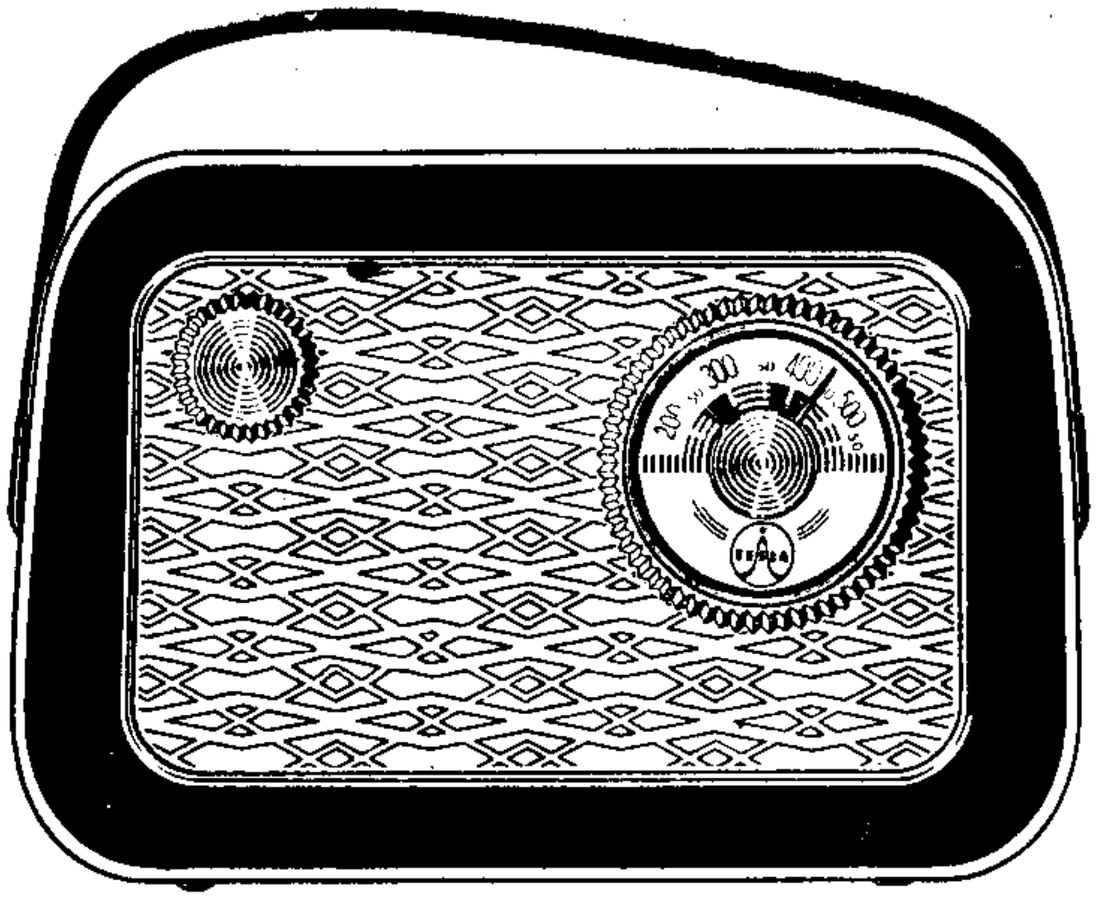
MAINTENANCE INSTRUCTIONS FOR THE

TESLA "2800 B"

TRANSISTOR RECEIVER

Valid for the Types „T 58A" and „Comet-9"



TECHNICAL DESCRIPTION

● GENERAL

The receiver is a handbag type superheterodyne with six tuned circuits, fully transistorized and powered by a built-in battery

● WAVE RANGE

Medium waves 184 — 571.4 m
(1,630 — 525 kc/s)

● INTERMEDIATE FREQUENCY

250 kc/s

● TRANSISTOR COMPLEMENT

152 NU 70	—	Mixer
154 NU 70	—	Oscillator
3 × 153 NU 70	—	Intermediate-frequency amplifier
1 NN 41	—	Detector
2 × 103 NU 70	—	Audio-frequency amplifier
2 × 103 NU 70	—	Push-pull power amplifier

● AVERAGE SENSITIVITY

300 μV at 1 Mc/s (loop aerial as for alignment) and 5 mW output power (signal/noise ratio 10dB)

● AVERAGE I. F. AMPLIFIER BANDWIDTH

20 kc/s (at 1:10 voltage ratio)

● OUTPUT POWER

100 mW (at 400 c/s and 10% distortion)

● LOUDSPEAKER

Dynamic loudspeaker Ø 95 mm, moving coil impedance 4 Ω

● POWERING

Dry battery 6 V
(4 cells, 1.5 V, Ø 24 mm, 50 mm length each, in series)

● AVERAGE CURRENT DRAIN

0.35 W (55 mA at full modulation)

● DIMENSIONS AND WEIGHTS

	Receiver	Receiver in packing
Height	150 mm	190 mm
Width	220 mm	260 mm
Depth	75 mm	100 mm
Weight	1.20 kg (without batter.)	1.40 kg

GENERAL INSTRUCTIONS FOR REPAIRS

The procedure of defect location is as follows:

1. Apply a stronger modulated R. F. signal to the input terminals and follow its amplification by the receiver stages. The first stage amplifies it approximately 4×, each further I. F. stage approx. 10×. Measure the A. C. of the current (according to the character of the defect) on the collectors or bases of the individual transistors (using a suitable signal tracer, e. g. the TESLA BS 367).
2. Check the D. C. voltages according to the voltage current table, after the defective stage has been located.
3. Check the data of the individual resistors, capacitors and coils according to the results obtained by the measurements.

