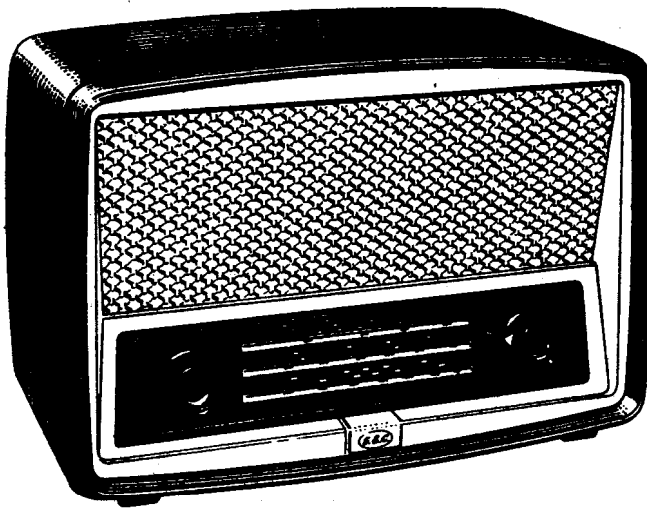


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BC5645 V.H.F./F.M. RADIO RECEIVER

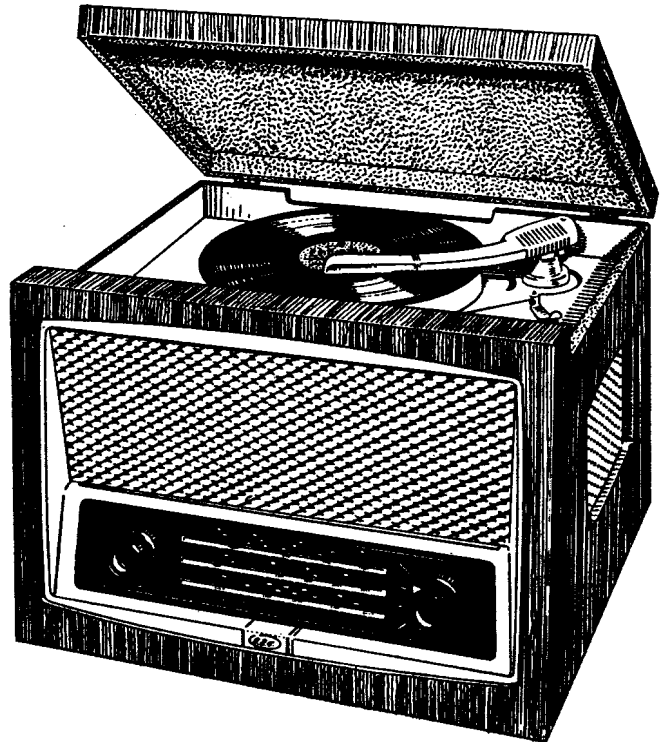
BC7445 V.H.F./F.M. TABLE RADIOGRAMPHONE

(Home models)



BC5645

7 valves, A.C. mains, F.M./A.M. superheterodyne receiver. Gramophone pick-up terminals. Internal F.M., M.W. and L.W. aerials.



BC7445

7 valves, A.C. mains, F.M./A.M. superheterodyne table radiogramophone, fitted with Collaro 4/564 four speed player and crystal turnover pick-up.

Internal F.M., M.W. and L.W. aerials.

SPECIFICATION

POWER SUPPLIES	200—250 volts, 40—100 c/s, A.C. mains	
POWER CONSUMPTION (approximate)	BC5645	50 watts
	BC7445	64 watts
WAVEBANDS	www.radio-workshop.co.uk V.H.F. (F.M.) 87.5—100 Mc/s Medium 187 — 545 metres (1.60—0.55 Mc/s) Long 1100 —1900 metres (0.27—0.16 Mc/s)	
V.H.F. AERIAL INPUT	Impedance 75 ohms, unbalanced	
INTERMEDIATE FREQUENCY	A.M.—470 kc/s	F.M.—10.7 Mc/s
G.E.C. VALVES	V1 V.H.F. (F.M.) amplifier Z719 V2 V.H.F. (F.M.) frequency changer Z719 V3 A.M. frequency changer X719 V4 I.F. amplifier W719 V5 { Signal detector } DH77 { A.G.C. rectifier } { A.F. amplifier } V6 Output pentode N709 V7 H.T. rectifier U78	
RATIO DETECTOR	2—GEX34 Germanium diodes	
LOUDSPEAKERS (permanent magnet)	BC5645 8 in. × 5 in. elliptical	BC7445 1—8 in. × 5 in. elliptical 2—5 in. diameter Speech coil impedance, 3 ohms at 400 c/s Extension loudspeaker terminals
NETT WEIGHT	18 lb.	32 lb.
DIMENSIONS	height 11½ in. width 17½ in. depth 8½ in.	height 12½ in. width 17½ in. depth 15½ in.

