BAIRD P1712, P1812, P1814, P1815, C1815

Prices and release dates: P1712, "Conway" table model £65 2s. 0d. (£48 13s. 11d. plus £16 8s. 1d. tax), June 1953; P1812, table, £66 3s. 0d. (£49 9s. 7d. plus £16 13s. 5d. tax), August 1952; P1814, table, £77 14s. 0d. (£58 2s. 5d. plus £19 11s. 7d. tax), August 1952; P1815 "Coronation" table, £86 2s. 0d. (£64 8s. 1d. plus £21 13s. 11d. tax), August 1952; C1815 "Coronation" console £101 17s. 0d. (£76 3s. 9d. plus £25 13s. 3d. tax), August 1952.

Fifteen-valve television receivers, incorporating self-contained mains-led aerial as well as sockets for external dipole. Receivers are available, suitable for any of the five BBC channels, use being made of appropriate plug-in RF and mixer sub-chassis. For 200-250V 50c/s AC. Consumption 160W. Manufactured by Baird Television, Lancelot Road, Wembley, Middlesex.

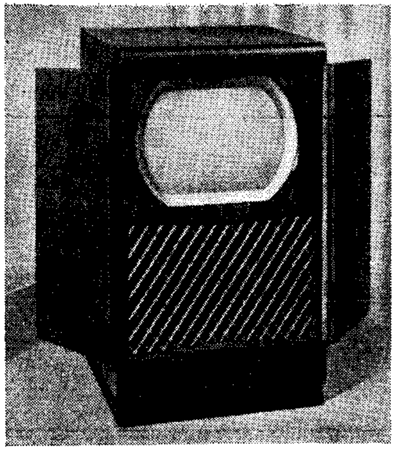
THE only differences between these models are the type of cabinet, CRT size, the line output transformer and the deflector coil assembly. The last two figures of the model number indicate the size of CRT screen; thus model P1712 has a 12in. screen, while model P1814 employs a 14in. tube. With the exception of console model C1815, all receivers are housed in table cabinets fitted with straight-line grey filters to improve the contrast ratio. Models P1815 and C1815, however, employ a filter-glass face and a clear implosion guard.

Aerial. A mains-lead aerial is provided, together with an input socket for external aerial. Mains-lead aerial inductance is wound on a cardboard former. Each transmission channel requires a different mains aerial lead. A colour code, which is the same as that for the RF units given below under Channel selection, ensures against error. The colour is painted on the former.

When mains-lead aerial is used, the aerial selector fuse on the RF unit should be plugged into socket marked M on the fuse panel. But when interference or poor signal strength demand the employment of an external aerial, the fuse should go into socket marked EXT. The external aerial input circuit is designed for 75 ohm coaxial cable.

A three-position aerial attenuator, giving two steps of attenuation of 20dB each, is incorporated on the aerial socket, and for best signal-to-noise ratio on the picture it should be set so that the "Shade" control (Contrast) operates near the fully anti-clockwise position. In fringe areas an improvement in signal-to-noise ratio of about 4dB can be realised by removing attenuator resistors R3 R5 from their common junction with aerial input socket and using the Distant socket.

Channel selection is by means of plug-in units incorporating the RF amplifier and mixer stages.



C1815, the "Coronation" 15in. console

IF coil cans of the units are colour coded as follows: London, brown; Birmingham, yellow; Holme Moss, red; Kirk o' Shotts, orange; Wenvoe, green.

Automatic noise limiters are provided for both vision and sound interference. Where severe interference is encountered, an adjustable vision interference limiter may be of advantage. Details for fitting one are given below under Modifications.

The receivers incorporate a superheterodyne circuit operating on lower sideband of vision frequency carrier.

RF stage. Aerial voltage is fed to grid of RF amplifier V1 by bandpass transformer composed of L13 L14 L15. When the mains-lead aerial is used, the input is fed to a tap on L13. RF choke L1 is included in the other mains-lead to prevent incoming signals from being bypassed to chassis through heater chain and mains transformer MT1.

