

# Marconiphone 4256

# 3043

## Two track cassette recorder

### Introduction

Mains operated cassette tape recorder in a teak veneered case.

The Marconiphone model 4256 employs nine transistors in a circuit that features manual or automatic record level control, selected by switch.

An output of 3W speech and music at 5 per cent distortion is handled by a 15Ω elliptical loudspeaker which is connected in series with a switched socket. This socket, used with a two pin plug, gives a choice of two plug positions. One position is for use with an earphone of 1kΩ-2kΩ impedance (1.2V) for monitoring recording. The other position is for either an external loudspeaker or earphone – of not less than 8Ω impedance – for playback with internal loudspeaker muted.

The tape deck employed is the BRC DG210 which features piano key controls and an eject button for ease of loading or changing cassettes.

### Voltage analysis

Voltages given in the transistor table were obtained from data supplied by the manufacturers. They were measured with a 20 000Ω/V meter and are with respect to the negative chassis line.

### Circuit description

**Playback**  
Signals from the record/play head are fed to the base of **TR1** via **S1** contacts 35 and 36, 15 and 14, and **C1**. The amplified signals at the collector of **TR1** are passed to the base of **TR2** via **C3**, **S1** contacts 11 and 12, **R9**, **S1** contacts 30 and 29, **R10** and **C4**. The output from **TR2** is further amplified by **TR3**, and part of the output appearing at **TR3** collector is fed via **C7** to the playback equalization circuits **R20**, **R21** and **C8**, and **R22**, **L3** and **C11** to the emitter of **TR2** via **S1** contacts 33 and 32.

Amplified signals from **TR3** are passed via **C12** and **R25** to the base of **TR4**. After further amplification, the signals are fed through **C14**, **S1** contacts 8 and

9, **R29**, **R31**, **S1** contacts 6 and 5, and **C17** to base of **TR5**, the audio driver. **C16-R30** provide tone adjustment. **TR5** drives the output pair, **TR6-TR7**, and the signals are passed to the loudspeaker via **S1** contacts 2 and 3, **C20** and **S4**. **R38** provides adjustment for symmetrical output.

### Record

Switch **S1** is switched to the 'Record' position and signals from the appropriate pins of Skt1 are fed via **S1** contacts 13 and 14, and **C1**, to the base of **TR1**. The output from **TR1** is fed via **C3** to **S1** contacts 11 and 10 and then by **R8** to **S2**. When **S2** is in the 'Manual' position, contacts 2 and 1 permit the record level to be manually controlled by **R9**.

Signals are fed via **S2** contacts 5 and 6, **S1** contacts 28 and 29, **R10** and **C4** to the base of **TR2**. When **S2** is switched to the 'Speech' or 'Music' positions, **R9** is taken out of circuit and the ARLC circuit (**W1**, **TR8**) is introduced at junction of contacts 3 and 7. The operation of this circuit is described under 'Automatic Record Level Control'.

Amplified signals from **TR2** and **TR3** are fed via **C7**, **S1** contacts 26 and 25 to the record equalization circuits **R23** and **C9**, **R24** and **C10**, **L3** and **C11** with feedback into **TR2** emitter via **S1** contacts 31 and 32. **C12** and **R25** feed signals to the base of **TR4**; **C14** passes the amplified signals via **S1** contacts 8 and 7 to the record head via **C5**, **R11** and **S1** contacts 34 and 35. Part of the output from **TR4** is fed to the base of **TR9**, the record level dc amplifier, via **C26** and **R51**, and via **R50** to **W2** to provide ARLC bias (see 'Automatic Record Level Control').

When **S1** is in the 'Record' position, the function of **TR6** and **TR7**, with associated components, changes to that of a push-pull oscillator providing erase power and recording bias. The oscillator output is fed by **C27** to the erase head and to the bias level control, **R45**. **C23** feeds the bias signal to the record head via **S1** contacts 34 and 35.

