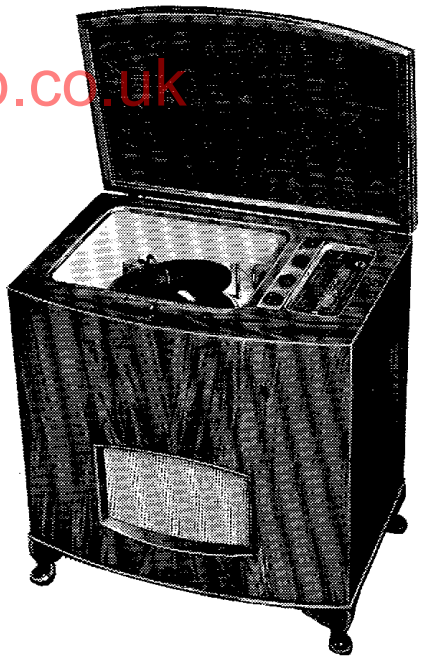
Issue 2. Nov., 1955

SERVICE SHEET FOR

FenMan I RG



CIRCUIT ANALYSIS A.M.

Mains Consumption, Gram. 45 watts, Gram Motor approx. 17 watts additional.
Mains Consumption, F.M. 47 watts. Smoothed H.T. F.M. 212 volts.
Mains Consumption, A.M. 45 watts. Smoothed H.T. A.M. 220 volts.
A.F. Output 3 watts.

	Valve	Mullard	Ea	Ia	Es	Is	Osc. Ea	Osc. Ia	Ek	Ik
V1	Not used	ECC85	—	—	—	—	—	—	—	—
V2	Frequency Changer	ECH81	215	1·25	85	3·2	112	4·0	3·2	8·45
V3	I.F. Amplifier	EF85	198	9·5	130	1·7	—	—	4·1	11·2
V4	Det. and A.F. Amp.	EABC80	104	0·5	—	—	—	—	1·3	0·5
V5	Output	EL84	246	40	220	4·2	—	—	7·2	44·2
V6	Tuning Indicator	EM34	220 v. Target						1·8	1·9
V7	Rectifier	EZ80	Anode to Anode 516 v. A.C.						262	66·25

Note.—All measurements taken on M.W. or F.M. with gang fully meshed. Mains input 210 volts into 200–220 v. tap. Measurements taken with an Avometer Model 8 instrument which has a resistance of 20,000 ohms per volt.

CIRCUIT ANALYSIS F.M.

	Valve	Mullard	Ea	Ia	Es	Is	V1 F.M. Osc./Mixer V2 A.F. Amp. Ea	V1 F.M. Osc./Mixer V2 A.F. Amp. Ia	Ek	Ik
V1	R.F. Amp. and Osc./Mixer	ECC85	55	3·9	—	—	106	3·3	—	7·2
V2	1st I.F. Amp. and A.F. Amp.	ECH81	205	2·0	78	2·5	83	1·8	2·8	6·3
V3	2nd I.F. Amp.	EF85	192	8·7	126	1·7	—	—	3·9	10·4
V4	Det. and A.F. Amp.	EABC80	89	0·3	—	—	—	—	1·2	0·3
V5	Output	EL84	245	38	212	4·0	—	—	7·0	42
V6	Tuning Indicator	EM34	212 v. Target						1·75	1·8
V7	Rectifier	EZ80	Anode to Anode 516 v. A.C.						260	68·0

INDUCTANCES

	Specification	Ref.	Fig.	No.
L1	F.M. Aerial Matching Coil			781560
L2	F.M. Aerial Coil	F.M.11	2 & 3	781500
L3	H.T. Choke		3	790417
L4	F.M. R.F. Coil	F.M.12	3	781501
L5	L.T. Choke		3	790416
L6	F.M. Osc. Coil	F.M.13	3	781502
L7	L.W. Aerial Coil	L.W.10	3	780571
L8	M.W. Aerial Coil	M.W.22	3	781186
L9	L.W./M.W. Osc. Coil	M.W.23	3	781187

TRANSFORMERS

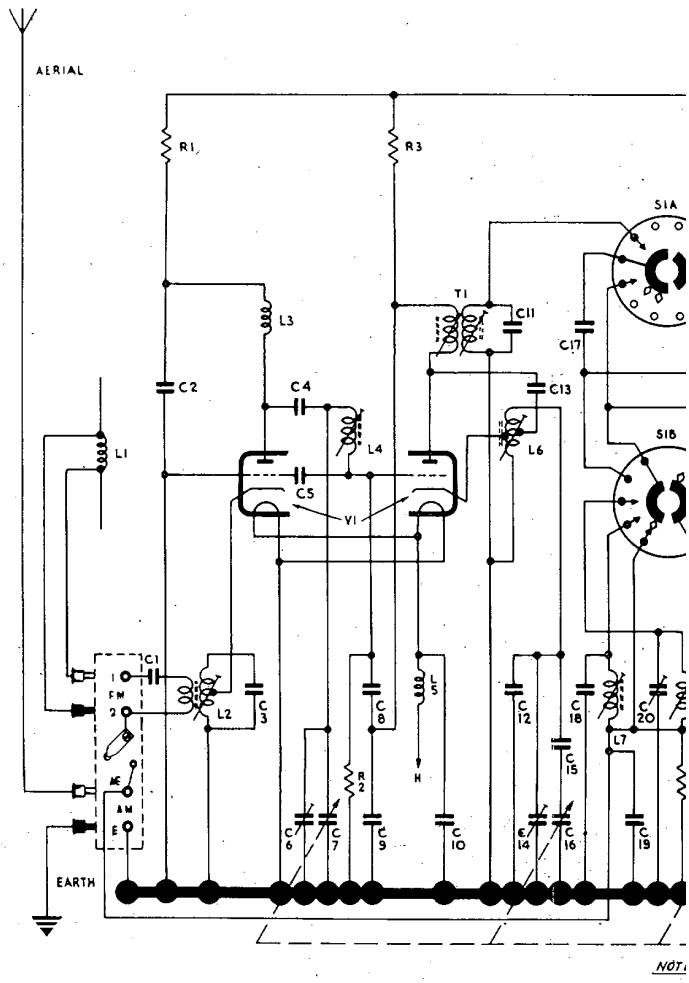
	Specification	Fig.	No.
T1	I.F. Transformer. F.M.T.4	2	771354
T2	I.F. Transformer. A.M.	2	771350
T3	I.F. Transformer. F.M.T.2	2	771352
T4	I.F. Trans. A.M. Prim. 10·0 Ω; Sec. 10·8 Ω	2	770369/A
T5	Ratio Det. Transformer	2	771365
T6	Output Trans. Prim. 450 Ω; Sec. ——	2	077070
T7	Mains Trans. Prim. Start to 225–250 v. Tap. 30·5 Ω; Sec. 318 Ω–307 Ω	2 & 3	077015

