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PHILIPS

SERVICE DOCUMENTATION

for receiver

314 X

FOR A.C. MAINS FEEDING

WAVERANGES

Short wave 1: 13.5 — 45 m (22.2 — 6.67 mc)
Short wave 2: 45.—165 m (6.67— 1.8 mc)
Medium wave: 165.—560 m (1800 —535.6 kc)

CONTROL KNOBS

From right to left:
1. Tuning.

2. Waveband switch.
3. Volume control with mains switch.
4. Tone control.

DIMENSIONS

Width: 58 cm
Height: 31.5 cm } knobs included.
Depth: 24.5 cm

WEIGHT: 11.6 kg, tubes included.

CIRCUIT DETAILS

TUNING INDICATOR.

Part of the I.F. voltage detected by the second diode (signal diode) of L3 is tapped from the potentiometer R18-R19 and applied to the control grid of the tuning indicator L8. On the signal becoming more powerful on the diode the negative bias on the grid of L8 increases, so that the anode current decreases. The voltage drop across R32 and R40 becomes smaller and therefore also the voltage difference between the screen and the two with each of the plates interconnected deflection plates.

The screening effect of the deflection plates diminishes, the light spots become wider. The two anodes and the corresponding part of the control grid are designed in such a way that the first part already reacts with weak signals and the second part not before powerful signals occur. The receiver is correctly tuned when the light spots are widest.

INVERSE FEED-BACK.

Inverse feed-back is provided in two ways:

- a. The L.F. voltage is fed back from the loudspeaker transformer-coil S30 via R29, R28, C49, R30, C53 to the anode circuit of L4.
- b. A part of the I.F. voltage is fed back from the anode circuit of L4 to the grid circuit of this tube via C55, C45, C46, R25 and R26.

L4 is regulated by the automatic volume control (via R15), so that the amplification of L4 depends on the incoming signal. However, along with the amplification the degree of inverse feed-back is also controlled. By a proper choice of the resistances and condensers in the inverse feed-back circuit and combination of the two methods it has been possible to achieve that a suitable frequency trend is obtained for weak and strong signals.

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 sensitive or selective enough.

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 L.F. is 452 kc.

The I.F. bandwidth 1 : 10 is $12^{3/4}$ kc.

The bandwidth at 1000 kc 1 : 10 is: $11^{1/2}$.

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. Short-circuit C33.
3. Apply a modulated signal of 452 kc via a condenser of 32,000 μMF to the first grid of L2.
4. Detune the third circuit by connecting a condenser of 80 μMF in parallel with S25-S31.
5. Tune S26-S27 to maximum output.
6. Detune the second circuit in the same way by connecting a condenser of 80 μMF in parallel with S24.
(From top L3 to chassis).
7. Tune successively S25-S31 and S23 to maximum output.
8. Remove the detuning condenser from S24 and detune the first circuit by connecting a condenser of 80 μMF in parallel with S23.
9. Tune S24 to maximum output.
10. Remove the detuning condenser and seal the coil cores.

B. H.F. AND OSCILLATOR CIRCUITS.

I. SHORT WAVE I (13.5—45 m).

1. Earth the set and switch to short wave 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 with the help of the variable condenser (first maximum starting from minimum capacity).

5. Tune C8, C15 to maximum output. Seal trimmers C8, C15.

NOTE. C24 is tuned to a fixed capacity and may NOT be altered.

II. SHORTWAVE 2 (45—165 m).

1. Fit the 15° gauge (lowest capacity). Switch the set to short wave 2.
2. Apply a modulated signal of 6.1 Mc via the short-wave dummy. Tune the set to this frequency with the aid of C25, C16 and C9.
4. Seal the trimmers.