**Automatic record level control**  
The incoming signal is amplified by **TR1**,

**TR2**, **TR3** and **TR4** and fed to the recording head. Part of the output signal is rectified by **W2**, and the d.c. voltage derived is used to bias **TR8-W1**, the impedance of this combination forming the lower leg of the ARLC level attenuator chain. Large signals give an increase in forward bias, lowering the impedance of **TR8-W1**. This reduces the level fed to **TR2**, and the system reaches a balance condition at the required recording level. The ARLC reservoir capacitor **C25**, with discharge path **TR8-W1-R46**, gives a control time constant which is long compared with the level fluctuations in a normal music programme. This is required to prevent undesired level compression. For speech, significant level variations are more likely to be due to the voices being at differing distances from the microphone. To compensate for this effect, the discharge path is shunted by **R48** to give a shorter discharge time for **C25**.

It should be noted that **S2** (the ARLC switch) *must be replaced* by the correct type, having shorting contacts in order to maintain the ARLC reset facility. This is necessary to discharge **C25**, by switching to 'Manual' and back again, should a large signal be unintentionally introduced into the system.

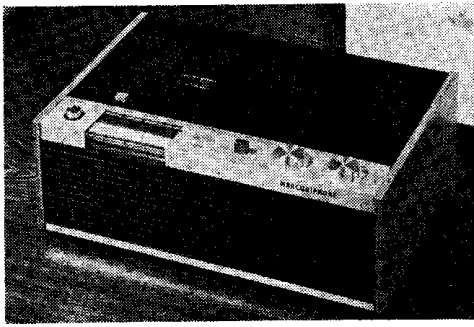
### Dismantling

Place the machine bottom uppermost on a clean non-abrasive surface and remove base cover – ten screws. This gives immediate access to the two fuses. *Note positions of the two earthing leads.*

Unplug loudspeaker leads then unscrew and remove the two end studs nearest mains transformer. Release the two cleats holding mains lead and loudspeaker leads then unbolt mains transformer and lift the case surround clear of chassis.

Most meter checks and adjustments can be made with the circuit panel in position. Holes are provided in the panel for access to variable resistors.

The circuit panel can be raised sufficiently for drive belt replacement after slackening the main cableform cleat and unscrewing and removing the four screws securing the panel. Ensure that undue strain is



not applied to the output transistor leads when raising the panel.

Note: The studs securing the main assembly to the top panel are of varying lengths. They are marked with rings to ensure correct positioning.

**General notes**

The following adjustments will not normally be necessary unless the pre-set component itself or one of the associated components is replaced:

Replacement of **C11** will necessitate adjustment of **L3**.

**R45** will need readjustment if **C23**

or record/play head, **L1**, is replaced. Oscillator coil **L4** should be checked and, if necessary, retuned (35kHz) if the erase head, **L2**, or **C21** has been replaced.

Access holes are provided in the circuit panel so that adjustments can be made from the foil side for all adjustments except **L3** and **L4**.