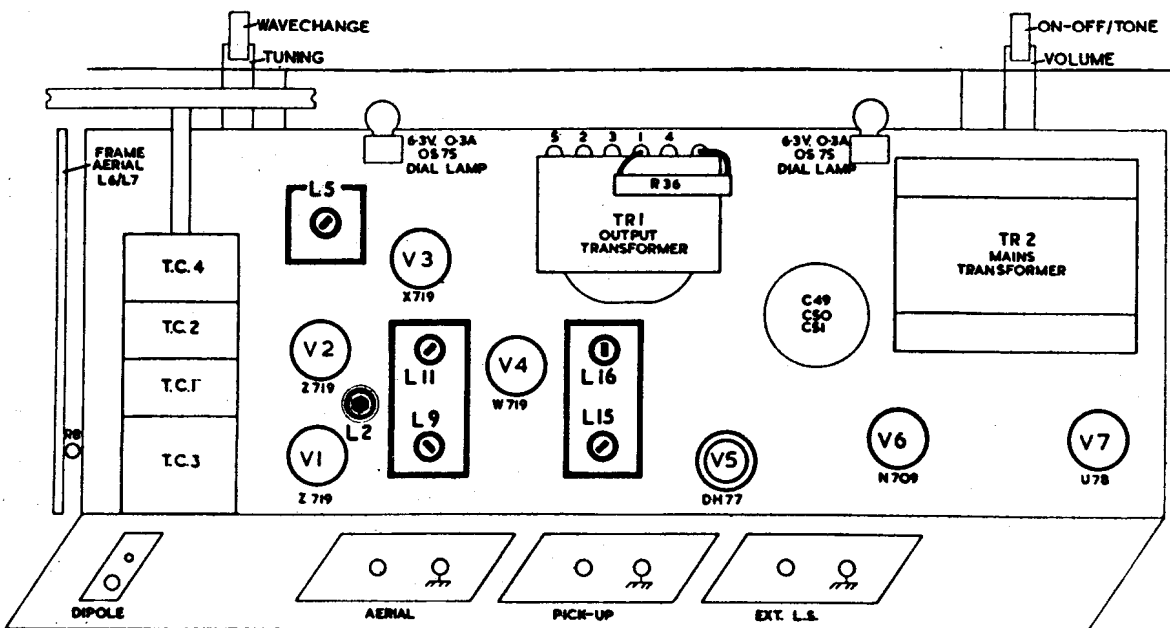


FIG. 1. UPPER VIEW OF CHASSIS

DISMANTLING

BC5645

- (a) Remove the back panel. This is held by four screws.
- (b) Remove the four control knobs (push fit).
NOTE :—There is a felt washer between the tuning and wavechange knobs.
- (c) Remove the two chassis fixing screws and spacers at the rear.
- (d) Withdraw the chassis to the limits of the loudspeaker leads.

BC7445

When the base cover is removed there is ready access to the receiver components under the chassis.

RECEIVER

- (a) Remove the back panel. This is held by three screws.
- (b) Remove the four control knobs (push fit).
NOTE :—There is a felt washer between the tuning and wavechange knobs.
- (c) Remove the two chassis fixing screws and spacers at the rear.
- (d) Release the two 5 in. loudspeakers on the side panels. Each loudspeaker is held by two wingnuts and brass spacers. Place the loudspeakers face down behind the cabinet as far as the leads permit.
- (e) *Very carefully withdraw the receiver chassis, taking extreme care not to damage the frame aerial on the L.S. fixing bolts. Viewed from the rear these are on the left hand panel. At the same time ease the two loudspeakers over the chassis so that the speakers rest face down on the floor of the cabinet with the chassis outside.*

RECORD PLAYER

- (a) Unsolder the player mains-leads (from the mains transformer on the receiver chassis), the pick up leads (from the p.u. terminals which are accessible on removing the base cover), and the player chassis earthing lead (from the tag on top of the 32+32+32 μ F capacitor C49, C50, C51).
- (b) Remove the turntable.
- (c) Undo the three pairs of nuts, below the motor board, to release the record player, this may then be withdrawn from the cabinet. (When replacing the player, note that the heavy copper springs should be placed above the motor board and the plated springs below the motor board).

WIRING COLOUR CODE

A colour code is employed for wiring to distinguish between circuit functions. The chart gives details of wire covering colours and the circuits in which they are used.

Colour	Use
ORANGE	Unsmoothed H.T. positive
RED	Smoothed H.T. positive
BLUE	Screen grids and mains
GREEN	Grids and oscillator coils
WHITE	Aerial and loudspeaker
BROWN	Heaters and dial lamps
BLACK	Points at chassis potential
YELLOW	Anodes and general purposes
	All sleeving is yellow

COLLARO 4/564 4 SPEED RECORD PLAYER

The instrument will play records at any one of four speeds of 78, 45, $33\frac{1}{3}$ and $16\frac{2}{3}$ r.p.m. The $16\frac{2}{3}$ r.p.m. records should be of the "talking book" type.

The turnover pick-up head plugs into the pick-up arm. It is fitted with a type "O" crystal insert with type 5304/L long playing stylus for 45, $33\frac{1}{3}$ and $16\frac{2}{3}$ r.p.m. records and type 5304/N standard stylus for 78 r.p.m. records. The stylus may be removed by undoing the small screw which holds it to the cartridge.

THE MOTOR is an induction constant speed type (model A.C.53) with a resistance of approximately 700 ohms.

A standard motor pulley for 50 c/s is fitted. For different supply frequencies a replacement pulley to suit the changed frequency must be substituted.

