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**"HIS MASTER'S VOICE"
MARCONIPHONE**

**1350
879**

SERVICE MANUAL

5-Valve Superhet Press-button AC/DC Model

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SPECIFICATION

PHYSICAL.

	Model 1350.	Model 879.
Height	20 $\frac{1}{4}$ ins.	20 ins.
Width	17 $\frac{3}{4}$ "	17 $\frac{5}{8}$ "
Depth (overall)	10 $\frac{1}{2}$ "	10 $\frac{1}{4}$ "
Net Weight	36 lb.	35 lb.
Gross Weight	45 "	44 "

RATED OUTPUT.

Maximum 6.5 watts.

VALVES.

Marconi X65 (V1)	...	Frequency-changer.
" KTW63 (V2)	...	I.F. Amplifier.
" DH63 (V3)	...	Second Detector, A.V.C., & L.F. Amplifier.
" KT33C (V4)	...	Output Valve.
" U31 (V5)	...	H.T. Rectifier.

Pilot Lamps, 2 at 6.5 v. 0.15 amp. Part No. 22704M.

SUPPLY.

200 to 255 volts 25—60 cycles/second (AC).
Consumption 80 volt/amps, 70 watts at 225 volts.
Two fuses—Part No. 19850A 1.25 amp. rating are fitted in the mains supply leads. Two spares are supplied.

WAVE-RANGES.

Manual—			
Short Waves	...	13.8 —	50 metres.
Medium Waves	...	196 —	580 "
Long Waves	...	726 —	2,000 "
Press Buttons—			
2 at 1,200—2,100 metres	...	Nos. 2 and 3.	
3 at 310—600 "	...	Nos. 4, 5 and 6.	
3 at 195—340 "	...	Nos. 7, 8 and 9.	

LOUDSPEAKER AND EXTRA LOUDSPEAKERS.

No. 20277D.

The circular cone loudspeaker with permanent magnet is used. For resistance data see circuit on page 7. One or two extra low resistance speakers may be connected to the sockets provided, and should be adjusted to a total impedance of as near as possible to 5 ohms. To silence the receiver loudspeaker remove the plug from the third socket in the E.L.S. panel.

The setting of the press-button trimmers must be done on the customer's mains, after the instrument has been set to the correct mains voltage. Allow 10 to 15 minutes for the receiver to warm up before making adjustments.

CIRCUIT DESCRIPTION

AERIAL CIRCUIT.

High impedance inductive coupling is employed on all bands to high efficiency tuned circuits. The medium and long wave coils are iron-cored (L4 and L8) and image rejection on LW is provided by L5, L6 and C1. The push-button circuits employ the same MW and LW inductances (L4 and L8) as for manual tuning but pre-set condensers (TC3—8 and TC15, TC16) are switched across them instead of the variable condenser VCI.

FREQUENCY CHANGER.

A triode-hexode (X65) valve is used. Inductive and capacitive coupled iron-cored circuits (L11, L12) are used on MW and LW to produce oscillations, whilst on short waves coupled coils (L9, L10) are used; the intermediate frequency is 465 kc. For the push-button ranges a fixed capacity (C12, C47) has pre-set inductances (L13—18 and L24, L25) switched in a capacity (C19) coupled circuit.

I.F. AMPLIFIER.

The first iron-cored I.F. transformer (L19, L20) of very stable characteristics is in the anode circuit of V1 and couples to the KTW63 I.F. amplifier. This valve has I.F. transformer (L21, L22) coupling it to the second detector valve.

SECOND DETECTOR.

The second detector is V3. A tuned secondary feeds the signal diode which has a load resistance R10, R11, with the signal tapped off through C22 to the volume control VR1. The A.V.C. diode is fed through C25 and the voltage produced is applied to V1 and V2.

OUTPUT STAGE.

Resistance capacity (R15, C28) coupling is employed between the DH63 and the KT33C output valve. The latter has a tone control circuit (C29, VR2) connected between the anode and grid and feeds the loudspeaker through the usual output transformer T2.

RECTIFIER.

A half wave U31 rectifier supplies H.T. current for all valves. When operating on D.C. this valve merely acts as a low resistance. Smoothing is by means of the choke CK1 in conjunction with electrolytic condensers C33, C32.

