MARCONIPHONE T18DA

Continued from page 20

AERIAL. The receiver is fitted with an MW frame aerial L1 with a series LW loading coil L2. A socket is provided underneath chassis for the use of an external aerial when desired. The external aerial is fed through isolating capacitor C1 shunted by R1 to R2, C2 in bottom end of L2.

The frame L1 and loading coil L2 are connected in series across aerial tuning capacitor VC1 and coupled by C5 to triode-hexode frequency-changer V1. On MW band L2 is shorted out by S1 and L1 is tuned by VC1 and trimmed by T2. On LW band S1 is open and L2 trimmed by T1, C3 is placed in circuit with L1 and tuned by VC1.

AVC decoupled by R8, C4 is fed by R5 to V1. Cathode is at chassis potential. Screen voltage is obtained from potential divider R3, R4 decoupled by C6. Primary L6, C8 of IFT1 is in the hexode anode circuit.

Oscillator is connected in a tuned-grid shunt-fed circuit. The grid coils L4 (MW), L5 (LW) which are trimmed by T3, T4 and padded by C11, C12 respectively, are switched by S2 to oscillator tuning capacitor VC2, and coupled by C7 to oscillator grid (gt) of V1. Automatic bias for grid is developed on C7 with R6 as leak resistor.

Anode reaction voltages are obtained inductively from L3 on MW and capacitively from across padder C12 on LW, and are fed by C10 to oscillator anode of V1 of which R7 is the load resistor.

IF amplifier operates at 465kc/s. Secondary L7 C9 of IFT1 feeds signal and AVC voltages decoupled by R8, C4 to IF amplifier V2. Cathode and suppressor are strapped together and earthed to chassis. Screen voltage is obtained from potential divider R3, R4 and is decoupled by C6. Primary L8, C14 of IFT2 is in the anode circuit.

Signal Rectifier. Secondary L9, C15 of IFT2 feeds signal to diode anode of V3. R11 is diode load and C16 reservoir capacitor.

AF amplifier is pentode section of V3 operated as a triode its screen being strapped to anode and suppressor connected to cathode.

Rectified signal developed across diode load R11 is fed through R10 to the volume control R12 and thence to gl of V3. R10 with self-capacity of screened lead form an IF filter. Cathode bias is provided by R14. Anode load is R13 with C17 as RF bypass capacitor.

AVC. Signal on secondary L9 of IFT2 is fed by C26 to diode anode of V2. R9 is the diode load and R8, C4 give decoupling to AVC line to V1, V2.

Output stage. C18 feeds signal through stopper resistor R16 to pentode output amplifier V4. R15 is its grid resistor and R17 decoupled by C20 provides cathode bias. Screen voltage is obtained from R18, R19 decoupled by C19. Primary L10 of output matching transformer OP1 is in the anode. C10 is a tone correction capacitor. Secondary L11 of OP1 feeds signal to a 5 in. PM speaker L12.

HT is provided on AC mains by an indirectly heated half-wave rectifier V5. Its anode voltage is obtained from the mains through current limiter R22 and tapped dropper resistor formed by R23, R24, R25. The dial lamp is shunted across R23. Resistance-capacity smoothing is given by R20, R21, C23, C24, C25. Additional smoothing and voltage dropping to earlier stages is given by R18, R19, C19. Modulation hum is eliminated by C22. Reservoir capacitor C25 should be rated to handle 125mA ripple current.

Heaters of V1 to V5 are series connected and obtain their current from the mains through R23 and dropper resistors R24, R25, R26. On 236-255V all the droppers are in circuit. On 216-235V and 195-215V the voltage changing plug short circuits R24 and R24, R25 respectively.

S3 which is ganged to volume control spindle is the ON/OFF switch.

Chassis removal. Undo the four screws securing panel to bottom of cabinet and remove panel. Remove the three push-on type control knobs.

Loosen the four chassis fixing screws (one at each corner of chassis). These screws are held captive on chassis by a small spring clip. Carefully withdraw chassis from cabinet.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune Receiver to	Trim in order stated for max. output
(1) 465 kc/s to gl of VI, via .1 mF	Gang at Max. Capacity	Core L9, L8, L7, L6.
(2) With Gang at Max. Capacity check to see that dial pointer coincides with 2000 metre mark at end of scale.		
(3) 530 kc/s to AE Socket via dummy aerial	566 metres (end of scale)	Core L3/4
(4) 1.52 mc/s as above	197.7 metres	T3
(5) 1.304 mc/s as above	230 metres	T2. Repeat (3) (4) and (5)
(6) 150 kc/s as above	2000 metres	Core L5
(7) 335 kc/s as above	895.5 metres	T4
(8) 160 kc/s as above	1875 metres	Core L2
(9) 300 kc/s as above	1000 metres	T1. Repeat (6), (7), (8) and (9).

