"HIS MASTER'S VOICE"

MODEL 1629
RADIO-GRAMOPHONE

SERVICE MANUAL

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REGD. TRADE MARK OF THE GRAMOPHONE CO. LTD.

PRICE 2/-

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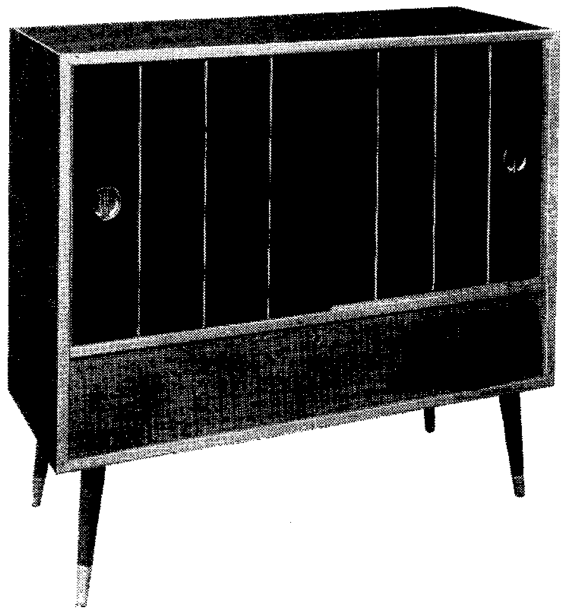
MODEL 1629

CONTENTS



1. GENERAL SPECIFICATION

1.1. MAINS SUPPLY

200 to 250 Volts A.C. (50 c.p.s.).
Power consumption, Radio 52 Watts, Gram. 67 Watts.
Record Changer motor pulleys for 60 c.p.s. mains are available.

1.2. WAVEBAND COVERAGE

Long Wave 1098—2027 Metres
Medium Wave 188— 547 Metres
V.H.F./F.M. 87— 101 Mc/s.

1.3. CONTROLS

Piano key Waverange, Gram, Mains Off switches.

Main controls under the switches are, from left to right:—V.H.F./F.M. tuning, Tone, Volume, A.M. Tuning.

A control for rotating the ferrite-rod aerial is positioned centrally below main controls.

A plug and socket adjustment located at top of rear of cabinet enables the treble response of the loudspeaker system to be reduced if desired.

1.4. VALVES

ECC85	V.H.F. Amplifier and Mixer Oscillator.
ECH81	A.M. Frequency Changer and F.M. I.F. Amplifier.
EF89	A.M. and F.M. I.F. Amplifier.
EM81	Tuning Indicator.
EABC80	A.M. and F.M. Detector and Audio Amplifier.
EL84	Audio Output.

The H.T. supply is obtained from a contact cooled selenium bridge rectifier.

1.5. LOUDSPEAKERS

Low Frequency
10 inch diameter, 3 ohm speech coil.

Medium Frequency
8 inch by 6 inch elliptical, 3 ohms speech coil.

High Frequency
4 inch diameter, 10 ohm speech coil.

Sockets for 3 ohm extension loudspeaker are provided at rear of cabinet. A separate plug and socket, adjacent to the above, enables the internal loudspeaker system to be muted.

1.6. RECORD CHANGER

Garrard RC.120 four speed automatic record changer fitted with GC2PA turnover crystal pickup.

1.7. CABINET DIMENSIONS

$40\frac{1}{2}$ in. wide by $37\frac{1}{2}$ in. high by $16\frac{3}{4}$ in. deep.

2. INSTALLATION AND OPERATION

2.1. MAINS VOLTAGE ADJUSTMENT

This is located on the mains transformer and provides the following tappings:—

200 to 210 Volts, 220 to 230 Volts and 240 to 250 Volts.

2.2. A.M. AERIAL

The internal ferrite-rod aerial will, in most situations, provide an adequate signal with the advantage that its directional properties help in reducing interference. The aerial control should normally be adjusted for maximum signal. If, however, reception is marred by interference from an adjacent transmission a compromise setting can usually be found which will reduce the interfering signal without seriously affecting the reception of the wanted station.

Sockets for an external aerial and earth are provided at rear of cabinet.

2.3. V.H.F./F.M. AERIAL

The high sensitivity of this receiver enables the internal V.H.F. aerial to be used where a reasonably good signal is available. It should, however, be noted that sufficient signal input to obtain satisfactory limiting action is necessary to obtain maximum discrimination against interference.

Improved reception may be obtained with a simple indoor aerial consisting of two 30 in. lengths of insulated wire connected to the receiver through a 75 ohm twin feeder. The half-wave dipole thus formed should be installed as high as possible and at right angles to the direction of the transmitter. Various positions should be tried for best results. Tilting the aerial may effect an improvement.

Multipath Propagation

Individual cases of multipath propagation can occur anywhere within the service area of an F.M. transmitter and cause severe audio distortion. Such cases are fortunately rare and the A.M. rejection provided by the receiver materially reduces the effect except where reception conditions are very poor.

When a high proportion of the signals picked up by the aerial are received indirectly from the transmitter via reflections, the phase differences, due to the various path lengths, produce both amplitude and phase modulation of the direct signal. The effect of this spurious modulation is extremely unpleasant, producing severe " break-up " at the higher audio frequencies.

Due to the nature of the distortion, the cause may not be immediately evident and could be mistaken for a receiver fault. If the effect is more noticeable on one of the three V.H.F. stations, it can be assumed that the distortion is caused by reception conditions. It is unlikely that all stations will be equally affected.

An efficient external multi-element aerial will be effective in most cases in reducing the pick-up of reflected signals, provided it is carefully orientated.

3. THE CIRCUIT

3.1. A.M. RECEPTION

When switched to Medium or Long wave ranges, the H.T. supply to the V.H.F. tuner is disconnected and H.T. is fed to the triode anode of the frequency changer **V2** by **S1B** (contacts 1 and 2). On M.W., **L9** is short circuited by **S2B** (contacts 2 and 3), and the ferrite-rod aerial **L8** is tuned by **C19** and the M.W. trimmer **C18,** which is connected in circuit by **S2B** (contacts 5 and 6). The signal is fed to the heptode control grid of **V2** via **S1A** (contacts 1 and 2) and **C20.**

On L.W. the inductance of the ferrite-rod aerial is supplemented by loading coil **L9,** and a fixed L.W. trimmer **C16** is switched in parallel with the tuning capacitor **C19.**

When an external aerial is employed, the signal is developed across **C14** in the low potential end of the aerial tuned circuit. **R5** in parallel with **C14** prevents modulation hum by limiting the grid circuit impedance of **V2** at low frequencies. The A.G.C. voltage is applied to the heptode control grid via **R7.**

The triode section of **V2** functions as a tuned grid oscillator with **L16** and **L17** providing the feedback coupling. On M.W. **L16** is tuned by **C23** and M.W. trimmer **C24,** whilst on L.W., tuning is by **C23** and L.W. trimmer **C32** shunted by **C33. C34** functions as a padder on both wavebands.

The 470 Kc/s I.F. signal appearing at **V2** heptode anode, is coupled by **L12, C28, L13, C29** to control grid of I.F. amplifier **V3.** The amplified 470 Kc/s signal at anode **V3** is finally coupled by **L18, C38, L19, C39** to the A.M. detector diode of **V5. R15** is the diode load, whilst **R16,** in conjunction with **C42, C43** forms an I.F. filter.

The A.F. signal developed across **R15** is coupled by **C51** to the volume control **R29** through **S1A** (contacts 4 and 5) and **S4A** (contacts 1 and 2).

The D.C. component of the rectified signal developed across **R15** is fed as A.G.C bias through **R14** and decoupling components to the control grid circuits of **V2, V3.** The cathode ray tuning indicator **V4** takes its feed from the other side of **S1A** through decoupling network **R19, C46.**

The audio signal appearing across the volume control **R29** is coupled by **C52** to the control grid of triode A.F. amplifier section of **V5,** which is grid current biassed by **R27** in conjunction with **C52.**

The resistance-capacitance coupling network, between anode **V5** and grid of output amplifier **V6,** incorporates a variable tone control circuit **R32, C54.** With the slider of **R32** at the top of its travel (fully anti-clockwise), **C54** has little effect on the response due to the high series resistance of **R32.** As the control is turned clockwise the shunting effect of **C54** at the higher frequencies progressively reduces treble response.

The output transformer **T1** in **V6** anode circuit has a tapped hum neutralising primary with **C57** across the main winding for phase correction. Negative feedback from secondary is applied through **R38, R39** to **R30** in low potential end of the volume control circuit. With this arrangement the proportion of feedback does not remain constant at all settings of the volume control but is at minimum when the volume control is at maximum, and progressively increases as the control is reduced to zero. By making the feedback loop frequency selective, this effect is used to provide automatic tone compensation.

On M.W. and L.W. ranges **C58** is connected through **R40** to chassis by **S2A** (contacts 2 and 3) or **S3A** (contacts 2 and 3). This reduces feedback at the higher frequencies and gives a limited treble boost to compensate for the restricted audio frequency range on these bands. When switched to V.H.F./F.M. or Gram., **S1B** (contacts 5 and 6) or **S4A** (contacts 5 and 6) are closed and **C58** is connected in parallel with **R39.** This provides a degree of bass boost which increases at low volume settings.