**Pre-set adjustments**

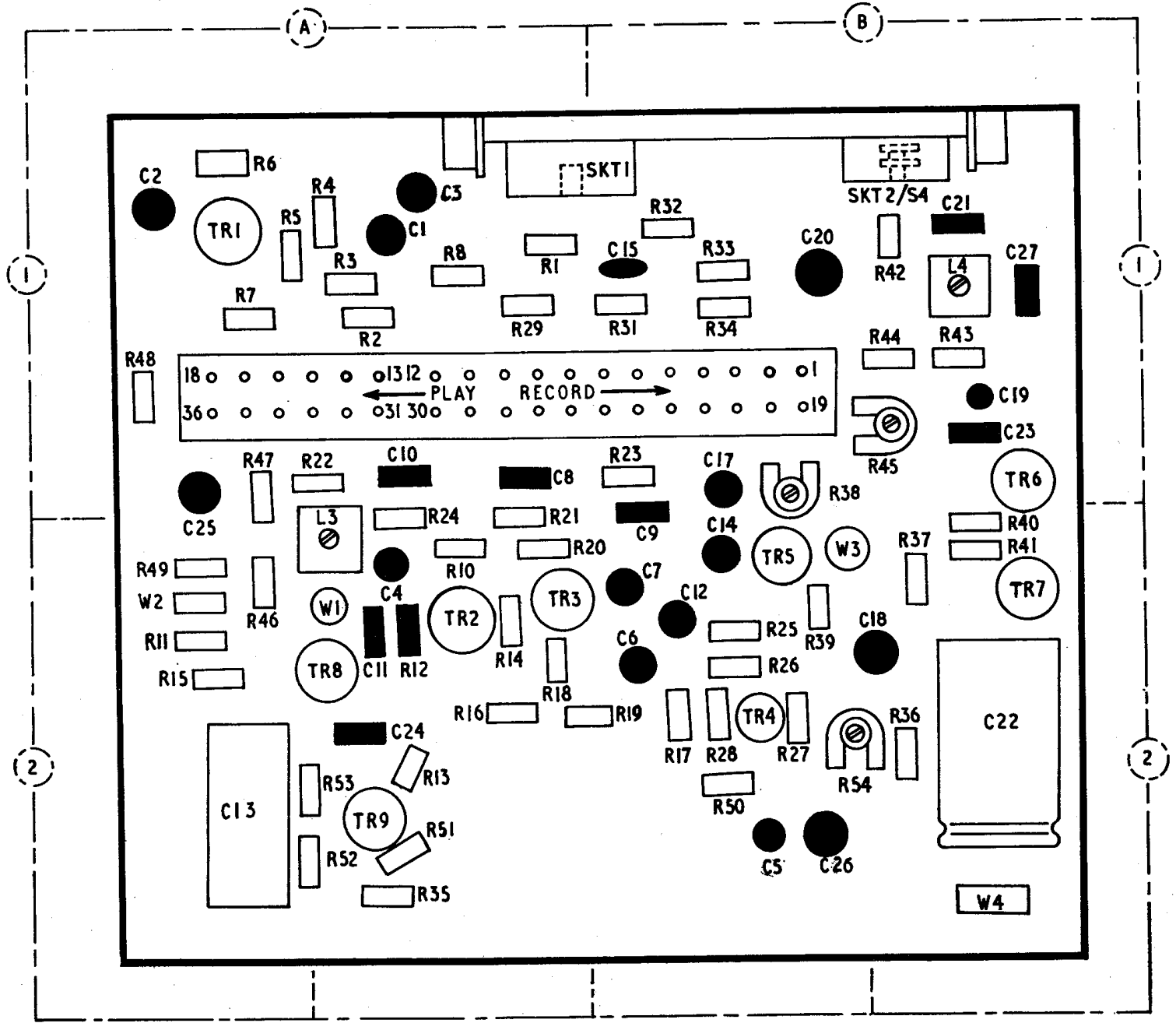
**Record equalization (L3).** – Depress 'Record' key and feed in a 150mV, 15kHz signal from an audio oscillator into Skt1 (pins 3 and 2) and adjust **L3** for maximum output indication on record level meter.

**Record level meter calibration (R54).** – Connect an a.c. electronic voltmeter between 'phone' pin (tag 4) and chassis (tag 2) of Skt2. Feed a 1kHz signal from an audio oscillator into Skt1. Depress 'Record' key and adjust signal level to obtain a reading of 1.2V r.m.s. on meter. This represents peak recording level, and preset resistor **R54** should be adjusted so that the record level meter registers at the junction of the red and black sections of the scale.

**Bias level (R45).** – Connect an a.c. electronic voltmeter with low input capacity (i.e. using shortest practical leads) across tags of record/play head. Depress 'Record' and 'Play' keys. Resistor **R45** should then be set initially to give a reading of 14V r.m.s. across the head.

At a level 20dB below peak recording level, make a frequency response recording, then switch to 'Play' and check that the frequency response falls within the following limits relative to level at 1kHz: 8kHz: +0-6dB. If the result is not within these limits, **R45** must be readjusted. If the response is too high, readjust **R45** to increase bias; if too low, readjust to reduce bias. If, in order to obtain a frequency response level within stated limits, it is necessary to adjust the bias voltage outside the limits 10V-18V, it must be assumed that either the record/play head is faulty or that a fault exists which affects the normal frequency response of the record amplifier, such as misalignment of **L3**. In any case, the fault must be corrected before attempting to readjust **R45**.

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**Output balance adjustment (R38).** — Switch to 'Play' and connect an audio oscillator to tags 19 and 20, with an oscilloscope connected to tags 17 and 18. Set volume and tone controls to maximum and feed in a 1kHz signal of sufficient amplitude to produce maximum

output to the internal loudspeaker (approx. 2.5W). Observe the output waveform and adjust (R38) to provide symmetry of both halves of the waveform and equal clipping at high output.