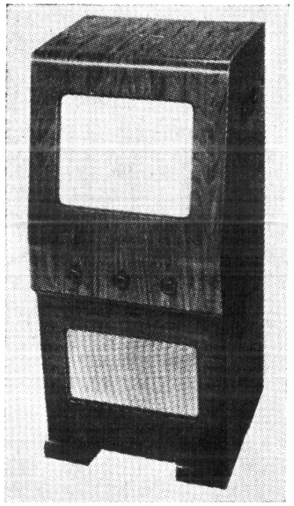
MOTOR-BOATING—WITHOUT HUM

ONE cannot depend on increased hum as an indication that the smoothing capacitor has gone "low." I had in two receivers which were "motor-boating" and, as the hum level was normal, I assumed the oscillation to be HF in origin.

When I finally found that lack of full LF decoupling was the cause, I decided that in such cases in future I would first check the smoother. If this is down in capacity, voltages may be a little low, but not enough to provide a real pointer and, as I have found, hum may not be noticeably increased.—E.G.C.

SERVICE CHART MANUAL

MASTERADIO T612L, T612M



Seventeen-valve television receiver fitted with a 12-in. CRT giving a 10 by 7½-in. picture. Walnut veneered console cabinet. Suitable for 200-250V 50c/s supplies. Model T612L is for London frequencies and T612M for Birmingham frequencies. Manufactured by Masteradio, Ltd., 319-321, Euston Road, London, NW1.

THE receiver uses TRF circuits with permeability tuned inductances operating on the lower sideband of vision carrier. Sound channel is fitted with noise suppressor and EHT is developed from line flyback pulses. Model T612L is for London area and Model T612M for Midlands. When fitted with preamplifier for use outside the normal reception areas the models become T612LP and T612MP respectively.

Aerial signal is fed by an 80 ohm co-axial feeder through isolating capacitors C1, C2 to L1 and coupled by L2 to first RF amplifier V1.

Vision channel consists of three RF amplifiers V1 to V3, signal rectifier V4A, and video output amplifier V5. V1 is resistance-capacity coupled by R4, C6 to tuned grid coil L3 of V2. Signal developed across tuned coil L5 in anode V2 is capacity fed by C11 to grid of V3, which is then resistance-capacity coupled by R10, C16 to tuned coil L7 in signal rectifier V4A anode circuit.

The tuned circuits are staggered to give an overall bandwidth of approximately 3mc/s at 6dB down. Aerial damping together with shunt effect of R4, C6 across L3 ensures that bandwidth of V1 is sufficient to cover both sound and vision frequencies. Gain of V1, V2 is adjusted by R2, the **Contrast** control in the common cathode circuit.

Sound signal rejection is given by L4, C7 in grid and L6, C12 in anode circuit of V2.

Rectified signal developed across R11, R12 is DC coupled to video output amplifier V5, the output of which is DC coupled through RF choke L14 to cathode of CRT. L10, L11 are grid and L12, L13 anode peaking coils and R63 limits DC potential between heater and cathode of CRT.

Sound channel. Sound signal of 41.5mc/s, which is amplified with vision by V1, is tapped from L4, inductively coupled to grid tuned coil L3 of V2, and fed to first sound RF amplifier V6. Tuned anode with capacity coupling is used between V6 and second sound RF amplifier V7 and also between V7 and signal rectifier diode of V8.

The gain of V6 is controlled by variation of its cathode bias by R2 the contrast control. Rectified audio signal developed across R48 is fed by C49 to **Volume** control R52 and thence through stopper R51 to grid of triode section of V8 for amplification, after which it is fed by C50 through noise suppressor diode V4B and coupled by C53 to tetrode output amplifier V9, the output of which is transformer coupled by OP1 to an 8-in. PM speaker L21.

Noise suppressor. Diode anode of V4B is connected to HT line through R56 and its cathode down to chassis through R55, R54, R53. It conducts and allows the audio signal fed to its cathode by C50 to be passed on to V9. The time constant of R56, C52 is such that the voltage on C52 follows that of the audio signal. When a large amplitude high frequency interference pulse appears with the signal then cathode of V4B is driven more positive than its anode—the anode voltage being unable to change rapidly due to the comparatively long time constant of R56, C52. Thus, during an interference pulse, V4B is cut-off and no signal is passed to output amplifier V9.

To prevent clipping, due to large amplitude transients, a small amount of the audio signal, obtained from junction of R59, C57, the tone correction network across primary L19 of OP1 in anode of V9, is fed by C54 to second diode anode of V8, rectified and applied as a negative bias through R54 to cathode of noise suppressor V4B.

Sync separator. Signal at anode of video amplifier V5 is fed by R17, C22 to grid of sync separator V11. The positive sync pulses drive V11 into grid current and produce across R20 a steady negative bias. The bias is sufficient to place the negative picture signal below cut-off and only the positive sync pulses appear in the anode of V11.

Sync amplifier. Frame sync pulses at anode V11 are fed by C25 to grid of triode V12A, amplified and then fed through C29 to anode of frame oscillator V13A. Line sync pulses are fed by C27 to triode V12B, amplified and then fed through C28 to grid of line oscillator V13B.

