H 482

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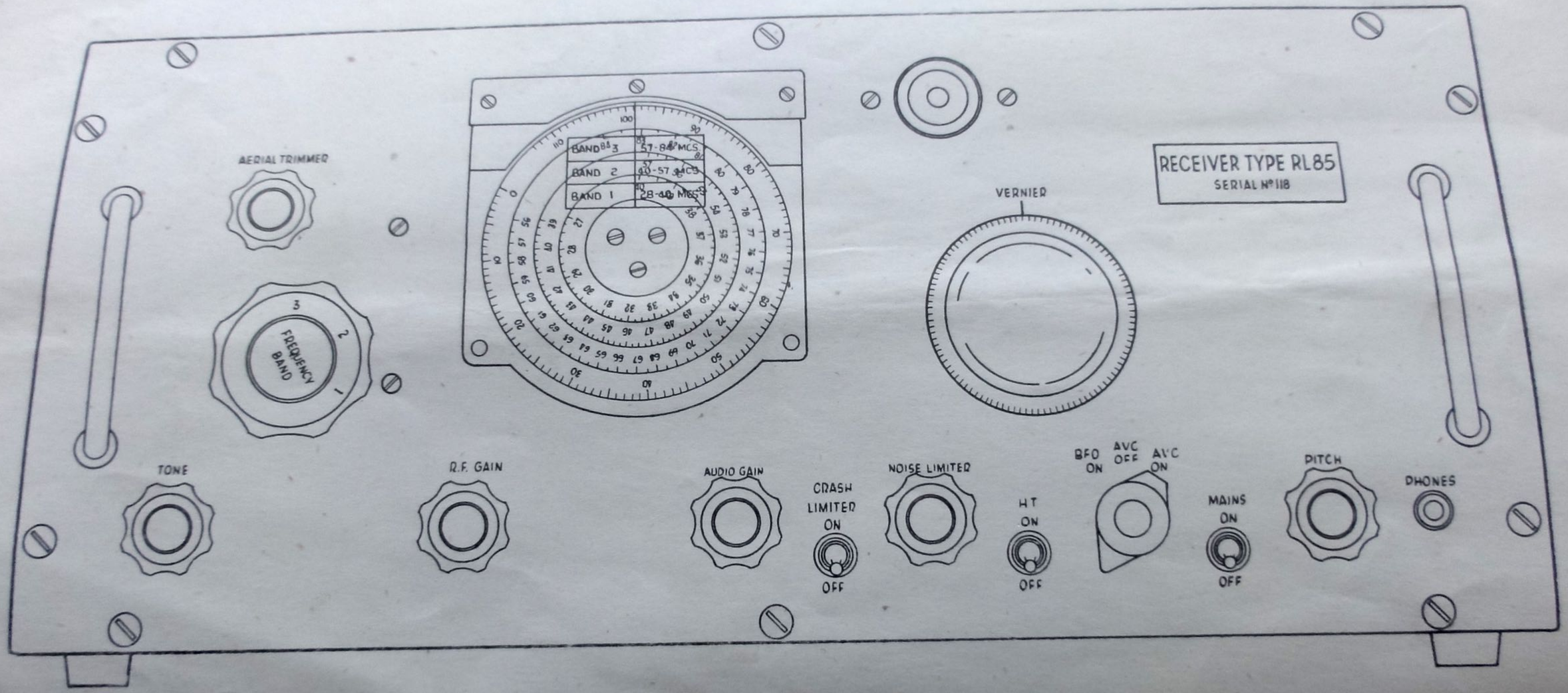
RECEIVER
TYPE RL. 85

OPERATING INSTRUCTIONS
&
SERVICE DATA

Remarks of 49°27'·7N,
2°03'·5W and 49°42'·7N, 2°01'·5W.

Carentan



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RECEIVER TYPE RL.85

OPERATING INSTRUCTIONS

The RL.85 Receiver is designed to be operated either from a 200-250 volts 50 c.p.s. A.C. supply or from D.C. H.T. and L.T. supplies (see under direct current operation).

By removing the top cover, the mains voltage tapping panel will be found on top of the mains transformer, and it can be adjusted to suit the appropriate supply voltage.

The aerial is connected to the terminal panel at the back of the receiver. For use with an open wire aerial the feeder is connected to A1, and A2 is strapped to E. For use with a half wave dipole, a 70 to 100 ohms impedance transmission line should be used and connected to terminals A1 and A2. A concentric line is preferable but if a twin line is used the strap between A2 and E must be removed. In all cases a good earth should be connected to E.

After connecting the aerial, the receiver is switched on by means of the MAINS ON/OFF switch, and after about half a minute the receiver is ready for use.