TURNTABLE REMOVAL. Place the fingers under the rim of the turntable and lift.

LUBRICATION should not normally be required as the motor is fitted with self-oiling bearings. Should lubrication of the motor bearings appear to be necessary after a very long period of service, it is recommended that the complete motor unit be returned to the manufacturers for overhaul or replacement. Dismantling the motor assembly is not recommended as it is difficult to reassemble the motor satisfactorily without special equipment, and noisy running and uneven speed may result.

Care should be taken to keep oil and grease from the inner rim of the turntable, the driving surfaces of the motor pulley and rubber idler wheel (fig. 2). Occasionally wipe these surfaces with a clean rag moistened with petrol or carbon tetrachloride.

PICK-UP STYLUS PRESSURE is not adjustable. A fixed stylus pressure suitable for $16\frac{2}{3}$, $33\frac{1}{3}$, 45 and 78 r.p.m. records is given by the spring under the pick-up arm.

Never use a record which is warped, cracked, chipped or has an enlarged or otherwise damaged centre hole. Destruction of the stylus may result.

AUTO TRIP ADJUSTMENT. No adjustment is provided. Failure may be caused by rough surfaces on the levers that are associated with the trip lever (fig. 2). Do not use oil or grease on these levers.

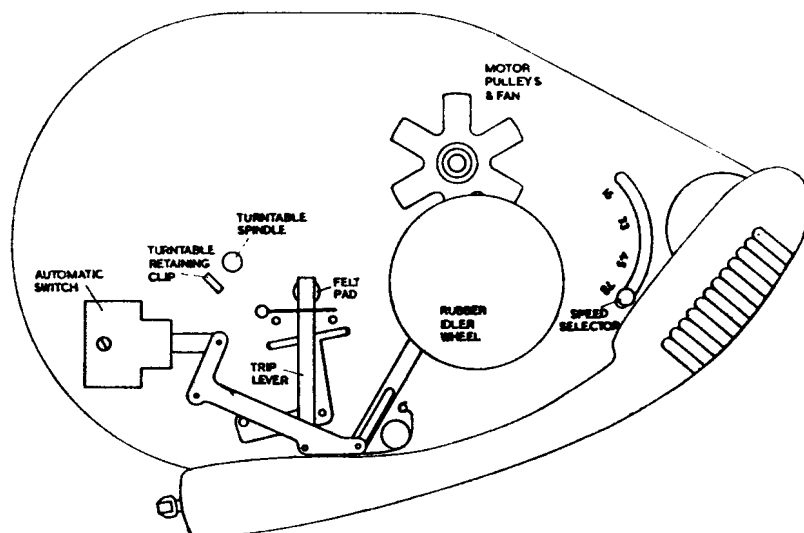


Fig. 2. UPPER VIEW OF COLLARO 4/564 RECORD PLAYER

R	32, 20, 31, 33, 34, 35	19, 38, 37, 27, 28, 26, 24, 30, 39, 23, 24, 21, 25, 29, 40, 17, 18, 15, 16, 14, 6, 9, 11, 13, 12, 10, 2, 3, 4, 1,	7	8	R
C	47	48, 39, 45	46, 49, 50, 51	40, 41, 44, 45, 38, 36, 52, 42, 37, 17, 29, 30, 28, 35, 25, 23, 15, 26, 19, 18, 11, 3, 4, 24, 7, 6, 8, 1, 27, 14, 5, 16, 10, 9, 2	C

L12/13. DUST CORE RP124800.
L2. DUST CORE RP124764.

