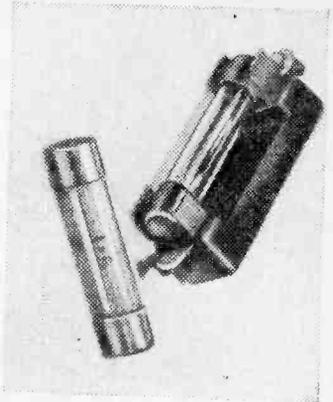
Headphones.



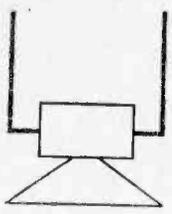
Valves commonly used in radio—ranging from diodes to pentodes and dual valves.



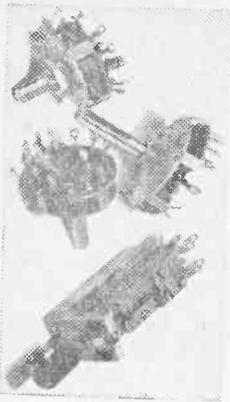
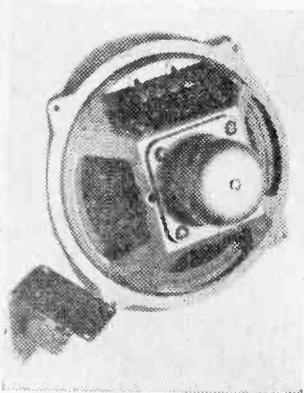
Coaxial sockets—used in audio circuits where screened wiring is essential.



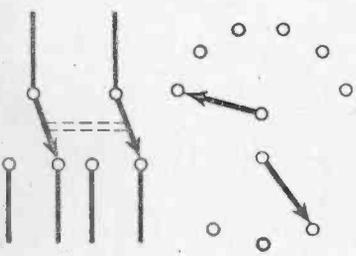
Fuse—used in power supply circuits.



Loudspeakers.



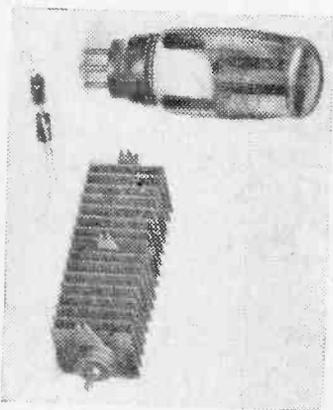
Switches—single- and multi-pole.



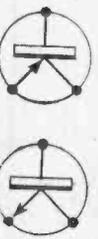
Cell.



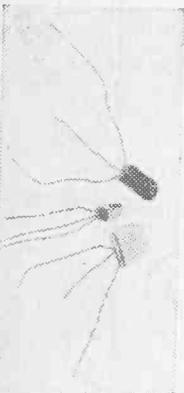
Battery.



Valve and metal rectifiers.



p-n-p Transistors. n-p-n



ciently strong. The paxolin is carefully filed until it fits the core slots properly.

Transformer Adjustment

The three I.F. transformers should now be adjusted for maximum volume. If this is done by ear keep volume down by reducing the coupling between generator and transistor base circuit. The audio volume control should be left at maximum, the aim being to avoid a large output from the diode, which would provide a large AVC voltage, and make critical adjustment difficult. If, however, a meter has been included in the battery circuit, as mentioned, core adjustments should be directed towards obtaining the maximum current reading, which indicates maximum signal strength. Once the I.F. cores have been peaked for maximum gain, they are not altered.

The lead from the generator should then be placed a little distance from the rod aerial, this being adjusted, according to generator output, etc., for convenient signal strength.

The switch is set to short out the L.W. portion of the aerial, and the oscillator coil core, oscillator trimmer, and aerial coil position are adjusted for optimum results. As there is no aerial coil trimmer, it is necessary to balance the oscillator coil trimmer against stray capacity and the aerial inductance. The latter is modified by the position of the winding on the rod, this effect being most obvious at higher wavelengths.

With a signal of about 225m adjust the oscillator trimmer and tuning dial simultaneously for best volume. Then use a signal of about 500m and

adjust the oscillator coil core, and position of the M.W. winding on the rod, for best results. When this has been repeated, good reception should be obtained over the M.W. band. If it is found that the M.W. winding needs to be slipped far off the rod, for best volume at a high wave length, unscrew the oscillator trimmer and core a turn or two, and repeat the procedure.

To align the L.W. band, screw down the L.W. trimmer for maximum sensitivity near the low wavelength end of the band, and adjust the position of the winding on the rod at a high wavelength. Or merely adjust for optimum reception of the 1500m Light Programme.

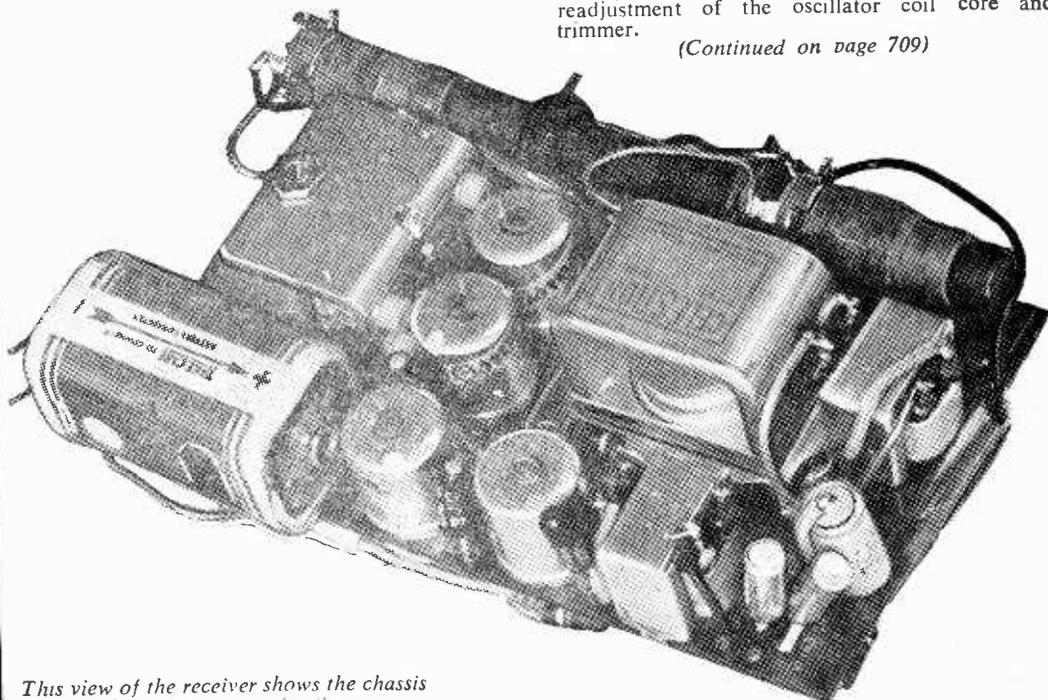
Without a Generator

If no generator is available, tune in a local station and peak the I.F. cores for maximum volume, as already explained. Care is necessary—half a turn of a core either way can easily reduce volume to a small part of that obtainable with correct adjustment.

The aerial and oscillator circuits should then be dealt with as explained, but actual stations are tuned in instead of the signal generator output. As alignment approaches that which gives best reception, sensitivity will increase, and weak stations should then be chosen.

When adjustment is finished, a spot of adhesive should be used to hold the windings in position on the aerial rod. Slight changes, such as caused by inserting or removing the receiver from its case, or moving the aerial and other internal connections, will have some effect on sensitivity, but can usually be ignored, or compensated for by slight readjustment of the oscillator coil core and trimmer.

(Continued on page 709)



This view of the receiver shows the chassis layout in some detail.

A Reliable Radiogram

AN ECONOMICAL AND EFFICIENT ARRANGEMENT

By A. Sydenham

NOWADAYS, when many new and attractive blank cabinets are available at reasonable cost it becomes possible to construct elegantly housed equipment of a kind only available commercially to those in a high income bracket. Much home construction equipment is of a superior variety but because it often does not have an attractive cabinet, it is not presentable when completed. This radiogram will be considered presentable by most people and, furthermore, is efficient in every way. It also remains comparatively cheap to construct.

Variations in Design

The whole equipment comprises an amplifier, a power pack, a 4-speed auto-changer gram unit and a superhet A.M. radio tuner, all of which are built into one of the Nordyck equipment cabinets, these being easily obtainable. The loudspeaker—a 10in. unit—is separately housed, though if desired, a speaker could be built in with the items detailed

above—one of the elliptical types operating through an aperture cut in the side of the cabinet. Alternatively, two such speakers could be used, one at each side. The possibilities are varied and interesting although the use of a separately housed speaker is preferable. The makers of the cabinet do supply, where required, a speaker cabinet that matches the equipment cabinet and as the size of both is identical, two mounting positions are thus made possible, viz, one above the other or side by side. In this case, however, an inexpensive cabinet was home-constructed to contain an existing unit and brief details of this will be given later.

When the equipment cabinet is purchased it will be undrilled, containing only a motor board that can be placed at two different heights depending upon the type of gram unit used. In the radiogram illustrated the auto-changer is fitted, not centrally on the motor board, but to the right and owing to the height of the record control arm the motor board is placed on the lower

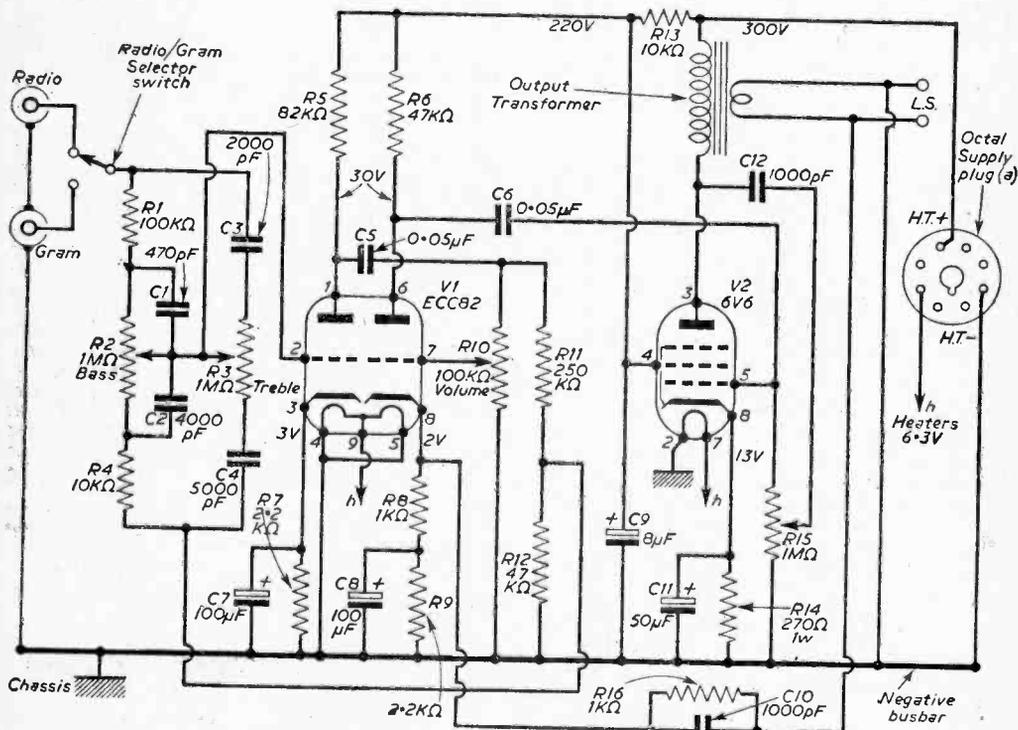


Fig. 1.—Circuit diagram of the amplifier.

of the two slots so that the lid can close properly. Mounting the gram unit in this way makes available enough space for the radio tuner unit which is positioned *above* the motor board instead of in the compartment housing the remainder of the equipment. The radio panel is thus some $4\frac{1}{2}$ in. higher than the turntable and permits the fixture of a pigmy bulb (of the type suitable for mains voltage) for illuminating the player deck.

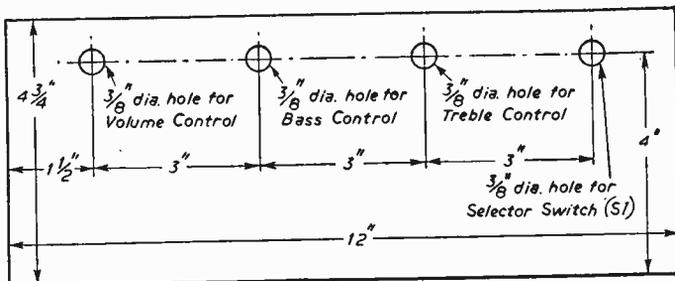


Fig. 3.—Details of the amplifier front panel.

The Amplifier Section

The circuit diagram of this section is illustrated in Fig. 1. In the average size room, the need for full rotation of the volume control never arises with this amplifier owing to the large output it affords. Distortion is low until the volume control reaches approximately three-quarters travel, but by then more than enough volume is experienced.

Owing to the wide range tone controls network VI(a) provides very little gain, but this is not important as VI(b) and V2 are sufficient. Note that part of the output from VI(a) is fed back to improve the response. Feedback is also taken from the secondary winding of the output transformer—which should be a good quality component—via R16, C10, etc., these values being used in conjunction with a 3Ω speech coil. The potentiometer, R15 (which is a pre-set type in the original amplifier) is not really essential and may be omitted together with C12 if desired, but if this is done, a 500k resistor should be connected from pin 5 of V2 to the negative bus-bar.