III. MEDIUM WAVES (165—560 m).

1. Fit the 15° gauge (lowest capacity). Switch the set to short wave 2.
 2. Apply a modulated signal of 1740 kc to the aerial socket via the normal dummy aerial.
 3. Accurately tune the set to this frequency with the aid of C26, C17 and C10.
 4. Connect GM 2404 to the anode of L2, and the output indicator after the GM 2404. Short-circuit the oscillator (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 frequency with the tuning knob.
 7. Take away GM 2404, connect the output indicator after 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 (lowest capacity).
 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 oscillator.
2. Apply to the aerial socket, via a normal dummy aerial, a modulated signal of 857 kc.
3. Accurately tune the receiver to this frequency.
4. Slightly loosen the screw on the pointer and set the pointer exactly to 350 m.
5. Tighten the screw again.

REPAIR AND RENEWAL OF PARTS.

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

TAKING OUT OF THE CABINET.

1. Take of the knobs and remove the rear panel.
2. Unsolder the connections to the loudspeaker.
3. Unscrew the tuning indicator holder (1 screw).
4. Unscrew the connection with the base screening of the chassis.
5. Slightly loosen the screw on the pointer for fixing the string so that the string is released.
6. Turn out the base screws.
7. Slide the chassis out of the cabinet, take the string for the waveband indication off the lever on the chassis. Returning to the cabinet is effected in the reverse order of sequence, after which correctly adjust the pointer (vide sheet 2 "Adjusting the dial").

RENEWING THE DIAL.

For renewing the dial it is not necessary to take the receiver out of its cabinet.

1. Loosen the fixing braces on the right of the dial (2 screws).
2. Loosen the fixing brace on the left of the dial with which the waveband indicator is also secured (2 screws). Be careful not to bend the waveband indicator.
3. Slide the dial with station names upwards between the ornamental window and the guide shaft of the pointer. Mounting is effected in the reverse order.

RENEWING THE POINTER.

1. Slightly loosen the screw on the pointer for gripping the string.
2. Undo the guide shaft for the runner by loosening the two 3 mm nuts near the end of this shaft. (Take care the small springs do not jump away).
3. Loosen the pointer from the pointer runner (1 screw), screw on a new pointer.

NOTE. The new pointer must be covered at the extremities with silk yarn; the length of the covered part is ± 8 mm. The silk covering serves for obtaining the correct distance between the luminous line pointer and the station name dial. The guide shafts must be adjusted in such a way that the pointer can easily be moved without play between the station name dial and these shafts.

MICROPHONIC 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.

- a. Ducts dried out.
- b. Fixing strip with pertinax between the brace on the variable condenser and the brace on the chassis riveted too firmly to these braces.
- c. Connections at the variable condenser too stiff or too taut.

VERNIER UNIT.

Slipping of the vernier unit may be caused by too weak springs (fig. 6) or greasy strips 36 between the springs 35 and the vernier drum 34. Bend the springs or clean the strips. Proceed as follows for renewing the whole unit:

1. Take the receiver out of its cabinet.
2. Take the driving strings of the large drum.
3. Turn the driving drum in such a way that the large hole in the drum is just before the left-hand fixing screw of the mounting plate of the driving mechanism. Loosen this screw.
4. Loosen the right-hand fixing screw for the mounting plate of the driving mechanism.
5. Unscrew the cogwheel on the condenser shaft (2 screws).
6. Remove the brace of the vernier unit.
7. Remove the clamping ring on the shaft of the vernier unit.
8. Take out the vernier unit and renew it.
9. Mount in the reverse order; make sure the strings are properly fitted and that the two halves of the cogwheel engage in the teeth of the large cogwheel in such a way that the springs 38, fig. 6 between these two halves are slightly compressed.

DRIVING CABLES.

The way the driving cables have to run is indicated in fig. 6.

Lengths:
string for the pointer of the station name dial 920 mm
string for the waveband indicator 520 mm
outer cable for waveband indicator 350 mm
driving string for the variable condenser 460 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.

