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Radio Techn. Bureau  
VOELENTZANG  
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# PHILIPS

## SERVICE MANUAL

FOR RECEIVER

# 656 A

FOR A.C. MAINS SUPPLIES

### WAVE RANGES

S.W. band: 13,7— 51 m ( 21,9— 5,88 Mc/s)  
 M.W. band: 178 — 585 m (1685 — 512 kc/s)  
 L.W. band: 708 — 2000 m ( 423 — 150 kc/s)

### CONTROL KNOBS

Left-hand side, above: mains switch  
 below: tone control

In front, left: volume control  
 right: wavelength switch

Right-hand side: tuning knob

LOUDSPEAKER: type 9678 or 9678-R50

### DIMENSIONS:

Width: 43 cm. }  
 Height: 27,5 cm. } including knobs.  
 Depth: 22 cm. }

WEIGHT: 6,9 kg. including tubes.

### BANDWIDTH

- The I.F. bandwidth (1 : 10) is 11 kc/s, measured from grid 1 of tube B2.
- The total bandwidth (1 : 10) is:  
 on M.W. (at 1000 kc/s): + 11 kc/s  
 on L.W. (at 160 kc/s):  $\pm 9$  kc/s  
 Th I.F. is 468 kc/s.

In the principle diagram the wavelength-switch is drawn in S.W. position; the subsequent positions are: S.W.; M.W.; L.W.

### TRIMMING OF THE RECEIVER

#### GENERAL

For trimming it is not necessary to uncase the receiver. The trimmers are attainable, when removing the bottomplate. On all wave ranges the oscillator-frequency is higher than the R.F.-tuning. For parts, needed when trimming, see „List of spare parts and tools”.

#### A. I.F.-BANDFILTERS

After adjusting the I.F.-bandfilters in the works, these cannot be trimmed anymore.

In case of renewal of the I.F.-coils, these too are first adjusted in the works, so that these coils can be mounted in the receiver without trimming. The I.F. = 468 kc/s.

#### B. R.F. AND OSCILLATOR-CIRCUITS

##### 1. SHORT WAVE RANGE

The short wave range cannot be trimmed; therefore it is necessary when exchanging coils in this range, to bring the wiring in its original position.

##### II. MEDIUM WAVE RANGE

- Fit the 15° jig and turn the condenser against the jig (minimum capacity).
- Connect output-indicator via trimming-transformer to the extension speaker-sockets.
- Wavelength-switch on M.W. Volume control on maximum.
- Apply a modulated signal of 1650 kc/s via a normal artificial aerial to the aerial-socket.

- Adjust trimmer C38 (see fig. 4) for maximum output.
- Adjust trimmer C18 (see fig. 4) for maximum output.
- Check with circuit tester, if C18 has been adjusted accurately. Add windings to the trimmer when with insertion of iron the output increases and uncoil when with insertion of copper the output increases.
- Seal the trimmers.

#### III. LONG-WAVE RANGE

- Short-circuit C7.
- Connect anode of B2 via 25 pF with aerial socket of an auxiliary receiver or with an aperiodic amplifier (G.M. 2404). Connect output indicator to the auxiliary receiver.
- Apply modulated signal of 160 kc/s to the aerial socket of the receiver to be trimmed.
- Tune both sets by means of the tuning knobs exactly on maximum output.
- Disconnect auxiliary receiver or aperiodic amplifier and short-circuit of C7. **Do not turn the tuning knob.**
- Connect output indicator via trimming transformer to the extension speaker sockets of the receiver which has to be trimmed.
- Adjust C49 for maximum output. Seal the trimmer.

#### C. ADJUSTING THE DIAL

- Wavelength switch on M.W.
- Apply a modulated signal of 1154 kc/s to the aerial socket.
- Tune receiver to this frequency.
- Disengage pointer and adjust exactly on 260 m.

## REPAIRING AND RENEWAL OF PARTS

In many cases it is not necessary to uncase the receiver, as after removal of the bottomplate one can attain the wiring.

## UNCASING THE RECEIVER

1. Remove knobs.
2. Loosen the screw, with which the pointer is fastened to the tuning cable.
3. Take tuning cable from the guiding wheels and fix it with clamps to the drum of the variable condenser.
4. Disengage the two clamps with which the wire of the pilot-lamps is fastened to the cabinet and remove the pilot-lamps.
5. Unsolder the speaker connections.
6. Disengage mains switch (2 screws). Loosen the small clip with which the wires of the mains switch are fastened to the cabinet.
7. Loosen the 5 screws (3 in the cabinet and 2 in the brackets) with which the cabinet is fixed to the bottom-plate.
8. Pull away the cabinet, during which one has to band both sides a little bit outward in order to come over the tuning shaft.
9. Remove the bottomplate.