Frame oscillator is triode V13A operated as a grid-blocking oscillator with anode to grid transformer back-coupling by FT1. Frequency is determined by time constant of R31, C30. Scan voltage is developed on C31 with R32 giving waveform correction. Adjustment of grid bias by R30 gives **Frame Hold.**

Frame amplifier. Scan voltage is fed by C32 through stopper R38 to beam-tetrode V15. Scanning waveform is developed across anode load R36 and fed by C33 to frame deflector coils L17, L18 on neck of CRT. R37 introduces negative feedback to screen (g2) to improve linearity. Variation of the HT across V15 by R41 gives control of **Frame Height.**

Line oscillator is triode V13B operated as a grid-blocking oscillator with anode to grid transformer back-coupling by LT1. Frequency is determined by time constant of R64, R65, C60. Adjustment of R64 gives **Line Hold.** Scan voltage is developed on C61. Variation of oscillator anode voltage by R66 the **Horizontal Drive** control gives preset adjustment of picture width.

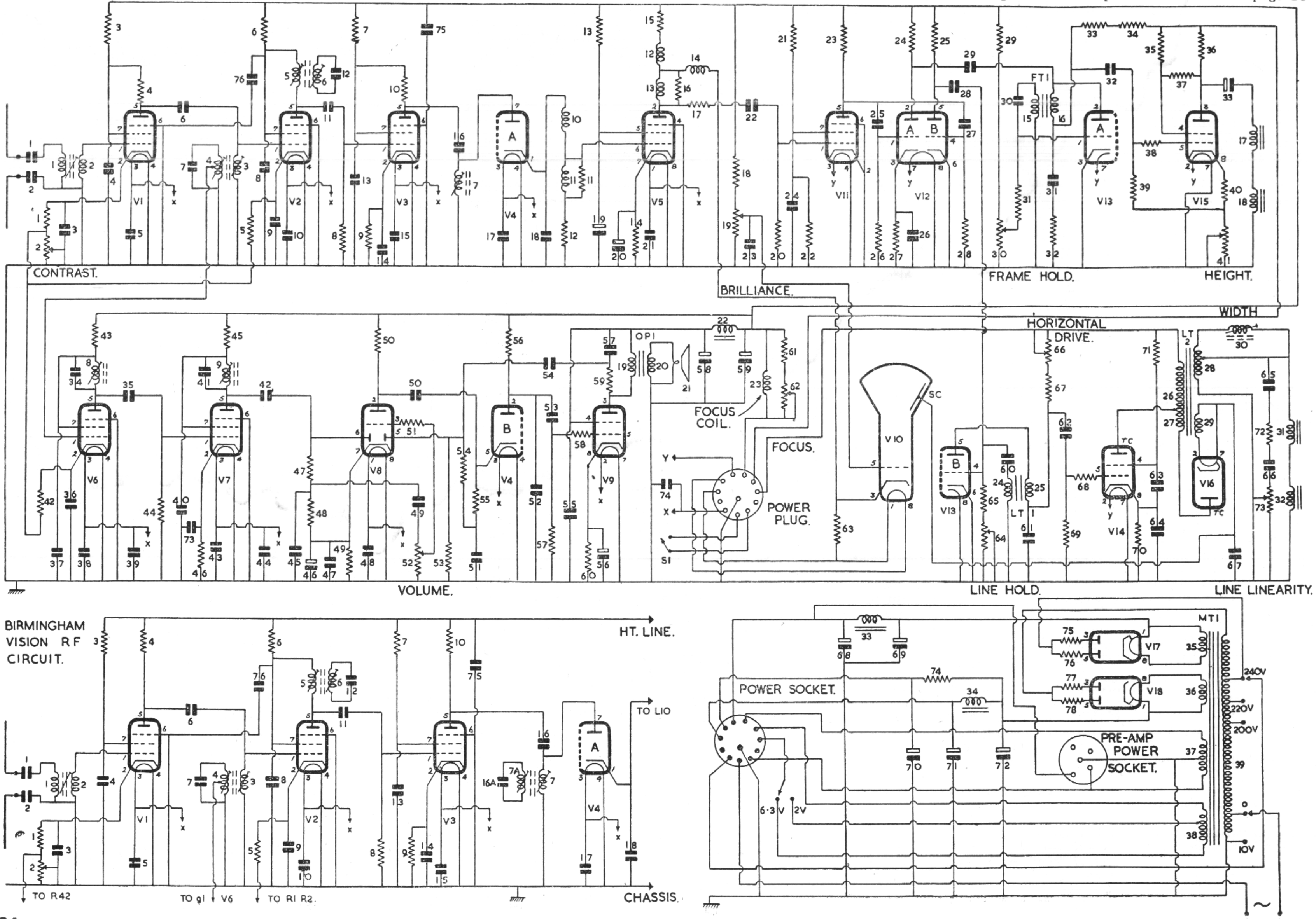
Line amplifier. Scan voltage is fed by C62 through stopper R68 to beam-tetrode amplifier V14. Secondary L28 of transformer LT2 in the anode circuit feeds the scanning waveform to the line deflector coils L31, L32 on the neck of the CRT. L30, which is a variable inductance shunted across section of secondary L28, enables **Picture Width** to be finally adjusted.

