

RANK HI-FI
LEAK 2200 AMPLIFIER SERVICE MANUAL

INTRODUCTION

The servicing instructions in the manual are divided into two levels:-

- (1) Servicing to module Level, where the fault is located to a module or major component which can then be replaced.
- (2) Complete servicing, where circuit descriptions, circuit diagrams and test point voltages are provided to assist the qualified service engineer.

CONTENTS

1. Dismantling the Case
2. Key to Major Components
3. Faultfinding to Module Level
4. Access to Main Amplifier Module
5. Access to Front Panel Components
6. Access to Rear Panel Components
7. Detailed Servicing

1 DISMANTLING THE CASE

1a. To remove the top panel:

Remove the two fixing screws "A" from the back panel. Lift slightly and remove to rear.

1b. To remove the side panels:

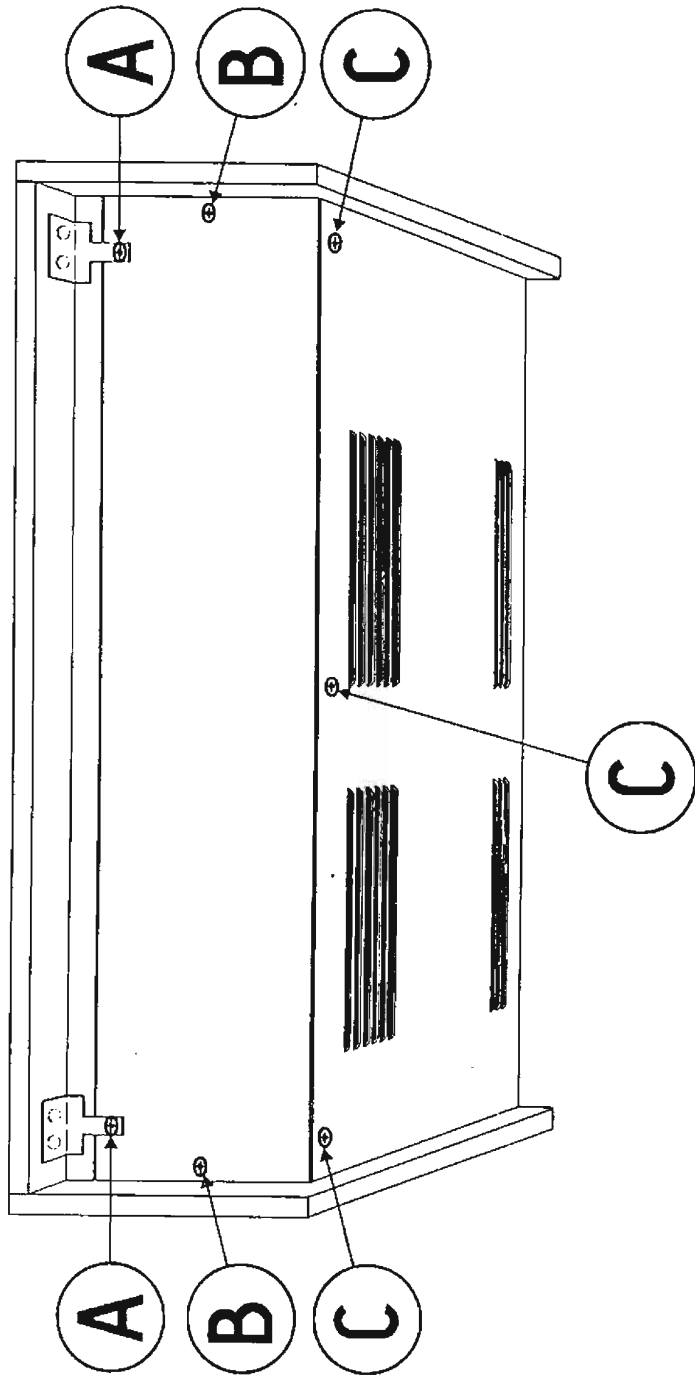
Remove the single fixing screw "B" from the back panel, pull the side panel forward approximately 1 inch and remove to side.

Repeat for the other side.

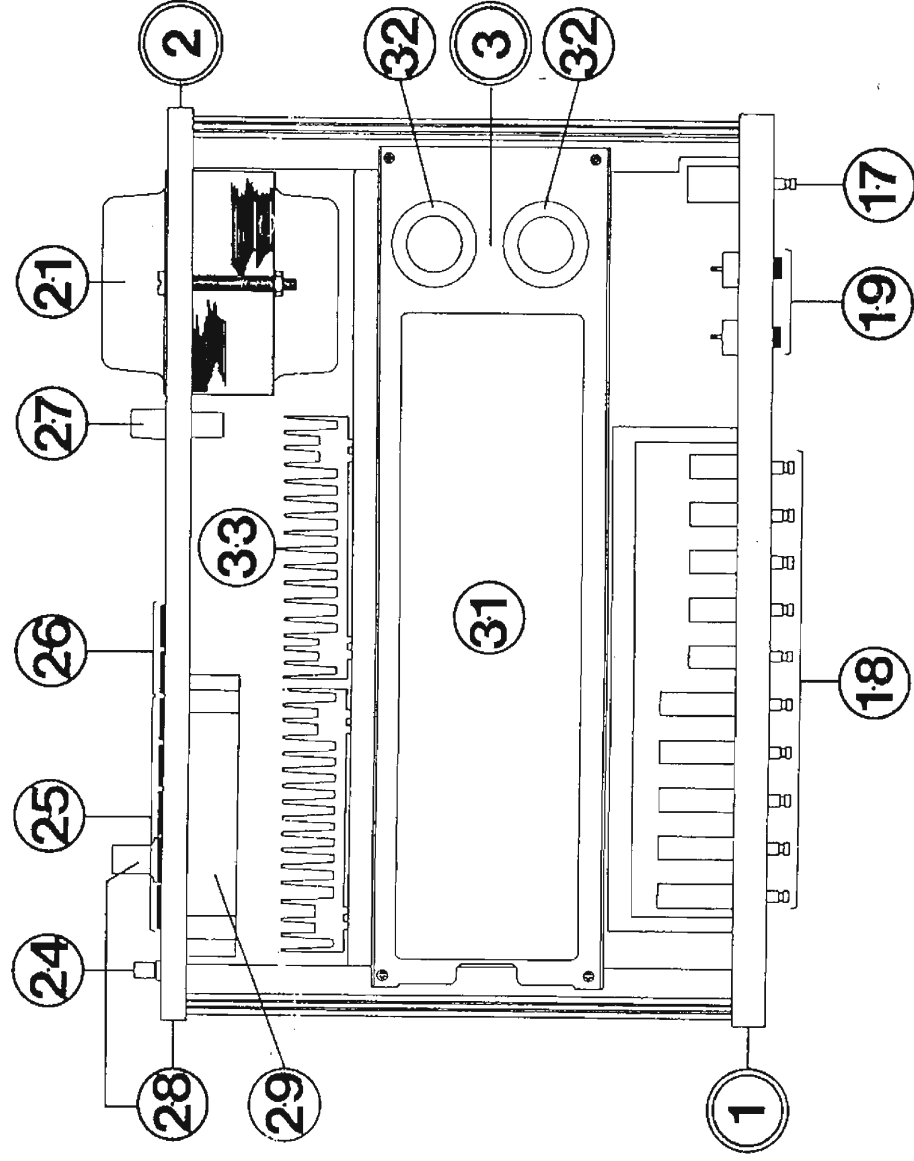
1c. To remove the bottom plate:

Remove the fixing screws "C" as indicated from the three positions at rear of bottom plate, remove bottom plate to rear.

Re-assembly is a direct reversal of these sequences.