SWITCHES, LAMPS, ETC.

	Specification	Fig.	No.
S1A	Front Bank 2 Aerial Section	3	083037
S1B	Rear Bank 2 Aerial Section		
S1C	Front Bank 1 Osc. Section		
S1D	Rear Bank 1 Osc. Section		
	Wavechange–Gram. Switch 4 position		
S2	INT./EXT. L.S. Switch	1	706036
S3	Gram. Motor Switch	1	
S4	Mains ON/OFF Switch (on Tone Control)	3	810311
LP1	Dial Lamp 6·5 V. 0·3 Amp.	2	700494
LP2	Dial Lamp 6·5 V. 0·3 Amp.	2	700494
LS	Loudspeaker 8 inch P.M.	1	850141

MISCELLANEOUS

Item	Part No.
Cabinet	063031
Card Back Assembly	073195
Aerial Socket Plate Assembly	073193
L.S. Control Panel	706036
L.S. Control Plug	705884
Gramophone Unit	712264
Scale	070449
Knob with spot	048093
Knob plain	055180
Knob Spring	700900

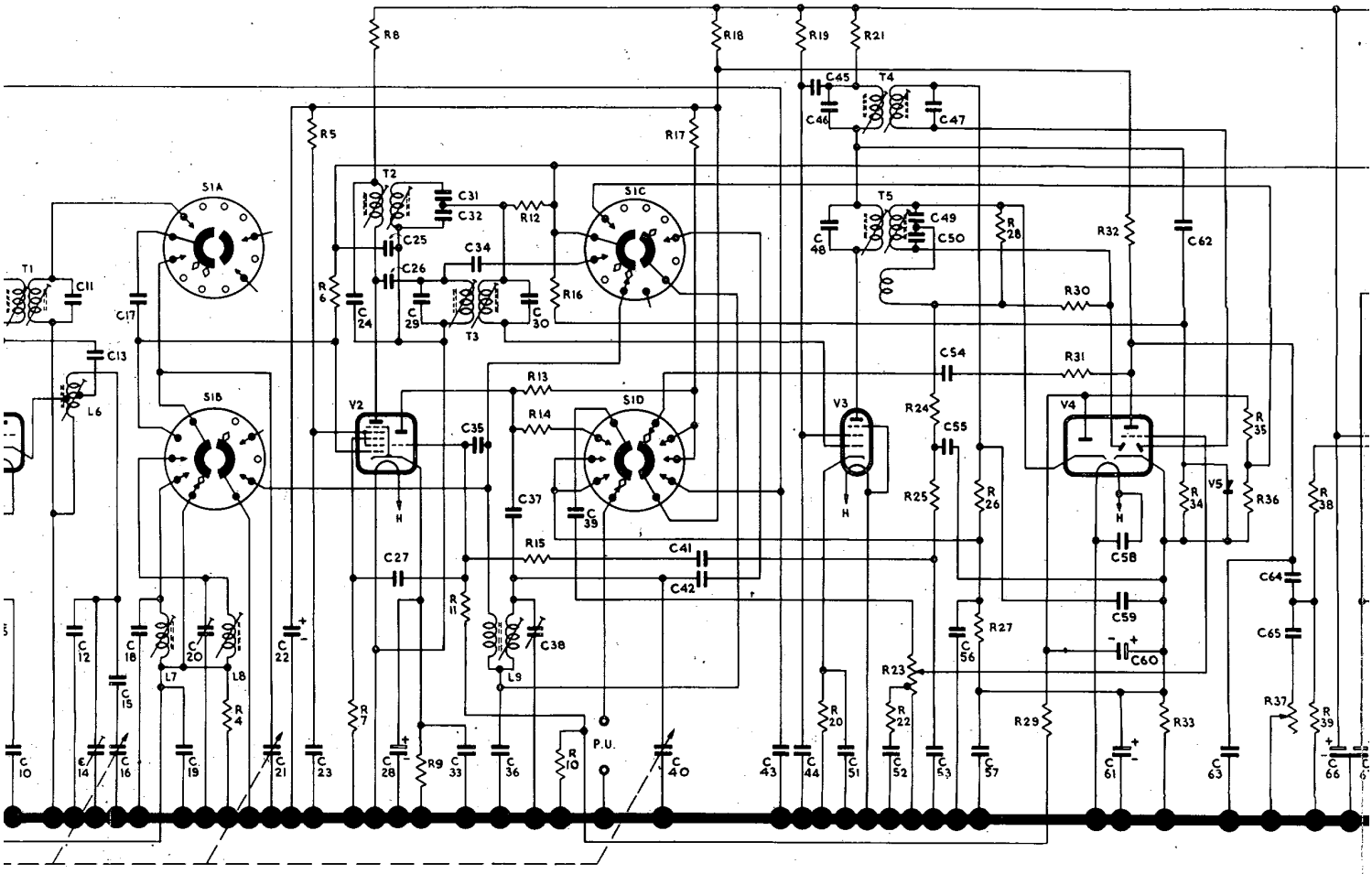


circuit diagram of the Pye FenMan I RG

Note.—* Integral part of I.F. Transformer.

