BEARD

BEARD AUDIO, UNIT B1, ASKEW CRESCENT WORKS, ASKEW CRESCENT, LONDON W12 9DP. TEL: 01-749 4258.

WITH COMPLIMENTS

1. Amplifier completely dead on switch on (no lights or output).	Blown A.C. fuse. Check that old fuse was an anti-surge type of the correct rating (5A). Fit correct replacement and switch on. If the replacement also blows, disconnect supply, remove bottom cover and examine A.C. wiring for damage to insulation. Test rectifiers and examine large capacitors for electrolytic leakage. Otherwise, ensure A.C. supply lead is reliably connected. Fuse may blow if repetitive surges occur or the fuse has been in service for a long time.
2. Lights work but no output from both channels.	Both D.C. fuses blown. This will occur if the amp is rapidly switched off and on again or if the connection to the A.C. supply is faulty. Always allow the amp to cool down for a minute or two before switching on again. Replace only with 1A quick blow fuses. See section 3.
3. Lights work but no output from one channel.	One D.C. fuse blown: may be caused by switching off and on again rapidly as in section 2. Otherwise, output may have been short circuited or connected to a very low impedance load (e.g. several loudspeakers of an unsuitable type connected in parallel). A worn or faulty output valve may blow a fuse. The valve can usually be identified by looking at the silver on the sides of envelope One patch may disappear completely or one edge of the oval patch may flatten off. Replace the faulty valve and check the resistors on the valve holder for damage. Both D.C. fuses intact: firstly, make sure that the P.100 is at fault rather than a preamplifier or a connecting cable. Check that the valve heaters glow when the amplifier is switched on. Look for gassy valves - if the seal breaks the silvering on the glass envelope turns white. Replace any faulty valves. Using a voltmeter, trace the D.C. supply through the fuseholder to the output valves and the board. Make sure that each anode and cathode is running at the correct voltage. If any voltage readings are a long way out, replace the valve and check again.

4. One channel crackles or distorts.	Check the D.C. OPERATING VOLTAGES against the table. If no faults show up, inject a 1kHz sinewave at 570mV into the input socket. A clean sinewave of amplitude 27V rms should appear at the output - check with an oscilloscope. If the waveform is not symmetrical the circuit is out of balance. Usually, a faulty valve will show up in the D.C. tests. Reduce the input signal to 50mV and disconnect the cable linking the red speaker terminal to the board. This breaks the negative feedback loop, making it easier to spot the fault. Use a probe rated at 600V or more in the following tests and select A.C. coupling on the oscilloscope. The signals at the anodes of V1 should be well balanced and should also appear at the grids of V2. There should be a slight imbalance between the two signals at the anodes of V2. Similar signals should appear at the grids of V3, the cathodes of V3 and the grids (pin 5).of V4 and V5. Faults usually appear as a severe imbalance. When the problem has been found and corrected, do not forget to reconnect the feedback line. High quality components are used in Beard products. Resistor and capacitor failures on the board are very rare.
5. Both channels crackle.	Fault in the A.C. supply wiring or radio frequency interference from a nearby appliance. The best cure for a noisy thermostat is to suppress it at source.
6. Excessive hum on both channels.	Earth loop in the system or poor earth connection.
7. Excessive hum on one channel.	Check the output valve bias currents. Check connecting cables for breaks and dirty connectors. Switch off P.100 and test 10ohm and 270 ohm resistors on each KT88 valveholder with an ohmmeter. Check D.C. operating voltages. This problem may be the result of ultrasonic oscillation caused by a combination of 'low loss' loudspeaker cables and awkward loudspeaker loads. If this is the case, the problem will not be present on the test bench. Changing to a different type of cable may cure this problem.

7. (Continued)

Short-circuit the inputs and examine the outputs with an oscilloscope. The residual noise should be of the order of a few millivolts.

