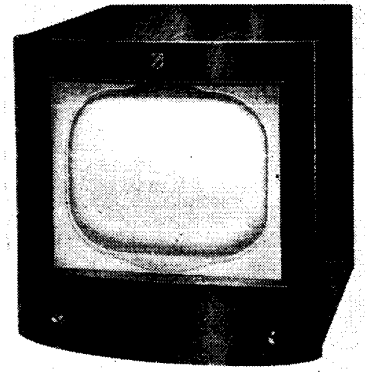
ALBA
T372, T472



Fifteen-valve five-channel television receiver fitted with 12in. tube giving a 10¼ by 7¾in. picture. Model T372 is in a walnut veneered table cabinet and T472 in a similarly-finished console. Suitable for 200-250V 50c/s AC and DC supplies. Made by A. J. Balcombe Ltd., 52-58, Tabernacle Street, London, EC2.

THE receiver employs a superheterodyne circuit designed to operate on lower sideband of vision carrier. The RF, frequency-changer and first IF stage are common to sound and vision channels. The inductances in the aerial, RF and frequency-changer tuned circuits are tuneable from 40 to 68mc/s to cover all five television channels.

Vision interference and sound noise suppression circuits are incorporated and EHT is obtained from line flyback pulses. Mains consumption is approximately 125W.

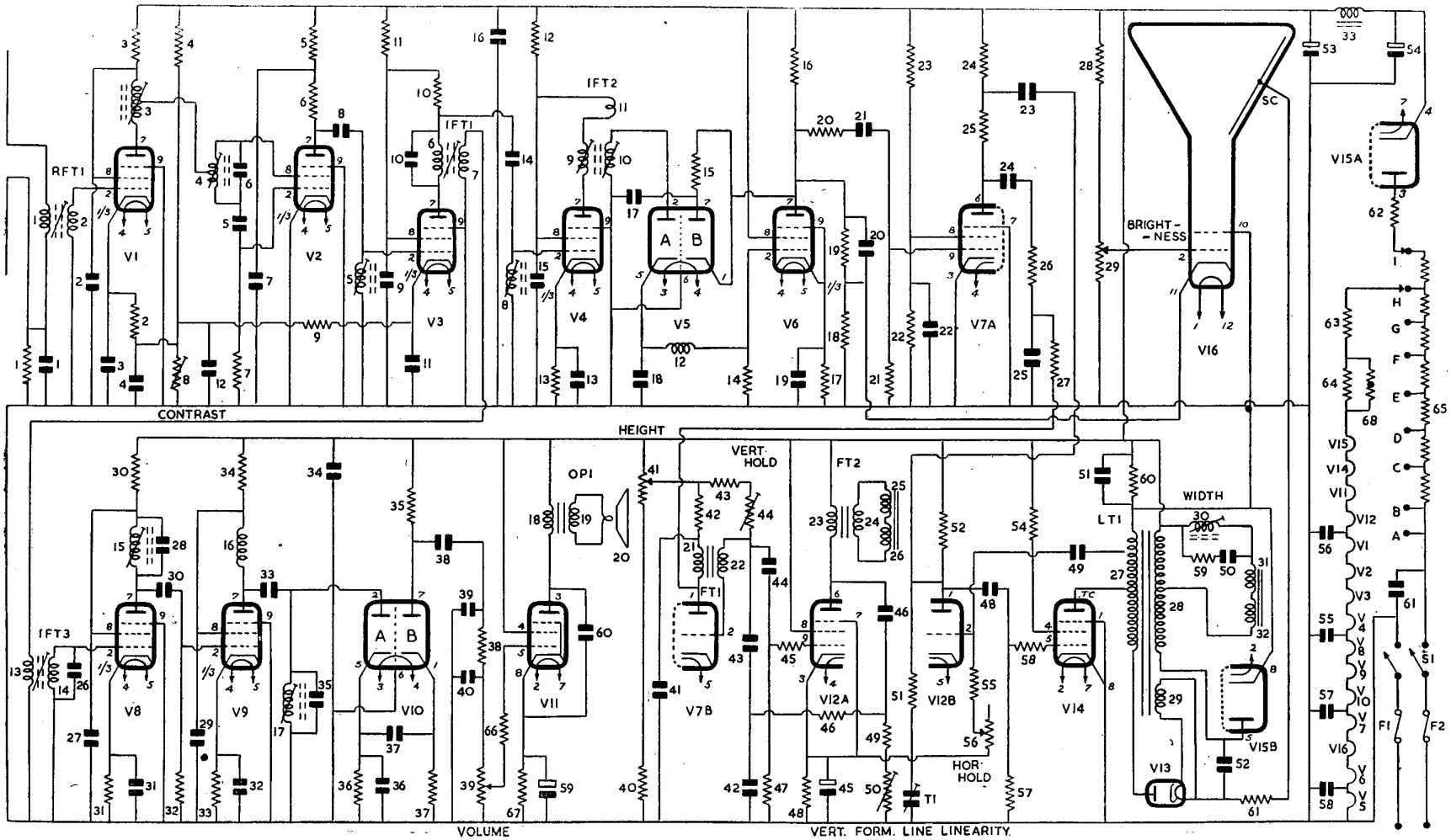
Aerial input circuit is for use with 80 ohm coaxial feeder. Outer screen is taken to chassis through RI C1.