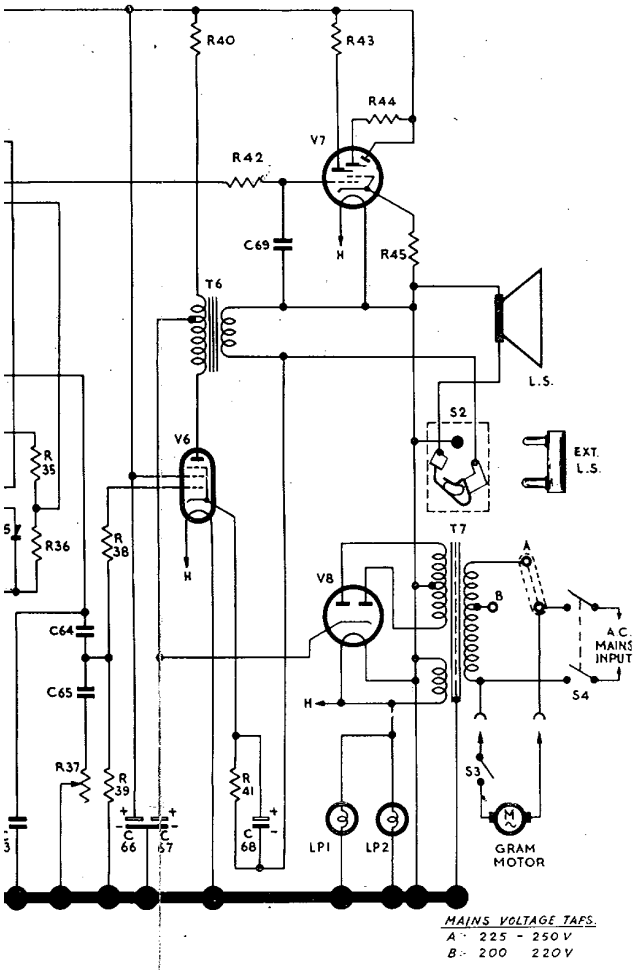
CONDENSERS

	Specification	Volts	±	Fig.	No.		
C1	22 pF Ceramic		20%	2	666802	C24	0·01 μF Tubu
C2	470 pF Mica		20%	3	665730	C25	0·04 μF Tubu
C3	15 pF Mica		5%	2	664712	C26	100 pF Mica
C4	22 pF Ceramic		20%	3	666802	C27	100 pF Cera
C5	30 pF Mica		5%	3	666406	C28	25 μF Electr
C6	3–30 pF Trimmer			3	800110	C29*	4·7 pF Mica
C7	17 pF Swing Gang Condenser F.M.			2	800351	C30*	15 pF Mica
C8	30 pF Mica		5%	3	666406	C31	150 pF Mica
C9	150 pF Mica		2%	3	664130	C32	270 pF Mica
C10	0·002 μF Tubular	350		3	669093	C33	0·04 μF Tubu
C11*	10 pF Mica		5%	2	665536	C34	100 pF Cera
C12	4·7 pF Ceramic N750			3	650737	C35	100 pF Cera
C13	22 pF Mica		5%	3	664724	C36	360 pF Mica
C14	3–30 pF Trimmer			3	800110	C37	100 pF Cera
C15	56 pF Mica		2%	3	664064	C38	3–50 pF Trim
C16	17 pF Swing Gang Condenser F.M.			2	800351	C39	0·01 μF Tub
C17	100 pF Ceramic		20%	3	666806	C40	528 pF Swin
C18	150 pF Mica		2%	3	664130	C41	0·05 μF Tub
C19	2,700 pF Mica		5%	3	663407	C42	390 pF Mica
C20	3–50 pF Trimmer			3	800076	C43	100 pF Cera
C21	528 pF Swing Gang Condenser A.M.			2	800351	C44	0·002 μF Tu
C22	8 μF Electrolytic	250		3	667663	C45	0·01 μF Tub
C23	0·01 μF Tubular	350		3	669219	C46*	100 pF Mica

