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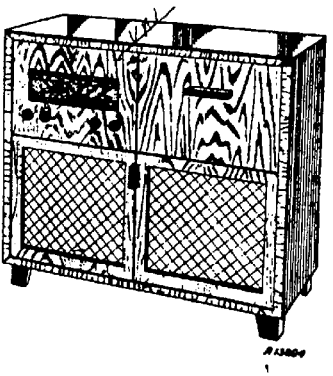
PHILIPS

SERVICE NOTES

for the

radiogramophone

FX613A



1952 For a.c. mains supply

GENERAL

WAVERANGES

S.W.2a :	25 - 31,6 m	(12 - 9,5	Mc/s)
S.W.2b :	16,5- 50,7 m	(18,2- 5,92	Mc/s)
M.W. :	185 - 580,2 m	(1622 -517	kc/s)
L.W. :	760 -2000 m	(395 -150	kc/s)

CONTROLS

From left to right:

1. Bass switch
1a High tones control
2. Radio-P.U. switch
2a Volume control + mains switch
3. Waverange switch
4. Tuning

VALVES

B1 : ECH42
B2 : EAF42
B3 : EBC41
B4 : EL41
B5 : AZ41
B6 : EM34

DIMENSIONS

Length : 88 cm)knobs
Depth : 40 cm)inclu-
Height : 78 cm)ded

WEIGHT : 26 kg.

DIALLAMP

L1 : 8045D-00
L2 : 8045D-00

I.F.: 452 kc/s

MAINS VOLTAGE

110, 125, 145, 200, 220, 245 V (50 c/s).

CONSUMPTION

57 W (at 220 V)

LOUDSPEAKER

Type number 9750-05
Z = 5 ohm

BANDWIDTH

The I.F. bandwidth (1:10) measured from g1 of B1 is about 10 kc/s. The overall bandwidth (1:10) measured from the aerial socket is about 10 kc/s at 1000 kc/s and about 9 kc/s at 250 kc/s.

93 976 38.1.05

Printed in Holland

This apparatus is provided with the record changer AG1000 (220/110V-50 c/s) connected to 220V-tap of mains-transformer.
For readjustment or repairs of this record changer see Service Notes for type AG1000.

CIRCUIT DESCRIPTION

R.F. PART

The circuiting of the R.F. part is shown in fig.1 for each position of the waverange switch separately.
The switch turns 90° for every position. In position S.W.2a bandspread is obtained by connecting capacitors in parallel and in series with C4 - C5. In fig.4 the waverange switch is drawn in position S.W.2a.

A.F. PART

The detected A.F. signal is applied to the grid of B3 via the volume control R12-R13 and C37. The cathode resistors R14 and R21 of B3 and B4 respectivily are not decoupled, so that negative feedback of current takes place for these valves.
The resulting loss of gain is compensated by a positive feedback circuit obtained by connecting R51 and R22 between the cathodes of B3 and B4.
Physiological audio correction, accentuating the bass notes compared with the treble at low signal strength, is obtained by connecting R11 in series with C36 in parallel across the part R12 of the volume control.

QUALITY CONTROL

A negative feedback voltage, taken from the slider of the potentiometer R16 shunted across the secundary S28-S29 of the output transformer, is applied via C38 to the cathode of B3. Together with R14, C38 forms a high-pass filter. When the slider of the quality control is in the lowest position the negative feedback voltage is strongest, with the result that the treble notes are suppressed. This is the "dull" position.
As the slider is moved upwards the negative feedback voltage is reduced to zero, then the phase of the voltage is inverted and thus a positive feedback is applied to the cathode of B3. This positive feedback voltage accentuates the reproduction of the treble notes; the "quality" position.

BASS-SWITCH

For position "min.low" of the bass-switch C61 is connected in series with C37 and a negative feedback signal for the low tones coming from R50 is led to C37, the reproduction of the low tones is decreased.
For the position "max.low" C61 is shortcircuited and the negative feedback signal from R50 is disconnected, the reproduction of the low tones is increased.

TRIMMING THE RECEIVER

For retrimming the receiver the chassis has to be taken out of the cabinet.
For the position of the trimmers see fig.2.