RF amplifier. Signal is coupled by RFTI to RF amplifier V1, gain being controlled by R8, the **Contrast Control** in its cathode. Amplified signal at anode is developed across tuned coil L3.

Frequency-changer is V2 operating as oscillator and mixer. Oscillatory tuned circuit L4 C6 is connected between screen and grid through C5, the screen or oscillator anode voltage being obtained from tap on L3 in anode of RF amplifier V1. Automatic bias for oscillator grid is developed on C5 with R7 as leak. The RF signals at anode V1 are mixed with oscillator signal, by virtue of coupling provided between L3, L4 by the DC link, and produce across R6 in anode V2 resultant IF carriers of 16mc/s (vision)—and 19.5mc/s (sound).

Vision and sound IF signals at anode V2 are coupled by C8 to tuned coil L5 in grid of common IF amplifier V3, the gain of which is controlled with that of V1, by variation of bias by R8. Amplified vision signal is developed across R10 and sound signal on primary L6 of IFTI.

Vision channel. Vision signal developed across R10 in anode V3 is capacitively coupled by C14 to tuned coil L8 in grid of final vision IF amplifier V4, the output of which is bandpass transformer coupled by IFT2 to vision signal rectifier V5A.



RESISTORS

R	Ohms	Watts
1	220K	¼
2	180	¼
3	1K	¼
4	150K	¼
5	1K	¼
6	5.6K	¼
7	68K (110K x 150K)	¼
8	2K WW Potr.	
9	180	¼
10	2.2K	¼
11	1K	¼
12	1K	¼
13	180	¼
14	5.6K	¼
15	3.3M	¼
16	7K	1W
17	170	¼
18	200K	¼
19	100K	¼
20	10K	¼
21	330K	¼
22	150K	¼
23	1.5M	¼
24	33K	¼
25	82K	¼
26	330K	¼
27	100K	¼
28	47K	¼
29	50K	Potr.
30	1K	¼
31	220	¼
32	82K	¼
33	180	¼
34	220	¼
35	2.2M	¼
36	47K	¼
37	1M	¼
38	47K	¼
39	500K Potr. with DPST switch	
40	47K	¼
41	50K	Potr.
42	22K	½
43	470K	½
44	2M	Potr.
45	1K	¼
46	16K	¼
47	2.2M	½
48	820	½
49	47K	½
50	250K	Potr.
51	10K	¼
52	560K	¼
53	No Component	
54	330	¼
55	100K	¼
56	50K	Potr.

