DECCA

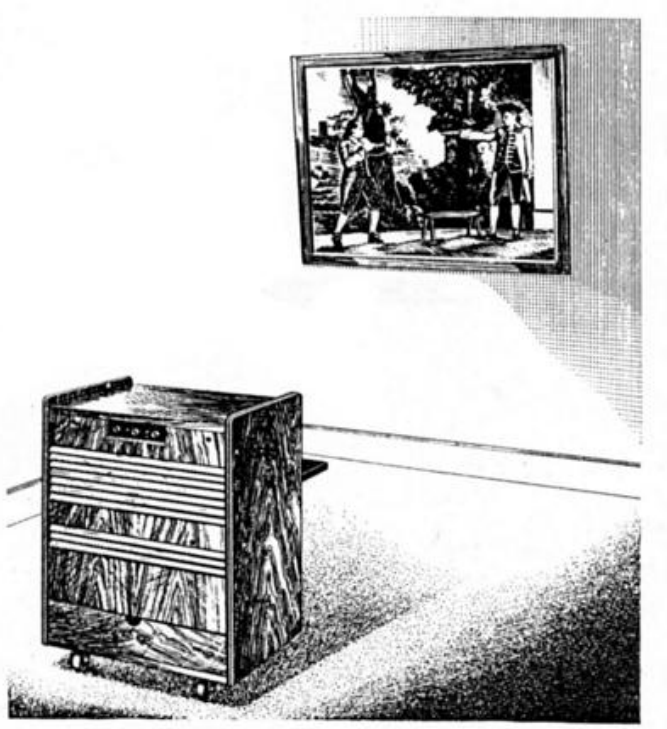
SERVICE NOTES

DECCA

LARGE SCREEN

PROJECTION TELEVISION RECEIVER

MODEL 1000



DECCA RADIO AND TELEVISION

branch of The Decca Record Co., Ltd.

1-3 BRIXTON ROAD, LONDON, S.W.9

RELiance 8111 (30 lines)

SPECIFICATION

Circuit: (i) Single sideband superheterodyne (All channels)
(ii) Double sideband superheterodyne for London reception only.

Radio Frequencies:

		Vision	Sound
(a)	London	45.0 Mc/s	41.5 Mc/s.
(b)	Sutton Coldfield	61.75 Mc/s	58.25 Mc/s.
(c)	Holme Moss	51.75 Mc/s	48.25 Mc/s.
(d)	Kirk O'Shotts	56.75 Mc/s	53.25 Mc/s.
(e)	Wenvoe	66.75 Mc/s	63.25 Mc/s.

Aerial Impedance:

80 ohms unbalanced. (Co-axial)

Intermediate Frequencies:

		Vision	Sound
(a)	London		
	(i) Single sideband	14.0 Mc/s	10.5 Mc/s.
	(ii) Double sideband	13.0 Mc/s	9.5 Mc/s.
(b)	Sutton Coldfield	14.0 Mc/s	10.5 Mc/s.
(c)	Holme Moss	15.0 Mc/s	11.5 Mc/s.
(d)	Kirk O'Shotts	14.0 Mc/s	10.5 Mc/s.
(e)	Wenvoe	14.0 Mc/s	10.5 Mc/s.

Colour Coding: Receivers are identified by the colour of the attenuator cover on the lower front of the chassis. In most cases the colour appears also on the metal brackets fitted on the R.F. strip. The coding is as follows:

London (Double Sideband)	Black
London (Single Sideband)	Yellow
Sutton Coldfield	Red
Holme Moss	Blue
Kirk O'Shotts	Green
Wenvoe	White

Cathode-ray Tube and Optical System: 2½" projection tube and Schmidt F.62 lens. Picture projected on to an aluminium-sprayed screen.

Picture Size: 4ft. x 3ft.

Controls: Sound Volume and On/Off: Focus: Brilliance.

Sound Output: 3 watts - (approximately)

Loudspeaker: 8" high flux P.M. unit.

Cabinet Dimensions: 24½" wide, 16½" deep, 30½" high.

Safety Device: Two valves are used to protect the cathode-ray tube in the event of failure of the time-bases.

E.H.T. Supply: Pulsed R.F. and voltage tripler: 25 kV.

Mains Voltage Range: 200-250 volts. A.C. 50 cycles.

Consumption: Approximately 200 watts.

INSTALLATION & SETTING-UP

Preliminary:

Before putting the receiver in service remove all packing material from the inside, and take off the red metal locking plate used to secure the optical unit during transit. Keep this, and the four securing screws, as they will be required again if the receiver is to be transported at some future date. The front panel of the cabinet (that which faces the screen) should be detached to gain access to the interior.

Adjust the mains input tap according to the voltage of the local supply: this adjustment is situated on the power chassis.

The mains input connector and a co-axial aerial socket will be found on the lower front panel of the receiver. Best results will be obtained only when an 80-ohms co-axial aerial feeder is used. The type of aerial to be used will depend on the district in which the receiver is installed and on local conditions, but it should be borne in mind that the better and more efficient the aerial, the better the picture obtainable.