EHT of approximately 6kV for the anode of CRT is obtained by rectifying by V16 the surge voltages set up across overwound primary L26, L27 of line output transformer LT2 when V14 is cut-off. Secondary L28 provides heater current of rectifier V16. EHT is smoothed by C67 and fed direct to anode of CRT.

HT is provided by two indirectly-heated rectifiers V17, V18 operated in separate halfwave circuits. Anode voltage of V17 is obtained from the 240V tapping and that of V18 from the top of auto-transformer overwind on primary L39 of mains transformer MT1. Heater current is obtained from secondaries L35, L36 respectively.

Output of V17 is choke-capacity smoothed by L33, C68, C69 and fed through focus coil L23 to supply HT for vision and sound receivers, sync separator and amplifier valves. The HT for sound output amplifier V9 is further choke-capacity smoothed by L22, C58, C59. Output of V18 is split

Continued on page 26



RESISTORS

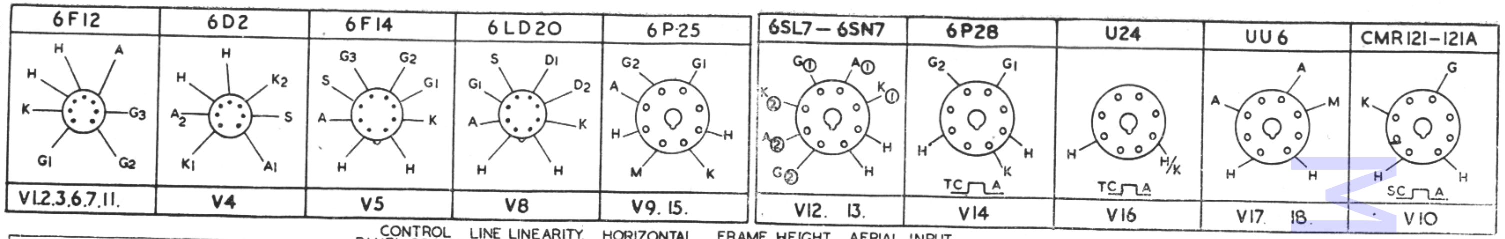
R	*Ohms*	*Watts*
1	150	¼
2	10K	WW Potr
3	1K	¼
4	4.7K (L)	½
4	6.8K (B)	½
5	150	¼
6	1K	¼
7	1K	¼
8	10K	¼
9	150	¼
10	4.7K (L)	¼
10	6.8K (B)	¼
11	27K	¼
12	4.7K	¼
13	1K	½
14	150	¼
15	4.7K	½
16	27K	¼
17	10K	¼
18	47K	1W
19	50K	WW Potr.
20	470K	¼
21	220K	¼
22	10K	¼
23	100K	¼
24	47K	¼
25	47K	¼
26	100K	¼
27	22K	¼
28	100K	¼
29	220K	¼
30	50K	Potr.
31	220K	¼
32	1K	½
33	100K	¼
34	470K	¼
35	10K	½
36	4K	WW 6W
37	68	½
38	220	¼
39	2.2M	¼
40	270	¼
41	2K	WW Potr.
42	220	¼
43	1K	¼
44	27K	¼
45	1K	¼
46	220	¼
47	47K	¼
48	100K	¼
49	1.5K	¼
50	100K	¼
51	27K	¼
52	500K Potr. with Sp. switch	
53	100K	¼
54	470K	¼
55	4.7M	¼
56	4.7M	¼
57	200K	¼
58	27K	¼
59	4.7K	¼
60	180	¼
61	1.5K	1W
62	3K	WW Potr.
63	100K	¼
64	50K	Potr.
65	27K	¼
66	500K	Potr.
67	470K	¼
68	330	¼
69	470K	¼
70	100	½
71	4K	WW 6W
72	1K	WW 2W
73	2K	WW Potr.
74	1K	1W
75	30 or 15	¼
76	30 or 15	¼
77	30 or 15	¼
78	30 or 15	¼