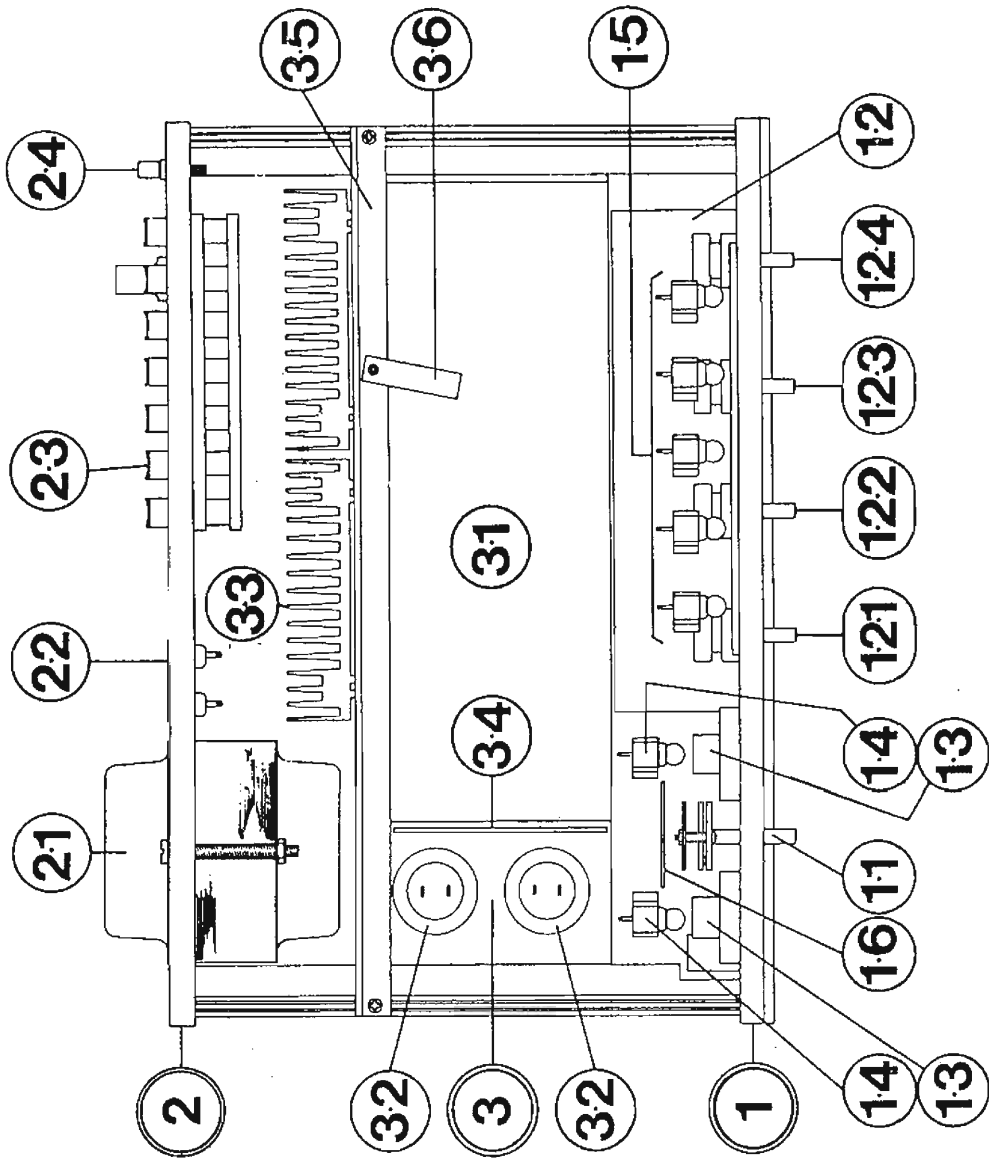
2 KEY TO MAJOR COMPONENTS



2a. TOP VIEW OF UNIT

- | | | | |
|-------|--|-------|----------------------------|
| 1. | <u>Front Panel Module</u> | 2. | <u>Rear Panel Module</u> |
| 1.1 | Four channel matrix switch | 2.1 | Transformer |
| 1.2 | Control amplifier assembly | 2.2 | Mains outlet socket |
| 1.2.1 | Volume Control | 2.3 | Switch bank - 7 way |
| 1.2.2 | Balance Control | 2.4 | Earth terminal |
| 1.2.3 | Bass Control | 3. | <u>Amplifier Module</u> |
| 1.2.4 | Treble Control | 3.1 | Amplifier board assembly |
| 1.3 | Output level meters | 3.1.1 | Power supplies |
| 1.4 | Meter bulb and holder 6V, .5A | 3.1.2 | Main amplifier |
| 1.5 | Function indicator bulb and holder 6.5V, .3A | 3.1.3 | Disc pre-amplifier |
| 1.6 | Meter board assembly | 3.2 | Capacitor, 6800 uF |
| | | 3.3 | Heatsink |
| | | 3.4 | Speaker protection circuit |
| | | 3.5 | Heatsink support strap |
| | | 3.6 | Screening contact clip |

2 KEY TO MAJOR COMPONENTS



2b. BOTTOM VIEW OF UNIT

<u>1.</u>	<u>Front Panel Module</u>	<u>3.</u>	<u>Amplifier Module</u>
1.7	On/Off Switch	3.1	Amplifier board assembly
1.8	Switch bank 10-way	3.2	Capacitor 6800 uF
1.9	Phone sockets	3.3	Heatsink
<u>2.</u>	<u>Rear Panel Module</u>		
2.1	Transformer		
2.4	Earth terminal		
2.5	Input sockets - 5 pin DIN		
2.6	Speaker sockets - 2 pin DIN		
2.6.1	Speaker 1 R & L		
2.6.2	Speaker 2 R & L		
2.7	Mains supply fuse and holder		
2.8	Microphone volume control		
2.9	Microphone preamplifier board assembly.		

3 FAULTFINDING TO MODULE LEVEL

The amplifier comprises:-

- a) **AMPLIFIER MODULE ASSEMBLY:** containing disc preamplifier (3.1.3), main power amplifiers (3.1.2), stabilised power supplies (3.1.1), and the speaker protection circuitry (3.4).
- b) **FRONT PANEL MODULE ASSEMBLY:** containing function selection switch bank (1.8), control amplifier circuitry (1.2), matrix switch (1.1), and meter drive circuitry (1.6).
- c) **REAR PANEL MODULE ASSEMBLY:** containing signal input and output sockets (2.5), microphone preamplifier circuitry (2.9), speaker outlet sockets (2.6), mains supply fuse (2.7), and mains transformer (2.1).

The control amplifier circuitry and the microphone preamplifier obtain their power supplies from the main amplifier module.

The following "check" procedures are a guide to help faultfinding of the amplifier to a level, whereby either the module, or part of the module, can be replaced. For more detailed servicing see section (7).

3.1 INITIAL PROCEDURE

Set up the amplifier as follows:-

- Plug the amplifier into the mains supply.
- Plug the speakers into the speaker 1 sockets.
- Depress the speaker 1 button, set all other buttons into the out position.
- Set the balance, bass and treble controls into the centre position.
- Turn the volume control fully anti-clockwise, adjust to the required level during testing.
- Turn the microphone volume control fully anti-clockwise.
- Set the four channel matrix switch to off.

3.2 CHECK LIST

Checks	Yes	No
3.2.1 <u>Initial Check</u> Switch on the amplifier. Do the meters illuminate?	Proceed to 3.2.2	Read section 3.3.1
3.2.2 <u>Main Amplifier Check</u> Press the MAIN AMP. INPUT switch in. Feed a signal (500mV 1kHz) into the PRE/MAIN socket. Check for left and right channel outputs.	Proceed to 3.2.3	Main amplifier module or associated wiring suspect. Read section 3.3.2
3.2.3 <u>Meter Check</u> With conditions as in check 3.2.2. check for left and right channel meter deflections.	Proceed to 3.2.4	Meter circuit or associated wiring suspect. Read section 3.3.3

/Continued.....

3 FAULTFINDING TO MODULE LEVEL

3.2 CHECK LIST (cont.....)

Checks	Yes	No
<p>3.2.4 <u>Control Amplifier Check</u> <u>Release MAIN AMP INPUT</u> Switch. Select TUNER function, feed a signal (100mV 1kHz) into the TUNER/MIC socket. Adjust volume and check for left and right channel outputs.</p>	<p>Proceed to 3.2.5</p>	<p>Control amplifier or associated wiring suspect. Read section 3.3.4</p>
<p>3.2.5 <u>Function Switch and Indicator Check</u> With conditions as in check 3.2.4 check for left and right channel output and for TUNER indicator light. Repeat for CASSETTE and TAPE functions. Select MONO and check for MONO indicator light.</p>	<p>Proceed to 3.2.6</p>	<p>Read section 3.3.5</p>
<p>3.2.6 <u>Disc Preamp Check</u> <u>Select DISC function.</u> Feed a signal (5mV 1kHz) into the DISC input socket. Adjust volume and check for left and right channel outputs and DISC indicator light.</p>	<p>Proceed to 3.2.7</p>	<p>Disc preamplifier or associated wiring suspect. Read section 3.3.6</p>
<p>3.2.7 <u>Microphone Preamplifier Check</u> Release DISC function. Press the TUNER/MIC switch in. Feed a signal (5mV 1kHz) into the TUNER/MIC socket. Adjust the Microphone Volume Control and check for left channel output.</p>	<p>Proceed to 3.2.8</p>	<p>Microphone preamplifier or associated wiring suspect. Read section 3.3.7</p>
<p>3.2.8 <u>Four Channel Matrix Check</u> Remove speakers from speaker 1 sockets and place in speaker 2 sockets. Release speaker 1 button. Press speaker 2 button. Press the MAIN AMP INPUT switch in. Feed a signal (500mV 1kHz) into the PRE/MAIN socket LEFT channel only. Switch the FOUR CHANNEL MATRIX SWITCH to 0, -1, -2, -3 respectively. Check that the output decreases with each step.</p>		<p>Associated wiring or switch suspect. Read section 3.3.8</p>

3 FAULTFINDING TO MODULE LEVEL

3.3 DETAIL CHECK PROCEDURES

3.3.1 Procedure

- a. Check mains supply voltage.
- b. Check Transformer primary voltage.
- c. Check transformer secondary voltages 27.5-0-27.5 on amplifier module (3) and 3-0-3 on Meter Board (1.6).

If have a. and not b. investigate mains fuse, on/off switch and associated wiring.

If have b. and not c. transformer is faulty.

If have c. and meters not illuminated check wiring to meter illuminating lamps.

If O.K. check fuses on meter drive P.C.B.

If O.K. check bulbs.

3.3.2 Procedure

- a. Check D.C. voltage across mains smoothing capacitors (on amplifier module).

If have 3.3.1.c. and 3.3.2.a. not present investigate secondary fuses (on amplifier P.C.B.), if blown replace. If they fail on switch on then fault on amplifier module.

If 3.3.2.a. present then:-

b. Check for signal on left channel speaker socket.

c. Check for signal on right channel speaker socket.

If not have b. or c. check continuity of wiring from speaker sockets to the amplifier outputs. If wiring O.K. then fault on amplifier module. To replace module see Section 4.

3.3.3 Procedure

If have no deflection at either meter check continuity of wiring from amplifier outputs to meter board inputs. If wiring O.K. check wiring from meter board outputs to meters. If wiring O.K. fault on meter board or meter. To replace meter board and meters see Section 5.

3.3.4 Procedure

Inject a signal at the input pin of both control amplifiers in turn. Turn volume control clockwise approximately 30°.

a. Check for signal on left channel speaker socket.

b. Check for signal on right channel speaker socket.

If not have a. or b. check continuity of wiring from control amplifier output to main amplifier input.

If O.K. check supply voltage on control amplifier.

If O.K. then fault on control amplifier.

To replace control amplifier see Section 5.

3 FAULTFINDING TO MODULE LEVEL

3.3 DETAIL CHECK PROCEDURES (Cont...)

3.3.5 Function Switch and Indicator Check:-

If any of indicators do not illuminate check bulbs. If O.K. check associated wiring. If O.K. check function selection switch. If for any selected function there is no output at the speaker sockets check associated wiring. If O.K. check function selection switch. To remove function selection switch see Section 5.

3.3.6 Procedure:-

If indicator does not illuminate check bulb. If O.K. check associated wiring. If O.K. check function selection switch. If no output at speaker sockets:-

- a. Check for signal at input to disc preamp.
- b. Check for signal at output from disc preamp.
- c. Check for input to function selection switch.
- d. Check for output from function selection switch.

If have a. and not b. fault on amplifier module.
To replace amplifier module see Section 4.

If have b. and not c. check associated wiring.

If have c. and not d. check function selection switch.

To remove function selection switch see Section 5.

3.3.7 Procedure:-

- a. Check for input to microphone preamplifier.
- b. Check for output from microphone preamplifier.
- c. Check for input to left channel main amplifier.

If have a. and not b. then fault on microphone preamplifier board.

To replace microphone preamplifier board see Section 6.

If have b. and not c. then fault in associated wiring.

