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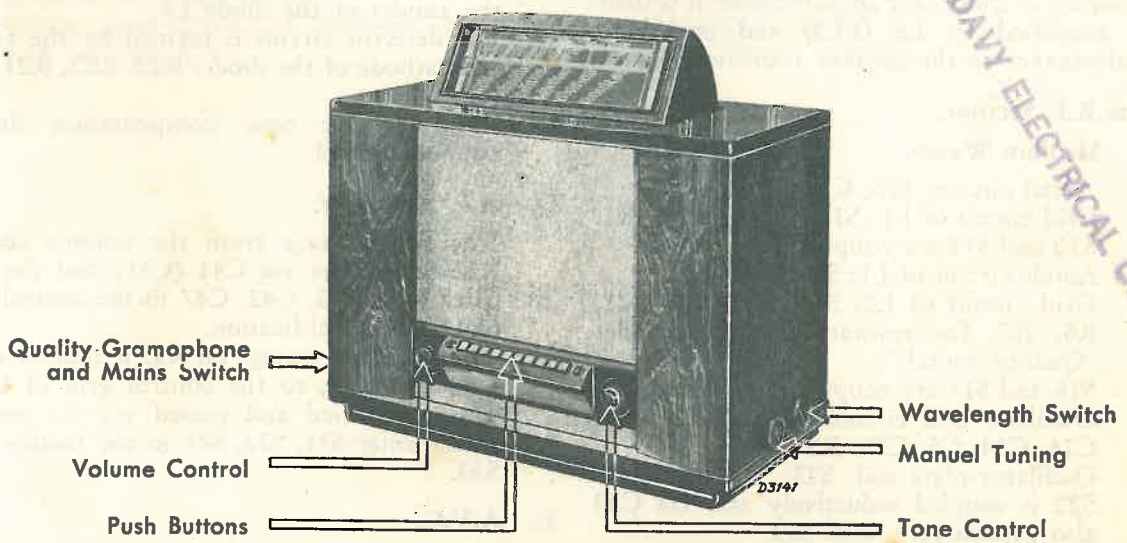
PHILIPS

SERVICE MANUAL

for receiver

753 A-34



GENERAL.

This superheterodyne receiver possesses the following features:
Seven tuned circuits.
R.F. pre-selection with silent pentode.
Octode mixing valve.
Variable band-width (three settings).
Continuously and variable tone control.
Delayed A.V.C. (three diode circuit with triple diode).
Quality correction by means of A.F. feed-back.
Tuning motor with push button control (eight buttons can be adjusted to required stations).
Automatic silent tuning.
Connections for pick-up and extension speaker.
Safety contact and mains tapping plate.
Speaker switch and speech music switch.
Rising scale embodying:
Visual tuning by means of electron beam indicator.
Wavelength indicator consisting of lighted arrows as well as signal lamps alongside the push button keyboard.
Indirect lighted stations scale and parallax free pointer.

CONTROLS.

The rear knob on the left-hand side of the cabinet operates the switch in five position, viz., in a clockwise direction, Off, Minimum Band-width, Medium Band-width, Maximum Band-width and Gramophone.
The rear knob on the right-hand side when operated in a clockwise direction controls the wavelength switch through SW1, SW2, and Medium Wave bands. The front knob on the right-hand side is the manuel tuning.
The volume and tone control knobs are fitted to the left and right respectively on the front of the cabinet.
The extreme left-and right-hand push buttons cause the tuning condenser to rotate for as long as they are depressed; one to the left and the other to the right.
The speech-music and loudspeaker switches are mounted at the back of the receiver.

Wave Ranges:

SW 1:	22 - 7,2 Mc.	(13.65- 41,67	m).
SW 2:	7,2- 2,2 Mc	(41.67-136	m).
MW:	1500 -525 kc.	(200 -571,4	m).

Weight:: Including valves: 20,5 kg.

Dimensions:

Width:	61 cm	including knobs
Height:	42 cm	with rising scale closed
	54,5 cm	with rising scale open
Depth:	28,5 cm	including knobs.

Printed in Holland.

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DESCRIPTION OF CIRCUIT.

General.

