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MAIDENHEAD, BERKS.
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General Service Information Ext. 20.
Component Orders Ext. 21.

GENERAL DESCRIPTION

The 'Oxford' is a nine-valve radiogramophone for the reception of broadcasts on V.H.F., Long and Medium wavebands. Each of the twin push-pull amplifiers feeds a high quality 10" x 6" elliptical loud-speaker and a 2½" tweeter mounted an acoustic chamber. Mono or stereo records may be played on the autochanger which is fitted with a turnover pick-up head incorporating a compatible L.P. mono/stereo diamond stylus. The radio unit incorporates a pre-amplifier having Balance, Volume, Treble and Bass controls. The internal ferrite rod aerial has a directional control, whilst sockets are provided for the connection of external A.M. and F.M. aerials.

An electronic tuning indicator assists accurate tuning on all radio bands. Two separate external loud-speakers may be connected to the sockets provided, whilst each of the internal speakers has a muting switch. The receiver operates on A.C. mains only.

TECHNICAL DATA

Operating Controls:

The three controls are, from left to right:—

Balance, Bass and Treble.

Six piano key switches below the scale are, from left to right:—

Off, Gram Stereo, Gram Mono, V.H.F., M.W. and L.W.

A concentric pair of controls at the right-hand side of the scale select A.M. Aerial Orientation (Inner) and Tuning (Outer). The knob at the left-hand end of the scale operates the ganged Volume controls. The internal loud-speaker muting switches protrude through the back cover.

Valves:

V1 ECC85 (F.M.) Grounded Grid R.F. Amplifier, Oscillating Mixer.

V2 ECH81 (F.M.) 1st I.F. Amplifier (A.M.) Frequency Changer

V3 EBF89 (AM-FM) I.F. Amplifier (A.M.) Detector, A.G.C.

V4 EM84 (AM-FM) Tuning Indicator.

V5 ECC83 2 channel A.F. Amplifier.

V6 ECL82

V7 ECL82

V16 ECL82 } Para-phase stage & Push-pull Output.

V17 ECL82 }

Diodes: D1 and D2, OA79 Discriminator.

Rectifier: M.R.1. Westinghouse EC3: Bridge Metal Rectifier.

Wavebands: F.M.: 86-100 Mc/s

A.M.: M.W. 545-182 metres, 550-1650 kc/s

L.W. 2000-1200 metres, 150-250 kc/s

Intermediate

Frequencies: A.M. 470 kc/s F.M. 10-70 Mc/s

Output: Approximately 7 watts per channel.

Speakers: Two 10" x 6" elliptical and two 2½" tweeters, providing a wide frequency response. (Impedance 3Ω).

Mains Supply: 200-250 volts. A.C. 50 c/s.

Mains

Consumption: Radio: 74 watts

Gram: 86 watts.

L.P. Stylus: Diamond-Acos type 73-IADS.

Stylus pressure 7 grams.

WARNING: The tapings of the mains transformer primary must be adjusted according to the mains supply voltage before the receiver is connected. The panel is accessible after removal of the back cover.

REMOVING UNITS FROM CABINET

To gain access to the units:

- (1) Disconnect the equipment from the mains supply.
- (2) Remove the F.M. aerial plug and the screws securing the back cover.
- (3) There are two separate chassis within the cabinet, one carrying the power supply unit and the twin amplifiers; the other the radio tuner and controls.

Amplifier and Power Unit Chassis:

- (1) Disconnect all plug and socket connections associated with the power unit.
- (2) Unscrew the four securing screws. Raise the chassis slightly and withdraw from cabinet

Radio Unit Chassis:

- (1) Remove the pick-up plug from the top of the chassis; 8-pin octal plug and 4-pin A.F. plug from power unit chassis.
- (2) Remove the external dipole and tape deck sockets, each secured by two screws.
- (3) Unscrew the two bolts securing chassis to cabinet. The chassis may then be removed by sliding it backwards, taking care to avoid damage to the ferrite rod assembly.

Auto-change Unit:

- (1) The auto-changer is removed by releasing the three securing clips in the baseboard of the unit. The plug-in pick-up and mains supply leads must also be disconnected.

REPLACEMENT OF DRIVE CORD ASSEMBLIES

Refer to 'Details of Drive Cord Assemblies' diagram

Pointer Drive:

- (1) First attach the drive cord to the tension spring.
- (2) With the tuning gang fully closed, secure the spring near the lower run of the two-section collar on the tuning gang. Make five turns anti-clockwise round the inner section, then locate the cord in the vertical pulley slot and wind a further $1\frac{1}{2}$ turns in the same direction on the outer section.
- (3) From the tuning gang collar, the cord passes clockwise round pulley B, and twice anti-clockwise round the drive spindle, then back to the return spring via the top of pulleys C and A.
- (4) Tie the cord to the spring under slight tension, and affix the pointer to coincide with the left-hand datum mark.

F.M. Unit Drive

With the tuning gang fully closed, attach the drive cord to the slider on the tuner unit, place it over the pivot pulley down to the lower side of the tuning capacitor spindle. Make one turn anti-clockwise, then thread the cord inside the lower screw in the collar, and attach the cord to the upper screw.

V.H.F. Slider Switch Drive

With the V.H.F. piano key released, the cord should be attached to the spring, and hooked on to the slider switch. Draw the cord round pulley D and on to the stirrup actuated by the V.H.F. piano key.

NOTE: With the key depressed the slider must be drawn fully out.

Aerial Orientation Drive

Turn the aerial orientation knob fully anti-clockwise, and hook one end of the cord to the tension spring. Attach the spring to a suitable anchor point, approximately 3" from the spindle. First make one clockwise turn over the control spindle, thread the cord through the spindle hole, then take another complete clockwise turn through the hole again to the top, followed by yet another half turn clockwise.

The cord is then passed through the lower eyelet of the pivot bracket. From the eyelet the cord is passed to the aerial mounting spindle, where it makes one complete anti-clockwise turn, passes through the spindle hole, another complete turn in the same direction, re-enters the spindle

and, after making another half-turn anti-clockwise, is returned through the upper eyelet to the tension spring.

Drive Cord Lengths

Pointer Drive 36". Aerial Orientation Drive 32". F.M. Unit Drive $8\frac{1}{2}$ ". V.H.F. Switch Drive $8\frac{1}{2}$ ".

CIRCUIT DESCRIPTION

F.M. Operation

V1A acts as a grounded grid triode R.F. amplifier, and is followed by a self-oscillating triode mixer which is inductively tuned by L3 and L4. Two I.F. amplifier stages, V2 and V3, feed the ratio detector D1, D2 and associated components. A.G.C. is derived from the D.C. potential developed across R22, C46 which varies in direct relation to the input signal amplitude, and is applied to V3 suppressor grid as additional bias.

A.M. Operation

On Long or Medium waves, H.T. is disconnected from V1 by SW4E, V2 operating as a normal triode-heptode frequency changer. V3 functions as a pentode I.F. amplifier, with diode demodulation and A.G.C. rectification. The A.G.C. voltage is taken via SW4A to V4, the tuning indicator. The A.M. or F.M. audio signal is selected by SW4B, and fed via SW3A, SW2B to the Volume controls R25, R125, switched in parallel by SW2A.