3.3.8 Inject a signal at the input pin of the left channel amplifier such that the left channel socket output voltage is 10V rms.

Switch the FOUR CHANNEL MATRIX SWITCH TO 0, -1, -2 and -3.

- a. Check that left channel output decreases as follows:-

<u>Matrix Switch Position</u>	<u>Socket Output Voltage (rms)</u>
"off"	10V ± 2dB
0	5V ± 2dB
-1	2V ± 2dB) for 8ohm
-2	1.5V ± 2dB) Loudspeakers
-3	0.8V ± 2dB)

If above results are not obtained check associated wiring, switch for correct operation, and the values of attenuation resistors.

To remove switch see Section 5.

4 ACCESS TO MAIN AMPLIFIER MODULE

To service the Main Amplifier Module remove the Top Panel and the Bottom Plate.

To remove the Main Amplifier Module, disconnect the amplifier from the mains supply. Unplug all connections to the Amplifier Module, noting the positions of the groups of leads. Remove the four Module fixing screws which fasten the Heatsinks to the heatsink support rail and the four Module fixing screws from the side rails. The Amplifier Module then lifts out. To replace the module reverse the procedure.

5 ACCESS TO FRONT PANEL COMPONENTS

To service the Function Switch, Phones Sockets and On/Off Switch, the bottom appearance parts only need removing. See Section 5.1.5.

By unscrewing and removing the Function Switch away from the front panel, access can be gained to the underside of the Control Amplifier.

To remove the Control Amplifier and the Four Channel Matrix Switch, it is necessary to remove the top appearance parts. See sections 5.1.1 to 5.1.4. Unplug all connections and unscrew the hexagon fixing nuts.

To remove the Output Power Meters, unplug the appropriate connections on the meter board, push the Meter towards the rear and then lift it out of its spring clip support bracket.

To remove the Meter Board Assembly, unplug all connections, ease the Board from its support brackets whilst compressing the locking devices.

5 ACCESS TO FRONT PANEL COMPONENTS

5.1 REMOVAL OF APPEARANCE PARTS

5.1.1 Remove four screws (A) and lift off TOP FASCIA STRIP as indicated.

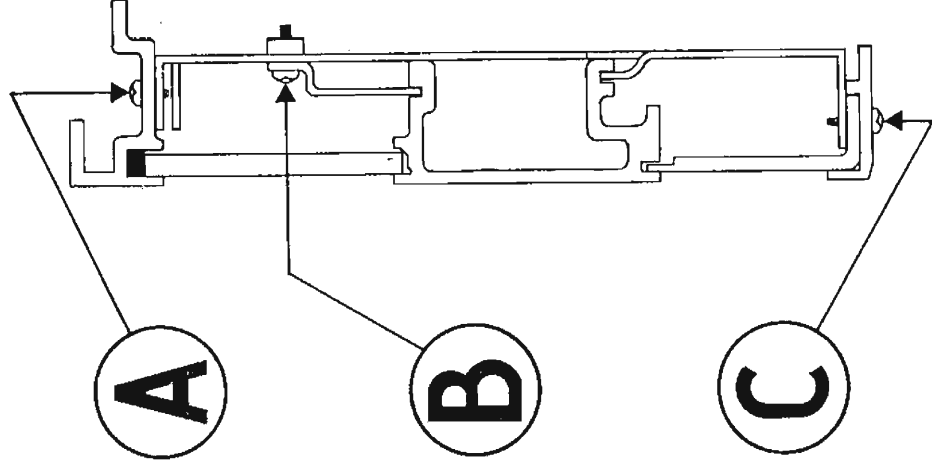
5.1.2 Remove FASCIA SCALE INSERT

5.1.3 Remove Control Knobs from their shafts by firmly and carefully pulling.

5.1.4 Remove the two Fascia Fixing Screws and Clips (B). Lift MAIN FASCIA STRIP and remove over Control Knob Shafts.

5.1.5 Remove four screws (C) and remove BOTTOM FASCIA STRIP and FASCIA INSERTS.

REMOVE the PUSH BUTTONS from their shafts by firmly and carefully pulling.



6 ACCESS TO REAR PANEL COMPONENTS

To remove the Microphone Preamplifier Board, unplug all connections, unscrew the two nuts and pull the board away from the rear panel.

To service the input/output sockets and the underside of the seven-way switchbank it may be necessary to remove the Main Amplifier Module. See Section 4.

7 DETAILED SERVICING

7.1 AMPLIFIER SPECIFICATION

Unless otherwise stated all specifications apply for 6 ohm loudspeakers, and values are typical. Noise measurement bandwidth 20Hz - 20kHz.

Distortion Limited Output Power:-

4 ohm speakers : greater than 60 + 60 watts
6 ohm speakers : greater than 50 + 50 watts
8 ohm speakers : greater than 45 + 45 watts
(both channels sinewave driven at 1kHz, 0.5% THD).

Total Harmonic Distortion:-

All powers up to 45 watts, 1 kHz : less than 0.1%
at 1 watt, 1kHz : 0.01%
at 45 watts, 10 kHz : 0.1%
Intermodulation Distortion : 0.1%
(70 Hz and 5 kHz in ratio 4 to 1).

Power Bandwidth:-

2dB down, relative to 50 watts : 10Hz to 40kHz
(0.5% THD, both channels driven)

Damping Factor

Measured at 80 Hz : 40

Input sensitivity for 50 watts

: 1V

Input impedance

: 47kohms

Frequency response (-2dB)

: 20Hz - 50kHz

Hum and Noise

: -90dB

Crosstalk at 10kHz

: -50dB

Input Function Sensitivity:-

Disc Input

: 2.5mV or 6.5mV

Sensitivity at 1kHz for 50 watts

: 47 kohms

Input impedance

: Compensated to IEC 98 fine

Frequency response

: groove characteristic

Hum and Noise

: - 65dB

Input overload margin

: 35dB

Crosstalk at 10kHz

: - 35dB

Tape/Cassette/Tuner inputs

: 150mV

Sensitivity for 50 watts

: 100kohms

Input impedance

: 25 Hz - 40kHz

Frequency response (\pm 1.5dB)

: better than -80dB

Hum and Noise

: -40dB

Crosstalk at 10kHz

: -40dB

Microphone Input

: 2.4mV

Sensitivity for 50 watts

: 47kohms

Input impedance

: 50Hz to 18kHz

Frequency response (\pm 1.5dB)

: better than -65dB

Hum and Noise

: -40dB

Tape/Cassette Output

: 150mV

Output high

: 1.5mV/kohm

Output low (DIN standard)

(based on above input sensitivities)

Residual Hum and Noise:-

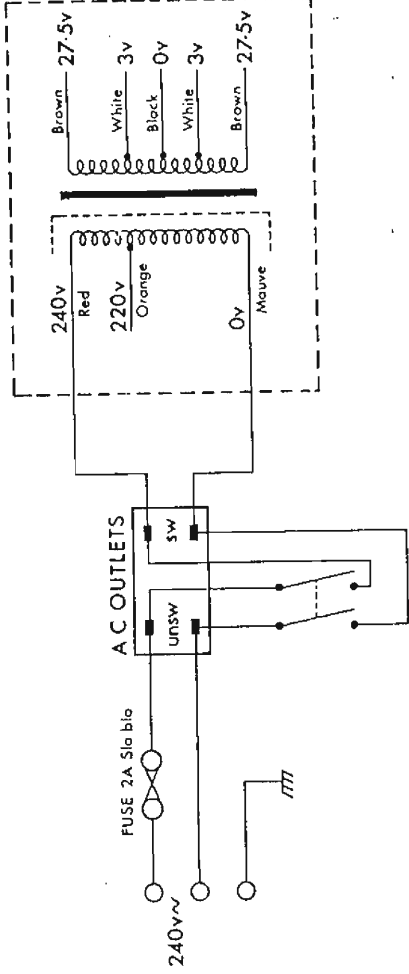
Volume control minimum

: 1.5mV maximum

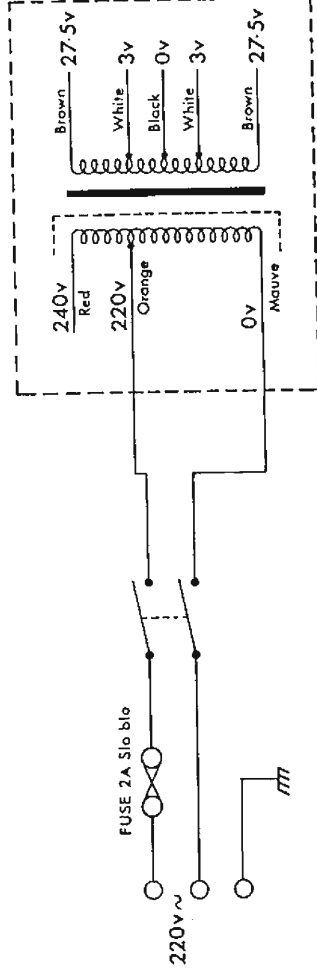
7.2. POWER SUPPLIES

U.K. Model (240V)

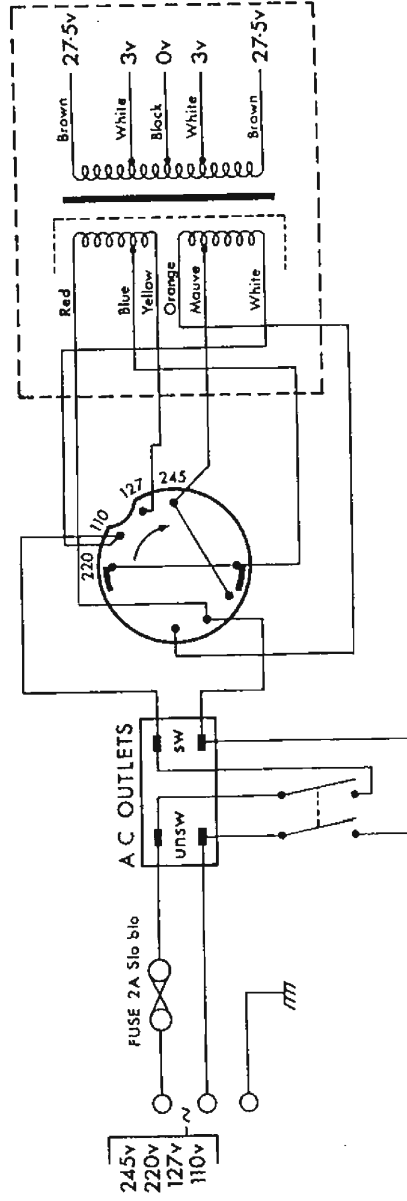
European Model (220V):-



Scandinavian Model:-



Voltage Selector Model:-



7.4 AMPLIFIER MODULE CIRCUIT DESCRIPTIONS**7.4.1 Power Supply Circuit:-**

The centre tapped secondary of the mains transformers (2.1) is connected via the fuses F1, F2 and then via D2, D3, D4 and D5 to the two 6800 μ F electrolytic capacitors producing a positive and negative supply rail. These rails supply the two main amplifiers directly, and the remaining circuitry via two series stabilisers. The positive stabiliser (the negative one being complementary) consists of an emitter coupled transistor pair TR1, TR4 which compares a fixed proportion (via R5, R6) of the 16 volt output, with a 12 volt reference from Z1. A decrease in output voltage causes the current in TR1 to fall, hence increasing the collector current in TR4 consequently providing increased output current from TR3 which serves to correct the original error. Under short circuit conditions, the output current is limited by the action of R11 and R9 which both serve to limit the base current in TR3. Since the Zener Z1 is supplied from the regulated output via R13 and D6, R2 is added to guarantee starting up of the regulator.

