RECEPTION SETS AR88D AND AR88LF

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

Erratum

Note: This Page 0 will be filed immediately in front of Page 1, Issue 1, dated 31 Mar 53.

1. The following amendment will be made to this Regulation.

Page 1017, Fig 1011

Delete: V3
Insert: V4

Delete: V4
Insert: V3

57/Maint/4017

ELECTRICAL AND MECHANICAL
ENGINEERING REGULATIONS
(By Command of the Army Council)

RECEPTION SETS AR88D AND AR88LF

TECHNICAL HANDBOOK - TECHNICAL DESCRIPTION

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Distribution - Class 910. Code No. 4

INTRODUCTION

1. The Reception sets AR88D and AR88LF are high grade, superheterodyne, general purpose communication receivers. They are designed for C.W., M.C.W. and R.T. reception and will withstand wide climatic and line voltage variations without appreciable loss of performance.

2. Both receivers incorporate temperature-compensated oscillator circuits fed with a stabilized voltage supply; a selectivity control; optional A.V.C. and noise limitation, and a variable pitch B.F.O. The receivers are basically similar but have different frequency ranges and output impedances.

BRIEF DESCRIPTION

Electrical

3. Fig 1 gives the block diagram applicable to both receivers. The frequency range of each is covered in six bands as follows:-

Range	Model AR88D (I.F. = 455kc/s)	Model AR88LF (I.F. = 735kc/s)
1	535 - 1,600kc/s	73 - 205kc/s
2	1.57 - 4.55Mc/s	195 - 550kc/s
3	4.45 - 12.15Mc/s	1.48 - 4.40Mc/s
4	11.90 - 16.60Mc/s	4.25 - 12.15Mc/s
5	16.10 - 22.70Mc/s	11.90 - 19.50Mc/s
6	22.00 - 32.00Mc/s	19.00 - 30.50Mc/s

4. The receiver sensitivities over most of the bands are as follows:-

C.W. - Less than 3.0 V input for 20db signal-to-noise ratio at 500mW to loudspeaker.
M.C.W. - Less than 10 V input for 20db signal-to-noise ratio at 500mW to loudspeaker.

5. Headphone, loudspeaker and line outputs are available from both receivers at the following impedances.

AR88D 2.5Ω to speaker
600Ω to balanced line
20,000Ω to headphones
AR88LF 2.5Ω to speaker
20Ω to unbalanced line
20Ω to headphones

6. The maximum indistorted output from each set is 2.5W to loudspeaker or line.

7. A 5-position SELECTIVITY control is incorporated which varies the band-width of the I.F. channel. A crystal filter is employed in three positions for narrow band-widths. The approximate band-widths are as follows.

Position	Band-width at -6db		Operation
	AR88D	AR88LF	
1	13kc/s	16kc/s	For wide band-pass Rec. Mod.
2	7kc/s	8kc/s	For normal Rec. Mod.
3	3kc/s	4kc/s	For C.W. or Rec. Mod.
4	1.5kc/s	2kc/s	For sharper C.W.
5	0.4kc/s	0.5kc/s	For sharpest C.W.

8. Both receivers carry an A.C. mains power supply system; but a removable plug on the rear of the chassis permits D.C. supplies to be used. The power requirements are as follows.

A.C.	AR88D :	100-165V or 190-260V, 50-60c/s at 100VA
	AR88LF :	115 or 230V, 25-60c/s at 10CVA
D.C.	Both sets:	L.T. 6V at 4A
		H.T. 250-300V at 90mA

9. The aerial input circuits are designed for coupling to a 200Ω balanced transmission line except on the low frequency broadcast bands, ie band 1 on the AR88D and and bands 1 and 2 on the AR88LF. On these bands one side of the aerial input coil is connected to chassis and a normal single wire aerial, 25-50 ft long, and earth should be used. On all bands a single wire aerial and earth connection may be used without appreciable loss in performance.

10. A terminal marked DIVERSITY is provided on the rear of the chassis for diversity reception when required. A wire joining these terminals of two or more receivers having spaced aerials will tend to reduce selective fading (see Tels A 017, A 172). Figs 2 and 3 show the rear chassis views of the AR88D and the AR88LF respectively.

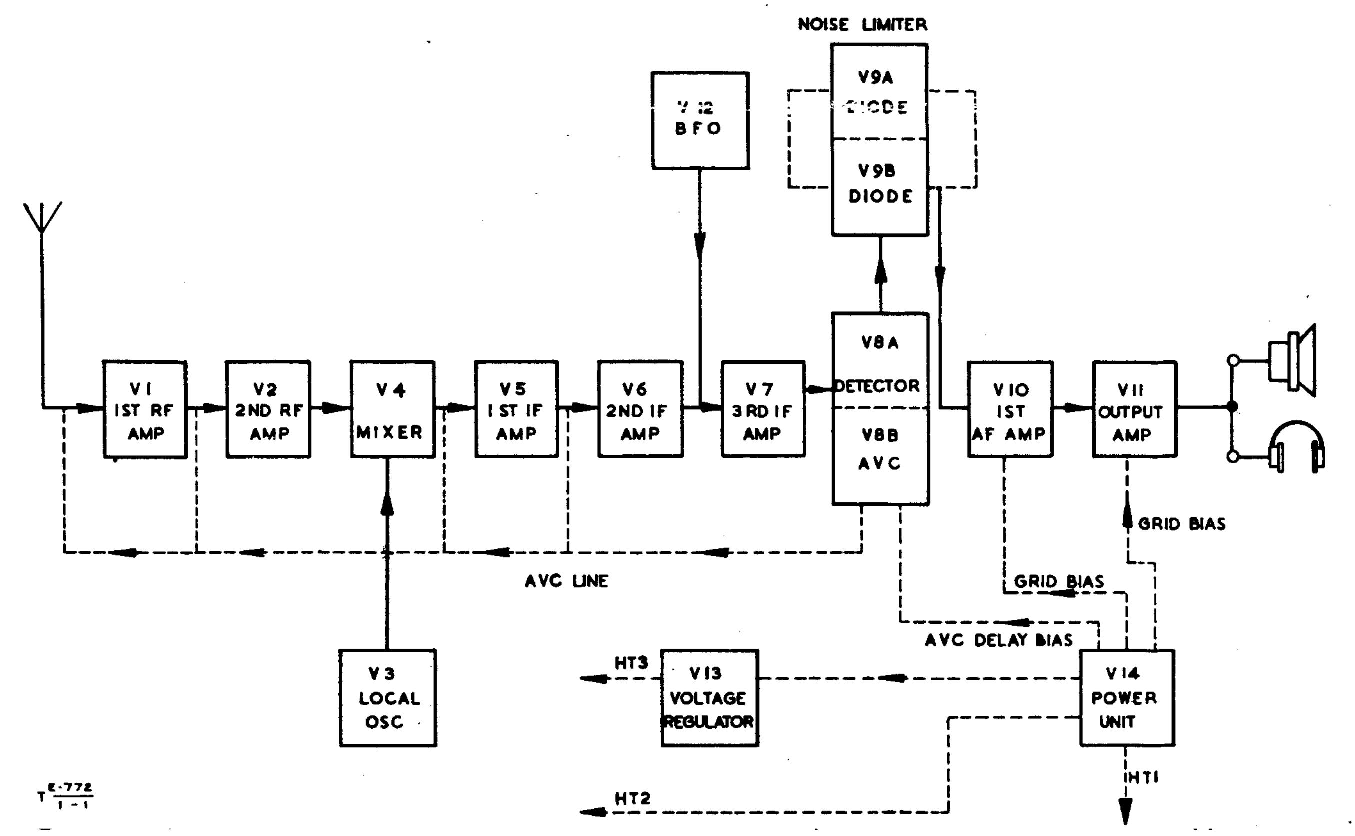


Fig 1 - AR88D and AR88LF - block diagram

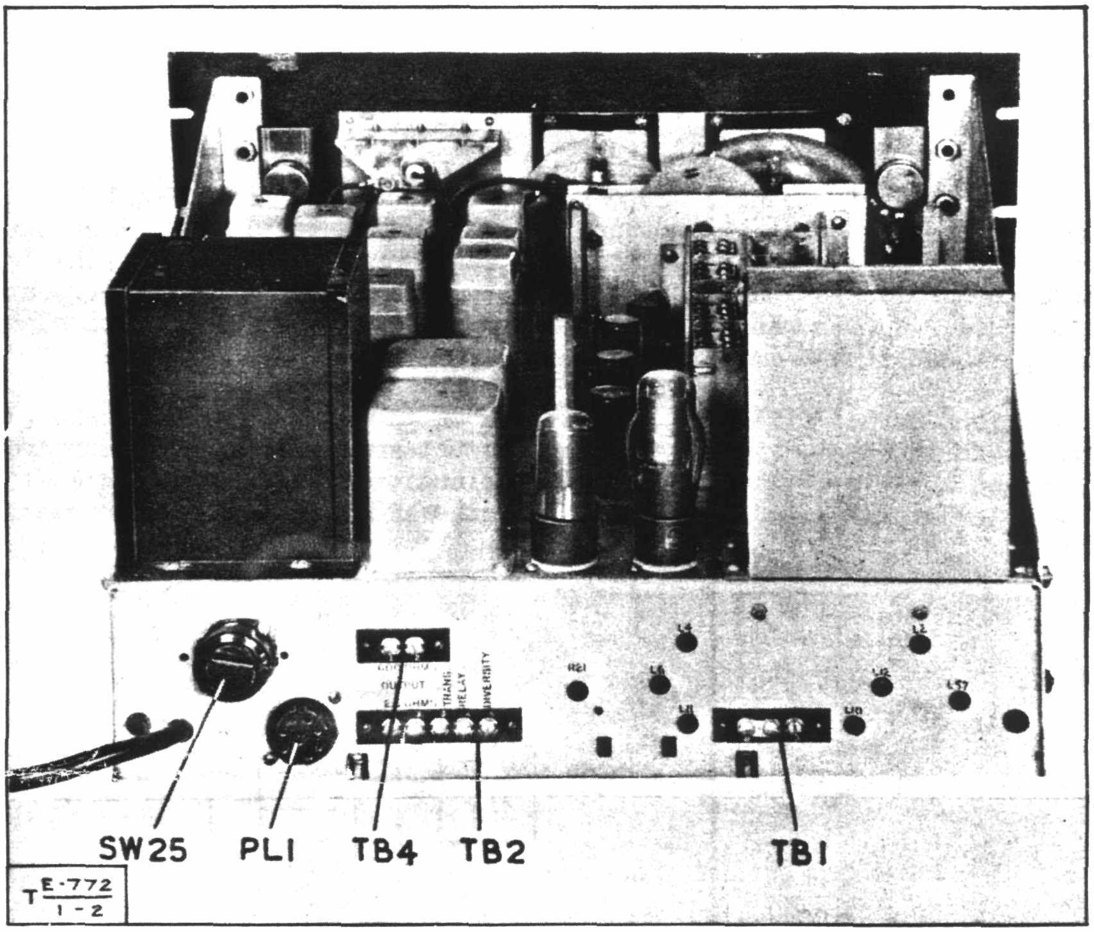


Fig 2 - AR88D - rear chassis view

Mechanical

11. The receivers are of similar mechanical construction and the following description refers to both.

12. The physical dimensions of the receiver in its steel case are as follows:-

Weight:	100 lb
Height:	11 in
Width:	19 in
Depth:	19¼ in

13. The receiver and its mains power unit are mounted on a heavy gauge plated steel chassis which is rigidly attached to an aluminium front panel. The front panel is heavily constructed and is slotted along each side so that the receiver may be rack mounted if desired. The chassis is normally housed in a steel case which bolts to the front panel. The case is provided with a hinged lid for easy access to the valves.

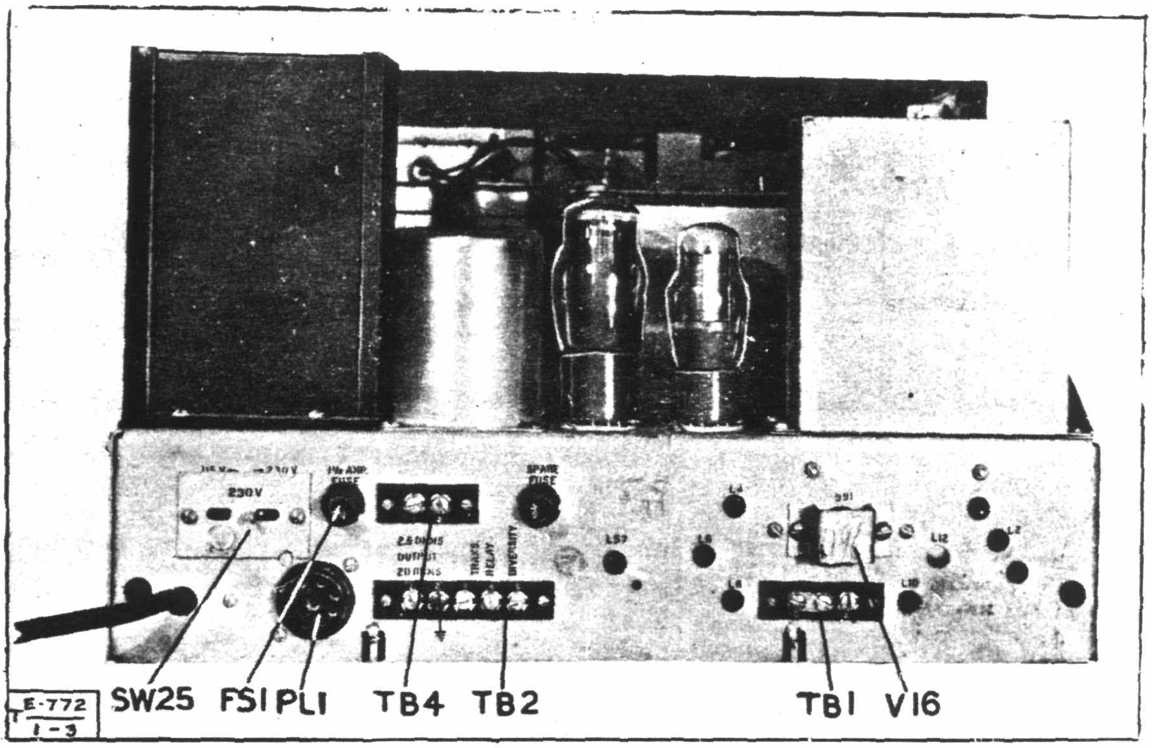


Fig 3 - AR88LF - rear chassis view

14. The ganged tuning capacitors and tuning coils in the oscillator and R.F. amplifier sections are thoroughly screened in order to minimize interaction and oscillator radiation. The R.F. amplifier and oscillator sections are mounted on a very rigid sub-chassis which can be removed from the main chassis.

15. The ganged tuning capacitors are driven via a slow-motion drive comprising a flywheel and a train of spring-loaded split gears. The system also drives two tuning dials and gives smooth operation with negligible backlash. The main tuning dial rotates with the tuning capacitors and is calibrated in frequency for each of the six ranges. The second tuning dial has a numerical scale, 0-100, and acts as a vernier in conjunction with a numerical scale, 0-22, on the main tuning dial. This facilitates accurate re-setting to any given dial position.

Controls

16. The front panels and the controls of the AR88D and AR88LF are identical. Fig 4 shows the front panel of the AR88D and Table 1 lists the functions of the controls.

Designation	Circuit ref	Function
H.F. TONE	RV4	Varies high audio-frequency
ANT. ADJ.	C2	Trims first tuned circuit
OFF - TRANS - REC. MOD. - REC. C.W.	SW 23, SW 24	OFF - Mains power off TRANS - Valve heaters energized, H.T. off, transmitter relay terminals shorted REC. MOD. - Normal R.T. reception REC. C.W. - B.F.O. switched on
RANGE	SW1 - SW16	6-way frequency range switch, see para 3
R.F. GAIN	RV3	Manual gain-control, varies bias on R.F. and I.F. stages
TUNING CONTROL	C3, C6, C35, C40, C49, C50, C70, C77	Drives ganged tuning capacitors and two tuning dials
A.F. GAIN	RV2	Adjusts input to A.F. amplifier V10
SELECTIVITY	SW17 - SW20	Varies selectivity of I.F. channel, see para 7
MAN. - MAN. N.L. - A.V.C. N.L. - A.V.C.	SW21 - SW22	MAN. - A.V.C. and noise limiter off MAN. N.L. - A.V.C. off, noise limiter on A.V.C. N.L. - A.V.C. and noise limiter on A.V.C. - A.V.C. on, noise limiter off
B.F.O. ADJ.	C86	Varies frequency of beat oscillator and hence pitch of a C.W. signal
NOISE LIMITER	RV1	Sets depth of modulation above which noise limiter operates

NOTE: The small knurled screw beneath the TUNING CONTROL locks the tuning drive

Table 1 - Front panel controls

TECHNICAL DESCRIPTION

General

17. Fig 1001 shows a simplified circuit diagram of the AR88D in which switching has been reduced to a minimum. The switch wiring diagrams of the R.F., oscillator and selectivity circuits are given separately in Fig 1002 etc in order to avoid confusion on the main diagram. The circuit values given in Fig 1001 apply to the AR88D only.

