STRICTLY CONFIDENTIAL

SERVICE DOCUMENTATION

for receiver

153 A

FOR A.C. MAINS FEEDING.

WAVERANGES

Short wave 1: 13.7— 45 m (21.9 — 6.67 Mc)
Short wave 2: 45 —160 m (6.67— 1.87 Mc)
Medium wave: 160 —560 m (1875 —535 Kc).

CONTROL KNOBS

From right to left:
1. Tuning.
2. Waveband switch.
3. Volume control with mains switch.
4. Tone control.

DIMENSIONS.

Width: 53.5 cm
Height: 31 cm
Depth: 24 cm
knobs included.

WEIGHT: 11 kg, tubes included.

TRIMMING THE RECEIVER.

Retrimming is necessary:
a. When a coil or condenser in the I.F., H.F. or oscillator part has been renewed.
b. When the receiver is not sufficient sensitive or selective.
It is not necessary to take the receiver out of its cabinet; all trimmers become accessible after removal of the rear panel and the base plate. The positions of the trimmers are indicated in figs. 4 and 5. As regards the necessary trimming tools vide the list of parts and tools.
On all wavebands the oscillator frequency is higher than the tuning frequency of the H.F. circuits.
The I.F. is 452 kc.
The I.F. bandwidth 1 : 10 is $11^3/_4$ kc.
The bandwith at 1000 kc 1 : 10 is $10^3/_4$ kc.

A. I.F. CIRCUITS.
1. Earth the set and switch to medium wave band. Turn the variable condenser to minimum position.
2. Connect the output indicator via a trimming transformer to the extension loudspeaker sockets.
3. Apply a modulated signal of 452 kc via a condenser of 32000 pF to the first grid of L2.
4. Detune the third circuit by connecting a condenser of 80 pF in parallel with S25.
5. Tune S26-S27 to maximum output, then remove detuning condenser from S25.
6. Detune the second circuit by connecting a condenser of 80 pF in parallel with S24.
7. Tune S25 to maximum output.
8. Remove the detuning condenser from S24 and detune the first circuit by connecting a condenser of 80 pF in parallel with S23.
9. Tune S24 to maximum output.
10. Remove the detuning condenser and detune the second circuit by connecting a condenser of 80 pF in parallel with S24.
11. Tune S23 to maximum output. Remove detuning condenser and seal the cores.

B. H.F. AND OSCILLATOR CIRCUITS.

I. SHORT WAVE 1 (13.7—45 m).
1. Earth the set and switch to short wave band 1.
2. Connect the output indicator to the set to be trimmed.
3. Apply to the aerial socket, via the short wave dummy aerial, a modulated signal of 20.5 Mc.
4. Accurately tune the receiver to this frequency by means of the variable condenser (first maximum starting from minimum capacity).
5. Tune C15, C8 to maximum output. Seal trimmers C8, C15.
NOTE. C24 is tuned to a fixed capacity and may not be altered.

II. SHORT WAVE 2 (45—160 m).
1. Fit the 15° gauge.
Switch the set to short wave band 2.
2. Apply a modulated signal of 6.1 Mc via the short wave dummy aerial to the aerial socket.
3. Accurately tune the set to this frequency with the aid of C25, C16 and C9.
4. Seal the trimmers.

III. MEDIUM WAVES (160—560 m).
1. Fit the 15° gauge.
Switch the set to medium waves.
2. Apply a modulated signal of 1740 kc to the aerial socket via the normal dummy aerial.
3. Accuretely tune the set to this frequency with the aid of C26, C17 and C10.
4. Connect an auxiliary receiver to the anode of L2 via a condenser of 25 pF, and the output indicator to the auxiliary receiver. Short-circuit C5.
5. Apply to the aerial socket of the set to be trimmed via the normal dummy aerial, a modulated signal of 600 kc.
6. Accurately tune the set to this frecuency with the tuning knob.
7. Take away the auxiliary receiver; connect the output indicator to the set to be trimmed. Remove the short-circuit of C5.
DO NOT TURN THE VARIABLE CONDENSER.
8. Tune C30 to maximum output.
9. Turn the variable condenser against the 15° gauge.
10. Apply to the aerial socket of the set to be trimmed, via the normal dummy aerial, a signal of 1740 kc.
11. Tune C26, C17 and C10 to maximum output. Seal C10, C17, C26 and C30.

C. ADJUSTING THE DIAL.
1. Switch the receiver to the medium wave band. Connect the output indicator.
2. Apply to the aerial socket, via a normal dummy aerial, a modulated signal of 857 kc. (350 m).
3. Accurately tune the receiver to this frequency.
4. Slightly loosen the screw on the pointer for attaching the string and move the pointer until it points exactly to 350 m.
5. Tighten the screw.

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REPAIRS AND RENEWAL OF PARTS.

For various kinds of repairs it is not necessary to take the receiver out of the cabinet as often removal of the rear panel and the base plate suffices.

TAKING THE CHASSIS OUT OF THE CABINET.

1. Remove the rear panel.
2. Remove the knobs.
3. Unscrew the connection of the chassis with the bottom-screening.
4. Unsolder the connections to the loudspeaker.
5. Take off the tuning cross.
6. Slightly loosen the screw on the pointer for fixing the string, so that the string is released.
7. Unscrew the chassis from the bottom.
8. Slide the chassis out of the cabinet.
   After having returned the chassis into the cabinet, the pointer must be correctly adjusted (vide sheet 1 "Adjusting the dial").

RENEWING THE DIAL.