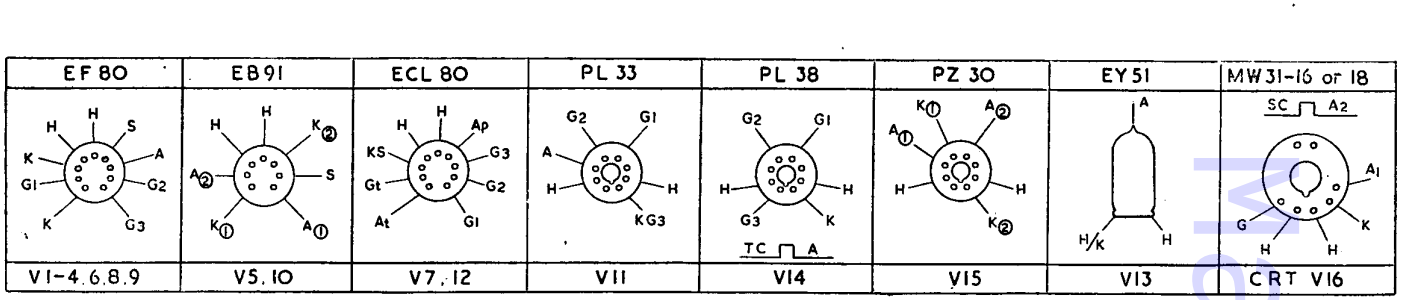
R	Ohms	Watts
57	820K	½
58	1K	½
59	500	1W
60	8K	WW 5W
61	470K	1W
62	50	WW
63	50	WW
64	500	WW
65	91 WW Dropper Tapped 14x7x7 x7x14x35	
66	47K	½
67	150	½
68	Thermistor	