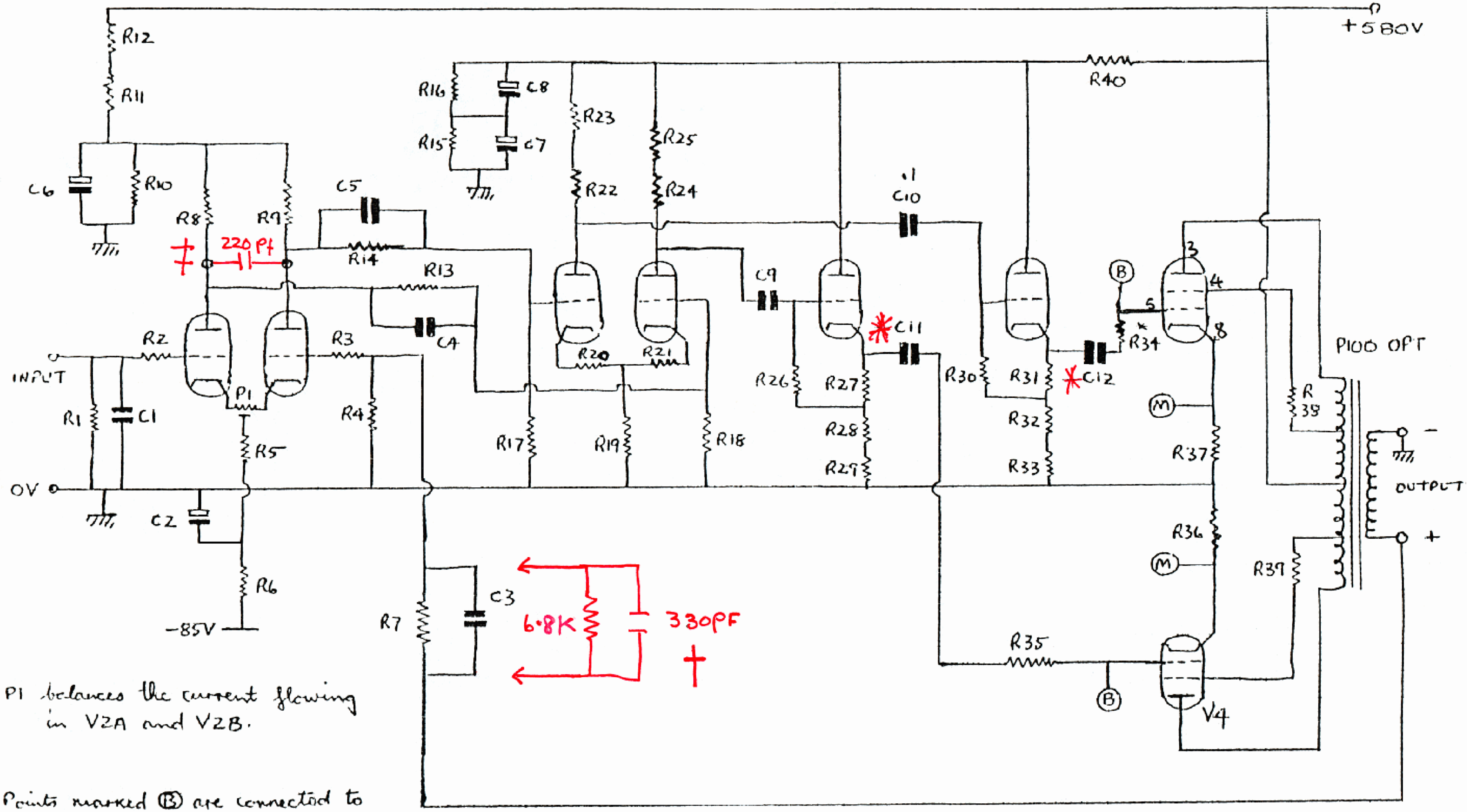
Check the A.C. operating voltages.

SETTING UP THE P.100.

If it is necessary to change the driver valves at any time, it is a good idea to adjust the two trimmer potentiometers on the main board. These adjustments are in the nature of 'fine tuning'.

Switch on and allow the valves to warm up for a few minutes. Taking each channel in turn, connect a voltmeter across pins 3 and 8 of V2. Adjust P1 (the trimmer near V1) until the voltage between the two pins falls to zero. V1 and V2 are now correctly biased

BEARD P100 – DIAGRAM OF AMPLIFICATION CIRCUITS MK II



P1 balances the current flowing in V2A and V2B.