18. The circuit of the AR88LF is similar to that of the AR88D. Differences occur, however, in the R.F., oscillator, mains transformer and output stage circuits; these are illustrated separetely in Fig 1003 etc.

19. Except where otherwise stated the following description refers to both receivers.

Aerial circuits

20. The aerial circuits are transformer coupled to the grid circuit of V1 on all ranges; wafers SW15 and SW16 of the RANGE switch perform the primary switching.

21. The AR88D, on range 1, incorporates an I.F. wave trap (455kc/s acceptor circuit, L57, C12) which is shunted across the primary of the aerial transformer.

22. The AR88LF has a neon tube, V16, connected permanently across the aerial terminals. This tube ionises when excessive R.F. voltages are picked up, thus protecting the aerial coils by acting as a low impedance shunt.

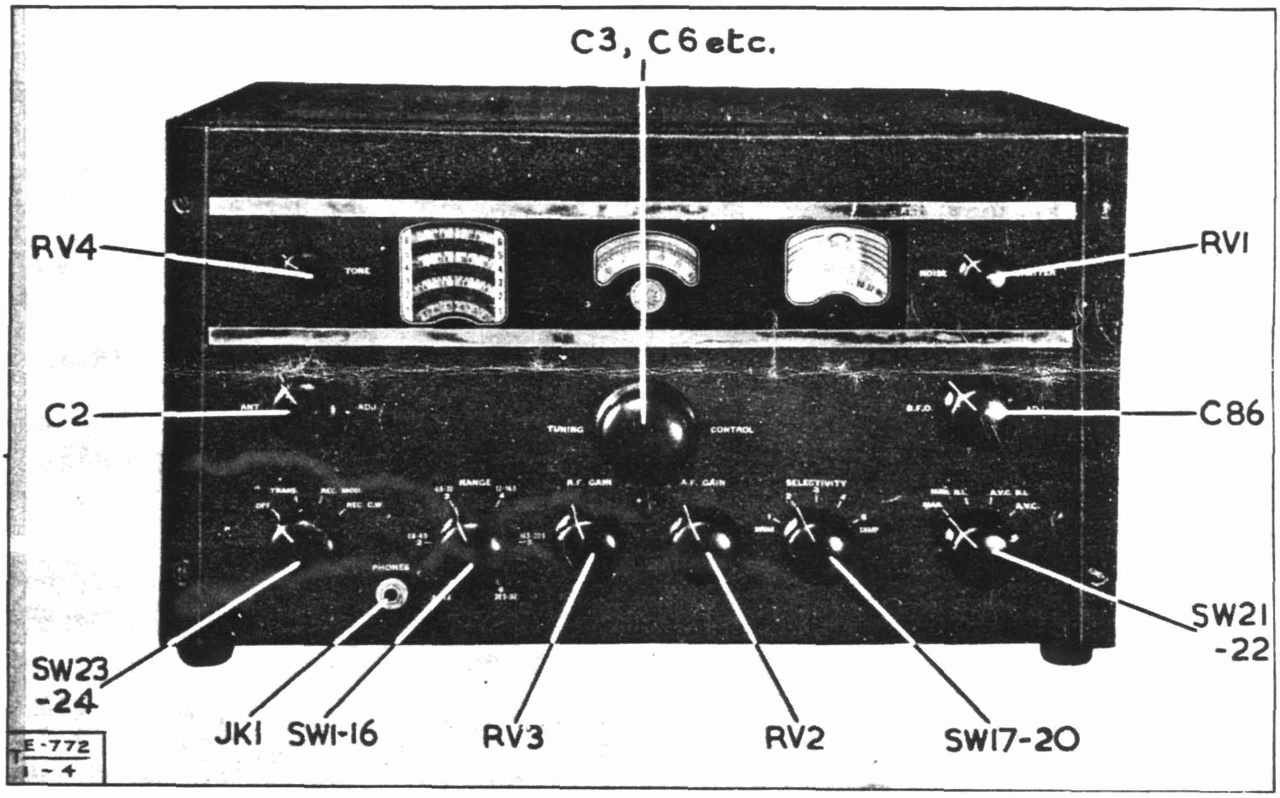


Fig 4 - AR88D - front panel view

R.F. stages

23. The secondary windings of the aerial transformers form part of the tuned grid circuit of V1 and are selected by SW13. SW13 also switches into circuit the tuning capacitors C3 and C6; these are employed either singly or in parallel according to the frequency range in order to maintain a suitable L to C ratio. SW14 short-circuits the windings which are not in use. C2 (ANT. ADJ.) trims the first tuned circuit to resonance and compensates for varying aerial impedances.

24. V1 is a high-grain R.F. amplifier. To maintain stability the anode loads on certain ranges are shunted by resistors and capacitors and the AR88D incorporates an anode stopper, R59. Coupling to the grid circuit of V2 is either by transformer or choke-capacity coupling. SW12 selects the primary windings of the transformers and the tuned secondaries are selected by SW9. On the AR88D the primary winding of range 3 is used as the inductive load for ranges 4, 5 and 6; on the AR88LF it is the primary winding of range 4 which is used as the load for ranges 5 and 6. SW11 short-circuits the primaries not in use; SW10 shorts out the secondaries not in use.

25. On range 3 of the AR88LF the anode load is shunted by an I.F. wave trap (735kc/s acceptor circuit L57, C12).

26. The grid and anode circuits of V2 are similar to those of V1. Coupling to the grid of the mixer stage, V4, is also similar. A.V.C. is applied to the grids of both V1 and V2.

Local oscillator and mixer

27. The local oscillator V3, employs a modified shunt-fed Colpitts oscillator circuit. The circuit varies slightly according to the frequency range in use. It oscillates at a frequency 455kc/s (or 735kc/s) above the signal frequency. The anode circuit is selected by SW3 and the grid connection by SW2. SW1 and SW4 short-circuit certain coils when not in use in order to prevent absorption effects. The anode of V3 is tuned by C49 and/or C50. The H.T. supply is taken from the stabilized line HT3 via the filter circuit C121, R12, C51 and R11.

28. The output of the local oscillator is fed via C53 to the oscillator grid of the mixer, V4. The mixer operates with fixed cathode bias and A.V.C. is not applied. The anode circuit is tuned to the intermediate frequency by the primary of TR3 and H.T. is derived from the line HT2. The screen is fed from the line HT3 via R19.

I.F. stages

29. The three I.F. stages, V5-V7, provide the five degrees of selectivity of the receiver. This is achieved by overcoupling between stages for broad band-pass and by feeding the signal through a crystal filter for narrow band-pass.

30. In position 3 of the SELECTIVITY switch the output of the mixer, V4, is fed to the grid of V5 via the crystal filter. This consists of a bridge circuit formed by the centre-tapped secondary winding of TR3, a 455kc/s (or 735kc/s) crystal and the phasing capacitor C75, which neutralizes the capacity of the crystal in its holder. TR4 (L34) forms the crystal load and with C73, is tuned to the crystal frequency.

31. The selectivity or Q of a crystal filter is dependent upon the value of the impedance into which it feeds. Thus, the smaller the impedance presented by TR4 the greater will be the effective Q of the crystal. In selectivity position 3 the impedance of TR4 is comparatively large giving a low crystal Q. In positions 4 and 5 the impedance of TR4 is reduced by tapping down on L34 thus giving progressively sharper selectivity. Extra capacitors are switched in at each tap in order to maintain resonance at the intermediate frequency.

32. In position 2 of the SELECTIVITY switch the crystal is shorted out and the load circuit is disconnected. The secondary of TR3 feeds directly to the grid of V5 giving normal band-pass coupling. The crystal filter filter switching is performed by SW19 and SW20.

33. In selectivity position 2 the output of V5 is fed to the grid of V6 via the I.F. transformers TR5 and TR6. The primaries and secondaries of these transformers are critically coupled, giving a single peak resonance curve. The two transformers are mutually coupled by a common capacitor C92. In position 1 of the selectivity switch the primaries and secondaries in each transformer are over-coupled by the introduction of extra turns in the secondary of TR5 and in the primary of TR6 giving a broad selectivity curve. This is repeated in the transformers TR7 and TR8 which couple the stages V6 and V7. The selectivity switching is performed by SW17 and SW18.

34. The output of V7 is fed to the detector V8 via the I.F. transformer TR9, which is unaffected by the setting of the SELECTIVITY switch.

Beat-frequency oscillator

35. V12 is a shunt-fed Colpitts oscillator operating about the intermediate frequency. C86 (B.F.O. ADJ.) varies the frequency and hence the beat note. The B.F.O. excitation voltage is fed to the 3rd I.F. stage V7, stray capacity coupling being used. This is achieved by means of a lead connecting an unused pin (4) on V12 valve base to an unused terminal (A) on TR9.

Detector and A.V.C.

36. The detector and A.V.C. diodes are combined in V8. The detector circuit is conventional and the A.V.C. voltage is obtained from the detector load through R47. V8B is used to provide delayed A.V.C.

37. The anode of V8B is connected to the A.V.C. line while the cathode is held negative by RV3, the R.V. GAIN control. Until the A.V.C. voltage exceeds this bias the diode will conduct and hold the A.V.C. line at the voltage set by RV3. Thus RV3 provides a variable A.V.C. delay. When the A.V.C. voltage exceeds this delay V8B is cut off and the control voltage is applied to the A.V.C. line. A.V.C. is fed to the R.F. stages, V1 and V2, and the I.F. stages, V5 and V6.

38. Under manual gain conditions SW22 shorts out V8B and the A.V.C. line is connected via R42 to the slider of RV3.

Noise limiter

39. The noise limiter is another double-diode, V9. The products of detection, ie an A.F. signal superimposed upon a D.C. voltage, are developed across the detector load, RV1 and R49. The anode of V9B is connected to the junction of RV1 and R49, while the cathode is connected to the slider of RV1 via the A.F. filter R50, C109, C110 and R35.

40. Thus the cathode of V9B is held at a steady D.C. potential which is proportional to the mean carrier level. The mean D.C. level of the anode is either equal to or more positive than the cathode according to the setting of RV1. Thus V9B will conduct and freely pass all A.F. signals whose amplitude is less than the anode-cathode voltage. If the amplitude of the A.F. signal rises above this voltage, ie due to a noise pulse, the negative peak will drive V9B anode negative with respect to its cathode. V9B will be cut off for the duration of the pulse and the signal will not be passed to the A.F. stages.

41. Thus all negative noise peaks in exceed of a certain potential, set by RV1, are effectively limited. Since the potential of the slider of RV1 is proportional to the mean carrier level, the anode-cathode voltage of V9B is a constant proportion of the carrier amplitude for any one setting of RV1. The setting of RV1 therefore corresponds to a certain percentage of modulation above which signals will be limited.

42. If RV1 is set so that the anode-cathode voltage of V9B is zero, the noise limiter will operate at 0% modulation and limit the negative half-cycles of all signals, producing extremely high distortion. Thus the optimum setting of the NOISE LIMITER control is a compromise between A.F. distortion and noise limitation.

43. The second diode V9A has two functions. Firstly, it adds to the effectiveness of V9B as a series limiter and secondly, it limits noise pulses from previous stages in the absence of a carrier. The action in each case is similar.

44. V9A is normally cut off by the voltage across R50 due to the current in V9B. When a noise pulse commences to cut off V9B, the voltage across R50 falls and allows V9A to conduct slightly due to the contact potential effect. V9A conducts through R50 and the voltage developed opposes the current in V9B. The action is cumulative and the cut-off of V9B is accelerated. V9A conducts and acts as a shunt limiter, shunting the A.F. output to earth via C109 and C110.

45. SW21 permits the noise limiter to be switched in or out of circuit as desired.

A.F. and output stages

46. V10 and V11 are the A.F. and power output amplifiers respectively. The output stages of the two receivers differ and Fig 1007 gives the circuit of the AR88LF. Grid-bias voltages from the power supply system are fed to each stage, and negative feedback is applied to the cathode of V10, via R54 and R39, from the secondary winding of the output transformer TR2. RV4 (H.F. TONE) in series with C117 shunts the anode of V10 and provides a 'treble cut' tone control.

47. On the AR88LF, TR2 has one secondary winding which is tapped giving 2.5Ω and 20Ω outputs. The complete winding is used for headphone reception and when a phone plug is inserted in JK1, R56 is brought into circuit as an additional shunt load to provide correct matching.

48. On the AR88D, TR2 is provided with two secondary windings. One gives a 600Ω 'floating' output; the other is tapped and gives 2.5Ω and 20,000Ω outputs. The 20,000Ω output is fed to a 2-position jack for headphone reception. With a phone plug inserted in the first position of the jack, the phones are connected in parallel with the loudspeaker on the 2.5Ω output. In the second position the phones are across the 20,000Ω winding and the speaker output is disconnected. When no load is connected to the 2.5Ω or 600Ω output the phone plug should always be pushed fully home as in this position the 2.5Ω output is automatically loaded by R56.

Power supply system

49. The power supply system provides three H.T., and three negative bias lines and a valve heater supply. The H.T.3 line is stabilized and feeds the local oscillator, the beat-frequency oscillator and the screens of the mixer and I.F. stages. H.T.2 is fully smoothed and supplies all other valves except the anode of V11. This is fed by H.T.1 from the junction of L49 and L50. The grid-bias voltages are derived from the resistor chains R43, R44, R45 and R55, RV3 (R.F. GAIN) in the H.T. negative return line.

50. The two receivers employ different mains transformers, (TR1), The circuit of the AR88LF mains transformer is given in Fig 1008. The primary winding of the AR88D transformer is tapped for various voltage inputs whilst that of the AR88LF is designed for 115V or 230V only. Both transformers incorporate an electrostatically screened primary.

51. When the receivers operate from D.C. supplies, the D.C. voltages are fed into SK1 as follows.

Pin 4	LT +	6V
Pin 5	LT -	
Pin 6	HT -	250-300V
Pin 7	HT +	

Separate ON-OFF switches are necessary in each supply.

CHANGES OCCURING DURING MANUFACTURE

52. The reception set AR88D was originally manufactured as the AR88, the change in designation occurring somewhere between the serial Nos. 003000 and 010000. The two sets differ slightly in the output stage, and the AR88 incorporates a tuning meter in place of the illuminated name-plate now appearing on the AR88D. Despite the change in designation, the AR88D still bears the name AR88 on the nameplate.