1. Unscrew the 4 screws A (fig. 8).
   The ornamental window can now be removed together with the scale, that can now be renewed easily.

RENEWING THE POINTER.

1. Slightly loosen the screw on the pointer for fixing the string, so that the string is released.
2. Undo the lower guide shaft for the pointer by loosening the two nuts near the end of this shaft.
3. Loosen the pointer from the pointer runner and screw on a new one.

NOTE. The new pointer must be covered at the extremities with silk yarn; the length of the covered part is ± 8 mm.

ADJUSTMENT OF THE LINE OF LIGHT.

If the line of light is not clearly defined, this can be corrected by adjusting the distance of the guide shafts till the scale by means of the nuts at the end of the shafts.

MICROFONIC EFFECT.

To avoid microphony, the variable condenser with the driving mechanism is fixed resiliently to the chassis by means of rubber ducts. This combination must therefore always be set up freely.
The following faults may lead to microphony:

1. Rubber ducts worn out.
2. Connections at the variable condenser too stiff or too taught.
3. The fixing strip 18 (fig. 6) is clamped to tight between the bracket on the variable condenser and the bracket on the chassis. This is to be remedied by unscrewing and fixing again the bracket on the variable condenser.

DRIVING CABLES.

The way the driving cables have to run is indicated in fig. 6.
Length of the string for driving the pointer 970 mm.
Length of the cord for driving the variable condenser 660 mm.
The length of the driving strings is measured from fixing point to fixing point. To allow for the loops, the strings must be cut slightly longer.

LIST OF PARTS AND TOOLS.

When ordering parts, please always mention:
1. Codenumber;
2. Description;
3. Typenumber of the receiver.

Fig.	Pos.	Description	Codenumber	Price
		Cabinet (colour 038)	23 661 35.0	
		Ornamental window (colour 038)	23 690 47.1	
		Stationnamedial	A1 896 38.0	
		Stationnamedial for British India	A1 896 39.0	
		Stationnamedial for South-Africa	A1 896 40.0	
		Stationnamedial for the Mediterranean	A1 896 41.0	
		Knob for wavebandswitch (colour 038)	23 613 02.0	
		Knobs, other then the foregoing (colour 038)	23 612 29.0	
		Wooden panel	A1 375 02.0	
		Loudspeakercloth	06 601 42.0	
		Rear panel	A1 356 98.0	
8	10	Glass pointer	57 027 76.0	
8	11	Screw for fixing the shafts for guiding the pointer	A1 854 62.0	
8	12	Flat spring under the two higher screws of pos. 11	A1 978 92.1	
8	13	Spiral spring under the two lower screws of pos. 11	A1 973 18.0	
6	37	Driving drum	23 687 13.1	
6	32	Spring for the pointerstring	28 740 59.0	
6	31	Spring for the driving cord	28 740 51.0	
6	34	Vernier unit	A1 322 06 0	
6	35	Flat spring for pos. 34	28 751 81.1	
6	36	Fibre strip for pos. 34	28 681 11.1	
6	39	Cogwheel	A1 346 10.0	
6	38	Spring for pos. 39	28 730 85.0	
6	33	Shaft for wavebandswitch	A1 436 68.0	
		Switch element no. 1	49 543 08.1	
		Switch element no. 2	49 543 30.1	
		Switch element no. 3	49 543 44.0	
		Mains voltage connecting plate	28 875 39.0	
		Valveholder for L2 (colour 344)	28 839 81.0	
		Gramophone switch	A1 133 35.0	
		Rubber grommet under the variable condenser	28 725 52.0	
		LOUDSPEAKER.		
		Service clamping ring	25 871 81.0	
		Paper ring	28 451 54.0	
		Cone with coil	28 220 51.1	
		TOOLS.		
		Service oscillator	GM 2880F	
		Universal Measuring Apparatus	GM 4256	
		Universal and Valve Measuring Apparatus	GM 7629	
		15°-gauge	09 992 44.0	
		Centring-gauge for loudspeaker	09 991 53.0	
		Insulated trimming screw driver	M646 38 2	
		Insulated trimming key 6 mm	23 685 66.0	

COILS.

	Value	Codenumber	Price		Value	Codenumber	Price
				S21	2 Ohm	A1 035 66.1	
S1	—			S22	5.5 Ohm		
S2	200 Ohm			S23	7 Ohm		
S3	< 1 Ohm	A1 055 44.3		S24	7 Ohm	A1 035 67.1	
S4	< 1 Ohm			C31	100 pF		
S5	3 Ohm			C32	106 pF		
S6	< 1 Ohm	A1 035 61.1		S25	10 Ohm		
S7	7 Ohm			S26			
S8	0.8 Ohm			S27	6 Ohm	A1 035 68.2	
S9	20 Ohm	A1 035 64.0		C37	106 pF		
S10	4 Ohm			C38	113 pF		
S12	< 1 Ohm			S28	600 Ohm		
S13	< 1 Ohm	A1 035 62.2		S29	< 1 Ohm	A1 103 29.0	
S14	< 1 Ohm			S30	230 Ohm		
S15	3 Ohm	A1 035 65.1		S31	230 Ohm		
S16	< 1 Ohm						
S17	< 1 Ohm			S32	4 Ohm	28 220 51.1	
S18	< 1 Ohm	A1 035 63.5					
S19	1 Ohm			S35	700 Ohm	A1 000 32.0	
S20	< 1 Ohm						

RESISTANCES.