The gain of V1 is governed by **Shade** control VR1, which varies the cathode bias and thereby provides adjustment of contrast. Negative feedback developed across R7 counteracts the change in input capacity which would otherwise occur at different gain settings of VR1. Screen is decoupled by C5, and the suppressor grid is earthed to chassis. Coupling of V1 to triode mixer V2A is by L16 L17 of bandpass transformer RFT2.

Oscillator. Triode V2B functions as a Colpitts oscillator. Oscillator coil L2 goes from anode to grid via C9, with C8 connected across it. Automatic bias is developed on C9, with R13 as leak. Oscillator voltage is injected at V2A mixer grid via C7.

Mixer V2A has vision and sound signals from RF amplifier V1 fed to its grid via bandpass transformer RFT2. Oscillator voltage from V2B is also injected at grid via C7. Combined vision and sound IF signals of 13mc/s and 9.5mc/s respectively, appear at the anode. Stray RF signals appearing at anode are reduced in amplitude by the capacity to chassis of the screened lead connector from pin 6 on octal socket of RF unit to first IF coupling transformer IFT1. Cathode bias is built up across R11 bypassed by C6.

Vision channel. The combined vision and sound IF signal is coupled by a double-tuned bandpass transformer IFT1 to first vision IF amplifier V3, the gain of which is determined by Shade control VR1 in the cathode circuit. Vision IF signals are further amplified by V4, to which they are coupled by L20 L21 of double-tuned bandpass transformer IFT2. A resonant circuit L8 C12 in the cathode is tuned to the sound IF of 9.5mc/s and produces a large amount of negative feedback at this frequency in V4, thereby eliminating the sound signal from vision channel.

Coupling between V4 and the demodulator diode V5A is achieved by bandpass transformer IFT3. A small positive voltage is applied to the cathode of V5A by R25. This prevents the diode conducting until the signal exceeds the standing voltage, so clipping the peaks of the synchronising pulses and removing noise which may cause ragged synchronising.

Demodulated signal at cathode of V5A is DC coupled to grid of video amplifier V6 via an inductive filter L3 R22, with R27 acting both as grid return for V6 and load resistor for V5A.

Bias for V6 is developed across R28 in the cathode, shunted by C18 R78. The value of C18 is such as to afford little decoupling at low frequencies, but as the frequency increases decoupling efficiency progressively improves. Thus, frequency selective negative feedback is applied to V6 and the frequency response of the stage is maintained at the higher video frequencies. Further correction is provided by L4, damped by C31, in series with the signal feed from the anode to CRT cathode. R29 C19 in the same circuit allow the DC level to vary with tube beam current while passing the full AC video signal; so that aircraft flutter and other unwanted variations in DC level are reduced.

Interference limiter diode V5B has negative-going picture signal applied to its cathode, so that it functions as a peak rectifier and provides a voltage across C17 which corresponds to the peak white content of picture. When interference pulses greater than peak white occur the diode conducts and provides a low impedance path to chassis.

Sound channel. V10 functions as IF and AF amplifier. IF sound signals of 9.5mc/s are fed from V3 anode to V10 grid via C51 L9 C58, and after amplification are transformer coupled by L26 L27 to demodulator diode V11A. The audio voltage produced across load resistor R64 is applied to anode of **Noise limiter** diode V11B. At normal audio frequencies the cathode of V11B follows the anode, and audio voltage appears across R62. Since interference noise pulses are composed mostly of frequencies outside the audio range, by providing a long cathode time constant R62 C47, the cathode is unable to follow the anode when they appear and the diode becomes non-conductive. The interference-free audio signal appearing at the cathode is fed back to the grid of V10 via C45 R72 for amplification. The amplified AF signal then appears across R75, the anode load resistor.

Signal across R75 is fed by C41 to **Volume control** VR3 in the grid circuit of output tetrode V12, which is transformer coupled by OP1 to a 10in. PM speaker of 3 ohms impedance.