Gram Operation

The output from the pick-up (stereo operation) is fed to the independent inputs to V5A, V5B with SW2A in the open position. When closed, the switch connects both inputs for monaural operation.

A.F. Circuits

V5A, V5B operate as pre-amplifiers, and the outputs are applied across RV2—the Balance control, which equalises the inputs to the succeeding amplifier stages. Bass and Treble compensation is effected by RV3A, RV3B and RV4A, RV4B respectively. Triodes V7A, V17A, V6A and V16A are arranged as self-balancing para-phase stages. These drive the push-pull output stages V6B, V7B and V16B, B17B respectively. Negative feedback is applied via R39, R36 to V7A, and via R37, R38, R136 to V17A. R38 adjusts the amplifiers to equal sensitivity to compensate for component tolerance.

Voltage and Current Data: F.M. Operation

VALVE	ANODE			SCREEN			CATHODE		
	Pin	V	mA	Pin	V	mA	Pin	V	mA
V1A, ECC85	6	208	8.2	—	—	—	8	—	—
V1B, ECC85	1	120	4.4	—	—	—	3	—	—
V2H, ECH81	6	205	7.9	1	120	4.9	3	2.4	12.8
V2T, ECH81	8	—	—	—	—	—	3	2.4	12.8
V3, EBF89	6	190	8.2	1	100	2.4	3	1.7	10.6
V4, EM84	9 & 7	56	0.35	6	215*	0.8*	3	—	—
V5A, B, ECC83	1-6	120	9.9	—	—	—	3-8	—	—
V6A, ECL82	9	147	0.35	—	—	—	8	20	27.5
V6B, ECL82	6	245	0.35	7	245	4.7	8	20	27.5
V7A, ECL82	9	55	0.3	—	—	—	8	20	30
V7B, ECL82	6	245	25	7	245	4.7	8	20	30
V16A, ECL82	9	145	0.54	—	—	—	8	20	31.2
V16B, ECL82	6	245	26	7	245	4.7	8	20	31.2
V17A, ECL82	9	55	0.3	—	—	—	8	20	i9.2
V17B, ECL82	6	245	24	7	245	4.7	8	20	29.2

A.M. Operation

VALVE	ANODE			SCREEN			CATHODE		
	Pin	V	mA	Pin	V	mA	Pin	V	mA
V1A, ECC85	6	—	—	—	—	—	8	—	—
V1B, ECC85	1	—	—	—	—	—	3	—	—
V2H, ECH81	6	225	3	1	116	6.1	3	2.2	11.8
V2T, ECH81	8	65	2.75	—	—	—	3	2.2	11.8
V3, EBF89	6	205	8.2	1	115	2.4	3	1.7	10.6
V4, EM84	9 & 7	65	0.3	6	225*	0.9*	3	—	—
V5A, B, ECC83	1-6	125	10.1	—	—	—	3-8	—	—
V6A, ECL82	9	158	0.45	—	—	—	8	20.5	30.4
V6B, ECL82	6	250	23	7	250	5	8	20.5	30.4
V7A, ECL82	9	56	0.3	—	—	—	8	20.5	31.3
V7B, ECL82	6	250	26	7	250	5	8	20.5	31.3
V16A, ECL82	9	158	0.5	—	—	—	8	20.5	31.5
V16B, ECL82	6	250	26	7	250	5	8	20.5	31.5
V17A, ECL82	9	57	0.34	—	—	—	8	20.5	30.3
V17B, ECL82	6	250	25	7	250	5	8	20.5	30.3

* Denotes Target readings.

D.C. Resistance of Windings

Winding	Ohms	Winding	Ohms
L9	8	L16	5
L10	10	L18	6
L12	10	T1 Pri.	380
L14	2	T2 Pri.	22
L15	1	T2 H.T. Sec.	39

CIRCUIT ALIGNMENT

Instruments Required

A standard AM-FM signal generator, an A.F. output meter, a 0-50 μ A meter, a 20,000 ohms-per-volt meter with a 10 volts D.C. range, a sweep generator and an oscilloscope.

Intermediate Frequency (F.M.)

Two methods are given (a) Visual, using a sweep generator and oscilloscope (b) Meter, using a standard signal generator and a voltmeter.

NOTE: R16 should not be adjusted in any way at this stage. See 'Adjustment of Discriminator' below.

Visual Method

- (1) Disconnect the positive side of C46. Tune the receiver to the low frequency end of the band, and connect the oscilloscope across R22.
- (2) Inject the sweep input to V3, pin 2, and tune L17 for peak response. Re-connect C46, and transfer the oscilloscope leads to the junction of R16, C40.
- (3) Tune L20 for the best 'S' waveform, re-adjusting L17 if necessary.
- (4) Transfer the sweep input to V2, pin 2, and adjust L10, L12 for maximum output and smooth response curve at 10.7 Mc/s.
- (5) Transfer the input to the junction of R2, C3. Connection should be made via a 0.1 μ F capacitor, as this point is at H.T. potential.
- (6) Tune L6, L7 for maximum output and smooth response curve at 10.7 Mc/s. For final discriminator adjustments, see below.

Meter Method

- (1) Connect the voltmeter, on the 10 volts D.C. range, across C46, observing polarity. Inject 10.7 Mc/s to V3, pin 2, and adjust L17 for maximum output.

- (2) Transfer the meter to between the junction of R16, R17 and earth, and adjust L20 for zero D.C. This should be tuneable from a maximum in one direction, through zero to a maximum in the other.
- (3) Re-connect the meter across C46. Input to V2, pin 2 at 10.7 Mc/s, adjust L10, L12 for maximum output.
- (4) Transfer the input to the junction of R2, C3 via a 0.1 uF capacitor, as this point is at H.T. potential, and tune L6, L7 for maximum output. Disconnect the test meter and resistors.
- (5) Unless facilities for the measurement of A.M. rejection are available, it is advisable to leave R16 at the works setting. If, however, the setting has been disturbed, or for any other reason it is necessary to alter it, in the absence of test gear it may be adjusted for minimum noise on a weak signal that has been accurately tuned in with the aid of the "Magic eye."

Adjustment of the Discriminator: To be carried out after R.F. alignment.

- (1) An interference-free signal at a suitable R.F. should be applied to the aerial input socket.
- (2) The signal should be at a level that is 6 dB up on that signal which just produces an output of half a watt at maximum volume. The balance and tone controls should be centralised.
- (3) Adjust the signal generator so that the I.F. produced is 10.7 Mc/s exactly, checking by means of a crystal, if available.
- (4) The discriminator secondary, L20, should be adjusted to produce zero D.C., as detailed in the 'Meter Method' above.
- (5) The R.F. signal should then be modulated with 30% A.M., and the pre-set resistor R16 adjusted for minimum audio output. It may be necessary to repeat the above two adjustments, as they are slightly inter-dependent.