The FREQUENCY BAND switch selects the required frequency bands which cover :—

Band 1.—27 to 40 Mc/s.
Band 2.—40 to 57 Mc/s.
Band 3.—57 to 84 Mc/s.

The gain of the receiver can be adjusted by means of the R.F. or AUDIO GAIN controls which are operative in both the AVC ON and AVC OFF positions.

The AERIAL TRIMMER enables the set to be operated in its most sensitive conditions at all frequencies, and compensates for the effect of different aerials on the first circuit in the receiver.

The Beat Frequency Oscillator is switched on when the B.F.O.-A.V.C. switch is turned to the B.F.O. ON position. In this position the PITCH control adjusts the frequency of the beat note and also the A.V.C. is inoperative.

The CRASH LIMITER switches in a Dickert noise limiter circuit which is particularly effective on ignition and other peaky types of interference.

The NOISE LIMITER has an adjustable control which varies the level at which limiting takes place in the audio stages. For normal operation where there is a considerable amount of interference, best results are obtained by using both limiters at once, but for reception of pulse type of signals the CRASH LIMITER should not be used as this results in a reduction of signal strength.

The set is designed primarily for high resistance HEADPHONES but will work satisfactorily with any type.

A LOUDSPEAKER JACK is provided at the back of the set and this is arranged so that when the speaker plug is withdrawn a dummy load is placed across the secondary of the output transformer, thus safeguarding the output valve. The plug should be wired direct to the speech coil of the speaker which should be of about 6 ohms impedance.

DIRECT CURRENT OPERATION

At the back of the chassis is a socket into which fits an eight-pin plug with jumpers soldered in place. For A.C. operation this plug must be in place. For operation from direct current sources, this plug must be removed and another inserted wired as shown in the circuit diagram. Under these conditions, all controls will operate as before except the MAINS ON-OFF switch. An external switch will be required to switch off the heater supply.

The supplies required are :—

6.3 volts 3 amps for heaters.
200–250 volts 100 mAs for H.T.

The 250 volt supply can be obtained direct from D.C. mains if required, as the smoothing chokes and condensers in the set remain in circuit.

The positions of the valves are shown in the chart pasted on the inside of the back panel.

They are :— 5—EF50 Mullard.
1—6K7G Brimar.
1—6Q7G ,,
1—6J7G ,,
1—6V6G ,,
1—5Z4G ,,
1—EB34 Mullard.
1—Y63 G.E.C.
1—S130 Cossor.

The scale lamps are 6.5 volt .3 amp 10 mm. Osram Flashlight Bulbs.

ALIGNMENT PROCEDURE

Intermediate Frequency Alignment.

Set controls as follows :—

Band switch to BAND 1.

B.F.O.-A.V.C. switch to A.V.C. OFF.

R.F. and AUDIO GAIN controls at maximum.

Connect signal generator via a .1 mfd. condenser to front top tag of coil L6.

Set generator to 5.25 Mc/s. and adjust trimmers on I.F.T.s 1, 2 and 3 for maximum output.

To adjust beat frequency oscillator, set PITCH control so that the dot on the knob is vertical, and using an unmodulated signal of 5.25 Mc/s., adjust iron core of L11 to give zero beat.

R.F. Alignment.

Connect generator in series with 100 ohm resistor across terminals A1 and E, and connect A2 to E.

BAND 1. Set generator and tuning dial to 40 Mc/s. and adjust trimmers TC7, TC4 and TC1 for maximum.

Set generator and tuning dial to 28 Mc/s. and adjust iron cores L9, L6, L3.

Re-check at both frequencies until no change in calibration is noted.

BAND 2. Set generator and tuning dial to 56 Mc/s., and adjust trimmers TC6, TC3, TC1 for maximum.

Set generator and tuning dial to 40 Mc/s and adjust iron cores L8, L5, L2 for maximum.

Re-check at both frequencies until no change in calibration is noted.

BAND 3. Set generator and scale to 80 Mc/s. and adjust trimmers TC5, TC2, TC1 for maximum.

Set generator and scale to 57 Mc/s. and adjust iron cores L7, L4 and L1 for maximum.

Re-check at both frequencies until no change in calibration occurs.

When making adjustments to trimmers TC2 and iron core L4 on Band 3, it is advisable to rock the gang slightly so as to obtain the exact maximum.

Note.—On BAND 3 the oscillator frequency is lower than that of the input signal, on BANDS 1 and 2 it is higher than the input signal. Should noise picked up by the receiver interfere seriously with the alignment, the R.F. Gain should be reduced and the input from the generator increased.

TECHNICAL DATA

Description of Circuit.