After finding the defective component carry on as follows:

4. Avoid soldering to the printed circuits plate. Cut the wire terminals of the defective component (resistor or capacitor) close to the unit so that sufficiently large wires remain attached to the printed circuits. Sorten the terminals of the new component and form them into eyelets, feed the latter over the remnants of the wire terminals and solder the joints thus produced (see Fig.).

5. The terminals of the resistors and capacitors are bent at that side of the printed circuits plate, where the circuits are. If it is necessary to remove the defective component together with its terminal wires, then the soldered point must be heated with a soldering iron and simultaneously the terminal pulled with considerable force in order to straighten its end and to pull it out of the hole in the circuits plate.
6. In order to prevent loosening of the metal foil — it is cemented to the laminate plate — it must not be heated during soldering above 250° C for a period of 5 secs maximum. Therefore, it is recommended to use a soldering iron of higher heat capacity (100 W) in order to ensure speedy warning up of the soldered point without exceeding the permissible heat of the foil. Only soft solder of best quality must be used and as flux resin dissolved in spirits is applicable.
7. Before the new component is fastened to the circuits plate, it is advisable to renew the respective holes in the solder remnants in order to ensure easy insertion of the terminal wires. Pressure at the soldering points, where the connection between foil and plate is weakened by the previous soldering, could easily loosen the metal foil and must, therefore, be avoided.
8. When an I. F. transformer or the oscillator coil has to be removed, its terminals must be unsoldered successively and simultaneously bent away from the foil.
9. Loosened parts of the foil must be fastened with epoxide resin or some other suitable cement.
10. Soldering with a soldering gun, especially in the vicinity of ferrite components is not permissible.
11. When a transistor or germanium diode is being exchanged, then the terminal wire which is being soldered must be gripped with flat-nose pliers between the soldered point and the semiconductor component, in order to protect the latter from excessive heat. The terminal wires must remain unshortened and must not bend close to the component.
12. The transistors T3, T4, T5 (153 NU 70) are classified by the makers according to their inherent capacitances "base/collector". The three classes are signified by colours on the component covers (at receivers of prod. Nos. lower than 430,000) as follows:
    Green units have a capacitance below 15 pF (preferred for T3)
    Blue units have a capacitance between 15 and 21 pF (used for T3, T4, T5 — neutralizing capacitance 35 pF)
    Black units have a capacitance between 21 and 31 pF (used for T4, T5 — neutralizing capacitance 47 pF).

At receivers of prod. Nos. higher than approx. 430,000 the inherent and neutralizing capacitances are as follows:

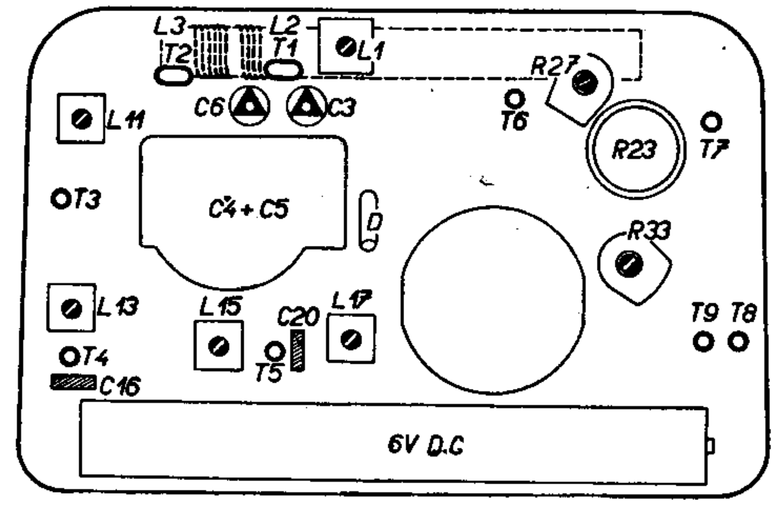
Colour:	Inherent Capacitance:	Neutralizing Capacitance:
green	8 — 9 pF	15 pF
blue	9 — 10.7 pF	
red	10.7 — 13.1 pF	22 pF
yellow	13.1 — 15.9 pF	
black	15.9 — 18.0 pF	33 pF
white	18 — 22 pF	
violet	22 — 26 pF	47 pF

Whenever one of these transistors is being exchanged, the replacement has to be of the same class in order to avoid an exchange of neutralizing capacitance C16 or C20.