## EXCHANGING OF THE VOLUME- AND TONE-CONTROL

Therefore it is necessary to uncase the receiver, after which the renewal is simple.

## ELECTROLYTIC CONDENSERS C1 AND C2

For these condensers there is a screw-thread in the chassis plate so they need not to be fastened by means of a nut.

## TUNING CABLE AND DRIVING CORD

The course of cable and cord is shown in fig. 7. The spring of the driving cord rests against a clip hooked in the drum.

The length of the cord is 540 mm.

The length of the cable is 1340 mm.

The lengths are without loops, so one has to cut off the cables a little longer.

## RENEWAL OF THE DIAL

The dial is fastened with two clamps. Loosen the screw of the left clamp (seen from the back) a few turns.

Remove right clamp. Now slide the dial to the right, after which it can be removed without any difficulty.

## RENEWAL OF THE POINTER

1. Remove the dial (see above).
2. Loosen the 2 screws with which the pointer is fastened to the courser.
3. Exchange the pointer.

In order to remove the courser, on which the pointer is fastened, from the bar, one has to loosen the nut on the end of the bar.

## REPAIR OF SPEAKER 9678 R-50

Never unsolder the connections of the excitation coil when the receiver is under tension (very high induction tension). Connect the ends of the excitation coil always in the same way, the end from the inside of the coil to the negative pole, the other end to the positive.

## EXCHANGING OF THE EXCITATION-COIL

1. Take speaker out of receiver.
2. Remove dust cover.
3. Take cone with coil away by removing the clamping ring.
4. Loosen screw in the iron-core and remove iron-core. Now the excitation coil can be exchanged.
5. Replace the core. Center by means of a centring-jig and fasten with screw.
6. Place cone with coil, center and fasten. Place dust cover.
7. Replace speaker in the set.

## SOCKETS

When the sockets for aerial, earth, gramophone or extension loudspeaker become defective, these can be replaced by a socket-plate code number A1 340 42.0.

This plate should be mounted in the chassis; two holes have to be drilled and the plate fixed with two screws and nuts of 3 mm.

## TUBES

B2	B3	B5	B6	L1—L2
ECH 21	ECH 21	EBL 21	AZ 1	8045 D-00

## CONDENSERS

Nr.	Value	Codenummer	Price
C1	50 $\mu$ F	49 031 10.1	
C2	30 $\mu$ F	49 020 01.0	
C3	50 $\mu$ F	49 020 01.0	
C6	11-490 pF	28 212 52.0	
C7		28 212 52.0	
C14	3,9 pF	49 055 11.0	
C18	32 pF	28 212 06.2	
C19	33 pF	49 055 22.0	
C20	18 pF	49 055 19.0	
C38	32 pF	28 212 06.2	
C40**	39 pF	49 057 16.0	
C47	450 pF	49 057 52.0	
C49	200 pF	29 212 08.1	
C51	103 pF	see „coils”	
C52	103 pF	see „coils”	
C61	103 pF	see „coils”	
C62	103 pF	see „coils”	
C81	22 pF	49 055 20.0	
C82	82 pF	49 055 27.0	
C83	22000 pF	49 127 59.0	
C85	4700 pF	49 129 82.0	
C100	100 pF	49 055 23.0	
C101	47000 pF	49 128 61.0	
C102	470 pF	49 055 53.0	
C103	82 pF	49 055 27.0	
C104	47 pF	49 055 24.0	
C120	47000 pF	49 128 61.0	
C121	47000 pF	49 127 61.0	
C122	10000 pF	49 128 57.0	
C126	2200 pF	49 128 53.0	
C127	47000 pF	49 127 61.0	
C128	0,1 $\mu$ F	49 128 63.0	
C130	47000 pF	49 129 85.0	
C131	22000 pF	49 129 90.0	