The loudspeaker system employs a 10 in. diameter unit **LS1** for bass reproduction, an 8 in. by 6 in. elliptical **LS2** for middle frequencies, and a 4 in. " tweeter " **LS3,** which extends the response to above 10 Kc/s. **S8** is a plug and socket adjustment to allow treble response of **LS2** and **LS3** to be reduced.

A contact cooled bridge type metal rectifier is employed for H.T. supply with a double wound mains transformer **T2.**

3.2. V.H.F./F.M. RECEPTION

The V.H.F. tuner unit employs a double triode valve **V1A** and **V1B. V1A** functions as an earthed grid R.F. amplifier and the 75 ohm aerial feeder is coupled into the cathode circuit by **L1, L2. L2** is broadly tuned by **C4** and the control grid is effectively earthed at R.F. by **C2. R1** is the grid leak and A.G.C. feed resistor.

The anode load **L3** is capacitively tuned by trimmer **C3** and is tuneable over the band by means of an adjustable aluminium slug core. **V1B** functions as a self-oscillating mixer with inductive coupling between anode and grid circuits provided by **L4, L5.** The grid winding **L5** is fitted with an aluminium slug core, mechanically ganged with **L3,** to provide variable tuning. The tuning capacitance is made up by a preset trimmer **C8,** temperature compensating capacitors **C6, C7,** which reduce the possibility of oscillator drift, and the series combination **C9, C10.** The junction **C9, C10** provides a point of injection for the signal voltage developed across **L3.** Additive mixing takes place and the resultant 10·7 Mc/s I.F. is developed across **L6** in **V1B** anode circuit. **L6** is tuned by **C5** which also serves as the anode coupling capacitor for the oscillator feedback coil.

A small proportion of the I.F. output is developed across **C12** and, coupled by **C11,** it provides I.F. feedback to **V1B** grid, thus increasing the impedance of the oscillator circuits which shunt **L6.**

L6 and **L7** (tuned by **C71** and self-capacitance of the inter- connecting cable) form the first 10·7 Mc/s I.F. transformer, which couples the output of the tuner unit via **S1A** (contacts 2 and 3) to the heptode control grid of **V2** operating as an I.F. amplifier. The triode A.M. oscillator section of **V2** is rendered inoperative on V.H.F./F.M. by disconnection of its H.T. supply by **S1B** (contacts 1, 2 and 3), which simultaneously applies H.T. to the V.H.F. tuner.

The second 10·7 Mc/s I.F. transformer **L14, C30, L15, C31,** is included in **V2** anode circuit and couples the signal to control grid of **V3,** which provides a further stage of I.F. amplification. The grid is returned to the A.G.C. line through the secondary of the 470 Kc/s I.F. transformer.

The A.G.C. line is common to both A.M. and F.M. circuits but, whereas on A.M. operation the A.G.C. control voltage is derived directly from the D.C. component of the rectified signal, on F.M. the A.G.C. line is biassed negatively by the charge built up on **C36** by grid current flow from **V3,** when the signal at its grid is strong enough to drive the valve into grid current. The A.G.C. voltage is decoupled by **C67, R10, C22** and applied to control grids of **V2** and **V1A.**

The signal developed in the anode circuit of **V3** is coupled to the ratio detector by a tuned transformer **L20, C40, L21, C41** with tertiary winding **L22.** Two of the diode sections of **V5** are connected in a ratio detector circuit with **R22, R23** forming the detector load and **C50** the stabilising reservoir capacitor. The load resistance is split to provide a potential divider feed to the tuning indicator **V4,** so that the normal operating voltage is similar to the voltage supplied by the A.G.C. line on A.M. reception. The tuning indicator is fed via **R21,** which serves to isolate the audio circuits from the detector load. I.F. filtering is given by **C48, C49** and F.M. de-emphasis is provided by **R17, C44.** The A.F. signal is coupled through **C45, S1A** (contacts 5 and 6), **C51,** and **S4A** (contacts 1 and 2) to the volume control **R29.**

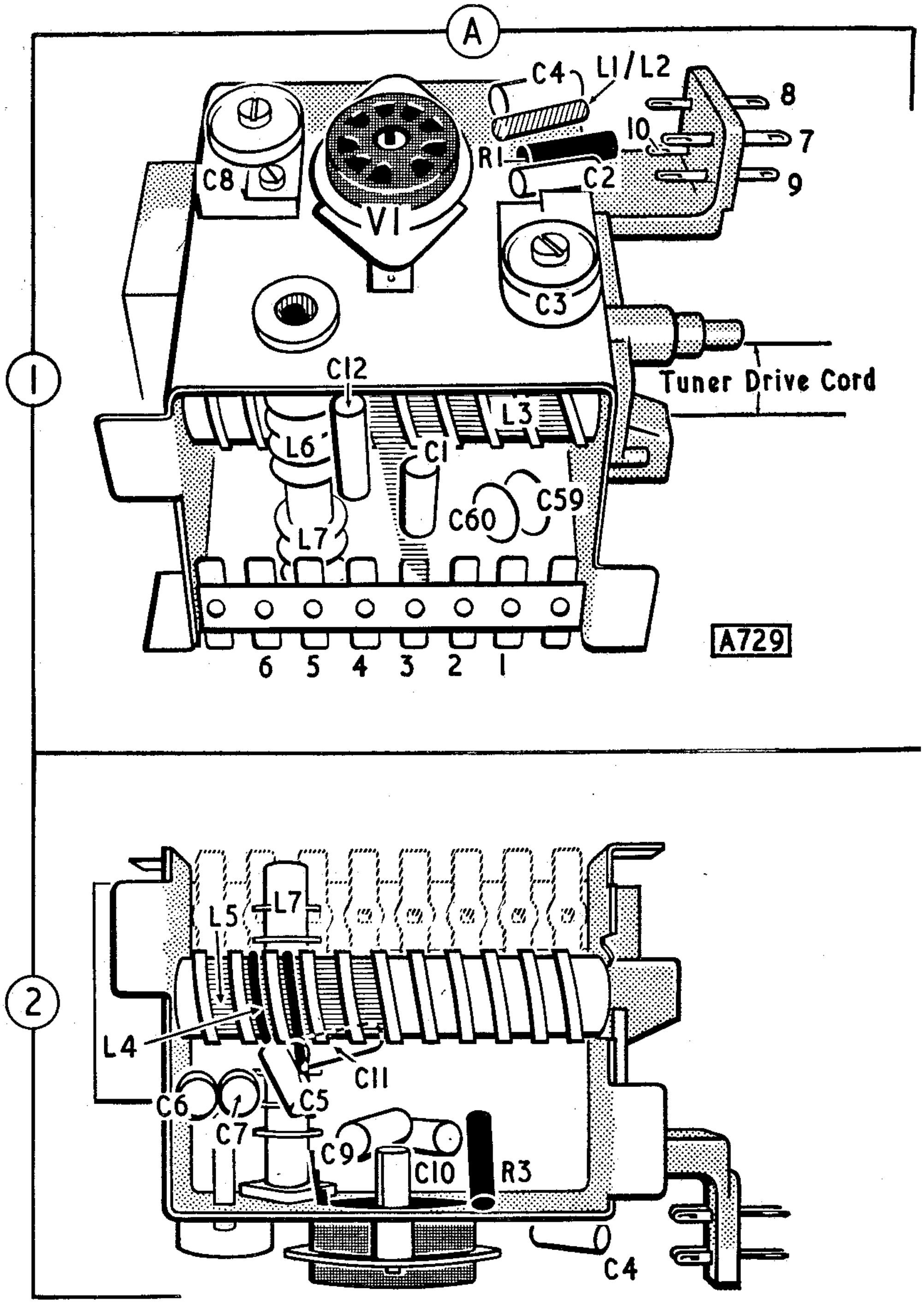


Fig. 1. V.H.F./F.M. tuner unit with screening box removed to show component locations.