Points marked (B) are connected to the bias presets on the rear board

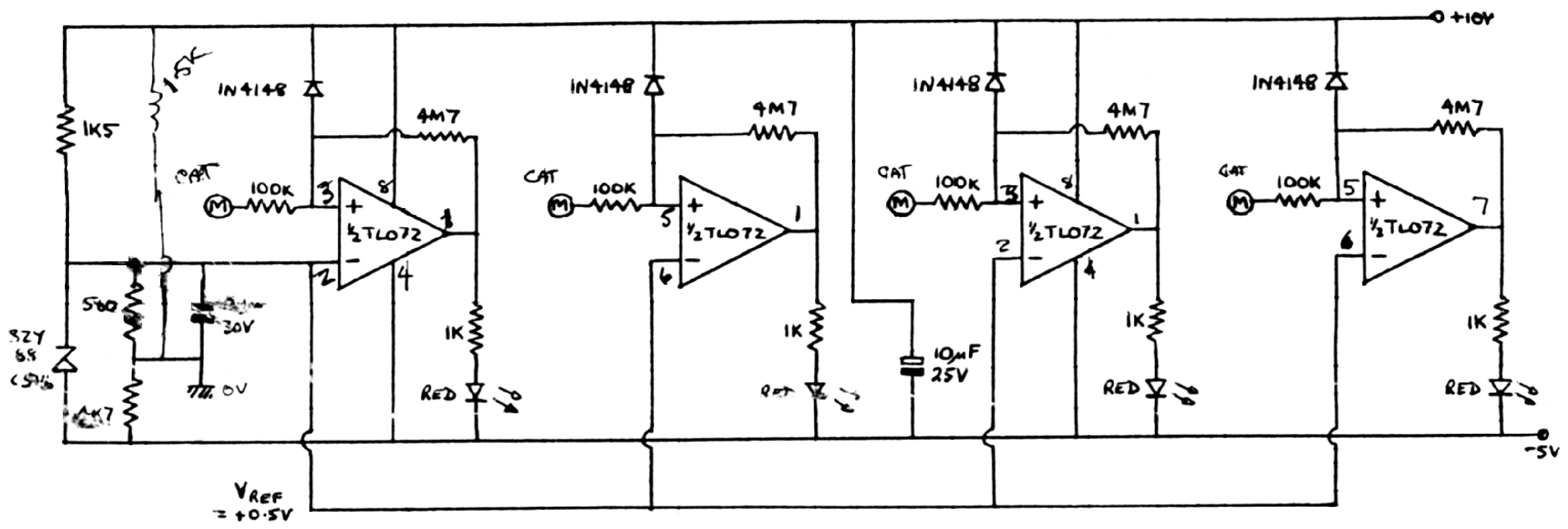
Points marked (M) are connected to the monitor inputs on the rear board.

* C11 + C12 ·47mf fitted

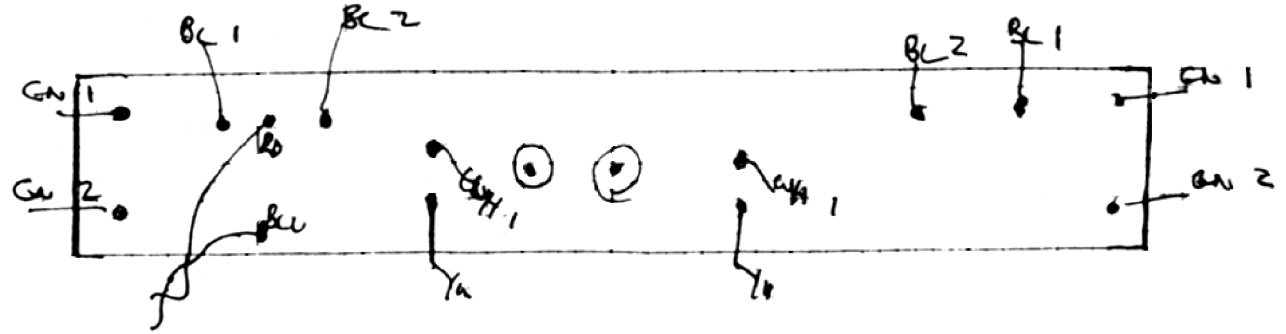
† 6·8K + 330pf piggy back onto existing 5·6K + 330pf