COILS

	Value	Code number	Price
Z1	34 ohm (245 V)	A1 055 44.0	
S1			
S2			
S3			
S4			
S5			
S6			
S7			
S8			
S9			
S10			
S12			
S13			
S14			
S15			
S16			
S17			
S18			
S19			
S20			

	Value	Code number	Price
S21	2 ohm	A1 035 66.0	
S22	6.5 ohm		
S23	9 ohm		
S24	9 ohm	A1 036 08.0	
S32	1 ohm		
S35	1 ohm		
C31	94 ohm		
C32	97 ohm		
S25	3 ohm	A1 036 09.0	
S26	—		
S27	3 ohm		
S31	4 ohm		
C37	103 μ F		
C38	113 μ F		
S28	240 ohm		
S29	240 ohm		
S30	1 ohm		
S34	9 ohm		
S33	4 ohm	28.220 51.1	

LIST OF PARTS AND TOOLS

When ordering parts always state:

1. Code number.
2. Description.
3. Type number of receiver.

Fig.	Pos.	Description	Code number	Price
7	1	Cabinet	A1 245	47.2
7	2	Decorative window (colour 038)	23 684	97.0
7	3	Station name dial	A1 894	53.0 ^o
7	4	Knob (colour 038)	23 612	29.0
7	5	Decorative strip	A1 345	16.0
7	6	Trade mark	28 713	27.1
7	7	Loudspeaker cloth	06 601	29.0
		Rear panel	A1 715	70.0
		Safety contact	28 839	51.1
		Casting (colour 1175)	23 660	59.3
		Plate	28 713	24.1
		Plate spring	28 753	02.1
		Plate spring	28 753	03.1
8	10	Spring for waveband indicator	A1 973	11.0
8	11	Plate for waveband indicator	A2 871	33.0
8	12	Pointer	A1 436	43.0
8	13	Spiral spring for shaft of pointer runner	A1 973	18.0
8	14	Screw for shaft of pointer runner	A1 854	25.1
8	15	Tube holder for L2	28 839	81.0
8	16	Tube holder for L1, L3, L4, L5	25 161	92.1
8	17	Rubber duct for variable condenser	28 725	52.0
8	18	Radio-gramophone switch	A1 133	08.0
8	19	Tube holder for L6	28 226	10.0
8	20	Mains voltage connecting plate	28 875	04.0
8	21	Fixing screw for loudspeaker	07 472	03.0
6	31	Drawspring for pointer string	28 740	59.0
6	32	Drawspring for driving string	28 740	51.0
6	33	Shaft for the driving mechanism of the waveband switch	A1 436	37.0
6	34	Vernier unit	A1 322	04.0
6	35	Plate spring for pos. 34	28 751	81.1
6	36	Fibre strip for pos. 34	28 681	11.1
6	37	Drum for driving strings	23 687	13.1
4	38	Pressure spring for driving cogwheels	28 730	85.0
4		Switch element No. 1	49 543	08.1
4		Switch element No. 2	49 543	30.1
4		Switch element No. 3	49 543	44.0
LOUDSPEAKER TYPE 9636				
		Protective cap	28 256	17.0
		Flanged ring	25 871	81.0
		Paper ring	28 451	54.0
		Anti-directional-effect cone	23 666	66.1
TOOLS				
		Aperiodic amplifier	GM 2404	
		Service oscillator	GM 2880P	
		Universal measuring apparatus	GM 4256	
		Universal and tube measuring apparatus	GM 7629	
		15° gauge	09 992	44.0
		Centring gauge for loudspeaker	09 991	53.0
		Insulated trimming screwdriver	M646.382	
		Insulated trimming plug-in key 6 mm	23 685	66.0

^o When renewing the station name dial always use a dial with the same code number as the one to be replaced.

For parts not mentioned on this list vide the "General list of parts".