A. I.F. BAND PASS FILTERS

1. Turn the variable capacitor to minimum.
2. Waverange switch to M.W.
3. Volume control to maximum.
4. Tone control to "dull".
5. Radio-P.U. switch to radio.
6. Connect a voltmeter via a trimming transformer to the additional loudspeaker sockets.
7. Unscrew the iron cores of the I.F. coils.
8. Apply to g1 of B1 a modulated signal of 452 kc/s via a capacitor of 33000 pF.
9. Trim the I.F. circuits in the following order:

   4th I.F. circuit S25 - S26 - C30
   3rd I.F. circuit S23 - S24 - C29
   1st I.F. circuit S19 - S20 - C27
   2nd I.F. circuit S21 - S22 - C28

   After the last circuit has been trimmed, no further readjustments should be made, otherwise the whole trimming procedure must be repeated.
10. Seal the cores.

NOTE

The iron cores of the I.F. band filters have been sealed with "Vaseline Compound" - see the List of Parts and Tools. This compound can easily be removed in the cold state with the aid of a screwdriver. Heating of the core damages the core holder and makes trimming impossible.

B. I.F. WAVE TRAP

1. Waverange switch to M.W.
2. Turn the variable capacitor to minimum.
3. Volume control to maximum.
4. Tone control to "dull".
5. Radio-P.U. switch to Radio.
6. Connect a voltmeter via a trimming transformer to the additional loudspeaker sockets.
7. Apply to the aerial socket a modulated signal of 452 kc/s via a normal dummy aerial.
8. Trim C7 to minimum output voltage.
9. Seal C7.

C. R.F. and OSCILLATOR CIRCUITS

Trimming is done with the aid of trimming points on the dial. Before starting to trim, with the variable capacitor in the minimum position set the pointer to the extreme left trimming point on the dial.
For all waveranges the following applies:

1. Volume control to maximum.
2. Turn the quality control to the "dull" position.
3. Radio-P.U. switch to Radio.
4. Connect a voltmeter via a trimming transformer to the additional loudspeaker sockets.

Trim as indicated in the following table, strictly observing the order of the manipulations.

1	Waverange switch in position	S.W.2a	S.W.2b	M.W.	L.W.
2	Pointer on trimming point for by means of tuning knob	16.2 m	25.4 m	184m	1910m
3	Apply modulated signal of.... to aerial socket via dummy aerial	18.5 Mc/s	11.8 Mc/s	1630 kc/s	157 kc/s
4	Trim for maximum output voltage	C19, C11	C25, C9	C20, C12	unscrew C23 trim C22 to past max.output-voltage
5	Pointer on trimming point for by means of tuning knob	49.18m	31.25m	545.4m	750m
6	Apply a modulated signal of.. to aerial socket via dummy aerial	6.1 Mc/s	9.6 Mc/s	550 kc/s	400 kc/s
7	Trim for maximum output voltage	C17	C18	C21	C23 C13
8	Repeat the points	2-7	2-7	2-7	2-3 and trim C22 (see 4 above) to max.output-voltage
9	Seal the trimmers	C19	C25	C20	C23

The wire trimmers must not be sealed with compound because changes in capacity may result.

REPAIRS AND REPLACEMENTS

REMOVING THE CHASSIS FROM THE CABINET

1. Remove the back panel of the receiver.
2. Remove the connections from motor, pick-up, shielding and loudspeaker (Note these connections).
3. Pull the knobs off the spindles.
4. Remove the four fixing screws of the chassis.
5. Take the chassis out of the cabinet.

REMOVING THE RECORD CHANGER

1. Remove the back panel of the record-changer.
2. Remove the connections from motor and pick-up.
3. Remove the fixing screws in the corners of the record-changer.
4. Take the record-changer out of the cabinet.
   Never rest the record-changer on its mechanism.

POINTER DRIVE

The paths and lengths of the cables are shown in fig.3, for the position where the variable capacitor is set to maximum.

To replace the driving cord for the variable capacitor the large "Philite" intermediate wheel has to be unscrewed (3 screws). The smaller wheel has to be fixed with a nail, after which the cord can be lain on, beginning with the small intermediate wheel. When the driving spindle is turned, the two loops of cord should move in the same direction.

WAVERANGE INDICATOR

The effective length of the cord is 7 cm. When replacing the cord the chassis has to be taken out of the cabinet.

The procedure is as follows:

1. Detach the indicator from the fixing stud.
2. Make a loop at one end of a cord of about 15 cm. length and pass this over the arrow head of the indicator.
3. Refixe the indicator on the stud in the cabinet.
4. Turn the waverange switch to the position S.W.2a (fully to the left).
5. At the free end of the cord make a loop with the aid of a cable loop grip first passed over the cord.
6. Lay the cord round the guiding stud in the cabinet and hook the loop onto the hook on the spindle of the waverange switch.
7. See that the loop at the indicator end lies in the notch for it.
8. Adjust the indicator to the uppermost waverange on the dial by shortening or lengthening the cord.
9. The loop on the hook of the spindle of the waverange switch is 2,5 cm long to prevent the grip from turning round the spindle.
10. Pinch the grip tight.

