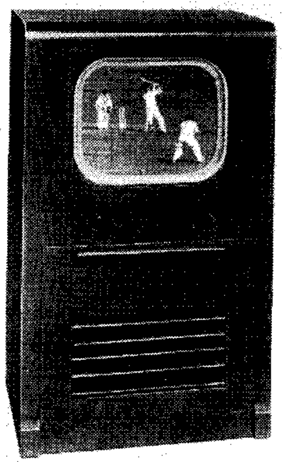
DECCA

111



Price £144 4*s.* 4*d.* (£107 10*s.* 6*d.* *plus* £36 13*s.* 10*d.* *tax*); *date released September,* 1952.

Combined tele-radiogram consisting of a fourteen-valve five-channel television receiver employing a 15in. CRT and a six-valve three-waveband superheterodyne radio receiver and BSR Monarch three-speed automatic record changer. Housed in walnut console cabinet with television at top, and radio and auto-changer in a sliding drawer at bottom. Suitable for 200-250V 50c/s AC only. Marketed by Decca Radio and Television, 1-3 Brixton Road, London, SW9.

TELEVISION **receiver** employs a superhet circuit operating on lower sideband of vision carrier. RF, oscillator, and first IF stages are common to both sound and vision signals. Aerial input, RF, and oscillator circuits are tunable over 40-70 mc/s, the tuners being ganged and controlled by a single tuning control located on top of chassis and accessible when rear cover panel of cabinet is removed. Tuning control is provided with a channel-calibrated scale to enable receiver to be quickly tuned to any one of the five BBC channels.

Sound noise and vision interference suppression circuits are incorporated, the latter being provided with a variable Interference Limiter control. EHT is derived from line flyback pulses. Mains consumption is approximately 150 watts.

Aerial input circuit is for 80 ohm coaxial feeder, the outer screen of which is isolated from chassis by R72 C2. An earth socket, isolated from chassis by C79, is also provided. Insertion of plug of earth lead into socket automatically connects outer screen of coaxial input cable, and one side of mains bypass capacitor C70, to external earth. Centre core of coaxial feeder is isolated from input circuit by C1 with R73 providing a DC path to chassis.

RF amplifier. Aerial signal is fed by C1 to L1 shunted by L2 in grid of RF amplifier V1. To obtain accurate tracking over the whole range of 40-70 mc/s covered both grid and anode tuned circuits of V1 employ shunt coils. In addition to tracking however, L1 functions as an aerial matching coil and as vision IF rejector circuit, the lower portion of L1 with C61 forming a series resonant circuit at between 14 to 15 mc/s. Gain of V1 is preset adjusted by VR3, the **RF Gain** control in its cathode. Amplified signal at anode is developed across shunt coils L3 L4, and coupled by C5 to grid (gl) of frequency-changer V2.

Frequency-changer is pentode V2 operated as a combined oscillator and mixer with oscillator tuned circuit L5 C7 C8 inserted in its screen feed. The valve is caused to oscillate by feedback between screen and grid through C6 and inter-electrode capacity, and by impedance of L3, between grid and chassis, which is inductive at oscillator frequency. RF and oscillator signals are mixed at grid and produce across L6 in the anode a vision IF of 14 mc/s and a sound IF of 10.5 mc/s.

Note: Receivers used in areas covered by Holme Moss (Channel 2) and Kirk o' Shotts (Channel 3) have their vision, and sound IF stages aligned to 15 and 11.5 mc/s respectively, and in these receivers the oscillator tuned circuit is adjusted to produce these frequencies at anode of frequency-changer.

Common IF amplifier. Vision and sound IF signals at anode of frequency-changer V2 are fed by C11 to grid of common IF amplifier V3, the gain of which is controlled by variation of its cathode and suppressor grid voltage by VR1 the **Contrast** control. Ratio of R8 R15 is chosen to give minimum change in input capacity of V3 with variation of its gain. Amplified vision and sound IF signals are developed across primary L7 L8 of IFT1 in the anode circuit. Damping, to maintain wide bandwidth, is provided by R11.

Vision channel consists of one further IF amplifier V4, crystal demodulator diode GD1, video amplifier V5, and interference limiter V12A.

Vision IF signal at anode of V3 is bandpass transformer coupled by IFT1 to vision IF amplifier V4. Sound on vision rejection at 10.5 or 11.5 mc/s is given by C14 L10 C15 shunted across secondary L9 of IFT1. Amplified vision signal at anode V4 is finally bandpass transformer coupled by IFT2 to germanium crystal diode demodulator GD1. Video signal is developed across R16 R17 and fed through IF filter and corrector choke L14 to grid of video amplifier V5. Amplified video signal at anode is passed through corrector choke L23 and anti-flutter filter R22 C23 to cathode of CRT

Interference limiter diode V12A is connected with its cathode to anode of video amplifier V5, and its anode, through load R36, to slider of pre-set **Interference limiter** control VR9 which is connected across vision channel HT line. Normally VR9 is adjusted so that V12A remains cut off up to peak white amplitude of video signal. Interference pulses of greater amplitude than peak white will cause the diode to conduct thus limiting the effect on the picture. Values of R36 C22 are selected to give a time constant which provides efficient clipping consistent with good picture quality.

Sound channel consists of one further IF amplifier V6, diode demodulator V7A, noise limiter V7B, and beam-tetrode output amplifier V8.

The sound signal of 10.5 or 11.5 mc/s is taken from anode of common IF amplifier V3 and coupled by C24 to tuned coil L15 in grid of sound IF amplifier V6. Amplified signal at its anode is bandpass transformer coupled by IFT3 to cathode of demodulator diode V7A.

Audio signal is developed across R28 C27 and fed by C28 through series noise limiter V7B, and thence passed by C29 through IF filter R31 C30 C31 to **Volume** control VR2 in grid of beam-tetrode output amplifier V8. Audio output at anode is transformer coupled by OP1 and fed through switch S1A and inter-connecting plug and socket B to a 10in. PM speaker mounted on front panel of radio receiver compartment.

Speaker is coupled across the series connected secondaries of television and radio output transformers. Switch S1A on television chassis is wired across secondary of radio OP1, whilst a similar switch S6A, ganged to radio on-off switch, is wired across secondary of television OP1. When television receiver is switched on then secondary of radio OP1 is shorted out, and conversely when radio receiver is switched on then secondary of television OP1 is shorted.

Noise limiter diode V7B is held conducting by positive anode bias through R29. Time constant of R30 C29 C30 in its cathode is such that the potential across the network follows that of the audio signal fed by C28 to anode V7B, High frequency interference pulses, however, drive the anode negative to the cathode, which is unable to follow due to the comparatively long time constant of R30 C29 C30, and the diode is cut off for the duration of the interference pulse.