The incoming signal is taken from a tuned circuit to the control grid of R.F. amplifier L1 (EF8), amplified and passed through a second tuned circuit to the control grid of the octode L2 (EK2). The a erial signal together with the oscillator voltage generated by the octode produces an I.F. signal which is passed to the first I.F. transformer and to the control grid of L3 (EF9). The amplified I.F. signal then passes by way of the second I.F. transformer to one of the anodes of L4 (EAB1) for detection.
The resultant A.F. voltage across the volume control R22—R52 is fed to the control grid of L5 (EF6, coupled as triode) for amplification; it is then further amplified by L6 (EL3) and passed to the loudspeaker via the speaker transformer.

A. The R.F. Section.

I. Medium Waves.

Aerial circuit: S10, C17.
Grid circuit of L1: S11, C8, C3 C18, R1.
S10 and S11 are coupled inductively.
Anode circuit of L1: S16, C45.
Grid circuit of L2: S17, C11, C4, C21, R6, R7, for resistance R5, see under "Quality Switch").
S16 and S17 are coupled inductively.
Oscillator-grid circuit of L2: S22, C48, C16, C14, C5, C25, R34, R12.
Oscillator-plate coil: S23.
S22 is coupled inductively and via C43 also capacitively with S23.

II. Short Waves 1.

Aerial circuit S8.
Grid circuit of L1: S9, C7, C3, C18, R1.
S8 and S9 are coupled inductively.
Anode circuit of L1: S14, C44.
Grid circuit of L2: S15, C10, C4, C21 R6, R7.
S14 and S15 are coupled inductively.
Oscillator-grid circuit: of L2: S20, C27, C13, C5, C25, R34, R12.
Oscillator-plate coil: S21.
S20 and S21 are coupled inductively.

III. Short Waves 2.

Aerial coil: S6.
Grid circuit of L1: S7, C6, C3, C18, R1.
S6 and S7 are coupled inductively.
Anode circuit of L1: S12, R68.
Grid circuit of L2: S13, C9, C4, C21, R6, R7.
S12 and S13 are coupled inductively.
Oscillator-grid circuit of L2: S18, C26. C12, C5, C25, R34, R12.
Oscillator-plate coil: S19.
S18 and S19 are coupled inductively.
Note. R6 and R34 prevent parasitic oscillation of L2. C25 is the oscillator-grid condenser. The tuned oscillator circuit is incorporated in the grid circuit of the oscillator. L12 lights up on M.W. (yellow on the left), and L11 on Gram (green on the right).
For greater sensivity on the shortwave bands, R19 is shorted.

B. The I.F.-Section.

First I.F. transformer: S24, C29 (S25, S44), S26, S30 (see also "Quality and Gramophone Switch").
Second I.F. transformer: S27, S28, C33, S29, S30, C34.

C. Detector.

The I.F. voltage across S30 is applied to one of the anodes ot the diode L4.
The detector circuit is formed by the anode and cathode of the diode, R22, R52, R21, S30 (C36).
R39-C52 give tone compensation during volume control.

D. A.F. Amplifier.

The A.F. voltage from the volume control R22-R52 passes via C41 (C51) and the tone filter R28, R15, C42, C47 to the control grid of L5, for amplification.
The amplified voltage on R33 is applied across C50 and R29, to the control grid of L6, is again amplified and passed via the speaker transformer S31, S32, S41 to the loudspeaker S33.

E. A.V.C.

The I.F. voltage on the anode of L3 is taken across C35 to the third anode of the diode L4 and the resultant control voltage across R27 is applied via R26 to the second anode of L4. Without input signal this anode is positive, due to the voltage applied to it across R14. The resistance cathode-anode A.II is then smal as compared with R26. On a weak signal, therefore, the anode voltage (via R26) is reduced by only a small part of the negative control voltage across R27. However, on a strong signal, the anode becomes negative and the resistance cathode-anode is then large in respect of R26 so that practically the whole of the control voltage across R27 is applied to C40.
This control voltage is fed via R7 and R6 to the control grid of L2 and also via R1 to that of L1, thus controlling the bias and, therefore, also the amplification of both L1 and L2.
Note: On SW1 and SW2 positions of the wavelength switch R7 is connected to chassis. In these cases L2 is not controlled by A.V.C.