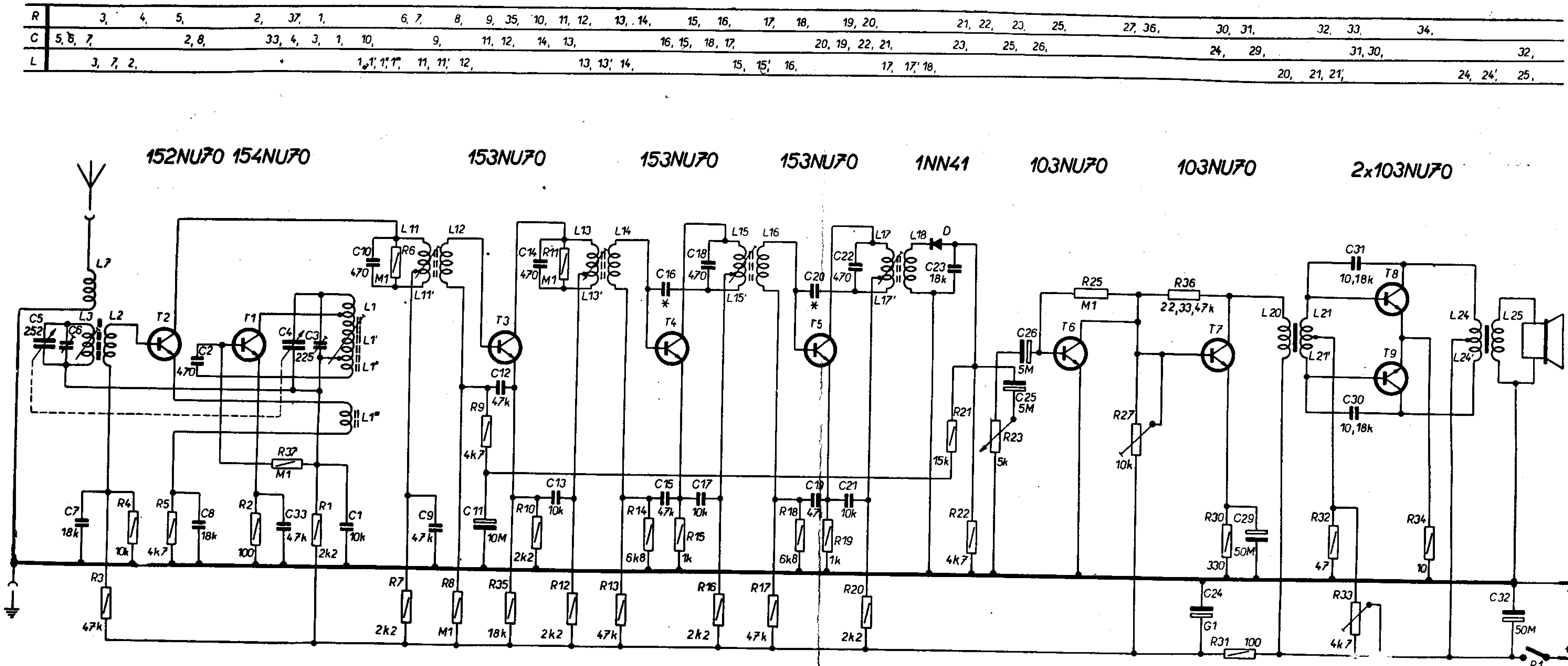
Adjustment and alignment of the receiver

1. Adjustment of the working points of T8 and T9.
   Connect an A. F. generator in parallel to the volume control R23 which has to be set to zero potential. Connect to the output, an output meter together with an oscilloscope connected in parallel.
   Set the control R27 to approx. the centre of the slider track and adjust the A. F. generator to 1,000 c/s. Set the control R33 so as to obtain an undistorted power of 5 mW. The current drain from the battery should not exceed 40 mA. When the modulation is increased to obtain 100 mW output, the drain must not exceed 55 mA.
2. Adjustment of the working points of T6 and T7.
   The A. F. generator, the output meter and the oscilloscope remain connected as described above.
   Set the control R27 to maximum output at minimum distortion. The total current drain must not exceed 55 mA.
3. For the alignment of the input circuits, the signal of a suitable generator is applied to the loop aerial.
   The loop aerial is formed by 37 turns of R. F. cable (40×0.04 mm) wound on an insulating frame of 160×53 mm dimensions. The inductance of the aerial is 320 μH, Q = 105.
   The aerial loop is perpendicular to the ferrite rod and its centre coincides with the axis of the rod. The distance between the end of the rod with the input coil L3 and the loop aerial has to be 120 mm.

The alignment must be carried out under conditions tallying with those when the receiver is mounted in its case. All conductive parts of the case (loudspeaker, ornamental grid) must be in their correct positions.