Smoothing

No hum is audible in the prototype owing to adequate smoothing of the H.T. supply and the fact that only a single connection is made to the

chassis at the input sockets. The power supply leads are plaited together and terminated in a plug that fits one of the international octal valve sockets on the power pack. This plug, together with the one required for the radio tuner, were made from the bases of discarded octal valves.

The layout above chassis is illustrated in Fig. 2, while in Fig. 3 the front panel that is bolted to this chassis is shown. This panel was made from a piece of ebonite, but plywood would do since it is not visible when the amplifier is in position. The purpose of it is merely to raise the four controls sufficiently to give the front of the cabinet a pleasing appearance. The decoupling capacitor, C9, is mounted under the chassis and is a wire-ended component.

The Tuner Section

Although this section is comparatively simple (see Fig. 4) one or two unusual features are included. For high sensitivity and good selectivity a superhet is used, designed in such a way that the output is comparable with that provided by the gram unit. Switched tuning is used, and as the Light programme is not satisfactorily received on the medium waveband at this location, long waveband coils have had to be incorporated, viz. L2 and L4. On the medium waveband the following arrangement is employed: the tuner is adjusted to receive the local Home Service transmission by means of L1, L3 and associated trimmers, C3 (which is a panel control) being set to approximately half capacity. Then, by rotating C3 slightly at the appropriate time during the evening it is possible to correct tuning or receive other stations.

Several advantages result from using a tuner that

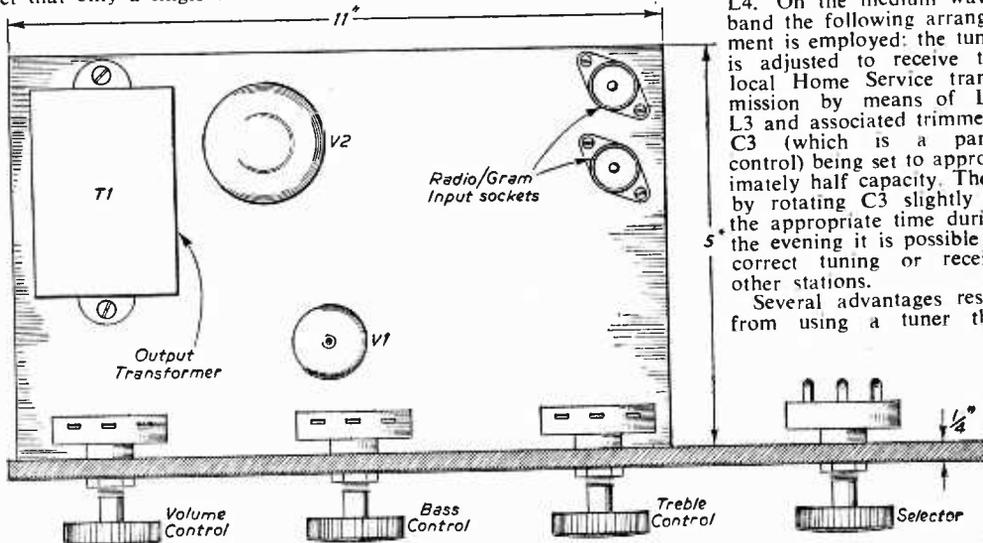


Fig. 2.—Above-chassis layout of the amplifier.

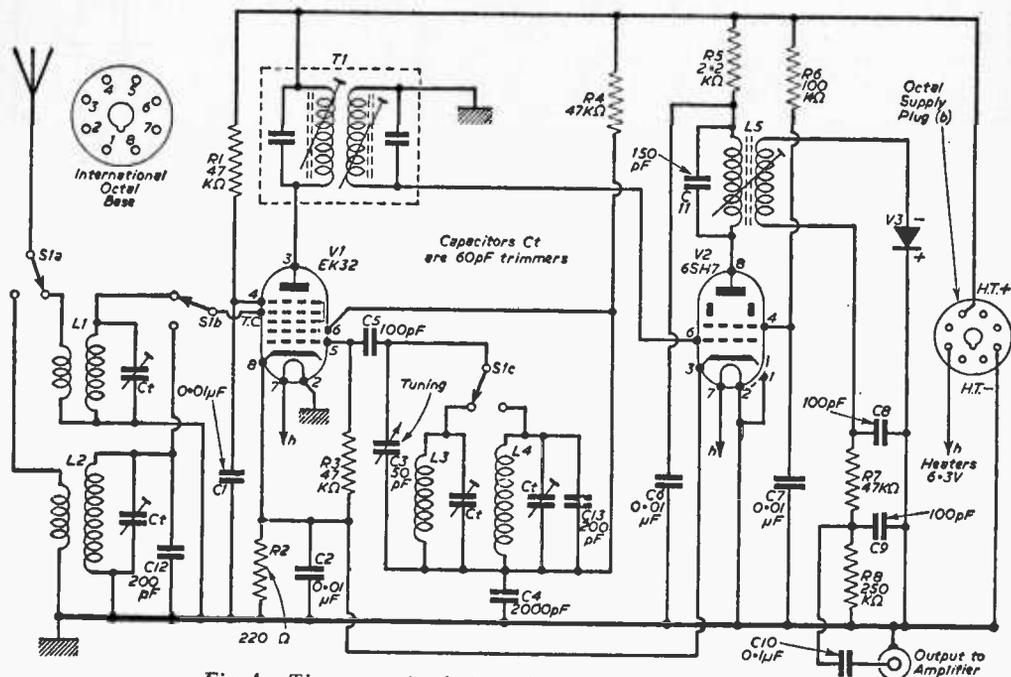


Fig. 4.—The tuner circuit (superhet, switched, pre-set type).

is switch-tuned, one of which is that no twin gang tuning capacitor is needed, thus making station selection easy. Secondly, padding problems do not arise, and, thirdly, the use of coils of differing makes and design can be utilized if desired since they do not need to be matched.

Automatic volume control is not really essential and has been omitted here, which means that a short grid based valve can be used as the intermediate frequency amplifier. All this simplifies matters and keeps down the cost considerably.

A disadvantage of switched tuning, however, is that full output might not result should the local oscillator drift off frequency after a period of running, but, owing to the inclusion of C3 no such trouble is encountered in this arrangement. A further disadvantage is that the choice of programme is limited, but in the prototype S1 is a 6-way switch so that at a later date other transmissions can be received.

The I.F. is 470kc/s, and only a single I.F. transformer is employed, V2 feeding into a long

LIST OF COMPONENTS FOR THE TUNER

Chassis—8½ in. x 4½ in. x 1½ in. Panel—14½ in. x 4½ in. x ½ in.

Two I.O. valve bases. One I.O. plug. One coaxial plug.

V1—EK32. V2—6SH7. V3—Germanium Crystal Diode. Two control knobs.

One tag strip (4 plus earth). Aerial/earth socket strip.

Wavechange switch—two-bank type (see text). T1—465kc/s I.F.T.

Capacitors: C1, 2, 6, 7—0.01µF 350VW. C3—50pF trimmer (see text), C4—2,000pF, C5, 8, 9—100pF, mica C10—0.1µF 350VW, C11—150pF, C12, 13—200pF (only required when long waveband coils are used for 12, 14), Ct—60pF trimmers.

Resistors: R1, 3, 4, 7—47k. R2—220Ω, R5—2.2k. R6—100k. R8—250k.

Coils: L1, PA2. L2, PA1. L3, PO2. L4, PO1. L5—QA12. (All "Osmor.")

LIST OF COMPONENTS FOR THE AMPLIFIER

Chassis 8 in. x 5 in. x 2 in. Panel 12 in. x 4½ in. I.O. valve base.

One B9A valve base. Four engraved control knobs. Output transformer.

Two surface-mounting coaxial sockets. One I.O. plug.

V1—ECC82. V2—6V6. S1—1-pole, 2-way selector switch.

Capacitors: C1—470pF, C2—4,000pF, C3—2,000pF, C4—5,000pF, C5, 6—0.05µF, C7, 8—100µF, 6 VW (electrolytic), C9—8µF 350VW (electrolytic), C10, 12—1,000pF, C11—50µF 25VW (electrolytic).

Resistors: R1—100k. R2, 3—1M potentiometers, R4—10k, R5—82k, R6, 12—47k, R7, 9—2.2k, R8, 16—1k, R10—100k potentiometer and switch, R11—250k, R13—10k, R14—270Ω, 1W, R15—1M potentiometer (see text).

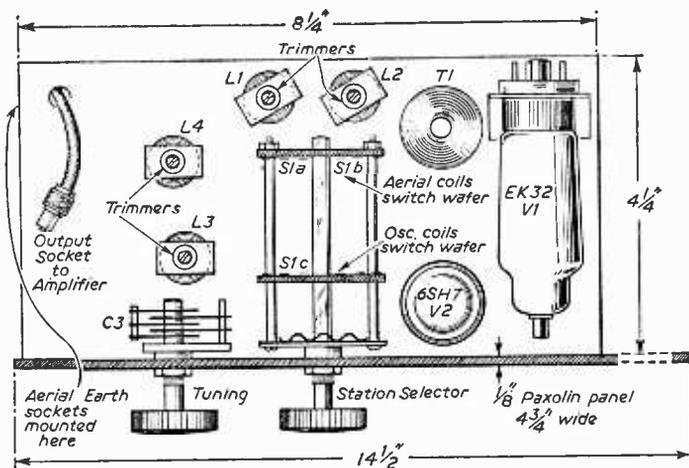


Fig. 5(a).—Layout of the main components on the tuner chassis.

waveband coil, the main winding of which feeds V3. The normal primary winding is tuned to the I.F. and connects to the anode of V2. No experience with coils other than the one specified for L5 is to hand and results might not be satisfactory if an alternative make is used.

In order that the tuner will fit into the space available, V1 is laid on its side on the chassis, but it will be observed that when in position in the cabinet, this valve is upright since the rear flange of the tuner chassis rests on the motor board. The layout and positioning of the main components is shown in Fig. 5 together with all necessary dimensions.

The Power Pack

This section is quite conventional and requires little comment. Only a single heater winding exists on the mains transformer used in the prototype, thus confining the choice of valve for V1 since a type with a separate cathode is essential. If a transformer with a separate rectifier heater

winding is available so much the better. Owing to the height of T1, the power pack was built on a flat piece of plywood and, as there are no items that need to be mounted under the chassis, this is quite satisfactory. Two "L"-shaped brackets need to be made from 16s.w.g. aluminium for retaining the power output sockets, which are, in fact, octal valve bases.

Setting Up

Except for the tuner section, setting up consists merely of sliding the chassis into the main cabinet after routine tests have been made for H.T. shorts, etc., and inserting the various power and signal supply plugs into their respective sockets. Coaxial cable is suitable for the signal leads,

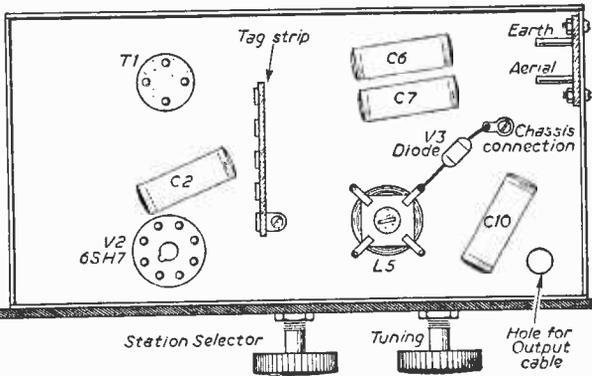


Fig. 5(b).—Under-chassis layout.

one length being required for the gram to the amplifier and another from the tuner to the amplifier. (To be continued)

POCKET SUPERHET

(Continued from page 705)

Fitting in the Case

A piece of thin card or similar material is cut to fit over the speaker grating, and has a round hole to match the speaker cone. Three 6B.A. bolts hold the set in the case. The mouldings in the case can be tapped to receive these. Alternatively, a 6B.A. bolt with a notch filed in it may be used for tapping, if this is done carefully.

A 6B.A. bolt, with washer under its head, secures the tuning dial to the condenser spindle, which is tapped to receive the bolt. A spacing bush about 1/16 in. long is placed between dial and condenser.

The cheapest and most economical battery supply will be obtained by wiring four U16 cells

in series to make a 6V battery. This will be approximately 3/4 in. x 3/4 in. x 1 1/2 in overall. It is not essential to use this voltage, though the circuit is intended for 6V and a larger battery will not necessarily improve reception. In no circumstance must more than 9V be used.

To prevent contact between the end of the battery and the can of the second I.F. transformer insulating tape should be applied to the transformer can. The lower tags of the tuning condenser are bent up to clear the battery. The largest battery which can be accommodated is the PP4. Smaller 9V batteries may also be fitted. **Transistors may be permanently damaged by connecting a battery in the wrong polarity.**

Coloured spots of enamel may be used to identify switch positions. If electrolytic condensers with bare metal cases are used, these should be covered with thin insulation, such as adhesive tape, before wiring them in.

PRE-SET TUNING FOR FIVE SHILLINGS

A SIMPLE MODIFICATION WHICH ANYONE CAN CARRY OUT

By E. L. Higgs

TWO pre-set stations can be added to an AM radio simply by fitting three inexpensive parts, giving instant selection of any two medium wave stations. No alteration of the original circuit is necessary and it takes a very short time to complete.

Set the tuning control to the required medium wave station that is highest in frequency and switch

on the tuning gang. These leads should be sleeved 16s.w.g. wire. Solder the leads from the switch tags to those of the "live" tuning gang, and the earth lead from the common pair of pre-set connections to an earth point on the radio chassis; near or on the gang frame is best.

Use of the Switch

Switch on the radio and tune to the station you require as a highest frequency of the preset pair, on the medium wave. Turn the new station switch "On." when the tuning of the first station will go. At this point adjust the new pre-set trimmer that has been connected across the local oscillator section of the gang until the second of the required stations comes in. Once tuned the other R.F. pre-set capacitor can be adjusted for a maximum sensitivity or volume. Now switching the new switch up or off will tune immediately to the first station.