53. The AR88 has two types of output circuit; these are given in Fig 1009. The following output impedances are provided:-

Receivers with serial Nos. below 00300

2.5Ω to speaker
20Ω to headphones

Receivers with serial Nos. above 003000

2.5Ω to speaker
600Ω to line (unbalanced)
600Ω to headphones

The next page is Page 1001

Table 1001 - AR88D and AR88LF - components list

Circuit ref.	Value AR88D	Value AR88LF	Rating	Tolerance	Type
		RESISTORS			
R1	33kΩ	33kΩ	½W	±10%	Insulated carbon
R2	2.2MΩ	2.2MΩ	½W	±20%	Insulated carbon
R3	1kΩ	1kΩ	½W	±10%	Insulated carbon
R4	56kΩ	100kΩ	½W	±10%	Insulated carbon
R5	1MΩ	1MΩ	½W	±20%	Insulated carbon
R6	33kΩ	33kΩ	½W	±10%	Insulated carbon
R7	10Ω	330Ω	½W	±10%	Insulated carbon
R8	5.6kΩ	-	½W	±10%	Insulated carbon
R9	100kΩ	100kΩ	½W	±10%	Insulated carbon
R10	1kΩ	1kΩ	½W	±10%	Insulated carbon
R11	10kΩ	10kΩ	½W	±10%	Insulated carbon
R12	1kΩ	1kΩ	½W	±10%	Insulated carbon
R13	560Ω	560Ω	½W	±10%	Insulated carbon
R14	100kΩ	100kΩ	½W	±10%	Insulated carbon
R15	15kΩ	22kΩ	½W	±10%	Insulated carbon
R16	1kΩ	1kΩ	½W	±10%	Insulated carbon
R17	10Ω	330Ω	½W	±10%	Insulated carbon
R18	5.6kΩ	-	½W	±10%	Insulated carbon
R19	33kΩ	33kΩ	½W	±10%	Insulated carbon
R20	100Ω	100Ω	½W	±10%	Insulated carbon
R22	1kΩ	1kΩ	½W	±10%	Insulated carbon
R23	560kΩ	560kΩ	½W	±10%	Insulated carbon
R24	120kΩ	120kΩ	½W	±10%	Insulated carbon
R25	180Ω	47Ω	½W	±10%	Insulated carbon
R26	1kΩ	1kΩ	½W	±10%	Insulated carbon
R27	560kΩ	560kΩ	½W	±10%	Insulated carbon
R28	120kΩ	120kΩ	½W	±10%	Insulated carbon
R29	47kΩ	47kΩ	½W	±10%	Insulated carbon
R30	2.7kΩ	2.7kΩ	4W	±10%	Wire-wound
R31	1kΩ	1kΩ	½W	±10%	Insulated carbon
R32	390Ω	390Ω	½W	±10%	Insulated carbon
R33	2.2MΩ	2.2MΩ	½W	±10%	Insulated carbon
R34	1kΩ	1kΩ	½W	±10%	Insulated carbon
R35	680kΩ	680kΩ	½W	±10%	Insulated carbon
R36	2.2MΩ	2.2MΩ	½W	±20%	Insulated carbon
R37	1MΩ	1MΩ	½W	±20%	Insulated carbon
R38	1.5MΩ	1.5MΩ	½W	±10%	Insulated carbon
R39	100Ω	100Ω	½W	±10%	Insulated carbon
R40	270kΩ	270kΩ	½W	±10%	Insulated carbon
R41	100kΩ	100kΩ	½W	±10%	Insulated carbon
R42	390kΩ	390kΩ	½W	±10%	Insulated carbon
R43	100Ω	100Ω	4W	±10%	Wire-wound
R44	160Ω	160Ω	4W	±10%	Wire-wound
R45	15Ω	15Ω	½W	±10%	Insulated carbon
R47	2.2MΩ	2.2MΩ	½W	±10%	Insulated carbon
R49	33kΩ	33kΩ	½W	±10%	Insulated carbon
R50	560kΩ	560kΩ	½W	±10%	Insulated carbon
R53	330kΩ	330kΩ	½W	±10%	Insulated carbon

Table 1001 - (contd)

Circuit ref	Value AR88D	Value AR88LF	Rating	Tolerance	Type
			RESISTORS		
R54	2.7kΩ	2.7kΩ	½W	±10%	Insulated carbon
R55	6.8kΩ	6.8kΩ	½W	±10%	Insulated carbon
R56	5Ω	39Ω	4W	±10%	Wire-wound
R58	-	5.6kΩ	½W	±10%	Insulated carbon
R59	15Ω	-	½W	±10%	Insulated carbon
R60	-	5.6kΩ	½W	±10%	Insulated carbon
R61	-	47Ω	½W	±10%	Insulated carbon
R62	-	47Ω	½W	±10%	Insulated carbon
R63	1MΩ	560kΩ	½W	±10%	Insulated carbon
R64	560kΩ	560kΩ	½W	±10%	Insulated carbon
R65	560kΩ	560kΩ	½W	±10%	Insulated carbon
R66	-	2.7kΩ	½W	±10%	Insulated carbon
R67	-	2.7kΩ	½W	±10%	Insulated carbon
			POTENTIOMETERS		
RV1	66kΩ	66kΩ	NOISE LIMITER control		
RV2	2MΩ	2MΩ	A.F. GAIN control		
RV3	66kΩ	66kΩ	R.F. GAIN control		
RV4	1MΩ	1MΩ	H.F. TONE control		
			CAPACITORS		
C1	0.0047µF	0.0047µF	500V	±10%	Mica
C2	3-25pF	3-25pF	-	-	Antenna trimmer
C3	10-410pF	10-410pF	-	-	Main gang assy
C4	220pF	220pF	500V	±10%	Ceramic tubular
C5	220pF	220pF	500V	±10%	Ceramic tubular
C6	8-68pF	8-88pF	-	-	Main gang assy
C7	18pF	-	500V	±5%	Ceramic tubular
C8	33pF	-	500V	±5%	Ceramic tubular
C9	22pF	10pF	500V	±10%	Ceramic tubular
C10	22pF	-	500V	±10%	Ceramic tubular
C11	0.0047µF	0.0047µF	500V	±10%	Mica
C12	56pF	56pF	500V	±10%	Ceramic tubular
C13	82pF	220pF	500V	±10%	Ceramic tubular
C14	220pF	220pF	500V	±10%	Ceramic tubular
C15	13pF	47pF	500V	±5%	Ceramic tubular
C16	2-12pF	2-20pF	-	-	Air trimmer
C17	525pF	68pF	500V	±10%	Mica
C18	13pF	39pF	500V	±5%	Ceramic tubular
C19	2-12pF	2-12pF	-	-	Air trimmer
C20	1,550pF	240pF	500V	±5%	Mica
C21	13pF	15pF	500V	±5%	Ceramic tubular
C22	2-12pF	2-12pF	-	-	Air trimmer
C23	0.003µF	0.001µF	375V	±5%	Mica
C24	0.0027µF	0.0025µF	500V	±5%	Mica
C25	2-20pF	2-12pF	-	-	Air trimmer

Table 1001 - (contd)

Circuit ref	Value AR88D	Value AR88LF	Rating	Tolerance	Type
			CAPACITORS		
C26	82pF	15pF	500V	±5%	Ceramic tubular
C27	2-20pF	2-25pF	-	-	Air trimmer
C28	0.003μF	0.003μF	375V	±5%	Mica
C29	82pF	30pF	500V	±5%	Ceramic tubular
C30	0.0039μF	0.0039μF	500V	±5%	Mica
C31	75pF	39pF	500V	±5%	Ceramic
C32	2-20pF	2-25pF	-	-	Air trimmer
C33	0.0047μF	0.0047μF	500V	±10%	Mica
C34	220pF	220pF	500V	±10%	Ceramic tubular
C35	10-370pF	10-370pF	-	-	Main gang assy
C36	180pF	0.0015μF	(600V (LF) (500V (D)	±20% (LF) ±10% (D)	Mica (LF) Ceramic tubular (D)
C37	2-12pF	22-20pF	-	-	Air trimmer
C38	2-20pF	2-20pF	-	-	Air trimmer
C39	2-20pF	2-20pF	-	-	Air trimmer
C40	8-128pF	8-128pF	-	-	Main gang assy
C41	2-20pF	2-20pF	-	-	Air trimmer
C42	82pF	-	500V	±5%	Ceramic tubular
C43	2-20pF	2-25pF	-	-	Air trimmer
C44	91pF	6.8pF	500V	±5%	Ceramic tubular
C45	2-20pF	2-25pF	-	-	Air trimmer
C46	85pF	15pF	500V	±5%	Ceramic tubular
C47	0.0047pF	0.0047pF	500V	±10%	Mica
C48	0.05μF	0.05μF	400V	-	3-section, oil filled
C49	8-128pF	8-128pF	-	-	Main gang assy
C50	10-370pF	10-370pF	-	-	Main gang assy
C51	0.0047μF	0.0047μF	500V	±10%	Mica
C52	0.0047μF	0.0047μF	500V	±10%	Mica
C53	6.8pF	6.8pF	500V	±10%	Ceramic tubular
C54	0.0047μF	0.0047μF	500V	±10%	Mica
C55	680pF	390pF	500V	±5%	Mica
C56	0.01μF	0.01μF	400V	-	3-section, oil filled
C57	220pF	220pF	500V	±10%	Ceramic tubular
C58	180pF	0.0015μF	(600V (LF) (500V (D)	±20% (LF) ±10% (D)	Mica (LF) Ceramic tubular (D)
C59	2-12pF	2-20pF	-	-	Air trimmer
C60	2-20pF	2-20pF	-	-	Air trimmer
C61	15pF	10pF	500V	±10%	Ceramic tubular
C62	2-20pF	2-20pF	-	-	Air trimmer
C63	0.0047μF	0.0047μF	400V	-	3-section, oil filled
C64	2-20pF	2-20pF	-	-	Air trimmer
C65	82pF	-	500V	±10%	Ceramic tubular
C66	2-20pF	2-25pF	-	-	Air trimmer
C67	82pF	22pF	500V	±10%	Ceramic tubular
C68	2-20pF	2-25pF	-	-	Air trimmer
C69	82pF	15pF	500V	±5%	Ceramic tubular
C70	8-128pF	8-128pF	-	-	Main gang assy
C71	0.1μF	0.1μF	400V	-	3-section, oil filled
C72	680pF	390pF	500V	±5%	Mica
C73	150pF	100pF	500V	±5%	Mica
C75	3-14pF	3-15pF			Crystal phasing trimmer

Table 1001 - (contd)

Circuit ref	Value AR88D	Value AR88LF	Rating	Tolerance	Type
		CAPACITORS			
C76	0.01µF	0.01µF	400V	-	3-section, oil filled
C77	10-370pF	10-370pF	-	-	Main gang assy
C78	680pF	390pF	500V	±5%	Mica
C79	0.1µF	0.1µF	400V	-	3-section, oil filled
C80	2-20pF	2-20pF	-	-	Airttrimmer
C81	2-20pF	2-20pF	-	-	Air trimmer
C82	56pF	56pF	500V	±5%	Mica
C83	0.0047µF	0.0047µF	500V	±10%	Mica
C84	0.1µF	0.1µF	400V	-	3-section, oil filled
C85	470pF	330pF	500V	±20%	Mica
C86	3-25pF	3-15pF	-	-	B.F.O. trimmer
C87	0.0022µF	0.0015µF	500V	±10%	Mica
C88	56pF	56pF	500V	±5%	Mica
C89	680pF	390pF	500V	±5%	Mica
C90	680pF	390pF	500V	±5%	Mica
C91	680pF	390pF	500V	±5%	Mica
C92	0.1µF	0.1µF	400V	-	3-section, oil filled
C93	0.01µF	0.01µF	400V	-	3-section, oil filled
C94	680pF	390pF	500V	±5%	Mica
C95	0.1µF	0.1µF	400V	-	3-section, oil filled
C96	4µF	4µF	-	+20%-10%	3-section, oil filled
C97	4µF	4µF	-	+20%-10%	3-section, oil filled
C98	4µF	4µF	-	+20%-10%	3-section, oil filled
C99	0.25µF	0.25µF	400V	-	3-section, oil filled
C100	680pF	390pF	500V	±5%	Mica
C101	680pF	390pF	500V	±5%	Mica
C102	0.1µF	0.1µF	400V	-	3-section, oil filled
C103	0.05µF	0.05µF	400V	-	3-section, oil filled
C104	680pF	390pF	500V	±5%	Mica
C105	560pF	560pF	500V	±10%	Mica
C106	0.05µF	0.05µF	400V	-	3-section, oil filled
C107	0.05µF	0.05µF	400V	-	3-section, oil filled
C108	180pF	100pF	500V	±5%	Mica
C109	0.05µF	0.05µF	400V	-	3-section, oil filled
C110	0.05µF	0.05µF	400V	-	3-section, oil filled
C111	0.0027µF	0.0027µF	500V	±5%	Mica
C112	0.25µF	0.25µF	400V	-	3-section, oil filled
C113	180pF	100pF	500V	±5%	3-section, oil filled
C114	180pF	100pF	500V	±5%	Mica
C115	180pF	180pF	500V	±5%	Mica
C116	0.0027µF	0.0027µF	500V	±10%	Mica
C117	0.0047µF	0.0047µF	500V	±10%	Mica
C118	0.0047µF	0.0047µF	500V	±10%	Mica
C119	0.0047µF	0.0047µF	500V	±10%	Mica
C120	15pF	-	500V	±10%	Ceramic tubular
C121	0.0047µF	0.0047µF	500V	±10%	Mica
C122	0.0047µF	0.0047µF	500V	±10%	Mica
C123	-	220pF	500V	±10%	Ceramic tubular

Table 1001 - (contd)

Circuit ref	Value AR88D	Value AR88LF	Rating	Tolerance	Type
		CAPACITORS			
C124	-	150pF	500V	±10%	Ceramic tubular
C125	-	650pF	300V	±10%	Mica
C126	-	650pF	300V	±10%	Mica
C127	-	240pF	500V	±5%	Mica
C128	-	285pF	500V	±5%	Mica
C129	10pF	10pF	500V	±10%	Ceramic tubular
C130	-	560pF	500V	±10%	Mica

INDUCTORS

L1, 2	Antenna coil, band 1
L3, 4	Antenna coil, band 2
L5, 6	Antenna coil, band 3
L7, 8	Antenna coil, band 4
L9, 10	Antenna coil, band 5
L11, 12	Antenna coil, band 6
L13, 14	R.F. coil, band 1
L15, 16	R.F. coil, band 2
L17, 18	R.F. coil, band 3 (band 4 on AR88LF)
L19	R.F. coil, band 4 (band 3 on AR88LF with L61)
L20	R.F. coil, band 5
L21	R.F. coil, band 6
L23, 24	R.F. coil, band 1
L25, 26	R.F. coil, band 2
L27, 28	R.F. coil, band 3 (band 4 on AR88LF)
L29	R.F. coil, band 4 (band 3 on AR88LF with L60)
L30	R.F. coil, band 5
L31	R.F. coil, band 6
L49	L.F. choke
L50	L.F. choke
L51	Oscillator coil, band 1
L52	Oscillator coil, band 2
L53	Oscillator coil, band 3
L54	Oscillator coil, band 4
L55	Oscillator coil, band 5
L56	Oscillator coil, band 6
L57	Wave trap 455kc/s (AR88D) 735kc/s (AR88LF)
L60, L29	R.F. coil, band 3 (AR88LF)
L61, L19	R.F. coil, band 3 (AR88LF)

TRANSFORMERS

TR1	Power transformer
TR2	Output transformer
TR3	1st I.F. transformer
TR4	I.F. crystal load
TR5	2nd I.F. transformer
TR6	2nd I.F. transformer

Table 1001 - (contd)

Circuit ref	Value AR88D	Value AR88LF	Rating	Tolerance	Type

TRANSFORMERS

TR7	3rd I.F. transformer	
TR8	3rd I.F. transformer	
TR9	4th I.F. transformer	
TR10	B.F.O. coil	

VALVES

	AR88D	AR88LF
V1	CV 1978 (6SG7)	CV 1978 (6SG7)
V2	CV 1978 (6SG7)	CV 1978 (6SG7)
V3	CV 1933 (6J5)	CV 1933 (6J5)
V4	CV 1966 (6SA7)	CV 1966 (6SA7)
V5	CV 1978 (6SG7)	CV 1978 (6SG7)
V6	CV 1978 (6SG7)	CV 1978 (6SG7)
V7	CV 1978 (6SG7)	CV 1978 (6SG7)
V8	CV 1930 (6H6)	CV 1930 (6H6)
V9	CV 1930 (6H6)	CV 1930 (6H6)
V10	CV 591 (6SJ7)	CV 591 (6SJ7)
V11	CV 1940 (6K6GT)	CV 511 (6V6GT)
V12	CV 1933 (6J5)	CV 1933 (6J5)
V13	CV 216 (VR150)	CV 216 (VR150)
V14	CV 1856 (5Y3GT)	CV 1856 (5Y3GT)
V16	-	CV 651 (991)

SWITCHES

SW1-SW4	Range switch oscillator circuits
SW5-SW8	Range switch 2nd R.F. circuits
SW9-SW12	Range switch 1st R.F. circuits
SW13-SW16	Range switch antenna circuits
SW17-SW20	Selectivity switch
SW21-SW22	AVC - NL switch
SW23	OFF - TRANS - REC. MOD. - REC. C.W. switch
SW24	ON/OFF switch ganged to SW23
SW25	Voltage tap switch

CRYSTALS

XL1	455kc/s (AR88D)
XL1	735kc/s (AR88LF)

