

TELEVISION SPARES

All Makes All Models By return of post

**LINE OUTPUT TRANSFORMERS FRAME OUTPUT TRANSFORMERS
DEFLECTOR COILS**

LINE AND FRAME BLOCKING OSCILLATOR TRANSFORMERS

ALL POTENTIOMETER AND SLIDER CONTROLS

MAINS DROPPERS

METAL RECTIFIERS

GERMANIUM DIODES

FOCUS MAGNETS

ION TRAPS

E.H.T. CONDENSERS

Our Range of Spares is probably the most extensive in the country and includes all Spares for Tape Recorders, Radio and Record Player Units.

Technical Advice Free. Service Manuals supplied on loan.

Terms: C.W.O. or C.O.D. All Components are supplied at list prices, plus 2 6 p.p.

Please enclose S.A.E. with all enquiries.

NEWBURY RADIO

272 ROMFORD ROAD, FOREST GATE, LONDON, E.7.

MARyland 3100

SPECIAL FOR THE "HAMS" RADIO STATION

Illustrated

½ inch detachable bit
soldering instrument
List No. 70

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

Apply **SALES & SERVICE**

ADCOLA
REGISTERED TRADE MARK
(Regd. Trade Mark)

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

Telephones:
MACaulay 4272 - 3101



British & Foreign
Patents, Registered
Designs, etc.

Telegrams:
"SOLJOINT, LONDON"

TELEVISION TUBES REBUILT

- ★ A NEW GUN IN EVERY TUBE
- ★ BUY DIRECT FROM THE FACTORY
- ★ 12 MONTHS' GUARANTEE

12 inch **£5.00**

14 inch **£5.10.0**

17 inch **£6.10.0**

Immediate dispatch on receipt of Remittance
Carriage and insurance 12/6 extra

**£1 Refunded on receipt of your
old Tube**

SPECIAL TERMS TO THE TRADE

Our new Saphire Tubes with 18 months' guarantee are also available.

MARSHALL'S for TELEVISION LTD.

131 St. Ann's Road, Tottenham, London, N.15
STAMFORD HILL 3267

BENTLEY ACOUSTIC CORPORATION LTD.

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

Telephone: PRIMROSE 9090

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

OZ4	5/-	6F1	26/6	9BW6	15/3	30P12	7/6	DF91	4/6	EF39	5/6	HN309	24/7	PL83	9/-	U404	8/6	X101	33/2
IA3	3/-	6F6G	7/-	9D2	4/-	30P11	11/6	DF96	8/6	EF40	15/-	HVR2	20/-	PL84	12/8	U400	29/10	X109	17/3
IA5	6/-	6F11	17/3	10C1	13/-	30P13	12/6	DF97	9/-	EF41	9/-	HVR2A	6/-	PL820	18/7	U801	16/7	XD(1.5)	6/6
IA7GT	12/6	6F13	11/6	10C2	26/6	35A5	21/3	DH63	6/6	EF42	10/6	KF35	8/6	PM2B	12/6	UABC80	9/-	XFG1	18/-
ICS	12/6	6F13	11/6	10D2	12/-	35L6GT	9/6	DH76	5/6	EF50(A)	7/-	KL35	8/6	PM12	6/6	UAF42	9/6	XFY12	9/6
IDS	9/-	6F14	26/6	10F1	26/6	35W4	7/6	DH77	7/-	EF50(E)	5/-	KL32	24/7	PM12M	6/6	UB41	12/-	XF34	17/6
ID6	10/6	6F15	15/3	10F9	11/6	35Z3	10/6	DH101	28/6	EF54	5/-	KTL2	5/-	PM24M	21/3	UBC41	8/6	XH(1.5)	6/6
IG6	17/6	6F16	19/6	10LD3	8/6	35Z4GT	9/-	DH102	13/11	EF73	10/6	KT33C	10/-	PX4	10/6	UBC81	11/4	XSG(1.5)	6/6
IHS5T	10/6	6F17	12/6	10LD11		35Z5GT	6/-	DK07	10/6	EF80	6/6	KT36	29/10	PX25	59/8	UBF80	9/6	Y63	7/6
IL4	4/6	6F23	10/6		15/11	43	10/-	DK40	21/3	EF85	7/-	KT41	12/6	PY31	16/7	UBF89	9/6	Z63	7/6
ILD5	5/-	6F32	10/6	10P13	15/-	50C5	10/-	DK91	6/6	EF86	10/6	KT44	12/6	PY32	11/6	UBL21	23/3	Z66	17/6
ILN5	5/-	6F33	7/6	10P14	19/3	50CD6G		DK92	9/-	EF89	9/-	KT61	12/6	PY80	7/6	UCC84	14/7	Z77	4/6
INS5T	10/6	6G6	6/6	12A6	6/6		36/6	DK96	8/6	EF91	4/6	KT63	7/-	PY81	8/6	UC85	9/6	Transistors:	
IRS	6/6	6H6GT	3/-	12AC6	15/3	50L6GT	9/6	DL33	9/6	EF92	4/6	KT66	15/-	PY82	7/-	UCF80	16/7	and diodes	
IS4	9/-	6J5G	5/-	12AD5	17/3	53KU	19/11	DL66	17/6	EF97	13/3	KT88	22/6	PY83	8/6	UCH21	23/3	GD3, 4, 5,	
IS5	6/-	6I6	5/6	12AE6	13/11	72	4/6	DL68	15/-	EF98	13/3	KTW61	6/6	PZ30	19/11	UCH42	9/6	6	4/-
IT4	3/6	6J7G	6/-	12AH7	8/-	77	8/6	DL82	46/5	EF183	18/7	KTW62	7/6	QP21	7/6	UCH91	9/6	OA70	4/-
IU5	6/-	6J7GT	10/6	12AH8	12/6	78	6/6	DL92	7/-	EK32	8/6	KTW63	6/6	QP25	14/6	UCL82	11/6	OA73	4/-
2P	26/6	6K7G	5/-	12AT6	7/6	80	9/-	DL94	7/6	EL32	5/-	KTZ41	8/-	QS150/15	10/6	UCL83	19/3	OA79	4/-
2X2	4/6	6K7GT	6/-	12AT7	6/-	83	15/-	DL96	8/6	EL33	12/6	KTZ63	7/6	UCL91	10/6	UCL91	19/3	OA81	4/-
3A4	6/-	6K8GT	10/6	12AU6	23/3	85A2	15/-	DM70	7/6	EL34	15/-	L63	6/-	R12	9/-	UF42	12/6	OA86	6/-
3A5	10/6	6K8G	6/6	12AU7	6/6	150B2	15/-	EA50	2/6	EL38	26/6	MHC(C)	7/-	R18	14/-	UF80	10/6	OA91	5/-
3B7	12/6	6K25	19/11	12AV6	12/6	161	10/6	EABC80	9/-	EL41	9/-	MHL4	7/6	R19	19/11	UF85	9/6	OA95	5/-
3D6	5/-	6L1	23/3	12AX7	7/6	185BTA	33/2	EAC91	4/6	EL42	10/6	MHLD6	12/6	RK34	7/6	UF86	17/11	OA210	25/-
3Q4	7/6	6L6G	8/-	12BA6	8/-	304	10/6	EAF32	9/-	EL81	12/6	ML4	8/6	S130	15/-	UF89	9/6	OA211	50/-
3Q5GT	9/6	6L6M	9/6	12BE6	8/-	307	10/6	EB4	2/6	EL83	7/6	M54B	23/3	SP4(7)	14/6	UL41	9/6	OC16	44/-
354	7/6	6L7GT	7/6	12BH7	21/3	305	10/6	EB41	8/6	EL84	7/6	MU12/14	8/-	SP41	3/6	UL44	26/6	OC19	54/-
3V4	7/6	6L18	13/-	12E1	30/-	807	7/6	EB91	4/6	EL85	13/11	N37	19/11	SP42	12/6	UL46	14/6	OC26	44/-
3R4GY	17/6	6L19	23/3	12J5GT	4/6	956	3/-	EB3C	23/3	EL86	17/3	N78	19/11	SP61	3/6	UL84	8/6	OC28	25/-
5M4G	6/6	6LD3	8/6	12J7G	9/6	1821	16/7	EB33	5/-	EL91	5/-	N108	19/11	SU25	26/6	UM4	17/3	OC35	48/-
5V4G	10/6	6LD20	15/11	12K5	17/11	5763	12/6	EB4C	8/6	EL95	10/6	N308	20/7	SU61	9/-	UM80	15/3	OC44	26/-
5Y3GT	6/6	6N7	8/-	12K7GT	5/6	7475	7/6	EB81	8/6	EL95	10/6	N339	15/-	T41	23/3	URIC	9/6	OC45	23/-
5Z3	12/6	6P25	12/6	12K8GT	14/-	9002	5/6	EBF80	9/-	EM71	23/3	P61	3/6	TDD4	12/6	UO6	19/11	OC65	22/6
5Z4G	9/-	6P28	26/6	12Q7GT	5/-	AC/PEN		EBF83	13/11	EM80	9/-	PABC80		TH41	26/6	UU7	16/7	OC66	25/-
6A7	10/6	6Q7G	6/6	12S47	8/6	5-pin 23/3		EBF89	9/6	EM81	9/6		13/11	TH233	33/2	UO8	26/6	OC70	14/-
6A8G	9/-	6Q7GT	11/6	12SC7	8/6	7-pin 15/3		EBL21	23/3	EM84	10/6	PCC84	8/-	TH2321	20/7	UU9	7/6	OC71	14/-
6A8B	9/-	6R7G	10/-	12SG7	7/-	AC/PEN/		EBL31	23/3	EN31	37/-	PCC85	9/6	TP22	15/-	UY1N	18/7	OC72	17/-
6AC7	4/6	6SA7GT	8/6	12SH7	8/6	DD	12/6	EC52	5/6	EY51	9/6	PCC88	18/-	TP25	15/-	UY21	13/11	OC73	20/-
6AG5	5/6	6SC7	7/6	12SJ7	8/6	AC/PEN/		EC54	6/-	EY83	16/7	PCC89	11/6	TP2620	33/2	UY41	7/6	OC75	15/-
6AK5	8/6	6SG7GT	8/-	12SK7	6/6	AC/PTP	33/2	EC70	12/6	EY84	14/-	PCF80	10/6	UY12/14	8/6	VM545	7/6	OC76	15/-
6AL5	4/6	6SH7GT	8/-	12SQ7	11/6	ATP4	5/-	EC92	13/6	EY86	9/6	PCF86	15/-	UY16	10/6	VP2(7)	12/6	OC78	17/-
6AM6	4/6	6SJTGT	8/-	12SR7	8/6	AZI	18/7	EC32	10/6	EZ35	6/-	PCL82	10/-	UY18/20	8/6	VP4	15/6	OC78D	17/-
6AQ5	7/6	6SK7GT	6/6	12TA7	10/6	AZ31	10/6	EC33	8/6	EZ40	7/6	PCL83	10/6	U22	8/-	VP2B	14/6	OC81	18/-
6AT6	7/6	6SL7GT	6/6	14S7	27/10	AZ41	13/11	EC33	24/7	EZ41	7/6	PCL84	12/6	U24	29/10	VP4B	23/3	OC170	35/-
6AU6	10/6	6SN7GT	5/6	18	23/3	B36	15/-	EC35	8/6	EZ80	7/6	PCL85	16/7	U25	17/11	VP13C	7/6	OC200	54/-
6AV6	12/6	6SQ7GT	9/-	19AQ5	10/6	BL63	7/6	EC40	23/3	EZ81	7/6	PCN4A	12/6	U26	10/-	VP23	6/6	OC203	58/-
6BB8T	15/6	6SS7GT	8/-	19A10	10/6	C1	12/6	EC81	6/-	FC14	24/7	PEN4A	26/6	U31	9/6	VP41	6/-	TJ1	40/-
6BA6	7/6	6UA4GT	12/6	20D1	15/3	CIC	12/6	EC82	6/6	FC15	15/-	PEN4D	26/6	U32	26/6	VR105	8/6	TJ2	45/-
6BE6	6/-	6US7	7/6	20F2	26/6	CB11	26/6	EC83	7/6	FC15	26/6	PEN4D	26/6	U33	26/6	VR150	7/6	TJ3	50/-
6BG6G	23/3	6U7G	8/6	20L1	26/6	CB13	23/3	EC84	9/-	FC13C	26/6	PEN25	4/6	U37	26/6	VT61A	5/6	TP1	40/-
6BH6	8/-	6V6G	7/6	20P1	26/6	CCH35	23/3	EC85	8/6	FW4/500	8/6	PEN40DD	U43	U45	9/-	VT501	5/6	TP2	40/-
6B16	6/-	6V6GTG	8/-	20P3	23/3	CK506	6/6	EC88	18/-			PEN44	26/6	U50	6/6	W76	5/6	TS1	10/-
6BQ7A	15/6	6X4	5/-	20P4	26/6	CL33	19/3	EC91	5/6	FW4/800	8/6	PEN45	19/6	U52	6/6	W81M	6/6	TS2	12/6
6BR7	15/6	6XS5GT	6/-	20P5	23/3	CV63	10/6	ECF80	10/6	GZ30	8/6	PEN45DD	U54	U54	19/11	W107	18/7	TS4	24/-
6B5T	25/6	6/30L2	10/-	25A6G	10/6	CY1	18/7	ECF82	10/6	GZ32	10/6	PEN46	26/6	U76	6/-	W229	18/7		
6BW6	8/6	7A7	12/6	25L6GT	10/-	CY31	16/7	ECH3	26/6	GZ33	10/6	PEN383	23/3	U107	16/7	X31	26/6	Special offer!	
6BW7	7/6	7B6	21/3	25Y5	10/-	DI	3/6	ECH21	23/3	GZ34	14/11	PEN43DD	U19	U167	16/7	X41	15/-	3-PCL83	
6BX6	7/6	7B7	8/6	25YS5	10/-	D15	10/6	ECH35	6/6	H63	12/6	PEN45DD	U33	U201	16/7	X61(C)	12/6	3-PCL84	
6C4	5/-	7C5	8/6	25Z4G	9/6	D63	5/6	ECH42	9/-	HAB80	9/-	PEN/DD	U251	U251	14/6	X61M	12/6	1-PL81	
6C5G	6/6	7C6	8/6	25Z5	9/6	D77	4/6	ECH81	13/6	HL2	13/6		U281	19/11	X63	9/6	2-EF80		
6C6	6/6	7D6	10/6	25Z6G	10/-	DA32	10/6	ECH83	13/6	HL23DD	7/6		U282	22/7	X65	12/6			
6C9	13/6	7H7	8/-	27SU	19/11	DAF91	6/-	ECL80	9/-				U301	23/3	X66	12/6			
6C10	9/-	7R7	12/6	28D7	7/6	DAF96	8/6	ECL82	10/6				U329	14/-	X76M	14/-			
6CD6G	36/6	757	9/6	30C1	8/6	DD41	13/11	ECL83	19/3				U339	14/-	X78	21/3			
6CH6	9/-	7F7	8/6	30F5	7/6	DE25	7/6	EF9	23/3	HL41DD			U339	16/7	X79	21/3			
6D3	19/11	7Y4	7/6	30FL1	10/-	DF33	10/6	EF22	14/-				U403	16/7	X91	21/3			
6D6	6/6	8D2	3/6	30L1	8/6	DF66	15/-	EF34	4/-	HL42DD									
6E5	12/6	8D3	4/6	30L15	11/6	DF70	15/-	EF37A	8/-										

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

VOLUME CONTROLS All with Long Spindle and Double-pole Switch, 4/6 each.

METAL RECTIFIERS Full List with ratings free for S.A.E.

10 K	25 K	50 K	100 K	DRM1B 13/-	RM-1 5/3	14A86 17/6	14B130 35/-	14RA 1-2-8-3 21/-	18RA 1-1-16-1 6/6
1/2 mg.	1/2 mg.	1 meg.	2 meg.	DRM2B 15/6	RM-2 7/6	14A97 25/-	14B261 11/6	(FC31)	(FC116)
				DRM3B 15/6	RM-3 7/9	14A100 27/-	14RA 1-2-8-2 17/6	16RD 2-2-8-1 12/-	18RA 1-2-8-1 11/-
				LW7 21/-	RM-4 14/-	14A124 28/-	(FC101)	16RE 2-1-8-1 8/6	18RD 2-

YOUR C.R.T. completely FACTORY REBUILT

New heater and Cathode assembly

12 months'
Guarantee

COMPARE OUR PRICES

- ★ 12 in. £3.0.0
 - ★ 14 in. £3.10.0
 - ★ 17 in. £4.0.0
 - ★ 21 in. £5.0.0
- (Money back if not completely satisfied)
- Carriage and Insurance add 12/6

PASSENGER TRAIN DISPATCH FOR SPEED

All Mullard and Mazda Types Rebuilt—Fast Service
Send your Tube now — Terms C.W.O. or Pro-forma Invoice

KING'S TELE SERVICE CO.

101-111, DAWES ROAD :: FULHAM, S.W.6

FREE TO AMBITIOUS ENGINEERS

— THE LATEST EDITION OF ENGINEERING OPPORTUNITIES

Have you sent for your copy?
ENGINEERING OPPORTUNITIES is a highly informative 156-page guide to the best paid engineering posts. It tells you how you can quickly prepare at home for a recognised engineering qualification and outlines a wonderful range of modern Home Study Courses in all branches of Engineering. This unique book also gives full details of the Practical Radio & Electronics Courses, administered by our Specialist Electronics Training Division—the B.I.E.T. School of Electronics, explains the benefits of our Employment Dept. and shows you how to qualify for five years promotion in one year.

We definitely Guarantee
“NO PASS—NO FEE”

Whatever your age or experience, you cannot afford to miss reading this famous book. If you are earning less than £20 a week, send for your copy of “ENGINEERING OPPORTUNITIES” today—FREE.

**BRITISH INSTITUTE OF ENGINEERING
TECHNOLOGY** (Incorporating E.M.I. Institutes)
Dept. SE/20, 29 Wright's Lane, London, W.8

**WHICH IS YOUR
PET SUBJECT ?**

- Mechanical Eng.,
- Electrical Eng.,
- Civil Engineering,
- Radio Engineering,
- Automobile Eng.,
- Aeronautical Eng.,
- Production Eng.,
- Building, Plastics,
- Draughtsmanship,
- Television, etc.

**GET SOME
LETTERS AFTER
YOUR NAME!**

- A.M.I. Mech.E.
- A.M.I.O.E.
- A.M.I. Prod.E.
- A.M.I.M.I.
- I.I.O.B.
- A.F.R.Ae.S.
- B.Sc.
- A.M. Brit. I.R.E.
- City & Guilds

Gen. Cert. of Education
Etc., etc.

**PRACTICAL
EQUIPMENT**

Basic Practical and Theoretic Courses for beginners in Radio, T.V., Electronics, Etc., A.M. Brit. I.R.E. City & Guilds Radio Amateurs' Exam. R.T.E.B. Certificate P.M.G. Certificate Practical Radio Radio & Television Servicing Practical Electronics Electronics Engineering Automation

**INCLUDING
TOOLS!**

The specialist Electronics Division of B.I.E.T. (Incorporating E.M.I. Institutes) NOW offers you a real laboratory training at home with practical equipment. Ask for details.

**B.I.E.T.
SCHOOL OF
ELECTRONICS**



POST COUPON NOW!

■ Please send me your FREE 156-page 'ENGINEERING OPPORTUNITIES' (Write if you prefer not to cut page)

■ NAME.....

■ ADDRESS.....

■ SUBJECT OR EXAM THAT INTERESTS ME..... (SF/20.)

THE B.I.E.T. IS THE LEADING ORGANISATION OF ITS KIND IN THE WORLD

TUBES

DIRECT FROM OUR FACTORY
New low prices. New top quality guns;
ALL GUARANTEED

Carriage and Insurance 12/6	6 MONTHS REYACUMED		12 MONTHS REGUNNED		12 MONTHS NEW TYPES	
	£1-10	£3	£2	£4	£4-10	£4-10
CRM92, MW22-7, MW22-14, MW22-14C, MW22-17, MW22-18, etc.					MW31/74	
12KPA, 121K, C12B, CRM121, CRM121A, CRM121B, CRM122, CRM123, MW31-14C, MW31-16, MW31-18, MW31-74, etc.					MW36/24	
141K, 7201A, C14FM, CRM141, CRM142, CRM143, MW36-24, MW36-44, etc.	£2-10	£4-10	£2-10	£4-10	£5-15	
17AS4, 171K, AW32-21, C17FM, CRM171, CRM172, MW43-64, MW43-69, 7401A, AW43-80, C14BM, C17BM, CRM151, CRM152A, CRM152B, CRM153, CRM173, MW43-80, MW41-1, etc.	£3	£5-5			AW43/80	
AW53-80, CRM212, MW53-20, MW53-80	£4	£6-10			MW43 64	
					£6-15	

NEW 108K (10in.) TUBES SPECIAL OFFER: 29/-
PLEASE NOTE: Many other types not listed available. S.A.E. enquiries.

13 CHANNEL TV'S

TABLE MODELS. FAMOUS MAKES. Complete with all valves and tubes. These sets are unequalled in value due to have purchase direct from source. They are untested and are not guaranteed to be in working order.

AMAZINGLY POPULAR-IDEAL SECOND SETS

- 12" - £3.19. (P. & P. 12/6)
- 14" - £6.19. (P. & P. 15/-)
- 17" - £9.19. (P. & P. 12/6)
- 12" 5 CHANNEL TV'S 45/- (P. & P. 12/6)
- 14" 5 CHANNEL TV'S 85/- (P. & P. 12/6)

17 INCH 5 CHANNEL TV'S

Complete table models with all valves and tubes. Amazing value. **£6.19** Carr. etc.

4-SPEED RECORD PLAYERS

Latest B.S.R. TU9. Turntable together with lightweight Stair Galaxy dual sapphire crystal turnover pick-up head. **£3.10** Carr. Truly amazing value at 3/-

100 CONDENSERS 10/-

Assortment of miniature silver mica and ceramic condensers. 3-10,000 pF. List value over £5.

100 RESISTORS assortment 7/6

4-2 watt.

PM SPEAKERS 3 chms, top makes

Super performance guaranteed. 8in. **8/-** 5in. **11/-** 10in. **13/-** 6in. 7x4

CO-AX standard and low loss, 25 yds., 12/6.

50 yds., 22/6. 100 yds., 42/6. Co-ax. Plugs 1/3. Wall outlet boxes 3/6.

SMASH HITS

STEREO AUTOCHANGERS

B.S.R. U48 Mousch with famous Xtal Stereo Cartridge. Unrepeatable. **£6.19**

STEREO OUTFITS

Consisting of Stereo B.S.R. UA8, together with two separate 3 watt minus amplifiers, 3 valves (10P2, 10P14, U19) with Stu. Speakers in two tone cases with controls. Also screened leads. **NOTHING ELSE TO BUY! £11.10!**

3 WATT AMPLIFIERS

As above, ideal for P.A. Guitars Grams. **49/-** etc. Ex. quality.

TV PROJECTION UNITS

Complete Standard Philips optical units with Mullard MW6-2 projection tube. **£3.10** (untested) at a fraction of cost.

VALVES SOILED GUARANTEED 3 MTHS.

EY51, PL81 AMAZING VALUE 4/6

12in. TV's 5 channel table models

Including speaker, line trans., cabinet. Top makes requiring only valves and tube to complete your choice. Available. **15/-** (carr. 4/-). (Or £8 per dozen carr. free.)

14in. TV'S 5 channel as above 35/-

(carr. 4/-).

RECTIFIERS 12 volt 31 amps, 9/6.

RM1, 6/6; RM2, 8/-; RM3, 9/-; RM4, 15/6; RM5, 21/-; 14A8, 17/-; 14A9, 22/-; 14A10, 25/-; 16CR1-1-16-1, 7/9; 16RA1-1-16-1, 7/9; 16RD2-2-8-1 14/-; 14RA1-2-8-2, 17/-; 14RA1-2-8-3, 20/-.

TURRET TUNERS

38 Mc. IF. Standard Famous Make with coils listed. £7. Complete with P.F80 **45/-** and PC84 valves. boxed (carr. 3/-). Ditto complete except for 1 condenser coil, 29/-.

Ditto 10 Mc. IF. complete all coils, 55/-.

EXTERNAL/INTERNAL I.T.V. CONVERTERS

WITH POWER PACK. Very compact PC84/P.F80. No alterations to set. Separate easy-mount control box. Listed at 27.7.0. **49/-** Our Price, carr. 2/6.

B.S.R. MONARDECK TAPE DECKS **£9 10 0**
COLLARO TRANSCRIPTION DECKS **£13 15 0**

VALVES BY RETURN OF POST

10% DISCOUNT SPECIAL OFFER

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

NEW LOW PRICES

GUARANTEED 3 MONTHS

OZ4	5/6	6A6	3/6	6J7G	5/6	6N4	4/6	12E1	12/6	42	7/6	DAF96	7/6	EC635	6/9	EL84	7/6	N75	15/-	SU2150A/4/6	UCH81	8/6	
1A5GT	5/6	6A4S	6/6	6J7GT	5/6	6N3	5/6	12E2	3/6	43	7/6	DF33	5/9	EC81	5/9	EL91	4/9	N108	18/-	T4	7/6	UCL81	11/3
1A7GT	11/9	6A7S	7/-	6K9GT	6/6	6X5GT	6/6	12K1GT	5/6	50C5	9/6	LF91	4/-	EC82	6/6	EM34	8/9	N152	10/6	TH30C	12/6	UCL83	13/6
1C5GT	9/9	6A7E	7/9	6K7	6/9	7A7	10/6	12K2GT	5/6	50L9T	9/6	DF96	7/6	EC83	7/6	EM80	9/9	P41	4/6	U14	8/6	UF42	6/9
1D5	9/6	6B7	9/6	6K7G	5/6	7B7	12/6	12Q7GT	5/6	53KU	10/6	DH63	6/9	EC84	8/9	EM81	9/9	P81	5/6	U16	8/6	UF42	6/9
1D6	9/6	6B8G	2/8	6K7GT	5/-	7B8	9/6	12S4GT	6/-	54KU	8/9	DH70	5/9	EC85	8/8	EM84	9/9	PACB0111	U22	6/9	UF80	9/6	
1H5GT	9/9	6B4S	6/-	6K9G	6/6	7B7	7/3	12S7	7/6	61SPT	11/-	DH77	7/-	EC86	9/9	EM85	10/6	PCC4	7/6	U24	15/-	UF85	9/6
1L4	3/6	6B6E	6/6	6K8G	10/6	7G5	9/6	12K8K	7/6	61S7	8/-	DK32	11/9	EC87	9/9	EN81	16/-	PCC5	8/8	U25	13/6	UF86	14/6
1LD5	3/6	6B6GG	12/6	6K25	7/6	7G6C	7/3	12SN7GT	8/6	77	8/6	DK91	8/-	EC821	14/-	EV31	PCX85	19/-	U26	11/-	UF89	7/3	
1LN5	4/6	6B7E	6/6	611	12/6	7E7	9/6	12T4	9/6	78	7/6	DK92	8/6	EC83	9/9	SMALL	9/9	PCC8	13/9	U31	7/3	UL41	7/6
1N5GT	9/9	6B7E	6/6	61E	9/6	77	7/6	1487	14/9	80	8/6	DK96	7/6	EC84	8/6	EV80	8/9	PCC8	7/6	U33	13/-	UL44	12/6
1R5	6/-	6B7R	7/3	61L6G	7/6	7K7	8/-	19A4Q5	7/-	83	9/6	DL33	8/9	EC81	8/3	EV25	6/6	PCC82	7/6	U35	8/9	UL48	9/9
184	8/6	6B7W	7/9	617	9/-	7K7	10/6	19BGG615/-	90AV	4/6	DL35	9/6	EC80	8/3	EV26	6/6	PCC82	8/6	U37	26/6	UL54	7/9	
185	5/3	6B7W	6/6	6167G	7/6	787	9/6	20D1	9/6	11727	10/6	DL52	9/6	EC82	8/6	EV27	6/6	PCC84	9/6	U39	6/-	UL6	12/6
1T4	4/-	6B8E	5/3	61818	9/-	7V7	7/9	20P2	9/6	1532T	18/-	DL91	6/6	EC82	13/-	EV28	6/6	PCC84	11/-	U39	12/6	UL6	12/6
2121	4/6	6C4	3/6	61819	12/6	7Y4	7/9	20U1	13/6	723A	29/-	DL92	6/6	EC82	12/-	EV28	11/-	PEN25	4/6	U52	5/-	UL7	9/6
2A5	5/6	6C5	4/6	61LD3	8/6	7Z4	7/6	20P1	11/6	807A	5/-	DL94	7/6	EC83	3/3	EV10	4/3	EV22	8/6	PEN46	7/3	UL7	9/6
2A5	5/6	6C5	4/9	61LD12	7/6	8D3	3/6	20P3	12/6	807E	3/9	DL96	7/9	EC83	3/3	EV10	4/3	EV22	8/6	PEN46	7/3	UL7	9/6
3Q4	7/3	6C9	9/6	61L20	8/6	10C1	11/-	20P4	17/-	808	3/9	DL96	7/9	EC83	3/3	EV10	4/3	EV22	8/6	PEN46	7/3	UL7	9/6
3Q5GT	8/9	6C9DG	18/6	6N7	6/6	10C2	13/6	20P5	16/-	905	2/9	EAC91	9/6	EV40	13/6	EV34	12/6	P133	9/-	U91	9/6	UL21	11/6
3S4	8/6	6C9G	9/9	6P1	14/-	10C14	9/-	25AG6	8/-	956	2/9	EAC91	9/6	EV40	13/6	EV34	12/6	P133	9/-	U91	9/6	UL21	11/6
3V4	7/6	6D11	9/6	6P25	9/-	10P1	6/9	25L6G	6/9	2050	3/6	EAP42	8/6	EV50-BR/2	14/6	EV34	12/6	P133	9/-	U91	9/6	UL21	11/6
3Y4G	9/6	6D16	12/6	6Q7G	6/6	10114	8/9	25L6GT	9/-	5763	10/-	EB34	1/6	EV50-USA	9/6	EV34	12/6	P133	9/-	U91	9/6	UL21	11/6
3Y4G	9/6	6D16	12/6	6Q7G	6/6	10114	8/9	25Y4	9/6	9001	4/-	EB41	7/-	EV50-USA	9/6	EV34	12/6	P133	9/-	U91	9/6	UL21	11/6
5X4G	11/-	6P1	5/9	61K7G	7/6	10LD12	8/9	25Z5G	7/3	9003	4/-	EB81	3/9	EV54	3/3	KT30	6/6	P44	10/6	U39	11/-	UL70	5/6
5Y3A	6/-	6P6G	6/6	6S47	5/9	10P13	9/6	25Z6	8/-	AZ31	9/6	EB83	5/-	EV55	3/3	KT36	6/6	P44	10/6	U39	11/-	UL70	5/6
5Y3GT	6/6	6P6M	7/-	6S97	4/9	10P14	9/6	27S1	15/-	B36	8/6	EB84	5/-	EV56	3/3	KT44	9/6	P45	10/6	U39	11/-	UL70	5/6
5Z4G	8/6	6P8	3/6	6B7	4/9	12A16	9/6	30C1	7/6	B85	4/9	EB84	5/-	EV56	3/3	KT44	9/6	P45	10/6	U39	11/-	UL70	5/6
5Z4GT	11/-	6P13	6/9	6N45	5/-	12A6	5/3	30P5	7/6	CB131	21/-	EB85	4/9	EV57	3/3	KT44	9/6	P45	10/6	U39	11/-	UL70	5/6
6A7	10/-	6P14	9/6	6B7K	5/3	12A47	6/9	30P11	9/6	CH35	7/6	EB85	4/9	EV57	3/3	KT44	9/6	P45	10/6	U39	11/-	UL70	5/6
6AM9	9/6	6P16	9/6	6B7LGT	6/-	12A48	8/9	30L1	7/6	CL33	9/6	EB85	4/9	EV57	3/3	KT44	9/6	P45	10/6	U39	11/-	UL70	5/6
6AM9GT	13/6	6P16	4/9	6B7LGT	4/9	12A16	6/9	30L2	8/9	30C1	12/6	EV34	9/9	EB131	21/-	EK32	7/9	KTW61	5/6	P230	12/6	UL80	14/6
6ABM	8/3	6P33	6/9	6B7GT	6/3	12A17	5/9	30P12	8/-	D63	1/6	EC52	4/9	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AC7	4/3	6B8	2/-	6E57	5/-	12A07	5/6	30P16	7/6	D77	3/9	EV30	3/6	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AG5	4/3	6J5	4/3	6U4GT	10/6	12AX7	7/-	30P11	10/6	D152	6/6	EV31	4/9	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AG7	8/-	845G	2/6	6U5G	6/3	12P16	8/-	30C1	12/6	EV34	9/9	EB131	21/-	EK32	7/9	KTW61	5/6	P230	12/6	UL80	14/6	X76M	11/6
6ABM	8/3	6P33	6/9	6B7GT	6/3	12A17	5/9	30P12	8/-	D63	1/6	EC52	4/9	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AC7	4/3	6B8	2/-	6E57	5/-	12A07	5/6	30P16	7/6	D77	3/9	EV30	3/6	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AG5	4/3	6J5	4/3	6U4GT	10/6	12AX7	7/-	30P11	10/6	D152	6/6	EV31	4/9	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AG7	8/-	845G	2/6	6U5G	6/3	12P16	8/-	30C1	12/6	EV34	9/9	EB131	21/-	EK32	7/9	KTW61	5/6	P230	12/6	UL80	14/6	X76M	11/6
6AK5	6/9	6J5GT	3/9	6V6G	5/6	12B66	8/9	35W4	6/9	DA90	2/6	EC32	4/9	EV32	4/9	KT11	14/-	PY3	8/-	U41	8/6	X76M	11/6
6AL5	3/9	6J6	4/3																				

TRUE ECONOMY Depends on Quality

Midland "New Alumina" rebuilt C.R.T.s conform to the highest standard of reliability—offering you the finest value available today. Each tube is completely rescreened, aluminised and fitted with a new gun unit.

Midland's reputation for quality and the rapidly growing demands for these dependable tubes are your assurance of satisfaction.

12 and 14in.—£5.0.0 15 and 17in.—£5.10.0 21in.—£8.0.0 (all types).

Reliable Rebuilds at Popular Prices.

Exceptionally low-priced Midland Rebuilds—the tubes you can always depend on.

12in.—£4.10.0 14in.—£4.15.0 15 and 17in.—£5.0.0 21in.—£7.0.0 (all types).

ALL TYPES COVERED BY MIDLAND'S 12 MONTH GUARANTEE AVAILABLE NOW—FROM STOCK

MIDLAND TUBES LTD.

37 GEORGE STREET, MANCHESTER, 1. Telephone: CENTRAL 4568/9



FOR THE MAN ABOUT THE HOUSE, A SOLDERING TOOL!



12/6 A.C. MAINS OR CAR BATTERY 110v or 6v and 12v. Special adapter for 200-250v working 10/- extra. Automatic solder feed. Includes a 20 ft. reel of ERSIN 60/40 solder. It is a tool for electronic soldering car wiring. Instantly ready for use and cannot burn. Fitted in a light metal carrying case, with full instructions for use. These solder tools are Brand NEW. Made to the high standard and quality for export sale. Sold all over the States for over £4 (exchange value) P. & P. 3/6d.

THE AMPLIFIER FOR CHRISTMAS. 59/6. Ideal for stereo attachment, well styled cabinet in Brown/Ivory with carrying handle. Contains 8in. high flux speaker. For use A.C./D.C. mains. 3 valves 10I1, 10P14, and U404. Max. O.P. 4.5 watts. Size 14 x 11 x 6 1/2ins. Wonderful for HOME, HALL, AMATEUR THEATRICALS. 2 units can give a world of amusement and special stereo effects. Ideal for works and offices as Loud Hailer, for Election Speaker and Public Address. Ready for immediate use. 12 months' guarantee. P. & P. 5/6. EXTRAS: Mike £7/8. Record Changer, £7/19/6. Extra Loudspeaker in Continental cabinet, 19/8. P. & P. Extra.

PORTABLE AMPLIFIER, 49/6 (Mk. 2EA) 3 watts. ECL82 valve, A.C. Mains. O.P. Transformer included (two controls). Latest circuit including negative feedback. Knobs 2/6 extra. P. & P. 3/6.

NEW LOOK AMPLIFIER, 49/6. For use with A.C. or D.C. mains 3 valve, 10I1, 10P14, and U404. Max O.P. 4.5 watts. Size 7 x 5 x 4in. Ready for immediate use. Salvage guarantee. P. & P. 5/6.

SPEAKERS 5/9. Limited quantity of these modern type speaker. They are tested and they have a slight cone fault, that is repaired, not affecting the quality. P. & P. 2/6.

8in. P.M. SPEAKER, 6/9. As above, but with O.P. transformer fitted. P. & P. 2/6.

P.M. SPEAKER, 9/6. 8in. of the highest quality, fitted with O.P. Transformer. P. & P. 2/6.

ELLIPTICAL SPEAKERS, 15/9. 8 x 3in. and 7 x 4in. Brand new. Specially made for Record and Tape Recording Cabinets. P. & P. 2/9.

ELLIPTICAL SPEAKERS, 19/8. Brand new. Ideal for Record Cabinets 9 x 4in. P. & P. 2/9.

TELEPHONE SETS, 7/9. Ex. W.D. Wireless remote control unit E.Mk.II New condition morse tapper, switched. Jack plugs, etc. Less phone. P. & P. 3/6.

TAPE AMPLIFIER, £7.19.6. 6 valve amplifier. Output 3.5 watts. Valve line up: EOC83, ECL82, 6BW6, EM84, EZ80. Input for Microphone, Radio and Gram. Controls—Record playback, volume, tone, and Off/On. Size 8 1/2 x 3 x 4 1/2in. Ins. & Carr. 4/6.

COLLARO 4-SPEED AUTO-CHANGER, £7.19.6. Incorporating auto and manual controls. Complete with dual turn over type studio crystal pick-up and sapphire styli. Four speed. A.C. Mains. 200-250v. P. & P. Ins. 5/6.

EXTENSION, 19/9. In polished oak cabinet of attractive design. Complete, fitted with 8in. P.M. Speaker of the highest quality, flex and switch. Ready for use. Ideal for kitchen or workshop, etc. Ins. and Carr. 3/9.



CONTINENTAL DESIGN EXT. SPEAKER, 19/9. Ideal for that extra stereophonic speaker. Covered in smart two tone leatherette colour scheme. Contains 8in. P.M. speaker. Ready for immediate use. P. & P. 3/9.

TV AERIALS, 35/6. Combined loft type, single dipole B.B.C. with 3 elements. I.T.A. Swivel bracket for universal fixing. Ins. & Carr. 3/-.

INDOOR COMBINED 27/-. Folded dipole with 12ft. co-ax. cable fitted. Gold finish. P. & P. 2/-.

I.T.A. AERIAL, 23/6. For all I.T.A. Channels for outdoor or loft. 3 elements. Famous manufacturer. Sold at half the normal price. P. & P. 2/6.
CO-AXIAL CABLE, 6d. PER YARD Cut to any length. Good quality at a very low price. Allow 1/6 postage on 20 yards. 45/- per 100 yards. P. & P. 3/6.