Sync separator. Video signal at V6 anode goes to grid of sync separator V7 via C20 and R33. Grid current drawn by V7 sets a bias across R32 which holds valve at cut-off while picture signal is present, but allows it to conduct on positive-going sync pulses. Grid stopper R33 limits grid current, so that tops of sync pulses are clipped and noise is removed.

Anode load is R56, together with R70 shunted by C40. Line sync pulses are taken from anode and applied to screen of line generator V13. R70 C40 serve to filter out frame sync pulses.

Combined line and frame sync pulses appear across R34 and are passed through the integrator circuit R35 R36 R37 C21 C22 C23 C24. Frame sync pulses are fed to the frame sawtooth oscillator V8 via C25. R35 R36 R37 filter out the line pulses.

Frame oscillator is double-triode V8 in a cathode coupled multivibrator circuit. C27 is charged through R41 from an HT voltage derived from boost voltage developed by efficiency diode V14, plus the normal HT line voltage. It is discharged when triode V8B (one triode section of V8) becomes conductive at end of scan. A positive-going sawtooth voltage is thus produced across C27. A high value of HT voltage on the charging circuit ensures that only a small part of the charging time is used, and therefore a more linear sawtooth output is obtained. Frequency of oscillation is controlled by VR5 **Frame lock** in the cathode.

Frame amplifier. Sawtooth output from V8 is fed via C28 and correction circuit C29 R44 C30, to grid of triode-connected tetrode V9. Variable bias control VR6 enables **Frame form** (linearity) to be adjusted, while VR7 **Picture height** control determines the amount of cathode negative feedback applied. Amplified output at anode is transformer fed by FT1 to frame deflector coils L11 on neck of CRT. R46 prevents interaction between line and frame deflector coils.

Line scan waveform is generated by a self-oscillating tetrode V13 operating in conjunction with efficiency diode V14. Oscillation in V13 is maintained by feedback between anode and grid in line transformer LT1, grid current being limited to a low value by R53 R54 shunted by R73 R74. V14 is arranged to conduct on the overshoot of the flyback pulse and provides the first part of the scanning stroke. At the same time a DC voltage is developed across C34 and added to the HT line and used to supply V13 anode and charging circuit of the frame oscillator. Frequency of oscillation is controlled by **Line lock** VR4, which determines the amount of bias applied to grid.

Line amplitude is governed by variable inductance L7, while **Line linearity** is corrected by a variable damping resistor VR8 on the resonant circuit made up of L6 C55 C37.

EHT for CRT anode is obtained by rectification by V15 of the high voltage surge set up across L31 of LT1 when V13 is cut-off at end of line scan. EHT is smoothed by C32 and fed through R77 to CRT anode. The value of EHT voltage will of course vary with the models and CRTs used. For model P1712 EHT will be 9KV; model 1812, 10KV; model 1814, 12KV; model 1815 12KV.

HT is provided by a metal rectifier MR which is fed from 225V tapping on auto-transformer MT1. Main HT is choke-capacity smoothed by L5 C52A C52B. A lower voltage HT rail is provided for the RF and IF sections of the receiver through R60 decoupled by C44A, while HT for V8 audio ouput is decoupled from main HT rail by R57 C44B. Reservoir capacitor C52A should have a ripple current rating of 500mA.

Heaters of all valves, except V14 V15, are series parallel connected. Three heater chains are used so that large series resistors 68E 69A 69B may be incorporated in each, and the starting current of the valves limited to a safe value.

CRT has video signal fed to its cathode, and picture brightness is controlled by variation of grid voltage by **Light** control VR2.

CRT for model P1712 is Mullard MW31/74;

P1812, Mazda CRM123; P1814 Brimar C14BM; P1815 and C1815, Mazda CRM, 152B.

Mains aerial. Inductance in mains lead is designed as a quarter-wave stub while L1 is more or less a half-wave stub. C53 acts as an RF filter. As mentioned earlier, it is necessary to change the mains lead when operating on a different channel. The number of turns for mains-lead inductance in respect of channel used is as follows: London 13; Holme Moss 12; Kirk o' Shotts 11; Birmingham 10; Wenvoe 9.

