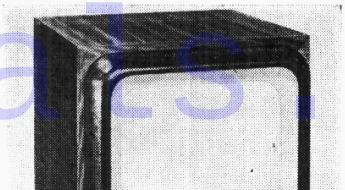
"TRADER" SERVICE SHEET

974/T7

MARCONIPHONE VT5

Covering also H.M.V.



The appearance of the Marconiphone VT53DA receiver. The tube mask escutcheon is a plastic moulding.

FIFTEEN valves, all but one of which are Marconi, and a metal rectifier are used in the Marconiphone **VT53DA** television receiver, which uses a T.R.F. circuit tuned to the lower side-band for the reception of the London transmission, and a 10-inch Emiscope triode C.R. tube with an ion trap and magnet, and a permanent magnet for focusing. It operates from A.C. mains of 200-250 V, 50 c/s, or D.C. mains of 220-250 V. The consumption is rated approximately as 130 W, and the power output as 1 W.

The **VC53DA** is a console version of the VT53DA. The **VT73DA** and **VC73DA** are respectively table and console versions for the reception of the Birmingham transmissions, using a superhet circuit. The differences between these and the London versions are fully explained overleaf, with a diagram of the vision R.F. strip.

Modifications to all models are explained also overleaf.

The H.M.V. **1807A** (London) is in every respect except the cabinet like the Marconiphone VT53DA, and H.M.V. **2807** (Birmingham) has an identical chassis to that in the Marconiphone VT73DA. The H.M.V. **1807** chassis is mainly like that of the 1807A, but there are differences which are described overleaf. The **H.M.V. 1808 and 2808 are** the console versions respectively of the 1807A and 2807.

Release dates and original prices: VT53DA, November 1949, £38 15*s; VC53DA, March* 1950, £48 15*s; VT73DA, February* 1950, £38 15*s; VC73DA, March* 1950, £48 15*s. Purchase tax extra.*

1807, *February* 1949, £37 16*s;* 1807*A, September* 1949, £40 19*s;* 2807, *November* 1949, £40 19*s;* 1808 *and* 2808, *September* 1949, £49 7*s; Purchase tax extra.*

CIRCUIT DESCRIPTION

50Ω co-axial input to 3-valve T.R.F. vision amplifier **(V1-V3, Z77's)**, tuned by staggered transformer couplings to the lower sideband. Aerial attenuator **R1, R2** and **R3** is provided for use in areas of high signal strength and gives

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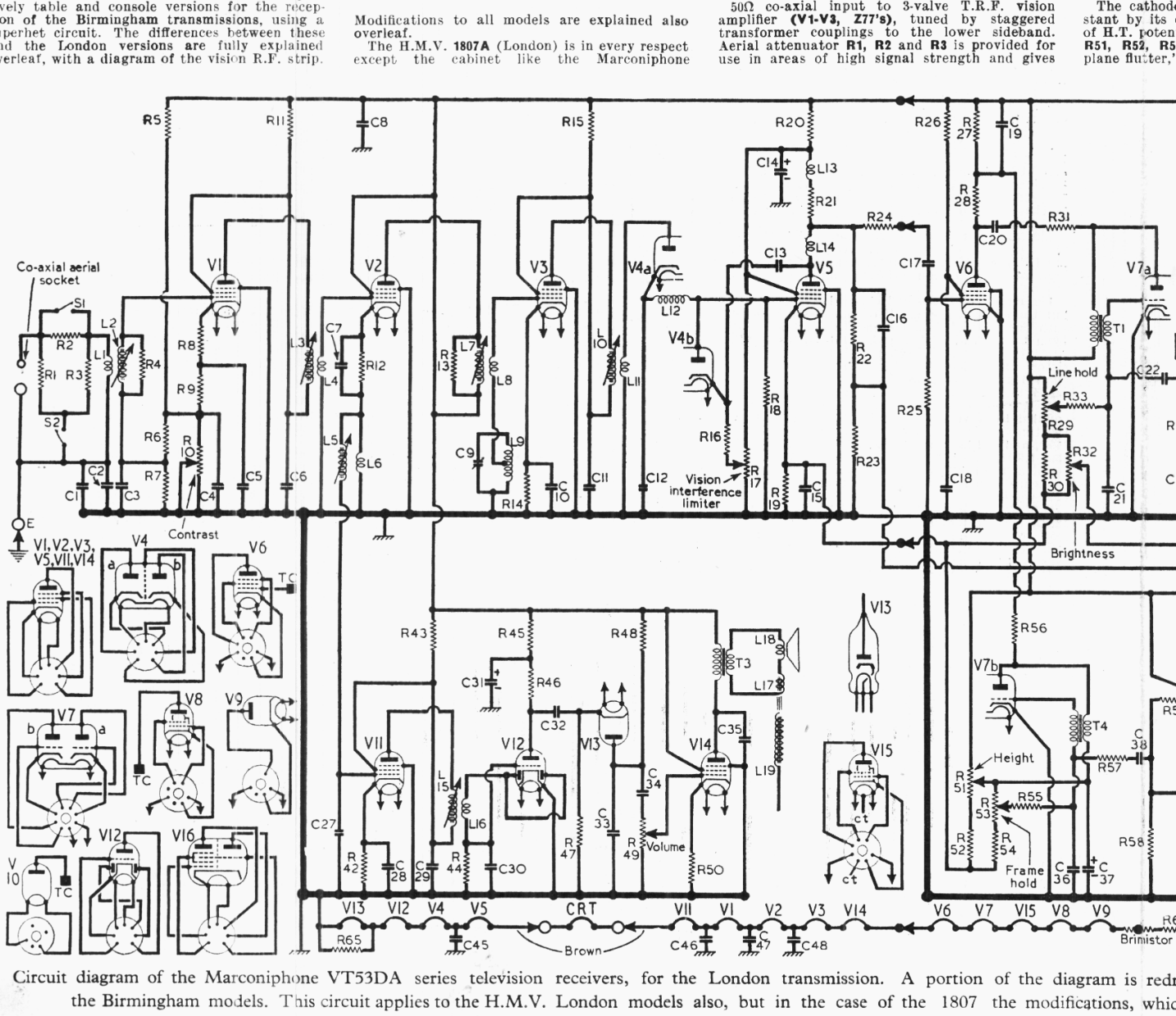