I.F. Alignment (A.M.)

- (1) Switch to M.W. and tune the receiver to 545 metres. Connect the output meter across the loud-speaker leads.
- (2) Input at 470 kc/s, A.M. 30% to V2, pin 2.
- (3) Adjust L18, L16, L13 and L11, in that order for maximum symmetrical output.

R.F. Alignment (F.M.)

- (1) Check that with the gang fully closed the tuner carriage is $\frac{1}{8}$ " from fully open. Adjust if necessary by rotating the drive collar on the gang shaft; also check that the pointer coincides with the datum mark on the scale

with the gang fully closed, and adjust by sliding the pointer along the drive cord.

- (2) Tune the receiver to the 92 Mc/s mark (a notch in the frame around 'THIRD'), and inject an F.M. signal of that frequency to the aerial input.
- (3) Adjust L4 for calibration and L3 for maximum output.
- (4) Finally, with the internal aerial re-connected and using the same 92 Mc/s input, adjust the aerial trimmer, C1 for maximum output.

R.F. Alignment (A.M.)

- (1) Connect the signal generator output to the aerial and earth sockets, and switch to the Medium Wave.
- (2) Tune to 500 metres and adjust L14 for maximum output, then tune to 200 metres and adjust C28 for maximum output.
- (3) Adjust C17 at 200 metres, and L8 at 500 metres.
- (4) Switch to L.W., align C66, then adjust L9 for maximum output at 1500 metres.

NOTE: The adjustment of L8 and L9 is carried out by sliding the coils along the ferrite rod until a point of maximum output is reached. The coils should be sealed on to the rod on completion of alignment.

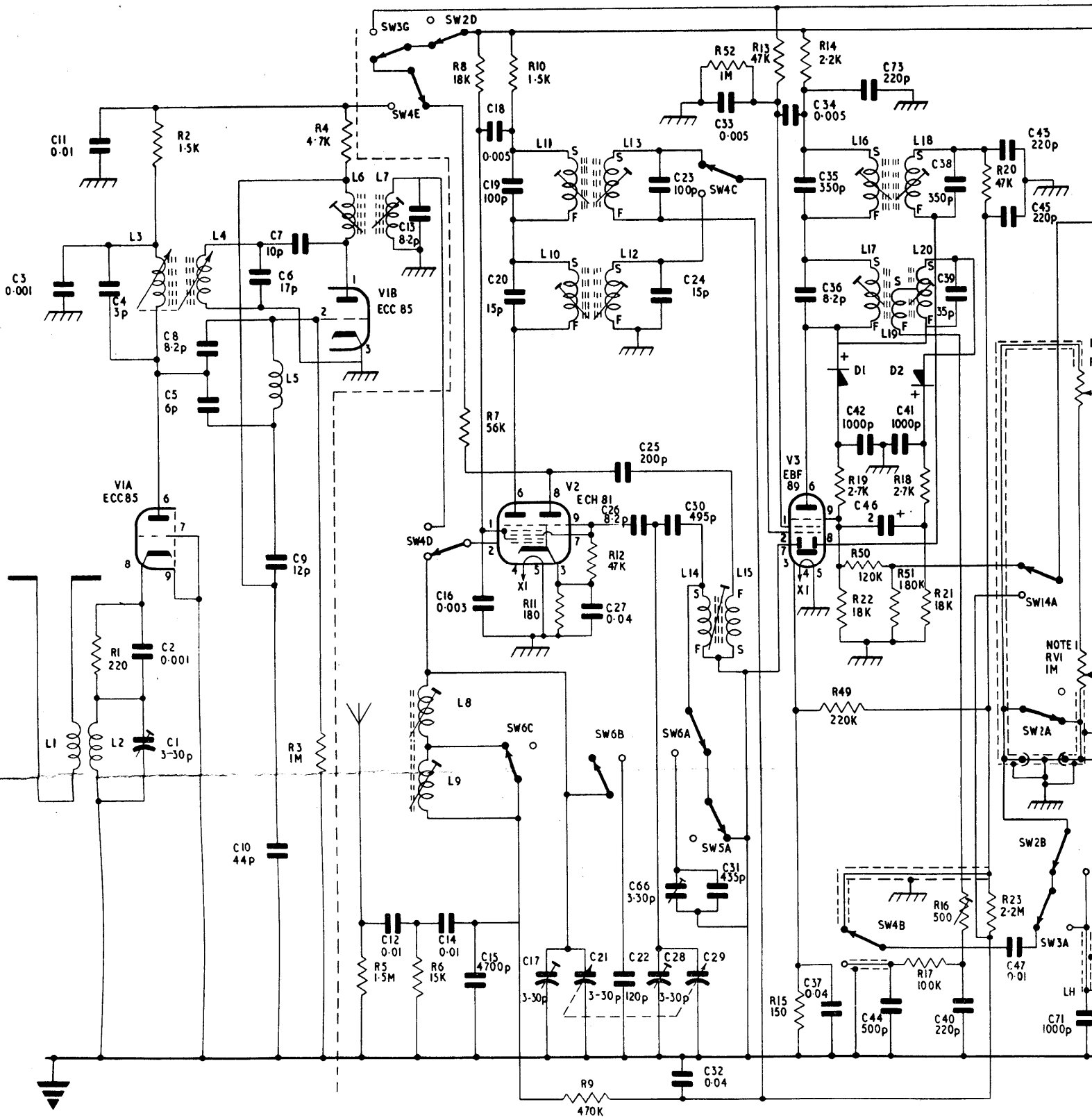
Service Notes

The outputs from each amplifier are not normally affected by valve changes due to the negative feedback action, but if it is desired to equalize the outputs proceed as follows:—