The heaters for all valves are in series, and a plug-in ballast resistance (R34, 35, 36) is fitted to drop the mains voltage to a suitable value. An H.F. filter consisting of two chokes and a condenser (CK2, CK3, C45) is connected in the mains leads, and voltage adjustment is done by means of a shorting plug which eliminates R34 for the low voltage range.

PRELIMINARY TESTS

1. **Continuity Test.**—Disconnect receiver from mains, switch on, and measure resistance between mains pins. This should be approximately 500 ohms (200—227 tapping) if the main heater circuit is in order. Low value suggest faulty ballast resistance or “earth” on wiring, high value (or infinity) check fuses all valves, ballast resistance, CK2, CK3.

2. **L.F. Test.**—Loud hum when top grid V3 (DH63) is touched, volume fully up, earth disconnected. Results, but no radio indicates a fault in V1, 2 or possibly V3. If no result is obtained from this test connect a small battery or ohmmeter across the extra L.S. sockets. A definite “click” indicates that the speech coil circuit is continuous.

3. **H.F. Test.**—Elimination of the earlier parts of the circuit can be done by contacting the aerial lead via a small condenser on to fixed vanes VC1. This eliminates the coupling circuit L1, 3, 5, 6 and 7, and medium wave results should be obtained but with whistles and loss of selectivity. Alternatively correct operation on push-button stations but not manual obviously suggest faulty gang condenser, switching or tuning coils. Bear in mind, however, that the M.W. and L.W. tuning and coupling coils are in use during push-button operation.

4. **Oscillator Test.**—No radio results may be brought about by failure of V1 to oscillate. To check this connect a voltmeter across R3 and note normal reading and reading with VC2 short circuited. The latter reading will be considerably greater if the valve is oscillating. For push-button check short C19.

CONDENSER DRIVE

The special wire drive fitted to this model should not often require renewal, but if it is necessary it is essential to use only the correct wire (Specification S 2447 Code No. 390/04001). Approximately 43 inches will be required for one drive.

1. Form a loop with an opening just over $\frac{1}{8}$ inch in diameter at one end. It will be found that the twisted part of the wire can be readily soldered.

2. Form a similar loop at the other end of the wire so that the distance from loop end to loop end is as near as possible 3 ft. $4\frac{1}{4}$ inches.

3. Remove scale pointer, and turn condenser to maximum position.

4. Pass one end of the wire through the right-hand hole in the condenser drive disc and fasten spring on to the loop.

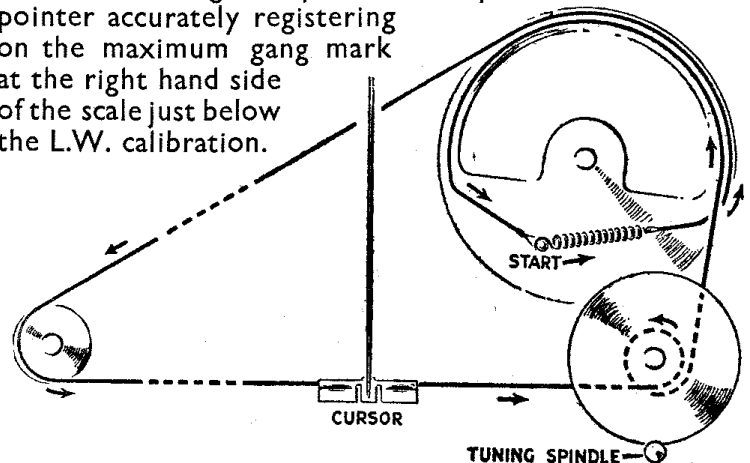
5. Hook coils of spring on to tongue of metal pressed out of disc where wire passes through so that the spring is held. Do **not** yet hook other end of spring on to anchor pin.

6. Wind the wire round pulleys exactly as shown in the diagram and hook loop end on to anchor pin.

7. Now tension drive by removing spring from temporary fastening and hooking other end on to anchor pin.

8. Replace pointer but do not yet tighten on to drive wire.

9. Replace scale, and ensuring that condenser is at maximum, tighten pointer clamp on to wire with pointer accurately registering on the maximum gang mark at the right hand side of the scale just below the L.W. calibration.



H.F. TESTS AND ADJUSTMENTS

Do not attempt to make any adjustment to the circuits of this receiver unless you have adequate equipment as outlined below. All necessary oscillators, trimming tools, etc., essential for the correct adjustment of H.F. and I.F. circuits can be obtained from:—

E.M.I. Service Limited

This model is fitted with a coil unit comprising all tuning coils, the press-button switch and all trimmer condensers. The use of fully adjustable inductances on all wave-bands greatly simplifies ganging.