Mains input. Auto-transformer MT1 has primary tapped for 205V, 215V, 225V, 235V, 245V AC supplies. Fuse ratings are: F1, 2A; F2, 2A; F3, 1A. Mains On/Off switch S1 is ganged to volume control VR3.

ALIGNMENT PROCEDURE

Apparatus required. Signal generator covering 9-14 and 45-70 mc/s with internal modulation; an 0-50V AC rectifier type voltmeter for use as output meter; a non-metallic trimming tool; damping lead consisting of a 500ohm $\frac{1}{4}$W resistor in series with a .01mF 350V capacitor with a 12in. wire end.

IF stages. Connect output meter, via a .5mF isolating capacitor, from anode of V6 to chassis.

In the following procedure Top means that the inductance core is above chassis, while Bottom indicates that it is tuned from the underside.

Inject modulated 11.5mc/s (20-50mV) to Grid V4, connect damper between anode V4 and chassis and tune L23 (Bottom) for maximum. Connect damper across L23 and tune L22 (Top) for maximum.

Inject modulated 11.5mc/s (10-20mV) to grid V3, damp L20, tune L21 (Bottom) for maximum. Damp L21 and tune L20 (Top) for maximum.

Inject modulated 11.5mc/s (15mV) to grid of mixer V2A, connect damper between anode and chassis, set **Shade** control to maximum, tune L19 (Bottom) for maximum. Damp L19 and tune L18 (Top) for maximum.

Remove damper, inject 9.5mc/s (10-15mV) to grid of mixer V2A, tune L8, sound rejector, for minimum. Connect output meter to V12 anode, reduce input to 1-5mV, set volume control at one-third maximum, tune L9 L26 L27 for maximum.

RF stages. Inject modulated signal (500 microvolts) of 41.5 (L), 48.25 (HM), 53.25 (Ko'S), 58.25 (B), or 63.25 mc/s (W) into aerial input socket with aerial selector fuse F1 set in EXT position, tune L2 for maximum sound.

Transfer output meter to V6 anode, inject 43, 49.5, 54.5, 59.5 or 64.5mc/s at aerial socket, according to channel required, and tune L13-14 L15 L16 L17 for maximum vision output.

Sensitivity. Final sensitivity obtained should be such that an input of 30-40 microvolts modulated to a depth of 30 per cent. applied to Distant aerial position produces an output of about 4V RMS at anode of video amplifier V6.

MODIFICATIONS

Fringe area. In areas where signal strength is low, two modifications may be made to RF amplifier to increase sensitivity and improve signal-to-noise ratio.

(1) Remove aerial attenuator resistors R3 R5 from their common junction with aerial input socket and use Distant position.

(2) Remove V1 cathode bypass capacitor C3 from junction of R7 R8 and connect to cathode pin 7. Disconnect end of R8 going to junction R19 VR1 and connect to chassis tag in centre of RF unit chassis. Retune L13-14 L15 on BBC transmission for maximum sensitivity.

Vision interference limiter. In localities where electrical interference on picture is severe and continues, an adjustable vision interference limiter is of advantage.