## RESISTANCES

No.	Value	Codenummer	Price
R1	1200 $\Omega$	49 356 28.0	
R2	82 $\Omega$	49 376 11.0	
R3	39 $\Omega$	49 375 07.0	
R11	0,5 M $\Omega$	49 470 30.0	
R21	50000 $\Omega$	49 470 49.0	
R31	0,47 M $\Omega$	49 375 56.0	
R32	39000 $\Omega$	49 377 43.0	
R33	22000 $\Omega$	49 377 40.0	
R34	68000 $\Omega$	49 376 46.0	
R35	39 $\Omega$	49 375 07.0	
R41	47000 $\Omega$	49 377 44.0	
R42	0,1 M $\Omega$	49 377 48.0	
R43	47000 $\Omega$	49 375 44.0	
R45	0,68 M $\Omega$	49 375 58.0	
R46	1,5 M $\Omega$	49 376 62.0	
R47	0,82 M $\Omega$	49 375 59.0	
R48	0,82 M $\Omega$	49 375 59.0	
R50	1,5 M $\Omega$	49 376 62.0	
R51	22000 $\Omega$	49 375 40.0	
R60	100 $\Omega$	49 375 12.0	
R81	47000 $\Omega$	49 375 44.0	

## CURRENTS AND TENSIONS

	V <sub>a</sub>	V <sub>g2</sub>	I <sub>a</sub>	I <sub>g2</sub>
B2	heptode 240	100	2,7	5,5
	triode 130		4,2	
B3	heptode 240	95	7,5	3,5
	triode 60		1,5	
B5	260	240	28	3
	Volts	Volts	mA	mA

VC1 = 275 Volts  
VC2 = 250 Volts

Primary consumption at 220 V: abt. 52 Watts.  
Current through the excitation coil of the speaker 12 mA.

## COILS

No.	Resistance	Codenummer	Price
S1	50 $\Omega$	A1 057 42.0	
S2	200 $\Omega$		
S3	<1 $\Omega$		
S4	<1 $\Omega$		
Z1	Fuse	08 100 99.1	
S13	2,5 $\Omega$	A1 038 27.0	
S14	<1 $\Omega$		
S17	30 $\Omega$	A1 037 16.1	
S18	70 $\Omega$		
S19	170 $\Omega$		
S20	40 $\Omega$		
S33	1 $\Omega$	A1 038 28.0	
S34	<1 $\Omega$		
S37	2 $\Omega$	A1 037 17.3	
S38	7 $\Omega$		
S39	4 $\Omega$		
S40	15 $\Omega$		
S51	4 $\Omega$	A1 037 33.1	
S52	7 $\Omega$		
C51	103 pF		
S53	<1 $\Omega$		
S54	4 $\Omega$	A1 037 34.1	
S55	7 $\Omega$		
C52	103 pF		
S61	4 $\Omega$	A1 037 61.0	
S62	7 $\Omega$		
S63	4 $\Omega$		
S64	7 $\Omega$		
C61	103 pF	49 981 04.0	
C62	103 pF		
S76	4 $\Omega$	A1 001 66.1	
S77*	22000 $\Omega$	A1 081 84.1	
S81	800 $\Omega$		
S82	1 $\Omega$		

Note: In case of I.F. interference an I.F. filter can be built in the aerial circuit. Codenummer of this filter is A3 140 02.0 (S110, C150—30 pF). All R.F. chassis are provided with 2 holes with thread for fixing the filter unit.

\*) Later series are provided with a loudspeaker with permanent magnet. In these sets S77 is replaced by a resistance of 22 000 Ohms (49 358 43.0).

\*\*) If necessary for reception on the lower side of the LW, C40 = 39 pF should be replaced by a condenser of 37 pF (49 057 53.0).

## LIST OF SPARE PARTS AND TOOLS

When ordering always state:

1. Codenumber.
2. Description.
3. Type number of the receiver.

Fig.	Item.	Description	Codenumber	Price
1	1	Cabinet (colour 038) . . . . .	23 640 07.0	
1	2	Station dial . . . . .	A1 898 09.1	
1	3	Pointer . . . . .	A1 350 77.0	
1	4	Speakersilk . . . . .		
1	5	Knob for waverange switch (colour 038) . . . . .	23 614 03.0	
1	6	Knob for volume control (colour 038) . . . . .	23 611 06.3	
1	7	Knob for tone control (colour 038) . . . . .	23 613 54.1	
1	8	Cover with knob for mains switch . . . . .	A1 331 22.0	
2	10	Plate under knurled screw . . . . .	A1 639 33.1	
2	11	Knurled screw . . . . .	07 741 06.0	
2	12	Guiding wheel for driving cable . . . . .	23 693 04.0	
2	13	Spindle for guiding wheel . . . . .	07 486 12.0	
2	14	Mains switch . . . . .	28 650 25.2	
2	15	Tension change over knob . . . . .	A1 339 01.0	
2	16	Plate with pins for item 15. . . . .	A1 359 74.3	
2	17	Valveholder . . . . .	49 231 31.2	
2	18	Special plug socket for pick-up connection . . . . .	28 822 47.0	
2	19	I.F. chassis (colour 111) . . . . .	23 664 37.0	
2	20	Fixing clip for coil can . . . . .	A1 529 73.2	
2	21	R.F. chassis (colour 111) . . . . .	23 664 36.0	
2	22	Knob for tuning (colour 038) . . . . .	23 613 53.0	
		Connection spring with soldering tag . . . . .	A1 980 00.0	
		Guiding wheel for driving cord . . . . .	23 681 30.1	
		Spindle for above . . . . .	A1 847 73.0	
		Pilot lampholder . . . . .	A1 326 30.0	
		Tension spring for driving cable . . . . .	28 740 48.3	
		Tension spring for driving cord . . . . .	28 740 49.0	
		Back plate . . . . .	A1 718 23.1	
		Safety contact . . . . .	49 295 07.0	
		Spindle for tone control . . . . .	A1 435 05.0	
		Switch section No. 1 . . . . .	49 546 76.0	
		Switch section No. 2 . . . . .	49 546 77.0	
		Component rack for resistances etc. . . . .	A1 933 73.0	
		Solder strip for above, single way . . . . .	28 032 86.0	
		Solder strip for above, 2-way . . . . .	28 032 84.0	
<b>LOUDSPEAKER</b>				
		Cone with coil . . . . .	49 981 04.0	
		Excitation coil . . . . .	A1 001 66.1	
		Paper ring . . . . .	28 452 69.0	
		Clamping ring . . . . .	25 873 41.0	
<b>TOOLS</b>				
		15° jig . . . . .	09 992 44.0	
		Trimming transformer . . . . .	09 992 22.0	
		Circuit tester . . . . .	09 991 59.0	
		Centring gauge . . . . .	09 992 50.0	