Ref.	Loc.
C 1	A 1
C 2	A 1
C 3	A 1
C 4	A 1
C 5	A 2
C 6	A 2
C 7	A 2
C 8	A 1
C 9	A 2
C10	A 2
C11	A 2
C12	A 1

Ref.	Loc.
C59	A 1
C60	A 1
R 1	A 1
R 3	A 2
L 1, L 2	A 1
L 3	A 1
L 4	A 2
L 5	A 2
L 6, L 7	A 1

Ref.	Loc.
C13	C 1
C14	C 1
C16	D 1
C18	D 1
C19	C 1
C20	J 2
C21	J 2
C22	J 2
C23	C 1
C24	D 1
C25	B 1
C26	B 1
C27	J 2
C28	B 2
C29	B 2
C30	B 2
C31	B 2
C32	C 1
C33	C 1
C34	B 2
C35	J 2
C36	J 2
C37	H 2
C38	C 2
C39	C 2
C40	C 2
C41	C 2
C42	H 2
C43	H 2
C44	H 2
C45	H 2
C46	B 1
C47	H 2
C48	H 2
C49	H 2
C50	H 2
C51	C 1
C52	H 2
C53	G 2
C54	G 2
C55	G 2
C56	G 2
C57	G 2
C58	C 1
C61	J 2
C62	H 2
C64	D 2
C65	D 2
C66	E 2
C67	J 2
C70	D 1
C71	C 1
C72	H 2
C73	J 2
C74	H 2

Ref.	Loc.
R 2	F 1
R 4	G 1
R 5	C 1
R 6	J 2
R 7	J 2
R 8	J 2
R 9	J 2
R10	J 2
R11	J 2
R12	H 2
R13	H 2
R14	J 2
R15	H 2
R16	H 2
R17	H 2
R18	H 2

Ref.	Loc.
R19	C 1
R20	B 1
R21	H 2
R22	H 2
R23	H 2
R24	H 2
R25	H 2
R26	H 2
R27	H 2
R28	D 1
R29	C 1
R30	H 2
R31	G 2
R32	D 1
R33	G 2
R34	G 2
R38	G 2
R39	G 2
R40	C 1
L 8	D 2
L 9	C 1
L12, L13, L14, L15	B 2
L16, L17	B 1
L18, L19, L20, L21, L22	C 2
L23	F 2
T 1	D 2
T 2	E 2
S1-6	C, D1
W1	G 1
PL1	J 1
PL2	G 1
PL3	F 1

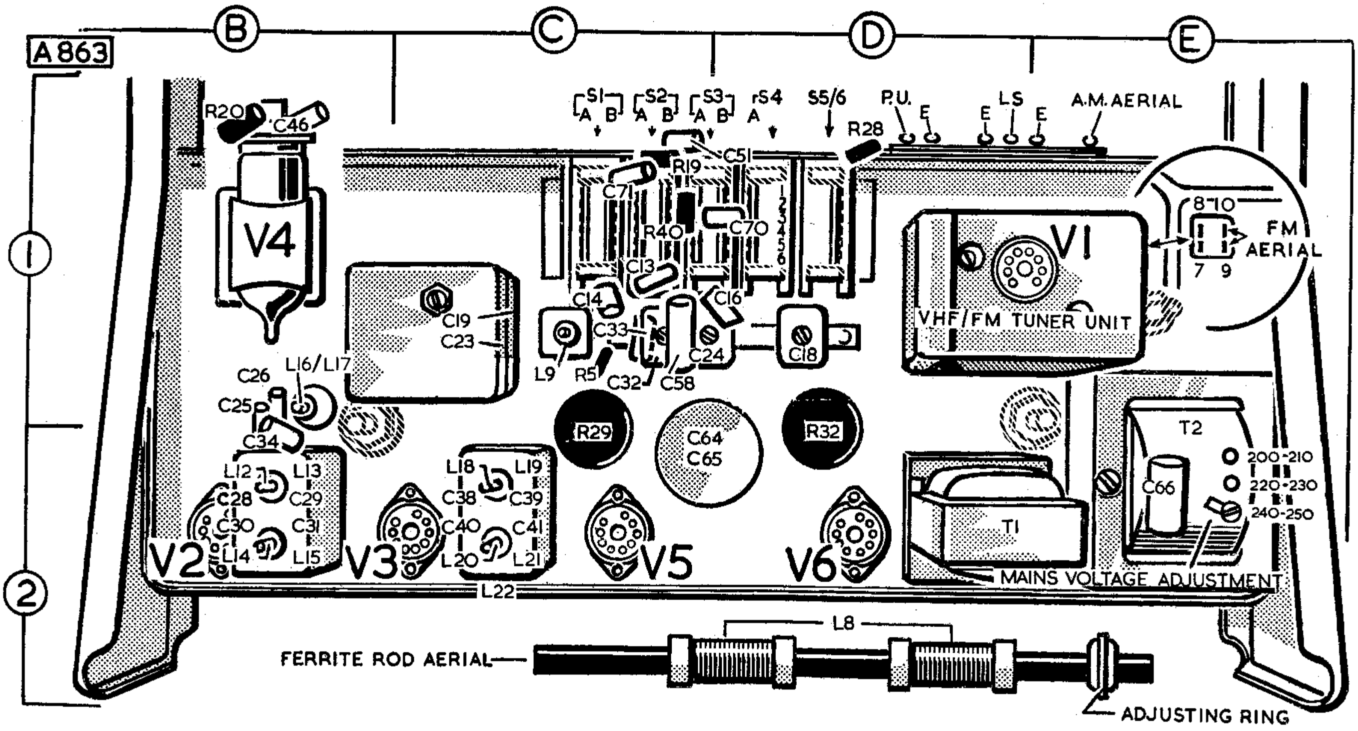


Fig. 2. View of valve side of chassis.

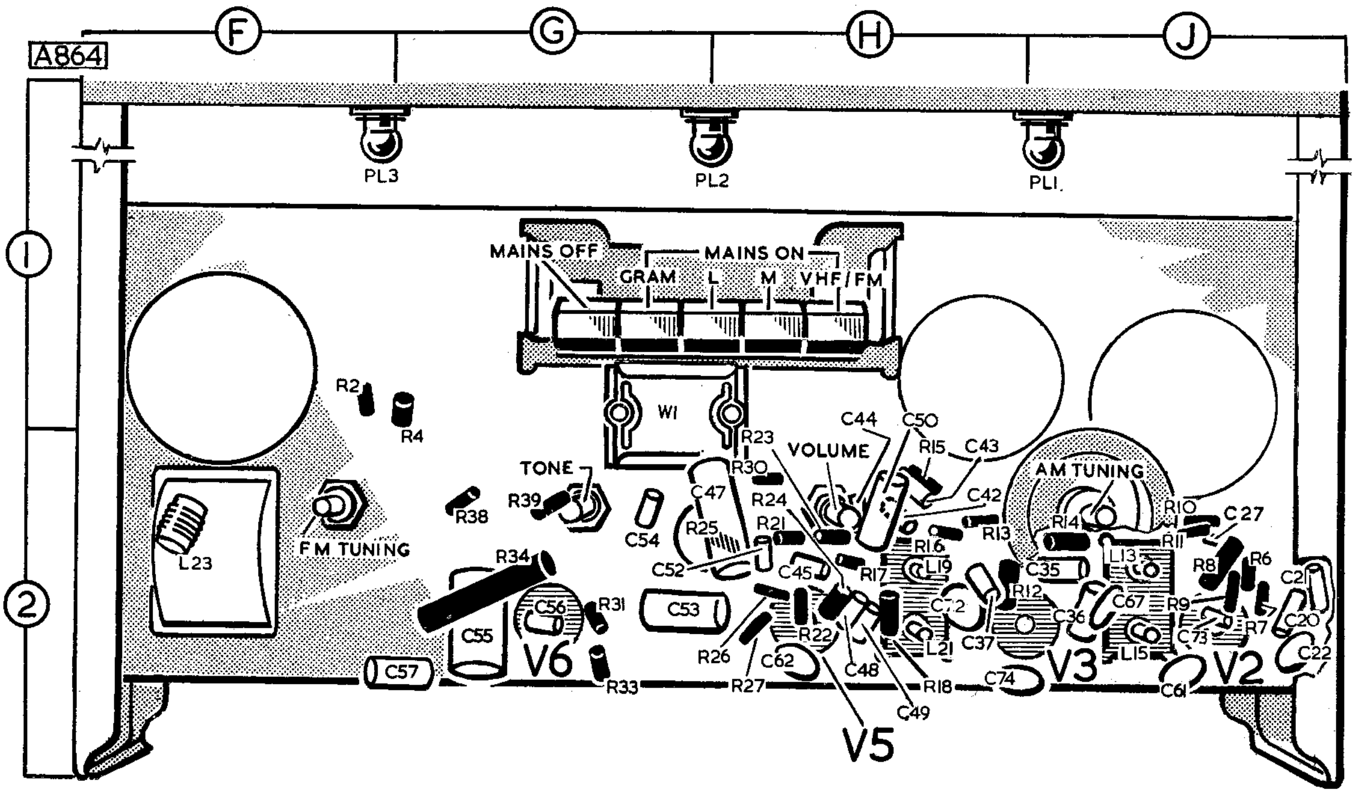


Fig. 3. View of wiring side of chassis.

3.3. COMPONENT VALUES AND FUNCTIONS

RESISTORS

(All ¼ Watt carbon, 20% tolerance unless otherwise stated.)