There may be some hand capacity and de-tuning effects when the switch unit is moved to its fixing position, and these can be finally trimmed up with a filed knitting needle afterwards. When using the radio to receive other stations put the switch into the "off" position and tune manually as before. The effect of the modification on the radio is to shift slightly the stations down the scale of the medium wave. This effect is negligible on the long wave, but the short wave is thrown out a lot.

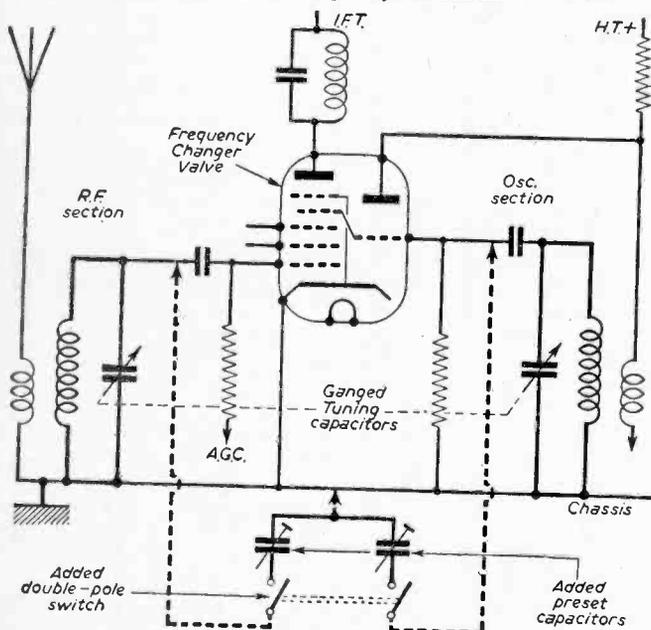


Fig. 1.—Circuit arrangement.

across each section of the variable tuning condenser, a pre-set capacitor which tunes the R.F. and oscillator to the new lower frequency (Fig. 1).

Components

Only three connections to the variable tuning condenser are made, and the parts needed are a double pole toggle switch, pre-set compression capacitors of 500pF, and a few inches of stiff wire.

The simple assembly shown in Fig. 2 should now be connected. Use the stiff connecting wire as short as possible making a rigid, compact unit. If the body of the reader's switch is metal then it is advisable to cover it with adhesive PVC tape.

Assembly

Decide where the switch is to be located. Cut the leads just long enough to reach the terminals

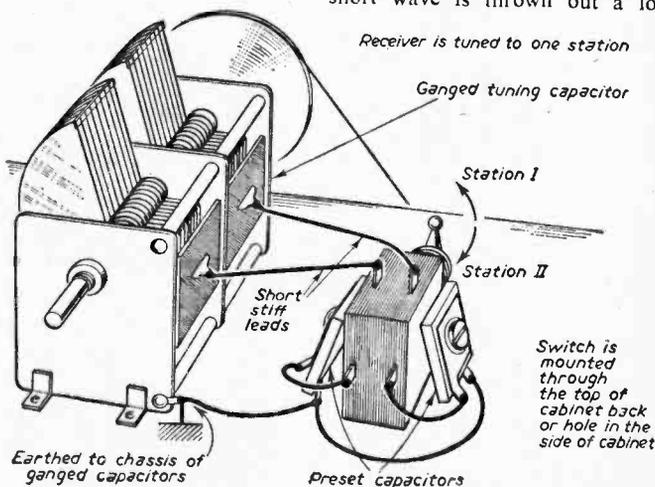


Fig. 2.—Practical interpretation.



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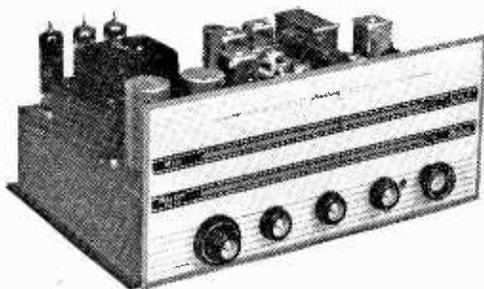
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Current and Voltage Feeds

SOME CURRENT DIFFICULTIES EXPLAINED

By B. Sexton

THE terms "current fed" and "voltage fed" occur frequently in circuit descriptions. A thermionic valve is normally considered as voltage operated whereas a transistor is current operated.

Whether the feed is voltage or current depends upon the output impedance of the source supplying the device and the input impedance of the device.

Fig. 1 shows a constant voltage circuit. Assume the source voltage is 3V. If R_S the source or output impedance, is 10k and R_L 50k then the current is $3/60\text{mA} = 0.05\text{mA}$ and the voltage across $R_L = 2.5$.

Now suppose R_L is increased by 50 per cent to 75k. The current is now $3/85\text{mA} = 0.0353\text{mA}$ and the voltage across R_L becomes 2.65 which is an increase of $(0.15/2.5) \times 100 = 6$ per cent.

If the original value of R_L is decreased by 50 per cent to 25k then the current becomes $3/35\text{mA} = 0.0857\text{mA}$ and the voltage across R_L is 2.14. This represents a percentage decrease on the original value of $(0.36/2.5) \times 100 = 14.4$ per cent.

Thus the (± 50) per cent variation of the load resistor has only varied the voltage across the load from (+6) per cent to (-14.4) per cent. Compared with the resistance variation the voltage variation is small. The voltage can be regarded as constant and the load is voltage fed.

Now consider how the current through the load has varied. The current was originally 0.05mA.

In this case a constant current of 0.06mA is assumed to flow to R_S and R_L in parallel. A current of 0.05mA will flow through R_L and 0.01mA through R_S .

To make a more direct comparison with Fig. 1, the circuit of Fig. 2, although unconventional, will be used. The current through R_L can be calculated as 0.05mA. If R_L is increased by 50 per cent to 75k the current becomes $(15/325\text{mA}) = 0.046\text{mA}$.

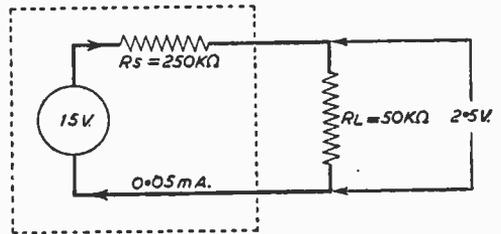


Fig. 2.—Circuit of a constant current source.

This is a percentage decrease of $(0.004/0.05) \times 100 = 8$ per cent. Now if R_L is decreased by 50 per cent to 25k the current becomes $(15/275\text{mA}) = 0.0545\text{mA}$, a percentage increase of $(0.0045/0.05) \times 100 = 9$ per cent.

Thus a variation of (± 50) per cent of R_L has only varied the current by (+9) per cent and (-8) per cent. The current can be regarded as constant and the load is current fed.

It should be noted that the voltage, across the load, has varied considerably. Increasing R_L by 50 per cent gives a voltage of 3.45, a percentage increase of $(0.95/2.5) \times 100 = 38$ per cent. Decreasing R_L by 50 per cent gives a voltage drop of 1.36 or a percentage decrease of $(1.14/2.5) \times 100 = 45.5$ per cent.

Thus comparing Fig. 1 and Fig. 2 it can be seen that the effect of the variation of R_L depends upon the ratio of R_S/R_L .

To obtain a constant voltage across the load the ratio of R_S/R_L must be low, as in Fig. 1. To obtain a constant current the ratio R_S/R_L must be high as in Fig. 2.

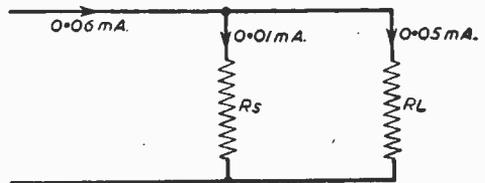


Fig. 3.—Compare this circuit with Figs. 1 and 2.

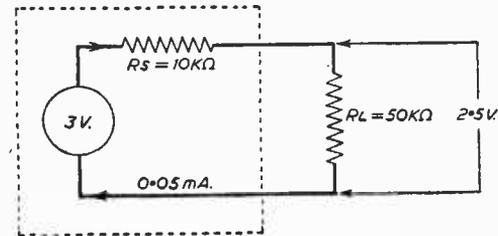


Fig. 1.—Circuit of a constant voltage source.

When R_L was increased by 50 per cent the current decreased to 0.0352mA which represents on the original value a percentage decrease of $(0.148/0.05) \times 100 = 29.6$ per cent

When R_L was decreased by 50 per cent the current increased to 0.0857mA or a percentage increase of $(0.0357/0.05) \times 100 = 71.5$ per cent. Thus the current is by no means constant.

If a constant current through the load is required a different arrangement must be used as in Fig. 2. This can be considered, as far as R_L is concerned, as a constant current source.

Some readers may be more familiar with "constant current generator" circuit as shown in Fig. 3.

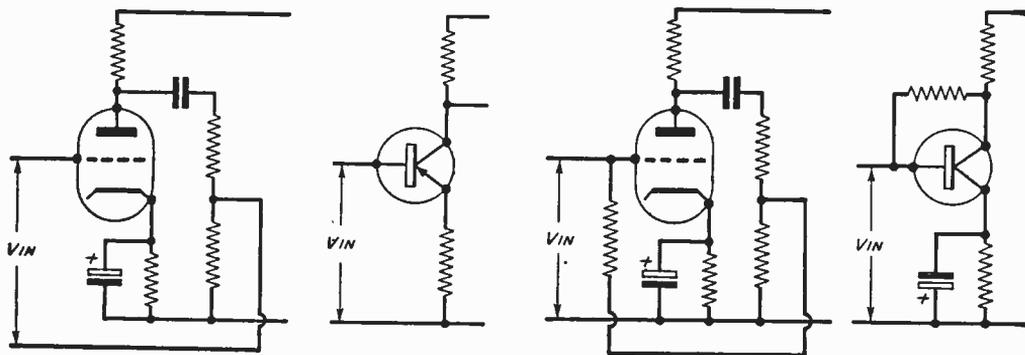


Fig. 4.—(left) Series feeds, and (right) parallel feeds.

Negative Feedback

With valves and transistors R_S and R_L can be modified by the use of negative feedback. R_S is the output impedance and R_L will depend upon the input impedance of the following stage.

The feedback voltage can be proportional to the output current (current feedback) or proportional to the output voltage (voltage feedback). The effect on the output resistance depends upon the type of feedback. Current feedback will increase the output impedance, i.e., tend to keep the output current constant. Voltage feedback will decrease the output impedance, i.e., tend to keep the output voltage constant.

The effect on the input impedance does not depend on whether the feedback is current or voltage but whether it is connected in series or parallel with the signal input voltage. If connected in series it will increase the input impedance, i.e., the required condition for voltage feeding. If connected in parallel it reduces the input impedance which is the required condition for current feeding.

Examples of various types of feedback applied to transistors and valves are illustrated in Fig. 4.

Measurement of Input and Output Impedance

Assuming the measurement is made at low frequencies and the impedance is resistive the simplest method is shown in Fig. 5. A voltmeter (V) is placed across the output terminals with the source off load. V should be of such high resistance that it can be considered to read the true off-load voltage, i.e., it must draw a negligible current from the source. A resistor is then placed across the output terminals, the resultant current will then cause the voltmeter reading to decrease owing to the internal voltage drop across R_S .

R is then varied until the voltmeter reading has dropped to half the original value. This then means that the load resistor is equal to R_S and thus R_S is known.

If the output impedance of a voltage source is being measured it will be remembered that the load resistor is large with respect to R_S . If the load resistor is made equal to R_S it will mean that a relatively heavy current is drawn from the source. This is to be avoided. The best method in this

case is to cause the off-load voltage to fall by a fraction, say $1/10$ or 10 per cent. Then:—

$$R_L / (R_S + R_L) = 0.9.$$

$$\text{Therefore, } R_L = 0.9 (R_S + R_L),$$

$$0.1 R_L = 0.9 R_S,$$

Therefore, $R_S = R_L/9$, i.e., R_S would then be a ninth of the resistor value found to decrease the off-load voltage by 10 per cent.

If the source impedance is known, the preceding method can be used to measure input impedance. The off-load voltage of the source must be measured and the percentage drop calculated as it is placed on load across the input terminals of the device being measured. Assume that the voltage drops by $1/20$ or 5 per cent. This means that the input impedance is high compared with the source impedance. We can calculate as below (letting R_L = input impedance); $R_L / (R_S + R_L) = 19/20$.

$$\text{Therefore, } R_L = 19(R_S + R_L)/20,$$

$$R_L/20 = 19R_S/20,$$

$$\text{Therefore } R_L = 19R_S.$$

Thus the input impedance is 19 times the source impedance.

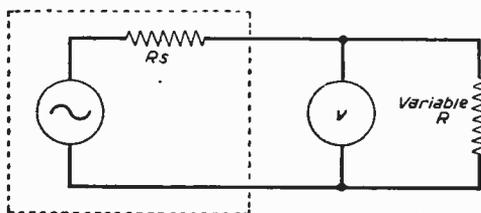


Fig. 5.—Measuring input and output impedances.

