E R T SERVICE CHART 1721

Philips 'Family' recorder is a single-speed four-track machine with recording facilities which include speaker monitoring and a meter-type recording level indicator

PHILIPS N4307

TAPE RECORDER

Additional copies of this chart 1s. 6d. including postage. Payment with order please to E R T, Dorset House, Stamford Street, London, SE1.

FOUR-TRACK mains operated tape recorder with facility for simultaneous playback of recordings on separate tracks. Other facilities include use as microphone, radio or pickup amplifier.

Mains. 110, 127, 200-250V 50c/s AC, adaptable to 60c/s.

Consumption. About 40W.

Transistors. TR1 BC109B/BC149B; TR2 BC147B; TR3 BC147A; TR4 BC147A; TR5 AC187/01; TR6 AC188/01; TR7 AC187/01; TR8 HAM-1/AC125; TR9 BC107A.

Diodes. D1, D2 BY126 or OF160.

Thermistor. R576 NTC stabilising.

Inputs. SKT 1: microphone pins 1/4 and 2, 0.2mV into 2K; radio (diode) pins 3, 5 and 2, 100mV into 1M; pickup pins 3, 5 and 2, 100mV into 1M.

Outputs. SKT 1: external amplifier pins 3, 5 and 2, 1V across 20K; SKT 2 external speaker, 4 or 8ohm impedance.

Frequency range. 60-14,000 c/s.

Signal/noise ratio. Better than 45dB.

Wow and flutter. ±0.25 per cent.

Tracks. Four.

Tape speed. 3¾in. per second.

Maximum spool diameter. 7in.

Playing time. Over six hours.

Fast wind time. 3mins for 1,200ft. of tape.

Record level meter. Moving coil type.

Microphone. Moving coil type N8207.

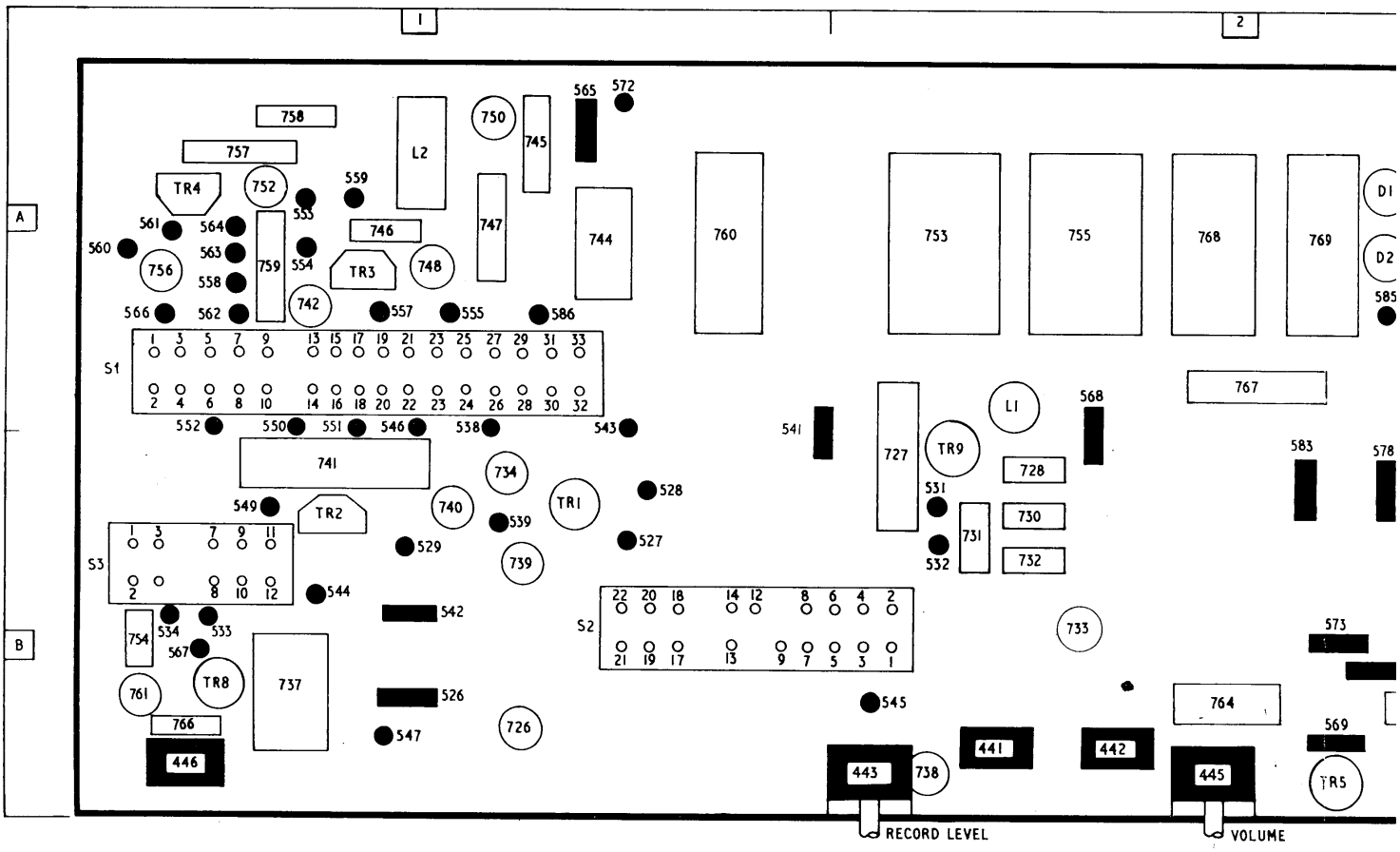
Fuse. FS1 thermal type.