Ref.	Value	Rating		Function and Part No.	
R1	680K Ω			V1A grid leak	
R2	10K Ω			V1A anode feed	
R3	680K Ω			V1B grid leak	
R4	15K Ω			V1B anode feed	
R5	3·3K Ω			A.M. aerial shunt	
R6	47K Ω	10%		V2 S.G. feed	
R7	470K Ω			V2 hept. A.G.C. feed	
R8	27K Ω	10%	½W.	A.M. osc. anode feed	
R9	47K Ω			A.M. osc. grid leak	
R10	470K Ω			A.G.C. decoupling	
R11	2·7K Ω			V2 hept. anode feed	
R12	39K Ω	10%		V3 S.G. feed	
R13	3·3K Ω			V3 anode feed	
R14	1M Ω			A.G.C. feed	
R15	330K Ω			A.M. detector load	
R16	220K Ω			A.M. I.F. filter	
R17	100K Ω			F.M. de-emphasis	
R18	68 Ω	10%		Ratio det. tert. resistor	
R19	1·5M Ω			V4 grid decoupling	
R20	470K Ω			V4 anode load	
R21	1M Ω			Tuning ind. feed (F.M.)	
R22	6·8K Ω			Ratio det. load	
R23	22K Ω	10%		Ratio det. load	
R24	820 Ω	10%		Diode series resistor	
R25	100K Ω			V5 triode H.T. decoupling	
R26	220K Ω			V5 triode anode load	
R27	10M Ω			V5 triode grid leak	
R28	820K Ω			Pickup series resistor	
R29	0·5M Ω	Car. Pot. Log.		Volume control	Y13036/1
R30	270 Ω	10%		N.F.B. injection	
R31	820K Ω			V6 grid leak	
R32	0·5M Ω	Car. Pot. Lin.		Tone control	Y13036/2
R33	140 Ω	5%	½W.	V6 cathode bias	
R34	1K Ω		1W.	H.T. smoothing	
R35	4·7 Ω			Treble L.S. control	
R36	4·7 Ω			Treble L.S. control	
R37	—			No component	
R38	3·9K Ω	10%		N.F.B. series	
R39	5·6K Ω	10%		N.F.B. series	
R40	100 Ω			Audio response correction	
R41	4·7 Ω			L.S.2 feed	
R42	4·7 Ω			L.S.3 feed	

INDUCTORS AND TRANSFORMERS

Ref.	Function	Part No.
L1, L2	V.H.F. aerial input transformer	Z10475
L3	V.H.F. amplifier tuning	
L4	V.H.F. oscillator feedback	
L5	V.H.F. oscillator tuning	
L6, L7	1st F.M. I.F.T.	Y10474
L8	Ferrite rod aerial	Y17275
L9	L.W. loading coil	Y10570
L10	No component	
L11	No component	
L12, L13	1st A.M. I.F.T.	X17016
L14, L15	2nd F.M. I.F.T.	X17016
L16	A.M. oscillator tuning	Y17260
L17	A.M. oscillator feedback	Y17260
L18, L19	2nd A.M. I.F.T.	X17017
L20, L21, L22	Ratio det. transformer	X17017
L23	Heater R.F. choke	Y17241
T1	Audio output transformer	Y17013
T2	Mains transformer	Y17249

CAPACITORS

(All 350 v. working, 20% tolerance unless otherwise stated.)

Ref.	Value	Rating			Function and Part No.	
C1	1500pF				V1A H.T. decoupling	
C2	220pF				V1A grid decoupling	
C3	2-10pF	Preset			L3 tuning	Z13903
C4	20pF	5%			L2 tuning	
C5	25pF	5%			V1B anode coupling and L6 tuning	
C6	4·7pF	±0·5pF	N750		Temp. compensating and part L5 tuning	C47XH75/F13
C7	14pF	±10%	P100		Temp. compensating and part L5 tuning	C140S75/F13
C8	2-10pF	Preset			L5 tuning	Z13903
C9	10pF	±0·5pF	P100		Oscillator mixer signal injection	C100H75/F13
C10	10pF	±0·5pF	P100		Oscillator mixer signal injection	C100H75/F13
C11	10pF	±0·5pF	P100		Oscillator balancing	C100H75/F13
C12	85pF	±2·5%			Mixer I.F. feedback	Y85OR35/SU4
C13	0·001μF			300V. A.C.	A.M. aerial isolating	
C14	3000pF	5%			A.M. aerial coupling	Y302G35/SU2
C15	—				No component	
C16	150pF	5%			L.W aerial trimmer	
C17	—				No component	
C18	40pF	Preset			M.W. aerial trimmer	Z13916
C19	528pF†	Variable			A.M. aerial tuning	Z5389
C20	200pF				V2 hept. C.G. coupling	
C21	0·0039μF	10%		750V.	V2 S.G. decoupling and neutralising	C392S75/F5
C22	0·0025μF	—20+80%			A.G.C. decoupling	
C23	528pF†	Variable			A.M. oscillator tuning	Z5389
C24	70pF	Preset			M.W. osc. trimmer	Z13916
C25	50pF				A.M. osc. grid coupling	
C26	200pF				A.M. osc. anode coupling	
C27	0·003μF				V2 hept. decoupling	
C28	220pF	2%			L12 tuning	
C29	220pF	2%			L13 tuning	
C30	15pF	5%			L14 tuning	
C31	15pF	5%			L15 tuning	
C32	70pF	Preset			L.W. osc. trimmer	Z13916
C33	410pF	2%			L.W. osc. trimmer	Y411R35/SU2
C34	440pF	2%			A.M. osc. padder	Y441R35/SU2
C35	0·0039μF	10%		750V.	V3 S.G. decoupling and neutralising	C392S75/F5
C36	0·04μF			150V.	A.G.C. time constant	
C37	0·003μF				V3 H.T. decoupling	
C38	220pF	2%			L18 tuning	
C39	220pF	2%			L19 tuning	
C40	12pF	5%			L20 tuning	
C41	47pF	5%			L21 tuning	
C42	100pF				A.M. diode reservoir	
C43	100pF				A.M. I.F. filter	
C44	680pF	10%			F.M. de-emphasis	
C45	0·01μF			150V.	F.M. A.F. coupling	
C46	0·04μF			150V.	V4 grid bypass	
C47	0·1μF				V5 H.T. decoupling	
C48	400pF				F.M. I.F. filter	
C49	400pF				F.M. I.F. filter	
C50	4μF	Electrolytic		100V.	Ratio det. stabiliser	
C51	0·01μF			150V.	A.F. coupling	
C52	0·01μF			150V.	V5 grid coupling	
C53	0·02μF				V6 grid coupling	
C54	0·0025μF				Part tone control	
C55	50μF	Electrolytic		12V.	V6 cathode bypass	
C56	7pF	±0·5pF		750V.	V6 N.F.B. phase correction	CO70H75/F13
C57	0·005μF			600V.	Phase correction	
C58	0·2μF			150V.	Frequency selective N.F.B. shunt	
C59	1000pF	—20+80%			Heater R.F. bypasses	
C60	1000pF	—20+80%			Heater R.F. bypasses	
C61	2500pF	—20+80%			Heater R.F. bypasses	
C62	2500pF	—20+80%			Heater R.F. bypasses	
C63	—				No component	
C64	50μF	Electrolytic		350V.	H.T. smoothing	Y13200/5
C65	50μF	Electrolytic		350V.	H.T. reservoir	Y13200/5
C66	0·01μF			300V. A.C.	Mains R.F. bypass	
C67	0·0025μF	—20+80%			A.G.C. decoupling	
C68	4μF	(2×2μF)		150V.	LS2 coupling	T205W15
C69	1μF			150V.	LS3 coupling	T105W15
C70	150pF				P.U. compensation	
C71	5pF	±0·5pF			Part L7 tuning	CO50H35/F7
C72	0·0025μF				H.T. decoupling	
C73	20pF				10·7 Mc/s I.F. bypass	
C74	2500pF	—20+80%			V3 heater bypass	

† Swing value

MISCELLANEOUS

Ref.	Function and Description	Part No.
S1A & B, S2A & B, S3A & B	Piano key waverange and N.F.B. switching	X17030
S4A	Piano key radiogram and N.F.B. switching	X17030
S5, S6	Piano key mains on/off switch	X17030
S7	Internal LS muting switch (plug and socket)	
S8	Treble control (plug and socket)	
W1	Bridge rectifier S.S.F. B250, C75 (Siemens) or P31T—2—2—8—1 (Westinghouse)	Z10508 / N10749
PL1, PL2, PL3	Pilot lamps 6·5V. 0·3A., 12 mm., M.E.S.	
PL4	Neon indicator lamp	Y17228/2
LS1	10 inch diameter, 3 Ω speech coil	Y16004/2
LS2	8 inch by 6 inch elliptical, 3 Ω speech coil	Y16012/2
LS3	4 inch diameter, 10 Ω speech coil	Y16020/2

When ordering a replacement loudspeaker, please state whether receiver is fitted with grey enamel finished or plain metallic speakers.