Stamp for FREE Catalogue (Resret U.K. Only)



COMPONENTS LTD.

219 ILFORD LANE ILFORD ESSEX

DOUBLE BEAM "SCOPE"



for D.C. & A.C. APPLICATIONS

Engineered to precision standards, this high-grade instrument is made available at the lowest possible price, incorporating the essential features usually associated with luxury instruments.

This "SCOPE" will appeal particularly to Service engineers and Amateurs. A high gain, extremely stable differential Y-amplifier (30 mV/C.M.). Provides ample sensitivity with A.C. of D.C. inputs. Especially suitable for measurement of transistors for operating conditions where maintenance of D.C. levels is of paramount importance. Push-pull X amplifier; Fly-back suppression; Internal Time-base Scan Waveform available for external use; pulse output available for checking TV Line O.P. Transformers, etc.; Provision for external — 1P and CRT Brightness Modulation. A.C. mains 200/250 v. £18.18.0, plus P. & P. 7/6. or 50/- deposit, plus P. & P. 7/6 and 12 monthly payments of 33/4.

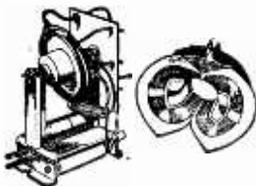
FULL 12 MONTHS' GUARANTEE INCLUDING VALVES AND TUBE.

ALIGNMENT ANALYSER TYPE MC12

A.C. mains 200/250 v. Provides: "Wobulator" (Swept Frequency) operation, for FM/TV alignment linear frequency sweep up to 12 Mc/s. From 400 kc/s-80 Mc/s. Capacitance Measurement. Two ranges provided 0-60pF and 0-120pF. Special Facility enables true resonant frequency of any tuned cct. I.F. transformer, etc., to be rapidly determined. Cash price £6.19.6, plus 5/- P. & P. H.P. terms 25/- deposit plus 5/- P. & P. and six monthly payments of 21/6.



LINE E.H.T. TRANSFORMER



With built-in line and width control. 14 KV. Scan coil. 90deg deflection, on ferrite yoke. Frames O.P. transformer pt. 18 KV. smoothing condenser. Can be used for 14in., 17in. or 21in. tubes. Complete with circuit diagram.

29/6 Plus 4/- P. & P.

As above, but for 625 lines, £2.10.0, plus 4/- P. & P.

FOCUS MAGNET suitable for the above (state tube). 10/- plus 2/6 P. & P

CYLDON TURRET TELETUNER

I.F. 34/38 Mc/s. Brand new, complete with biscuits for channels 2, 4, 8, and 9, but less valves. 10/- plus 2/6 P. & P. Valves required P.C.C. 84, P.C.F. 80.

MAINS TRANSFORMERS

All with tapped primaries. 200-250 volts. 0-160, 180, 200 v., 60 mA. 6.3 v. 2 amp., 10/6. 200-0-200 80 mA., 6.3 v. 2 amp., 6.3 v. 1 amp., 10/6. 350-0-350 v., 70 mA., 6.3 v. 1 amp., 6.3 v. 2 amp., 10/6. 250-250 v. 70 mA., 6.3 v. 2 amp., 10/6. Postage and packing on the above. 3/.

SURFACE BARRIER TRANSISTORS

Type 8B305, 15 Mc/s, 7/8 each. 100% AUDIO TRANSISTORS, 5/- each.

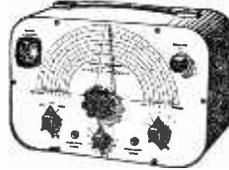
TRANSISTOR TESTER

For both P.N.P. and N.P.N. transistors incorporating moving coil meter. In metal case, size 4 1/2 x 3 1/2 in. Scale marked in gain 19/6 Plus 2/6 P. & P.

A.C./D.C. POCKET MULTIMETER KIT

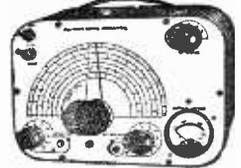
2in. moving coil meter, scale calibrated in A.C./D.C. volts, ohms and milliamps. Voltage range A.C./D.C. 0-50, 0-100, 0-250, 0-500. Milliamps 0-10, 0-100. Ohms range 0-10,000. Front panel, range switch, wirewound pot (for ohms zero setting), toggle switch, resistor and rectifier. 19/6, P. & P. 1/6. Wiring diagram 1/-, free with kit.

SIGNAL GENERATORS



£6.19.6 or 25/- deposit and 6 monthly payments of 21/6. P. & P. 5/- extra. Coverage 100 Kc/s-100 Mc/s on fundamentals and 100 Mc/s to 200 Mc/s on harmonics. Metal case 10in. x 6 1/2in. x 5 1/2in., grey hammer finish. Incorporating three miniature valves and Metal Rectifier. A.C. Mains 200/250. Internal Modulation of 400 c.p.s. to a depth of 30%; modulated or unmodulated R.F. output continuously variable. 100 milli-volts. C.W. and mod. switch, variable A.F. output. Incorporating magic-eyes as output indicator. Accuracy plus or minus 2%.

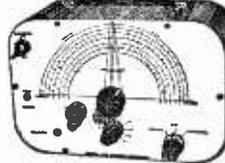
Cash £4.19.6 or 25/- deposit and 4 monthly payments of 21/6. Plus Postage and Packing 5/-. Coverage 100 Kc/s-84 Mc/s. Metal case 10in. x 6 1/2in. x 4 1/2in. Size of scale 6 1/2in. x 3 1/2in. 2 valves and rectifier. A.C. mains 200-250 v. Internal modulation of 400 c.p.s. to a depth of 30% modulated or unmodulated R.F. output continuously variable. 100 milli-volts. C.W. and mod. switch variable A.F. output and moving coil output meter. Grey hammer finished case and white panel. Accuracy plus or minus 2%.



SIGNAL & PATTERN GENERATOR

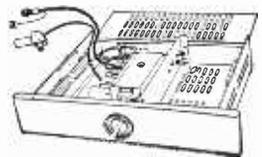
£6.19.6 P. & P. 5/-.

Or 25/- deposit. P. & P. 5/- and 6 monthly payments of 21/6. Coverage 7 Mc/s-210 Mc/s in five bands, all on fundamentals, slow motion tuning audio output. 8 vertical and horizontal bars, logging scale. In grey hammer finished case with carrying handles. Accuracy ± 1% A.C. mains 200-250 v.



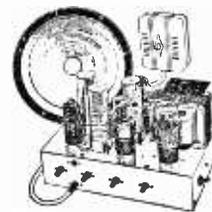
CHANNEL TUNER

Will tune to all Band I and Band III stations. BRAND NEW by famous manufacturer. Complete with P.C.C. 84 and P.C.F. 80 valves (in series). I.F. 16-19 or 33-38. Also can be modified as an aerial converter (instructions supplied). Complete with knobs. 32/6 Plus 3/6 P. & P.



HEATER TRANSFORMER

To suit the above, 200-250 v., 6/- Plus 1/6 P. & P.



8-WATT PUSH-PULL AMPLIFIER

COMPLETE WITH CRYSTAL MIKE AND 8in. LOUDSPEAKER

A.C. mains 200-250 v. Size 10 1/2in. x 8 1/2in. x 4 1/2in. Incorporating 6 valves. H.F. pen., 2 triodes, 2 output pens and rectifier. For use with all makes and type of pick-up and mike. Negative feed back. Two inputs, mike and gram., and controls for same. Separate controls for Bass and Treble Hfl. Response flat from 40 cycles to 15 Kcs.,

± 2 db; 4 db down to 20 Kcs. Output 8 watts at 5% total distortion. Noise level 40 db down all hum. Output transformer tapped for 3 and 15 ohm speech coils. For use with Std. or L.P. records, musical instruments such as Guitars, etc. £4.19.6 P. & P. 7/6. Or 20/- deposit Plus P. & P. 7/6, and 4 monthly payments of 23/-.

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

23 HIGH STREET, ACTON, LONDON, W.3.

All enquiries S.A.E. GOODS NOT DESPATCHED OUTSIDE U.K.

ACCURATE READINGS IN ANY POSITION

ADVANCED DESIGN—MINIMUM WEIGHT

ALL-ROUND RELIABILITY

THE *NEW* SALFORD SELECTEST

MODEL SUPER K 1 mA movement.
39 self-contained ranges for measuring
A.C., D.C. voltages and currents and resistance.

MODEL SUPER 50 50 μ A movement

Send for leaflet No. S.K.50/6002/PT



SALFORD ELECTRICAL INSTRUMENTS LTD.

PEEL WORKS, SILK STREET, SALFORD 3, LANCs. Tel: Blackfriars 6688

London Sales Office: Magnet House, Kingsway, W.C.2. Tel: Temple Bar 4668

A Subsidiary of THE GENERAL ELECTRIC CO. LTD. OF ENGLAND



A NEW-PRACTICAL WAY of UNDERSTANDING

Radio : Television Electronics

Including: Transistors; VHF/FM; Hi-Fi equip-
ment; Computers; Servo-mechs; Test instru-
ments; Photo-electrics; Nucleonics, etc.

Radiostructor—an organisation specialising in
electronic training systems—offers a new self-
instructional method using specially designed
equipment on a "do-it-yourself" basis. You learn
by building actual equipment with the big kits
of components which we send you.

You advance by simple steps, performing a whole
series of interesting and instructive experiments—
with no complicated mathematics! Instructional
manuals employ the latest techniques for showing
the full story of electronics in a practical and
interesting way—in fact, you really have fun whilst
learning! Fill in the coupon below, for full particulars.

POST NOW

TO RADIOSTRUCTOR (DEPT. G.40)
READING, BERKS.

Please send brochure, without obligation to:

★ Name _____
Address _____

★ BLOCK
CAPS
PLEASE

(We do not employ representatives)

12/60



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

RADIOSTRUCTOR

LEADS THE WORLD
IN ELECTRONICS TRAINING

Practical Television

AND TELEVISION TIMES

VOL. 11, No. 123, DECEMBER, 1960

Editorial and Advertisement
Offices:

PRACTICAL TELEVISION

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

© George Newnes Ltd., 1960

Phone: Temple Bar 4363.

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

SUBSCRIPTION RATES

including postage for one year

Inland - - - £1.2.0 per annum
Abroad - - - £1.0.6 per annum
Canada - - - 19s. per annum

Contents

	Page
Editorial	123
A.M. Radio from Spare Turret Coils	124
Telenews	127
EHT Generation (Valves)	129
A Band III Loft Aerial	133
Replacing CR Tubes	134
Servicing TV Receivers	135
Line Oscillator and Sync Circuits	141
The "Olympic"	144
It Will Need Servicing	147
A Triode Converter	151
Phones for TV Receivers	155
Underneath the Dipole	159
Letters to the Editor	163
Your Problems Solved... ..	164

The Editor will be pleased to consider articles of a practical nature suitable for publication in "Practical Television". Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for the manuscripts, every effort will be made to return them if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed to: The Editor, "Practical Television," George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2.

Owing to the rapid progress in the design of radio and television apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

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

THE REPORT OF THE BBC

THE report of the BBC which was published in October gave rise to a great deal of comment in the daily Press, and the statements concerning the views of the BBC on the future of television were given particular prominence. Under the heading "Tasks for the Future", the report states that the Corporation sees as its first task the need to extend the coverage of its transmitters to those areas which at present lack a television service or do not possess a satisfactory service. The BBC has in mind especially the need in the remoter parts of Scotland and Wales. This policy statement shows that the Corporation is aware of the limitations of the present service and, sensibly, intends to improve it before, or together with, the introduction of an alternative service. It must be remembered that where the coverage is at present poor—in remote areas—the need for a television service is great owing to the lack of other forms of entertainment.

Where the introduction of another service is concerned, and it is decided that the uncommitted channels in Band III should be used for an additional television service instead of being employed to extend the present coverage, the report states that "the BBC would wish to provide the additional service". The report continues, "It remains the BBC's objective to provide the public with a planned choice between two different television programmes as soon as possible. This is necessary to the proper fulfilment of the Corporation's obligations as a public service." The BBC considers that this second service would enable it to "increase the number of serious, cultural and informational programmes; cater more fully for regional needs than is possible at present; extend educational broadcasts; provide more opportunity for programmes of an experimental nature".

Of the two alternative uses of the remaining channels in Band III, we think that the proposal to use them to increase the coverage of existing transmitters is the better. As the BBC points out, television in Bands IV and V is all the more likely to succeed if a completely new programme is transmitted to give viewers an incentive to purchase new receivers or the new equipment necessary to receive the transmission.

The report states that the BBC would also be prepared to introduce colour television in any band when the time comes. The point is made that the studios at the Television Centre have been designed so as to be suitable for the introduction of colour at any time.

This latest report of the BBC has already given rise to many comments and we consider that, so far as the future of television is concerned, a number of factors have been mentioned which are worthy of more attention than has so far been bestowed upon them.

Our next issue, dated January, 1961, will be published on December 22nd.

A.M. Radio from Spare Turret Coils

RETUNING THE LOCAL OSCILLATOR TO 38 MC/S

By L. E. Higgs

UNUSED channel coils that are fitted in many TV receivers can be modified, in many cases, to tune down to the local broadcast radio station frequencies. The convenience of changing from either channel to A.M. (amplitude modulation) radio for a quick news check, or to

types are still being incorporated in sets today, and can be identified by the shaped coil mouldings (Fig. 1). Almost any set with this type of coil and standard I.F.'s should function on radio from the modifications given here.

Receivers using different types of turrets, converted sets with the old low I.F., in fact almost any tuner with detachable coils can be modified using this procedure as a guide. Switch tuners, continuously tuned front-ends, and incremental inductance tuners are not suitable.

Briefly then, the oscillator coil has additional turns added to bring its frequency down to around the 38.15Mc/s sound I.F. The mixer grid coil is replaced with a M.W. pre-tuned coil. The cascode anode coil is dispensed with and replaced by a resistor and coupling capacitor. The aerial coil is replaced by another M.W. pre-tuned coil but with a coupling winding.

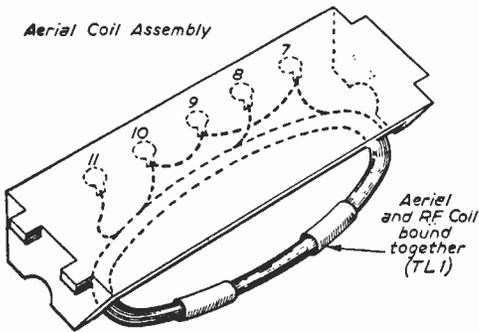


Fig. 1.—Aerial coil assembly.

listen to a short item, without switching off the TV and waiting for the radio to warm up is one advantage. The other is that all modifications are made on detachable spare coils from the turret, without interfering in any way with the circuit of the receiver. If a mistake is made, only a coil is spoiled.

Coil Information

Since about 1955, most thirteen channel receivers use the standard intermediate frequencies of 35Mc/s vision and 38.15Mc/s for sound. This makes the coil information similar for a whole range of sets. Added to this, the turrets fitted in a large range of sets are similar, and often originate from the same factory. These turret

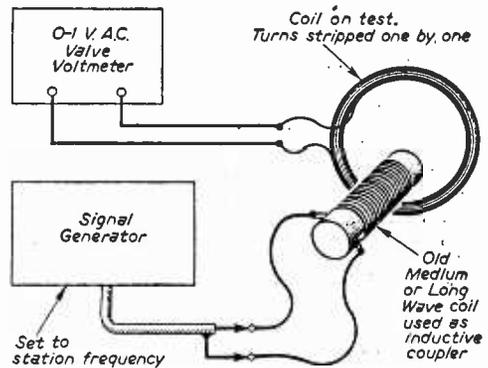


Fig. 3.—Pre-tuning the coils.

The Modifications

Remove all the windings from a spare mixer coil except the slug-tuned oscillator winding. Rewind the oscillator section, tags 1 and 2 (Fig. 2), until, after trial and error guided from the coil table, the oscillator runs at the sound I.F. and can be tuned off on either side of this point. When the oscillator passes through the sound I.F. a hum and rushing noise is heard accompanied by disturbances of the brilliance of the unsynchronised raster. The coarse-tuning slug decides this frequency. Coat this winding with cellulose cement to fix the turns, and improve frequency stability. Cut off the remaining length of paxolin tube (Fig. 2) and solder a 5.6k resistor 1/4W with short ends across the cascode output anode coil contacts. In Fig. 2 these are shown as pair 5 and 6, but check the circuit of the turret in question as it may differ from the examples shown. Now connect a capacitor from the anode contact of the

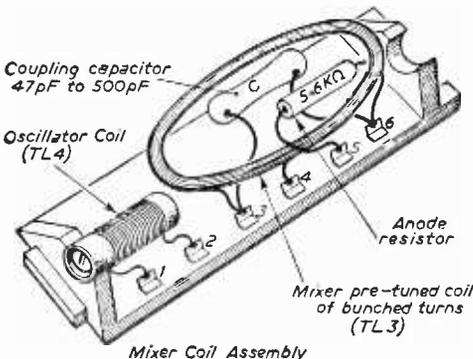


Fig. 2.—Mixer coil assembly.

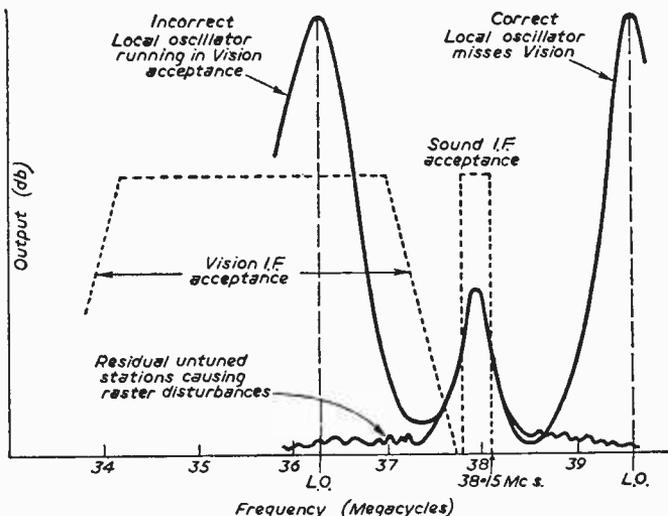


Fig. 4.—Correct and incorrect local oscillator settings.

cascade to the mixer grid contact (6 and 3 in the particular example). This capacitor is not critical. Try 500pF at first until a good signal strength is obtained and then reduce it to improve selectivity compatible with output—47pF is about the lowest tolerable.

Wind a medium wave coil to fit between the mixer grid and the bottom contact of the grid circuit (the pair of contacts from which the original grid winding was removed) 3 and 4 in Fig. 2. This coil is quickly hand-wound on the can of one of the turret valves, slipped off, tested and adjusted to one of the required stations and bound with tape in three places in a circular bundle winding. The whole coil is shaped into an ellipse and wired on to the coil holder and cemented with an adhesive. Do not cement it until all the adjustments have been completed. The problem with these coils is to obtain a good Q in a small space and yet leave them easy to adjust, and the rough coils shown here work well, although time and patience spent with alternative arrangements and miniature screened dust-cored M.W. types would probably give better efficiency.

Pre-tuning the Coils

The method of pre-tuning the M.W. coils will depend on the equipment available. A signal generator and a valve voltmeter were used by the author (Fig. 3). Good positive peaks were obtained with the signal generator set to the station frequency. The turns are removed one by one until resonance shows as a peak reading on the valve voltmeter, and are then bound with tape, soldered on to coil former, and checked again.

When no equipment is available, the coils can be tuned by substituting them for the medium wave coil in a TRF radio and adjusting for maximum volume on the required station. It is important to remember to keep the tuning condenser vanes fully out of mesh during this operation, which is repeated until optimum results are obtained. A superhet would not be suitable owing

to the ganging between the oscillator and the R.F., which would prevent keeping the R.F. vanes open.

The Aerial Coil

A check should be kept of the number of turns needed for the mixer coil as this saves time when winding the aerial coil. For this repeat the winding but this time use exactly the same number of turns as were found to be needed for the mixer. Do not remove it from the screening can when completed, but wind another coupling winding of 25 per cent of the turns just fitted and bind the two coils with a couple of layers of tape and remove from the can used as a former. Make sure that the ends do not become mixed. Now fit on to a stripped-aerial-coil former.

The way these four connections are made to the contacts will depend upon the reader's particular turret circuit. Generally, after a study of the stripped winding connections and the circuit, the small 25 per cent aerial coupling winding goes between the aerial inner and the coaxial outer (not always the chassis), and the tuned R.F. coil between the lower cascade grid and the chassis or old winding connection, whichever is better.

Make the tests for performance described below and when satisfied with one station, repeat for the other station. Make sure that the aerial socket does not become connected to the mains via direct chassis connection.

COIL DETAILS

Oscillator: $\frac{1}{2}$ in. dust-core tuned, 17-25 turns (strip off from 25 turns), 32s.w.g.

M.W. mixer coil:

247m. $\frac{1}{2}$ in. in diameter air core "bundled" winding, 47 turns 32s.w.g.

330m. 47 turns, 32s.w.g.

R.F. and aerial coils: as for mixer but with 25 per cent additional winding, 32s.w.g.

The information above can only be approximate and should only be used as a guide. This is due to the circuit variations and coil positioning, the turns spread, and the dielectric effect of adhesive soaked into windings.

Testing and Adjusting

It cannot be overstressed that the turret wiring must not be altered. To do so can spoil the TV reception. Manufacturing experts leave this section well alone while it is working, especially the trimmers. Use a long aerial plugged into the inner only at the start. With the set on, select the newly fitted radio coil pair and, with the volume full up, tune the oscillator slug slightly above or below the I.F. and several stations should be heard; the pre-tuned should be loudest. Watch

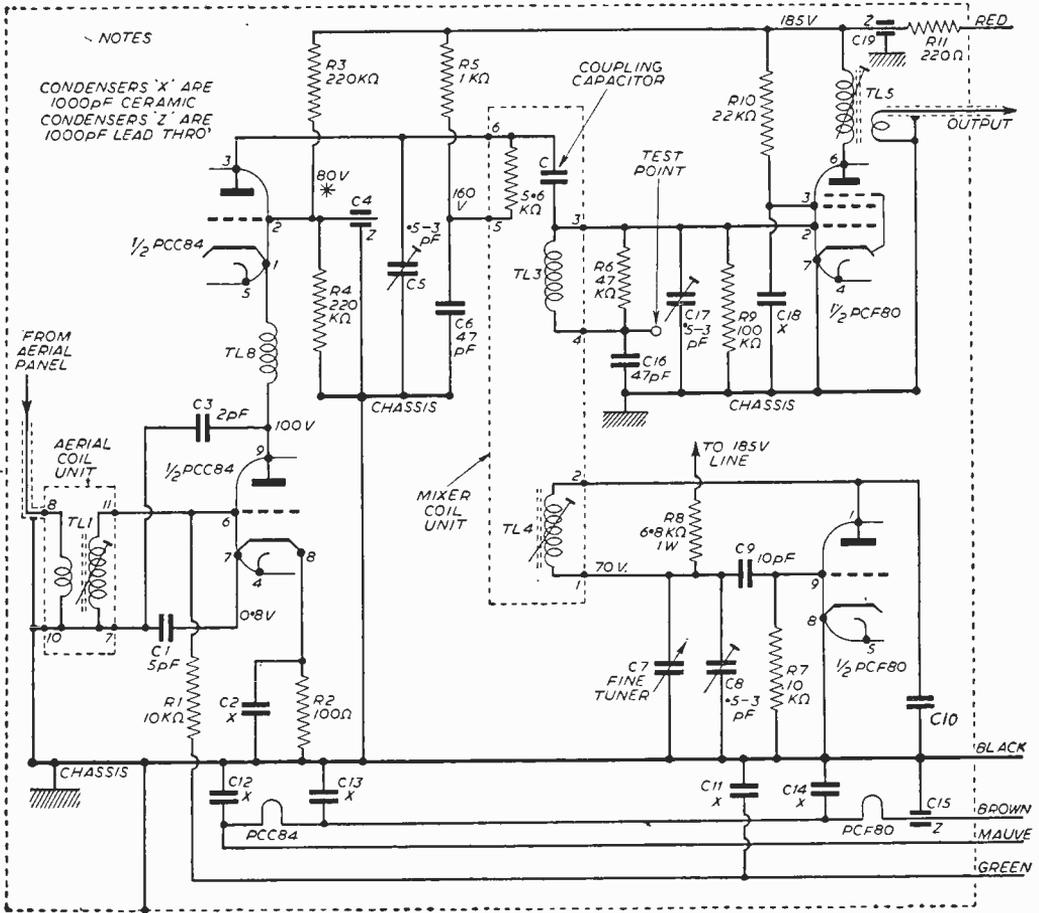


Fig. 5.—A typical turret tuner circuit.

the screen when adjusting because there are two places that the selected station can appear owing to the sum and difference heterodyning of the local oscillator. Between these two points the described effects will occur as the oscillator runs at the I.F. It is important to chose the highest oscillator setting as this lies outside the vision I.F. acceptance band. The wrong setting can be seen in Fig. 4, and shows up on the screen as a strong brightening of the raster while the correct setting leaves the raster at "no signal" illumination but slightly rippled and torn by other signals.

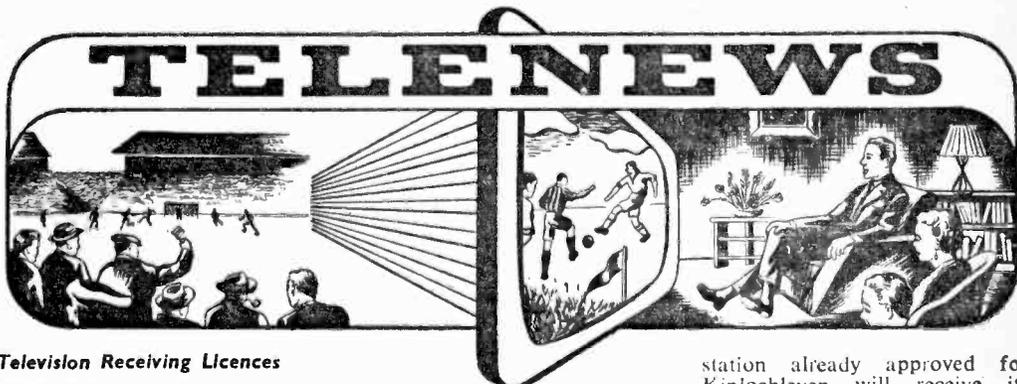
When the station is tuned in, try the normal TV aerial. This will probably give weaker reception, and a loft or outside aerial is essential for a good signal. If a good result is obtained, the next pair of station coils can be made. However, if the selectivity is poor, then reduce the size of the coupling capacitor until the best result compatible with good volume is obtained. The setting of the contrast and sensitivity controls will affect the signal output and, in the absence of AVC on some

models, any overloading, choking, sound can be cured by slight oscillator detuning or by reducing the number of turns on the aerial coupling winding. It is assumed that the alignment of the vision I.F. is reasonably accurate. Because prolonged running of the oscillator at the intermediate frequency can overrun the video output valve, or possibly affect the vision detector if it is a crystal type, it is wise to short the vision I.F. out with a 1000pF capacitor from the last I.F. valve anode to chassis while tests are made. This can be removed for a second or two when the screen has to be observed and, of course, when the work is finished.

Curing Instability

The many things that cause frequency shift in a turret would in a good proportion of cases make the local oscillator "pull into the I.F." and the powerful signal, greatly amplified, could radiate back into the whole of the turret and I.F. stages,

(Continued on page 152)



Television Receiving Licences

THE following statement shows the approximate number of Television Receiving Licences in force at the end of September, 1960, in respect of television receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland.

Region	Total
London Postal	1,874,893
Home Counties	1,460,283
Midland	1,647,057
North Eastern	1,769,871
North Western	1,439,379
South Western	911,893
Wales and Border Counties	653,255
Total England and Wales	9,786,621
Scotland	981,786
Northern Ireland	162,063
Grand Total	10,880,470

Structure and Future Prospects of the Electronic-based Industries in the United Kingdom", a new 54-page survey by Cyril C. Gee, managing editor of "British Communication and Electronics" and the recently launched newspaper "Electronics Weekly".

Low Power Television Station for Ballachulish

THE Postmaster General has approved in principle a proposal by the BBC to build a low-power television station near Ballachulish, Argyllshire. The

station already approved for Kinlochleven will receive its television programme from the existing BBC station at Rosemarkie via the satellite station to be built at Fort William. This plan necessitates the use of a relay point at Ballachulish to feed the programme to the Kinlochleven station. The BBC has decided that, rather than provide a point-to-point link over this part of the route, it would be better to build a small satellite station at Ballachulish that would not only serve the main purpose of providing the feed of the programme to Kinlochleven, but would also give direct television reception to some 1,500 people in

French Television

MR. H. A. RICHARDSON of Ingoldmells, Skegness, Lincolnshire, has been supplied by Aerialite Ltd. with the television aerials necessary for his experiments and these have proved very successful in receiving French Television Services at Skegness.

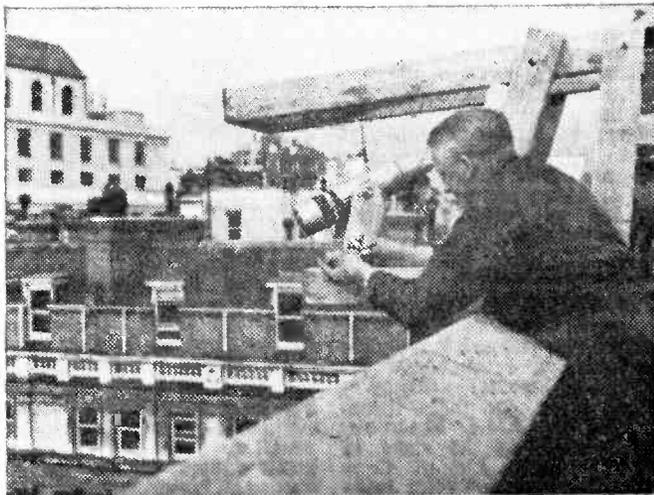
Tests have also been carried out on the French channel eleven station at Bouvigny and the French channel 8A, Lille and Paris.

The receiver being used was a standard British model, but Mr. Richardson proposes acquiring a set suitable for the French Service.

New Survey of British Electronics Industry

TODAY, over 1,700 firms in Britain employing more than 350,000 people operate within the broad field of electronics. Value of the gross output is around £475 million and exports this year are expected to exceed £100 million.

These and a mass of other facts are brought out in "The



Taylor Woodrow Ltd. have installed Marconi closed circuit television on the site of the new building they are erecting at the junction of Gracechurch Street and Fenchurch Street. The installation enables the public to watch building operations in progress on a 21in. monitor fitted in a public observation platform. This illustration shows a Marconi engineer fitting the closed circuit television camera on the roof of a building adjoining the site.

the immediate neighbourhood of Ballachulish.

The new station, the site and technical details of which have not yet been authorised, is to be built concurrently with the other satellite stations in Stage I of the BBC's scheme, all of which are scheduled for completion by March 1962.

TV as a Public Observation Aid

THE first public "televieing" platform at a building site in this country is now in use at Gracechurch Street, London.

Taylor Woodrow Construction Ltd. have installed Marconi closed-circuit television on the site of the new building they are erecting at the junction of Gracechurch Street and Fenchurch Street, E.C.3.

A Marconi 21in. monitor installed on an observation platform at Gracechurch Street enables the public to watch work in progress in areas which would otherwise be hidden from view. A control unit mounted near the monitor enables the public to move the camera in bearing and elevation to view different parts of the site.

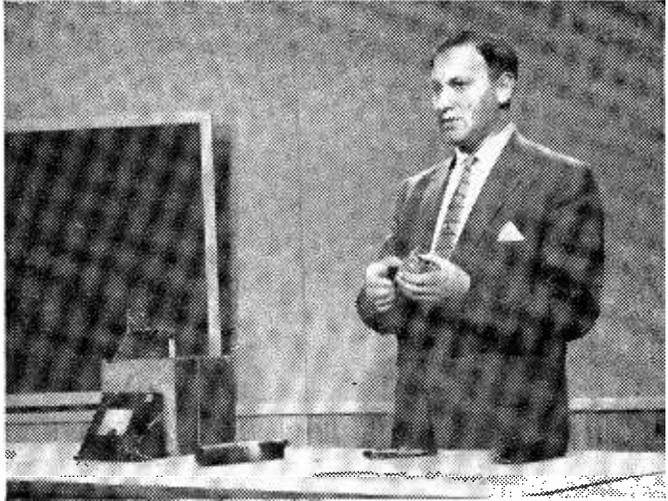
An industrial camera complete with a remotely controlled pan/tilt head has been fitted on premises overlooking the site, where work will be completed by autumn, 1961.

The TV installation is a development of the public observation platforms first introduced to building operations in this country by Taylor Woodrow in 1955. "Televieing" will prolong the life of observation platforms, which are normally dismantled as building progress screens the view.

Stockholm Exhibition

PHOTOMULTIPLIER tubes, of the type used in space rockets for measuring radiation hundreds of miles above the earth, were among the display of special valves and tubes, manufactured by E.M.I. Electronics Ltd., shown on the stand of Swedish SAAB Aircraft Company, at the recent Fifth International Instruments and Measurements Exhibition in Stockholm.

A vidicon television tube which can "remember" a transient picture for up to two minutes after the subject has passed out of camera range, and microwave



Dr. H. K. Henisch, of the Department of Physics, Reading University, lectures in the first of the new series of Discovery, Granada TV's schools programme for sixth formers. Every Thursday at 11.40 a.m. Granada TV's Discovery can be seen in the North and Wales and the West. Dr. Henisch's subject: "Semi-Conductors".

klystron valves of the type used by the Eurovision network of radio links, for televising such events as the Olympic Games to Stockholm and other cities of Europe, were also shown.

Visitors to the exhibition were able to see the latest E.M.I. closed-circuit television equipment. This system, which is being used for applications as varied as police control of traffic and auditioning of television artistes, has recently been installed in the offices of a leading Wall Street stockbroker to show busy executives a continuous picture of the latest ticker-tape price changes.

During the Exhibition, the SAAB Company also showed a range of E.M.I. stroboscopes and oscilloscopes in their Stockholm offices. These included E.M.I.'s latest high-power industrial stroboscope which "freezes" fast-moving mechanisms for observation and critical adjustments without interrupting production. This stroboscope, which uses an ultra-high intensity Xenon discharge tube, has a flash rate of up to 60,000 flashes per minute.

Appointment

MR. Michael Clark, Director of the Electronic and Equipment

Group of The Plessey Company Ltd. announces the appointment of Mr. George A. Smith as Commercial Executive of that Group.

This Plessey Group includes the Telecommunications, Electronics and the Domestic Equipment Divisions and Hagan Controls Ltd., with a total pay-roll of over 4,000 people. In this appointment he will be responsible for the co-ordination of the four sales organizations within the Group.

British Instrument Display in Germany

THE Board of Trade and the Scientific Instrument Manufacturers Association (S.I.M.A.) co-operated for a second time in the organisation of a collective display of British scientific instruments at the triennial International Congress and Exhibition of Measuring Instruments in Dusseldorf, which was held this year from October 19th to 26th.

This year's collective British display followed a successful combined effort by the Board of Trade and S.I.M.A. similar to the first event of the same exhibition in 1957. Twenty-five firms have displayed their products on the official stand, which covered an area of 5,000sq ft.

EHT Generation

By G. K. Fairfield

No. 1—THE USE OF THERMIONIC VALVES

THE need for a compact unit capable of providing the EHT required for television equipment often arises where servicing or experimental work is undertaken. Safety requirements demand that the type of EHT unit chosen should not be capable of giving a lethal shock as very high voltages are in use. Consequently a simple transformer system for increasing the A.C.

Since the resonant frequency is high, only small smoothing capacitors are necessary in the rectifying system and these cannot contain enough energy to give a lethal shock. In addition their smaller size, compared with those necessary for mains EHT production, allows a much more compact unit to be designed.

The second method is similar to the way in which the line timebase transformer operates to provide a high potential from the flyback pulse appearing across the deflection coils.

The principle is to "shock-excite" a tuned circuit by passing a large pulse of current through it at a repetition frequency that is low compared with its self-resonant frequency. This current pulse sets up a train of high frequency oscillations in the tuned circuit which are then transformed to a higher voltage and rectified in the same manner as the R.F. oscillator system. This arrangement is known as the "Ringing Choke" or "Pulsed EHT System."

In addition, circuits may be used where a transistor acts as a very effective switch and converts a D.C. voltage into a square wave, also at a frequency high compared with the mains supply frequency. This waveform can also be increased in amplitude by transformer action to a high voltage. The use of transistors for this purpose is very attractive owing to the high efficiency of conversion, and a future article will be devoted to a description of their operation, and practical designs will be discussed.

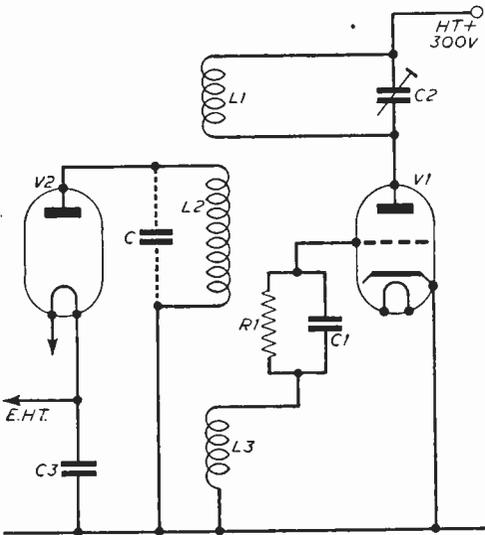


Fig. 1.—R.F. oscillator circuit (grid-leak bias).

mains potential to a high voltage, followed by a rectifier or voltage-doubling circuit may not be used and therefore one of the various types of high-frequency circuits that are available must be employed. In addition to its use as a test source, the provision of EHT independently produced, will simplify the design of the line scanning section of the television receiver, which usually provides, by line-flyback action, the EHT for the CRT. The brightness of the screen will not then depend on the action of the time-base, and since the separate EHT unit can have better regulation, then defocusing on high-lights can be avoided and improved picture definition results.

Methods of EHT Production

Two general methods are possible to produce the high voltage required and both lead to a compact unit being produced which is quite safe to use. The first of these is the R.F. Oscillator system in which a class C oscillator, containing a high-Q tuned circuit resonating at a radio frequency provides an oscillatory voltage which may be stepped up by transformer action and subsequently rectified.

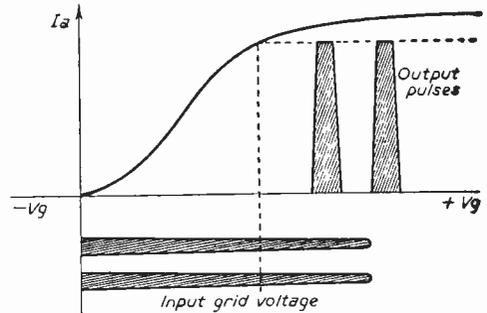


Fig. 2.—Generation of current pulses.

In this article it is intended to describe both types of thermionic valve circuits and show how the regulation of such circuits may be improved very considerably by the use of negative feedback.

R.F. Oscillator

This method consists of an R.F. oscillator having a large secondary winding tightly coupled to its anode "tank" circuit.