Output. 2W.

Speaker. 6×4in. elliptical, 8ohm impedance.

Weight. 17¾lb.

Dimensions. 16½×11¾×5⅞in.



Layout of components on main circuit board as seen from component side. Resistors are shown in solid black, capacitors in outline onl

DISMANTLING

Case. Remove lid, pull off three control knobs and undo four ornamental screws. Take off cover plate and disconnect speaker leads and case screening lead (these may have slide-on connectors but in some cases are soldered).

Lift out chassis. This can be operated out of the cabinet, providing care is taken to keep chassis level and speaker of correct impedance is connected.

Printed panel. Put track selector switch in 'PAR' position and undo four screws holding printed panel frame to chassis. Printed panel, on its frame, can be removed to extent of connecting leads. When refitting ensure that switch operating levers are correctly engaged with switch sliders.

SERVICE NOTES

Output transistor bias. Adjust R448 to get quiescent current through output transistors of 5-7mA, with no signal input and R445 turned to minimum. This can be measured as 25mV across either R578/R581 or R579/R582.

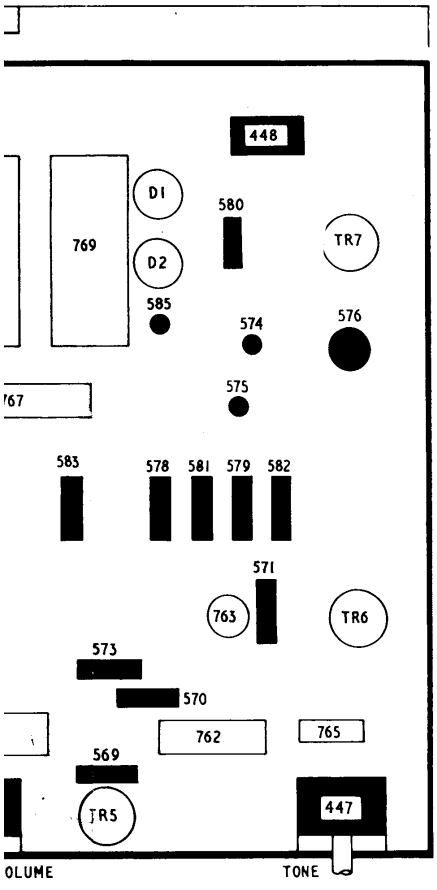
Playback sensitivity. Substitute an 8ohm 3W resistor for L3 and put speaker impedance switch S4 in 8ohm position. Depress Play key and apply 1kc/s signal at 28mV level via a 22K resistor to MP1 for tracks 1-4, and MP2 for tracks 2-3. Turn volume and tone controls fully clockwise and check with AC millivoltmeter that voltage across 8ohm resistor is between 470 and 800mV. With volume and tone controls fully anticlockwise check that voltage between tags 3 and 2 (5 and 2) on SKT 1 is 45-80mV.

Frequency response. With 8ohm resistor in place of speaker L3, turn volume and tone controls fully clockwise. Apply 1kc/s signal in turn to MP1 and MP2 via 22Kohm resistor for tracks 1-4 and 2-3 respectively. Adjust signal level to give 244mV measured with AC millivoltmeter across 8ohm resistor. Voltages should be within 2dB of 975mV at 125c/s, 244mV at 1kc/s, 153mV at 6.3kc/s, 136mV at 12.5 kc/s.