Alignment elements

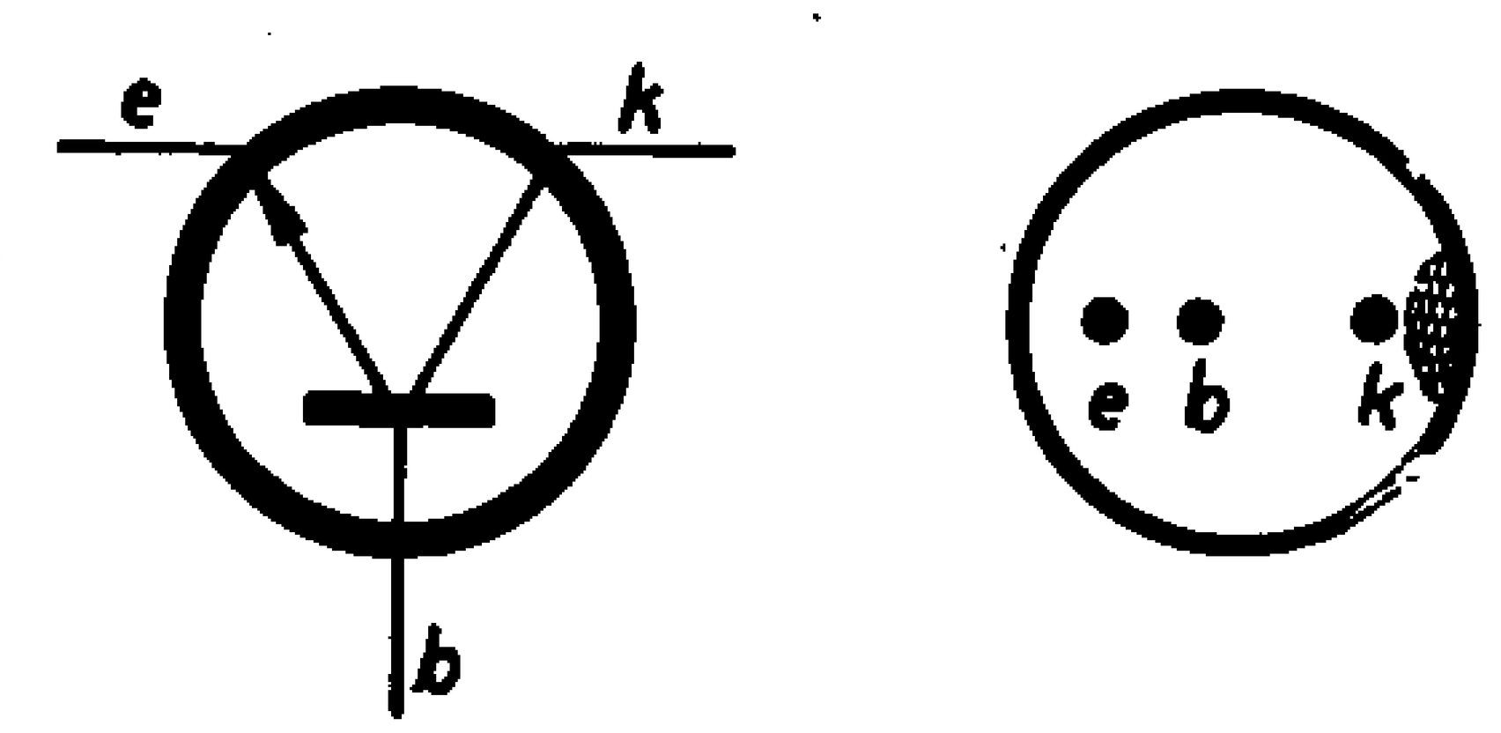


CIRCUIT DIAGRAM OF TESLA "2800 B"