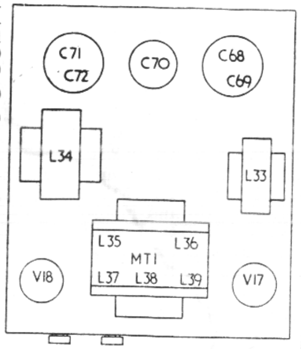
CAPACITORS

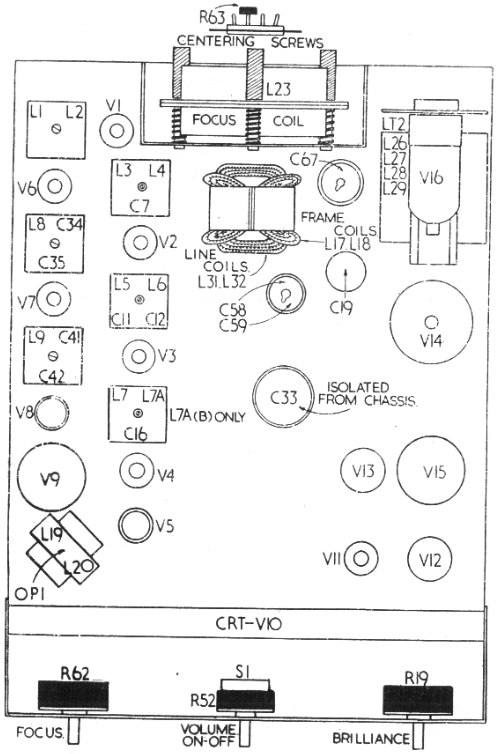
C		Capacity	Type
1	...	100pF	Silver Mica
2	...	100pF	,, ,,
3	...	1000pF	Tub. Cer.
4	...		,, ,,
5	...	1000pF	,, ,,
6	...	110pF	Siver Mica (L)
6	...	100pF	,, ,, (B)
7	...	40pF	,, ,, (L)
7	...	25pF	,, ,, (B)
8	...	1000pF	Tub. Cer.
9	...	1000pF	,, ,,
10	...	1000pF	,, ,,
11	...	110pF	Silver Mica (L)
11	...	100pF	,, ,, (B)
12	...	40pF	,, ,, (L)
12	...	25pF	,, ,, (B)
13	...	1000pF	Tub. Cer.
14	...	1000pF	,, ,,
15	...	1000pF	,, ,,
16	...	110pF	Silver Mica (B)
16	...	100pF	,, ,, (L)
17	...	.002	Tubular 500 V
18	...	10pF	Tub. Ceramic
19	...	16	Electrolytic 275V
20	...	50	,, 12V
21	...	.002	Tubular 500V
22	...	.1	,, 350V
23	...	.001	,, 500V
24	...	.5	,, 350V
25	...	320pF	Silver Mica
26	...	.1	Tubular 350V
27	...	25pF	Tub. Ceramic
28	...	10pF	Silver Mica
29	...	10pF	,, ,,
29	...	50pF	Fitted on fringe area models
30	...	.1	Tubular 350V
31	...	.25	Tubular 200V
32	...	.1	,, 350V
33	...	30	Electrolytic 350V
34	...	15pF	Silver Mica (L)
34	...	30pF	,, ,, (B)
35	...	110pF	,, ,, (L)
35	...	100pF	,, ,, (B)
36	...	1000pF	Tub Cer.
37	...	1000pF	,, ,,
38	...	1000pF	,, ,,
39	...	1000pF	,, ,,
40	...	1000pF	,, ,,
41	...	15pF	Silver Mica (L)
41	...	30pF	,, ,, (B)
42	...	100pF	,, ,,
43	...	1000pF	Tub. Ceramic
44	...	1000pF	,, ,,
45	...	150pF	Silver Mica(L)
45	...	100pF	,, ,, (B)
46	...	50	Electrolytic 12V
47	...	.01	Tubular 500V
48	...	.002	,, 500V
49	...	.01	,, 1000V
50	...	.01	,, 1000V
51	...	.1	,, 350V
52	...	150pF	Silver Mica
53	...	.01	Tubular 1000V
54	...	600pF	Mica (300 x 300)
55	...	.1	Tubular 350V
56	...	50	Electrolytic 12V
57	...	.01	Tubular 500V
58	...	16	Electrolytic 250V
59	...	16	,, 250V
60	...	.002	Tubular 500V
61	...	.001	,, 500V
62	...	.01	,, 1000V
63	...	.1	,, 350V
64	...	.05	,, 350V
65	...	.01	,, 1000V
66	...	.01	,, 1000V
67	...	.001	Special 12kV
68	...	60	Electrolytic 350V
69	...	30	,, 350V
70	...	30	,, 35)V
71	...	60	Electrolytic 350V
72	...	30	,, 350V
73	...	1000pF	Tub. Cer.
74	...	1000pF	,, ,,
75	...	1000pF	,, ,,
76	...	1000pF	,, ,,