Apply 1kc/s signal via 22Kohm resistor to MP1 and MP2 in turn. With volume and tone controls turned fully anticlockwise adjust signal level to give a voltage between tags 2 and 3 (5 and 2) of SKT 1 of 77.5mV. Voltages should be within 2dB of 385mV at 125c/s, 77.5mV at 1kc/s, 52mV at 6.3kc/s and 47mV at 12.5kc/s.

Record sensitivity. Set track selector switch to 1-4 and depress Record key only. Apply 1kc/s signal at 85mV direct to pin 3 SKT 1, turn record level control R443 to maximum and volume control R445 to minimum. The voltage measured at MP1 should be 2.2-3.8mV. Repeat in track position 2-3, measuring voltage at MP2.

Record bias. Switch to Record, set track selector switch to 1-4 position and adjust R441 so that 18mV is measured at



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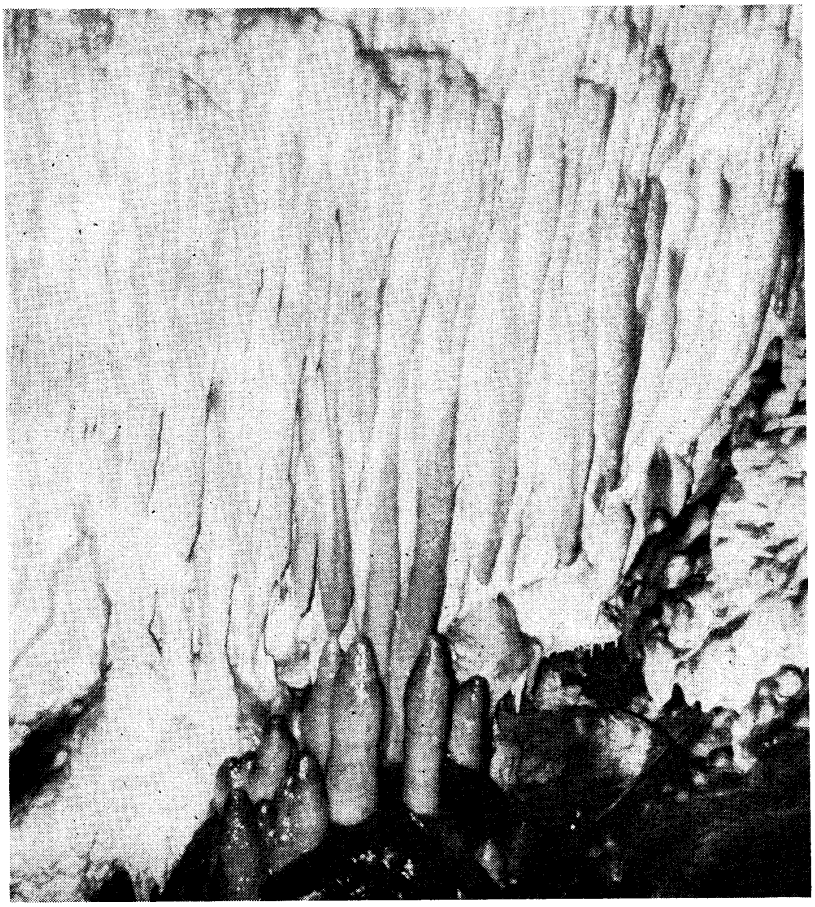


MP1. Obtain same reading at MP2 in track position 2-3 by adjusting R442. Check overall frequency response and if necessary adjust bias current to obtain response required.

Reducing bias current will increase treble response; increasing bias current will reduce treble response. Limits for bias current are 10-25mV. If after adjustment bias current is outside these limits, a defect in record/playback head or in the amplifier circuitry is indicated.

Meter calibration. Set track selector switch to 1-4 (2-3), turn record level control R443 to maximum and depress Record key only. Apply 1kc/s signal to pin 3 SKT 1 and adjust level so that 3mV is measured at MP1 (MP2).

Adjust R446 so that pointer of modulation level meter registers on the division between red and black sectors of scale. Remove signal input and switch to record; meter pointer should deflect up to 1mm because of bias current.

Overall response. Depress Record key only. Apply 1kc/s via 22Kohm resistor to pin 1SKT 1, adjusting level so that voltage measured at MP1 (MP2) is 0.3mV. Maintain this reading, switch to Record and record some frequencies between 60c/s and 14kc/s.