CURRENTS AND VOLTAGES

			Va	Vg2(+4)	Vk	Ia	Ig2(+4)
B1	ECH42	Heptode	230	50	-	1,4	2,5
		Triode	90	-	-	4,5	-
B2	EAF42	Pentode	230	50	-	3	0,9
B3	EBC41	Triode	100	-	1,15	0,59	-
B4	EL41	Pentode	225	230	5,5	34	4,7
B6	EM34		230	Va1 = 30 Va2 = 30		Ia1 = 0,2 Ia2 = 0,2	
			Volts	Volts	Volts	mA	mA

V11=250 Volts V02=230 Volts Iprim.=180 mA

These values have been measured with the universal measuring instrument GM4257, with the receiver connected to 220 V. A.C., the waverange switch set for M.W., the radio-P.U. switch in radio-position and without any signal on the aerial socket.

LIST OF PARTS AND TOOLS

When ordering always quote:

1. Codenumber and colour.
2. Description.
3. Typenumber of the set.

		Description	Codenumber
		Rear panel (chassis)	A3 253 27.1
		Rear panel (loudspeaker)	A3 253 29.1
		Pointer for waverange indicator	A3 697 08.0
		Pointer for dial	A3 692 31.0
		Dial (N)	A3 224 86.0
		Dial (S)	A3 224 87.0
		Ring for dial	28 451 14.0
		Knob for radio P.U.-switch (colour MC) and basscontrol	A3 369 65.0
		Knob for tuning, waverange switch, volume- and tone control (colour MC)	P4 075 21.1
		Leaf spring for knobs	28 753 01.0
		Rubber grommet for fixing chassis	A3 642 15.0
		Tension spring for support frame of record-changer	89 312 44.0
		Spring for fixing record-changer	49 924 95.0
		Cable drum (colour AA)	23 644 47.2
		Cable drum (small) (colour AA)	P4 380 03.0
		Spring for capacitor drive	A3 646 26.0
		Spring for pointer drive	A3 646 14.0
		Leaf spring for arret of waverange switch	A3 648 42.0
		Fixing plate for same	A3 661 82.0
		Valve holder for tuning indicator	B1 505 26.1
		Plate for voltage adaptor	A1 354 86.2
		Knob for same	28 855 29.1
		Regulating pin for S.W. coils	A3 599 56.0
		Collar screw for supporting frame of record-changer (back)	A3 712 34.0
		Collar screw for same (front)	A3 712 45.0
		LOUDSPEAKER 9750-05	
		Clamping ring	25 871 81.0
		Paperrring	28 451 54.0
		Diffusor	23 666 56.0
		TOOLS	
		Service oscillator	GM2882, 2883 2884
		Universal Measuring	GM4256, 4257
		Vaseline compound	X 009 47.0

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SPOELEN-COILS-BOBINES

S1	50 Ω	A3 141 63.2
S2	500 Ω	
S3	<1 Ω	
S4	<1 Ω	
S5	32 Ω	A3 110 60.1
S6	2 Ω	A3 123 36.0
S7	<1 Ω	
S8	100 Ω	
S9	55 Ω	
S10	170 Ω	A3 123 37.0
S11	45 Ω	
S11a	7 Ω	
S12	<1 Ω	
S13	<1 Ω	
S14	21 Ω	
S15	3,2 Ω	A3 123 39.0
S16	7,5 Ω	
S17	5,5 Ω	
S18	20 Ω	

S19	2,8 Ω	A3 121 94.2
S20	4,6 Ω	
S21	3,1 Ω	
S22	4,8 Ω	
C27	115 pF	
C28	115 pF	
S23	2,8 Ω	A3 121 94.2
S24	4,6 Ω	
S25	3,1 Ω	
S26	4,8 Ω	
C29	115 pF	
C30	115 pF	
S27	750 Ω	A3 152 29.0
S28	<1 Ω	
S29	<1 Ω	
S30	3,5-4,3 Ω	49 981 27.0

CONDENSATOREN-CONDENSERS-CONDENSATEURS

C1	50 µF	48 317 09/50-50
C2	50 µF	
C4	12-489 pF	49 001 56.1 X
C5	12-489 pF	
C7	30 pF	28 212 36.4
C8	233 pF	48 203 01/233E
C9	175 pF	49 005 52.2
C10	15 pF	48 201 05/15E
C11	50 pF	49 005 50.2
C12	25 pF	49 005 49.2
C13	50 pF	49 005 50.2
C14	220 pF	48 203 20/220E
C15	56 pF	48 203 10/56E
C16	330 pF	48 203 20/330E
C17	175 pF	49 005 52.2
C18	175 pF	49 005 52.2
C19	30 pF	28 212 36.4
C20	30 pF	28 212 36.4
C21	400-575 pF	49 005 55.2