	Value	Codenumber	Price
R1	1800 Ohm	49 356 30.0	
R2	0.82 M.Ohm	49 375 59.0	
R3	39 Ohm	49 375 07.0	
R4	10000 Ohm	49 377 36.0	
R5	0.15 M.Ohm	49 375 50.0	
R6	3.3 Ohm	49 377 66.0	
R7	150 Ohm	49 375 14.0	
R8	0.1 M.Ohm/2 = 50,000 Ohm	49 377 48.0	
R9	220 Ohm	49 375 16.0	
R10	33000 Ohm	49 375 42.0	
R11	2×10,000 Ohm= 20,000 Ohm	49 376 36.0	
R12	5.6 M.Ohm	49 377 69.0	
R13	47000 Ohm	49 375 44.0	
R14	47000 Ohm	49 375 44.0	
R15	22000 Ohm	49 375 40.0	
R16	68000 Ohm	49 375 46.0	
R17 / R17a	0.65 M.Ohm / 0.2 M.Ohm	49 500 19.0	
R18	1000 Ohm	49 375 24.0	
R19	1 M.Ohm	49 376 60.0	
R20	180 Ohm	49 376 15.0	
R21	47000 Ohm	49 375 44.0	
R22	1.5 M.Ohm	49 376 62.0	
R23	82000 Ohm	49 375 47.0	
R24	1800 Ohm	49 375 27.0	
R25	0.35 M.Ohm	49 470 31.0	
R28	5.6 M.Ohm	49 377 69.0	
R29	12000 Ohm	49 375 37.0	
R30	12000 Ohm	49 375 37.0	
R31	2700 Ohm	49 375 29.0	
R32	47000 Ohm	49 375 44.0	
R33	39000 Ohm	49 375 43.0	
R40	2.2 M.Ohm	49 377 64.0	
R41	2.2 M.Ohm	49 377 64.0	
R42	1 M.Ohm	49 376 60.0	
R43	1.5 M.Ohm	49 376 62.0	
R44	0.82 M.Ohm	49 375 59.0	

TUBES.

L1	L2	L3	L4	L5	L6	L7
EF8	ECH3 B	EBF2	EL3	AZ1	8091 D-00	EM4

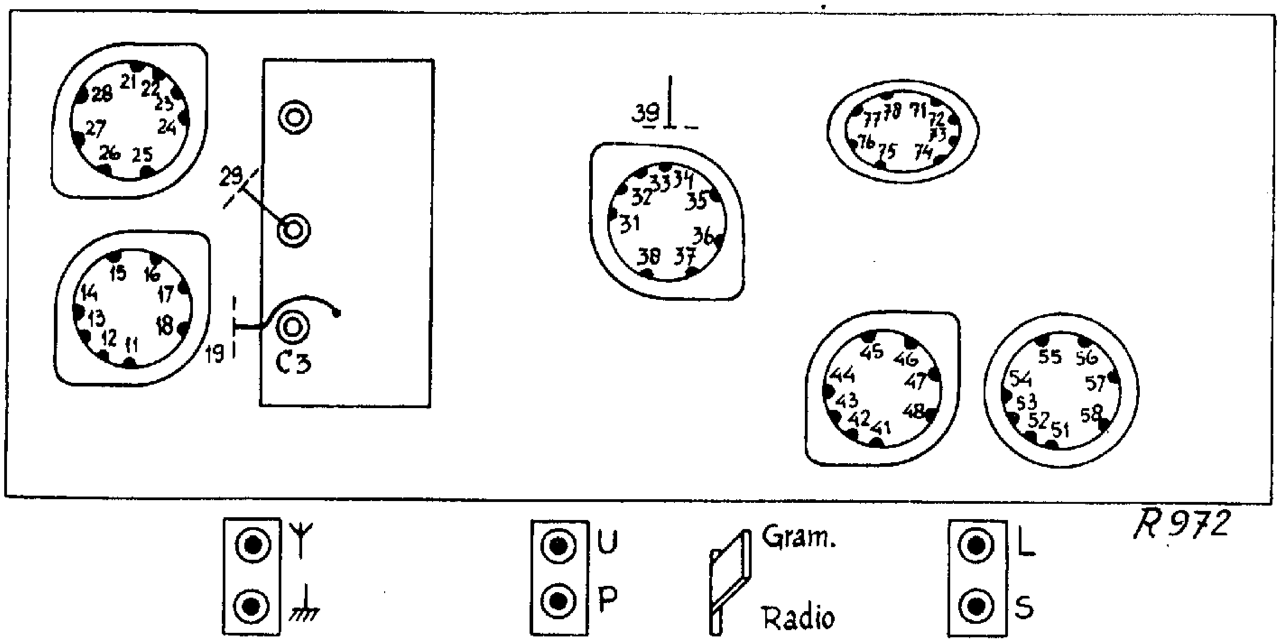
CURRENTS AND TENSIONS.

	Va	Va tr.	Vg2	Vkath	Ia	Ia tr.	Ig2
L1	150		170	0.3	7.6		0.2
L2	220	115	80	1.2	1.4	4.6	2.2
L3	225		85	0	4.6		1.5
L4	255		225	6.2	32		3.1
L7	20		225	0	0.2 and 0.1		0.6

Vc1 = 275 V. Vc2 = 225 V.
Primary consumption = 50 Watt.

CONDENSERS.