When played back output voltages of recorded frequencies, measured between tags 3 and 2 (5 and 2) of SKT 1, should not differ by more than 6dB.

Record head height. With recorder in Stop position remove head screening cover. Use adjusting screws on head mounting plate to position face parallel to tape so that tape passes smoothly through jaws of head tape guide. Do this by releasing tension spring from pressure pad pivot bracket, feeding reel of new DP tape through tape guides each side of head and pushing pressure roller towards head by hand.

Check that tape does not foul jaws of head tape guide (pressure pad should not touch tape during this operation).

Note. Head tape guide is accurately manufactured and if it becomes misaligned, damaged or excessively worn the record/replay head should be replaced.

Head azimuth. When head height has been adjusted as above, core gap must be adjusted perpendicularly using a full tape width azimuth test recording of 8kc/s. A four track recording made on another machine is *not* suitable.

With head screening cover in position, place test tape in machine and switch to Playback. Connect AC millivoltmeter to pins 3 (or 5) and 2 of SKT 1 and select track 1. Adjust spring loaded screw at right hand end of head mounting plate (viewed on face) for maximum voltage, and note reading.

Switch to track 3 and again adjust screw for maximum voltage, noting reading. Switch back to track 1 and, without further adjustment note reading again. If it is within 2dB of first reading, adjustment is in order.

If not readjust screw again for maximum and switch to track 3 and note new reading. If this is within 2dB of first reading on track 3, adjustment is acceptable. If not head is faulty and should be replaced.

Finally check that tape does not foul jaws of head tape guide, as described above.

Sensitivity checks. Set track selector switch to position 1-4. Switch to Playback and apply 1kc/s signal at 30mV to MP1 via a 22Kohm resistor. Using an AC millivoltmeter, following voltages should be obtained ±2dB:

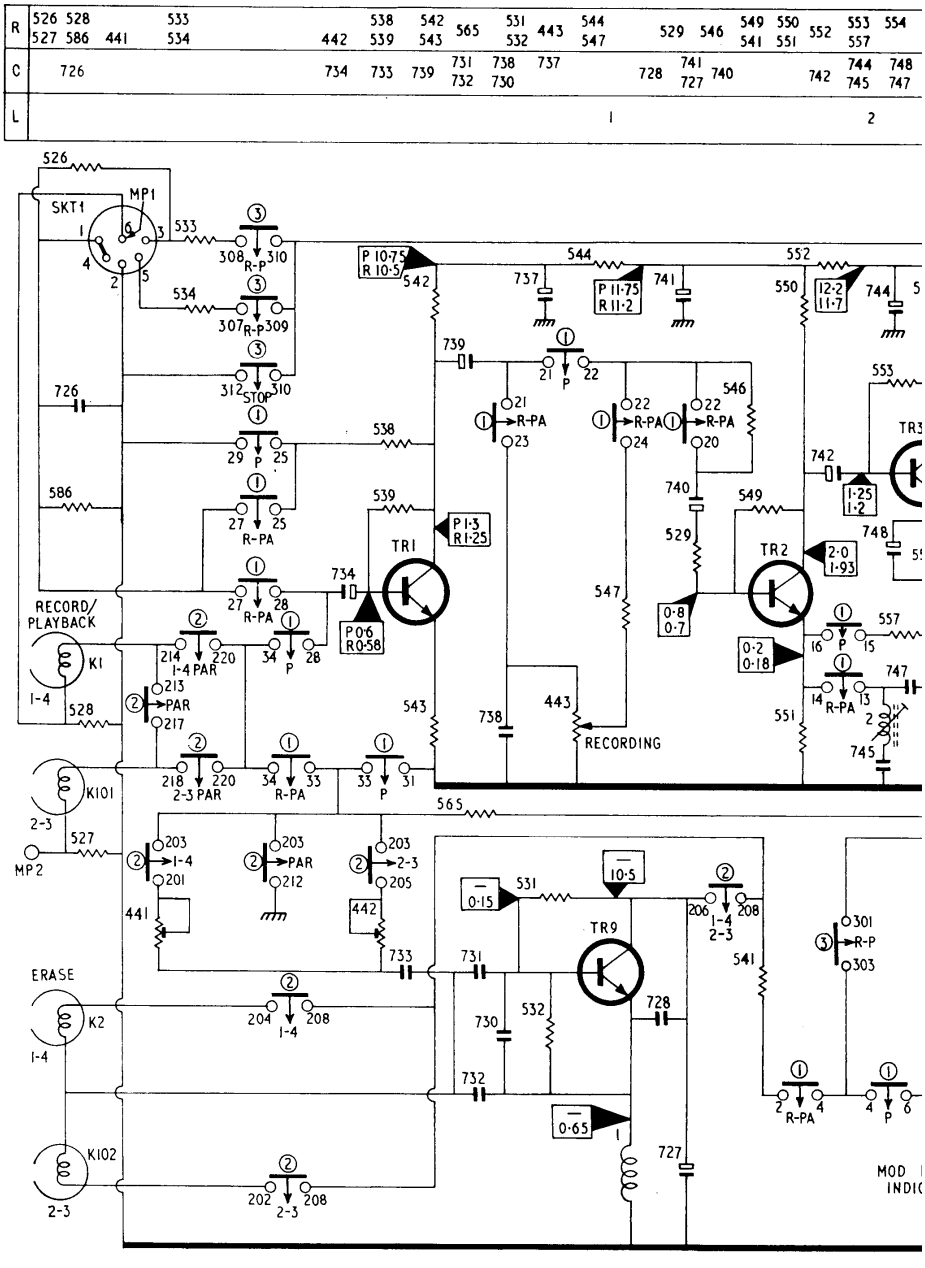
Stage	Base mV	Collector mV
TR1	0.2	5.0
TR2	1.5	3.0
TR3	2.5	22
TR4	22	45
TR5	1.5	1V
TR6	1V	—
TR7	1V	—
LS	680	—