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From 40, 200, 500, 1,000, 2,000, 5,000, 10,000, 20,000, 50,000, 100,000, 200,000, 500,000, 1,000,000, 2,000,000, 5,000,000, 10,000,000, 20,000,000, 50,000,000, 100,000,000, 200,000,000, 500,000,000, 1,000,000,000, 2,000,000,000, 5,000,000,000, 10,000,000,000, 20,000,000,000, 50,000,000,000, 100,000,000,000, 200,000,000,000, 500,000,000,000, 1,000,000,000,000, 2,000,000,000,000, 5,000,000,000,000, 10,000,000,000,000, 20,000,000,000,000, 50,000,000,000,000, 100,000,000,000,000, 200,000,000,000,000, 500,000,000,000,000, 1,000,000,000,000,000, 2,000,000,000,000,000, 5,000,000,000,000,000, 10,000,000,000,000,000, 20,000,000,000,000,000, 50,000,000,000,000,000, 100,000,000,000,000,000, 200,000,000,000,000,000, 500,000,000,000,000,000, 1,000,000,000,000,000,000, 2,000,000,000,000,000,000, 5,000,000,000,000,000,000, 10,000,000,000,000,000,000, 20,000,000,000,000,000,000, 50,000,000,000,000,000,000, 100,000,000,000,000,000,000, 200,000,000,000,000,000,000, 500,000,000,000,000,000,000, 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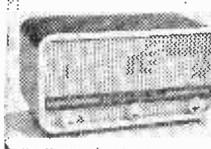
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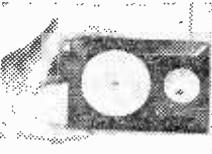


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A Midget T.R.F. Receiver

By J. Smith

(Continued from page 607, November issue)

the trimmers to 1500kc/s, the addition of 100pF will shift the resonant frequency to about 1000kc/s, while another 100pF will take it to 850kc/s. The operation must then be repeated for the second medium wave position. For the light programme with the switch in the third (long wave) position, 250pF will usually be correct for C6 and C14.

Modulation Hum

It may be found that as the circuits are tuned to resonance on a transmission, a prominent hum appears. This is modulation hum and is due to R.F. currents circulating in the A.C. mains. The usual remedy is to use a mains transformer with a screened primary winding but transformers of the type specified for this receiver are often not so fitted. If modulation hum is found, it may be eliminated by connecting two 0.01μF

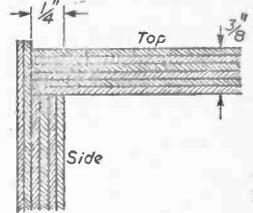
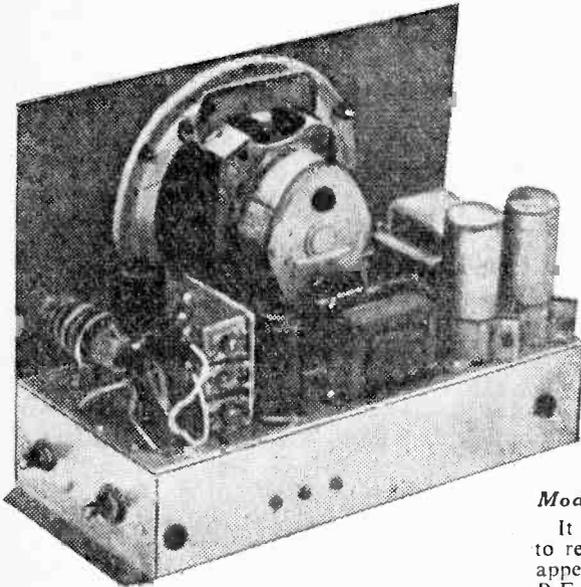


Fig. 6. — The rebated corner joint for the cabinet. Note the slight projection to allow for sanding-off.

capacitors across the transformer primary and earthing the centre tap as shown in Fig. 1. The capacitors should be high voltage ceramics as used for the suppression of interference from domestic electrical apparatus.

Cabinet

The best home-built receiver will be viewed with disfavour about the house if insufficient attention has been paid to its appearance and a proper cabinet which at least does not offend the eye, must be regarded as an essential part of the construction. This is neither expensive nor difficult to build and no special tools are needed. For this receiver, plywood 3/16 in. thick with a facing of oak, walnut, etc., is suitable for the top, bottom and sides, and 1/4 in. ply, similarly faced, is required for the front of the cabinet. First



Tuning

WHEN all is well, advance C15 to a point just short of oscillation and connect a reasonably good aerial. It should now be possible with the switch in the first medium wave position, to tune with the appropriate trimmers (C1 and C9) stations between 200m and 210m. If one of these is required, nothing more need be done; otherwise, capacity must be added to the circuits (C4 and C12) until they may be tuned with the trimmers to the desired frequency. This must be carried out by trial, and error as the capacity required varies somewhat with different coils, but as a guide it can be said that with a typical coil tuned on

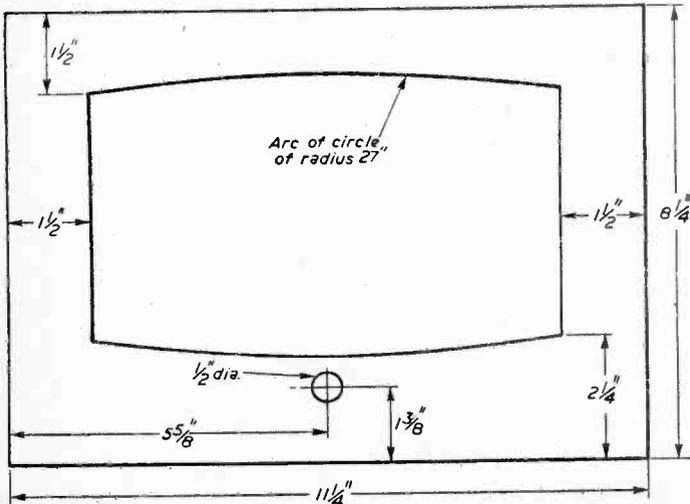
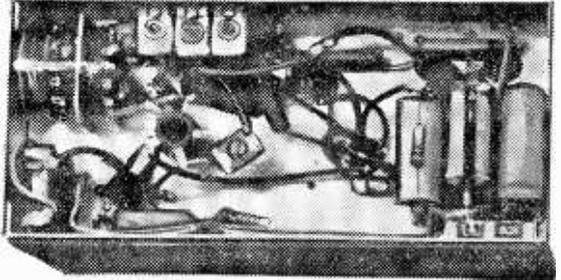


Fig. 7.—Cutting and drilling dimensions for the front of the cabinet.

cut the top and bottom, each 11in. x 5in. and the two sides, each 8 $\frac{1}{4}$ in. x 5in. At the top and bottom of each side on the unfaçed surface form a rebate very slightly more than $\frac{1}{8}$ in. wide and $\frac{1}{4}$ in. deep, so that when assembled, the corners of the cabinet will come together as shown in Fig. 6. These rebates must be fairly accurate and may be made by cutting across the wood with a tenon saw and removing the unwanted material with a chisel or penknife. Finish off with glass paper. The more fortunate constructor will probably tackle the job with a rebating plane.

When this has been carried out, assemble the top, bottom and sides securing them temporarily with two or three 1in. panel pins driven half way home at each corner. Square up the assembly, lay it on a sheet of $\frac{1}{8}$ in. ply

good result can be obtained with any of the several kinds sold for amateur use. Alternatively, a satisfactory finish can be obtained by rubbing in two or three coats of a colourless floor sealer



View of the underside of the chassis.

marketed by a well known polish manufacturer. Rub down lightly with No. 0 paper between each coat.

Fitting the Receiver

Glue a piece of coloured Perspex over the pilot light position and fit a piece of speaker cloth over the speaker aperture. The latter is best secured with an impact adhesive if a good tight fit is to be obtained. Cut off the control spindles to a length of $\frac{1}{2}$ in. and slide the receiver into position. Now drill two holes through the bottom of the cabinet into the chassis flanges, one at each end and enlarge the holes in the wood only and countersink them. If two $\frac{1}{4}$ in. wood screws of suitable gauge are now inserted, they will have a self-tapping action as they enter the chassis flanges.

Brass couplers should be fitted to the controls and the cut off portions of the spindles can then be used to extend the controls to the outside of the cabinet so that knobs can be fitted. A piece of felt should be glued to the bottom of the cabinet so that it will not mark polished surfaces on which it may stand, remembering to make holes in the felt for access to the screws which secure the chassis.

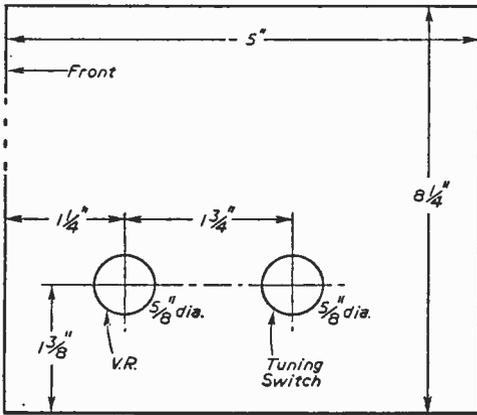


Fig. 8.—The right-hand-side of the cabinet drilling data.

and mark out the front. Cut the front about $\frac{1}{2}$ in. oversize to allow for sanding off, and make apertures for the speaker and pilot light as in Fig. 7. The curves at the top and bottom of the speaker apertures are arcs of a circle of which the radius is 27in. and can be marked out accurately with the aid of a pencil and a length of string.

Assembly

Dismantle the assembly and make two $\frac{1}{4}$ in. holes in the right hand side for the controls in the positions shown in Fig. 8. Coat all mating surfaces with casein glue and re-assemble, driving the panel pins right home. Square up, and fit the front similarly with glue and panel pins.

Finishing

Punch the heads of the panel pins below the surface and fill in the holes and any other blemishes with plastic wood of the colour in which the cabinet is to be finished. When the filler is hard, give a good rub down with No. 2 glass-paper, squaring off the corners and removing any old polish from the wood. Finish off with No. 0 paper and rub in wood dye of the desired colour. The best final finish is French polish and a very

COMPONENTS LIST.

Resistors ($\frac{1}{2}$ W): R1 220 Ω , R2 1.2M, R3 470k, R4 47k, R5 100k, R6 33k, R7 22 Ω , R8 470k, R9 150 Ω , R10 220 Ω .

Resistors (1W): R11 2.2k.

Variable Resistor: VR 10k with switch.

Capacitors: C1, 2, 3, 9, 10, 11 and 15. 50pF (max.) trimmers.

C4, 5, 6, 12, 13, 14—values as required.
C7 0.1 μ F, C8 0.1 μ F, C16 16 μ F, 350VW electrolytic, C17 47pF, C18 0.1 μ F, C19 0.01 μ F, C20 330pF, C21 50 μ F, 25VW electrolytic, C22 0.002 μ F, C23 16 μ F, 350VW electrolytic, C24 16 μ F, 350VW electrolytic.

Coils: Any T.R.F. dual range pair.

Valves: V1 EF92, B7G base and can, V2 EF91, B7G base and can, V3 EF91, B7G base.

Switch: Yaxley type, 2-bank, 3-pole, 3-way.

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1N5 4/6	6F15 14/9	11D3 17/6	415TH 23/6	D77 5/6	EF41 9/3		PL82 8/-	U801 29/-
1R5 9/6	6F17 12/-	11D5 17/6	42 15/-	D152 6/-	AF42 10/6		PL83 10/6	U4020 15/6
1S4 8/6	6F33 5/6	12A6 6/6	43 15/-	DAC32 10/6	EF50(E) 3/6		PL80 21/-	UABC80 8/-
1S5 9/6	6H5 2/6	12AH8 10/-	50C5 15/-	DAF91 7/6	EF50(A) 4/-		PM24M 17/6	UAF42 9/6
1T4 9/6	6J5GT 4/6	12AT6 9/-	50CD6G 21/-	DF33 10/6	EF80 6/-		PM22A 13/6	UB41 9/-
1U5 10/6	6J6 7/6	12AT7 8/-	50L6GT 9/-	DF91 4/-	EF85 6/6		PM24M 17/6	UBF89 8/6
2D21 8/6	6J7GT 9/6	12A7 9/6	61BT 17/6	DF92 7/-	EF86 11/-		PM202 16/-	UBF89 8/6
2X2 5/6	6K7G 3/-	12AX7 9/6	615PT 17/6	DF96 9/6	EF89 10/-		PM202 16/-	UCH42 9/-
2A5 12/-	6K7GT 10/6	12BA6 9/6	62BT 17/6	DF97 9/6	EF91 4/9		PM202 16/-	UCH42 9/-
3D6 14/6	6K8GT 12/6	12BE6 9/6	75 12/6	DH63 10/6	EF92 5/-		PM202 16/-	UCH42 9/-
3O4 8/-	6K25 19/6	12EJ 17/6	77 12/6	DH76 7/6	EF93 7/6		PM202 16/-	UCH42 9/-
3Q5 10/6	6L1 15/6	12J7GT 9/6	80 10/-	DH77 8/3	EF95 15/-		PM202 16/-	UCH42 9/-
354 8/-	6L6 7/6	12K7GT 8/6	88 12/6	DH107 13/6	EL31 12/6		PM202 16/-	UCH42 9/-
3V4 9/6	6L18 12/6	12K8GT 12/6	80 10/-	DH719 7/6	EL32 5/-		PM202 16/-	UCH42 9/-
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6A8 10/6	6M2 10/6	12SQ7 11/6	328 7/6	DL32 8/6	EL41 10/6		PM202 16/-	UCH42 9/-
6ABB 9/6	6P1 17/6	12SN7 17/6	329 7/6	DL32 8/6	EL41 10/6		PM202 16/-	UCH42 9/-
6A8B 9/6	6P25 19/6	12Z3 15/-	807 7/6	EA50 2/6	EL81 14/9		PM202 16/-	UCH42 9/-
6AK5 8/6	6P28 26/-	13D3 12/6	955' -4/-	EAC91 7/6	EL84 7/-		PM202 16/-	UCH42 9/-
6AK8 7/6	6Q7GT 10/6	14H7 12/6	5763 7/6	EAC91 7/6	EL85 10/6		PM202 16/-	UCH42 9/-
6AL5 6/-	6SA7GT 7/6	14R7 12/6	9002 7/6	EAF42 10/6	EL90 8/6		PM202 16/-	UCH42 9/-
6AM5 5/-	6SG7 7/6	14S7 21/-	9003 7/6	EB41 7/6	EL91 5/-		PM202 16/-	UCH42 9/-
6AM6 4/6	6SH7 6/6	15A2 17/6	AC4/PEN 25/-	EB41 7/6	EM80 10/6		PM202 16/-	UCH42 9/-
6AN5 7/6	6S17 5/6	15D2 23/9	AC5/PEN 22/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6AQ5 8/3	6SK7 7/6	19AQ5 10/6	AC6 22/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6AQ8 9/3	6SL7GT 6/6	19B6G6 24/4	AC7/PEN 22/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6AT6 8/3	6SN7GT 5/6	20D1 12/6	AC8 22/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6AU6 10/6	6U4GT 11/6	20D2 23/-	AC9 22/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6B7 10/6	6U5 7/6	20F2 26/6	AC10 12/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6B8 4/-	6V6G 5/6	20L1 26/6	AC/PEN 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BA6 7/6	6V6GT 8/-	20P1 26/-	ACTH1 34/9	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BE6 7/6	6X4 5/-	20P3 23/-	ACVP1 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BG6G 21/-	6X5GT 5/-	20P5 22/6	ACVP2 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6B16 7/6	7B7 8/-	25L6GT 9/6	AC2/PEN 21/-	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BR7 15/6	7C5 8/-	25Y5 10/6	AC21 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BW6 8/6	7C6 8/-	25Z4 9/6	AC22 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BW7 6/6	7D5 15/-	25Z5 9/6	PENDD21- 15/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BX6 6/-	7D6 15/-	25Z6 10/6	AZ1 15/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6BY7 7/6	7D8 15/-	17SU 17/6	AZ31 10/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6C4 6/6	7H7 8/-	30 13/6	B36 21/-	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6CSGT 8/-	7K7 10/6	30C1 12/6	B65 8/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6C6 6/6	7Q7 11/6	30FLS 11/6	B152 8/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6C9 12/6	7R7 12/6	30FL1 10/6	B309 9/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6C10 12/6	7S7 10/6	30L1 11/6	B329 5/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6CD6G 27/6	7Y4 7/6	30P4 22/-	B339 9/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6D1 7/6	8D3 4/-	30P12 11/6	B719 9/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6D2 5/-	9BW6 14/9	30P16 10/-	CBL1 17/6	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-
6D3 15/-	10C1 18/-	30PL1 15/-	CBL31 21/-	EB91 5/-	EM81 10/6		PM202 16/-	UCH42 9/-