For maximum efficiency a class C oscillator is used, the grid leak being of such a value that the

minimum anode potential is small compared with the anode supply potential.

Assuming an anode supply of 300V, let the minimum anode potential be 50V. Then the peak

is usually constructed in sections to avoid insulation breakdown. The Q-factor of this coil is most important and if this falls much below 450 then excessive power will be dissipated in the coil, the overall efficiency will fall, and the protective coating of wax given to the completed coil will melt, increasing the danger of breakdown between windings. Filament current for the high voltage rectifier V2 can be obtained by an extra winding on the former which must be suitably spaced or insulated from other windings since it is at EHT potential.

Disadvantage

A disadvantage of the arrangement shown in Fig. 1 is that, should the valve cease to oscillate for any reason, the large negative bias is removed,

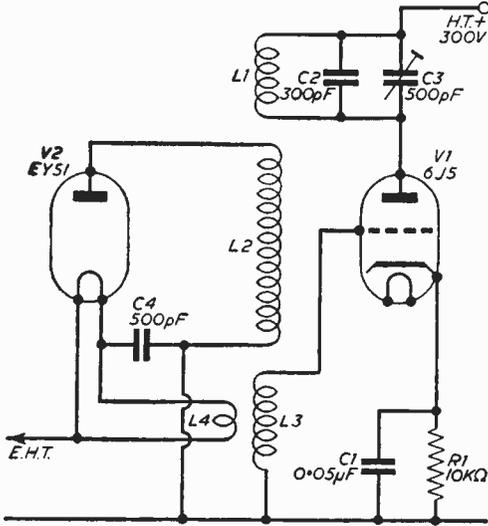


Fig. 3.—Circuit of the R.F. oscillator EHT unit.

A.C. potential developed across the tank winding will be 250V. In order to have, say, 5kV across the secondary winding the transformation ratio must be 20:1. In practice a ratio of 25:1 is necessary to take into account coil losses etc., and this corresponds to a transformer ratio of 15:1. This winding will be so large relative to the grid and tank coils that the frequency of operation will be governed by the inductance of this coil together with its self and stray capacitances to earth. The frequency will be found to lie between 100 and 300kc/s.

R.F. Oscillator Circuit

A circuit of such an R.F. oscillator is shown in Fig. 1. The circuit oscillates by virtue of the positive coupling that exists between the anode and grid coils L1 and L3. Oscillation build-up, at a frequency determined by the tank or anode-tuned circuit, occurs until grid current is drawn by V1. This flows through R1, bypassed by C1 to radio frequencies, and builds up a negative bias which limits the action of the valve. After a few oscillations the bias increases to a maximum where V1 only conducts for each half cycle as shown in Fig. 2, with the anode passing pulses of current at oscillation frequency.

In the circuit shown in Fig. 1, the anode inductance L1 is tuned by C2 to the frequency of the circuit L2 and stray capacitances, shown dotted as C. L3 is the grid coupling coil and need not be tuned.

To prevent the tuning of the tank coil with C2 becoming too broad, L1 can be made about 600μH, with C2 as a parallel combination of fixed and pre-set capacitors of 600pF maximum capacitance. L2 then have 15 times the number of turns as L1, and due to the large potential developed, it

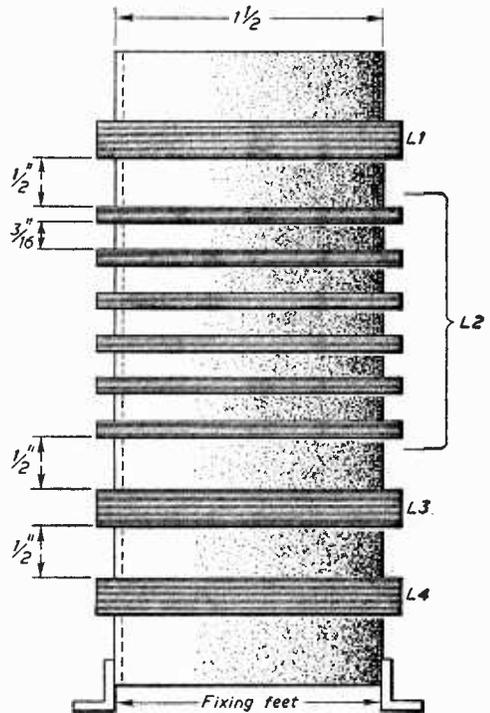


Fig. 4.—R.F. oscillator coil construction.

and the resulting large cathode current may damage the valve through excessive anode dissipation. Using cathode bias as shown in Fig. 3, the anode current is actually reduced on cessation of oscillations and no power is being delivered to the external circuit.

Choice of V1 is governed by consideration of the EHT required, peak anode dissipation at this value of EHT, and peak A.C. potential. The latter is important as the peak voltage between the anode and grid is twice this peak voltage across L1, hence the valve chosen must have adequate grid-anode spacing to avoid internal "flashover". For EHT potentials below about 7-8kV then a medium impedance triode, such as a 6J5 can be used.

Varying the EHT Value

The value of EHT produced can be varied over small limits by tuning the tank circuit. If this process is carried too far then poor regulation of the output results. A better method is to adjust the cathode bias resistor and maintain the tuning capacitor at optimum setting where a maximum EHT is produced.

With any design a value of EHT will be found corresponding to peak efficiency of operation. Above this value the efficiency of conversion drops and high anode dissipation results. With the design described, this optimum EHT is about 6kV at a load current of 100 μ A.

Practical Design

Suitable component values are given in Fig. 3 for an EHT unit giving up to 7kV EHT, at a load current up to 100 μ A—usually quite adequate for most cathode-ray tubes.

A diagram of the oscillator coil is shown in Fig. 4. L1 is the anode tank coil and consists of 100 turns of 30/48 Litz wire either wound between insulating cheeks or preferably wave-wound so as to be self-supporting. L2 is the main EHT winding and is found in six sections each of 250 turns. Thinner wire is chosen to avoid excessive bulk and 6/5 Litz wire will be suitable. Litz wire is used to give a high Q-factor by avoiding "skin effect"—that is the high R.F. resistance that occurs in solid wire owing to the high frequency currents travelling only at the surface of the wire. L3 is the feedback winding and need only have about 50 turns of 38s.w.g. wire to couple sufficient energy into the grid circuit. Fairly tight coupling is required but this is limited by the nearness to which L1 can approach the high potential end of L2. A satisfactory arrangement is to wind L1 and L3 on either side of L2 as shown in the diagram.

The filament winding L4 will depend on the requirements of V2—the high voltage rectifier. Using an EY51, 24 turns of 23s.w.g. polythene covered wire will suffice. To avoid "tracking"—a gradual breakdown of the paxolin former due to the voltage stress across it—the completed coil is given a fairly thick coating of soft wax.

Screening of the complete oscillator is necessary, both from the point of view of interference with neighbouring broadcast receivers, and avoidance of interference patterns on the screens of the television receiver which is being supplied by the unit. A close mesh wire screen will be necessary to enclose the coil completely or complete circuit, care being taken to ensure that adequate clearance is maintained between the screen and the high potential points.

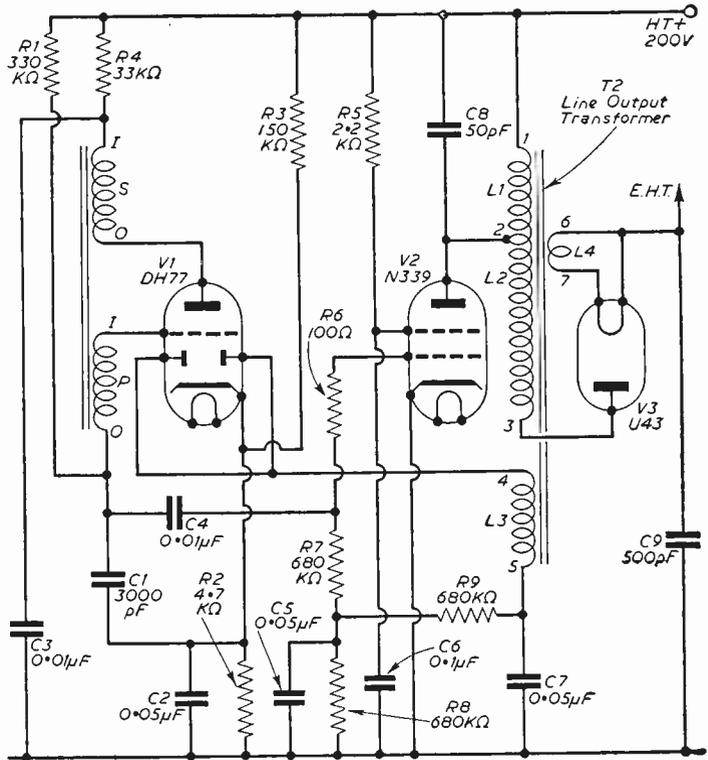


Fig. 5.—Ringing choke circuit.

Ringing Choke Unit

The ringing choke system is rather elaborate but has the advantage that it is easier to modify the circuit to produce control over the regulation of the EHT produced.

The principle has been stated earlier in that a valve is pulsed repetitively into current which flows through an inductive circuit, thus setting up a large resonant voltage across it. To pulse this valve a sawtooth generator is used and it is convenient to make this a blocking oscillator similar to that used in the time-base sections of the television receiver.

If an additional winding is placed on the output transformer core then the voltage developed across this may be rectified and fed to the driven valve as a controlling bias and in this way any increase in load current can be made to cause an increase in the amplitude of the current pulse, thus maintaining the EHT voltage constant. A circuit of the type is shown in Fig. 5.

The triode section of V1 functions as a blocking oscillator and provides a sawtooth driving waveform to the grid of V2. This has an inductance L1 tuned by C8 in its anode circuit and by auto-transformer action provides a large pulse voltage across the EHT winding L2. Rectification of this pulse voltage is carried out by V3 which develops the EHT voltage across the smoothing capacitor C9.

Feedback Action

Feedback action is carried out by coupling winding L3 to the diode of the double-diode triode V1. This rectifies the pulse voltage induced in L3 and develops a D.C. voltage across the diode load R9 proportional to the peak value of the EHT pulse. Controlling action is obtained by feeding this as bias to V2 such that as the load across C9 increases, then this bias is reduced, allowing V2 to supply more current to the transformer windings. If the load is reduced then the bias is proportionally reduced and less current is supplied by the valve.

Thus the EHT potential tends to remain constant irrespective of the load current supplied. To render this action more effective a fixed voltage is added in series with the peak rectified voltage so that as the load varies then the percentage variation of the resulting control is greater than that of the induced peak.

Consider a change in rectified bias of from 12 to 15V due to a change in load current. This represents a change of 25per cent in bias value. Now if 10V of fixed bias is deduced from this then the change is from 12-10=2V to 15-10=5V, i.e. a 150per cent change thus rendering the arrangement much more sensitive to changes in load.

The effect of this feedback on regulation of the supply is illustrated in Fig. 6 which shows the change in EHT output with and without the feedback circuit connected.

Transformer Design

A blocking oscillator transformer as used in line timebase operation may be used for T1. A suitable design has been described in the October 1957 issue (now out of print). The output transformer is wound on a paxolin former ¼in. in diameter with the turns given in Fig. 7. Windings L1 and L2 should preferably be wavewound and the gear ratios for the Douglas wave-winding machine are given in the diagram. A satisfactory coil may be obtained by winding this between thin perspex cheeks cemented on to the former. These cheeks

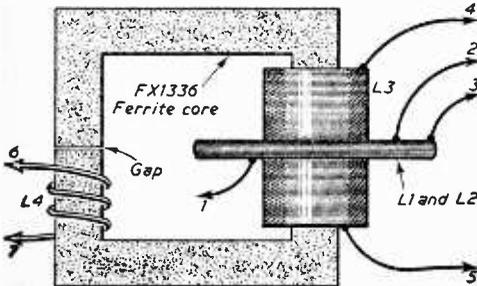


Fig. 7.—Construction of the transformer.

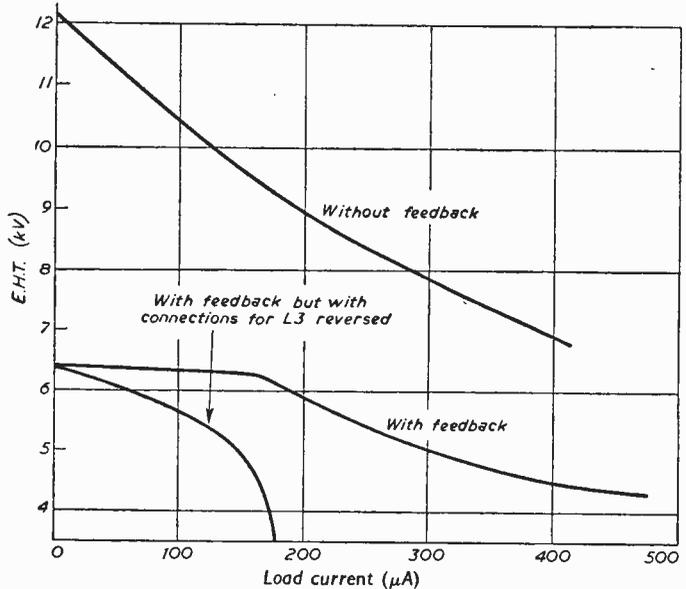


Fig. 6.—Regulation of ringing choke system.

should be separated by a gap of ¼in. and the 1,500 turns pile-wound between them. The whole coil should be impregnated in soft wax for insulation purposes.

A ferrite core is used for the transformer consisting of two U-shaped cores (Mullard type FX1336) with a 0.003in. paper spacer in each gap. The heater winding for the EHT rectifier can consist of six turns of 20s.w.g. polythene covered wire, (the "inner" of television coaxial cable will be found quite satisfactory for this purpose) wound on one of these limbs as shown in Fig. 7.

It is important to connect the feedback winding in the correct sense to obtain best regulation and Fig. 6 shows the effect of incorrect connections.

Performance

With this design a regulated supply of 6kV is obtained adequate for supplying currents up to 200µA.

Higher voltages than this can be supplied by adjustment of the fixed potentiometer R8R9 with, of course, reduced regulation performance. The limit being reached at 11-12kV with this design.

(To be continued)

WINDING DATA FOR FIG. 7	
Winding	No. of turns and wire gauge
4/5	40 turns of 0.026 enamelled copper wire.
1/2	500 turns of 0.0058 enamelled and single-silk wire (wavewound).
2/3	1,000 turns of 0.0048 enamelled and single-silk wire (wavewound).
6/7	6 turns of polythene-covered wire.
A B C D E F	
Gears for windings 1/2 and 2/3 42 31 36 48 80 40	
(Douglas machine)	

A BAND III LOFT AERIAL

A 10-ELEMENT DIRECTIONAL ARRAY

By A. R. Richards

MANY articles have appeared in *Practical Television* from time to time on how to construct a suitable array for Band III transmissions.

Substitute for Metal Elements

Nothing basically new is offered in this article, other than to introduce a suitable substitute for the normal metal elements, and which should simplify the construction, even for the very inexperienced constructor.

The whole array is constructed with a length of 1in. x 3in. timber, a dozen 3/8in. x 3ft dowelling rods, and a box of aluminium cooking foil. The total cost amounts to less than 10s.

There is no real need for perfection in placing the foil on the dowel rods, and wrinkles will not impair the efficiency of the array.

Cut 3in. wide strips of foil to length and roll around each element lengthwise. Any method can be used to hold the foil such as glue, elastic bands, cotton, thin wire, etc. The directors are then nailed to the main support with panel pins, taking care that the centre of each director is properly in line (Fig. 1).

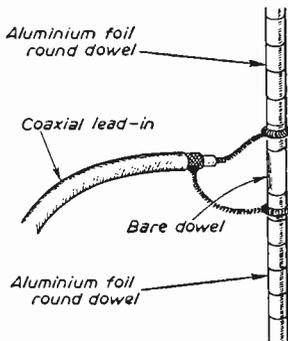
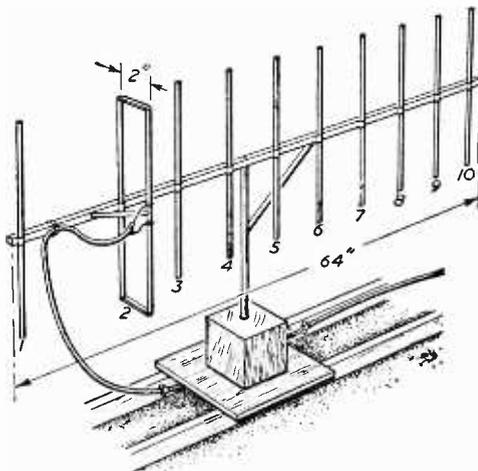


Fig. 2.—The method of making the elements from aluminium foil.

Connecting the Feeder

The two main lengths of the folded dipole are wrapped with foil in a similar manner to the directors and reflector, with the exception that the wrapping on the one length allows for a 1/2in. to 3/4in. gap at the centre. Two 2in. lengths of dowelling rod are then cut and these are nailed to the ends to form the folded dipole, and over these ends are wrapped more foil taking care to bond this with the foil on the main elements. The folded dipole is then nailed in the appropriate position on the main support, and if thought necessary, further short pieces of dowelling rod can be used as struts for the outer element of the dipole to give additional support. These are easily nailed *in situ* providing reasonable support is made beneath the dowelling rod when being nailed. Bare lighting flex wire is wound firmly around the ends of the foil at the gap of the folded dipole outer element, and to these ends are soldered the co-axial down lead (Fig. 2). A 1in. wide strip of foil is attached to the centres of all the directors thus connecting them together.



Spacing between each Director is 6", between Dipole and Director, 6" and between Dipole and Reflector, 12"

Fig. 1.—The construction of the aerial.

Mounting

It is necessary to stress that the array must be sited in the loft with the maximum available space above and to the sides.

Mounting can be carried out by placing a board across two rafters, to which has been nailed a 6in. cube of wood suitably drilled to receive the 3/8in. vertical dowelling-rod mast. An elastic band will effectively hold the co-axial down lead to the horizontal support, and the lead can also be anchored to the rafters when the correct positioning of the aerial has been obtained.

This aerial is highly directional, and a deviation of 1in. to 2in. will appreciably vary the signal strength. However, no real difficulty should be experienced in swinging the aerial to the best position to receive maximum signal.

Band I aerials or V.H.F. aerials generally can be constructed quite simply with this method of construction, and many experiments can be carried out cheaply and without waste, as the dowelling rods can easily be spliced to make them longer should an aerial for other frequencies be required.

ELEMENT DIMENSIONS

Channel	Reflector (1)	Dipole (2)	Director (3)
	ft in.	ft in.	ft in.
8	2 7	2 5 1/2	2 2
9	2 6 1/2	2 5	2 1 1/2
10	2 5 1/2	2 4	2 1
11	2 5	2 3 1/2	2 0

Directors numbered 4 to 10 may each be 1/2in. shorter than their predecessor; for example, for channel 9, director No. 4 would be 2ft 1in. long and director No. 5 2ft 0 1/2in. long, etc. (Note that the number of directors may be varied to suit the available space.)

Replacing CR Tubes - 13

R.G.D. AND REGENTONE RECEIVERS

By H. Peters

(Continued from page 85 of the November issue)

HAVING dealt with unboxing and removal of the CRT in the R.G.D. Deep 17, we now deal with the boosting and focusing procedure.

Boosting

Use a 6-3V CRT transformer and connect the boosted secondary to pins 1 and 12 of the tube, having removed the previous two leads from these pins, and joined them together to complete the heater chain. Mains voltage for the transformer may be obtained from between the set side of the mains fuse and chassis.

Screen Cleaning

In all cases the chassis is removed from the cabinet to clean the screen as outlined in "Unboxing."

Focusing

"The 17", "The 21", and earlier models have a magnetically focused tube which has as its picture shift device a shuffle plate just forward of the focus magnet adjustable by a bent metal strip at the top. The tube neck is centred within the focus magnet by a wedge-shaped rubber ring which should be removed with the ion trap magnet when replacing the tube.

On electrostatic models, focus is adjusted by touching the lead attached to pin 6 on to various other electrodes around the tube base, and fixing it to the one which gives the best focus. This adjustment seldom needs altering when a tube is replaced.

MODEL T14 Transportable

Unboxing

Remove the main control knobs (the inner two are grubscribed in, and retain the outer two) and the cabinet back. Take off the two rear rubber feet and the green earth wire. Remove the handle, which is held by two screws located beneath the plastic trim over the handle support, and which should be picked out to gain access. Remove the two insulated spacers from the lower chassis securing screws and withdraw the chassis.

Changing the CRT

Discharge and remove the EHT cap, CRT base, ion trap magnet and picture shift magnet, keeping these latter two in a safe place away from strong magnets and each other. Remove the four self-tapping screws holding the tube support board to the top edge of the chassis and the two diagonal support struts to the side of the chassis and withdraw the CRT assembly. Clean all parts thoroughly before reassembling.

Setting Up

Ensure that the scanning coils are seated well forward on the tube neck, adjust ion trap and picture position magnets in turn for the brightest possible picture centrally placed on the screen.

The ion trap magnet should not be used to position the picture at the sacrifice of brightness. Focusing is adjusted by the small pre-set resistor mounted on the tube base.

Boosting the Tube

This is performed in exactly the same way as on the Deep 17, detailed above.

Models 605. 590. 610. 611. etc.

Warning: 110deg tubes are used.

All the above receivers use a wide angle 110deg tube. It should be realized that the more the shape of a tube departs from the traditional goldfish bowl the greater are the stresses set up in the glass under high vacuum. The risk of implosion when handling is therefore theoretically greater than with earlier shapes of CRT.

Unboxing Model 605/590

Lay face down on a soft cloth, remove two back screws and lift off the cabinet.

(Continued on page 148)

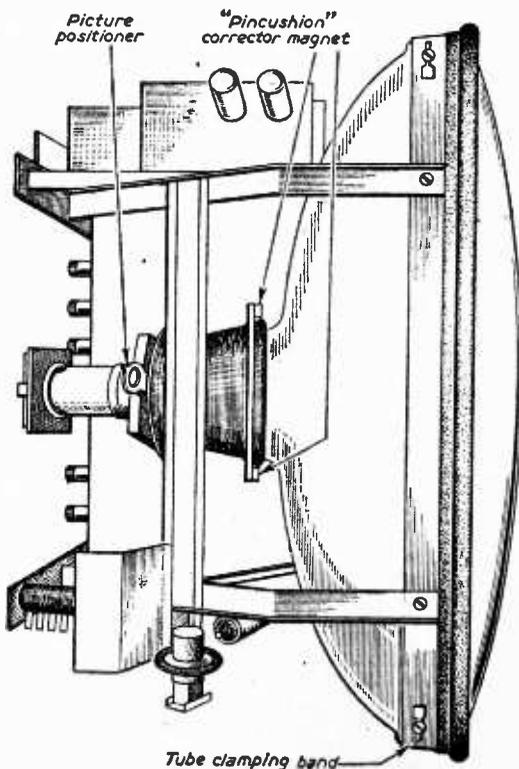
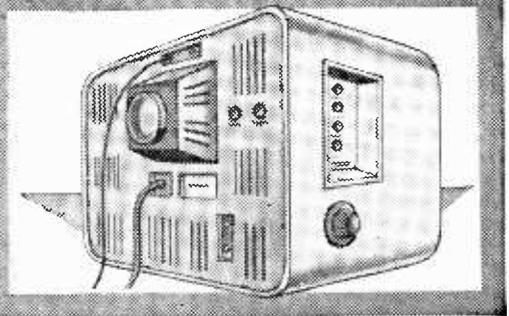


Fig. 5.—R.G.D. 605/610 series—plan view.

Servicing Television Receivers



No. 62—THE DEFIANT TR1456T AND TR1756T SERIES

By L. Lawry-Johns

THESE receivers bear a close resemblance to several other receivers of well-known makers. Probably the closest relative is the Regentone 143T, and these notes may be used in cautious conjunction with these models. There is, however, absolutely no resemblance between this range and the R.G.D. 1455-1456 series, the chassis and circuit being completely different. Defiant models covered by these notes are, in addition to those above, TR1456TL, TR1456C, TR1456CT, TR1756TD and TR1756C. Three types of tube are fitted, a Mazda CRM171 17in. rectangular, CRM141 14in. circular (actually 13½in.) and CRM143 14in. rectangular.

The electrical shift controls are fitted in 17in. models only and there are minor component differences.

Common Faults

The most common fault encountered by the

writer is failure of the metal rectifier, especially when the original 14RA1-2-8-2 (short) or 14RA1-2-8-3 (long) is fitted. The normal symptoms are no sound, no vision, valves light up but no raster or hum from the speaker. This generally only necessitates replacement of the contact cooled rectifier, MR1, which, as shown on the chassis layout diagram, is bolted on the front centre of the chassis. A replacement, FC101 (short) or FC31 (long) should be fitted. Occasionally the H.T. fuse, 500mA, or 1A on some models, will be found blown, due to a short on, or in, the rectifier, and this can blow the 1.5A mains fuse at times.

Dull Negative Picture

When the picture lacks brilliance or what may be termed crispness, having a uniform grey appearance with silvery highlights, worsening when the controls are advanced, the tube may be assumed

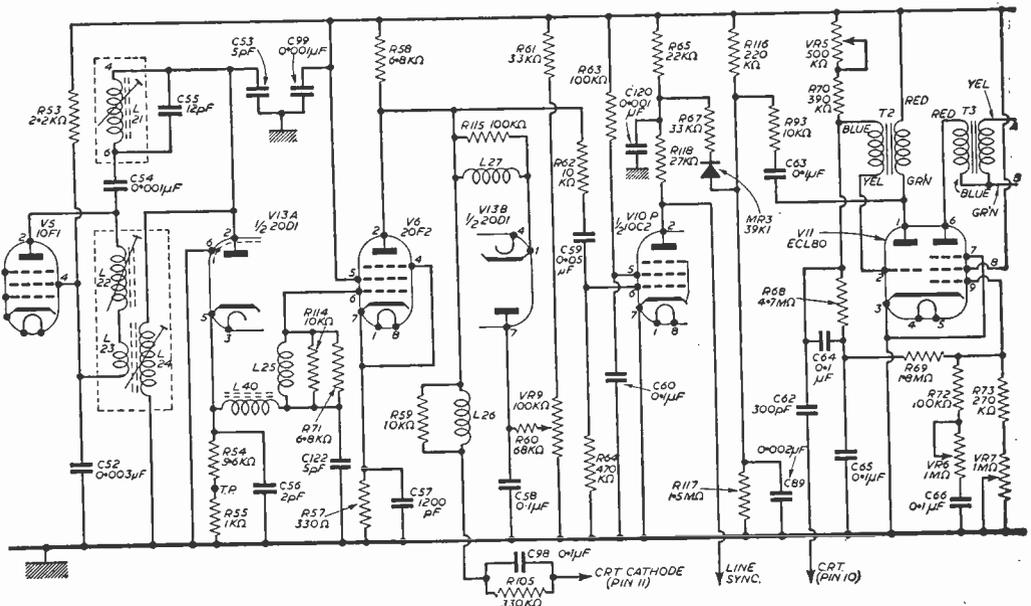


Fig. 1.—The video amplifier, sync separator and frame timebase circuits.

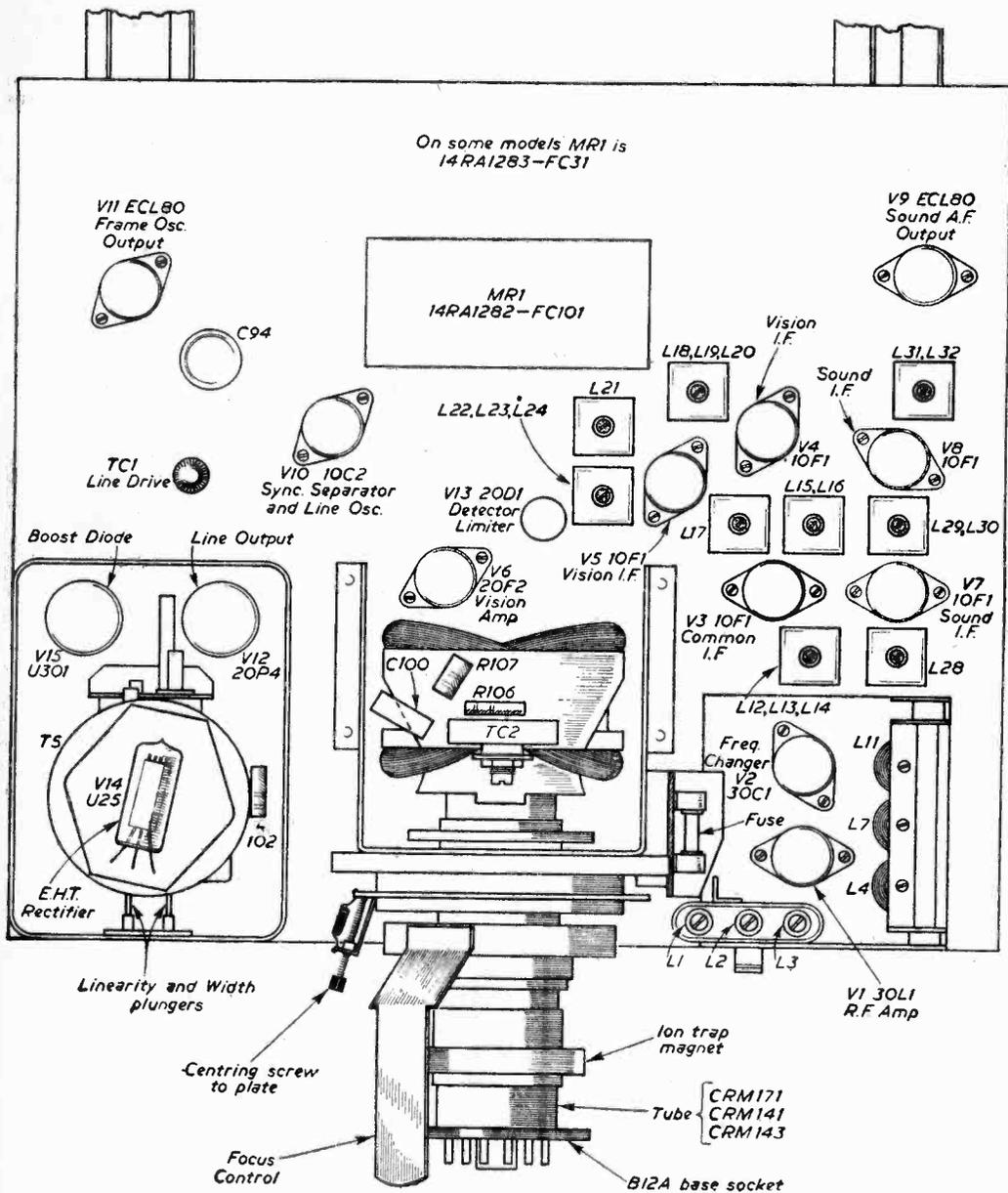


Fig. 2.—The above-chassis layout.

to be losing emission. Check the setting of the ion trap magnet on the rear of the tube neck (set for maximum brilliance), and make a voltage check across the heater pins 1 and 12. In some cases these tubes seem to lose some heater resistance, thus causing the voltage drop across the heater to fall. Even though the cathode may be in good

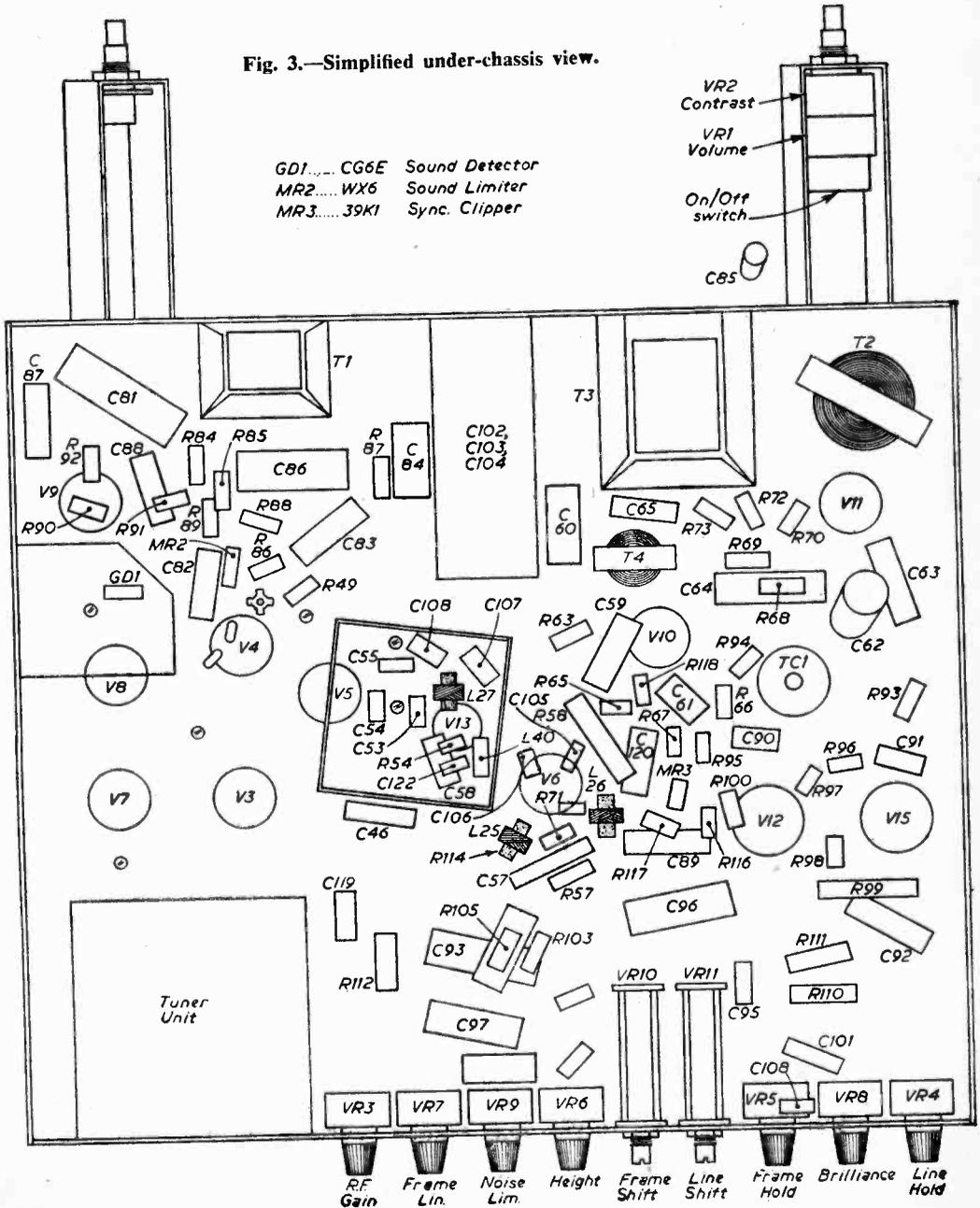
order, its temperature is lower than that specified and the beam current is correspondingly less. The provision of a 12-6V heater transformer (13V is usually supplied) will overcome this trouble and restore the emission if the cathode is in good condition. When this is done, remove the original heater leads from pins 1 and 12, connect these

leads together and shift the green lead on the mains voltage adjustment one letter up, e.g. C to D. The mains supply for the transformer may be obtained with a lead to the chassis and a lead to the main 1.5 fuse.

There are occasions, however, when the

symptoms are misleading unless carefully studied. When the brilliance control produces a fairly bright raster although the contrast only shows a negative or thin picture when advanced, check the V6 20F2 anode load resistor 6.8k, the cathode 330Ω, and the video choke L25-L40, R54, etc. The video

Fig. 3.—Simplified under-chassis view.



- GDI.....CG6E Sound Detector
- MR2.....WX6 Sound Limiter
- MR3.....39K1 Sync Clipper

VR2 Contrast
VR1 Volume
On/Off switch

C85

Tuner Unit

RF Gain Frame Lin. Noise Lim. Height Frame Shift Line Shift Frame Hold Brilliance Line Hold

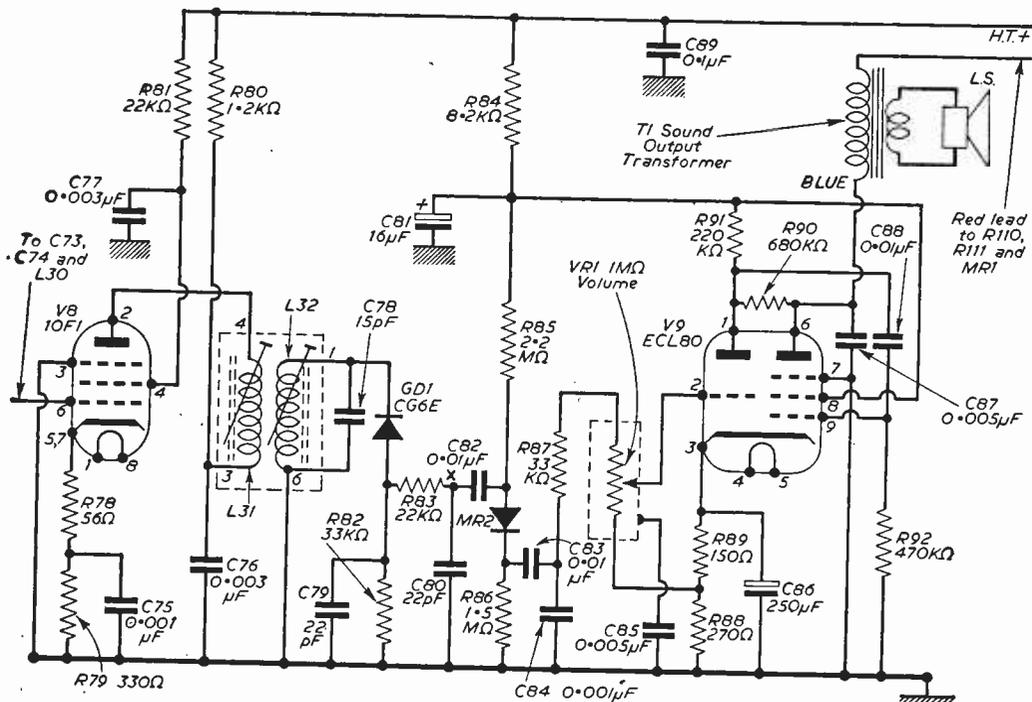


Fig. 4.—The sound detector, limiter and A.F. output stage circuits. ('X' marks a test-point)

coupling capacitor C98 may occasionally be found o.c.

Frame Faults

The most common frame trouble is compression at the bottom of the picture. This is usually due to a failing V11 ECL80. Replacement of this normally restores full height and linearity once the controls have been reset. If, however, valve replacement fails to cure the condition, attention should be directed to the biasing, which is unusual. It will be seen from the circuit that the cathode is returned to the chassis with no bias resistor. The bias is applied to the control grid pin 9 from the oscillator which when the stage is working is a source of heavy negative potential, via R68 (4.7M) and R69 (1.8M). The actual bias applied depends upon the value of these resistors, C65 (0.1 μ F) and the linearity network R73 270k and VR7.