Sync separator. Video signal at anode of video amplifier V5 is fed through R23 C40 to grid of pentode sync separator V9A. Positive sync pulses of waveform drive the valve into grid current and the resultant bias set up across R40 is sufficient to place video signal below cut-off, thus only sync pulses appear at the anode of V9A. Line sync pulses are developed across R44 and fed by C51 R68 to anode of line scan oscillator V10B. Frame sync pulses are integrated by R43 C43 and applied through R45 to cathode of interlace diode V12B. This valve is provided with positive anode bias from potential dividing network R37 R38 and between sync pulses is held cut-off due to its cathode being at HT line voltage. When sync pulses appear at anode of sync separator V9A then, due to the long time constant of R43 C43, the short duration line pulses are attenuated but the longer duration frame pulses build up a negative charge on C43 which is sufficient to allow diode V12B to conduct. Frame sync pulses at anode V12B are further integrated by R38 C37 and fed through R39 C42 to anode of frame scan oscillator V9B.

Frame scan oscillator is triode V9B operated as a grid blocking oscillator with anode to grid back-coupling by transformer FT1. Scan waveform is developed on C46, whilst frequency of oscillation is controlled by variation of grid voltage by VR5, the **Frame Hold** control. Adjustment of anode voltage by VR6 gives **Height** control.

Frame amplifier. Scan voltage on C46 is fed through waveform correcting network R42 VR7 C49 C65 to grid of pentode frame amplifier V10A.

Amplified output at its anode is transformer coupled by FT2 to frame deflector coils L25 damped by R51 R52. Linearity at bottom of picture is adjusted by VR7, the **Frame Linearity** control in the input correcting network. Linearity of top of picture is controlled by variation of anode to grid negative feed-back by VR7 the **Frame Form** control.

Line scan oscillator is triode V10B operated as a grid-blocking oscillator with anode to grid back-coupling by transformer LT1. Scan waveform is developed on C52, whilst frequency of oscillation is controlled by variation of grid voltage by VR4, the **Line Hold** control.

Line amplifier. Scan voltage on C52 is fed by adjustable drive trimmer T1, through stopper R55, to grid of beam-tetrode line amplifier V11. Amplified output at anode is transformer coupled by LT2 to line deflector coils L26.

Width is controlled by adjustment of shunt inductance L22 coupled across section of secondary L38 of LT1.

Line linearity is controlled by adjustment of inductance of L21A L21B which are connected in series with HT feed to anode of efficiency diode V14. Trimmer T2 together with C64, which are connected in series across one of deflector coils, enables stray capacities to be balanced out and prevents ringing on left of picture.

Efficiency diode. First portion of line scanning stroke is produced by conduction of V14 when its anode is driven positive on second half-cycle of shock oscillation set up in LT2 when V11 is cut off at end of previous line scan. Charge built up on C62, by rectification of shock oscillations by V14, is added in series with normal HT to provide a boosted HT voltage for anode of line amplifier V11.

Frame and Line Shift are controlled by adjustment of VR11 VR12 respectively. The controls are inserted in HT feed to their respective scanning coils and are so connected as to allow the polarity and amount of DC current flowing through the scanning coils to be adjusted. The DC current produces a magnetic field which deflects the picture vertically or horizontally.

EHT for anode of CRT is obtained by rectification by V13 of the high surge voltage set up across primary L37 and overwind L39 of LT2 when line amplifier V11 is cut off. EHT is smoothed by C59.

HT is provided by a half-wave metal rectifier MR1 which is fed from the input mains through tapped dropper resistor R61.

Choke-capacity smoothing is given by L24 C76 C77. A 500mA fuse F2 is inserted in lead between reservoir smoothing capacitor C76 and choke L24. As all HT current, excepting that of anode of sound output valve V8, passes through whatever portion of frame shift control VR11 is in circuit, then further smoothing and decoupling is provided by C78. RF decoupling is given by C35. Reservoir smoothing capacitor C76, which is shunted by a discharge resistor R70, should be rated to handle 500mA ripple current.

Heaters of all valves, excepting CRT and V13, are connected in a series-parallel circuit and obtain their current from the input mains through tapped dropper resistor R60 and ballast resistors R62 R63. Heaters are RF decoupled where shown by C68 C69 C71-75, and C80-82. Heater of EHT rectifier V13 is fed from a secondary winding L41 provided on line output transformer LT2, whilst CRT heater current is obtained from secondary L28 of mains transformer MT1. R57 prevents high voltage developing between heater and cathode of CRT.

Mains on-off switch S1B, which is ganged to **Volume** control spindle, is in neutral lead to chassis. Live mains lead is fitted with 1 Amp fuse F1 and filter capacitor C70.

CRT is a 15in. wide-angle triode type Mazda CRM152B with aluminised grey filter screen. Permanent magnet focusing is employed and picture signal is fed to its cathode. **Brilliance** is controlled by variation of its grid voltage by VR8. Frame fly-back lines are suppressed by feeding frame saw-tooth waveform through C60 on to CRT grid.

ALIGNMENT PROCEDURE

Apparatus required. Signal-generator covering 9-16 mc/s and 40-70 mc/s. AC output meter to indicate sound output. Microammeter to indicate vision output. Connect microammeter in series with diode load R16, and connect AC output meter across secondary L30 of OP1.

IF stages. Place RF gain VR3 and contrast VR1 at maximum. Disconnect C5 from anode V1 and inject output of signal-generator through C5 to grid of V2.

1. Inject 13.75 mc/s and adjust core L7/8 (top) for maximum vision.
2. Inject 14 mc/s and adjust core L11/12 (top) for maximum vision.
3. Inject 11.5 mc/s and adjust cores L9 L13 (bot.) for maximum vision.
4. Inject 13 mc/s and adjust core L6 for maximum vision.
5. Inject 10.5 mc/s and adjust core L10 for minimum vision.
6. Inject 10.5 mc/s and adjust cores L15 and L16 L17 for maximum sound.
7. Repeat operation 1 to 5 re-adjusting where necessary.

Note: receivers for use on Channels 2 and 3 should be aligned to frequencies 1mc/s higher than those given above.

RF stages. Re-connect C5 to V1 anode. Connect signal generator to aerial socket, bearing in mind that input impedance of receiver should be 70 to 80 ohms; a matching resistance must be inserted in series with signal generator output probe if its output impedance is under that value.

1. Inject 53.25 mc/s, adjust permeability tuner so that calibration line "S" (for Scotland) on pointer coincides with cursor line engraved on can and tune oscillator core L5 for maximum sound output.