In general, the iron-cored inductances are very stable, and unless repair work or replacement has been carried out on the coil itself it is rarely necessary to re-adjust these inductances when ganging. The usual symptom of mis-matched inductances is low sensitivity at the

high end of the wave-scale. In the event of it being thought necessary to adjust inductances it is important first to scrape or melt the wax away from the thread on the L.W. aerial coil, and from the sides of the M.W. aerial coil.

Owing to the fact that the M.W. and L.W. aerial tuning coils are also used as the push-button inductances any adjustment to these coils must be followed by a check of all push-button aerial circuit trimmers.

GANGING

Always follow any adjustment to the I.F. trimmers with complete R.F. alignment (L.W., M.W., S.W. and **Push Buttons**) but where work has been done or sensitivity is low on a specific band it is necessary only to regang this band.

A screened oscillator (30—2,000 metres) with an attenuator, an output meter, a trimming screwdriver, a S.W. inductance trimming tool and, if the M.W. aerial inductance is to be done, a special tool (Stock No. Q2527) are required.

In carrying out all ganging operations the input to the receiver from the oscillator must be kept low and progressively reduced as the circuits are brought into line so that the output meter reading does not exceed 500 mW or 1.3 volts. The output meter should be connected between the anode V4 (KT33C) and chassis if it is of the high resistance type, or across the E.L.S. sockets if a low resistance A.C. Voltmeter is being used.

I.F. GANGING.

Set receiver to L.W., tone control fully anti-clockwise, volume control and gang condenser to maximum. Short circuit VC2, and inject signal to V1 top cap (via a 0.1 mfd. condenser) leaving grid connexion in position, and earth socket (**not** chassis).

1. Tune oscillator exactly to 465 kc. (6452 metres).
2. Adjust TC11, TC12, TC13, and TC14 in that order for maximum output.
3. Check adjustments in the same order.

SETTING OF TUNING POINTER.

Before commencing R.F. ganging operations it is essential to check the position of the wave-scale and pointer in relation to the gang condenser.

1. Turn gang condenser to maximum.
2. See that the pointer registers accurately on the small mark just below the L.W. calibration line in the bottom right-hand corner of the scale.
3. If adjustment is necessary slacken the two grub screws securing the drive disc to the condenser spindle.

SHORT WAVES.

Connect oscillator to A and E sockets via a S.W. dummy aerial device. Set receiver to S.W., volume fully up, and tone fully anti-clockwise.

1. Inject signal of 50 metres (6 Mc.), set tuning pointer to 50 metres and adjust loop in L10 for maximum output.
2. Set oscillator and receiver (by scale) to 30 metres (10 Mc.) and adjust loop of L2 for maximum output.

3. Repeat 1 and 2 several times if necessary until no further increase in output can be obtained.

MEDIUM AND LONG WAVES.

Set receiver to M.W., other control as for Short Waves. See "Setting of Tuning Pointer" above. Oscillator connected to A and E sockets.

1. Tune receiver to exactly 225 metres (1,333.3 kc.) by scale, and inject signal of this frequency from oscillator.
2. Adjust TC9 and TC1 for maximum output.
3. Set oscillator and receiver (by scale) to 530 metres (566 kc.) and adjust the cores of L11 and L4 for maximum. Unless either of these coils has been changed very little adjustment should be necessary.
4. Repeat operations 1, 2 and 3.
5. Set oscillator and receiver to 850 metres (352.9 kc.) and adjust TC10 and TC2 for maximum output.
6. Set oscillator and receiver to 1,900 metres (157.9 kc.) and adjust L12 and L8 for maximum output.
7. Repeat operations 5 and 6.

After ganging do **not** alter position of pointer in relation to the gang condenser. If the above instructions have been correctly carried out the calibration should be satisfactory.

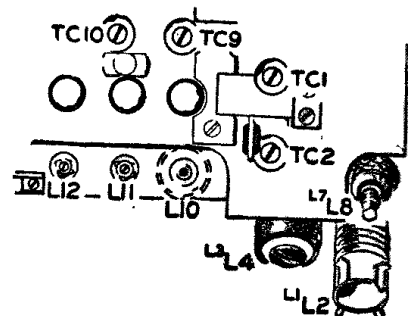
Remember to check adjustment of all push-button trimmers.