F. Visual Tuning.

A portion of the direct voltage rectified by the first anode of L4 is taken from potentiometer R23, R24 to the control grid of the tuning indicator L8. When the strength of the signal applied to the diode increases, the nega-

tive bias on the grid of L8 becomes larger and the anode current falls. The voltage drop across R25 is then not so great, in other words the potential difference between the screen of L8 and the deflector plates connected to the anode becomes less, thus reducing the screening effect of the deflector plates and increasing the size of the light bands on the screen. The receiver is properly tuned when the green bands of light have reached their maximum width.

G. **Quality and Gramophone Switch.**

This switch is shown in the theoretical circuit in the "Off" position. In the "minimum" position resistance R5 is short-circuited and the first I.F. bandfilter then comprises only S24, C29, S26 and C30 (loose coupling and, therefore, high selectivity). In the "medium"position, (only on M.W.) R5 is included in the control grid circuit of L2; the damping of this circuit is thereby increased and the tuning curve is broader. The first I.F. band filter then consist of S24, C29, S26, S44, C30. Due to the inclusion of S44 which is coupled to S24, the coupling is greater and the selectivity less. The third "quality" position is "maximum", in which position not only R5 (on M.W.) is included in the R.F. circuits and S34 in the I.F. band filter, but the coupling to the latter is increased by the addition of S25. This position gives the widest tuning curve.

The final position is "gramophone", whereby:

1. The anode circuit of L3 is broken.
2. A portion of the voltage from the pick-up taken from the potentiometer R20-R50 is fed, via S26, to the control grid of L3.
3. The screen grid of L3 is connected to volume control R52 across C37. L3 then works as a triode, the screen grid serving as anode.
4. Connection between R21-R52 is broken.
5. Both signal lamps are lighted.

In the "minimum" setting, the lower frequencies are corrected (see "Quality Correction").

H. **Quality Correction**

A part of the A.F. voltage across the speaker is fed back from the potentiometer circuit S35, C20; C37; S43, C56, R43; S42, R19 (S34), to the grid circuit of L5 to ensure that the distortion due to the A.F. amplification is as small as possible. The components of this potentiometer circuit are dependent upon frequency and a careful selection of the correct size of component ensures very natural proportions in the strength over the whole of the frequency range.

When the switch is set to "minimum", S34 is switched out and more inversed reaction is applied to the lower frequencies so that the amplification of these is less than of the remaining frequencies. Further inversed feed back is applied to L6 due to the fact that R30 is not decoupled.

I. **Motor Tuning. (See also G sheets.)**

M is the rotor for single phase asynchonous motor which is coupled to the 3-gang tuning condenser. Dependent upon the depth to which the stop pin (H Fig. 11) is pressed into the spiral in the selector drum, S37 or S38 are connected directly across the whole of the voltage on the primary of the mains transformer, the other winding being fed across C49. Due to this condensers, a phase displacement of 90° occurs between the currents in the two field coils, and as these coils are also disposed perpendicular to each other, a torque is applied to the rotor which then rotates. If the stop pin is at a high level, S37 is the main coil and S38 (across C49) the auxiliary winding, the direction of rotation being anti-clockwise, but when the pin is placed more deeply in the groove the functions of the two coils are reversed and, therefore, also the direction of the motor.

Between the two levels in the selector drum there is a hole and if this hole comes under the stop pin, the pin drops into it. When one of the buttons is depressed (other than the first and last), the insulating lug *a* permits spring 1 to drop and make contact with spring 2. Spring 2 is connected electrically with the contact lug *b* and dependent upon the depth to which the stop pin is pressed into the selector disc corresponding to the particular push button operated, *b* makes contact with spring 3 or 4 and the motor revolves in either one direction or the other. When the stop pin falls into the hole, the position of the variable condenser is fixed. At the same time, lug *a* depresses spring 2 thus breaking the motor current.

The first and last push buttons are used to move the pointer quickly up or down the scale. Lug *b* makes contact with spring 4 when the left-hand button is depressed, and with spring 3 when the right-hand button is operated.