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RM1 6/-	18RA 1-1-8-1 4/6	16RE 2-1-8-1 8/6
RM2 8/-	18RA 1-1-16-1 6/6	18RA 1-2-8-1 11/-
RM3 9/-	16RC 1-1-16-1 88/6	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

1T4 4/-, 6K8 8/-, 6K7G 3/-, 6V6G 5/-,
EBC33 4/-, EF39 4/-, EF80 6/-, EF91 4/9
6X5G 5/-, 5U4G 4/6. 80 7/6

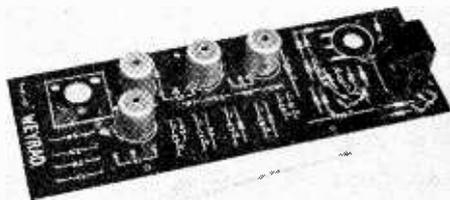
TERMS OF BUSINESS C.W.O. or C.O.D.
2/9 PACKING CHARGE ON ALL C.O.D.
ORDERS. POSTAGE 3d. PER VALVE

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

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, $\frac{7}{8}$ in. diameter, connections to 6-Tag Ring, 208 pF tuning 12/6
- OSCILLATOR COIL P50/1AC**
Medium wave in screening can. For 176 pF tuning condenser 5/4
- 1st AND 2nd I.F. TRANSFORMERS—P50/2CC**
470 Kc/s operation with 250 pF tuning in cans. $\frac{1}{8}$ in. diameter by $\frac{3}{4}$ in. high 5/7
- 3rd I.F. TRANSFORMER—P50/3CC**
Last stage transformer to feed diode detector. Size as P50/2 6/-
- DRIVER TRANSFORMER—LFD2T**
Upright mounting with six connecting tags— $1\frac{1}{8}$ in. x $\frac{7}{8}$ in. x $1\frac{3}{4}$ in. 9/6



PRINTED CIRCUIT—PCA1

Size $2\frac{3}{4}$ in. x $8\frac{1}{4}$ 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

LASKY'S RADIO

BARGAINS IN 4-SPEED AUTO-CHANGERS

- B.S.R. type UA8 £6.19.6
 - 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. £6.19.6
 - 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 £6.19.6
 - 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 £6.19.6
- 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 L.O. crystal cartridge and two sapphire styl. 79/6.

CARRYING CASE. as illustrated, handsome two-tone finish, 17in. deep, 14in. wide, 5 in. 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 $3\frac{1}{2}$ x 4 x $\frac{1}{2}$ in., 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 Vynide covered cabinet measures $8\frac{1}{2}$ x $6\frac{1}{2}$ 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. 12/6. Post free.

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All Mail Orders to Lasky's Radio Dept. PW, 207 Edgware Road, London W.2

Buying Radio Components by Post

NEW AND SURPLUS EQUIPMENT

By E. V. King

THE author, in dealing with readers' queries, has noted the difficulty many enthusiasts have in obtaining supplies to build the apparatus described in this and other journals. The author purchases entirely through the post hundreds of pounds' worth of new and surplus radio components each year and feels justified in saying that he is an expert in this matter.

Types of Dealer

Postal dealers are divided, by the author, into two classes:—

- (a) Those supplying new standard (non-surplus) components.
- (b) Those supplying ex-Government and other surplus equipment.

Of course, some dealers' stock will fluctuate between the two types. Others offer a counter service as well as postal. It should be noted that sometimes a dealer has two addresses, and to avoid delay the correct mail order one must be used.

Catalogues

As many catalogues and lists as possible should be obtained and filed. The date each is received should be entered on one main sheet by the dealer's name, and the correct mail order postal address should be shown on the sheet. The dates are then amended as new lists are received.

In this way the addresses are always at hand and those catalogues which might be out of date can be seen at a glance.

The catalogues will cost a few shillings, but are full of useful data. Each should be read carefully and compared with one another.

Readers should remember that most radio dealers do not stock, or cannot be bothered with, the single small items required by the amateur; and in the exceptions to this rule the purchaser is limited in choice, and therefore, when looking for a specific item, several catalogues should be consulted.

Return of Post Service

Many advertisers give a trustworthy guarantee of a return of post service (especially in dealing with valves). Other firms keep the customer waiting for any length of time—from a few days to even a few weeks.

Ordering the Components

Many people do not like writing letters, but a

letter is not required to order radio parts. As long as the dealer has his money, your correct address and knows *exactly* what you want, that is enough.

A typical order to a dealer is given as a suitable guide.

SPECIMEN LETTER USING CATALOGUE CODING

Messrs. Radio Parts, Ltd.
London, W.C.2.
October 4th, 1960.

Deliver to:
Mr. K. N. Brown,
29 Forest Lane,
Tiny Village,
Sorting Office Town,
Sussex.

Dear Sirs,

Please supply the following goods (as advertised in the October issue of "Practical Wireless") by return of post:

No. Required	Catalogue No.	Maker and No.	Description	Cost
1	MRC6	Electrix No. unknown	250V 50mA Rectifier	18s. Od.
2	ECC5	T.C.C. CEL28L	Electrolytic Condenser	10d.
1	WR3	Bulgin R.33	Resistor, 100 ohms, 5 watts	3s. Od.
1	TS2	Arcoelectric a610	Toggle Switch	3s. 8d.
1	QT12	Ardenite D147/3	P/P output transformer	30s. Od.
Total ...				£2 15s. 6d.
Postage				3s. 6d.
P.O enclosed for				£2 19s. Od.

Yours faithfully,
R. N. BROWN (signed).

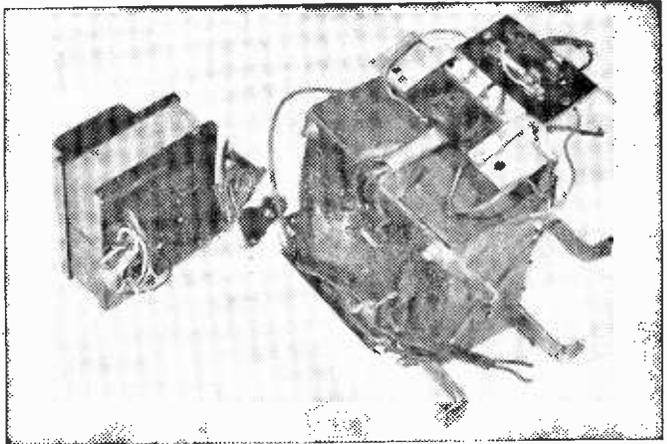


Fig. 1.—A "surplus" mains transformer compared with a standard component.

Readers will note how helpful catalogue coding is. When ordering from dealers who do not have their own code, or give the maker's name and code, the description of the goods must be clear enough to give perfect selection. If possible the maker's name and the dealer's number should be given. The type of the article required must be made clear in words, and the range or working capacity of some equipment is often important

and sometimes essential. The dimensions of components are usually important for the customer and so the required size should be stated (where there is a choice).

All other features of the equipment which help to make it specific must, of course, be stated.

Paying the Money

Never send money through the post, always use postal orders, money orders or a cheque and make them payable to the dealer and cross them. Most dealers will return your money or give credit if the goods are unsuitable or damaged and are returned *immediately*. The author has never experienced trouble in this respect with any advertiser. Remember to comply with the dealer's advertised postal charge; some have a round figure of 1/- on all orders, others have a sliding scale, while some charge the full fee. Where the latter is charged the dealer will return any excess cash which you may have sent.

Correct Addressing

Correct addressing both ways is important to avoid delay. Names of towns with similar spelling (especially when in the same county) often lead to confusion, and so the address should include the actual town and the postal district (where applicable).

Insurance of Parcels

Where possible you should take up an option to insure goods, usually at a charge of about 6d.



Fig. 2.—The contacts of "surplus" valveholders and valves often need cleaning before use.

When this is done there is a minimum of delay in dealing with damage or non-delivery.

Purchasing from Surplus Dealers

To help some readers the author gives some hints which he has gained from experience.

Readers should look at a bargain and ask themselves why it is being sold so cheaply? Sometimes size does not matter, but weight often does.

Physical Aspects of Govt. Surplus Equipment

Until recently, when some lightweight material came on the market, most surplus equipment was somewhat bulky and heavy. At the same time it was robust and could be thrown about without harm. One dealer advertises transformers for 240V 50c/s mains at under 10s. and they are good ones, but they are about four times as large and heavy as standard types (Fig. 1).

Often the method of fixing is not standard and adaptation is necessary. This applies in particular to electrolytic condensers of the box type, plugs and sockets, variable condensers and control knobs.

The metal of which the components are made is often better than used elsewhere, or is plated to resist corrosion, but in some cases, where the part was made for a special purpose, it is inferior.

Difficult Packing

Many dealers pack their goods very thoroughly, and the customer must be careful and patient when unpacking them.

Corrosion

Surplus soldering tags, valve bases (especially the EF50 type), plugs and sockets, valve pins, and the sliding contacts of condensers may become either oxidised or corroded with salt water. Generally, this means scraping at the offending parts with a penknife before soldering or plugging in a valve, etc. (Fig. 2).

Age of the Components

The durability of Government surplus equipment is such that age will not matter much except in the case of electrolytic capacitors which may have to be brought slowly to their working voltage to avoid breakdowns.

Removal of Fixed Components

Sometimes goods advertised are in one unit, the implication being that the parts can be removed for use. This is not always an easy task for the following reasons:—

- 1—The nuts and bolts may be varnished to lock them (Fig. 3), but a hot iron on them may loosen them.
- 2—The wired joints may be so short as to make resistors and other components useless when removed.
- 3—It may be extremely difficult to get to the parts concerned.
- 4—Rivets may have been used in difficult places.

Electrical Aspects of Government Surplus Gear

Often the electrical conditions used by the armed Forces bear no relation to those in our homes. For instance, many units sold as complete with transformers are indeed as stated, but they are designed for use on a mains frequency well above the usual 50c, and with a few exceptions are useless on normal mains.



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THE FAMOUS COSSOR

(Traveller's Friend) Transistorised

£7.19.6 POCKET RECEIVER
P. & P. 2/-

in leatherette case

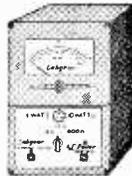
This set can be built for £7.19.6. Size 6 x 3½ x 1½in. Weight 17 oz. This set covers medium waveband 190/500 metres intermediate frequency. 470 kc/s using 4 transistors (Ediswan) and 2 diodes on a printed circuit board, plus a 2½in. moving coil speaker. Instruction book with point to point wiring diagram, 2/6 each. Batteries, PP4 (Ever Ready) 2/- each.

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 3in. 0-1mA meter.

NOT GOVERNMENT SURPLUS



FERGUSON VHF/FM TUNER

This F.M. adaptor is completely self-contained and can be fitted to any A.C. mains radiogram or radio with P.U. sockets. Valves 2-EF80's, ECF80. Input 200-250v. A.C. range 80-98 Mc/s. **Greatly Reduced £13**
P. & P. 2/-
LIST PRICE 18 gns.

