

A CLOSED-CIRCUIT TV SYSTEM

Practical Television '13

JULY 1959

AND TELEVISION TIMES



CONTENTS

A STACKED AERIAL ARRAY

- 410 deg. C.R. TUBES

SERVICING TV RECEIVERS

TELEVISION TROUBLES—11

**ANALYSING & SERVICING TV
RECEIVERS**



Just Right for your pocket !

THE MULTIMINOR

This splendid AVO instrument has been developed to meet a definite demand for a sturdy pocket-size multi-range test meter at a modest price, suitable for use on modern electronic apparatus as well as for radio and television receivers, motor vehicles, and all kinds of domestic appliances and workshop equipment. Readings are obtainable quickly and easily on a very open scale, and range selection is by means of a robust, clearly marked rotary switch of the characteristic AvoMeter type. Measurements of A.C. and D.C. Voltage, D.C. Current and Resistance are made by means of only two connection sockets.

Designed and Manufactured by

19 Ranges

- D.C. Voltage: 0-1,000V in 7 ranges
- A.C. Voltage: 0-1,000V in 5 ranges
- D.C. Current: 0-1A in 5 ranges
- Resistance: 0-20,000 Ω. 0-2M Ω.

Pocket Size: 5½ x 3½ x 1½ inches.
Weight: 1 lb. approx.

List Price **£9 : 10s.**

Complete with Test Leads and Clips.
Leather Case if required 32/6.

Sensitivity :
10,000 ohms per volt on D.C. voltage ranges.
1,000 ohms per volt on A.C. voltage ranges.

Accuracy :
On D.C. 3% of full scale value.

On A.C. 4% of full scale value.

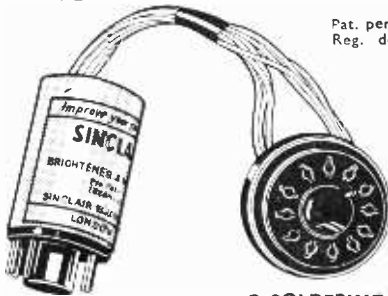
To meet special requirements, instruments can be supplied to a higher degree of accuracy for a small additional charge.

AVO LTD AVOCET HOUSE · 92-96 VAUXHALL BRIDGE RD. · LONDON · S.W.1

Telephone: VICTORIA 3434 (12 lines)

MM.2

IS YOUR T.V. TUBE DIMMING? YOU CAN EXTEND THE LIFE OF THAT TUBE AND IMPROVE THE PICTURE



Pat. pending.
Reg. design.

PRICE **30/-**
Package & Postage 2/6.
(Postal Orders.
C.W.O. C.O.D.)

- NO SOLDERING
- NO WIRING
- JUST PLUG IN
- IT'S AUTOMATIC
- IT'S GUARANTEED !

One of the most common T.V. Tube faults is low emission, resulting in loss of brightness, contrast, definition and focus. The Sinclair Unit restores the cathode emission and corrects the above faults for a very low cost. Applicable to all sets operating off A.C. mains.
IMPORTANT. State make and model No. of set and tube in block capitals, please. If not satisfied money refunded if returned within 7 days.

SINCLAIR ELECTRONICS,
18, NEWPORT COURT, CHARING CROSS
ROAD, W.C.2. Phone: REGent 5520

TELEVISION TUBES REBUILT

12 MONTHS' GUARANTEE

- 12" - - - - £5. 0.0
- 14" - - - - £5.10.0
- 17" - - - - £6.10.0

Carriage and insurance 12/6 extra.

Customers are requested to send their old tubes for rebuilding. We offer 48 hr. service. In the case of 12" MAZDA tubes please confirm before sending.

MARSHALLS for TELEVISION

131 St. Ann's Road, Tottenham,
London, N.15.

Telephone: STAmford Hill 3267

BENTLEY ACOUSTIC CORPORATION LTD.

THE VALVE SPECIALISTS. 38 CHALCOT ROAD, LONDON, N.W.1. Telephone: PRIMROSE 9090

EXPRESS SERVICE I. C.O.D. ORDERS RECEIVED BY 3.30 P.M., EITHER BY LETTER, PHONE OR WIRE, DESPATCHED. THE SAME AFTERNOON, ALL ORDERS RECEIVED BY FIRST POST DESPATCHED SAME DAY.

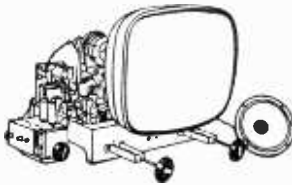
ANY ORDER UP TO £10 INSURED AGAINST DAMAGE IN TRANSIT FOR ONLY 6d. EXTRA.																				
0B2	17/6	6C5G	6/6	6U7G	8/6	18	23/3	5763	12/6	DK96	10/-	EF91	7/6	KTW61	8/-	PY80	8/-	UBL21	23/3	
0Z4	6/-	6C6G	6/6	6V6G	7/6	19AQ5	11/6	7193	5/6	DL33	9/-	EF92	5/6	KTW62	8/-	PY81	9/-	UCC84	19/11	
1A3	3/-	6C8	12/6	6V6GTG	8/-	19B6G	6/23/3	7475	7/6	DL66	15/-	EK32	8/6	KTW63	8/-	PY82	9/-	UCF85	10/6	
1A5	6/-	6C9	12/6	6X4	7/-	19H1	10/-	9002	5/6	DL68	15/-	EL32	5/6	KTZ41	8/-	PY83	9/6	UCF80	21/11	
1A7GT21/11	6C10	9/6	6X5GT	6/6	20D1	15/3	9006	6/-	DL92	7/6	EL33	12/6	KTZ63	10/6	PZ30	19/11	UCH21	23/3		
1C5	12/6	6CD6G	6/30L2	10/-	20F2	26/6	AC/PEN		DL94	7/6	EL34	17/6	L63	6/-	QP21	7/-	UCH42	9/6		
1D6	10/6		29/10	7A7	12/6	20L1	26/6	(5 or 7 pin)	DL96	10/-	EL38	26/6	LN152	12/6	QP25	15/-	UCH81	11/6		
1HSGT	11/-	6CH6	12/6	7B6	19/3	20P1	26/6	23/3	DLS10	10/6	EL41	11/-	LZ319	9/-	QS150/15		UCL82	15/6		
1L4	6/6	6D3	19/11	7B7	8/6	20P3	23/3	AC2PEN	DM70	8/6	EL42	11/6	MH4	7/-	R12	10/6	UF41	9/6		
1LD5	5/-	6D6	6/6	7C5	8/-	20P4	26/6	23/3	EA50	2/-	EL81	15/-	MHL4	7/6	R18	17/6	UF42	18/7		
1LNS	5/-	6E5	12/6	7C6	8/-	20P5	23/3	AC2PEN	EA76	9/6	EL84	9/6	MHLd6	12/6	R18	17/6	UF42	18/7		
1NSGT	11/-	6F1	26/6	7D5	23/3	25A6G	19/3	DD	26/6	EABC80	9/6	EL91	5/-	M4	12/6	R19	19/11	UF80	10/6	
1R5	7/6	6F6G	7/-	7H7	8/-	25L6GT	10/-	AC4PEN	EAC91	7/6	EL95	10/6	ML6	6/6	Sd6	12/6	UF85	10/6		
1S4	9/-	6F6GTM	8/-	7R7	12/6	25Y5	10/6	26/6	EAF4	10/6	EM34	10/6	MPT4	(5 or 7 pin)	SP4(7)	15/6	UF89	10/6		
1S5	7/6	6F8	12/6	7S7	10/6	25Y5G	10/-	AC5PEN	EB34	2/6	EM71	23/3	7	7	SP4	3/6	UF89	23/3		
1T4	6/6	6F11	17/3	7V7	8/6	25Z5	10/6	23/3	EB41	8/6	EM78	10/6	MU14	10/6	SP62	12/6	UL41	9/6		
1U5	10/-	6F12	7/6	7Y4	8/-	25Z4G	10/-	AC6PEN	EB91	6/6	EM81	10/6	MX40	26/6	SP61	12/6	UL44	26/6		
2A7	10/6	6F13	12/6	8D2	3/6	25Z6G	10/-	AC/HL	EBC33	7/6	EN31	10/6	N77	19/11	SU25	26/6	UL46	15/6		
2C26	4/-	6F14	26/6	8D3	7/6	25Z6GT	16/7	DD	15/-	EBC41	10/-	EY51	10/6	N77	19/11	SU61	10/6	UL84	11/6	
2D13C	7/6	6F15	15/3	9D2	4/-	27SU	19/11	AC/PD	8/-	EBC81	13/11	EY83	16/7	N108	10/7	T41	23/3	UM4	17/3	
2P	26/6	6F16	9/6	9BWC	15/3	28D7	7/-	AC/TP	33/2	EBF80	10/-	EY86	11/6	N308	20/7	TDD4	24/7	URIC	16/7	
2X2	4/6	6F17	12/6	10C1	14/6	30C1	9/-	AC/VPI	15/-	EBF89	9/6	EZ35	6/6	N339	26/6	TH4B	26/6	UU6	19/11	
3A4	7/-	6F32	10/6	10C2	26/6	30F5	8/-	AC/NP23/3		EBL21	23/3	EZ40	8/-	OA70	5/6	TH41	26/6	UU6	26/6	
3A5	12/6	6F33	7/6	10D2	12/6	30FL1	10/-	ATP4	5/-	EBL31	23/3	EZ41	10/-	OA71/81	6/6	TH233	33/2	UYIN	16/7	
3B7	12/6	6G6	6/6	10F1	17/6	30L1	9/-	AZ1	16/7	EC53	5/6	EZ80	9/6	OC72	30/6	TH232	20/6	UY21	16/7	
3D6	5/-	6H6GTG	3/6	10F9	10/6	30P12	12/6	AZ31	10/-	EC54	6/-	EZ81	9/-	P61	13/6	TF22	15/6	UY41	8/6	
3Q4	7/6	6H6GTM	3/6	10LD3	10/-	30P16	8/6	AZ41	13/11	EC70	12/6	FC2A	24/7	PABC80	15/6	TP2620	33/2	VMP4(7)	12/6	
3QSGT	9/6	6J5G	5/6	10LD11	15/11	31	7/6	BL63	7/6	EC33	15/-	FC4	26/6	PCC84	9/6	TR86F	19/11	VP2(7)	12/6	
3S4	7/6	6J5GTM	6/6							EC33	8/6	FC13	26/6	PCC85	12/6	U12/14	12/6	VP4(7)	12/6	
3V4	7/6	6J5GTM	6/6	10P13	15/6	31A/158M		C1	12/6	EC33	8/6	FC13C	26/6	PCC89	29/10	U16	12/6	VP4B	23/3	
5R4G	17/6	6J6	5/6	10P14	19/3			C1C	12/6	EC34	24/7	FW4/500		PCC80	9/6	U18/20	10/6	VP13C	7/6	
5U4G	8/6	6J7G	6/6	11D3	24/7	35/51	30/6	CB1	26/6	EC35	8/6	10/-		PCF82	12/6	U22	8/6	VP23	6/6	
5V4G	11/6	6J7GT	10/6	12A6	6/6	35A5	9/6	CB13	23/3	EC40	23/3	FW4/800		PCF82	12/6	U28	29/10	VP41	12/6	
5X4G	12/6	6K6GT	8/6	12AC6	15/3	35L6GT	9/6	CBH35	23/3	EC81	8/6	10/-		PCL82	12/6	U24	29/10	VP42	12/6	
5Y3G	8/-	6K7G	5/-	12AD6	17/3	35W4	8/6	CK506	6/6	EC82	7/6	GZ30	10/6	PCL84	21/11	U25	17/11	VR105/309/2	12/6	
5Y3GT	8/6	6K7GT	6/6	12AE6	13/11	35Z3	10/6	CL33	19/3	EC83	8/6	GZ32	12/6	PEN4DD	5/6	U26	12/6	VR150/309/2	12/6	
5Y4	12/6	6K8G	8/-	12AH7	8/-	35Z4	7/6	CV63	10/6	EC84	10/-	GZ34	14/-	5/6	26/6	U31	10/6	VT61A	5/-	
5Z3	12/6	6K8GT/G		12AH8	10/6	35Z5GT	9/6	CV85	12/6	EC85	9/6	H30	5/-	PEN25	19/11	U31	26/6	VT501	5/-	
5Z4G	10/6		12/6	12AT6	10/6	41MTL	8/-	CV271	10/6	EC91	5/6	H63	12/6	PEN36C	10/6	U35	26/6	W61M	26/6	
5Z4GT	12/6	6K25	19/11	12AT7	8/-	42	23/3	CV428	30/-	ECF80	13/6	HABC8013/6		PEN40DD	U37	26/6	W76	7/6	W67	6/6
6A7	26/6	6L1	23/3	12AU6	23/3	43	23/3	CY1	16/7	ECF82	10/6	HL133DD		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6A8	10/-	6L6G	9/6	12AU7	7/6	50C5	12/6	CY31	16/7	ECH3	26/6	HL23DD		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AB7	8/-	6L7GT	12/6	12AX7	8/-	50CD6G		DI	3/6	ECH21	23/3	HL23	10/6	PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AB8	12/6	6L18	13/6	12BA6	9/-	29/10		D15	10/6	ECH35	9/6	HL23DD		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AC7	6/6	6L19	23/3	12BE6	10/-	50L6GT	9/6	D42	10/6	ECH42	9/6	HL41DD		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AG5	6/6	6LD20	15/11	12BFH7	21/3	53KU	19/11	D63	5/6	ECH81	9/-	HL41	12/6	PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AK5	8/-	6N7	8/-	12C8	15/-	72	4/6	D77	6/6	ECL80	12/6	HL41DD		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AL5	6/6	6P1	19/3	12E1	30/-	75	24/7	DAC32	11/-	ECL82	12/6	19/3		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AM6	7/6	6P25	12/6	12J5GT	4/6	77	8/6	DAF91	7/6	ECL83	24/7	23/3		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AQ5	8/6	6P28	26/6	12J7GT	10/6	78	8/6	DAF96	10/6	EF9	29/3	19/3		PEN45DD	U52	8/6	W729	18/7	W719	6/6
6AT6	8/6	6Q7G	10/-	12K5	17/11	80	9/-	DD41	13/11	EF22	14/-	HN309	24/7	4020	33/2	U282	22/7	X66	12/6	
6AU6	10/6	6Q7GT	11/-	12K7GT	7/6	83	15/-	DDT4	24/7	EF36	6/-	HVR2	20/7	PL33	19/3	U301	23/3	X76M	14/6	
6B7	10/6	6R7G	10/-	12K8GT	14/-	83V	12/6	DF33	11/-	EF37A	8/-	HVR2A	6/-	PL36	15/-	U329	15/-	X78	21/3	
6B8G	4/6	6SA7GT	8/6	12Q7GT	7/6	85A2	15/-	DF91	6/6	EF39	6/-	KF35	8/6	PL38	26/6	U339	16/7	X79	21/3	
6B8GTM	5/-	6SC7	10/6	12SA7	8/6	150B2	15/-	DF96	10/-	EF40	15/-	KK32	21/11	PL81	13/6	U403	16/7	X109	17/3	
6BA6	7/6	6SG7GT	8/-	12SC7	8/6	185B7	33/2	DH63	10/-	EF41	9/6	KL35	8/6	PL82	8/6	U404	10/6	XD(1.5)	6/6	
6BE6	7/6	6SH7	8/-	12S7G	8/6	203THA	26/6	DH63(M)	17/6	EF42	12/6	KLL32	24/7	PL83	11/6	U801	29/10	XFG1	18/6	
6BG6G	23/3	6J57	8/-	12SH7	8/6	203THA	26/6	(M)		EF50(A)	7/6	KT2	5/-	PM2B	12/6	U801	29/10	XG(1.5)	6/6	
6BH6	9/-	6SK7GT	8/-	12SJ7	8/6	220T	24/7	DH76	7/6	EF50(E)	5/-	KT33C	10/-	PM12	6/6	U801	29/10	XG(1.5)	6/6	
6BJ6	7/6	6SL7GT	8/-	12SK7	8/6	305	10/6	DH77	8/6	EF54	5/-	KT36	29/10	PM12M	6/6	U801	29/10	XG(1.5)	6/6	
6BR7	23/3	6SN7GT	7/6	12SQ7	12/6	402PENA		DH107	13/11	EF73	10/6	KT41	26/6	PM24M	21/3	U841	12/6	Z63	10/6	
6BV6	9/6	6SO7GT	9/-	12SR7	8/6			DK32	21/11	EF80	8/6	KT44	15/-	PX4	33/2	UBC41	10/6	Z66	20/6	
6BW7	8/-	6SS7	8/-	12Y4	10/6	807	7/6	DK40	21/3	EF85	7/6	KT61	12/6	PX25	59/8	UBC81	13/11	Z77	7/6	
6BX6	8/-	6U4GT	12/6	1457	23/3	956	3/6	DK91	7/6	EF86	14/6	KT63	7/6	PY31	16/7	UBF80	9/6	Z719	8/6	
6C4	7/-	6U5G	7/6	15D1	26/6	1821	16/7	DK92	10/6	EF89	10/-	KT66	15/-	PY32	19/11	UBF89	10/6	Z729	14/6	

NEW METAL RECTIFIERS—FULLY GUARANTEED

DRM-1B	15/4	RM-2	9/-	WX3	3/6	14A100	27/-	14RA 1-2-8-2	19/-	16RE 2-1-8-1	8/6
DRM-2B	16/2	RM-3	9/6	WX4	3/6	14A124	28/-	14RA 1-2-8-3	23/6	18RA 1-1-8-1	4/6
DRM-3B	23/3	RM-4	18/-	WX6	3/6	14A163	38/-	14RA 2-1-16-1	21/-	18RA 1-1-16-1	6/6
LW7	22/6	RM-5	24/-	14A86	18/-	14B130	35/-	16RC 1-1-16-1	8/6	18RA 1-2-8-1	11/-
RM-0	7/11	W4	3								

FOR YOUR CONVENIENCE EASY, NO DEPOSIT, INTEREST FREE DEFERRED TERMS ON ALL GOODS

17" T/V CHASSIS, TUBE and SPEAKER 16 GNS.



17in. Rectangular Tube on modified chassis. Supplied as single channel chassis covering B.B.C. channels 1-5, or incorporating Turret Tuner, 50/- extra (chassis purchasers only), giving choice of any 2 channels (B.B.C. and I.T.A.). Extra channels can be supplied at 7/6 each. Chassis size 12 x 14½ x 11in. With Tube and Speaker (less valves), 16 gns.

Complete and working with valves and Turret Tuner, 24 gns. cash price. OR initial payment of £3 (plus Ins. & Carr.) and 36 weekly payments of 12/4.

12 months' guarantee on the Tube, 3 months' guarantee on the valves and chassis. Ins. Carr. (incl. Tube), 25/-.

14in. T.V. CHASSIS, TUBE & SPEAKER, 11 GNS.

As above, with 14in. Rectangular Tube. 12 months' guarantee on Tube, 3 months' guarantee on chassis and valves. Chassis with Tube & Speaker (less valves), 11 guineas. Complete and working with valves and Turret Tuner, 19 guineas. Ins. Carr. (incl. Tube), 25/-.



★ REPLACEMENT REBUILT T/V TUBES

12 MONTHS' FULL GUARANTEE YOURS FOR 8/6 INITIAL PAYMENT AND 19 WEEKLY PAYMENTS OF 8/6.

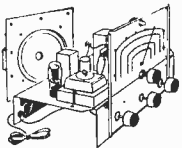
(plus Carr. & Ins.)

CASH PRICE £8/10/-

All sizes and types except 10in. Completely rebuilt gun assembly, new cathode, heaters, etc., giving the high standard required for long picture life, quality and value. Carr. & Ins. 15.6.

EXPRESS DESPATCH SERVICE

Please phone to confirm Tube in stock. Send Telegraph Money Order (cash only). Tube despatched Passenger Train same day. This service only available with remittance by a Telegraph Money Order.



SOLO SOLDERING TOOL 12/6

110 v., 6 v. or 12 v. (special adaptor for 200/240 v., 10/- extra). Automatic solder feed including a 20 ft. reel of Ersin 60/40 solder and spare parts. It is a tool for electronic soldering or car wiring. Revolutionary in design. Instantly ready for use and cannot burn. In light metal case with full instructions for use. Post 3/6.



FAMILY RADIO. £6.10.0

5 valve (octal) superhet. A.C. 3 waveband and gram. position. 4 controls. Modern attractive cabinet size 15½ x 18 x 10½in. in cream and brown. Carr. & Ins. 8/6.

RECORD PLAYER CABINET R.P.4 79/6

Cash Price



Stylish cabinet. Cloth covered in contrasting colours (red and grey). Grilled front controls panel. Size 15 x 19 x 8½in. deep. Takes 4-speed B.S.R. Autochanger. 6½in. round or 4 x 7in. elliptical speaker. Carr. & Ins. 4/6.

OR INITIAL PAYMENT OF 5/1 (PLUS CARR. AND INS.) AND 19 WEEKLY PAYMENTS OF 3/11.

WORLD'S FINEST AUTOCHANGER

U.A.8. B.S.R. MONARCH 4-SPEED AUTO-CHANGER. CASH PRICE £6.19.6

OR INITIAL PAYMENT OF 8/1 (PLUS CARR. AND INS.) AND 19 WEEKLY PAYMENTS OF 6/11.