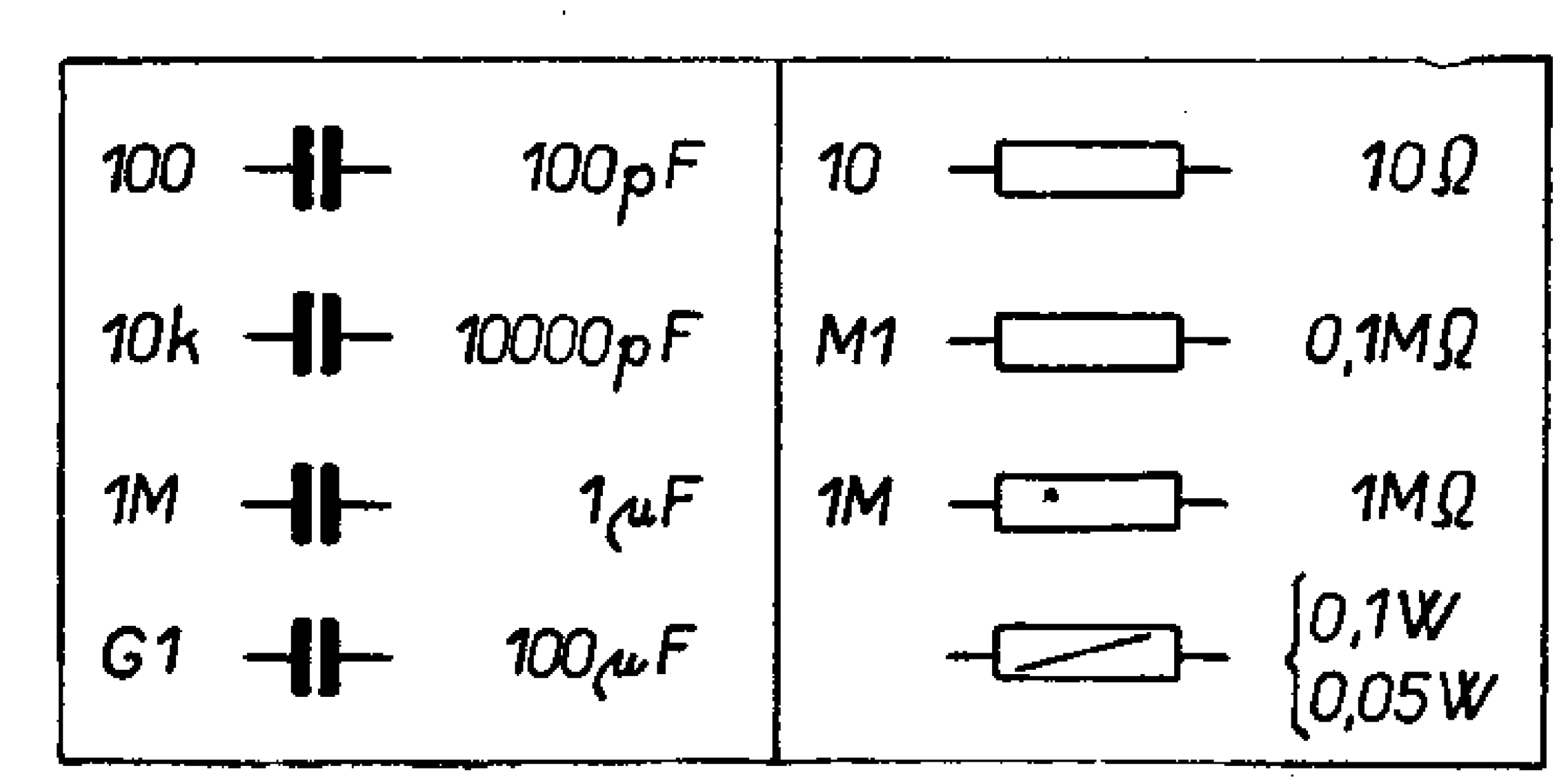
Current and Voltage Table

Transistor		Ub	Ue	Uco	Ico	Notes
No.	Type	V	V	V	mA	
T 1	154 NU 70	0.45*	0.3*	5.5	3	* L1 shortcircuited
T 2	152 NU 70	0.5	0.4	4	0.2	
T 3	153 NU 70	0.5	0.4	4.5	0.4	
T 4	153 NU 70	0.5	0.4	4.5	0.4	
T 5	153 NU 70	0.5	0.4	4.5	0.4	
T 6	103 NU 70	—	—	—	—	
T 7	103 NU 70	—	—	—	—	
T 8	103 NU 70	—	—	5.9	2-6**	According to the working point adjustment to minimum distortion at 5 mW
T 9	103 NU 70	—	—	5.9	2-6**	

All voltage are measured with a V. T. voltmeter with 6 V powering voltage applied and no signal on the input terminals.



Outlets of TESLA transistors



Symbols and values of electric parts

TABLE OF ALIGNMENT

Item	Standard signal generator		Receiver		Defections of the output meter
	Connection	Frequency	Turning capacitor setting	Aligned component	
1	To the base of T2 in series with 20,000 pF. Coil L2 shortcircuited	250 kc/s modulated with 400 c/s to 30%	Set to minimum capacitance	L 17	maximum
2				L 15	
3				L 13	
4				L 11	
5		525 kc/s	To maximum capacitance	L 1	
6		1,630 kc/s	To minimum capacitance	C 3	
7	To the loop aerial/distance from L3 . . 120 mm	600 kc/s	Set to the injected signal	L 3*)	maximum
		1,350 kc/s		C 6	

*) Tuned by shifting the coil on the ferrite rod.

SPARE PARTS

Mechanical components

Item	Description	Order No.	Notes
1	Case, assembled ("Comet")	2PK 127 16	
1a	Case, assembled ("T 58A")	2PK 127 13	
2	Case ("Comet")	2PK 127 17	
2a	Case ("T 58A")	2PK 127 12	
3	Dial ("Comet")	2PA 151 06	
3a	Dial ("T 58A")	2PA 151 05	
4	Dial indicator	2PA 165 06	
5	Test lamp holder	2PK 498 03	
6	Lamp 2.2 V/0.2 A	ČSN 36 0152.01	
7	Plate with printed circuits	2PF 196 49	DC 072
8	Volume control knob	2PF 243 21	
9	Turning knob	2PF 246 05	
10	Fixing spring for knobs	2PA 668 50	
11	Battery clamp, fixed	2PF 806 99	
12	Battery clamp, mobile	2PF 668 14	
13	Tension spring	2PA 786 12	
14	Ferrite rod	2PA 892 00	
15	Rubber ring for ferrite rod	9 × 1/M	
16	Battery container (T58A)	2PA 910 05	
17	Battery container (Comet)	2PA 900 17	
18	Loudspeaker	2AN 632 16	
19	Cone with coil	2AF 759 09	
20	Fabric cover for loudspeaker	2AV 791 00	