7.4.2 Power Amplifier Circuit:-

The input signal is coupled via R16 (or R15) and C6 to the input point at the base of TR7. The D.C. coupled amplifier comprises TR7, TR8 an emitter coupled input pair, TR10 a PNP inverter and TR12, an emitter follower, driving the fully complementary output comprising TR19, 20, 21 and 22. The system is inverting and negative feedback is thus provided by R30, C10, R18, C7 and R17. TR13 and its associated components control quiescent current in the output pair. The quiescent current setting is 90mA with the amplifier cold and is adjusted by means of VR1 and monitored in the supply rail feeding the emitter of TR21. Of the remaining transistors in the amplifier TR9 monitors the current in TR12 by means of R23 shunted by C9 and provides current limiting by clamping the input to TR10 under fault conditions. In a similar way TR14 is controlled by TR11 to provide a constant current, i.e. high impedance collector load for the pre-drivers TR10, TR12. The complementary transistor pairs TR15, TR16 and TR17, TR18 provide output current limiting. The output current is controlled by comparing the voltage across the low value emitter resistor R36, R37 with the base-emitter voltage of the appropriate sensing transistor TR16 or TR17. As soon as either of these transistors conducts sufficiently to turn on the other one of its pair, they both conduct together and remain locked in this condition until the polarity of the audio signal reverses. This "snap" action at a fixed output current provides ideal protection even under complete short circuit conditions, since the drive to both the driver (TR19 or TR20) and the output transistor (TR21 or TR22) is removed until normal conditions prevail. The input to the main amplifier is clamped to earth for a period of approximately 3 seconds by TR26 and associated components D8, C27, R52, R53 to suppress any transient pulses which may occur during switch on.

7 DETAILED SERVICING

7.4 AMPLIFIER MODULE CIRCUIT DESCRIPTIONS (cont.)

7.4.3 Disc Preamplifier Circuit:-

The circuit consists of an emitter coupled transistor pair TR23, TR24 coupled to the grounded emitted PNP transistor TR25 giving an overall non-inverting system.

The input is directly coupled from the magnetic cartridge to TR23 to minimise low frequency flicker noise. Negative feedback to TR24 is provided by R45, C16, C15, R44 with R42, R43, C14 providing the lower limb of the potential divider network. The R.I.A.A. playback characteristic is provided by the feedback components listed above with R43 acting to reduce the gain with the 'DISC' function switch (2.3) in the 'LOW SENSITIVITY' position.

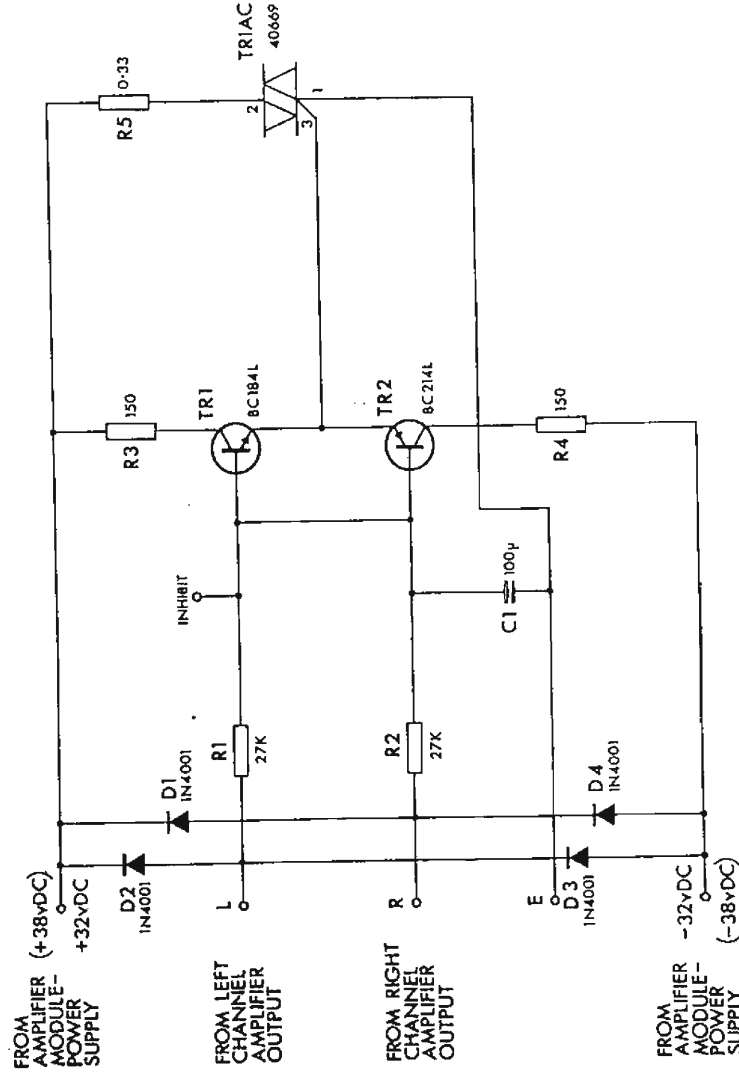
7.4.4 Speaker Protection Circuit:-

The speaker protection circuit is designed to blow the A.C. fuses, if for any reason the output from the amplifier swings to either of the supply voltages and stays there for more than 0.5 seconds. This eliminates the risk of prolonged D.C. current flowing through the speaker voice coil causing permanent damage.

The circuit operates as follows:-

The inputs to TR1 and TR2 are connected to the outputs of the main amplifiers via R1 and R2. Under normal operating conditions TR1 and TR2 are in the off state due to the filtering action of C1. If the amplifier outputs swing up to a D.C. level and remain there, either TR1 or TR2, depending on the polarity of the amplifier output voltage will trigger the triac, which in turn will blow the main amplifier A.C. fuses.

To avoid premature triggering of the protection circuit when servicing the main amplifier, connect the INHIBIT pin on the speaker protection P.C.B. to earth potential. N.B. DISCONNECT on completion of work.



7.4 AMPLIFIER MODULE CIRCUIT DESCRIPTIONS (cont.)

7.4.5 Test Point Voltage Charts:-

All measurements taken with respect to earth potential using an AVO model 8 or equivalent. The voltages shown in the chart are nominal values intended as a guide to faultfinding, and were measured with the amplifier inputs connected to signal earth.

Power Amplifier Test Point Voltage Chart:

<u>Test Point</u>	<u>Voltage</u>	<u>Test Point</u>	<u>Voltage</u>
Pin 22V	27.5 a.c.	TR6 Emitter	36-
Pin 22V	27.5 a.c.	TR6 Collector	16-
Pin e TR21R	38+	TR7 Base	0
Pin e TR22L	38-	TR8 Base	0
TR1 Base	12+	TR8 Emitter	0.6-
TR1 Emitter	11.3+	TR8 Collector	36-
TR2 Base	12.0-	TR13 Emitter	1.5-
TR3 Emitter	34+	TR13 Collector	1.2+
TR3 Collector	16+	TR26 Base	2.5-
TR4 Base	12+	TR26 Emitter	0
TR5 Base	12-	Pin OUTPUT	0
TR5 Emitter	11.3-		

Quiescent current setting 90mA, see Section 7.4.2.

Pre-Amplifier Test Point Voltage Chart:-

<u>Test Point</u>	<u>Voltage</u>	<u>Test Point</u>	<u>Voltage</u>
TR25 Emitter	15+	TR23 Base	0
TR25 Collector	5+	TR23 Emitter	0.6-
R47-R49 Junction	13-	TR24 Base	0

7.4.6 Parts List:-

Component Ref.	Part No's.
Amplifier Module Assembly Complete.	153.04
6800 µF Electrolytic Capacitor	396.02
Main Amplifier Assembly	153.02
Rectifiers (D2, D3, D4, D5)	501.18
R36, R37	200.03
TR21 Power Transistor PNP	505.09
TR22 Power Transistor NPN	504.22
Speaker Protection P.C.B. Assembly	152.09

7.5 FRONT PANEL MODULE CIRCUIT DESCRIPTIONS

7.5.1 Control Amplifier Circuit:-

The appropriate audio signal selected by the Function Selection Switch (1.8) is connected to the volume control VR2. This linear control is centre-tapped and loaded by R1 and VR1 on the right channel and R2 on the left channel. These resistors give the control a logarithmic law and VR2 allows balancing of the channels at half rotation of the volume control. When "loudness" is selected at switch bank (1.8) C1 and C2 are added into circuit to provide bass boost at low volume settings. TR1 in conjunction with C18, R3 and R19 provides impedance transformation and fixed low frequency roll-off (1dB ~ 20Hz, 10dB - 10Hz) after which the signal is fed to the normal Baxendall type feedback tone control. The amplifier section consists of TR2 and TR3, an emitter coupled NPN pair connected to TR4 a PNP inverter.

L1, C15 and R14 form a 12dB per octave scratch filter selected by "high-filter" at switch bank (1.8). The output from the balance control VR5 goes to C5, right channel and C6 left channel on the switch bank (1.8) which provides a 6dB per octave rumble filter selected by "low-filter" at switch bank (1.8).