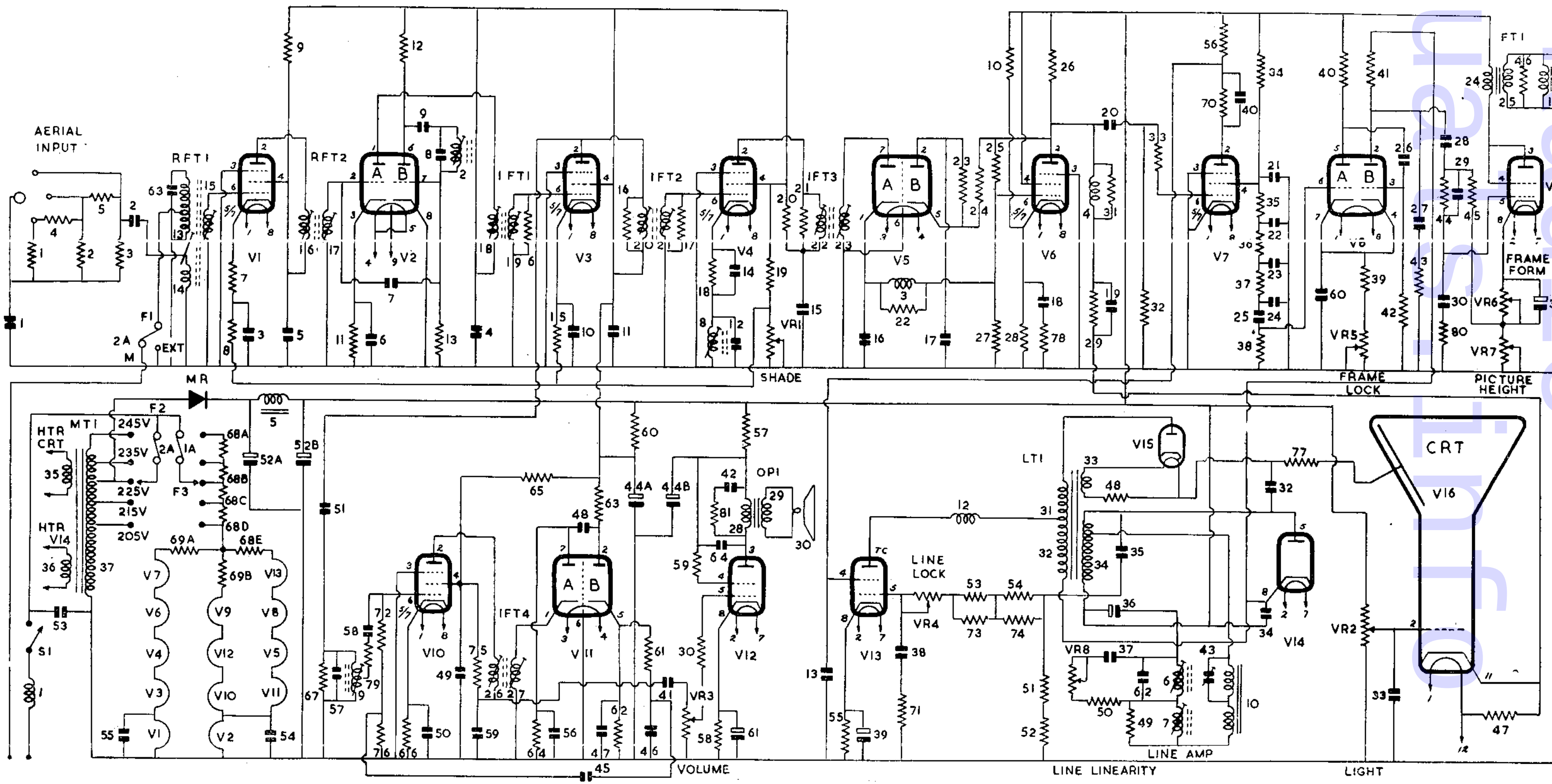
Remove R23 from diode V5B; connect a bleeder chain of 22K $\frac{1}{4}$W, 50K potentiometer, 47K $\frac{1}{2}$W, in that order, between the low HT rail (feeding IF section) and chassis. Connect a 1 megohm $\frac{1}{4}$W resistor between slider of 50K potentiometer and V5B anode, and a .1mF 350V capacitor between slider and chassis.

Sound noise limiter. The performance of the limiter may be improved at the expense of high frequency response in audio amplifier by increasing the values of C46 C47 from .001mF to .005mF each.

Improved definition. Remove L4 R31 from V6 anode circuit. Remove R78. Remove L3 R22 and replace by separate RF choke.