J. **Silent Tuning.**

When at rest, the armature of the motor projects slightly outside the stator but is drawn into the field when rotating. In this manner, the rotor shaft operates the shorting contact 6 to short-circuit the primary side of the speaker transformer across C65. As soon as the motor stops, the rotor returns to its neutral position and the short circuit is removed.

K. **Voltage Supplies.**

Mains transformer: S1, S2, S3, S4.
Rectifier valve: L7.
Smoothing filter: C1, S5, C2.

Voltages for L1:

V_a : Across R51, decoupled by C62.
V_{g3} : Tapped from potentiometer R8, R9, R10 and decoupled by C24.
$V_{g2,4}$: Voltage drop across R3.
V_{g1} : Voltage drop across R3 + R2; decoupled partly by C19. See also "A.V.C.".

Voltages for L2:

V_a : Direct from C2.
$V_{g3,5}$: Tapped from potentiometer R69, R31, (R8, R9), R10, decoupled by C23.
V_{g2} : From potentiometer R8, R9, R10, decoupled by C24.
V_{g4} : Voltage drop across R11, decoupled by C22. See also "A.V.C.".
V_{g1} : The direct voltage across R12, R34.

Voltages for L3:

V_a : Direct from C2. The anode circuit is broken for gramophone pick-up.
V_{g2} : From potentiometer R8, R9, R10, decoupled by C24 and further via R18; on radio decoupled by C37.
V_{g1} : Voltage drop across R17, decoupled by C32. See also A.V.C.

Voltages for L4:

See "A.V.C."

Voltages for L5:

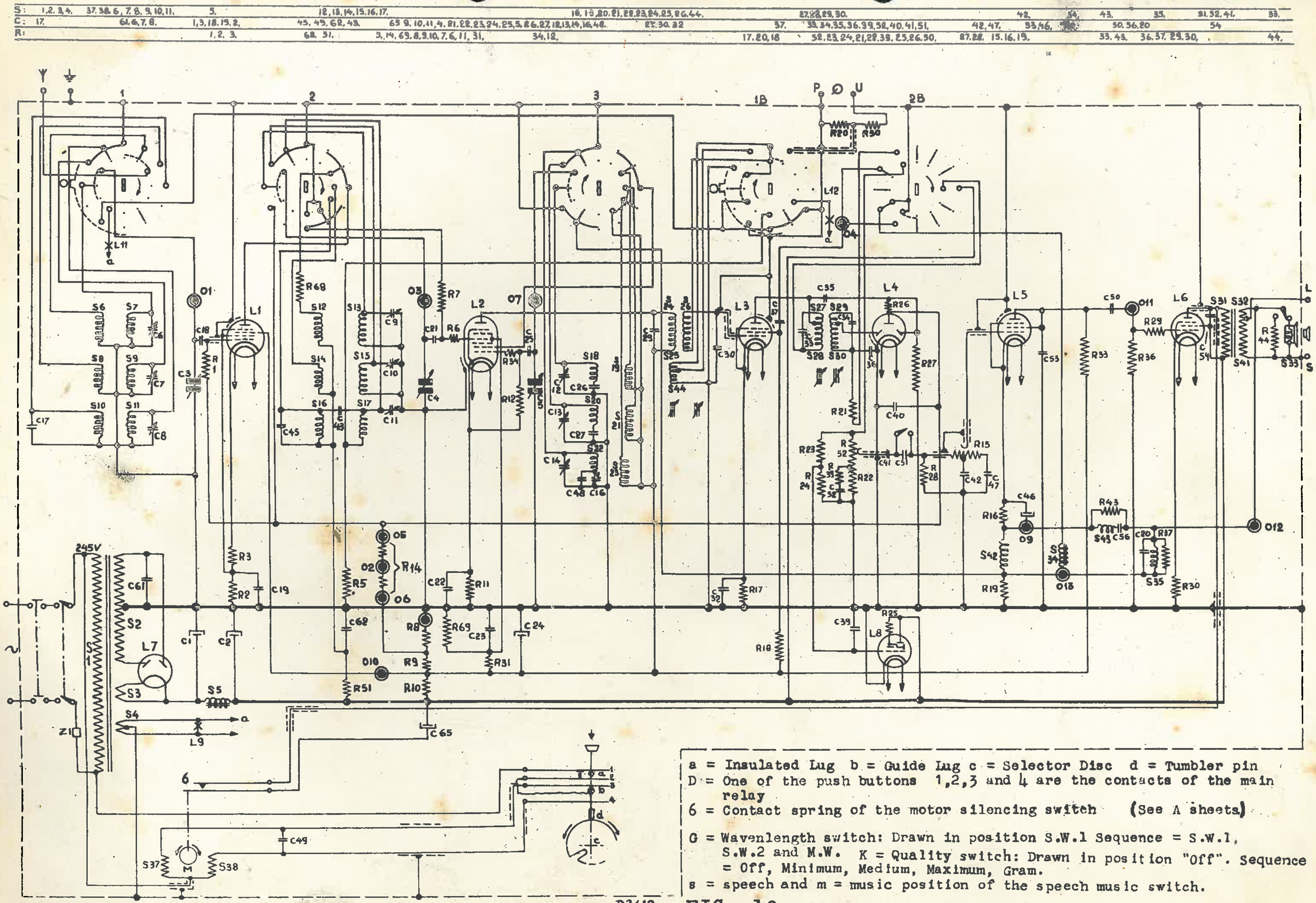
V_a, V_{g2}: From potentiometer R8, R9, R10, decoupled by C24 and further by R33.
V_{g1} : Voltage drop across R16 (S42, R19, S34.) decoupled by C46.