U.A.12. Latest B.S.R. Monarch 4-speed mixer, £8.9.6.

T.U.9. B.S.R. 4-speed single player, 89/6.

B.S.R. Monarch 4-speed Stereo Autochanger, £9.19.6.

Collaro Conquest 4-speed Autochanger, £6.19.6.

Collaro Conquest Stereo Autochanger, 11 gns. Carr. & Ins. on all above 5/6.

PORTABLE AMPLIFIER

MK. D.1 59/6

12 Months' Guarantee



Brand new. Latest design with printed circuit. Dimensions 7 x 2½ x 5in. A.C. only. Mains isolated. 2-3 watts output. Incorporating EL84 as high gain output valve. Volume and tone controls. Knobs 2/6 extra. P. & P. 3/6.

IDEAL FOR STEREPHONIC SOUND

8in. P.M. Speaker, 8/9. 6½in. or 4 x 7in. Elliptical Speaker, P.M. Speaker, 12/6. 8 x 5in. 19/6. Post 2/9.

EXTENSION SPEAKERS

19/9

CASH PRICE



Polished oak cabinet of attractive appearance. Fitted with 8in. P.M. Speaker, W.B. or Goodmans of the highest quality. Standard matching to any receiver (2-5 ohms). Switch and flex included. Ins. & Carr. 3/6.

OR INITIAL PAYMENT OF 9d. (PLUS INS. CARR.) AND 19 WEEKLY PAYMENTS OF 1/-.

B.S.R. FUL-FI Crystal Turnover Cartridges, 19/6

Brand new. Including sapphire needles for L.P. and Standard giving fullest range and finest tone obtainable for any player. Can be fitted to all standard pick-up arms. P. & P. 9d.

DUKE & CO.

(DEPT. E.7),

621/3, ROMFORD RD., MANOR PARK, E.12. Tel.: ILF. 6001/3.

Deferred terms to suit all pockets. Monthly credit terms or weekly easy payments—details on request.

For maximum reliability 'LECTROPACK' ETCHED FOIL ELECTROLYTICS

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T.C.C. "Lectropack" Dry Electrolytic Condensers are robust yet compact and employ ALL-ALUMINIUM non-corrosive internal construction. The range below is a useful guide to the types available.

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200	"	"	770	4 1/2	1 1/2	CE 36 LE	24/-
60 - 100	"	"	500	4 1/2	1 1/2	CE 36 LEB	23/-
60 - 250	"	"	500	4 1/2	1 1/2	CE 60 LEB	34/-
100 - 100	"	"	550	4 1/2	1 1/2	CE 36 LEA	26/-
100 - 200	"	"	700	4 1/2	1 1/2	CE 60 LEA	33/-
60	450	550	450	3 1/2	1 1/2	CE 38 PE	14/-
60 - 100	"	"	500	4 1/2	1 1/2	CE 60 PE	29/-

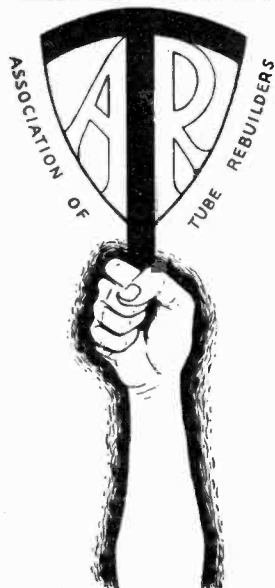


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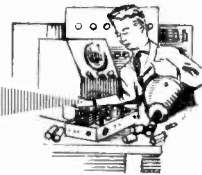
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Practical Television



& TELEVISION TIMES

Vol. 9 No. 108

EVERY MONTH

JULY, 1959

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110 DEG. C.R. TUBES

THE progress of domestic television is at present relatively slow, but advances in design and technique do take place, and the latest is the introduction of cathode-ray tubes with deflection angles of 110 deg. The early TV picture tubes used when electronic television first commenced had deflection angles of 70 deg. (meaning that the electron beam was deflected through an angle of 70 deg. in its travel from one side of the picture to the other). Developments in circuitry and tube design eventually enabled the deflection angle to be increased to 90 deg., and one important result of this was the reduction in the length of the tube which was made possible. A deflection angle of 110 deg. enables the tube to be made shorter still, and already designers of cabinets for TV receivers are taking advantage of this.

No doubt further reduction in tube lengths will take place in the near future. Indeed, it has been reported that one manufacturer has succeeded in producing a prototype of a flat TV tube which is rectangular and only about 3in. deep. If such tubes eventually appear it will be possible to incorporate TV screens in the wall of the room, or to hang them on the wall like a picture frame. The receiver proper could then be housed in a remote part of the house.

ADVERTISING ON TV

MANY readers have written to us to express their dislike of the advertising breaks on commercial television. All agree that the length of these advertisements is far greater than it used to be when ITV first commenced and that their quality has greatly deteriorated. As many readers will know, questions have been asked in Parliament about the increased time allotted per hour to advertisements.

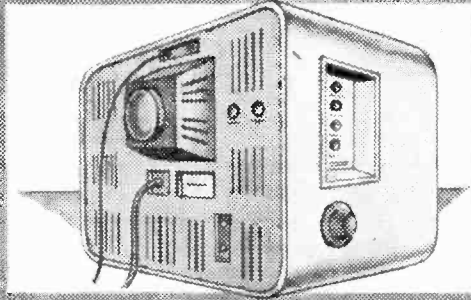
Large manufacturers of various goods are spending more and more on television advertising with the result that the price of the advertising is increasing because of the restricted amount of space available. The profits of commercial television companies are rising yearly and reach astronomical figures. At present it appears that this state of affairs will continue unless the advertisers and the TV authorities come to some understanding. They must surely realise that they are antagonising their public with the result that ITV is gaining the reputation of being an interminable series of "natural breaks."

INDEX TO VOLUME 8

WILL readers please note that the index to Volume 8 is now available for 1s. 3d., by post from the publisher, address as on this page. Readers are reminded that loose-leaf binders for this journal are available for 10s. 6d., post free. Please state the volume number when ordering.

Our next issue, dated August, will be published on July 22nd

Servicing Television Receivers



No. 48.—REGENTONE T176. ARGOSY 17K40. DEFIANT T1410, T1710, ETC. By L. Lawry-Johns

THESE receivers and several others use a Plessey dual band chassis. Most makes use Mullard valves and tubes but some, such as the Defiant fit Mazda. There are minor differences but the chassis layout is practically identical and the circuit in Fig. 1 of the Regentone is representative of all the models.

Tube

The tube used in the Defiant models is a CRM143 or CRM144 in the 14in. version; a CRM171 or CRM172 in the 17in., these being Mazda. An MW43-64 17in. Mullard tube is used in the Regentone and Argosy models.

These sets are suitable for use on A.C. or D.C. mains of 200-250V, and are intended for operation in the service area (not in fringe areas unless reception conditions are favourable). These receivers are very reliable and give little trouble and this is due in no small measure to the relative simplicity of the circuit used.

H.T. Supply (Fig. 1)

The H.T. rectifier V14, is a PY32 and the faults caused when this valve becomes defective will be discussed first. In common with all rectifiers, not necessarily of the valve type, the PY32 does tend to spark internally between the electrodes and this is often the cause of fuse FS1 (occasionally

FS2) blowing. When a fuse fails, the effects depend upon which of the two fuses is defective. If FS2 goes, the receiver is completely dead owing to one side of the mains supply becoming open circuited. If FS1 fails, the valve heaters continue to glow, but there is no picture, sound, hum, or line timebase whistle owing to the H.T. supply circuit being broken. If a replacement fuse causes the set to function for a period and then this blows also, suspect the PY32 valve (V14) and replace it.

Emission

After a period of use, the emission of the PY32 may begin to fail and the symptoms of this will include lack of width; compression at the bottom of the picture; changed setting of the focus control and perhaps a slight loss of contrast and general definition.

The next common complaint is due to a defective EY51 (U25 in Defiant) EHT rectifier (see Fig. 1). (Before going further we would make it clear that EY51 and U25 valves are *not* interchangeable. The EY51 and its equivalents have a 6.3V heater, the U25 a 2V heater.) A failing EHT rectifier causes the position of the brilliance and contrast controls to become critical, i.e., if they are advanced beyond a certain point the picture expands, goes out of focus and disappears.

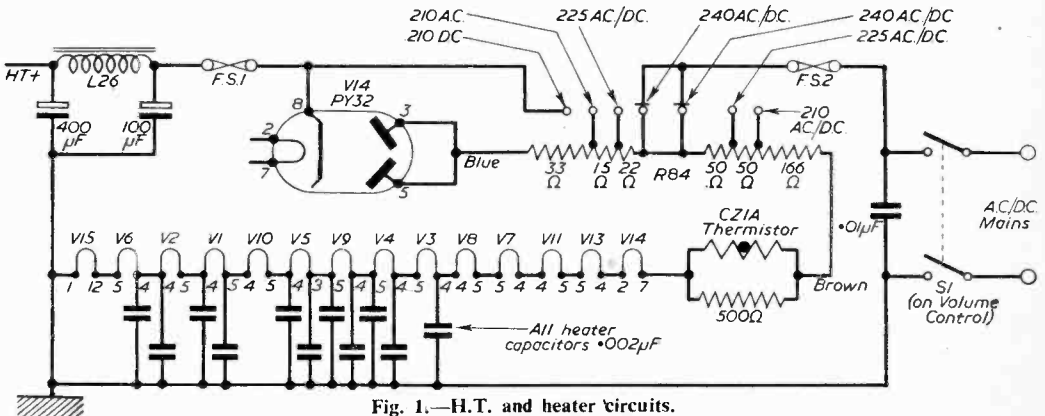


Fig. 1.—H.T. and heater circuits.

However, as with all other receivers fitted with a bent gun assembly (ion trap) a displaced ion trap magnet will give rise to these or similar symptoms, but if the symptoms are accompanied by an initial lack of width or poor line linearity, check the PL81 and PY81 valves. Insufficient line drive may be causing the EHT rectifier to be under-run. (In Defiant receivers, V11 is a 30P4, and V13, a U191.)

Heater Failure

If the heater of V12 has failed altogether there will be no picture at all at any setting of the controls. It is possible to be misled by these symptoms as the heater power for the EHT rectifier is derived from the line output transformer. Thus, of course, a failure in the line timebase will result in V12 being unheated although the valve may be perfectly in order. Therefore, if V12 is out, listen for the line timebase whistle and attempt to draw a spark from the single wire end of V12. If a healthy blue spark crackles to the blade of a screwdriver, the line timebase can be assumed in order and only V12 need be suspected.

An internal short in V12 will result in the high A.C. voltage at the anode (single wire) end of the valve being applied to the C.R.T. and thus to the EHT smoothing capacitor, whether this consists of the outer and inner coatings of the C.R.T. or is an actual capacitor (C68).

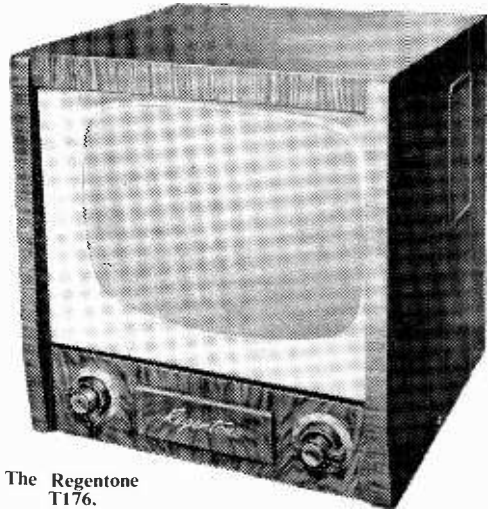
Confusing Symptoms

The symptoms seem to cause some confusion and will thus be briefly explained. A receiver with an internally shorted V12 presents no picture and the line timebase whistle is subdued and "strained," being of a different pitch from the normal. V12 may glow blue or show no light or coloration at all.

Removal of the EHT lead from the C.R.T. (or

from C68) results in extremely heavy sparking from the EHT clip or cap, identical to that obtained at the single wire end of V12, but the line whistle recovers and sounds much relieved at being released from its burden.

The explanation is that the coatings of the tube or the capacity of C68 will present a path of low resistance to an A.C. voltage and thus



The Regentone T176.

the anode of V12 is virtually shorted to chassis. Now this condition is very easily confused with the effect of a first anode-to-grid short in the tube or a short in C68. In this case the D.C. output is shorted thus overloading the valve and line output stage (perhaps damaging V12, the EHT rectifier). The behaviour of the EHT clip and V12 when removed from the tube

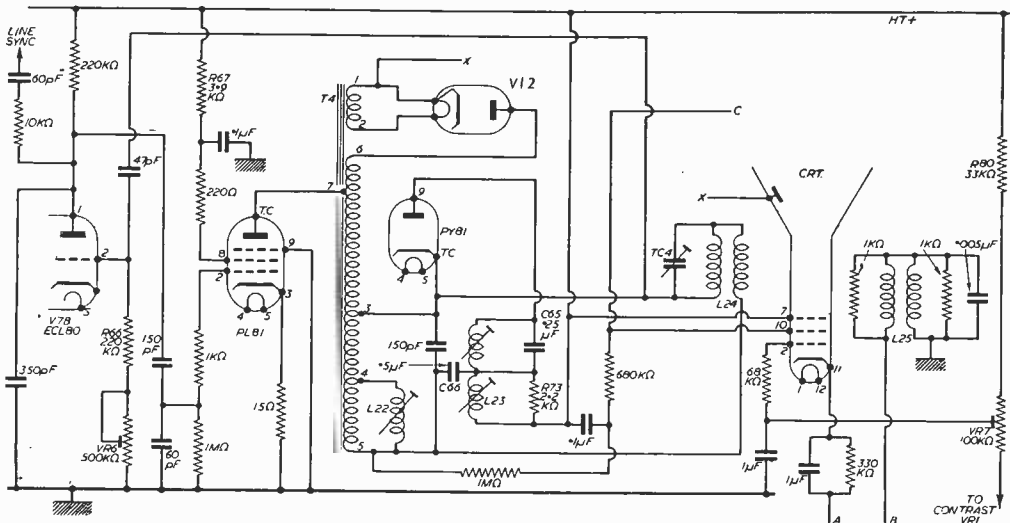


Fig. 2.—Line oscillator, output and tube circuits. Note :—C68 (EHT smoothing capacitor) is not shown as it is not fitted on all models.

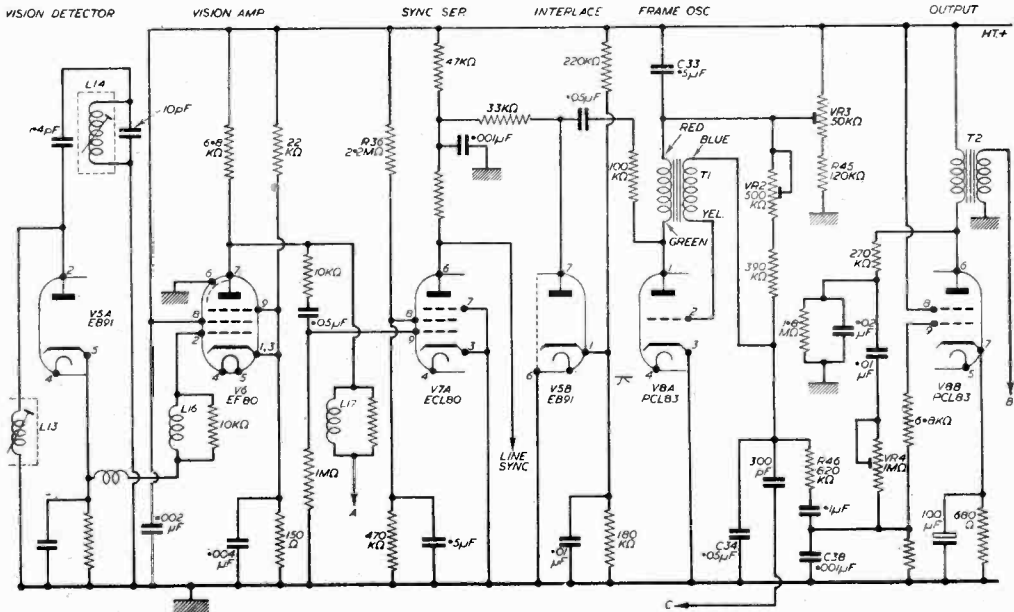


Fig. 3.—Video, sync and frame circuits.

or C68 provides the distinguishing characteristics. When V12 is shorted the EHT clip carries the same high voltage A.C. as the V12 anode and the spark is unmistakable, being quite violent.

Different Spark

Where the tube or C68 is at fault a difference will be obvious when a spark test is made. Although the spark at the EHT clip will be vigorous, it will be thinner and distinctly blue, lacking the flame-like quality of the V12 anode spark when subjected to the same test. The above remarks apply to receivers generally and not to these models in particular.

Thus when the conditions of no picture, no raster, sound O.K. is met, check the right side rear section, first noticing whether V12 is lighting up at all.

Frame Timebase—Fig. 3

A common condition in these receivers is that they show a brilliant horizontal line when the brilliance is advanced with nothing else on the screen. The sound continues without complaint. This immediately directs attention to the frame timebase, firstly V8 the oscillator output valve, PCL83 (30PL1 in Defiant). This valve is the most common cause of frame timebase failure. If a replacement fails to produce a raster, check for H.T. voltage

at pins 6 and 1 of its valve base. If there is no reading at pin 6 suspect an open-circuited primary winding in T2. If there is no reading at pin 1, suspect T1 and VR3 (either may be O.C.). If, however, there is H.T. at pins 1 and 6 check C37 and associated components.

(Continued on page 608)

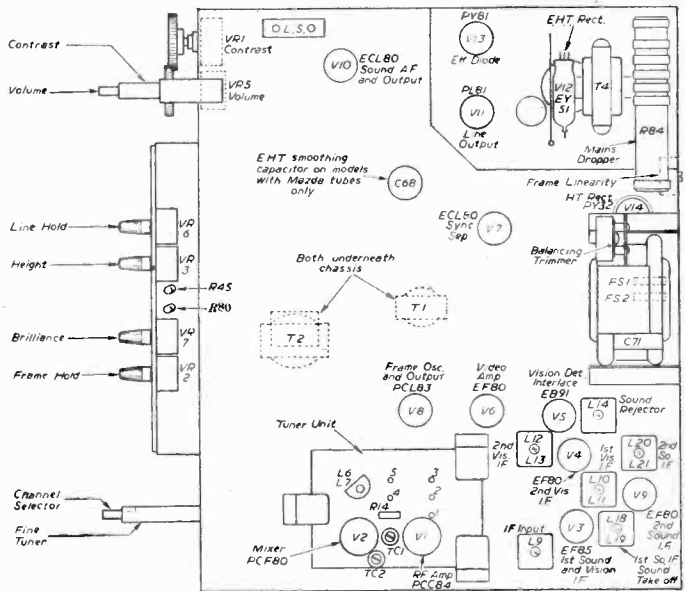


Fig. 4.—The chassis layout.

A Stacked Aerial Array

A VERY EFFICIENT BAND III UNIT SUITABLE FOR USE IN FRINGE AREAS

By A. Sydenham

IN areas of low Band III signal strength viewers are hard pressed to obtain a sufficiently strong signal with the result that the picture received has ragged edges and "snow" and grain effects weary the eyes. Whilst a preamplifier can sometimes prove beneficial it is the aerial that should first receive attention and only when this important item has been attended to should the use of a preamplifier be considered.

Stacked Array

This article describes a very high gain array that utilises both end-fire and broadside characteristics and which is capable of being erected in most lofts or attics. The aerial will prove very efficient in fringe areas, the estimated gain being some 14dB over a dipole.

The aerial is a stacked array and is illustrated in Fig. 1. The active section consists of two

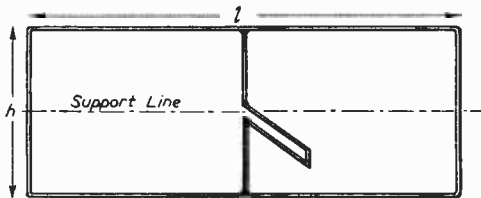


Fig. 2.—The active element of the aerial.

$\frac{1}{2} \lambda$ squares brought so close together that they touch, thus allowing the central vertical element to become common to both and available for cable connection purposes. The active element is more clearly shown in Fig. 2 and although 300 ohm balanced twin cable can be directly connected, a matching stub is incorporated so that coaxial cable can be used if preferred.

Elements

To improve both the forward gain and also the front to back ratio, parasitic elements are added and these modify the feed point impedance. The matching stub proves most useful when optimum results are required. When 75 ohm cable is used the tap in is approximately 3in. from the shorted end of the stub.

Ten directors are used as "double fives" (see Fig. 3) and a reflector screen (see table) is placed at the rear, the size of which is limited by the amount of erection space available. The more

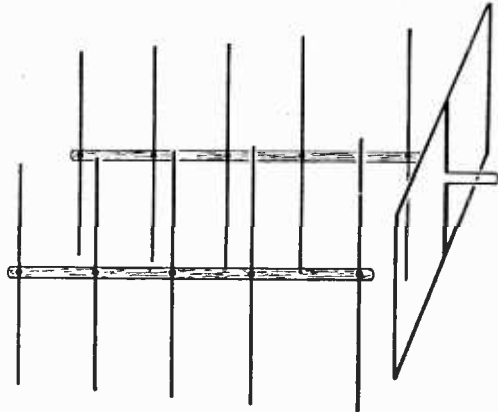


Fig. 1.—The aerial array (reflector not shown for clarity).

usual $\frac{1}{2} \lambda$ elements may be used as reflectors if preferred.