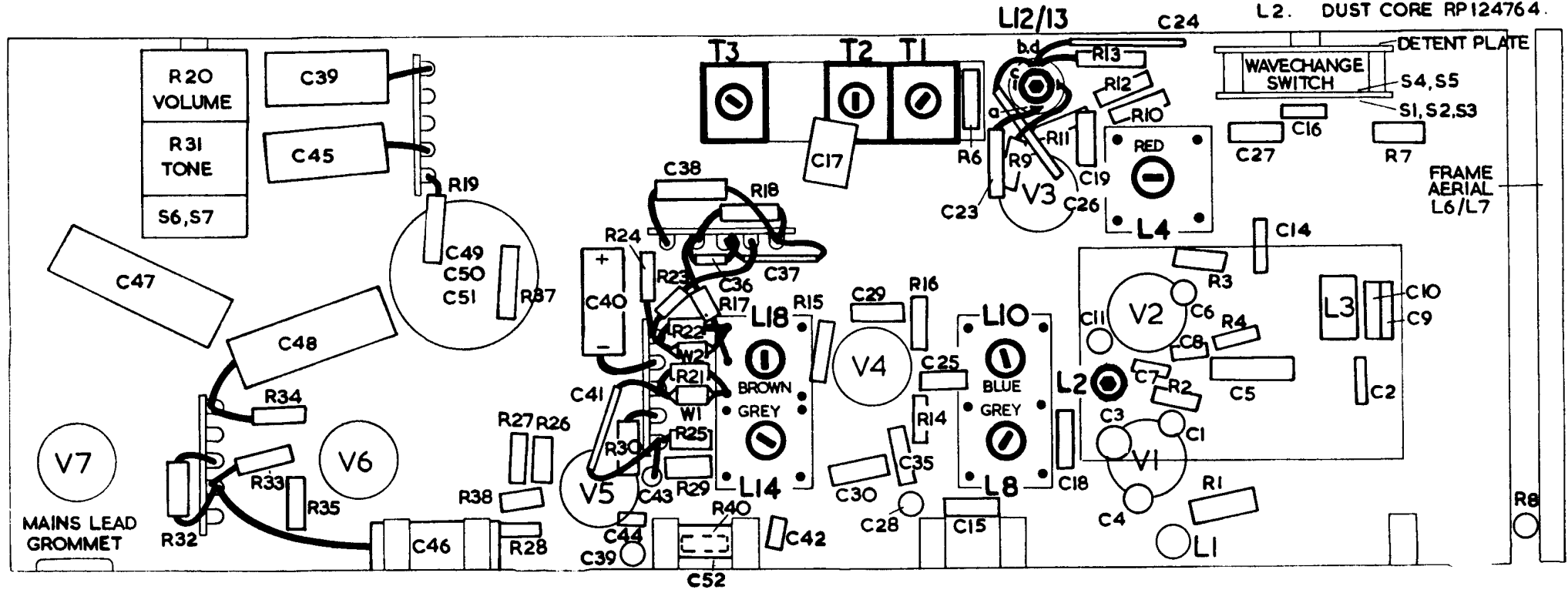


Fig. 3. UNDER VIEW OF CHASSIS

CIRCUIT NOTES

The V.H.F. (F.M.) circuits are shown on the top section of the diagram to separate, as far as possible, the F.M. and A.M. functions of the receiver. X719 (V3) operates as a frequency changer on A.M. and as an I.F. amplifier on F.M., the A.M. oscillator tuned circuit is made ineffective by connecting across it a 150 ohm resistor (R7) in series with C15. This is accomplished by means of S3.

The coil assembly L6/L7 acts as an internal aerial for M.W. and L.W. reception and the tinfoil on the back panel forms an internal V.H.F. aerial. Provision is made for the use of an external dipole aerial with unbalanced feeder.

Mains switches S6 and S7 are incorporated in the tone control, R31, which is combined with the volume control R20. S1-3 are on the back and S4-5 are on the front (spindle end) of the wavechange switch wafer, which is combined with the tuning control. The circuit diagram shows the switches as viewed from the front of the receiver with the control turned fully anti-clockwise for V.H.F. (F.M.) reception. A rear view of the switch is given in fig. 6. V.H.F. and A.M. tuning capacitors TC1 to TC4 are ganged.

The tag connections for the oscillator coil L12/13 may be identified by the corresponding letters in the circuit and under-chassis diagrams.

Details of the resistors and capacitors may be found in the replacement parts list on pages 12 and 13.

DIAL LAMPS. *Two Osram 6.3V 0.3A, m.e.s. OS75 lamps are fitted. Other types should not be used as they may give an unduly short life or fail to provide sufficient illumination.*

NOTE : *The receiver is designed to employ the specified Valves and any replacements that may be necessary must be of these types. G.E.C. or Osram Valves may be fitted and are identical except for the Trade Marks. The alternative branding is in no way associated with any difference in quality or manufacture.*

F.M. SERVICE NOTES

INSTABILITY

In some early models it may be found that there is a tendency for instability to occur on the V.H.F./F.M. range, when using the internal plate aerial. If instability is experienced connect a lead from the tag of valveholder V2 pin 6 to the chassis at a point immediately below the tag. Check that (a) the white lead from the aerial section of the ganged tuning capacitor is kept clear of the tuning capacitor tags, (b) the H.T. yellow lead to V1 screen, pin 8, is placed in close proximity to the chassis, (c) the lead from the 47 pF capacitor C8 to the grid of V2 (pin 2) is kept as short as possible.

MULTIPATH DISTORTION

It has been found that in a few localities severe reflections arriving at the receiving aerial, out of phase with the direct signal, have caused objectionable distortion. This may manifest itself on one or more of the three programmes and vary in magnitude over a period of time. Experience has shown that increasing the aerial efficiency and in extreme cases, improving the aerial directivity and altering its position, clears this "multipath" distortion.

If the difficulty arises it is recommended that the following procedure is adopted :—

- (a) When using the internal aerial move the receiver to different positions in an attempt to find a place where there is no distortion.
- (b) Check with a simple dipole in the immediate vicinity of the receiver, e.g. picture rail fixing.
- (c) Check with an outdoor or loft aerial.
- (d) In very severe cases it will be advisable to instal an efficient directional external aerial.

CIRCUIT ALIGNMENT NOTES

After switching on, allow five minutes for the valves to reach their normal operating temperature. With the tuning capacitor plates fully meshed the right hand edge of the pointer carriage should coincide with the "90" mark on the carriage guide.

The adjustable dust cores in L2 and L12/13 have hexagonal holes and a special insulated trimming tool, manufactured by The General Electric Co. Ltd., is required. The dust cores in the I.F. transformers have screwdriver slots and should be adjusted with a non-metallic screwdriver.