Complete Loss of Frame Scan

When only a bright horizontal line is visible across the screen, V11 should be checked and if this is in order a voltage check made on pins 1 and 6. Full H.T. should be present at both these pins, allowing for a slight drop across the transformer windings. If there is no voltage at pin 6, check the blue lead H.T. If H.T. is present here, the transformer T3 has an o.c. primary winding. A cold resistance check should record about 750 Ω between the blue and red leads. If the voltage

is present at pin 6, check pin 1, where the same remarks apply to T2, green and red resistance reading about 780 Ω .

If these voltages are present and V11 is in order, check C65, which may be shorted.

Frame Hold

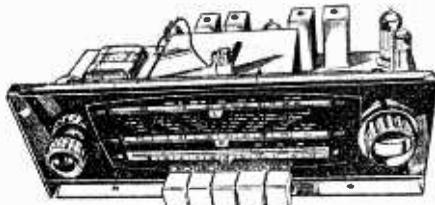
If the picture rolls with the hold control set at one end of its travel for the best condition without locking, check V11, R70 and C64. Alternatively if the picture rolls up or down but will not lock, check MR3 (39K1), R116, R117 and C63. If both line and frame holds are critical or cannot be obtained at all, check V10, R63, C59 and C102 (250 μ F H.T. decoupling). If this capacitor is open circuited the loss of hold will be accompanied by hum, sound on vision and other symptoms, depending upon the setting of the various controls.

Intermittent Sound

This normally shows as a sudden drop in volume or sometimes complete loss which is restored just as suddenly, sometimes by the operation of a light switch in the house, by switching channels or even by removing and replacing the aerial plug. This should immediately direct attention to C82 and C83, both 0.01 μ F audio coupling capacitors. Firmly moving each will usually show which is the culprit. It is pointed out, however, that C88, 0.01 μ F, could equally be at fault, as could a poor connection anywhere in the V7-V8-V9 stages, and GD1 should not be neglected in this respect.

(To be continued)

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



Tapped input 220-225 v. and 225-250 v. A.C. ONLY. Chassis size 15 x 6 1/2 x 5 1/2 in. High. New manufacture. Dial 1 1/4 x 4 in. in gold and black. Pick-up, Extension Speaker, A.C., E., and Dipole sockets. Five "plano" push buttons—OFF, L.W., M.W., F.M. and Gram. Aligned and tested. With all valves & O.P. Transformer. Tone-control fitted. Covers 1,000-1,900 M.; 200-500 M.; 88-98 MC's. Valves E230 rect., ECH81, 6F88, 2A B30, EL84, ECC85. Speaker & Cabinet Valves £2.90 each. £7/6. 10 x 6 in. ELLIPTICAL SPEAKER, 20/- TERMS—(Chassis) £4.16.8 down—10/- carr.—and 6 Monthly Payments of 30/-, or with Cabinet & Speaker £5.9.2 down and 7 Monthly Payments of 32/-.

A FEW CHASSIS DUSTY AND TARNISHED THROUGH STORAGE at £10 (10/- P. & P.). Working and unused but only 3 months' guarantee.

"READY TO USE" ITA CONVERTER

We are specialists in ITA Converters. Our converters give direct switching ITA to BBC, metal rectifier, co-axial plug. Can be fitted in 5-10 mins. and need no alteration to your set. ALL AREAS, ALL SETS. ALL CHANNELS. 12 months' guarantee (3 months on valves).

Separate gain controls. Valves PCF80 and PCC84. Switch positions ITA (1)—ITA (2)—BBC. Bakelite moulded cabinet 8 1/2 x 4 x 6 in. £5.5.0. P. & P. 3/-.



REGUNDED TUBES

Mullard and Mazda, all types. 12 months' guarantee. First grade guns.

14 inch **£5.0.0**

17 inch **£5.10.0**

Carriage and Insurance 12/6.

and NEW COSSOR 10 inch, 108K, 20/- (P. & P.).

THE "CABY" TEST METERS

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

A-10 **£4.17.6**

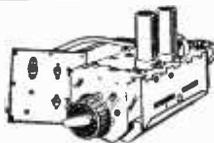
B-20 **£6.10.0**



A-10—2K ohms/v. on A.C. and D.C. volts (10, 50, 250, 500 and 1000 v.); 10K and 1M ohms; 1 mA, 25 mA and 250 mA. D.C. Size: 5 1/2 x 3 1/2 x 1 1/2 in. Weight 17 ozs.
B-20—10K ohms/v. on 0.5 v. and 2.5 v.; 4K ohms/v. on 10, 50, 250, 500 and 1000 v. A.C. and D.C. Resistance. 2K, 200K, 2M and 20M-ohms; D.C. Current, 100 microA, 2.5 mA, 25 mA, 250 mA. Size: 5 1/2 x 3 1/2 x 2 1/2 in. Weight 24 ozs.

THE BRAYHEAD TURRET TUNER

£7.7.0 post free. Complete with booklet and fitting instructions. State set and model number when ordering. Converts your 5-channel BBC only set to receive ITA as well.



ITA AERIALS clipping to existing mast 1-2 in. dia. 3-element, 22/-; 5-el., 30/-; 9-el., 50/-; Loft mounting, 3-el., 20/-; 5-el., 26/-; Combined single BBC and 5-el. ITA, 75/- with chimney-lashings; Co-axial cable semi-air-spaced, 7d. yd. or 20 yds., 11/-; Aerial prices carr. paid. Postage on cable 1/-.

NEW WAXED TUBULARS, 350 v. or above, 3 of each, 0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1 mF. Total 21 for 4/6, post paid.

OFFER OF 13-CHANNEL INCREMENTAL TUNER

I.F. 34-38 Mc/s without valves. Removed from chassis but in working order. PCF80 and PCC84 required.

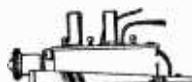
7/6 (2/6 P. & P.). Knobs 2/6 extra.



NEW ITA AND BBC TUNER.

By well-known manufacturer for superhet TVs with 35-38 Mc/s I.F. For all areas; covers all 13 channels. Switch gives BBC and two ITA selections. Suits G.E.C. sets B74543, 4544, 5146, 5147, 5543, 5542, and 6341

without alteration. Easily adapted as aerial converter, and instructions can be provided free. Has ITA and BBC co-axial sockets and separate gain controls. WITH VALVES PCF80 and PCC84, 22/6 (P. & P. 3/-). Some without valves at only 12/6 (P. & P. 3/-).



PERSPEX UNSCRATCHED. (Post 2/- each or 6 post free.)

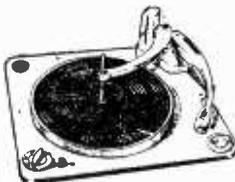
16 1/2 x 14 1/2 x 3 1/2 in. 7/6; 12 1/2 x 9 1/2 x 1 1/2 in. 4/6.

Armour Plate Glass 16 1/2 x 14 x 3 1/2 in. 7/6.

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

£7.10.0 (5/- P. & P.)

B.S.R. 4-speed UA14, auto-changer £7.10.0 or STEREO UA8 for only £6.17.6 (carr. 5/- on either).



GRAMOPHONE

AMPLIFIER with 5 in. SPEAKER. On fabric-covered Baffle 12 1/2 x 5 in. Mains and Output Transformers, Valves E240 and EL41. Tone and Volume

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

ONLY 57/-, post 3/-

LISTEN WITHOUT INTERFERENCE

Fully built V.H.F./F.M. set. Wired, aligned and tested, 4 Mullard valves; with mains transformer, 35-38 Mc/s. ONLY £5.5.0 (4/- carr.). Cheap room dipole 10/- 300 ohm twin feeder, 6d. yd. Valves 3 months' guarantee. Incorporates Mullard Permeability Tuner.



Delivery by return. C.O.D. 2/- extra. Terms: Cash with order or one-third down and balance plus 7/6 (up to £7.10.0) in four equal monthly payments. Balance over £7.10.0 add 1/- in £1 and pay in not more than 3 monthly payments. See special terms for A.M.-F.M. chassis. All new goods unless stated. Send 6d. for NEW 20-page catalogue.

GLADSTONE RADIO

Camberley closed Sats.

Portsmouth closed Weds.

POSTED ORDERS TO CAMBERLEY PLEASE

58A HIGH STREET, CAMBERLEY, SURREY. Tel. 22791
and 247 NEW ROAD, PORTSMOUTH

FIRST IN QUALITY - FOREMOST IN ECONOMY



Suffolk's reputation for reliability accounts for the rapidly increasing popularity of Suffolk rebuilt tubes. Now you can obtain "NEW ALUMINA" C.R. Tubes of all types completely rescreened and aluminised—at an exceptionally low price!

12" £5. 14" £5.5. 15" & 17" £5.10.
21" £8.

Sensational value with the existing range of picture tubes!

12" £4.10. 14" £4.15. 15" & 17" £5.
21" £7.

Suffolk's FULL 12 MONTH GUARANTEE is your assurance of satisfaction. You get FREE DELIVERY anywhere in the U.K. when you trade with Suffolk, the largest independent tube rebuilders in London.

SUFFOLK TUBES LTD



SUFFOLK HALL, 1-3 UPPER RICHMOND ROAD, PUTNEY, S.W.15

Telephone: VAN 5267, 4304



KENDAL

THE ALL NEW
COMPLETELY REPROCESSED
PICTURE TUBES

Real performance with brand new Mullard, Mazda, etc., gun units

Fully rescreened with latest type sm all particle silver activated screens

All tubes are DIRECT plug-in replacements

All tubes aluminised for brilliant daylight viewing

Specially selected reprocessed glass envelopes

FULLY GUARANTEED 12 MONTHS

EXACT replacements for ALL MULLARD, MAZDA, COSSOR, E.E., GEC, FERRANTI, BRIMAR, EMITRON, EMISCOPE (Incl. hard glass) type

12" £5.10.0
14" £5.17.6
15"-17" £6.10.0

20/-

Gladly refunded if you return your old tube

c.w.o.-c.o.d. Pos: & Inc. 7/6 (pass.)

KENDAL TUBES

MILNT HORPE
KENDAL
WESTMORLAND

FOR SOLDERING THAT'S CERTAIN ...

HENLEY SOLON
Trade Mark

Best electric soldering irons in the business — first choice with Industry for over 25 years. Full range available, 25 watt model illustrated. For leaflet writes

AEI CABLE DIVISION

Associated Electrical Industries Limited
Distribution Equipment Sales Department.
145 Charing Cross Road, London, W.C.2.
Tel. GERRard 8660.

Line Oscillator and Sync Circuits

No. 2—SYNCHRONISATION PROBLEMS

(Continued from page 94 of the November issue)

HAVING dealt with the basic requirements of line oscillator stages, the next step is to discuss the circuits involved in line sync separators and pulse-forming stages. First, however, the effects of variations of H.T. and of component tolerances must be considered.

Change of Oscillator Frequency with Picture Brightness

If the oscillator is fed from the boost H.T. line, or if the main feedback is obtained from a tap on the line transformer, the frequency may change as the picture brightness is increased or decreased either by means of the control or due to a change of programme or scene. This is because any change of brightness alters the loading on the line output circuit and thus affects the amplitude of the boost H.T. voltage and the pulse fed back to the oscillator.

An exception to this occurs when a stabilised line output circuit is used, where the voltages change only a very small amount over a wide range of loading. These circuits are uncommon at present but will probably become more popular in the near future.

The change of frequency is undesirable because the hold range has to be increased correspondingly, to the detriment of the sync performance, and even then the picture may break sync when the brightness is changed, if the hold control happens to have been adjusted near the end of its range.

If the trouble is due to changes of boost H.T., the obvious cure is to return the oscillator to ordinary H.T. instead, if the other circuit characteristics permit. Changes of feedback amplitude are not easy to compensate because they are inherent in the circuit, and if the fault is serious it is probably best to use a different type of oscillator, unless the time and equipment necessary for a full-scale investigation are available to the reader, in which case the aim should be to alter the circuit so that another frequency change is induced of the opposite sense to cancel out the first one.

Circuit Tolerances and Component Ratings

The commercial setmaker has to take a great deal of trouble to investigate the effects of component tolerances on the working of a circuit. This is necessary to avoid making a large number of reject receivers which have failed to pass the stringent production tests because the tolerances added up the wrong way. Fortunately the home constructor is not much affected by tolerances, since he is only making one receiver, and he can afford to ignore this aspect of the task.

In the case of component ratings the setmaker is again vitally interested, because any carelessness in the specification of components will cause a lot of unnecessary and premature failures in customers' sets. The home constructor is also concerned, although not quite so seriously, because he does not want any unnecessary faults either.

The thing to do here is to measure or calculate the currents, voltages and powers in each part of the circuit and then to make sure that components of the correct rating are used. This applies particularly to valves, and great care should be taken to avoid exceeding any of the published limits, as this invites an early failure, and will prove expensive. Valve makers do not want to limit the usefulness of their valves, but they are forced to do so in order that their products shall give good service.

It is as well to bear in mind, too, that resistors of over 1M and of small size and wattage rating do not always take kindly to pulses; even quite small ones. In such cases it is best to err on the side of safety and use 1W types where a $\frac{1}{2}$ W component would be adequate in theory. They are also easily damaged by too much soldering.

Pulsed applications commonly occur in the frequency controlling circuits of line and frame oscillators, and also in the feedback stages of the frame output valve. This is a good point to bear in mind when servicing a receiver, since by replacing a $\frac{1}{2}$ W resistor by a 1W type, you may prevent repetition of the fault.

Line Synchronisation

In an ideal receiver, fed from a perfect transmission, the sync pulse always arrives at exactly the correct moment and triggers the oscillator so that the next line of the picture starts in precisely the right place. This means that the edge of the raster will be perfectly straight, and any vertical line will appear "clean". (Fig. 4.) This is what we mean by good synchronisation.

In practice, however, electrical noise is generated in both the aerial and the receiver circuits and this, added on to the sync pulses, causes them to trigger slightly too early or slightly too late. As a result the individual lines of the picture will be displaced, and vertical lines will appear ragged. (Fig. 5.)

In areas close to the transmitter (called the service area) the signal picked up by the aerial is so large that the noise forms only a very small proportion of it.

Vertical lines on a picture

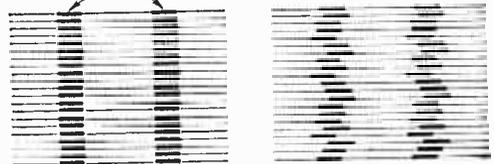


Fig. 4 (left)—Part of a "clean" picture.
Fig. 5 (right)—Part of a "ragged" picture.
Note the random displacement of the lines.

Consequently with almost any type of synchronisation arrangement the displacement of the lines in the picture will be so small that the picture detail will look clean.

In the outer region of the service area the signal is not so strong and the noise forms an appreciable part of the total signal; consequently care is needed in the design of the sync circuits.

In the fringe area the signal-to-noise ratio is so poor that special synchronisation circuits have to be used in order to obtain a stable picture, and these are usually of the so-called flywheel type. Often the entertainment value is small, even if the picture is steady, because the detail tends to be lost amongst noise.

Other Causes of Poor Synchronisation

When considering the causes of poor synchronisation in general, the electrical noise generated in the

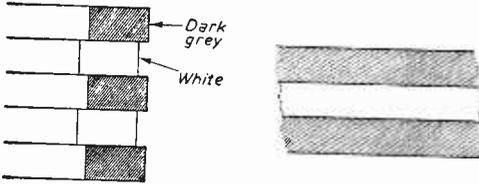


Fig. 6 (left)—Squaring.
Fig. 7a (right)—Part of a picture comprising dark grey and white horizontal bars.

aerial or receiver circuits is only one of the hazards. Other sources of trouble include:

- impulse interference;
- squaring;
- self-generated oscillation in the line transformer;
- spurious line hold characteristics;
- interaction of line and frame sync.

Impulse Interference

This is the kind radiated by electric motors, thermostats and arcing in faulty connections. Cars, electric hair dryers and razors, immersion heaters and old power points are often the culprits, although most of these should have suppression devices. The effect is to swamp the sync pulses so badly that several lines of the picture may be hopelessly displaced, and since the interference is also fed to the cathode ray tube, the picture is affected by black or white spots and streaks.

Squaring

This is the term given to a fault which causes groups of lines in a picture to be displaced towards the left-hand side. On looking more closely it will be found that this only happens where a white portion of the scene occurred at the end of the line before.

Fig. 6.) The reason for this is shown in Figs. 7a-e. Diagram (a) shows a picture comprising dark grey and white horizontal bars; (b) is the corresponding video signal for a dark grey line and (c) for a white line. Note particularly the so-called "front porch", which is an interval to give the signal time to fall from white to black level before the sync pulse comes along.

Supposing that there is a long time constant in, say, the sync separator, then the signal will take too long to fall from white to black level and it will not have reached it by the time the sync pulse arrives. This state of affairs is illustrated in Fig. 7d, and it should be compared with the dark grey line in (e). It can be seen that in case (d), for a white line, the

oscillator will be triggered too late, causing the next line to start too late also, i.e. this line, and any subsequent white ones, will be displaced towards the left and in bad cases with a picture of the appropriate pattern, the whole scene appears almost to be built up from a number of squares, like a chess board.

Sometimes the trouble is aggravated by a faulty transmission which has an unusually short front porch. This is easily tested by switching over to another channel and seeing if the fault persists. If it does, then the fault lies in the receiver, and may be due to valve or component failure in the sync separator or video circuits, or to incorrect tuning of R.F. or I.F. circuits causing poor H.F. response.

Another way in which this peculiarity can arise is when video information reaches the line sync pulse more directly. If a video voltage is added to the sync pulse, the size of the pulse, and hence the time of firing of the oscillator varies with the picture content. This is basically the same mode of action as in the previous case, but the means by which it comes about are different.

If the sync separator fails to separate completely the video information from the sync pulses, i.e. its

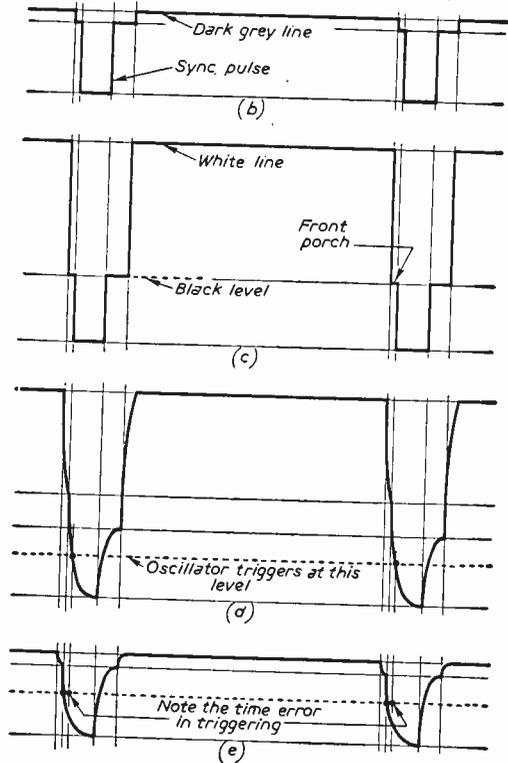


Fig. 7b—Ideal signal waveform corresponding to the dark grey lines of Fig. 7a.
7c—Ideal signal waveform corresponding to the white line of Fig. 7a.
7d—Video signal with a long time constant giving a white line.
7e—Video signal with a long time constant giving a dark grey line.

clipping action is inadequate, squaring will occur. Alternatively, if a lead carrying line sync pulses passes too close to one carrying video information, the mixture will be passed to the oscillator, with the same results. This mixture is shown in Fig. 8 (a) and (b).

Spurious Oscillations

Another form of bad synchronisation is due to a spurious oscillation (ringing) in the line transformer. This gives rise to the trouble illustrated in Fig. 9, where the vertical lines on a picture tend to form a zig-zag with two or three lines at a time. It only occurs in circuits where a capacitor is used in series with the deflection coils, and these two components may resonate at a frequency corresponding to a few lines of the picture. This condition is easy to recognise because the quality of synchronisation is worse on the right-hand side of the picture than near the beginning of each line.

There is no cure for this trouble except to change the circuit for a less efficient one, but it can be improved by good design of the sync circuits.

In some circuits ordinary line transformer ringing, characterised by vertical bars on the raster, can be fed back to the oscillator, and this causes the output pulses to vary in a regular pattern with the result that the raster has a wavy edge, as shown in Fig. 10.

Spurious Locking

If you turn the line hold control of an ideal receiver the picture should remain in perfect synchronisation over the whole of the hold range, and should break up smoothly at each end. Most receivers, however, show some slight peculiarities. In some cases the

This spurious hold position can hardly be classified as a fault, but it is an interesting peculiarity, and provides an easy means of looking at the transmitted blanking times and sync pulse widths. Incidentally, the actual times can easily be measured and then

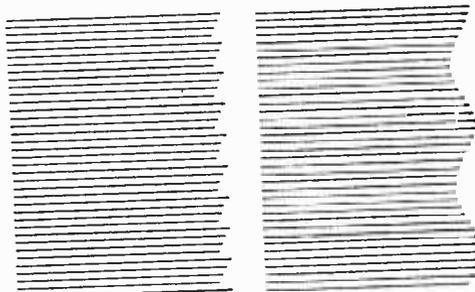


Fig. 9 (left)—A form of poor sync which may occur when a capacitor is used in series with the deflection coils.

Fig. 10 (right)—The raster may have a wavy edge when line transformer ringing is fed back to the oscillator.

compared against the transmission standards. Day to day variations can be recorded as well. How to do this will be described in a future article.

Another phenomenon which may as well come under this heading is backlash in the hold control. This is very much akin to lost motion in the steering wheel of a car, which makes it difficult to set the road wheels in the right direction. When the hold control is adjusted so that the picture just breaks lock, it has to be rotated back again quite a long way before the picture is resynchronised. This characteristic must be classified as a design fault because it makes the control difficult to adjust to its best position, and makes a larger hold range necessary.

The third peculiarity is that of the picture jumping sideways slightly when passing through a certain critical setting of the hold control. This, too, is a slight fault since it makes it more difficult to choose a mean position of the control when centring the picture on the screen of the CRT. (To be continued)

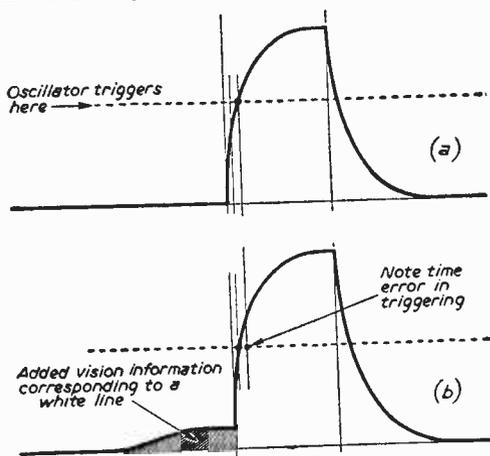


Fig. 8a—Normal line sync pulse.

Fig. 8b—Normal line sync pulse with added video information.

picture does not immediately break up at one end of the control range, but first slips sideways. The last half of the picture then appears at the left-hand side of the screen followed by a broad vertical bar and then by the first half. The black bar in the middle is the sync pulse and blanking period, illustrated earlier in Fig. 7, and this can be seen in detail by turning up the brightness. Further rotation of the hold control then causes the picture to go out of sync in the usual way.

LAST MINUTE CHRISTMAS GIFTS

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

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

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

* RATES (INCLUDING POSTAGE) FOR ONE YEAR (12 ISSUES):—U.K. £1.2.0, OVERSEAS £1.0.6, CANADA £0.19.0, U.S.A. \$3.00.

The Practical Television

CONSTRUCTING THE I.F. TRANSFORMERS AND THE TUNER

Continued from page 98 of the November issue

OLYMPIC

By D. R. Bowman

THE layout is also complicated to some extent by the need to keep line and frame time-bases well separated. It is not always realized that in places very heavy pulse currents flow, and that the large magnetic field associated with them can induce quite high voltages in adjacent high-impedance circuits. If this happens, interlace may

leaving about 4in. as leads. The tape is then carefully trimmed to the size of the coil with a sharp penknife or razor blade.

In order to obtain the correct spacing between the coils it is best to mark off a strip on a long piece of drawing paper, and cut it to precisely the width required. A long piece is needed of uniform

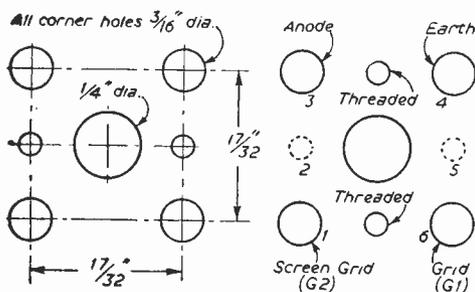
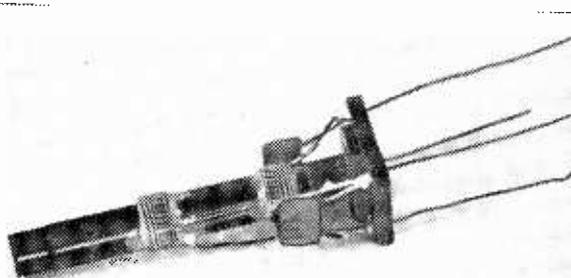


Fig. 4.—(left) Chassis drilling details for the I.F. transformers, and (right) the coil connections.



The internal construction of a sound I.F. transformer.

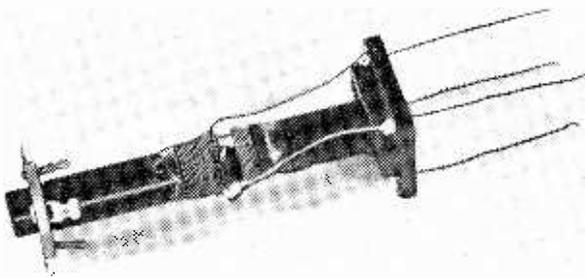
be seriously affected. As extremely good interlace is a feature of this receiver, care must be taken not to spoil it through thoughtless location of components.

The last components to be fitted to the chassis will be the I.F. transformers and R.F. chokes, because these are to be home-constructed and are moreover not very robust. Among these is classed the sound-I.F. rejector which is of the same physical form. The data for winding these components was given on page 80 of the previous issue.

The coil forms for these transformers are made of bakelite, a substance of very satisfactory resistance to temperature. It is, however, not particularly easy to wind on it a coil which will not slip or deform as time goes on. The vision I.F. coils are of finer wire than the sound I.F. coils because more turns have to be accommodated. These are prepared in the following way.

A piece of adhesive cellulose tape is wound once round the coil former, sticky side on the bakelite, with an overlap of about 1/4 in. The wire is looped several times through one of the fixing holes, and is wound quite tightly on to the tape, as many turns as are required. Another piece of sticky tape is placed carefully over the wound coil and pressed down firmly. The ends are now cleaned of enamel and soldered into the eyelets,

width. This is now wound round the former several times in close contact with the coil already wound, and secured with waterproof cement. When dry the next coil is wound in the same way as the first one beginning close up to the paper spacer, and finished off as before. The paper spacer can now be stripped off, and the relative spacing of the coils preserved by a further layer of adhesive tape.



A vision I.F. transformer.

The presence of large quantities of a material of unknown dielectric properties matters very little in the vision amplifier because the coils are heavily damped in any case to obtain the necessary bandwidth.

Before closing up the coils in their cans, the damping resistors are soldered into place. These

are very small items and if they are arranged neatly in the corners no difficulty will be found in accommodating them. Fig. 4 shows the recommended connections to the eyelets.

This system separates anode and grid leads as far as possible and is convenient for the EF80 valves. It should be noted that the centre ends of the windings are screen or earth connections to reduce

the capacitance coupling between the primary and secondary of the transformer. Fig. 5 shows this. The two coils are both wound in the same direction on the former.

The sound I.F. transformers are of somewhat different construction, because of the need to avoid losses. A heavier gauge wire is used, and this is wound direct on to the former. When wound the turns are cemented together with polystyrene cement (plastic model aircraft cement). The cement may appear to stick the coil to the former, but it does not do so. It does fix the turns very firmly together however. The wire ends are then cleaned off and soldered into the eyelets, making sure that they are not under tension. In this way the coil holds together very well, and the stiff leads automatically ensure that correct spacing is maintained. Spacing is arranged by eye and ruler in this case, as it is much larger and is not critical. No damping resistors are used, but tuning capacitors are soldered across the coils and closed up in the can, together with the 1pF top-coupling capacitors. These will

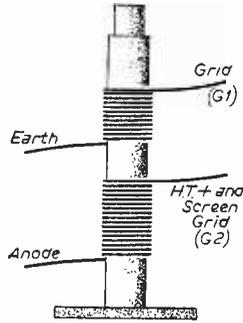


Fig. 5.—Winding details for the I.F. transformers.

go in with ease, but there is not a great amount of room.

The sound I.F. trap is constructed in the same way, except that there is no necessity to put the tuning capacitors in the can; but they may be included with the phase-correcting resistor if the constructor desires.

When polystyrene formers are used, as in the tuner and the pre-video stage I.F. filter, polystyrene cement may be used to secure the turns. Here it is essential to do the sticking with a core slug in place, and to leave the component at least overnight to harden. The slug in position prevents warping of the former, and the long drying time is necessary because the cement solvent penetrates the former deeply. Artificial drying by heat is not advised as warping will almost certainly take place. There is some tendency to soften on

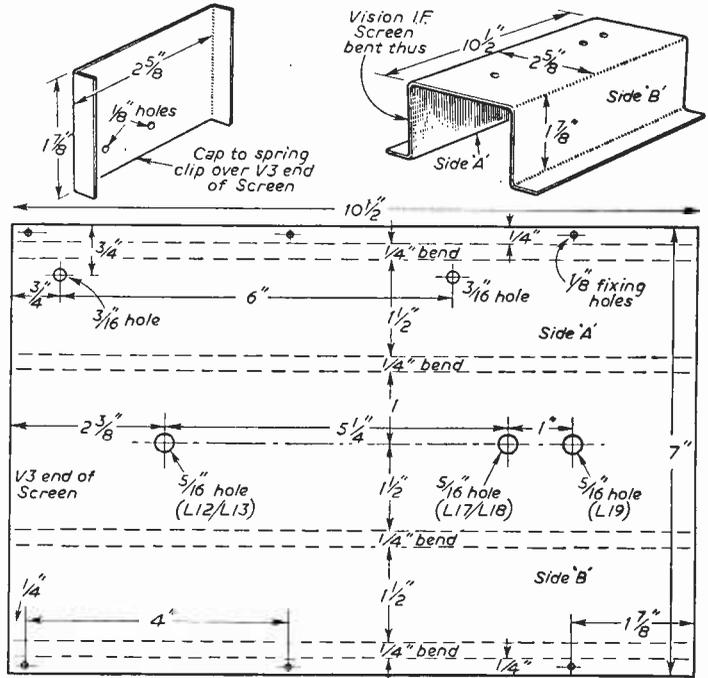
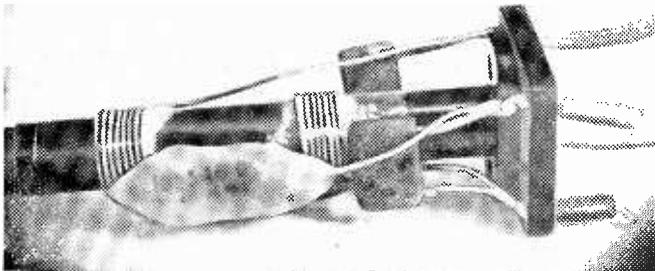


Fig. 6.—Dimensions of the vision I.F. screen or attenuating waveguide.



heating for a week after sticking, but this only means that soldering the ends should be done with a "heat-sink"—a pair of pliers to grip the wire—between the soldered wire and the former. It should be realised that before the knack is obtained, one polystyrene former will probably have to be sacrificed!

The tuner is next to be tackled. This is a critical item, and even

(left)—Another view of a sound I.F. transformer.

if the layout given is followed accurately, different constructors will probably obtain different circuit capacitances. The chief difficulty is in the Band III oscillator, and to obtain a stable oscillator of large (and therefore less critical) dimensions a tuned-lines oscillator is specified.

The very much increased physical size of the inductors of a tuned-lines oscillator also enables a quite large temperature-compensating capacitor (Ck) to be included in the circuit. This should be soldered very close to the ends of the lines, care being taken not to let its temperature rise appreciably during the operation. This precaution is necessary whenever a negative temperature coefficient capacitor is soldered in. This is because any overheating may, and usually does, impair the negative temperature coefficient quite seriously.

Provided the dimensions given are adhered to reasonably closely there should be no difficulty encountered in covering the range of frequencies needed. The aerial and inter-stage circuits are heavily damped by the input resistance of the valves, and are not critical.

With the frequency changer, temperature rise is minimised by running it at reduced anode and screen voltages, and the gain improved by using an inductance in the screen lead to neutralise

cathode lead inductance. The screen inductance consists of 0.9in. of lead between the valve pin and the decoupling capacitor. More length than this may lead to instability; less length will reduce the conversion conductance, but if the receiver is to be used in an area of high signal strength the length may be reduced at will.

The Band III oscillator lines are constructed from 1/4in. outside diameter copper tubing, which

(Continued on page 168)

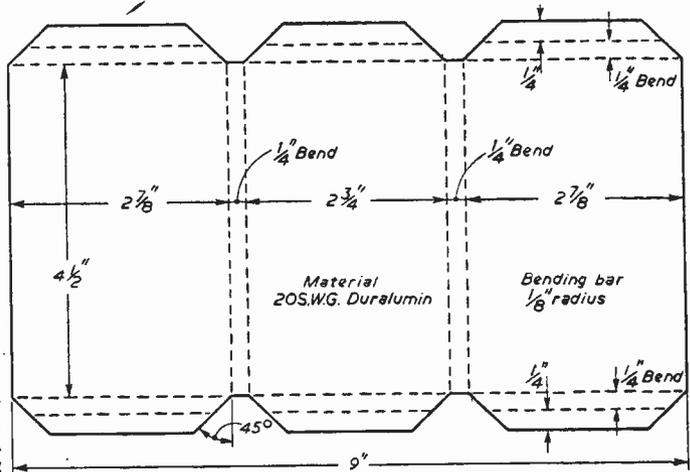


Fig. 7.—The containing screen of the tuner unit.

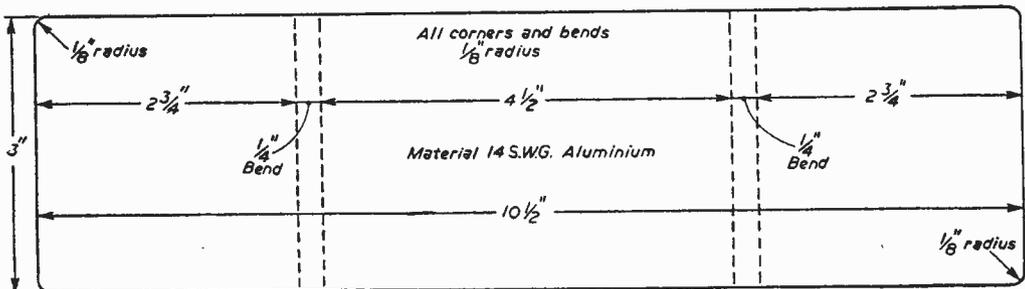
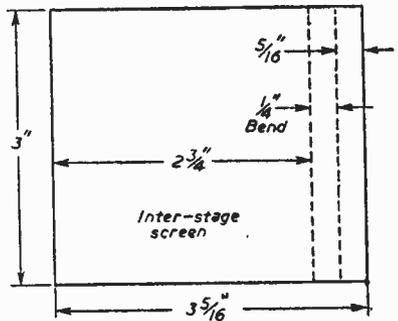
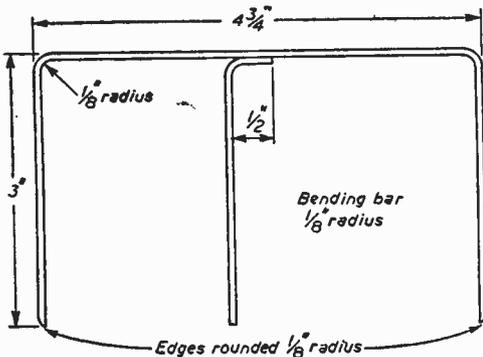


Fig. 8.—Dimensions of the chassis of the tuner and inter-stage screen.

It will need servicing!

USEFUL HINTS ON WIRING AND CONSTRUCTION

By R. B. Archer

WHETHER you build for yourself or for your friends—it will need servicing. Here are some hints for cutting down the need to a minimum, and to ensure simple repair when the need does arise.

Soldering

Learn to solder perfectly. A good iron is the best investment in the world—except a pair of good irons, one large for heavy soldering and an instrument type for small components. Scrupulous cleanliness and the use of a good cored solder (e.g. Ersin Multicore) are the next requirements, and then commonsense.

In the realisation that short leads to condensers and resistors are needed at the higher frequencies, some constructors try to cut the wire ends too short. This often causes a component to become overheated during soldering and defects easily arise. A useless component is still useless even if it is soldered in with very short leads. The "thermal shunt" is often advocated to minimise this trouble, and it can help a great deal to hold the wire, between the component body and the soldering point, with a pair of pointed pliers. What is more effective, often, is to dip the pliers into water first so that water is held in contact with the wire being soldered. If this precaution is taken the component is very unlikely to be overheated, especially if a really hot iron is used. A cool iron means long contact with the soldering point and much heat can travel along the wire in such circumstances.

Avoid, too, the use of a mechanical joint as a preliminary to soldering. A wire looped through the hole in a valveholder tag and bent round on itself, or twisted round the tag, makes a sound joint, but if later the component has to be removed—especially if the space is confined—neighbouring components can easily be damaged and the last state can be worse than the first. If a "lying side by side" joint is not good enough, better soldering technique is needed!

Solder tidily: loose blobs usually end up in very tiresome positions—for example, between anode and suppressor grid connections. The decoupling resistor will probably burn out, but even if it does not, the anode still will be deprived of H.T. and the valve will be overheated by excessive screen current.

Components

Component reliability is high these days—except for volume controls. This does not mean that one can take liberties. A 450V condenser may cost a shilling more than one rated at 350V, but if it saves a replacement it pays for itself when it is soldered into place. The rule should always be to work well within the rating of all components,

including valves. However, in this latter connection, it is better to overrun heaters than to under-run them, if the choice has to be made.

If you rely on "surplus" resistors and condensers—or those stripped from ex-government equipment—always test them before use. While resistors are not too bad for reliability, they are often different in actual value from that colour-coded on them. Many people will not employ condensers taken from such a source; they are often very unreliable. If you do use them, test the insulation resistance first. Fig. 1 shows the simple apparatus needed. V is a neon lamp—any type will do. R1 is about 50,000Ω. C is a first-rate mica condenser of about 0.01μF capacitance. X is the condenser to be tested. H.T. should be about 250 volts. Comparative tests with components known to be good are the best guide to the rate of flashing of the neon which should be tolerated. In any case, never test by connecting a delicate milliammeter in series with a doubtful component and H.T. The sudden demise of the meter, if one's fears are found to be well-grounded, is not amusing and costs more than buying a new condenser of reliable make in the first place.

Ex-government and manufacturers' surplus valves are defective often enough to warrant testing each one before use. Test the cathode-heater insulation, and do not be content with the 9V or so of an ohmmeter—use 50V in series with a 10k resistor. The neon tester is of little use for this purpose. If any component is found to be seriously defective, destroy it—if you put it back in the box you will use it some time and probably regret it!