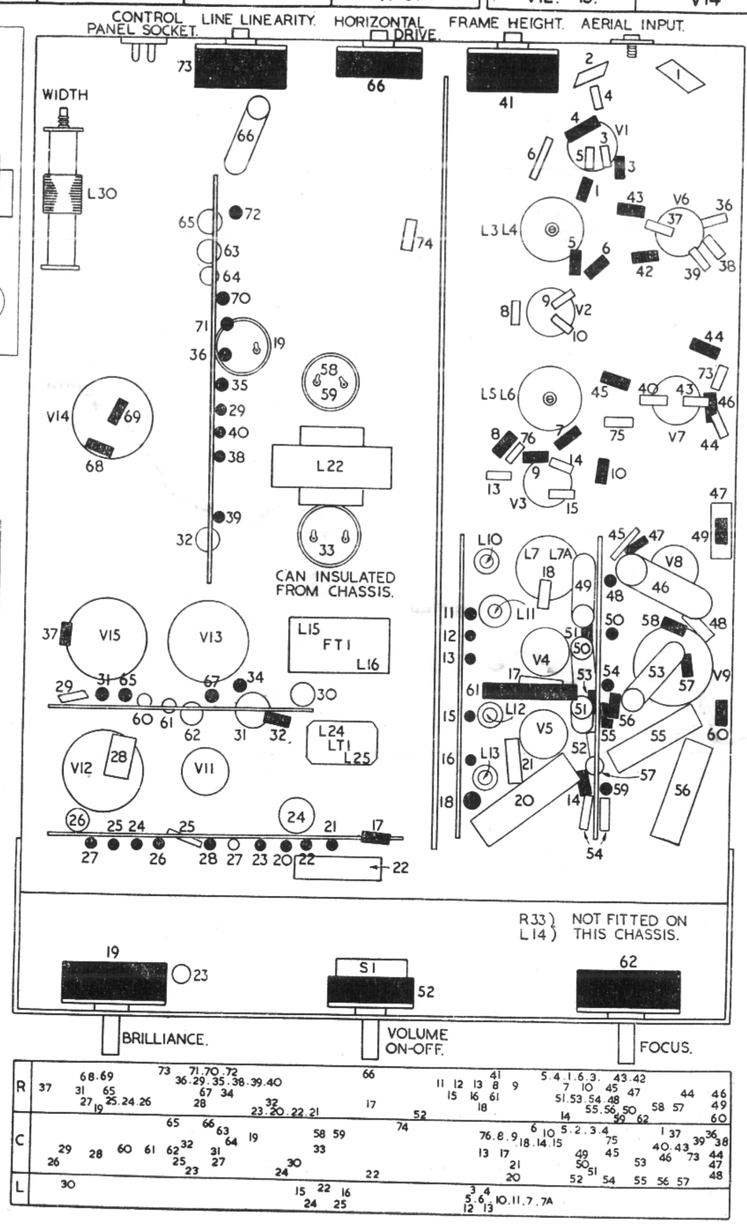
INDUCTORS

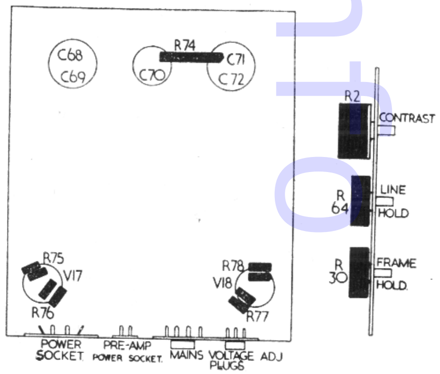
L	Ohms
1—9	very low
10	4
11	21
12	4
13	4
14	not fitted
15	500
16	250
17, 18	1500
19	300
20	.5
21	2.5
22	125
23	700
24	60
25	27
26	120
27	190
28	5
29	very low
30	.5
31, 32	12.5
33	275
34	80
35—38	very low
39	21 total











VALVE VOLTAGE READINGS

V	A	G_2	K	Remarks
1	180V	190V	3.3V	R2 at Minimum (V1–V9)
2	190V	190V	3.3V	
3	135V	190V	1.5V	
5	110V	190V	2V	
6	190V	190V	3.3V	
7	190V	190V	1.7V	
8	60V	—	1.2V	
9	185V	190V	6.3V	
10	6kV	—	100V	Grid. 0–75V
11	125V	10V	—	
12A	90V	—	—	
12B	130V	—	—	
13A	15V	—	—	
13B	30V	—	—	
14	310V	250V	7.5V	
15	210V	210V	—	
16	—	—	6kV	
17	225V RMS	— —	260V	Total current = 75MA
18	260V RMS		300V	Total current = 90MA

MASTERADIO T612L/M

Continued

between frame and line scan circuits. Frame circuit HT is resistance-capacity smoothed by R74, C70, C72 and line circuit feed is choke-capacity smoothed by L34, C71, C72. Vision channel HT line is HF decoupled by C75.

Smoothing capacitors C69, C72 should be rated to handle 200MA of ripple current each.

Heaters of V1 to V9 are parallel connected and obtain their current from one half of centre-tapped 12.6V secondary L37 of mains input transformer MT1. Each heater (with the exception of V9) is fitted with a bypass capacitor and in addition input tags are also bypassed by C74. Heaters of V11 to V15 are parallel connected and obtain their current from other half of L37, the centre tap being earthed to chassis. Heater of V10, the CRT, obtains its current from secondary L38 of MT1. The secondary is tapped for 6.3 and 2V, the latter being used for Mazda type CRT fitted.

Mains transformer primary L39 is tapped for 200, 220, 240V 50c/s. S1, ganged to the volume control spindle, is the ON/OFF switch.