Voltages for L6:

V_a : From C2 and further via S31.
V_{g2} : From C2.
V_{g1} : Voltage drop across R30.

Voltages for L8:

V_a : Across R25.
V_{g2} : Decoupled by C2.
V_{g1} : See "Visual Tuning".



a = Insulated Lug b = Guide Lug c = Selector Disc d = Tumbler pin
D = One of the push buttons 1,2,3 and 4 are the contacts of the main relay
6 = Contact spring of the motor silencing switch (See A sheets)

G = Wavenlength switch: Drawn in position S.W.1 Sequence = S.W.1, S.W.2 and M.W. K = Quality switch: Drawn in position "Off". Sequence = Off, Minimum, Medium, Maximum, Gram.
s = speech and m = music position of the speech music switch.

3626 D3412 FIG. 16

COILS

No.	Value	Code No.	No.	Value	Code No.
			S18	0,1 ohm	
			S19	1 ohm	
			S20	8 ohm	
S1	35 ohm		S21	3,5 ohm	
S2	340 ohm	28.538.041	S22	20 ohm	28.574.332
S3	1 ohm		S23	4 ohm	
S4	1 ohm		C12	30 mmF	
			C13	30 mmF	
S5	375 ohm	28.546.081	C14	30 mmF	
			S44	1 ohm	
			S24	9 ohm	
	3,5 ohm		S25	0.1 ohm	A1.035.280
	0,1 ohm		S26	7 ohm	
S8	28 ohm		C29	91 mmF	
S9	5 ohm		C30	97 mmF	
S10	100 ohm	28.574.311	S27	3.5 ohm	
S11	50 ohm		S28	4 ohm	
C6	30 mmF		S29		28.574.061
C8	30 mmF		S30	2,5 ohm	
			C33	103 mmF	
			C34	103 mmF	
S12	2,5 ohm		S41	1 ohm	
S13	0,1 ohm		S31	800 ohm	A1.060.080
S14	260 ohm		S32	1 ohm	
S15	4,5 ohm		S33	4 ohm	28.220.230
S16	450 ohm	28.574.322	S34	8.5 ohm	28.546.780
S17	42 ohm		S35	10 ohm	28.587.930
C9	30 mmF		S37	950 ohm	Tuning Motor
C10	30 mmF		S38	950 ohm	see O-sheet
C11	30 mmF		S42	9 ohm	28.588.300
			S43	15 ohm	