In areas of very high signal strength, such as when the set is installed close to the transmitter, it may be necessary to fit an attenuator to the aerial input circuit to prevent overloading. Details of this are given on Page 5.

Siting the Receiver:

The distance between the front of the receiver cabinet and the screen should be approximately 8ft. 6ins. This distance is not critical, but mechanical focus adjustments will be required if the receiver is placed much nearer or further away from the screen.

The screen should be securely suspended on a wall directly facing the projection lens of the receiver, the two struts fitted to the top of the frame being used to tilt the screen downwards. An average height for the screen is 38 inches above floor level, measured to the lower edge of the picture area. A wing-nut adjustment is provided at the front of the optical unit on the receiver to enable the angle of the lens to be varied within limits to correctly position the picture on the screen.

Setting-up:

Switch on (left-hand knob on Receiver Control Panel), turn Brilliance Control (right-hand knob) fully anti-clockwise and allow a minute or so for the valves to reach operating temperature. Set the Volume Control (left-hand knob) to desired level.

obtain a picture by turning the Brilliance Control slowly clockwise. If turned too far, this control will cause a sudden increase of brightness which will blank out the picture. When first installed, it is expected that some adjustment of the auxiliary controls will be needed, and the following procedure should then be adopted. These controls are placed on a panel behind the hinged flap at the lower part of the rear of the cabinet. The adjustments should, if possible, be made on the B.B.C. Test Card radiated during weekday morning transmissions.

Set the Contrast Control to maximum (fully clockwise) and adjust the Sensitivity so that the video amplifier is just approaching overload. As either of these controls can cause 'blanking out' if turned too far they should be advanced slowly. When a picture is obtained, adjust the Contrast and Brilliance controls together for best definition. If overloading is apparent even when the Sensitivity Control is set at, or close to, its minimum position, an aerial attenuator should be fitted.

Time-bases:

If necessary, adjust the time-base controls as follows:

(1) Line Hold: Set this to give a steady picture without "tearing" across the top.

(2) Frame Hold: This should be adjusted to correct slipping or vertical jumping so that the picture remains locked. The control is gradual in operation but it is important to set it for best interlacing.

Focusing:

Both electrical and mechanical focus arrangements are used. The mechanical adjustments are made by means of three knurled knobs on the optical unit, and are generally similar to those required for Decca receivers using the rear projection system. A separate manual on the setting-up of the optical unit is issued with these Notes. The mechanical focus is set at the Factory and no further adjustment of this should be needed for normal use. If, due to movement in transit, the degree of resolution is not even all over the raster, the mechanical alignment should be checked according to the procedure laid down in the manual on the optical unit.

Electrical focus is adjusted by the centre control on the top receiver panel, and this works in conjunction with a pre-set control mounted towards the left of the end of the chassis remote from the auxiliary controls. With the main focus control set at two-thirds of its travel in a clockwise direction, adjust the pre-set control for the sharpest picture focus.

Vision Suppressor:

Set this as far possible clockwise without reducing peak white, then return it very slightly anti-clockwise.

Width:

With the distance between receiver and screen approximately 8ft. 6ins. adjust so that the picture is just wide enough to fill the screen.

Height:

Adjust to fill the screen vertically.

Line Linearity:

If re-setting is required, as evident by distortion at the left side of the picture, a slight adjustment of this control may be made. This should only be done on a proper tuning signal, and the control should not be moved unless linearity is definitely bad.

Frame Linearity:

Vertical cramping or stretching of the picture may be corrected by careful adjustment of this pre-set.

Sync:

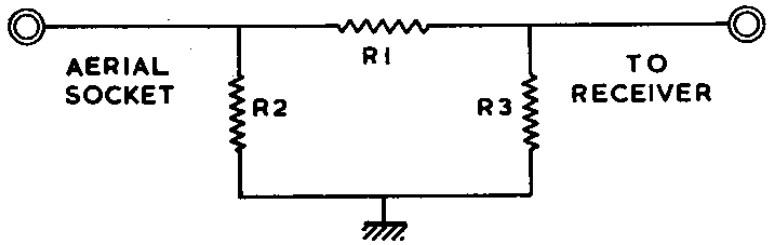
The normal position for this control is one-third of a revolution back from its full clockwise position. The control is correctly set at the Factory and should not be disturbed any more than necessary as incorrect adjustment will interfere with interlacing.

The above adjustments are not of necessity carried out in the order given. Serious maladjustment of one control may effect others, so that it is advisable to check all adjustments if difficulty has been experienced.

AERIAL ATTENUATOR

An attenuator network may be required if the receiver is installed close to a transmitter. The following table gives suitable resistor values and the degrees of attenuation provided. Ordinary $\frac{1}{4}$ watt carbon resistors are suitable and should be mounted inside the small box to be found on the lower front of the receiver chassis. R1 is fitted in place of the wire link at present joining together the top two contacts.