Depress record key only and apply 1kc/s signal at 70mV to pin 1 SKT 1 via 1Mohm resistor. Following voltages ±2dB should be obtained:

Stage	Base mV	Collector mV
TR1	0.25	3.5
TR2	3.5	3.5
TR3	4.0	120
TR4	120	1.2V
TR9*	7.5V	6.2V

*Switch to record for reading at base and collector of TR9

CAPACITORS					
C726	4K7pF	B1	C744	220mF	A1
C727	68mF	A/B2	C745	150KpF	A1
C728	68KpF	B2	C746	68KpF	A1
C730	68KpF	B2	C747	220KpF	A1
C731	10KpF	B2	C748	33mF	A1
C732	33KpF	B2	C750	680pF	A1
C733	1KpF	B2	C752	2·5mF	A1
C734	2·5mF	B1	C753	680mF	A2
C737	100mF	B1	C754	68KpF	B1
C738	680pF	B2	C755	680mF	A2
C739	640KpF	B1	C756	2·5mF	A1
C740	2·5mF	B1	C757	120KpF	A1
C741	220mF	B1	C758	22KpF	A1
C742	2·5mf	A1	C759	120KpF	A1
			C760	330mF	A1



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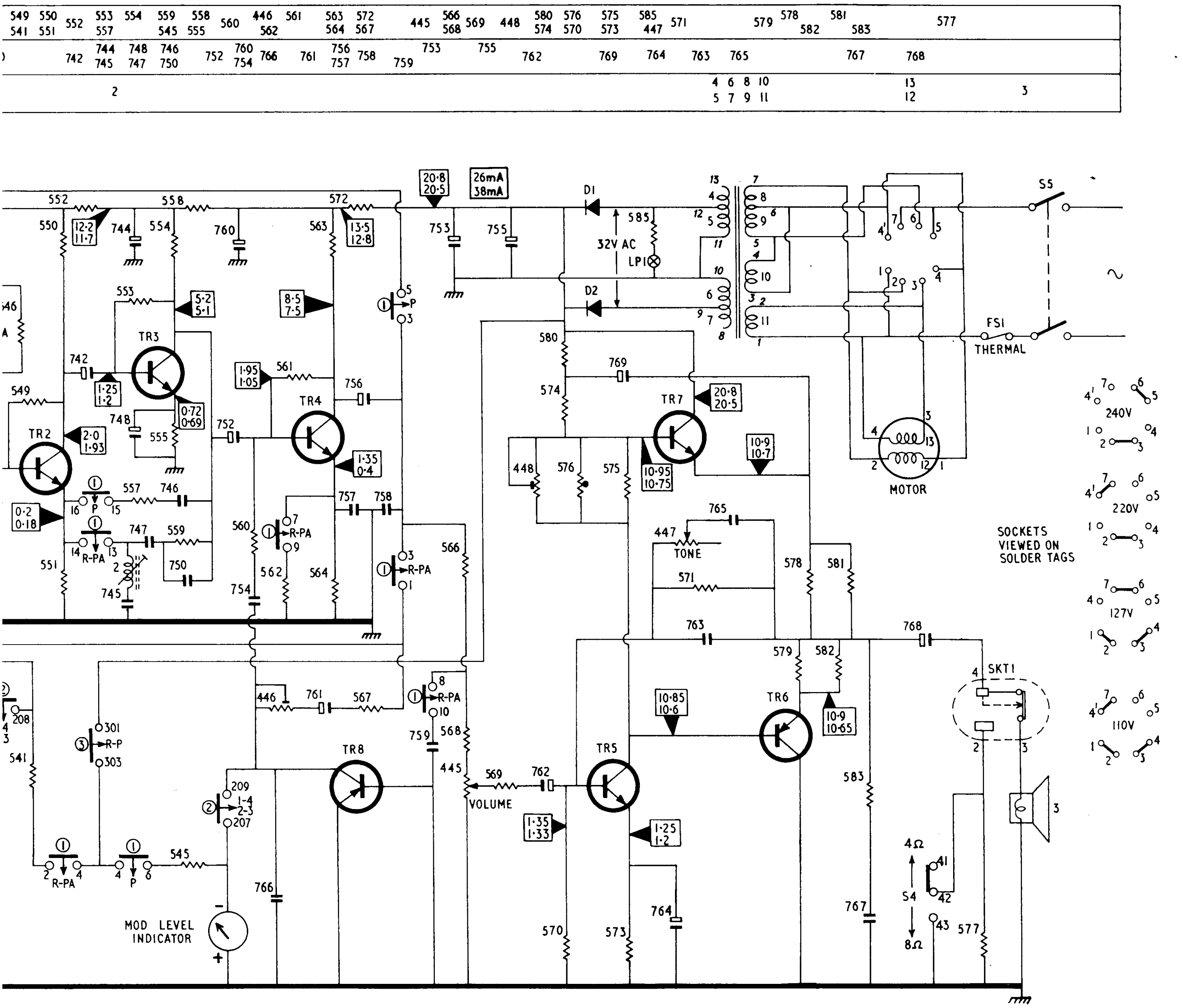
220mF	A1	C761	2·5mF	B1	R443	10K Log	B2	R541	560	A/B1	R558	470	A1	R573	68	B2
150KpF	A1	C762	2·5mF	B2	R445	2K2 Log	B2	R542	56K	B1	R559	6K8	A1	R574	390	A2
68KpF	A1	C763	820pF	B2	R446	1K	B1	R543	47	A1	R560	2K2/4K7	A1	R575	56	A2