CHANGING PUSH-BUTTON STATIONS.

The method of adjusting the trimmers to different stations is clearly given in the Instruction Card. Bear in mind that the buttons cover only the ranges give on page 2 of this Manual.

To ensure complete confidence in the operation of the receiver, the short time spent on checking over the push-button trimmer adjustments will not be wasted.

Allow 10 to 15 minutes for the receiver to warm up before making adjustments.



CONTINUITY CHECKS

Resistance values \pm 20 per cent.

Component.	Measured.	Switch.	Resistance.
L1, 3, 5, 6 and 7	Chassis and C43	—	38.0 ohms. (L1 5.5 ohms.) (L3 0.6 ohm.) (L5 8.0 ohms.) (L6 10.0 ohms.) (L7 4.0 ohms.)
L2, L4, L8	Top grid V1 (X65) and C2	SW MW LW	L2 0.1 ohm. L4 2.0 ohms. L8 9.5 ohms.
L9	Across ends	—	0.6 ohm.
L10, L11, L12, R33	Fixed vanes VC2 and C7	SW MW LW	L10 0.1 ohm. L11 4.5 ohms. L12, R33 1.011 ohms. (L12, 11.0 ohms.)
L13, 14, 15, 16, 17, 18, 24, 25	Across ends	—	L13, 24 and 25 4.0 ohms (each). L14, 15 and 16 5.0 ohms (each). L17 and 18 10.5 ohms (each).
L19	Anode V1 and junction C31, R41	—	6.0 ohms.
L20	Across ends	—	6.0 ohms.
L21	Socket 2 ballast resistance and anode socket V2 (KTW63)	—	4.0 ohms.
L22, R10, R11	Diode and cathode sockets V3 (DH63)	—	0.6 megohm. (L22, 4.0 ohms.)
L26	Across ends	—	77.0 ohms.
For other grid resistances, transformers, chokes, etc.	See Valve Table and Circuit Diagram	—	