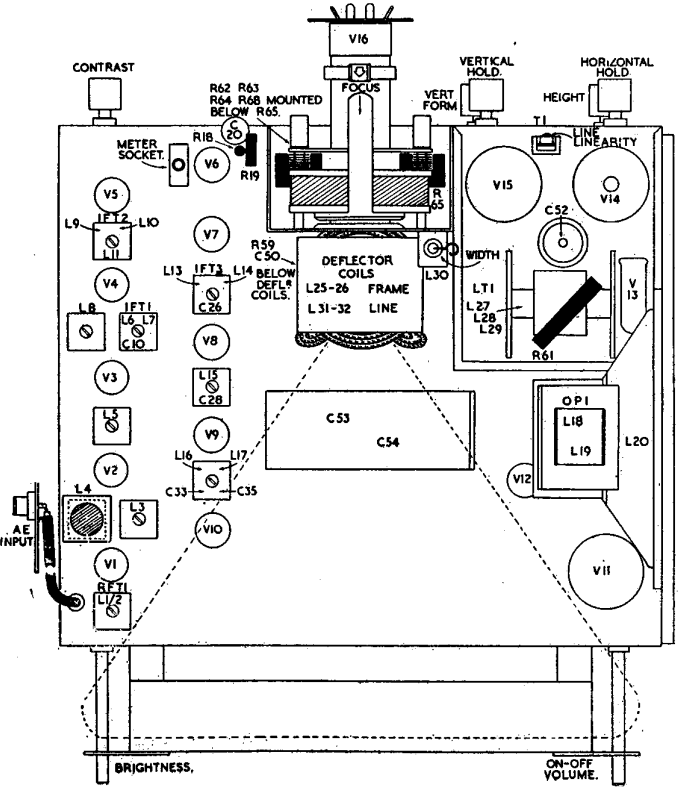
CAPACITORS

C	Capacity	Type
1	.005	Tubular 500V
2	.005	Tubular 500V
3	.005	Tubular 500V
4	.005	Tubular 500V
5	56pF	Silver Mica
6	20pF	Silver Mica
7	.005	Tubular 500V
8	.005	Tubular 500V
9	.005	Tubular 500V
10	25pF	Silver Mica
11	.005	Tubular 500V
12	.005	Tubular 500V
13	.005	Tubular 500V
14	.005	Tubular 500V
15	.005	Tubular 500V
16	.005	Tubular 500V
17	.1	Tubular 350V
18	8.2pF	Silver Mica
19	2000pF (500 +1500)	Silver Mica
20	.25	Tubular 350V
21	.02	Tubular 750V
22	.1	Tubular 350V
23	15pF	Silver Mica
24	.01	Tubular 350V
25	.001	Mica
26	25pF	Silver Mica
27	.005	Tubular 500V
28	15pF	Silver Mica
29	.005	Tubular 500V
30	.001	Mica
31	.005	Tubular 500V
32	.005	Tubular 500V
33	.001	Mica
34	.005	Tubular 500V
35	15pF	Silver Mica
36	47pF	Silver Mica
37	.01	Tubular 500V
38	.01	Tubular 500V
39	300pF	Mica
40	300pF	Mica
41	.1	Tubular 350V
42	.1	Tubular 350V
43	.05	Tubular 750V
44	.1	Tubular 350V
45	50	Electrolytic 12V
46	.075	Tubular 350V
47	No	Component
48	.01	Tubular 500V
49	250pF	Silver Mica
50	.02	Tubular 750V
51	.5	Tubular 350V
52	500pF	Special 15kV
53	250	Electrolytic 350V
54	60	Electrolytic 350V
55	.005	Tubular 500V
56	.005	Tubular 500V
57	.005	Tubular 500V
58	.005	Tubular 500V
59	25	Electrolytic 25V
60	.01	Tubular 750V
61	.05	Tubular 750V

INDUCTORS

L	Ohms
1-8, 11, 13-15, 17	Very low
9	.25
10	.25
12	12
16	.3
18	500
19	.5
20	2.5
21	540
22	250
23	1000
24	1
25	8.25
26	8.25
27	350
28	10
29	Very low
30	2.5
31	9
32	9
33	14

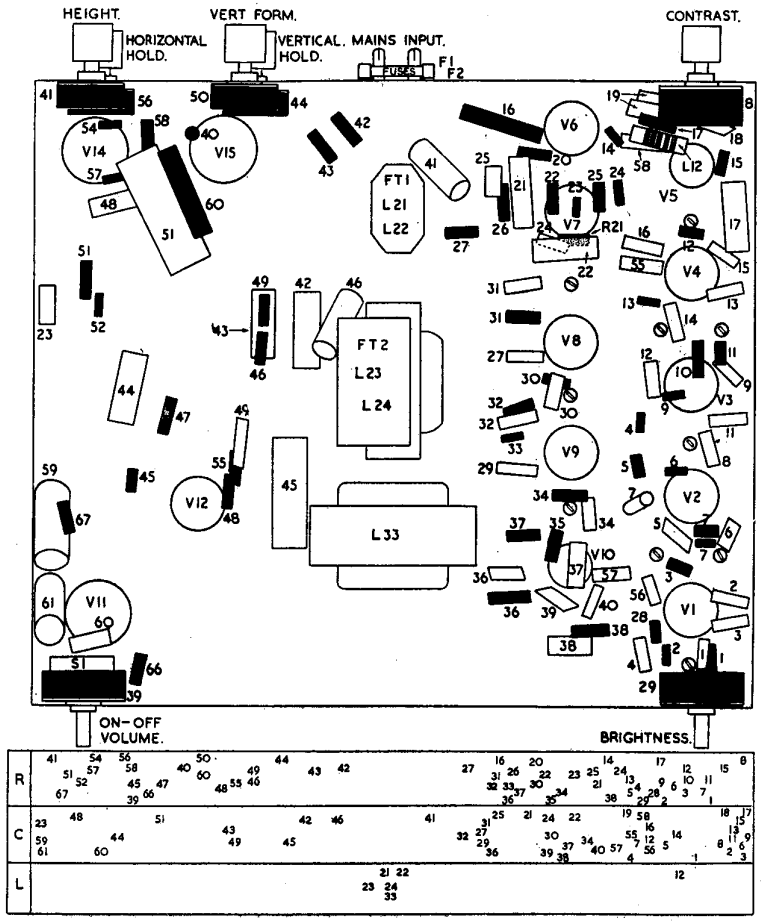




Rectified signal across R14 is DC coupled to grid of video amplifier V6, the output of which is DC/AC coupled by R18, R19, C20 to cathode of CRT V16.