Circuit diagram of the Marconiphone VT53DA series television receivers, for the London transmission. A portion of the diagram is redr
the Birmingham models. This circuit applies to the H.M.V. London models also, but in the case of the 1807 the modifications, whic

VT53DA, VT73DA, VC53DA, VC73DA

M.V. 1807, 1807A, 1808, 2807 and 2808

positions of gain. The **Contrast** control **R10** art of H.T. potential divider **R5, R6, R7** and rs the gain of **V1** by varying its cathode ential.

ection **a** of double diode valve **(V4, D77)** oper- s as vision detector, and section **b** as inter- nce limiter, the latter being adjusted by **on Interference Limiter** control **R17** to con- t only on interference pulses of greater am- ude than the picture signal, thus applying ative feedback via **C13** between anode and of the video amplifier **(V5, Z77)** and reducing gain during the interference. The positive- g detector output, developed across **R18,** is ctly coupled to the grid of **V5,** whose nega- -going output is A.C. and D.C. coupled via and **R22** to the cathode of the cathode ray e **(CRT, Emiscope 3/20).**

ne cathode voltage of **V5** is maintained con- t by its cathode resistor **R19** which is part .T. potential dividers **R29, R30, R32, R19** and **, R52, R53, R54, R19.** To minimise "aero- ne flutter," only half of the total D.C. picture component, that developed across **R23** in poten- tial divider **R22, R23,** is fed to the **CRT** cathode. **C16** is as small as phase shift considerations will permit.