Construction

To facilitate erection in a loft it is probably best to make up the array as four separate items, each physically independent of the others and mounted separately, care being taken to ensure that in the final assembly both sets of directors lie parallel to each other with the longest element of each 11in. in front of the outer elements of the active rectangle with the reflector(s) approximately 13in. behind and also parallel to the active elements.

Dimensions for the various Band III channels are given in the table, those shown for Channel 11 being identical with the prototype, the others being calculated on this basis. Inter-element spacing has deliberately been reduced in order to keep the overall size down, the slight loss in efficiency being considered negligible.

Materials

For the various elements $\frac{1}{8}$ in. \times 20 s.w.g. alloy tubing is recommended. It is readily worked and can easily be bent by heating to a dull red and allowing it to cool slightly before making the bend. For the director carriers, broom

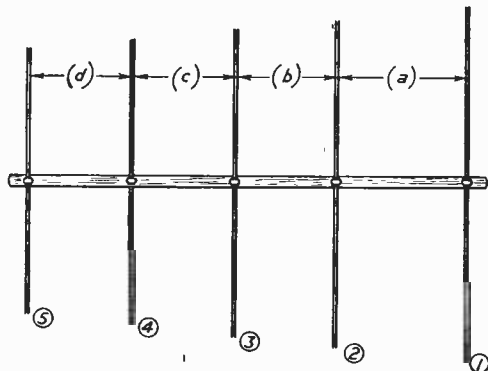


Fig. 3.—The spacing of the directors (see Table overleaf).

DIMENSIONS OF THE ELEMENTS

Channel	Active elements		Directors					Spacing	
	l	h	1	2	3	4	5	a	b-d
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	in.
8	2 0	13	2 1 $\frac{3}{4}$	2 0 $\frac{1}{2}$	1 11 $\frac{1}{4}$	1 10	1 9 $\frac{1}{2}$	11	8
9	2 0	13	2 1 $\frac{1}{4}$	2 0	1 10 $\frac{3}{4}$	1 9 $\frac{1}{2}$	1 9	10 $\frac{1}{2}$	7 $\frac{1}{2}$
10	1 11	12	2 0 $\frac{3}{4}$	1 11 $\frac{1}{2}$	1 10 $\frac{1}{2}$	1 9	1 8 $\frac{1}{2}$	10	7
11	1 11	12	2 0	1 10 $\frac{3}{4}$	1 9 $\frac{1}{2}$	1 8 $\frac{1}{2}$	1 8	10	6 $\frac{1}{2}$

Reflector—5ft. x 5ft. (or elements 10 per cent. longer than D1).
Stub length—As "h," spaced 1 $\frac{1}{2}$ in. and shorted at far end.

Positioning

Unfortunately the strongest signal is not always obtained at the most convenient erection position in a loft and it might in some cases—a new installation, for example—be necessary to "hunt" for the signal. Where an aerial converter is in use for Band III purposes it is sometimes convenient when "hunting" to tune the local oscillator in the converter

handles of lin. diameter are excellent, slots being cut to take the elements and keep them from skewing. The elements are held by $\frac{1}{8}$ in. screws. The screen is easily made from chicken wire netting secured to a light wooden frame. All woodwork may be treated with preservative or painted on completion. The foregoing presupposes an installation in a loft. A more substantial construction would be required for outdoor use.

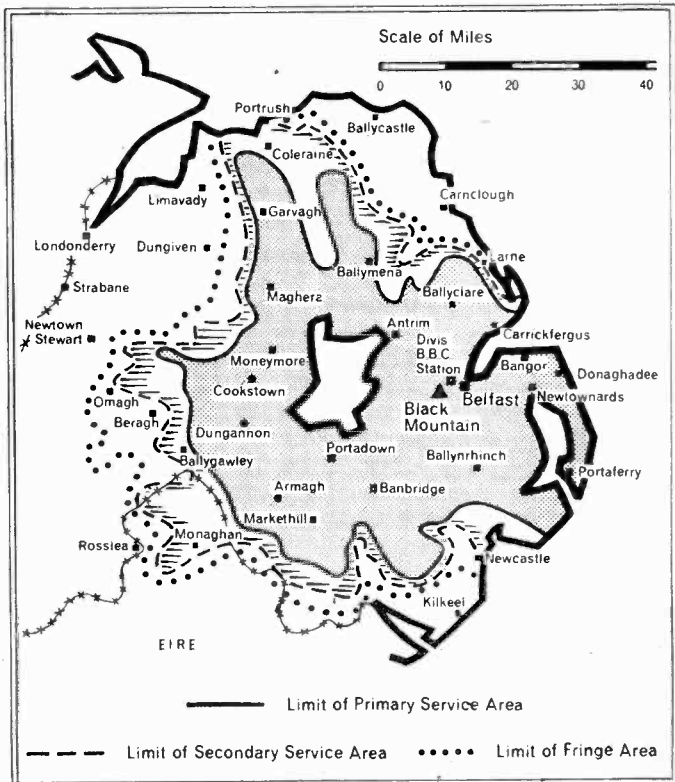
until vision on sound is apparent. The unmistakable drone can then be adjusted to a suitable level by means of the receiver volume control so that it can be heard in the loft and by this means it is possible to ascertain approximately the best position. The active loop used on its own should be sufficient for this rough test. Further improvements can be made when the array is completed whilst an assistant watches the picture and comments.

N. IRELAND ITV STATION

THE I.T.A.'s transmitter at Black Mountain will be the first ITV station to operate in Northern Ireland. The aerial array is being supplied by Marconi's and the mast by B.I.C.C.C. The site is 987ft. above sea level and the main aerial height will be 1,687ft. The transmitter will operate on Channel 9, with horizontal polarisation, the vision frequency being 194.74325Mc/s and the sound frequency 191.230Mc/s.

The programme contractor is Ulster TV Co., Ltd., of 43, Donegal Street, Belfast, with London offices at 1, Hanover Square, W.1. The studios for local programmes will be built in Belfast and the connection to the national I.T.A. network will probably be by radio link from Carlisle.

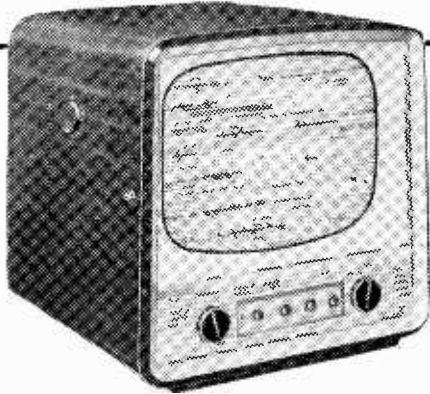
The map on the right shows the estimated coverage of the station; viewers in the primary service area (bounded by the 2mV/m median contour) should receive a consistently satisfactory service. The majority of those in the secondary service area (within the $\frac{1}{2}$ mV/m median contour) should also receive a satisfactory service. Adaptable reception should be possible in many places in the fringe area (defined by the $\frac{1}{4}$ mV/m median contour) although interference may be present at times.



Estimated coverage of the transmitter.

TELEVISION

TROUBLES



Model BT5147—Self-generated Interference

CONTINUING with the range of G.E.C. receivers, an interference fault, producing small white spots on the picture and a slight hiss on sound is sometimes experienced on the model given above. Although, on the face of it, the trouble may seem removed from the timebase or sync circuits, it is, in fact, present only when the line timebase comes into action, and during the period that this section of the set is warming up. The sound, which comes on a minute or so beforehand, is free from the interference effect.

The indication is, therefore, that the trouble lies somewhere in the line timebase section. However, since the interference spots appear in random manner over the whole picture, impaired insulation in the line output transformer can be excluded, as this fault gives the symptom of vertical columns of short, irregular white dashes, owing to the resulting interference which in this case is synchronised with the line oscillator.

Insulation Failure

As shown in Fig. 1, there is a 50pF capacitor connected between the cathode of the U329 and chassis, and it is the insulation of this which fails and promotes the disturbance. The cathode of the U329 is terminated at the top cap of the valve, so the capacitor is not difficult to locate, and it is quite a simple matter to disconnect the cathode side to prove the fault. Replacement should be made with a component rated at 5,000 volts working.

The receiver will operate with the capacitor disconnected, but the width of the picture will be reduced. Indeed, on some models the capacitor may not be connected—both terminals being earthed—and this may well be the case where it has been established that the width control will not reduce the scan sufficiently to give a picture of the correct width with the capacitor connected.

Their Symptoms and How They May be Cured—II By G. J. King

No Line or Frame Lock

This symptom is usually associated with trouble either in the sync separator or coupling circuits to the line and frame oscillator. However, in cases where this section appears to be in good order and yet the symptom persists, attention should be directed to the 16 μ F electrolytic smoothing capacitor.

The expected symptoms of hum on sound and a hum bar on the picture are not always present, so unless one is aware that a defective smoothing electrolytic can cause the trouble, considerable time may be wasted.

Models 7092 and 7094

One rather interesting fault is interaction between the line and frame hold controls. The line hold control may, for example, be set critically, but this adjustment will be destroyed when the frame hold control is adjusted, and vice versa. This, as would be expected, makes correct adjustment extremely tedious.

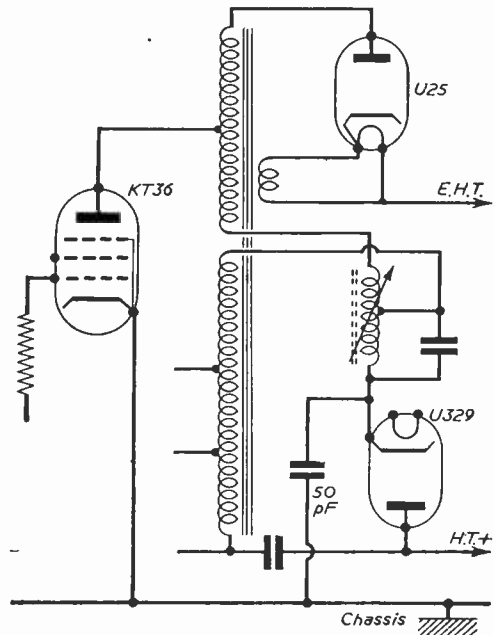


Fig. 1.—Self-generated interference is sometimes produced on the G.E.C. BT5147 by the 50pF capacitor at the cathode of the U329 becoming defective.

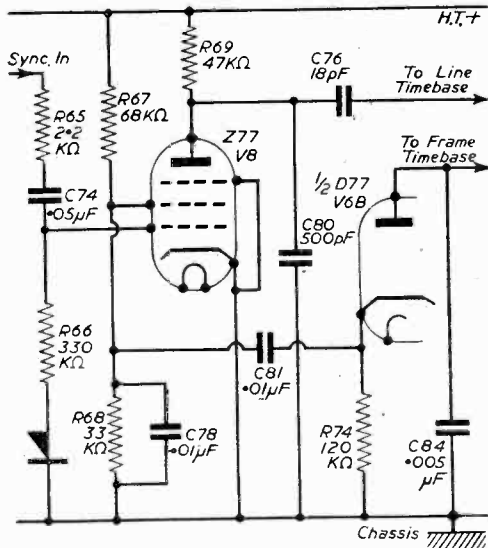


Fig. 2.—The sync separator of the G.E.C. BT1746 series.

The trouble is often caused by open-circuit of the $8\mu\text{F}$ electrolytic capacitor connected between one side of the focus coil and chassis.

Critical Frame Hold

On the same model, a very critical frame hold is the result of an open-circuit electrolytic capacitor connected across the cathode resistor of the video amplifier valve. The picture definition does not always suffer noticeably, but it is possible just to hold the picture vertically by very careful adjustment to the frame hold control. After a few minutes, though, the picture will nearly always begin to roll.

Model BT1746—Barretter Failure

This model features a type 305 barretter in the heater chain, and there have been a number of reports of this component having only a short life, and replacements failing after only a few weeks service.

The most likely cause of the trouble is an intermittent heater-to-cathode short in one of the three valves in the heater chain directly following the barretter. This is not essentially a timebase or sync fault, but since the valves concerned occupy positions in these circuits, the trouble is recorded in this present series. The valves are the U329 efficiency diode, the N339 line amplifier and the B329 oscillator.

Replacements

The most likely culprit is the U329 efficiency diode, and where the barretter has only a short life, some engineers also replace this valve. Unfortunately, this is by no means a conclusive remedy, but in view of the fact that the fault only occurs intermittently and very rarely shows up by a cold valve test, it is excusable.

However, if the barretter is replaced temporarily

with a 150W, 230V household lamp, a valve short will be revealed by the lamp illumination increasing during the short. By gently tapping the valves mentioned with the handle of a screwdriver, the culprit is sometimes revealed. Substitution tests may, however, be called for, running the set with the bulb after each change in obstinate cases.

An over-run barretter is indicated by the severe kinking of its filament.

Alternate Dark and Light Vertical Bars on Left of Picture

This is the symptom of ringing in the line timebase or interaction between the line and frame scan coils. To some degree the effect can be cleared by making careful adjustment to the trimmer capacitor on the scanning unit.

In obstinate cases, though, a breakdown of insulation between the line and frame coils may well be aggravating the effect. This can be proved quite simply by short-circuiting to chassis the centre tag on the frame scanning coils. An insulation breakdown will be shown up by a flash-over when such a short is promoted.

Insufficient Width and Poor Focus

The most likely cause of these accompanying symptoms is impaired efficiency of the metal H.T. rectifier. The H.T. voltage at the output of the rectifier is usually almost equal to, or a little higher than, the value of A.C. voltage at the input of the rectifier, as measured with a normal multi-range meter.

A lower voltage at the output, accompanied by the symptoms mentioned, will indicate a worn rectifier. This is a type RM4.

No Horizontal Hold and Impaired Frame Hold

This trouble is often caused by a low resistance or a short-circuit in C80, which is a 500pF capacitor connected between the anode of the sync separator valve (which is a Z77) and chassis (see Fig. 2).

Complete failure of the line hold, but with normal frame hold should lead to a check of the 18pF capacitor (C76) connected between the anode of the sync separator valve and the line oscillator.

On the other hand, normal line hold and impaired frame hold may well be caused by open-circuit of C81, being that 0.01 μF capacitor between the screen of the sync separator valve and the cathode of the interlace filter diode (V6B).

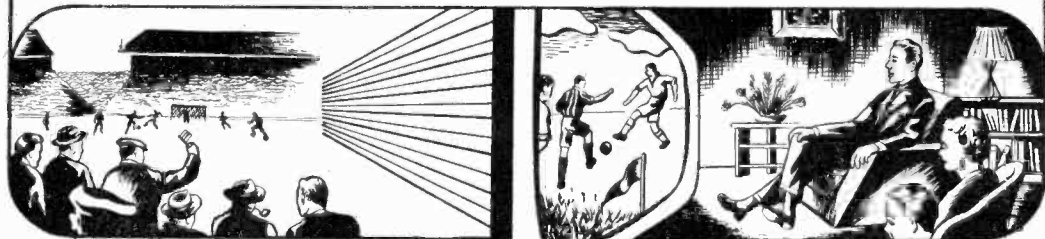
Interference Limiter

It is of interest to note that the other half of V6B is in the vision interference limiter circuit, and it often happens that a heater-to-cathode short in the valve generally results in uncontrollable brightness, which at first may give the impression that the picture tube is defective.

Referring again to Fig. 2, internal leakage in V8 can result in a weak picture with a "cogging" effect on Test Card "C." When this is the case, the contrast control has virtually no effect on the picture.

(To be continued)

TELENEWS



Television Receiving Licences

THE following statement shows the approximate number of Television Receiving Licences in force at the end of April, 1959, in respect of receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland.

Region	Total
London Postal	1,698,813
Home Counties	1,208,588
Midland	1,444,671
North Eastern	1,524,337
North Western	1,280,559
South Western	762,104
Wales and Border Counties	555,126
Total England and Wales	8,474,198
Scotland	761,374
Northern Ireland	111,125
Grand Total	9,346,697

Brit.I.R.E. TV Convention

THIS convention is being arranged by the British Institution of Radio Engineers on *Television Engineering in Science, Industry and Broadcasting* and is attracting great international interest, and many members and other delegates from overseas have arranged to attend. The Convention will be held in the University of Cambridge from July 1st to 5th, and delegates will reside in the colleges of the University.

Among the distinguished engineers from abroad participating in the arrangements will be Dr. Vladimir K. Zworykin (Director of the Medical Electronics Centre, Rockefeller Institute, New York), and Dr. S. K. Mitra, F.R.S., M.Brit.I.R.E. (Emeritus Professor of Physics, Calcutta University).

New Factory

WORK will commence shortly on the construction of a new factory at Simonstone, Lancashire, for Mullard Ltd.

This factory will produce glass for the manufacture of TV tubes and will be built on a 24-acre site adjacent to the existing tube factory at Simonstone and it is hoped that it will commence production later next year.

I.T.A. Appointment

THE I.T.A. has appointed Mr. A. Graham to a new senior post in which he will take over some of the duties hitherto carried out by the Secretary, Mr. A. W. Pragnell. These include supervision of the Authority's rules and practices in relation to television advertising.

Mr. Graham was for some years closely connected with

broadcasting matters on the staff of the General Post Office.

TV Festival

THE BBC and British commercial television companies are being invited to participate in the world's first international Festival of Television Arts and Sciences. It is to be held in Montreux, Switzerland. This announcement has been made by the Montreux City Council who are sponsoring the Festival as an annual event comparable with the annual world film and arts festivals.

TV in Steel Works

IN December last, Marconi's Wireless Telegraph Co. Ltd., completed an installation of 15 closed-circuit television



Closed circuit TV is shown being used for the remote observation of the transfer of red-hot steel ingots from the soaking pits to a buggy and thence to a shuttle-car for conveyance to the rolling mill. Fifteen monitors give the operator a composite view of some 700ft. of track. (See "TV In Steel Works.")

channels in the new rolling mill of the Steel Company of Wales at Port Talbot. The cameras are mounted in lines on one of the outside walls of the rolling mill, looking inwards and downwards at an angle at a rail track. Each camera is fitted with a wide-angle lens and surveys some 45ft. of track, so that a total of approximately 700ft. of track is covered.

Longer Guarantee

SIEMENS EDISWAN SWAN LTD., announce that from June 1st, 1959, all new Ediswan-Mazda cathode ray tubes are covered by a 12 month guarantee instead of the six month guarantee which has previously operated. The company states: "Since the purchase tax on cathode ray tubes was removed at the last Budget there has been a five-fold increase in the demand for new tubes and the company is confident that this extended guarantee period will further increase the sales of new tubes as against repaired tubes."

Change of Address

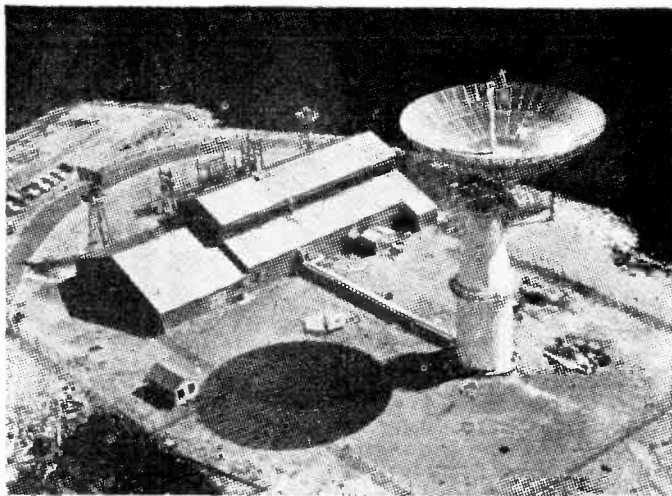
ON June 1st. the London District Office of Siemens Edison Swan Ltd. moved into premises at Crown House, Aldwych, W.C.2 (Tel. No. TEMple Bar 8040), and from there all sales and deliveries will be controlled for the London area, which includes the Home Counties and the branches at Reading, Maidstone and Ipswich.

TV in Ghana

MARCONI'S WIRELESS TELEGRAPH CO. LTD., of Chelmsford and Pye Limited of Cambridge are to co-operate in providing television in Ghana during the visit of Her Majesty the Queen to the country in November. Under an agreement reached with the Ghana Broadcasting Authorities recently, the companies are to supply vision and sound transmitters with the necessary aerials and masts, a studio, a mobile Outside Broadcasting Unit (to relay live coverage of the Royal visit), and also telecine and video tape equipment.

Sliding Chassis

IT is reported that a new chassis has been produced by Philco in the U.S.A. After removing the screws from the



This American radio station was used for receiving signals which had been reflected from the moon.

back of the cabinet the chassis slides out on runners, to provide instant access to every component. The design also enables the servicing of the chassis while the set is operating, so that typical service jobs like changing capacitors is done in half the time. The C.R.T. swivels, permitting the checking of the picture, positioning it and adjusting it without mirrors.

New Radar Tube

A C.R.T. capable of extremely high resolution through the use of an abnormally small spot has been produced by Ferranti Ltd. for use in aircraft radar which shows on the screen details of the terrain beneath it. This is an improvement on the H2S that was used by bombers during the war. This new micro-spot tube can resolve 5,000 lines. The spot size is less than one-thousandth of an inch in diameter and the tube, 5in. across.