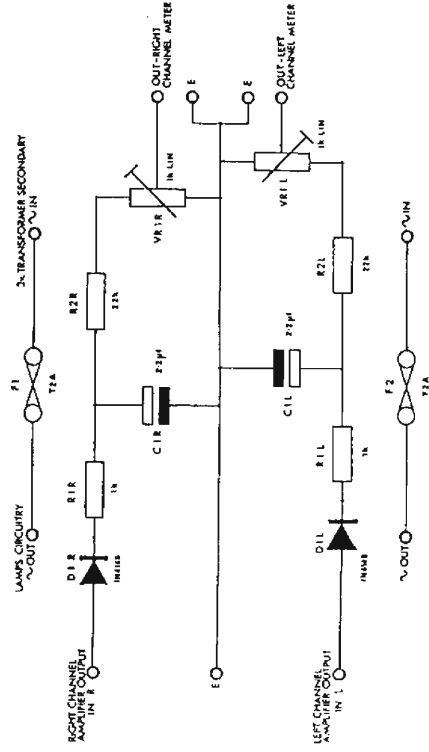
7.5.2 Control Amplifier Specification:-

Frequency Response	: ± 1.5 dB	: 25Hz - 40 kHz
Treble Control	: ± 13 dB at 15kHz	
Bass Control	: ± 13 dB at 50Hz	
High-Filter	: -3dB at 5 kHz -10dB at 10 kHz	
Low-Filter	: -3dB at 70Hz -10dB at 20Hz	
Loudness	: +10dB at 50Hz (-40dB volume setting)	
Output Impedance	: 10 kohms nominal	

7.5.3 Meter Board Circuit:-

The amplifier outputs from the speaker switches (1.8) are half wave rectified by the diodes D1R, right channel and D1L, left channel. R1 and C1 smooth the signal and along with R2 and VR1 provide the required attack and decay times for the meter. Deflection of the meter is controllable by VR1.

Two fuses F1 and F2 are positioned on the board to protect the indicator lamps circuitry. The fuse ratings are 2 amp. slow blow.



7 DETAILED SERVICING

7.6 REAR PANEL MODULE ASSEMBLY

7.6.1 Switch Functions:-

The input and output sockets (2.5) are mounted on the rear panel below a bank of seven switches (2.3). The switches are used to perform the following functions:-

DISC function, input sensitivity "high sensitivity" (2.5mV), "low sensitivity" (6.5mV) for full power output.

TUNER/MIC function, tuner input sensitivity 150mV. Microphone input sensitivity 2.4mV for full power output. (Microphone Volume Control turned fully clockwise).

CASSETTE function, output impedance "output high" (10k) or "output low" (100k).

TAPE function, output impedance "output high" (10k) or "output low" (100k).

PRE-AMP AND MAIN AMP, "normal" or "separate", separates Control Amplifier outputs and Main Amplifier inputs.

MAIN AMP INPUT, "off or on", connects the input pins of the PRE-MAIN AND MAIN AMP socket to the Main Amplifier.

N.B. The Main Amplifier has two inputs, one is connected via the normal/separate switch to the control amplifier, the other via the OFF/ON switch to the PRE-MAIN AND MAIN AMP socket. Both inputs may be used simultaneously providing a "mixing" facility.

The remaining switch is associated with the speaker 2 output sockets (2.6.2) mounted on the back panel. These and speaker 1 output sockets (2.6.1) are of the two pin DIN type.

"NORMAL" or "HIGH POWER". In the high power mode the output of the right channel main amplifier is connected to the input of the left channel main amplifier via a resistor. The signal is fed into the right channel input socket. With a speaker connected across the two output sockets the system operates in a "High Power Mono Mode".

7 DETAILED SERVICING

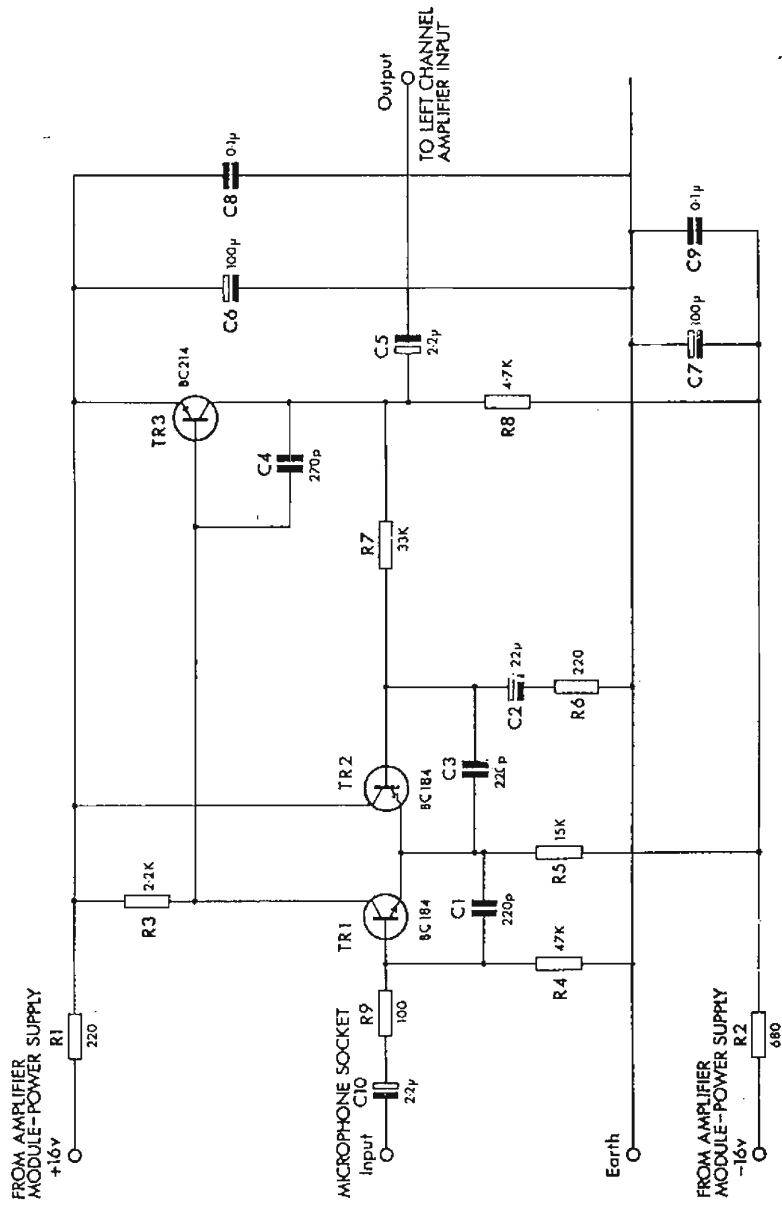
7.6 REAR PANEL MODULE ASSEMBLY (cont....)

7.6.2 Microphone Pre-Amplifier Circuit Description:-

The left channel input from the TUNER/MIC (2.5) socket is connected to the microphone board by the TUNER/MIC switch (2.3).

The circuit consists of an emitter coupled transistor, TR3, giving an overall non-inverting system.

Negative feedback to TR2 is provided by R7 with C2 and R6 providing the lower limb of the potential divider network. The output is fed via the Microphone volume control (2.8) to the input (input 2) of the main amplifier LEFT channel.

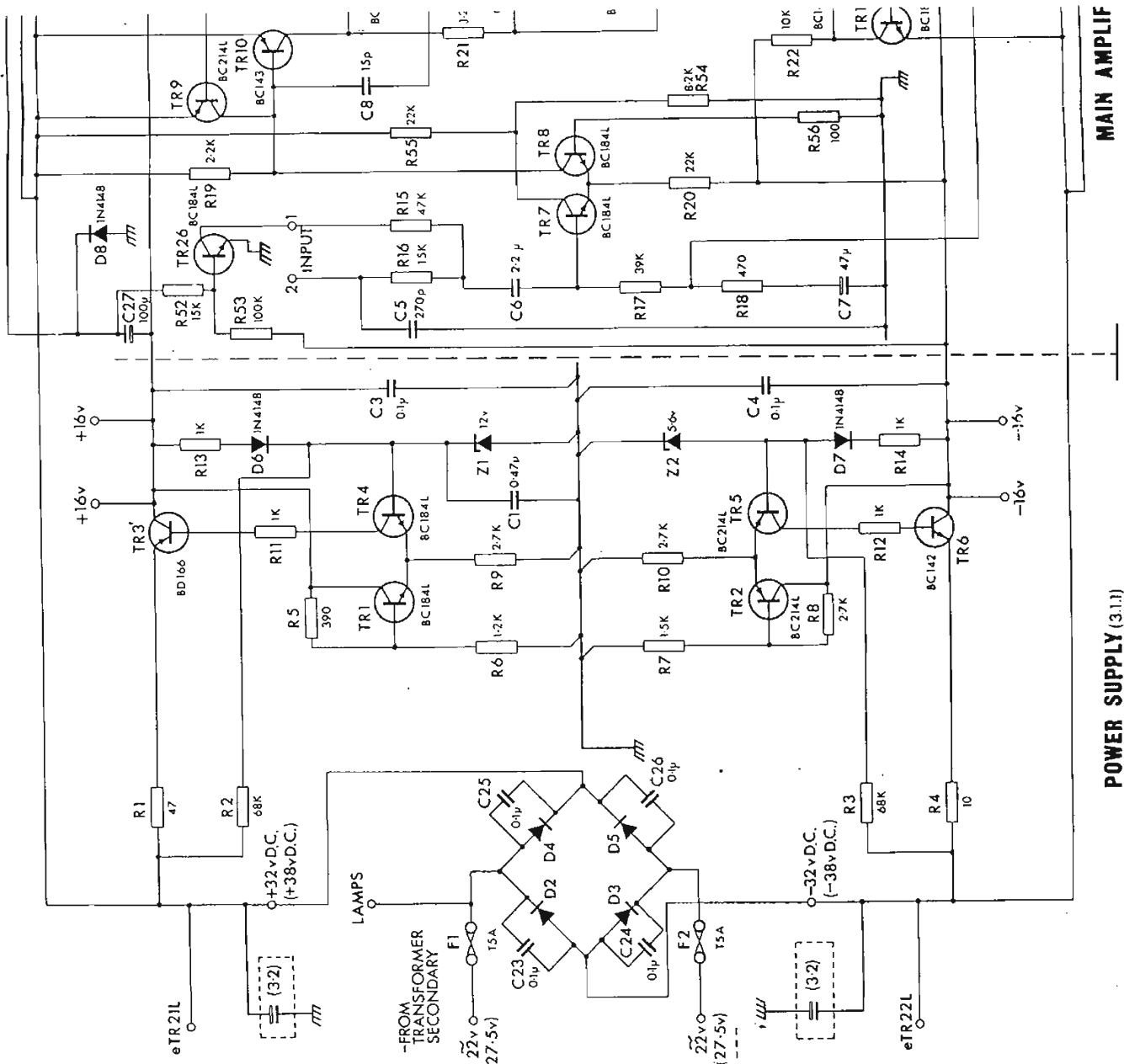


7.6.3 Test Point Voltage Chart:-

TR1 Base	0
TR1 Emitter	0.6-
TR2 Base	0
TR3 Emitter	16+
TR3 Collector	0
R2/R5 Junction	14.5-