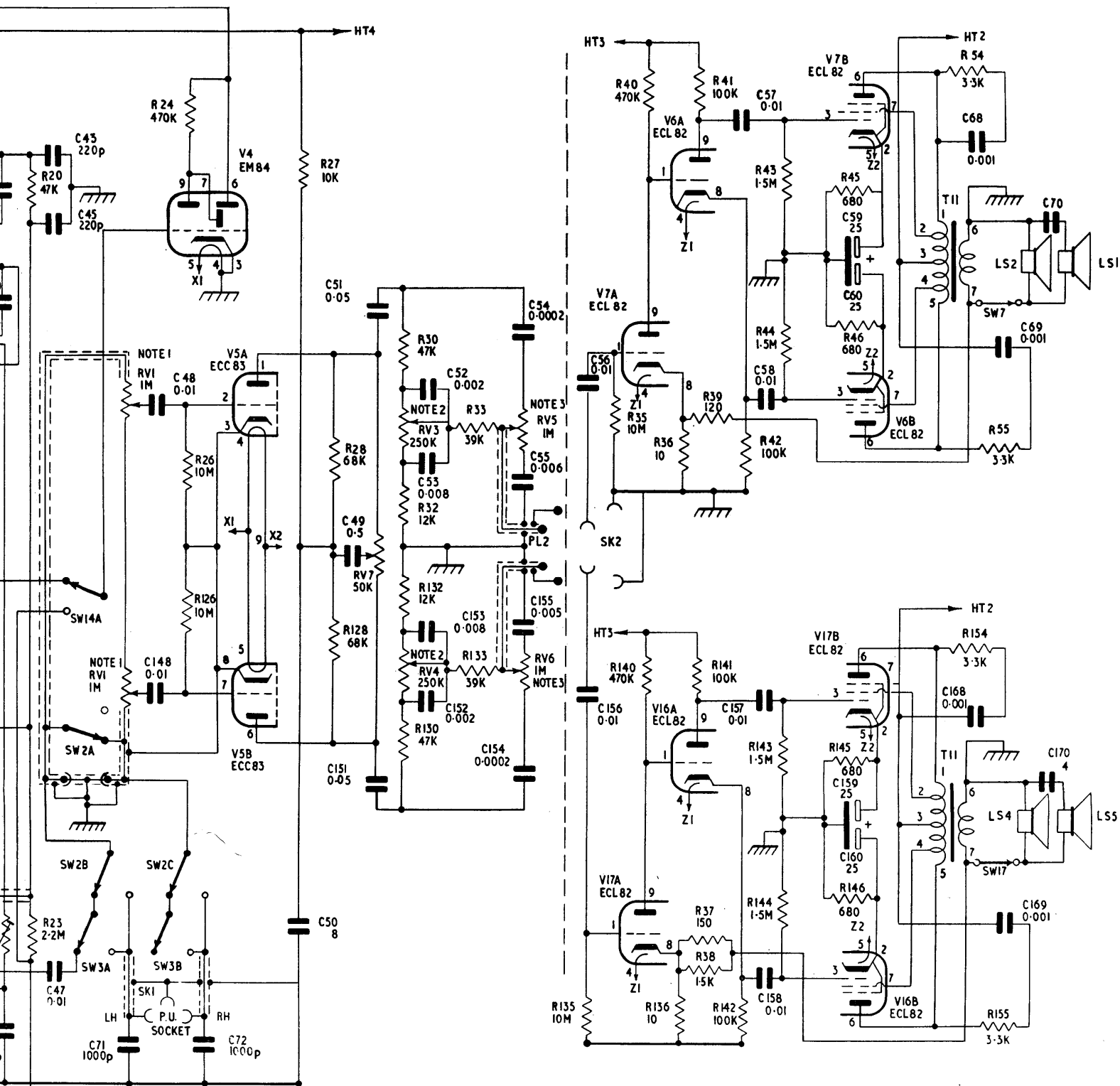
Parallel the inputs to the amplifiers and feed a signal into both simultaneously. From T1 output transformer secondary obtain an output reading. Transfer the output meter to T11 secondary, and adjust R38 until the reading coincides with that previously obtained from T1.

NOTE: The loud-speakers should remain connected for this adjustment.

R	2		4		8		10		12		52		13		14		19		18		16		20	
C	11	4	8	7	6	13	18	17	66	26	23	30	33	34	42	41	73	38	43	45	47	71		
V	IA		IB		2		3																	
MISC	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	D1	D2	L18	L19	L20		

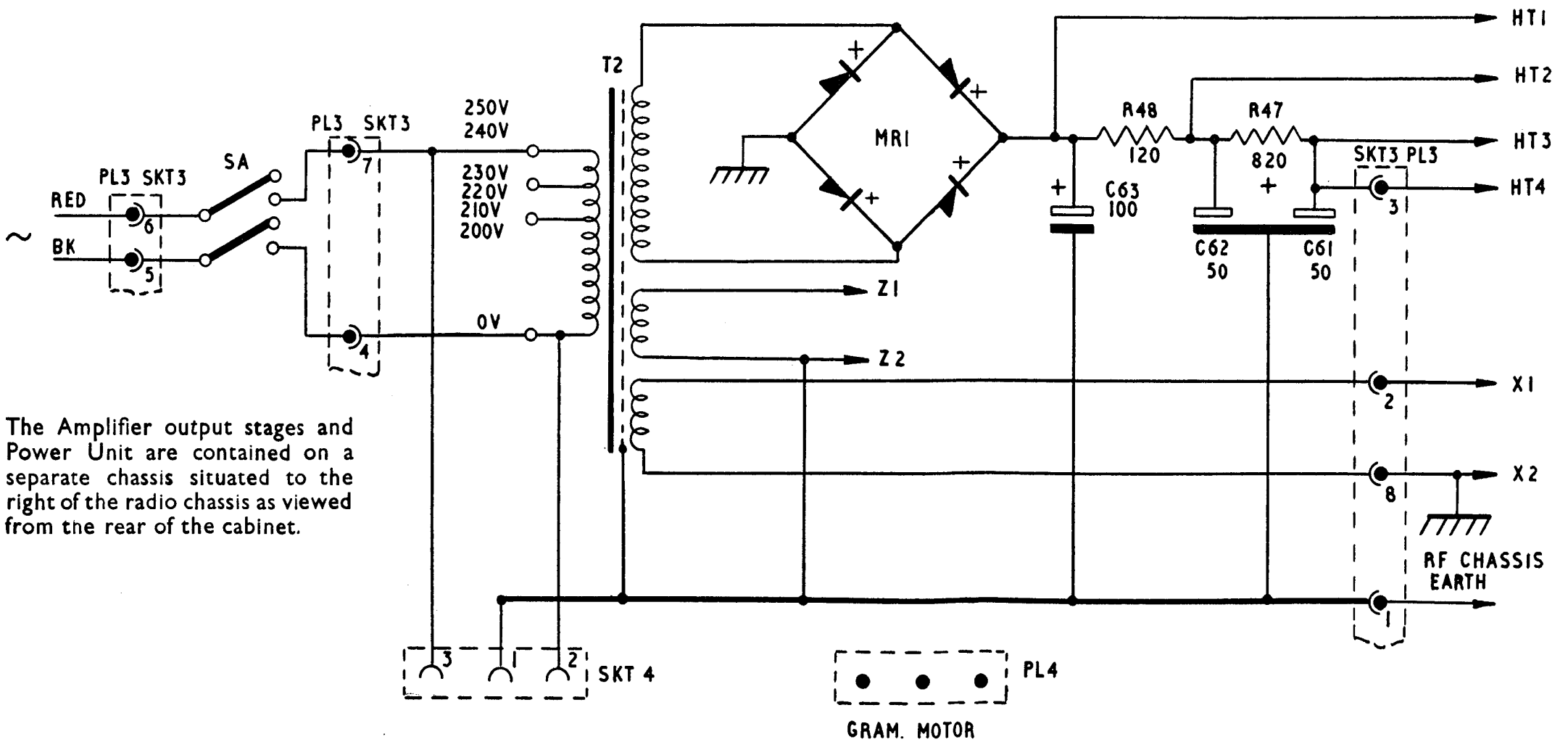


6	20	24	26	27	28	30	32	33	35	40	41	38	43	143	45	54	A	
	23		126		128	132	130	133	135	140	36	39	42	44	144	46	55	
38	43	48		50	51	52	53	153	54	56	57	58	59	157	145	68	70	C
39	45	71	148	72	49	130	132	154	55	156		158	159		60	160	69	
			4	5A					7A	6A					17B		170	V
			5B						17A	16A					16B			
20		RV1		RV7		RV3		RV4		RV5					T11	LS2	LS1	MISC
										RV6					T12	LS4	LS3	