Attenuation	R1	R2 & R3
3 times	100 ohms	150 ohms
10 "	390 "	100 "
30 "	1,000 "	82 "
100 "	3.900 "	82 "



VALVE TYPES & FUNCTIONS

V1	-	EF42	-	Common R.F. Amplifier
V2	-	EF42	-	Mixer-Oscillator
V3	-	EF42	-	Vision & Sound I.F. Amplifier
V4	-	EF42	-	Vision I.F. Amplifier
V5	-	EB91	-	Vision Det. & D.C. Restorer
V6	-	6F13	-	Video Amplifier
V7	-	EF42	-	Sound I.F. Amplifier
V8	-	EB91	-	Sound Det. & Interference Limiter
V9	-	ECC34	-	Cathode Follower & Right Form
V10	-	EB91	-	Sync. Separator
V11	-	6F14	-	Sync. Amplifier
V12	-	6L18	-	Pulse Limiter
V13	-	EB91	-	Spotter & Frame Pulse Separator
V14	-	T41	-	Frame Oscillator
V15	-	Pen 45	-	Frame Output
V16	-	T41	-	Line Oscillator
V17	-	EL38	-	Line Output
V18	-	EL38	-	Left Form
V19	-	6SN7GT	-	Tube Protection
V20	-	6SN7GT	-	Tube Protection & Brilliance Level Control
V21	-	6L18	-	Audio Amplifier
V22	-	6V6GT	-	Audio Output
V23	-	GZ32 (or 45 IU)	-	H.T. Rectifier
V24) V25) V26)	-	EY51	-	E.H.T. Rectifiers
V27	-	EBC33	-	E.H.T. Blocking Oscillator
V28	-	EL38	-	E.H.T. Pulse Generator

CIRCUIT DESCRIPTION

R.F. & Vision I.F. V.1 is an R.F. amplifier common to sound and vision, and is followed by a pentode mixer-oscillator, V.2. The first I.F. amplifier (V.3) is also common to sound and vision, the two frequencies being separated in the anode circuit. A second stage of vision I.F. amplification is provided by V.4. this valve being followed by a diode detector (one half of V.5), the second half of this valve providing D.C. restoration.

Video Amp. V.6 is the video amplifier. The amplified video signal is fed via C.25 and L8/R31 to the grid of one triode of V.9, used as a cathode follower, the cathode being directly connected to the grid of the C.R.T. The other triode of V.9 operates as the "right form" control valve. Details of this circuit are given following the general circuit description.

Synch. V.10. V.11 and V.12 are, respectively, Synch. separator, Synch. amplifier and Synch. pulse limiter stages. In addition, one diode of V.13 is used as a frame pulse separator. The second diode, fed from the top end of L8/R31, operates as a parallel-connected interference 'spotter'. V.14 a T41 gas-filled triode, is the frame oscillator, and V.15 the frame output stage. A T41 (V.16) is also used as the line oscillator, the line output valve being V.17. The functions of V.18 ("left form"), the Brilliance level control valve and the Tube protection stages (V.19 and V.20) are explained in greater detail later in these notes.

Sound Channel. The sound I.F. signal fed from L.4 is taken via C.17 to the grid of V.7, where it is amplified and then passed by means of IFT3 to the combined sound detector and interference limiter, V.8. A.F. voltages appearing across the Volume control R99 are tapped off and fed to the triode amplifier V.21, and thence to the beam-power tetrode output valve V.22.

C.R.T. & E.H.T. The miniature C.R.T. is grid modulated, the brilliance being variable by means of R100 in the cathode lead. An E.H.T. voltage of 25kV is applied to the anode of the tube, the voltage being obtained from a separate E.H.T. unit using a triode oscillator (V.27) and a pentode amplifier (V.28) to supply pulsed voltages to three EY51 rectifiers in cascade.

Power Supply. A full-wave rectifier supplies H.T. to the whole of the receiver. The mains transformer has a separately-wound primary which gives complete chassis isolation.

Trapezium Controls (Left & Right Form) Due to the fact that the projection lens is at an inclined angle in relation to the viewing screen distortion in the form of a trapezium effect would occur if correction were not made for this. Such correction is

provided by the Left and Right Form controls, and the functions of these should be studied to enable their purpose to be fully understood.

"Left Form" Control, V.18.

A portion of the frame scan is taken via R59, the Line Form Control R84 and C53, and is developed across R83. If the cathode and anode of V18 are considered as a diode, the action of which is controlled by the frame scan waveform on the interposed grid, then successive lines will be damped at one end by an amount directly proportional to the amplitude of the applied frame scan, the action being controlled by R84.

The Line Linearity Control R85 functions in the usual manner, C54 being common to both form and line linearity controls.

"Right Form" Control, Half V.9.