North Eastern ITV

AFTER three years of ITV transmissions in the Northern ITV area, some eight million viewers in 2,300,000 homes in the area covered by the Winter Hill and Emley Moor transmitters are able to watch ITV programmes. This figure represents 60 per cent. of all individuals living in the area.

These facts are outlined by Television Audience Measure-

ment Limited (TAM) in a review of the development of ITV in the area since the Lancashire and Yorkshire transmitters first began operations in May and November, 1956, respectively.

Siemens Ediswan Radio Products Overseas

MR. M. CARPENTER, B.Sc. (Tech.), has been appointed overseas technical representative of Siemens Edison Swan Ltd., radio division. He will promote overseas sales of the company's cathode ray tubes, valves, semi-conductors and other components for industrial and domestic equipment, mainly in the Western European market. He will be based on the company's office at 155, Charing Cross Road, London, W.C.2.

Mr. Carpenter has been with R.C.A. (Great Britain) Ltd. for five years. Prior to that he was at the Brimsdown engineering laboratories of the Edison Swan Electric Co., Ltd.

New Manager for G.E.C. Publicity Organisation

AFTER 40 years' service with The General Electric Co., Ltd., Mr. M. R. Neville, Manager of the Publicity Organisation, is retiring at his own request on June 30th, 1959. Mr. A. C. V. Clarkson will take over as manager as from July 1st, 1959.

Replacing C.R. Tubes—6

MURPHY RECEIVERS

By H. Peters

(Continued from page 496 of the May issue)

THIS month we shall deal with various Murphy receivers. It is worth noting that most tube changes on Murphy receivers are comparatively straightforward, so if a particular change proves difficult or if a large number of spare parts are collected, it is likely that an incorrect method has been used.

Model V250

Covering all the V240 and V250 series, and also the V270 and V280 series, the V300, V290CA, V214 and V216C and their "A" Fringe Versions.

Unboxing

Remove the front control knobs by slackening the grub screw on the inner of each. Remove the cabinet back and the two 0 B.A. screws which hold the rear chassis flange to the brackets on the runners fixed to the cabinet. The chassis may now be removed complete with tube. (Note: on 21in.

KEY TO LETTER REFERENCES IN ILLUSTRATIONS

- B: Clamping bolt.
- C: Clamping band.
- F: Focus magnet lateral adjustment (focused with user's control set midway).
- I: Ion trap magnet.
- L: Loudspeaker contact.
- M: Adjustment for centring tube in mask.
- P: Picture positioning adjustment (needs unlocking first).
- R: Rubber seating blocks.
- S: Scancoils.
- SP: Spring clips holding tube cradle to chassis.
- T: Picture tilt.

models it is also necessary to remove the small power unit on the cabinet floor.) If the C.R.T. is stuck in the escutcheon the rear of the chassis can be lifted a few inches and the leverage obtained should force the tube sufficiently to enable the chassis to be withdrawn.

Removing C.R.T.

Take off the plastic focus dome, and, on early models, catch the two aluminium washers that are released by each screw as these must be replaced on reassembly. Remove EHT cap and C.R.T. base. Note position of ion trap magnet and remove it. Slacken off the band around the tube bowl and remove the tube (complete with mask on 14in. sets). Thoroughly clean inside cabinet and glass before replacing in reverse order.

Reassembly

Provided the new tube is of the same physical shape this is a simple matter. If for any reason it is a bad fit it can be located in the mask by

altering the front adjusters and the extendable support beneath the focus unit. The two wing nuts on the front adjusters form variable platforms which enable the tube to be raised, lowered or tilted slightly. If the original tube was stuck around the escutcheon it is advisable to treat the escutcheon edge with a little French chalk prior to reassembly.

Special Note: The CRM171 originally fitted is superseded by the CRM172. A C.R.T. anode connector adaptor will be required and it is necessary to connect the graphite coating to chassis.

Setting Up

Adjust the ion trap magnet for maximum light regardless of picture position. Refocus, and adjust the picture for tilt by unlocking the 4 B.A. hex. headed bolt on the front of the scan coils and moving it sideways in its slot. Picture position is controlled on the 214-216 series by a pair of rotating paxolin discs which support ring magnets. Various angles of shift are obtained by moving either or both discs in each direction. On the V240/250 series picture positioning is varied by a black knob on the top of the focus assembly. This is locked in position by a 2 B.A. brass nut just below it. In the V270/280 series a "joystick" lever is provided and this is accessible through the cabinet back after the set has been boxed up, thus enabling a precise final adjustment to be made.

When the picture positioning, focus and ion trap settings cannot be improved, refit the focus dome and box the set up. You may be a bit confused by the hardware you have collected

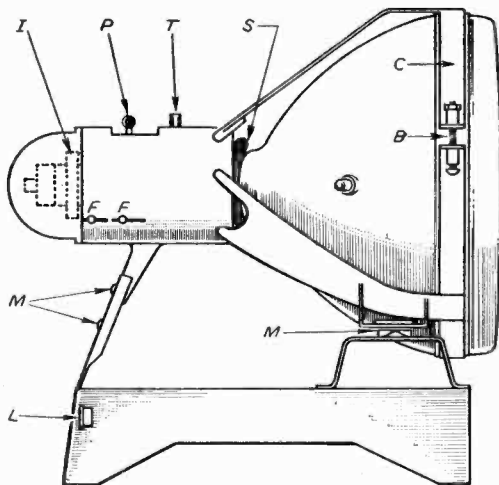


Fig. 13.—Side view of Murphy V250.

from your control knobs and the various items should be refitted in the following order:—Felt washer, outer knob, long steel washer, circular brass washer, plastic disc, knob with grub screw. On the V270/280 a small dished washer is fitted between the plastic disc and the volume knob. Care must be taken to locate the numbered channel selector disc in the pegs on its knob, and to ensure that it is showing the correct channel number uppermost.

Screen Cleaning

To clean the tube face unbox the set as outlined above. Fingermarks on the rubber mask may be removed by sparing application of warm soapy water. Make sure that any strips of sticky tape around the edge are not loose, as they have a habit of dangling down into the picture area immediately the repair has been completed.

Boosting (A.C. Only)

All the tubes in these models have 12.6 volt heaters so will require 13 volt low capacity isolating transformers with mains primary. The two existing wires to pins 1 and 12 should be removed and a 40 Ω , 5 watt resistor fitted across them to take the place of the tube in the heater chain (V214/216 excepted). The black (chassis) lead of these two usually connects one other component fixed around the tube base down to chassis and an extra lead will now have to be provided to do this.

Connect the 13 volt side of the boost transformer to the blank pins 1 and 12 of the C.R.T., and obtain mains for the transformer primary from between chassis and the set side of the mains fuse (except V214/6 where it is connected between chassis and the centre contact of the voltage adjuster). Check that the ion trap magnet is set to give the brightest picture.

Models V204 and V204C

These are the only two models in which Murphy Radio have mounted the tube cradle separately from the chassis. In the console it is not necessary to remove the chassis in order to take out the tube cradle, but as the chassis removal may be of interest to some readers the table model tube change is given, since it includes both.

Remove the cardboard back(s). Partially remove the two nuts securing the control panel and withdraw the panel inwards complete with knobs. Unplug C.R.T. base, EHT lead and scancoil plug. Take the two retaining plates from the two dowels at the chassis bottom and slacken the two fixing nuts at the rear chassis corner. Withdraw chassis and tip cabinet on its face. Remove the two $\frac{1}{2}$ in. nuts and bolts holding the ends of the scanning and focus "wings" and lift assembly up off the tube. Slacken the wing nuts on the tube mount-

ing brackets and unscrew the clamping wing nut on the side of the tube to allow the bar to be removed from the tube clamping ring. The tube can now be lifted out. Clean thoroughly before reassembling and do not tip the cabinet upright until the tube has been finally secured in its mountings.

Setting Up

Picture tilt is adjusted by means of the knurled thumbscrew in the slot at the front of the focus unit. To set focus correctly, turn the user focus knob (next to volume on the control panel) to mid-position, slacken the four locking screws holding the focus plate and slide the whole inner assembly up and down the tube neck until focus is obtained. Lock the plate in this position,

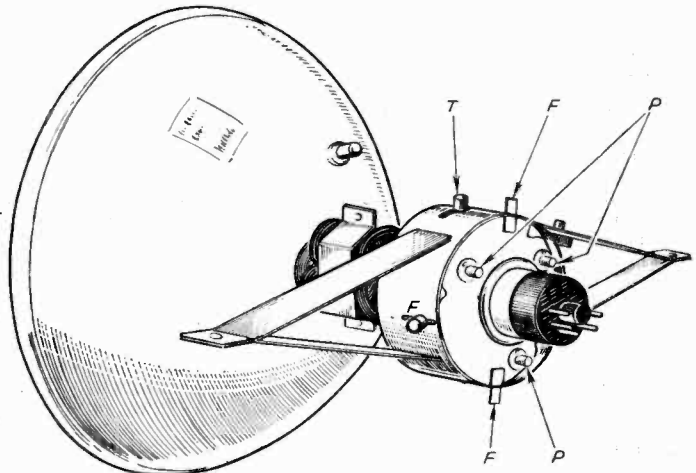


Fig. 14.—Focus and scanning unit V204. (This is, in essence, the same physically as the V200 series.)

ensuring that it is at right angles to the C.R.T. neck. Picture positioning is varied by loosening the three 4 B.A. brass nuts protruding from the focus plate, and inserting a screwdriver in the slot of each of the upper two eccentric washers. By rotating these in various directions the picture may be centred in the mask.

Screen Cleaning

On the V204 the C.R.T. has to be removed as outlined above. On the V204C the safety glass lifts out when the three screws holding the retaining strip at the bottom have been removed.

Boosting

To boost the tube, use a 2 volt type low capacity booster-isolator transformer. Remove the wiring from pins 1 and 12 of the tube and tape it back. Connect the 2 volt winding of the boost transformer to the empty pins 1 and 12 and take mains from the set side of the on-off switch. Fix the transformer to the woodwork.

Special Note: The V204 H.T. supply is provided by a bridge rectifier. This makes the chassis 110V live with respect to earth regardless of the mains lead polarity.

Models V200, V200A, V202C, V202CA, VU200A, V210, and VU210C

Unboxing

Remove the back and the three large control knobs, which are secured inside the cabinet by cross-headed screws. Slacken off the square nuts at each side of the rear chassis hoop and withdraw the chassis.

There is a tendency for the chassis to jam when nearly out and this can be overcome by tilting it forward so that the tube bowl and mask pass beneath the loudspeaker. On the V202C it is first necessary to remove the mains transformer from the bottom of the cabinet and place it in the two clips provided at the bottom of the rear chassis hoop.

Replacing the C.R.T.

Remove the C.R.T. base and anode cap. Release the four springs holding the tube mask and clamp and withdraw the tube. Lay it with the mask face down and note the relative positions of the top of the mask, the clamping band and the tube anode cap. Remove the clamping band, lift the tube out of the mask and thoroughly clean all parts (including the cabinet inside) before replacing.

The polythene bandage should be fitted first around the tube and if when reassembled glass bubbles near the edge of the tube appear on the picture area they may sometimes be hidden by the mask if the tube is rotated 90 degrees. Be careful when doing this that the anode cap does not foul or approach the chassis wings.

Provided that the two tubes are of similar proportions, fitting is straightforward, but if they are slightly dissimilar, the relative positions of the tube and the chassis can be adjusted by moving

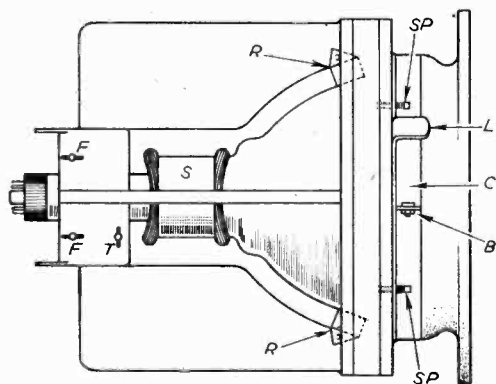


Fig. 15.—Side view, V200 series.

the four rubber seating blocks. These should be moved until the distance between the front edge of the rubber mask is just under $4\frac{1}{4}$ in. from the front edge of the front chassis support hoop.

Setting Up

The scan and focus unit is the same as the V204, to which you should refer.

Boosting the C.R.T.

(Except VU200A, VU210C and V202C.)

Remove all wiring from pins 1 and 8 of the tube and tape the individual ends back. Fit a 2 volt booster isolator transformer (a convenient place is on the bottom of the rear chassis hoop, where two useful holes are already drilled).

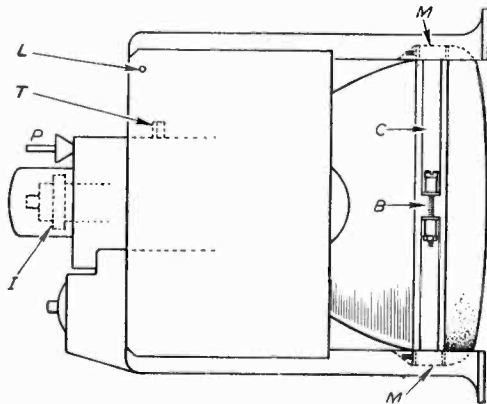


Fig. 16.—Side view of the V310.

Connect the 2 volt side of the transformer to the blank pins 1 and 8 of the tube and obtain mains for the transformer from between chassis and the set side of the mains fuse. On the VU200A and VU210C the procedure is similar except that the transformer should have a 7.5 volt secondary and the previous heater wires must be joined together to preserve heater chain continuity. The V202C has a bridge rectifier and the mains supply for its two volt transformer must therefore come from the set side of the on-off switch.

Latest Models V310, V310A, V310C, V310D, V310CA, V310AD, V320, V320C, V320A, V320AD, V330, V330D and V330F

The basic model for this range is the V310, of which the tube change is as follows:

Unboxing

Shut the lid, lay the set on its face, remove the two large bolts (four in 21in. sets) underneath the chassis and pull the cabinet off the chassis. On consoles (except the swing-screen models) remove as per V250 instead.

Replacing the Tube

Remove the plastic focus dome and also the C.R.T. base and ion trap magnet is thus revealed. Discharge and remove EHT connector. Remove the four cross-headed screws holding the chassis to the brown plastic escutcheon. Lift the chassis off the escutcheon and mask and lay it down the right way up. Slacken the band clamping the tube bowl and remove the tube forward. Clean and replace in the reverse order.

(To be continued)

110 deg. C.R. Tubes

INCREASING THE DEFLECTION ANGLE ENABLES SMALLER CABINETS TO BE USED

TWO new Mullard cathode ray tubes, which have a 110 deg. deflection angle, are being used in several new receivers, and it is thought that dealers and service engineers would welcome some comments on the advantages and the changes resulting from the use of these tubes in receivers.

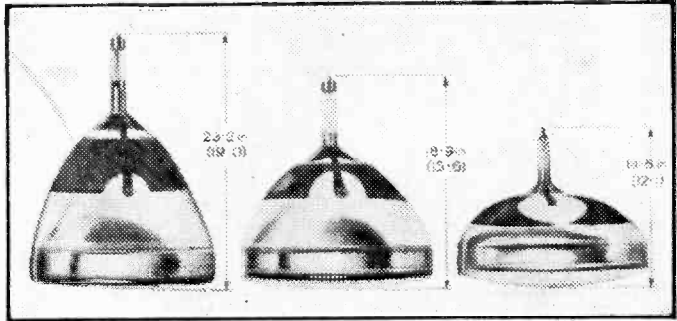
Shorter Tubes

Tubes with 17in. and 21in. screens are available, their type numbers being AW43-88 and AW53-88 respectively. The distance from the screen to the base is considerably shorter than that in the 90 deg. tubes of corresponding screen size, therefore, allowing the depth of the cabinet to be greatly reduced. The accompanying illustration depicts the progressive shortening of the tubes having 21in. screens with deflection angles of 70 deg., 90 deg. and 110 deg.

The new tubes have a "straight" electron gun and the focusing system is electrostatic; no ion trap magnet is required. The metal-backed screen is made from high-efficiency phosphors so that excellent brightness is obtainable and good con-

avoid over-running the valve. The PL36 line-output pentode, used for the 90 deg. circuits, is also adequate for use with the 110 deg. tubes, as also is the PY81 booster diode.

The new tubes will be especially useful in port-



The illustration above compares the sizes of three 21in. C.R. tubes: the one on the left is a 70 deg. type and is 23.2in. long, the 90 deg. type shown in the centre is 18.9in. long and, on the right, the overall length is reduced to 14.6in. in the new 110 deg. type. The bracketed dimensions (19.0, 15.6 and 12.1) refer to similar, 17in. tubes.

able receivers where small cabinets and bright pictures of good contrast obtained with a built-in aerial are very desirable.

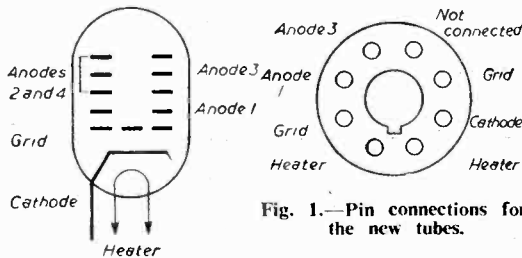


Fig. 1.—Pin connections for the new tubes.

trast can be achieved even in very bright surroundings.

Power Requirements

As the deflection angle is increased, more power is needed to scan any given size of screen. To minimise the increase of power required for these 110 deg. tubes, the diameter of the neck has been reduced, thus allowing the deflector coils to be placed nearer to the electron beam. The narrower neck has necessitated the use of the new B8H base, and pin connections for the tubes are shown in Fig. 1. It should be noted that the pins on the B8H base which is used can be damaged by bending. Care must therefore be taken when removing or replacing the tube socket.

To provide the increased frame-scanning power, the PL84 output pentode has been introduced as the frame-output valve; use of the PCL82 would probably necessitate elaboration of the circuit to

Ultra-violet Television Microscope

ENGINEERED for the first time in this country, by Pye Ltd., St. Andrew's Road, Cambridge, in collaboration with Cooke, Troughton and Simms Limited, of York, this apparatus evolves round a special "Stacion" television pick-up tube.

Television techniques in conjunction with the microscope allow an unlimited number of students to observe specimens in a way which is normally available only to those who possess projection microscopes.

Now that the range of usefulness of the equipment has been extended from 8,000 Å to as far as 2,000 Å in the ultra-violet, the technique becomes an extremely powerful research tool. It is now possible to reduce the dose of radiation required to obtain a photographic record of the structure of a specimen to a value, which, unlike existing techniques which do serious harm to the cell, will enable a number of photographs to be obtained showing the development of the cell throughout its normal life.

The equipment consists essentially of a small camera head 5½ in. square by 10½ in. long, weighing 8½ lb., mounted behind the ocular of the microscope. The complete control of the camera head and all supplies to it are obtained from a camera control unit 14 in. by 6 in. by 16½ in. and weighing 30 lb. and which may be as far as 50 ft. away. The camera head may be attached to an existing microscope, and fittings have been devised to allow this to be accomplished with the ultra-violet microscopes made by Messrs. Cooke, Troughton and Simms Limited.

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NEW REDUCED PRICES!

12in.....£6	17in.....£8. 10. 0
14in.....£7	21in.....£10. 10. 0
15in.....£7. 10. 0	Carr. and Insur. 10/-

All tubes Rebuilt with new Heater, Cathode and Gun Assembly—reconditioned virtually as new! Full 6 months' unconditional Guarantee. As used by our own Service Dept. Good stocks Mullard and Mazda types. 10/- part exchange allowance on your old tube.

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TRANSISTOR 'ONE-WATT' AMPL.

6 v. Battery Operated
Latest Push-Pull 4 Transistor circuit giving full 1 watt output using standard 3 ohm speaker. Good sensitivity (approx. 10 mV) and improved frequency response. Neg. feedback, volume and tone controls. Chassis size 6 1/2 in. x 3 in. x 1 1/2 in. Current consumption 10 mA. quiescent—250 mA. at 1 watt.
2 GEC (GT23 Transistors 21/- pr.
Driver Trans. 8/6
Output Trans. (to 3 ohms) 10/6
Complete kit of parts incl. **99/6** P. & P. 2/6
Circuit, etc., less speaker, only
Recommended 7in. x 4in. speaker 18/6. P. & P. 1/6.

STAAR 45 r.p.m. SINGLE RECORD PLAYER

6 v. Battery operated. Lightweight Xtal Pickup with Twin Sapphire Stylus (one spare). Auto stop. Mounting 7 1/2 in. x 6 in. Attractive Continental styling. Ideal companion unit to above Transistor Amplifier.
RECOMMENDED BARGAIN 92/6 P. & P. 3/6
Suitable cabinet to house above 2 units **22/6**. P. & P. 2/6.

RECORD PLAYER CABINETS

Contemporary styled, revine covered cabinet in two-tone brown and brown. Carr. and or mottled red lac. 3 1/2" with white polka dot. Size 14 x 13 1/2 x 6 in. fitted with all accessories, including handle and finished metal fret space available for all modern amplifiers and auto changers, etc. (Unrot record player mounting board 14 x 13 in. supplied).



2-valve AMPLIFIER Mk. 2

Latest developed circuit giving a higher fidelity response and greater output (2-3 watts) using twin stage valve ECL82 and neg. feedback Tone Control. Complete with knobs wired and tested with 6in. speaker, etc., ready to fit in above cabinet. Only **23.13.6**. Carr. 2/6.