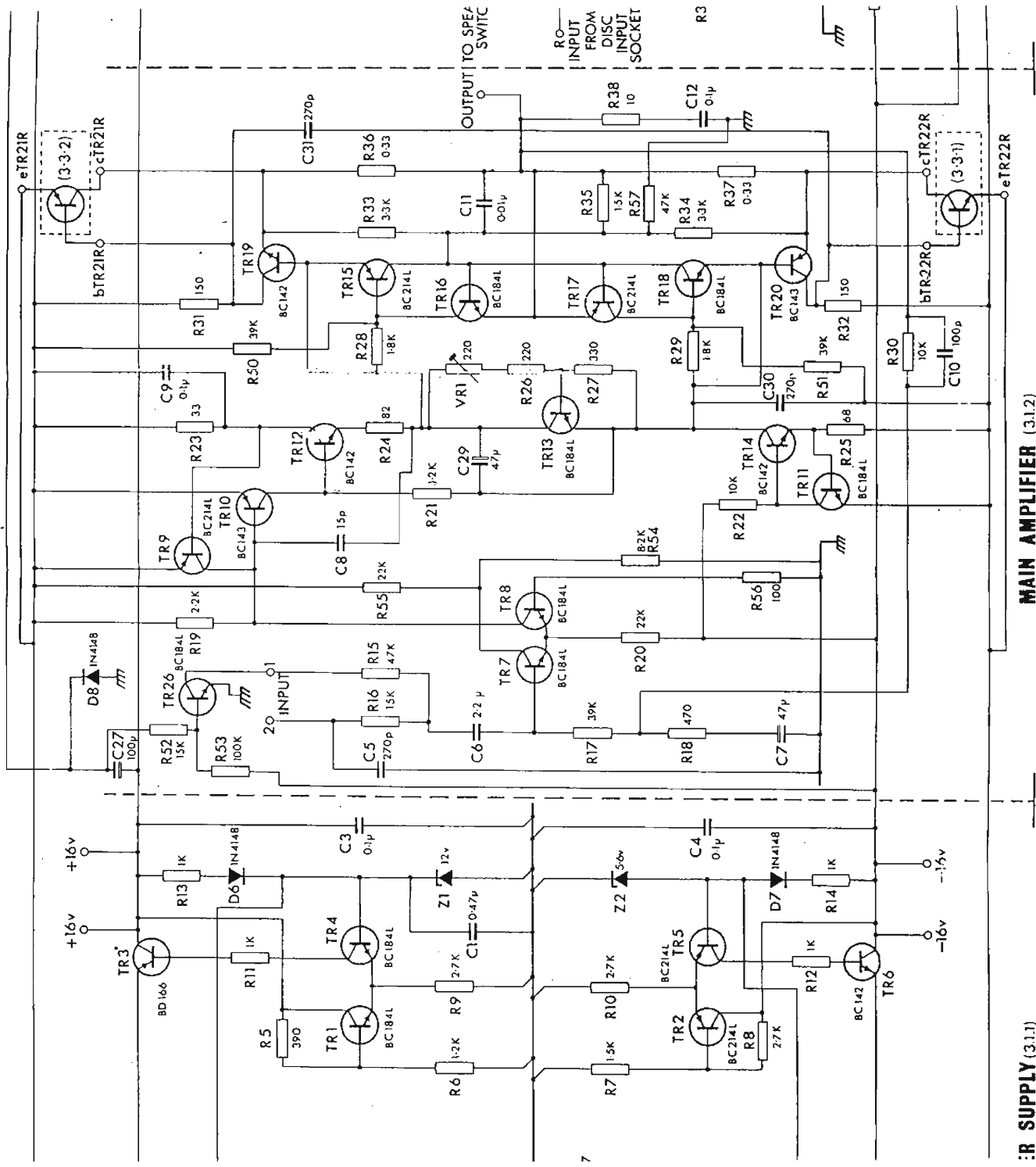
7.6.4 Parts List:-

Component Ref.	Part No's.
Microphone P.C.B. Assembly	163.04
Microphone Volume Control	258.01



MAIN AMPLIF

POWER SUPPLY (3.1.1)



POWER SUPPLY (3.1.1)

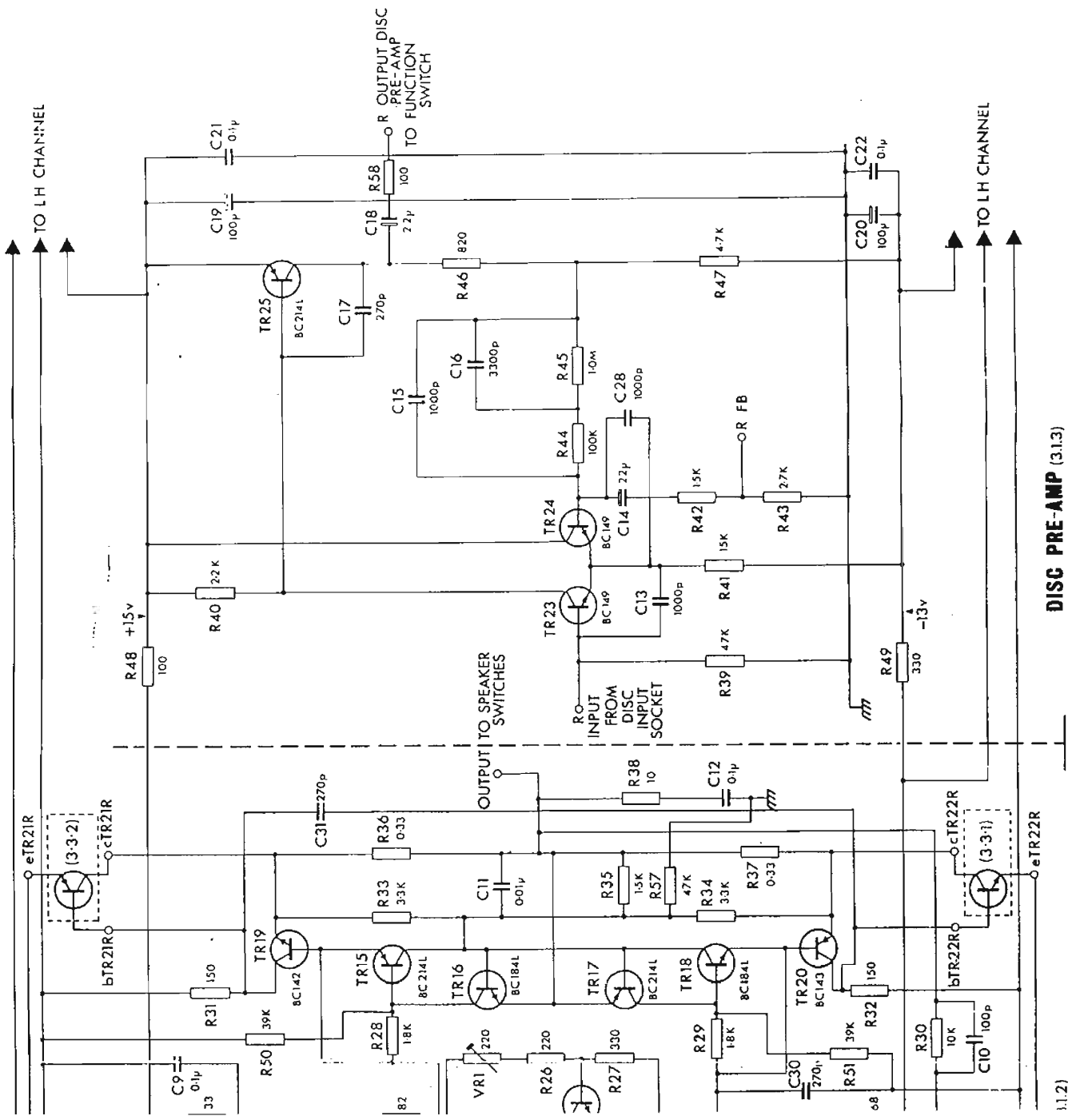
MAIN AMPLIFIER (3.1.2)

OUTPUT STAGE (3.1.3)