Interference limiter is diode V5B shunted by R15, which is connected with cathode to anode of V6 and anode to chassis through C17. C17 charges through R15 to a potential approximately equal to peak signal level. When a high frequency interference pulse arrives, cathode of V5B is driven

Continued on page 16.



VOLTAGE READINGS

V	Type	A	G2	K	
1	EF80	180–165	180–170	1.8–4.5	R8 Min.–Max.
2	EF80	115	160	0	—
3	EF80	180–145	183–165	1.8–4.5	R8 Min.–Max.
4	EF80	170	170	2	—
5A	EB91	—	—	—	—
5B	EB91	7.5	—	122	—
6	EF80	122	185	3	R8 at Min.
7A	ECL80	75	10	0	R41 Min.–Max.
7B	ECL80	55–155	—		
8	EF80	175	175	2.2	—
9	EF80	183	183	2.2	—
10A	EB91	—	—	—	—
10B	EB91	15	—	—	—
11	PL33	175	185	4	—
12A	ECL80	175	185	9.3	—
12B	ECL80	45	—		
13	EY51	—	—	7.5–8.5kV	—
14	PL38	—	180	0	No anode reading advisable Cathode current = 185mA
15A	PZ30	205	—	190	—
15B	PZ30	185	—	300	—
16	MW31-16 or MW31-18	7.5–8.5kV	300	60	R8 Min.

ALIGNMENT INSTRUCTIONS

Apparatus required: Accurately-calibrated signal generator covering 17 to 20mc/s and having modulated output. High-resistance voltmeter, which should be connected between chassis and socket provided adjacent to V6. Place Contrast Control R8 to maximum.

Inject 17.5mc/s to gl of V3, damp secondary L10 of IFT2 with 470ohm resistor and tune L9 (bottom) for maximum vision output on meter. Connect damper across primary L9 and tune L10 (top) for maximum vision. Inject 18.75mc/s to V3 and tune L8 for maximum.

Inject 19.5mc/s to V3 and tune IFT1 for minimum vision output and then tune IFT3, L15 and L17 for maximum sound output on LS.

Inject 17mc/s via 500pF mica capacitor to anode V1 and tune L5 for maximum vision output on meter.

Injecting to V1, repeat all operations.

Inject appropriate sound carrier frequency into aerial socket and tune oscillator coil L4 for maximum sound output on L.S. Inject appropriate vision carrier frequency into aerial and tune L3, RFT1 for maximum vision.

To set up CRT ion trap. Loosen lock screw on clamp ring and check that arrow on trap is pointing towards screen end of tube and that it is over line etched on tube neck. Switch on receiver and adjust Brightness control so that raster is just visible. Slide ion trap backwards or forwards along neck of CRT until raster is at its brightest. In this position rotate trap a few degrees on either side of etched line to find position of maximum brightness. Now increase picture brightness to give correct level for peak whites, and if necessary re-adjust setting of ion trap to give maximum brilliance. Finally lock ion trap in position

BURCO WASHER—*Continued*

Drive to gearbox is taken by mild-steel shaft with slotted end to accept key on drive rod which passes through support column. Box contains two bevel gears in mesh with crown gear on lower roller shaft and a sliding clutch plate coupled to vertical shaft by woodruff key. Clutch plate has dogs on either side which engage with either of " forward " or " reverse " bevel gears, according to position of control handle at end of wringer. This handle is connected to a circular plate fitted (Fig. 6) with pivoted bar which rides in annular groove in clutch plate.

Gearbox is packed with Mancolene 586 grease and is enclosed by a cover plate on which is mounted clutch shaft. A two-piece diecast outer case to enclose gearbox and support column is attached by two screws to cover plate. Lower portion of wringer gearbox column fits over support tube which is fastened to left rear corner of top.