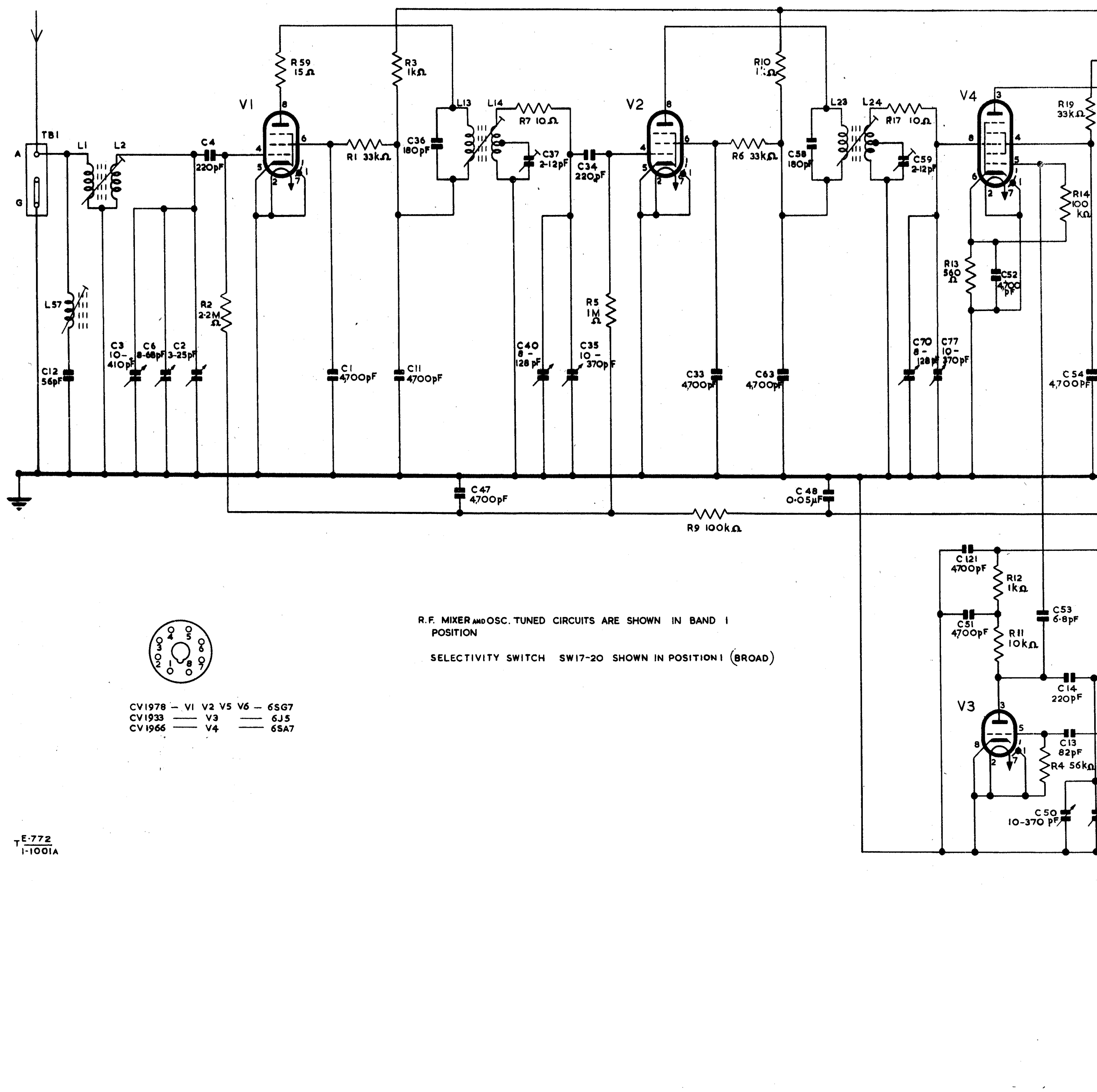
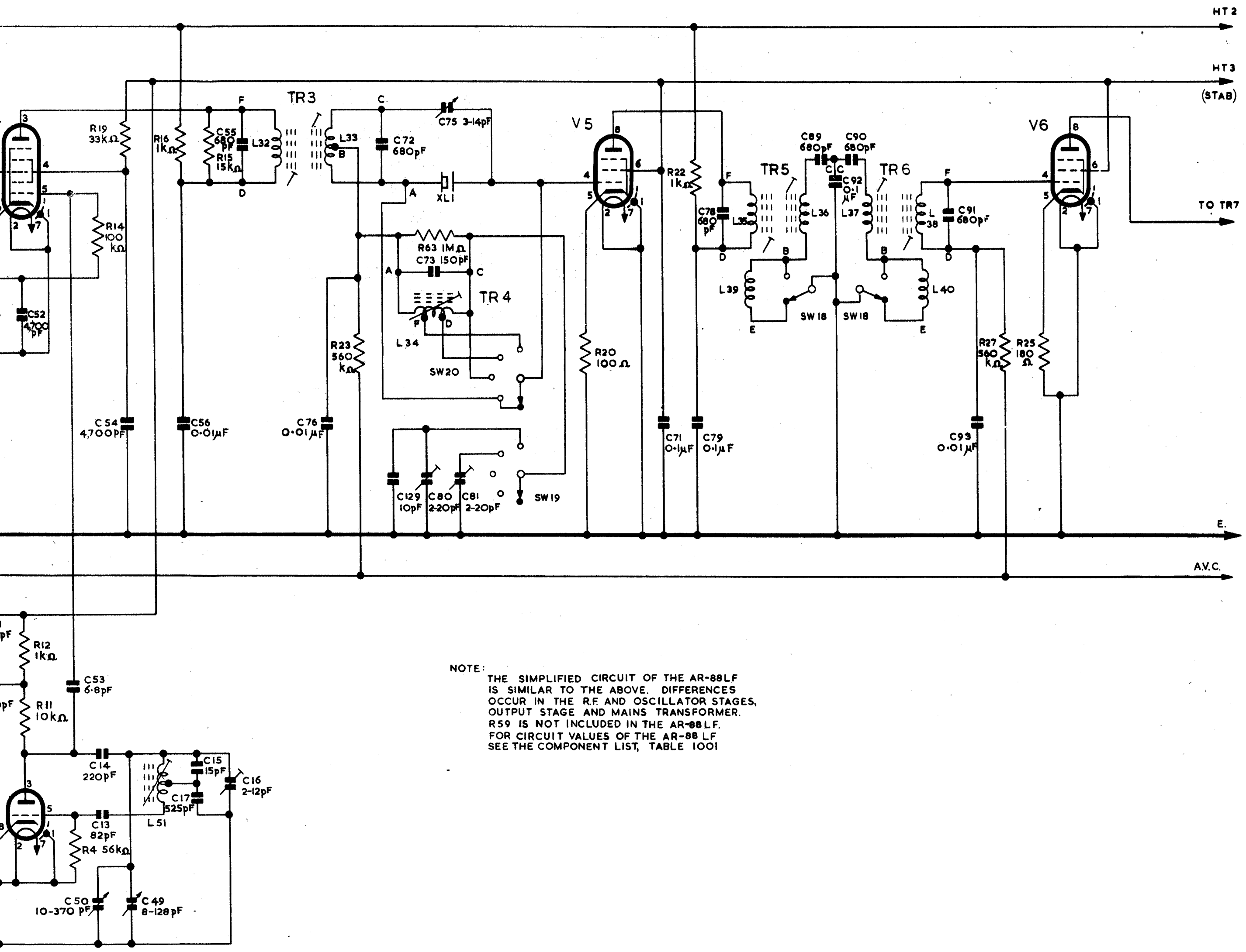


Fig 1001(A) — AR88D — sim



288D - simplied circuit diagram

RESTRICTED

Fig 1001(A) - AR88D - simplified circuit diagram

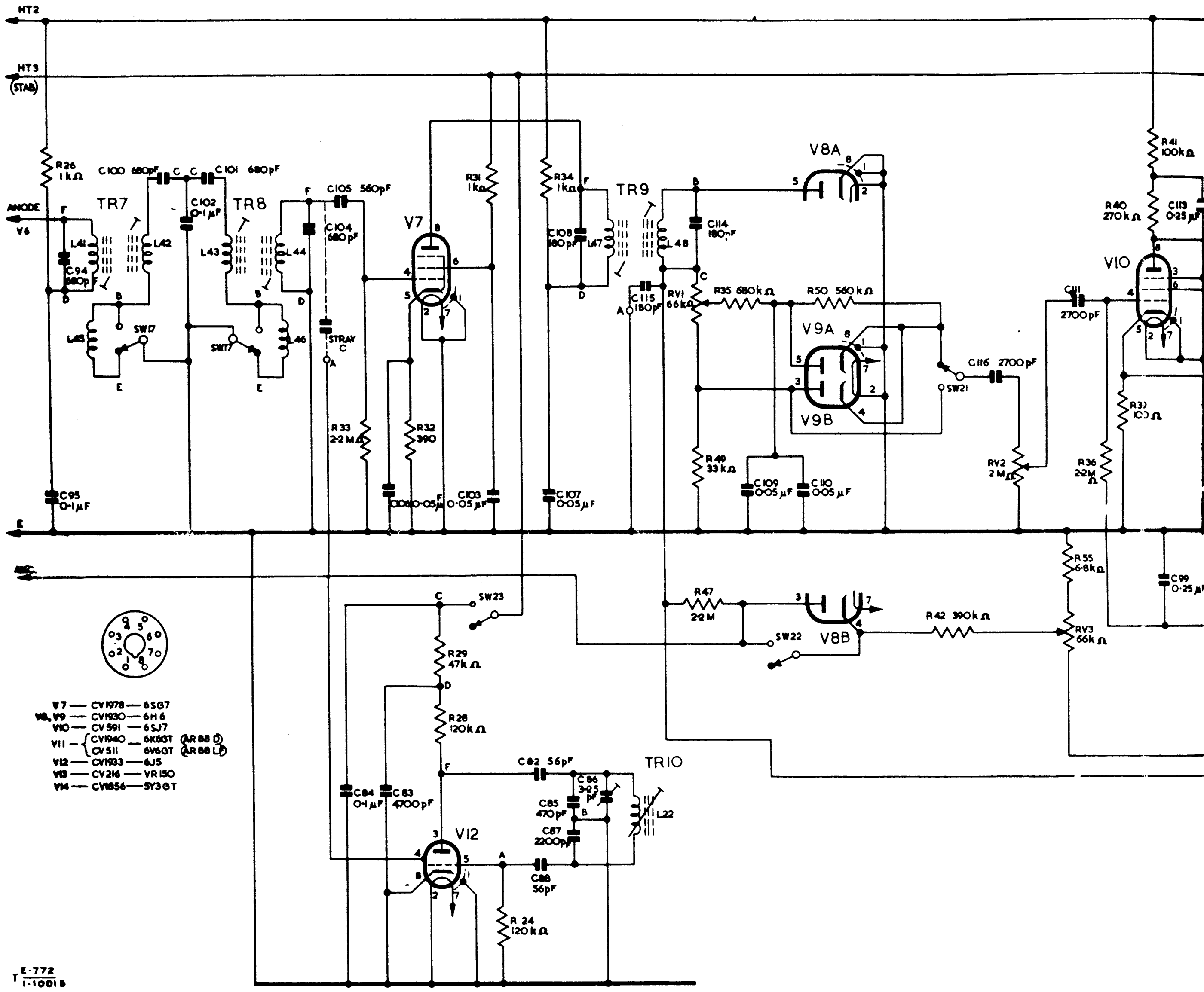
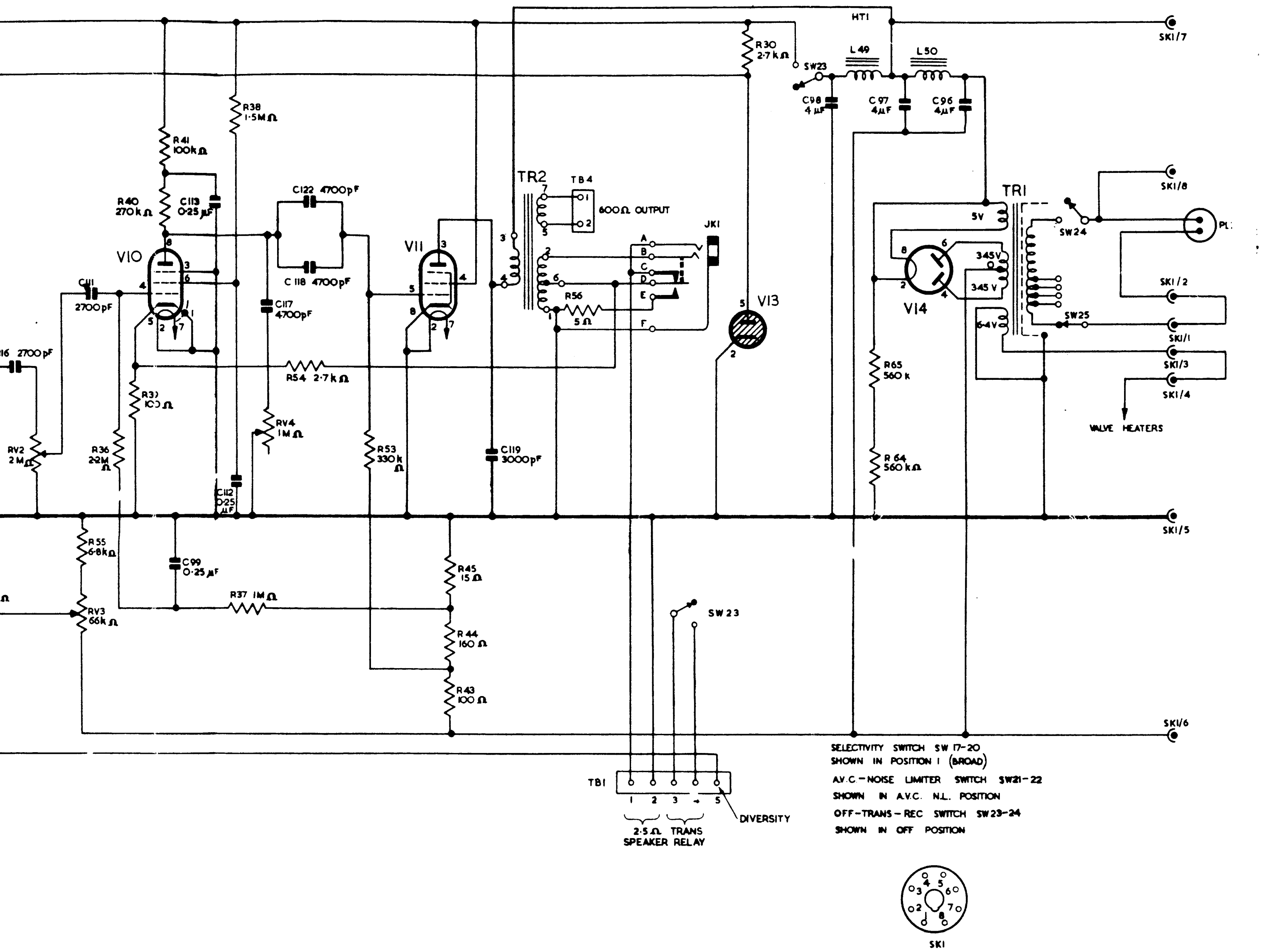


Fig 1001(B) - AR88D - simplifi



AR88D - simplified circuit diagram

RESTRICTED

Fig 1001(B) - AR88D - simplified circuit diagram

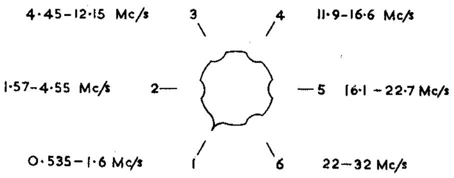
NOTE

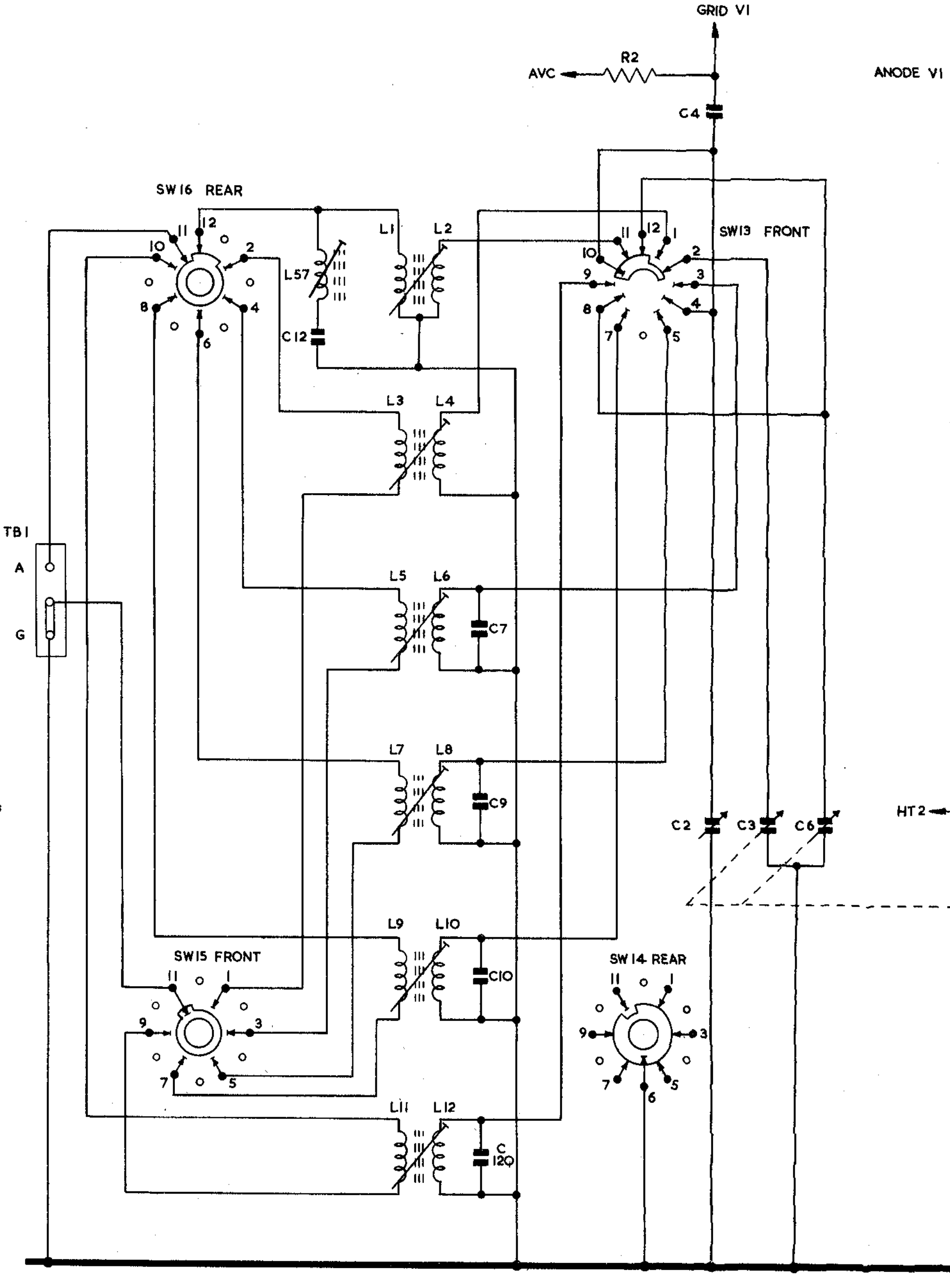
THE RANGE SWITCH SW1-16 CONSISTS OF EIGHT PAIRS OF SWITCHES, EACH PAIR FORMING THE FRONT AND REAR PORTIONS OF A SWITCH BANK EACH SWITCH IS DRAWN AS VIEWED FROM THE FRONT OF THE SET