Birmingham Model

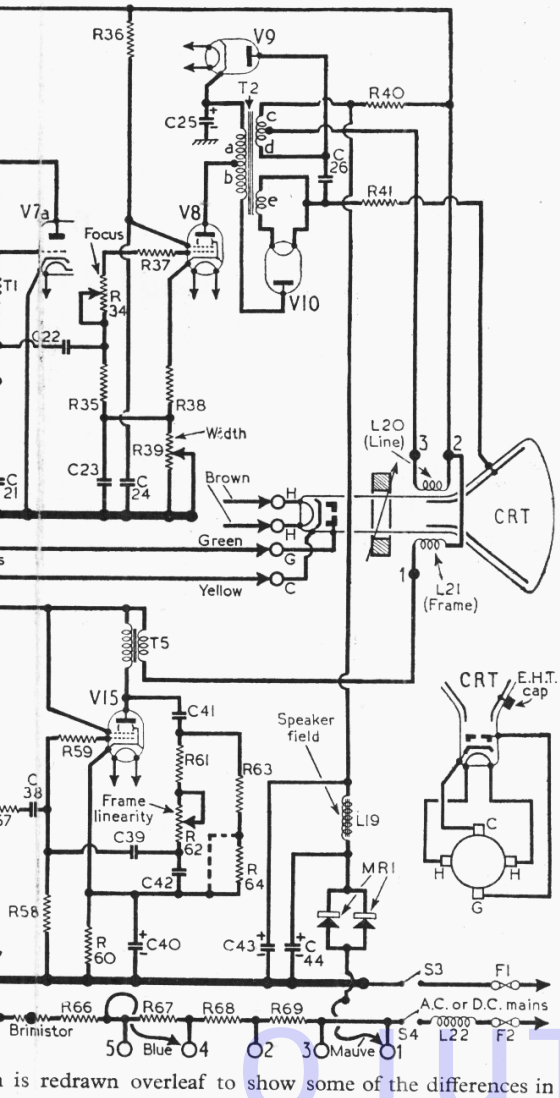
In the Birmingham version, a superheterodyne receiver is used, the sound and vision signals having a common R.F. amplifier **(V1, Z77)** and frequency changer **(V16, X76).** Separation of the sound and vision signals takes place in **V2** grid circuit, **L24, L25** being tuned to the vision inter- mediate frequency, **34 Mc/s,** and **L5, L6** to the sound intermediate frequency **37.5 Mc/s.** The vision I.F. amplifier **(V2, V3, Z77's)** is tuned by staggered transformer couplings to the lower sideband.

Sound Channel

The sound signal is amplified by **V1** and taken out of the vision amplifier in **V2** cathode circuit by **L5, L6,** which at the same time apply nega- tive feedback at 41.5 Mc/s, and after further amplification by **V11 (Z77)** is rectified by the diode section of **V12 (DH77).** A.F. output de- veloped across **R44** is amplified by the triode section of **V12** and passed via a series noise limiter diode **(V13, Mullard EA50)** and **Volume** control **R49** to C.G. of R.F. pentode **(V14, Z77)** which operates as A.F. output valve.

Time-base Circuit

Positive-going sync pulses from **V5** are separ- ated from the negative-going modulation by the sync separator **(V6, Z63),** driving the valve into grid current, which provides D.C. restoration and biases the grid negatively via **R25,** so that the negative-going picture signals drive this valve beyond cut-off. Negative-going sync pulses from **V6** are applied via the differentiating cir- cuit **R28, C20** and **R31** to the anode of the block- ing oscillator line saw-tooth generator **V7a,** part of double triode valve **(V7, B36).** The frequency of oscillation is adjusted by the **Line Hold** con-



is redrawn overleaf to show some of the differences in ns, which are explained overleaf, are extensive.

COMPONENTS AND VALUES

Resistors

R1	75Ω	—
R2	120Ω	—
R3	75Ω	—
R4	33kΩ	G4
R5	33kΩ	J4
R6	2·2kΩ	H4
R7	47kΩ	H4
R8	33Ω	G4
R9	130Ω	G4
R10	10kΩ	D1
R11	470Ω	G4
R12	130Ω	F4
R13	15kΩ	F4
R14	130Ω	F4
R15	470Ω	F4
R16	100kΩ	D1
R17	100kΩ	D1
R18	4·7kΩ	E4
R19	160Ω	E4
R20	2·2kΩ	D1
R21	6·8kΩ	C1
R22	68kΩ	C1
R23	68kΩ	C1
R24	10kΩ	C1
R25	1MΩ	B2
R26	680kΩ	H6
R27	68kΩ	J6
R28	33kΩ	J6
R29	25kΩ	D3
R30	47kΩ	D3
R31	22kΩ	G6
R32	50kΩ	A3
R33	330kΩ	G7
R34	100kΩ	E7
R35	470kΩ	F7
R36	4·7kΩ	G6
R37	15kΩ	E7
R38	100Ω	F7
R39	250Ω	D3
R40	2·25Ω	G6
R41	470kΩ	F7
R42	130Ω	G4
R43	470Ω	G4
R44	47kΩ	H4
R45	33kΩ	H4
R46	47kΩ	H4
R47	1·5MΩ	H4
R48	4·7MΩ	J4
R49	500kΩ	A1
R50	150Ω	H4
R51	25kΩ	D3
R52	22kΩ	D3
R53	25kΩ	D3
R54	10kΩ	D3
R55	3·3MΩ	J7
R56	150kΩ	J6
R57	6·8kΩ	H7
R58	2·2MΩ	J7
R59	1kΩ	H7
R60‡	2·2kΩ	H7
R61	27kΩ	E5
R62	25kΩ	E6
R63	43kΩ	H7
R64	22kΩ	J7
R65	47Ω	C1
R66	69Ω	D2
R67	54Ω	D2
R68	51Ω	D2
R69	16Ω	D2
R70	160Ω	—
R71	100kΩ	—
R72	220kΩ	—
R73	100kΩ	—
R74	22kΩ	—
R75	470Ω	—
R76	15kΩ	—
R77	680Ω	—
R78	47kΩ	—
R79	680Ω	—