YOUR EXISTING RADIOGRAM OR RECORD PLAYER CHANGED TO STEREO BY OUR STEREO ADAPTOR

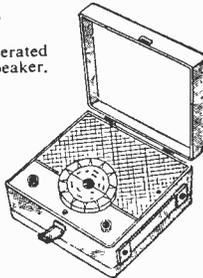
Tech. Data 2 valves EF80 and EL84. Switch control for Stereo and Mono Dual volume and tone control. Output 3ohms, suitable for use with Acos GC/71, GP/73 and Garrard GC/10. Complete with wiring diagram. **£2.19.6**
P. & P. 2/6

COSSOR BATTERY PORTABLE

£7.19.6 P. & P. 3/6

This extremely sensitive battery operated set has a printed circuit and 5in. speaker. A frame aerial fitted in the lid gives high quality listening on L and M Bands.

LIST PRICE 13½ gns.



GARTRIDGES

- Collaro Studio O .. 18/-
- Collaro Studio P .. 18/-
- B.S.R. 18/-

RECORDING TAPE OFFER

FAMOUS MAKE P.V.C. BASE ON PLASTIC SPOOL
1800ft on 7in. spool .. 32/6 1200 ft on 7in. spool .. 21/-
1200ft on 5½in. spool .. 22/6 850 ft on 5½in. spool .. 16/6

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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.

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£45 FEW ONLY—BRAND NEW
Model No. 942 LIST PRICE 79 gns.

"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

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£6.19.6

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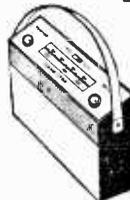


A printed circuit, 5in. speakers are features of this battery portable. An internal ferrite rod aerial for L and M Bands. A polythene wrapper provided to protect receiver. Width 10in., height 6½in., depth 5½in.

"EASY SIX" TRANSISTOR RADIO

Complete Kit to Build this Set

£9.15.0 P. & P. 1/6



6 transistor printed circuit, ferrite aerial, 5in. speaker, push-pull output, with 3 I.F. stages, and driver stage. Range MW 180-550 metres, LW 1,200-2,000 metres. Wooden case attractively covered in Blue and Grey washable vinyl.

COSSOR RECORD PLAYER KIT

We can now supply the following parts to build this unit:
(1) Player Case.
(2) Garrard Motor B.A.1.
(3) Amplifier 4 transistor.
(4) Speaker.
(5) Knobs, Plugs, etc.
Suitable for 7in. 45 r.p.m.s.

COMPLETE KIT **£5.9.6**

P. & P. 5/-

17in. TUBE BARGAIN

Type CME/1702 90° by Mazda. Not surplus. Heater (amps) 0.3, Heater (volts) 12.6 (Seconds).

SPECIAL PRICE

£3.19.6

P. & P. 10/-
Scan Coil and E.H.T. Transformer for this Tube **£1 extra.**

RECORD CHANGERS

- B.S.R. UA8 comp. with latest "ful-f" 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

SPEAKERS

- 3½in. SPEAKER .. 17/6
- 5in. SPEAKER .. 15/-
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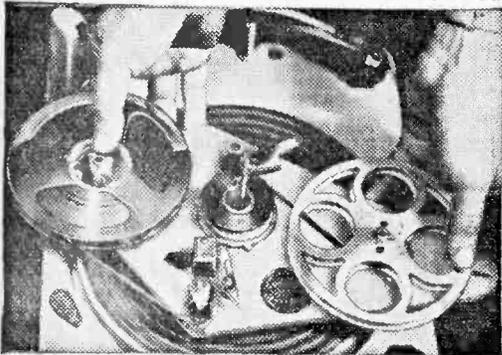
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Gramdeck

GRAMOPHONE TAPE RECORDER



**Turns any gramophone into
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and back into a record-player in a moment!**

- ★ Plays at 7 $\frac{1}{2}$ 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 . . . 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.

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GRAMDECK TURNS A TURNTABLE INTO A TAPE-RECORDER



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Telegrams: 'Wharfedel', Idle, Bradford.
Telephone: Idle 1235/6

The impedance of headphones and speakers is often unusual, and in some cases has a marked effect on the use to which the gear can be put. Some small one-valve shortwave radios advertised will not give reaction when used with low impedance phones. On the other hand, the reed-type high impedance phones, available quite cheaply, are as good as any on the market.

The frequency for which coils and I.F. transformers, etc., were designed may make them quite useless for the home unless they are rewound or otherwise adapted.

Measuring instruments, on the whole, are very good and quite suitable for home use without any adaptation. The cheaper meters will be found to have unconventional calibrations, but it is not difficult to replace them with new scales.

Buying Government Surplus Gear by Post

Readers should try to obtain a clear picture of the meaning of the dealers' advertisements which use few words and many abbreviations.

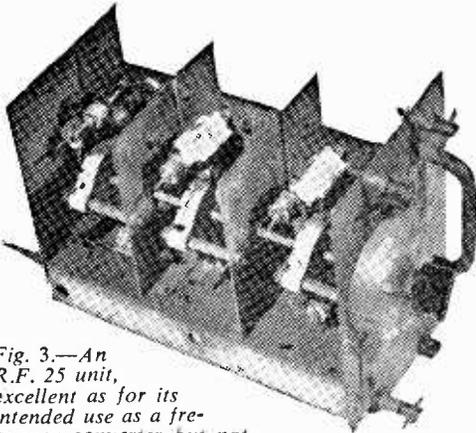


Fig. 3.—An R.F. 25 unit, excellent as for its intended use as a frequency converter but not as a source of spare parts; it is difficult to remove components without damaging them.

It should be remembered that the postal charge for heavy equipment is very great and road carriage may be required in some cases. Damage in transit is unlikely as the equipment is strongly made.

These points should be noted about Government supplies:—

They are usually robust and reliable, but some may be difficult to use as the calibrations used by the Forces do not always coincide with the normal ones experienced by the radio enthusiast (e.g., L.F. chokes and coupling transformers).

Other components will be found to be almost useless because of being too large, or corroded (e.g., valve bases, tag strips, etc.), or tend to leak (paper condensers). The author also advises careful ordering of plugs, sockets and metal rectifiers.

For surplus equipment other than ex-Government one would not expect it to be so conservatively rated, so well packed, or so strong.

Express Postal Service

A small fee is charged for express delivery from certain main post offices. The local postmaster will give you full details about the service. Valves ordered by express can sometimes be received the same day by a later post.

Registration and Postal Receipts

When returning unsuitable or faulty goods either register the parcel (all loose string ends must be fixed with sealing wax) or ask for a postal receipt (free of charge). If a small parcel is sent by letter post, ask for a receipt and expect a charge of 1d. for it.

Postal Regulations

Parcels are limited in size, dimensions, weight, etc., and sometimes they will have to be sent by rail or road.

The passenger train parcel service is very useful and quick.

Credit Notes

Where goods are returned as unsuitable, the supplier will either return the money or send a credit note. The credit note must be sent with the next order as part of the payment.

Faulty Goods

Goods should be inspected and tested immediately on arrival, and returned at once if faulty. If the parcel is damaged keep the wrapping and goods, inform the supplier and the local postmaster, who will send round a representative to look at it. The post office will give compensation quickly and efficiently in most cases.

CHRISTMAS GIFTS FOR RADIO ENTHUSIASTS

Send them *PRACTICAL WIRELESS*, of course. A year's subscription will bring them a reminder of your good wishes every month throughout 1961 . . . and all through the year they'll thank you for the interest and help it contains.

Either send your friends' names and addresses, together with your own and remittance* to cover each subscription, to The Subscription Manager (G.2), *PRACTICAL WIRELESS*, Tower House, Southampton Street, London, W.C.2, or you may place your instructions with one of the leading newsagents or bookstalls, who will be pleased to make the necessary arrangements.

Whichever way you choose, your friends will receive a Christmas Greetings Card announcing each gift.

* **RATES (INCLUDING POSTAGE) FOR ONE YEAR (12 ISSUES):—U.K. £13.0, OVERSEAS £11.6. CANADA £0.19.0. U.S.A. \$3.00.**

Club News

REPORTS OF CURRENT ACTIVITIES

AMATEUR RADIO MOBILE SOCIETY

Hon. Sec.: N. Fitch, 79 Murchison Road, Leyton, London E.10.
At the Lincoln Hamfest and Rally about half the mobiles present were ARMS members. (Two travelled from London for the occasion.) The ARMS committee members met personally several members of the Radio Amateurs' Invalid and Bedfast Association.

A representative of ARMS who went by chance to the Science Museum in London was made most welcome at a meeting of the Civil Service Radio Society, where Mr. J. Haywood, of the British Astronomical Society gave a lecture on radio astronomy. Several members in the North of England have suggested that the ARMS form a North of England Section. The committee has discussed and agreed with this idea and invites volunteers to contact the hon. sec. to work out the details.

BRADFORD AMATEUR RADIO SOCIETY

Hon. Sec.: M. T. Powell, G3NNO, 28 Gleithow Avenue, Roundhay, Leeds 8.

The first meeting of the new session was held on September 6th when G3LZW gave an interesting talk on "Transistors for the Amateur". A recorded talk was given by W1PFA on September 13th and this was illustrated by colour slides. The talk was on the DXpedition to St. Pierre and Miquelon Islands and was presented by G3LB. "TV Circuitry" was the subject of the talk given on September 26th by G3EKE. A Mullard film show was held at St. George's Hall, Bradford on October 11th. All meetings are held at Cambridge House, 66 Little Horton Lane, Bradford 5 at 7.30 p.m.

Future Events:

- November 8th—Visit to Tinsill Television Radio Link Station.
- November 22nd—Modulation.
- December 6th—Junk Sale.
- December 20th—Social Evening at Mechanics' Institute Cafe.
- January 10th—Talk on Transistors.
- January 24th—Amateur Receiver Alignment.
- February 14th—Transistors, Pirates, and Direction Finding.
- February 28th—Informal Meeting.

BRITISH INSTITUTION OF RADIO ENGINEERS

Hon. Sec.: F. W. Sharp, 9 Bedford Square, London W.C.1.

The British I.R.E. held its annual convention recently at the Bristol College of Science and Technology. The subject of this year's convention was "Aviation Electronics and its Industrial Applications". It took place on October 7th and 8th, and the two days were taken up by lectures given by members of various electrical and aeronautical firms.

THE CHESTER AND DISTRICT RADIO SOCIETY

Hon. Sec.: A. Bagley, Oak Lea, Long Lane, Saughall, near Chester.

Future Events:

- November 8th—Bring and Buy Sale.
 - November 15th—Discussion on R.E.A.N. led by Mr. C. Riche.
 - November 22nd—The Moni-Match by G3EWZ.
 - November 26th—Visit to the R.S.G.B. Radio Hobbies Exhibition.
 - December 6th—Club Net Night in which other amateurs are invited to take part.
 - December 13th—Open Night.
- All meetings are held at the Y.M.C.A., The Old Bishop's Palace, Chester.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: F. C. Ward, 5 Uplands Avenue, Littleover, Derby.

A demonstration of standing waves was given for members on October 19th.

Future Events:

- November 16th—Stereo demonstration.
- November 23rd—Direction finding theory and practice.
- November 26th—Annual Trip to London and Hobbies Exhibition.

HALIFAX AND DISTRICT AMATEUR RADIO SOCIETY

Hon. Sec.: A. Robinson, G3MDW, Candy Cabin, Ogdon, Halifax.

On October 4th, G3LB presented a recorded talk on St. Pierre and Miquelon Islands DXpedition by W1PFA. Projected slides accompanied the talk.

Future Events:

- December 6th—"Where, When and What to Look For" by G3IGW.
- December 20th—An informal evening.

MITCHAM AND DISTRICT RADIO SOCIETY

Hon. Sec.: M. Pharaoh, G3LCH, 1 Madeira Road, Mitcham.

On October 7th, F. G. Parker gave a lecture on colour television, and on October 21st R. Sykes described the DX100 transmitter.

Future Events:

- December 2nd—Round and About with a Camera, by K. Frankom.
- December 16th—Constructional Contest.

PETERBOROUGH AMATEUR RADIO SOCIETY

Hon. Sec.: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

Meetings are held at Peterborough Technical College on the first Friday in each month at 7.15 p.m. At the first meeting of the winter session, a lecture on ultra-high frequency communication was given by Mr. D. Gordon, G3EJK, and a new type all-band transmitter was demonstrated by Mr. W. Miles, G3GGK, whilst the chairman, Mr. D. Byrne, had a RTTY teleprinter on view.

A course of instruction for the Radio Amateurs' Examination and the G.P.O. Morse Test will be held at Peterborough Technical College during the autumn and winter months.

Future events:

- December 2nd—Teleprinters.
- January 6th—A film show.

THE READING AMATEUR RADIO CLUB

Hon. Sec.: R. G. Nash, G3EJA, "Peacehaven", 9 Holybrook Road, Reading.

Recent meetings have been very well attended and several "shams" have given interesting descriptions on the early days of radio. On October 29th Morse Instruction was given and this was followed by a talk on Mobile Operation by a former member of the Club who, at one time, lived in Reading. All meetings are held at Palmers Hall, West Street, Reading.

SOUTHPORT RADIO SOCIETY

Hon. Sec.: J. E. Ford, 278 Portland Street, Southport.

The Southport Radio Society meets every Thursday at the Club House, The Esplanade at 8.30 p.m. and on Sunday afternoons at about 4 p.m. There is also morse code practice at 8 p.m. on Thursdays.

SOUTH SHIELDS AND DISTRICT AMATEUR RADIO CLUB

Hon. Sec.: K. Skelthway, 51 Baret Road, Walkergate, Newcastle-on-Tyne 6.

The Annual General Meeting was held in September when several new officials were elected. The Treasurer remains as previous, G3ELP, with G3KZZ elected Chairman and G3NCL as Secretary. Arrangements were made for the coming session and the following monthly meetings which are held every last Wednesday of the month will consist of film shows, lectures and demonstrations.