**Tape head adjustments.** — For access to the magnetic heads, remove cassette well and envelope.

A spring, fitted under one of the two record/play head mounting screws, permits the head to be 'rocked' for azimuth. No specific provision is made for head height adjustment. Note, however, that provision is made for horizontal alignment of the heads with the pinch-

wheel by the insertion or removal of shims.

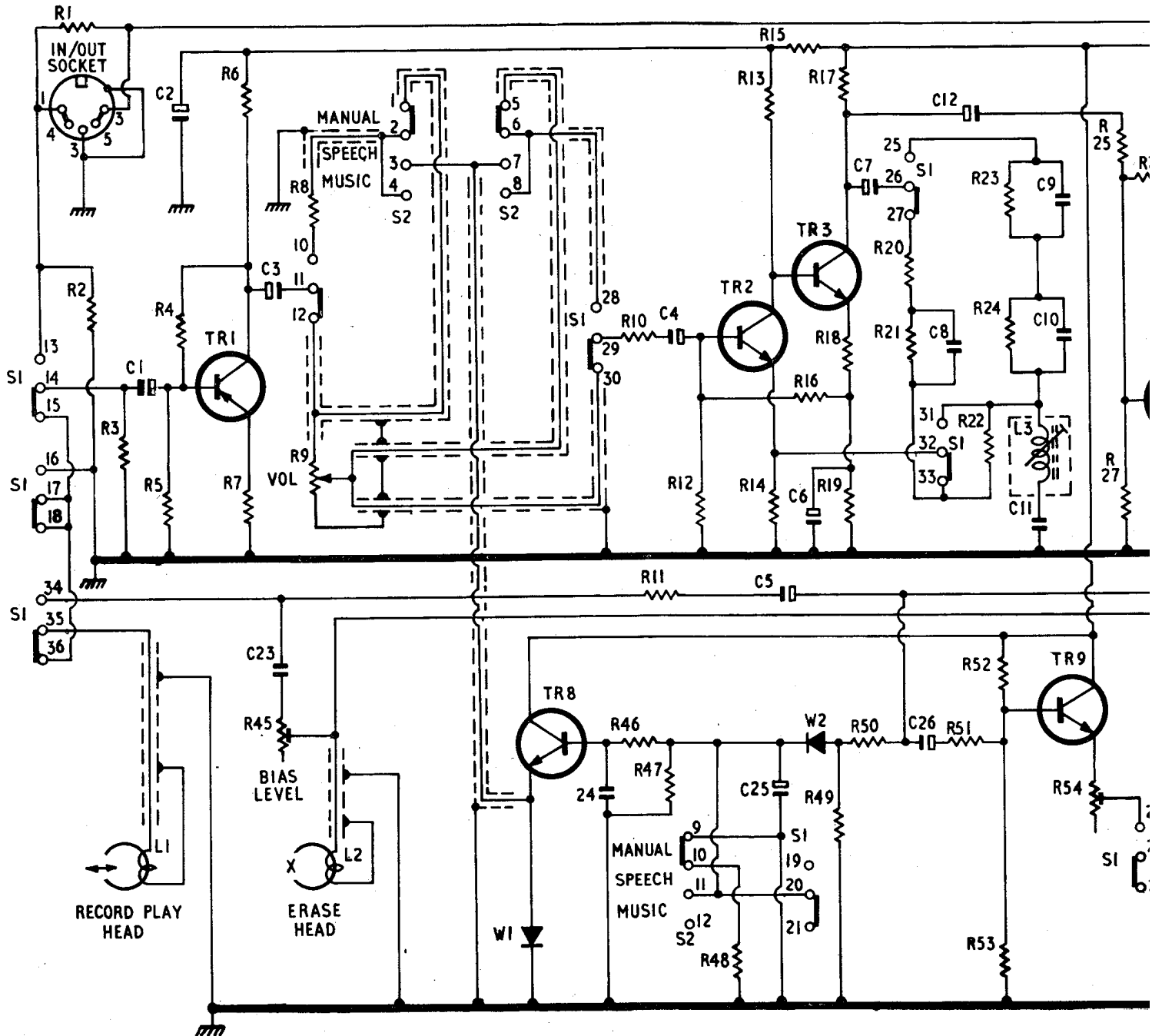
For record/play azimuth adjustment; play back a standard azimuth tape, and with an output meter connected adjust the azimuth screw (left-hand mounting screw) for maximum meter reading whilst keeping the volume as low as possible.