C22	175 pF	49 005 52.2
C23	30 pF	28 212 36.4
C24	33 pF	48 203 10/33E
C25	30 pF	28 212 36.4
C26	190 pF	48 429 01/190E
C31	2200 pF	48 751 20/2K2
C32	47000 pF	48 750 20/47K
C33	0,22 µF	48 751 20/220K
C34	82 pF	48 203 10/82E
C35	47000 pF	48 750 20/47K
C36	15000 pF	48 750 20/15K
C37	8200 pF	48 750 20/8K2
C38	12000 pF	48 750 20/12K
C39	0,1 µF	48 751 20/100K
C40	3300 pF	48 751 20/3K3
C41	6800 pF	48 750 20/6K8
C42	2700 pF	48 751 20/2K7
C43	120 pF	48 203 10/120E
C44	150 pF	48 203 20/150E
C61	1000 pF	48 751 20/1K
C62	4700 pF	48 751 10/4K7

WEERSTANDEN-RESISTORS-RESISTANCES

R1	1200 Ω	49 379 78.0
R2	100 Ω	48 555 10/100E
R4	0,82 MΩ	48 555 10/820K
R5	33000 Ω	48 555 10/33K
R6	33000 Ω	48 557 10/33K
R7	0,15 MΩ	48 556 10/150K
R8	1,5 MΩ	48 555 10/1M5
R9	47000 Ω	48 555 10/47K
R10	1 MΩ	48 555 10/1M
R11	27000 Ω	48 555 10/27K
R12	0,05 MΩ	49 500 34.0
R13	0,45 MΩ	
R14	1800 Ω	48 555 10/1K8
R15	0,12 MΩ	48 556 05/120K
R16	50000 Ω	49 472 49.0
R18	0,1 MΩ	48 555 10/100K
R19	0,68 MΩ	48 555 10/680K
R20	1000 Ω	48 555 10/1K
R21	150 Ω	48 556 10/150E
R22	18000 Ω	48 555 05/18K
R24	56000 Ω	48 557 10/56K
R25	2,2 MΩ	48 555 10/2M2
R26	1 MΩ	48 555 10/1M
R27	1 MΩ	48 555 10/1M
R35	0,12 MΩ	48 555 10/120K
R50	5,6 MΩ	48 555 10/5M6
R51	18000 Ω	48 555 05/18K
R52	0,1 MΩ	48 555 10/100K

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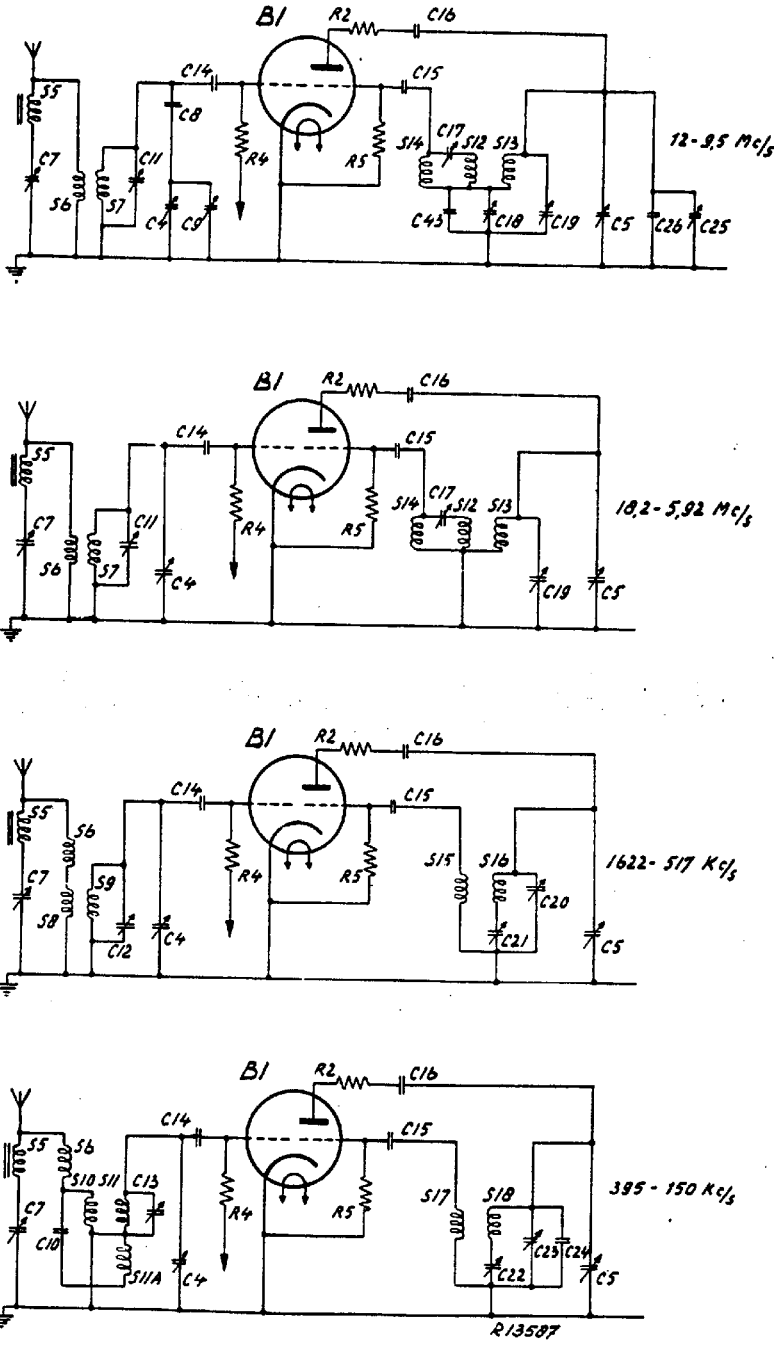