Capacitors

C1	0·01μF	—
C2	0·001μF	G4
C3	0·001μF	G4
C4	0·001μF	H4
C5	0·001μF	G4
C6	0·001μF	G4
C7	0·001μF	G4
C8	0·001μF	F4
C9*	30pF	F4
C10	0·001μF	F4
C11	0·001μF	F4
C12	10pF	E4
C13	0·047μF	C1
C14†	4μF	C1
C15	0·001μF	E4
C16	0·22μF	C1
C17	0·047μF	B2
C18	0·047μF	J6
C19	0·0047μF	J6
C20	220pF	G6
C21	0·001μF	G7
C22	0·01μF	G7
C23	0·01μF	G7
C24	0·1μF	G6
C25†	2μF	G6
C26	0·001μF	F6
C27	10pF	G4
C28	0·001μF	G4
C29	0·001μF	G4
C30	100pF	H4
C31†	1μF	J4
C32	0·01μF	J4
C33	0·001μF	J4
C34	0·01μF	A1
C35	0·0022μF	J4
C36	0·015μF	J7
C37†	1μF	J5
C38	0·1μF	J7
C39	0·0039μF	J7
C40†	50μF	C2
C41	0·1μF	J6
C42	0·015μF	J7
C43†	120μF	B2
C44†	64μF	B2
C45	0·001μF	E5
C46	0·001μF	G4
C47	0·001μF	G5
C48	0·001μF	F5
C49	0·001μF	—
C50	0·001μF	—
C51	0·001μF	—
C52	22pF	—
C53	5pF	—
C54	22pF	—
C55	0·001μF	—
C56	0·001μF	—
C57	0·001μF	—
C58	0·001μF	—

Coils

L1	—	B1
L2	—	B1
L3	—	C1
L4	—	C1
L5	—	C1
L6	—	C1
L7	—	C1
L8	—	C1
L9	—	F4
L10	—	D1
L11	—	D1
L12	300·0	E4
L13	13·5	C1
L14	300·0	F4
L15	—	B1
L16	—	B1
L17	0·7	A2
L18	4·0	A2
L19	90·0	A2
L20	5·5	—
L21	5·5	—
L22	3·5	E4
L23	—	—
L24	—	—
L25	—	—

Transformers

T1	Pri.	5·0	G7
	Sec.	2·8	
T2	a	200·0	C3
	b	110·0	
	c	1·8	
	d	12·0	
	e	—	
T3	Pri.	900·0	A1
	Sec.	0·2	
T4	Pri.	260·0	A3
	Sec.	160·0	
T5	Pri.	1,000·0	A3
	Sec.	0·6	

Miscellaneous

F1, F2	1·5 amp	D2
MR1	—	C2
Brimistor	CZ1	D2
S1, S2	—	—
S3, S4	—	A3

* Pre-set. † Electrolytic. ‡ 1·5 kΩ in our chassis, made up of 2·2kΩ.+4·7kΩ in parallel.

trol **R29**, and the amplitude by the **Width** control **R39**. The saw-tooth waveform is passed to the line output valve (**V8, KT36**), which is transformer coupled by **T2** to the line deflector coils **L20**. **Focus** control **R34** varies the fly-back time, thus changing the E.H.T. voltage which in turn governs the focusing of the electron beam. The focus field is provided by a pre-set permanent magnet.

The "efficiency" diode (**V9, U31**) damps the fly-back oscillations and its rectified output, as developed across **C25**, is added to the positive side of the H.T. voltage applied to **T2** primary, giving a "boosted" H.T. voltage to the anode of **V8**. A third winding on **T2** applies some of the output to the E.H.T. rectifier (**V10, U35**) which conducts during the fly-back stroke and charges **C26**, whose negative side is connected to the positive side of the "boosted" H.T. circuit.