The action of this stage is similar to the Left Form Control except that the 50 cycle modulation is applied to the grid directly from the secondary of the frame output transformer while the effect influences the anode of the line oscillator valve V16 via the networks C55, the Right Form Control R87, R80, C52, R74, R75 and R88.

Brilliance Level Control, V.20b.

Examination of the circuit will show that V20b, V19b, the Brilliance Control R100, R82 and R105 are in series between chassis (cathode V20b) and the H.T. line. The grid of V20b is connected to the video demodulation cathode of V5 via R18 and is decoupled by C16. It will be apparent, therefore, that changing levels at the cathode of V5 due to maximum modulation (peak white) will effectively control the series chain between the slider of the Brilliance Control R100 and chassis. This signal-controlled potentiometer thus maintains the tube brightness level narrowly at the potential manually set by the Brilliance Control and prevents excessive peak white over-modulation effects on the tube.

Tube Protection Device, V19a, V19b and V20a.

In the absence of scan voltages at the grids of V19a and V20a both triodes conduct heavily and their anode voltage is therefore low. V19b is at cut-off as its grid voltage is considerably negative with respect to the cathode due to the position of V19b in the series chain mentioned in the previous paragraph. V19b is thus, under these conditions, a high resistance in series with the Brilliance Control, the slider of which is connected to the cathode of the C.R. tube.

When the time-bases are functioning, the anode voltage on V19a and V20a rises but this rise is limited by a small (due to the high value of R93) value of grid current produced in V19b.

If either or both time-bases fail, therefore, the voltage on the anodes of V19a and V20a, and hence the grid of V19b, immediately falls. The result is a reduction of V19b anode current, a rise of C.R. tube cathode voltage and a consequent reduction of beam current.

ALIGNMENT DATA FOR SINGLE SIDEBAND MODELS

See Separate Instructions for
London Double Sideband Model.

It is not recommended that re-alignment be attempted unless an accurately calibrated signal generator covering the intermediate and radio frequencies is available.

Indication of vision output may be obtained by connecting a voltmeter (such as a Model 7 Avometer) in parallel with R17. A test socket is provided on the left-hand side of the R.F. strip to facilitate this connection; the positive lead being taken to this and the negative lead to chassis. Sound output may be measured on an output meter as for an ordinary broadcast receiver.

All trimming adjustments should be made with the Contrast and Sensitivity controls turned fully clockwise for maximum gain, but the Brilliance control should be set at minimum. A non-metallic trimming tool must be used. To avoid damage to the tuning cores a little gentle heat may be applied before turning them. If the chassis is covered by a cloth and left working on the bench for about fifteen minutes beforehand the wax will become sufficiently soft for the cores to be turned with ease.

I.F. Alignment:

(1) Connect the signal generator output between the grid of V2 and chassis, and adjust L4, followed by the primary and secondary windings of IFT 3, for maximum sound output at the relevant frequency according to the table shown below:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
10.0 mc/s	10.5 mc/s	11.5 mc/s	10.0 mc/s	10.5 mc/s

(2) Adjust L5 at the same frequency for minimum vision indication.

(3) Check L4 to see that maximum sound output corresponds with minimum vision response. If not, repeat operations (1) and (2).

(4) Adjust secondary windings of IFT 1 and IFT 2 (both below chassis) for maximum vision reading at frequency as determined below:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
10.5 mc/s	11.0 mc/s	12.0 mc/s 12.0	10.5 mc/s	11.0 mc/s

(5) Adjust primaries of IFT 1 and IFT 2 (both above chassis) for maximum vision reading according to the following table:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
13.0 mc/s	13.5 mc/s	14.5 mc/s 14.0	13.0 mc/s	13.5 mc/s

(6) Repeat all preceding adjustments.

(7) Adjust core of L3 at 12.5 mc/s for London, S. Coldfield, Kirk O'Shotts and Wenvoe, or 13.5 mc/s for Holme Moss. The settings are approximate as L3 should be set 11.5 for an overall flat response.

R.F. Alignment:

Transfer signal generator output to aerial socket and proceed as follows:-

(8) Adjust L2 for maximum sound output at a frequency according to the table below:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
41.5 mc/s	58.25 mc/s	48.25 mc/s	53.25 mc/s	63.25 mc/s

(9) Adjust secondary of RFT 1 for maximum vision response as follows:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
43.0 mc/s	60.0 mc/s	50.0 mc/s	55.0 mc/s	65.0 mc/s

(10) Adjust L1 for best results on frequency as in following table:-

London	S. Coldfield	H. Moss	K. O'Shotts	Wenvoe
44.0 mc/s	61.0 mc/s	51.0 mc/s	55.0 mc/s	66.0 mc/s

(11) Check that the response curve is flat overall, re-adjusting L3 if necessary to obtain this result.

ALIGNMENT OF DOUBLE SIDEBAND CHASSIS (Coded Black)

I.F. Alignment: Set up receiver as for Single Sideband models - and proceed as follows:-

(1) Feed signal generator to grid of V2, and adjust L4, followed by primary and secondary of IFT 3, for maximum sound output at 9.5 mc/s.