Wringer is locked in any one of its four working positions by a knob-operated spring-loaded stop which drops into notches cut in a plate at base of support tube.

A pivoted drain tray, automatically tilted according to direction of rotation of lower roller, is fitted to underside of frame. A clip-on pressed aluminium apron feeder board is fitted each side.

Wringer is white or cream enamel finished.

MAINTENANCE

Five-yearly overhaul. Lift off wringer and remove driving rod from support tube. Unscrew retaining spindle and remove agitator. Remove tap handle from tap body. Break connection between clutch handle and gearbox at turnbuckle, and disconnect the four-core switch cable from terminal box.

In early models, where incoming cable is taped to support frame, it will be necessary to slacken off cable entry gland and draw through a length of cable. In later models, disconnect incoming cable from terminal box and free it from spring clip attached to motor bracket.

On removing eight screws holding the top casting to case, all works suspended from top casting can be lifted from cabinet in one unit.

To top up agitator gearbox. Remove oil level plug and pour oil through wringer drive vent until oil level reaches bottom of oil plug hole. Recommended oil is Wakefield's Special Alpha 17 (also known as Wakefield's 717). Replace plug and gasket.

General oiling. Any medium grade machine oil is suitable for pivot points and vertical spindles of castors. Castor wheels are fitted with oilite bushes; oiling at these points, therefore, is not necessary. A survey should be made to ensure that all screws are tight, split pins and drive pins are secure, and motor belt serviceable.

A watertightness check should be made of both tap washer and tap body connection to tub.

Motor. This should not need re-oiling during life of machine when used for normal domestic purposes. If it is used almost continuously, however, as in a works laundry, then the motor should be replenished with oil every 2,000 running hours. It is advisable before re-oiling to remove motor from its frame and ensure that overflow holes, ocated in cover at each end of machine, are not blocked up.

Oiling is done by removing grub screws in circumference at each end and filling slowly with Vitrea No. 27 oil until it seeps through overflow holes.

On re-assembly ensure that motor pulley is in line with gearbox pulley and that belt is reasonably tight. Slots in both motor base and motor bracket permit correct positioning and belt tensioning. With DC motors it is important that motor shall be re-assembled with rubber buffers under mounting feet to ensure resiliency of operation.

To adjust clutch link mechanism. When re-assembling machine rotate gearbox pulley until it is possible to press home the clutch; then with operating lever in " ON " position couple up the two rods with the turnbuckle.

Wringer. Remove handle and two half shrouds which are

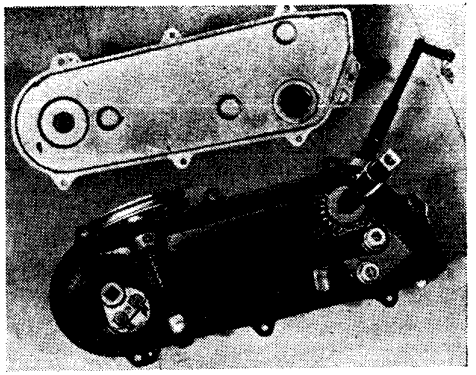
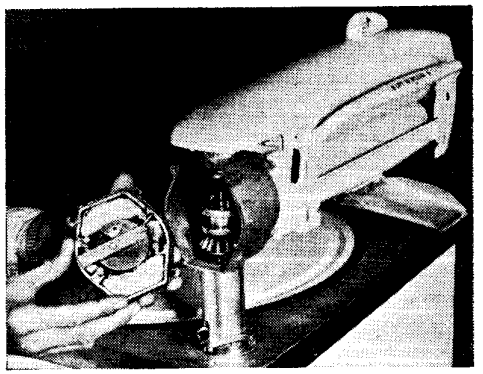


Fig. 5.—Agitator gearbox with cover removed and oil drained off. Fig. 6 (below)—Wringer gearbox showing gear selector



each held in position by a single screw. Before removing gearbox cover replace handle, thus preventing internal ball catch from becoming detached. Gearbox should be approximately half full of grease, the recommended grade being " Mancolene " 586, manufactured by Marine and Industrial Lubricants, Ltd.