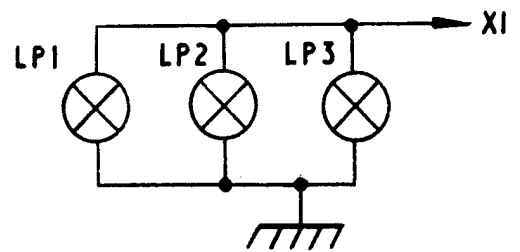
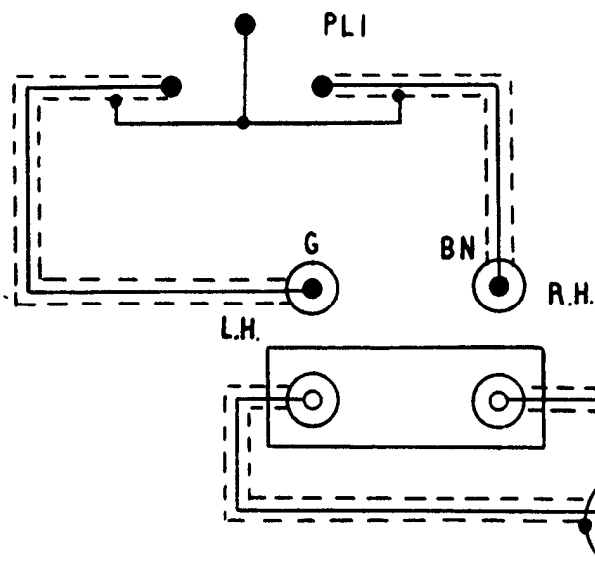
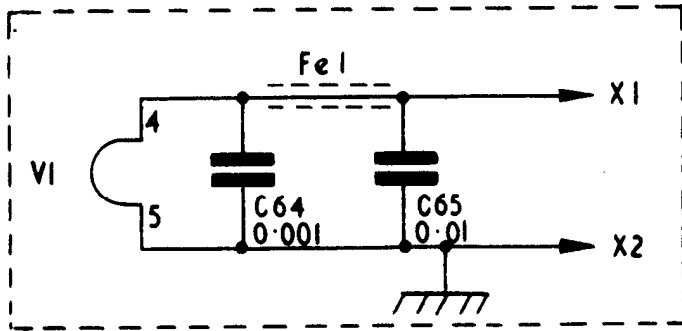