RECORD PLAYER BARGAINS

ALL NEW 4-SPEED MODELS

SINGLE PLAYERS BSR (TU9), £4.10.0.
COLLARO (4/564), 6 gns. GARRARD (4NP), £7.10.0, carr. 2/6. GARRARD (TA MK. II), £9.5.0, carr. 3/6.

AUTOCHANGERS BSR (U48), £6.19.8. BSR (U412) with stereo/monaural 10 in. 10 gns. COLLARO CONQUEST, £7.19.6. GARRARD RC121(D)MK. II. Plug-in head, stereo adapted. 10 gns., carr. 4/6.

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6X8 7/6, E1P82 12/6, E1Z80 8/6, PY83 10/6	
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SPECIAL PRICE PER SET

1R5, 1T4, 1R5 or 3R4, or 4V4	... 27/6
DK96, D1P96, D1P96, D1P96	... 35/-
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10,000 ohms—2 Mechanisms. All long spindles. Morganite Midget type. 1 1/4 in. diameter. Guar. 1 year. Log. or Lin. Ratios. Less Sw. 5/4, D.P. Sw. 4/9. Twin Gauged controls, 1 meg. 1 meg., 1 meg. less Sw. 8/9 ea.

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Tabular Wire Ends 100 Types, Clips 3d. ea.	
25/25 v. 50/12 v. 100/500 v. Dist.	3/6
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16/450 v. B.E.C. 2/6	60/450 v. T.C.C. 6/6
16+16/450 v. T.C.C. 5/6	60+100/450 v. B.E.C. 11/6
32/350 v. B.E.C. 4/6	60+250/275 v. B.E.C. 12/6
50+50/350 v. B.E.C. 6/6	100+200/275 v. B.E.C. 12/6
32+32/350 v. B.E.C. 5/6	

SEMI-CONDUCTOR RECTIFIERS. E.H.T. Type Fly-back Voltages. K3/25 2 kV. 5/-; K3/10 3.2 kV. 6/9; K3/45 3.6 kV. 7/3; K3/50 4 kV. 7/9; K3/100 8 kV. 13/8. **MAINS TYPES.**—RM1, 125 v. 60 mA., 4/8; RM2 125 v. 100 mA., 5/8; RM3 125 v. 120 mA., 7/8; RM4 250 v. 250 mA., 16/8; RM4B type 270 mA., 17/8; RM5, 250 v. 300 mA., 21/8.
SPEAKER FRET.—Expanded. Bronze anodized metal x 8 in., 2/3; 12 x 8 in., 3/6; 12 x 12 in., 4/6; 12 x 15 in., 5/6; 24 x 12 in., 9/6, etc.
TYGAN FRET (Murphy pattern) 12 x 12 in., 2/-; 12 x 15 in., 3/-; 12 x 24 in., 4/6, etc.
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2 Waveband Car Radio Kit

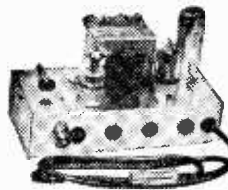
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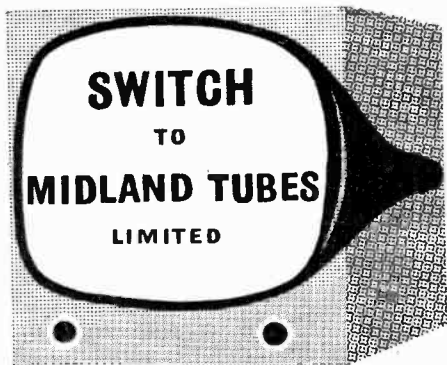
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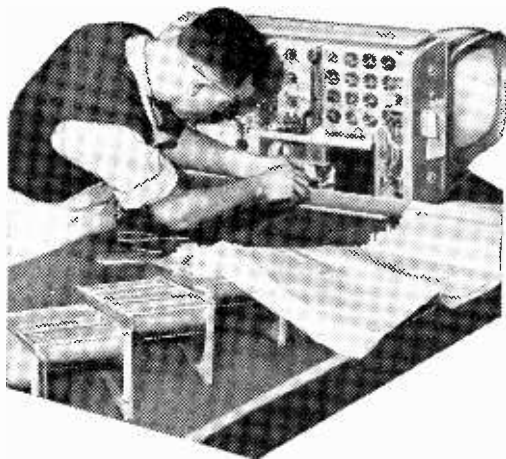
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Analysing and Servicing TV Receivers

No. 8.—THE FRAME TIMEBASE

By "Diadem"

will be cumulative until the grid is driven positive and a heavy grid current is drawn. This current discharges C2 and then commences to charge it in the opposite direction. Now the potential at the junction of C2 and R1 will be negative-going. This then reduces the anode current and the voltage induced into the transformer. After a while the potential at the grid which is now derived solely from C2 is sufficiently negative to cause the valve to cease conducting. This is the end of the cycle and it now repeats.

Sync Pulses

The sync pulse can be fed into either the grid or anode circuit of the blocking oscillator, and the sawtooth waveform for feeding into the frame amplifier can also be taken from the anode or grid. In this circuit it is taken from the grid through C4. The frame amplifier is the pentode section and at the commencement of the scan the grid is biased below cut off and does not con-

THE circuit of a modern compact frame timebase, consisting of a triode blocking oscillator and a pentode amplifier, is shown in Fig. 31. Discrepancies in the waveform, components and valve variations during life can be corrected by the linearity network R2, R3, R4, C3. R3 being the variable control. The feedback condenser is C2 and the charging capacitor is C1. The rate of charge depends on the setting of the frame hold control and the value of R1. Therefore, by varying the hold control the frequency of the timebase can be varied. Some readers may wonder why the hold control is fed from the slider of the height control and why the two controls are not independent. If each one were connected separately as a potential divider across the H.T. supply, varying the height control to increase the height of the picture would cause the triode to conduct in advance thus reducing the frequency of the timebase and vice versa. With the hold control connected as shown, varying the height control also alters the charging of C1 in such a way as to vary the frequency in the opposite direction and the two frequency variations cancel each other out.

Blocking Oscillator

We will now look at the function of the valves and the blocking oscillator. Resistors R5, R6 and R7 form a potential divider across the H.T. supply. Capacitor C2 charges up from this supply. Its potential depends on the setting of R6 and its rate of charge depends on the value of R1. A positive-going potential is present at the junction of C2 and R1. But let us assume that a large negative potential is present at the grid of the triode. No anode current flows and the valve does not conduct. Because the top of C2 is positive-going and this is connected through the transformer to the grid, the potential at the grid will become less negative. As the valve starts to conduct, the anode current rises—slowly at first—and then rapidly. This also causes the voltage to rise in proportion and this voltage will then be induced into the transformer secondary and transferred by the action of the transformer to the primary. This positive potential causes a further increase in anode current. The action

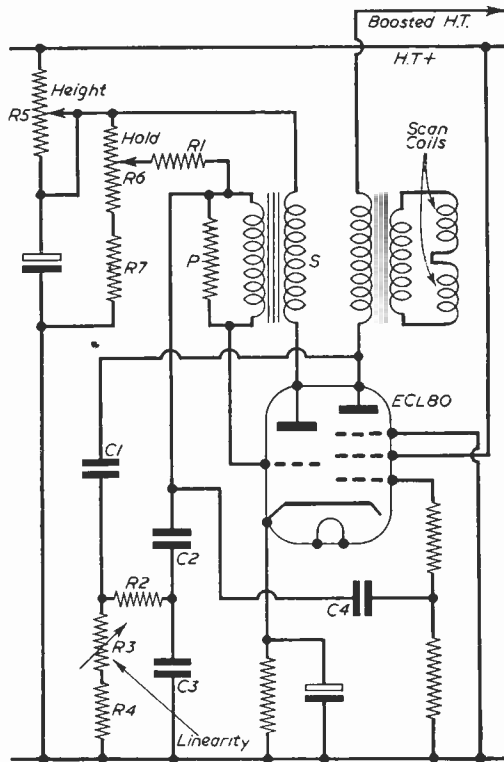


Fig. 31.—Frame blocking oscillator circuit.

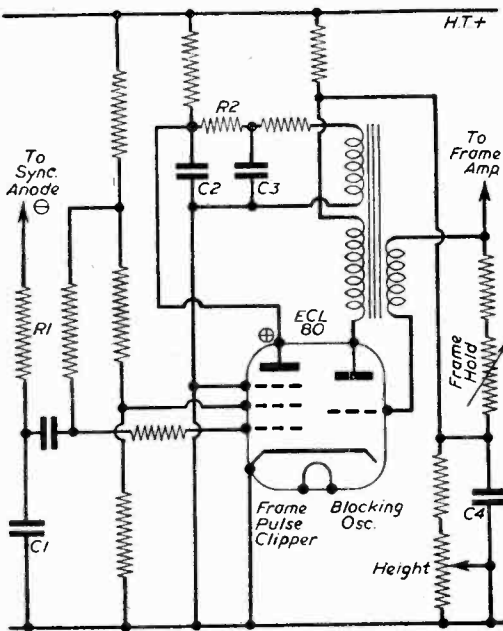


Fig. 32.—Frame pulse clipper and blocking oscillator circuit.

duct. As the sawtooth potential is fed through C4 to the grid it becomes less negative and the valve starts to conduct. The transformer in the pentode anode circuit is the frame output transformer: the secondary "steps down" to match the low impedance scan coils.

Fig. 32. This circuit shows a frame pulse clipper (explained in the sync section) and a blocking oscillator circuit all designed around one valve. The frame pulse from the sync valve is integrated by R1 and C1 and passed to the grid of the frame pulse clipper. The inverted sync pulse appears at the anode. This pulse is then fed through a further integrator C2, R2, C3, and is then inductively coupled to the blocking oscillator transformer by an additional winding. The charge condenser which controls the repetition frequency is C4.

Multivibrator Timebase

A multivibrator frame timebase is shown in Fig. 33. This type of generator has a flip-flop action. The two triodes are the multivibrator, C1 and C2 being the coupling capacitors. Capacitor C3 is the charging condenser. The rate of charge and therefore the frequency is controlled by R2 and the hold control R3. C5 is the frame sawtooth coupling to the amplifier. The waveform is made linear by C7, C8, R5, R4. The feedback capacitor is C6.

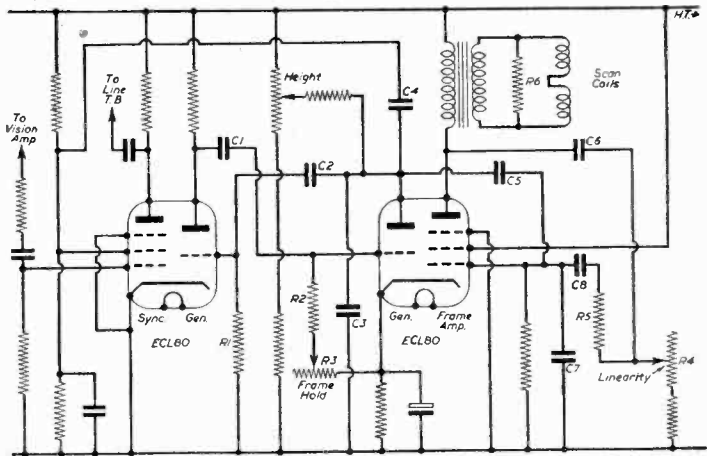


Fig. 33.—A multivibrator frame timebase circuit.

R6 across the frame scan coils is the line-damping resistor to prevent any interaction between the line and frame coils. C4 is the frame sync coupling capacitor.

We will now see how the multivibrator works. Let us suppose the grid of V1 goes slightly negative. The valve is biased back and there is a rise in anode voltage which is then passed to V2 grid through C1 causing the anode current of V2 to increase and its anode voltage to fall. This drop in voltage appears via C2 on the grid of V1 and the valve is carried towards cut-off. The anode voltage of V1 rises even more and is again fed to V2 for further amplification. Now we find that the grid of V2 is highly positive and the grid of V1 is driven negative beyond cut-off. We have now come to a point where only one valve, V2, is drawing anode current. The cumulative amplification has now stopped. When the voltage on the grid of V1 has leaked away through R1 the valve will again pass current. Now the whole process is repeated in the reverse direction. This time the grid of V1 is positive while the grid of V2 is negative. The whole effect is cumulative as before, but V2 is driven beyond cut-off. By making one of the grid-leaks variable the rate of discharge of C1 can be controlled; this will also control the frequency of the oscillator.

Thyratron Generator

A gas-filled thyratron frame generator with amplifier is shown in Fig. 34. C3 is the charging condenser which charges through R1 and R2 from the H.T. line with R3 controlling the frequency. The synchronising pulse from C1 locks the frequency to that of the transmitter. A leak in C1, C3, C4 will prevent the timebase from locking. Loss of capacity of C2 will distort the scan.

The sawtooth output is fed to the frame amplifier via the coupling capacitor C4 and the waveform-correcting potential divider R4, R5, R6, C5. Loss of capacity of C6 will reduce the height. The height is controlled by the variable resistor R7 in the cathode circuit.

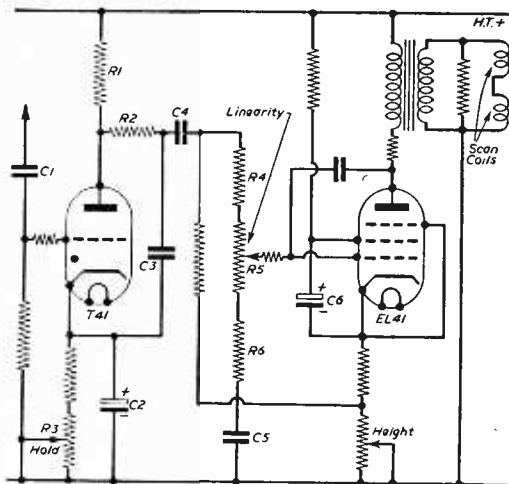


Fig. 33.—Thyratron frame timebase circuit.

High-impedance Scan Coils

Another type of frame output circuit referred to in the faults section is shown in Fig. 35. The usual frame output transformer is dispensed with and high impedance scan coils of 700Ω are used in place of the low impedance type of 6Ω which are necessary when a step down transformer is fitted. The capacitor C1 is sometimes connected to the other side of the coils thereby isolating them from the H.T. line and D.C. Capacitor C1 must have good insulation.

Faults Affecting the Frame Timebase

Line pairing or faulty interlacing.—Check H.T. decoupling condensers in the timebase, and the frame integrator network in the sync separator output stage, the interlace diode connected between the sync separator and the frame generator. This may be a crystal or valve diode or in some cases a triode. Check the frame generator valve and its anode and grid resistors, and the frame blocking oscillator transformer if fitted. Look at the run of the wiring for disturbance and make sure coupling is not taking place between the line and frame circuits. See that the screens around the line valve and transformer are secure.

Waving raster and verticals.—The cause is a 50c/s ripple gaining entry to the frame timebase. Check decoupling condensers in frame circuits and the main H.T. smoothing, and EHT power supply smoothing if it is mains driven.

Black bar locked across centre of screen with the bottom half of the picture at the top and the top half at the bottom which may right itself at intervals. If all the components in the frame generator are correct, the fault is usually inadequate smoothing to the frame timebase H.T. line. The fault is usually accompanied by prominent frame flyback lines. Make sure the picture is not weak and the definition is satisfactory, otherwise if any hum is present the frame will false-lock to the mains frequency instead of the sync pulse and either one or two hori-

zontal hum bars may also be present across the picture (see sync faults).

Picture slips on camera changes.—Make sure this is not due to a sync fault. The picture locks out of position until the next camera change when it returns to normal. This often occurs when hum and sync pulse are at nearly equal strengths—check the smoothing electrolytics and add an additional capacitor to the H.T. line near the frame timebase if required.

Frame foldover at bottom, and cramping.—Check frame amplifier valve for low emission and the value of its cathode bias resistor. Too low a bias will aggravate this fault, and an alteration of capacity in the cathode bias electrolytic will also cause the raster to be distorted. Check the values of the condenser and resistance network in the frame amplifier feedback linearity circuit, between the anode and control grid and the anode load resistor of the previous valve. Check also the frame generator, the grid leak in the frame amplifier, and the condenser coupling the frame generator to the amplifier. If the fault is still prevalent suspect the blocking oscillator transformer if fitted. In cases of severe cramping only the top half of the picture may be visible.

Foldover at the top and top cramping.—Check the value of the cathode bias resistor and its electrolytic condenser in the frame amplifier stage. Too high a bias will create this fault. If the fault is still there, check as above for foldover at bottom.

Horizontal white line across raster.—Faulty frame output valve, change it round with one in the sound circuit if of similar type. This fault has nothing to do with foldover or collapse.

Distorted wedge-shaped raster.—Suspect scan coil insulation breakdown.

(Continued on page 612)

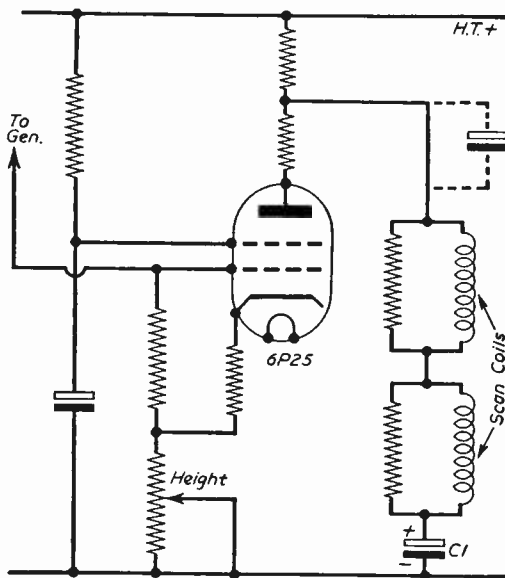


Fig. 34.—Circuit using high-impedance scan coils.

A Closed-Circuit TV System

A SEQUENTIAL SYSTEM WITHOUT MOVING PARTS

By R. W. Wells

ing mechanical devices have obvious limitations owing to inertia; and the amateur, with limited financial resources, will probably find synchronisation problems a difficulty.

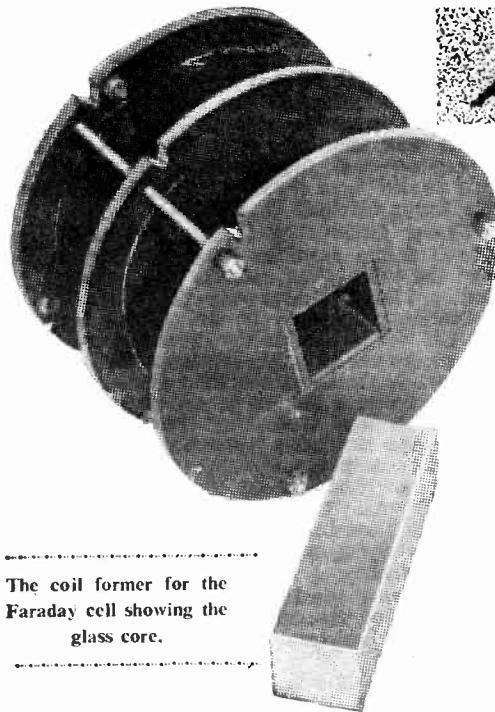
At the Television Society's Exhibition in March, 1958, the writer demonstrated a new colour television display system consisting of variable, non-rotating, colour filters in front of a black and white tube. The technical details were given in the "Journal of the Television Society," Oct.-Dec., 1958.

As regards practical difficulties, problems of inertia and synchronisation do not arise in the new system, so that amateur construction is made particularly easy.

A Black-and-white Flying-spot Television

One of the advantages to the amateur of a system which derives a colour picture from a black-and-white image is that the construction is in easy stages. Firstly, a black-and-white television has to be constructed, to which colour may be added after the experimenter is satisfied that the picture is bright and clear enough to allow the addition of colour filters.

Fig. 1 shows the basis of a black-and-white flying-spot television system. Mullard MW6/2 picture tubes may be used both as a scanner at the transmitter and as a projector tube at the



The coil former for the Faraday cell showing the glass core.

THE construction of this TV system should be well within the capabilities of the amateur enthusiast and should suit his pocket since the maximum use has been made of equipment which is readily available on the surplus market.