(2) Adjust L6 and L5 at 9.5 mc/s for minimum vision response, and follow this by re-setting L4 for minimum vision reading.

(3) Adjust primaries (above chassis) of L3, IFT 1 and IFT 2 for maximum vision output at 15.5 mc/s. Two positions of resonance will normally be found: use the first one encountered as the core is screwed in.

(4) Adjust secondaries (below chassis) of L3, IFT 1 and IFT 2 for maximum vision output at 10.5 mc/s.

(5) Repeat above operations.

R.F. Alignment:

(6) Feed generator output to aerial socket and trim L2 for maximum sound at 41.5 mc/s.

(7) Adjust primary of RFT 1 for maximum vision response at 48.0 mc/s.

(8) Adjust secondary of RFT 1 for maximum vision response at 42.0 mc/s.

(9) Adjust L1 for maximum vision response at 45.0 mc/s.

(10) Repeat operations (7), (8) and (9).

ALL READINGS WITHOUT SIGNAL AND TAKEN ON 400 V. RANGE OF AVO 7

Focus, Preset Focus and Brilliance Control and gain control fully clockwise.

VALVE NO.	ANODE	CATHODE	SCREEN	GRID
1	220	2	220	
2	240		125	(Decoupled side)
3	220	2	220	
4	220	2	220	
6	115	1	200	
7	220	2	220	
9a	365	30		
9b	30			
11	15	1.5 - 9.5*	60	
12	25			
13		50 - 150*		
14	65	4		
15	240	65	240	
16	65	4		
17	365	20	290	
19a	40			
19b	100	50		40
20a	40			
20b	50			
21	85	4		
22	300	10	200	
23	360v-360	375v		

* According to setting of sync. cont.
\+ When not oscillating 90v.
* To vision noise clipper control R.48.