Electric components

L	Coils	Resistance Ω	Order No.	Notes
1	Oscillator	2.9 Ω	2PK 593 25	
1′		1 Ω		
1″		1 Ω		
1‴		1 Ω		
2	Input (ferrite)	1 Ω	2PF 600 11 / 2PF 600 06 / 2PF 600 20 x	
3		3.5 Ω		
7	External aerial coil (on ferrite rod)	20 Ω	2PF 600 15	
11	I. F. transformer I.	4.3 Ω	2PK 854 14	
11′		1 Ω		
12		2.1 Ω		
13	I. F. transformer II.	4.3 Ω	2PK 854 15	
13′		1 Ω		
14		2.1 Ω		
15	I. F. transformer III.	4.3 Ω	2PK 854 16	
15′		1 Ω		
16		2.1 Ω		
17	I. F. transformer IV.	4.3 Ω	2PK 854 17	
17′		1 Ω		
18		4.9 Ω		
20	Coupling transformer	10 Ω	2PN 666 03	
21		70 Ω		
21′		70 Ω		
24	Output transformer	10 Ω	2PN 673 12	
24′		10 Ω		
25		1 Ω		

x) To be used according to permeability of ferrite rod.
Adjust inductance of the coil L3 to 340 μH (Q = 120 at 1 Mc/s).

C	Capacitors	Capacitance	Working voltage	Order No.	Notes
1	Paper	10,000 pF ± 20%	160 V	TC 151 10k	
2	Mica	470 pF ± 20%	500 V	TC 210 470	
3	Trimmer	3— 30 pF		PN 703 01	
4	Tuning	11—225 pF	300 V	2PN 705 07	
5	Tuning	11—252 pF			
6	Trimmer	3— 30 pF		PN 703 01	
7	Paper	18,000 pF ± 20%	160 V	TC 151 18k	
8	Paper	18,000 pF ± 20%	160 V	TC 151 18k	
9	Paper	47,000 pF ± 20%	160 V	TC 161 47k	
10	Mica	470 pF ± 5%	500 V	TC 210 470/B	
11	Electrolytic	10 µF + 50—10%	12 V	TC 903 10M	
12	Paper	47,000 pF ± 20%	160 V	TC 161 47k	
13	Paper	10,000 pF ± 20%	160 V	TC 151 10k	
14	Mica	470 pF ± 5%	500 V	TC 210 470/B	
15	Paper	47,000 pF ± 20%	160 V	TC 161 47k	
16*)	Mica	15 uF ± 20%	500 V	TC 210 15	
	Mica	22 pF ± 20%	500 V	TC 210 22	
	Mica	33 pF ± 20%	500 V	TC 210 33	
	Mica	47 pF ± 20%	500 V	TC 210 47	
17	Paper	10,000 pF ± 20%	160 V	TC 151 10k	
18	Mica	470 pF ± 5%	500 V	TC 210 470/B	
19	Paper	47,000 pF ± 20%	160 V	TC 161 47k	
20*)	Mica	15 pF ± 20%	500 V	TC 210 15	
	Mica	22 pF ± 20%	500 V	TC 210 22	
	Mica	33 pF ± 20%	500 V	TC 210 33	
	Mica	47 pF ± 20%	500 V	TC 210 47	
21	Paper	10,000 pF ± 20%	160 V	TC 151 10k	
22	Mica	470 pF ± 5%	500 V	TC 210 470/B	
23	Paper	18,000 pF ± 20%	160 V	TC 151 18k	
24	Electrolytic	100 µF + 50—10%	6 V	TC 902 100M	
25	Electrolytic	5 µF + 50—10%	12 V	TC 903 5M	
26	Electrolytic	5 µF + 50—10%	12 V	TC 903 5M	
29	Electrolytic	50 F +50—10%	6 V	TC 902 50M	10-18k**)
30	Paper	18,000 pF ± 20%	160 V	TC 151 18k	10-18k**)
31	Paper	18,000 pF ± 20%	160 V	TC 151 18k	
32	Electrolytic	50 F +50—10%	6 V	TC 902 50M	
33	Paper	47,000 pF ± 20%	160 V	TC 161 47k	