Layout

This is just as important a matter as good soldering or watchfulness over components. The rules are simple enough: they are these. Economise in space, but not to the extent that components are rendered inaccessible by others being put on top of them. A logical order is important—a valveholder the wrong way round will cause endless difficulties with crossing wires. Always leave room for the soldering iron between components and don't pack them so close that heat radiated from the iron causes wax to drip or insulation to be charred. It is sound practice to do development work on a skeleton chassis, where different

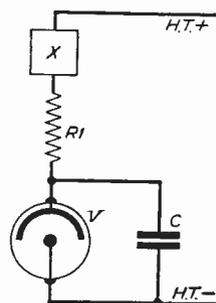


Fig. 1.—Simple neon tester for capacitors.

arrangements can be tried out. When the circuit is satisfactory, the layout can then be considered carefully before actual construction begins.

Always use enough components. This may sound strange advice, but I have seen many chassis where the H.T. wiring is insecure for want of a few stand-off insulators or insulated tag-strips. Such economy may be all right in a development chassis, but in a receiver itself it must be assumed that shaking and bumping will inevitably occur. If the H.T. leads are loose, trouble can then be expected with some confidence. Clips to hold down bulky components with wire ends can be manufactured easily enough by anyone with a broom handle, tin-snips and a drill; and so there is no excuse for unstable components wagging about and not supported properly.

Mount condensers, resistors, etc., so that their value can be read without taking half the set to pieces.

Circuit Diagram

Always have an accurate circuit diagram inside the instrument itself. If modifications are carried out, enter them on the diagram as amendments in

a different-coloured ink. This saves endless bother and is well worth the trouble. If you are making a set for a friend, give him a circuit diagram and keep a copy yourself. It is hardly fair if he is deprived of the use of a receiver for want of a diagram, if you are in hospital, or Africa. Make sure that relevant voltages, wave-forms and the like, together with component resistances, and tolerances on condensers, etc are recorded. If you cannot service the thing yourself, make sure that somebody else can.

A circuit diagram ought to be kept carefully. Usually they are not, but if you make the diagram an awkward thing to handle the chances are that it will survive. If it is drawn large, in Indian ink and pasted on to a piece of plywood, or stuck to the inside of an instrument case, and varnished over, its chances of being available when needed are improved.

These four factors more than anything else contribute to ease and efficiency to servicing and maintenance. There is a fifth—the “savvy” that comes with experience and knowledge which in effect an eye for a good design. But perhaps that is just another way of saying—“design for future servicing”.

REPLACING CR TUBES

(Continued from page 134)

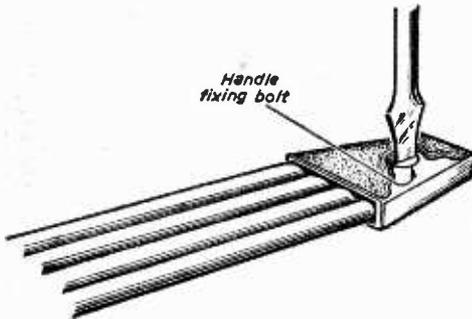


Fig. 6.—Removal of the carrying handle (and chassis) on the T14 transportable.

Unboxing Model 610/611

Remove the four front control knobs and the cabinet back, disconnect and remove the loud-speaker by taking out the wing nut and spring clip. Remove the base fixing screws from the side brackets at the rear of the chassis and withdraw the chassis backwards.

Replacing the CRT

Discharge the EHT cap and remove it. Disconnect the wires from the deflector coils, having marked their position, and withdraw all units from the tube neck. Remove the clamping band around the tube bowl and withdraw the tube from its harness. The setting up follows the previous models, with a tapping system for the adjustment

of focus on the 605, and a small pre-set potentiometer on the 110deg models.

NOTE ON THE FOCUSING OF ELECTROSTATIC TUBES

Two methods of adjusting the focus on electrostatic tubes are commonly employed by R.G.D. One is to have a short flying lead permanently connected to pin 6 of the tube (the focusing electrode), the other end of which may be taken to any of the other tags around the tube. An H.T. feed is brought up to pin 9 and, because pin 12 is the earthing end of the heater chain, the voltages available are thus:

Pin 9	—	200
Pin 10	—	400
Pin 11	—	100
Pin 12	—	0

On other models a small 2M pre-set resistor is connected between A1 and chassis providing a continuously variable voltage on the focus electrode of between 0 and 400.

JOIN THE PRACTICAL GROUP

PRACTICAL WIRELESS 1/6
Every Month.

PRACTICAL MECHANICS .. 1/3
Every Month.

PRACTICAL MOTORIST .. 1/6
Every Month.

PRACTICAL HOUSEHOLDER 1/3
Every Month.

A.C./D.C. Multimeter Kit

Ranges: D.C. volts 0-5, 0-50, 0-100, 0-500.
 1-1,000 A.C. volts 0-5, 0-50, 0-100, 0-500.
 0-1,000 D.C. milliamps 0-5, 0-100.
 0-500 Ohms 0-50,000 with internal batteries. 0-500,000 with external batteries. Measures A.C./D.C. volts, D.C. current and ohms. All the essential parts including metal case, 2in. moving coil meter, selected resistors, wire (or shunts), range selector, switches, calibrated scale and full instructions. price 19/6, plus 2/6 post and insurance.



TV Workshop Aids

F.H.T. SEALER. Apply with soldering iron. Stops corona discharge, etc. 2/6 per stick.
POLYTHENE TAPE. 2in. x 10 thou. for E.H.T. insulation up to 25 kV, 5/- per 20ft. roll.
SPONGE STRIP. 3in. x 4in. For sealing or cushioning. 9d. per foot.
ANTI-STATIC SCREEN CLEARER For TV tubes and screens. Perspex or glass. Delays accumulation of dust. 3/- per tube.
CELLULOSE CEMENT. Specially prepared for radio plating of metal, glass, ceramic, wood, fabrics, 4/6 per tin.

Component Storage Drawers

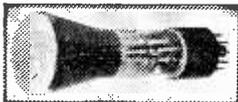
Stout board construction, these drawers are ideal for small parts. Supplied complete with simple erection instructions — 1/6 each or 12 drawers each 6 x 2 1/2 x 6 1/2in., 13/6, post 2/-.



TV Masks

Latest type grey crystallate.
 14in. 10/-; 17in. 12/-
 Plus 1/- post.

Building A Scope?

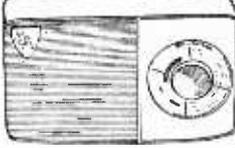


3in. oscilloscope tube. American made type No. 3FP7, octal base 6.3 v., 5 amp. heater, electrostatic deflection, brand new and warranted, with circuit diagram of scope, 15/- each, plus 1/6 post and insurance.

Transistor Loudspeaker Radios

To build yourself — anyone can do it!

Pocket 4 uses three transistors and a diode, complete cost 42/6 plus postage and insurance.
Pocket 5, much louder, uses four transistors and diode, complete cost 55/-, plus 2/6 postage and ins. Each complete to last nut and bolt with proper cabinet, with proper tuning condenser and miniature loudspeaker. Batteries available 10d. extra) and solder (1/- are definitely only other items needed. Our circuits are completely portable and do not need any aerial, also SERVICE AT MODERATE CHARGES IS AVAILABLE SHOULD YOU GET INTO DIFFICULTIES. Demonstrations gladly. Money back guaranteed. S.A.E. for additional details.



The Taylor Meter

Model 127A



A pocket size meter but with a big scale and a sensitivity of 20,000 Ohms per volt D.C., therefore an ideal unit for television servicing — robustly made and complete with leads and prods—20 ranges as follows:
 D.C. current 50 micro-amps. to 1 Amp.
 D.C. voltages—0-1,000 volts in seven ranges (25 kV.) with external probe, optional extra.
 Volts A.C.—0-2,500 in six ranges.
 Ohms—0-20 meg. Ohm in three ranges (self-controlled).

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

Components for Transistor Sets

Parts for "Practical Wireless." Pocket Transistor Radios available. Send for lists.
 Sub-miniature Electrolytics, 1 mid 10v., 2.5 mid 6v., 4 mid 6v., 8 mid 6v., 5 mid 12v., 10 mid 6v., 25 mid 6v., 30 mid 3v., 50 mid 3v., 200 mid. All 1/9 each.
 Transistor Ferrite Rod Aerial with medium and long wave coils with circuit. Price 7/6.
 Oscillator Coils and set of 9 F. transformers for transistor set with circuit. Price 23/6.
 Midget 3in. P.M. Loudspeaker or transistor set, 3 ohm or 8 ohm coil. Price 18/6.
 Midget 288 pF - 176 pF two-gang Tuning Condenser with trimmers, 1 spindle drilled and tapped. Price 9/-, plus 1/- post.
 Push-pull Output Transformers, for transistors OC78, etc. Sub-miniature. Price 8/6, plus 1/- post.
 Push-pull Input Transformer to match the above Output Transformer, 3/6.
 0.0005 mfd Single Tuning Condenser. Solid dielectric 4in. spindle for transistor or crystal set. 3/9; ditto with spindle tapped 6 BA, 4/-.
 Transistors tested. Set of six or Superbet includes matched pair, Mullard 23-10L, ditto unbranded, 45/-; suitable as mixers, 9/8 each. Suitable as I.F. amplifiers, 8/6; suitable for R.F. and Reken. circuits, 6/6; matched pairs for Push-pull Output, 18/- per pair. High gain for single ended output, 7/6. Ordinary white spot, 3/8; red spot, 3/6.
 Resistors, miniature quarter watt type for transistor sets. All popular values, 5d. each.
 Miniature ceramic condensers 6d. each.

"Dim and Full" Switch

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

Connecting Wire



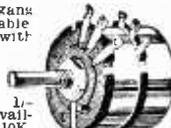
P.V.C. covered in 100ft. coils—2/9 a coil or four coils different colours, 10/-, post free.

Yaxley Switches

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

Morganite Potentiometers

Single and 2-gang types available standard size with good length spindle, all new and boxed.
 Single types, 1/- each, values available: 5K, 10K, 25K, 50K, 100K, 250K, 1 meg., 2 meg. 0 Gang type 3/- each—values available: 5K +5%, 100K +100K, 1 meg. ±1 meg., 2 meg. ±2 meg.



Band III Converters



valves, coils, fine tuner, contrast control, condensers and resistors. (Metal case available as an extra.) Price only 18/6, plus 2/6 post and ins. Data free with parts or available separately. 1/6. Please send two more kits, the one you sent last week is performing magnificently. We receive this sort of letter every day of the week, so if you have hesitated because you thought our kits too cheap you need hesitate no longer.

Suitable Wales, London, Midlands, North, Scotland, etc. All the parts including two EF80

TV Service Sheets

200 sheets covering most popular post-war televisions by leading makers—Cossor, Ekco, Ferguson, Pve, etc. £2 post free. PREVIOUS PURCHASERS OF THESE SHEETS PLEASE NOTE: WE CAN SUPPLY SHEETS Nos. 100-200, £1. or 150-200, 10/-.

Miniature Microphone

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



ELECTRONIC PRECISION EQUIPMENT LTD.

★ Orders received by post are despatched from our warehouse, Dept. 5, 66 Grove Road, Eastbourne, and to save time, please post your order to this address. Please include enough for postage. Callers, however, should use one of the following addresses:
 Electronics (M.P.) Ltd., Electronics (Ruisslip) Ltd., Electronics (Croydon) Ltd., Electronics (Finsbury Park) Ltd.,
 520 High Street North, 42-46 Windmill Hill, 286 London Road, 29 Strand Green Rd.,
 Manor Park, E.12, Ruisslip, Midx., Croydon, Finsbury Park, N.15,
 Phone: Ilford 1011 Phone: RUISLIP 5790 Phone: CRO 6558 Phone: ARChway 1049
 Half day Thursday Half day Wednesday Half day Wednesday Half day Thursday

MICROPHONES

Acos Mic 39/1, crystal stick microphones for use as a hand, desk or floor stand unit, listed at 3 gns., our price 35/8. Table stand 7/6 extra, floor stand adaptor 12/6 extra. **Acos Mic 40**, as supplied with modern tape recorders, with a folding rest and 8 ft lead, listed at £1.15.0. Our Price 19/6. **G.B.S. Microphone**, pencil stick type, fitted with muting switch, 42/-.

T.S.L. Crystal "Stick" Microphone, model MX3, for general purpose use, complete with table stand, 45/-.

T.S.L. Moving Coil Microphone, for high or low impedance, brown and cream plastic case with a fold-in table rest 8 ft cable and a standard 3-way connecting continental plug.

AUTOMATIC RECORD CHANGER UNITS

B.S.R. Monarch UAS, 4-speed unit with a B.S.R. monaural full-f cartridge, £8.19.6.

B.S.R. Monarch UAS, 4-speed unit with a B.S.R. stereo full-f cartridge, £8.19.6.

B.S.R. Monarch UA14, 4-speed unit in two-tone grey, £8.19.6.

Collaro Conquest, 4-speed fully mixing changer, complete with studio cartridge, £8.19.6.

Collaro RC457, 4-speed record changer, fitted with transcription cartridge TX88, £8.19.6.

Garrard RC120, Mark II, 4-speed unit with manual control, to enable records to be played singly, fitted with the GC2 cartridge, £8.19.6.

AMPLIFIERS

Decamatic, fitted with valve ECL2, contact cooled rectifier, tone and volume on/off, chassis size 8 x 3in., complete with Celestion speaker, 8 x 6in., £4.5.0.

ALPHA RADIO TERMS.—Cash with order or C.O.D. Postage and Packing charges extra, as follows: Order value 10/- add 1/3; 20/- add 1/9; 40/- add 2/6; £5 add 3/6. Minimum C.O.D. Fee and Postage 3/-. For full terms of business see inside cover of our catalogue. Personal Shoppers 9 a.m. to 5 p.m. Monday to Friday. Saturday 10 a.m. to 1 p.m.

103 LEEDS TERRACE, WINTOUN STREET, LEEDS, 7.

ALPHA RADIO SUPPLY CO.

VALVES GUARANTEED ALL TESTED BEFORE DESPATCH

AZ1	10/-	GZ32	11/6	354	7/6
AZ31	10/-	PCC84	8/8	3V4	8/-
DAF96	8/-	PCC85	11/6	5Y3G	8/-
DF96	8/-	PCF80	8/8	5Z4G	9/-
DK96	8/-	PCL82	12/-	6AL5	4/-
DL96	8/-	PCL83	13/6	6F1	14/-
EAF42	9/8	PL36	15/-	6F15	14/-
ENC33	8/8	PL39c.l.	26/6	6J7G	6/8
EC41	8/8	PL81	11/-	8K7G	3/8
ECC81	7/6	PL82	8/6	8K8G	6/8
ECC82	8/-	PL83	8/6	8K25	19/11
ECC83	8/-	PY32	17/11	6L58M	9/8
ECC84	10/-	PY81	8/6	6AM6	4/-
ECP80	12/-	PY82	7/-	8Q7G	7/6
ECF82	10/6	PZ30	19/11	8V6G	9/-
ECH42	9/8	TP25	10/-	8V6GT	7/6
ECH81	9/-	U25	13/6	8X5GT	7/-
ECH90	9/6	U26	10/-	7B8	10/6
EF35	5/8	U37	26/6	7H7	8/-
EF41	9/6	U281	19/11	757	9/8
EF90	7/-	U901	29/10	7Y4	8/-
ER86	12/6	UAF42	9/8	10P1	15/-
EL33	14/-	UBC41	8/6	10P13	17/6
EL41	8/-	YCH42	9/8	12AT7	7/8
EL42	10/6	UF41	9/-	12AX7	8/-
EL84	9/-	UL41	9/-	12AU7	8/6
EM34	9/6	U55	29/8	23P1	26/6
EM30	9/6	UY1N	12/6	25A6G	10/8
EY51	9/6	UY41	7/8	26Z4G	9/6
EY86	10/-	1R5	7/8	27SU	19/11
EZ40	7/6	1S5	9/8	35L6GT	10/-
EZ81	7/-	1T4	5/6	35Z4GT	7/-

CATALOGUE
Our 1961 catalogue is now available. Please send 1/- in stamps for your copy. Trade catalogue also available. Please attach your business letter heading.

SINGLE RECORD PLAYER UNITS
Garrard, Model TA, Mark II, 4-speed single player, die-cast aluminium pick-up with a GC2 cartridge, automatic stop, 9in. diameter turntable, £8.10.0.

Collaro Junior, 4-speed turntable and pick-up, complete with a crystal cartridge and sapphire styl, finished cream with a maroon turntable mat and speed control, £3.15.0, or turntable and motor only at £2.12.6. pick-up only £1.7.6.

TELEPHONE ADAPTOR
Geloso, type 9010 45/-.

METAL RECTIFIERS

Alpha Range of Guaranteed Bridge Rectifiers suitable for Battery Chargers, 6 and 12 volt output;

2 amp	7/-	4 amp	12/6
3 amp	10/-	5 amp	14/6

LOUDSPEAKER UNITS

2in. Brand New	.. .. .	26/10
2in. Square Rola C25	.. .. .	18/6
2in. Square Celestion	.. .. .	19/6
3in. Square Celestion	.. .. .	19/6
4in. Square Elao	.. .. .	18/6
5in. Round Plessey with C.P.T.	.. .. .	18/6
6in. Round Celestion	.. .. .	17/8
8in. Round Richard Allen	.. .. .	18/6

ALL PERMANENT MAGNET

10in Round Philips type with Tweeter	.. .. .	37/6
10in. Round Elac	.. .. .	25/-
12in. Round Plessey	.. .. .	29/6
12in. Round Celestion	.. .. .	25/6
12in. Round Plessey, 15 ohms speech coil	.. .. .	59/6
6in. x 4in. Plessey	.. .. .	19/6
7in. x 4in. Plessey	.. .. .	19/6
8in. x 6in. Celestion and Richard Allen	.. .. .	25/6
10in. x 6in. Celestion and Plessey	.. .. .	25/6

TV PICTURE TUBES

BUY DIRECT FROM FACTORY

SAVE up to £8

- ★ 12 months' guarantee
- ★ Cash allowance for Old Tube
- ★ All Types
- ★ Free advice on fitting

12" & 14" || 15" & 17"

£5-19-6 || £6-19-6

Send cash with order or C.O.D. giving size and type of tube required to:—

HOMEVISION SERVICES
17 OXFORD STREET, SWANSEA

For Safety's Sake use AVO Prodclips

Pat. No. 748811

.. with Trigger-Action Spring-Loaded Clips

PRESS TRIGGER TO OPEN
RELEASE TO GRIP

Safety first every time with these patented spring-loaded AVO Prodclips.

Cleverly designed for use as insulated prods, they are invaluable for reaching and holding test points which are difficult of access.

Suitable for use with AvoMeter, Multimeter and Avo Electronic Test Meter Leads.

Post Free 15/- per pair.

AVO LTD . AVOCET HOUSE.
92-96 VAUXHALL BRIDGE ROAD, LONDON, S.W.1.
Victoria 3404 (12 lines)
A MEMBER OF THE METAL INDUSTRIES GROUP OF COMPANIES

A Triode Converter

COMPLETING THE WIRING AND TESTING THE UNIT

(Continued from page 89 of the November issue)

By H. G. Underwood

soldered to the first star tag. Now solder C8 and C9 into position.

The Band-Switch Installation

This completes the main circuit wiring, and the band-switch can now be installed. Cut down all the tags on this component and the centre pin of the coaxial Band I input socket, leaving about $\frac{1}{8}$ in. for soldering. This is essential to prevent patterning from BBC on the ITV signal.

Pass the end of a piece of p.v.c.-covered twin flex (approximately 2ft long) through the right-hand hole in the chassis end and solder one lead to the heater section of the switch. The other lead is secured by loosening the bolt holding the corner of the chassis, tucking the bared end of the lead in and tightening the bolts again. Wire the remainder of the switch as shown in the layout diagram and solder in C15 and C16. Allow about 2ft of coaxial lead for the output to the receiver for preliminary testing and fix a coaxial plug on its further end. Finally solder a 2-3ft length of black p.v.c.-covered wire to a convenient solder tag direct on the chassis and take through the same hole as the H.T. lead. This is the H.T. return wire and must be soldered direct to the main receiver chassis. Insert a grommet, or bind these two wires with insulation tape where they pass through the hole in the chassis end.

Testing

The unit is now ready for testing. Insert the two valves in their holders and connect the heater cable to the output tags of a small 6.3V 1A heater transformer. Take a mains lead, complete with plug, and solder to the mains input of the heater transformer. Now cover all the tags on this component with insulating tape to obviate any possibility of shock whilst testing. Connect an ohmmeter or continuity tester between the H.T. lead and the chassis and make quite sure that no short exists between the two. The meter should not read less than 200k.

Solder the red p.v.c.-covered H.T. supply wire to the output tag of the

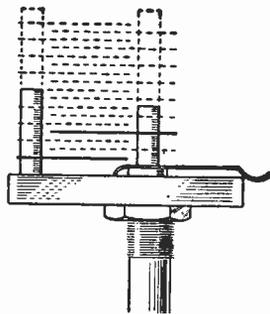


Fig. 5.—Modifications to the tuning condenser to leave one moving and one fixed vane.

The completed converter.

Remaining Wiring

BEFORE proceeding with the remaining wiring, make sure that all the necessary earth connections have been made from the valveholders and taken to the star-shaped tags mounted as shown (Fig. 2, last month). Note that capacitors C7 and C11 must be positioned near the valveholders, as close to the chassis as possible.

Mount the fine tuner (C14), after modifying it as shown in Fig. 5. Connect the moving vane to the second star-tag and solder a wire connecting the two fixed vane pillars and connect with an insulated lead to pin 7 on V2. Bolt the L5 oscillator coil former into place. Wind L5 (turning up the bottom end lead as shown to meet pin 7 of V2) on a $\frac{1}{4}$ in. drill shank and press carefully in position on the former, using a small screwdriver to feed the coils over the top rim of the former. Solder the bottom end lead to pin 7 of V2 and solder C13 between the top lead and pin 6. If one is available, it is advantageous that C13 should be of the negative temperature coefficient type to minimise tuning drift.

Attaching the Formers

Now attach former L1 and wind the coil as shown. The primary is a piece of p.v.c. covered wire, wound once round the former between the bottom turn of the secondary, then twisted and taken to the input socket connections. Solder the top lead of the secondary to pin 2 of V1, and solder C2 and R1 to the bottom, followed by C3.

Now L3 and L4 formers must be fixed so that their centres are approximately $\frac{1}{4}$ in. apart. Wind L3 and L4 (both in the same direction), press them on to the formers and solder the top end of L3 to pin 6 of V1, and the bottom end of L4 to the second star-tag. Solder R5 and connect the free end of C6, which should already have been

main smoothing condenser of a single band television receiver and the black wire to a convenient earth tag. Set the fine tuner so that the vanes are half engaged. Plug in the aerials to the correct sockets of the converter, and the output lead of the converter to the input socket of the television receiver. Switch the band-switch on the converter to position 1, and switch on the main receiver and allow to warm up on the BBC signal.

Tuning

Now plug in the lead to the filament transformer, switch to position 2 and observe that the converter valves light up correctly. Allow about 30sec and switch to position 3. With a non-metallic tuning rod, such as a broken plastic knitting needle with its end filed to a chisel point adjust the core of the output coil (L6) for the loudest "rushing" noise from the speaker. Set all other cores with their tops about level with the rims of the holders and slowly screw in the oscillator core (L5) until the vision signal is heard on the speaker. Screwing in the core a little further should produce a picture, accompanied by sound. If, however, the vision signal sounds weak, leave the oscillator core in that position and adjust all the other cores to produce the loudest vision signal noise in the speaker. Now go back to the oscillator core and screw in until the picture and sound appear. It is only necessary, then, to readjust all the cores for the best picture and sound, adjusting L4 for maximum sound, and noting also that the fine tuner functions correctly.

If the sound and picture are only obtainable separately, then the oscillator frequency is too high, and the core of that coil should be screwed further into the former.

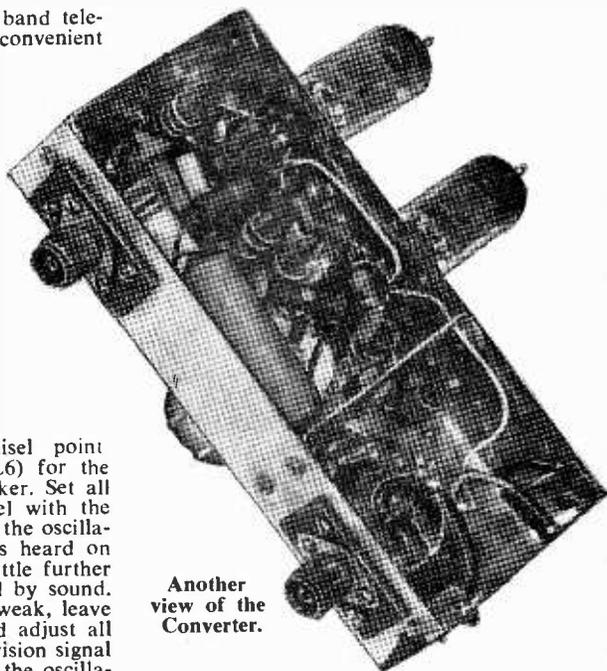
If the heater transformer can be accommodated on the main receiver chassis, then a worthwhile refinement could be added to the converter by incorporating a four-way non-reversible plug and socket in the bottom end of the chassis to convey the supplies to the converter from the main set. This would make subsequent servicing far easier.

Installing the Converter

Before installing the converter in the receiver for which it is intended, switch on that receiver and test the chassis with a neon screwdriver. This is a precaution one should always take before touching any receiver. If it is alive—and it is surprising how many are—reverse the connections to the mains plug. If the plug is of the reversible type, mark suitably with white paint and give firm instructions to the owners always to ensure that the plug is correctly inserted.

Resistor R2 can now be experimented with to obtain reasonable matching between the signals—the higher the value, the lower the gain.

On some older receivers employing auto-wound or double-wound mains transformers it will be found that the receiver H.T. line will be in the neighbourhood of 350V. Under such conditions R10 should be increased to about 5k to 6k, so as to reduce the supply to the converter to about 200-250V.



Another view of the Converter.

A.M. RADIO FROM SPARE TURRET COILS

(Continued from page 126)

which might become a combined feedback oscillator. To keep an oscillator running about 5 per cent from the main I.F. is difficult. There need be no great concern of the TV enthusiast on this count, as dirty contacts, valve bases and drift are speedily noticed and corrected.

Filters

Other points to watch for are the possibility of filters fitted in the aerial lead to the turret removing M.W. radio frequencies. These should only be removed if they do not spoil the results on the TV. The disturbed raster that may irritate when using radio can in some cases be cleared by making a vision valve inoperative with any spare switch contacts existing on the wafer where fitted on to the turret spindle. It is not advisable to attempt to switch off the vision sections of the set owing to the complex interdependence of sound and turret sections on the normal running of picture and timebase sections. Heater current, H.T. level and parts of some AGC systems affecting sound rely on line gating pulses.

Results

Good radio results were obtained in the London area with a normal outside aerial on the Light and Home programmes, 247m and 330m, with no noticeable drift or oscillator pulling. Radiation to other receivers was also negligible. Using the inner only of the coaxial increases the volume.

7-VALVE AM/FM RADIOGRAM CHASSIS

Valve Line up:
EC85, ECH81
EF89, EA8C80,
EL84 EM81 EZ80.



3 wave band and switched gram positions. Med. 200 m.-500 m., Long 1,000 m.-2,000 m., VHF/FM 88-95 Mc/s.
4 Controls. Vol., On-Off, Tone Tuning. Wavechange. P.U., Ae. and E., and speaker sockets. Magic eye tuning. Philips continental tuning insert with permeability tuning on FM, and combined AM/FM IF transformers, 460 Kc/s and 10.7 Mc/s. Dust cone tuning all coils. Latest circuitry, including AVC and Neg. Feedback. 3 watt output. Sensitivity and reproduction of a very high standard. Chassis size 13 1/2 in. x 6 1/2 in. Height 7 1/2 in. Edge illuminated glass dial 1 1/2 in. x 3 1/2 in. Vertical pointer. Horizontal station names, gold on brown background. A.C. 200/250 v. Indoor dipole aerial 3 1/2 extra. Complete with 4 knobs walnut or ivory to choice.

£13.10.0 Carr. and Ins. 5/- Recommended Speakers 8in. 21/6, 10in. 30/-.
 As previously announced fresh supplies are now being received, but we regret some slight delay may be experienced in fulfilling orders for this popular item.

New and Guaranteed VALVES—Reduced Prices			
IR3, IS5	7/6	DK92	9/6
IT4	8/6	EC85	11/6
3S4, 3V4	7/6	ECF80	9/6
6Z4	9/-	ECL80	10/8
6K7	5/6	ECL82	10/8
6K8	7/6	EF80	8/-
6K7	7/6	EF86	12/6
6V6	8/6	EF91	8/-
DAF96	9/-	EL84	8/6
DF96	9/-	EM81	9/6
DK96	9/-	EY51	9/6
DL96	9/-	EY86	10/-
		E280	7/6
		MU14	9/-
		PC84	9/6
		PCF90	9/6
		PLL83	12/6
		PL81	12/6
		PL82	9/6
		PL83	10/8
		PY80	7/6
		PY82	7/6
		PY39	18/6
		U25	12/6

SPECIAL PRICE PER SET
 IR3, IT4, IS5, 3S4 or 3V4 25/-
 DK96, DF96, DAF96, DL96 35/-
 6K9, 6K7, 6K7, 6V6, 5Z4 or 6X5 32/6

TRANSISTORS—BVA 1st GRADE—NEW Reduced Price
 MAZDA: XA101 14/6, XA102 16/6, XA103 15/-, XA104 18/-, XB102 10/-, XC101 10/6.
 MULLARD: OC70 9/6, OC71 12/6, OC72 15/-, OC44 23/6, OC45 21/-, OC18 49/6.

G.E.C.: GET114 9/6, GET10 12/6, ditto matched pairs 25/-.

NEWMARKET: "Goldtop" V15/10P 15/-.

GERMANIUM DIODES: OA70 2/9, OA81 3/6.

RECORD PLAYER CABINETS

Contemporary styled, rexine covered cabinet 16 x 10 x 10 in. £3.3.0 Carr. and Ins. 3/6
 with wine and cream, or mottled red with white polka dot. Size 18 1/2 x 15 1/2 x ht. 8 1/2 in., fitted with all accessories, including baffle board and anodised metal fret. Space available for all modern amplifiers and autochangers, etc. Uncut record player mounting board 14 x 13in. supplied.



2-VALVE AMPLIFIER MK. 2.
 Latest developed circuit giving a higher fidelity response and greater output (2-3 watts) using twin stage valves ECL82 and neg. feedback Tone Control. Complete with knobs, etc., wired and tested ready to fit in above cabinet.

ONLY £2.17.6 P. & P. 1/-.
 6in. speaker and matching transformer. 22/- P. & P. 1/9.

VOLUME CONTROLS
 5k ohms—2 Megohms. All tone spindles. Morganite Midget type, 1 1/2 in. diameter. Guar. 1 year. Log of Lin. Ratios. Lens Sw. 3/- D.P. 8/-, 4/9. Twin Stereo Controls—Log or Lin. Lens Sw. 6/6. D.P. Sw. 8/6.

CONDENSERS.—Silver mica. All prel. values. 2 pl. to 1,000 pl., 6d. each. Ditto. ceramic 9d. each. Tubulars 450 v. T.C.C. etc., .001 mfd., .01 and 1/250 v. .9d. each. .02-1/500 v. 1/- each. .25 Hunta. 1/6. .5 T.C.C., 1/8, .001 8kV., 5/6, .001 20 kv., 9/6.
RESISTORS.—FULL RANGE 10 ohms—10 megohms 20% 1/2 w. and 1 w. 8d., 1 w. 5d. (Midget type modern rating), 1 w., 6d., 2 w., 6d., 10% E1-STAB., 1 w., 5d., 4 w., 7d., 5% 1/2 w. 9d., 1% E1-STAB., 1 w., 1/8 10-100 ohms 2/-.

BARGAINS GARRARD PLAYER UNITS
SINGLE PLAYERS: Model 48P £8.17.6. Carr. 3/6.
 3/6. Model TA Mk. 2, £7.19.6. Carr. 3/6.
Most 41/6 41S. Carr. 3/6
AUTOCHANGERS: Model KC210, with plug-in GC8 head, 10 ana. Carr. 4/6. Latest release Transcription Unit Model "A". Autochanger. £18.18.6 Carr. and Ins. 5/-.

RE-GUNNED TV TUBES
 New reduced prices
 ... and now 12 months' guarantee!
 All tubes rebuilt with new heater, cathode and gun assembly—reconditioned virtually as new.
 12in. £5, 14in. £5.10, 17in. £6, etc.
 10/- part exchange allowance on old tube
 Carr. and Ins. 10/-. Compre hensive stocks—quick delivery.

TRANSISTOR (ONE-WATT) AMPLIFIER 6 v. operated
 Latest Push-Pull, 4 Transistor circuit giving full 1 watt Output into standard 8 ohms speaker. Good sensitivity and improved freq. response. Neg. feedback. Var. Tone and Volume Controls. Chassis size 6 1/2 in. x 3 1/2 in. x 1 1/2 in. Current consumption 10 mA quiescent—250 mA at 1 watt.
COMPLETE KIT—now ONLY 79/6. Carr. 2/6.
 7in. x 4in. matching speakers 15/6. Circuit and instruction leaflet for complete Portable Record Players 2/6, post free.
 Driver Trans. 10/6 special price per set ONLY
 O/P Trans. 10/8 59/6, carr. 2/6.
 2 GET 15's 25/- pr. 59/6, carr. 2/6.
 3 GET 114 9/6 ea.

RECORDING TAPE—SPECIAL OFFER

Manufacturers 1st grade Acetate Tape—BRAND NEW—sealed boxes.

Standard	Long/Play
5in. 800ft. .. 15/-	850ft. .. 19/6
5 1/2in. 800ft. .. 16/6	1200ft. .. 22/6
7in. 1200ft. .. 21/-	1800ft. .. 32/6

 Plastic Tape Spools
 3in., 2/9; 5in., 3/-; 5 1/2in., 3/8; 7in., 3/6

BAND 3 TV CONVERTER

All channels 7-13 (180-260 Mc/s). Mk. 2 Model. Using EC85 and EL84 valves. 18d. dial, 200-250 v. A.C. Sockets 1 1/2 in. x 4in. Simple to fit, ready to use. ONLY 79/6, P. & P. 2/0.
 I1-B3 changeover Sw. and BBC Aerial Socket fitted and wired, 8/- extra.
 Band 3 Aerials, single Dipole with 4 yds. cable, 1 1/8", 3 Element Beam, 25/-, 5 Element, 32/6, etc. I1-B3 Crossover Unit, 7/6.

COAX 80 OHM CABLE
 Stand. 1/2 in. diameter Low-loss Semi Air-Spaced Aerials. A high-grade Coax at NEW REDUCED PRICES. NOW ONLY 6d. per yard. Special prices—quantity lengths.
 20 yds. 9/-, Carr. 1/6. Coax Plugs 1/-.
 40 yds. 17/6, Carr. 3/6. Sockets 1 1/2. Couplers 1/8.
 60 yds. 25/-, Carr. 3/6. Cable end Sockets 1/8. Outlet Boxes 4/6.

CR7 HTR ISOLATION TRANSFORMERS

New improved types, low capacity, small size and tag terminated. Prim. AC 200/250V. Secondaries Nil, +25%, +50% BOOST for 2V, 4V, 6.3V, 13V or 13V Tubes. 18/6 each. P. & P. 1/6.

SENTERCEL RECTIFIERS, E.H.T. Type Fly-back Voltages. K5/25 2 kV., 17/-; K3/40 3.2 kV. 8/9; K3/45 3.6 kV., 7/9; K3/50 4 kV., 7/9; K3/100 9 kV., 13/6. MAINS TFPES—RM1, 136 v. 60mA, 4/8; RM2, 125 v. 100 mA, 5/8; RM3, 125 v. 120 mA, 7/8; RM4, 250 v. 250 mA, 16/-; RM4B type 270 mA, 17/6; RM5, 250 v. 300 mA, 21/- etc.

SPEAKER FRET—Expanded Bronze anodised metal 8 x 8in., 2/8; 12 x 8in., 3/6; 12 x 12in., 4/6; 12 x 15in., 8/6; 24 x 12in., 9/- etc.

TYGAN FRET (Murphy pattern) 12 x 12in., 2/6; 12 x 18in., 3/6; 12 x 24in., 4/6, etc.

SPEAKERS P.M. 8 ohms 2 1/2in. Blac. 17/6, 3 1/2in. Goodmans, 18/6, 5 1/2in. B. & A. 3in. Selection, 18/6; 7 x 4in. Goodmans, 18/6, 8in. Roia, 20/-, 8in. Special Cone G'mans, 21/6. 10in. B. & A., 25/-.

JASON FM TUNER UNITS (87-105 Mc/s)

Designer-approved kits of parts for these quality and highly popular tuners available as follows:
STANDARD MODEL (FM-T)—as previously extensively advertised. COMPLETE KIT, 5 gns., P. & P. 2/6. Set of 4 spec. valves. 20/-, post free.
LATEST MODEL (FM-T)—attractively presented shelf mounting unit in enclosed Metal Cabinet with Built-in Power Supply. COMPLETE KIT, 27. P. & P. 3/6. Set of 5 spec. valves, 27/6.
LATEST MODEL (JTB). Self-powered Switch tuned Band 1-2.5 AM/FM Unit 5 pre-set stations AFC and AGC circuits. Complete kit, including ready-built Tuner Tube. £12.19.6, P. & P. 3/6.
NEW JASON COMPREHENSIVE F.M. HANDBOOK, 2/6, post free. 48-hr. Alignment Service. 7/6. P. & P. 3/6.

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



RADIO COMPONENT SPECIALISTS
 70 Brigstock Road, Thornton Heath, Surrey

Terms. C.W.O. or C.O.D. post and packing up to 7d. 7d. 1/6; 1/1 3/6. 1/6; 5/6. 2/-; 10/6. 2/9; 15/6. 3/6.

Open: THO 2188. Hours 9 a.m.—6 p.m. 1 p.m. Wed 5 p.m. Open all day Saturday. By Thornton Heath Station



THE "STUDIO TWIN"

Listed 40 gns. NOW ONLY 29 gns.

This quality Twin Speaker Tape Recorder at this amazing reduced price. Two hours' playing time on 7in. 1,200ft. Standard reels. Latest Studio 3-speed Deck. 1½, 3½, 7½ I.P.S. Includes Twin Tracks Reverse counter, Pause control and magic eye recording indicator. Volume and tone control, superimposed switch. Two 7in. x 4in. matched speakers. 3 watts output. Attractive design cabinet in fibre. Size 19in. x 13in. x 8in. Ins. and Carr. 12/6.
EXTRAS: Microphone 27/6. Tape 25/-.



DE LUXE TAPE RECORDER CABINET only

29/9

Beautifully made Tape

Recording Cabinet. Size 13 x 10½ x 7in. Covered in two tone rexine Cloth. Stylish design. Carrying handle and detachable lid with lock and key. Easily adapted to Record Player Cabinet. Exceptional value at this very low price. Post and Packing 4/6.