THE FOLLOWING SWITCH PAIRS HAVE CORRESPONDINGLY NUMBERED TERMINALS CONNECTED TOGETHER

SW 13 AND SW 14 SW 11 AND SW 12
SW 9 AND SW 10 SW 7 AND SW 8
SW 5 AND SW 6 SW 3 AND SW 4
SW 1 AND SW 2

FOR CLARITY THE CONNECTIONS ARE NOT SHOWN IN THE DIAGRAM





AERIAL AND V1 GRID CIRCUITS

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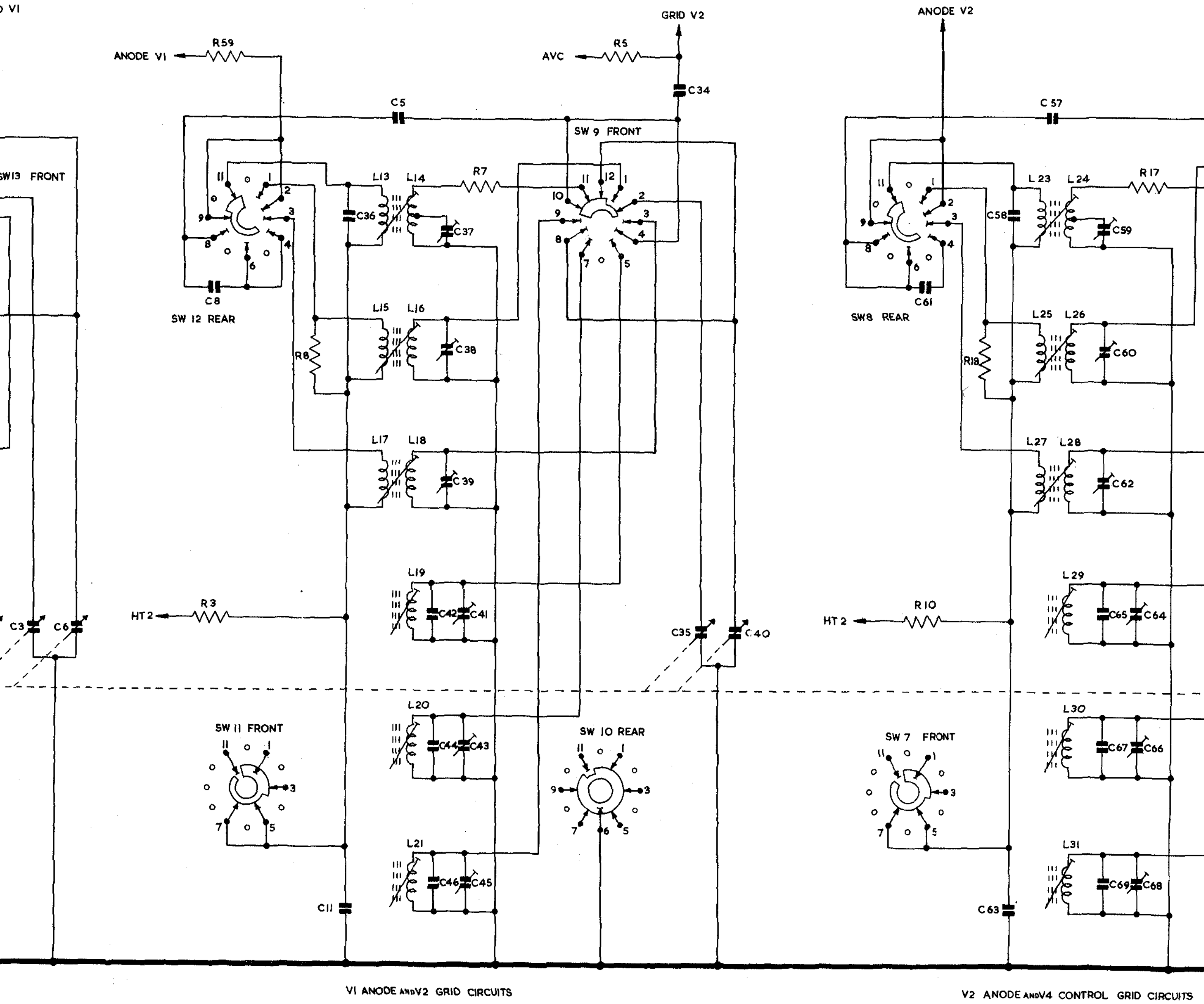

Fig. 1002 — AR88D — R.F. and oscillator coil switching

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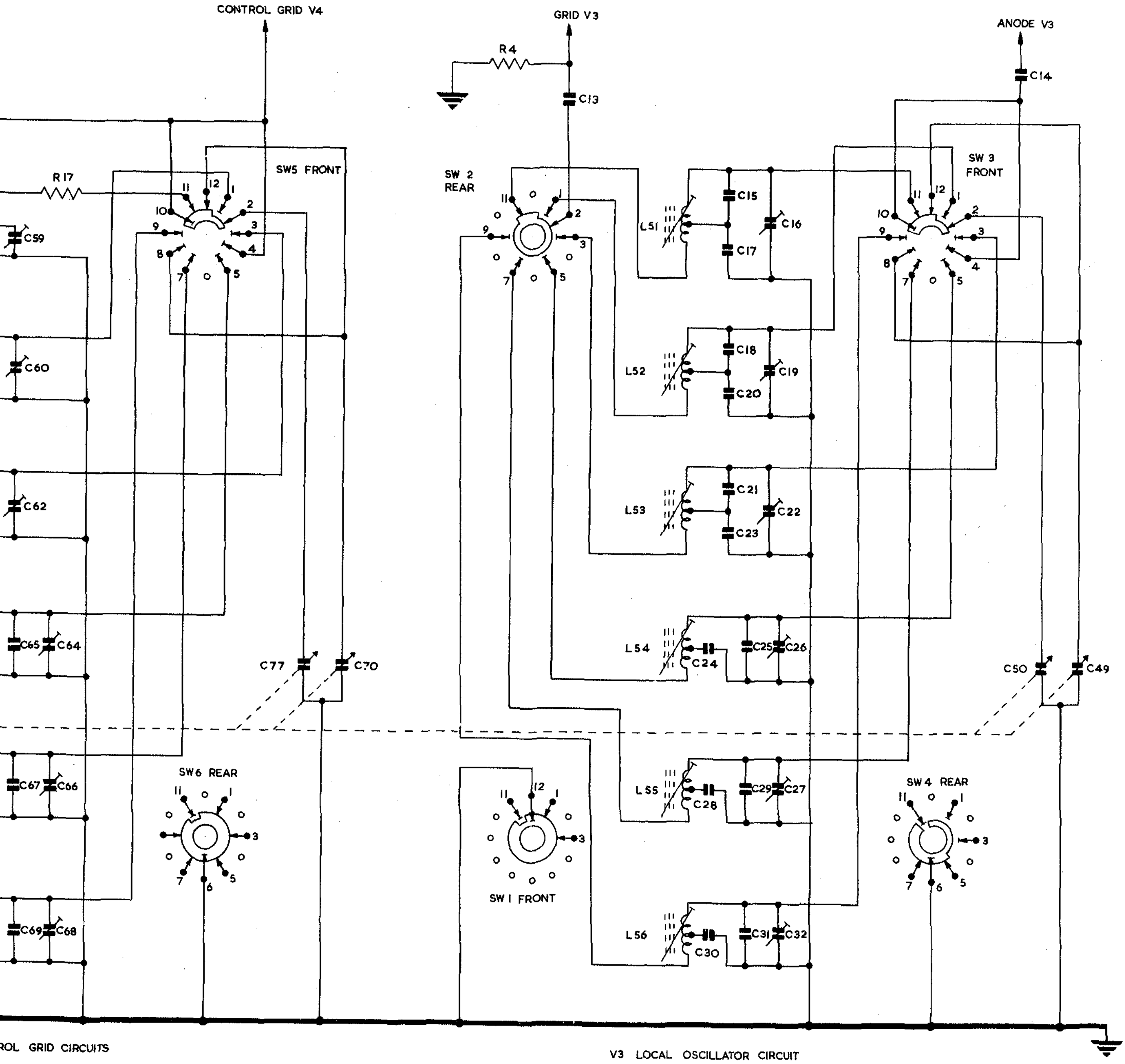
Fig.1002 - AR88D - R.F. and oscillator coil switching


CONTROL GRID V4
GRID V3
ANODE V3
R4
C13
C14
R17
SW5 FRONT
SW 2 REAR
SW 3 FRONT
C59
C60
C62
C65
C64
C67
C66
C69
C68
C77
C70
SW6 REAR
L51
C15
C16
C17
L52
C18
C19
C20
L53
C21
C22
C23
L54
C24
C25
C26
L55
C28
C29
C27
L56
C30
C31
C32
SW I FRONT
C50
C49
SW 4 REAR
ROL GRID CIRCUITS
V3 LOCAL OSCILLATOR CIRCUIT

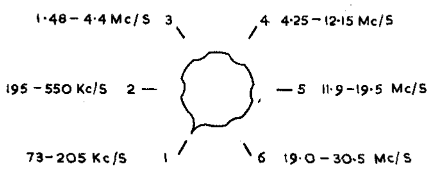
NOTE:-

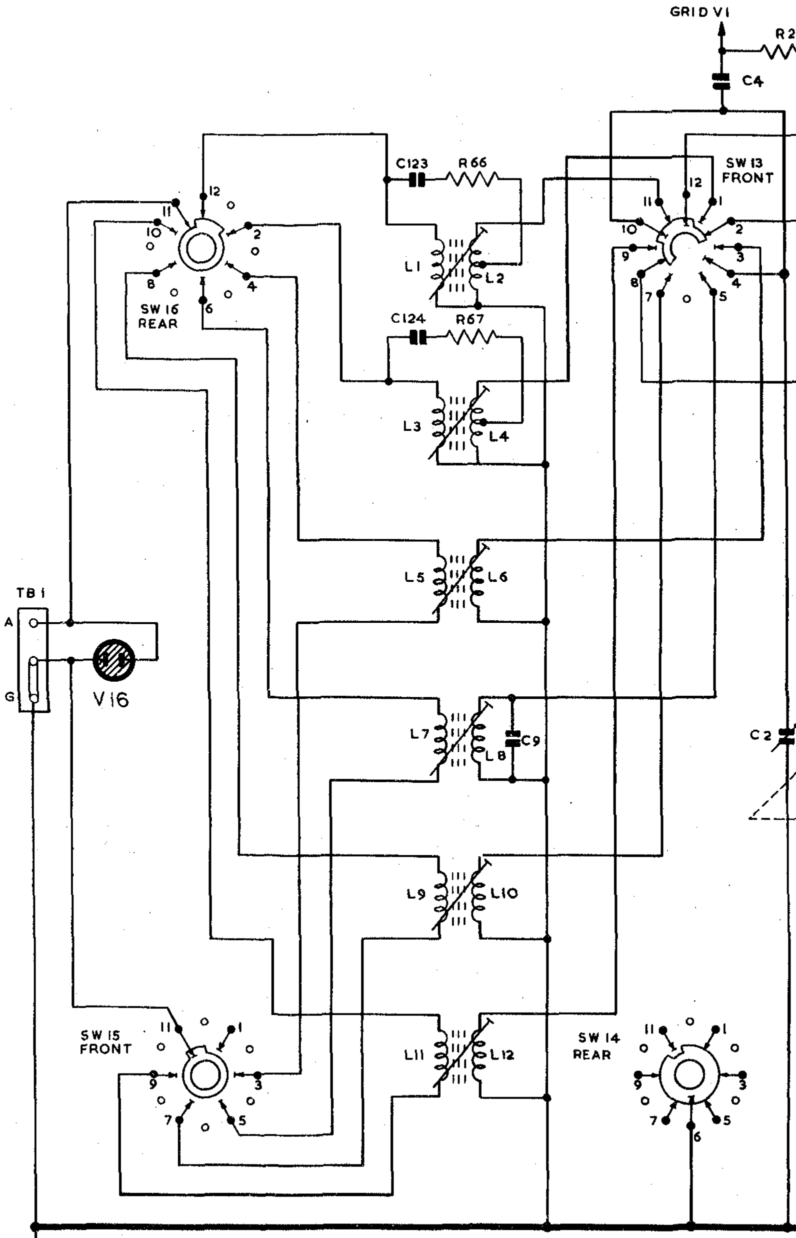
THE RANGE SWITCH SW1-16 CONSISTS OF EIGHT PAIRS OF SWITCHES, EACH PAIR FORMING THE FRONT AND REAR PORTIONS OF A SWITCH BANK. EACH SWITCH IS DRAWN AS VIEWED FROM THE FRONT OF THE SET