The weekly club meeting is held on Fridays from 6.30 p.m. onwards. Meetings are held at Trinity House, Laygate Lane, South Shields.

WELLINGBOROUGH RADIO CLUB

Hon. Sec.: P. E. B. Butler, 88 Wellingborough Road, Rushden, Northamptonshire.

S. Harris gave a lecture for members on October 6th. He called his lecture "The Upper Atmosphere".

Future Events:

- December 1st—"Cumberland Expedition 1960".
- December 15th—Annual Christmas Dinner.

WEST MIDDLESEX TAPE RECORDING CLUB

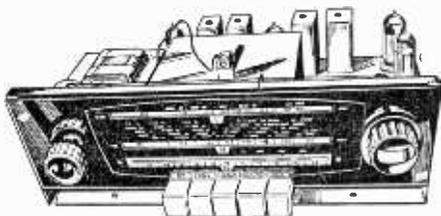
Hon. Sec.: H. E. Saunders, 20 Nightingale Road, Hampton, Middlesex.

At the meeting in the Railway Hotel on October 13th, Hampton members made recordings of Bruce Bargaev singing.

The promised playlets and sketches, written by a local author for members to record, may have to be cancelled owing to some extra work that has befallen Ken Phipps who is arranging this item.

Freddie Westcott has been able to obtain some of the prize-winning tapes from the recent National Contest, and these are to be played at a forthcoming meeting.

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 1/4 x 4 in. in black and yellow.
 Pick-up. Extension Speaker. Ae. E. hd Dipole sockets. Five "plane" push buttons—OFF L.W., M.W., F.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). 47/6.
 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 £5.9.2 down and 7 Monthly Payments £1.12.2.
 Some duty (but working) 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.

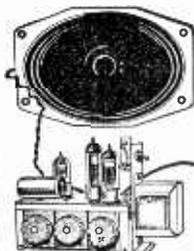
A-10 **£4.17.6**

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.

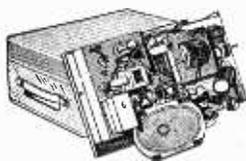
B-20—10K ohms/v. on 0.5 v. and 2.5 v.; 4K ohms/v. on 10, 50, 250, 500 and 1000 v.. A.C. and D.C. Resistance, 2K, 200K, 2M and 20M-ohms.; D.C. current, 100 microA, 2.5 mA, 25 mA, 250 mA. Size: 5 1/2 x 3 1/2 x 2 1/2 in. Weight, 24 ozs.



5-VALVE AMPLIFIER (INC. RECT.). Capable of giving 6 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 1 1/2 x 7 in.

PRICE for Recorder and Deck Assembled, 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 743

GLADSTONE RADIO
 Also at 247 New Road, Portsmouth,
 Camberley closed Saturdays.

58A HIGH STREET, CAMBERLEY, SURREY. Tel. 22791
 Hants. and 3 Church Road, Redfield, Bristol 5.
 Portsmouth and Bristol closed Wednesdays.

"READY TO USE" ITA CONVERTER

Separate gain controls. Valves PCF80 and PCC84. Switch position ITA (1)—ITA (2)—BBC. Bakelite moulded cabinet 8 1/2 x 4 x 6 in. £5.5.0. P. & P. 3/-.



LISTEN WITHOUT INTERFERENCE

Fully built V.H.F./F.M. Set for £8.8.0 (3/- post). Covers 88-98 Mc/sec. Wired, aligned and tested. Mullard permeability tuner and 4 valves (ECC85, ECL82 and two EF91), with mains transformer. Cheap room dipole. 10/-, 300 ohm twin feeder. 6d. yd. All with 12 months' guarantee.



GRAMOPHONE AMPLIFIER with 5in. SPEAKER. On Fabric-covered Baffle 12 1/2 x 5in. 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/-

BERIC BATTERY RADIO IN MAKER'S CARTON. Valves DK96, DF86, DAF96, DL96. Requires Ever Ready battery B103 (or battery elim. for convert'ng 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.)

B.S.R. UAR 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 7/6 in four equal monthly payments. Postage with down payment (C.O.D. 2/- extra).

SEE SPECIAL TERMS FOR A.M./F.M. CHASSIS.

Posted Orders to Camberley Please.

Electronics Ltd

(FLEET ST)

Dept. B

152/3 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 new MIGHTY SIX TRANSISTOR 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.

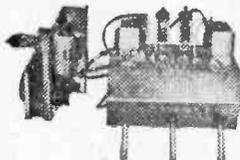
PORTABLE BATTERY ELIMINATOR

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/-.



3 TRANSISTOR RECEIVER

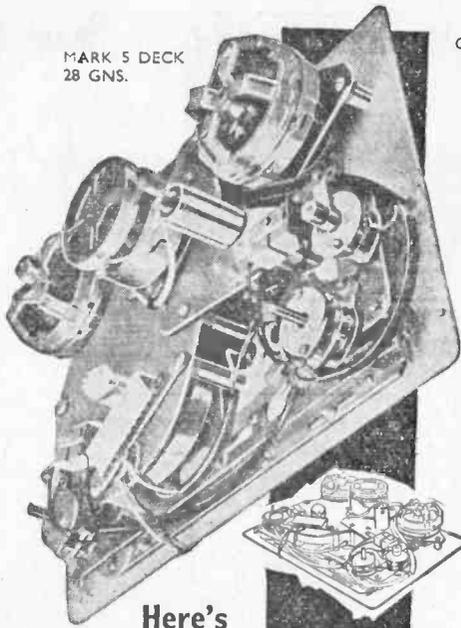
Our new popular 3 transistor receiver using miniature speaker, 1 audio transistor, 2 surface barrier transistors, germanium diode, printed circuit, ferrite rod aerial, medium and long wave coverage, all components complete, with ivory moulded cabinet, circuit diagram and instructions. 39/6, post and pkg. 1/6. All parts available separately. Circuit diagram, 1/6.

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 0-IMA moving coil meter and silver hammertone enamel case. Kit complete with instructions 59/6 post and pkg. 1/6.

MARK 5 DECK
28 GNS.

GD499



Here's
where you get performance!

A tape recorder is only as good as its deck. This is where precision in manufacture and assembly are vital for professional standards of recording and reproduction. In the Brenell Mark 5 deck there's a rare combination of advanced technology and an almost-forgotten kind of craftsmanship.

The Mark 5 deck has a remarkable, new main motor of a type widely regarded as the most efficient to be used in tape recording. The HYSTERESIS SYNCHRONOUS MOTOR, with a balanced outer rotor and a heavy, statically and dynamically balanced flywheel. It brings 'wow and flutter' down to below 0.1% at 7½ i.p.s.!

This and the other components providing the specification shown below, are assembled with fanatical care. Brenell Mark 5 production is an individual task which is repeatedly checked and tested. Nothing less than mechanical and electrical perfection will do.

At 28 gns, you'd be missing a great deal to pay less and there's no need to pay more.

ABRIDGED SPECIFICATION: 3 INDEPENDENT MOTORS . 4 RECORDING SPEEDS . FAST REWIND in either direction. 1,200ft. reel rewind in 45 seconds.

WOW AND FLUTTER

Below 0.05% at 15 i.p.s.
Below 0.1% at 7½ i.p.s.
Below 0.15% at 3½ i.p.s.
Below 0.25% at 1½ i.p.s.

FREQUENCY RANGE

15 i.p.s. 50/16,000 c/s ± 3db
7½ i.p.s. 60/12,000 c/s ± 3db
3½ i.p.s. 60/7,000 c/s ± 3db
1½ i.p.s. 60/4,000 c/s ± 3db

SELECTIVE FREQUENCY CORRECTION at 15, 7½ and 3½ i.p.s. **ACCEPTS 8½in. REELS** **PAUSE CONTROL** **DIGITAL REV. COUNTER** . **PROVISION** for EXTRA HEADS

TAPE RECORDERS:

3 STAR 58 GNS.
MK.5 64 GNS.
3 STAR R/P Stereo 89 GNS.
MK.5 R/P Stereo £98.12.0

Brenell

* ½ track available with 3 Star models

Sole manufacturers: **BRENELL ENGINEERING CO. LTD.**

1a DOUGHTY STREET, LONDON, W.C1. Chanoyry 5809 and Holborn 7388

Trade News

NEW PRODUCTS AND DEVELOPMENTS

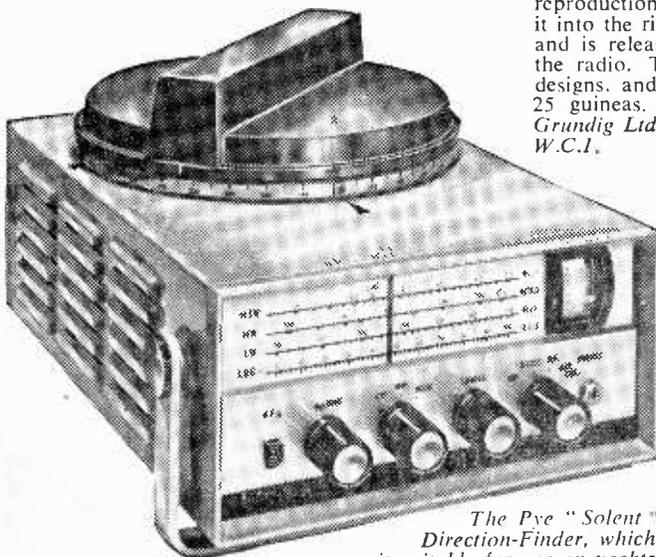
DIRECTION-FINDER FOR SMALL CRAFT

FOR the first time yachtsmen can obtain a fully portable direction-finding receiver offering in one case all the facilities of a large ship's installation. With the Pye "Solent" accurate direction finding bearings can be taken from radio beacons on the Long Wave Beacon Band. Sensitivity and selectivity compare favourably with that of fixed installations and bearings can be taken to an accuracy of plus or minus one degree. The aerial is of a new design using a ferrite rod which is mounted, together with a compass rose, on top of the receiver case. A beat frequency oscillator is incorporated so that the "Consol" method may be used for long-range navigation. Marketed at 45 guineas, the direction-finder will be available in early December and is made by *Pye Limited, Cambridge.*

RECORD PLAYER FOR THE MOTORIST

FEATURED on the Philips stand at this year's Motor Show was a record player made for easy installation in any make of car. This record player, the Philips Auto-Mignon, has been designed to operate in conjunction with a car radio, which acts as the amplifier, and is fully automatic.

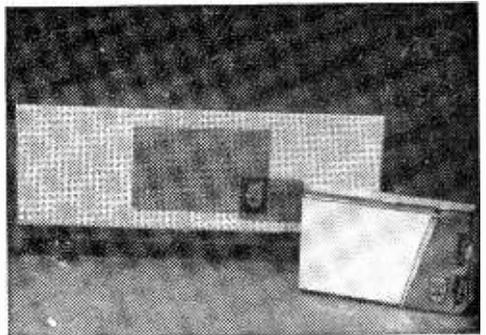
It is the only record player available in Britain which has been specially constructed for permanent installation in a car and gives good reproduction of seven-inch 45r.p.m. records. It can be adjusted for either 12 or 6V supply and sells at 23 guineas. *Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2.*



The Pye "Solent" Direction-Finder, which is suitable for use on yachts.

NEW MINIATURE RADIO

A NEW pocket radio recently introduced by Grundig Ltd. measures only 4in. x 2½in. x 1in. and weighs 8½oz. The "Mini-Boy" can be stowed into the smallest pocket or handbag. Controlled by two thumb wheels, one the on/off switch and volume control, the other the tuning control, the Mini-Boy gives up to 80 hours' use on one battery. Fully transistorised, it has its own built-in directional ferrite rod aerial, a high flux



This illustration shows the Grundig "Mini-Boy" together with the speaker enclosure.

permanent magnet dynamic loudspeaker and gives full medium wave coverage.

For home use, a speaker enclosure is supplied. This contains a larger speaker providing excellent reproduction. The radio is fitted simply by sliding it into the right hand end of the speaker enclosure and is released by pressing the left hand side of the radio. There is a choice of three two-colour designs, and the price, including purchase tax, is 25 guineas. *The Mini-Boy is manufactured by Grundig Ltd., 39/41, New Oxford Street, London, W.C.1.*

NEW VALVE TESTER

THE new Model 45C valve tester is capable of testing over 5,000 different types of valves, British, American and Continental. Two ranges of Mutual Conductance are provided, 0-3mA/V and 0-15mA/V, and tests are also incorporated for element shorts, cathode leakage and emission. This instrument is also able to check the latest 12V car radio valves.

The 45C incorporates 21 valve holders and test facilities are provided for earlier type valves as well as the very latest TV types, etc. This valve tester is made by *Taylor Electrical Instruments Ltd., Montrose Avenue, Slough.*



Dynatron have recently marketed this new record reproducer, which is known as the "Mazurka."

STEREO RECORD REPRODUCER

THE "Mazurka" is a new record reproducer introduced by Dynatron Radio Ltd., and is available in four versions, designed to meet every requirement. There are two stereo models, one fitted with automatic record changer and the other with a single record player. Both versions incorporate six valves and provide 6W power output on each channel. It has a dual channel tone control unit incorporating ganged volume, bass and treble controls. A two-position selector switch can be set to "Gram" for record reproduction or "Radio" for monophonic reproduction from an external radio or tape input. The mains on/off and balance control is located inside the reproducer for ease of operation. Models GR3ST (autochanger) and GR4ST (single player) are made by Dynatron Radio Ltd., Maidenhead, Berks.

A ROTARY POSITION SELECTOR UNIT

A REMOTELY controlled device with applications in many fields where it is required to rotate a shaft with a high degree of accuracy has been developed by the Plessey Company Ltd. in conjunction with the Ministry of Supply for use with multi-channel transmitters and receivers.