RESISTANCES

	Value	Code number	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	10.000 ohm	49 377 36.0	
R5	33.000 ohm	49 375 42.0	
R6	0.47 M.ohm	49 375 56.0	
R7	150 ohm	49 375 14.0	
R8	0.1 M.ohm	49 375 48.0	
R9	220 ohm	49 375 16.0	
R10	39.000 ohm	49 375 43.0	
R11	$\frac{20,000}{2} = 10,000$ ohm	49 375 36.0	
R14	0.1 M.ohm	49 376 48.0	
R15	0.47 M.ohm	49 375 56.0	
R16	0.18 M.ohm	49 375 51.0	
R17	0.35 M.ohm	49 500 13.0*	
R18	2.2 M.ohm	49 376 64.0	
R19	4.7 M.ohm	49 377 68.0	
R20	1 M.ohm	49 376 60.0	
R21	0.33 M.ohm	49 375 54.0	
R22	1000 ohm	49 375 77.0	
R23	0.5 M.ohm	49 470 30.0	
R24	180 ohm	49 376 15.0	
R25	2.7 M.ohm	49 376 65.0	
R26	2.7 M.ohm	49 376 65.0	
R27	18.000 ohm	49 375 39.0	
R28	330 ohm	49 375 18.0	
R29	3.300 ohm	49 375 30.0	
R30	3.300 ohm	49 375 30.0	
R31	1 M.ohm	49 375 60.0	
R32	1 M.ohm	49 375 60.0	
R33	10.000 ohm	49 375 36.0	
R35	0.1 M.ohm	49 375 48.0	
R36	10.000 ohm	49 375 36.0	
R37	2.2 M.ohm	49 376 64.0	
R38	1 M.ohm	49 375 60.0	
R39	0.47 M.ohm	49 375 56.0	
R40	1.5 M.ohm	49 375 62.0	
R41	5.6 M.ohm	49 377 69.0	
R43	5.600 ohm	49 377 33.0	

*) Carbon potentiometer.

CURRENTS AND TENSIONS

	Va	Vg2(3)	Vk	Ia	Ig2(4)
L1	140	200	0,3	8,3	0,27
L2	triode	115	—	5	—
	hexode	220	50	1	1,65
L3	225	65	—	2,9	1,—
L4	15	23	—	0,52	0,2
L5	265	225	5,5	29	2,87
L8	65	230	—	0,03	0,06
	45		—	0,04	
	Volt	Volt	Volt	mA	mA

VC1 = 275 Volt

Primary consumption 50 W.

VC2 = 225 Volt.

VC30 = 200 Volt.

The above values were measured with a measuring instrument GM 7629 or GM 4256. These apparatus, when used as voltmeter, have a resistance of 2000 ohms per volt. When voltmeters with a low internal resistance are used the measured values will generally be lower.

CONDENSERS

			Price
C1	50 μ F	49 025 02.0	
C2	50 μ F	49 029 01.0	
C50	15 μ F		
C3	11-490 μ F		
C4	11-490 μ F	49 000 09.0	
C5	11-490 μ F		
C6	10.000 μ F	49 127 14.0	
C7	68 μ F	49 055 48.0	
C8	20 μ F	49 005 03.0	
C9	20 μ F	49 005 03.0	
C10	20 μ F	49 005 03.0	
C11	100 μ F	49 005 49.0	
C12	10.000 μ F	49 128 57.0	
C14	10.000 μ F	49 128 57.0	
C15	20 μ F	49 005 03.0	
C16	20 μ F	49 005 03.0	
C17	20 μ F	49 005 03.0	
C19	10.000 μ F	49 127 14.0	
C20	56.000 μ F	49 128 23.0	
C21	56 μ F	49 055 25.0	
C22	100 μ F	49 055 28.0	
C23	220 μ F	49 055 32.0	
C24		49 005 13.0	
C25	20 μ F	49 055 05.0	
C26	20 μ F	49 055 03.0	
C27	3750 μ F	28 195 69.0	
C28	1600 μ F	49 080 34.0	
C29	400 μ F	49 080 92.0	
C30	200 μ F	28 212 08.0	
C31	94 μ F		
C32	97 μ F	Vide „Coils”	
C33	47.000 μ F	49 127 61.0	
C35	56.000 μ F	49 128 23.0	
C37	103 μ F		
C38	113 μ F	Vide „Coils”	
C39	100 μ F	49 055 28.0	
C40	50 μ F	49 020 01.0	
C41	22.000 μ F	49 128 18.0	
C43	22.000 μ F	49 128 18.0	
C44	2.200 μ F	49 129 81.0	
C45	56 μ F	49 055 25.0	
C46	390 μ F	49 055 35.0	
C47	0.1 μ F	49 128 63.0	
C48	0.1 μ F	49 127 26.0	
C49	33.000 μ F	49 128 20.0	
C50	15 μ F	Vide C2	
C51	50 μ F	28 182 32.0	
C52	680 μ F	49 128 00.0	
C53	0.1 μ F	49 128 26.0	
C54	10.000 μ F	49 127 14.0	
C55	10.000 μ F	49 128 57.0	
C56	3,7 μ F	1,5 μ F	49 055 60.0
C57	2,2 μ F	49 055 61.0	
C58	47.000 μ F	49 127 22.0	
C59	22 μ F	49 055 20.0	
	68 μ F	49 055 26.0	