The sequence of stages is :—

Aerial Transformer ; R.F. valve (V1) ; Inter-valve Transformer with top capacity coupling ; Frequency changer (V2) ; Cathode coupled oscillator (V3), supplied with stabilised H.T. from the neon stabiliser (V4), and injecting into grid of the frequency changer valve V2 via the condenser C11 ; 1st intermediate frequency (5.25 kc/s) transformer (I.F.T.1) ; 1st I.F. valve (V5) ; 2nd intermediate frequency transformer (I.F.T.2) ; 2nd I.F. valve (V6) ; 3rd intermediate frequency transformer (I.F.T.3) ; double diode triode (V7), rectifying on the diodes and supplying audio to the triode grid via the audio gain control (VR2); Rectified voltage from the diodes supplies bias to I.F. valves V5 and V6 through the filter network R37, C46, R33, C42, when switch (SW7) is in A.V.C. ON position, and also via the filter R38, C47 to the "magic-eye" V11 ; Audio from the anode of V7 is taken via noise limiter valve (V8) to the output valve (V9). The B.F.O. valve V10 is cathode coupled and injects into the primary of I.F.T.2.

Operation of Noise Limiting Circuits.

(*a*) *Crash Limiter.*

Consider first an unmodulated signal which is rectified by the diodes in V7. A steady negative potential is produced at the top end of R17, and this is transmitted via the resistance R38 to the anodes of the double diode V12. A negative potential, smaller in the ratio N $\frac{R19}{R17+R18+R19}$ is also fed to the cathodes of V12 when the switch SW9 is closed. There is consequently a negative potential equal to $\frac{R17+R18}{R17+R18+R19}$ of the steady rectified potential across the diode which is thus made non-conducting. Now if a pulse of interference is received the potential at top of R17 suddenly becomes more negative, and this is passed on via the potentiometer made up of R17, R18, R19 to the cathodes of V12. Owing to the time constant of R38, C47, the anodes cannot follow this quick change and so as soon as the amplitude of the

pulse exceeds the steady potential across the diodes of V12, they become conducting and hence limit the peak value of interference signal which can be passed on to the audio stages. For a modulated signal, the modulation is treated in the same way as the pulses of interference, that is, the signal is limited if the modulation is greater than the steady potential across the diode but is otherwise unaffected. In the RL.85, the values of R17, R18, and R19 are .05, .22, and .47 megohms respectively. The steady potential is consequently $\frac{.27}{.74} = .365$ of the rectified voltage. The change in potential required at the top of R17 to produce this change on the cathode of the diode is $.365 \times \frac{R17+R18+R19}{R19} = .365 \times \frac{.74}{.47} = .575$ of the rectified voltage. Hence any interference peaks of magnitude greater than 57 per cent. of the carrier will be limited to this value, and signals having modulation greater than 57 per cent. will be clipped.

(b) Noise Limiter valve.

Any noise pulses rectified by the diodes in V7, are of negative polarity, and appear as pulses of positive polarity in the anode of V7. The initial bias on V8 is set by means of a potentiometer across the H.T. supply consisting of R26, R28, and a variable resistance VR3. The positive noise impulses are applied to the grid of V8 via the network R21, R22, R24, R25, and if these exceed the initial bias the valve conducts and the impedance drops to low value compared with R23, with which it forms a potentiometer for incoming audio signals. Thus on the pulses of noise the input to the output valve is limited to a value determined by the setting of the variable control VR3.

For general noise, the control is useful as it can be used to limit the amplitude of noise on the positive cycles to that of the modulation which is being received. It is obvious that if the noise control is set too far in the clockwise direction (i.e., at too low a setting of initial bias) the audio waveform will be distorted by having one side limited.

COIL RESISTANCE CHART

Range 1.	Intervalve primary L6 ...	0.7 ohms	
Range 2.	,, ,, L5 ...	0.3 ,,	
I.F.T.'s (All coils)	... ...	0.4 ,,	
Smoothing choke	CK1	420 ,,	
Smoothing choke	CK2	160 ,,	
Output Transformer secondary	...	0.4 ohms	
Output Transformer primary	...	310 ,,	
Mains Transformer H.T. Sec.	...	100 ,,	
Mains Transformer primary	11.5, 12.5, 13.5		
All other coils are less than	...	0.1 ohm	

All above measurements are made between appropriate points.

VOLTAGE CURRENT AND RESISTANCE CHART

(VALVE HOLDERS VIEWED FROM BELOW)

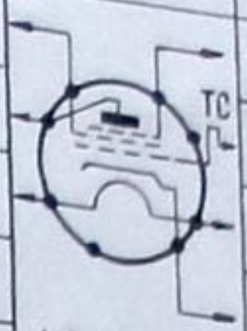
OHMS	MILLI-AMPS	VOLTS
0	-	0
2200+	7·5	210
2200+	2	220
-	-	6·3 V A.C

V1. E.F. 50.