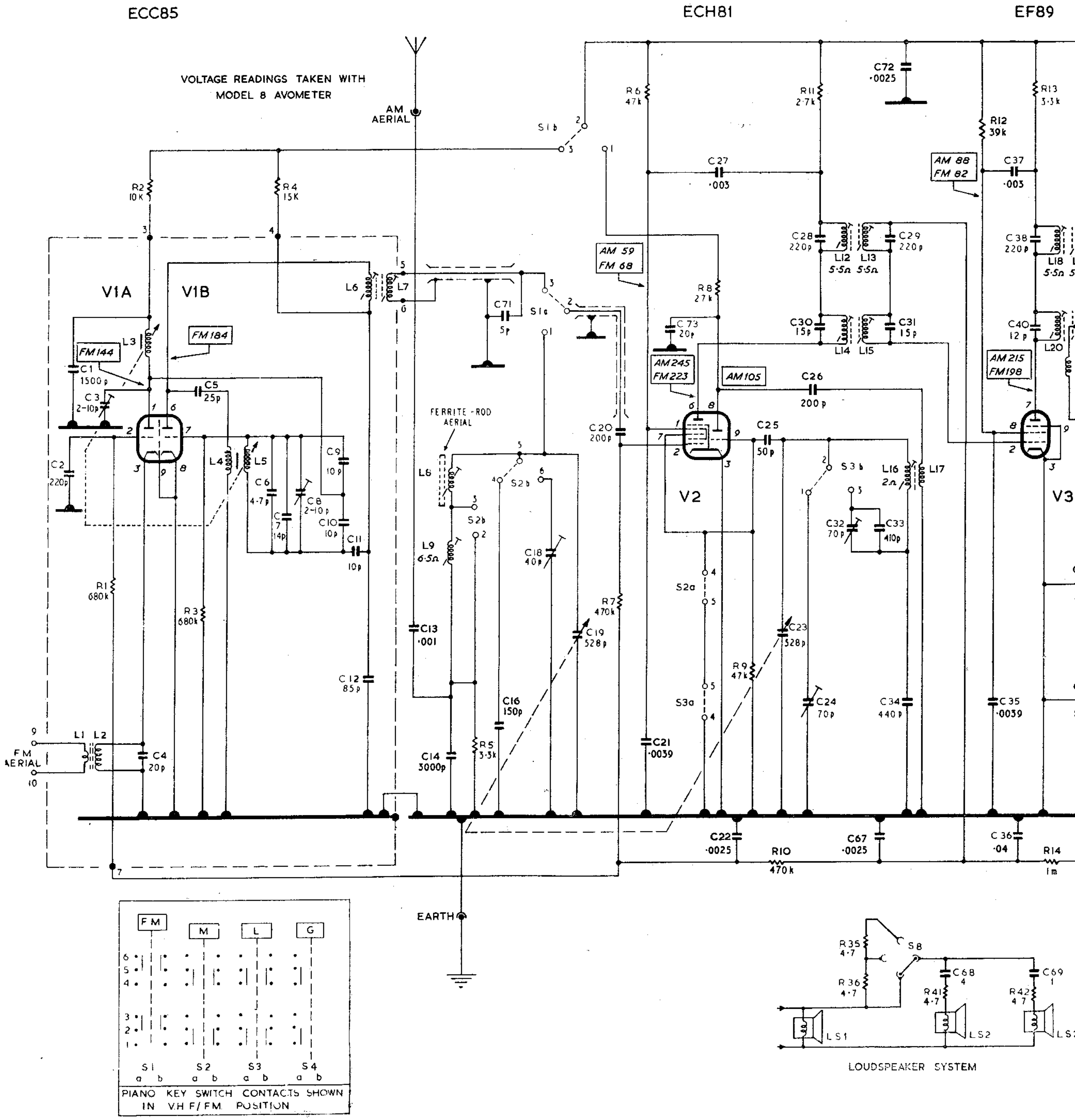
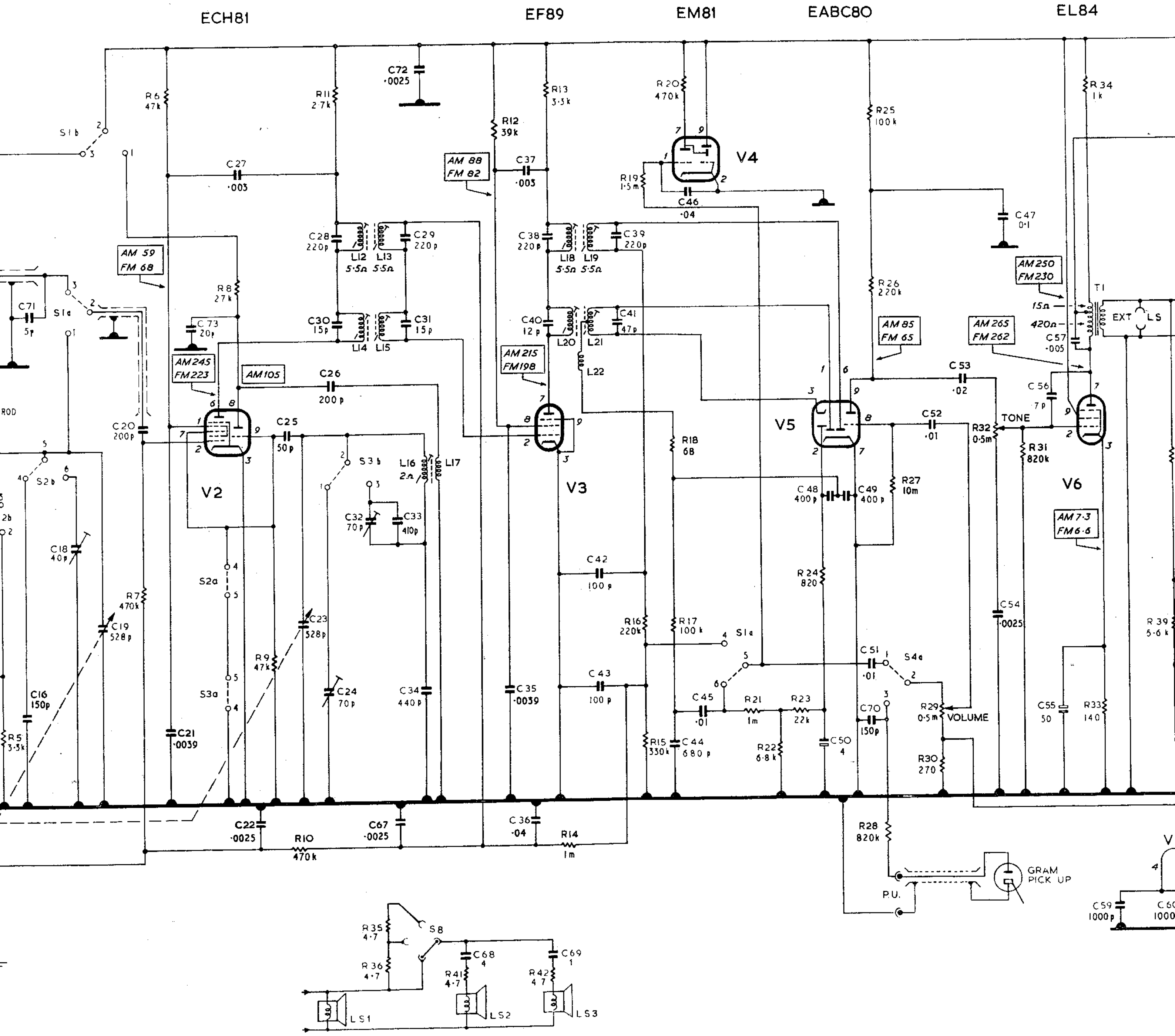
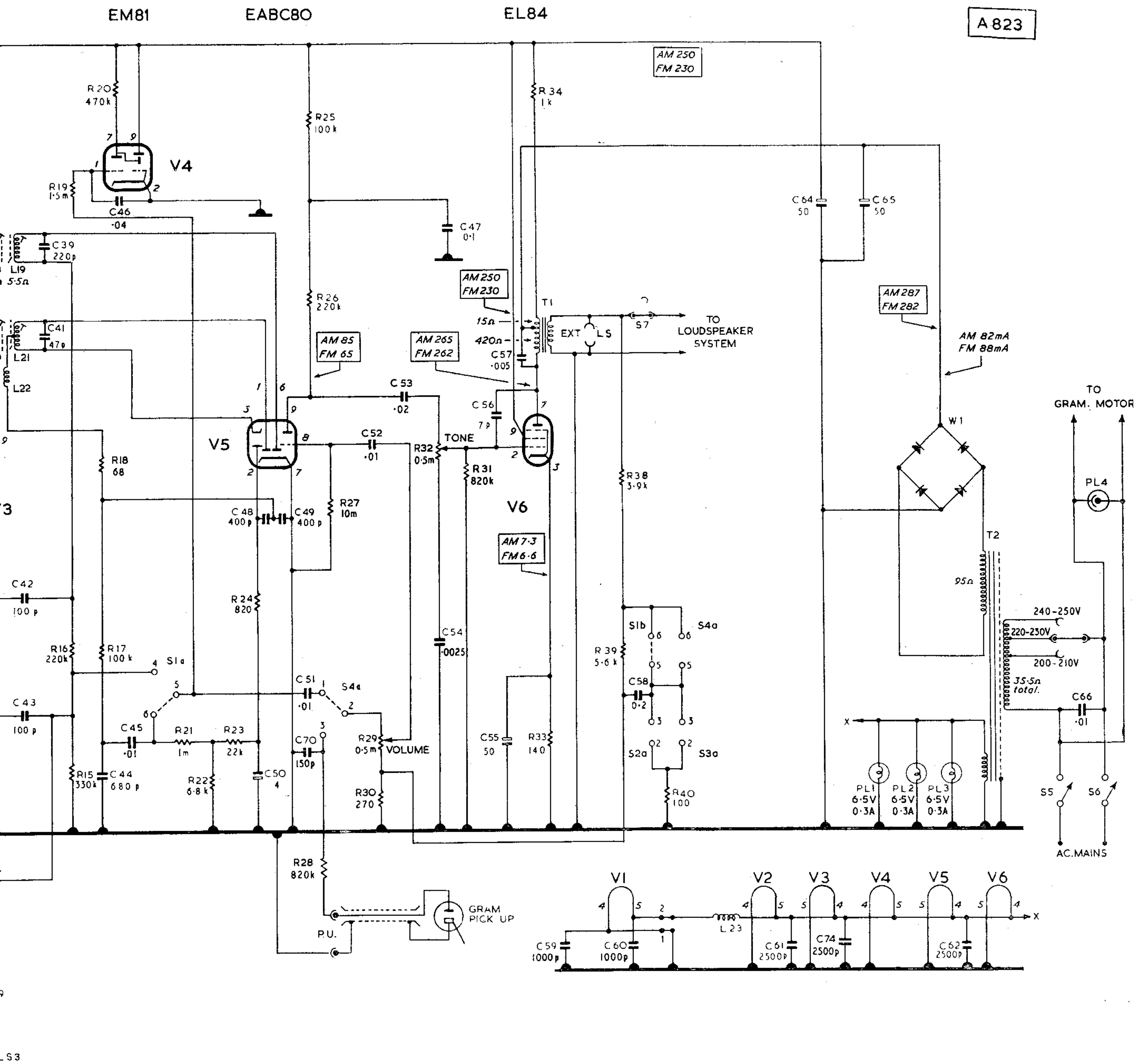