Colour Discs

In a sequential system, a rotating colour disc in front of a conventional black-and-white picture tube synchronised with a similar disc at the scanner avoids the necessity for expensive tricolour tubes. For closed-circuit work, where a large picture is not required, this is still one of the most satisfactory methods. However, rotat-

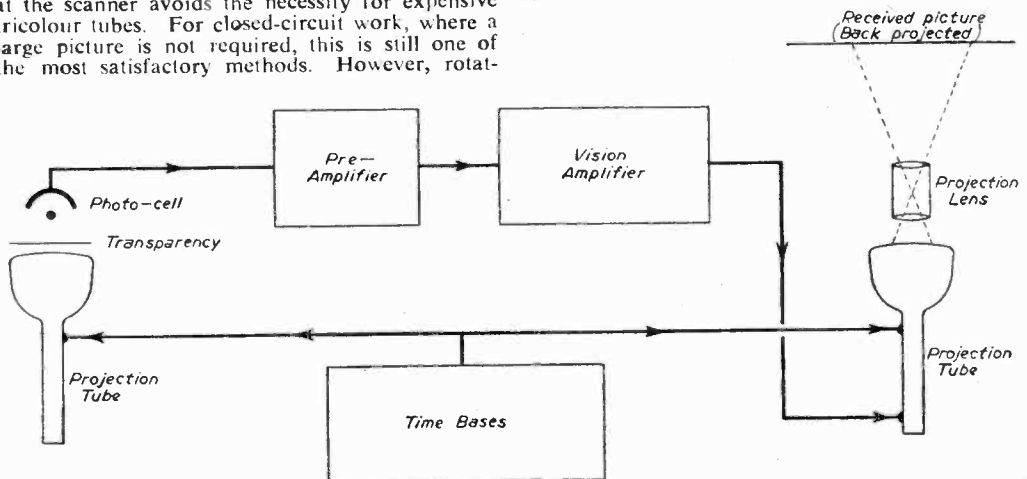
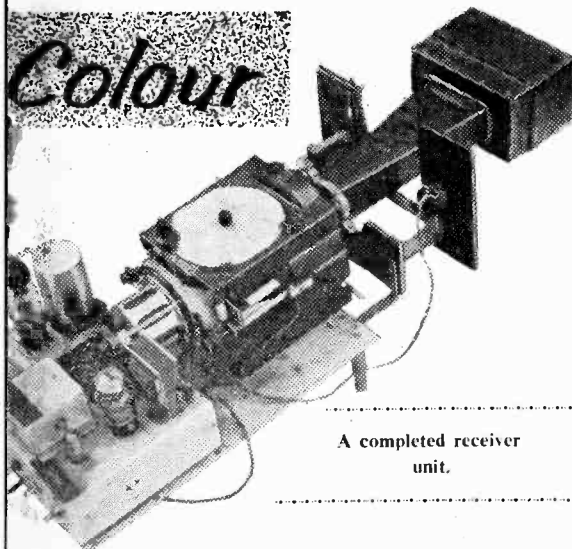


Fig. 1.—Block diagram of a black-and-white flying-spot television system.



A completed receiver unit.

receiver; thus the low initial cost of this tube is doubly exploited. Moreover, from time to time, optical units complete with scanning and focus coils are advertised on the surplus market. If these can be obtained, it is necessary to remove the large concave mirrors from the front of the units in order to convert them into straight-through optical systems.

Pre-amplifier

The circuit design of the pre-amplifier to be employed in the system needs careful consideration, especially so far as the achievement of a good signal-to-noise ratio is concerned, otherwise there

will be a degradation in the quality of the final image. Experiments as to the relative merits of the Mullard AV90 photo-cell and the 931A photo-multiplier have shown the vacuum photo-cell plus a pre-amplifier to give better results as regards signal-to-noise ratio. If it is decided to use such a cell, the two-stage battery pre-amplifier shown in Fig. 2 will be found suitable. The H.T. must be from a battery supply but a filament transformer has been found not to introduce appreciable hum. In order to supply 6V of modulation to the cathode of the projector tube at least a further six stages of video amplification would be required for a bandwidth of 2Mc/s.

Having built a satisfactory black-and-white system on the basis of Fig. 1, the next step is to start making the variable colour filter for fixing in front of the projector tube. The colour filter is of two essential parts, the interference filter itself and the Faraday cell which provides a magnetic field for effecting the colour change without any mechanical movement. The interference filter will be described first.

The Interference Filter

The materials required are two sheets of 30 mil polaroid, about 1½ in. square, obtainable from various optical suppliers, and Cellophane, which is widely used as a wrapping material. The final wrapping from a packet of cigarettes should be found suitable.

It is now necessary to carry out some simple experiments in order to be sure that the filter gives the desired complementary colours.

On close examination of the Cellophane surface, scratch lines extending in one direction will probably be seen. These lines indicate the direction of orientation of the cellulose crystals. The sheet should be folded into two layers in

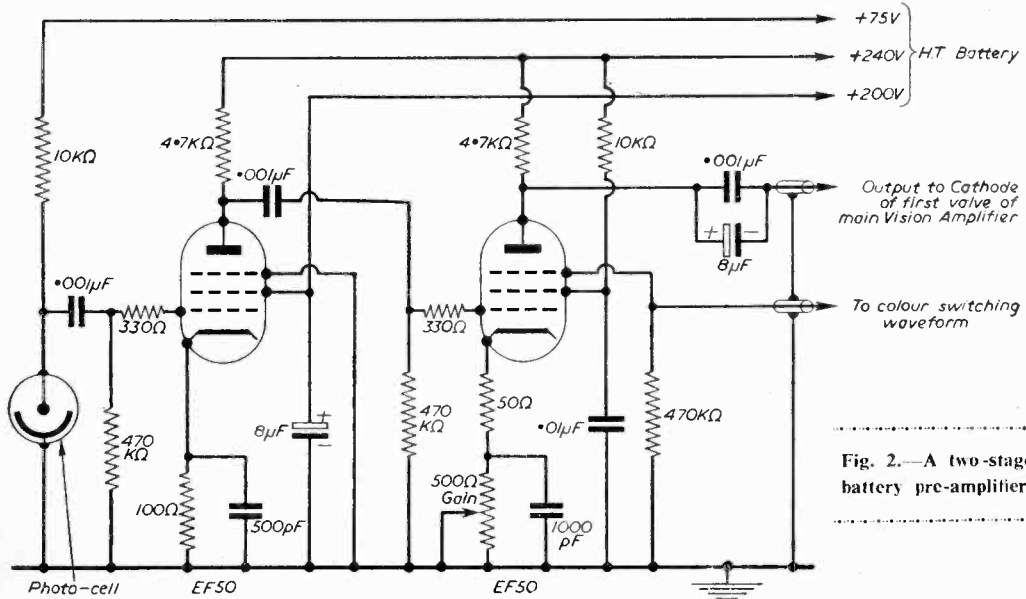


Fig. 2.—A two-stage battery pre-amplifier.

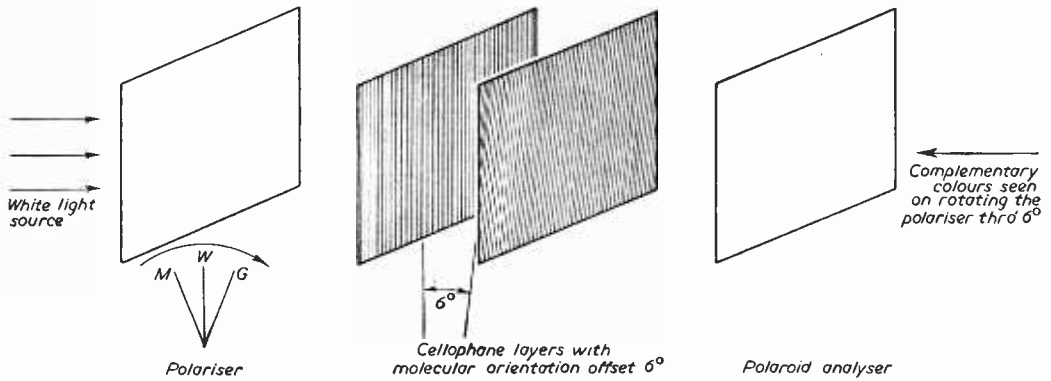
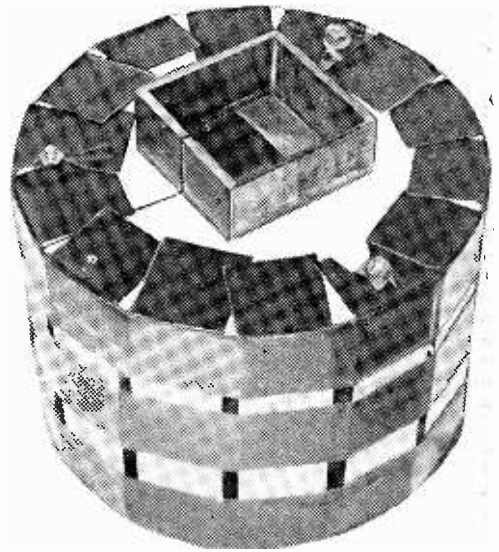


Fig. 3.—Arrangement of Cellophane filters to give complementary colours when viewed in plane-polarised light.

such a way that the scratch lines are displaced by a small angle. For convenience, during the experiments, the layers may be compressed between glass plates and interspersed with silicone or some other oil to prevent internal reflections. They are then viewed between the nearly crossed polaroids as shown in Fig. 3. It will probably be found at first that the colours seen for a two-layer filter constructed in this way will be yellow changing rapidly to blue on rotation of the front polaroid through a few degrees. Using a double layer for each orientation (in order to increase the overall thickness) should result in a magenta and green colour change.

Third Layer

If a three-colour change is required, a third single or double layer is added so that the orientation is offset by a further small angle; a little experimentation using sheets of varying thickness should enable the additive primaries,



The completed Faraday cell.

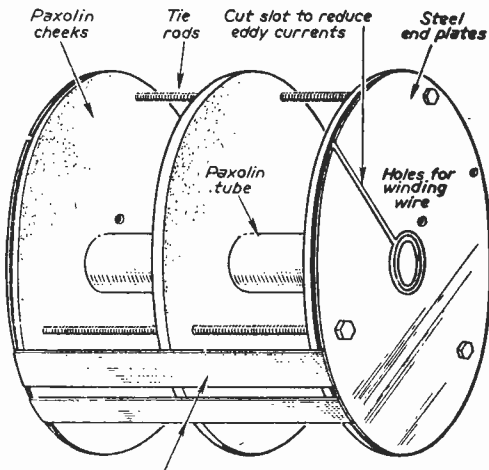


Fig. 4.—Coil former and shroud for Faraday cell.

red, green and blue, to be obtained on rotating the front polaroid through, say, 12 deg.

However, it is recommended that readers experiment first with a simple two-colour system using the magenta and green complementary colours as a start. The eye mixes these colours to give white so the colours transmitted would have to be limited to white and various pastel shades of green and magenta. If content with a slightly yellowish shade of white, it is a good idea to add a fixed yellow filter and convert the magenta/green filter into the basis of a red/green system capable of handling red, orange, yellow, green and, of course, the yellowish-white and black.

In these experiments, the colour change has been brought about by manually rotating the plane of polarisation of the light through a few degrees. Next month's article will describe how the Faraday cell performs the same function without moving parts.

(To be continued)

Building a Spot-wobble Unit

(Concluded from page 561 of the June issue)

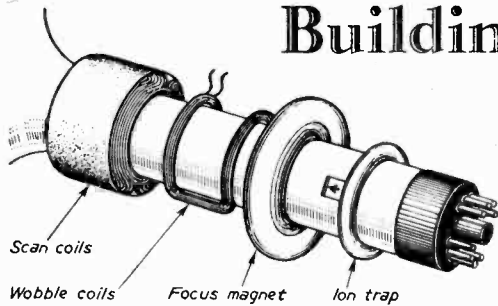


Fig. 7.—The coils in position on the neck of the tube.

ALTHOUGH the deflector coils described in last month's article are suitable for many sets, it may be found that the coils are too large for the available space.

Experimental Deflector Coils

Where the reader possesses a receiver with a space between the scan coils and the focus magnet, an experimental coil can be wound and made to slip on to the tube neck without disturbing the magnet. This coil can be compressed to $\frac{1}{4}$ in. if necessary, although it should be as wide as the space will allow. The same amount of wire is used, except that it is wound on a former twice as long with the same width as previously. The nails are spaced $3\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. The coil is then bent nearly double half way along both sides of the $3\frac{1}{2}$ in. dimensions (Figs. 8(a) and (b)) and is then shaped by pressing it round the tube neck (Fig. 8(c)). This coil is of 7 turns.

The unit must be thoroughly screened in a metal box and the box "earthed." The valve should also be fitted with a can if an unscreened type is used. Remember that the radiation from the coils can carry many yards and could cause patterning on neighbouring receivers when adjusting the trimmer of the unit.

Checking the Frequency

To check the frequency of the unit, a radio can be switched to short-waves and its aerial removed. Switch the unit on and place the spot wobble coils near the receiver. A beat note will be heard when the receiver is tuned to 25-30 metres and will depend on the setting of the trimmer C3.

When an I.T.A. converter is used, this should be completely boxed, otherwise when trimming the oscillator of the spot wobble unit to avoid patterning on the BBC, patterning will appear on the I.T.A. when switching over. If any difficulty is experienced in removing patterns from both stations together, remove a turn of wire from each coil in Fig. 6 or a half turn from the complete coil in Fig. 8(a) or shunt a condenser of 100pF across the coils in Fig. 3.

Fixing the Coils

When the unit is working correctly the coils should be fixed firmly to the tube neck, as if they move about, the frequency will change. This

AN ALTERNATIVE DEFLECTOR COIL AND A CIRCUIT USING AN EF80 VALVE

also applies to the wires connecting the coils: twin flat flex with a moulded covering which keeps the wires the same distance apart is most suitable. This wire should be as short as possible—6 in. or less. If the tube has a heavy internal coating on the neck, difficulty may be experienced in obtaining a spot wobble effect. Try increasing the H.T. voltage.

Two circuits are given, one for an EF50 and one for an EF80. Either a SW choke or resistor can be used in the anode circuits. A choke is more efficient and the voltage drop across it is lower. The consumption of the unit is about 9mA; 6.3V, 0.3A.

Component Values

For those readers who like to experiment with various values, the components C1, C2, C4 and R1, R2 are not critical. C1 and C2 can be between 500 and 1,000pF; and C4, 50-100pF. With a different R.F. pentode it may be advantageous to experiment with the value of R1; say, 20k to 50k. When a higher voltage H.T. line is used as with the EF50, EF91, 6F1, etc., the control VR1

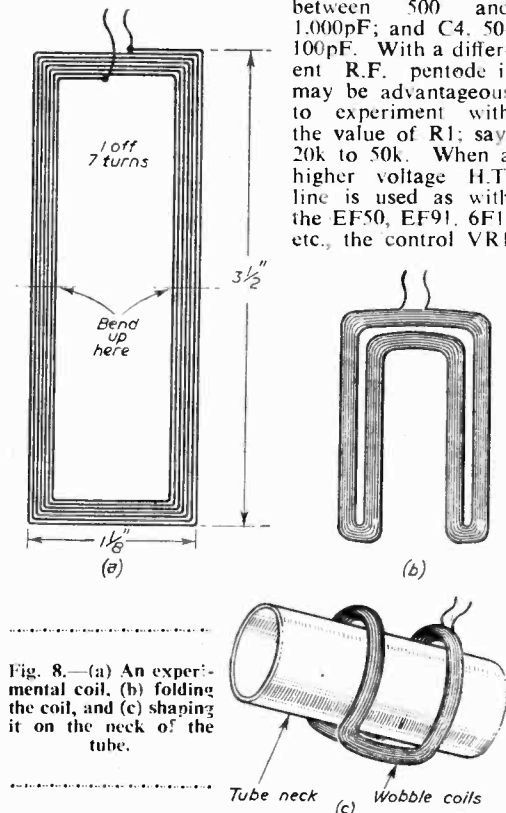


Fig. 8.—(a) An experimental coil. (b) folding the coil, and (c) shaping it on the neck of the tube.

can be increased to 50k to enable the voltage on the anode to be reduced sufficiently for the lines just to merge.

Oscillator trimmer C3 can be a "beehive" or

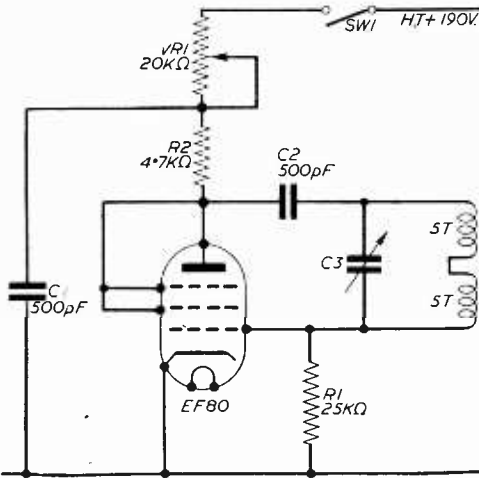


Fig. 9.—An alternative circuit for the oscillator, using an EF80 valve.

"postage stamp" type and is soldered across a tag strip, a hole being drilled in the chassis top for trimming purposes. All fixed condensers can be either ceramic or mica.

A raster of dots, dashes or lines of wriggling isolated "S" shaped patterns is not spot wobble and can be removed by alteration of C3.

SERVICING TV RECEIVERS

(Continued from page 588)

Failure to Lock

If the picture rolls in one direction with the frame hold at the end of its travel, check the 390kΩ (orange-white-yellow) resistor in series with the hold control.

If operation of the height control VR3 affects the hold unduly, check C33 (0.5μF). If the frame control is about at its centre but the picture rolls either up or down, with correspondingly critical horizontal (line) hold, check R36, 2.2MΩ (red-red-green) to pin 8 of V7 and check V7 itself.

If the line hold is at the end of its travel, check V7 and R66, 220kΩ (red-red-yellow).

Poor Frame Linearity

Compression at the bottom of the picture leaving a gap which adjustment to VR3, VR4 only worsens by extending the top of the picture should direct attention to V8, the emission of which is probably failing. Compression at the top of the picture should direct attention to VR4 and its associated components.

Lack of Width

If the PY32 and PL81 valves are in order, check V7 then, R67 3.9kΩ resistor to pin 8 of

the PL81 via the 220Ω resistor. Persistent failure of the PL81 should also direct attention to R67 which has a great influence on the current passed through V11.

Poor Width and Linearity

Check V13, PY81, width and linearity controls and then C65, C66 and R73. Light and dark striations (vertical rulings) on the left side of the raster too prominent to be cleared by adjustment of TC4 should put R73 under suspicion.

Weak, Grainy Picture

Check aerial, then V1, PCC84.

Sudden Alteration of Tuning

Check V2 (PCF80) by replacement. This valve can change its characteristics giving such symptoms as above or complete loss of Band III signals.

Sound

Apart from the above conditions, the sound circuit is fairly trouble free but if distortion develops which worsens at higher settings of the contrast control, check the 2.2MΩ resistor (red-red-green) wired to the small M1 rectifier situated under the rear centre of the chassis on the end of the centre tag panel. Low sound accompanied by distortion as above but not affected by the contrast control should direct attention to the 220kΩ resistor (red-red-yellow) to pin 1 of the base of V10 and to V10 itself. Then check the CG6E sound detector crystal, diode situated farther to the left under the chassis to the M1 between two 22pF capacitors.

Centring

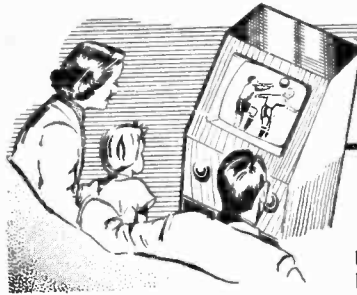
To tilt the picture in either direction, loosen thumbscrew underneath the deflector coil assembly, square picture and tighten screw. To centre the picture use the picture shift lever in front of the focus magnet. Vertical movement will move the picture horizontally, horizontal movement will shift the picture vertically.

(To be continued)

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UNDERNEATH THE DIPOLE

A MONTHLY COMMENTARY

By Iconos

DO you find yourself dozing gently off to sleep when watching some of the more pedestrian or the more pretentious television plays? I do—often. The BBC plays which come into these categories drone on and on until they come to their inevitable end, when one wakes up with the crash of the end-title music or the cheerful sound of an announcer's voice.

In this manner, the BBC has often provided a mental sedative far more effective than some mysterious and expensive soothing *nostra* from the chemist.

The I.T.A.'s tranquillising powers are far less effective owing to the awakenings provided by the advertising breaks. One has to be practically in a coma to remain asleep during these assaults on the ears. And why should they be so loud, so insistent, so strident? It is the advertising agencies' firm belief that there is no volume level less than *ff*, and that even if there is such an insignificant thing as *pp*, it is only 2 dB less than *ff* on the volume indicator.

Compression

THIS matter of level, volume, power and sound impact on advertising slots has been worrying the Chief Engineers of I.T.A. programme companies for some time. It seems that the makers of the TV advertising filmlets have discovered the virtues of compressor amplifiers, in which a volume range is compressed to a ratio of about 2:1, or, used as a limiter, adjusted to a ratio of 10:1. The first adjustment has the effect of making weak sounds louder, without affecting the volume of the loud sounds. Limiting, however, takes care of the peaks of sound only, and prevents overloading. Both are valuable refinements to have available for use with discretion

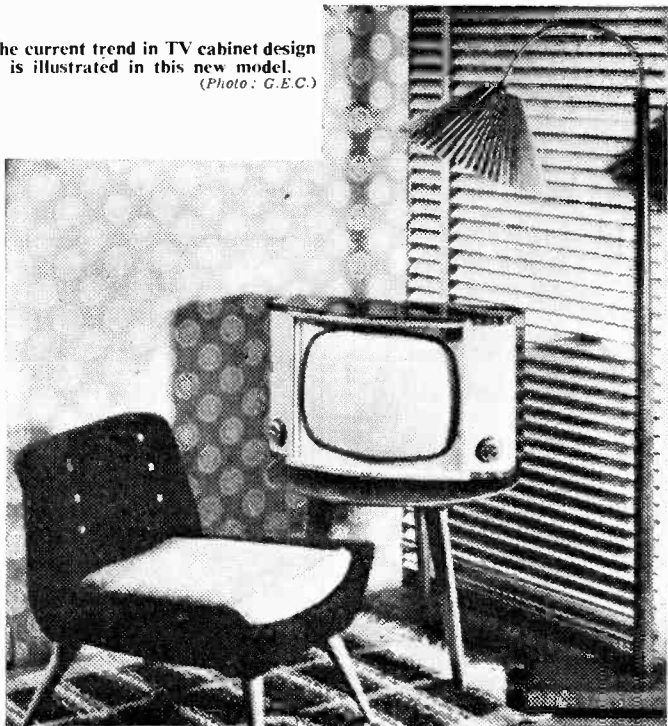
by the sound engineer. Needless to say, discretion has to be thrown to the winds when the advertiser wants to make his message sound louder than anybody else's. The programme contractors are presented with the problem of volume adjustments which have to be made for each advertising slot. Just how to de-compress these advertisements is not too easy. Almost immediately after writing these words, I switched on my TV set and in a very few moments there was a "natural break." This comprised advertising filmlets of the most amusing type on all of which the sound was quietly effective. The stories were amusing and interesting and the pictorial craftsmanship was superb.