VOLTS	MILLI-AMPS	OHMS
1·7	-	180
-	-	<0·1
0	-	0

OHMS	MILLI-AMPS	VOLTS
2200 & 33000+	-	-
·75 MΩ	-	-
0	-	0

VALVE



V8. 6J7G.

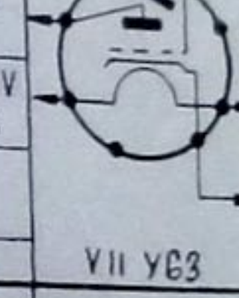
VOLTS	MILLI-AMPS	OHMS
CONNECTED TO CATHODE		
-	-	·25 MΩ
6·3 V AC	-	-
0 TO 5	-	0 TO 1000

OHMS	MILLI-AMPS	VOLTS
0	-	0
2200+	1·2	220
0·1 M+	0·3	130
-	-	6·3 V A.C

V2. E.F. 50

VOLTS	MILLI-AMPS	OHMS
3	-	220
-	-	<0·1
0	-	0

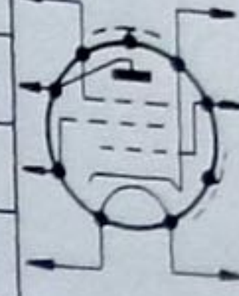
OHMS	MILLI-AMPS	VOLTS
0+	2	225
760+	37	245
0	-	0



V9. 6V6G

VOLTS	MILLI-AMPS	OHMS
-	-	·47 MΩ
6·3 V AC	-	-
10	-	250

OHMS	MILLI-AMPS	VOLTS
0	-	0
·47 MΩ+	0·4	-
1 MΩ+	0·15	-
0	-	0



V10 EF 50

VOLTS	MILLI-AMPS	OHMS
0	-	0
-	-	47000
6·3 V AC	-	-

OHMS	MILLI-AMPS	VOLTS
3000+	30	115
0	-	0

V4. 9 130

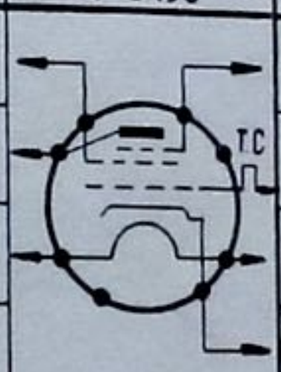
VOLTS	MILLI-AMPS	OHMS

OHMS	MILLI-AMPS	VOLTS
0+	3·5	225
1 MΩ+	-	-
-	-	6·3 V AC

V11 Y63

VOLTS	MILLI-AMPS	OHMS
-	-	175 MΩ
0	-	0
0	-	0

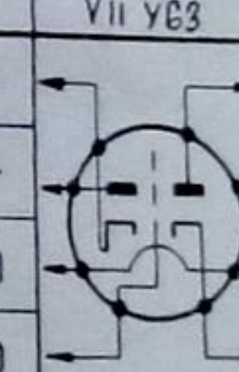
OHMS	MILLI-AMPS	VOLTS
17000+	2	110
1000+	8·5	215
0	-	0



V5. 6K7G

VOLTS	MILLI-AMPS	OHMS
CONNECTED TO CATHODE		
-	-	1·8 MΩ
6·3 V AC	-	-
3·5	-	330

OHMS	MILLI-AMPS	VOLTS
·22 MΩ SW9 CLOSED	-	-
1·75 MΩ	-	-
0	-	0
0	-	0



V12 EB 34

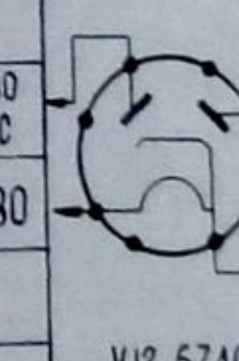
VOLTS	MILLI-AMPS	OHMS
-	-	1·75 MΩ
6·3 V AC	-	-
-	-	·22 MΩ SW9 CLOSED

OHMS	MILLI-AMPS	VOLTS
1·7 MΩ	-	-
1000+	8	215
1000+	1·7	215
-	-	6·3 V AC

VG E.F. 50

VOLTS	MILLI-AMPS	OHMS
2·5	-	217
-	-	1·7 MΩ
0	-	0

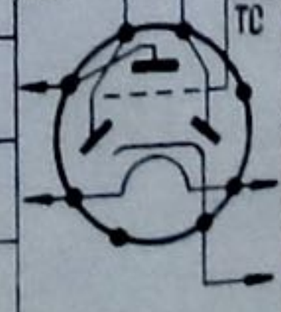
OHMS	MILLI-AMPS	VOLTS
100	-	280 AC
600+	-	280