Fig. 4. Circuit diagram of Model 1629 with loudspeaker system shown separately below. The waverange switches are shown in the V.H.F./F.M. positions and the physical arrangement of the contacts is shown in the small diagram on the left. This diagram is lettered and numbered so that the various groups of contacts may be identified with the switches in the circuit diagram. The D.C. resistance of inductors, if 1 Ω or greater, is given in the circuit diagram.
Voltage readings taken with a Model 8 Avometer are shown by figures in rectangles.



LOUDSPEAKER SYSTEM

...n separately below. The waverange switches are shown in the
...ontacts is shown in the small diagram on the left. This diagram
...tacts may be identified with the switches in the circuit diagram.
... in the circuit diagram.
...n by figures in rectangles.


EM81
EABC80
EL84
A 823
AM 250
FM 230
R20 470k
R19 1·5m
C46 ·04
V4
R25 100k
C47 0·1
R34 1k
C64 50
C65 50
C39 220p
L19
5·5Ω
C41 47p
L21
L22
R26 220k
AM 85
FM 65
AM 250
FM 230
AM 265
FM 262
T1
15Ω
420Ω
C57 ·005
EXT
LS
S7
TO LOUDSPEAKER SYSTEM
AM 287
FM 282
AM 82mA
FM 88mA
C53 ·02
C56 7p
C52 ·01
TONE
R32 0·5m
R31 820k
V5
V6
R18 68
C48 400p
C49 400p
R27 10m
R38 3·9k
W1
TO GRAM. MOTOR
PL4
AM 7·3
FM 6·6
T2
95Ω
C42 100p
R24 820
C54 ·0025
R16 220k
R17 100k
S1a
R39 5·6k
S1b
S4a
C58 0·2
240-250V
220-230V
200-210V
35·5Ω total.
C66 ·01
C43 100p
C51 ·01
S4a
C45 ·01
R21 1m
R23 22k
R29 0·5m
VOLUME
C70 150p
C55 50
R33 140
S2a
S3a
R15 330k
C44 680p
R22 6·8k
C50 4
R30 270
R40 100
PL1 6·5V 0·3A
PL2 6·5V 0·3A
PL3 6·5V 0·3A
S5
S6
AC.MAINS
R28 820k
GRAM PICK UP
P.U.
V1
V2
V3
V4
V5
V6
L23
C59 1000p
C60 1000p
C61 2500p
C74 2500p
C62 2500p
LS3

4. VOLTAGE AND CURRENT MEASUREMENTS

Input 225 V., 50 c.p.s.

Mains Tapping 220—230 V.

Model 8 Avometer.

GENERAL MEASUREMENTS

	A.M.	F.M.
Total H.T. current	82mA	88mA
H.T. Voltage unsmoothed	287V.	282V.
H.T. Voltage smoothed	250V.	230V.

VALVE MEASUREMENTS (A.M.)

Valve		*Anode*		*Screen*		*Cathode*
Ref.	*Type*	*Volts*	*mA*	*Volts*	*mA*	*Volts*
V1A	ECC85	—	—	—	—	—
V1B	ECC85	—	—	—	—	—
V2	ECH81 Heptode	245	2	59	4	—
	ECH81 Triode	105	5·6	—	—	—
V3	EF89	215	12·5	88	4·3	—
V5	EABC80 (Triode)	85	0·5	—	—	—
V6	EL84	265	46	250	4·9	7·3

VALVE MEASUREMENTS (F.M.)

Valve		*Anode*		*Screen*		*Cathode*
Ref.	*Type*	*Volts*	*mA*	*Volts*	*mA*	*Volts*
V1A	ECC85	144	9·6	—	—	—
V1B	ECC85	184	5·6	—	—	—
V2	ECH81 Heptode	223	7	68	3·5	—
	ECH81 Triode	—	—	—	—	—
V3	EF89	198	12	82	4	—
V5	EABC80 (Triode)	65	0·5	—	—	—
V6	EL84	262	42·5	230	4·7	6·6

5. ALIGNMENT DATA

5.1. A.M. CIRCUITS

I.F. Alignment

Switch receiver to M.W., turn gang to minimum capacitance position and volume control to maximum. Inject a 470 Kc/s modulated signal through an 0·01μF capacitor at the grid of **V2** (pin 2).

Adjust **L19, L18, L13, L12** for maximum output, reducing the input signal level to maintain peak output at approximately 50 mW.

R.F. Alignment

M.W. must be aligned first. Signals to be injected via a loop loosely coupled inductively to the ferrite rod aerial. Input level to be adjusted to maintain output at 50 mW, volume control at maximum.

1. With gang at maximum capacitance, set cursor to the end marker on tuning scale.
2. Switch to M.W., inject 1,500 Kc/s signal, set pointer to 'M.W. Trim' and adjust **C24** and **C18** for maximum output.
3. Set cursor to 'M.W. Pad', inject 590 Kc/s signal and adjust **L16** and the aerial adjusting rjng for maximum output.
4. Repeat 2 and 3 until no further improvement results.
5. Switch to L.W., inject 223 Kc/s signal, set cursor to 'L.W. Trim' and adjust **C32** and **L9** until no further improvement results.

5.2. F.M. CIRCUITS

The various trimming adjustments associated with the V.H.F./F.M. band must not be disturbed unless suitable equipment is available to re-align the tuned circuits. In the event of component replacement in the V.H.F. tuner unit, care must be taken to restore the wiring to its original position and to ensure that the lead lengths of the replacement part are the same as in that originally fitted.

The following alignment procedure is based on the use of an A.M./F.M. signal generator with I.F. and Band II coverage and an output impedance of 75 Ω. For all adjustments other than **L20** and **L21,** the signal generator output should be reduced as the circuits are brought to resonance so that the audio output does not exceed 50 mW with the volume control at maximum.