	Value	Codenumber	Price
C1	48 μF	49 025 22.0	
C2	48 μF	49 025 22.0	
C3 / C4 / C5	11—490 pF / 11—490 pF / 11—490 pF	49 000 09.0	
C6	10000 pF	49 127 14.0	
C7	68 pF	49 055 48.0	
C8	20 pF	49 005 03.0	
C9	20 pF	49 005 03.0	
C10	20 pF	49 005 03.0	
C11	100 pF	49 055 49.0	
C14	10000 pF	49 128 57.0	
C15	20 pF	49 005 03.0	
C16	20 pF	49 005 03.0	
C17	20 pF	49 005 03.0	
C19	10000 pF	49 127 14.0	
C20	0.1 μF	49 128 63.0	
C21	100 pF	49 055 28.0	
C22	150 pF	49 055 30.0	
C23	220 pF	49 055 32.0	
C24		49 005 13.0	
C25	20 pF	49 005 05.0	
C26	20 pF	49 005 03.0	
C27	5750 pF	28 195 69.0	
C28	1600 pF	49 080 34.0	
C29	400 pF	49 057 00.0	
C30	125 pF	28 212 07.0	
C31 / C32	100 pF / 106 pF	Vide "Coils"	
C33	47000 pF	49 127 61.0	
C34	10000 pF	49 127 57.0	
C35	10000 pF	49 128 57.0	
C36	100 pF	49 055 28.0	
C37 / C38	106 pF / 113 pF	Vide "Coils"	
C39	100 pF	49 055 28.0	
C40	27000 pF	49 127 19.0	
C41	3300 pF	49 128 08.0	
C42	25 μF	49 020 00.0	
C43	330 pF	49 055 05.0	
C44	4700 pF	49 126 54.0	
C47	1000 pF	49 126 53.0	
C51	22000 pF	49 129 90.0	
C52	0.22 μF	49 128 65.0	
C54	2×2.2 pF par.	49 055 61.0	
C58	47000 pF	49 127 61.0	
C59	47000 pF	49 127 61.0	



RESISTANCE:

12	11	12/13	14	15	16	21	22/23	27 Gram	29 KG1	29 KG2	31	32/33	34	42/43	52/53	72/73
	10	10	400	10	10	10	10	10	10	40	10	10	10	10	10	10
12	74	Y KG1	Y KG2	Y MG for	Y MG loc	C3 KG1	C3 KG2	C3 MG for	C3 MG loc							
	10	120	210	350	350	10	40	150	150							
11	24	28	38	44	47	48	55	58	77							
	215	450	450	240	450	385	170	165	450							
10	18	25	26	27												
	320	240	140	185												
9	17	19	29 MG for	29 MG loc	35	36	37	39	46	P Gram	75	76	78			
	360	80	120	120	120	250	400	65	130	150	100	120	140			

CAPACITY:

12								**10**							
11	27	35						**9**	44	47	52				
	255	150							460	480	475				

NUMBERING OF THE CONTACTS.
The first number indicates the number of the tube, the second number corresponds with the number indicated in fig. 3 and 4.

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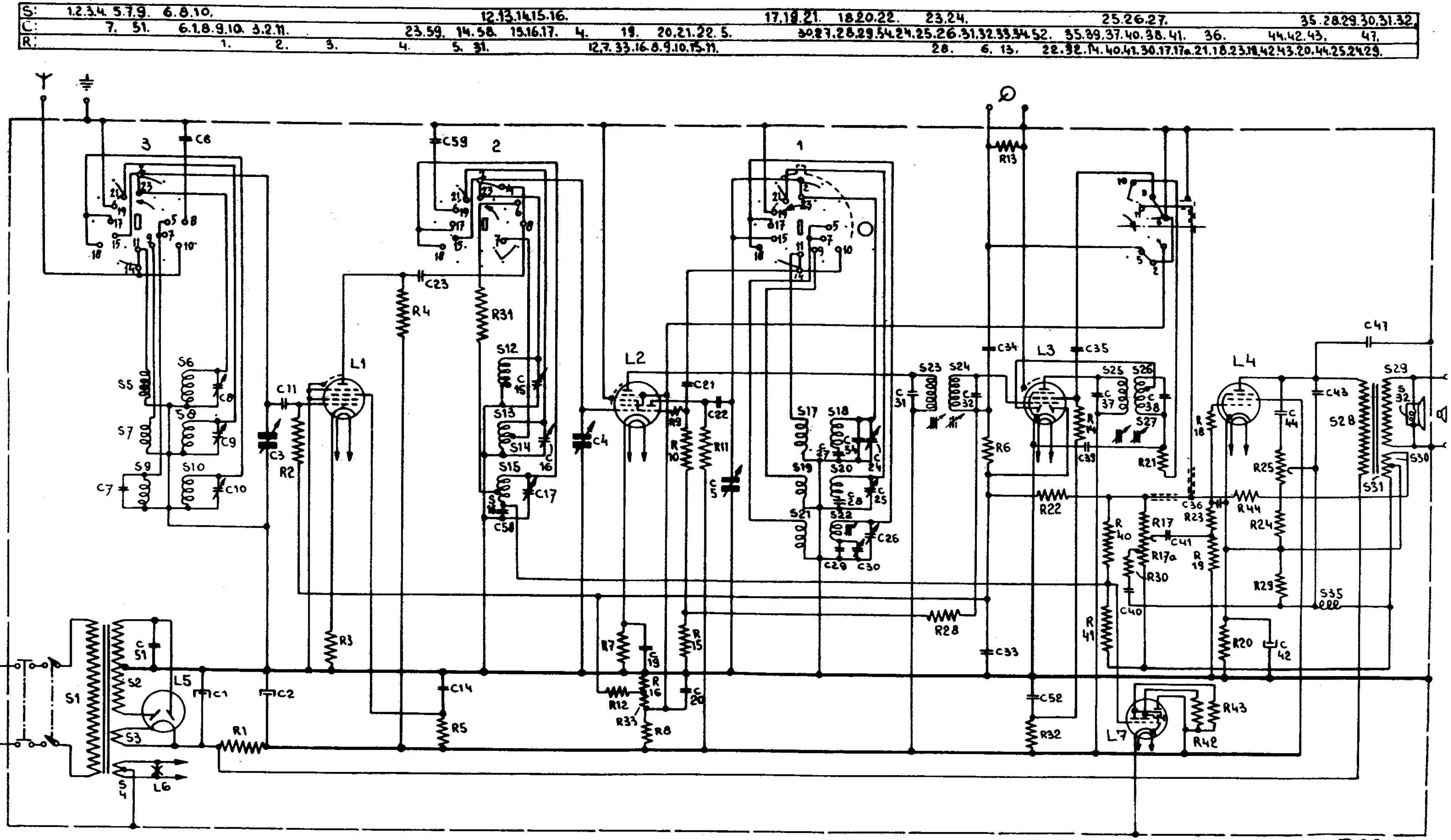