Re-assemble in reverse order, ensuring that horizontal clutch bar engages in clutch groove, and that paper gasket is not damaged.

SERVICING

Replacement of agitator shaft water seal. Using special tool (No. 989) remove agitator tube assembly—turn in an anti-clockwise direction. Tub, sealing washers and distance piece are now free from support frame. On slackening retaining screw on boss of agitator gearbox, agitator drive shaft can be withdrawn and replaced by dummy shaft (tool No. 921) which retains alignment of clutch and drive gear.

The complete water seal assembly and agitator driving shaft are to be returned to Burco, Ltd., to be replaced by new or re-conditioned components.

When fitting new assembly meticulous care must be taken to prevent damage to water seal or drive shaft surface. The honed surface is protected by a cardboard tube.

To re-assemble. Remove dummy shaft from gearbox, substitute new drive shaft and fasten with locking screw. With assembly tube (tool No. 990) in position add, in the following order; distance piece, metal washer, rubber washers, tub, rubber washers, metal washer—then, keeping parts in alignment, remove assembly tube.

Fit waterseal assembly sleeve (tool No. 901) over square end of the shaft and smear it liberally with Castrolease Water Pump Grease; then fit agitator tube assembly and tighten into position.

Removal of agitator gearbox. It is necessary to remove agitator tube, etc., so that tub and cabinet top can be removed from mechanism chassis to expose gearbox fixing nuts. After gearbox has been serviced it will be necessary to replace agitator water seal as described above.

Dismantling gearbox. Undo the seven nuts and bolts and remove gearbox lid and gasket. Next lift off clutch and drive gear below it and also remove roller from pin on clutch operating shaft. Pour off oil in gearbox.

To extract worm gear remove pulley, thrust screw and steel ball; loosen bearing locking screw, then gently tap out worm gear using steel drift (tool No. 994). Worm will bring away with it the oil seal, bearing and distance collar.

Next, remove link, worm wheel and quadrant gear.

Removal of the clutch driving shaft necessitates extraction of drive pin, nearest to gear box, which passes through connecting sleeve. Before withdrawing pin, however, it is important that shaft and sleeve be marked so that on re-assembly the correct relationship can be established.

Re-assembling gearbox. First smear heavy grease on clutch operating shaft stem and then insert it in bearing tube so that it is correctly aligned with mark made on sleeve; replace pin. Then replace quadrant gear and worm wheel with connecting link and wringer socket in position, making sure that brass bearing washer (chamfer uppermost) is between bottom of case and worm wheel.

Insert worm gear with collar and bearing bush on shaft into gearbox—tighten bearing bush locking screw. Place steel ball in position at end of shaft and screw in thrust screw tightly, so that worm gear is driven hard against collar—then slacken back screw one-third turn and lock.

Refit oil seal, using sleeve (tool No. 991) and hollow punch (tool No. 992) to force it into housing until it is flush with side of gearbox.

Check to see that footstep bearing (chamfer upwards) is in bottom of agitator drive shaft bearing, then place in position drive gear followed by clutch—the dogs of the latter being in mesh with gear and roller of clutch operating shaft in groove of clutch.

Insert *new* agitator drive shaft, with Woodruff key in position, through clutch and gear into bearing—tighten locking screw. Fill gearbox with 1½ pints of Wakefield's Special Alpha 17 oil—replace lid, making quite sure that sealing gasket is in good condition.

When attaching gearbox to mechanism chassis, check to see that packing washer is placed on fixing stud furthest from agitator drive shaft.

Finally, re-assemble cabinet top, tub and mechanism chassis and fit *new* agitator water seal assembly.

Note. With gearbox filled with oil it is essential that neither it nor the completely assembled machine be inverted, as oil can escape through wringer drive socket.

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negative, but due to comparatively long time constant of R15 C17, the anode potential does not change. The diode conducts to short the pulse.