Sync pulses are also applied via the integrating circuit **C19, R27** and **R28** to the anode of the frame saw-tooth generator **V7b**. The frequency of oscillation is adjusted by the **Frame Hold** control **R53**, and the amplitude by the **Height** control **R51**. The saw-tooth waveform is passed to the frame output valve (**V15, KT33C**) which is transformer coupled by **T5** to the frame deflector coils **L21**. Linearity of the output waveform is adjusted by the **Frame Linearity** control **R62**. Both pairs of deflector coils are "anchored" to H.T. positive.

Power Supplies

Normal H.T. current is supplied by metal rectifier **MR1 (Westinghouse)** whose two half-sections are connected in parallel. Smoothing by speaker field **L19** and electrolytic capacitors **C43** and **C44**.

Valve heaters, together with the voltage adjustment ballast resistors **R66, R67, R68** and **R69**, are connected in series across the mains input circuit, which is protected by fuses **F1** and **F2**. The Brimistor protects the heater chain against a current surge when switching on from "cold."

VALVE ANALYSIS

Valve voltages given in the table below are those quoted by the manufacturers, and with the exception of E.H.T. voltages they were measured with a meter having a resistance of 500 ohms per volt, chassis being the negative connection.

The receiver was connected to A.C. mains of 220 V, and there was no signal input. Voltage ranges given for **V1, V5, V7b, V8, V10** and **CRT** indicate the variation caused by adjustment of their associated controls. The voltage on **V10** cathode and **CRT** anode should be about 5.2 to 5.7 kV for a normal focused picture.

Valve	Anode (V)	Screen (V)	Cathode (V)
V1 Z77	222	222	45–1·7
V2 Z77	230	230	1·5
V3 Z77	222	222	1·5
V4 D77	—	—	—
V5 Z77	165–172	206–210	2·35
V6 Z63	100	30	—
V7 B36 {a	230	—	—
V7 B36 {b	100–230	—	—
V8 KT36	209–263	145	5·8
V9 U31	230	—	280·0
V10 U35	—	—	2·0–9·0 k*
V11 Z77	220	220	1·5
V12 DH77	48	—	—
V13 EA50	—	—	—
V14 Z77	221	230	1·7
V15 KT33C	200	230	18·0
V16 X78	220 / Oscillator / 82·5	68	—
CRT 3/20	2·0–9·0 k*	—	110·0

* Measured on an electrostatic meter.

CIRCUIT ALIGNMENT

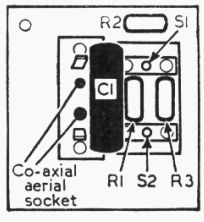
Equipment Required.—An accurately calibrated signal generator with an output impedance of 50Ω; an 0-200 V high resistance D.C. voltmeter for vision output; an A.C. voltmeter for sound output; a screwdriver type trimming tool made of insulating material, and a special trimming tool, type QD5033, for adjusting **C9**.

Connect the vision output meter to the junction of **L14** and **R21**, and earth (across **R22, R23**). Connect the sound output meter across the speaker speech coil, and the signal generator output to the aerial socket, feeding in an unmodulated signal for vision alignment and a 30 per cent modulated signal for sound alignment. Turn the vision interference limiter control (viewed from rear) and volume control fully clockwise, and the contrast control fully anti-clockwise (maximum, when viewed from the rear).

Make the adjustments in the order shown in the alignment tables. "V" under "Meter deflection" means vision, and "S" means sound. "Max. V" means maximum change downwards (decreased reading) from the steady state with no signal input. Adjust the output of the signal generator during alignment so that the sound output meter reading does not exceed 1.1 volts (250 mW), and so that the change (decrease) in the vision output meter reading from the no-signal condition does not exceed 40 volts.

Sensitivity Figures.—A peak white picture should be obtained for an input signal of 190 μV in the London model, 350 μV in the Birmingham model. A sound output of 350 mW should be obtained for a 30 per cent modulated input signal of 120 μV in the London model, 175 μV in the Birmingham model. These values apply to a properly aligned receiver in new condition.

Sketch of the inside (front) of the aerial panel. **S1** and **S2** are threaded holes, with a single screw.