RECORD PLAYER CABINET RP2

59/6

Made by a famous manufacturer. In polka dot cloth with clipped lid and carrying handle. Size 16 x 14½ x 8½in. deep. Carr. and Ins. 4/6. Will take B.S.R. Monarch 4-speed Auto-changer £6.19.6. 7 x 4in. Elliptical Speaker 15/9 and our Mk. D.2A Portable Amplifier 79/6.



B.S.R. MONARCH,
4-speed Autochanger
£6.19.6

T.U.9 B.S.R., 4-speed
single player ... 99/6

Collare CONQUEST,
4-speed Autochanger
£7.19.6

DE LUXE TAPE RECORDER List price 31 gns. OUR PRICE **22 gns.**

Beautifully styled rexine covered cabinet in Red/Beige, with carrying handle. Size: 14½ x 13 x 9½in. Storage comp. in lid for tapes and mike. Playing time 1½hrs. Speed 3½in. per second. Compact set using latest 5 valve amplifier with 4-stage amplification and separate valve for Bias osc. 2 controls. Contains 7 x 4in. elliptical speaker and incorporating B.S.R. Tape Deck. 5½in. standard tape, 3 months' guarantee. Ins. & Carr. 12/6. Deposit £8 plus ins. & Carr. and 10 payments of 17/-.

17" TV's 17½ gns.

MODERN CHASSIS, Modified
Complete 17in. TUBE. VALVES—SPEAKER—KNOBS. Tuned ITV/BBC. Ready to use, fully guaranteed, TUBE 12 months. CHASSIS and VALVES 3 months. Cabinet to fit £1.11.6 if ordered with set. Salvage. Set—tube—cabinet despatched separately. Carr. and ins. on set £1.5.0; on Cabinet 12/6.



12 months' Guarantee
Terms available over
10 weeks
Carr. & Ins. 15/6

REPLACEMENT, REBUILT TV TUBES

21" TUBE	£8.10.0	£2	Allowed on old Tube
17" TUBE	£7.10.0		
12" 14" 15" TUBES	£5.10.0	£1	Allowed on old Tube

DUKE & CO. (London) Ltd., 621/3 Romford Road, Manor Park, E.12. 1LF. 6001/3.

TELEVISION SPARES

We can supply from stock almost any component from a Resistor to a Tube.

NEW OR USED

Line Output Transformers from 25/-, S/Coils from 15/-, Line or Frame Blocking Osc. Transformers from 3/8. Frame Output Transformers from 10/-. 12 Channel Turret Tuners from 40/-. 10-16-38 Mc/s. State which. Ion Traps, 2/8 each. Resistors, mixed (25), 2/8. Speakers for TV, 7/6. Cabinets, New or Secondhand, from 10/-.

Spares for:

PYE V/4, V/7, FV1, etc.
 EKCO 141, 161, 221, 231, 283, etc.
 FERGUSON 388, 388, 392/4/8/8, 304/8, 306/8, etc.
 H.M.V. 1807 to 1840 series, etc.
 MURPHY 214, 200, 240, 250, etc.

These are only examples of stocks, we have spares for nearly any make and model.

FIRST-CLASS PICTURE TUBES (used)
 9in. and 12in., 35/-; 14in., £2.10.0; 17in., £3.0.0.
7-DAY MONEY BACK GUARANTEE if not perfectly satisfied.

REGUNNED TUBES:

12in., £4.0.0; 14in., £4.10.0; 17in., £5.0.0.
 12 months' guarantee.

SOME OF OUR VALVES, e.g.

EBF80	6/-	EF80	4/-	PCC84	7/-	PL81	8/8
ECC81	5/-	EF91	3/8	PCF80	7/-	PY81	6/8
ECL80	7/-	PY51	9/-	PCL83	11/-	U25	12/6

Send 3d. for lists.

CALL, WRITE OR PHONE

D and B TELEVISION

131A, Kingston Road, London, S.W.19.

CHE. 3955.

S.A.E. all enquiries. Terms: C.W.O. or C.O.D. 2/8 extra. Postage on Valves 6d. each. Picture Tubes 12/6 inc. Insurance. Enquiries answered and orders despatched by return post. Advice and technical information free—we are always pleased to help.



TOP QUALITY AT LOWEST PRICES
with 12 months' Guarantee.

VIRTUALLY AS NEW

COMPLETELY REBUILT TUBES

TERMS—C.W.O. MULLARD - MAZDA AND HARD GLASS TYPES

12-14 inch	£6. 0.0	} ELECTROSTATIC TYPES 10/- EXTRA.
15-17 inch	£6.10.0	
21 inch	£9. 0.0	

TRADE ENQUIRIES WELCOMED

PRICES SUBJECT TO RETURN OF OLD TUBE

Pass. Train, Carr. & Ins.-To You-& return of old tube, in special containers. All covered for 20/- extra anywhere in U.K. or N. Ireland. BRAND NEW TUBES WITH 2 YEARS' GUARANTEE—NOW AVAILABLE (i.e. 17 inch at £10.). From:—

SABRINA C. R. TUBE CO.
 Electron Works, North Bar,
 BANBURY - OXON

Phone: 2390.

PHONES FOR TV RECEIVERS

FOR PERSONAL LISTENING AND THE DEAF

By F. G. Rayer

IT is not always realised that headphones can be worked from a TV receiver, and that this can be of great convenience for individual listening, or for a deaf person. If the receiver speaker is switched off (as it can be) a viewer can use the phones without any danger of disturbing others, and this arrangement is occasionally handy.

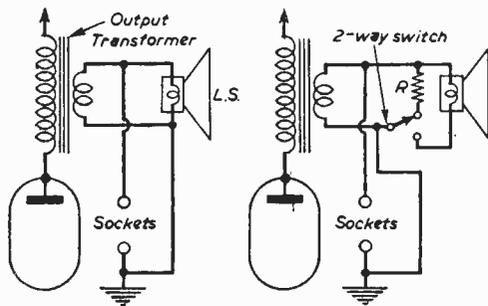


Fig. 1.—Connections for a receiver with an earthed chassis.

Advantages

In the case of a deaf person, when phones are connected, there is no longer any need to adjust the receiver volume control to a level which is unpleasant for other people in the room nor need for the deaf individual to sit near the receiver. This is sometimes done in an attempt to follow the programme, but is not a good viewing position. A deaf aid can, of course, be helpful, but it is not always easy to situate this so that it picks up a good signal from the receiver loudspeaker and yet allows the deaf person to be at the best viewing distance.

To overcome these difficulties, phones may be connected to the output circuit, with their own volume control. The exact manner in which hearing has deteriorated varies with different people, and this can have a bearing upon the circuit which is found best. Frequently, however, the maximum reduction in hearing is in the top register, and a simple condenser coupling circuit will allow considerable top boost to be made available.

Output Sockets

Sockets are provided so that the phone circuit can be plugged in. If the receiver speaker is always to be left working when the phones are in use, no changes will have to be made except for this socket circuit. But if a speaker silencing switch is required, this will have to be fitted at a convenient point at the back of the cabinet.

It is essential that the headphone circuit is isolated from receiver high tension and mains voltages. If the receiver is of A.C. type, with all circuits isolated from the mains by means of a transformer, and an earthed chassis, then it is only necessary to connect the sockets to the output transformer secondary, as in Fig. 1. One side of the phone circuit is then earthed.

If the receiver speaker is to be silenced, it is often enough to include an on/off switch in one lead from output transformer secondary to speaker speech coil. But if the circuit has a powerful output stage, or takes negative feedback from the secondary, a 2-way switch can be used instead, as also shown in Fig. 1. The resistor R is somewhat higher in value than the speech coil impedance of the speaker—say 5Ω , for a $2/3\Omega$ unit. For normal purposes with the speaker silenced it is unlikely that very much power will be dissipated in this resistor, so a 1W to 5W component may be fitted.

Isolation

With A.C./D.C. or series-heater circuits, it is not safe to assume that the output transformer secondary is isolated, because it may be wired to chassis, or to a negative feedback circuit. Because of this, an isolating transformer can best be added, as in Fig. 2. The primary of this is returned to the chassis, and is therefore alive to the mains. The secondary is isolated, however, and one secondary lead can be connected to earth (not the receiver chassis, with this type of set).

The transformer is a small output coupling type, with a fairly high primary impedance. The condenser C is a high voltage paper component, and $0.1\mu\text{F}$ will usually be suitable. This can be modified if desired, as explained later.

Phone Control Unit

A length of twin flex is run from the receiver sockets to a small box or case, which contains a volume control for the person using the phones. Some surplus phones of very low impedance are encountered, and these may be operated directly from the low impedance output sockets, fitted as in Figs. 1 and 2. The matching will not usually be correct, but can be near enough for satisfactory quality.

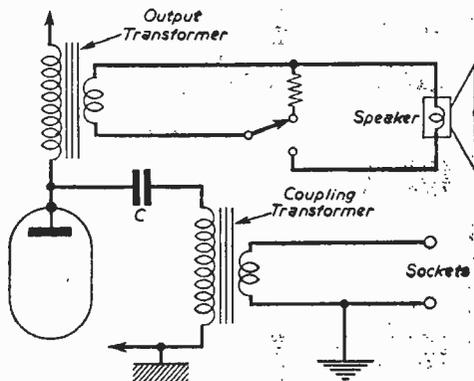


Fig. 2.—Isolating circuit.

When this method of operation is to be adopted, the circuit in Fig. 3 will be satisfactory. R1 is a volume limiting resistor, because the power required by the phones will usually be relatively small. R2 is for volume control purposes. For a low impedance circuit, R2 can usually be some 10. to 50 Ω or so, without very much influencing results. R1 can, of course, be omitted. But it is

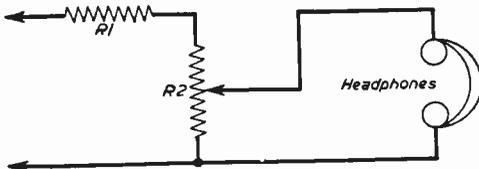


Fig. 3.—Low impedance circuit with volume control.

wise to adjust speaker volume to a normal level, then employ for R1 a resistor which will avoid distress to the person using the phones, even with the volume control near maximum.

If medium or high impedance phones are to be used, the volume obtained from them will be small with a low impedance output circuit. It is possible to feed such phones from isolating condensers connected to the primary of the receiver output transformer, but a fault can then result in a high voltage reaching the phones. For this reason, a small output transformer is best used, wired as shown in Fig. 4. A moderate ratio, such as would be fitted to couple a triode output valve to a speaker, will be satisfactory.

Resistor R1 is again so chosen that careless adjustment of the phone unit volume control will not distress the listener. R2 should be of fairly high value, and 10,000 Ω will generally serve. A small 0.1 μ F condenser can be used for C.

Treble Boost

When it is necessary to accentuate the treble, the condenser in Figs. 2 or 4 can be reduced in value. Quite small condensers can be fitted, if necessary. Readjustment of the volume control will be needed, and this will give a relative

increase in the power of the higher frequencies. If the phones are only to be used for personal listening by people having normal hearing, the coupling condenser should be of reasonably large value. When a deaf person is using the phones, while other viewers listen with the speaker, the receiver volume control should be adjusted first. The deaf person should then set the phone volume at the required level.

Many ex-service headsets can handle quite a powerful signal. This is not so, however, with some types of diaphragm phones which are produced for crystal sets, 1-valvers and similar purposes. Attempts to work the phones at high volume will then cause a rattle, owing to the diaphragm striking the magnet poles. If this arises, the cap should be unscrewed, and the diaphragm lifted off. By drawing a pencil line round the diaphragm, a narrow washer of the same

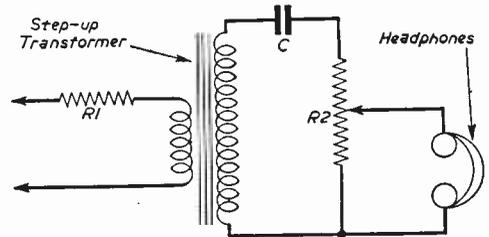


Fig. 4.—Impedance matching and top-boost circuit.

diameter can be cut from stout paper or very thin card. One such washer is then placed under each diaphragm, to increase the clearance between diaphragm and magnet poles.

A spare multi-ratio output transformer will be handy for coupling purposes, as it is then possible to select tappings to match phones of various impedances.

NEW BBC TRANSMITTING STATION AT DRYDEN HILL

THE BBC has chosen a site at Dryden Hill, near Galashiels, for its new station in South-East Scotland. The site has been approved by the Postmaster General and legal negotiations for its acquisition are in progress. The station will transmit BBC Television, and also the Scottish Home Service, the Light Programme, and the Third Programme, with Network Three, on VHF. The station will be provided with a 750ft. mast, and will serve an area with a population of nearly 100,000 people, some 70,000 of whom have not hitherto been within range of BBC Television or of the VHF sound services. This area will extend to Lauder, Duns, Selkirk, Hawick, Jedburgh, and Coldstream.

The station will work in Channel 1 with vertical polarization.

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

FRIDAY, JANUARY 13th, 1961

A FILM SHOW

(in collaboration with Mulard Ltd.)

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

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

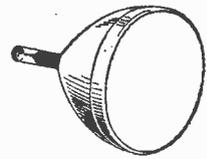
The films to be shown will be announced later, but, as in previous years, the programme will be arranged to appeal to all who are interested in radio.

The demand for tickets is great; order yours NOW.

LASKY'S RADIO

LARGE STOCKS OF 12-CHANNEL TURRET TUNERS

New and unused. Large selection, many by famous makers such as Cvydon, Erayhead, Plessey, Coscor, etc. Let us quote for the model you require. Examples:-
 33-38 Mc/s. 37/6
 6-9 Mc/s. 59/6
 9-14 Mc/s. 59/6
 14-25 Mc/s. 59/6



MAKER'S SURPLUS COMPONENT BARGAINS

- WIDE ANGLE 38 mm.**
 Line E.H.T. Trans. Ferro-cube core, 16 kv. 19/6
 Scanning Coils, Low imp. line and frame. 19/6
 Ferro-cube cored Scanning Coils and Line Output Trans., 10-15 kv. EY51 winding Line Trans. with width and linearity controls, circuit dia., pair. 50/-
 Frame Output Transformer Frame or line block osc. Transformer 6/6
 Focus Magnets Ferro-cube P.M. Focus Magnets, Iron Cored 12/6
 Duomag Focallisers 15/-
 300 mA Smoothing Chokes 10/6
- STANDARD 35 mm.**
 Line Output Transformers 6.9 kv. E.H.T. and 6.3 v. winding, Ferro-cube. 17/6
 Scanning Coils, Low imp. line and frame. 7/6
 Frame or line blocking oscillator Transformer.. 4/6
 Frame Output Transformer Focus Magnets: Without Vernier 9/6 With Vernier 12/6
 200 mA Smoothing Chokes 7/6



SPECIAL OFFER! MULTI-TEST METER FAMOUS MAKE NEW AND UNUSED

A.N.27. An accurate, highly sensitive 27-RANGE Test Meter, 5,000 ohms per volt A.C. and D.C. in black leatherette-covered wood case, 7 1/2 x 9 1/2 x 3 1/2 in. deep, with carrying handle and ample room for small tools as well as leads. LIST 15 gns. Lasky's Price **£9.19.6**
 Post 5/- LEADS, 7/6 extra.

SEND FOR LASKY'S COMPONENTS CATALOGUE OVER 100 ILLUSTRATED PAGES, SIZE 8 x 5 1/2 in. Price 2/-. Post 6d.
 Latest 12-page BARGAIN BULLETIN included free.

CO-AXIAL CABLE, 80 ohms Impedance, 9d. per yard, 12 yards or more, 7fd. per yard. Post extra.

20,000 VALVES in stock including new and manufacturers' surplus, also imported Valves. Send for our new list and save money. Large stocks of TRANSISTOR RS.

C. R. TUBES NEW, UNUSED AND GUARANTEED

FERRANTI 12in., 112/44, 4 volt heater.
LASKY'S PRICE 49/6
 Carr. & Insur. 12/6.
 Also 9in. T9/3, at same price.

FERRANTI 17in. type TR17/10, 6.3 v., 0.3 amp. heater.
LASKY'S PRICE £6.19.6
 Carr. & Insur. 12/6

16in. METAL CONE, famous make, type T901/A, 6.3v., 0.3 amp. heater. **£6.9.6** Carr. & Insur. 12/6

RE-GUNNED C.R. TUBES GUARANTEED FOR 12 MONTHS

Type	Price	Carr.	Ins.
12in. round	£8 10 0		12/6
14in. rect.	£6 10 0		12/6
15in. & 16in. round	£6 19 0		12/6
17in. rect.	£6 19 0		12/6
21in. rect.	£7 19 0		21/-

LASKY'S (HARROW ROAD) LTD.

42, TOTTENHAM COURT ROAD, W.1. Telephone: MUSEum 2606.
 207 EDGWARE ROAD, LONDON, W.2. PAdDington 3271/2.
 Open All Day Saturday. Early Closing, Thurs. Mail Orders to Dept. P.T., Edgware Road.

CLARKSON'S TUBE CHANGE

120 COMMERCIAL ROAD, LEEDS 5

We are now able to offer SUPER SCREEN TV TUBES with 12 months' guarantee at the keenest exchange price ever.

Example:

Tubes all types	Cash allowance on return of old tube	Actual Cost of Tube
12" - 14" £5	15/-	£4. 5. 0
15" - 17" £6	25/-	£4. 15. 0
21" £8	30/-	£6. 10. 0

Carriage and Insurance 10/- extra

These tubes are COMPLETELY REBUILT by experts, with the most up-to-date electronic equipment, and are fitted with the famous American Superior Electron Gun. Many thousands of these tubes are in service today. Our factory is open to inspection to readers of "Practical TV". Technical advice and queries are answered free of obligation. All tubes are dispatched with adhesive paper and return labels. Cash allowance is sent on receipt of old tube.

RST

MAIL ORDER DEPARTMENT
 211 Streatham Road, Mitcham, Surrey
 ALL VALVES LISTED ARE NEW STOCK
 • Terms C.W.O. or C.O.D. Postage 3d. per valve.
 MITCHAM 6201

AZ31 15/8	EF92 5/-	UY85 7/8	6K8G 7/6
B65 9/6	EL42 10/-	V24B 17/6	6K8GT 7/6
DAF91 7/6	EL84 7/-	W81M 5/8	6L1 12/6
DAF96 9/6	EL90 9/6	W142 9/-	6L1 15/6
DF91 4/-	EM80 10/-	W179 7/6	6L6G 7/6
DH719 7/6	EM81 10/-	W727 7/8	6L18 12/6
DK91 9/-	EY81 10/6	X78 21/-	6L19 21/-
EABC80 9/6	EY84 10/6	X79 21/-	6N7G/GT 7/6
EAF42 10/-	EY86 9/6	Z21 12/6	6SL7GT 6/8
EB91 5/-	EY91 8/-	Z77 4/9	6SN7GT 6/8
EBC41 9/6	EZ35 7/6	PL36 15/-	6V8G 5/6
EBF80 9/6	EZ40 7/6	PL81 14/9	6V8GT 5/-
EBF89 9/6	EZ41 7/6	PL82 8/-	6X5GT 5/6
EC91 9/6	EZ80 7/6	PL83 10/6	6Y4G 4/6
ECC33 5/-	EZ81 7/6	PY80 8/-	6X5GT 5/6
ECC81 8/-	FC2 21/-	PY81 7/8	5Y3GT 8/6
ECC83 9/6	FC4 17/6	PY82 8/6	5Z4G 10/-
ECC84 9/6	FC13 17/6	PY83 8/6	6A8GT 7/6
ECC85 9/6	FC13C 21/-	R10 21/-	6AL5 10/-
ECCF80 9/6	G232 11/8	R19 19/6	6AL6 9/-
ECF82 12/6	H83 9/6	TDD4 17/6	6AM6 4/-
ECH35 9/6	H8C90 9/6	U142 8/-	6AN5 7/8
ECH42 10/-	HL82 8/6	U147 7/-	6AQ5 8/3
ECH81 9/6	HL133D 9/6	U153 9/6	6BA6 7/6
ECL80 9/6	KT33C 10/-	UABC80 9/6	6BE6 7/6
ECL82 9/6	KT86 17/6	UA42 8/-	6BJ6 7/6
EF37A 8/6	LZ319 12/6	UBC41 9/6	6BR7 15/-
EF40 15/-	MKT3(5) 7/6	UBF90 9/6	6BW8 8/6
EF41 9/3	ML4 17/6	UCH42 8/6	6BW7 6/6
EF42 10/8	MSP4 17/6	UCH81 9/-	6BX5 9/-
EF50(A) 4/6	MU14 9/6	UCB81 9/-	6D2 15/-
EF90 7/6	MX40 17/6	UCL83 9/6	6E1 5/6
EF85 6/6	N142 9/6	UF41 8/-	6F12 4/8
EF88 11/-	N153 11/8	UF88 8/6	6F13 17/6
EF89 10/-	PCC84 9/6	UL41 9/6	6J4G 12/6
EF91 4/9	PCF80 10/6	UL84 9/6	6J7GT 9/6
		UY41 7/6	6K7 4/8
			6K7G 3/-
			6K7GT 7/6
			6L3 9/6
			6L7GT 9/6
			35Z4GT 9/6
			50L8GT 7/6
			813 9/-
			50/-

SEND FOR LISTS.
 Quotations given for any types not listed. Obsolete and old types a speciality.

BRAND NEW TUBES

12 months' guarantee

TOP CLASS MAKE

CARR. & INSURANCE PAID

12" MW 31-74 etc. **£5.5.0**

14" MW 36-24 etc. **£6.6.0**

17" MW 43-64; 43-69
CRM 171, 172 **£7.0.0**

NEW, BOXED, ex Factory

RESISTORS—NEW, 1/4w-3w, mixed, 50 for 4/-, 100 for 7/6, post 1/-.
WELWYN 5w, w/w precis, ceramic 5K, 1/3 each (12/- doz.), post 6d.

SUPERB CABY MULTI-METERS. Inclusive of Test prods. Batteries, Instrn. Book.

MODEL A-10, 2K ohms/v. 10 ranges of volts, current, resistance. **£4.15.0** post 2/6.

MODEL B-29, 10K ohms/v. on .5v, and 2.5v. 4K ohms/v. on (10 v. to 1000 v.) 19 ranges. **£6.5.0** post 2/6.

RECORDING TAPES

5in. 600ft. .. 18/- 5in. 900ft. .. 18/8
5 1/2in. 1200ft. .. 23/6 7in. 1200ft. .. 25/-
7in. 1200ft. .. 35/-

"Instant" Bulk Eraser and Head
Defuzzer, 27/6.
Above items, post 1/6.

TRADE ENQUIRIES INVITED

LINE OUTPUT TRANSFORMERS

Direct Replacements for 500 sets.

Baird, T29, T163	53/-
T184, T167, T172, 2014, T172 ..	60/-
Bush, TV 11A, B; 12A, B; TVF 12A ..	45/-
TUG 12A, B; TRG 12A, B ..	60/-
TV12AM; TV22, 24; TRG24, TUG 24	58/-
Cossor, 930, 931, 933, 934, 948, etc. ..	58/-
Ekco, TS146; TS113-114; T161, 164; T222, 231; TSC311, etc. ..	47/8
Ferguson, 841, 2, 3; 941 to 945 ..	55/-
990T-998T; 103-145T; 203-246T ..	66/8
Ferranti, 14T3, 14T4, 17K3, 17T3 ..	45/-
14T2, T1205, T1215, T1225, T1325, T1435, T1415, T1425, T1505, T1825 ..	65/-
G.E.C. and H.M.V. mostly 55/- to	80/-
Invicta, T101-104; T108-110 ..	60/-
T114-126; T133-142 ..	60/-
Murphy, V114C, V116C, V118C ..	45/-
V120C, V180, V178, V200, V202C ..	57/8
Philips, 114 UF/UM, 1115 U, 1437 U, 1446 U, 1726 U, 1746 U, 1747 U ..	85/-
383A, 463A, 563A, 663A ..	80/-
Pye, LV30, 16T, CS17, etc. ..	60/-
CTM4, V4, VT4; V7, VT7; VT17 ..	52/6

Add 2/6 post. S.A.E. with enquiries.

SPECIAL!

NEW L.O.P.T. COMPLETE

with:

- Linearity and width controls.
- EY86 base and top caps.
- Valve connectors.
- E.H.T. leads.
- Circuit diagram.

BEAUTIFULLY MADE

ONLY **£1**

post 2s. 6d.

IS IT THE L.O.P.T. ?

Be SURE with the SKANTEST. The most compact low-priced line output and time base component shorting turn tester. Will indicate even one shorting turn. **£7.10.0.** Carriage 5/-.

COAX LOW-LOSS CREAM/BROWN

50 yds. 22/6, carr. 3/-; 100 yds. 42/6, carr. 6/-

EAGLE MULTI-PURPOSE VALVE FILAMENT TESTER VT41

Checks ● Valves, fuses
● Cct. Continuity
● Pilot lamps
● 7, 9 pin straighteners
● Battery test
COMPLETE with batteries, instrns. **30/-** Carr. 2/6.

RADAR KILOVOLTAGE. A servicing "must". Checks accurately and safely. actual E.H.T. volts at C.R.T., E.H.T. rectr., etc. **£3.17.6.** carr. 2/6.

MAINS TRANSFORMERS SPECIAL OFFER. 350-0-350 v. 80 ma. 6.3 v. at 3a. 5 v. at 2 a. Half-shrouded, drop-through. Ex new equipment. By well-known manufacturer. WHILE THEY LAST **ONLY 13/6,** post 1/6.

PLESSEY O.P. transformers—standard matching for 3-5 ohm spkr. Only **2/9,** p. 1/-

CRYSTAL MICROPHONES. 3ix2ix1 1/2in. For tape recorders, public address, etc. Cream plastic casing—gold metal grille. Boxed, with long grey screened lead. **BARGAIN 25/-,** post 1/-.

S.A.E. with enquiries please
5 Westward Way
Preston Road, Harrow, Middx.

WESTWAY RADIO

**"Better get the best—
it costs less"**

VIDIO

Offers you the finest rebuilding service available today. Each tube is completely rescreened aluminised and fitted with a new Gun Unit. Available now — for IMMEDIATE DELIVERY.

12"—£5, 14"—15"—17"—
£5. 10, 21"—£8.

VIDIO'S SECOND CHOICE
—GUN UNITS.

12"—£4. 10, 14"—£4. 15,
15"—17" £5, 21"—£7.

ALL TUBES GUARAN-
TEED FOR ONE YEAR.

Get full details now from.

VIDIO REPLACEMENTS LTD.

Hales St., Deptford High St.

London S.E.8. Tel: TID 4506



SPECIAL OFFER !

TO THE FIRST HUNDRED CUSTOMERS

COSSOR 10" TUBES

Brand New NOT A Regun

108K 15/- plus 6/- carr & ins

75K 15/- plus 6/- carr & ins

12 MONTHS' GUARANTEE

ION TRAP MAGNETS

Suitable for all bent gun type tubes

2/9 EACH Plus 6d post & pack

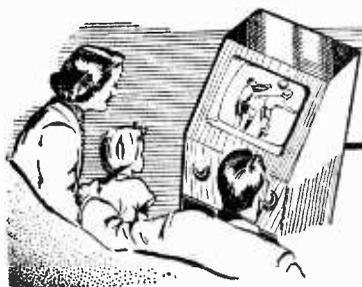
HARVERSON SURPLUS

LIMITED

83 HIGH STREET

MERTON S.W.19

CHERRYWOOD 3985/6/7



UNDERNEATH THE DIPOLE

TELEVISION PICK-UPS AND REFLECTIONS

By Iconos

SOUNDING brass and tinkling cymbals! How realistically they are reproduced on modern V.H.F. hi-fi sound radio—and especially on the latest stereophonic radiograms. Memories of the Radio Show are fading now, but recent examinations I have made of some of the very latest commercial television sets have reminded me of the enormous difference in the sound quality when compared with the best of the hi-fi receivers.

Lo-fi Sound

THE shape of the modern TV set allows little space for a good loudspeaker and baffle, and in any case the loudspeaker is usually relegated to the side or back of the set, thus effectively losing the high harmonics and "top" that give sound presence and character.

What is to be done about it? Nothing, I regret to say. For in the majority of cases, it is the woman of the family who chooses the make of television set at the shop and the choice is dependent upon her existing furniture styles in the house, the wallpaper or other local colour. Some modern receivers have spikes on their legs as injurious to the carpets as stiletto heels. With a resigned expression on his face, a television set designer said to me, "I don't like the trends, but what can I do? I'm restricted by the credit squeeze and slimline fashions; outer styling is now more important than inner engineering—and I have to sell my sets to eat, so I pander to the ladies."

I am, of course, exaggerating to make my point, but not grossly exaggerating. However, two or three makers have lately achieved an admirable compromise by producing rather wide-fronted slimline models with forward directed loudspeakers on each

side of the TV picture combined with cabinet styling that harmonises with almost any kind of furnishings. This is a remarkable achievement!

Piped Television

POOR sound on television is not only heard from some modern TV sets. It is very often heard on the sets provided by wired television companies in some provincial towns. These services are a boon for those viewers who live in towns which are badly screened from their local BBC and ITA transmitters. In some cases, even the highest aerials will not give an interference-free picture from either transmitter, whereas the piped services originate from a first-class receiver with a high aerial on high ground outside the town. Picture and sound are relayed to various parts of the town with amplifiers and repeaters at

various points. Picture quality is usually of a high order, free from car and other similar interferences, but sometimes subject to very slight ghost or reflection effects which are possibly due to local distribution line conditions. Surprisingly, the sound sometimes lacks brightness and top. The pictures of BBC and, say, two alternative ITA transmitters are often surprisingly different in strength and quality. I recently looked at a provincial wired television set in a hotel which gave the following picture results:—

1. BBC—excellent.
2. London ITA—excellent.
3. Local ITA—weak and poor.

Considering that the people in the town who use their own sets with normal aerials can receive the local regional ITA station perfectly but **not** the London ITA, the above results are sur-



Tyne Tees Television's new Remote Unit equipped with two Marconi Mark IV cameras in action at Redcar Racecourse.

prising. I would imagine that advertisers who have purchased expensive space for their commercials from the local regional ITA company must be furious.

TV Humour

It really is not very surprising that the public seem to prefer television in its lightest vein. The most popular films in the cinemas are light comedies which include a quota of slapstick such as the "Doctor" series ("Doctor At Sea", "Doctor In Love", etc.) and the "Carry-ons" ("Carry on, Constable", "Carry on, Nurse", etc.). Virtually the same formulae are used for "The Army Game", "Bootsie and Snudge", Granada's two comedy series.

It all goes to show that there is no joke like an old joke, as long as you dress it up in a new way. Granada do this very well, and a good storyline and slick direction keep the laughter going, however old the chestnuts.

My personal preference is for "goonish" humour of the type "distilled" by Peter Sellars, Harry Secombe, Valentine Dyall and the "Fred" gang. There is a touch of this type of humour in BBC's "Parade", in which Alan Melville distinguished himself recently. The pace of this show is a merry one. It is always a wonder to me how the writers and producers, not to mention the artists, can keep it up week after week in any of these comedy series.

I hear that Gracie Allen, of the Burns and Allen team, rejoices in the end of the series which has caused so much laughter week by week both here and in the U.S.A. "What a lovely rest from having to learn pages and pages of dialogue each week!" she said. It is forgotten by many that Burns and Allen toured their music hall act in Britain before the war. I remember seeing them at the Victoria Palace. They were not at the top of the bill then, but their act had the audience rolling in their seats with laughter. Their television act each week is based upon the same routines. Early episodes of "I Love Lucy", another domestic comedy series, are still being enjoyed by some of the regional stations more recently opened.

Many a humorous film series is started for TV but not many succeed in getting further than a pilot of the first episode. It is

a big gamble to assess the possible audience reactions to humour, but there are big financial rewards for those who succeed in making the grade.

Special Effects

IT only seems a few months since the special effects panel, capable of providing a variety of electronic wipes, was evolved, and yet years have passed since a BBC engineer, Dr. Spooner, first investigated the prospects of applying photographic trick effects, as used in films, to television. He spent several weeks visiting Ealing Studios and watching the travelling matte process in use on a famous film called "The Lavender Hill Mob." Alec Guinness (now Sir Alec) and the other actors, including Stanley Holloway, were unable to leave London and so other means had to be found to enable them to act in front of the authentic backgrounds. Fore-ground actors and pieces of scenery were therefore shot in the Ealing Studio and superimposed on backgrounds of the Eiffel Tower and streets of Paris. The result was most convincing and it was hard to believe that the chase down the iron stairway of the great tower was not completely shot *in situ*. Dr. Spooner then started his first experiments on inlay and overlay which resulted in the development of the electronic switch. In turn this was simplified to provide straight electronic wipes in which one scene wipes across and replaces an existing scene.

A further recent development and simplification of the special effects wipe panel was evolved by Dave Whittle, Chief Engineer of Alpha Television Studios, Birmingham, and now, various

versions of special effects panels are being supplied to the BBC and ITV Companies by Pye, Marconi, RCA, and E.M.I. The Marconi panel is the most elaborate and can deal with overlay as well as eighteen different types of wipe. These electronic tricks will become commonplace, largely replacing the cumbersome back-projection system. The only danger is that they will become over-used at the least pretext. Remember the dazzling wipes and zooms which became such boring technical clichés in film trailers announcing next week's attractions at the cinema? Let us hope the television people do not overlay this new electronic card in their hands.

Granville Theatre

AS I mentioned last month, the Granville Theatre, Fulham Broadway, has once more been opened for television but in a more elaborate way than it was four years ago and is available for hiring to any of the TV Companies. It is fitted with Pye cameras and telecine, and excellent lighting grid by Mole Richardson and all the very latest paraphernalia of the TV studios. I'm glad that the Granville is in circulation again. It has been a theatre of some kind since 1898, housing music hall, melodrama, revue and non-stop variety in turn. It was rather on the small side, seating only 777 people, but this is no disadvantage for television. The maximum audience that can now watch television shows here is about 200. Almost the entire stalls and pit have been turned into an extension of the stage and large control rooms have been fixed up in the gallery.

PRACTICAL WIRELESS

CHIEF CONTENTS OF THE DECEMBER ISSUE

Now on Sale, 1/6

A RELIABLE RADIOGRAM
CURRENT AND VOLTAGE FEEDS
A MIDGET T.R.F. RECEIVER
TWO-VALVE GENERAL PURPOSE AMPLIFIER
SIMPLE GUITAR MICROPHONE
INEXPENSIVE PRE-SET TUNING
ETCHED CIRCUIT T.R.F.
CLUB NEWS
ETC., ETC., ETC.

R.S.C. BRADFORD, LEEDS and MANCHESTER

(Leeds) Ltd.

Post Terms C.W.O. or C.O.D. No C.O.D. under £1. Postage 1/9 extra under £2. 2/9 under £5. Open to callers 9 a.m. to 6 p.m. Wednesdays until 1 p.m. S.A.E. with enquiries, please. Trade supplied.

R.S.C. TRANSFORMERS

Fully Guaranteed
Interleaved and Impregnated
Primaries 200-230-250 v 50 c/s screened
TOP SHROUDED DROP THROUGH
 250-0-250 v 70 ma, 6.3 v 2 a, 5 v 2 a .. 17/9
 350-0-350 v 80 ma, 6.3 v 2 a, 5 v 2 a .. 18/9
 250-0-250 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 23/9
 300-0-300 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 23/9
 350-0-350 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 23/9
 350-0-350 v 150 ma, 6.3 v 4 a, 5 v 3 a .. 28/9
FULLY SHROUDED UPRIGHT
 250-0-250 v 60 ma, 6.3 v 2 a, 5 v 2 a
 Midget type 21-3-31n. 17/11
 250-0-250 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 25/9
 300-0-300 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 27/9
 350-0-350 v 100 ma, 6.3 v 4 a, 5 v 3 a .. 27/9
 350-0-350 v 150 ma, 6.3 v 4 a, 5 v 3 a .. 35/9
 425-0-425 v 200 ma, 6.3 v 4 a, C.T.
 6.3 v 4 a, C.T. 5 v 3 a .. 49/9

FILAMENT TRANSFORMERS
 All with 200-250 v 50 c/s Primaries: 6.3 v 1.5 a, 5/9; 6.3 v 2 a, 7/6; 0-4-5.3 v 2 a, 7/9; 12 v 1 a, 7/11; 6.3 v 3 a, 8/11; 6.3 v 6 a, 17/8.

CHARGER TRANSFORMERS
 200-250 v 0-9-15 v 1 a, 12/9; 0-9-15 v 3 a, 16/9; 0-9-15 v 5 a, 19/9; 0-9-15 v 6 a, 23/9.

OUTPUT TRANSFORMERS
 Midget Battery Pentode 66:1 .. 3/9
 Standard Pentode 5,000 to 3 ohms .. 3/9
 Small Pentode 5,000 to 3 ohms .. 5/9
 Standard Pentode 7,600 to 3 ohms .. 6/9
 Push-Pull EL84 to 3 or 15 ohms .. 18/9
 Push-Pull 10-12 watts 6V6 to 3, 5, 8 or 15 ohms .. 19/9
SMOOTHING COKES .. 8/9
 80 ma 10 h 250 ohms .. 5/6
 60 ma 10 h 400 ohms .. 4/11

SELENIUM METAL RECTIFIERS
 Special quotes for quantities of 50 to 5,000 H.T. (H.W.)
 250 v 50 ma .. 3/11
 250 v 80 ma .. 5/11
 250 v 100 ma .. 6/11
 Contract Cooled
 250 v 80 ma .. 6/11
 250 v 75 ma .. 6/12 v 15 a .. 27/9
 F.W. (Bridge) 8/11
 24 v 15 a .. 29/9

CO-AXIAL CABLE in.
 75 ohms 14/36 .. 8d. yd.
 Twin-screened Feeder .. 11d. yd.

BATTERY SET CONVERTER KIT
 All parts for converting any normal type of Battery Receiver to A.C. mains 200-250v 50 c/s. Supplies 120 v, 90 v or 60 v at 40 ma, fully smoothed and fully smoothed L.T. of 2 v at 0.4 to 1 a. Price including wiring, 48/9. Or ready for use, 9/9 extra.

ALL DRY RECEIVER BATTERY ELIMINATOR KIT.—All parts for the construction of a unit (metal-case 5i-4i-2in.) to supply Battery Portable receivers requiring 90 v and 1.5 v. Fully smoothed. From 200-250 v 50 c/s mains. Price, inc. point-to-point wiring diagrams, 39/9. Or ready for use, 46/9.

D.C. SUPPLY KIT.—Suitable for Electric Trains. Consists of mains trans. 200-250 v 50 c.p.s. A.C. 12 v 1 a Selenium F.W. Bridge Rectifier, 2 Fuseholders, 2 Fuses, Change Direction Switch, Variable Speed Regulator. Partially drilled Steel Case, and Circuit. 33/9

AUTO (STEP UP/STEP/DOWN) TRANSFORMERS
 0-110/120—230/250 v. 50-80 watts. 11/9.
 0-110/120—200-230-250 v. 150 watts. 27/9.

TELEVISION RECTIFIERS

250 v 200 ma. Size 3 x 1 1/2ins. Brand New. 6/9.