RESISTORS

R	*Ohms*	*Watts*
1	120	$\frac{1}{4}$
2	120	$\frac{1}{4}$
3	120	$\frac{1}{4}$
4	390	$\frac{1}{4}$
5	390	$\frac{1}{4}$
6	4.7K	$\frac{1}{4}$
7	33	$\frac{1}{4}$
8	100	$\frac{1}{4}$
9	2.2K	$\frac{1}{4}$
10	27K	2
11	680	$\frac{1}{4}$
12	10K	$\frac{1}{2}$
13	10K	$\frac{1}{4}$
14	No Component	
15	150	$\frac{1}{4}$
16	4.7K	$\frac{1}{4}$
17	4.7K	$\frac{1}{4}$
18	150	$\frac{1}{4}$
19	220K	$\frac{1}{4}$
20	470	$\frac{1}{4}$
21	10K	$\frac{1}{4}$
22	1.5K	$\frac{1}{2}$
23	10M (3 x 3.3M)	$\frac{1}{4}$
24	150	$\frac{1}{4}$



R	Ohms	Watts
25	1M	¼
26	8.2K	2
27	4.8K or 3.3K	¼
28	270	½
29	220K	¼
30	47K	¼
31	22K	½
32	2.2M	¼
33	22K	¼
34	47K	¼
35	22K	¼
36	22K	¼
37	47K	¼
38	47K	¼
39	4.7K	¼
40	100K	¼
41	1.8M	¼
42	1M	¼
43	4.7K	¼
44	470K	¼
45	1M	¼
46	470	¼
47	100K	¼
48	5	¼
49	1K	6
50	500	6
51	120K	½
52	120K	½
53	47K	½
54	47K	½
55	100	3
56	4K or 3.5K	5
57	510	2
58	740	10
59	100	¼
60	510	2
61	47K	¼
62	1M	¼
63	2.2M	¼
64	47K	¼
65	2.2K •	¼
66	330	½
67	15K	¼

R	Ohms	Watts
68	A 25, B 25, C 25, D 25, E 675	Mains Dropper
69	A 950, B 1030	Mains Dropper
70	22K	½
71	47K	¼
72	100K	¼
73	47K	½
74	47K	½
75	10K	½
76	47K	¼
77	100K	½
78	220	¼
79	3.3K	¼
80	3.9K	¼
81	3.3K	¼
VR1	2K WW	Potr.
VR2	500K	Potr.
VR3	500K Potr. with SP switch	
VR4	30K WW	Potr.
VR5	2K WW	Potr.
VR6	5K WW	Potr.
VR7	2K WW	Potr.
VR8	500 WW	Potr.

R22 } Not fitted to this
R31 } chassis

CAPACITORS

C	Capacity	Type
1	.001	Tub. 300V AC
2	.001	Tub. 300V AC
3	.001	Tubular 350V
4	.01	Tubular 350V
5	.001	Tubular 350V
6	.001	Tubular 350V
7	5pF	Silver Mica

Continued in next column

C	Capacity	Type
8	75pF	Silver Mica
9	47pF	Silver Mica
10	.01	Tubular 150V
11	.01	Tubular 350V
12	500pF	Silver Mica
13	100pF	Silver Mica 1000V
14	.01	Tubular 150V
15	.01	Tubular 350V
16	5pF	Silver Mica
17	.1	Tubular 350V
18	.002	Tubular 350V
19	.1	Tubular 350V
20	.1	Tubular 350V
21	.05	Tubular 350V
22	.002	Tubular 350V
23	.002	Tubular 350V
24	.001	Tubular 350V
25	.001	Tubular 350V
26	.01	Tubular 350V
27	.05	Tubular 350V
28	.5	Tubular 350V
29	.001	Tubular 350V
30	.015	Tubular 150V
31	100	Electrolytic 25V
32	.001	Visconol 12kV
33	.1	Tubular 350V
34	.5	Tubular 350V
35	.001	Tubular 350V
36	50	Electrolytic 12V
37	.02	Tubular 350V
38	100pF	Silver Mica 1kV
39	8	Electrolytic 150V
40	500pF	Tubular 600V
41	.01	Tubular 350V
42	.02	Tubular 500V
43	200pF	Variable 2kV
44A	8	Electrolytic } 350V
44B	8	Electrolytic } 350V
45	.1	Tubular 350V
46	.001	Tubular 350V
47	.001	Tubular 350V
48	.01	Tubular 350V
49	.01	Tubular 350V
50	.01	Tubular 150V
51	5pF	Tubular Ceramic 350V
52A	100	Electrolytic } 350V
52B	200	Electrolytic } 350V
53	.01	Tubular 1kV
54	.01	Tubular 150V
55	.002	Tubular 350V
56	33pF	Silver Mica 350V
57	47pF	Silver Mica 350V
58	47pF	Silver Mica 350V
59	.001	Tubular 350V
60	.02	Tubular 350V
61	25	Electrolytic 25V
62	.002	Tubular 350V
63		
64	.01	Tubular 350V