Fig 1

R990

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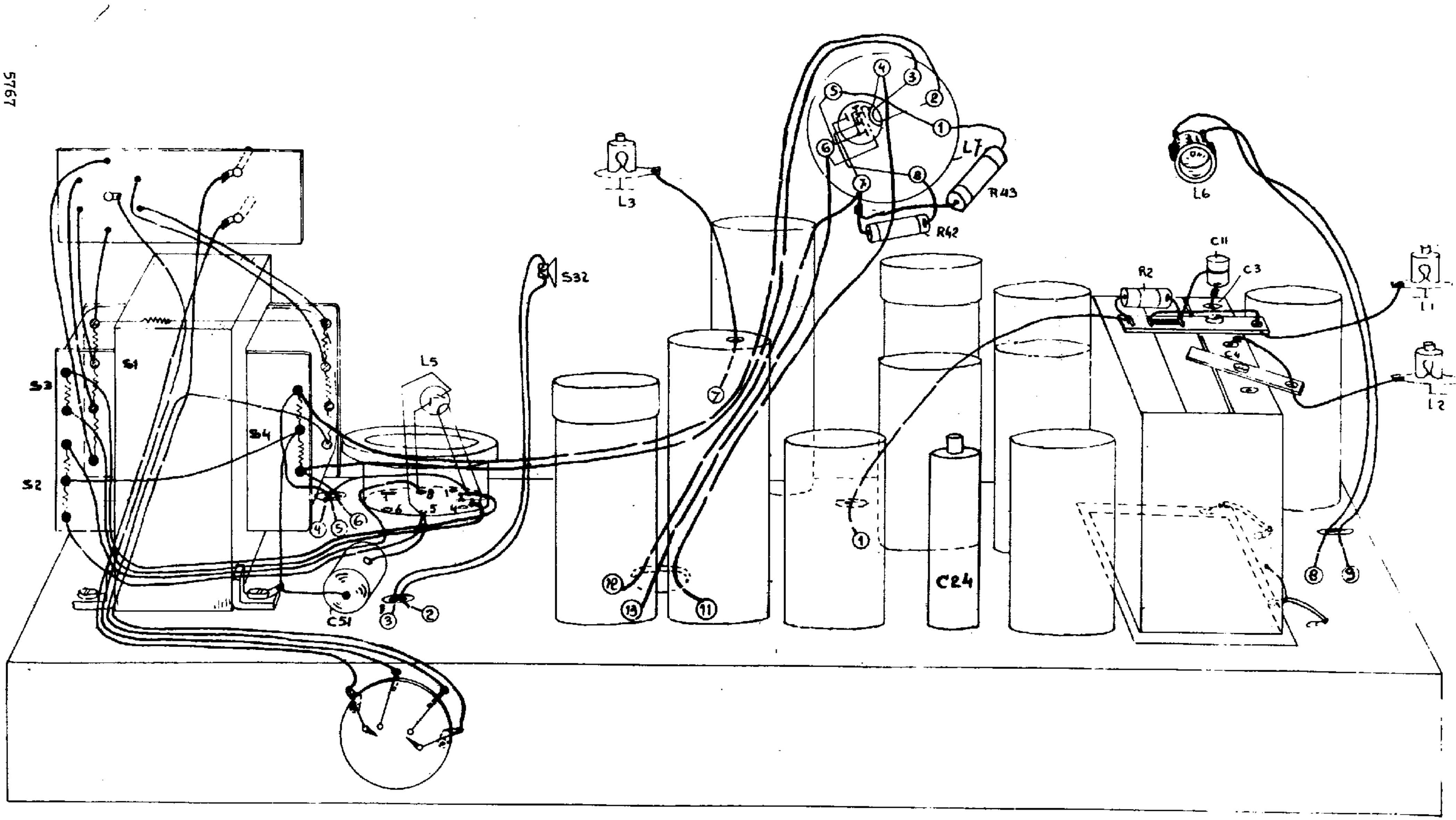

S:	3, 2, 1 4 32.
C:	51. 24 11.
R:	43. 42. 2.