EX-GOV'T. MAINS TRANSFORMERS
 All 200-250 v 50 c/s input.
 Removed from New ex-Gov't. units, 22/9
 270-0-275 v 100 ma, 6.3 v 2 a, 5 v 3 a .. 27/9
 350-0-350 v 160 ma, 6.3 v 5 a, 3 v 3 a .. 18/9
 350-0-350 v 100 ma, 6.3 v 2 a, 5 v 2 a .. 18/9
 0-10-25 v 24 a, .. 79/6. carr. 15/-

EX-GOV'T. SMOOTHING CHOKES.—
 60 ma 5-10 h 250 ohms .. 2/11
 80 ma 10 h 150 ohms .. 6/9
 100 ma 5 h 100 ohms Tropicalised .. 3/11
 100 ma 8-10 h 100 ohms Parmeko .. 6/9
 120 ma 12 h 100 ohms .. 8/9
 150 ma 10 h 150 ohms .. 9/9
 200 ma 3-5 h 100 ohms Parmeko .. 7/9

EX-GOV'T. CASES. Well ventilated, black crackle finish, undrilled cover. Size 14 x 10 x 9 1/2 in. HIGH. IDEAL FOR BATTERY CHARGER OR INSTRUMENT CASE, OR COVER COULD BE USED FOR AMPLIFIER. Only 9/9, plus 2/9 postage.

BATTERY CHARGERS
 For 200/250 v 50 c/s A.C. mains. 12 months guarantee. Attractive, well ventilated hammer finished cases, 6 v or 12 v, 4 amp, with meter and variable charge rate selector, as illustrated. 69/9
 Or 5/-
 200/250 v 50 c/s A.C. 5 monthly payments of 13/3. 6 v or 12 v 1 amp type. Also suitable for electric train power supply. Only 29/9 post 2/9.



FACTORY REBUILT TELEVISION TUBES

After considerable development work and extensive trials under working conditions, the manufacturer is confidently offering an

18 MONTHS' WRITTEN GUARANTEE on all tubes.

To ensure extreme reliability, not only are the best available materials used under controlled conditions, but all tubes are given

12 THOROUGH TESTS after completion of the processes.

- 12" £5.7.6.
- 14"—16" £5.10.0.
- Allowance on old tube 10/-.
- 17" £6.19.6.
- Allowance on old tube 20/-.
- 21" £8.19.6.
- Allowance on old tube 30/-.

C.W.O. or C.O.D. Carr. and Ins. 10/-

TELEVIEWER SUPPLIES

95 Caldmore Road, Walsall, Staffs.

AERIALS

- | | | |
|---------------|--------------------------------------|-----------------|
| BAND I | BAND II | BAND III |
| | Combined Arrays I and III | |
| | 1+3 Element Loft Mounting .. 38/3 | |
| | 1+5 Element Loft Mounting .. 48/9 | |
| | 1+3 Element Wall Mounting .. 45/3 | |
| | 1+5 Element Wall Mounting .. 61/- | |
| | 1+3 Element Chimney M'ting. 57/10 | |
| | 1+5 Element Chimney M'ting. 66/9 | |
| | Band I | |
| | Single Dipole Wall Mounting .. 24/7 | |
| | Single Dipole Chimney M'ting. 40/2 | |
| | X Aerial Chimney Mounting .. 62/3 | |
| | H Aerial Chimney Mounting .. 67/7 | |
| | Band III | |
| | 3 Element Yagi Wall Mounting 33/- | |
| | 6 Element Yagi Wall Mounting 43/- | |
| | 9 Element Yagi Wall Mounting 56/- | |
| | Chimney Lashing Mounting add 10/- | |
| | Double 6 Array, only with clamp 83/- | |
| | Band II | |
| | Single Dipole Wall Mounting .. 20/5 | |
| | Single Dipole Chimney M'ting. 52/4 | |
| | H Array Chimney Mounting .. 52/4 | |



- Rabbit Ears Antenna, ready to plug in. All Bands .. 21/3
- 6-inch Lashing Kit 14/8
- 7-inch Lashing Kit 14/8
- 6-inch Wall Bracket, U Bolts 7/10
- 1 to 1-inch Clamps 3/10
- 1 to 1-inch Clamps 3/10
- 1 to 2-inch Clamps, Universal 5/4
- Bracket Repair Kit, J Bolts, U Bolts, 20ft Lashings 6/-
- Wire, Thimbles, Corner Plates (Enquire)
- Insulators, All Types (Enquire)
- Co-Ax. Semi Air Spaced, 70. yd. (Enquire)
- Send 6d. for Lists. Please state Channels when ordering.
- Cash with Order. Post and Packing 3/- extra.

SATISFACTION OR MONEY BACK GUARANTEE

WALKER & SQUIRES

PINNOX STREET, TUNSTALL, STOKE-ON-TRENT
 Phone: Stoke-on-Trent 88767

VALVES SAME DAY SERVICE

NEW! TESTED! GUARANTEED!

SETS IR5, IS5, IT4, 3S4, 3V4, DA9F1, DF91, DK91, DL92, DL94 .. any 4 for 19/6
 DA9F6, DF96, DK96, DL96 4 for 27/6
 6K7G, 6K9G, 6Q7G, 6V6G, 6X5G, or 6Y3G 5 for 27/-

1A7GT 11/8	6L1 14/-	25Z4G 7/6	EBF89 8/9	EY86 7/9	PZ30 17/-
1D5 8/-	6L18 10/-	25Z8GT 9/6	EEL21 13/6	EZ40 6/9	T41 9/6
1H5GT 10/-	6LD20 8/-	30FL1 9/-	EC92 11/-	EZ41 7/-	U22 7/3
1N5GT 10/-	6P1 13/6	30PL1 10/-	ECB81 5/-	EZ80 6/3	U25 13/-
IR5 5/8	6P25 9/-	35A5 9/6	ECC82 6/3	EZ81 7/-	U23 10/-
184 8/-	6Q7G 9/-	35L8GT 9/-	ECC83 9/-	FW4500 9/-	U50 9/-
IS5 5/8	6Q7GT 9/6	35Z4GT 6/-	ECC84 8/9	GZ30 8/6	U52 4/6
IT4 4/-	6SL7GT 6/3	35Z8GT 8/6	ECC85 8/3	GZ32 9/8	U78 4/9
1U5 5/9	6SN7GT 4/9	60L8GT 8/8	ECP80 8/8	HBC90 7/-	UABC80 7/9
3A5 5/8	6U4GT 11/-	AC7FH1 16/9	ECP82 8/6	KT33C 7/-	UAF42 9/-
3Q4 7/-	6V8G 5/6	AZ3 13/6	ECH21 13/6	KT41 11/8	UBC41 7/9
3S4 6/-	6V8GT 6/6	B38 8/9	ECH35 6/3	KT44 9/-	UBF80 8/9
3V4 7/-	6X4 4/9	CL33 12/3	ECH42 8/9	KT61 10/-	UBF89 8/-
5U4G 4/8	6X5GT 4/9	DAC32 10/-	ECH81 9/-	K783 6/6	UC92 12/6
5V4G 8/9	6Y9 9/6	DK91 5/3	EEL80 7/3	MU14 7/6	UC84 12/6
5Y3GT 6/-	7B7 7/6	DA9F6 7/6	EEL82 9/6	MX40 8/6	UC85 7/6
5Z4G 7/9	7C5 7/6	DCC90 9/-	EF39 4/6	N18 7/-	UCF90 14/-
6AL5 3/9	7C8 7/6	DF33 10/-	EF41 8/3	PCC84 7/8	UCH21 13/6
6AM6 3/9	7HT 7/6	DF91 4/-	EF42 9/6	PCC89 11/-	UCH42 8/6
6AQ5 8/-	7S7 9/6	DF92 7/8	EF80 5/6	PCF80 7/8	UCB1 8/-
6AT8 6/9	7Y4 7/-	DH76 4/9	EF85 9/-	PCF82 8/-	UCL82 10/9
6BA6 6/9	10C1 11/6	DH77 6/9	EF96 9/9	PCL82 7/6	UCL83 13/3
6BE8 5/9	10C2 17/6	DK32 11/6	EF99 7/-	PCL83 11/-	UF41 8/9
6BH6 5/9	10P13 14/6	DK91 5/3	EF91 3/6	PCL84 7/8	UF85 8/6
6BJ6 5/9	12AT8 9/6	DK92 7/6	EF92 4/3	PEN44 11/-	UF99 9/6
6BR7 9/9	12AT7 7/6	DK96 7/8	EL33 10/-	PEN36C 8/-	UL41 8/-
6BW8 8/9	12AU7 5/3	DL33 9/-	EL41 6/6	PEN45 7/6	UL84 7/6
6BW7 5/8	12AX7 7/-	DL35 10/-	EL42 9/-	PL36 11/8	URIC 8/-
6C9 9/-	12XGT 5/3	DL92 6/-	EL81 12/-	PL81 9/-	UY21 11/3
6CD8G 8/9	12K8GT 11/6	DL94 7/-	EL84 7/-	PL82 7/6	UY41 5/6
6F1 12/6	12Q7GT 4/9	DL96 7/6	EM34 6/9	PL83 7/6	UY85 6/6
6F8G 6/8	12Z3 7/6	EABC80 7/8	EM80 8/6	PL84 10/9	UYIN 10/9
6F13 11/-	14S7 16/9	EAF42 8/6	EM81 8/6	PY32 11/-	VP4B 9/6
6F14 16/6	20F2 1/6	E991 3/9	EM84 10/-	PY30 7/6	VP41 5/6
6K7G 2/6	20L1 17/6	EBC33 7/6	EY51 7/6	PY81 6/6	W76 5/6
6K7GT 5/-	25A8G 8/-	EBC41 8/-	EY81 10/-	PY82 6/6	W77 4/8
6K8G 6/3	25L8GT 9/-	EBF80 8/-	EY84 9/-	PY83 7/9	Z77 3/6

“AS-NU” Regunned TV Tubes

Supplied from stock, and despatched by British Railways same day.

COMPLETE NEW GUNS

fitted in every tube and fully guaranteed for TWELVE MONTHS.

12 in. ...	... Mullard	Mazda
14 in. ...	... £4.10.0	£4.10.0
15 in. ...	... —	£6. 0.0
16 in. ...	... £6.10.0	—
17 in. ...	... £5.10.0	£5.17.6
21 ins. ...	... £8.10.0	£8.10.0

Plus 10/- Carr. & Ins.

Other types available. Please contact:

J. P. WRIGHT

1c Shotton Street, Doncaster
Sole Distribution Agent

'Phone: DON 2636 or 66252

READERS RADIO

24 COLBERG PLACE, STAMFORD HILL
LONDON, N.16 STA. 4587

Post 6d. per valve extra.
 Any Parcel Insured Against Damage in Transit 6d. extra.
 Any C.O.D. parcel 2/6 extra.

ACT NOW!

Get information-packed literature FREE. Mail coupon today.
PRIME ELECTRICS DEPT. G.A. 11.
 36-38 Queensdale Rd., London W.11.

Please send me your FREE brochure and tell me how I can make EXTRA MONEY in my spare time by introducing your new product which sells on sight to all TV viewers.

NAME
 (Please Print and send 3d. stamp for postage)
 ADDRESS
 UNITED KINGDOM ONLY.

LINE OUTPUT TRANSFORMERS

Most types available. State Make and Model Number of Receiver when ordering.
S.A.E. please with all inquiries

HOWORTH

51 POLLARD LANE, BRADFORD 2, YORKS.
 Tel. 37030

Just published in a NEW 3rd edition...

TELEVISION ENGINEERS' POCKET BOOK

Edited by J. P. HAWKER

are extensive sections on the basic circuits used in receivers, on fault finding—including a new trouble tracing chart—and on the alignment of Band 1/III receivers. There is guidance on the conversion of Band I sets and a comprehensive list of receiver intermediate frequencies. Colour and transistorized receivers are described. There are also special sections on servicing equipment, dealing with printed-circuit models and projection receivers, aerials and interference problems.

Only 12s. 6d. FROM ALL BOOKSELLERS ... or, in case of difficulty, 13s.6d. by post from George Newnes Ltd., Tower House, Southampton Street, London, W.C.2. **NEWNES**

Much new information has been added to this enlarged and fully revised third edition.

Apart from essential reference data on cathode-ray tubes, valves, television stations and transmission standards, there

A SUPER SPECIAL TV TUBE OFFER

New tubes made by world-famous manufacturers complete with 12 months' maker's guarantee. 17in. Tube to replace the MW43-04 49-69, 17K1, 17K2, 17 ASP4, 17 AXF4, C17-1, C17-A, CR-17-22, C17-FM, MW 43-90. Our Unbeatable Price £8.10.0. Also available brand new 14in. to replace 96-24, 36-34, TR14-21, TR14-22, 14 KP4A, 14-LP4, 14K1, C36-24, or for AW 39-20, 36-21 12in. brand new 91 MW 31-74, all at £7 each. Post packing and insurance 10/- extra.

NEW MAX ELECTRONICS

For London's Finest Bargains in Electronic and radio equipment. Also Largest Selection of Tape Recorders in the U.K. All Guaranteed.

220, Edgware Road, London, W.2.
 Tel. PAD 5407

Letters to the Editor

The Editor does not necessarily agree with the opinions expressed by his correspondents.

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.

SURGES

SIR,—I am an experimenter and find most enjoyment in trying out timebases. Recently I had a most unfortunate accident with a unit which virtually "blew up". I assumed at the time that one of the condensers had developed a fault which is not uncommon, and proceeded to dismantle it and wired in a new one. I have now found that the output transformer has gone o.c. The primary is burnt out and so I looked through a large number of circuits and books I have, and discovered a very interesting point. Some years ago it was the custom, apparently, to fit a 1W resistor across the primary as a "surge limiter". Today this does not seem to be included in any of the commercial circuits which I have looked at, and I wonder whether there is anything in the frame circuits which now does away with this surge, or are transformers now made to withstand the surge? I have not been able to see any data on this in any books or publications.—G.E. (Enfield).

A STRANGE FAULT

SIR,—I have seen some peculiar faults in television sets, but am now faced by a most awkward one, which two local dealers have been unable to solve. When switched on the set warms up in the usual way, and suddenly the line whistle may be heard. The screen then starts to light up, and for about ten seconds there is a good picture with a full raster. Almost immediately, however, the frame jumps to about two-thirds full size with no alteration in width. Everything is accordingly elongated but if the set is not touched, after a period varying from ten minutes to half an hour, the frame jumps back to full size. It may do the same thing once or twice more during the evening, although some evenings it remains constant for the entire viewing period. Every component has been changed in the frame timebase, and the valves replaced with no effect. Can anyone offer a suggestion as to the cause?—D.K.L. (Aylesbury).

ALTERNATIVE TRANSMISSIONS

SIR,—It is now many months since I read that the Government had authorised the use of Bands IV and V, yet nothing seems to transpire. I expected to see something at the Radio Show on the lines of a really simple multi-band tuner, but was disappointed. Why cannot the BBC or ITV give us the opportunity of having these additional bands, especially as I understand that this may be done with no heavy cost, simply by using the present programmes, radiating them on two or three bands as required. It would

give us experimenters something to mess about with on those nights when there is nothing to hold our interest, as well as permitting developments to be made in multi-band tuning. I agree that colour would be more difficult as changes in the transmitter would be required, but the addition of a simple aerial array on all masts and radiation on three or four bands does not appear to me to be a difficult proposition, and would also help the transmitting people when an alternative transmission is commenced.—F.T.R. (Hull).

COLOUR TV

SIR,—The BBC has just announced the possibility of introducing colour television to Britain. Unless I am very much mistaken, this will be a costly change-over for both the viewer and the BBC.

For the BBC it will mean employing many more technical advisers who have had experience with scenery and costume arrangement suitable for colour television, as well as the cost of new cameras and equipment. This means that some of the finer points of acting and arrangement of the "sets", which in recent years have come near to perfection, will inevitably be lost under the restrictions caused by the necessity that colours will neither clash nor become lost against a background of similar colour. The result can only be a deterioration in the high standard of production we have at the moment on British television. Which excels, I wonder—a cheap colour production or a first-class play in monotone?

For the viewer it will almost certainly mean an increase in the price of a television licence—the BBC have said so. The receiver will cost many times the amount usually paid for one now. Also, every TV set will have to be increased in size to accommodate the extra components, and much of the elegant styling that has been accomplished over a number of years and which can be seen in nearly all of today's models will have to be forfeited for the addition of colour programmes.—D. HILLIAM (Bexley).

SIR,—I, for one, was pleased to hear of the BBC's plan for colour television in this country, but am somewhat sceptical about the quality of the picture that will be received. Although I have no experience in this field of television, I would imagine that faults that were either common or inevitable on normal TV sets would become serious defects on colour receivers.

For instance, would the strength of the colours become lessened when a receiver is used in a "fringe" area? Would the overlapping images formed by "ghosting" result in a change of colour over certain parts of the screen?

No doubt manufacturers will overcome these and other difficulties, but additional controls will almost certainly be necessary, making the operation of receivers more complex than ever.—J. EVANS (Redhill).



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. 168 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.

ULTRA V707

This set has developed a lin. black line down the right-hand side of the picture. When the sound is loud, the picture breaks up.—D Cole (London, W.3).

We are not familiar with the model V707, but assuming this belongs to the W700 series we would suggest you check the UU8, the electrolytic capacitors and the "beehive" capacitor adjustment on the right side chassis (oscillator tuning).

H.M.V. 1826

This set uses an Emiscope 4/15 tube which is now going dim. As regunned tubes are hard to obtain for this model I was wondering if there is any way to convert it to take a Mullard or Mazda tube.—E. Williams.

A rebuilt 4/15 tube may be obtained from firms advertising in our pages.

FERGUSON 989T

The trouble started with what appears to be EHT "brushing" spots in two separate horizontal bands. These have now spread all over the screen, but not always present. I have inspected the circuit in the dark for sparking but with no success. This has become worse after interference accompanied by a forked lightning effect from the top centre to the middle of the screen. This appears to have caused a slight vertical burn, leaving a permanent mark. There is also an erratic frame hold. At intervals of up to 15 minutes or more the picture commences to move up or down and, while a lock can be obtained, there is sometimes a tendency for the bottom of the picture to fold up.—P. Hunt (Hackney, E.8).

There is a possibility that the disturbance is in fact the result of a form of external electrical interference. You should first prove this by disconnecting the aerial from the set when the effect occurs. If the interference spots are still present with the brightness suitably advanced to show a raster, then it is

being caused by a fault in the set. If the raster is clear, however, the interference is external. In the former case check the line output transformer insulation and soldered connections, especially those on the EHT rectifier. Also check the EHT smoothing capacitors. These often tend to break down and cause the troubles mentioned. External interference may require Post Office investigation.

ALBA

This set is six years old and has developed a wedge-shaped raster or picture. I purchased a new set of scan coils but there was no life on the tube face at all, so I put the old ones back without results. I increased the heater voltage on the tube slightly, and I was able to see the wedge shape but it was misty. The sound is also lacking in strength, and the ion trap magnet failed to increase the brilliance. There is plenty of EHT and the line timebase whistle is loud and clear.—A. James (New Tredegar).

Whilst the tube is almost certainly responsible for the lack of brilliance, we do not doubt that the scan coils were responsible for the wedge-shaped raster. Check H.T. and electrolytic capacitors.

BUSH M56

I have noticed the fault on this set for some time and have carried out a check over the sound output stage but can find no fault with it. The effect I am obtaining is a low-pitched hum on sound, but while checking I noticed that the hum was not present during the warm-up period, and does not become apparent until the line timebase starts, which also makes the frame circuit operate. I believe that I am obtaining a feedback from the frame circuit. If I open the height control to maximum, the hum becomes louder, and likewise if I reduce the height the hum decreases. I have been wondering if it could be a fault in the frame output transformer.—C. E. Herridge (Paignton).

The main smoothing is carried out by a 100+100 μ F and separate 200 μ F electrolytic capacitors. It is quite likely that one of the 100 μ F sections of the former is open circuited. A wire-ended 32 μ F 350VW capacitor can be used for checking, touching the negative wire to chassis and the positive to each capacitor tag in turn to see which gives a result.

VIDOR CN4217

The picture is excellent but tapered from top to bottom leaving a 3in. blank each side of the screen. The coils on the CRT neck become fairly hot. There is a white band about 1in. wide at the bottom of the screen. The following have been checked and found to be in order:—sound, interlace, contrast, horizontal and vertical holds, picture height and brightness.—J. Davies (Barry).

The scanning coils should be changed as it would appear that a fault in these is causing the tapered picture. The 1in. white band at the bottom should direct your attention to the ECL80, beneath and to the left of the focus magnet, i.e. to the right of the PY82 valves as viewed from the rear.

PHILIPS 1746U

Recently the picture on this set has been gradually contracting in width, to about 3in. border on

EDDY'S (Nottm.) LTD.

172 ALFRETON RD., NOTTINGHAM
New or Surplus Valves. Guaranteed
and Tested, by Return Post.

DAF91 4/9	EL42 9/3	IS5 4/9
DAF96 6/11	EL84 6/6	IT4 3/11
DF91 3/11	EL91 4/6	SZ4G 7/6
DF96 6/11	EY51 7/11	6A7 10/-
DK91 5/6	EY86 7/9	6AG5 4/-
DL96 6/11	GTIC 6/11	6B8G 2/11
EB34 1/3	L63 5/11	6BA6 5/11
EB41 6/11	MU14 7/-	6BJ6 5/11
EB91 3/6	PCC84 7/3	6C4 3/6
EBC33 5/11	PCF80 7/-	6C6 4/9
ECC81 5/3	PCF82 7/6	6F33 6/9
ECC82 5/11	PLC82 7/6	6J5G 2/9
ECC83 6/6	PEN25 4/6	6J5M 4/3
ECC84 8/3	PEN36C 8/-	6J7G 5/7
ECC85 8/-	PEN4A 12/6	6K7G 1/11
ECF82 9/-	PL36 10/9	6K8G 5/11
ECL90 7/-	PY31 8/3	6P28 7/6
EF36 3/2	P61 2/3	6Q7G 5/9
EF40 13/3	U25 12/6	6SA7M 4/9
EF41 7/9	UBC41 7/3	6SG7M 4/9
EF42 7/6	UL41 7/3	6SN7GT 4/3
EF50 1/9	VT52 (4 pin) 2/6	6V6G 4/9
EF80 5/-		6V6GT 6/-
EF86 9/9	TDD4 12/6	6U4GT 10/6
EF89 7/-	ID5 7/6	12AT6 7/6
EF91 3/6	IL4 3/6	12A6 5/3
EF92 4/6	IRS 5/6	35Z4 5/3

GUITAR PICK-UPS. Super Hi-Fi Non Acoustical Universal fitting High Output. Complete with lead and plug. Full and easy instructions, 49/11. P. & P. 2/6.

CAR RADIO KIT 7 TRANSISTOR. Long and medium 2 watts output. R.F. stage and auto gain control. 10½ gns. P. & P. 5/-, 6 or 12 v (state which) with full instructions. Size 7½ x 7½ x 2½in. speaker ex 17/11.

DYNAMOTORS. 200v D.C. to 12v D.C. Ideal for train sets, etc.. 19/11. P. & P. 2/6.

CRYSTAL SETS. Complete 2 wave bands. High gain. Good quality, 19/11, also with transistor amp. extra 9/11. P. & P. 2/6.

HEADPHONES. High Resistance to suit above crystal sets. Good quality, 12/11 pair. P. & P. 1/6.

NIFE ACCUMULATORS. 1.25v. Size 3 x 2½ x ½in. 7 amp hrs., weight 13 ozs. 1/11 ea. P. & P. 1/6 one only, add 9d. per cell.

DIMMER SWITCHES. Ideal for train speed regulators 1/11. Post 9d.

GERMANIUM DIODES. 8d. each., 7/1 dozen. Post 6d.

THROAT MIKES. 1/-, P. 6d. Could be used for electrifying musical insts., etc.

VIBRATORS. 12v 4 pin, 4/11. Post 1/-.

JACK PLUGS. Standard 1/11. Post 9d.

VARIABLE CONDENSERS. 0.0005 small twin gang. Built in slow motion drive, 8/11 P. & P. 1/6.

SPEAKER GOLD GRILL. 6½ x 4in., 1/- each. Post 6d.

NEON MAINSTESTER/SCREW-DRIVERS. 3/11. Post 9d.

HEADPHONE CORDS. High quality 6ft. lengths 1/11. Post 6d.

MORSE TAPPERS. Plated contacts. Adjustable gaps. Heavy duty, 3/6. Post 9d.

POCKET RADIO 2 transistor with miniature speaker, 2 wave bands. Complete with all parts wiring diagram and full instructions 27/6. Batteries 1/-, P. & P. 1/6.

CONDENSERS. Tubular wire end (not ex-govt.). 8mfd. 450v., 1/9, 8-8 450v., 2/6, 16mfd. 450v., 2/9, 16-16 450v., 2/6, 16-8 450v., 4/-, 32mfd. 450v., 3/9, 32-32 350v., 4/-, Post 1/11.

LUXEMBOURG AERIALS. Expanding Complete and easy to fit. No technical knowledge required. Greatly improves reception, 3/11. Post 6d.

All above are New and Guaranteed Any parcel insured against damage in transit for only 6d. extra per order. All uninsured parcels at customer's risk. Post and packing 6d. per valve extra. C.W.O. or C.O.D. only. C.O.D. charge 3/- extra. S.A.E. with enquiries.

REBUILT TV TUBES

FULLY GUARANTEED
12 MONTHS

Complete New Gun fitted in every Tube

12in., 14in. ...	£5.00
15in. ...	£5.10.0
17in. ...	£6.0.0
21in. ...	£8.0.0

Immediate Delivery
Carriage and Insurance 10/- extra
Allowance on old tube

NU-GUN TELETUBES LTD.

3 The Mews, Duckett Rd.
Harringay, London, N.4
Telephone: MOUntview 2903

RES/CAP. BRIDGE 38/-

p. & p. 2/-
Checks all types of resistors, condensers
6 RANGES

Built in 1 hour. Direct reading
READY CALIBRATED

Stamp for details of this and other kits.
RADIO MAIL (Dept. FV)

Raleigh Mews, Raleigh Street, Nottingham

SPECIAL VALVE OFFER

For Limited Period

EB91 4/6	UF42 7/-	6L1 8/-
ECL80 7/6	UL41 7/-	6L18 9/-
ECL82 8/6	UL44 7/6	6P25 6/6
EF80 5/-	UL45 7/6	6LD20 7/6
EF91 4/-	UBC41 7/6	6SN7GT 5/6
EL38 10/6	UCH42 7/6	6P28 8/6
EY83 7/6	U35 8/6	757 9/6
GZ32 8/6	SP61 2/6	10P1 8/6
KT39C 6/6	3D6 2/6	10P14 8/6
PLC83 12/6	6AT6 6/6	12AT7 6/6
PL33 8/-	6CH6 7/-	20D1 7/6
PL82 7/6	6BG6G 10/6	UY41 5/6
PL83 7/6	6F1 6/-	N37 7/6
PY80 7/-	6F13 6/-	ECC83 8/-
PY82 7/-	6F14 6/-	807 6/6
PZ30 11/-	6F15 6/-	PY31 7/6
UAF42 8/6	6J5GT 5/-	1625 6/-

Postage 4d. per Valve.

Coaxial Cable, 75 ohms. 6d. yd. Ion Traps, 5/-; Midget 2 Gangs, 6/6; New 7 x 4 P.M. Speakers Large or Small Magnet, 15/-.

TV AERIALS: We carry large stocks; send S.A.E. with your requirements and we shall reply and send leaflets by return.

MAIL ORDER ONLY - NO CALLERS

Terms: C.W.O. or C.O.D. minimum C.O.D. 3/-; postage, packing other than valves, under £2, 1/6; under £5, 2/-; aerials, 2/6.

ELECTRO SERVICES & CO.

221 BATTERSEA PARK RD., S.W.11

Mac. 68334

DID YOU KNOW

COYNE'S NEW

TROUBLE-SHOOTING
SERIES TAKES HEADACHES
OUT OF ALL SERVICING
PROBLEMS?



Pin-Point
TV troubles
in 10 minutes

Find the exact sound or picture trouble in ANY TV set from 700 possibilities! Latest Edition now has 332 pages of solid, down to earth TV Servicing information; 300 diagrams, check charts, 31/6. Postage 1/-.

Pin-Point
Transistor troubles in 12 minutes



Trouble-shoot every type of circuit in ALL transistorized equipment! 525 pages; hundreds of illustrations; 120 check charts, 47/6, postage 1/6.

SIMPLE CHECK CHART SYSTEM SAVES TIME

These amazing practical handbooks with ENTIRELY NEW METHOD show you how to find the trouble in ANY TV, or transistor circuit. FAST! Index tells you where to look; famous Check-Charts help you to pin-point the exact trouble in minutes! These on-the-job books quickly pay for themselves in profitable new business and valuable time saved!

SEND NO MONEY

Just mail coupon for free trial. After 7 days send only low price or return books and pay nothing! If you keep both books send only 19/- after 7 days and 11 a month until a total of 75/- has been paid. If ordering one book, pay one half after seven days and the other half in 30 days.

FREE TRIAL OFFER
Mail Coupon Now for
FAST RETURN SERVICE

Mail Order Division, SIM-TECHBOOK COMPANY, Gater's Mill, West-End, Southampton, Hants.

- Rush 2-book PIN-POINT Series for 7-day FREE TRIAL per offer (postage free).
- I do not require both books, please send me the following book as per offer.
- TRANSISTORS, 47/6, plus postage.
- TV TROUBLES, 31/6, plus postage.

Name

Address

City..... County.....

Check here if enclosing full price; we pay postage. Same 7-day money-back guarantee.

DARWINS "Lancashire" tested television tubes. Completely rebuilt and guaranteed fully for twelve months. 12 inch £5. 14 inch £5-5. 15 inch £5-10. 17 inch £5-15. 21 inch £8-10.

Carriage and insurance paid on to your doorstep.

GEORGE E. DARWIN

45, Shaw Street, St. Helens,
Lancashire,

Telephone: St. Helens 4246

B.B.C. - I.T.V. - F.M. AERIALS



B.B.C. (BAND 1). Telescopic loft, 19/8. External, S/D, 26/3.
I.T.V. (BAND 3), 3 Element loft array, 24/-, 5 Element, 32/8. Wall mounting, 3 Element, 33/0. 5 Element, 41/3.

COMBINED - B.B.C. + I.T.V. Loft 1+3 Element, 41/3. 1+5 Element, 43/0. Wall mounting, 1+3 Element, 56/3. 1+5 Element, 63/0. Chimney and mast mounting units also available.

F.M. (BAND 2). Loft "H" 28/-, 3 Element loft, 52/8. S/D loft, 12/8. External S/D, 26/3. State channel when ordering. C.W.O. or C.O.D. P.P. 2/6. Coaxial cable, 8ft. vd. Coaxial plugs, 1/3. Send 6d. stamps for illustrated lists.

K.V.A. ELECTRONICS (Dept. T.P.)
3a Godstone Road, Kenley, Surrey

You can't help earning more!

WITH NEWNES

RADIO and TV SERVICING

LATEST EDITION IN SIX VOLUMES

FREE FOR 7 DAYS



**OVER
2,300
POPULAR
MODELS**

MORE THAN
3,800

Circuit & Component
Layout Diagrams
OVER
3,750 Pages

**2 Years' Free Postal
Advisory Service**

Includes Practical Guidance on Circuit Developments. Fault-finding and Alignment. Servicing Tape Recorders. Aerial Installation. Electrical and Car interference suppression. Servicing Transistor and VHF/FM Radios. Printed-wiring sets. Servicing Equipment. Salvaging Picture Tubes, etc.

**INCREASES YOUR EARNINGS
FOR YEARS TO COME**

This Latest Edition of Newnes Complete Library of Servicing Data is exactly suited to your needs. Here in six packed volumes are all the circuits, component and layout diagrams you must have for speedy, efficient repair work, tuning and general maintenance—over 2,300 models pre-1954 right up to 1960. All the famous makes below are included—everything you want for years to come. If you've never seen previous editions be sure to see this one!

TELEVISION, RADIO, RECORD REPRODUCERS, TAPE RECORDERS

All these popular makes—

Ace, Alba, Ambassador, Argosy, Armstrong, Baird, Banner, Beethoven, Berec, Brayhead, Bush, Capitol, Champion, Channel, Collaro, Cossor, Cydon, Dansette, Decca, Defiant, Dynatron, E.A.R., Eddystone, Ekco, Elizabethan, E.M.I., Emerson, English Electric, Ever Ready, Ferguson, Ferranti, G.E.C., Grundig, H.M.V., Invicla, K.B., McCarthy, McMichael, Marconiphone, Masteradio, Motorola, Murphy, Pageant, Pam, Perdio, Peto Scott, Philco, Phillips, Pilot, Portadyne, Pye, Pye Telecommunications, Radiomobile, Rainbow, Raymond, Regentone, R.G.D., Robert's Radio, Sobell, Spencer-West, Stella, Strad, Ultra, Valradio, Vidor, Walter, Webcor.

Important Reference Data on Valve and Picture Tube Bases and Equivalents. BBC and European Broadcasting Stations. TV and VHF/FM Channel and Stations.

POST NOW No Cost-No Obligation

GEORGE NEWNES, LTD., 15-17 Long Acre, London, W.C.2

Please send me Newnes RADIO AND TELEVISION SERVICING without obligation to purchase. I will return it in 8 days or send 11/- deposit 8 days after delivery, then twenty monthly subscriptions of 11/- paying £11 11s. 0d. in all. Cash price in 8 days is £11.

Name _____

Address _____

Occupation _____

Your Signature _____

(Or Your Parent's Signature if under 21) **RV 120**

Tick (✓) where applicable

HouseOWNER	<input type="checkbox"/>
Householder	<input type="checkbox"/>
Living with Parents	<input type="checkbox"/>
Lodging Address	<input type="checkbox"/>

the right-hand side and 1in. on the left. Although the knob for adjusting the horizontal width is working it has no effect on the picture. The image appears to be curved on the right-hand side at the extreme edge.—E. Robinson (Staines).

We would advise you to replace the PL81 line output valve. This is the right-hand valve of the two situated in the screened compartment on the left side as viewed from the rear.

G.E.C. BT1748

After being switched on for about an hour, the width and height become smaller. I fitted a new metal rectifier RM5 a few months ago to remedy this fault, which it did, but now it has appeared again.—J. Goodger (Leicester).

Check the H.T. voltage which should not be much under 200. If it is, change the RM5 and see that the ventilation of the receiver is not restricted in any way. If the H.T. voltage is normal, check the N339 line output valve and the timebase voltages generally.

ALBA T432

A fault has developed in the H.T. circuit. In the past six months we have changed four GZ32 valves, three condensers C37a and C37b. On the last occasion, a U52 rectifier was used to increase current. This too has burned out. After changing condenser 37a and 37b a new rectifier was fitted but this immediately flashed. Condensers 36a, b and c, 37a and b do not appear to be shorting. — H. Mercer (Hove 4).

You should not use a directly heated rectifier such as a U52 since this causes a rapid voltage rise (to about 500V) almost as soon as the receiver is switched on. Revert to the GZ32. Check the line oscillator EF50 and circuit since a short often occurs here of an intermediate nature causing the rectifier to flash over and fail.

BANNER 124B

Can you tell me where to obtain a service sheet for this receiver? I have flyback lines seriously interfering with the top half of the picture. I think I have the wrong value components.—G. Gibson (Wadhurst).

You will find that a service sheet on the Sobell T143-T144 series will apply to your receiver. You may have fitted a wrong value coupling capacitor in the frame timebase; that to pin 9 of the ECL80 via a 10k resistor is 0.1 μ F.

INVICTA 126

My trouble is two or three lines down the left-hand side of the screen like waterfalls. This only occurs on BBC, ITA is perfect. — R. Shorrocks (New Ferry).

Check the PL81 line output valve by replacement, then the top centre PCF80. If these are in order, check the 3.9k resistor and 47pF capacitor wired in series behind the line output transformer.

PILOT TV94

This set has completely broken down to give a horizontal white line of intense brightness. When this line appeared a rasping, grating sound was heard from the speaker. The brilliance con-

trol was turned down and the set switched off. Previous to this fault, the line hold control was at the end of its travel but failed to lock. The only method of locking the line hold was switching from one channel to the next then back again but this operation had to be carried out every 20 minutes or so. The line output valve was glowing rather blue before horizontal lines appeared. It was later noted that the large resistor underneath the line output valve was rather black and burnt. The set is three years old and has the original valves except for the EY51. — A. Taylor (B.F.P.O.39).

The 12BH7 may be at fault but from the "rasping sounds" heard we are suspicious of the frame output transformer or the H.T. feed from the boosted line. Check for H.T. at pin 1 of the 12BH7 and at the junction of the 6.8k resistor and 8 μ F capacitor. If no H.T. is present at pin 1, but it can be recorded at the resistor/capacitor, the transformer is at fault. Inability to lock should direct your attention to the 12AU7 line oscillator valve and the adjustment of the lower core of the coil next to the PY83.

DEFIANT T.R.1756T

When first switched on there is a loss of height top and bottom. After one hour or so it reaches the correct height and later it loses height or perhaps becomes "too tall". The ECL80 has been changed without effect. — D. Tindel (North Shields).

The ECL80 concerned is that on the front left side as viewed from the rear. Then replace the 4.7M (yellow-violet-green) and 1.8M (brown-grey-green) resistors associated with this valve and circuit. The H.T. metal rectifier is possibly low but this would also cause loss of width and focus.

ENGLISH ELECTRIC C45

An unusual fault has developed on the above set. Everything is normal except when the contrast control is turned down or when the aerial plug is removed. Then the EY51 heater goes out and this means that there is no EHT and the PL81 becomes red-hot. Also the line output transformer becomes overheated. All the valves in the line output section and EF80 line oscillator have been checked and also the components but they are in order. As this circuit has a separate line oscillator valve this does not make sense to me. There are about five bands about $\frac{1}{2}$ in. wide on the left-hand side of the screen which do not alter with the controls.—W. Worrall (Holywell).

There is no completely separate oscillator, the EF80 is operated in conjunction with the line output transformer in a feed-back circuit. We would direct your attention to the 220pF capacitor to pin 2 of the EF80 and the 33pF wired across terminals 1 and 3 of the line output transformer.

VIEWMASTER

This set is built to take wide angle 17in. tube and adapted to take a 12-channel turret tuner. I am unable to obtain a full-width picture; it is about 1in. too small on either side. The width control is at its best position. I have replaced C82 on the side of the line transformer 140pF and this

improved the width slightly, but not enough.—A. Kemp (Leeds).

Loss of width, evenly on both sides, normally denotes a low-emission H.T. rectifier. If this is in order, however, check the anode resistor of the line oscillator and the timebase valves and components generally.

BUSH TV56

I believe the fault is in the tuner. The fault is only on ITA. It is a noise rather like an electric shaver and at the same time two white bands appear on the screen from left to right, one about $\frac{1}{4}$ in. from the top and the other $\frac{1}{4}$ in. from the bottom. These white bands pull the picture contents to the right. I have changed PCF80 in the tuner and also PCC84 and EF80, first I.F. valve but the noise still remains. The only way to eliminate it momentarily is to adjust the fine tuner very slightly, but the slightest movement to either left or right brings it back.—H. Wronski (Leeds).