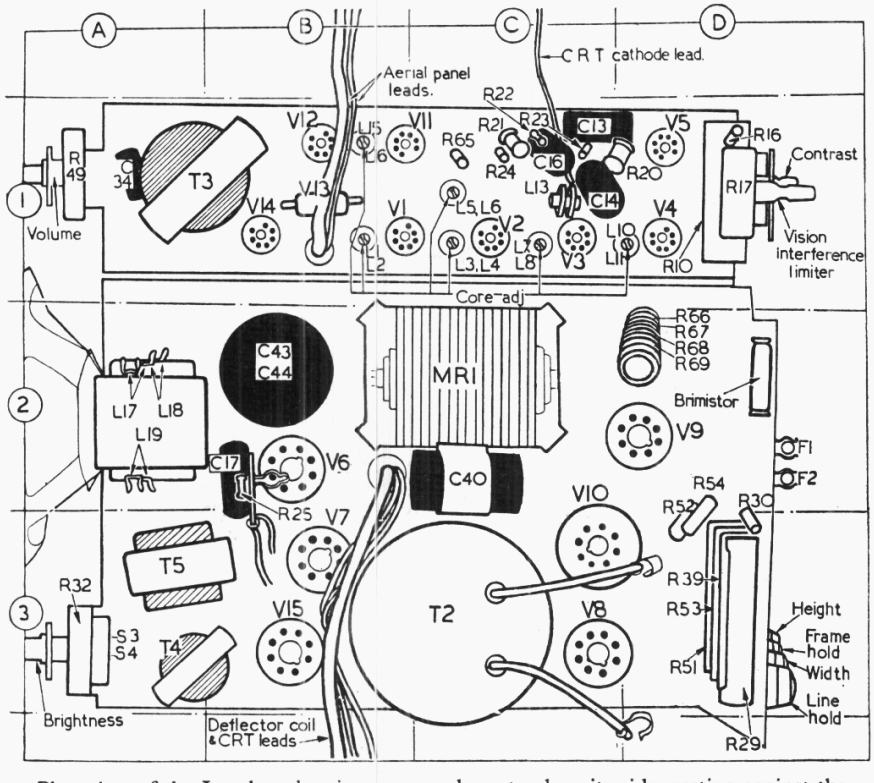
London Alignment Table

Signal Generator Output (Mc/s)	Adjustment	Meter deflection
41·5	L5, L6	max. S
41·5	L15, L16	max. S
41·5	C9	min. V
41·5	L1, L2	max. V
44·0	L3, L4	max. V
43·0	L7, L8	max. V
45·0	L10, L11	max. V

Birmingham Alignment Table

Signal Generator Output (Mc/s)	Adjustment	Meter deflection
37·5	C9	min. V
37·5	L5, L6	min. V
36·25	L24, L25	max. V
34·3	L7, L8	max. V
36·5	L10, L11	max. V
37·5	L16 and L15*	max. S
58·25	L23	min. V.
58·25	C9	min. V
58·25	L5, L6	min. V
59·5	L1, L2	max. V
61·0	L3, L4	max. V
58·25	L16 and L15	max. S

* Two separate units in Birmingham models. Repeat adjustments several times, for max. S.



Plan view of the London chassis, as seen when stood on its side, resting against the metal screen round **V8** and **V10**. The R.F. unit is at the top, and the speaker on left.

GENERAL NOTES

The chassis is all in one piece, but it consists of two units bolted together. The connections between the two sections are indicated in our circuit diagram by solid dots and arrows, of which there are four in a vertical row. A fifth occurs at the grid connection to the C.R. tube, and a sixth between the two chassis units. No wire is used for this last, however, connection being effected via the chassis frame.

To remove the screening cover from the underside of the R.F. unit, the fixing screws at the corners of the R.F. unit must first be removed.

Attenuator.—The attenuator switches **S1, S2** consist of a screw and two tapped holes in the aerial panel. When the screw is in the upper position, **S1** is closed and the attenuator is out of circuit. In the lower position **S2** is closed, and the attenuator is in circuit.

Ion Trap.—The position of the circular ion trap magnet on the neck of the C.R. tube is critical, and if it is misplaced the brightness will be poor or the picture entirely absent. The magnet should be rotated slowly until the position of maximum brightness is found. It should then be slid back and forth along the neck of the tube for maximum brightness, finally being eased backwards as far as it will go without losing any brightness.

Mains Voltage Adjustment.—This is effected by two leads, one blue and one mauve, and five terminals at the rear of the chassis. For all settings except one the mauve lead goes to terminal **1**, but for 240-250 V A.C. it goes to **2**. The blue lead goes to the following terminals: 220-230 V A.C. or D.C., **4**; 240-250 V D.C., **5**; 200-210 V A.C., **3**; 240-250 V A.C., **5**.