TUBES

L1	L2	L3	L4	L5	L6	L8
EF8	ECH3 (10)	EBF2	EBF2	EL3	AZ1	EM4

Dial lightinglamp: 8091D-00.

In Fig. 1 the waverange switch is designed in pot SW1.

5	1,2,3,4	5,6,7,8,9,10	2,3,4,5,6	11,12,13,14,15,16,17,18,19,20,21,22	23,24,25,26,27,28,29,30,31,32	33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55	56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100
6	1	2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100	1	2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100	1	2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100	1

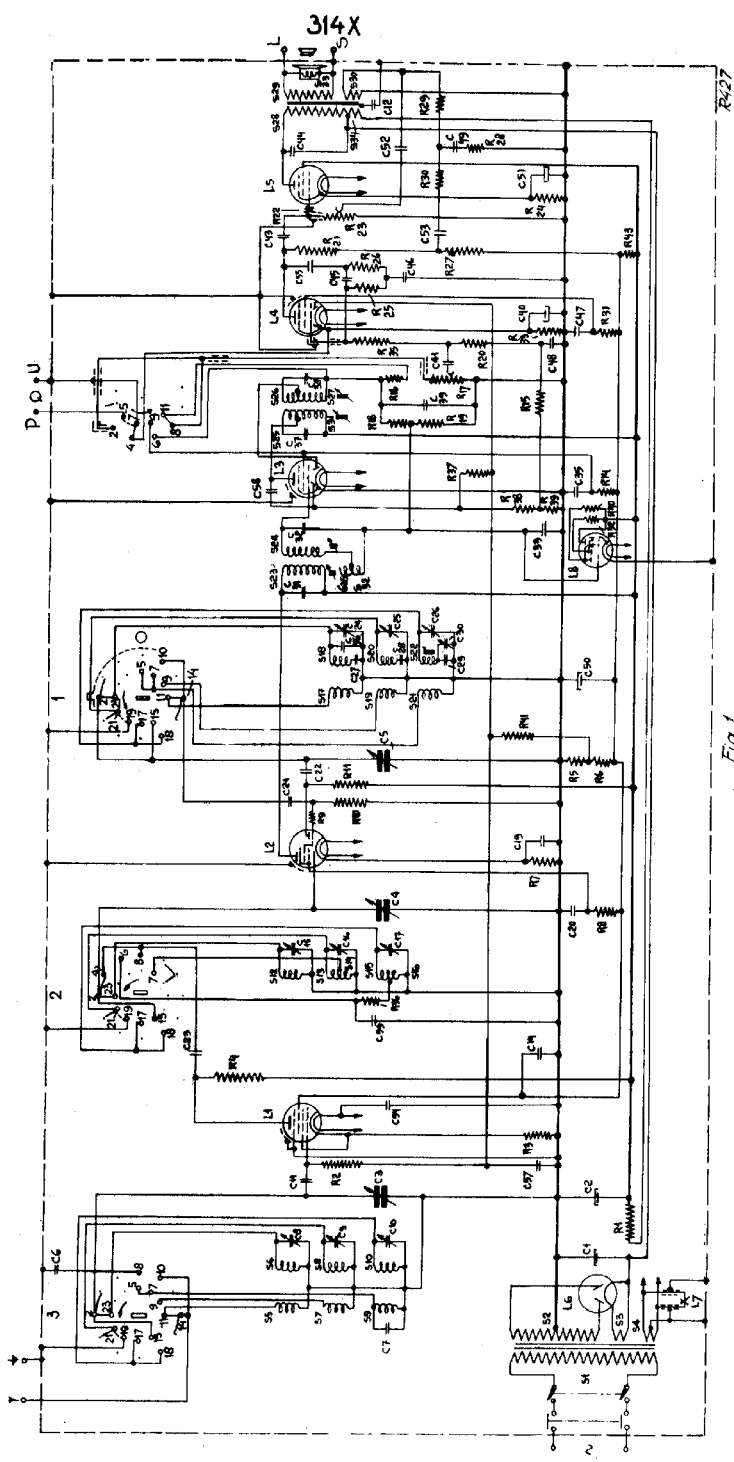


Fig 1

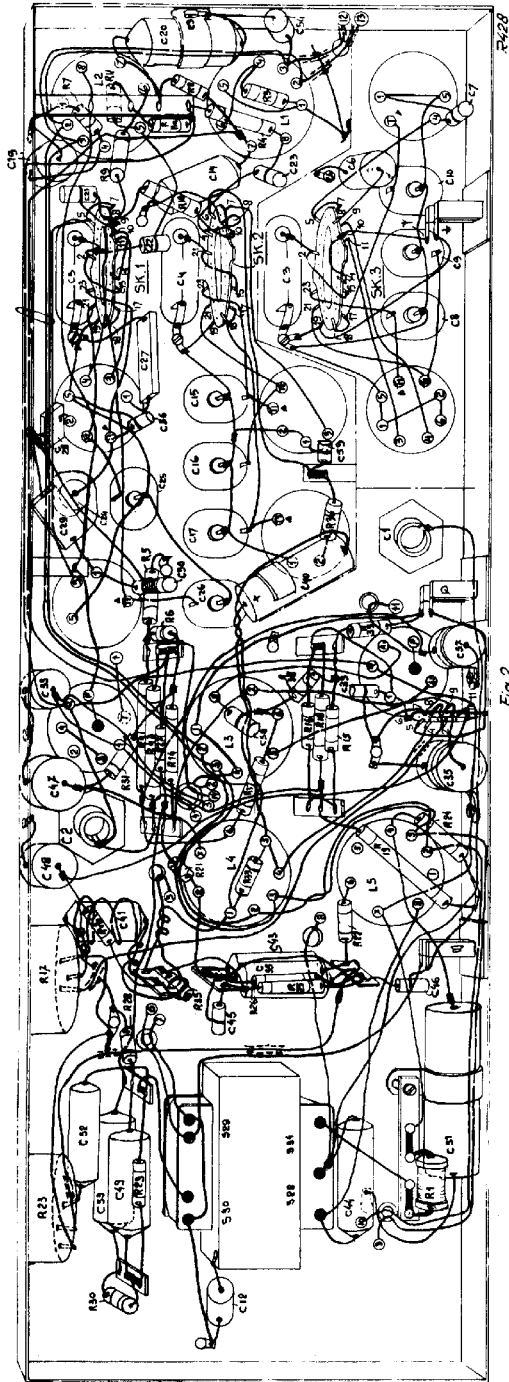
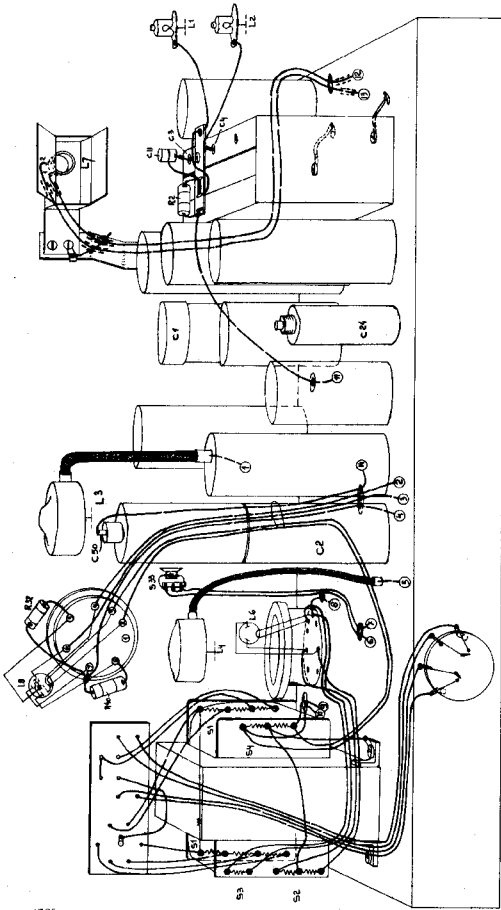