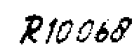


FIG. 6

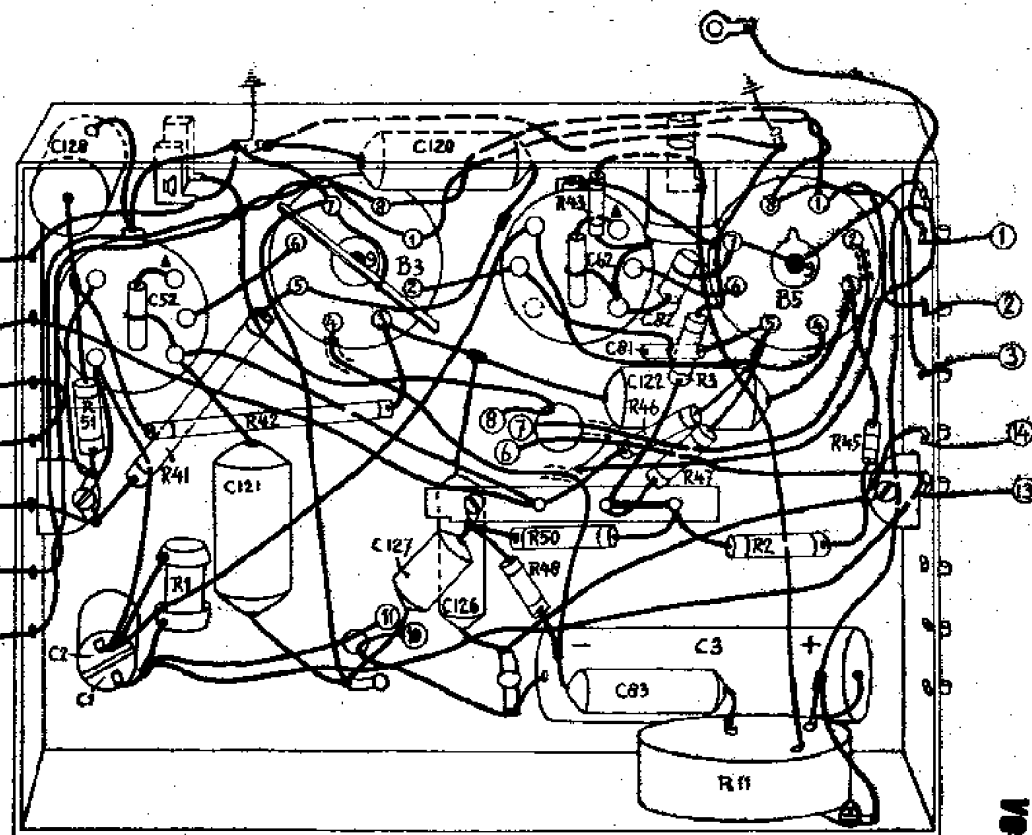
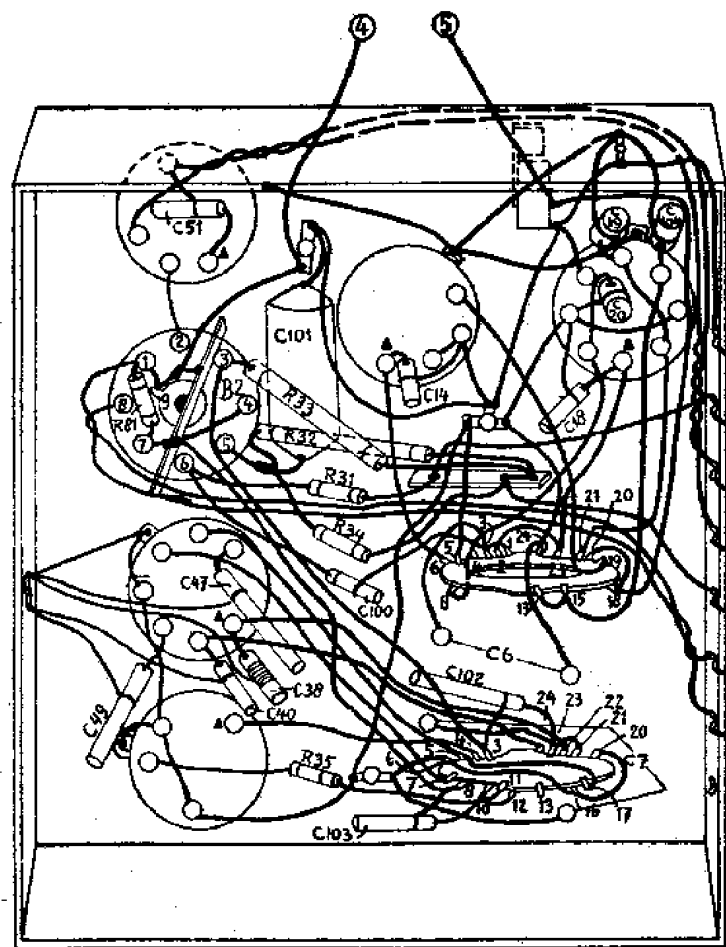