Compression with Good Effect

SOUND compression is not necessarily evil, however. It has been used for all kinds of purposes for many years, but the most effective results have been obtained on long distance communications and on the recording of dialogue for films. It was first used for film work to mitigate photographic distortions which affected the weak sounds only. For instance, soft sounds such as whispers and end syllables of sentences were lost in processing. Even if they survived, they had to compete with distortions on the projector, theatre ventilation noise, coughs of the audience and the rustle of paper. For the same reasons, compression could now be usefully applied to the sound of

The current trend in TV cabinet design is illustrated in this new model.

(Photo: G.E.C.)



television play dialogue and even to musical shows. But it is a controlled form of amplitude distortion which can easily be overdone. Too much compression on the sound channel takes the character out of the voice, increases the level of "noises off" and magnifies acoustic defects and echo. TV engineers who are purists on this subject don't like it very much—but then, they usually listen to TV sound reproduced on monitor sets which have hi-fi quality sound.

Background Suppression

ANOTHER sound recording facility, borrowed from the film people, is arousing the interest of television engineers. This is a device known as a "background suppressor" and is normally used during the recording process, when important lines of dialogue on one sound track are spoken during necessarily heavy background noise on another, such as loud applause, gunfire, heavy music and the like. The dialogue itself actuates an A.V.C. circuit and reduces the volume of the background automatically by, say, 3dB, during the sound of each word. This is just sufficient to make each word audible, with apparently no effect upon the background noise. This, again, is a device which can be overdone, but used with discretion makes all the difference to dialogue intelligibility and dramatic effect.

"Sheppey"

I DON'T know how many years ago it was that I saw Somerset Maugham's play "Sheppey" at the St. James's Theatre, which is now demolished. But I remembered it as a fine piece of dramatic characterisation by a good cast, with Cedric Hardwicke (now Sir Cedric) as Sheppey, the hairdresser's assistant. Granada's television play version, directed by Clifford Owen from a TV script by Gerald Savory, had just the right amount of movement and additional scenes which are necessary in adapting a stage play to the television medium. The story is slight. Sheppey wins £8,500 in the Irish Sweep, gives up his job at a high-class hairdresser's saloon in the West End

and decides to give the money to the needy, including inviting a thief and a shady lady to his home. The effect of this do-gooding upon his family and the reactions of those he helps enables Maugham, the master playwright, to hold our attention with crisp dialogue and dramatic situations. Maurice Denham was superb as Sheppey, and Victor Maddern, Jane Hylton, Tom Criddle and Lesley Nunnerley all gave fine performances. Victor Maddern is an actor worth watching. The cameo he gave as the thief who was a guest in the house, is another fine characterisation in his collection of well-observed portraits. Quite apart from the excellent performances by the actors and their directors, this play was beautifully handled by the technicians at Granada's Studio. Camerawork and sound deserve special mention for their high standard.

New Studios

SPRING is the time when the housewife contemplates a general clear-up and replacement of worn-out furnishings. Viewers are much the same, contemplating their four- or five-year old television sets with baleful eyes and thinking of larger and larger screens. Astonishingly good pictures are reproduced on the latest 21in. tubes, though I do not think anyone will dispute the fact that on the 405 line standard, it is a borderline operation! If only

we had 625 lines, what a difference there would be! In the studios, too, a new look is appearing with all kinds of new equipment, mostly of a lighter and more flexible kind. New studios are being brought into operation by TWW at Bristol, which, like their Pontcaana Studios, Cardiff, will be a highly practical set-up for big productions. This is the first I.T.A. company to have separate studios at both ends of its service area. Southern Television will be following it up, however, with a small interview studio at Dover, for news and other items of special interest to the Kent area. At one time it was stated that the new I.T.A. Dover transmitter would serve a population of less than 500,000. Now I see it stated that the service area will cover a population of 1,000,000. I would have thought this total number was sufficient to maintain a new, entirely independent company for that area. However, there is the knotty problem of overlapping service areas of A-TV, AR-TV, Southern and the Kent transmitter. Southern have done so well as a really independent organisation that they deserve the contract. New studios at the BBC are coming to shape at last, at the Television Centre at Shepherds Bush. This is an enormous undertaking which, from the outside, is very good to look upon. I am looking forward to viewing the inside of this excellently planned centre.

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CORRESPONDENCE

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

QUAD AERIALS

SIR,—I was very interested in recent articles on the above subject in the July issue of PRACTICAL TELEVISION and duly constructed an aerial as per details and dimensions for Channel 9. This was installed in the loft of the house where I had previously used an eleven element yagi with folded dipole. The results were very pleasing. The picture was without question greatly improved. Endeavouring to improve even more I added one director, then a second, with even more pleasing results. The directors added were to the dimensions given in the article by G. Clements, September issue and the material used was $\frac{1}{4}$ in. dia. copper tube.—C. E. (Reading).

EY51

REPLACEMENT

SIR,—The method you recommended in "Your Problems Solved," May issue, for replacing the EY51 in a Ferguson 996T seems unnecessarily difficult. The method which I use is as follows and should be found easier.

(1) Uncover PL81 and PV81 valves by removing small plate immediately beneath tube neck. (2) Remove leads from tops of those valves, also EHT connector. (3) Turn cabinet on its side, remove bottom and four self-tapping screws will be seen holding the line output transformer. (4) Remove these, and the transformer can be removed sufficiently in a downward direction to enable the rectifier to be replaced. In the majority of these sets, no other leads have to be unsoldered.—R. G. HARRISON (Newcastle-on-Tyne).

INTERLACE

SIR,—I was very interested to read D. R. Bowman's description of Patchett's sync separator (June issue) and having used the separator for several years I can vouch for its excellent performance.

An important point which does not appear to be mentioned in the text, is that the pentode used must be of the short-base suppressor grid type to ensure that the valve is cut off between the pulses.

As an alternative to the 6F33, the 6E32 (VR116, CV1116) which is an older Mazda octal-based valve, may be used.—E. P. ALEXANDER (Liverpool, 18).

TV THIRD PROGRAMME?

SIR,—I am one of the many people in this country who enjoy listening to the BBC Third Programme—I find the talks and discussions most enlightening, and the plays and operas in other languages of great educational value, both from my own point of view and from that of my pupils. Now, however, with the advent of

television into most homes, would it not be possible to have another Channel on television showing programmes of a similar nature? It has been said that "between 7.0 p.m. and 10.30 p.m., only about one-fifth of the total TV programmes offered to the British public could be described as being of any serious value." I feel that this is a great pity for surely there are a number of viewers who would benefit and, indeed, be entertained, for example, by plays in a foreign tongue, complete operas or talks and discussions on a slightly higher plane. I realise that this suggestion will cause an outcry in some quarters, but so did the establishment of the Third Programme on sound radio and I am sure there are few to dispute the fact that this has proved a great success, separating as it does programmes of a widely differing nature.
—"SCHOOLMISTRESS"
(London).

SPECIAL NOTE

Will readers please note that we are unable to supply Service Sheets or Circuits of ex-government apparatus, or of proprietary makes of commercial receivers. We regret that we are also unable to publish letters from readers seeking a source of supply of such apparatus.

COLOUR TELEVISION

SIR,—Your correspondent R. D. Coyle (May issue) seeks to make a case for work on a high definition colour television system with no effort made to secure compatibility. No one would deny the pleasure of watching such a television but I feel that a number of points must be considered.

High definition is not secured merely by increasing the number of lines; it is also a function of the band-pass frequencies and the spot speed. The higher the spot speed, the higher the frequency needed to obtain a sharp vertical edge to the picture detail.

The spot speed is, of course, a function of picture size, number of lines and frame frequency. Ignoring the first named, which is simply the statement that small screens produce a high definition picture, it is evident that increasing the number of lines increases the frequency needed for satisfactory picture definition unless the frame frequency is reduced, and I assume this is not contemplated as flicker would be almost inevitable.

In order to produce an all round increase in definition, after increasing the number of lines, the frequency must be increased by a factor equal to the square of the factor by which the lines have been increased.

Raising the definition will, therefore, substantially increase the cost of receivers, and, of course, transmitters. If this increase in cost is to be coupled with the inevitable increase in costs incurred when buying a colour TV receiver I suggest that the cost of such a receiver will be so high that few will be able to afford one.

If this is so then the whole of the colour TV service will be provided for a very small number of viewers. Who will pay for it? If the cost

is to be borne by its viewers—the only equitable scheme—the licences will be prohibitively expensive. If, on the other hand, the cost is to be borne by all viewers then Mr. Coyle's parallel of the development of theatre and cinema is untrue; theatre-goers were never asked to contribute towards the costs of developing the cinemas!

The only alternative is compatibility so that all viewers can contribute towards the cost of the service, and view the programmes.

It seems to me that either definition or colour TV can be worked on but not both.

Since the colour TV system must, of necessity, be compatible I suggest that the definition should be improved first, and that this should be done in stages, as follows: the bandwidth should be increased as soon as possible and all new sets should be constructed with suitable video strips and with easily removable timebase circuits so that, at some future date, the timebase circuits could be replaced by a new unit having higher

ANALYSING AND SERVICING TV RECEIVERS (Continued from page 603)

Scan distortion with high impedance scan coils.—Suspect a leaky electrolytic in series with scan coils to frame amplifier anode. The displacement of the raster will depend on the leakage of the condenser: a serious leak will deflect the raster off the screen.

Frame bounce, judder or jitter.—The frame rapidly vibrates vertically but remains locked. The frame generator valve is usually responsible; EC180's often cause this and thyratrons like the 6K25 also show this symptom.

Venetian blind effect.—Caused by line pulse on frame. Check the sync network and H.T. decoupling condensers in the frame timebase and main smoothing electrolytics.

Frame flyback lines visible at normal brilliance setting. Check frame flyback suppression condenser usually connected from brilliance control or C.R.T. grid to frame amplifier or oscillator circuit. If the picture is weak this will not be the fault (see weak picture faults).

Frame bounce in addition to what has already been said on this subject in an earlier paragraph, the frame sync network of the integrator should also be checked feeding into the frame generator, and the diode or triode interlace filter could also be responsible.

Scanning lines at top of picture very wide apart.—Check the condensers in the frame-output linearity network and the cathode electrolytic condenser, and the capacitor coupling the frame generator to the amplifier. This distortion may cause the upper part of the raster to be slightly darker than the rest.

Intermittent frame collapse.—Usually the frame generator or output valve, blocking oscillator transformer and on rare occasions the output transformer or scan coils. In the old type Plessey chassis which was fitted in many commercial receivers, a sync pulse is required to trigger off the frame oscillator before a raster can be seen properly. An intermittent heater to cathode short in the C.R.T. will cause the

line frequency and faster frame flyback. A date when the number of lines would be changed would then be announced.

During the transitional period a colour television system compatible with the new higher definition system could be developed.—E. H. PRICE B.Sc. (Eng.), Grad.I.E.E. (Streetly, Warks).

A REMOTE TV SILENCER

SIR,—Regarding the article in the May issue by G. Zygmund, "A Remote TV Silencer," I should like to point out that in quite a few receivers the output transformer secondary is at chassis potential and with mains incorrectly connected, i.e., line to chassis, it can be dangerous unless great care is taken with the installation especially as the writer says he "used an aluminium cigarette case."—E. T. DUDFORD (Westcliff-on-Sea).

[All connections and metalwork should, of course, be insulated from the user in this and similar devices connected to a radio or TV set whether the chassis is "live" or not.—ED.]

frame to collapse. Any fault in the vision strip, sync or interlace stages which prevents the sync pulse from reaching the frame generator will have a similar effect.

In the old type Plessey chassis, the raster does not collapse to a white line, but only partially collapses and then builds up again in a flip-flop manner. If it does collapse completely the fault lies in the frame timebase.

Weak frame lock.—Hold control very "touchy," picture either runs up or down on variation of hold control, but the locking frequency is well within the range of the control. The frame blocking oscillator transformer or its valve sometimes causes this fault, but the usual cause is a weak sync pulse. Check the electrolytic condenser in the video amplifier and cathode circuit; picture deterioration will also be evident if this is the cause. Examine the sync separator output integrator resistors and condenser, also the frame interlace filter (frame pulse clipper, line suppressor or frame pulse separator). This is a crystal, single or double diode or triode valve between the sync separator and frame generator (see sync faults).

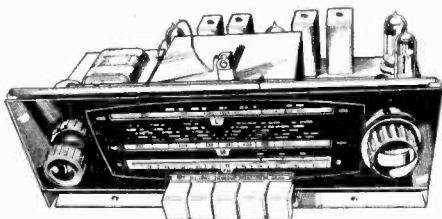
No frame hold.—Inability to lock picture vertically. Picture "runs" rapidly and folds over itself. Check the resistor in series with the hold control for high resistance, and the charging capacitor for variation, the generator valve, the hold control itself and in some circuits the height control also, and the blocking oscillator transformer.

Lack of height.—Check the frame generator valve for low emission, its anode load resistor for increased resistance and its coupling capacitor to frame amplifier; the amplifier valve and H.T. line.

Picture collapsed to white horizontal line.—This could be almost any component in the generator stage. Change the valve first and test the hold and height controls for continuity and then the resistors and condensers, the frame amplifier valve, the oscillator and output transformers if fitted, and the scan coils.

(To be continued)

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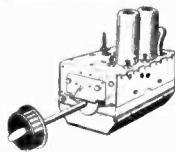
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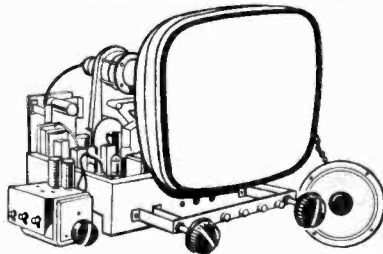
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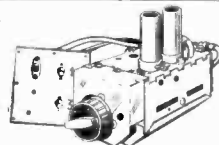
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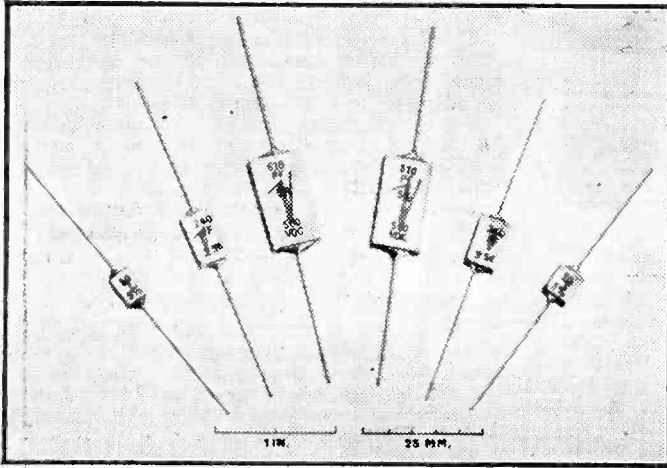
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News From the Trade

New Vitramon Capacitors

A NEW range of Vitramon capacitors has been made available by The Plessey Company Limited, Ilford, Essex, especially for use in radio and electronic equipment where close tolerances and negligible capacitance drift are vital factors. Vitramon porcelain dielectric is a controlled material, lending itself to the production of capacitors with electrical and mechanical characteris-



A selection from the new range of Vitramon capacitors.

tics not possible with such natural materials as mica.

Two ratings are available in the new range, at 300V. and 500V. D.C. working. The capacitors are also capable of withstanding an application of twice the rated voltage.

Close tolerances are maintained without drift by the capacitors over considerable periods of time; standard tolerances being — 5 per cent. or 0.25pF, whichever is greater. For more rigid requirements, special orders can be filled for tolerances to — 1 per cent. or 0.1pF, whichever is greater.

"Belling-Lee" Chimney Bracket

THE L.10 chimney bracket recently introduced by Belling and Lee Limited, Great Cambridge Road, Enfield, Middlesex, is suitable for single or double lashings and made in corrosion-resistant aluminium alloy, tested to withstand 80 m.p.h. gusts when used with suitable "Belling-Lee" Unit Plan arrays.

The spine of the bracket is of box-section construction to give maximum strength with minimum weight, and extra wide chimney seating is provided. The edges of the chimney seating are radiused to prevent chafing of brickwork. The bracket is for use with 1in. to 2in. masts, and slots allow for vertical adjustment of the mast.

The L.10 kit for single lashing costs 40s., and the L.A.10 conversion kit for double lashing 13s.

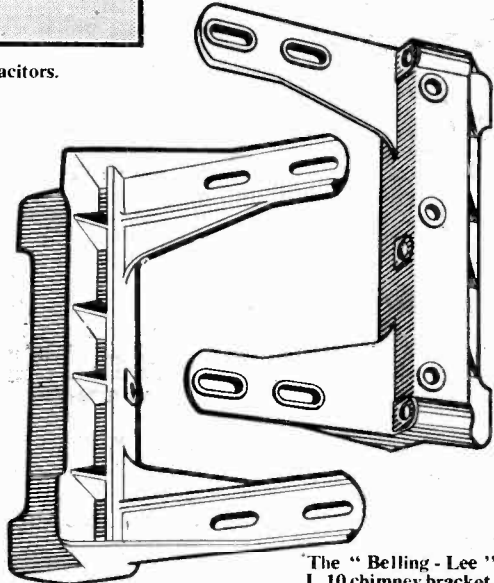
"Golden Touch" Price Reduction

THE abolition of purchase tax on replacement TV tubes and the consequent removal of the necessary clerical work involved has enabled C.R.T. Ltd., of Baldock, Herts, to brighten still further their Golden Touch rebuilt tubes service by reducing prices. The effect of this means a C.R.T. rebuilt tube, guaranteed for six months from date of fitting, can be obtained for at least 25 per cent. less than that of a new replacement.

Repaired Tubes Known as "Extra-Life"

SIEMENS EDISON SWAN LTD. now accept television tubes for repair. This new trade service covers all types and sizes of Ediswan Mazda television tubes.

The company emphasise, however, that certain tubes may be found unsuitable for repair. Also a certain number of tubes may be lost during processing. All tubes repaired under this scheme are known as "Extra-Life" and carry a six months' guarantee with an additional allowance of one month for possible transit and



The "Belling-Lee" L.10 chimney bracket.

handling delays. The guarantee operates from the date of leaving the factory.

Full details of the scheme and its method of operation are available from Siemens Edison Swan Ltd., Extra-Life Dept., 155, Charing Cross Road, W.C.2, any Siemens Edison Swan district offices or B.V.A. wholesalers. The scheme will not operate in Eire or the Channel Isles.



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 surplus equipment. We cannot supply alternative details for constructional articles which appear in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. The coupon from p. 620 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.

EKCO T310

My set has developed a dark wavy band on the right-hand side of the screen, which is about 1in. wide on BBC, but only about $\frac{1}{2}$ in. on ITV. Apart from this, the set is operating perfectly, and I wondered whether the fault is due to local interference, as my neighbour tells me he has experienced the same trouble.—T. I. Jones (Treuddyn, Flintshire).

Your fault is due to a breakdown inside the line output and EHT compartment, and this may be seen in a darkened room. Check the line linearity coil and see that the EHT lead is not breaking down to the supporting clip, and check the valves. As this type of interference can affect sets over a wide area, your neighbour may be picking up yours. Should this not be the fault, a poor aerial contact may be the trouble. You can check this by removing the aerial plug and trying the set on a few channels. If the line is still there, the fault is inside the set.

MURPHY V150

I have a perfect picture on the above set, but the sound is marred by a constant buzz. When I turn the brightness control, the buzz dies away, leaving just a hiss. Turning the volume control knob does not eliminate this.—R. Stearns (Foxton).

The buzz you describe is vision-on-sound, and is commonly due to faulty smoothing. Check the large main smoothing condensers, and also the two 40 μ F electrolytics associated with the sound output valve.

An alternative cause of your trouble is a low emission tube, which may be needing more drive than the video stages can supply. This will lead to overloading in the front end of the set, and also cause your symptoms.

PYE VT4

When the brightness control is increased, the picture elongates vertically and then disappears

completely. It is also noted that upon lowering the focus control at the rear, the picture darkens considerably. Lately, white lines have appeared across the picture, and the vertical hold has started to slip.—E. Jones (Slough).

Your symptoms indicate a faulty C.R. tube, a displaced ion-trap magnet, or poor EHT regulation caused by a low EY51. From the behaviour of the focus magnet, we would say that the ion-trap magnet is the most likely of the three. Weak vertical hold may be due to the interlace diodes (type WX6) "going high resistance," or else to an inefficient ECC82 valve.