Sound Channel. Sound IF of 19.5mc/s, developed by IFT1 in anode of V3, is coupled by L7 to primary L13 of IFT3 in grid of sound IF amplifier V8. Amplified signal on tuned anode coil L15 is coupled by C30 to final IF amplifier V9, the output of which is choke-capacity fed by L16 C33 to tuned coil L17 in diode signal rectifier V10A circuit.

Audio signal across R36 C36 is fed by C37 through series noise suppressor diode V10B and C38 and RF filter R38 C39 C40 to **Volume Control** R39 in grid of pentode sound output amplifier V11. This feeds, through transformer OP1, a 6½in. television type PM speaker L20.

Noise suppressor. Anode of V10B is biased positively from HT line through R35 and conducts to set up a voltage across cathode load R37. The time constant of R35 C38 C39 is such that the voltage across the capacitors follows the audio signal fed by C37 to cathode V10B. When a large amplitude high-frequency interference pulse is passed by C37 then, because of comparatively long time constant of R35 C38 C39, the cathode is driven positive and the diode cut-off.

Sync separator. Video signal at cathode of CRT is fed through R20 C21 to grid of V7A. Positive sync pulses of video signal drive V7A into grid current and the resultant bias produced across R21 is sufficient to place video portion of signal below cut-off, thus only the sync pulses appear at anode. Anode and screen voltages of V7A are low to give a short grid base.

Frame sync pulses are integrated by R25 C24 and fed through R26 C25 R27 to anode of frame scan oscillator V7B. Line sync pulses are developed across R24 and fed by C23 to anode V12B.

Frame scan oscillator is triode V7B operated as grid-blocking oscillator with anode-grid back coupling by transformer FT1. Scan voltage is developed on C42 C43. Adjustment of oscillator anode volts by R41 gives **Height** control and variation of rate of charge of C42 C43 by adjustment of series resistance R44 gives **Vertical Hold.**

Frame amplifier. Scan waveform is fed by C44 through R45 to grid of pentode frame amplifier V12A. Amplified scanning voltage at anode is transformer coupled by FT2 to low-impedance scanning coils L25 L26 on neck of CRT. Linearity of waveform is controlled by adjustment by R50, the **Vertical Form** control, of the amount of negative feedback through C46, R46 etc.

Line scan waveform is generated by a multivibrator type oscillator formed by triode V12B and line output amplifier V14, which are anode to grid cross coupled by C48 C49. Frequency of scan is dependent on time constant of C49 and grid load R55 R56 of V12B and adjustment is provided by R56 **Horizontal Hold** control. Waveform correction is by R51, LT1, adjustment of the latter providing control of **Line Linearity.**

Output waveform is transformer coupled by LT1 to line deflector coils L31, L32 on neck of CRT. Amplitude of line scan is adjusted by variation of inductance of series coil L30.

Additional HT for anode of line amplifier and for first anode of CRT is provided by booster-diode V15B which rectifies and damps out the shock oscillations set up in LT1 when V14 is cut off. Anode of V15B is fed from an overwind on secondary L28 and additional HT is stored on C51.

EHT of approximately 8.5kV is obtained by V13 rectifying the large surge voltage developed across overwound primary L27 of line output transformer OP1 when V14 is cut off. EHT is smoothed by C52 R61 and fed to final anode of CRT. Capacity between inner and outer coatings of CRT provides further smoothing.

HT. On AC supplies HT is provided by indirectly-heated halfwave rectifier V15A with anode voltage obtained from mains through limiter R62 and tapped dropper R65. Choke-capacity smoothing is by L33 C53 C54, and RF decoupling by C16, C34. Reservoir smoothing capacitor C54 should be rated to handle 500mA ripple.

Heaters of all valves except V13 are series connected and obtain their current from the mains through thermal surge limiter R68, shunted by R64 R63 and tapped dropper R65. Heater line is RF decoupled by C55 to C58.

CRT is a 12in. tetrode Mullard MW31-16 or MW31-18 with PM magnet focusing. Variation of grid bias by R29 gives control of **Brightness.**