Modifications

London Model.—Our circuit diagram is based on our sample receiver, but since it was produced the following modifications have been added. Some chassis may contain some of these modifications and not others.

The thermionic sound interference suppressor **V13** is replaced by a Westector W6 rectifier, **R65** of course being discarded. A second W6 rectifier is connected in parallel with **R56**, which is then changed to 2.2 MΩ. The "Red" end of the rectifier goes to the **V6** end of **R56**, and a 0.047 μF capacitor is inserted in series with the lead between **R56** and **V7b** anode.

R55 is changed to 2.2 MΩ, and **C36** to 0.022 μF. **R63** becomes 100 kΩ, and **C39** 0.0082 μF. A 330 kΩ resistor may be connected across **R63** in some models to improve frame linearity, and **R64** is omitted. **R64** was optional in early models, as indicated by the dotted line.

Birmingham Models.—Apart from the different tuning circuit, the Birmingham versions VT73DA and VC73DA, incorporate all the foregoing modifications as compared with our circuit diagram. The differences in the vision amplifier are shown in the separate circuit diagram at the foot of this column.

The amplifier is a superhet, in which **V16** is the frequency changer **(V16, X78)** and **V2, V3** are I.F. amplifiers. The intermediate frequencies are 34 Mc/s (mean vision) and 37.5 Mc/s (sound).

The circuit of the sound channel is not shown, but there are a few small changes as compared with our diagram. The sound I.F. is taken out from **L6** instead of **L5, and C27 becomes 15 pF.** A 22pF coupling capacitor and 100kΩ C.G. resistor are interposed between **C27** and **V11** control grid.

L15 and **L16** no longer form a transformer, but are two separate tuned coils "top" coupled by a very small capacitance formed by twisting their leads together. **R42** becomes 160Ω, and **C28** becomes 200pF. **R44** becomes 100kΩ, **R48** 3.3 MΩ, and **R50** becomes 160Ω and is decoupled by a 25 μF electrolytic. The heater sequence also is different from that in the London version.

H.M.V. Models.—In the H.M.V. range, the 1807A may be taken as being technically equivalent to the Marconiphone VT53DA. The 1807, however, is different in a number of ways. The 1808 is the console version of the 1807A. The 2807 is the Birmingham version of the 1807A, and the 2808 its console equivalent. The console has a P.M. speaker, a smoothing choke taking the place of **L19**. Some of them have band-pass coupling between **V3** and **V4A**.

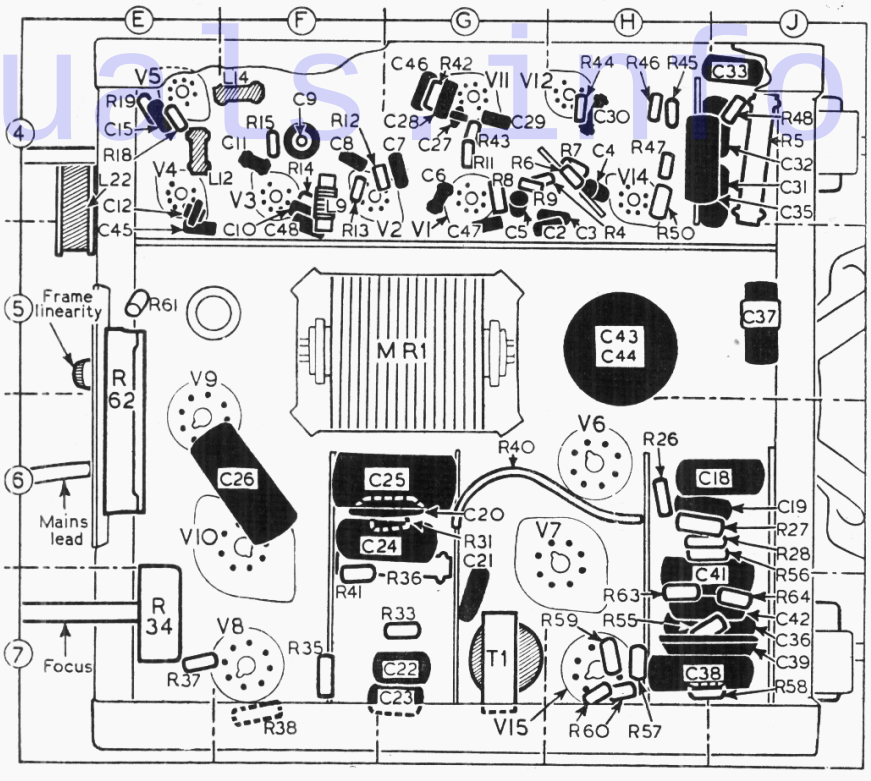
Model 1807.—The principal differences in the 1807 as compared with the 1807A are in the frame time-base circuit and in the omission of both the sound and vision interference limiters. In the vision circuit, this latter amounts simply to the removal of **C13, R16** and **R17**, while there are no connections to pins 1 and 7 of **V4b**. Similarly, in the sound channel **V13, R47, R48, C33** and **C34** are omitted, and **C32** goes directly to the top of **R49**. The shunt **R65** across **V13** heater, of course, comes away with the valve. In addition, the attenuator circuit **R1, R2, R3** is omitted in the aerial input.