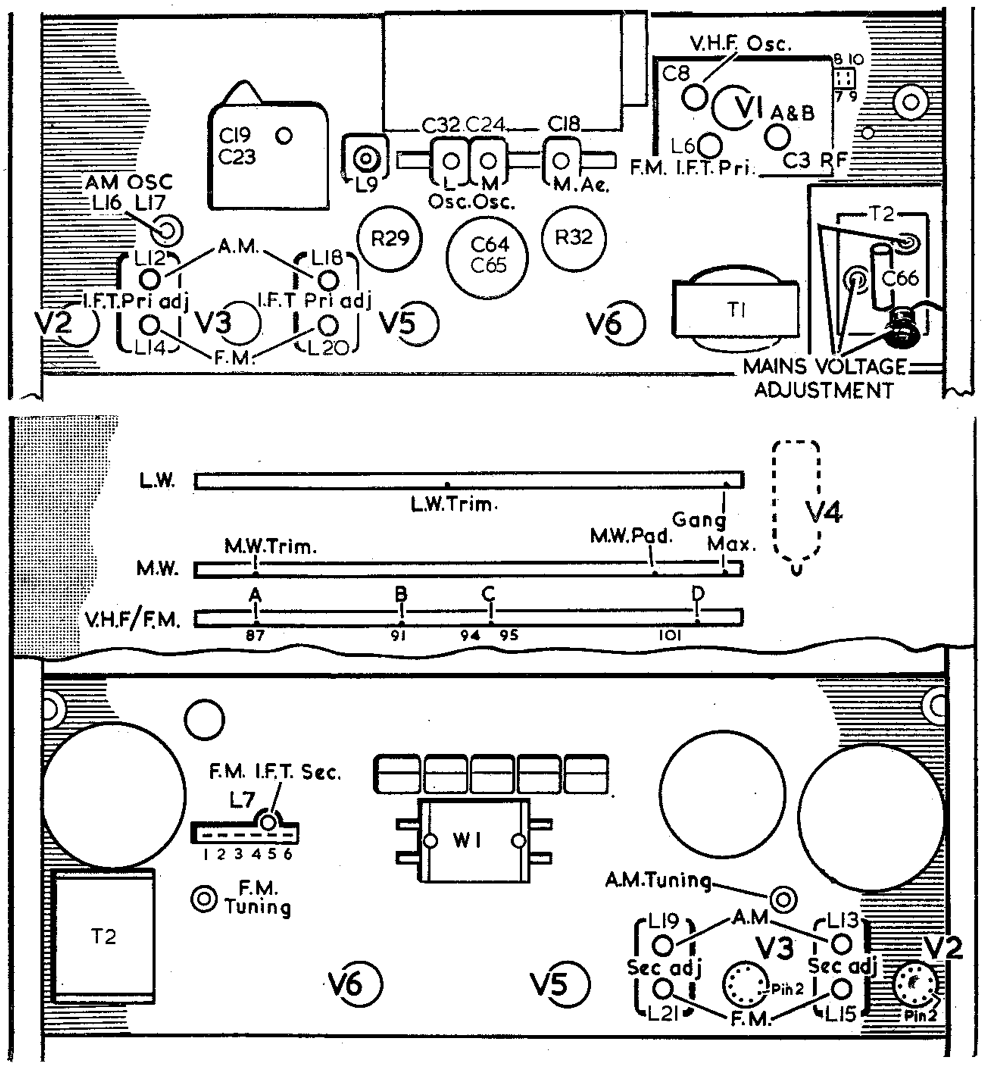
I.F. Alignment

Allow the receiver to warm up for at least ten minutes, switch to V.H.F./F.M. and set volume control to maximum. The signal should be injected via a 500pF isolating capacitor in each case.

1. Inject 10·7 Mc/s 30% amplitude modulated signal to the control grid (pin 2) of **V3** at an output level of 20 mV. Unscrew the core of **L21** to its fullest extent and adjust **L20** for maximum output. Switch signal generator to F.M. 25 Kc/s deviation and adjust **L21** for maximum output. Adjust the volume control so that the output is limited to 50 mW during this adjustment.
   Switch signal generator back to A.M. and swing the frequency above and below 10·7 Mc/s and check that the main dip in the response occurs within ±20 Kc/s from the mid frequency.
2. Inject 10·7 Mc/s F.M. signal, 25 Kc/s deviation, to control grid (pin 2) of **V2** and adjust **L15** and **L14,** in that order for maximum output.
3. Inject 10·7 Mc/s F.M. signal, 25 Kc/s deviation to tag 3 on tuner unit. Using a non-metallic trimming tool, adjust **L7** and **L6** for maximum output.

R.F. Alignment

1. Slacken off the locking screws of the F.M. drive drum. Rotate tuning control to bring the cursor to the low frequency end of the scale and continue until the limiting stop is reached. Adjust the cursor position to correspond with scale marker **A** (87 Mc/s).
2. Rotate tuning control until cursor locates at marker **C.**
3. With the main drive held in this position, rotate the tuning spindle, by means of the screwdriver slot, in a clockwise direction so that the cord which runs over the pulley on the tuner unit is drawn out to its limit. Tighten up the drum fixing screws with the spindle in this position.
4. Rotate tuning control until the cursor reaches marker **D** at the H.F. end of the scale.
5. Inject 91 Mc/s F.M. signal, 25 Kc/s deviation into aerial socket and, using a non-metallic trimming tool, adjust **C8** for maximum audio output. **No further adjustment of C8 should be made.**
6. Slacken off the V.H.F. drive drum and rotate the tuning drive until the cursor coincides with marker **B** (91 Mc/s). Rotate the tuner unit drive spindle until the 91 Mc/s signal is received, then tighten up the locking screws on the drive drum.
7. Adjust **C3** for maximum output, reducing the input level to prevent the audio output exceeding 100 mW.



5. Locations of trimming adjustments, signal injection points and scale calibration markers.

6. MECHANICAL DETAILS

6.1. REMOVING THE CHASSIS

Remove the four push-on control knobs, and also the self-tapping screws which secure the rear panel enclosing chassis compartment.

Unplug the P.U., L.S. and A.M. aerial leads from the socket panel at top of chassis. Unsolder the F.M. aerial feeder from tags 9 and 10 of the F.M. tuner unit, and also the gram. motor mains lead from the OFF switch. Remove lower rear panel of cabinet and disconnect the mains lead from the neon indicator terminal block on floor of cabinet. Pull this lead up through cavity in centre partition into chassis compartment. Remove the plug from end of mains connecting lead and pull it through anchoring hole in rear runner of chassis compartment.

Remove the two self-tapping screws securing ferrite rod aerial mounting bracket to supporting block attached to top of cabinet and also the two screws attaching the control knob bracket to front panel. This latter bracket is accessible from below bottom edge of chassis. Metalwork of the aerial control assembly is earthed to chassis by a lead secured by one of the control knob bracket fixing screws.

The chassis complete with ferrite rod aerial assembly may now be withdrawn by loosening the clamps securing the bottom of the chassis and unscrewing the two 2BA bolts holding the top rail.

6.2. REMOVING THE RECORD CHANGER

To remove the record changer, undo and remove the three bolts which attach unit plate to spring suspensions.

When replacing the changer it may be necessary to level the unit. This adjustment is made by turning each suspension bolt clockwise to lower, and anti-clockwise to raise.

6.3. REPLACEMENT OF NEON INDICATOR LAMP

The neon indicator lamp is mounted on a small panel secured to front of cabinet by two screws, and can only be replaced as a complete unit containing a wired-in neon lamp. The assembly (Part No. Z17228/2) is attached to the panel by inserting it through hole and then bending outwards the claws of the clip.

6.4. TUNING DRIVE CORDS

There are four separate drive cords, two associated with A.M. tuning and two with F.M. tuning. The arrangement of each drive is illustrated in the accompanying diagrams.

To renew the drives, unclip the glass tuning scale and proceed as follows:—

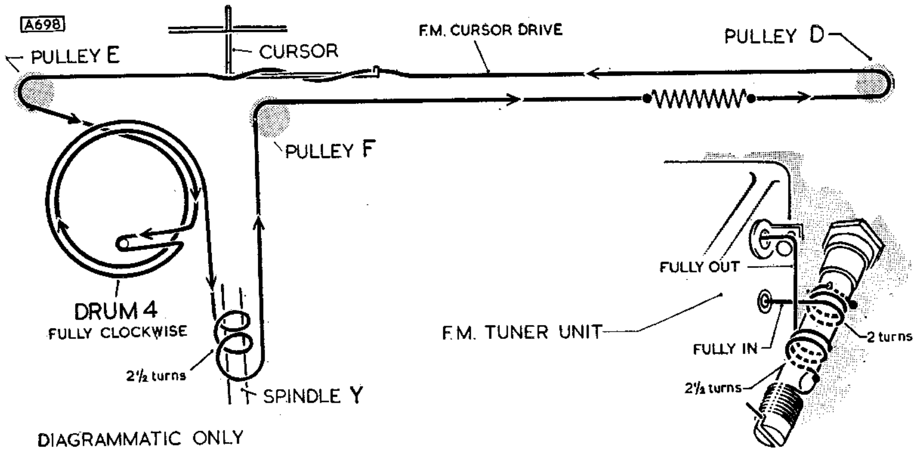


Fig. 7. The F.M. cursor drive cord and tuner unit drive.

A.M. Cursor Drive

First withdraw the flywheel from the control spindle and take the F.M. cursor drive cord off the outside pulleys E and D. Allow 6 ft. of braided nylon cord and tie the tension spring to one end. Turn the tuning gang to maximum capacitance and set drums 1 and 2 so that their slots are in the positions shown in Fig. 6. Hook free end of spring over the spindle of pulley F. This provides a point at which to begin winding the cord. Start by taking over pulley A and arrange the cord as shown in the diagram. The arrows show the direction of winding. When completed, unhook the spring and tie on the free end of the cord. The spring should maintain a slight tension on the cord so that a positive drive is obtained.

Fit the cursor so that it rides inside the upper guide loop and behind the lower one. When the tuning scale is replaced, the cursor should be positioned so that it registers with the "gang max." marker at the right hand end of the scale.

A.M. Tuning Drive

For this drive, allow 3 ft. of braided nylon cord and wind over drums 1 and 3 as shown in Fig. 6.

F.M. Cursor Drive

Allow 6 ft. of nylon braided cord for this drive and tie the tension spring to one end. Whilst arranging this cord over drum 4 and the pulleys shown in the diagram (Fig. 7), it is necessary to anchor the spring close to pulley D. This can be done by making a temporary wire hook to slip over the spindle of the A.M. tuning gang. Start by taking the cord over pulley D and continue in the direction of the arrows. When completed, unhook the spring and tie on the free end of the cord.

Position the cursor in the lower guide loop and replace the tuning scale. With the tuning control turned fully anti-clockwise, the cursor should be behind the 87 Mc/s marker on the scale.

F.M. Tuner Unit Drive

If the drive cord of the F.M. tuner unit becomes badly worn the complete cord assembly with tuning slugs (Part No. Z17223) must be replaced.