R	Resistors	Magnitude	Wattage	Order No.	Notes
1	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
2	Carbon layer	100 Ω ± 13%	0.05 W	TR 112 100	
3	Carbon layer	47,000 Ω ± 13%	0.05 W	TR 112 47k	
4	Carbon layer	10,000 Ω ± 13%	0.05 W	TR 112 10k	
5	Carbon layer	4,700 Ω ± 13%	0.05 W	TR 112 4k7	
6	Carbon layer	0.1 MΩ ± 13%	0.05 W	TR 112 M1	
7	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
8	Carbon layer	0.1 MΩ ± 13%	0.05 W	TR 112 M1	
9	Carbon layer	4,700 Ω ± 13%	0.05 W	TR 112 4k7	
10	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
11	Carbon layer	0.1 MΩ ± 13%	0.05 W	TR 112 M1	
12	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
13	Carbon layer	47,000 Ω ± 13%	0.05 W	TR 112 47k	
14	Carbon layer	6,800 Ω ± 13%	0.05 W	TR 112 6k8	
15	Carbon layer	1,000 Ω ± 13%	0.05 W	TR 112 1k	
16	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
17	Carbon layer	47,000 Ω ± 13%	0.05 W	TR 112 47k	
18	Carbon layer	6,800 Ω ± 13%	0.05 W	TR 112 6k8	
19	Carbon layer	1,000 Ω ± 13%	0.05 W	TR 112 1k	
20	Carbon layer	2,200 Ω ± 13%	0.05 W	TR 112 2k2	
21	Carbon layer	15,000 Ω ± 13%	0.05 W	TR 112 15k	
22	Carbon layer	4,700 Ω ± 13%	0.05 W	TR 112 4k7	
23	Potentiometer	5,000 Ω log.		WN 693 03 5kG	
25	Carbon layer	0.1 MΩ ± 13%	0.05 W	TR 112 M1	
27	Potentiometer	10,000 Ω		WN 790 25 10k	
30	Carbon layer	330 Ω ± 13%	0.05 W	TR 112 330	
31	Carbon layer	100 Ω ± 13%	0.05 W	TR 112 100	
32	Carbon layer	47 Ω ± 13%	0.05 W	TR 112 47	
33	Potentiometer	4,700 Ω ± 13%		WN 790 25 4k7	
34	Carbon layer	10 Ω ± 13%	0.05 W	TR 112 10	
35	Carbon layer	18,000 Ω ± 10%	0.05 W	TR 112 18k/A	22, 33, 47k**)
36	Carbon layer	33,000 Ω ± 13%	0.05 W	TR 112 33k	
37	Carbon layer	0.1 MΩ ± 13%	0.05 W	TR 112 M1	