VOLTAGE READINGS

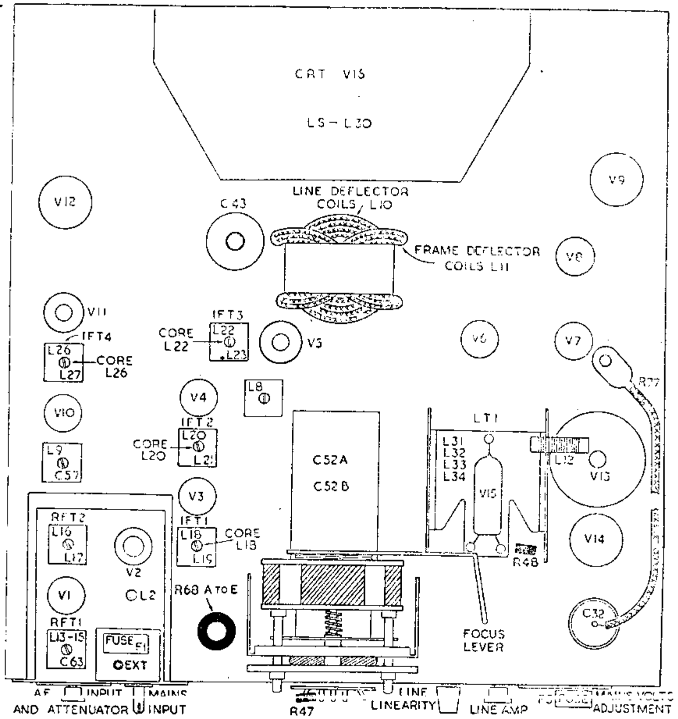
V	Type	A	G2	K	Remarks
1	10F1	215	215	4.5	VR1 at Min.
2A	12AT7	215	—	3.5	
B		100	—	0	
3	10F1	215	215	4.5	VR1 at Min.
4	10F1	210	215	1.8	
5A	20D1	N/R	—	1	Varies with signal
B		N/R	—	195	
6	10F1	175	245	4.2	
7	10F1	35	150	0	
8A	20L1	70	—	} 5	
B		12	—	} 5	
9	10P14	235	235	25	VR6 VR7 Normal
10	10F1	135	200	2	
11A	20D1	N/R	—	N/R	
B		15	—	15	
12	10P14	225	230	15	
13	20P1	N/R	160	11.5	
14	U281	N/R	—	450	1812 = 370 1814 = 450
15	U25	N/R	—	12.5kV	1812 = 10kV 1814 = 12kV
16	CRM152B	12.5kV	—	175	Grid 0—230 VR2 Min.-Max.