2. Inject 55.75 mc/s and adjust RF anode coil L3 for maximum vision output.

3. Re-check (1) and repeat adjustment if necessary.

4. Inject 63.25 mc/s and tune whole permeability tuner to sharp dip on vision response.

5. Inject 65.75 mc/s and adjust RF aerial core L2 for maximum vision output.

6. Inject 41.5 mc/s and tune permeability tuner to sharp dip on vision response.

7. Inject 44 mc/s and adjust aerial padding coil core L1 for maximum vision output.

Note: Under conditions where strong local signal in the vicinity of the IF frequency (i.e. around 15 mc/s) is liable to produce interference on the screen, L1 should be slightly re-adjusted to give, in combination with C61, maximum rejection on the IF frequency. This adjustment should not be made with the tuner set to the London frequency.

RADIO Receiver is constructed as an entirely separate unit which is housed with the speaker and automatic record changer, in a sliding drawer at bottom of console. The receiver employs six valves in a conventional three-waveband superheterodyne circuit.

Aerial signal is fed through C2 and switched by S1 to tapping on SW grid coil L4, and to MW and LW aerial coupling coils L3 L2. L1 C1 which are connected in series between aerial and earth sockets constitute an IF filter.

Grid coils L4 (SW), L6 (MW), L5 (LW), which are trimmed by T3 T5 T6 respectively, are switched by S2 to aerial tuning capacitor VC1 and coupled by C8 to gl of triode-hexode frequency-changer V1. Cathode is earthed to chassis and AVC voltages, decoupled by R7 C10, are fed through R3 to its grid. Screen voltage is obtained, in common with that of IF amplifier V2, from potential divider R1 R2, decoupling being provided by C9. Primary L14 C11 of IFT1 is in the anode circuit.

Oscillator is triode section of V1 connected in a shunt-fed tuned anode circuit. Anode coils L12 (SW) L10 (MW) L8 (LW), which are trimmed by T22 T20 T18-C17 and padded by C21 C19 C16 respectively, are switched by S4 to oscillator tuning capacitor VC2 and coupled by C15 to oscillator anode of V1 of which R5 is the load. The grid reaction voltages, which are developed inductively on L11 (SW) L9 (MW) L7 (LW), are switched by S3 through C13 to oscillator grid. Automatic grid bias is developed on C13 with R4 as leak resistor. R6 is SW limiter resistor.

IF amplifier operates at 472 kc/s. Secondary L15 C12 of IFT1 feeds signal and AVC voltage, decoupled by R7 C10, to grid of IF amplifier V2. Cathode bias is provided by R9 decoupled by C24. Screen voltage is obtained, in common with that of V1, from R1 R2 decoupled by C9. Suppressor is internally strapped to cathode. Primary L16 C23 of IFT2 is in the anode circuit.

Signal rectifier. Secondary L17 C26 of IFT2 feeds signal to anode of diode V3A. Rectified audio signal is developed across R10 and fed through IF filter R11 C27 C35 and C34, to the three radio positions of S5.

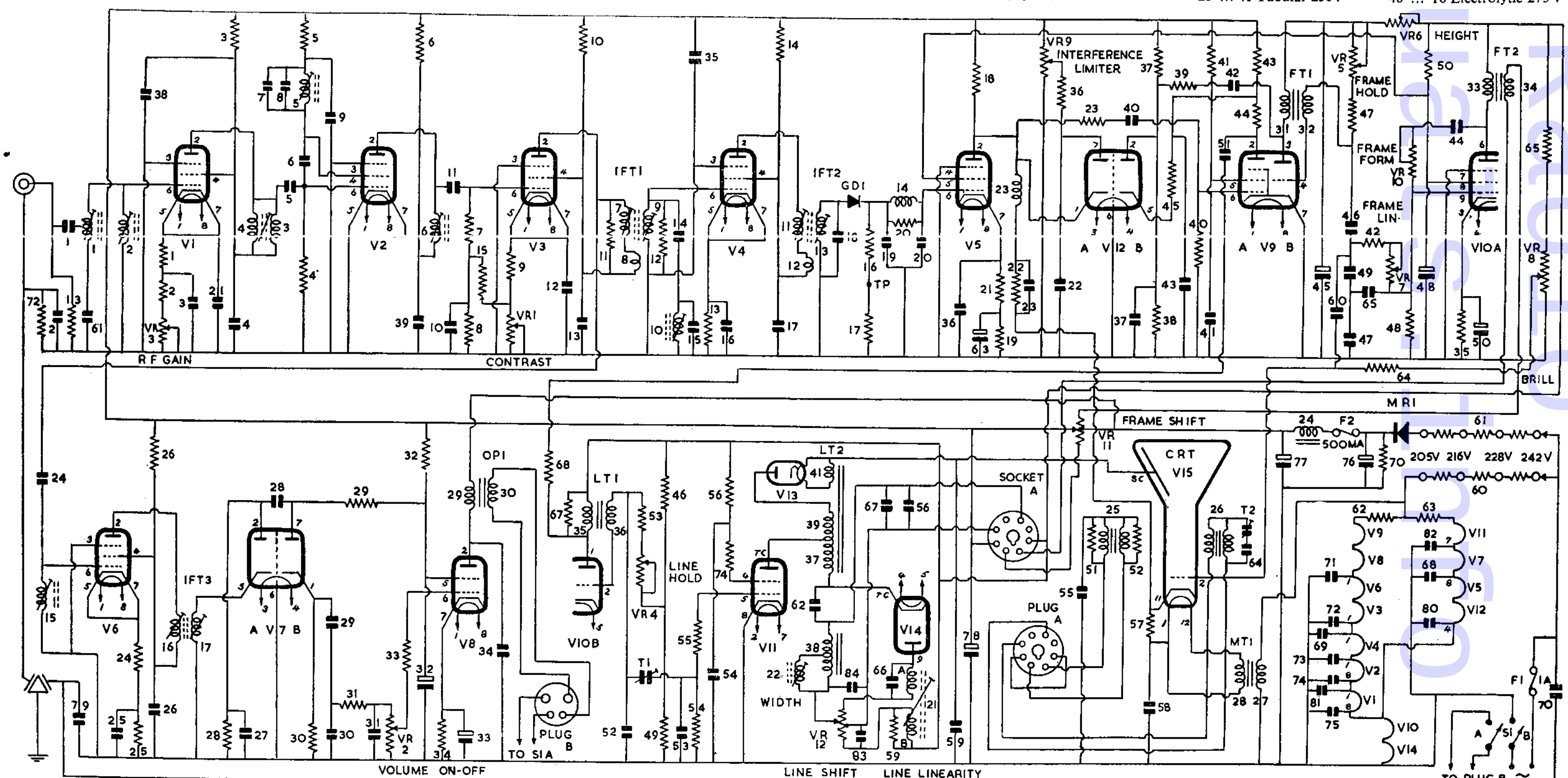
AVC. Signal at anode of IF amplifier V2 is coupled by C25 to anode of second diode V3B of which R8 is the load. AVC voltages are decoupled by R7 C10 and fed to control grids of V1 V2. AVC diode is provided with a 2V delay bias by connecting its cathode to junction R20 R24 in cathode V5.