VALVE TABLE

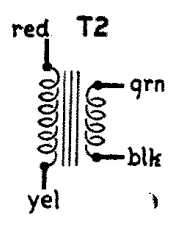
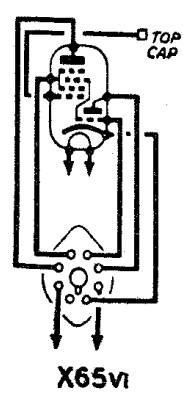
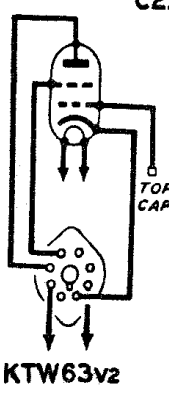
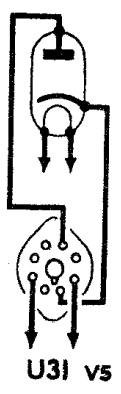
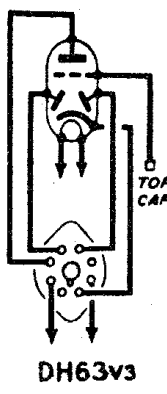
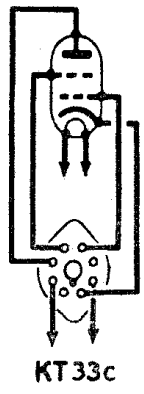
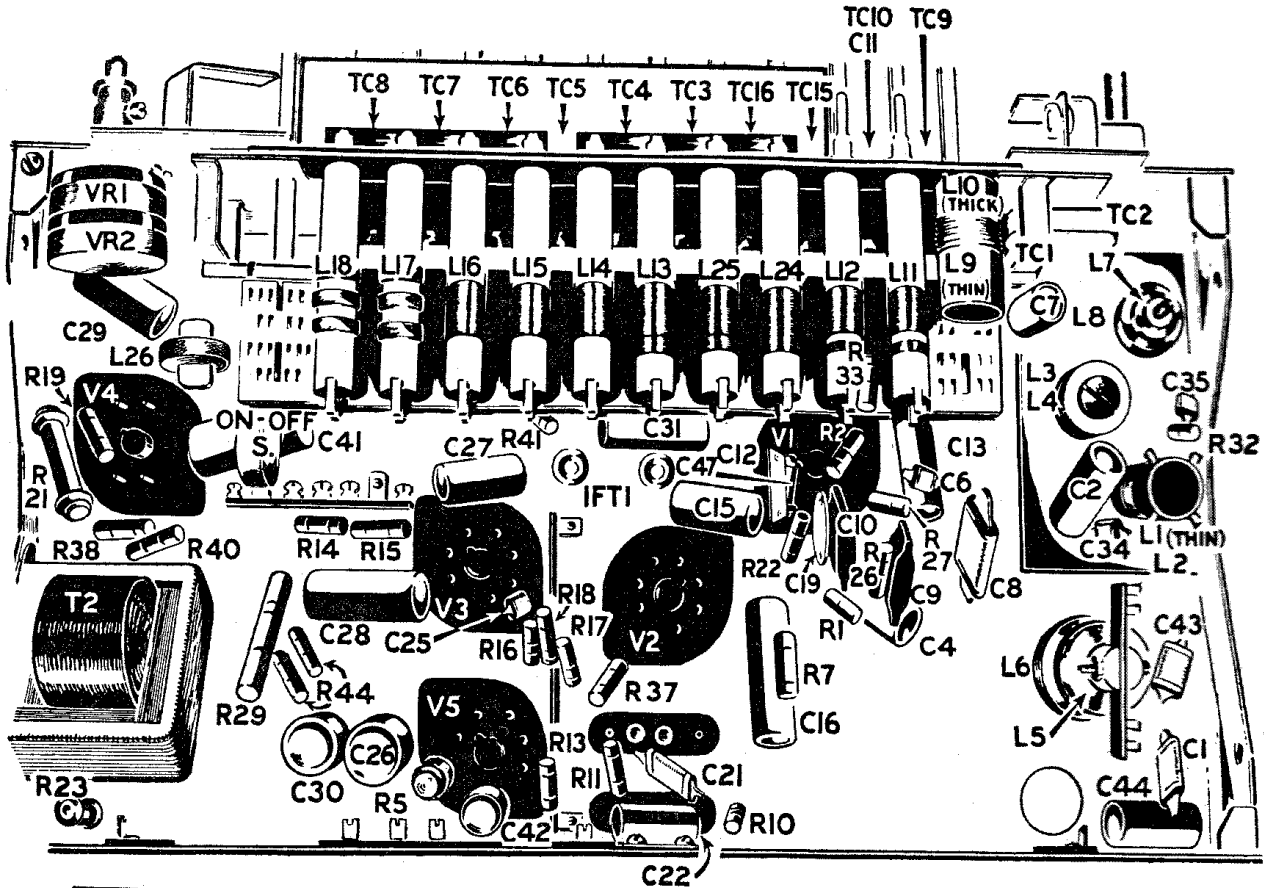
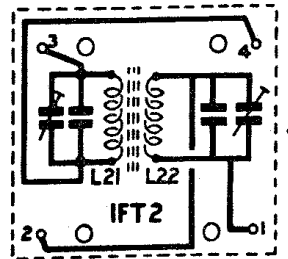
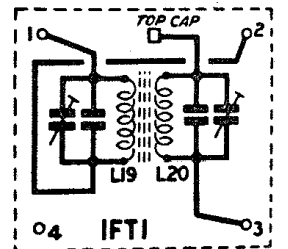
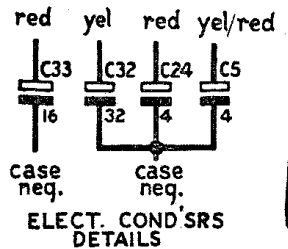
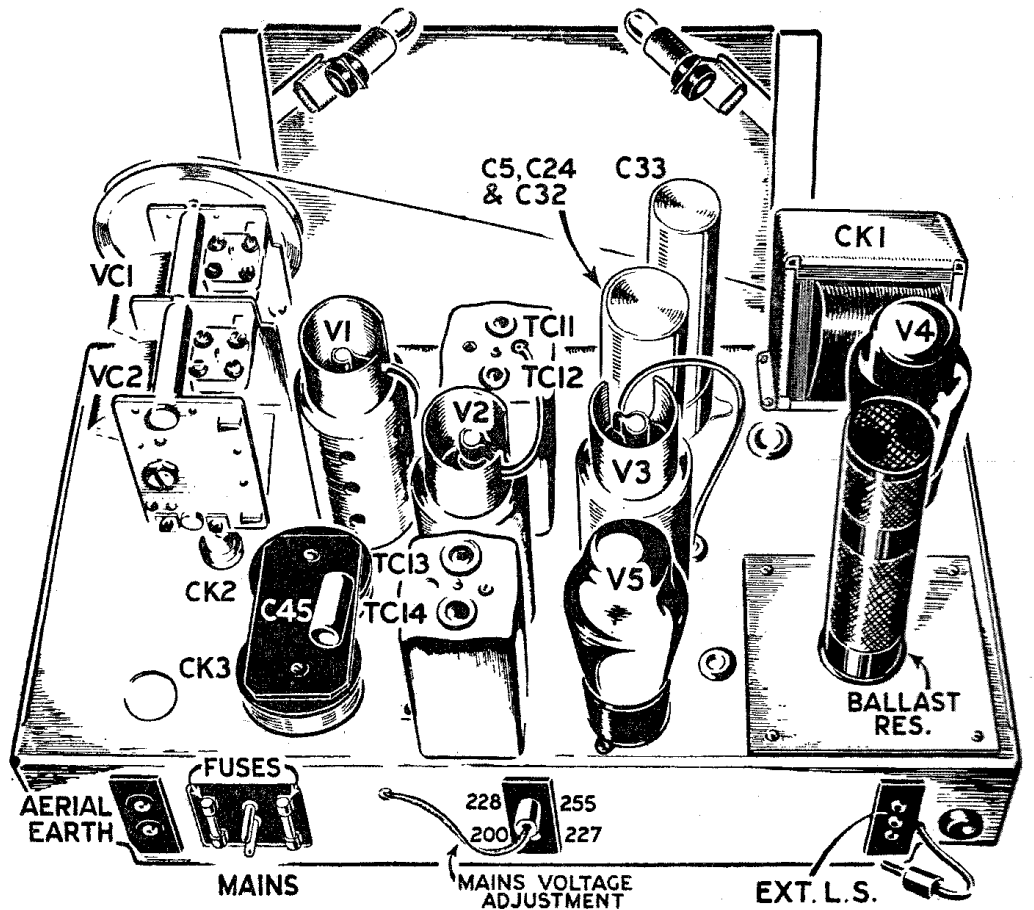
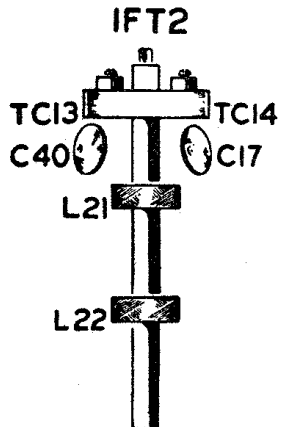
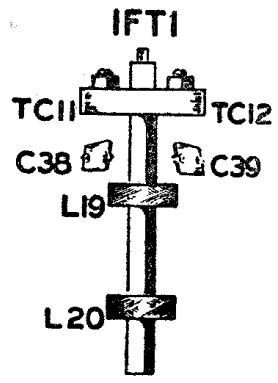
(Voltage, Current and Resistance Tests.)