For A.M. alignment at I.F., inject the signal via an isolating capacitor of 0.001 μ F minimum, into the signal grid of V3 (pin 2) and, for the signal frequency circuits feed the signal via a suitable dummy aerial to the aerial and earth sockets. Modulation should be 30% at 400 c/s.

For F.M. alignment at I.F., inject an unmodulated signal via 2000 pF ceramic capacitor with short leads, to the junction of C7 (5.6pF) and L2. The tuning capacitor plates must be fully open. For the V.H.F. circuits feed the signal via an unbalanced 75 ohm network into the dipole socket. A suitable output indicator is a D.C. voltmeter with a F.S.D. of 10 volts and resistance of at least 200k ohms. The meter reading should not be allowed to exceed 4 volts during the alignment procedure.

If difficulty is experienced in achieving complete V.H.F. coverage alter the position of the oscillator fixed-tuning capacitors relative to the coil and the position of the grid coupling capacitor.

A.M. sensitivity figures indicate the required signal level in microvolts, under the given alignment conditions, to produce 50 mW output (0.387 volts r.m.s. across a 3 ohm resistive load connected to the secondary of the output transformer). Sensitivity variations of up to +100% or -50% may be tolerated.

F.M. sensitivity figures are the input levels in microvolts required to produce 4V across R24 in the discriminator circuit.

TUNED CIRCUIT ALIGNMENT

Range	Frequency Mc/s	Scale Setting	Adjust in sequence	Notes	Average Sensitivity μ V
A.M. I.F.	0.470	90	L15, L14 L9, L8	Input to V3 grid (pin 2). Switch to L.W. Tuning capacitor at maximum. Repeat adjustments.	110
M.W.	0.60	78	L12/13		75
	1.50	10	T1	Repeat adjustments. L12/L13, T1 in sequence.	
	1.50	—	T3	Tuning control set for maximum output.	50
L.W.	0.23	—	T2		175
F.M. I.F.	10.70	0	L16, L11, L10, L5, L4	Input between C7/L2 junction and chassis. Tuning capacitor at minimum. 0—10 voltmeter across R24. Adjust for maximum output.* Finally adjust input for meter reading of 4 volts.	
			L18	Transfer meter across C36. Adjust L18 for reading of 2 volts.	
			L16, L11, L10, L5, L4	Meter across R24. Adjust for maximum output.*	
			L18	Transfer meter across C36. Adjusting L18 note max. and min. readings. Add these figures, divide by 2 and set L18 to give a meter reading equal to the result.	2000 for 4V across R24
V.H.F. (F.M.)	94	46.5	L3, L2	Meter across R24. Input to dipole sockets. Adjust for maximum output.* To adjust L3 space-off or close-in end turn next to C8. Rock tuning capacitor whilst adjusting L2 for maximum meter reading. If pointer calibration is appreciably affected, readjust L3.	2.5

*Adjust the input to maintain the meter reading at or just below 4 volts.

R	1	2	3,4	5,6,10	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21,22,18	23	24,23	25	26,27,30	28	29	30,31	32	33,35	34	36	37	38	R	
C	1	4,5,5,2,7	8,9,6,10	12,11	14,13	17,16	24	18	19	20	23	21,25,22	26	27	30,28,29	33,31	35	34,32	41	36,40	43	44	45,46	47	48	49	50,51	52	53	54	55	56	57	C