THE FOLLOWING SWITCH PAIRS HAVE CORRESPONDINGLY NUMBERED TERMINALS CONNECTED TOGETHER:-

SW13 AND SW14	SW11 AND SW12
SW9 AND SW10	SW7 AND SW8
SW5 AND SW6	SW3 AND SW4
SW1 AND SW2	

FOR CLARITY THE CONNECTIONS ARE NOT SHOWN IN THE DIAGRAM





AERIAL AND V1 GRID CIRCUIT

T $\frac{E \cdot 772}{1 \cdot 1003}$

C.B.H. 22604 - Wt. 40710 - Dd. 8632 - 3000 - 3/53

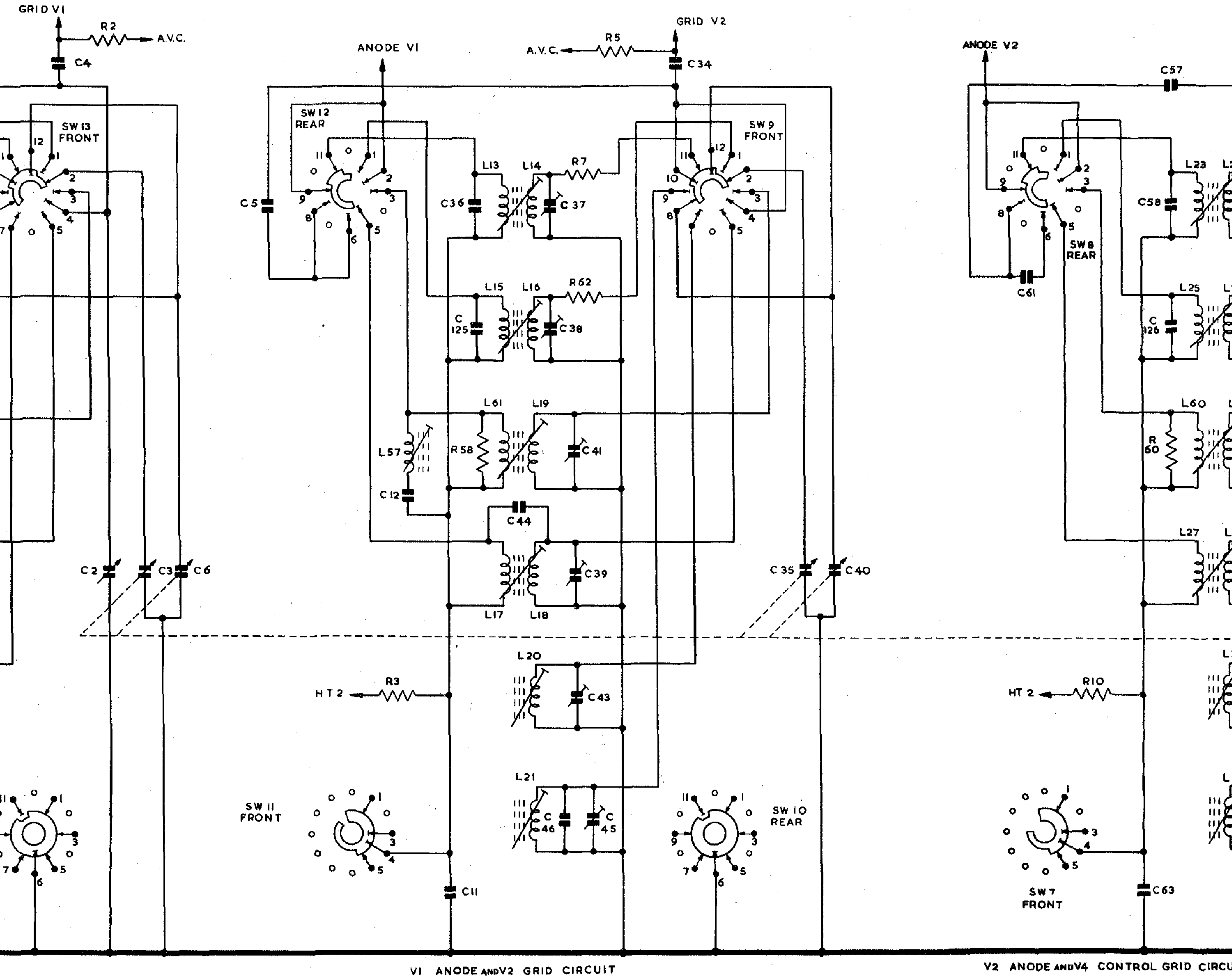


Fig. 1003 — AR88LF — R.F. and oscillator coil switching

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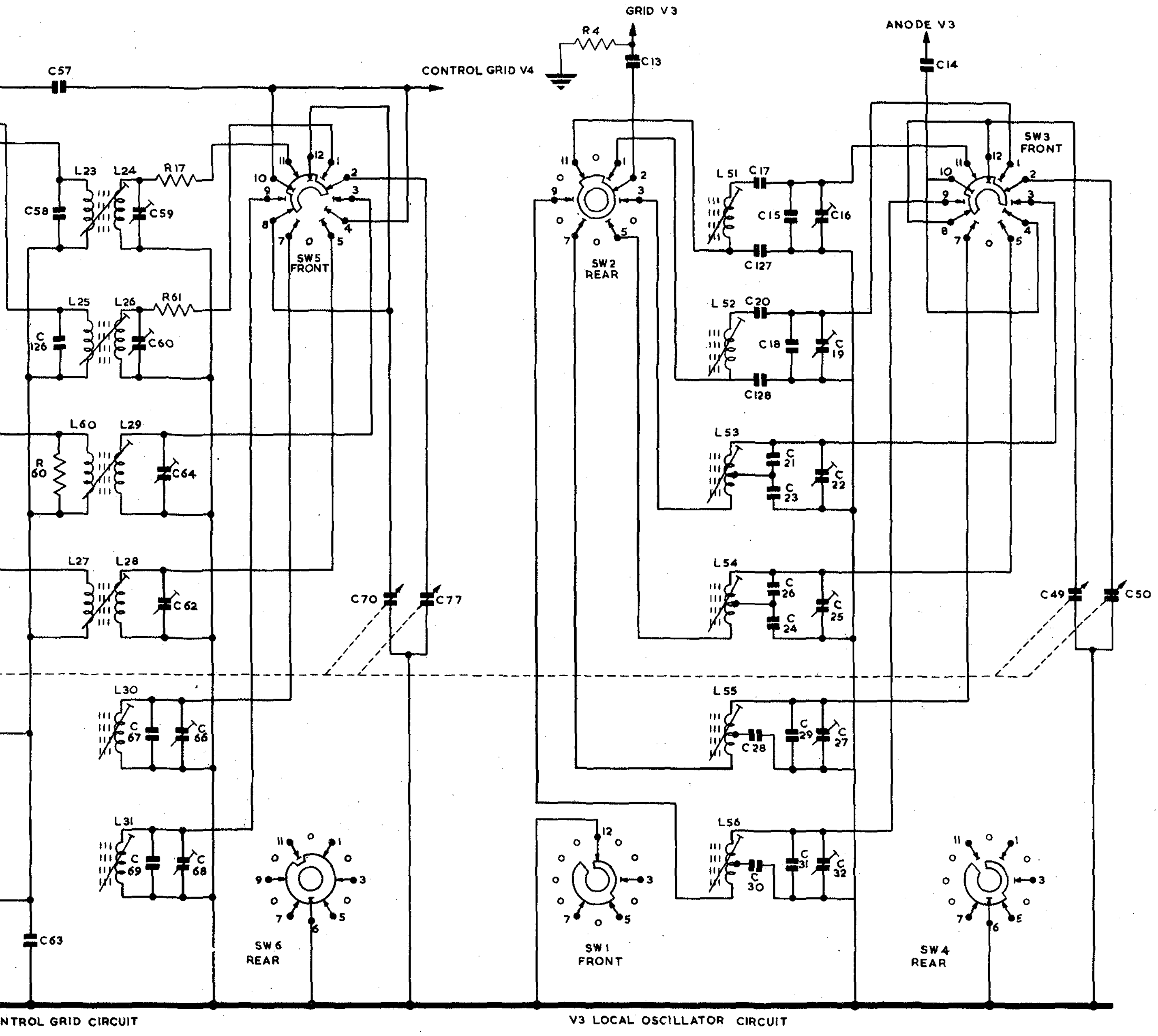
Fig.1003 - AR88LF - R.F. and oscillator
coil switching


GRID V3
R4
C13
ANODE V3
C14
C57
CONTROL GRID V4
L23
L24
R17
C58
C59
SW5 FRONT
L25
L26
R61
C 126
C60
L60
L29
R 60
C64
L27
L28
C62
C70
C77
L30
C 67
C 66
L31
C 69
C 68
C63
SW6 REAR
SW2 REAR
SW3 FRONT
L51
C17
C15
C16
C127
L52
C20
C18
C 19
C128
L53
C 21
C 23
C 22
L54
C 26
C 24
C 25
C49
C50
L55
C 29
C 27
C 28
L56
C 31
C 32
C 30
SW1 FRONT
SW4 REAR
NTROL GRID CIRCUIT
V3 LOCAL OSCILLATOR CIRCUIT

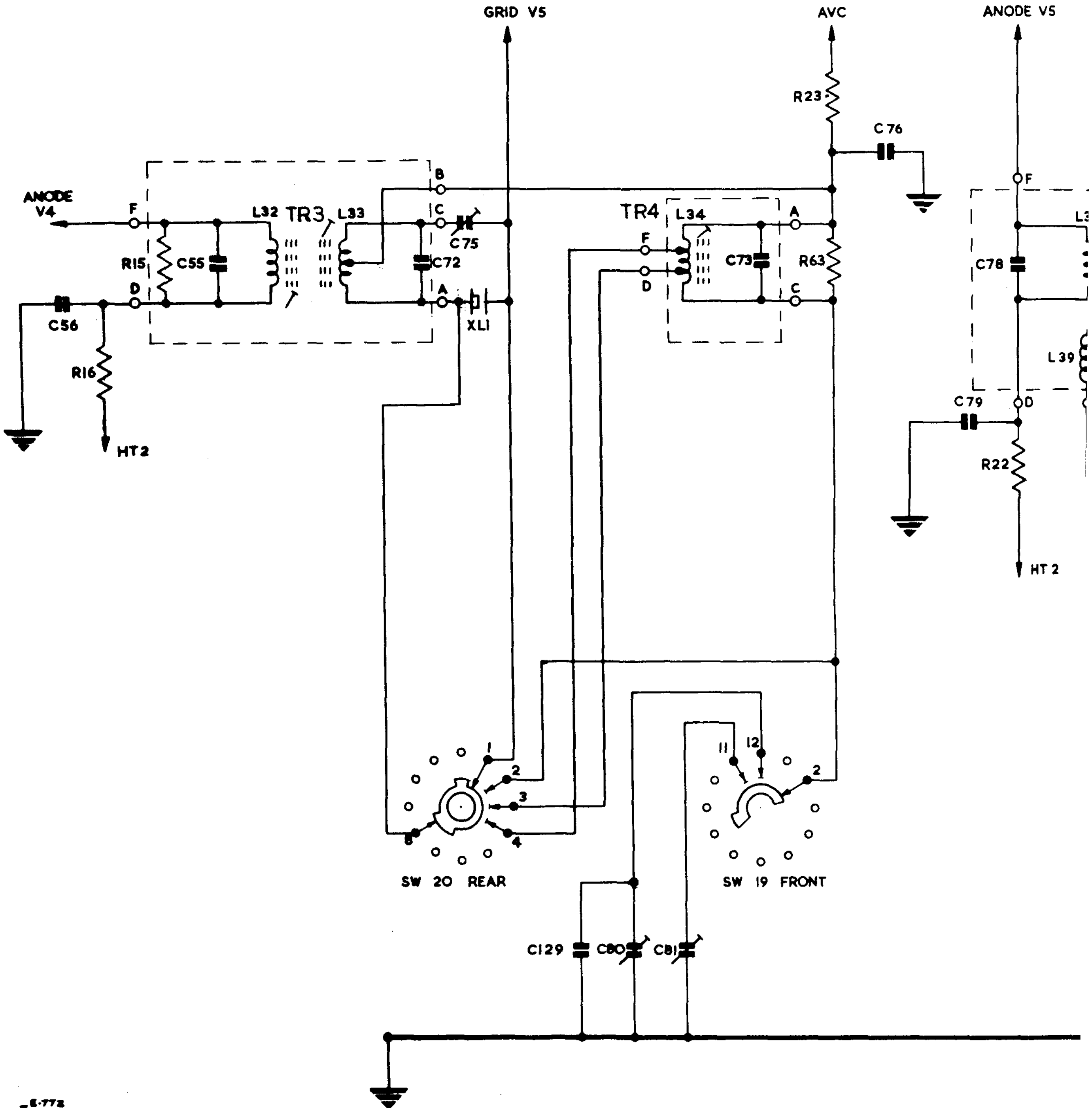


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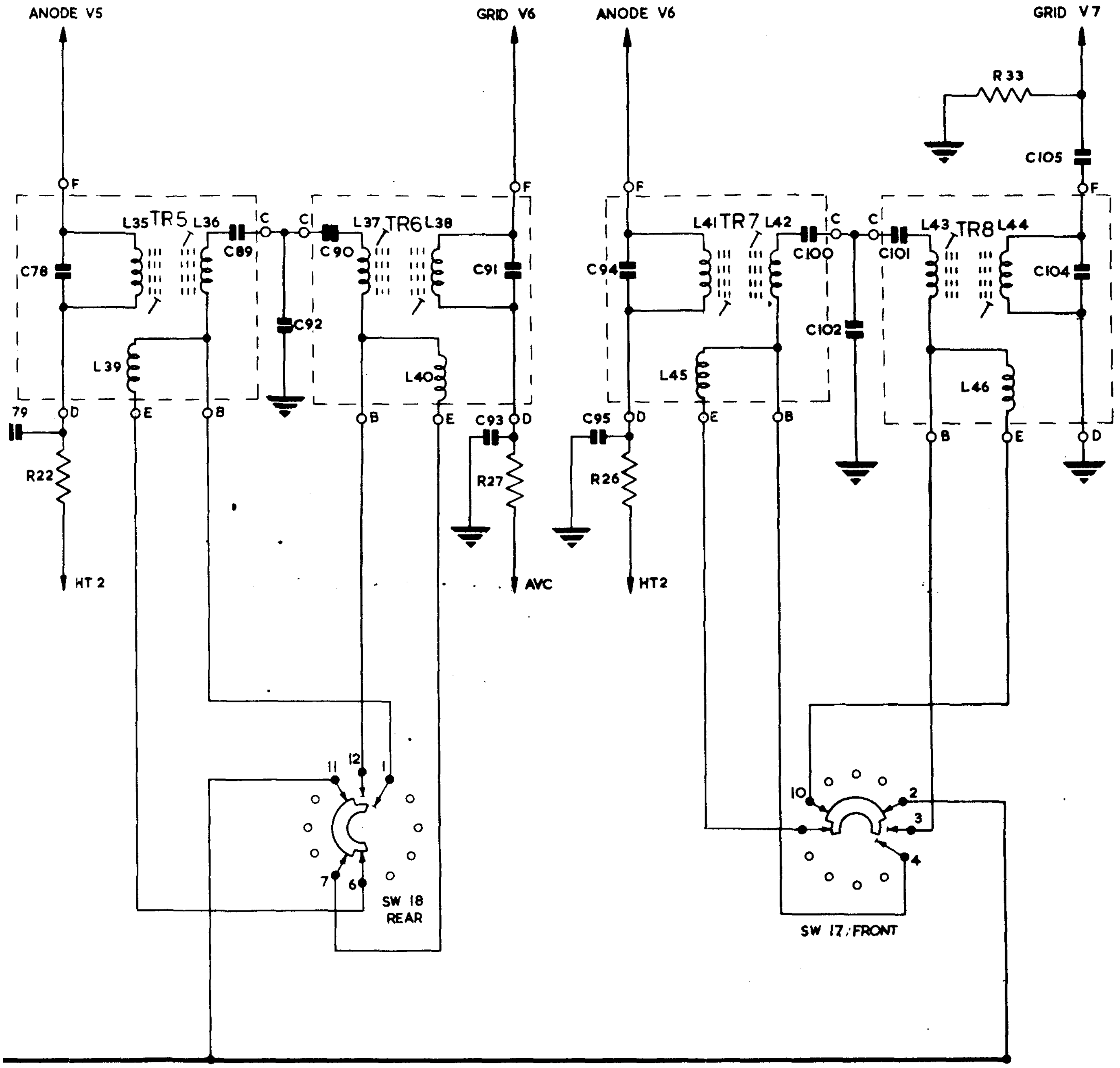
Fig 1004 - AR88D and AR88LF - wiring o