**Replacement diodes and transistors**

Diode and transistor types quoted in the tables are BRC classified. Suitable Mullard types are as follows:

TR1, TR8, TR9	BC109
TR4, TR5	BFY52
W1	BC109
W2	BA114

C	1	2	3	4	5	6	7	8	11	9
			23							
								24		
R	1	2	3	5	4	6	8	10	11	12
						7	45	9	13	15
									17	18
									14	16
									49	19
									20	21
									51	53
									24	25
									26	27
									28	29
									30	31
									32	33
L	1					2				
										3



wheel by the insertion or removal of shims.

For record/play azimuth adjustment; play back a standard azimuth tape, and with an output meter connected adjust the azimuth screw (left-hand mounting screw) for maximum meter reading whilst keeping the volume as low as possible.

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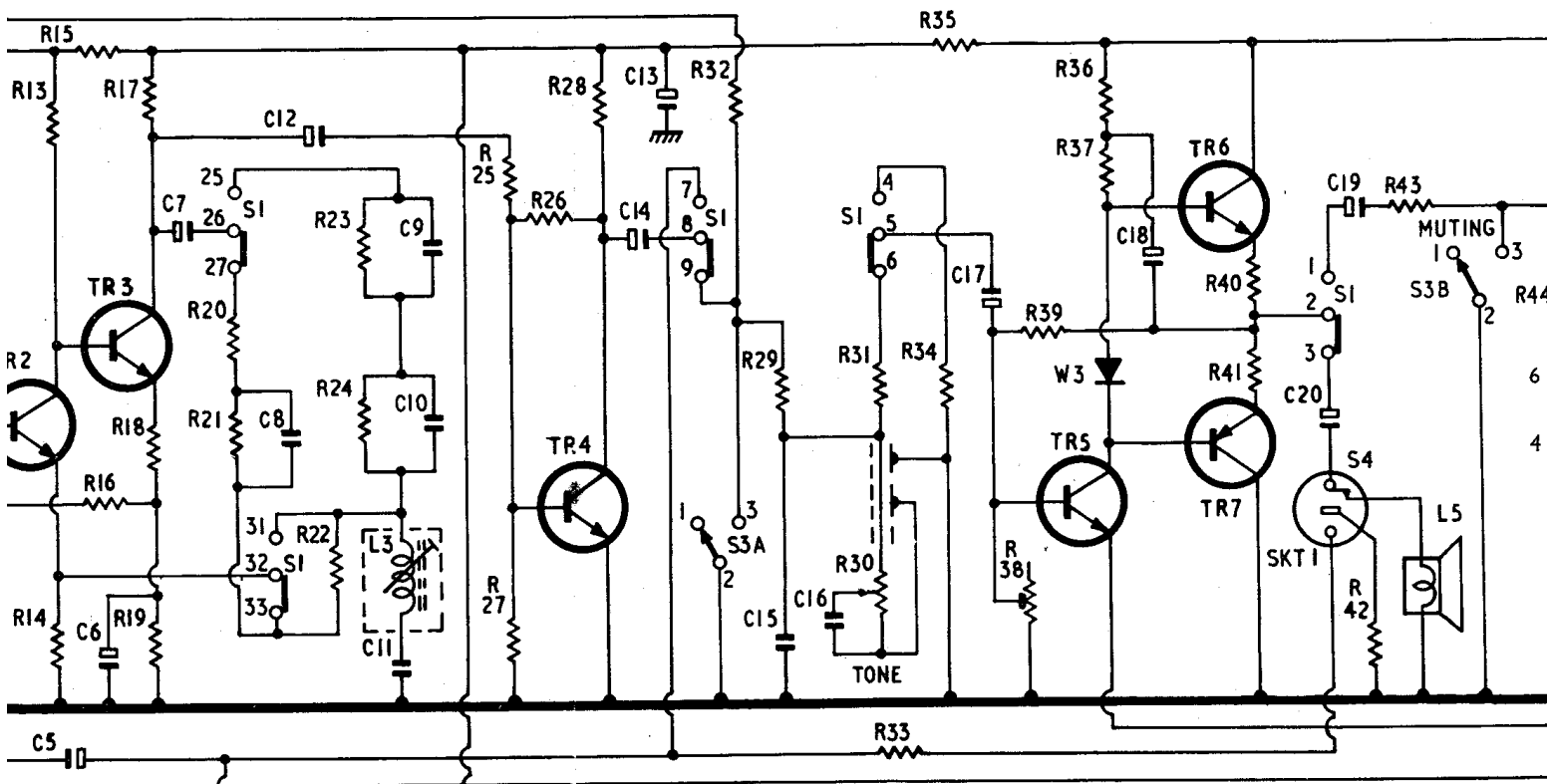
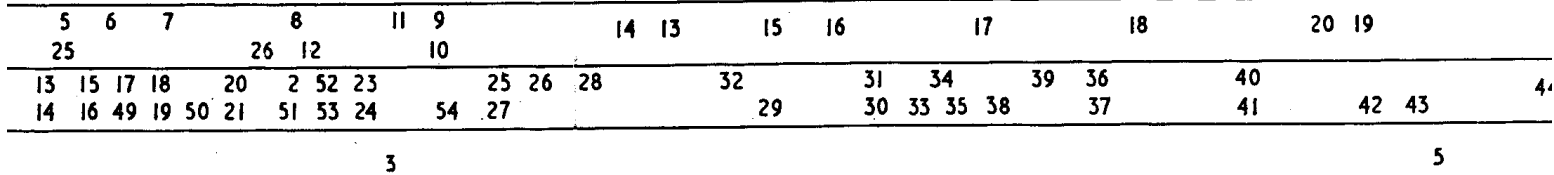
- TR1, TR8, TR9 BC109
- TR4, TR5 BFY52
- W1 BC109
- W2 BA114