Pickup of auto-changer is connected to receiver by inserting the three-pin plug attached to its lead, into a socket provided at rear of chassis. Pickup signal is fed to S5 which in its Gram position passes the signal through to volume control R16. When wavechange switch is placed in its Gram position then aerial and oscillator tuned circuits are disconnected from anodes and grids of V1 in order to prevent radio breakthrough.

Continued on page 24

CAPACITORS

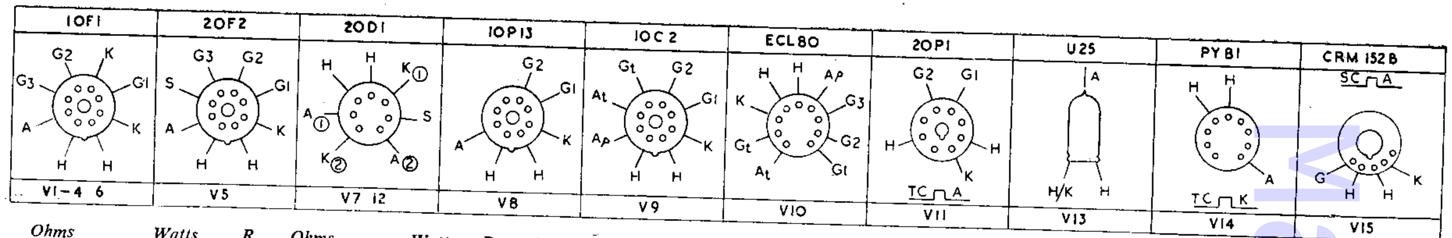
C	Capacity	Type
1	.001	Disc 500V
2	.001	Disc 500V
3	.003	Disc 500V
4	.003	Disc 500V
5	300pF	Mica
6	2pF	Tubular Ceramic
7	15pF	Tubular Ceram.
8	35pF	Silver Mica
9	.003	Disc 500V
10	.003	Disc 500V
11	100pF	Tubular Ceram.
12	.003	Disc 500V
13	.003	Disc 500V
14	15pF	Silver Mica
15	60pF	Silver Mica
16	.003	Disc 500V
17	.003	Disc 500V
18	5pF	Tubular Ceramic
19	5pF	Tubular Ceramic
20	5pF	Tubular Ceramic
21	50pF	Tubular Ceram.
22	.1	Tubular 250V
23	.1	Tubular 250V
24	2pF	Tubular Ceramic
25	.003	Tubular 350V
26	.003	Tubular 350V
27	50pF	Tubular Ceram.
28	.01	Tubular 500V
29	.01	Tubular 500V
30	500pF	Tubular 350V
31	500pF	Tubular 350V
32	32	Electrolytic 275V
33	25	Electrolytic 12V
34	.005	Tubular 1000V
35	.05	Tubular 500V
36	.001	Mica
37	.002	Tubular 1000V
38	.003	Disc 500V
39	.003	Disc 500V
40	.05	Tubular 350V
41	.1	Tubular 350V
42	.1	Tubular 350V
43	.001	Tubular 1000V
44	.005	Tubular 1000V
45	16	Electrolytic 350V
46	.5	Tubular 350V
47	.1	Tubular 350V
48	16	Electrolytic 275 V

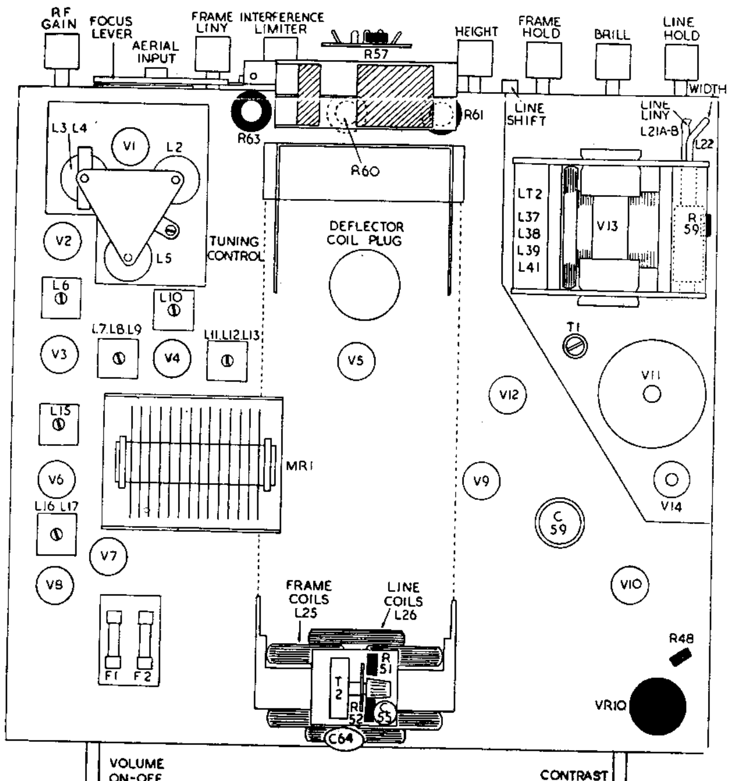


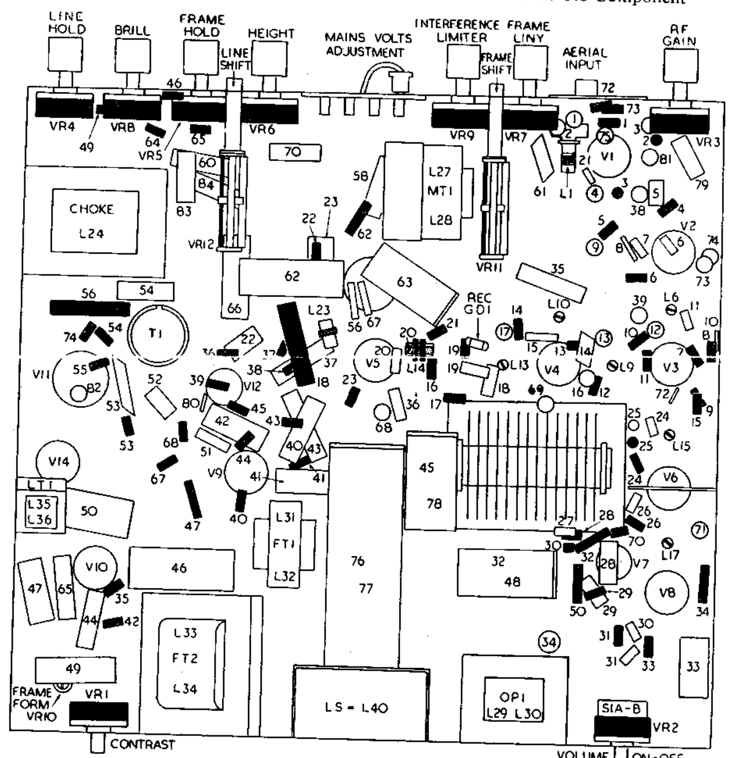
C	Capacity	Type
49	.1	Tubular 350V
50	500	Electrolytic 12V
51	200pF	Mica
52	470pF	Mica
53	100pF	Silver Mica
54	.1	Tubular 350V
55	.005	Tubular 1000V
56	47pF	Disc 3.5kV
57	No Component	
58	.1	Tubular 350V
59	.001	TCC 15kV
60	.001	Tubular 1000V
61	350pF	Silver Mica
62	.5	Tubular 350V
63	250	Electrolytic 25
64	100pF	Disc 3.5kV
65	.02	Tubular 750V
66	.25	Tubular 350V
67	100pF	Disc 3.5kV
68	.001	Disc 300V
69	.001	Disc 300V
70	.01	Tubular 300V
71	.001	Disc 300V
72	.001	Disc 300V
73	.001	Disc 300V
74	.001	Disc 300V
75	.001	Disc 300V
76	60 }	Electrolytic
77	200 }	275V
78	16	Electrolytic 350V
79	.01	Tubular 300V
80	.001	Disc 300V
81	.001	Disc 300V
82	.001	Disc 300V
83	.5	Tubular 150V
84	.5	Tubular 150V