FIG. 5

R10067

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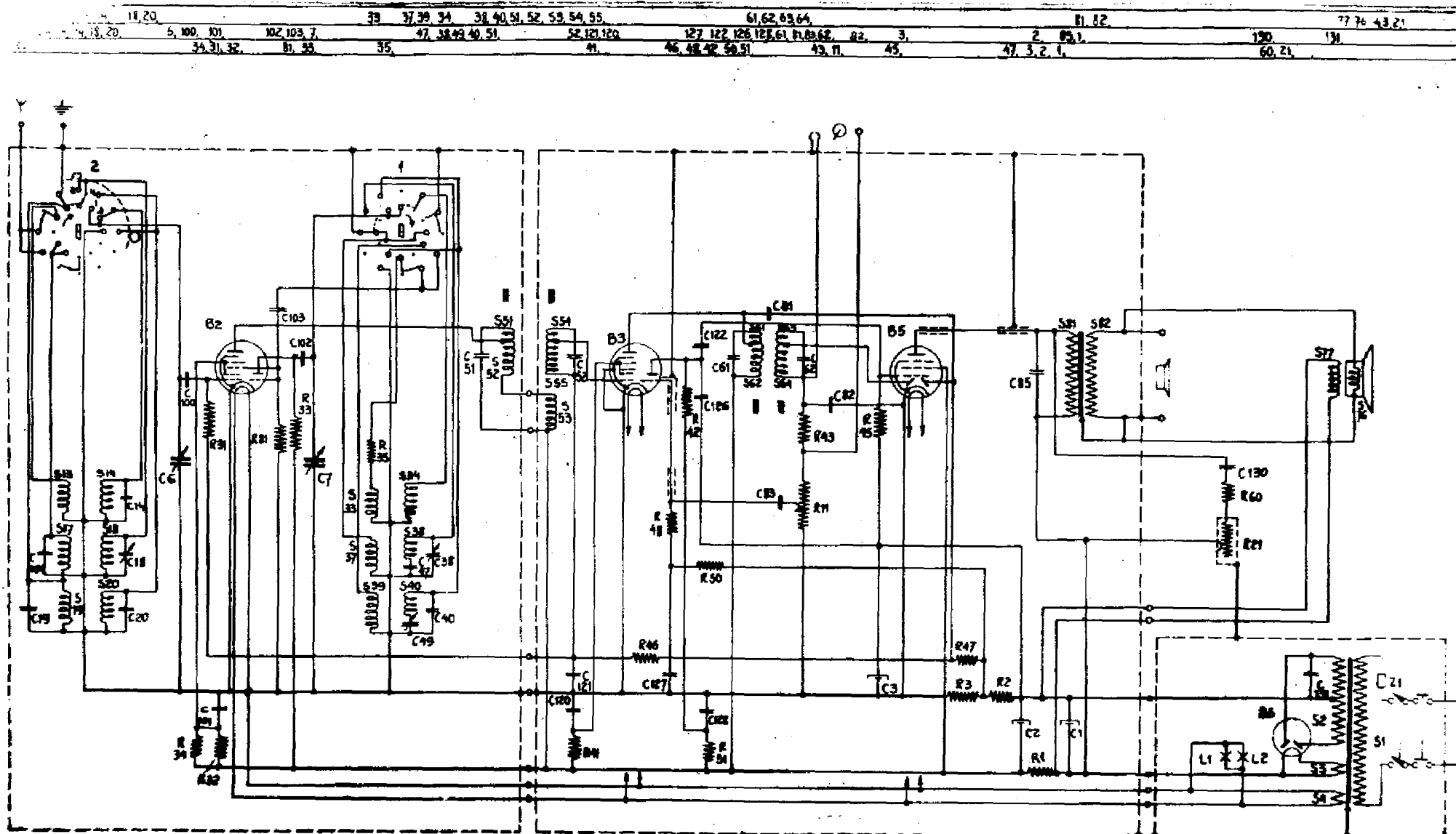