V13 5Z4G

VOLTS	MILLI-AMPS	OHMS
280 AC	-	100
280	-	600+

OHMS	MILLI-AMPS	VOLTS
·75 MΩ	-	-
·22 MΩ+	0·5	60
0	-	0



V7. 6Q7G

VOLTS	MILLI-AMPS	OHMS
-	-	·5 MΩ MAX
6·3 V AC	-	-
0·7	-	2200

VOLTAGE BETWEEN H.T. POSITIVE AND CHASSIS IS 225 VOLTS

TOTAL HT CURRENT IS 115 MILLI-AMPS

ALL READINGS ARE REFERRED TO CHASSIS EXCEPT THOSE MARKED + WHICH ARE REFERRED TO H.T. POSITIVE (SMOOTHED). ALL VOLTAGE READINGS TAKEN WITH A 1000 OHM PER VOLT METER. MAINS INPUT IS 230. V. A.C AND GAIN CONTROLS ARE AT MAXIMUM TO OBTAIN COMPARABLE READINGS. A GOOD HIGH RESISTANCE METER MUST BE USED.

ALL VALVE CHARTS ARE DRAWN WITH KEY ON SPIGOT IN A DOWNWARD DIRECTION

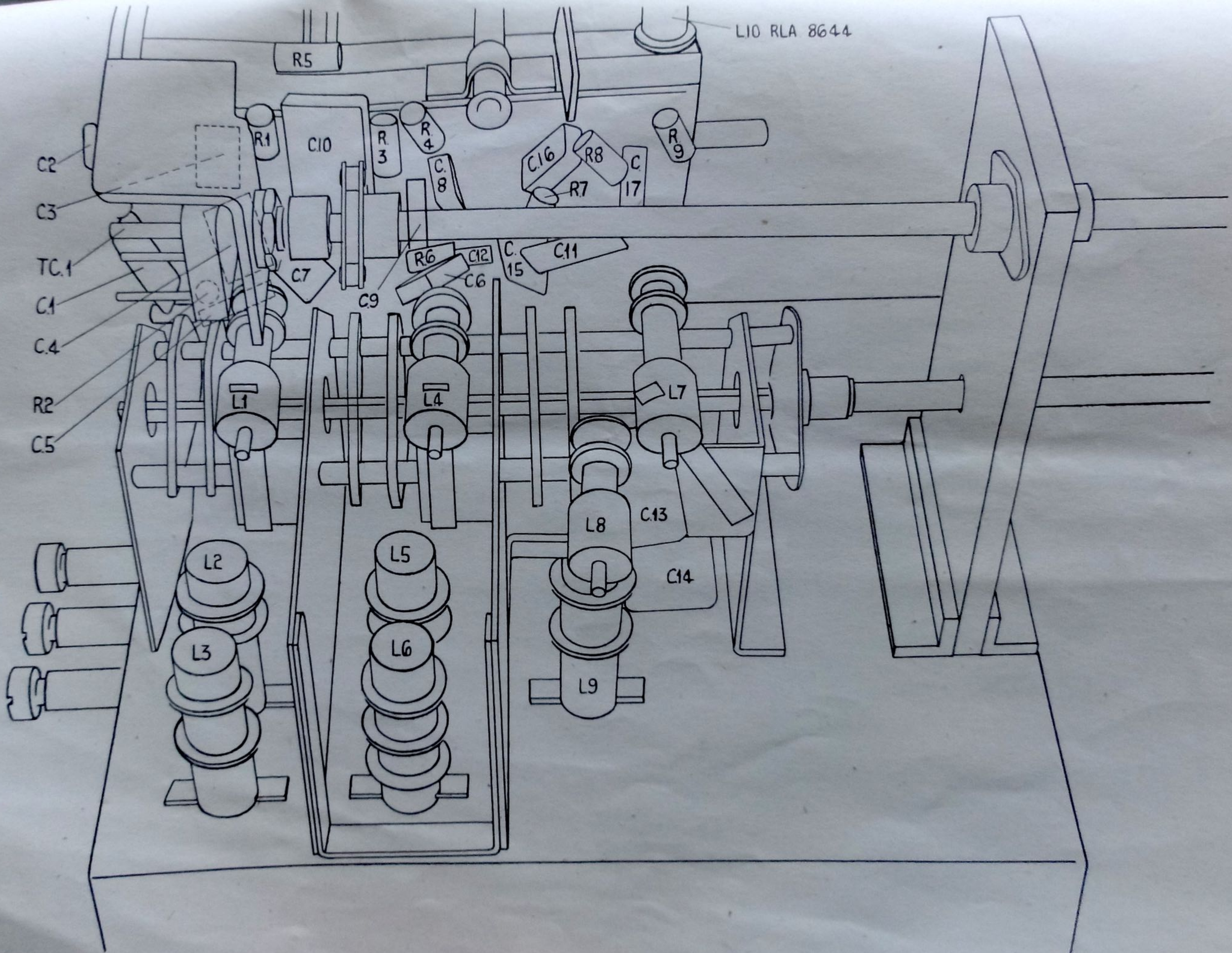
RLD. 9583

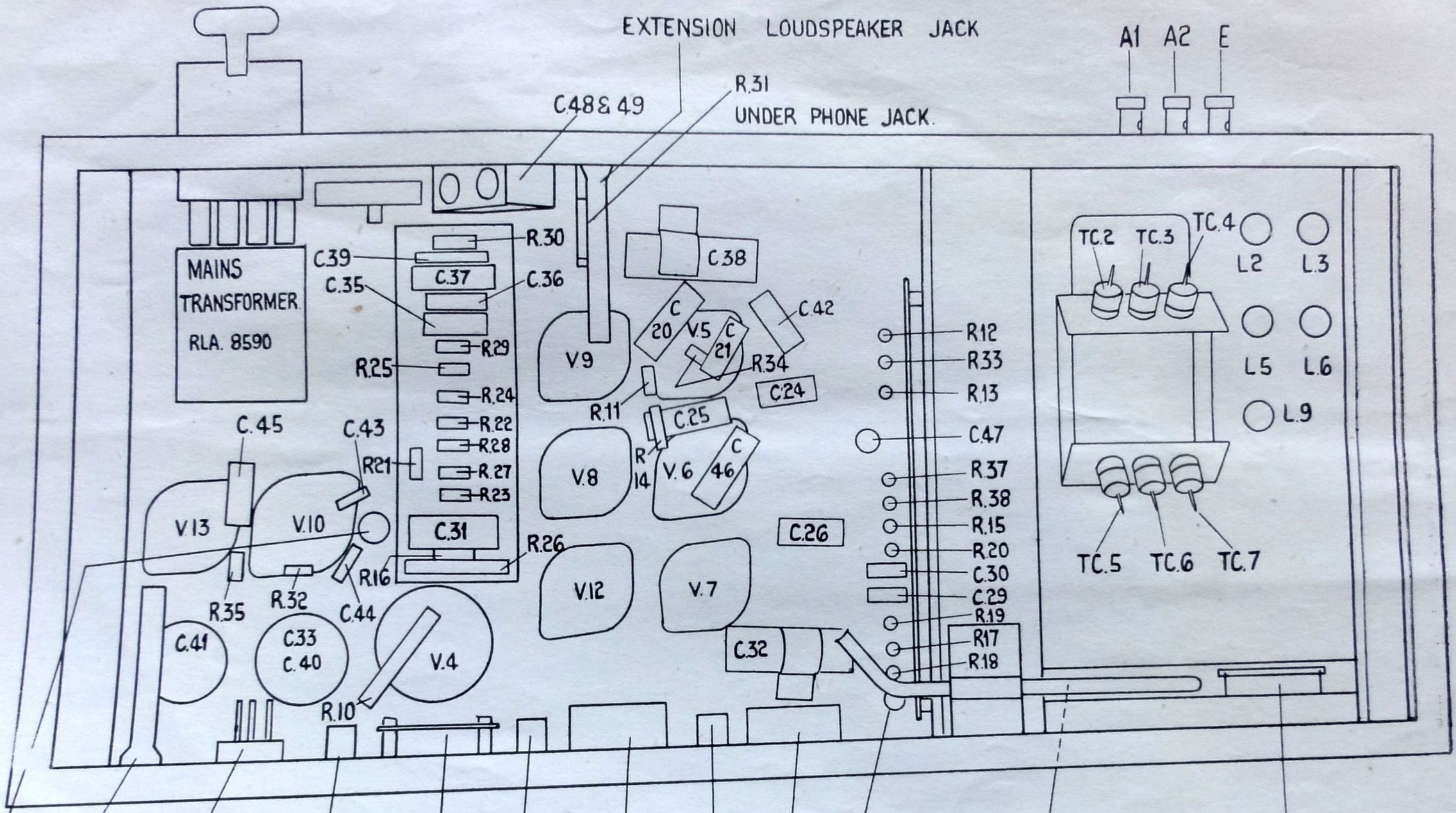
SW. 1 RLA. 9586

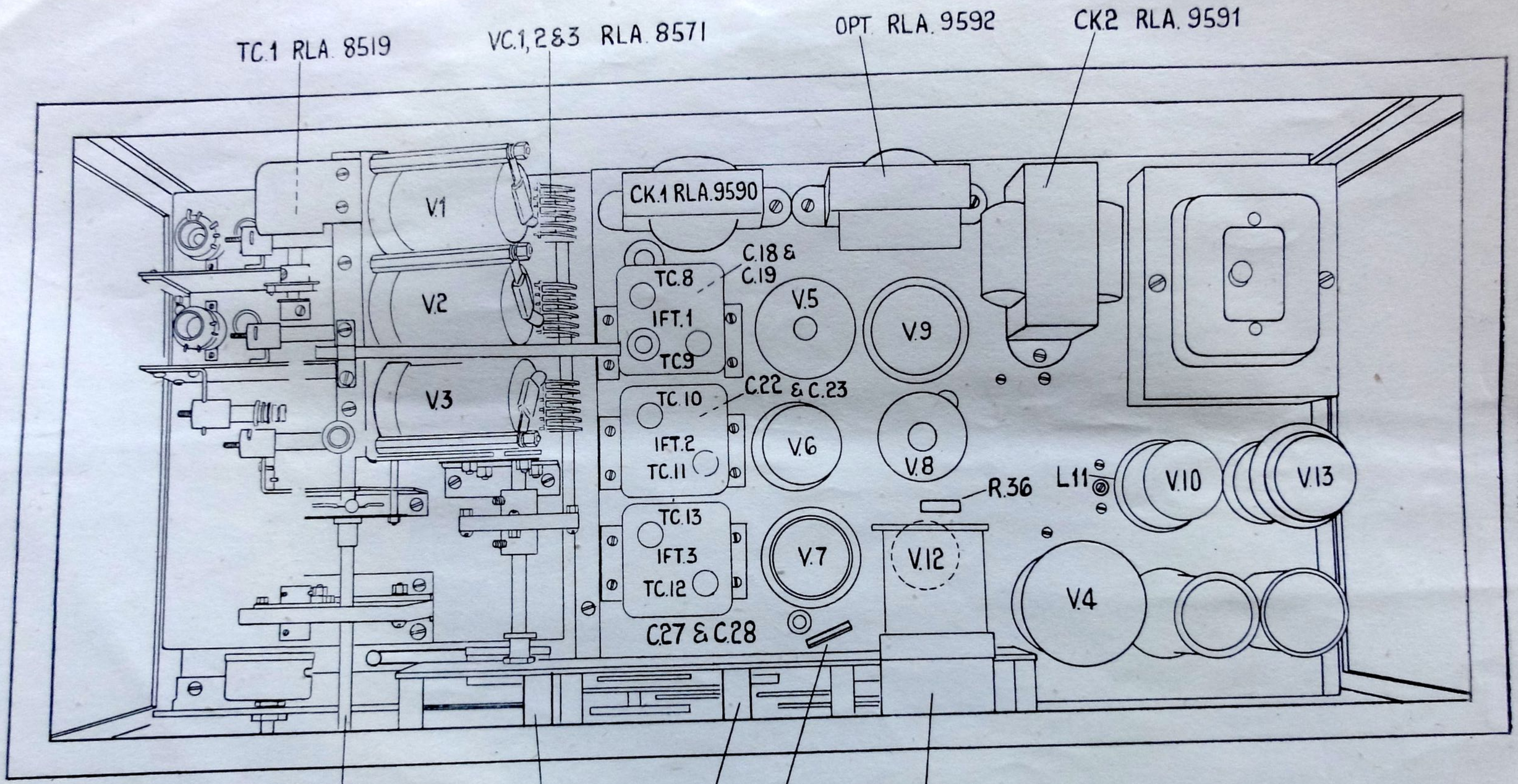
RLD. 9604

BFO. COIL

L 11 RLA. 8594


L10 RLA 8644
R5
R1
C10
R3
R4
C8
C16
R8
R7
C17
R9
C2
C3
TC1
C1
C4
R2
C5
C7
C9
R6
C12
C6
C15
C11
L1
L4
L7
L8
C13
C14
L2
L5
L3
L6
L9


EXTENSION LOUDSPEAKER JACK
A1 A2 E
C.48 & 49
R.31
UNDER PHONE JACK.
MAINS TRANSFORMER RLA. 8590
R.30
C.39
C.37
C.36
C.35
R.29
R.25
R.24
R.22
R.28
R.27
R.23
C.31
R.26
R.16
C.45
C.43
R21
V13
V.10
R.35
R.32
C.44
C.41
C.33
C.40
V.4
R.10
V.9
C.38
C 20
V.5
C 21
C.42
R.34
C.24
R.11
C.25
R 14
V.6
C 46
V.8
V.12
V.7
C.26
C.32
R12
R33
R13
C.47
R.37
R.38
R.15
R.20
C.30
C.29
R.19
R17
R.18
TC.2
TC.3
TC.4
L2
L3
L5
L6
L.9
TC.5
TC.6
TC.7
C.34
PHONE JACK
SW.11
SW.10
VR.3
SW.9
VR.1
VR.4
TC. 14 BFO PITCH.
SW. 8 AVC & BFO SWITCH
RLD. 9580
VR.2
RLD. 9585
RLD. 9579
RLD. 8624
SW. 7 RLA. 9586
RLD. 9583
BFO. COIL
L.11 RLA. 8594