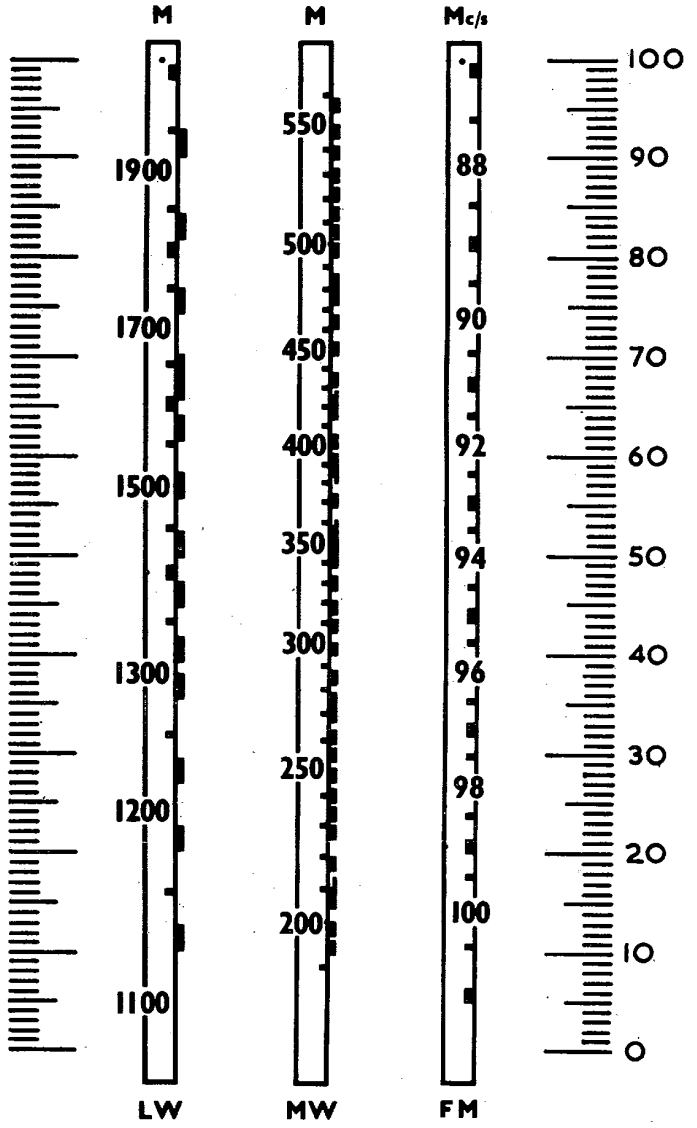


NOTE :- THE WAVECHANGE SWITCH VIEWED FROM FRONT IS SHOWN IN FULLY ANTI-CLOCKWISE POSITION, I.E. IN "GRAM" POSITION.

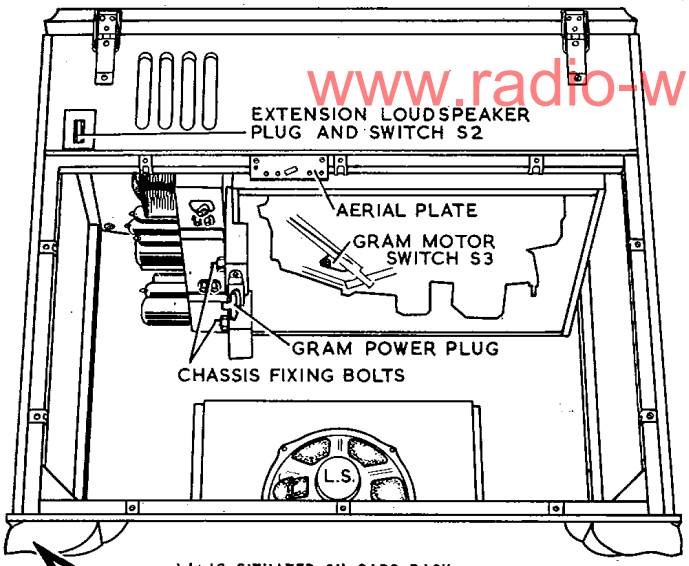
No.	CONDENSERS (cont'd)					No.	CONDENSERS (cont'd)					
		Specification	Volts	±	Fig.			Specification	Volts	±	Fig.	No.
66802	C24	0·01 μF Tubular	350		3	669219	C47*	100 pF Mica		2%	2	666776	R1
65730	C25	0·04 μF Tubular	150		3	669106	C48*	10 pF Mica		5%	2	665536	R2
64712	C26	100 pF Mica		2%	3	664100	C49*	68 pF Mica		2%	2	664080	R3
66802	C27	100 pF Ceramic		20%	3	666806	C50*	68 pF Mica		2%	2	664080	R4
66406	C28	25 μF Electrolytic	12		3	667662	C51	0·04 μF Tubular	150		3	669106	R5
00110	C29*	4·7 pF Mica		½ pF	2	665537	C52	0·02 μF Tubular	350		3	669261	R6
00351	C30*	15 pF Mica		5%	2	665525	C53	220 pF Mica		20%	3	665710	R7
66406	C31	150 pF Mica		2%	3	664130	C54	0·02 μF Tubular	350		3	669261	R8
64130	C32	270 pF Mica		2%	3	664190	C55	330 pF Mica		20%	3	665720	R9
69093	C33	0·04 μF Tubular	150		3	669106	C56	220 pF Mica		20%	3	665710	R10
65536	C34	100 pF Ceramic		20%	3	666806	C57	0·01 μF Tubular	350		3	669219	R11
50737	C35	100 pF Ceramic		20%	3	666806	C58	0·002 μF Tubular	350		3	669216	R12
64724	C36	360 pF Mica		2%	3	664222	C59	100 pF Ceramic		20%	3	666806	R13
00110	C37	100 pF Ceramic		20%	3	666806	C60	4 μF Electrolytic	150		3	667221	R14
64064	C38	3–50 pF Trimmer			3	800076	C61	25 μF Electrolytic	12		3	667662	R15
00351	C39	0·01 μF Tubular	350		3	669219	C62	10 pF Mica		20%	3	665650	R16
66806	C40	528 pF Swing Gang Condenser A.M.			2	800351	C63	100 pF Ceramic		20%	3	666806	R17
64130	C41	0·05 μF Tubular	350		3	668599	C64	0·005 μF Tubular	500		3	668588	R18
63407	C42	390 pF Mica		2%	3	664232	C65	0·005μF Tubular	500		3	668588	R19
00076	C43	100 pF Ceramic		20%	3	666806	C66	32 μF+ } Electrolytic					R20
00351	C44	0·002 μF Tubular	350		3	669216	C67	32 μF+ } Electrolytic	350		2	667504	R21
67663	C45	0·01 μF Tubular	350		3	669219	C68	50 μF Electrolytic	12		3	667688	R22
69219	C46*	100 pF Mica		2%	2	666776	C69	0·01 μF Tubular	350		3	669219	R23