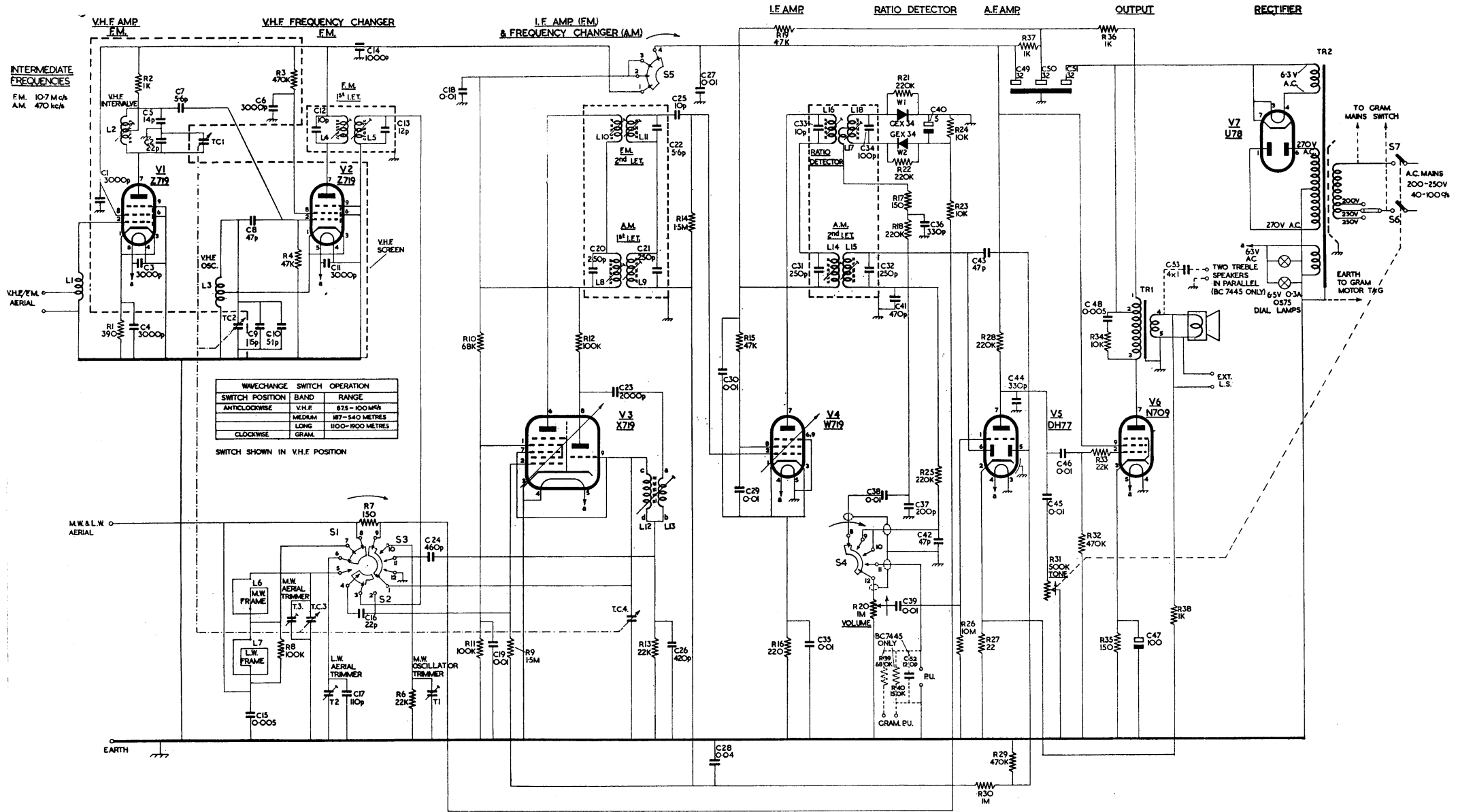


Fig. 4. CIRCUIT DIAGRAM FOR BC5645 V.H.F./F.M. RADIO RECEIVER AND BC7445 V.H.F./F.M. RADIOGRAMOPHONE

POTENTIAL READINGS

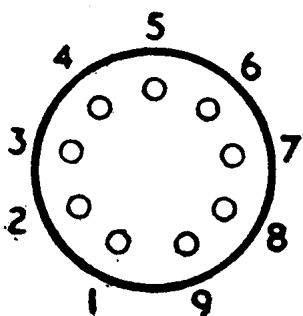
230 Volts 50 c/s mains at 230V tap.

Measurements with 20,000 ohm/volt meter.

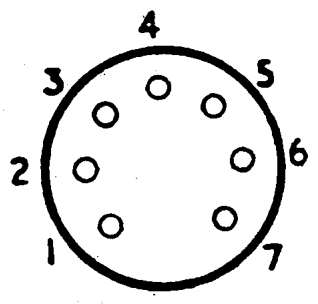
No signal input and receiver tuned to 94 Mc/s on V.H.F./F.M. and 1.5 Mc/s on M.W.

Valve No.	Condition	Anode Volts	Screen Volts	Cathode Volts
1	V.H.F.	205	210	3.3
	A.M.	—	—	—
	Gram.	—	—	—
2	V.H.F.	210	45	0
	A.M.	—	—	—
	Gram.	—	—	—
3 (hexode) (triode)	V.H.F.	210	50	0
	A.M.	240	46	0
	Gram.	—	—	—
	V.H.F.	25	—	0
	A.M.	40	—	0
	Gram.	—	—	—
4	V.H.F.	190	100	2.1
	A.M.	200	110	2.2
	Gram.	210	110	2.2
5	V.H.F.	80	—	0
	A.M.	85	—	0
	Gram.	85	—	0
6	V.H.F.	250	210	6.0
	A.M.	250	240	6.9
	Gram.	250	255	7.4
7	V.H.F.	—	—	265
	A.M.	—	—	270
	Gram.	—	—	275