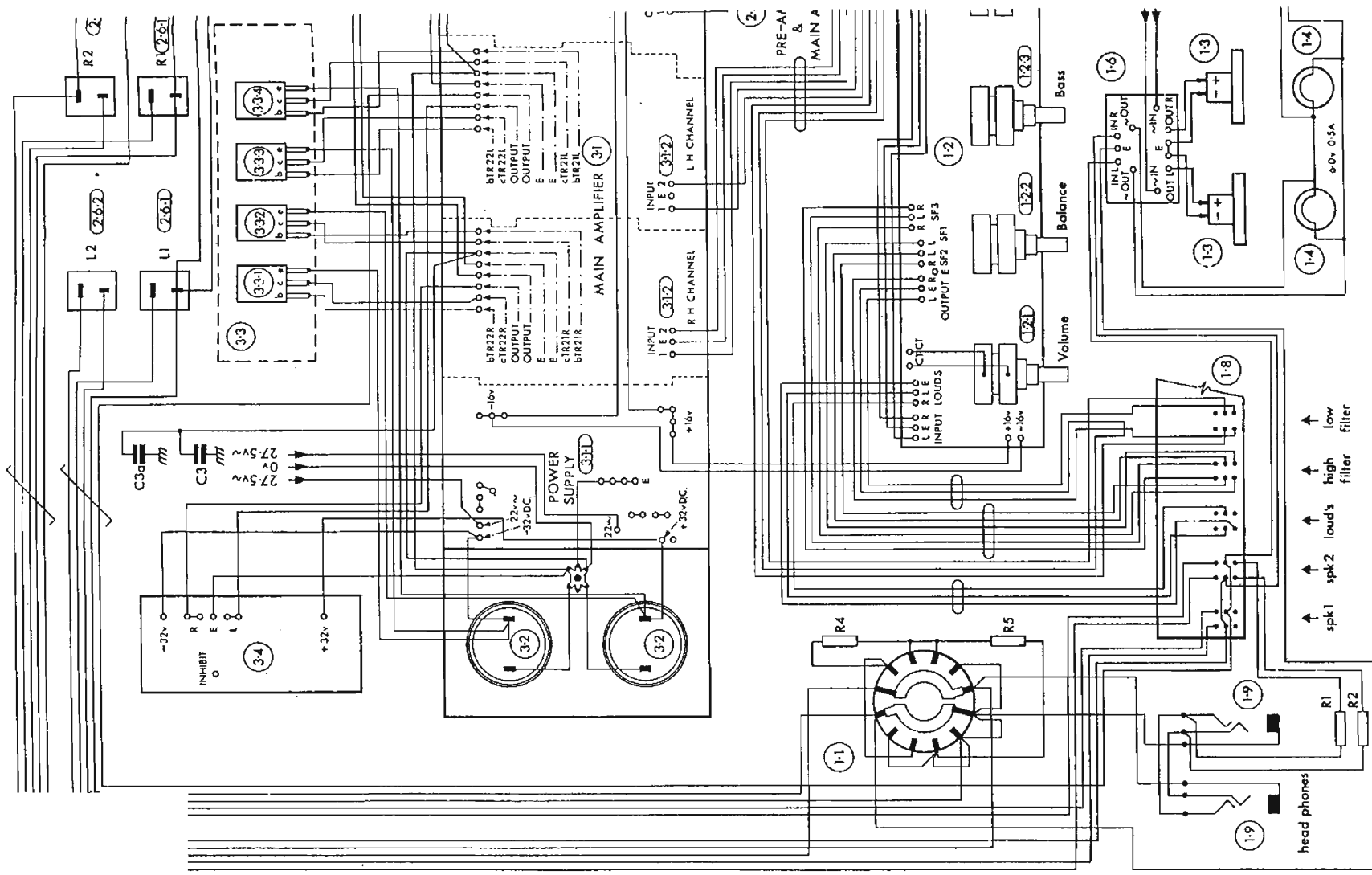
7 DETAILED SERVICING

7.4.5 Test Point Voltage Charts

7.4.6 Parts List

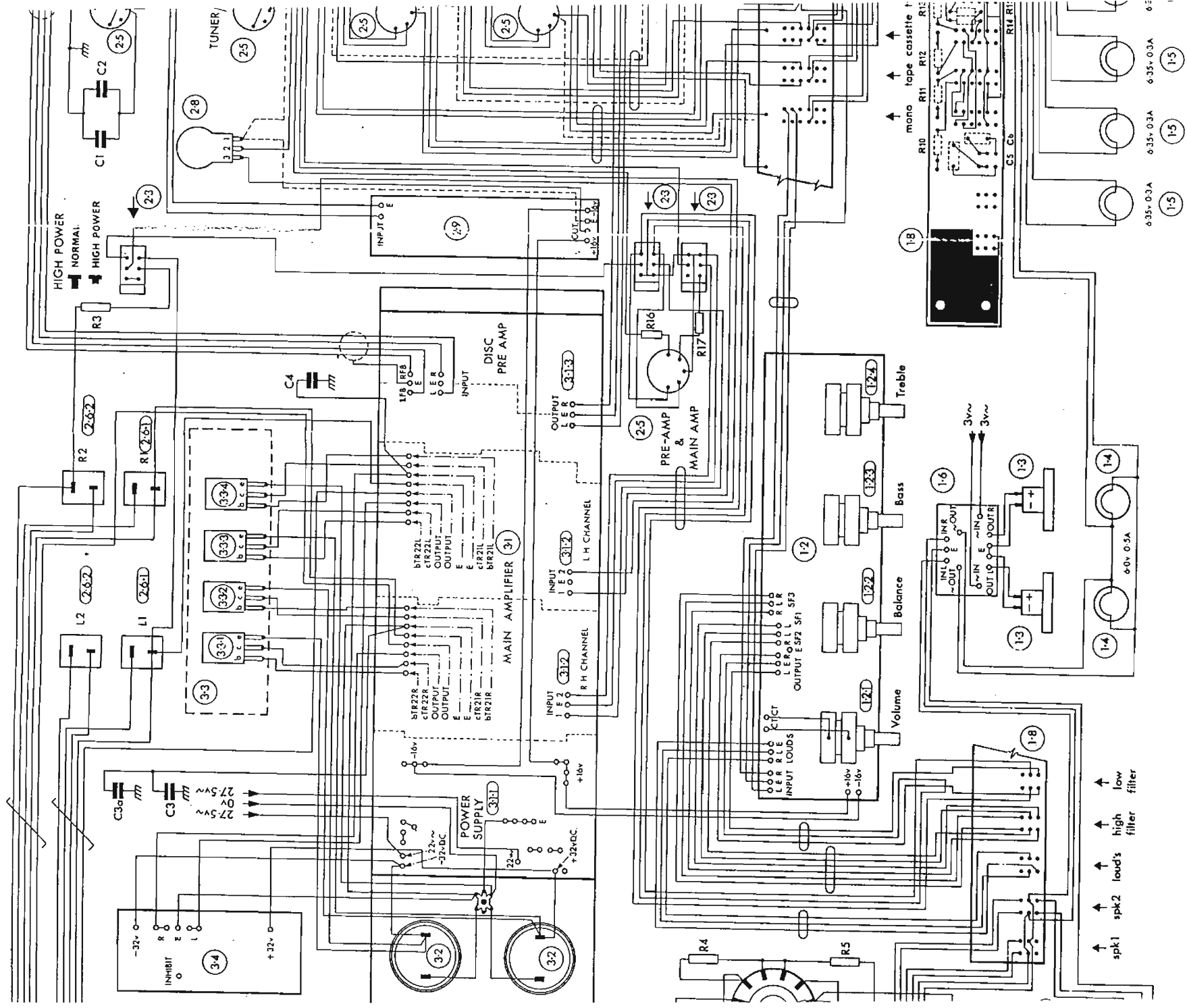


7.4.7 AMPLIFIER MODULE CIRCUIT DIAGRAM



↑ low filter
 ↑ high filter
 ↑ spk2 loud's
 ↑ spk1

head phones

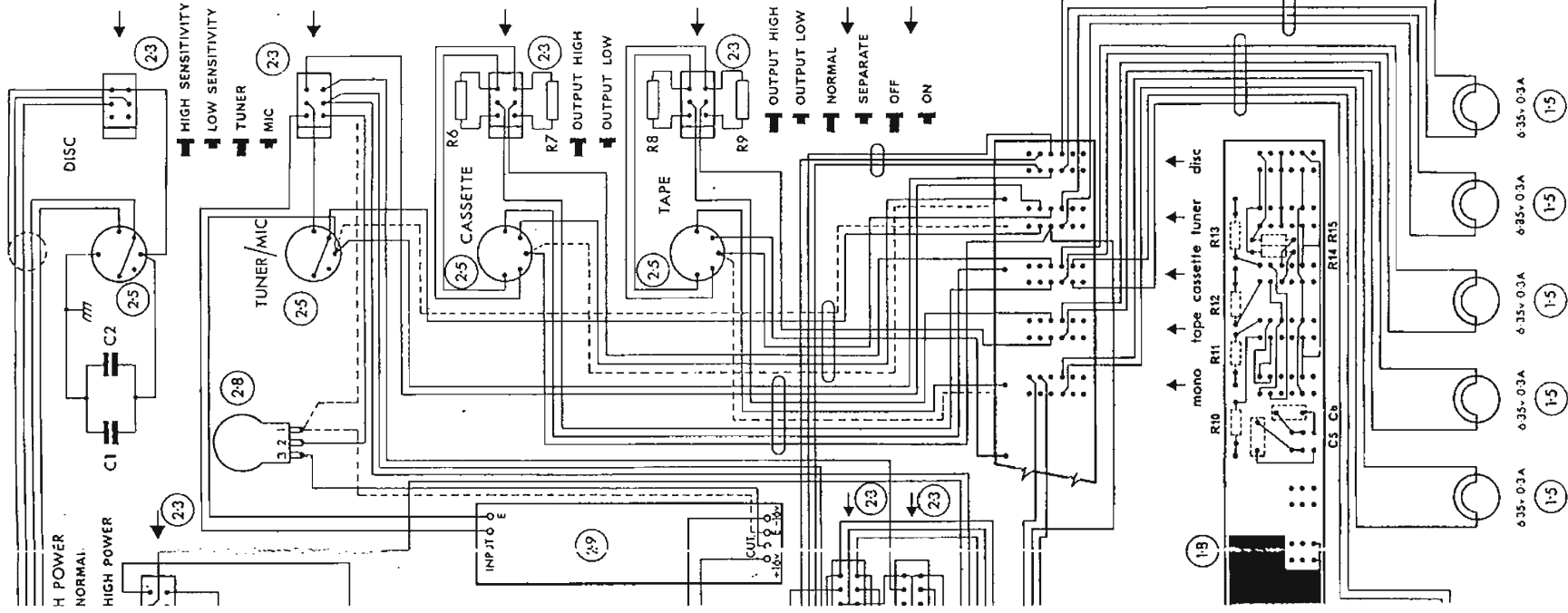
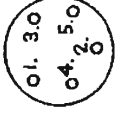


↑ spk1
 ↑ spk2
 ↑ loud's
 ↑ high filter
 ↑ low filter

6.35V 0.3A (1-5)
 6.35V 0.3A (1-5)
 6.35V 0.3A (1-5)

7 DETAILED SERVICING

7.2 Power Supplies



DIN socket Connections
(Rear View)

1. Left Output
2. Earth
3. Left Input
4. Right Output
5. Right Input

Component Values:

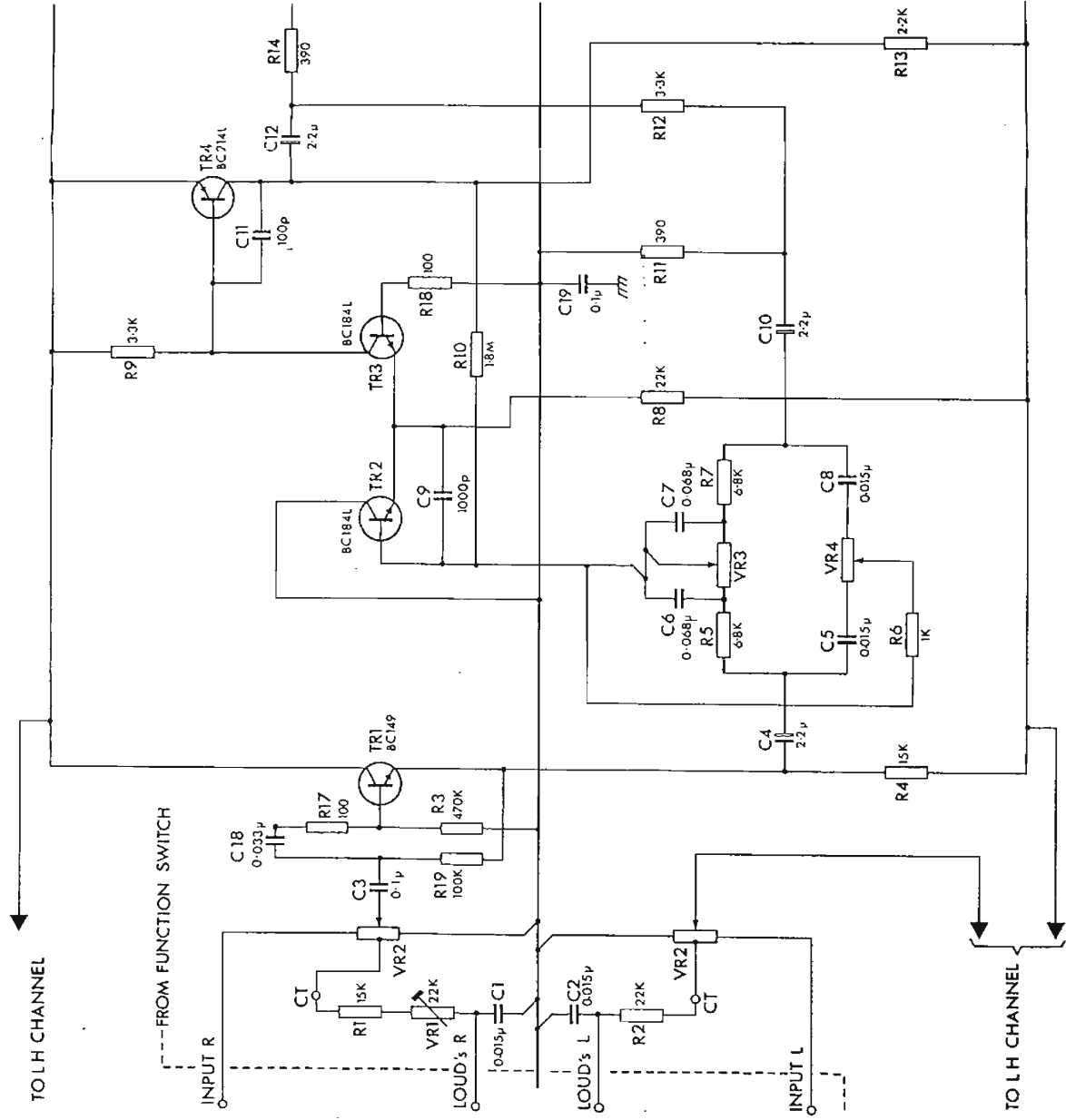
R1	100 ohms
R2	100 ohms
R3	820 kohms
R4	47 ohms
R5	47 ohms
R6	100 kohms
R7	100 kohms
R8	100 kohms
R9	100 kohms
R10	10 kohms
R11	10 kohms
R12	10 kohms
R13	10 kohms
R14	10 kohms
R15	10 kohms
R16	33 kohms
R17	33 kohms
C1	0.01 uF
C2	0.01 uF
C3	0.01 uF
C4	0.01 uF
C5	0.033 uF
C6	0.033 uF

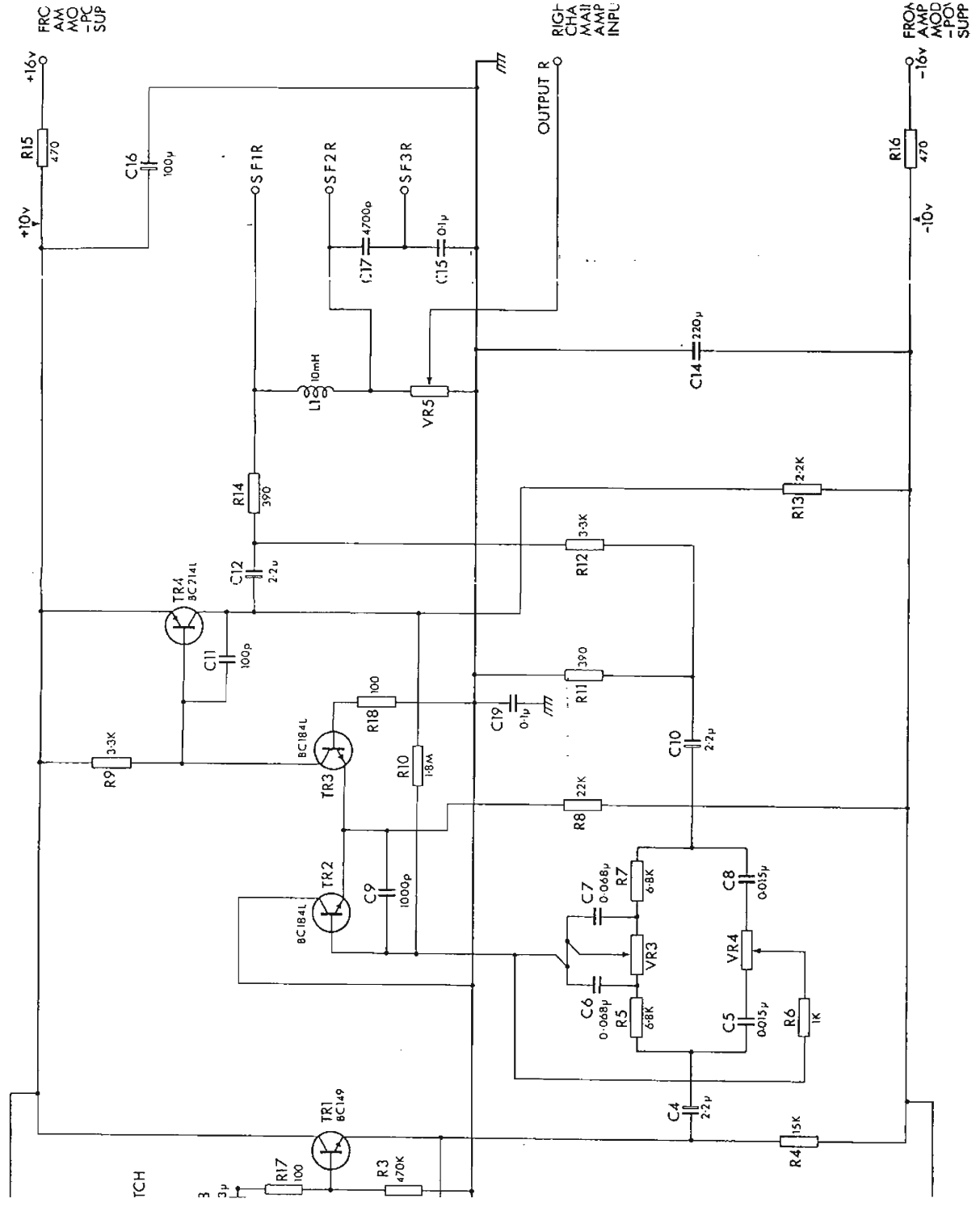
Component Ref.

Part No's.

1.1	520.15
1.2	162.02
1.3	483.04
1.4	482.03
1.5	482.02
1.6	190.20
1.8	523.19
1.9	536.23
2.3	523.18
2.5	536.18
2.6	536.17
2.8	258.01
2.9	163.04
3.1	153.02
3.2	396.02
3.3	509.16
3.4	152.09

7.3 AUDIO INTERCONNECT DIAGRAM

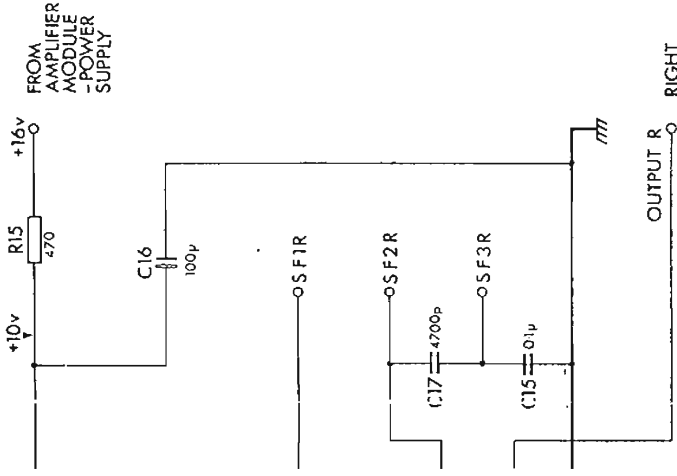




7 DETAILED SERVICING

- 7.5.1 Control Amplifier Circuit
- 7.5.2 Control Amplifier Specification
- 7.5.3 Meter Board Circuit
- 7.5.4 Test Point Voltage Chart:-

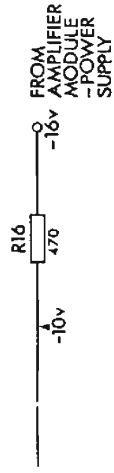
All measurements taken with respect to earth potential using an AVO model 8 or equivalent. The voltages shown in the chart are nominal values intended as a guide to faultfinding and were measured with the input connected to signal earth.



20µ

7.5.5 Parts List:-

<u>Components Ref.</u>	<u>Part Nos.</u>
Control Amplifier P.C.B. Assy.	162.02
VR1 22k ohm Linear	237.04
VR2 200k + 200kohm Linear CT	248.17
VR3 50k + 50kohm Linear	248.19
VR4 25k + 25kohm Linear	248.20
VR5 50k log + 50k reverse log	248.18
L1 10mH	403.30
Meter P.C.B. Assembly	190.20



7.5.6 CONTROL AMPLIFIER CIRCUIT DIAGRAM