CALIBRATION CHART



No.		RESISTORS Ohms	Watts	±	Fig.	No.		RESISTORS (cont'd) Ohms	Watts	±	Fig.	No.
666776	R1	27,000	¼	10%	3	670535	R24	47	¼	10%	3	670502
665536	R2	1 meg.	¼	20%	3	670410	R25	47,000	¼	10%	3	670538
664080	R3	15,000	¼	10%	3	670532	R26	220,000	¼	20%	3	670406
664080	R4	22,000	¼	20%	3	670400	R27	220,000	¼	20%	3	670406
669106	R5	33,000	¼	10%	3	670536	R28	33,000	¼	10%	3	670536
669261	R6	1 meg.	¼	20%	3	670410	R29	100,000	¼	20%	3	670404
665710	R7	47,000	¼	10%	3	670538	R20	33,000	¼	10%	3	670536
669261	R8	2,200	¼	10%	3	670522	R31	33,000	¼	10%	3	670536
665720	R9	390	¼	10%	3	670513	R32	220,000	¼	20%	3	670406
665710	R10	10,000	¼	20%	3	670398	R33	3,900	¼	10%	3	670525
669219	R11	100,000	¼	20%	3	670404	R34	1 meg.	¼	20%	3	670410
669216	R12	1 meg.	¼	20%	3	670410	R35	27,000	¼	10%	3	670535
666806	R13	22,000	¼	20%	3	670400	R36	27,000	¼	10%	3	670535
667221	R14	47,000	¼	20%	3	670402	R37	0·5 meg. Tone Control			3	810311
667662	R15	47,000	¼	20%	3	670402	R38	10,000	¼	20%	3	670398
665650	R16	1 meg.	¼	20%	3	670410	R39	470,000	¼	20%	3	670408
666806	R17	22,000	¼	20%	3	670400	R40	1,600	¼	5%	3	671836
668588.	R18	4,700	½	10%	3	670450	R41	180	¼	10%	3	670509
668588	R19	56,000	¼	10%	3	670539	R42	2·2 meg.	¼	20%	3	670412
667504	R20	390	¼	10%	3	670513	R43	1 meg.	¼	20%	2	670410
	R21	2,200	¼	10%	3	670522	R44	1 meg.	¼	20%	2	670410
667688	R22	47,000	¼	10%	3	670538	R45	1,000	¼	10%	2	670518
669219	R23	1 meg. Volume Control			3	810310						



L1 IS SITUATED ON CARD BACK

FIG. 1

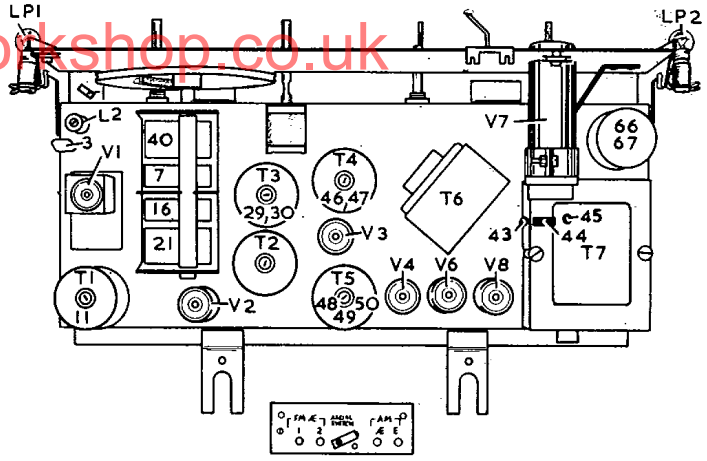
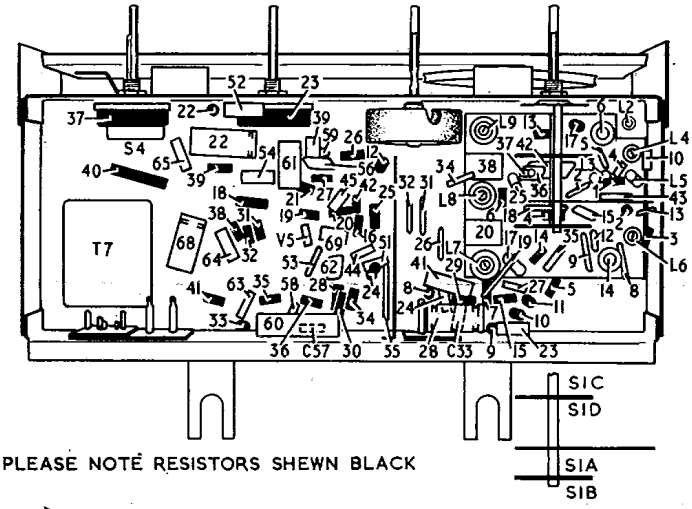