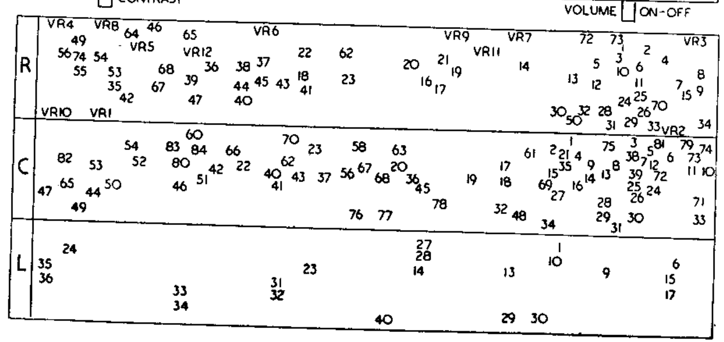
RESISTORS

R	Ohms	Watts
1	39	1/4
2	120	1/4
3	1.5K	1/4
4	22K	1/4
5	100K	1/4
6	1.5K	1/4
7	3.9K	1/4
8	100K	1/4
9	120	1/4
10	1.5K	1/4
11	10K	1/4
12	8.2K	1/4
13	150	1/4
14	1.5K	1/4
15	3.9K	1/4
16	5.6K	1/4
17	1K	1/4
18	6.8K	2
19	180	1/2
20	47K	1/4
21	220	1/4
22	220K	1/4
23	10K	1/4
24	39	1/4
25	150	1/4
26	1.5K	1/4
27	No Component	
28	68K	1/4
29	1M	1/4
30	1.5M	1/4
31	47K	1/4
32	6.8K	1/2
33	10K	1/4
34	180	1/2
35	390	1/4
36	68K	1/4
37	330K	1/4
38	1.5M	1/4
39	10K	1/4
40	330K	1/4
41	100K	1/4
42	220K	1/4
43	15K	1/4
44	27K	1/4
45	33K	1/4
46	150K	1/4
47	330K	1/2
48	330K	1/4
49	33K	1/4
50	4.7K	1/2
51	1K	1/4
52	1K	1/4
53	15K	1/4
54	1M	1/4
55	1K	1/4
56	2.7K	1
57	100K	1/4
58	No Component	
59	2.2K	1/4
60	33 + 33 + 33 Mains Dropper	15
61	20 + 15 + 18 Mains Dropper	30
62	33	1/2
63	570 WW	25
64	82K	1/4
65	33K	1/4
66	No Component	









VOLTAGE READINGS

V	Type	A	G_2	K	Remarks
1	10F1	188-204	188-204	1.5-3.2	VR3 Min.-Max.
2	10F1	200	58	0	
3	10F1	186-197	186-197	1.6-33	VR1 Min.-Max.
4	10F1	190	190	2	
5	20F2	135	135	3.1	No Signal
6	10F1	187	187	1.9	
7 A	20D1	0	—	0	
7 B		40	—	40	
8	10P13	191	160	6.7	
9 A	10C2	140	110	0	
9 B		100	—		
10 A	ECL80	200	180	8	
10 B		205	—		
11	20P1	No Reading	160	0	
12 A	20D1	135	—	0-110	VR9 Min.-Max.
12 B		150	—	75	
13	U25	No Reading	—	12-14kV	
14	PY81	190	—	350	
15	CRM152B	12-14 kV	—	100	

Total HT Current = 235mA.
Mains Current = 530mA

RESISTORS *Contd.*

R	Ohms	Watts
67	6.8K	1/4
68	12K	1/4
69	No Component	
70	470K	1/4
71	No Component	
72	1M	1/4
73	1M	1/4
74	220	1/4

PENTIOMETERS

VR1	5K	Potr.
VR2	1M	Potr. with DP Switch
VR3	10K	Potr.
VR4	250K	Potr.
VR5	500K	Potr.
VR6	250K	Potr.
VR7	2M	Potr.
VR8	100K	Potr.
VR9	100K	Potr.
VR10	500K	Potr.
VR11	10	Potr.
VR12	100	Potr.

INDUCTORS

L	Ohms
1	Very Low
2	Very Low
3	Very Low
4	Very Low
5	Very Low
6	.6
7 } 8 }	.9
9	.6
10	.2
11 } 12 }	.9
13	.6
14	6
15	1.2
16	3
17	1.8
18 } 19 } 20 }	No Components
21A	5.2
21B	9.7
22	30
23	6
24	79
25	60.6
26	45
27	733
28	.1
29	446
30	.5
31	523
32	785
33	752
34	7
35	50
36	28
37	15
38	29
39	700
40	2
41	Very Low

DECCA 111—*Continued*

AF amplifier. Radio or pickup signal, switched by S5 to Volume control R16, is fed to grid of triode AF amplifier V4. Cathode bias is developed across R15 R14 with negative feedback from secondary L19 of output transformer OP1, being applied through R22 and developed across R14. R13 is anode load, whilst HT feed to anode V4 is decoupled by R17 C30 C31.

Output stage. Signal at anode V4 is fed by C33 to grid of beam-tetrode output amplifier V5. Cathode bias is provided by voltage developed across R20 R24 decoupled by C36. Screen voltage is obtained from R18 decoupled by C31 in the HT feed to V4. Amplified signal at anode V5 is transformer coupled by OP1 to a 10in. PM loudspeaker L20. Switch S6A, which is ganged to on-off switch S6B, short circuits secondary of OP1 in television receiver. With inter-connecting lead from television receiver unplugged from socket B, then S6A merely connects one side of loudspeaker L20 down to chassis and across secondary L19 of OP1. Fixed degree of tone correction is given by C37, whilst C32 with R12 provides a variable top cut tone control. R21 is an anode stopper resistor.