No.	Value.
	0,8 M.ohm
	160 ohm
	64 ohm
	32 ohm
	40 ohm
	0,8 M.ohm
	25000 ohm
	40000 ohm
	2x10000 ohm par 5000 ohm
	400 ohm
	20000 ohm
	8M ohm = 2 X 4 M. ohm
	0,3 M.ohm + 0,3 M.ohm
	3200 ohm
	320 ohm
	50000 ohm
	32 ohm
	0,125 M.ohm
	0,1 M.ohm
	0.07 M.ohm +
	0.28 M.ohm
	4 M.ohm
	1,6 M.ohm
	4 M.ohm
	1,25 M.ohm
	0,8 M.ohm
	1,6 M.ohm
	1000 ohm
	(320 ohm par
	177 ohm-
	(400 ohm
	50000 ohm
	0,1 M.ohm
	40 ohm
	0,4 M.ohm
	800 ohm
	16000 ohm
	2000 ohm
	2 x 20 = 10 ohm
	0,32 M.ohm
	5000 ohm
	40 ohm
	50000 ohm

No.	Value.
C1	28 mF
C2	28 mF
C3	11-490 mmF
C4	11-490 mmF
C5	11-490 mmF
C6/C14	30 mmF
C16	200 mmF
C17	80 mmF
C18	100 mmF.
C19	0,1 mmF.
C20	50.000 mmF
C21	100 mmF
C22	0,1 mF
C23	0,1 mF
C24	32 mF
C25	50 mmF
C26	5750 mmF
C27	2050 mmF
C29	91 mmF
C30	97 mmF
C32	0.1 mF
C33	103 mmF
C34	103 mmF
C35	20 mmF
C36	50 mmF
C37	50000 mmF
C39	50000 mmF
C40	0,1 mF
C41	10000 mmF
C42	400 mmF
C43	2 mmF
C45	50 mmF
C46	50 mF
C47	400 mmF
C48	400 mmF
C49	0,32=2 x 0,16 mF
C50	8000 mmF
C51	500 mmF
C52	80000 mmF
C53	400 mmF
C54	2000 mmF
C56	32000 mmF serie
C61	20000 mmF
C62	0,1 mF
C65	25 mF

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27th July, 1942.

REPLACING TYPE EAB1 VALVE WITH TYPE EB4 (Model 753A).

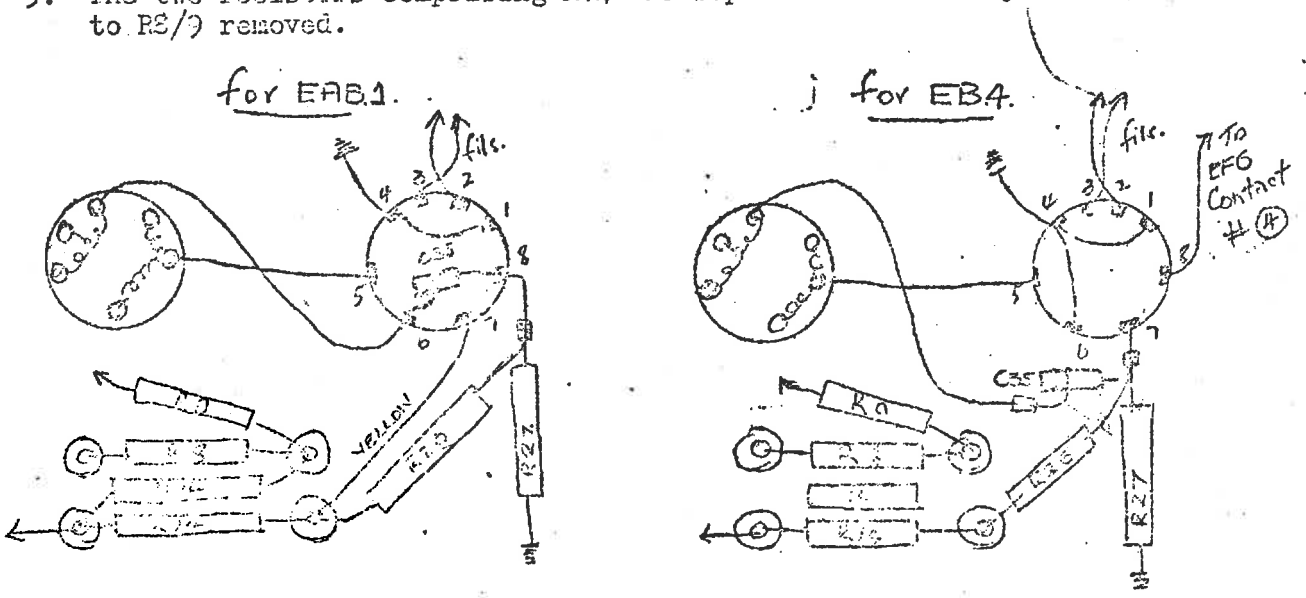
As type EAB1 is now unprocurable from overseas, we have found a suitable substitute in type EB4.