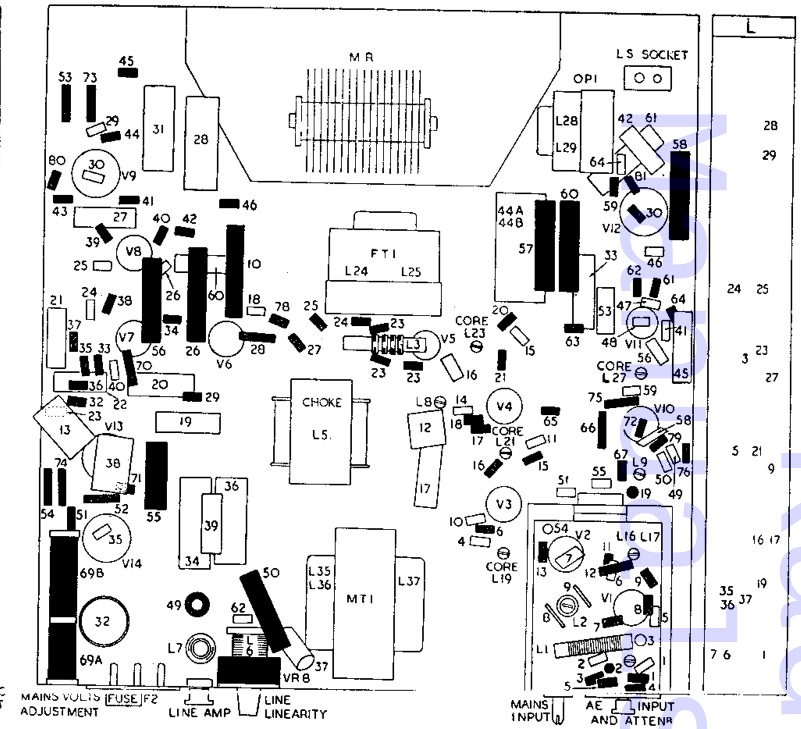
Total HT current from MR = 220mA approx.

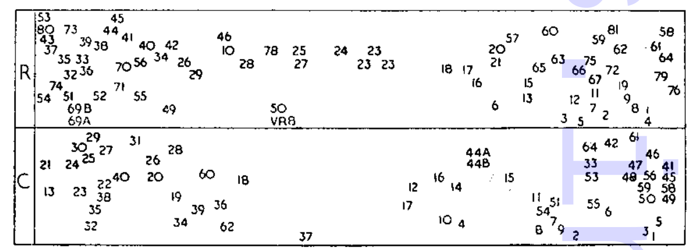
Mains consumption = 650mA

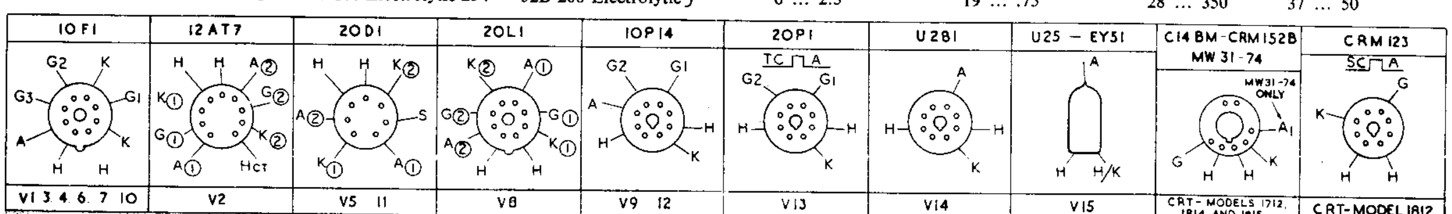
INDUCTORS

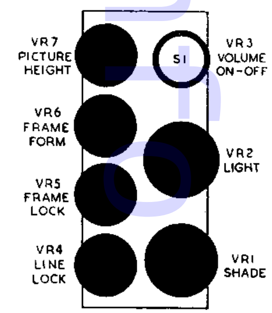
L	Ohms
1	Very Low
2	Very Low
3	9.5
4	Not Fitted
5	45
6	2.5
7	6.5
8	Very Low
9	Very Low
10	28
11	6
12	18.5
13–17	Very Low
18	1
19	.75
20	1
21	.75
22	1
23	1
24	900
25	3.5
26	3.5
27	3
28	350
29	.6
30	2.5
31	200
32	45
33	Very Low
34	22
35	Very Low
36	Very Low
37	50











How pre-set controls are located on their panel