HT is provided by an indirectly-heated full-wave rectifier V6 fed from HT secondary L22 of mains input transformer MT1. Choke-capacity smoothing is given by

TRIMMING INSTRUCTIONS

Apply Signal as stated below	Tune Receiver to	Trim in Order stated for Max. Output
(1) 472 kc/s to gl of V2 via .01 capacitor	—	Cores L16 L17
(2) Short VC2	—	—
(3) 472 kc/s to gl of V1 via .01 capacitor	—	Cores L11 L12
(4) Check to see that with gang capacitor fully meshed the dial cursor coincides with 550 metre calibration. If not adjust by opening up clasp with penknife and moving to correct position. Nip clasp together with pair of flat nosed pliers. Remove all control knobs and lower perspex panel which is held by 3 counter-sunk bolts with nuts and spacers.		
(5) 6 mc/s to AE socket via dummy aerial	50 metres	Cores L12, L4
(6) 15 mc/s as above	20 metres	T22, T3, repeat (5) and (6)
(7) 600 kc/s as above	500 metres	Cores L10, L6
(8) 1.2 mc/s as above	250 metres	T20, T5, repeat (7) and (8)
(9) 164 kc/s as above	1,830 metres	Cores L8, L5
(10) 250 kc/s as above	1,200 metres	T18, T6, repeat (9) and (10)
(11) 472 kc/s as above	MW band	Core L1 for *minimum*

RESISTORS

R	*Ohms*	*Watts*
1	36K	½
2	20K	1
3	1M	¼
4	51K	¼
5	27K	¼
6	100	½
7	470K	¼
8	1.5M	¼
9	200	¼
10	220K	½
11	100K	¼
12	50K Potr.	
13	220K	¼
14	500	½
15	2.2K	¼
16	500K Potr. with DP Switch	
17	22K	¼
18	22K or 5K	1
19	1M	¼
20	270	1
21	100	¼
22	5.1K	¼
23	2.2K W W	5
24	47	¼

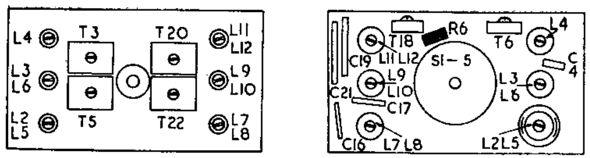
CAPACITORS

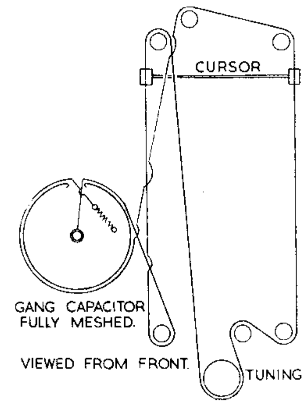
C	*Capacity*	*Type*
1	60pF	Silver Mica
2	200pF	Mica
3	No Component	
4	30pF	Tubular Ceramic
5	No Component	
6	No Component	
7	No Component	
8	100pF	Silver Mica
9	.1	Can Tubular 350V
10	.1	Can Tubular 350V
11	100pF	Silver Mica
12	100pF	Silver Mica
13	47pF	Silver Mica
14	N.C.	
15	275pF	Silver Mica
16	200pF	Silver Mica
17	100pF	Silver Mica
18	N.C.	
19	515pF	Silver Mica
20	N.C.	
21	5,000pF	Silver Mica
22	N.C.	
23	100pF	Silver Mica
24	.1	Tubular 350V
25	60pF	Silver Mica
26	200pF	Silver Mica
27	100pF	Mica
28	8	Electrolytic 500V
29	N.C.	
30	12	Electrolytic } 450V
31	12	Electrolytic } 450V
32	.05	Tubular 350V
33	.01	Tubular 350V
34	.01	Tubular 500V
35	100pF	Mica
36	25	Electrolytic 25V
37	.001	Tubular 500V
38	8	} Electrolytic 450V
39	16	} Electrolytic 450V
40	.005	Tubular 750V

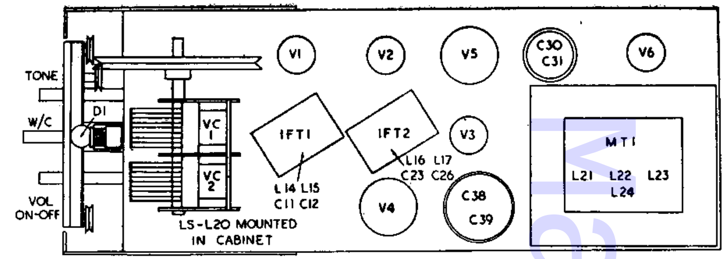
INDUCTORS

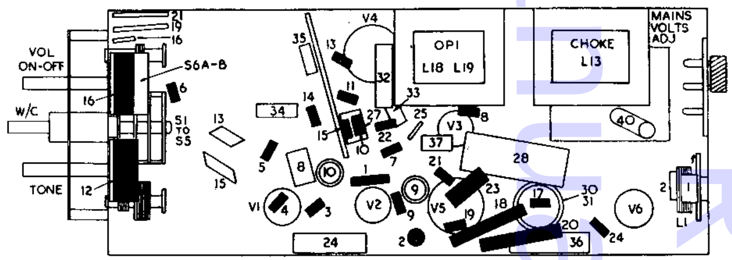
L	*Ohms*
1	8.5
2	27.5
3	21
4	Very Low
5	12
6	1.5
7	1.25
8	9.5
9	1
10	4
11	.4
12	Very Low
13	290
14	6
15	7
16	5.5
17	4
18	400
19	.5
20	3.75
21	Very Low
22	550
23	Very Low
24	38 Tapped 32 35