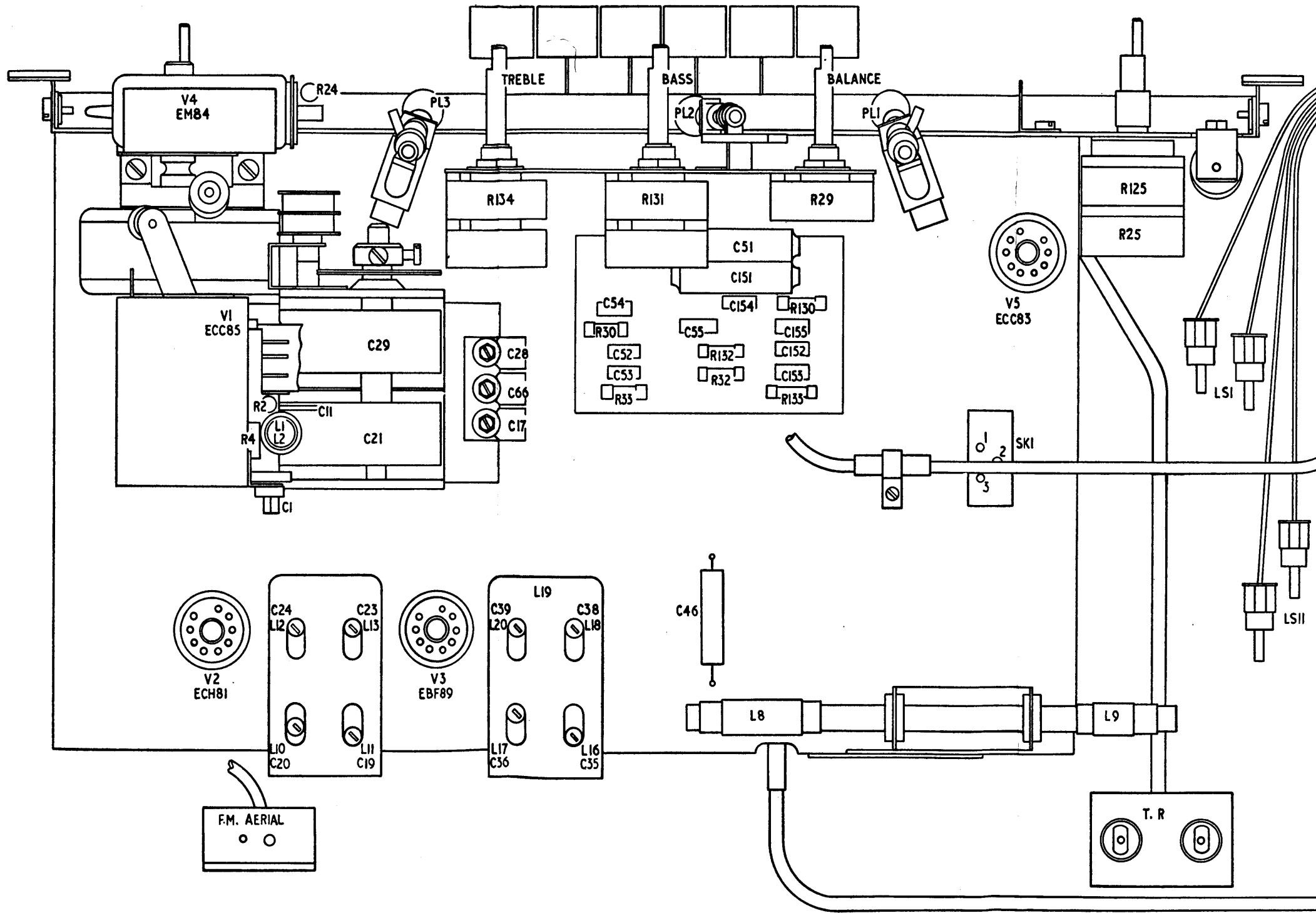
NOTES:-

1. RV1 AND RV2 ARE GANGED
2. RV3 AND RV4 ARE GANGED
3. RV5 AND RV6 ARE GANGED

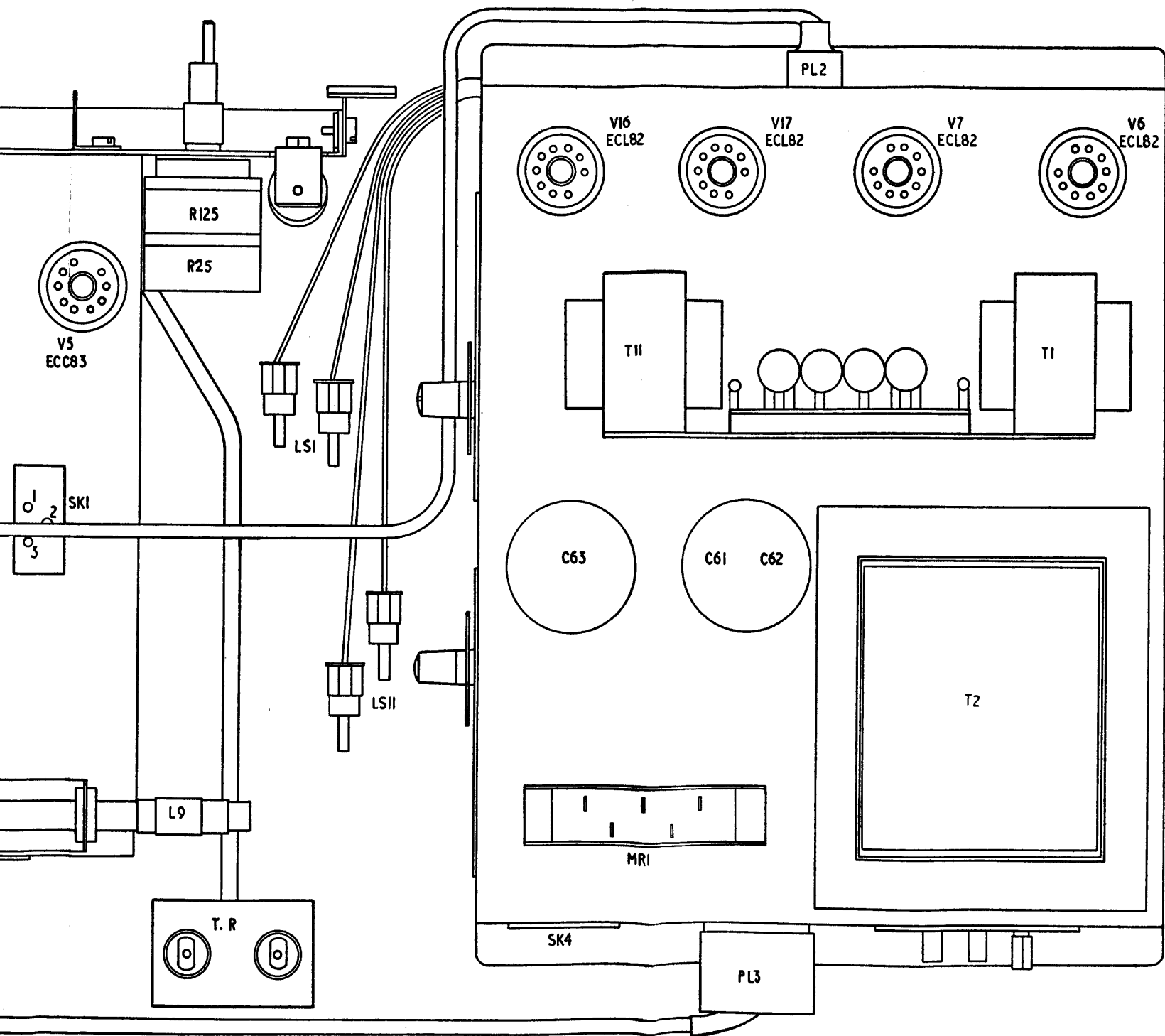


The Amplifier output stages and Power Unit are contained on a separate chassis situated to the right of the radio chassis as viewed from the rear of the cabinet.