*) According to the colour of the transistor

**) Permissible tolerance according to the employed transistor.

TESLA

R	10, 11, 6, 15, 14, 35, 12, 8, 13, 7, 16, 5, 3, 4, 17, 18, 2, 19, 20, 1, 37, 9, 21, 22, 23, 27, 32, 39, 23, 34, 01, 36, 30
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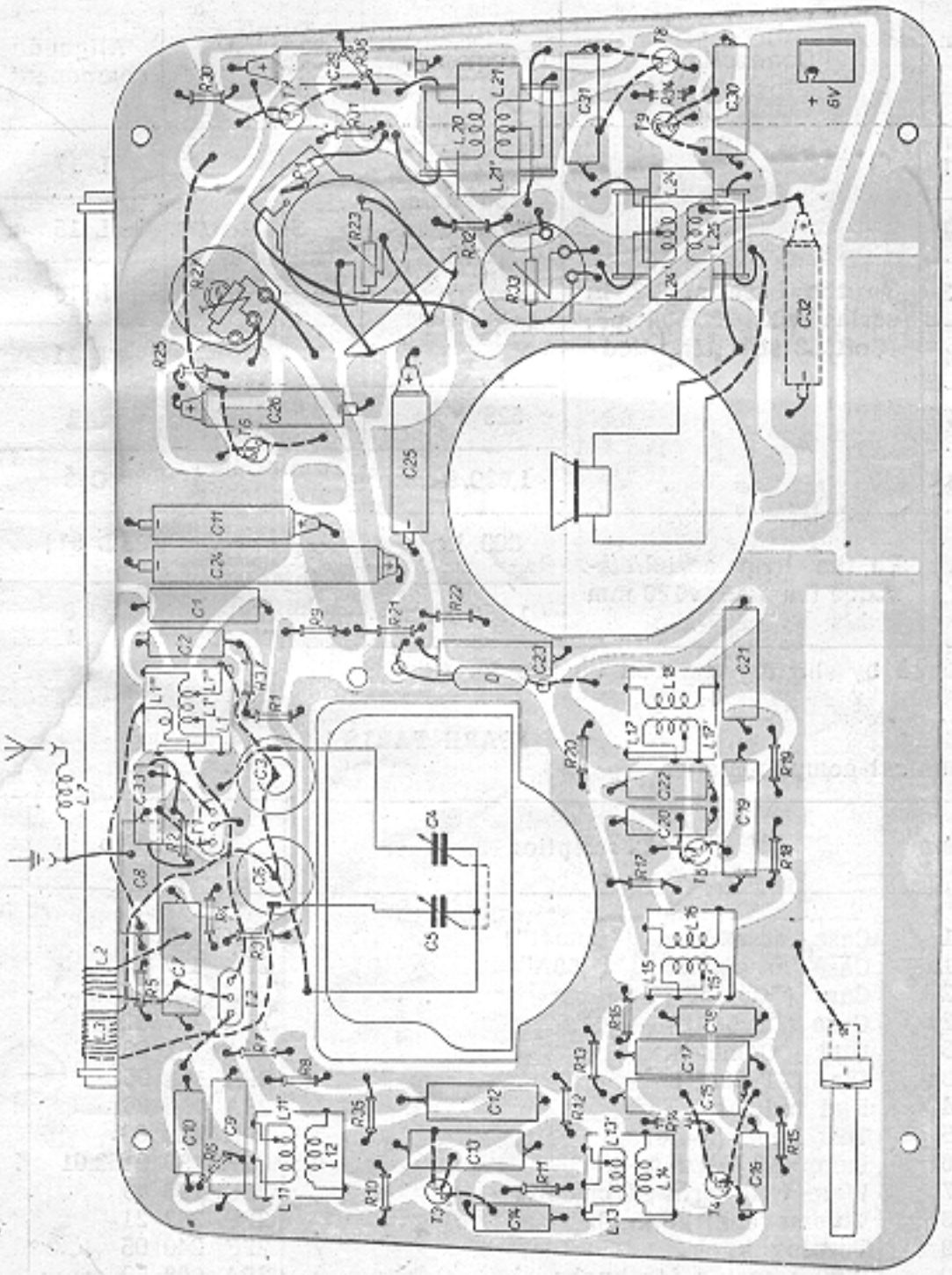
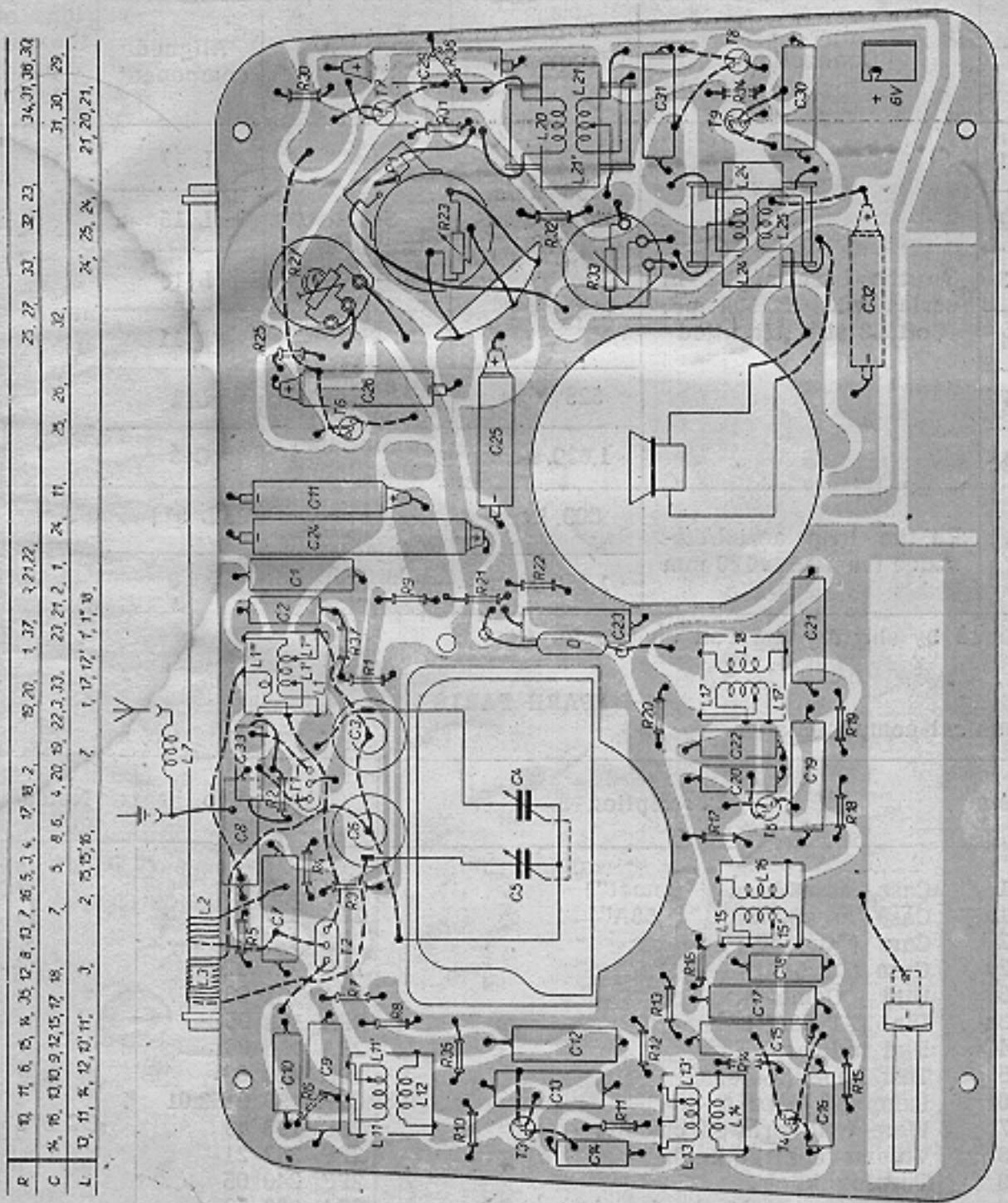


WIRING DIAGRAM



WIRING DIAGRAM