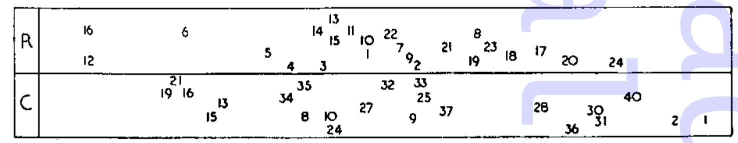
COIL PACK LAYOUT

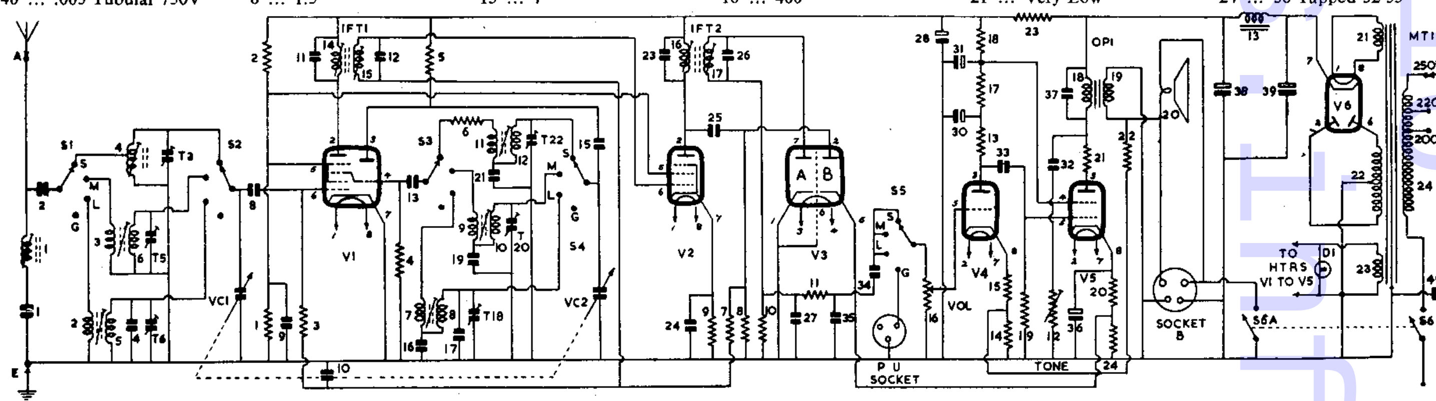


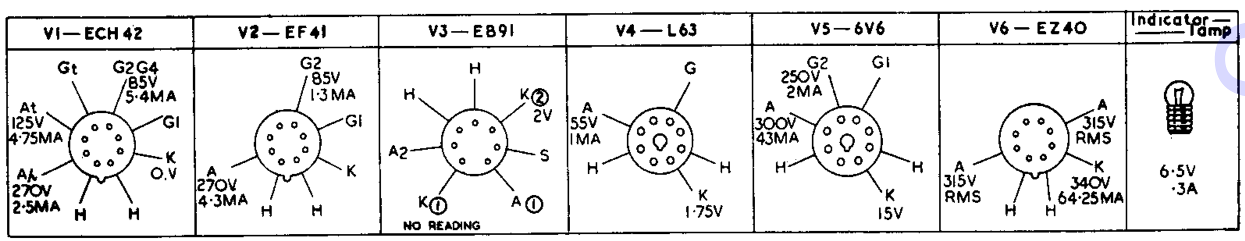












DECCA III—*Continued*

L13 C38 C39, whilst additional resistance-capacity smoothing to HT feed to V1 to V4 and screen V5, is provided by R23 C28. Reservoir smoothing capacitor C39 should be rated to handle 100mA ripple current.

Heaters of V1 to V5 and dial lamp D1 are parallel connected and fed from secondary L23 of MT1. One side of L23 is connected down to chassis.

Rectifier heater is fed from separate secondary L21.

Primary L24 of MT1 is tapped for inputs of 200 to 250 volts 50c/s.

S6B, which is ganged to Volume control spindle, is on-off switch.

C40 is mains bypass capacitor.

Automatic record changer is a three-speed BSR Monarch capable of handling eight mixed 10 and 12in. standard 78 rpm records, ten mixed $33\frac{1}{3}$ rpm records, or ten 7in. 45 rpm records. Pickup fitted is lightweight turnover crystal type with separate stylii for standard and LP recordings. Full details of its operation with adjustments, maintenance etc., were given in the September, 1953, Service Chart Supplement.

Removal of radio chassis. Remove rear cover panel of cabinet. Unplug four-way lead (from televison chassis) from socket mounted at bottom of cut-out at rear of radiogram drawer. Remove mains and four-way lead from under-cleat on rear panel of drawer, and also unplug aerial and earth leads from socket on radio chassis. Slide drawer forward sufficiently to allow the two pairs of mains leads to be disconnected from the two-pin input socket mounted on side rail of cabinet—separate television and radiogram leads. Lift up into vertical position the two drawer slide stops and then carefully pull out drawer until it is free of cabinet.

Check to see that retaining clip is securing pickup arm to its rest and then place drawer front downwards on a suitably protected surface.

Unplug pickup lead from socket on radio chassis, and disconnect leads from loudspeaker (press-stud type connectors). Remove cover plate of auto-changer mains voltage adjusting and terminal box, and unsolder the mains leads from their tags. Remove the two screws holding the four-pin socket to rear of drawer.

Next, undo and remove the two screws at top edge of radio receiver front panel (as viewed with drawer front downwards), and also the two screws holding retaining slat, at the bottom, to inside of front panel of drawer. Slacken off nuts securing rear of chassis. The chassis complete with front panel can now be slid forward out of drawer. Front panel is secured to brackets attached to each side of chassis by four screws.

Auto-changer can be withdrawn if the two nuts on the diagonally opposite anchoring bolts are removed (these are located on underside of unit-plate).

SERVICE CASEBOOK

MURPHY 210C

NOTHING but a thin bright horizontal line was to be seen. Obviously frame trouble, so frame oscillator and output valves were replaced. No improvement, so chassis was removed for more detailed checking.

With the meter on the frame oscillator grid, the normal negative kick-back was observed, proving the stage was in order.

Proceeding to frame output grid and tapping with the test prod caused the line to jump. Obviously the output was in order too.

Turning to the coupling condenser between the two stages I discovered a dead short to chassis by way of the metal casing, which is clamped in position. Replacing same brought up the full raster.—K.U.

BSR MONARCH AUTO-CHANGER

A NOT uncommon fault with this machine is that the pickup descends on to the first groove of the record, then trips and returns to the rest.

Much time may be saved by first taking a look underneath at the reset spring—a long piece of spring steel—between the main gear wheel and chassis. The function of this spring is to reset the pawl (which acts as a tooth in starting the main gear) so that it will not function again on its return. If the spring is out of position it will allow the pawl to slip past without resetting it. Loosen spring retaining nut and bolt, and adjust for correct position. —K. Underwood, Rowlands Gill.

EKCO TC206

FRAME collapse was the fault in an Ekco TC206. Tested voltages in frame timebase circuit after the usual valve substitution and located 25V positive on 10P13 grid.

Naturally suspected our old friend leaky coupling condenser C73 .25 C74 .02 (Ekco service sheet). Replace, still 25V positive.

Next remove screen feed to valve as screen pin is next to grid. Still 25V positive. Bell rings for call into shop. Switch off bench light and notice blue haze near heater pins of U282 (V15).

White wire going to centre of height control is laid on these pins. Remove same and test, no positive, perfect raster.—John R. Passmore, Scarborough.

PHILIPS 1800

HERE is a job I should have left to the apprentice. It illustrates the importance in television servicing of mixing the scientific approach with a little intelligent guessing.