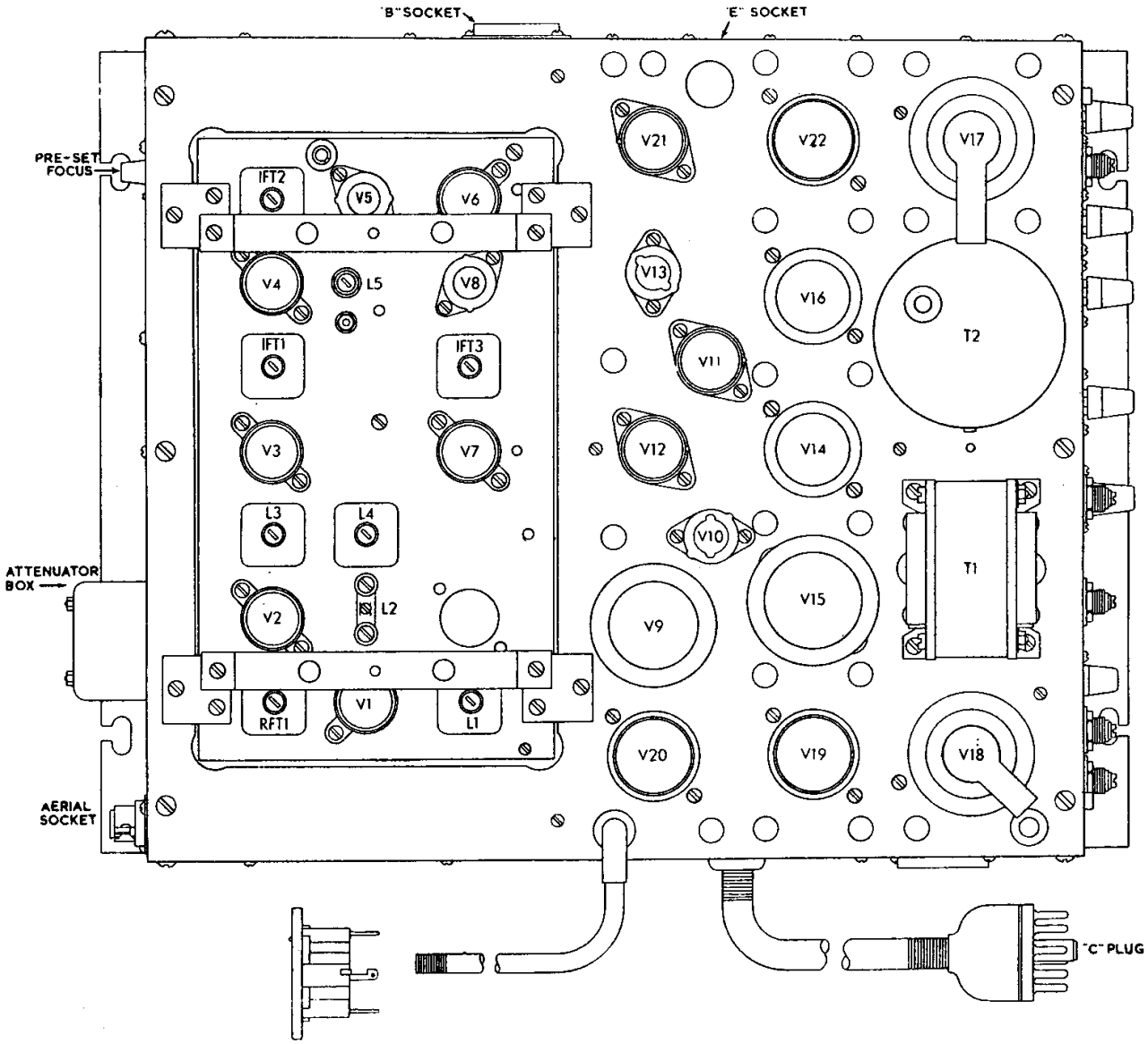
POWER PACK

"C" sockets
Pin 4 365v
Pin 5 340v
Pin 6 260v

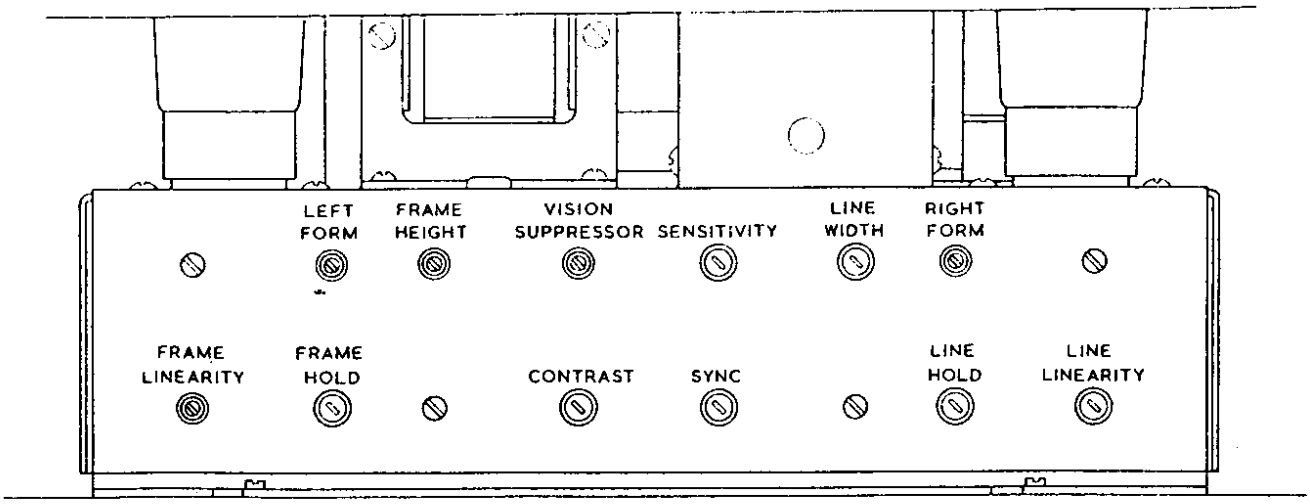
TUBE CATHODE

Varies with Brilliance Control from 90-160v, or if scans fail, rises to 200v or more. If this last condition applies disconnect tube base until fault is cleared in order to safeguard tube.

PLAN OF MAIN CHASSIS



The above plan shows the valve lay-out for both the Single and Double Sideband chassis. V23 is placed separately on the power pack and V24-V28 on the E.H.T. unit. V24-26 are miniature E.H.T. rectifiers contained in a sealed can. Should a defect become evident in this it should be returned complete for repair or replacement. No attempt at opening the can should be made as it is filled with a special oil.