Fig. 2

314X



R429

Fig 3

314X

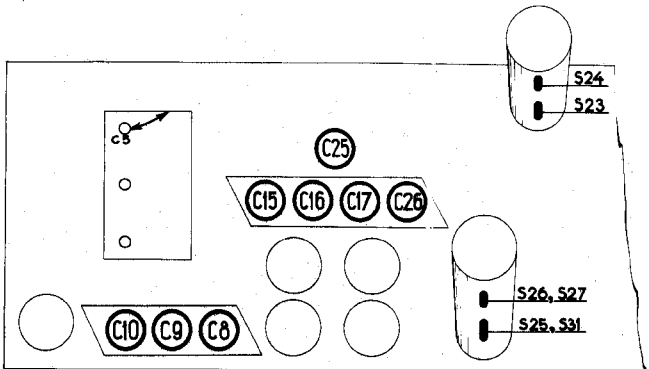


Fig. 5

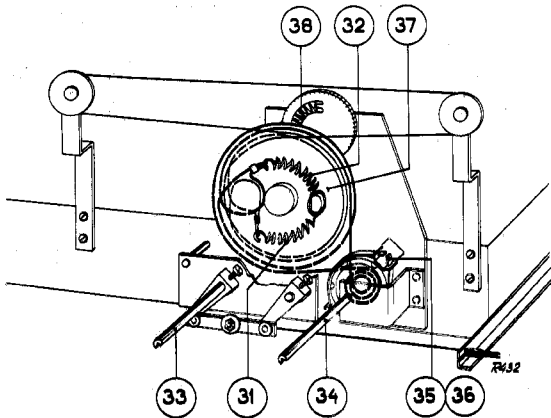


Fig. 6

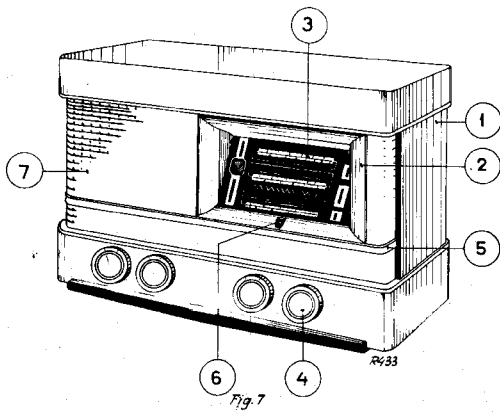


Fig. 7

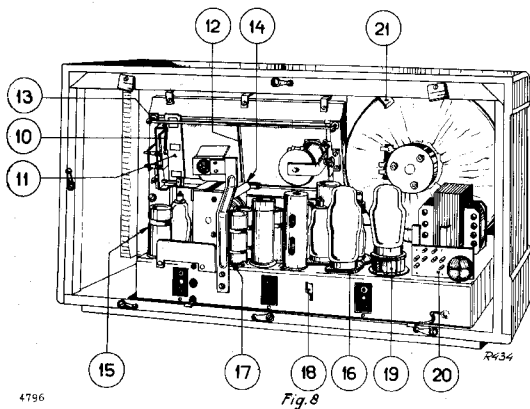


Fig. 8