FIG. 2

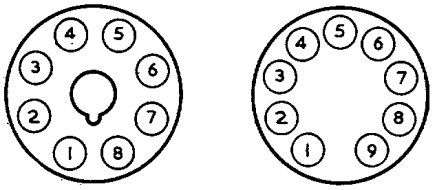


PLEASE NOTE RESISTORS SHEWN BLACK

FIG. 3

VALVE BASE CONNECTIONS

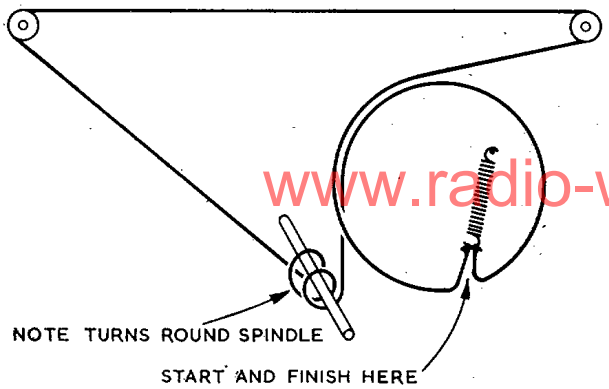
	1	2	3	4	5	6	7	8	9
V1	A2	G2	K2	H	H	A1	G1	K1	S
V2	G2,G4	G1	K,S	H	H	A H	G3	AT	GT
V3	K	G1	K	H	H	S	A	G2	G3
V4	A_{D3}	A_{D2}	K_{D2}	H	H	A_{D1}	K_T, K_{D1}, K_{D3}, S	G	AT
V6	IC	G1	K,G3	H	H	IC	A	IC	G2
V7	——	H	A1	G	T	A2	H	K	——
V8	A1	IC	K	H	H	IC	A2	IC	IC



VIEW LOOKING AT PINS

FIG. 4

THE DRIVE CORD SHOULD BE OF NYLON BRAIDED GLASS YARN LENGTH 44¼" BETWEEN CENTRES OF LOOPS.



DRIVE CORD VIEWED FROM FRONT OF CHASSIS WITH GANG FULLY CLOSED

FIG. 5

Notes

1. Care must be taken not to disturb the positions of wiring and components beneath the chassis.
2. The Special Flywheel Tuning needs no maintenance other than a very occasional drop of oil.
3. A 100 Division Trimming Scale is printed on the rear of the scale back plate for use when trimming the receiver outside the cabinet. With the Gang fully closed, one edge of the pointer carriage should line up with the 100 division; this will serve as an index for the scale.
   A Calibration Chart is printed adjoining the circuit. After the alignment has been carried out and the chassis refitted in the cabinet, the pointer should be lined up with the spots to be found at the top of the tracks.
4. External Speaker 2–4 ohms impedance.
5. Dial Lamps 6·5 v. 0·3 amp.
6. Make sure Mains Voltage Adjuster is in correct position to ensure (*a*) maximum valve and component life, and (*b*) full benefit of the Pye "FIDELITY" reproduction.

TRIMMIMG PROCEDURE A.M.

Apply signal as below	Set receiver controls to	Adjust in order for maximum output
(1) 470 kc/s between chassis and control grid of V2 via 0·01 μF condenser	Low frequency end of M.W. band	Iron dust cores of T4 and T2
(2) 600 kc/s (500 metres) between aerial and chassis via standard dummy aerial	M.W. 500 metres	Iron dust cores of L9 and L8
(3) As (2) but 1,500 kc/s (200 metres)	M.W. 200 metres	Trimmers C38 and C20
(4) Repeat (2) and (3) until tracking and calibration are correct.		
(5) As (2) but 214 kc/s (1,400 metres)	L.W. Tune to signal	Iron dust core of L7

Alignment of F.M. circuits

I.F. ALIGNMENT

The intermediate frequency is 10·7 Mc/s. and the circuits may be aligned by an A.M. signal generator with or without modulation or by an F.M. generator with a frequency deviation of 100 kc/s.

Measurement of output and circuit resonance may be obtained by using a high resistance D.C. voltmeter and a meter capable of measuring about 25 μA. An Avometer model 8 is suitable for both purposes.

Alternative methods of adjustment are given which require a meter for measuring the audio output of the receiver instead of the two D.C. meters.

1 Set wavechange switch to "F.M." and gang condenser to fully closed position.
2 Screw out cores of F.M., I.F.Ts, T1, T3 and T5. The upper (primary) cores should be about flush with formers and the lower ends of the secondary cores should be about $\frac{1}{4}$ in. in from base of formers.
3 Connect a high resistance D.C. voltmeter set to 10 v. range across the 4 μF condenser, C60, with negative terminal to diode anode and positive terminal to diode cathode (marked + on condenser).
4 Connect signal generator via 0·001 μF condenser to grid of V3 connection on T3. Set frequency to 10·7 Mc/s. unmodulated.
5 Adjust upper core of Ratio Detector Transformer, T5, for maximum D.C. volts reading on meter, reducing input signal during alignment to obtain a working level of approximately 5 v. Input level approximately 100 mV.
6 Connect signal generator to T1 secondary connection to switch.
7 Adjust upper and then lower cores of T3 for maximum D.C. voltage maintaining similar reading on meter as in 5. Input level approximately 10 mV.
8 Connect signal generator to input cathode of V1 R.F. amplifier (connection to L2 aerial coil).
9 Adjust lower and then upper cores of T1 for 5 v. D.C. reading on meter. Input level approximately 20 mV.
10 Connect two resistors of approximately 100 K ohms accurately matched to each other in series across 4 μF condenser C60 and remove D.C. voltmeter. Between the junction of these resistors and the junction of R24, R25 and C55 connect a D.C. meter with a full scale deflection of 50 to 100 μA with negative terminal connected to the junction of 100 K ohm resistors.
11 Adjust the lower core of T5 by screwing it inwards until the meter shows a reading in one direction which will increase to a maximum, drop to zero and then increase in a reverse direction. The correct point of alignment is when the meter reads zero between the two deflections.