**Resistors**

R1	2.2MΩ	A1	R18	100Ω	A2	R37	390Ω	B2
R2	2.2kΩ	A1	R19	680Ω	B2	R38	5kΩ	B1
R3	100kΩ	A1	R20	3.9kΩ	A2	R39	33kΩ	B2
R4	1MΩ	A1	R21	56kΩ	A1	R40	2.2Ω	B2
R5	390kΩ	A1	R22	820Ω	A1	R41	2.2Ω	B2
R6	56kΩ	A1	R23	22kΩ	B1	R42	6.8Ω	B1
R7	680Ω	A1	R24	100kΩ	A1	R43	12Ω	B1
R8	22kΩ	A1	R25	5.6kΩ	B2	R44	68Ω	B1
R9	100kΩ	—	R26	27kΩ	B2	R45	50kΩ	B1
R10	5.6kΩ	A2	R27	2.2kΩ	B2	R46	390kΩ	A2
R11	15kΩ	A2	R28	1.5kΩ	B2	R47	3.3MΩ	A1
R12	390kΩ	A2	R29	1kΩ	A1	R48	100kΩ	A1
R13	120kΩ	A2	R30	10kΩ	—	R49	5.6kΩ	A2
R14	390Ω	A2	R31	1kΩ	B1	R50	680Ω	B2
R15	10kΩ	A2	R32	10kΩ	B1	R51	22kΩ	A2
R16	330kΩ	A2	R33	3.9kΩ	B1	R52	6.8MΩ	A2
R17	4.7kΩ	B2	R34	2.7kΩ	B1	R53	82kΩ	A2
			R35	270Ω	A2	R54	5kΩ	B2
			R36	220Ω	B2			

**Capacitors**

C1	4.7μF	A1
C2	100μF	A1
C3	1μF	A1
C4	1μF	A2
C5	1μF	B2
C6	100μF	B2
C7	4.7μF	B2
C8	0.033μF	A1
C9	470pF	B1
C10	0.068μF	A1
C11	0.15μF	A2
C12	4.7μF	B2
C13	400μF	A2
C14	4.7μF	B2
C15	5,000pF	B1
C16	0.33μF	—