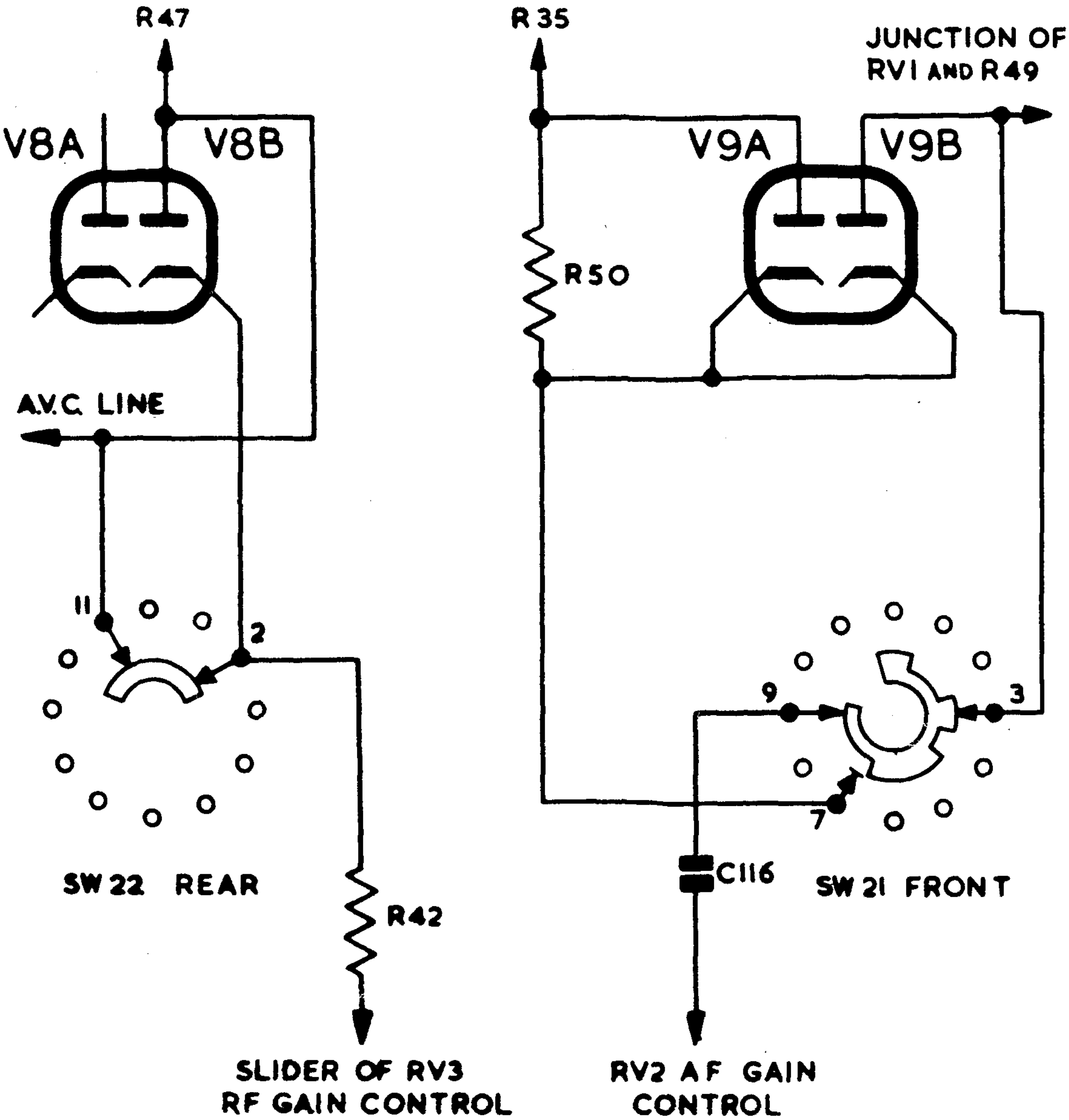


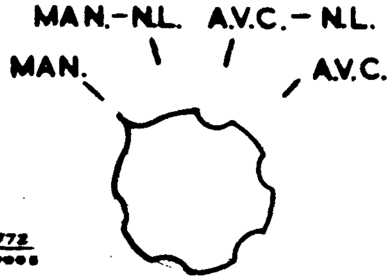
ALL SWITCHES SHOWN IN POSITION 1 (BROAD)

- wiring of SELECTIVITY switch, SW17-20

RESTRICTED

Fig 1004 - AR88D and AR88LF - wiring of SELECTIVITY switch, SW17-20





NOTE: SW21 AND SW22 ARE THE FRONT AND REAR PORTIONS OF THE SAME SWITCH. BOTH ARE DRAWN AS IF VIEWED FROM THE FRONT

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Fig 1005 - AR88D and AR88LF - wiring of A.V.C. - N.L. switch, SW21-22

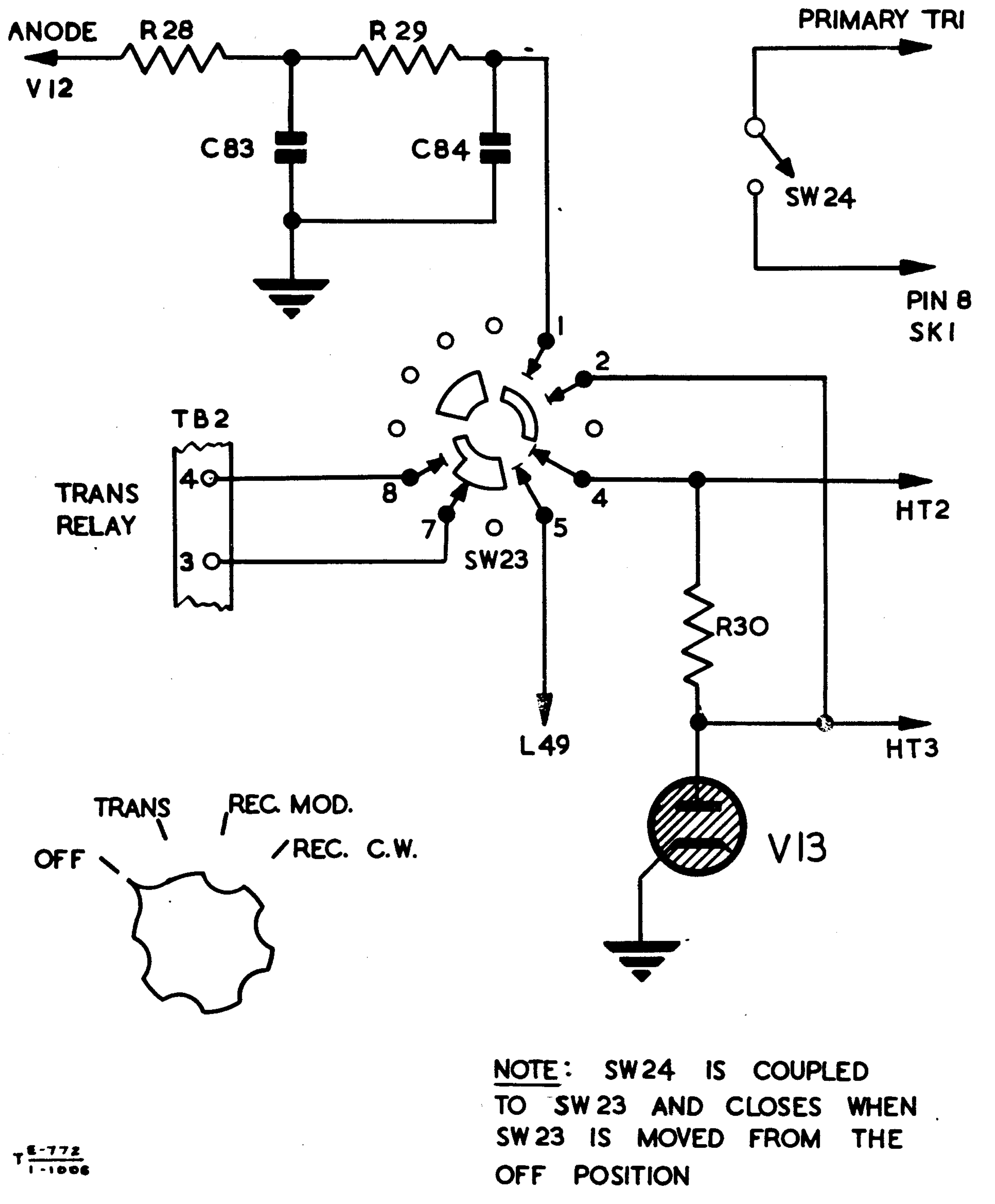


Fig 1006 - AR88D and AR88LF - wiring of OFF-TRANS. switch, SW23-24

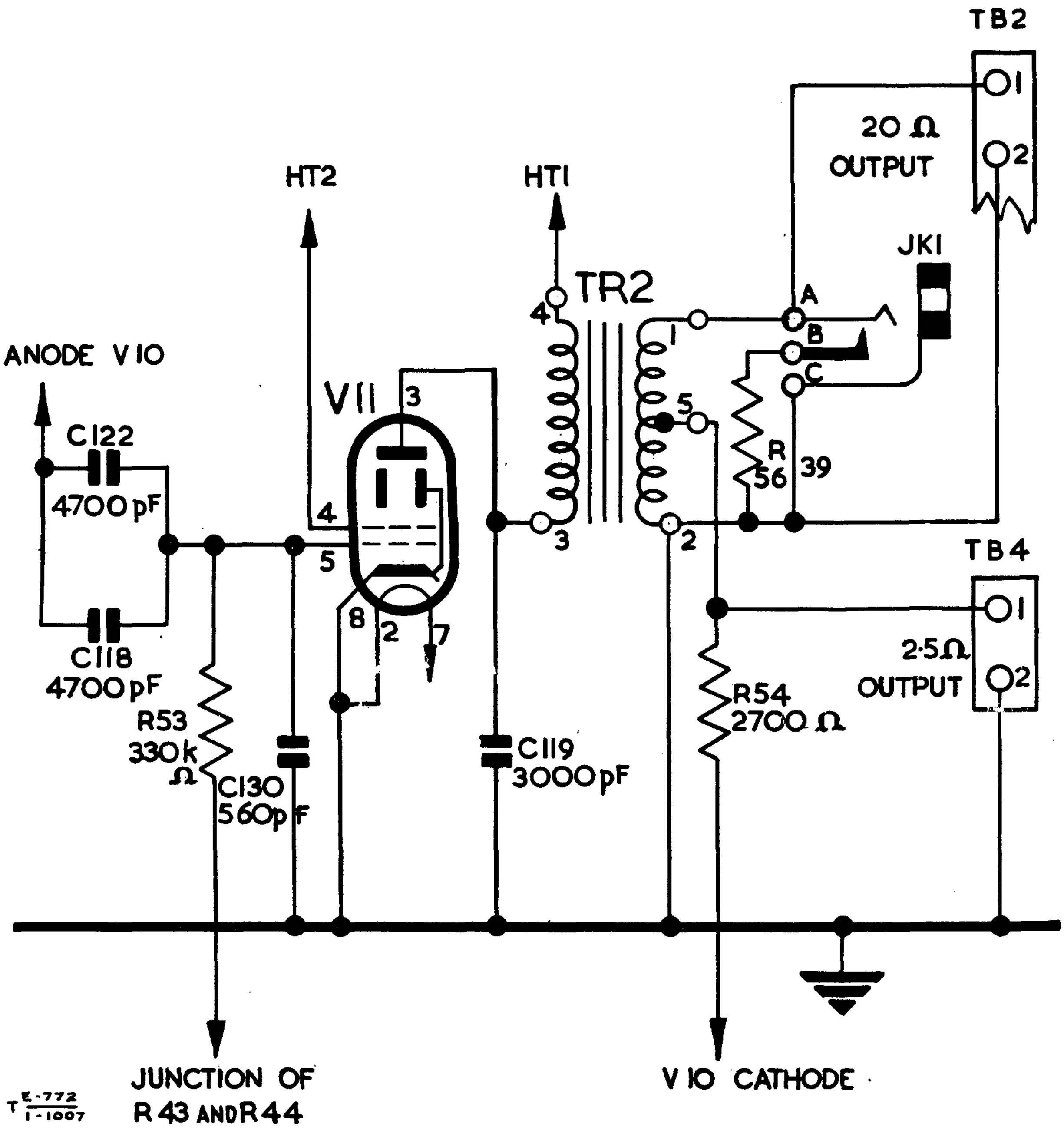
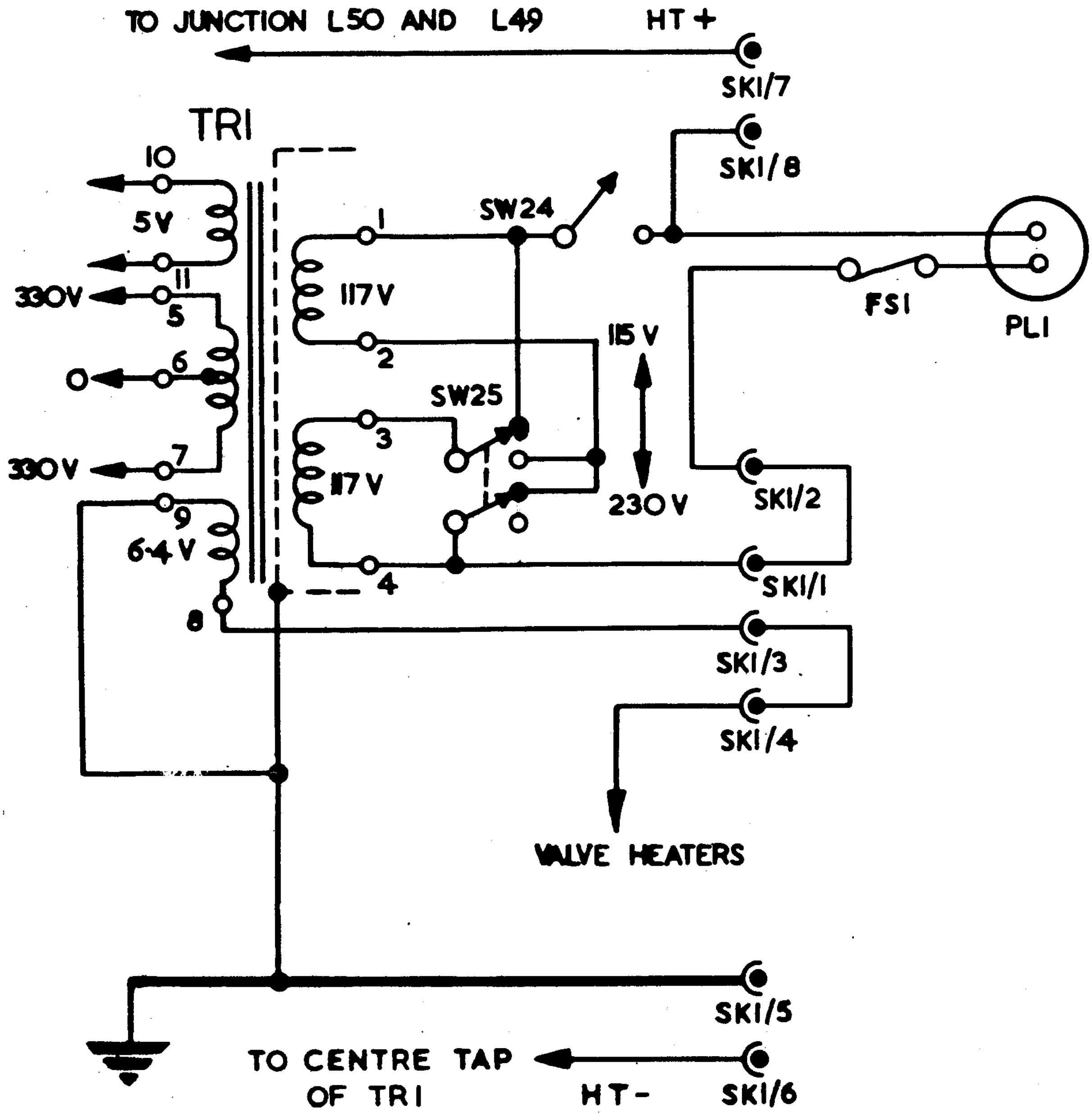


Fig 1007 - AR88LF - output stage



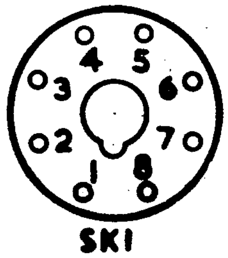


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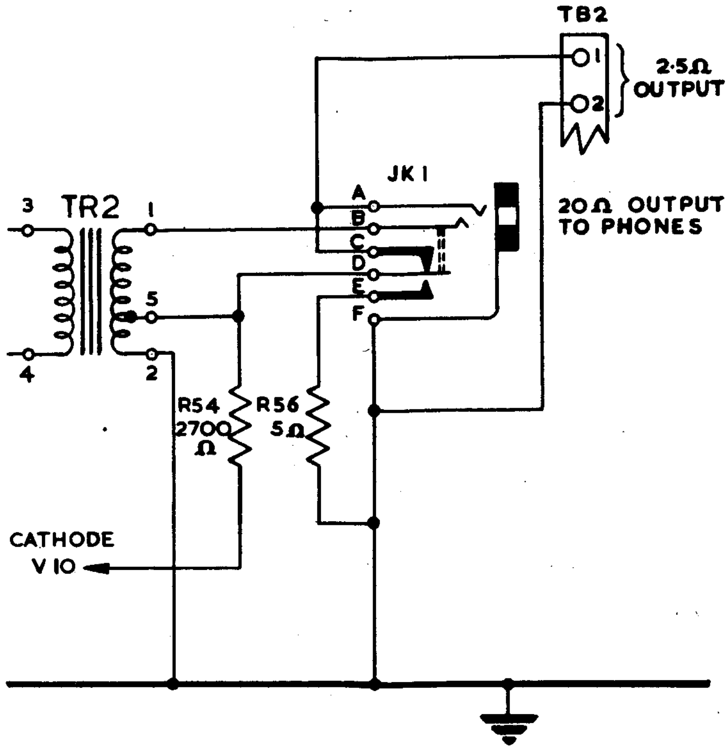
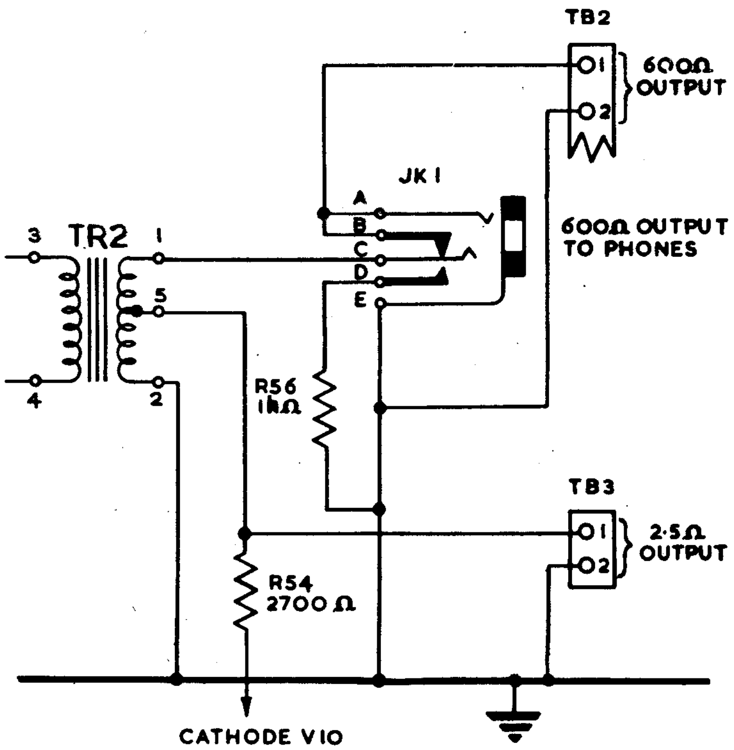
Fig 1008 - AR88LF - mains transformer