This unit, which is designed to rotate a shaft to any one of the twelve positions, each position being set up independently, with an accuracy of within six minutes of a degree, is available for 12-48V D.C. operation in two panel sizes

(4in. x 4in. or 3½in. x 4½in.) and with a torque of either 35oz-in. or 60oz-in.

Visible indication from the front of the unit shows the selected position and a built-in switch can be used for confirming the position to the remote control site. Further information may be obtained from *The Plessey Co Ltd., Ilford, Essex.*

TRANSISTOR PORTABLE RADIO

LEATHERCLOTH has been chosen for the exterior finish of the "Decca Debonaire" transistor portable. The leathercloth (PVC) is in mushroom-grey which can be sponged clean quite easily should the surface become spoiled. The durable handle is also in Everflex PVC. The "Decca Debonaire" can be tuned to both medium and long wavebands and retails at 17 guineas. It is available from most Decca dealers.



Model D900 is a new transistor test set made by Beulah Electronics Ltd. This model was recently seen at the Radio Show at Earls Court.

TRANSISTOR TEST SET

THIS new Beulah test set (the D900) enables quick and easy tests to be made of transistors and transistor receivers. The instrument has a novel feature in that it has a self-contained power supply, continuously variable from 0-25V centre tapped, supplying a current of up to 25mA. A continuously variable base current is available from 10µA to 1mA.

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Required channels must be specified.

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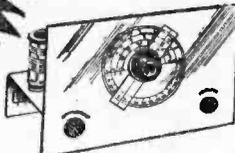
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Covers M/W Band

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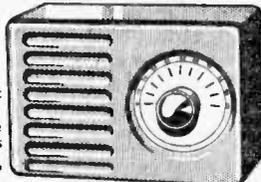
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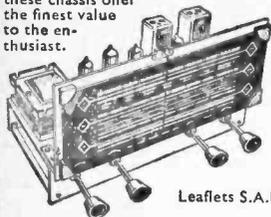
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Letters to the Editor

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.

SHORT WAVE LISTENERS' LOG

SIR,—I was very pleased to see the "Short Wave Listeners' Log—1" on page 442 of the September 1960 issue. To a short wave enthusiast, a log such as this is most interesting and helpful, as much of this useful information is hard to come by. Together with many more of your readers, I hope this will now be a regular feature. — H. CHAMBERLAIN (Newark-on-Trent).

RADIO MOSCOW

SIR,—I wonder if any readers could help me. I have just been listening to Radio Moscow on about 217m, the signal quality was so good that my father and I argued about the origin of the signal. My father's argument was that it was relayed by a trawler outside of the three mile limit; mine was that it was direct from Moscow. We have also had the same argument about Radio Luxembourg.—R. W. L. LIMBEAR (London N.21).

CRYSTAL SET RECEPTION

SIR,—With reference to D. J. Connolly's letter (October issue) about reception of Radio Moscow on a crystal set, I have often noted the same occurrence. I believe that it is due to Radio Moscow's programmes being beamed to the British Isles at certain times of the day—mainly in the evening.—J. A. ROHAM (Dublin).

THREE TRANSISTOR RECEIVER

SIR,—I built a three transistor receiver using a crystal detector. After various experiments I found the crystal not very sensitive so I removed it and connected the aerial to the base and the earth to the emitter of the first transistor. It has improved reception in the way of cutting out BBC television interference but has decreased sensitivity. Perhaps I should put a capacitor between the aerial and base of the first transistor, but I do not know of what capacity it should be. Has anybody else had this difficulty and found a suitable solution to the problem? — N. MILLER (Sutton Coldfield).

TRANSISTORS v VALVES

SIR,—Is it not about time the dispute between transistors and valves was forgotten? Every-

one who has used them will realise that each has its limitations. Whereas valves are slightly bigger and need larger transformers and so on, transistors do not, but their reproduction is slightly inferior, etc. We all realise that each has its own uses and disadvantages and I believe that everyone has now heard enough on the subject. — D. RASBERRY (St. John's Wood, N.W.8.).

PRINTED CIRCUITS

SIR,—I was interested in the experience of D. M. Payne (September issue) but when I tried to remove a similar coil I was not as lucky. The very frail base of the coil broke and when eventually I managed to remove it the printed circuit at that point was ruined. The coil in question can be put in according to the instructions and be wrong if one does not follow the circuit, as the instructions merely state, "the red spot to point to the transistor". This could be any of three positions as all pins are spaced the same. — E. CLARK (Leeds 12).

SHORT WAVE LISTENING

SIR,—How fascinating short wave listening is! For days conditions are so poor that one almost gives up, then suddenly, as on August 17th, stations under a thousand miles away disappear and those over this distance suddenly re-appear. This revealed that Lima, Peru, broadcasts in English every Wednesday and Friday from 10.30 p.m. to 11 p.m., with South American music, in the 19.8m vicinity. Buenos Aires, Argentine, nightly broadcast in English both in 19m and 25m bands with Argentine tangos and traditional Latin music.

On the night in question, on an 8ft upright aerial, no less than a dozen Brazilian broadcasters were heard on 16, 19 and 25m bands. In addition Monte Video, only heard rarely from Uruguay on 19.5m came over at good strength between 10 p.m. and 11 p.m.—F. N. H. (London W.2.).

INTERFERENCE

SIR,—Can anyone explain the reason for the following fault on my radiogram? When tuned to the Light Programme, medium waveband, the Home Service is often heard in the background. Sometimes, this is so loud that the Light Programme is badly distorted and it is just a jumble of words. However, the Home Service is received quite free from interference.—C. E. C. (Borehamwood).

STEREO PHASE DIFFICULTIES

SIR,—I have recently been experimenting with stereo and after reading an advertisement, decided to employ a multi-speaker system. I bought

some "tweeters" and assembled them with the necessary woofers in the two cabinets and was very pleased with the results. A friend came round and after listening to one or two records criticised the reproduction, and after a lot of trouble we came to the conclusion that the phasing of the speakers was not correct. We made several changes and finally found an arrangement which satisfied my friend. When he had gone I carried out a few tests and found that the speakers were not phased in the way one usually associates with two speakers. Is there, in fact, a difference when using this multi-speakers scheme for stereo? Perhaps some keen reader has experimented in this connection and can lay down some rule, such as all tweeters in phase, all woofers out of phase, or some similar rule which could be followed. I quite see that all in phase, may not apply when the speakers are separated by the space one usually devotes for stereo reproduction.—W. S. YSMUDU (W.1).

CORRESPONDENTS WANTED

SIR,—I am 17 years of age and would like to correspond with other amateurs of my age who hope to become licensed operators. I have been interested in short wave radio for about a year now.—F. SHURAN (6, St. Mary's Terrace, Daingean, Offaly, Ireland).

SIR,—I have been interested in amateur radio for three years and would like to correspond with other amateurs of my age, 14.—G. CHERINGTON (42, Severn Drive, Pemberton, Wigan, Lancs).

SIR,—Amateur radio has been my hobby for some years and I would like to hear from other readers of my age, 13, with similar interests.—G. CALLISTER ("Silverburn", Ballanard Road, Douglas, Isle of Man).

SIR,—I should like to correspond with anyone who has performed a successful conversion on the Bendix R.A. 10DB. — M. CLEAR (140a, Oxford Road, Calne, Wilts).

VALVE BASE TROUBLE

SIR,—I recently experienced serious trouble in a set which, in servicing, I found to be due to the material between two of the valve pin sockets having carbonised. Thinking it might have been a manufacturing fault I threw it away and bought a new one. Shortly after the set had been put into use again, the same trouble occurred and on looking at the valvebase I found the same carbonising. I put a new holder in and again tried out the set, this time, with the chassis upside down, and I found that after working for an hour or so, a small arc began between the two pins, which eventually made a very good carbon path and finally short-circuited the two pins. I know this often happened with old paxolin or ebonite type valveholders, but I thought the new nylon loaded types were free from this trouble. It appears, therefore that the makers have still not found a solution to this kind of fault and it would be interesting if we could be given details of the maximum current and voltage ratings which must be employed.—G. RICH (Teddington).

LOUDSPEAKER EXPERIMENTS

SIR,—I have at last found what I feel to be the best circuit for my particular requirements and have finalised the design and cabinet. As a result I am at a loss most evenings and weekends for something to experiment with. I am not interested in television and think perhaps that there would be an interesting field for me in loud-speaker experiments. I visualise obtaining two or three different types and then trying out cabinets and labyrinths, etc. I wonder if any reader could give me some suggestions for tests which I could carry out or interesting lines upon which my experiments could be based.—F. R. ENTWHISTLE (Rotherham).

COIL CORES

SIR,—I wonder if I could seek some aid in repairing some I.F. coils which I have damaged. In setting up a receiver some time ago I tried to fix the cores by putting in some adhesive. Recently I found it necessary to retrim one of the coils but couldn't turn the core. After a lot of work I unfortunately pushed the trimmer screwdriver through the side of the coil former. Happily the wire was not damaged, but I cannot remove the old pieces of core. If these could be taken away I have sufficient thread for a new core. Can anyone suggest a way of cleaning out the coil former, which is a standard bakelite component with about $\frac{3}{16}$ in. clean thread at the top and $\frac{1}{16}$ in. or so at the other end.—J. BRADLY (Portsmouth).

CROSS-OVER NETWORKS

SIR,—I would endorse Mr. Baker's remarks that cross-over units need not be expensive. From the information in various books the coils can be wound and absolute accuracy is not essential. Suitable $4\mu\text{F}$ 100V condensers could be bought from many of your advertisers.

Mr. Baker appears to be confused however, in the relation of loudspeakers to cross-over units by his remark that an 8in. speaker will make a unit sound better. A cross-over does not add anything, in fact there is a slight power loss when it is inserted in a speaker system. The extra bass he obtained by using a larger speaker could have been obtained by connecting it in parallel with the smaller speaker.

One of the reasons for using a cross-over unit is to feed each speaker with the frequency range it is best equipped to handle. From personal experience there appears to be little advantage in using a cross-over unit with two or three speakers of the same size, whether they be 12in. or 5in. in fact it is not worth while using them under these conditions. My personal preference is 12in. bass, 8in. for middle range and 3in. for treble.

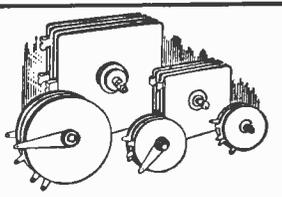
This question of phase does not seem to be appreciated by many stereo enthusiasts. I have found it advisable to wire a double pole switch in the leads to one speaker so that phasing can be easily corrected, as in some installations the stereo effect can be considerably improved by ensuring the speakers are in phase. A quick check can be made by placing the speakers side by side when a loss in bass will indicate that they are out of phase.—J. W. DAVISON (Durham).



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DH101	8/-	EZ80	7/-
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EBC81	11/4	KT24	5/-
EBC90	12/7	KT32	14/-
EBC91	12/7	KT33C	8/6
EBF80	9/9	KT61	13/6
EBF89	9/6	KT63	7/6
ECC81	8/6	KT74	6/6
ECC82	7/6	KT76	6/6
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ECH81	9/6	ML4	8/6
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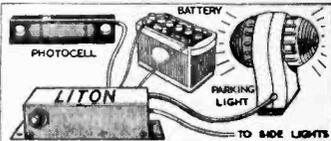
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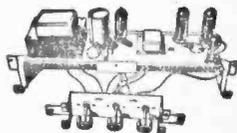
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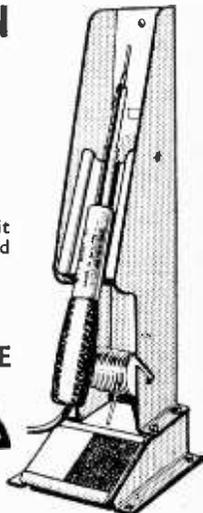
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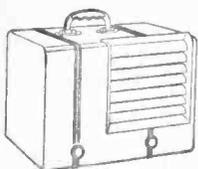
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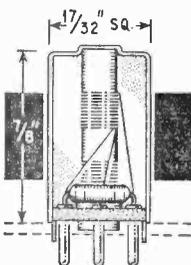
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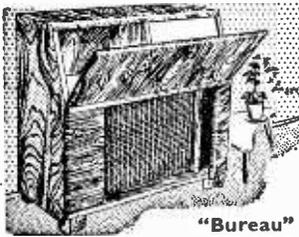
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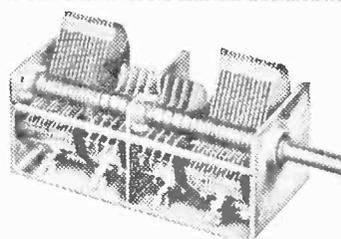
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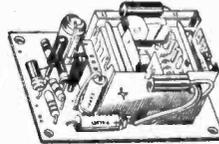
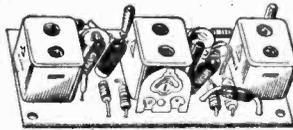
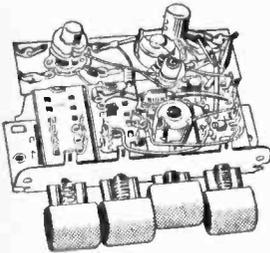
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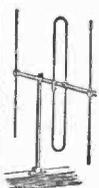
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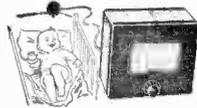
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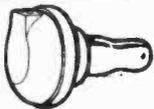
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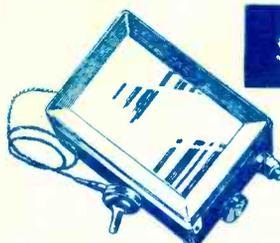
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