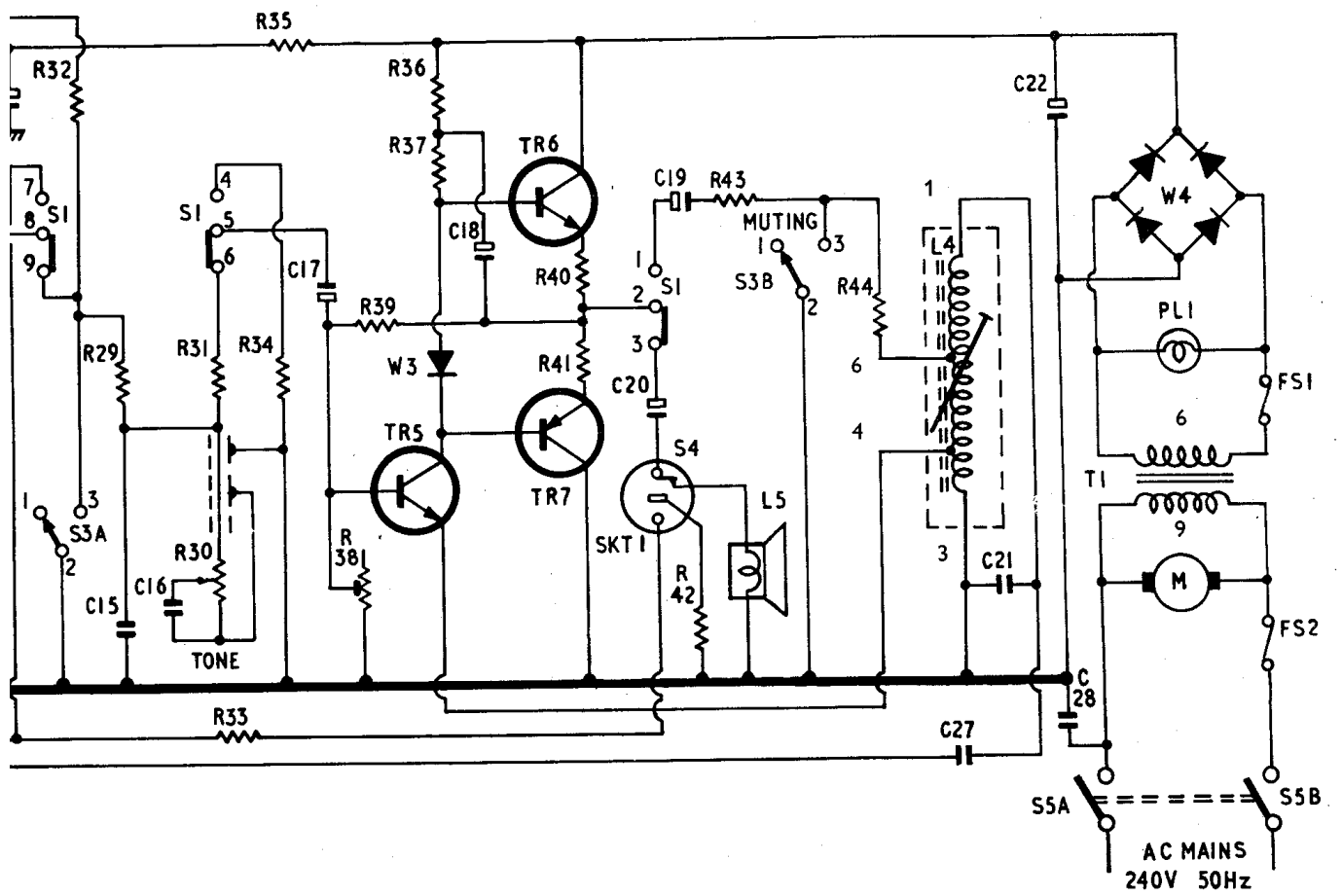
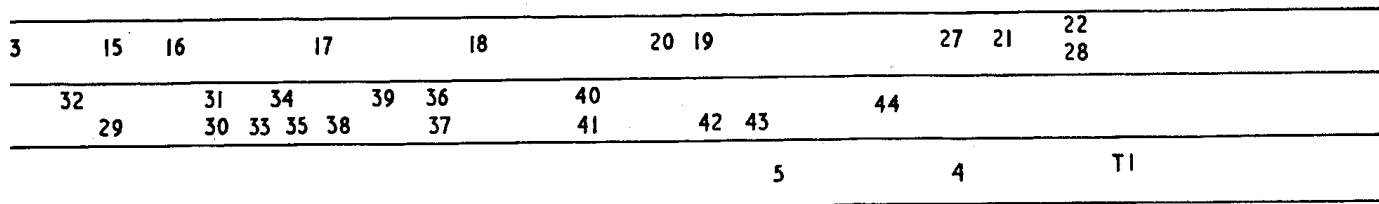