B1
R2
C16
C14
C15
S5
C8
C7
C11
R4
R5
S14
C17
S12
S13
12 - 9,5 Mc/s
S6
S7
C4
C9
C43
C18
C19
C5
C26
C25
18,2 - 5,92 Mc/s
1622 - 517 Kc/s
S9
S8
C12
S15
S16
C20
C21
395 - 150 Kc/s
S10
S11
C13
C10
S11A
S17
S18
C23
C24
C22
R13587

Fig.1

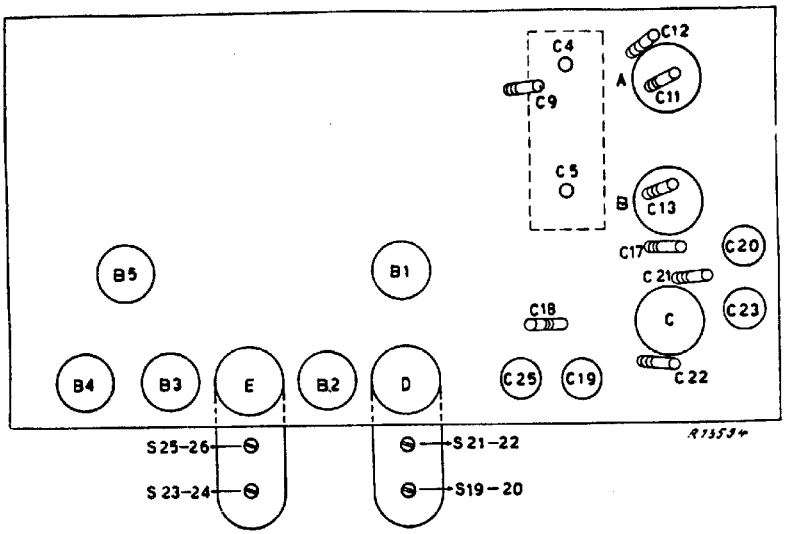


Fig.2

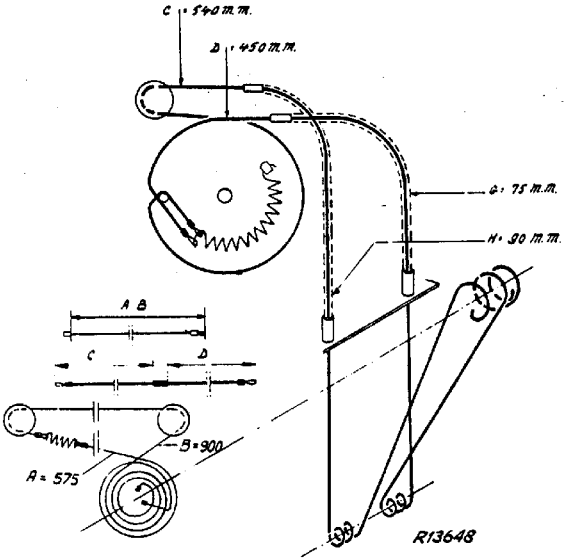
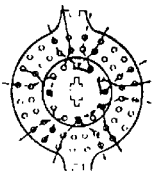