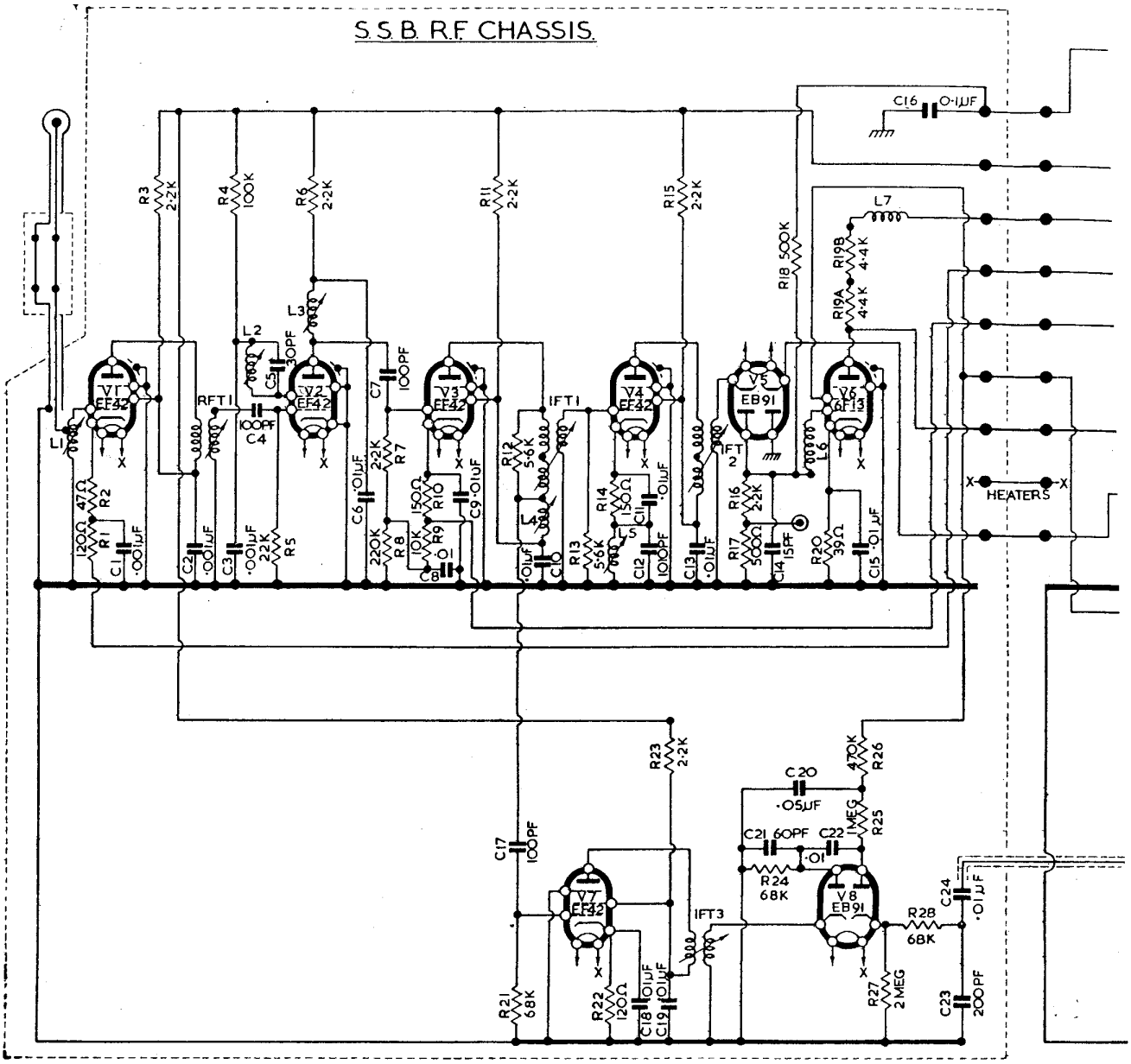
Auxiliary Control Panel

R.F. CHASSIS CONNECTION NOTES

The numbers at the right of the Double Sideband diagram refer to the contacts on the main tag panel on the underside of the R.F. chassis assembly, and are applicable also to the Single Sideband circuit. The extreme right-hand contact on the panel (looking towards the corresponding panel on the main chassis) is Tag 1.

Note that some tags are not used for inter-chassis connection and are, therefore, not included in the numbering. No earth connection is taken to the panel, but the two units have a common earth line completed through the sub-chassis securing screws.

The top end of R23 (R26 in the Double Sideband circuit) is taken to the H.T. line via a spare tag on the panel, this being looped on the main chassis to Tag 8. This does not alter the theoretical circuit in any way.



CAPACITORS

C. No.	VALUE	TOL. %
1	·001 µF	10
2	·001 µF	10
3	·001 µF	10
4	100 pF	5
5	30 pF	5
6	·01 µF	10
7	·01 µF	10
8	·01 µF	10
9	1010 pF	5
10	·01 µF	10
11	·01 µF	10
12	1010 pF	5
13	·01 µF	10
14	15 pF	5
15	·01 µF	10
16	4 pF	5
17	·01 µF	10
18	·01 µF	10
19	·05 µF	10
20	60 pF	5
21	·01 µF	10
22	200 pF	5
23	·01 µF	10
24	·1 µF	10

RESISTORS

R. No.	VALUE (Ω)	TOL. %
1	120	5
2	47	10
3	2.2 k	5
4	3·3 k	10
5	100 k	5
6	22 k	10
7	2·2 k	5
8	3·3 k	10
9	220 k	10
10	10 k	5
11	3·3 k	10
12	150	10
13	2·2 k	5
14	3.3 k	10
15	3·3 k	10
16	150	10
17	2·2 k	5
18	5·1 k	5
19	500	10
20	2·2 k	5
21	39	5
22	5·1 k	5
23A	4·4 k	5
23B	4·4 k	5