Alternatively, if a high sensitivity meter is not available, the lower core of T5 may be adjusted by amplitude modulating the input signal 30% and aligning the circuit for minimum audio output into a loudspeaker with an output meter across it. This method is not quite as accurate as the previous one.

Note.—It is important that the leads from the signal generator do not come in close proximity to those connected to the D.C. meter.

The adjustments in paragraphs 5, 7 and 9 may be carried out using a frequency modulated input signal of 10·7 Mc/s ± 100 kc/s. deviation and tuning the transformers in order as above for maximum audio output from the receiver instead of observing the D.C. voltage appearing across C60.

R.F. ALIGNMENT

R.F. alignment may be carried out by using either an unmodulated signal input and tuning for maximum D.C. volts across C60 or a frequency modulated signal with ± 100 kc/s. deviation and tuning the circuits for maximum audio output from the receiver.

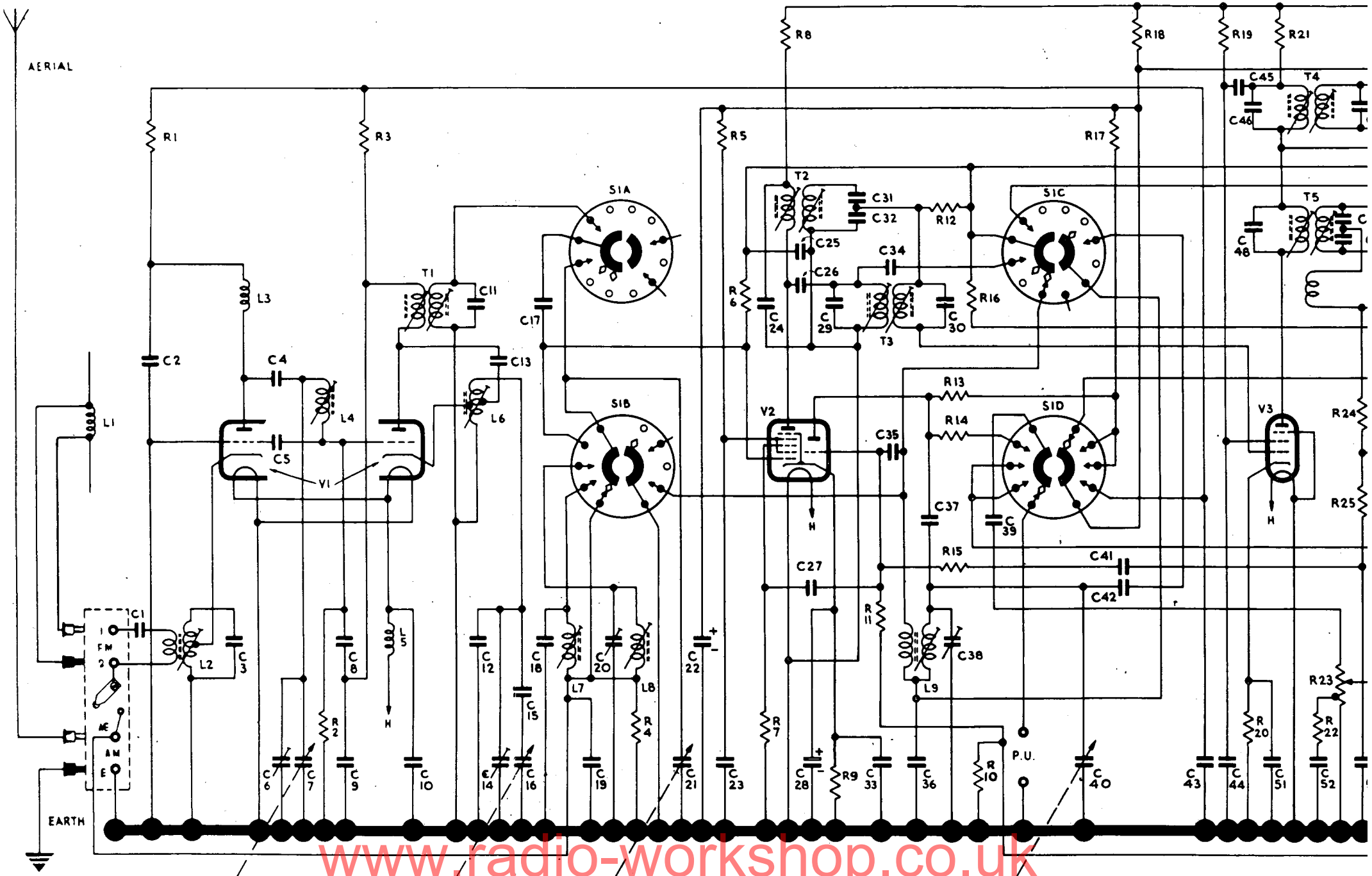
1 Set wavechange switch to "F.M." position.
2 Set oscillator trimmer, C14 to minimum capacity and R.F. amplifier trimmer, C6, about half-way. Set the cores of oscillator coil, L6 and R.F. coil, L4, flush with tops of formers.
3 Apply signal from generator (75 ohms source impedance) to F.M. aerial sockets, noting that inner conductor of coaxial generator lead must be connected to the F.M. Æ:1 socket.
4 With input signal of 99 Mc/s., tune receiver to correct position with the aid of calibration chart and adjust C14 until output is observed, and signal is correctly tuned.
5 Adjust C6 for maximum output.
6 Inject signal of 89 Mc/s., tune receiver to correct calibration point and adjust L6 until output is observed and signal correctly tuned.
7 Adjust L4 for maximum output.
8 Repeat 4 and 6 until calibration is correct.
9 Repeat 5 and 7 until circuit tracking is correct.
10 Inject signal of 89 Mc/s. and adjust L2 for maximum output.
11 Inject a signal of 10·7 Mc/s. into input cathode of V1 (see I.F. alignment, paragraph 8) and re-align T1 as described in paragraph 9 of I.F. Alignment.