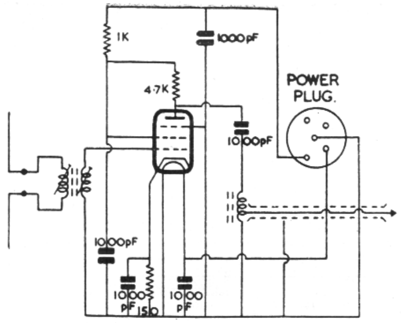
CRT is a 12-in. triode with electro-magnetic focusing. **Brilliance** is controlled by variation of grid bias by R19.

BIRMINGHAM MODEL

The circuit of model T612M, which covers the Birmingham frequencies, differs from the above as follows:—

V1 anode load R4 is connected to HT line instead of to screen dropper R3. V3 anode load R10 is connected to HT line instead of to screen dropper R7. Adjacent sound channel trap L7A, C16A is fitted between V3, V4. Sound Channel HT line is decoupled by 1,000 pF capacitor.

Components which differ in value are earmarked (B) in the Tables.



Circuit of the Masteradio pre-amplifier.

ALIGNMENT PROCEDURE

Connect signal generator to aerial and earth terminals via an 80 ohm matching pad. Connect a 3 ohm AC output meter to LS terminals. Adjust Contrast Control R2 to a setting of approximately 250 ohm.

Feed in 45mc/s (L),51.75mc/s (B), modulated (400c/s) signal and adjust core L1, L2 to give maximum black to white contrast of horizontal bars appearing on CRT. Feed in 42.5mc/s (L), 49.25mc/s (B) and adjust core L3 (bottom) for maximum black to white contrast.

Feed 44.5mc/s (L), 51.25mc/s (B) and adjust core L5 (bottom) for maximum. Feed 44.25mc/s (L), 57mc/s (B) and adjust core L7 (top) for maximum.

Feed in 41.5mc/s (L), 48.25mc/s (B) and adjust core L4 (top) for maximum deflection on output meter. Increase sig. gen. output until modulation appears on CRT and adjust core L6 (top) for *minimum*. Adjust L8, L9 for maximum.

Birmingham model only: feed in 53.25mc/s and adjust L7A for *minimum* picture contrast.

Re-check vision channel alignment.

DOUBLE DECCA

THE owner of a Double-Decca, who used it only for mains operation, complained that it was intermittent on all wavebands. Despite a careful check of valve voltages, valve emission, and a search for loose connections or bad valveholder contacts, no fault could be found.

We had it playing in the workshop almost continuously for three days without fault, so after changing the oscillator grid condenser "just in case," we delivered the set back to the customer.

Within a couple of days, however, he again complained of the receiver's intermittency, and during the course of our conversation with him we learned that this intermittency occurred only during "power cut" periods.

The oscillator valve, we deduced, failed to oscillate unless the mains supply was at its correct figure, so armed with a new frequency-changer and the usual service equipment we drove our customer back to his address.

His house was at the end of a long road in a fairly new housing estate, and to our surprise his mains supply voltage even at a "non-power-cut" period was a mere 211V instead of 230V.

We immediately altered the Double-Decca's mains voltage to suit, and no further trouble was experienced.

EKCO AW87

AN Ekco AW87 gave no results, but it needed only a brief inspection to reveal the cause—none of the valve heaters or rectifier filament was warming up. Obviously, we thought, an o/c mains transformer primary or a defective ON/OFF mains switch.

But both these components proved to be perfect as also was the mains lead itself.

We next removed the lower power pack chassis for a detailed examination. No heater supply leads had come unsoldered nor was there any sign of an LT short circuit while similarly there was no HT short circuit.

After a little probing amongst the transformer leads however we discovered the cause of the vanished heater supply. The two ends of the 350-0-350 HT winding were covered in thin gauge sleeving and at one point they touched. The 700V had sparked across and broken down the insulation.

The resultant short circuit on the mains transformer had lowered the output given by the two 4V windings to such an extent that they were incapable of heating the valves or rectifier.

We covered these leading out wires in fresh sleeving and kept them well spaced. The transformer gave no sign of having been damaged by the short circuit.

REGENTONE AUTO 99

AERIAL is fed through C1 to SW aerial coupling coil L1, and thence fed to bottom ends of grid tuned coils L3 (MW), L4 (LW). R1 between aerial and earth sockets is a static drain. The grid coils L2 (SW), L3 (MW), L4 (LW), trimmed by T1, T2, T3 respectively, are switched by S1 to aerial tuning capacitor VC1 and to grid of triode-hexode frequency-changer V1.

AVC decoupled by R2, C2 is fed through the tuned coils to V1. When wavechange switch is in the Gram position, however, G1 is connected by S1 down to AVC line to prevent radio signal break-through.

Cathode is at chassis potential, and screen voltage is obtained from potential divider R3, R6 and decoupled by C3. Primary L9, C4 of IFT1, damped by R5, is in the hexode anode of V1.

Oscillator is connected in a tuned-grid shunt-fed circuit. The grid coils L5 (SW), L7 (MW), L8 (LW), trimmed by T4, T5, T6, C6 and padded by C8, C9, C10, are switched by S2 to oscillator tuning capacitor VC2 and to oscillator grid of V1, of which R7 is the leak. When S2 is in the Gram position oscillator grid is put down to AVC line.