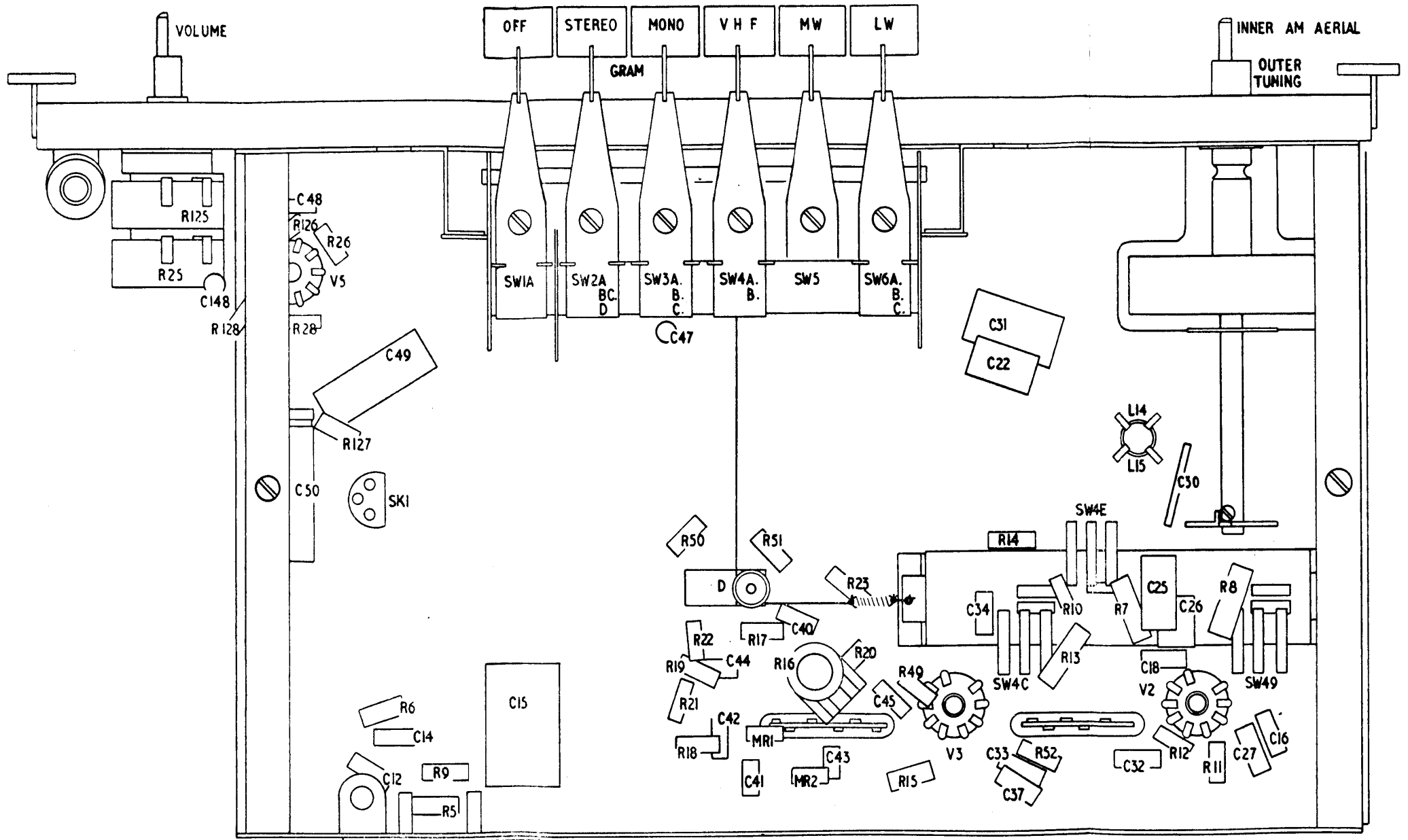




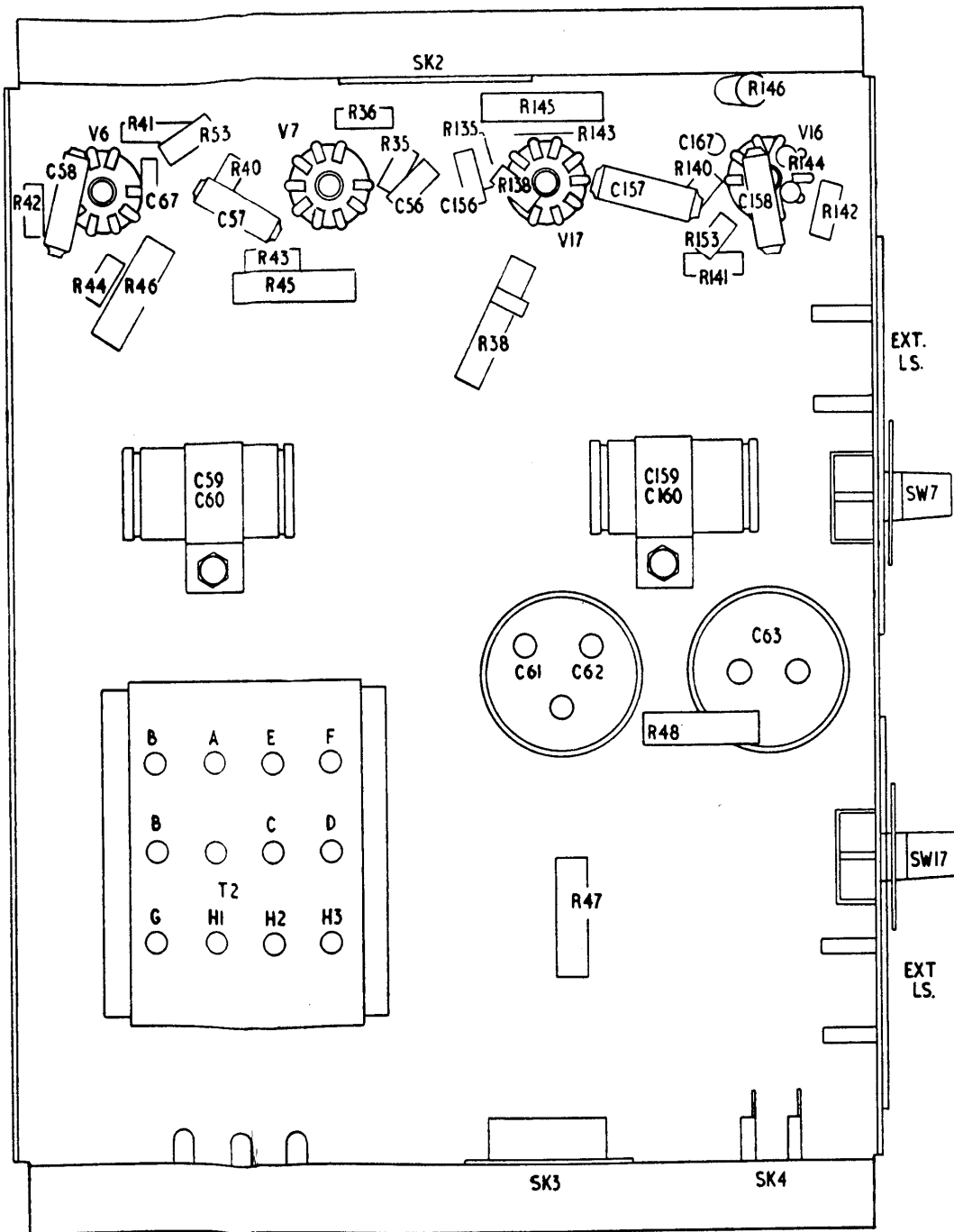
TOPSIDE OF RADIO CHASSIS



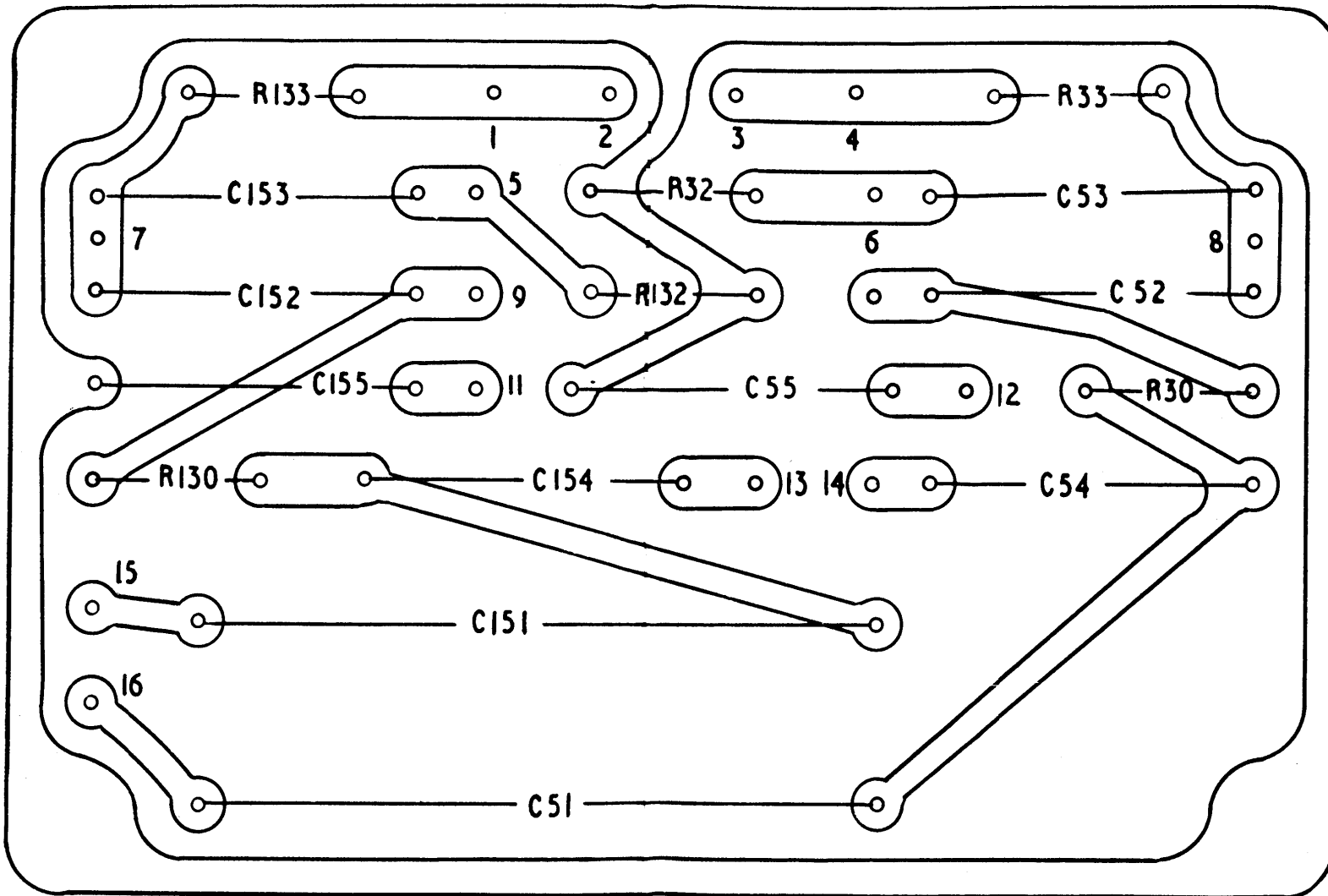
TOPSIDE OF AMPLIFIER AND POWER SUPPLY CHASSIS



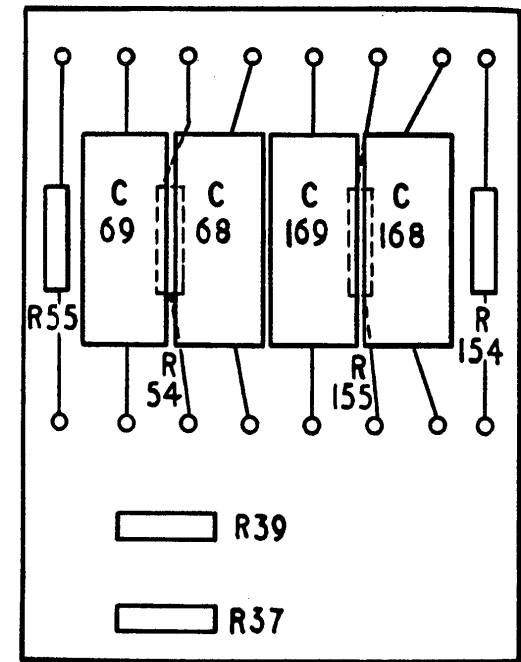
UNDERSIDE OF RADIO CHASSIS