**Transistor table**

Transistor	Emitter (V)	Base (V)	Collector (V)	Transistor	Emitter (V)	Base (V)
TR1 AF15	r 0.15	0.7	3.5	TR6 OP1B	r 11.0	11.1
	p 0.15	0.7	3.6		p 10.6	10.7
TR2 AF15	r 0.05	0.6	2.0	TR7 OP1A	r 11.0	10.9
	p 1.4	2.0	12.9		p 10.6	10.5
TR3 AF2	r 1.4	2.0	13.4	TR8 AF2	r 0	0
	p 0	0.6	9.3		p 0	0
TR4 AF4	r 0	0.6	9.4	TR9 AF2	r 0	0.02
	p 0	0.6	10.9		p 0	0.01
TR5 AF4	r 0	0.6	10.5			
	p 0	0.6	10.5			

Note: r - record; p - playback.

Resistors				Capacitors				Miscellaneous				
R18	100Ω	A2	R37	390Ω	B2	C17	4.7μF	B1	L4	[1,6	1Ω]	B1
R19	680Ω	B2	R38	5kΩ	B1	C18	25μF	B2	L4	[3,6	1Ω]	B1
R20	3.9kΩ	A2	R39	33kΩ	B2	C19	6.8μF	B1	T1	[1,3	2Ω]	—
R21	56kΩ	A1	R40	2.2Ω	B2	C20	400μF	B1	T1	[a	250Ω]	—
R22	820Ω	A1	R41	2.2Ω	B2	C21	0.047μF	B1	T1	[b	2.5Ω]	—
R23	22kΩ	B1	R42	6.8Ω	B1	C22	2,500μF	B2	<b>Miscellaneous</b>			
R24	100kΩ	A1	R43	12Ω	B1	C23	470pF	B1	W1	AF2	A2	
R25	5.6kΩ	B2	R44	68Ω	B1	C24	0.22μF	A2	W2	D17	A2	
R26	27kΩ	B2	R45	50kΩ	B1	C25	320μF	A1	W3	D5	B2	
R27	2.2kΩ	B2	R46	390kΩ	A2	C26	4.7μF	B2	W4	—	B2	
R28	1.5kΩ	B2	R47	3.3MΩ	A1	C27	0.15μF	B1	F1	500mA anti surge		
R29	1kΩ	A1	R48	100kΩ	A1	C28	1,000pF	—	F2	800mA anti surge		
R30	10kΩ	—	R49	5.6kΩ	A2	<b>Inductors*</b>						
R31	1kΩ	B1	R50	680Ω	B2	L1	—	—	PL1	28V 40mA		
R32	10kΩ	B1	R51	22kΩ	A2	L2	—	—	* Approximate d.c. resistance in ohms.			
R33	3.9kΩ	B1	R52	6.8MΩ	A2	L3	2.5Ω	A1				
R34	2.7kΩ	B1	R53	82kΩ	A2							
R35	270Ω	A2	R54	5kΩ	B2							
R36	220Ω	B2										



Transistor table

Transistor	Emitter (V)	Base (V)	Collector (V)	Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 AF15	[r 0.15	0.7	3.5	TR6 OP1B	[r 11.0	11.1	24.5
	[p 0.15	0.7	3.6		[p 10.6	10.7	25.1
TR2 AF15	0.05	0.6	2.0	TR7 OP1A	[r 11.0	10.9	0
TR3 AF2	[r 1.4	2.0	12.9		[p 10.6	10.5	0
	[p 1.4	2.0	13.4	TR8 AF2	[r 0	0	21.4
TR4 AF4	[r 0	0.6	9.3		[p 0	0	22.1
	[p 0	0.6	9.4	TR9 AF2	[r 0	0.02	21.4
TR5 AF4	[r 0	0.6	10.9		[p 0	0.01	22.1
	[p 0	0.6	10.5				

Note: r - record; p - playback.