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Z719, X719,
W719, N709



DH77, U78

UNDERVIEW OF VALVE BASES

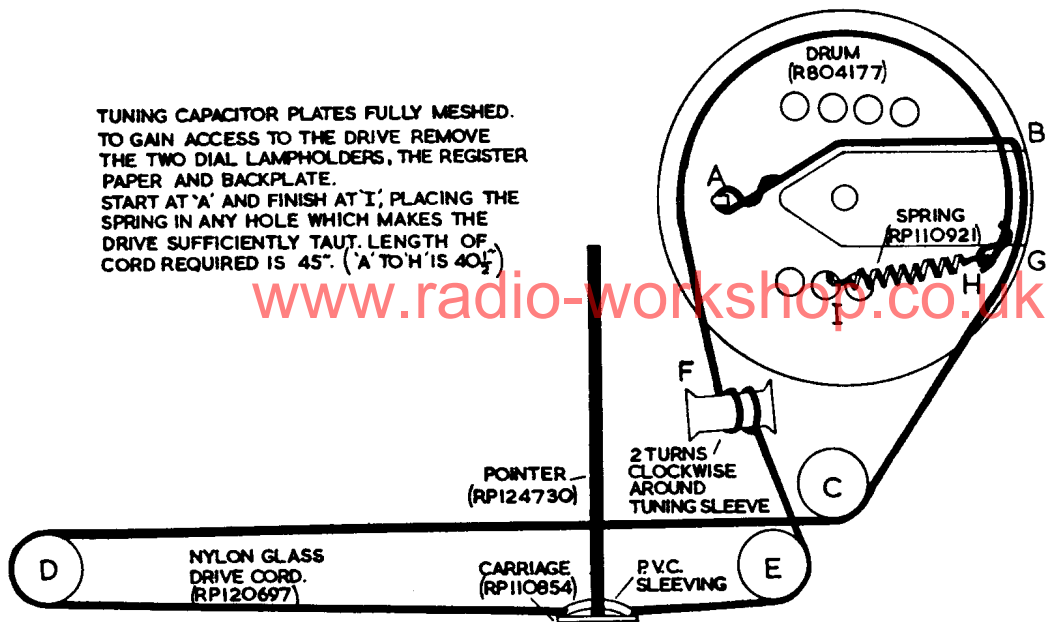


Fig. 5. TUNING DRIVE

DRIVE CORD BRACKET

In early models damage to the drive cord may occur on removing the tuning control knob, due to the tuning control sleeve being free to move. A special bracket, part No. RP124889 can be fitted over the collar of the sleeve and the control securing locknut, to hold the sleeve in position. The bracket is fitted in later models.

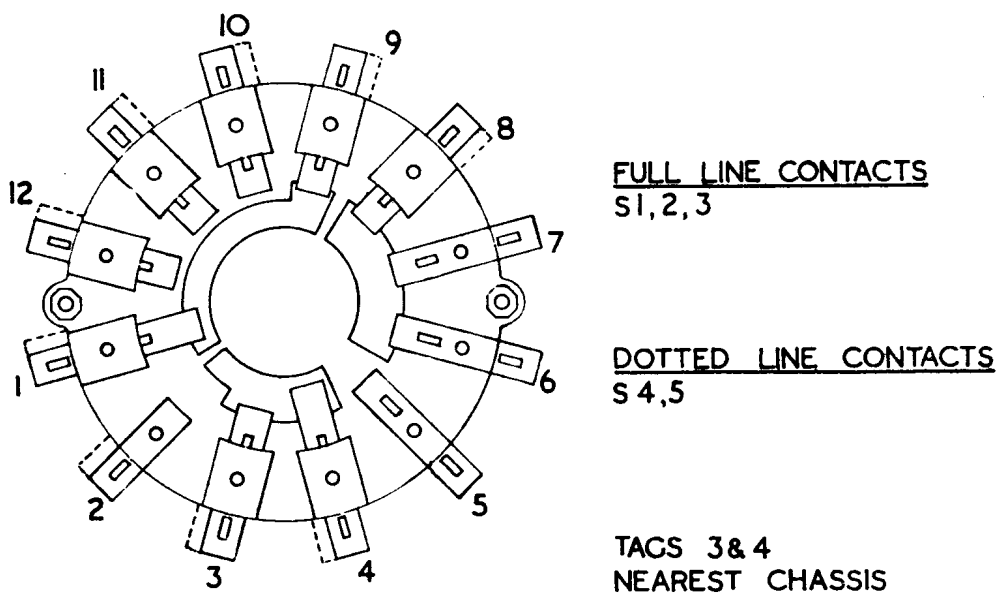


Fig. 6. WAVECHANGE SWITCH (REAR VIEW)

REPLACEMENT PARTS—ORDER REFERENCE NUMBERS

Cabinet (BC5645)	R811832	Drum	R804177
Cabinet assy. (BC7445)	R811876	Screen	R811863
Front panel	R811837	Trimmer unit (triple, 3-5—30pF) ...	RP119517
Baffle (BC5645)	R811855	Iron dust core (L12/13)	RP124800
Baffle (BC7445)	R811959	Iron dust core (L2)	RP124764
Gram. unit (BC7445)	R811922	Wavechange switch	R811868
Pick-up cartridge	RP124047	Potentiometer, combined	R811869
Std. stylus (5304/N)	RP124296	Volume 1M, log	
L.P. stylus (5304/L)	RP124297	Tone 500k, linear	
Base cover (BC7445)	R811923	Tag boards	RP123704
Back assembly (BC5645)	R811861	Terminal plates	RP107765
Back assembly (BC7445)	R811924	Mains cord	R803259
Register	R811856	Grommet	RP117766
Knob (on/off, Tone)	R811857	Backplate	R811871
Knob (volume or tuning)	R811858	Lampholders	RK200461
Knob (wavechange)	R811920	Sleeve	RP124729
Plug (aerial/earth)	RK203680	Pulleys	RP111654
Plug (2 pin)	RK202429	Bushes... ..	RP117767
Shell (for 2 pin plug)	RP124728	Rod (tension)... ..	RP124732
Socket (2 pin)	RP124726	Springs	RP101401
Valveholders (B9A)	R808714	Screen (diffusion)	R811874
Valveholders (B7G)	RK204216	Carriage guide	R811875
Valveholders (B7G)	RP123806	Carriage	RP110854
Valve screen	RP123807	Pointer	RP124730
Tuning capacitor	R811839	Spring (drum)	RP110921
TC1/2 Min. 9pF (max.), swing		Nylon glass drive cord	RP120697
17.4pF (min.)		Drive cord bracket (page 11) ...	RP124889
TC3/4 Min. 13.5pF (max.), swing			
528pF (min.)			