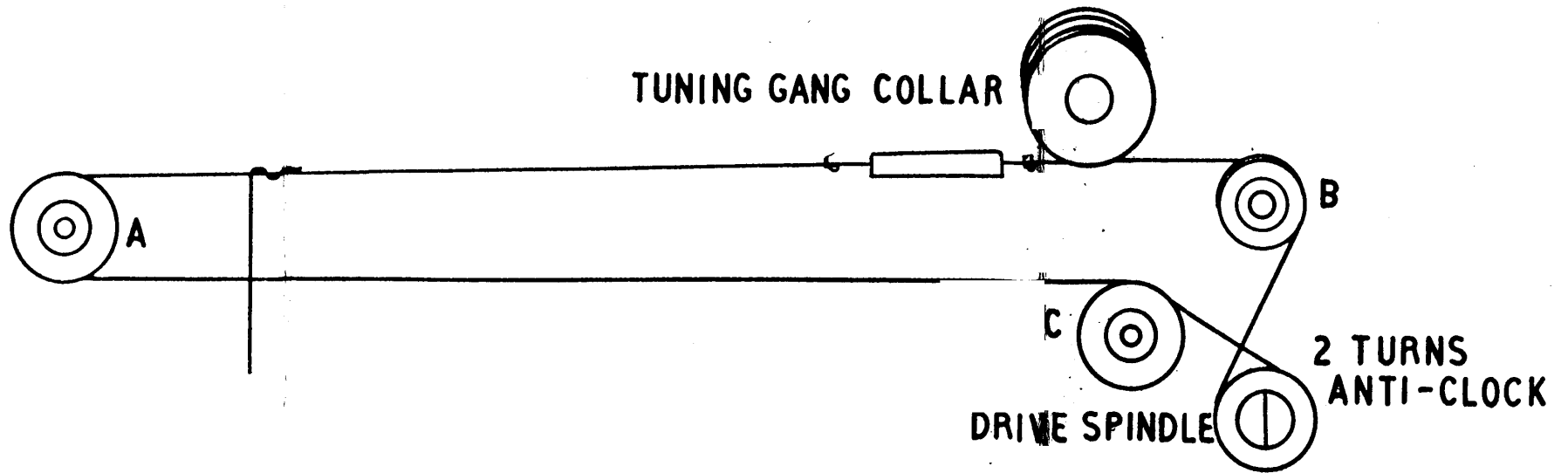
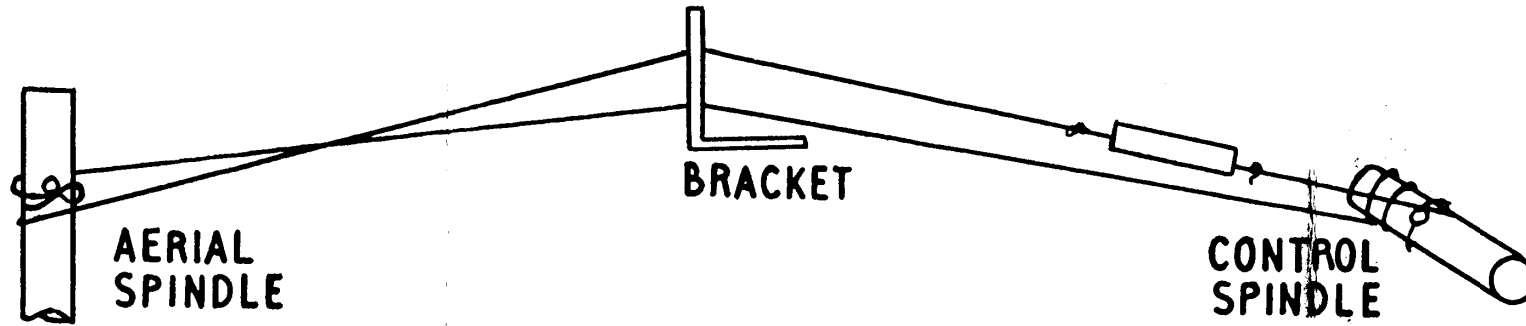
UNDERSIDE OF AMPLIFIER AND POWER SUPPLY CHASSIS



PRINTED WIRING PANEL
 Located on Topside of Radio Chassis



TAG BOARD
 Located on Topside of Amplifier
 and Power Supply Chassis



DETAILS OF DRIVE CORD ASSEMBLIES