Fig 2

R 991

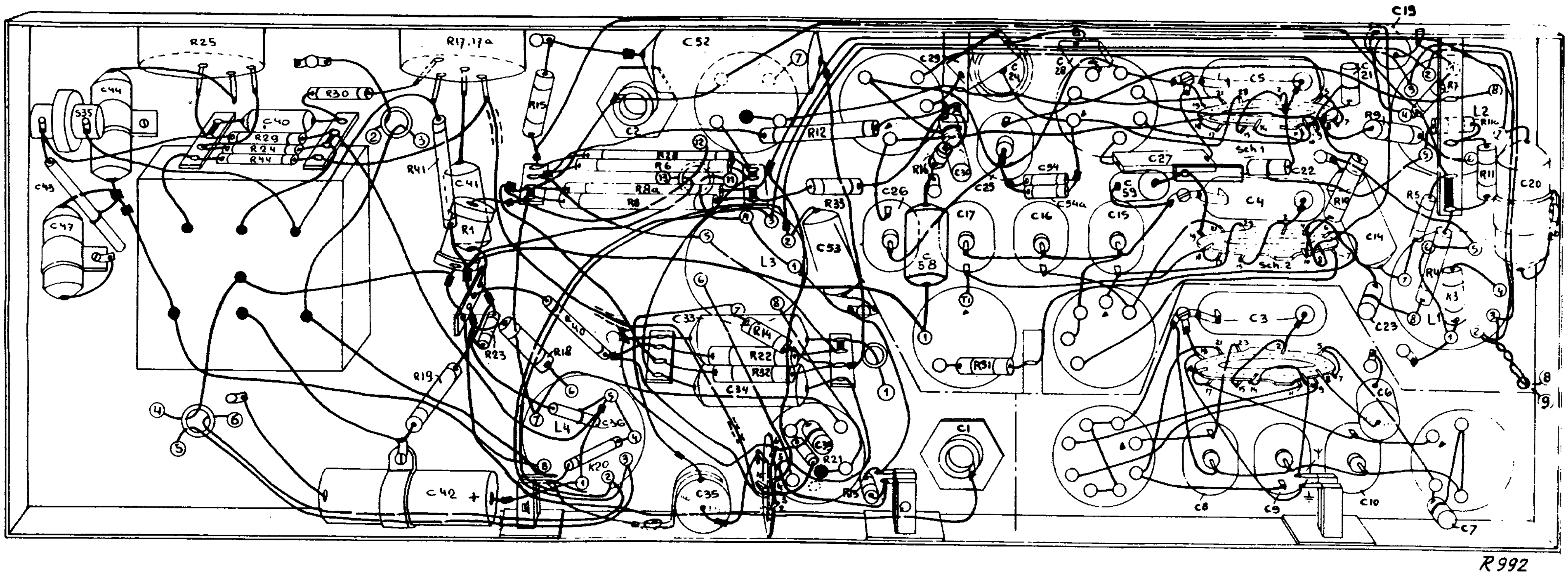

Fig 3

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S:	35 · 30, 28. 31. 29 · 24 · 23.27.26. 25. 21. 22. 16. 15 · 20.18.12.14.7.8.6.13.19. · 10.9
C:	47. 43. 44. · 40. · 42. 41. · 36. 2. 52.32.31.35.34.33.39.53.37.38 · 26.58.30.1.29.17.24.25.54.16.28.15.59. 27. · 5.4.3.8.9.10.22. 21.14.19.23.6. 7.20.
R:	25. · 44.24.29. 30. · 41. 19.17.17a.1.23.18. .15.40.20 · 8.8a.6.28. · 14.22.32.21.12.33.13. · 16. 31. · 10. 9. 7.5.4.3. 11.11a.