AERIAL FOR MENDLESHAM

Could you please give me details for the construction of an aerial suitable for receiving a signal from the new transmitter being erected at Mendlesham?—C. G. Rouse (Norwich).

For Mendlesham (Channel 11) the dipole should be 1ft. 11in., with a reflector 2ft. 3in. and a director 2ft. 1in. Spacing between aerial and reflector should be 1ft. 1in. and between aerial and director 1ft. 11in. The spacing and dimensions of further directors, if required, should be progressively 5 per cent. shorter.

REGENTONE "BIG TWELVE"

The picture is very dim and only about 3in. wide, although the height and sound are satisfactory. After about 15 minutes the picture becomes normal in width, but is very dim. I have boosted the tube and interchanged valves where possible.—E. E. Whittaker (Newbury).

We would advise you to change the EL38 valve and the 14A100 metal rectifier. Both are on the left side of the chassis.

BUSH TV24C

The picture is very much oversize, both vertically and horizontally, and it is off-centre by about 2in. to the left. The associated controls, while varying the picture somewhat, do not correct the proportions. The horizontal hold is very critical and at one point in its travel the picture suddenly vanishes to a thin bright vertical line. I have had the valves on the "top deck" tested, and all seem O.K., except the ECL80, which is said to be "just O.K."—H. R. Hayman (West Bridgford).

The EY51 EHT rectifier associated with the line output transformer should be replaced, also the horizontal hold control, 30k Ω wire wound.

BANNER B416

I have tried a converter with this set, but cannot obtain ITV picture or sound, as the BBC signal is always on the screen. Could I fit a turret tuner in order to get ITV, and if so, what type do you suggest?—R. Foulds (Glasgow, S4).

In view of the high signal strength of the Band I transmission, an R.F. type converter is bound to be susceptible to break-through and it is advisable to fit a tuner unit. The I.F.'s of this receiver are sound, 19.5Mc/s and vision, 16Mc/s. This being so, either a Cyldon or a Brayhead tuner can be used.

(Continued on page 619)

TUBES

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- MW31-18, T12/54, £3/5/-
- 3/16, 3/31, 14KP4, 14KP4A, 108K, 121K, 141K, 7201A, 7202A, 7203A, AW36-21, C14FM, CRM141, CRM142, MW31-16, MW31-74, £3/15/-
- MW36-24, MW36-44, T12-849, £3/15/-
- 17ARF4, 17ASP4, 6706A, C12FM, CRM171, CRM172, MW43-43, £4/10/-
- MW43-64, 7401A, £4/10/-
- 3/6A, 4/15, 6901A, C14BM, C17BM, CRM151, CRM152A, CRM152B, CRM153, MW41-1, MW43-80, T415, £5/15/-
- TR14-2, MW43-69, £5/15/-
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 - CRM152A, CRM152B, CRM153, £6/15/-
 - CRM171, MW43-80, T415, 17K1, 17ASP4, £6/15/-
 - MW53-20, MW53-80, £9/10/-
 - CRM211, CRM212, £9/10/-

NEW TV TUBES

- Subject to Manufacturers Guarantee. Carriage and insurance 12/6 extra. All standard types available including Coscor, 41.C.C., Emitron, Emiscope. MW6-2, 8/10.
- MW31-74, AW36-21, AW36-80, £10/10/-
 - MW36-24, MW36-44, £13.0.0.
 - C14FM, C14BM, £11.15.
 - AW43-80, MW43-84, MW43-89, £12/-/-
 - MW43-80, £12/-/-
 - MW41-1, CRM141, CRM142, £12.15.0.
 - CRM121, CRM122, £13.0.0.
 - CRM171, CRM172, CRM173, £13/10/-
 - C17BM, C17FM, £13/10/-
 - CRM153, £15.15.0. CMR152B, £16.15.0.
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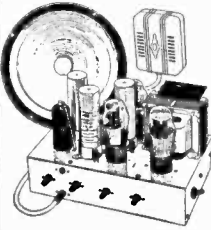
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- | | | | | | | | | | | | | | | | |
|-------|------|---------|------|-------|------|--------|------|--------|------|-------|------|--------|------|---------|-------|
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| 7C5 | 7/6 | 25146G | 6/6 | CH35 | 8/6 | EC91 | 4/6 | EL42 | 9/6 | P41 | 4/6 | U26 | 13/6 | U89 | 10/8 |
| 7C6 | 7/6 | 25146GT | 9/6 | CL33 | 9/6 | EC91 | 11/6 | EL44 | 9/6 | P81 | 2/6 | U31 | 8/6 | U16 | 20/11 |
| 7H7 | 7/6 | 25156 | 9/- | CV31 | 4/6 | EC32 | 9/6 | EL45 | 11/6 | PC84 | 8/6 | U33 | 9/6 | U184 | 27/10 |
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| 787 | 9/6 | 2526 | 9/6 | D77 | 4/6 | EC34 | 10/6 | EL95 | 10/6 | PC89 | 10/6 | U30 | 6/6 | UY1 | 4/6 |
| 7V7 | 8/- | 2528 | 10/6 | D132 | 5/6 | EC31 | 7/6 | EM34 | 9/6 | PC80 | 8/6 | U32 | 6/6 | UY8 | 9/6 |
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| 8D1 | 6/6 | 3516GT | 9/6 | DAP91 | 7/6 | EC35 | 8/6 | EM85 | 10/6 | PC84 | 14/6 | U281 | 8/6 | W81 | 9/6 |
| 8F9 | 10/6 | 35W4 | 8/6 | DAP96 | 8/6 | EC31 | 2/6 | EM31 | 16/6 | PC85 | 5/6 | U282 | 22/7 | W11M | 11/6 |
| 8H1 | 12/6 | 35ZGT | 8/6 | DQ1 | 6/6 | EC32 | 11/6 | EM44 | 7/6 | PC86 | 7/6 | U301 | 11/6 | W16 | 6/6 |
| 8K1 | 10/6 | 35ZGT | 8/6 | DF33 | 10/6 | ECF92 | 11/6 | EM86 | 11/6 | PC84 | 5/6 | U402 | 9/6 | W77 | 6/6 |
| 8L1 | 12/6 | 42 | 7/6 | DF91 | 5/6 | EC35 | 6/6 | EM40 | 7/6 | PC83 | 9/6 | U404 | 8/6 | W81 | 5/6 |
| 8M1 | 9/6 | 50C5 | 10/6 | DH63 | 8/6 | EC42 | 9/6 | EM41 | 9/6 | PL33 | 8/6 | U401 | 18/6 | X16M | 9/8 |
| 8N1 | 12/6 | 50C6 | 18/6 | DH77 | 8/6 | EC81 | 9/6 | EM40 | 8/6 | PL36 | 16/6 | U408 | 9/6 | X63 | 9/6 |
| 8P1 | 7/6 | 50C7 | 9/6 | DK91 | 7/6 | EC80 | 9/6 | EM41 | 9/6 | PL38 | 14/6 | U434 | 9/6 | X65 | 11/6 |
| 8Q1 | 7/6 | 53K1 | 11/6 | DK92 | 9/6 | EC82 | 12/6 | EM42 | 9/6 | PL32 | 9/6 | U431 | 8/6 | X66 | 9/6 |
| 8R1 | 6/6 | 54K1 | 12/6 | DK96 | 8/6 | EF36 | 3/6 | EM44 | 3/6 | GM4 | 9/6 | U431 | 8/6 | X76 | 9/6 |
| 8S1 | 5/6 | 5L35 | 11/6 | EL35 | 11/6 | EF37 | 7/6 | HABL80 | 12/6 | PL82 | 9/6 | U401 | 12/6 | X78 | 22/3 |
| 8T1 | 9/6 | 61B1 | 9/6 | EL92 | 9/6 | EP39 | 9/6 | HL41 | 9/6 | PL35 | 16/6 | U408 | 9/6 | X83 | 9/6 |
| 8U1 | 14/6 | 61B1GT | 11/6 | EL93 | 7/6 | EP40 | 14/6 | HL22 | 6/6 | PL31 | 8/6 | U408 | 9/6 | X63 | 9/6 |
| 8V1 | 4/6 | 61B1 | 7/6 | EL94 | 7/6 | EP41 | 9/6 | KT33 | 6/6 | PL22 | 16/6 | U408 | 9/6 | X63 | 9/6 |
| 8W1 | 5/6 | 61B1 | 7/6 | EL96 | 8/6 | EF50 | 8/6 | KT36 | 9/6 | PL81 | 8/6 | U408 | 10/6 | Z63 | 5/6 |
| 8X1 | 8/6 | PA50 | 9/6 | PA50 | 9/6 | Brit. | 1/6 | KT44 | 9/6 | PL80 | 8/6 | U408 | 9/6 | Z66 | 5/6 |
| 8Y1 | 8/6 | PA80 | 8/6 | PA80 | 8/6 | Red. | 2/6 | KT45 | 9/6 | PL82 | 8/6 | U408 | 9/6 | Z67 | 4/6 |
| 8Z1 | 9/6 | PA81 | 9/6 | PA81 | 9/6 | U.S.A. | 2/6 | KT46 | 11/6 | PL83 | 9/6 | U408 | 9/6 | Z67 | 4/6 |
| 8Z1 | 9/6 | PA81 | 9/6 | PA81 | 9/6 | KT51 | 9/6 | PT22 | 9/6 | PL82 | 9/6 | U408 | 9/6 | Z152 | 5/6 |
| 8Z1 | 9/6 | PA81 | 9/6 | PA81 | 9/6 | KT51 | 9/6 | PT22 | 9/6 | PL82 | 9/6 | U408 | 9/6 | Z152 | 5/6 |
| 8Z1 | 9/6 | PA81 | 9/6 | PA81 | 9/6 | KT51 | 9/6 | PT22 | 9/6 | PL82 | 9/6 | U408 | 9/6 | Z152 | 5/6 |
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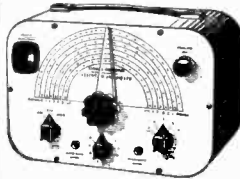


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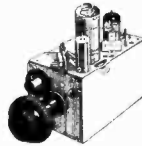
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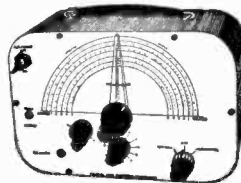


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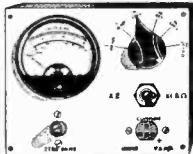
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COSSOR 938

The picture on the above set is rapidly closing in with black bands at either side, though what picture we do see is of good quality on both channels. Sound on BBC is good, but to receive sound or picture on ITV, the fine tuning control must be advanced to maximum setting, otherwise the screen remains blank and sound is merely a harsh roar. I have replaced V15, and adjusted L16, but am wondering if the trouble lies with V13.—J. Walsh (London, S.W.1).

Lack of width, accompanied by a dull picture can be due to faults in any of the following—V14, T3, V17 or V18 (or the associated R96 or R97).

Your sound fault may be due to a low VT1 (7AN7), but if replacement fails to remove the rushing sound, you will probably need to modify the sound I.F. stage to remove one stage of I.F. gain.

EKCO T164

When switched on, the picture spins and continues to do so for about 10 minutes before it stops and remains steady. I can stop the spinning, but then the picture slips three or four times during the next half-hour or so, and I have to readjust. After this, it will probably hold the rest of the evening, although it may require further readjustment later.—P. D. Phillips (Kenton, Middx.).

The cause of your trouble is almost certainly the Q3/4 interlace rectifier (coded orange-yellow) which in appearance, is like a small fat resistor adjacent to the frame blocking oscillator transformer.

FERGUSON 203T

This set is working well, but recently I have noticed that when switching off at the end of an evening the picture disappears at once, but shortly after this a brilliant pin-point of light appears in the centre of the tube face, and lingers for quite a time. I fear this may cause an ion burn. Can you advise me how to rectify this?—A. G. Anstead (Ilford, Essex).

The small spot will not harm the tube in any way. An ion burn cannot develop as no negative ions reach the tube face, owing to the action of the ion trap magnet and the bent gun assembly.

SOBELL TPS147

The contrast on Channel 9 is quite good, but to bring the picture into sharp focus, I have to sacrifice contrast, as I have to alter the fine tuner. I have tried adjusting the oscillator coil and the aerial coil by means of the slugs, but to no avail. There is no trouble at all on Channel 1, so I am reluctant to touch the actual set, in case I spoil that, too.—F. G. Burgin (Aylesbury, Bucks).

We would say that the fault is either in the turret or the aerial system, and you may be receiving a much weaker ITV signal than the local BBC station provides. This will give a different setting on the AGC line and may alter the input capacity of the controlled valves. We advise you to check the PCC84 and ITV biscuits in the turret tuner, in addition to examining your

aerial for possible faults, suspecting particularly any diplexer you may have.

HMV 1842

Height and width of picture on this set are short by some 1½ in. when controls are set normally, although when the controls are set to maximum the screen is almost filled. I have moved voltage tap 10V with very little difference, so have you any other suggestions, please?—R. Kirkwood (Glasgow).

This could be caused by low H.T. voltage. Suspect metal rectifier. Smoothed H.T. should be 215V. at 215mA.

PYE FV1

About half an hour after switching on, the bottom of the screen begins to cramp, then folds over, leaving nearly 2 in. blank. At the same time, the top of the picture expands. If I switch on and off several times, the picture will gradually fill the screen for five or ten minutes before cramping again.—T. Palmer (Middlesbrough, Yorks.).

We advise you to replace the ECL80 frame scan generator, which is just outside the screened compartment below the point at which the EHT lead emerges.

MARCONIPHONE VT173DA

The picture has started to decrease in width, and adjustments of the width control fail to fill the screen, merely breaking up the picture. I have replaced the B36 and U35, also the metal rectifier.—R. T. Bradley (Rugeley, Staffs.).

Have KT36 checked, or try substituting one known to be good. Width control should be checked for continuity and resistance; check also that the slider is making good contact. Resistance R53, which is in series with the width control, should also be serviced.

INVICTA T112

As the screen brightens, the picture is rolling and has to be steadied by means of the frame hold control, which is extremely critical. I then find I have two images, the top half of the picture being superimposed on to the lower half, with the frame flyback lines across the whole of the screen.—A. Shepton (St. Helens, Lancs.).

You should check the frame oscillator—output valve ECL80, the frame hold control and the 470KΩ (yellow—violet—yellow) resistor wired to the centre tag of the control; trace green lead. If still defective, suspect frame blocking oscillator transformer associated with pins 1 and 2 of the ECL80.

PHILIPS 1726U

When switched on, the picture lacks height, and the corners are turned over. This clears slowly to a perfect picture, except that at times the top left-hand corner drops slightly. There is no lack of brilliance or contrast, although the line hold is unstable. The mains voltage in this area appears to affect the hold at peak-load periods. I have recently fitted an external converter with two aerials. Patterning has developed on both channels (more noticeably on ITV) and 1

wondered if this is due to the two aerial down-leads being close?—F. W. Gibbons (Whitley Bay, Yorks.).

The curled edges are typical symptoms of a failing tube, aggravated by residual dampness on the tube face and surround.

The critical line hold may be due to a failing ECL80 valve (centre of the time-base chassis) or a defective 220K Ω resistor to pin 1 of the valve base (red-red-yellow). We suggest that you change the valve and replace the resistor with one valued at 100K Ω (brown-black-yellow).

SOBELL T145

The picture on above was very unstable, and upon examination, I found that smoke was coming from valve No. 7 (EF80), which was glowing very brightly, with blackened connections. Is this caused by failure of resistances connected to the valve, and what are their values, please?—J. Macnally (Glasgow, C.2).

We think the valve in question is the video amplifier and the components that are burnt out are R61 (47K Ω), which comes from pin 8 to pin 3, also R60 (470 Ω) from pin 3 to earth. This may well have been caused by the valve developing an internal short circuit. Replace these components and the valve.

SOUND RECORDING FROM TV

I wish to record TV sound on to tape. My tape recorder has the necessary inputs, but I should like some advice on how to set about this.—D. G. Hassell (Sutton Coldfield).

Use a short length of screened cable (coaxial will do), two .01 μ F capacitors and a suitable output socket to mount on the rear of the set. Solder the inner of the coaxial to the centre tag of the receiver volume control, the screening to chassis or "low" end tag of the volume control, depending upon your television model). Connect the capacitors to the socket and wire the coaxial inner to the free end of the one connected to the inner conductor of the socket, and the screening to the free end of the other. The capacitors are to isolate the receiver from the socket and tape-recorder.

Whenever leads are taken from a TV receiver, they should have capacitors wired in series to isolate the mains.

EKCO T126

I should be greatly obliged if you could let me have details of the functions of all the various valves in the set by reference to type and layout.—R. H. Harper (Bexleyheath, Kent).

Right Side.—R.F., mixer, I.F. and video amplifier valves, all 10F1, except for the first sound I.F., which is a 6F15. Vision and sound detectors and noise limiters (two), 20D1. Sound output 10P13.

Centre—Sync separator, 20F2; frame and line oscillator 20L1. Frame output 6L18.

Left side.—Line output, 20P1; main rectifier/efficiency diode U801.

FERGUSON 996T (SCHEDULE E)

Quite frequently, I have to replace the video detector crystal diode. The original was an OA60, but I have used OA79's. The set also suffers occasionally from uncontrollable brilliance. Do you think a valve diode would improve matters?—W. Attwood (Sheldon, Birmingham).

Frequent failure of the crystal diode normally denotes a screen to control grid short in the EF80 video amplifier valve, occurring intermittently. It should not be necessary to replace the diode frequently. The vision interference limiter section of the EB91 could be used in place of the crystal if desired. Failure of the diode does not cause uncontrollable brilliance, but a short in the EF80 could, as could also vision instability (oscillation). This latter can often cause a short in the diode also.

VIDOR CN4218

I intend to fit a turret tuner to my receiver. I have studied the article on page 361 of the March, 1958, issue, but if possible I should like clarification of the following points.

(a) To what extent should the circuit of V2 (EF80) be modified and what are the recommended values of any resistors and/or capacitors which may have to be replaced.

(b) The grid of V1 of the turret tuner is taken via a 10k resistor to the A.G.C. line. How should this line be connected into the existing circuit of my set? I am in possession of a circuit diagram of both the set and the tuner.—L. C. Day (London, S.E.14).

The frequency changer should be modified to the extent as detailed in Figs. 3 and 4 of the article. The values shown in Fig. 4 would be suitable. The turret tuner A.G.C. line should be connected to receiver chassis.

RGD 1757C

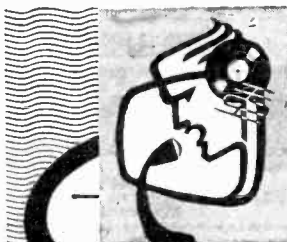
I cannot get the contrast right. The picture just stays grey and will not show black and white. I renewed the EHT valve EY51 and the ECL80 next to the EY51. This improved the picture, but the contrast is far from right. I have a cascode pre-amp. for STV channel 10 with a PCC84 valve, would it be advisable to add another stage e.g., PCF80 valve to it or would the TV sound tuner with the PCF80 do the same job?—A. Paterson (Ayrshire).

This effect may well be caused by a weak aerial signal, and while a two-stage cascode pre-amp. may assist, if the signal is very weak the resulting picture will appear rather "grainy" owing to valve noise. It would be desirable if possible to improve the I.T.A. aerial system.

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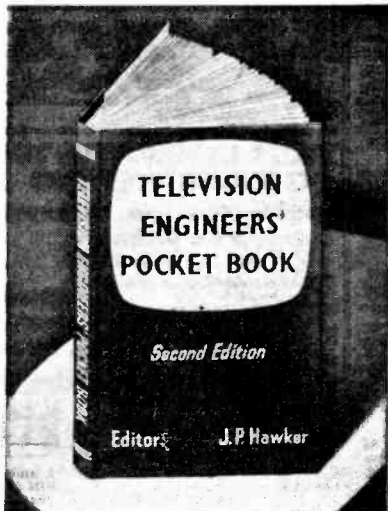
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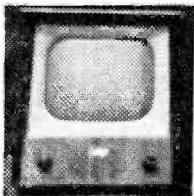
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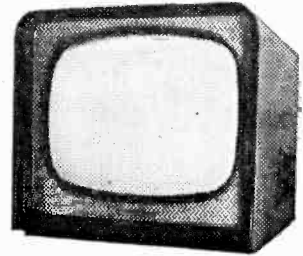
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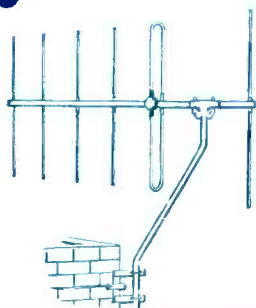
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Table listing various vacuum tube valves with their types and prices. Columns include valve type (e.g., 1X5, 1Y5, 2X5) and price (e.g., 8/6, 10/6).

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THREE WAVEBANDS FIVE VALVES
S.W. 16 m.-50 m. LATEST MULLARD
M.W. 200 m.-550 m. EC142, EF11, EBC41,
L.W. 800 m.-2,000 m. EC11, E230,
12-month guarantee.

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£9.10.0 Carr. & Ins. 4/6.

TERMS: Dep. £5.5.0 and five monthly of £1. MATCHED SPEAKERS FOR ABOVE CHASSIS. 6in., 17/6; 10in., 25/6; 12in., 30/6.



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OUR PRICE £6.19.6

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

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