TC.1 RLA. 8519
VC.1, 2 & 3 RLA. 8571
OPT. RLA. 9592
CK2 RLA. 9591
CK.1 RLA. 9590
V.1
V.2
V.3
TC.8
C.18 & C.19
IFT.1
TC.9
TC.10
C.22 & C.23
IFT.2
TC.11
TC.13
IFT.3
TC.12
C.27 & C.28
V.5
V.9
V.6
V.8
V.7
V.12
R.36
L11
V.10
V.13
V.4
SW.1 TO SW.6
RLA. 8641
PILOT LAMPS
PL & PL.2
R.39
RLA. 8645
V.11

RL.85. COMPONENTS.

SWITCHES.

S.W. No.	Part No.	Reference.	Type.
S.W.1.			
S.W.2.			
S.W.3.	RLA.8641	Range Switch	K. Type.
S.W.4.			
S.W.5.			
S.W.6.			
S.W.7.	RLA.9586	A.V.C. - B.F.O	A. Type.
S.W.8.			
S.W.9.	S80T	Crash Limiter	Bulgin
S.W.10	S80T	H.T. On-Off	Bulgin
S.W.11.	S80T	Mains On-Off	Bulgin

TRIMMING CONDENSERS.

T.C. No.	Part No.	Value	Type.
T.C.1.	RLD.8519	12 uf swing	
T.C.2.	4684/01	3 - 30 pf	Philips
T.C.3.	4684/01	3 - 30 pf	"
T.C.4.	4684/01	3 - 30 pf	"
T.C.5.	4684/01	3 - 30 pf	"
T.C.6.	4684/01	3 - 30 pf	"
T.C.7.	4684/01	3 - 30 pf	"
T.C.8.	4684/01	3 - 30 pf	"
T.C.9.	4684/01	3 - 30 pf	"
T.C.10	4684/01	3 - 30 pf	"
T.C.11.	4684/01	3 - 30 pf	"
T.C.12	4684/01	3 - 30 pf	"
T.C.13	4684/01	3 - 30 pf	"
T.C.14	RLD.8624	5 pf swing	

VARIABLE CONDENSERS.

V.C.1.) V.C.2.) V.C.3.)	RLA.8571	9 - 61 pf

VARIABLE RESISTORS.

V.R.1.	RLD.9585	5000 ohms
V.R.2.	RLD.9583	0.5 M.ohms
V.R.3.	RLD.9580	1000 ohms
V.R.4.	RLD.9579	20,000 ohms

COILS.

L. No.	Part No.	Type.
L.1	RLA.8585	Range 3 Aerial
L.2	RLA.8584	Range 2 "
L.3	RLA.8583	Range 1 "
L.4	RLA.8582	Range 3 Int.valve
L.5	RLA.8581	Range 2 "
L.6	RLA.8580	Range 1 "
L.7	RLA.8579	Range 3 Oscillator
L.8	RLA.8578	Range 2 "
L.9	RLA.8577	Range 1 "
L.10	RLA.8644	H.F. Choke
L.11	RLA.8594	B.F.O.
I.F.T.1.	RLA.8621	No.1. Int.valve.
I.F.T.2.	RLA.8622	No.2. "
I.F.T.3.	RLA.8623	No.3. "
C.K.1.	RLA.9590	Choke
C.K.2.	RLA.9591	Choke
O.P.T.	RLA.9592	Output Transformer
	RLA.8590	Mains "

VALVES.

V.1	E.F.50	Mullard.
V.2	E.F.50	"
V.3	E.F.50	"
V.4	S.130	Cossor
V.5	6K7G	Brimar
V.6	EF.50	Mullard
V.7	6Q7G	Brimar
V.8	6J7G	"
V.9	6V6G	"
V.10	EF.50	Mullard
V.11	Y.63	General Electric Co.
V.12	EB.34	Mullard.
V.13	5Z4G	Brimar.
PL1. & PL2.	6.5 v. .3 amp. 10 m/m flashlight bulb round type - G.E.C.	

Apparatus	R.L.85.		
Title	COPONENT SHEET.		
Drawn By RRAL	Checked By	Date	14/3/48
The Plessey Co. Ltd. Vicarage Lane. Ilford		RLC.	8500/1.