Fig.3



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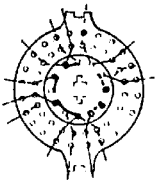

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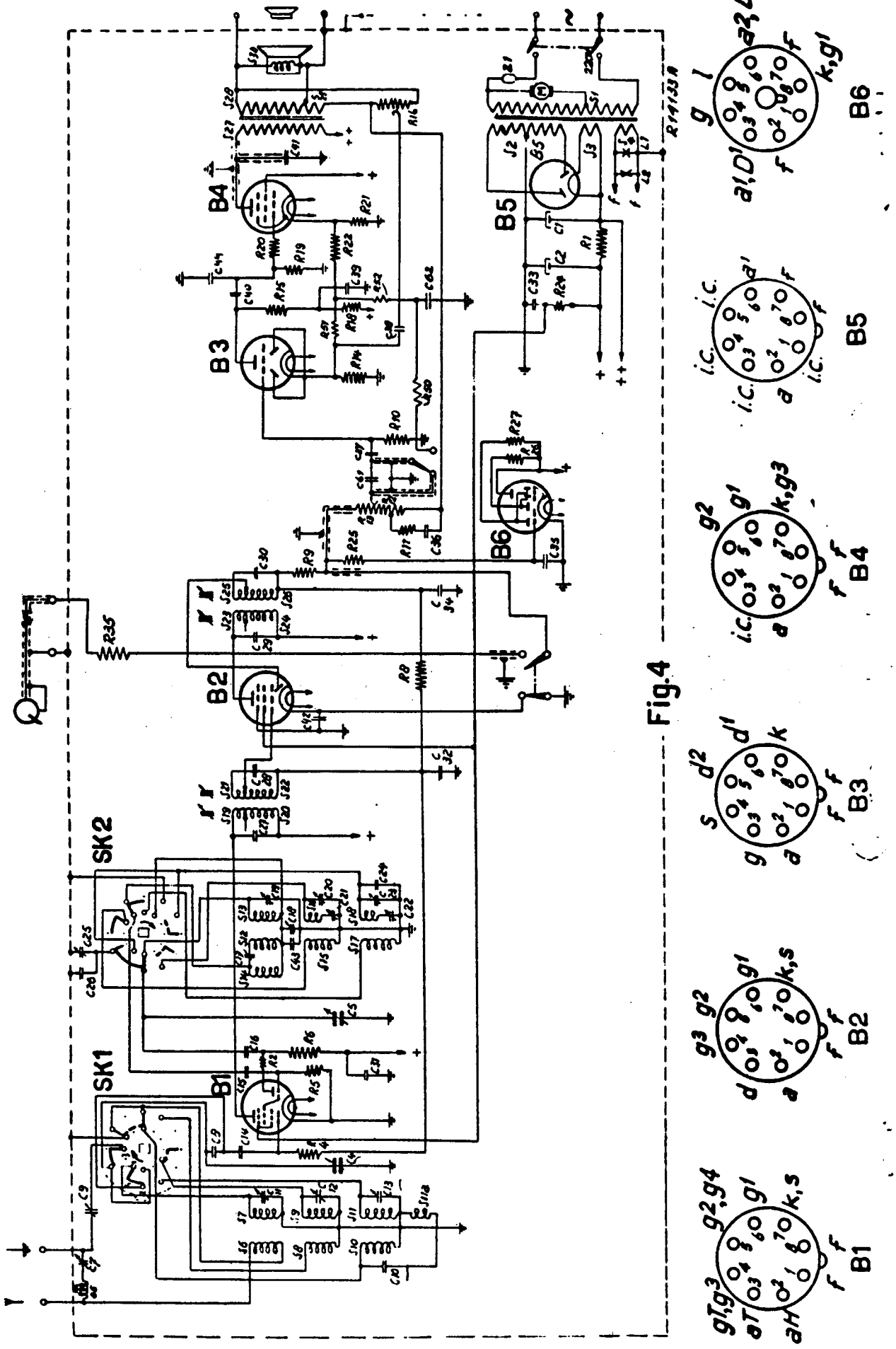