TO REMOVE CHASSIS

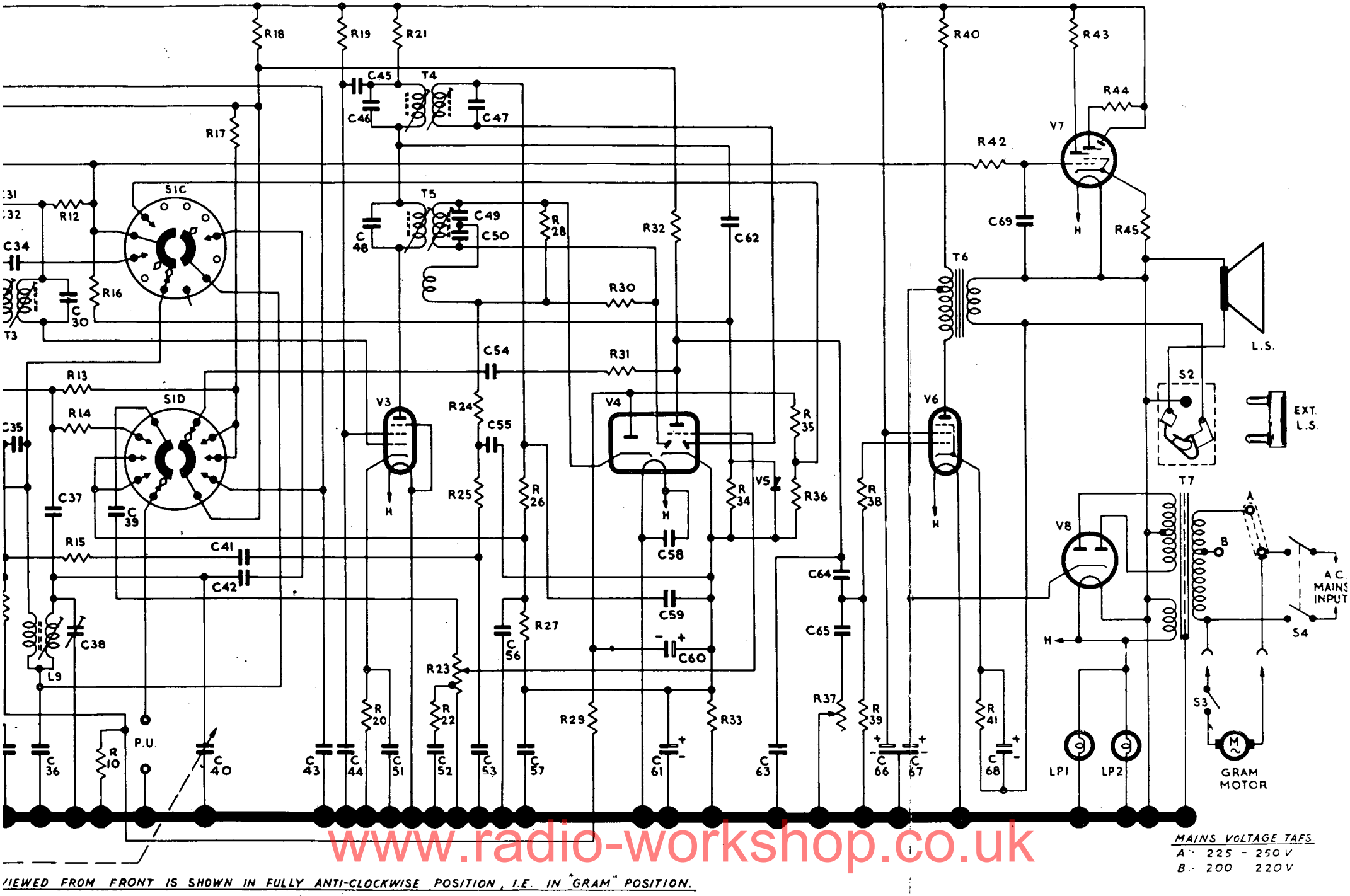
1 Remove Mains Plug from wall socket. *2* Remove back of set. *3* Pull off knobs. *4* Withdraw all plugs from chassis. *5* Detach Mains Lead from cleat. *6* Disconnect gram. power plug. *7* Remove chassis fixing nuts. *8* Move chassis to the left to clear fixing screws. *9* Withdraw chassis.

FITTING A NEW TUNING SCALE

1 Remove chassis. *2* Place scale plate centrally in cabinet aperture and screw the clips tightly in position. *3* Replace chassis in cabinet and reconnect all plugs in their original positions. *4* Adjust gang condenser to maximum position and line up the pointer to the spots to be found at the top of the tracks.



NOTE - THE WAVECHANGE SWITCH VIEWED FROM FRONT IS SHOWN IN FULLY ANTI-CLOCKWISE POSITIO



MAINS VOLTAGE TAPS
A - 225 - 250 V
B - 200 - 220 V

VIEWED FROM FRONT IS SHOWN IN FULLY ANTI-CLOCKWISE POSITION, I.E. IN "GRAM" POSITION.