220KpF	A1	C764	150mF	B2	R447	47K Log	B1	R544	4K7	B1	R561	120K	A1	R576	NTC	A2
33mF	A1	C765	18KpF	B2	R448	100	A2	R545	120K	B2	R562	39	A1	R577	2·2	—
680pF	A1	C766	15KpF	B1	R526	1M	B1	R546	680K	A1	R563	390	A1	R578	8·2	B2
2·5mF	A1	C767	220KpF	A2	R527	22	B1	R547	6K8	B1	R564	100/82	A1	R579	8·2	B2
680mF	A2	C768	680mF	A2	R528	22	B1	R549	470K	B1	R565	8K2	A1	R580	150	A2
68KpF	B1	C769	330mF	A2	R529	15K	B1	R550	12K/39K	A1	R566	390	A1	R581	8·2	B2
680mF	A2				R531	22K	B1	R551	220	A1	R567	1K2	B1	R582	8·2	B2
2·5mF	A1				R532	1K2	B1	R552	470	A1	R568	150	A2	R583	15	B2
120KpF	A1	**RESISTORS**			R533	18K	B1	R553	470K	A1	R569	150	B2	R585	270	A2
22KpF	A1				R534	18K	B1	R554	4K7	A1	R570	2K7	B2	R586	3K9	A1
120KpF	A1	R441	22K	B2	R538	150K	A1	R555	470	A1	R571	18K	B1			
330mF	A1	R442	22K	B2	R539	1M	B1	R557	1K5	A1	R572	470	A1			

Circuit diagram showing voltages taken with respect to chassis using 100Kohm/volt meter with 240V mains input to 240V tap. Sockets shown as viewed on solder tags



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