This is a double diode type with separate cathodes for each section and suits the requirements well because the special delaying feature of the circuit used in conjunction with type EAB1 is not operative with two diodes only and a separate source of delay voltage is necessary.

This is readily available from the EF6 cathode where there are about 2.5 to 3 volts.

The EAB1 socket has to be rewired to suit the type EB4 according to the sketch and description below:-

1. Contacts one, two, three, four and five remain as wired.
2. Contact six is grounded.
3. Contact seven originally has one yellow lead (to R14) connected. This is removed entirely and R26, 27 and C35 are connected to the contact after removing them from
4. Contact eight, which is connected across to contact 4 of the EF6 socket.
5. The two resistors comprising R14 are separated at their junction and the one to R8/9 removed.



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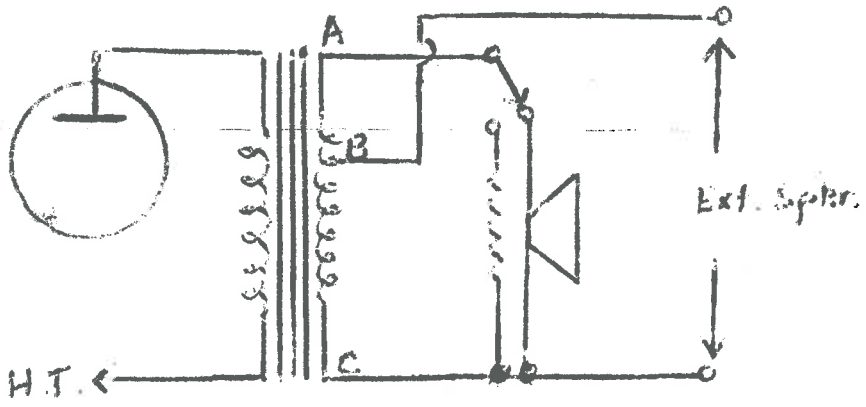
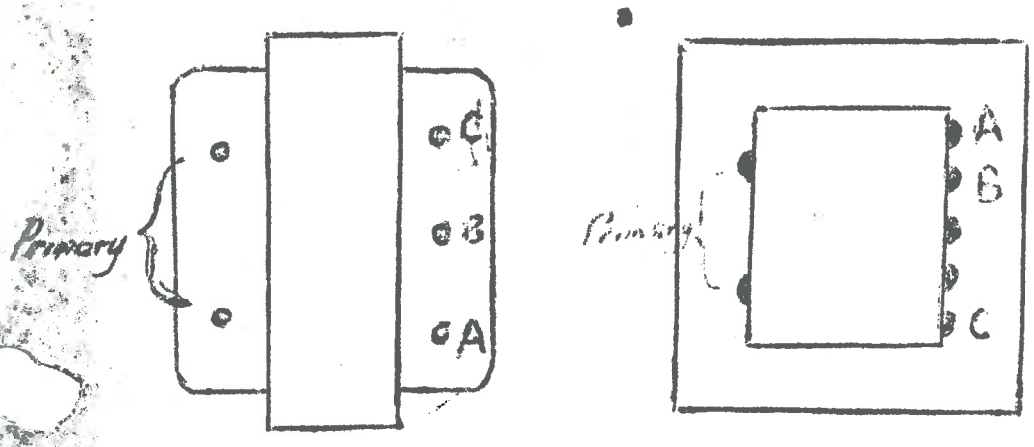


A3151520 - O.P. Transformer replacing

A10800C O.P. Trans for Model 753A.



A10800C

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