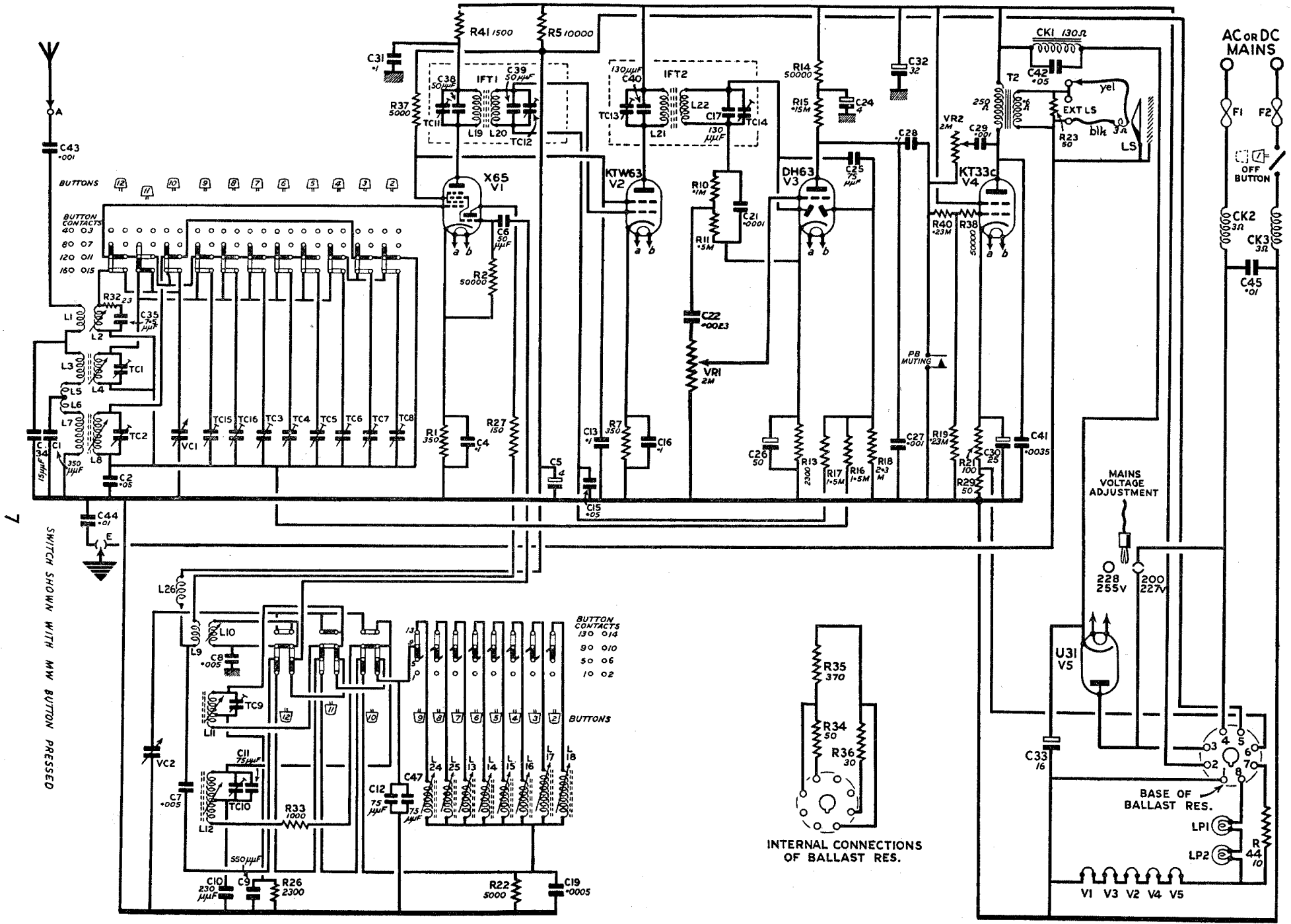
Voltage and current values \pm 20 per cent. Resistance values approximate. S = short circuit. ∞ = open circuit. The following readings were taken on receiver operating on 220 volt A.C. mains (200—227 tap) switched to M.W. and aerial disconnected. Resistance readings taken with valves and pilot lamps removed.