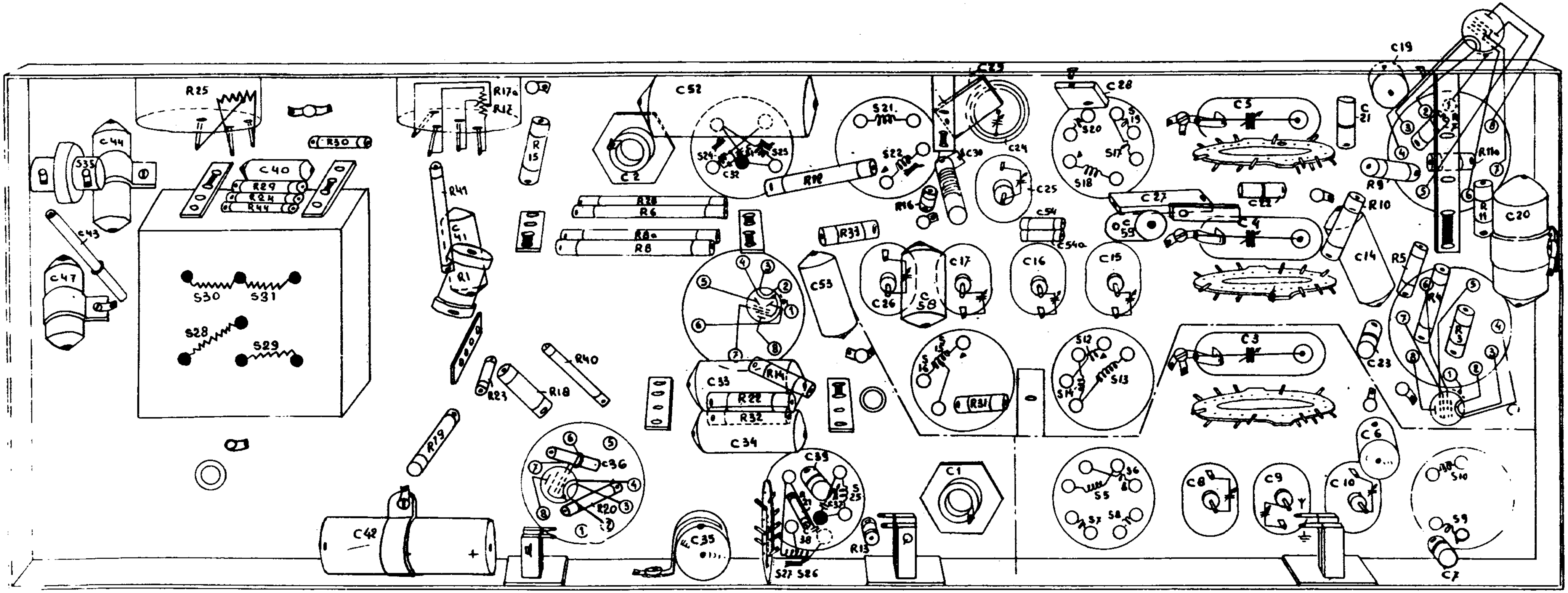

Fig 4

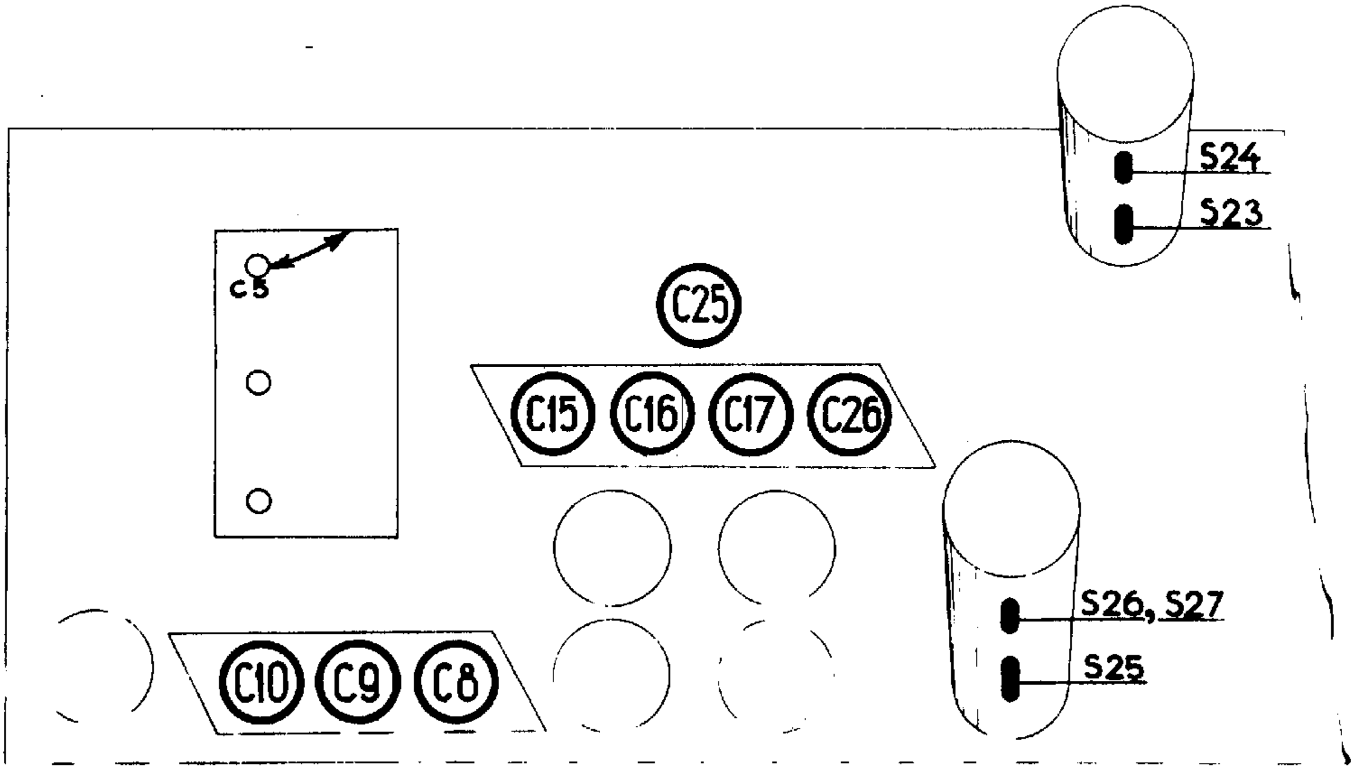

Fig 5

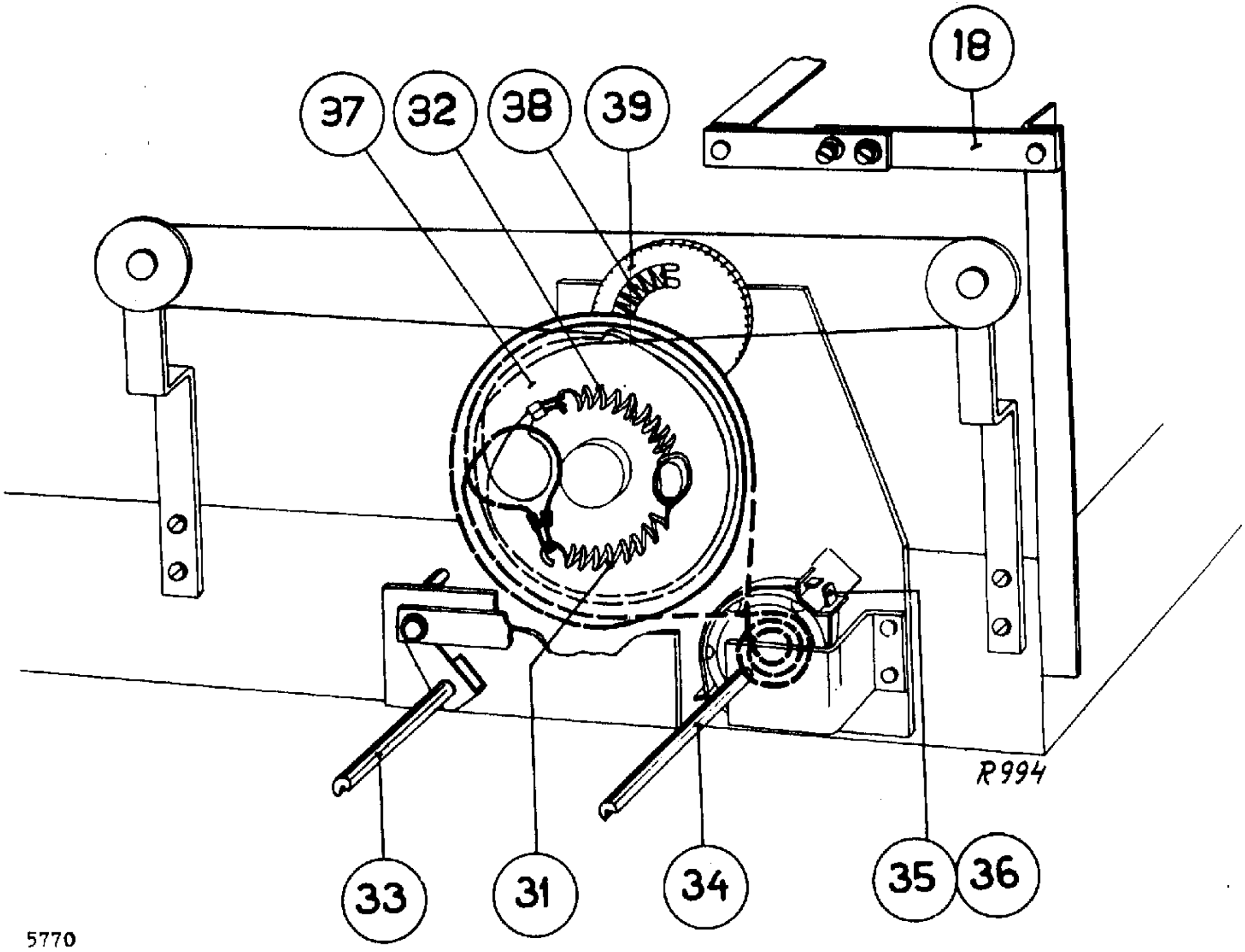