The frame output circuit is very different. The deflector coils **L21** are fed via a D.C. isolating 32 μF electrolytic capacitor from the junction of two anode resistors, one of 6.8 kΩ going to H.T.+ and the other 220Ω going to **V15** anode. **T5** is eliminated.

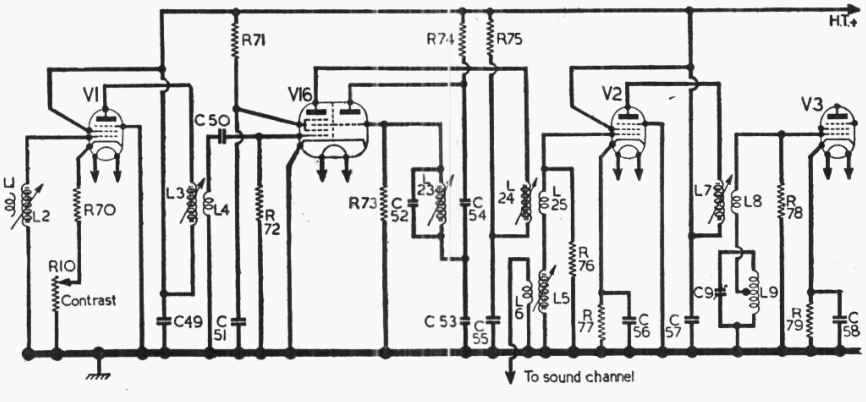
The frame linearity control **R62** and all the components associated with it, **C41, C42, R61, R63, R64,** are omitted from **V15** anode/cathode circuit, together with **R60** and **C40**. The frame linearity control and the height control are two variable resistors connected in series, in that order, between **V15** cathode and chassis. The former is 1-1 kΩ, and the latter 1 kΩ. **R59** is omitted, and **R58** goes to the junction of the two controls instead of the chassis.

Our height control potentiometer **R51, R52** is omitted, and the top of **R53** goes to H.T.+ while **R55** and **C36** become 1.5 MΩ and 0.047 μF respectively. **R57** is omitted. **T4** primary, no longer obtaining its H.T. supply from **R51**, goes instead to the H.T.+ line at the junction of **L19** and **R40, C37** being omitted.

The brightness control **R32**, which we show connected in parallel with **R30**, is connected instead across **R54**, its value being unchanged. The value of **R30** is changed to 15 kΩ, and that of **R54** to 22kΩ. Finally, **R37** in the line output valve grid circuit becomes 1 kΩ, and the mains R.F. filter choke **L22** is omitted. **CRT** is an Emiscope 3/16, with no ion trap.



Underside view of the London chassis, standing on the same edge as in the plan view, with the R.F. unit, which is normally covered by a metal screen, at the top.



Section of the diagram of the vision R.F. unit in the Birmingham models. It is a superhet circuit, **V16** being the frequency changer and **V2, V3** I.F. amplifiers.

DISMANTLING THE SET

Removing Chassis.—Withdraw connecting leads from base of C.R. tube and E.H.T. cap;
slide off the ion trap magnet, remove the focus magnet (three screws with springs and washers), and slide off deflector coil assembly;
remove aerial panel and chassis fixing screws, and lift out chassis.
To gain access to underside of R.F. unit, remove four screws at its corners, ease up unit, and slacken six screws on edges.
When replacing, tag 1 on the deflector coil assembly should be at the bottom, and tag 5 at the top. Tag 2 should be at the front, and 5 at the rear. Lock the assembly in position with a rubber band fore and aft.
Slip on the ion trap magnet, and adjust it later as explained under "General Notes."
The focus magnet should then be adjusted by its spring-loaded fixing screws and, if necessary, by sliding its mounting bracket to and fro in the roof of the cabinet.

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