Anode reaction voltages are obtained inductively fromL6 on SW band, but capacitively from across padders C9, C10 on MW and LW bands and are switched by S3 through C7 to oscillator anode of V1, of which R4 is the load. In SW position of S3 one end of L6 (SW) is connected across to bottom of grid coil L5.

IF amplifier operates at 465kc/s. Secondary L10, C5 of IFT1, feeds signal, with AVC voltages decoupled by R13, C11, to IF amplifier V2. Cathode and suppressor are connected down to chassis, and screen voltage is obtained from potential divider R3, R6 and decoupled by C3. Primary L11, C12 of IFT2 is in the anode circuit.

Signal rectifier. Secondary L12, C14 of IFT2 feeds signal to one diode of V3. R9, the volume control, is the load and R8, C13, with self-capacity of screened lead between R8, R9, forms an IF filter.

Pickup. Sockets are provided at rear of chassis for the high-fidelity moving-iron pickup fitted to the auto-changer. In the Gram position S4 switches PU to volume control R9. In the three radio positions PU is earthed. R18 is PU impedance matching resistor.

AVC. IF signal is coupled by R13 to second diode of V3, where it is rectified and then fed to grids of V1, V2. Decoupling is by C11, R2, C2.

AF amplifier. Rectified signal across volume control R9 is fed by C15 to triode section of V3. Cathode is connected down to chassis, hence bias for grid is developed on C15 with R10 as leak. R11 is anode load.

Output stage. C16 feeds signal at anode V3 to output pentode V4, of which R14 is grid resistor. Cathode bias is provided by R15 decoupled by C19, and screen voltage is obtained direct from HT line, decoupling being given by C20. OP1 in the anode circuit feeds signal to a 6½-in. PM speaker L15 situated on a baffle attached to front of auto-changer drawer.

Three degrees of tone control are given by S5 in conjunction with C17, C18 and R16, which are connected between anode V4 and chassis. Negative feedback between anode and grid of V4 is introduced by R12.

Sockets are fitted on secondary L14 of OP1 for connection of a 2.5 ohm extension speaker.

HT is provided by indirectly-heated full-wave rectifier V5. Anode voltages are obtained from secondary L16 of mains input transformer MT1. Resistance-capacity smoothing is by R17, C20, C21, and reservoir C21 should be rated to handle 100mA ripple current.

Heaters of V1 to V5 and dial lamps are connected in parallel and obtain their current from L17 of MT1. Primary L18 of MT1 is tapped for inputs of 100-120, 200-220, 230-240V 50c/s.

S6, ganged to volume control spindle, is receiver ON/OFF switch and also breaks mains supply lead to auto-changer motor.

Auto-changer is a Collaro model RC500 fitted with a high-fidelity moving-iron pickup using long-playing silent stylus needles. The changer will take nine 10- or 12-in. records, and is set to take either size by a switch positioned on baseplate just below pickup head. The motor is switched on and record dropping cycle started by moving pickup head outwards away from turntable.

At end of last record the motor is automatically switched off, but pickup arm has to be returned to its 'rest' position by hand. A stop and reject switch is provided.

Auto-changer motor is suitable for use on 100-125, 200-250V 50c/s. Pulleys for 40 or 60c/s mains are available.

For details of adjustment and maintenance instructions reference should be made to the appropriate Collaro booklet.

Chassis removal. Remove four push-on control knobs and rear panel of cabinet. Unplug PU leads from receiver chassis. Unsolder the mains and LS leads of receiver from tag strip on base of cabinet. Remove the three chassis fixing screws on underside of shelf. Slide chassis backwards off shelf sufficiently to allow the mains and LS leads to be pulled through the guide slot in front of cabinet. Then tilt chassis downwards to clear top rail and carefully withdraw it.

Auto-changer removal. Slide auto-changer drawer out and remove the three Philips screws located just under LS, in corner of operating lever escutcheon and midway along right-hand side of unit plate. Close drawer and from the rear remove Philips screw on rear edge. Remove pickup lead from cleats on side of cabinet and just under rear of drawer platform and unsolder the two motor leads from tag strip on base of cabinet. Auto-changer can be lifted out.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune Receiver to	Trim in Order stated for Max. Output
(1) 465 kc/s to g1 of V1 via .01 mF	Gang at Max. cap.	Cores L12, L11, L10, L9.
NOTE:—It is essential to tune L12, L9 to the second peak whilst unscrewing cores. L11, L10 should be tuned to second peak whilst screwing in cores.		
(2) With chassis replaced in cabinet and gang set to min. capacity adjust dial pointer to coincide with the two dots at left hand side of scale		
(3) 300 kc/s to aerial sockets via dummy aerial	1000 metres	T6, T3
(4) 1500 kc/s as above	200 metres	T5, T2
(5) 15 mc/s as above	20 metres	T4, T1