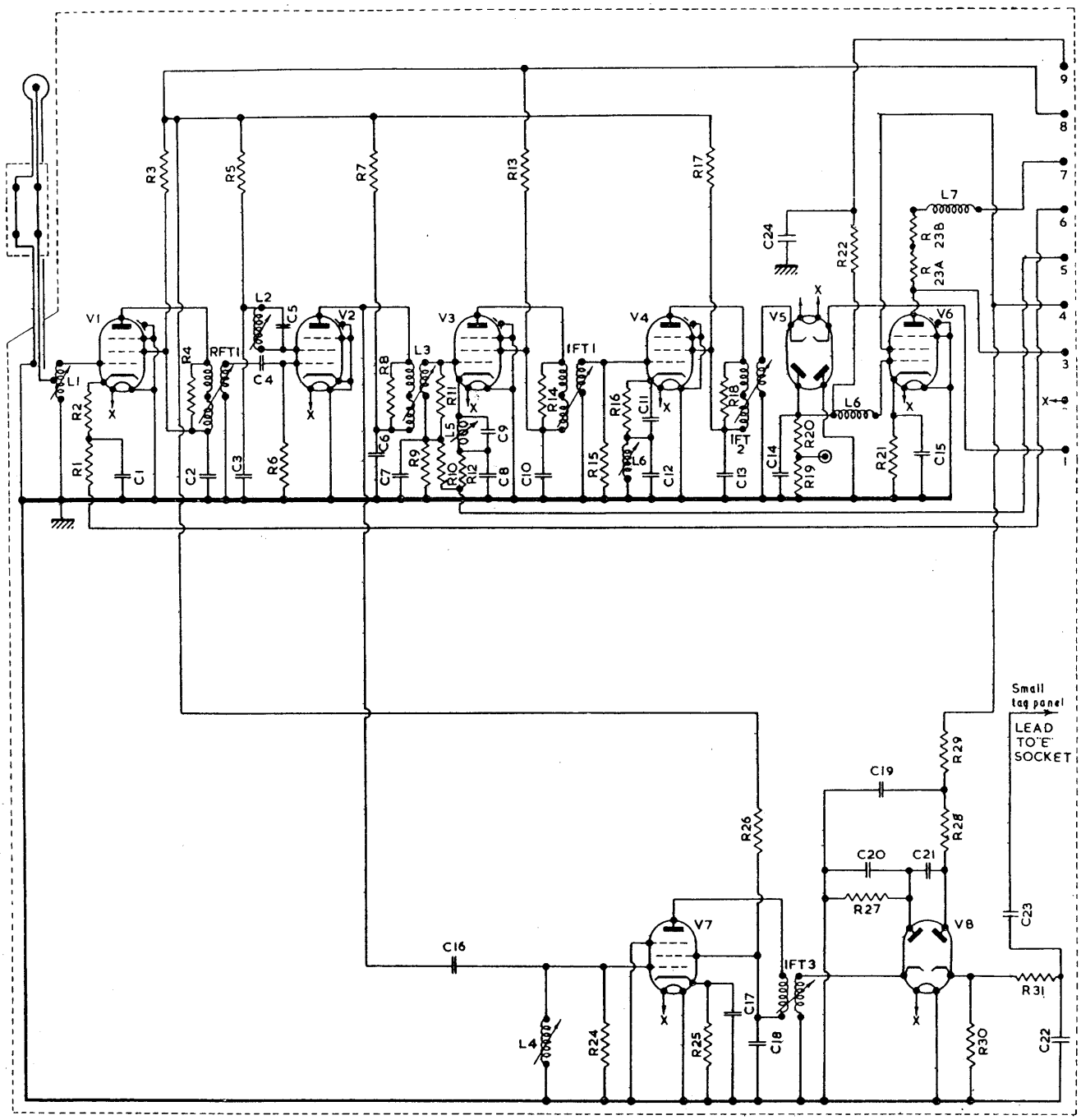
R. No.	VALUE (Ω)	TOL. %
24	110 k	5
25	120	5
26	2·2 k	5
27	68 k	10
28	1 M	5
29	470 k	10
30	2 M	10
31	50 k	10

Some models may have component values slightly different from those given. This does not affect the performance of the receiver.

VALVES

V. No.	TYPE
1	EF42
2	EF42
3	EF42
4	EF42
5	EB91
6	6F13
7	EF42
8	EB91

R.F. SECTION OF DOUBLE SIDEBAND RECEIVER



MISCELLANEOUS RESISTANCE READINGS

Readings plus or minus 10%

T4 (Mains Transformer)
Primary: 2.8 + 0.3 + 0.4Ω. H.T. Secondary: 27 + 29.5Ω.

T3 (Sound Output Transformer)
Primary: 400Ω. Secondary: 0.5Ω.

T2 (Line Transformer)
Primary: 100Ω. Secondary: 1.2Ω.

T1 (Frame Transformer)
Primary: 580Ω. Secondary: 2Ω.

L12 (Smoothing Choke)
50Ω.

L11 (Focus Coil)	L10 (Line Coils)	L9 (Frame Coils)
1,300Ω	4Ω.	12.2Ω.