	Anode.			Screen.			Cathode.		Grid.	
	Volts.	Milliamps.	Resistance to Chassis.	Volts.	Milliamps.	Resistance to Chassis.	Volts.	Resistance to Chassis.	Resistance to Chassis.	
V1 (X65)	{	Mxr. 208	1.25	}	85	4.4	∞	3.3	350	3.8M 50,350
		Osc. 105	4.25							
V2 (KTW63) ...	210	6.0	∞	85	1.4	∞	2.3	350	3.8M	
V3 (DH63) ...	90	0.6	∞	—	—	—	1.0	2,300	2M to S(VR1)	
V4 (KT33C) ...	192	68.0	∞	210	11.5	∞	12	150	0.28M	
V5 (U31)	215 AC	—	∞	—	—	—	220	∞	—	

Total H.T. feed 97.0 mA
 Total A.C. current 0.43 amp. } approx.
 Heater current 0.32 amp.

Values taken on D.C. mains of similar voltage (220) will be similar to the above (excepting the anode of V5). On mains of lower, or higher voltages (A.C. or D.C.) proportionate differences in values must be expected.





The push-button switch is shown with MW button pressed.

Each button is in effect a two-position switch ; the two positions are shown by solid and open bars. All switches, with the exception of M.W. (Button No. 11), are shown in the " off " position ; the contacts closed when the button is pressed are shown by open bars as explained above.

The lay-out of the contacts is a physical representation of the actual switch, and will be helpful in tracing the circuit.