To fit a new slug assembly, remove the tuner unit from the chassis and take off the end cap. The two small pulleys over which the cord runs, are carried in a plastic moulding covered by adhesive paper. When the paper is removed, the cores may be slipped out and the new assembly inserted. Care should be taken to insert them, as shown in Fig. 8, with the closed end of the core showing in the centre coil former, and the open end in the upper former as viewed from the rear.

Refit tuner unit to chassis and wind the two ends of the cord round the drive spindle as shown in Fig. 7.

The tuner unit must then be re-aligned as described in Alignment Data.

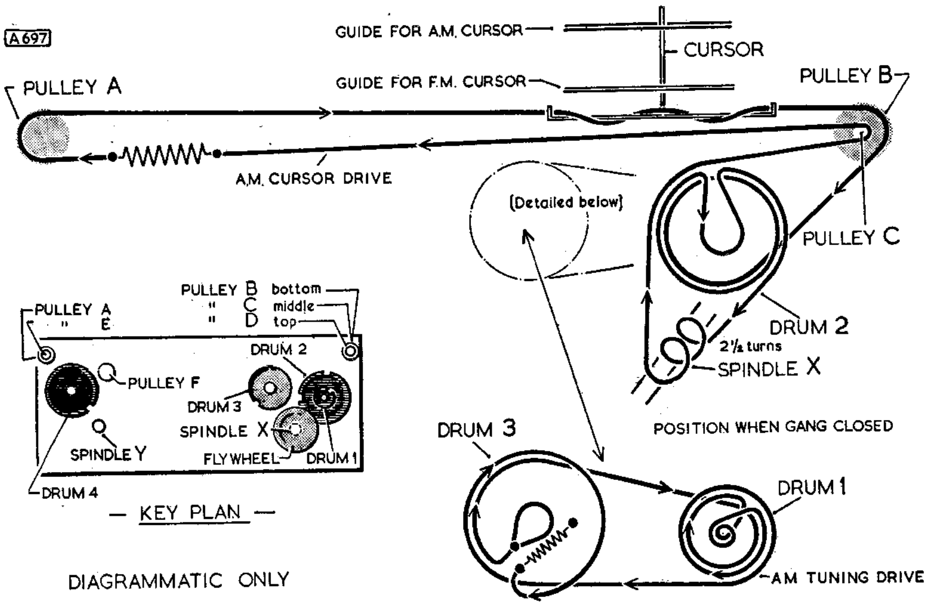


Fig. 6. The A.M. tuning drive cords.

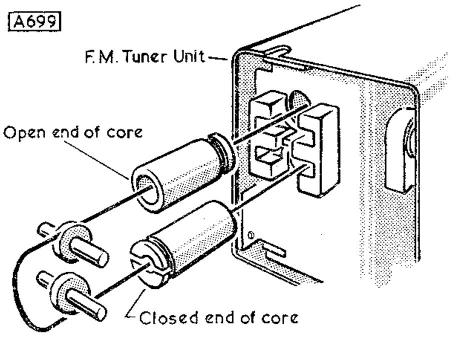


Fig. 8. The F.M. tuner unit with end cap removed, showing the arrangement of the tuning cores relative to each other.

6.5. FERRITE ROD AERIAL CONTROL

The ferrite-rod aerial is mounted on a rotatable drum which is mechanically linked by a flexible cable drive with the edgewise projecting control knob located on front panel. The arrangement of the cable drive is shown in Fig. 9.

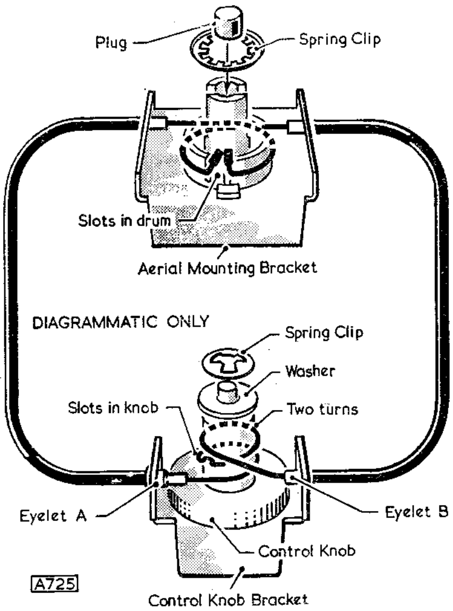


Fig. 9. The cable control assembly for the ferrite-rod aerial.

Tension Adjustment

Apply soldering iron to the soldered joint at eyelet A (Fig. 9) taking care to avoid marking the plastic control knob. This eyelet has a larger bore than the others and is a loose fit on the flexible guide sleeve. Draw the sleeve away from the control knob bracket so that the slack is taken up and then re-solder the tube in its new position. If the steel sleeve is already well tinned, resin flux cored solder may be used, but if any difficulty is experienced then one of the more active types of flux should be used.

Cable Replacement

A replacement cable assembly comprising the drive wire with eyelets fitted at each end and two flexible sleeves with terminating eyelets, is available from the Service Department under Part No. Y17052.

To fit this assembly, solder the sleeve eyelets in position on the aerial mounting bracket, using Arax cored solder or similarly active flux, and anchor ends of the flexible drive wire in the slots in the moulded drum. Arrange the wire round the drum as shown in the diagram (Fig. 9). Insert the sleeve and the larger eyelet " A " into the control knob bracket, but do not fix with solder. Loop the wire twice round the capstan section of the control knob, fitting it into the slots as shown in the diagram. Fit eyelet " B " into the control knob bracket and solder it in position.

Take up slack in the drive wire by drawing the sleeve away from control knob bracket and then solder sleeve and eyelet " A " into position.

6.6. INTERNAL V.H.F. AERIAL

This consists of two crossed dipoles with delay line coupling to correct the phasing of the aerial elements. The aerial is mounted in the loudspeaker compartment, the aerial elements being stretched diagonally across the cabinet. The general arrangement of the aerial is shown in Fig. 10, the red and blue wires forming the " legs" of the two dipoles.

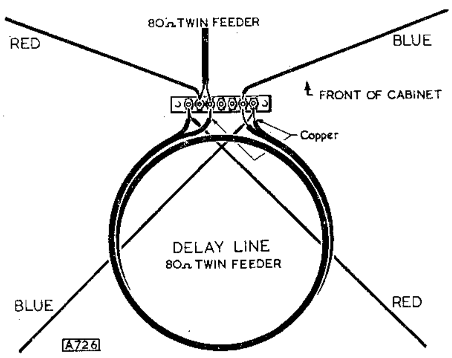


Fig. 10. This diagram illustrates the general arrangement of the internal V.H.F. aerial.

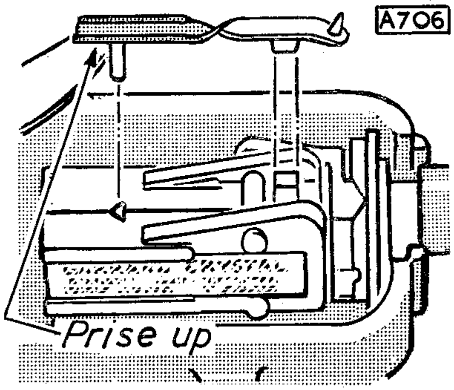


Fig. 11. The pickup cartridge, showing method of removing stylus assembly.

6.7. PICK-UP STYLUS REPLACEMENT

The styli of the Garrard GC2/PA pick-up cartridge are easily replaced as shown in Fig. 11.

Replacement sapphire styli are:

GC2/3 (Green) for 78 r.p.m. recordings.

GC2/1 (Red) for L.P. Microgroove recordings.

6.8. ACCESS TO TUNING INDICATOR (V4)

The tuning indicator becomes accessible when the scale reflector is removed. If this is attempted when the chassis is in the cabinet, the reflector should not be completely removed, but should be released only at the top. Handling will be facilitated if the pilot lamps are removed and the fingers inserted through the holes in the top bar. If the reflector is allowed to slip out of the bottom rail, its replacement may involve removal of the chassis from the cabinet.

7. SPARE PARTS LIST (MECHANICAL)

Part Description	Part No.
Cabinet	V30010
Cabinet Legs (Set of 4)	N30014
Cabinet Back	W30006
Control Knob (Volume, Tone, A.M. Tuning, V.H.F./F.M. Tuning)	Y17007/2
Control Knob Spring	37302
Cursor A.M.	Z17272
Cursor F.M.	Z17044
Drive Drum A.M. (Aluminium)	Z9527
Drive Drum A.M. (Plastic)	Y17034
Drive Drum F.M. (Plastic)	W17032
Drive Cord Tension Springs:—	
A.M. Cursor Drive	Z3194
A.M. Tuning Gang Drive	Z9528
F.M. Drive	Z9528
Ferrite-Rod Aerial Control Assembly:—	
Aerial Fixing Clip	45907
Aerial Fixing Plug	Z17224
Aerial Mounting Drum	Y17046
Aerial Drum Fixing Clip	45906
Cable Assembly	Y17052
Control Knob	Z17008
Control Knob Clip	37282
F.M. Tuner Drive Assembly	Z17223
Neon Indicator Lamp Assembly	Z17228/2
Pilot Lamp Holder	Z13308
Pilot Lamp Holder Grommet	33655
Scale	Y30003
Scale Reflector	X17040

MODIFICATIONS