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Fig 6

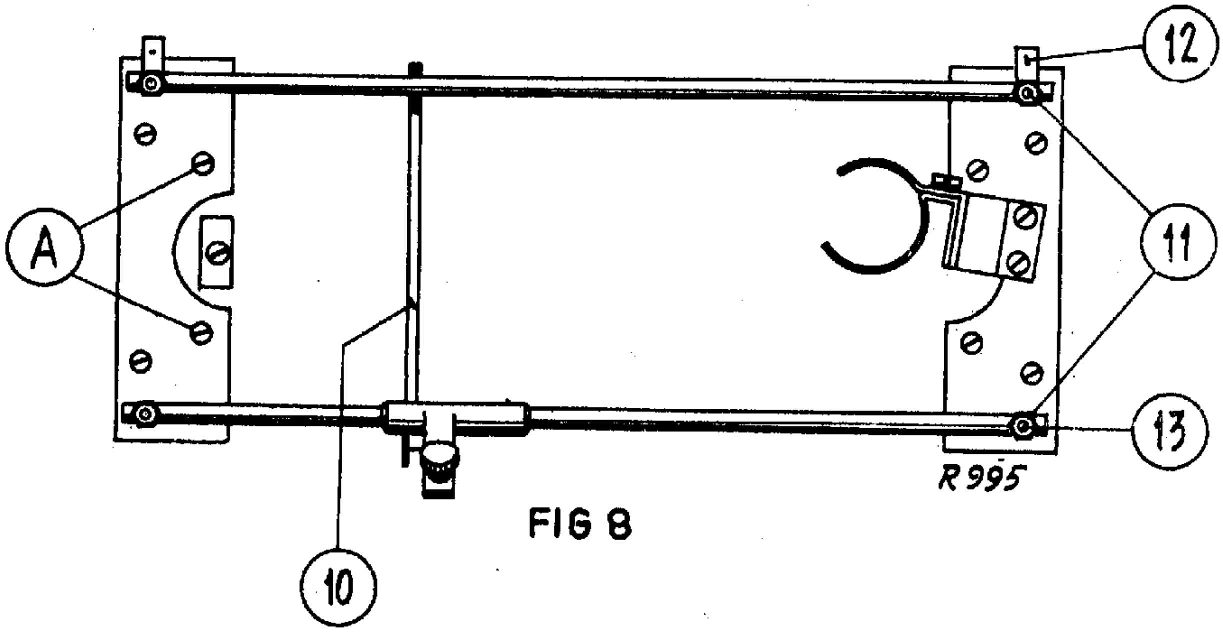

FIG 8

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