FIG. 3

R10065

A.526  
L.553



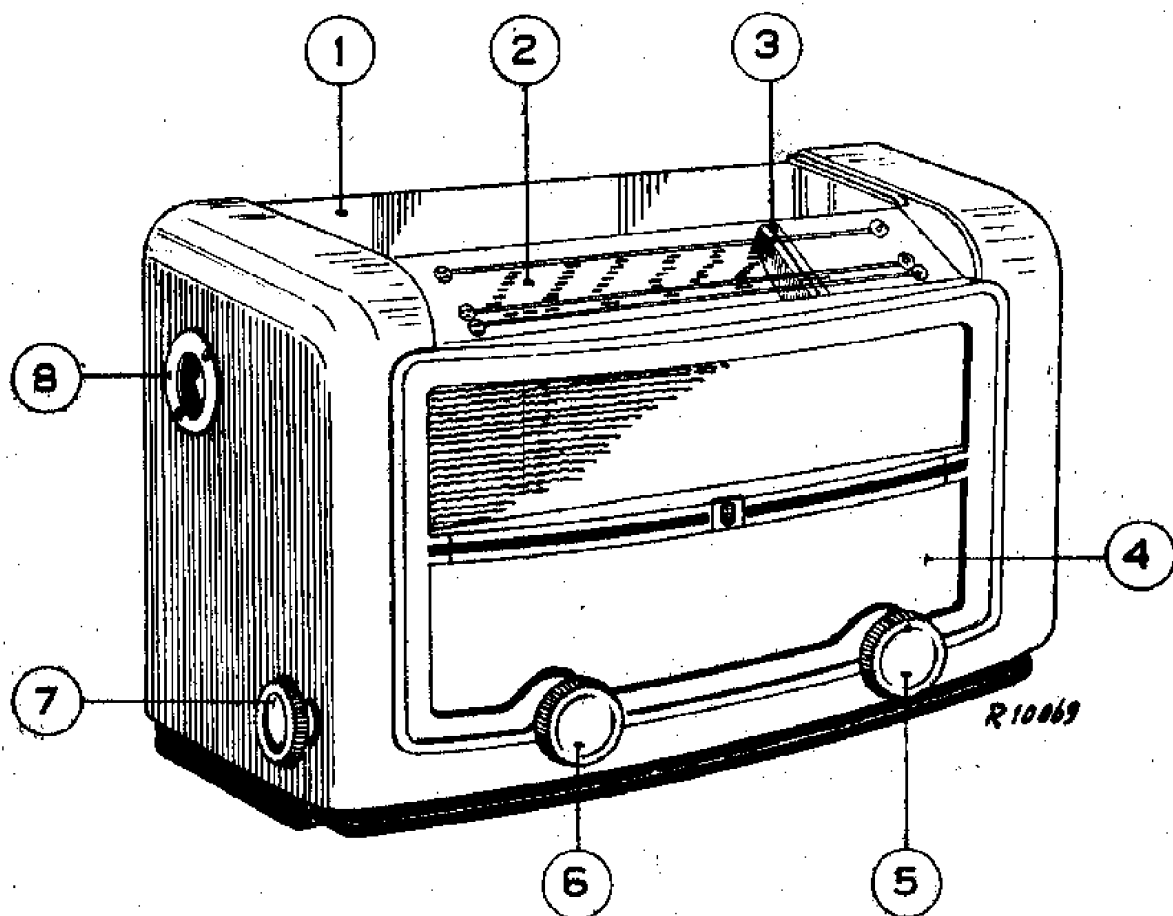


FIG. 1