CAPACITORS

	Capacitance	Volts	Type	Tolerance ±%	
C1, 3, 4, 6, 11	3000pF	500	Disc 831	+80 -20	RP194277
C2	2.2pF	750	310P100	±0.5pF	RP194416
C5	14pF	750	P100L	±0.5pF	RK202819
C7	5.6pF	750	P100AD	10	RP194409
C8, 41, 43	47pF	750	N750A	2	RK202641
C9	15pF	350	P.S.M.	±0.5pF	RP194418
C10	5.1pF	750	310N750	±0.5pF	RP194417
C12	10pF	} Part of I.F.T. assembly			
C13	12pF				
C14	1000pF	500	Feed through	+80 -20	RP194289
C15	0.005μF	350	W99	20	RK204126
C16	22pF	750	N750AD	±1pF	RP194379
C17	110pF	350	P.S.M.	2	RK202803
C18, 19, 27, 29, 30, 35, 38	0.01μF	400	W99	20	RK203856
C20, 21	250pF	} Part of I.F.T. assembly			
C22	5.6pF				
C23	2000pF	500	GP2/CD	20	RP194001
C24	460pF	350	P.S.M.	1	RK202610
C25	10pF	750	P100AD	10	RP194410
C26	420pF	350	P.S.M.	2	RP194012
C28	0.04μF	150	W99	20	{ RP194398 or RP194060
C31, 32	250pF	} Part of I.F.T. assembly			
C33	10pF				
C34	100pF				
C36, 44	330pF	500	GP2/AD	20	RP194412
C37	200pF	350	P.S.M.	2	RK203784
C39, 45, 46	0.01μF	1000	Paper	25	RK200875
C40	5μF	25	Elect.	25	RP194414
C42	47pF	350	P.S.M.	±1pF	RK202635
C47	100μF	12	Elect.	+100 -20	RP194313
C48	0.005μF	1000	Paper	25	RK201257
C49, 50, 51	32+32+32μF	275	Elect.	+50 -20	RP194364
C52	120pF	350	P.S.M.	2	RP194017
C53	4 × 1μF	250	Paper	25	RK202086

RESISTORS				
	ohms	Watts	Tolerance ±%	
R1	390	½	10	RP190789
R2, 38	1k	½	10	RP190794
R3, 29, 32	470k	½	10	RP190826
R4, 15	47k	½	10	RP190814
R6, 13, 33	22k	½	10	RP190810
R7, 17, 35	150	½	10	RP190784
R8, 11, 12	100k	½	10	RP190818
R9, 14	1.5M	½	10	RP190832
R10	68k	½	10	RP190816
R16	220	½	10	RP190786
R18, 21, 22, 25, 28	220k	½	10	RP190822
R19	4.7k	½	10	RP190802
R20	1M	Volume pot., log	} combined 1 in. spindle	R811869
R31	500k	Tone pot., linear		
R23, 24, 34	10k	½	10	RP190806
R26	10M	½	10	RP190842
R27	22	½	10	RP190774
R30	1M	½	10	RP190830
R36	1k	1	10	RP191334
R37	1k	½	10	RP191064
R39	680k	½	10	RP190828
R40	150k	½	10	RP190820

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COIL AND TRANSFORMER DATA				
(*indicates less than 1 ohm)				
Circuit reference	Component	Resistance (ohms)	Inductance μH (or turns)	Part No. for Ordering
TR1	Output transformer			RK202705
	primary, tags 1-2	20		
	tags 2-3	560		
	secondary	*		
—	8 in. × 5 in. elliptical loudspeaker (BC5645) ...			R810839
—	8 in. × 5 in. elliptical loudspeaker (BC7445) ...			R811948
—	5 in. dia. loudspeaker (BC7445)			R811949
TR2	Mains transformer (270-0-270V)			R811867
	primary, 0-200V	22.4		
	0-230V	25.7		
	0-250V	28.3		
	secondary, total H.T.	648		
	rect. fil.	*		
	heaters	*		
L1	F.M. aerial coil, T	*	6T tapped at 2½T 7T tapped at 3T 3T tapped at ¾T	RP124723
L2	F.M. R.F. coil, T	*		RP124724
L3	F.M. osc. coil, T	*		RP124725
L4	1st F.M. I.F.T., primary	1.6	}	R811864
L5	secondary	1.2		
L6	Frame aerial, M.W.	*	178.5μH 1770μH	R810669
L7	Frame aerial, L.W.	14.9		
L8/9	1st A.M. I.F.T. (each winding)	10.5	}	R811865
L10/11	2nd F.M. I.F.T. (each winding)	1.5		
L12	A.M. osc., T	2.16		
L13	A.M. osc., C	*	58.4μH	RP123712
L14/15	2nd A.M. I.F.T. (each winding)	10.5		
L16	3rd F.M. I.F.T., primary	1.5	}	R811866
L18	secondary	0.2		
L17	tertiary	0.3		

NOTE:—"C" refers to the coupling winding and "T" to the tuned winding.