RECEIVERS WITH SERIAL NUMBERS BELOW 003000



RECEIVERS WITH SERIAL NUMBERS ABOVE 003000

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Fig 1009 - AR88 - output circuits

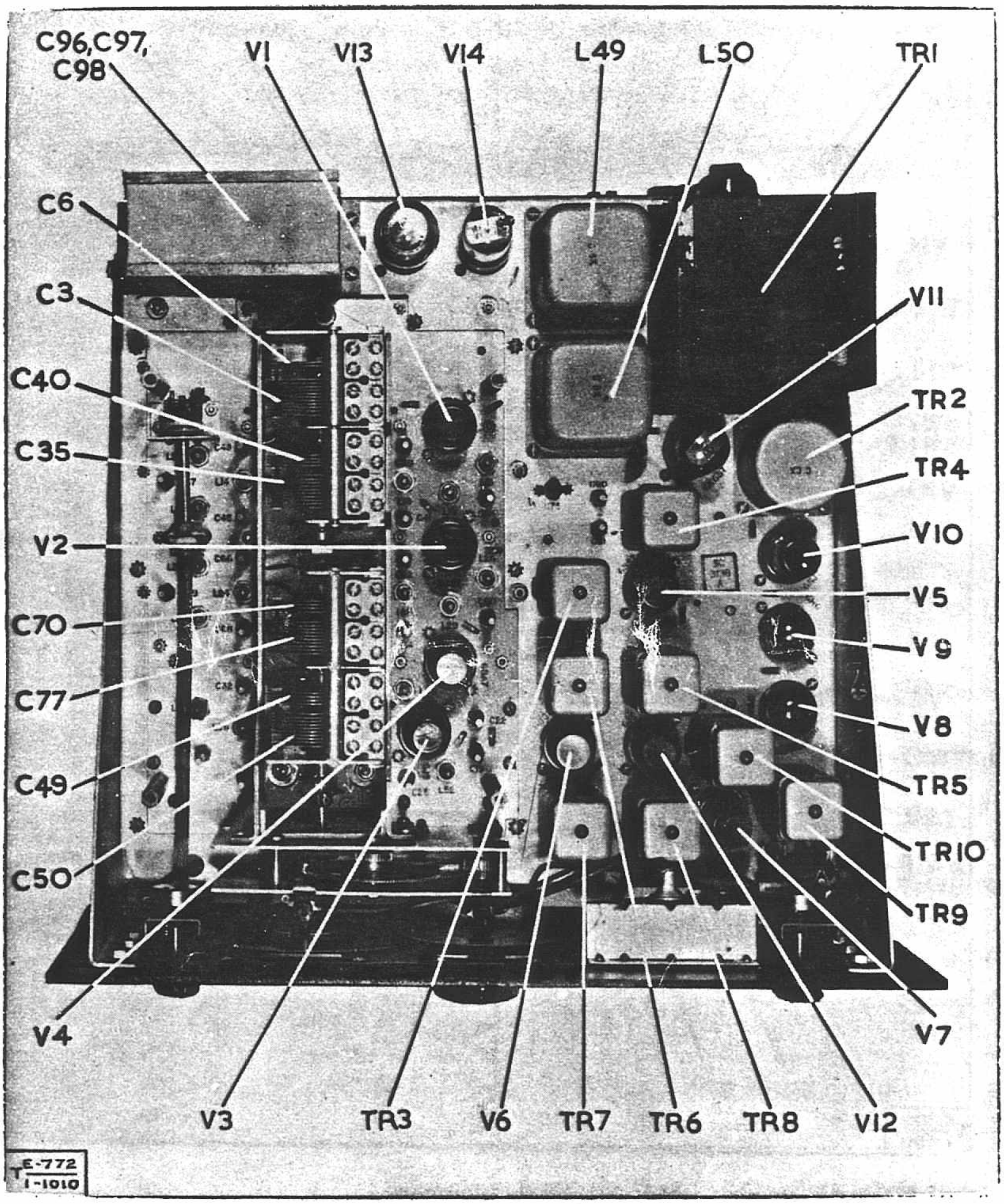

Fig 1010 - AR88D - top view

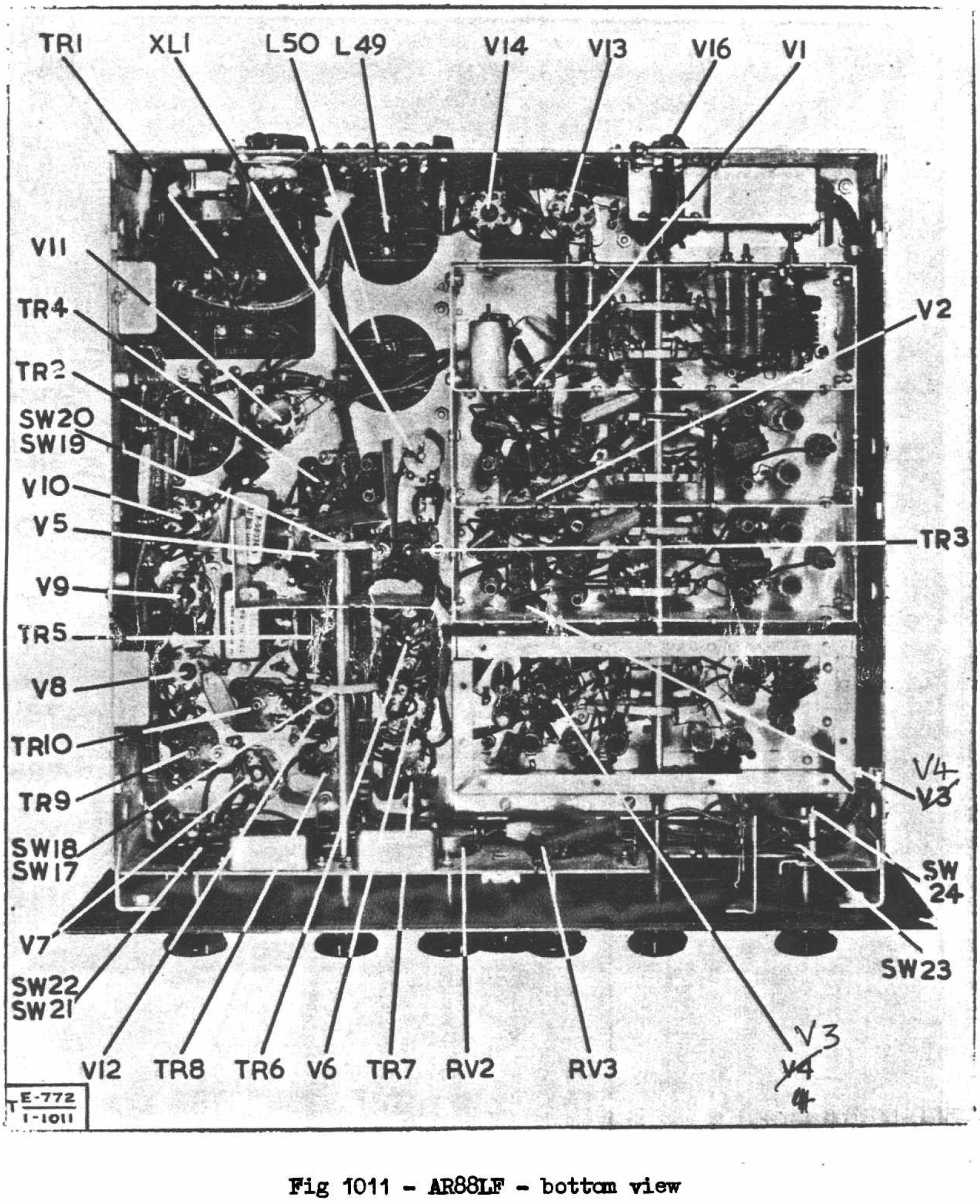

Fig 1011 - AR88LF - bottom view

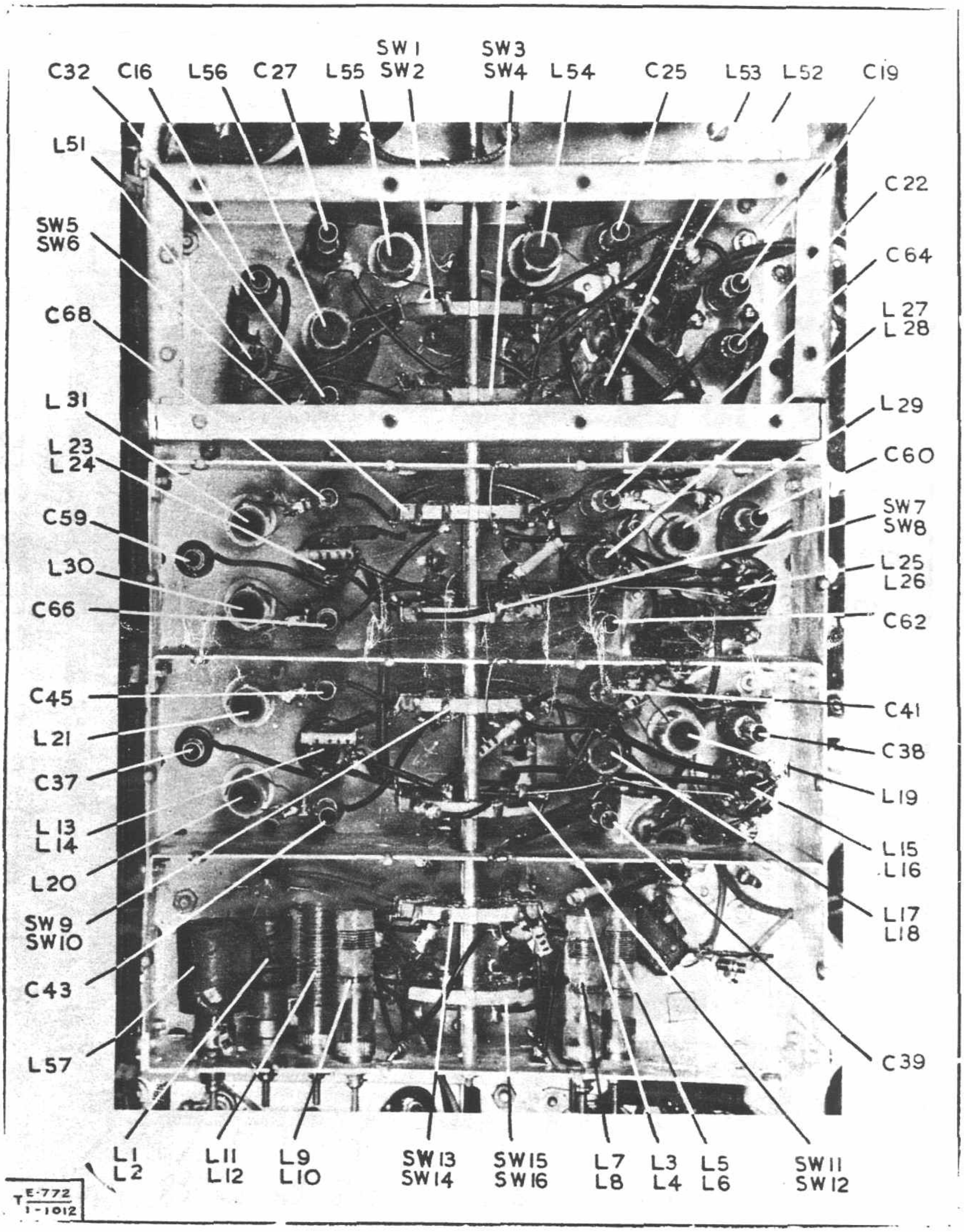

Fig 1012 - AR88D - view of R.F. and oscillator sections

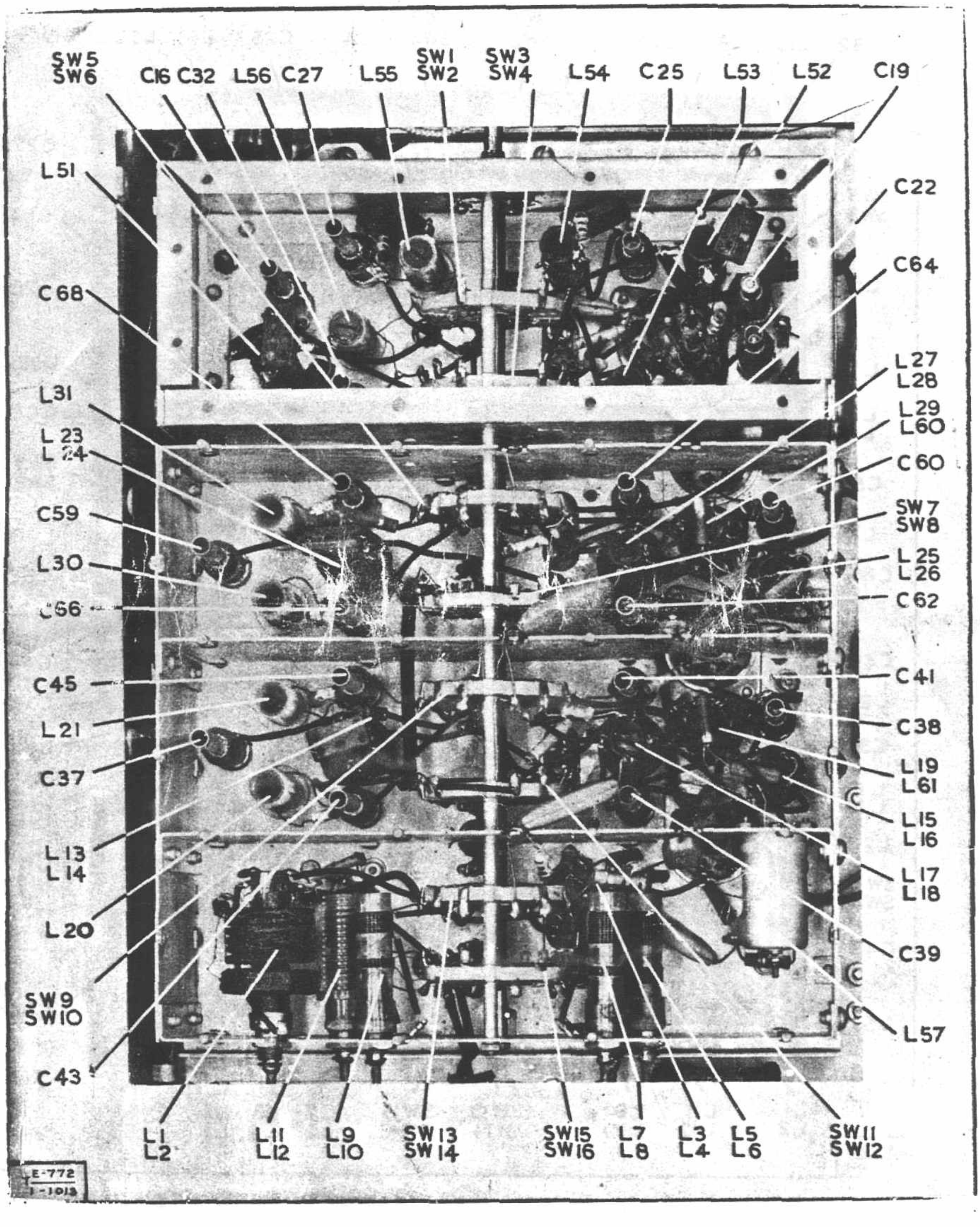

Fig 1013 - AR88LF - view of R.F. and oscillator sections