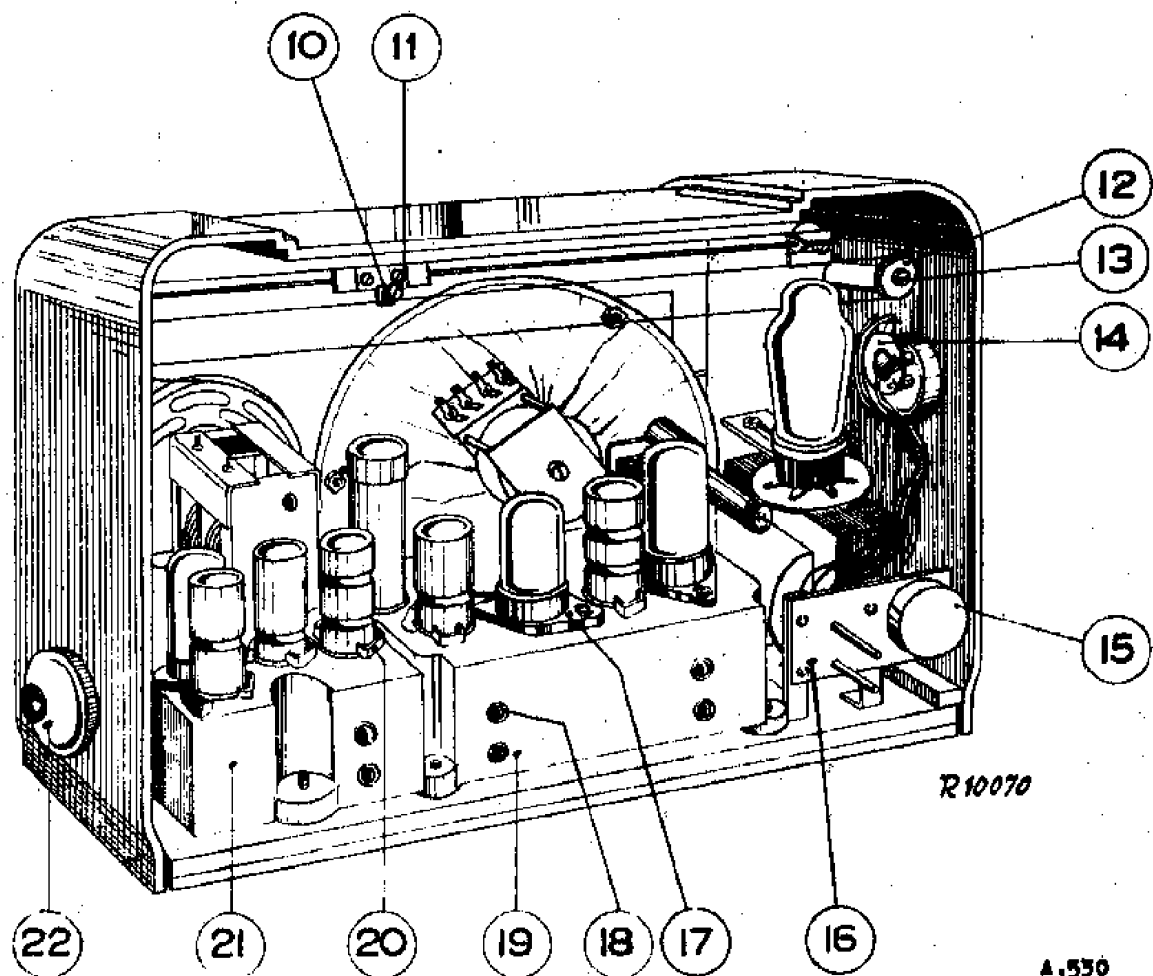


FIG. 2

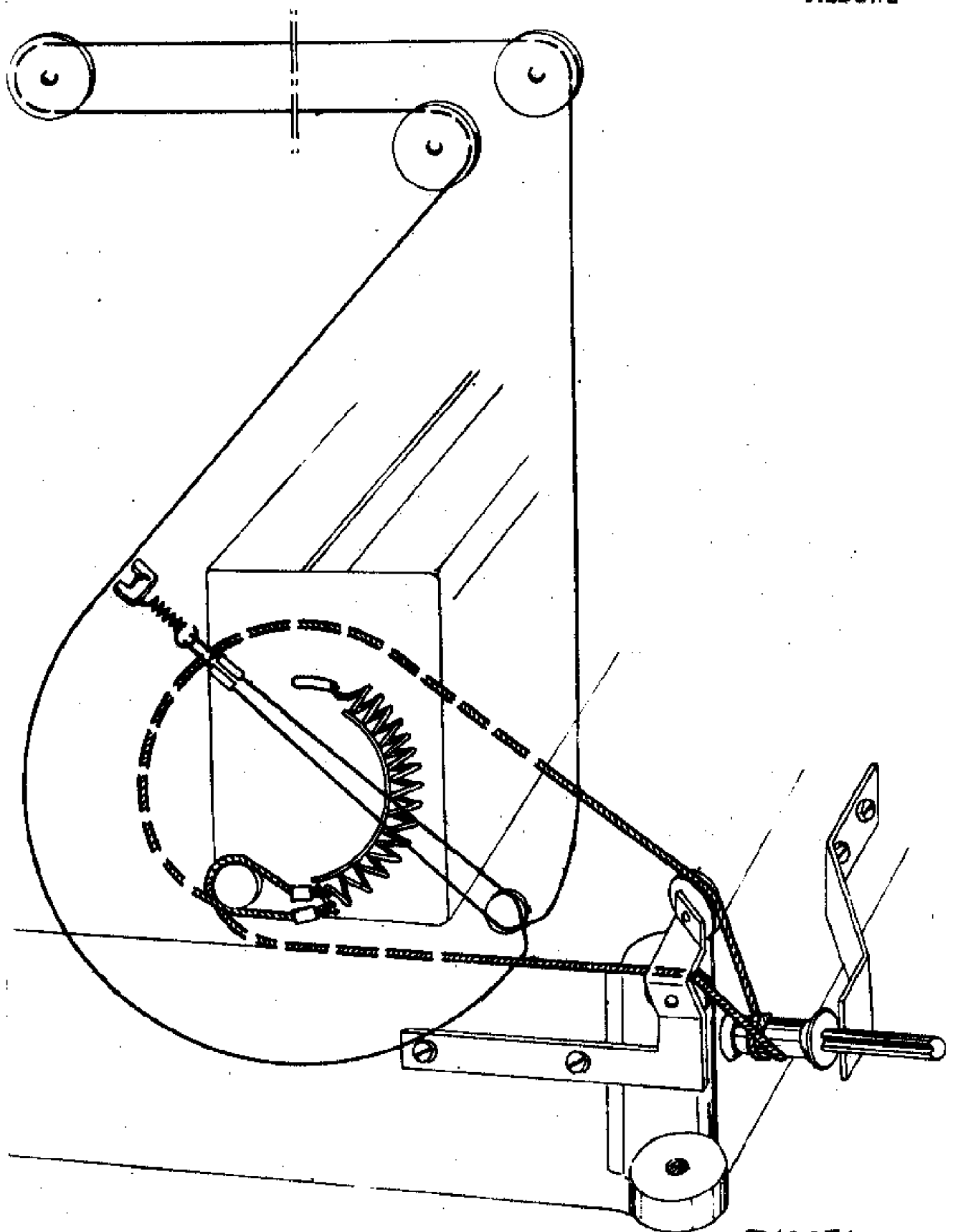


FIG 7