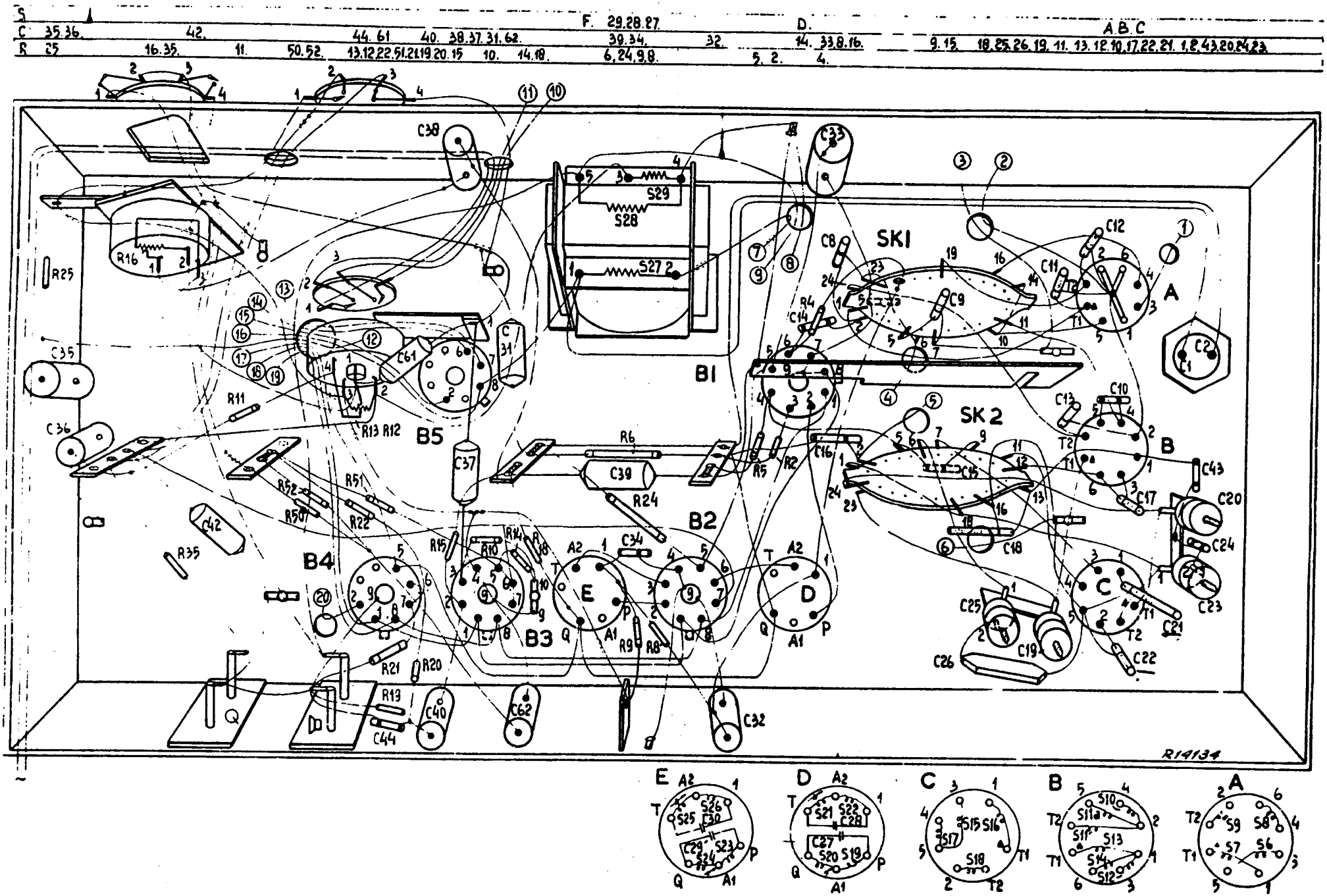
S
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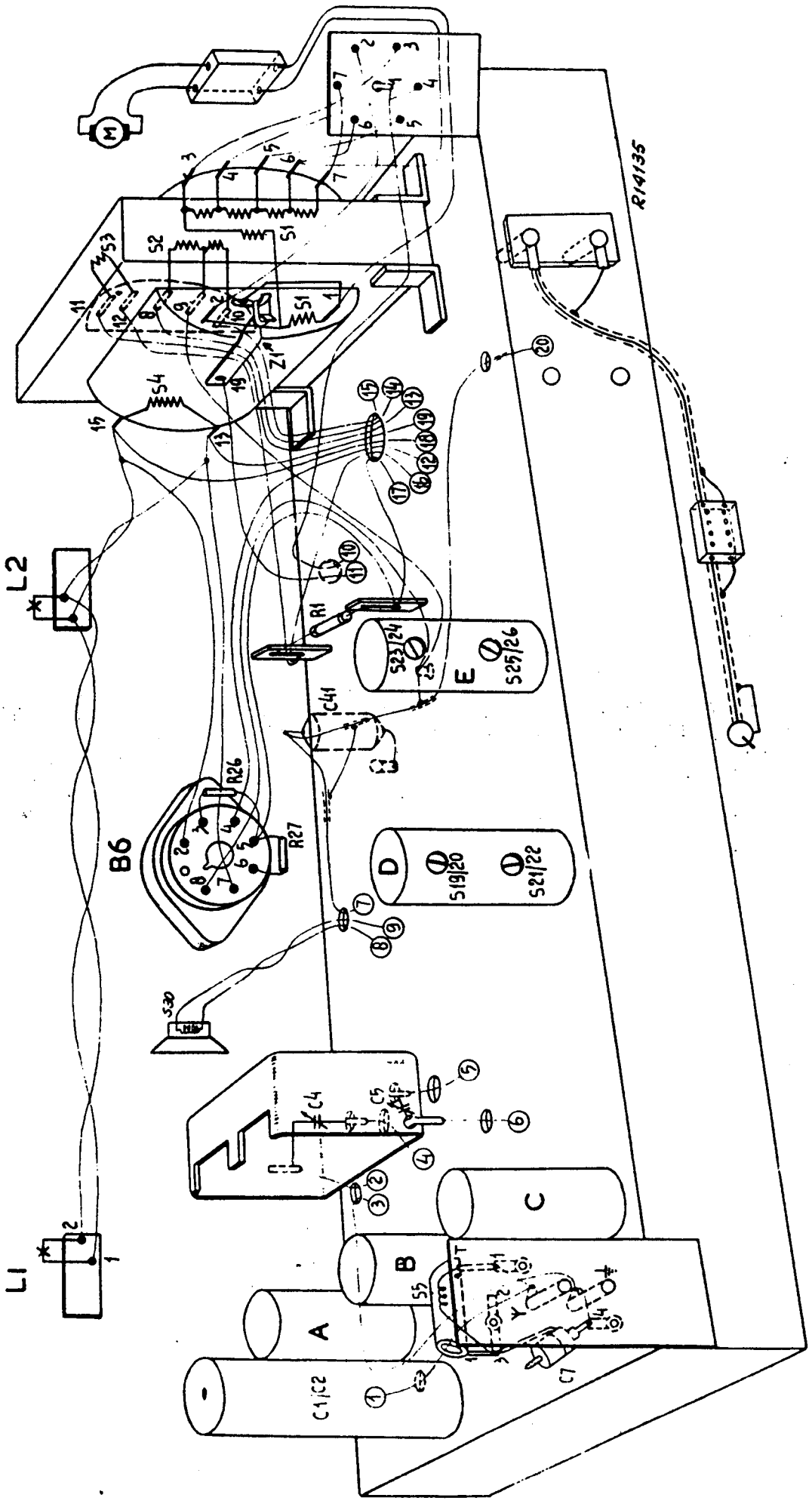
R 25 16.35. 11. 50.52. 13.12.22.51.21.19.20.15 10. 14.18. 6,24,9,8. 5. 2. 4. 9.15. 18.25.26.19.11. 13.12.10.17.22.21. 1.2.43.20.24.23
F. 29.28.27.
C38
C33
S29
S28
S27
R16
R25
C35
C36
R11
R13 R12
B5
C61
C31
C37
R6
C39
R24
B2
B1
SK1
SK 2
C12
C11
C8
C9
R4
C14
C2
C10
C13
C16
C15
C17
C43
C20
C24
C23
C18
C25
C19
C26
C21
C22
R5
R2
R52
R51
R50
R22
C42
R35
B4
B3
R15
R10
R14
R18
R9
R8
C34
E
D
C
R21
R20
R19
C44
C40
C62
C32
Q
R14134
E A2 1 T S25 S26 S30 C29 S24 S23 P Q A1
D A2 1 T S21 S22 C28 C27 S20 S19 P Q A1
C 3 1 4 5 S15 S16 S17 S18 T1 2 T2
B 5 4 T2 2 S10 S11a S11 S13 S14 S12 T1 1 6 3
A 2 6 T2 4 S9 S8 S7 S6 T1 3 5 1

Fig 5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L1
L2
B6
A
B
C
D
E
S1
S2
S3
S4
S5
S19/20
S21/22
S23/24
S25/26
R1
R26
R27
C4
C5
C7
C41
C1/C2

Fig.6