The customer complained the picture was slipping and I found that the picture would not quite lock at the extreme of the frame hold control. New frame valves were tried but didn't improve matters so the set was brought in.

I decided the resistance in series with the frame hold control had gone high but this was not so. Voltages were checked but these appeared OK. Next I changed the charging capacitor, resulting in a slight improvement (this foxed me—it was later tested and found to be outside the specified tolerance).

All the other components in the frame circuit were then tested without result but the resistance readings for the oscillator transformer were well outside the readings given in the manufacturer's service manual. This component was, however, checked against one from a similar set and found to be in order.

Voltage readings were then compared on both sets and differed by about 10 per cent. Our local mains voltage is rather low and we have to allow for this when checking sets, but in this case I "smelled a rat."

I checked the supply to the frame oscillator and found a suspicious voltage drop across the feed resistor. The current taken was found to be excessive so the bias on the valve was checked and found to differ between sets. A glance at the circuit diagram was sufficient for me to see that the bias line was fed from the limiter. I changed this valve and the set returned to normal.—G. A. Pearson, Sheffield

FISHER WASHER—*from page 20*

to cabinet by two screws. Switch is enclosed by a press-in moulded Bakelite cover.

The wringer (Fig. 1) is a Fisher or Acme type A75 with 11in. rubber-covered rollers, adjustable roller pressure, twin bar-operated quick-release safety device coupled to pressure beam, and a lever-controlled off, forward and reverse gearbox. A pivoted flume, automatically tilted in required direction by action of the lower roller, is fitted.

Gearbox pillar is designed to slide into a four-position locating socket bolted to rear left-hand corner of washer top plate (Fig. 2). The wringer is positively locked in any one of the four positions by a spring-loaded stud, operated by small knob at side of pillar, which engages with locating slots cut in top of socket. Wringer is driven from agitator gearbox through a mild steel drive bar, fitted with square socket coupler, into which fits the square keyed driving shaft of wringer gearbox.

MAINTENANCE

Lubrication. About once a month the following points of lubrication should be attended to:—

Lift agitator from tub, invert it on a piece of old newspaper and insert a few drops of light machine oil into agitator cap.

Apply a little grease to base of agitator drive shaft, at bottom of tub, and in same way grease collar at the top of this drive shaft.

Remove wringer completely from machine and apply a little grease to wringer drive shaft coupling which will beseen in wringer location boss.

Oil the pressure release mechanism and the clamping arm pivots with a light oil.

Invert wringer and drop a small amount of oil on to position-locating plunger. This is the small pin which protrudes from gearbox near to wringer tube. Also drop a small amount of oil inside wringer tube whilst wringer is in inverted position. A few drops of oil should be occasionally applied to base of wringer control handle.

Apply a little grease to each end of each wringer roller spindle. The rollers can be removed by releasing the pressure by means of the safety release bars and lifting the top beam as far as possible. First ease out the top roller complete with bearing blocks; then lift out the bottom roller. Grease each end of the roller spindles and replace the parts.

Agitator gearbox is filled with oil before leaving the factory and no replacement should be required for about two years. When replacement does become necessary remove filler and drain plugs from gearbox. Run out old oil and replace with $1\frac{1}{2}$pts. SAE 140 grade. Extreme pressure oil.

Motor—Sleeve Bearings. These are sent out *fully charged* with oil sufficient for at least two years' operation. At the end of this period it is desirable to remove the screw plug at the top of the bearing, and slowly to feed a good machine oil into the bearing until oil is seen at overflow hole.

Dismantling. Lift off wringer and remove agitator from tub. Remove the four screws securing washer top plate to cabinet and remove the rear panel held in place by two screws. Next drive out the $\frac{3}{16}$ in. dia. steel pin securing collar to top of agitator drive shaft and lift off collar. When driving out this pin it is advisable to hold a block of metal against the shaft to counteract hammer blows and so avoid damage to enamel of tub, etc.

Remove agitator column by unscrewing it in an anti-clockwise direction using a suitable large box spanner.

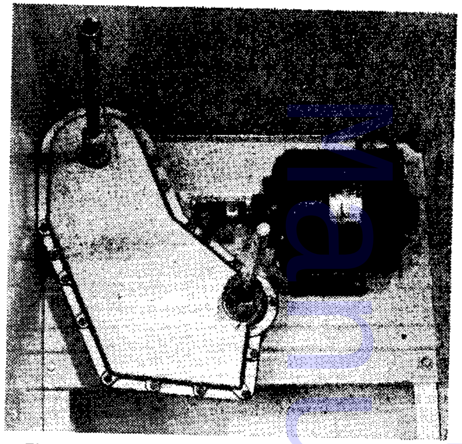


Fig. 5.—Removal of tub gives access to motor and gearbox

Top plate with tub attached can now be lifted out of cabinet (Fig. 4). Tub can be detached from top plate by undoing nuts securing the four clamps. Remove wringer drive bar by withdrawing split pin securing coupler on lower end of worm wheel shaft extension.

Undo and remove the two screws fastening on-off switch assembly to side panel. Undo and remove six screws and nuts securing chassis to L brackets on cabinet. Withdraw mains cable and lift out chassis complete with motor and gearbox.

Undo and remove the two nuts and bolts fastening flexible hose coupling to motor and gearbox drive shaft.

Remove nut and bolt securing mains input cable cleat to motor and gearbox chassis. Remove press-on cover and disconnect leads from switch.

Finally undo and remove the four bolts securing motor to chassis and pull mains lead and switch lead through chassis. Motor can now be lifted.

Gearbox can be lifted when the nuts on the three fixing bolts on underside of chassis are removed.

Wringer (Acme). Remove control handle, held by screw in centre, and also the two half shrouds enclosing gearbox—these are held by two screws adjacent to control spindle and two screws on underside. Before removing gearbox cover replace handle to prevent the ball-catch from becoming detached.

When reassembling, check to see that the horizontal clutch bar engages with clutch groove and that sealing gasket is in good condition.

Wringer (Fisher) Release pressure, undo grub screw at gearbox end of top beam and knock out pin, undo grubscrew at clamp end of beam and knock out pin. Remove top beam. Withdraw rollers and bearing blocks. Undo and remove two screws and remove drip tray. Remove two screws and two bolts from gearbox end of wringer body, this will release gearbox from wringer body.

Remove plunger screw from gearbox cover and withdraw spring and $\frac{1}{4}$ in. dia. ball. Remove six screws from gearbox cover and lift off cover plate. Withdraw centre driving shaft and release $\frac{5}{8}$in. and $\frac{1}{2}$in. bore bevels and clutch bobbin. Slacken off grub screw on bottom shaft casting and withdraw insert, bottom bevel will not withdraw. Knock out pin on control handle and take off handle, the eccentric shaft will now withdraw.