MODELS 879 & 1350

Part No.	Description of Part.	Part No.	Description of Part.
INDUCTANCES			
29838A	L1 & L2.	—	L19 & L20—in—IFT1.
20666C	L3 & L4.	—	L21 & L22—in—IFT2.
29861A	L5 & L6.	29827E	L24.
20661D	L7 & L8.	29827E	L25.
20657Y	L9 & L10.	16664C	L26.
29827C	L11.	26330BE	IFT1—1st IF transformer, complete with L19, L20, C38, C39, TC11 & TC12.
29827D	L12.	26330BL	IFT2—2nd IF transformer, complete with L21, L22, C17, C40, TC13 & TC14.
29827E	L13.	22624AF	T2—Output transformer.
29827K	L14.	25103F	CK1.
29827K	L15.	16840F	CK2.
29827K	L16.	16840F	CK3.
29827H	L17.		
29827H	L18.		
RESISTANCES			
24150AD	R1—350 ohms.	24150E	R22—5,000 ohms.
24150J	R2—50,000 ohms.	19104AA	R23—50 ohms.
19104B	R5—10,000 ohms.	24150C	R26—2,300 ohms.
24150AD	R7—350 ohms.	24150AB	R27—150 ohms.
24150L	R10—0.1 megohm.	5786AZ	R29—50 ohms, special limit.
24150N	R11—0.5 megohm.	24150V	R32—23 ohms.
24150C	R13—2,300 ohms.	19202B	R33—1,000 ohms.
24150F	R14—10,000 ohms.	27336C	R34, R35 & R36.
24150AJ	R15—0.15 megohm.	24150E	R37—5,000 ohms.
24150Q	R16—1.5 megohm.	24150J	R38—50,000 ohms.
24150Q	R17—1.5 megohm.	24150M	R40—0.23 (for 200—255 volt models).
24150AM	R18—2.3 megohm.	19202AF	R41—1,500 ohms.
24150M	R19—0.23 megohm.	5786CU	R44—10 ohms (for 200—255 volt models).
25786T	R21—100 ohms.	28403E	VR1 & VR2—Volume and tone control.
CONDENSERS			
22001AE	C1—350 mmfd.	24900AA	C31—0.1 mfd.
24900W	C2—0.05 mfd.	—	C32—32 mfd. electrolytic, with C5.
24900AA	C4—0.1 mfd.	27325D	C33—16mfd. electrolytic.
27325B	C5—4mfd. electrolytic, with C24 & C32.	22164D	C34—15 mmfd.
22164J	C6—50 mmfd.	22164B	C35—7.5 mmfd.
24900J	C7—0.005 mfd.	28444A	C38—50 mmfd. special limit.
22005A	C8—0.005 mfd.	28444A	C39—50 mmfd. special limit.
22330CS	C9—550 mmfd. special limit.	28444E	C40—130 mmfd. special limit.
22330BJ	C10—230 mmfd. special limit.	26300G	C41—0.0035 mfd.
22164K	C11—75 mmfd.	24900W	C42—0.05 mfd.
28444F	C12—75 mmfd. special limit.	22001F	C43—0.001 mfd.
24900AA	C13—0.1 mfd.	24900N	C44—0.01 mfd.
24900W	C15—0.05 mfd.	24900N	C45—0.01 mfd.
24900AA	C16—0.1 mfd.	28381B	C47—75 mmfd.
28444E	C17—130 mmfd. special limit.	26350BE	TC1 & TC2.
28444H	C19—0.0005 mfd. special limit.	26350BK	TC3 & TC4.
22164L	C21—0.0001 mfd.	26350BJ	TC5 & TC6.
26300E	C22—0.0023 mfd.	26350BJ	TC7 & TC8.
—	C24—4 mfd. electrolytic, with C5.	26350BE	TC9 ; TC10.
22164K	C25—7.5 mmfd.	26350AP	TC11 & TC12.
17250F	C26—50 mfd., electrolytic.	26350A	TC13 & TC14.
24900A	C27—0.001 mfd.	26350BL	TC15 & TC16.
26300AA	C28—0.1 mfd.	20280G	VCI & VC2.
26300A	C29—0.001 mfd.	22704M	Lamp.
17250D	C30—25 mfd. electrolytic.		

Order spare parts from :—

E·M·I SERVICE, LTD.,

SHERATON WORKS,

HAYES, MIDDLESEX.

Telephone : Southall 2468.

Telegraphic Address : Service, Hayes, Middlesex.

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