If the original position of the components and wiring in the tuner have not been disturbed, you will probably find that the cause of the disturbance is an open-circuited decoupling capacitor of 560pF associated with the H.T. feed to pin 1 of the

PCF80. Check the other decouplers of this value if necessary. It is necessary to maintain the original positions of the components.

FERRANTI 1775

I am shortly moving to Sittingbourne, Kent and I am anxious to know whether my set will work in that area without many adjustments.—T. Scoates (Orpington).

Set channel selection switch to Band I, and adjust tuning control until Channel 1 is opposite pointer (this gives London BBC); set switch to Band III and adjust tuning control until channel 9 is opposite pointer (this gives London ITV).

COSSOR 948

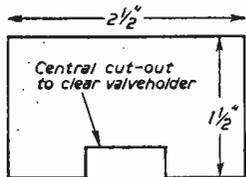
On switching off the set a residual spot of some intensity persists for about a minute, which, according to my agent, is of no importance. However, I should like to remove it.—A. Lacy (Aspley).

An EHT Metrosil, fitted between the EHT lead and chassis should reduce the time taken for your spot to decay, and should improve EHT regulation. Metrosils are ordered by their working voltage and we suggest you measure the EHT and purchase the nearest available Metrosil.

THE "OLYMPIC"

(Continued from page 146)

can be obtained from most good garages. They are carefully straightened by rolling them on a hard flat surface with a domestic iron, after thoroughly cleaning with metal polish and hot detergent solution. They are preferably silver plated—the method has been described in this



Material 22 swg. Tinplate
5 required
Details of inter-stage screen

Fig. 9.—Details of the valveholder screens—these screens are used across various valveholders as indicated on the blueprint.

journal—not only to improve the "Q" of the circuit but to avoid oxidation which will cover the copper in time with a layer of copper oxide, which is less conductive. A hole of suitable size is cut in the back plate of the tuner chassis, and a large enough piece of paxolin to cover it is obtained. This is drilled with two holes exactly $\frac{1}{4}$ in. apart each $\frac{1}{4}$ in. in diameter. A piece of Perspex is also drilled with holes $\frac{1}{4}$ in. apart in the same way. The two pieces of tube are pushed and tapped carefully through the paxolin to the required depth, and then the piece of Perspex is also pushed over the tubes so that it will in the end be inside the tuner. The slight inaccuracies which will inevitably occur in drilling

will enable the Perspex to jam the tubes solidly in position when it is tapped gently towards the paxolin mount. Last of all, the paxolin, with tubes in place, is mounted on the back plate of the tuner, and the tubes rendered parallel by slight bending as necessary.

Attachment of the tubes to the oscillator wafer is made by means of flexible braid which may be obtained from odd lengths of coaxial cable. A hot soldering iron is required because of the high thermal capacity of the copper tubes. Extra heat may be needed, from a small blowlamp or gas jet, to increase the temperature of the soldering iron.

Building up the tuner should be carried out wafer by wafer. The first, for the aerial switching (if used), is slipped into position and the wiring done on it. Then the valve wiring for the R.F. stage should be started, and when the grid circuit is reached the second wafer is put in position, using the correct spacers between the two wafers. No inter-stage switching is needed—the coupling circuit has been designed so as to avoid this complication—and so the remainder of the wiring can be completed as far as the oscillator stage.

(To be continued)

QUERIES COUPON

This coupon is available until DECEMBER 22nd, 1960, and must accompany all Queries sent in accord with the notice on page 164.

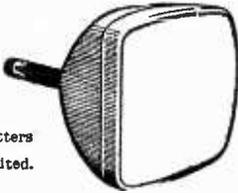
PRACTICAL TELEVISION, DECEMBER, 1960.

LAWSON

EXACT REPLACEMENT Completely Reprocessed TUBES

(3) New Mullard, Mazda, Emiscope, etc., electron guns.

(4) Exact plug-in replacements.



(6) New getters and regraphited.

(1) Silver activated screen

(2) Micro fine aluminised.

(5) Specially reprocessed glass envelopes.

POINTS FOR PERFORMANCE

(1) These new small particle silver activated screens have been specially developed for increased brightness with greater contrast. This results in a brilliant crisp picture especially suitable for daylight viewing even in the older type sets. In addition sharper focus, better definition and increased life result, because correct brightness levels are obtained with lower beam currents.

12 MONTHS' NEW TUBE GUARANTEE

ALL MATERIALS AND COMPONENTS USED IN THE MANUFACTURE OF THESE TUBES ARE COMPLETELY NEW, EXCEPT THE GLASS ENVELOPE AND ONLY ENVELOPES WHICH WILL PASS INSPECTION TO NEW GLASS STANDARD ARE USED.

ALL MAKES ALL TYPES FROM STOCK

12" - £5.10.0

14" - £5.19.0

15-17" - £6.10.0

LAWSON TUBES

156 PICKERSLEIGH RD., MALVERN, Worcs. MAL. 3798

20/-

Gladly refunded if you wish to return your old tube.
Carr. and Ins. 7/6 (express passenger).

NEW VALVES!

Guaranteed Set Tested
24 HOUR SERVICE

1R5, 1S5, 1T4, 3E4, 3V4, DAF91, DF91, DK91, DL92, DL94, SET of 4, 19/6.
DAF96, DF96, DK96, DL96: SET of 4, 28/-.

1D5	7/-	DL33	8/8	PCF80	7/3
1R5	5/-	DL35	9/6	PCF82	7/8
1S5	4/6	DL82	5/11	PCL82	7/6
1T4	3/9	DL94	6/9	PCL83	10/6
3E4	5/11	DL96	6/9	PCL84	7/6
3V4	6/9	EB241	7/8	PL38	10/9
5U4G	4/3	EBF80	7/8	PL81	9/-
5Y3GT	5/6	EBL21	12/6	PL82	7/-
5Z4G	7/3	ECC81	4/9	PL83	7/-
6KTG	1/9	ECC82	5/9	PL84	9/6
6K9G	4/9	ECC83	1 6/3	PY32	10/3
6Q7G	5/8	ECC84	9/-	PY80	7/-
6SL7GT	6/-	ECC85	7/9	PY81	6/3
6SN7GT	4/8	ECC86	8/3	PY82	6/3
6VB6	4/9	ECC87	8/3	PY83	7/3
6V8GT	1 6/9	ECH21	12/6	U25	12/-
6X5GT	4/9	ECH42	7/8	U26	10/-
12K7GT	4/9	ECL80	7/-	UABC80	7/6
12K9GT	11/-	EF41	7/8	UAF42	8/6
12Q7GT	4/6	EP80	4/9	UBC41	7/6
3L6GT	5/8	EP85	5/8	UBP80	3/6
3Z4GT	6/8	EP86	9/8	UC86	7/-
AZ31	8/9	EP89	6/8	UCH21	12/6
B36	8/3	EL41	7/-	UCH42	7/6
CL33	11/9	EL84	6/3	UCH81	8/-
DAC32	9/8	EY61	7/3	UCI82	10/-
DAF91	4/8	EY86	7/8	UCL83	13/-
DAF96	6/9	EZ40	6/9	UF41	7/9
DF33	9/6	EZ41	6/9	UF85	8/-
DF91	3/9	EZ80	5/9	UF89	6/6
DF96	6/9	EZ81	6/8	UL41	7/-
DH7T	9/-	G230	8/-	UY41	5/9
DK32	11/-	GZ32	8/9	UY21	11/-
DK91	5/-	MU14	7/-	UY41	6/9
DK92	7/3	PCC84	7/3	UY85	6/3
DK96	6/9	PCC88	10/-	VP4B	8/6

Postage 6d. per valve extra. Any Parcel Insured Against Damage in Transit 6d. extra. Any C.O.D. Parcel 2/6 extra. Office address, no callers.

GERALD BERNARD
90 CARR MANOR AVENUE
LEEDS 17

USING TRANSISTORS

Philips' Technical Library
By D. J. W. Sjoebema

15/- Postage 8d.

REFERENCE MANUAL OF TRANSISTOR CIRCUITS. Mullard Publ: 12/6. Postage 1/-.

TELEVISION ENGINEERS' POCKET BOOK. By J. P. Hawker. 12/6. Postage 6d.

TV FAULT FINDING. Data Publ: 5/- Postage 4d.

A BEGINNER'S GUIDE TO TELEVISION. By F. J. Camm. 7/6. Postage 6d.

RADIO VALVE DATA. 6th Ed. Compiled by "WW". 5/- Postage 9d.

THE RADIO AMATEUR'S HANDBOOK 1960. By A.R.R.L. 32/6. Postage 2/-.

FUNDAMENTALS OF SEMI-CONDUCTORS. By M. G. Scroggie. 23/- Postage 1/-.

MODEL RADIO-CONTROL. By E. L. Safford. 21/- Postage 1/-.

RADIO CONTROL MECHANISMS. By R. F. Stock. 4/6. Postage 4d.

THE MODERN BOOK CO.

BRITAIN'S LARGEST STOCKISTS of British and American Technical Books
19-21 PRAED STREET, LONDON, W.2.
Phone: PADdington 4185.
Open 6 days 9-6 p.m.

FIRST-CLASS TELEVISION and RADIO COURSES

GET A CERTIFICATE!

After brief, intensely interesting study—undertaken at home in your spare time—YOU can secure your professional qualification or learn Science and Theory. Let us show you how.

FREE GUIDE

The New Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as A.M.Brit.I.R.E., City and Guilds Final Radio, P.M.G. Radio Amateurs' Exams., Gen. Cert. of Educ. London B.Sc. (Eng.), A.M.I.P.E., A.M.I.Mech.E., Draughtsmanship (all branches), etc., together with particulars of our remarkable Guarantee of

SUCCESS OR NO FEE

Write now for your copy of this invaluable publication. It may well prove to be the turning point in your career

FOUNDED 1885—OVER 150,000 SUCCESSSES

NATIONAL INSTITUTE OF ENGINEERING (Dept. 462), 148 HOLBORN LONDON, E.C.1

S. Africa: P.O. Box 8417, Jo'burg. Australia: P.O. Box 4570 Melbourne.

SETS & COMPONENTS

IN SCOTLAND RENVU

For **BETTER VALUE**
Completely REPROCESSED TUBE
(New Gun, Rescreened,
aluminised)

6.3v. .3 amp. 17" types ...	£7. 0.0
6.5v. .3 amp. 14" types ...	£6.10.0
12.6v. .3 amp. 17" types ...	£7. 0.0
12.6v. (round)	
.3 amp. 14" types ...	£6.10.0
12.6v. .3 amp. 15" types ...	£7. 0.0
12v. 15" types ...	£7.10.0
2v. 12" types ...	£6.10.0

ELECTROSTATIC 90° TUBES

10/- extra.
10/- allowed on old tube.

**RENFREW ELECTRONICS LTD.,
ANDERSON DRIVE
RENFREW**

Tel.: RENfrew 2642

VALVES, RECORD Changers and
Players, Speakers, Rectifiers, Valve
Testers, Condensers, Resistors. Send
for list, H. F. JAMES, 21, Claremont
Road, Twickenham, Middx.

AMATEURS HANDYMEN. Change
your TV Tube with a Rebuilt one by
post. Free advice given. Service
Sheet library, S.A.E. with enquiries.
G. HURST, 3, Coniston Road, Shef-
field 8.

TV TUBES. New gun, 17in. £5. Twelve
months' guarantee. Dealers supplied.
Aerials and Coax cheap. TV ELEC-
TRIC & CYCLE CO., 1, High Street,
Chalvey, Slough. Tel.: Slough 21860.

Television Tube Shop

now stock

Tubes for every make of set

NEW REDUCED PRICES

12 inch, Mullard type	£4. 5.0
12 inch, Mazda type	£4.15.0
14 inch, Mullard type	£5. 9.0
14 and 15 inch, Mazda type ..	£5.15.0
17 inch, All types	£6.10.0
17 inch, Sum line 110°	£6.17.6
21 inch, All types	£8.10.0

Also G.E.C., BRINAR, E.M.I. types.
Add 10/- for delivery to your door within
48 hours or 5/- B.R.S. Terms-£2 down.
All Tubes Carry 12 months' guarantee.
A few shop-soiled tubes available. Good
picture. Fully guaranteed, from 50/-.
Spare-time service. Engineers—send for
details of our rebate scheme.

TAPE RECORDERS

Latest Collaro "Studio" 3-speed Tape Deck, complete	£13.17.6
Fitted to Motor Board, with 1,200 feet E.M.I. tape, knobs, etc., to fit into your own cabinet	£15.15.0
50 watt Amplifier, specially de- signed for the "Studio" complete with power pack, knobs, etc. ..	£10.10.0

VALVES

A very wide range at 50% off list price. Send
for complete price list of these and other
Bargains.

TELEVISION TUBE SHOP

48 Battersea Bridge Road, LONDON
S.W.11. BAT 6656. Open Saturdays.

RATES: 4/- per line or part
thereof, average five words to line,
minimum 2 lines. Box No. 1/- extra.
Advertisements must be prepaid
and addressed to Advertisement
Manager, "Practical Television"
Tower House, Southampton St.,
London, W.C.2.

TELEVISION TUBES! Rebuilt, new
guns, twelve months' guarantee, 14in.,
75/-, 17in., 79/6. Quantity discounts.
3, Pank Ave, New Burnet, BAR 3185.

OLYMPIC TV SET

Top Quality Valve., EF33 7/-, EF80 7/6,
EB91 6/6, ECC82 9/-, FCC89 12/-, ECL82 12/6,
FCP80 10/6, PL82 12/6, PY81 10/-, 6d. p.p.
each valve. VALVE HOLDERS, BTG and
B9A, Skirt/Can 1/9 each, 6d. p.p. TAG
STRIPS, 11-way 9d., 7-way 6d. RESISTORS
1/2 watt 3d., 1 watt 5d., WIRE WOUND
POTS, Presets 2/-, Carbon 3/- with switch
5/-, COIL FORMERS with Cores, 6d., 4-PIN
COIL FORMER with Can, 2/- each, SILICON
RECTIFIERS, 125 v. R.M.S. 300 mA, 10/- ea.,
6d. p.p., 17in. Rectangular Tubes, 1s
months' guarantee, £6.0.0. LORENZ
ELECTROSTATIC TWEETER SPEAKERS,
frequency 8000-20,000 c.p.s., 7/- each, 6d. p.p.
VIBRATORS, 2, 12 and 24 volt 4-pin, 4/- each,
6d. p.p. BLOCK PAPER CONDENSERS,
0.25 to 50 mfd, 3/- each, 6d. p.p.

SOUND VISION

ANCHOR STREET, CHELMSFORD

TV TUBES, factory rebuilt (re-
gunned), fully guaranteed, 14in. £5,
17in. £6, p and p 10/- 24, Bristol
Road, Brighton.

"HEATHKITS" can now be seen in
London and purchased on easy terms.
Free brochure. DIRECT TV REPLACE-
MENTS LTD., Dept. P7/22/11, 138,
Lewisham Way, S.E.14, Tideway 6666.

TV SPARES

London's Largest

Range—New or Used

LINE OUTPUT TRANS- FORMERS and SCAN COILS

for nearly every make and model.
New from 45/-. Used from 20/-.
Just a few examples from our extensive
range **IN STOCK.** Add 2/6 for P. & P.
TELEPHONE ORDERS SENT SAME DAY
C.O.D.

NEW LINE O.P. TRANSFORMERS

Pye V4/7, VT4/7, 52/6; LV30, FVI, 52/6.	
Ferranti 14T2/3/4/5, 45/-; T1225, 62/6.	
Ferguson 992/6/7/8, 66/9; 941-55, 57/6.	
Ekco T221/231, 50/-; T161, etc., 45/-.	
H.M.V. 1624-9, 58/6; 1840-8, 59/6.	
Cossor 920-9, 58/6; 916-25, 75/-.	
Alba T301/504, 45/-; 362/441, 47/6.	
Murphy V240/250, 62/6; V200, 49/6.	
Ultra VT9-17, etc., 108/6, with U25.	

New Scan Coils for Pye, V4/7, VT4/7, 62/6.
We also stock a complete range of spares
for nearly all makes and models, e.g.
LOPT's, Line and Frame Blocking Trans.,
Frame Output Trans., valves, resistors
capacitors, ion traps, etc., etc.,
PLEASE SEND S.A.E. FOR IMMEDIATE
QUOTE.

Used Chassis for most of the older sets at
only 50/- plus 20/- carriage.

TELEVISION CONSUMER SERVICES LTD.

28 BROCKLEY CROSS, S.E.4.
TIDeway 5394
112 CAMBERWELL RD., S.E.5.
RODney 7917

SPARES - VALVES - TUBES

1930-1960

Guaranteed Perfect, set tested, ex-
working equipment. LOTS from £1.
POTS, Osc. Tr. Def. Coils, etc., cheap.
TUBES, guaranteed 6 months. FITTED
FREE. Picture shown to callers. 9in.,
30/-, 12in. 50/-, 14in. 60/-, 17in. 70/-.

VALVES, 3,000 types stocked, EF50, SP61,
1/-, EF91, EB91, 6H6, Z77, D77, 6J5, 2/-,
EF80, UF42, 6FL1, 6P13, 6AG5, UB41, 20D1, 3/-,
10P1, 3B6, 6V6, KT61, 6SN7, EL32, B36,
6P25, 4/-, PCC84, PCF80, PL81, PL82, PY81,
ECL80, PCL83, 6K25, EBC91, EY51, EL33,
5U4, 5/-, KT3C, 10P14, 10C1, UCH42, UL41,
ECH35, HVR2, 7C5, 7Y4, 6/-, EL38, KT36,
PY31, 20P3, U281, U16, 7/6, PL38, P230,
20P1, 20P3, 185BT, U08, U24, U25, 10/-,
U801, 20P4, 6CD6, ZTSU, U37, 12/6. Pre-war
4, 5 and 7 Pin, 5/- each Postage 6d.
"Constructor's Parcel," 2 lbs. assorted
resistors, condensers, pots, etc., from
modern TVs, 7/6. Postage 2/6. Write or
phone. Send S.A.E. for list or with enquiries.

"ST. JOHN'S RADIO", 156 St. John's Hill,
S.W.11. BAT. 9838

RECLAIMED VALVES. All tested and
perfect; modern and obsolete; huge
stocks; all one price, 5/-, plus 6d.
postage each, delivered by return.
LEWIS, 46, Woodford Avenue, Ilford,
Essex.

TUBES - AERIALS - VALVES

Regunned tubes, guaranteed one year,
prices from £5, allowance on old tube.
Revacuumed tubes, all sizes, 50/-; guaran-
teed 4 months. Full range of aerials at trade
prices, double five costs only 56/-. Full
range of valves, sample PCC84 cost 8/-.
ITV pre-amplifiers, £3.15.0, self-contained
in case, ITV converters, £5. Brayhead
tuners, £4.12.6. New TV sets and transistor
radio supplied, ask for quotation. Low loss
co-axial, 1 1/2 yd., Standard 6d. yd.
Diplexers 8/8 each. All items carriage
extra. S.A.E. for lists.

G. A. STRANGE

BROADFIELD, NORTH WRAXHALL,
Nr. Chippenham, Wilt. Tel. Marshfield 236

50 PAM 13-Channel TVs, require some
repairs, complete with valves and
C.R.T.s. £5. COURTENAY, DAVIS
LTD., Harpenden, Herts. Tel.: 418.

TELEVISION PICTURE TUBES

Manufacturers' Guarantee

Twelve Months

Tubes for All British made Sets

10 inch	£4. 0.0
12 inch	£5. 0.0
14 inch	£5.10.0
15 inch	£7. 0.0
16 inch	£7. 0.0
17 inch	£7. 0.0
21 inch	£8.15.0

£2.12.6 with order

Balance £1.0.0 Month

Carriage 12/6.

Despatched British Railways Passenger
to give a fast delivery and a
48-hour service from:

Cathode Ray Tube Service

35 BROOMWOOD ROAD
ST. PAUL'S CRAY, KENT
Orpington 21285

SETS & COMPONENTS
(continued)

C. EDWARDS

1070 HARROW ROAD
LONDON, N.W.10
LADBROKE 1734

Offers
S/H TV in
First-class
Condition.

12in. £5.00
14in. £7.10.0
17in. £13.10.0
(all 5 channel)
+15/- carriage.



Guaranteed VALVES
10F1, 10A; 10C2, 10I6; 5A, 5P61, 7A; 6K25, 8A; 20P1, 10A; PZ30, 8A; PL33, 7A; ECL80, 8A; EB91, 4A; Plus 6d. post.
S/H 12in. tubes, 50/- plus 7/6 post.

FERGUSON, EKCO

AJAX TV SIGNAL BALANCER. Gives both programmes with identical brilliance. 10/- post free. **AJAX ELECTRONICS, 572, Fulham Road, S.W.6.**

BRAYHEAD TURRET TUNERS for any area. Will convert over 600 models. Complete with fitting instructions. State set, model and 2 channels when ordering. 10m/c and 35m/c models £5/15/-, 16m/c £8/8/- External cabinet (if required) 24/-. Carriage paid. C.W.O. or C.O.D. **DURHAM SUPPLIES, 175, Durham Road, Bradford 8, Yorkshire.**

SETS & COMPONENTS
(continued)

GUARANTEED VALVES

1L4	2/6	12AT7	6/6	EF91	8/-
6F1	6/6	20D1	6/6	EL32	8/6
6F13	5/6	20P2	7/6	PUC84	8/6
6F14	7/6	20L1	8/6	FX80	6/6
6F15	7/6	177	3/6	PY82	6/6
10C1	7/6	KARC80	7/6	UF41	7/6
10F1	6/6	EF80	5/-	UL46	7/6

Postage 6d. each List 3d.

SERVICE SHEETS, BOOKS, COMPONENTS.

Lists 3d.

Hamilton Radio (T), 13 Western Rd., St. Leonards, Sx.

BOURNEMOUTH

14in., 15in., 17in. Round and Rectangular TV Tubes. £8.15.6 (10/- allowed on your dud tube). 12 months guarantee. 3 element 1TV/BEC aerial with wall bracket. 34/6. Both carr. paid.

BF80	7/6	EZ30	7/6	ECC91	7/6
EL34	8/6	EB91	6/6	ECC82	7/11
PY82	8/6	PL81	12/6	ECC83	7/11
EY51	11/6	PL82	11/6	PCF80	11/6
6V6	5/6	PY81	8/6	PCC84	10/6
12AT7	7/6	EC91	4/-	ECL80	10/6
12AX7	7/11	12AU7	7/11	ECC91	5/-

Complete range of capacitors, resistors, Hi-Fi radio/gram chassis, amplifiers, motors, pick-ups, mono and stereo.

BOURNEMOUTH'S HI-FI AND CONSTRUCTORS' CENTRE

NATIONAL RADIO SUPPLIES

68 HOLDENHURST RD., BOURNEMOUTH
Tel. 25232

REBUILT TELEVISION TUBES—12in.

£5; 14in. 5/10/-; 17in. £8/10/-
Twelve months' guarantee. 10/- carr. **BRAYHEAD TURRET TUNERS—£8/10/6.** Carriage paid. State coils. All types BBC and ITA AERIALS. AIRSPACED COAXIAL CABLE from 6d. per yard. **TELEVISION SPARES AND EXACT REPLACEMENTS.** The latest BSR UA14 four-speed Changer £9/10/-. Carriage paid. All leading makes of **TAPE RECORDERS, TAPES, AMPLIFIERS, TAPE DECKS, RECORD PLAYERS, TELEVISIONS AND RADIOS.** All new goods on Easy Hire Purchase Terms. **TRANSISTORS RED SPOT 5/6, TRANSISTORS WHITE SPOT 5/6 each. GERMANIUM DIODES 1/- each** Stamped addressed envelope, please. For inquiries and callers are welcome.

DEVIZES TELEVISION SERVICE
29-30, The Nursery, Bath Road, Devizes, Wilts. Tel.: Devizes 1100.

H.P. on Regunned C.R.Ts.

At No Extra Charge
12 Months' guarantee
12" & 14" .. £3.10.0
17" .. £4.10.0
21" .. £5.10.0

Phone or Call only:
Rod 7778

P. J. F. Andrews
61-63 ROSEMARY RD.
LONDON, S.E.15

SETS & COMPONENTS
(continued)

TV SPARES New. Used: LOT from 20/-, etc. Valves from 2/6. S.A.E. quotation **BOYD, LANGFORD, 162, Church Street, London, N.16.**

IT4	3/6	EB91	3/6	PCF80	7/6
IL4	1/9	EF91	3/6	PCC84	7/6
IR5	3/6	ECC81	5/-	PL81	8/6
IS5	3/6	ECC82	3/6	6K8G	5/-
DK92	8/-	ECH42	9/-	6SN7GT	4/-
DK96	8/-	ECL80	7/6	6V6G	4/6
DL92	6/6	EY51	7/6	12AH7	4/-
DL96	6/9	EY86	7/6	954	1/3
DL94	7/6	EF86	9/-	EF50	1/3

All Brand New and Boxed. C.W.O. Over 200 Types Available, **Woodward, 16 Aubrey Road, Sherwood, Nottingham. 65504.**

17-INCH TUBES £5, new guns, all sizes available guaranteed. **STAR TUBES, Brief Street, Bolton.**

SALVAGED VALVES
2/6 each

Tested on Mullard High Speed Valve Tester
New and Boxed Valves
all at 10/- each

S.A.E. FOR LIST
ARION TELEVISION, 4 Macted Road, S.E.15 NEWX 7152

REBUILT TV TUBES

Fully Guaranteed
12 months
All makes—12" to 21"

Blane & Martin Electronics

Sandown Lane, Liverpool

DETAILS ON REQUEST. Tel. SEF. 342.

AERIALS

MAKE YOUR OWN AERIALS
SAVE 25%

TV aerial manufacturer offers "do-it-yourself" kits. 50 components include castings, pressings, mouldings, tubes, brackets, can be utilized to make 100 different models. TV, V.H.F., amateur. Brochure gives full illustrations, element dimensions and prices. Discounts for quantities.

THE RICHARD MAURICE EQUIPMENT CO.,
Portsmouth Road, Cobham, Surrey.
COBHAM 3238.

BOOKS

FIND TV SET TROUBLES IN MINUTES from that great book "The Principles of TV Receiver Servicing." 10/6 all book houses and radio wholesalers. If not in stock from: **Secretary I.P.R.E., 20, Fairfield Road London, N.8.**

(continued on next page)

MULLARD CATHODE RAY TUBES

All at the new reduced prices.

RADIANT SCREEN. The very finest picture tube available.

LUMENAR. Built to the same high standards as the Radiant screen tube, but using reclaimed glass bulbs. Every other part is brand new.

FULL 12 MONTHS' GUARANTEE ON EITHER TYPE

	Radiant Screen	Lumenar
12" MW31/74	£5. 0.0	£5. 2.6
14" MW36/24, MW36/44	£9. 0.0	£8. 2.6
14" AW36/20, AW36/80	£9.10.0	£8.16.0
17" MW43/69, MW43/90	£10. 0.0	£9. 0.0
17" AW43/80	£10.10.0	£9.10.0
21" MW63/80, MW63/90	£14. 0.0	£13.15.0
21" AW63/80	£14.10.0	£13.10.0

ALL CARRIAGE & INSURANCE FREE

HIRE PURCHASE

All of the above tubes can be supplied on Hire Purchase as follows:—

Cash Price	Deposit	12 monthly payments of
£5. 2.6	£1.10.6	12/6
£8.10.0	£1.14.0	18/-
£9. 0.0	£1.18.0	18/8
£9.10.0	£1.18.0	14/4
£10. 0.0	£2. 0.0	15/-
£10.10.0	£2. 2.0	15/8
£12.15.0	£2.11.0	18/9
£13.10.0	£2.14.0	19/10
£14. 0.0	£2.18.0	£1. 0.6
£14.10.0	£2.18.0	£1.13

WATTS RADIO (Mail Order) LTD.

64 CHURCH STREET
WEYBRIDGE, SURREY
Telephone: WEYBRIDGE 4558

Please note: Postal business only from this address.

EDUCATIONAL

RADIO AND TV SERVICING. all aspects from basic principles. Guaranteed Coaching for City and Guilds, R.T.E.B. Cert., Brit. I.R.E., etc. Study at home under highly qualified tutors. No books to buy. Write for FREE Prospectus, stating subjects to I.C.S., Intertext House, Parkgate Road (Dept. 516A), London, S.W.11.

FREE FROM THE I.P.R.E. Syllabus of famous radio and TV Courses. Membership Condition booklet. 1/- Sample copy the Prac. Radio Engineer. 2/- post free. Secretary, 22, Fairfield Road, London, N.8.

**Radio
Television
& Electronics**

Learn at home with the world's largest home study organisation. Brit. I.R.E.; City & Guilds; R.T.E.B., etc. Also Practical Courses with equipment. No books to buy.

Write for FREE prospectus stating subject to

I.C.S.
Dept. 516
Intertext House, Parkgate Road,
London, S.W.11.

"HOW AND WHY" of Radio and Electronics made easy by a new, non-maths practical way. Postal instructions based on hosts of experiments and equipment building carried out at home. New courses bring enjoyment as well as knowledge of this fascinating subject. Free brochure from Dept. 12, P.T. RADIO-STRUCTOR, 40, Russell St., Reading.

LEARN

**RADIO & TV
SERVICING
for your OWN
BUSINESS/HOBBY**

by a new exciting no-maths system, using practical equipment recently introduced to this country.

FREE Brochure from:—

RADIOSTRUCTOR
DEPT. G78
READING, BERKS. 22/11/60

SERVICE SHEETS

SERVICE SHEETS Radio, TV, 5,000 models. Lists 1/-. S.A.E. enquiries: TELRAY, 11, Maudland Bk., Preston.

FAULTFINDER FILES (TV) showing common faults that each receiver is prone to and other useful servicing information, 2/- each. List 9d, plus postage. S.P. DISTRIBUTORS, 11, Old Bond Street, London, W.1.

SERVICE SHEETS (continued)

SERVICE SHEETS for sale, all types from 1/-, with free fault-finding guide. 125 Radio/TV sheets covering 370 popular models 20/-. S.A.E. Lists/Enquiries. HAMILTON RADIO (T), 13, Western Road, St. Leonards, Sussex.

SERVICE SHEETS. — We have the largest stock of Radio and TV Sheets in the country for sale at 4/- ea. Radio and Television Service Sheet List 1/-. Also Manuals for sale or hire. List 9d. S.A.E. please. Mail Orders Only. S.P. DISTRIBUTORS, 11, Old Bond Street, London, W.1.

SERVICE SHEETS. TV 2/6 each, radio 2/- each. Post free. DARWINS, 45, Shaw Street, St. Helens, Lancs.

SERVICE SHEETS, TV 4/- ea. Radio 3/- ea. List 1/-. All orders dispatched on day received. C.O.D. if required. Also manuals for sale and hire. SULTAN RADIO, 29, Church Road, Tunbridge Wells, Kent.

WANTED

NEW VALVES WANTED. — EY51, ECL80, PCC84, PCF80, PCL83, PL81, PCL82, PY81, R19, U801, 30P4, etc. Best Cash prices by return. DURHAM SUPPLIES, 175, Durham Road, Bradford 8, Yorkshire.

WANTED, Service Sheets. No quantity too large, highest prices paid. SULTAN RADIO, 29, Church Road, Tunbridge Wells, Kent.

A PROMPT CASH OFFER for your surplus Brand New Valves, Speakers, Components, Test Instruments, etc. R.H.S., 155, Swan Arcade, Bradford 1.

BEST PRICE paid by return for new Valves and equipment. STAN WILLETS, 43, Spon Lane, West Bromwich, Staffs. Tel.: WES. 2392.

NEW TV VALVES WANTED. Send valves, cash by return. to: P. J. F. ANDREWS, 61-63, Rosemary Road, London, S.E.15.

WANTED—VALVES. Modern TV and radio types. Large or small quantities. Box No. 22.

FOR SALE

VALVE CARTONS at keen prices. Send 1/- for sample and list. J. & A. BOXMAKERS, 75a, Godwin Street, Bradford 1.

SERVICE SHEETS: also Current and Obsolete Valves for sale. JOHN GILBERT RADIO, 20, Extension, Shepherd's Bush Market, London W.12 (Phone: SHE 3052).

1,000 TELEVISIONS, all makes, from £3 working, 10/- not. Callers only 9 till 6 including Sats. 39, Whitehorse Lane, Stepney, London.

TELEVISIONS

All sizes including Projections. Require attention from £3. In working order:— 12in. BBC from 65. 12in. and 14in. BBC/ITA from £10. Regunred CRT 26 extra. 17in. from £25. Send for Lists. Carriage Paid.

CADMANS

SERVICE DEPARTMENT
BRYAN STREET, HANLEY
STOKE-ON-TRENT

**TV PHONE
TRANSFORMERS BY 3 p.m.**

SENT SAME DAY C.O.D. ON ALL ITEMS BELOW IN STOCK
LINE OUTPUT TRANSFORMERS

Makes	Models	Prices
ARGOSY:	T2, CTV517	59/6
DECCA:	D17 & C	59/6
DEFIANT:	TR1753	59/6
R.G.D.:	6017T, 7017C, C84	59/6
REGENTONE:	17C, 17T, 17H, C5H	59/6
BAIRD:	2014, 2017, 2114, 2117	49/8
COSSOR:	930 & T, 931, 933-4-5, 937, 938 & A & F, 939 & A & F, 943T, 948	59/6

H.M.V.:	1824 & A, 1825 & A, 1826 & A, 1827 & A, 1829 & A	65/-
MARCONI:	VT68DA, VT69DA	65/-
SOBELL:	T817, T346	63/-
FERGUSON:	398T, 398T	63/-
H.M.V.:	1865, 1869	63/-
FERGUSON:	992T-997T, 998T	69/9
PYE:	V4, V74, V7, V77, CTM4	55/-

All other makes available (3-5 days) S.A.E. ALL ENQUIRIES

LINE BLOCKING OSC. TRANSFORMERS

ARGOSY:	T2-3, CTV517	8/6
DECCA:	D14, D17, D17C	8/6
DEFIANT:	TR1454-5-6, 1552, 1754-5-6	8/6
MARCONI:	VT68DA	8/6
REGENTONE:	14-5-7T, 143T, 173T	8/6
R.G.D.:	6012-4-5-7T series	8/6

H.M.V.: 1824 & A, 1825 & A, 1826 & A, 1827 & A, 1829 & A, 1840-1-2, 3-4-5-6-7-8

MARCONI:	VT68DA, VT69DA, VT150, Vc & VT151, VC152-3	14/6
FERGUSON:	992T-997T, 998T	14/8
PYE:	V4, V74, V7, V77, CTM4	16/9

FRAME BLOCKING OSC. TRANSFORMERS

ALBA:	T301, 304, 312 372 & B, 394, 473 & B series	12/9
ARGOSY:	T9-3, CTV517	12/9
DECCA:	D14, D17, D17C	12/9
DEFIANT:	TR1454-5-6, 1552, 1754-5-6	12/9
MARCONI:	VT68DA	12/9
R.G.D.:	6012-4-5-7T series	12/9
REGENTONE:	14-5-7T, 143T, 173T	12/9
VIDOR:	CG 216, CG 422 series	12/9
PHILIPS:	385U, 485U, 492U, 683U, 704A, 1502U	15/-
STELLA:	1922U	15/-
PHILIPS:	1400A, 1700A, 1800A, 2347A	15/-
PHILIPS:	E4, V74, V7, V77, 1000A, 1700A, 1800A, 2347A	15/-

PHILIPS:	1101U, 1200U & UF, 1400A, 2374A, 2347A	16/-
PHILIPS:	1114UM, 1115U, T01437U, 1818U & 45, 1726U, 1746U	16/-
STELLA:	45, 1747U	16/-
PYE:	8314U, 8317U	16/-

PHILIPS:	FV1 & C, FV2C, V2, FV4C, & C4, V74, V7, V77, CTM4	11/8
PAM:	904, 906, 952-3-4, 958	11/8
INVICTA:	T105, 107-8, 110-1-2-4-5-7-8-9, T120	11/8

FERRANTI:	1473-4-5-6, 17T3-4-5-6, 20T4-5, 21K5-6, 24K4, T1325, 1825, 1825	14/6
-----------	---	------

SOBELL:	T817, T144, T145 & C, T174 & C, TRG174, T175 & LC, TRG	15/-
BANNER:	175, T274, T277, T346	15/-
COLUMBIA:	BT114, BT117 & C	15/-
H.M.V.:	593, 595-6	15/-

H.M.V.:	1814, 1816, 1821, 1824 & A, 1825 & A, 1826 & A, 1827 & A, 1829 & A, 1840, 1841, 1842, 1843, 1844, 1845-7-8	14/8
---------	--	------

MARCONI:	VC69DA, VT59DA, VC60DA, VC62DA, VT68DA, VT69DA, VT150, Vc & VT151, VC152-3	14/8
PYE:	V4, V74, V7, V77, CTM4	11/9

All Makes Available.

FRAME BLOCKING OSC. TRANSFORMERS

BANNER:	BT114, 117 & C	25/-
COLUMBIA:	C503, C505, C506	25/-
SOBELL:	T817, T121, T122, T143, T144, T145 & C, T174C, TRG174, T175 & LC, TRG175, T176, T234, T274, T277, T346	25/-

PYE:	V4, V74, V7, V77, CTM4	23/8
FERGUSON:	992T-998T	21/-

All Makes Available
SCAN OILS

PYE:	V4, V74, V7, V77, CTM4	59/6
FERGUSON:	992T-998T series	59/6
EKCO:	T217, TC178, TC186, T205, T206, TC207	89/6

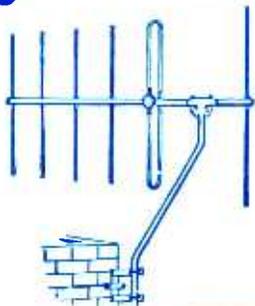
All Makes Available for A.L.L. Models.
S.A.E. ALL ENQUIRIES

Post and Packing all items, 1/6. C.O.D. 1/6 extra.

Wyndors Television Service
ST. ALBANS ROAD
BARNET, HERTS.

BAE, 1769. Closed Thursday 1 o'clock.

Build your own Aerials...



AT HOME

AERIAL FITTINGS FOR BAND III, BAND I & RADIO F/M. Useful formulae and hints for constructing your own aerial quickly and cheaply. Catalogue illustrating our increased range of Diecast Alloy Fittings, including Band III to Band I Mast Couplers, Reflector and Director Rod Holders, Insulators (both "Inline" and "H" types), Masthead Fittings, Masts and Elements, Chimney Brackets, etc. Send 1/- in stamps for the above, to:—

*Fringe*vision Ltd.

MARLBOROUGH, WILTS. Phone : 657/8

AS ADVERTISED ON TELEVISION

Save £££

12 Months' Guarantee

FACTORY REBUILT ...

TELEVISION TUBES

ALL TYPES AND SIZES - Immediate Delivery
FITTED WITH COMPLETE NEW GUN

Price

12" £5.0.0

14" £5.0.0

15" £5.15.0

17" £6.0.0

21" £8.10.0

TERMS TO
THE TRADE

Plus 10/- carriage and insurance.
Cash with order or C.O.D.

RE-VIEW (LONDON) LTD.

10 High Street - - Colliers Wood, S.W.19

Telephone: Liberty 3272