‡ 220pf fitted between V1a V1b's anodes

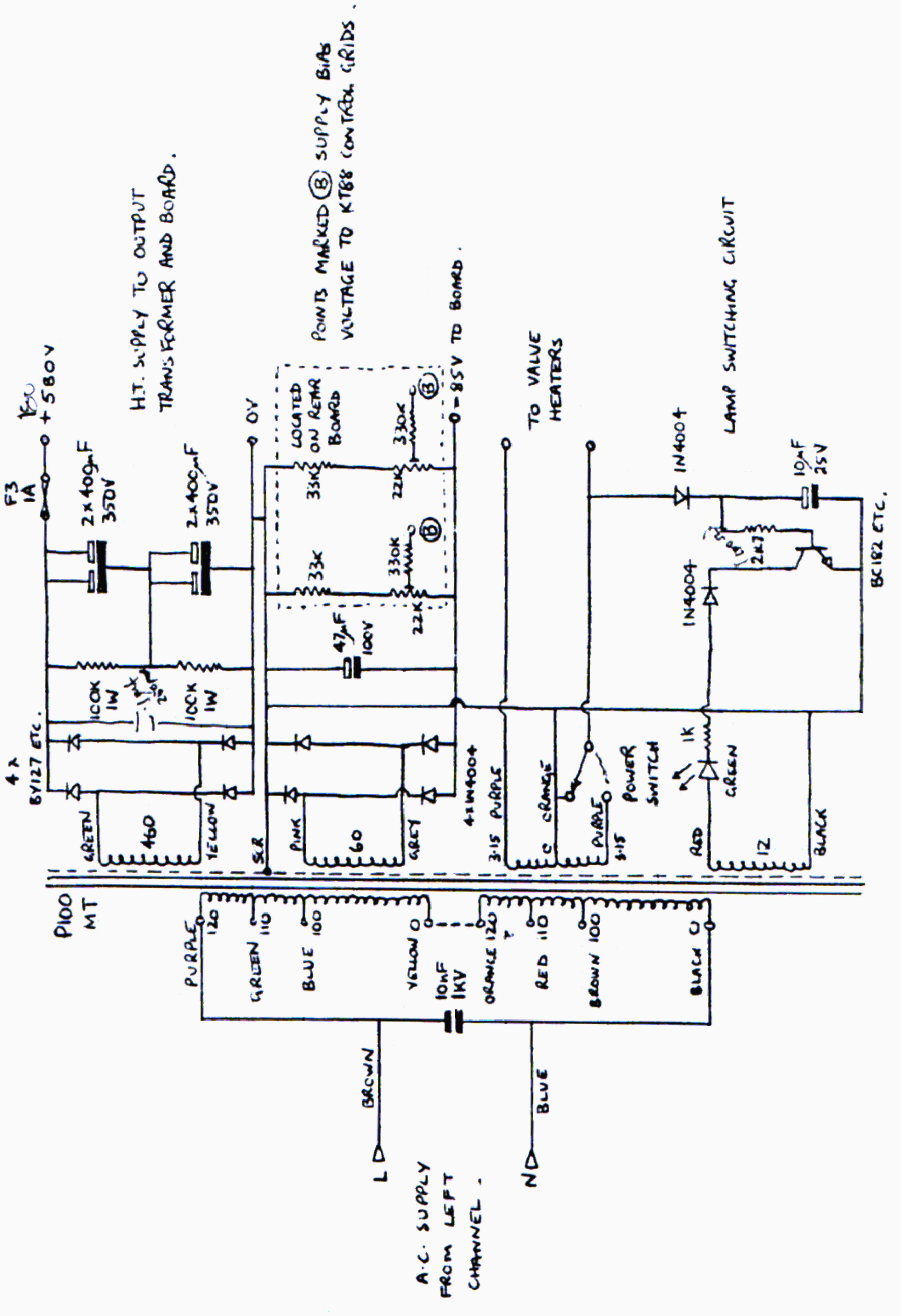
BEARD P100 – CIRCUIT DIAGRAM OF BIAS MONITOR SYSTEM MK II



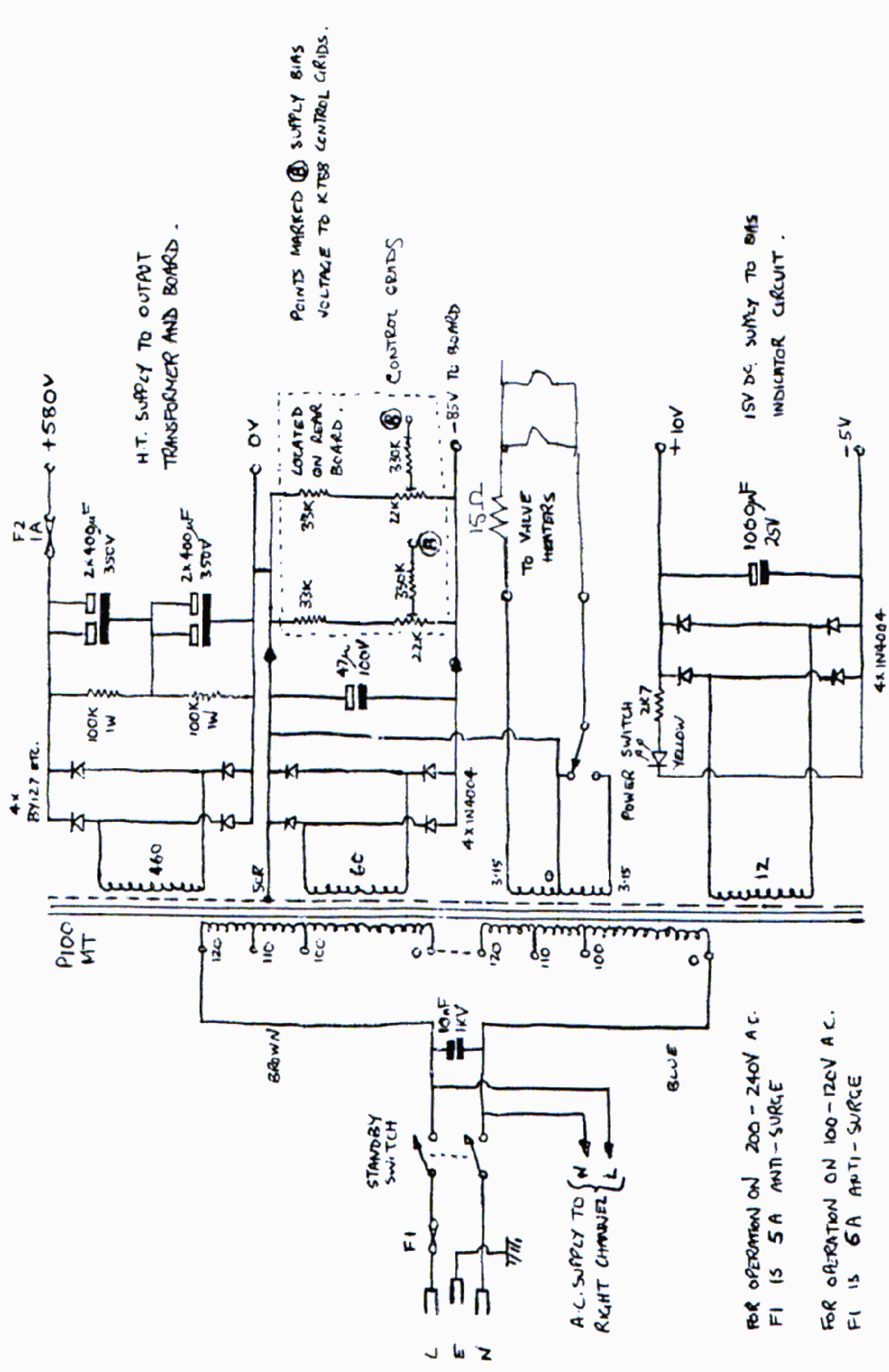
THE D.C. SUPPLY IS OBTAINED FROM THE LEFT CHANNEL POWER SUPPLY.



BEARD P100 – CIRCUIT DIAGRAM OF RIGHT CHANNEL POWER SUPPLY. MKII



BEARD P100 - CIRCUIT DIAGRAM OF LEFT CHANNEL POWER SUPPLY. MK II



Ma1

BEARD P100 – COMPONENT LIST FOR AMPLIFICATION CIRCUITS PER CHANNEL

R1	100kΩ	R11	47kΩ	R21	100Ω	R31	2.2kΩ
R2	2.2kΩ	R12	47kΩ	R22	47kΩ	R32	15kΩ (High Watt)
R3	2.2kΩ	R13	4.7MΩ	R23	56kΩ	R33	15kΩ (High Watt)
R4	100Ω	R14	4.7MΩ	R24	39kΩ	R34	4.7kΩ
R5	33kΩ	R15	270kΩ	R25	47kΩ	R35	4.7kΩ
R6	5.6kΩ	R16	270kΩ	R26	1MΩ	R36	10Ω
R7	5.6kΩ	R17	470kΩ	R27	2.2kΩ	R37	10Ω
R8	100kΩ	R18	470kΩ	R28	15kΩ (High watt)	R38	270Ω
R9	100kΩ	R19	4.7kΩ	R29 5% 1w	15kΩ (High watt)	R39	270Ω
R10	270kΩ	R20	100Ω	R30	1MΩ	R40	2.2kΩ 4W 5% WW

All resistors are metal film, 1%, 50 p.p.m. except R36–40 which are wirewound.

P1 470Ω cermet preset

C1	100pF	630V	polystyrene	2%	C7	33µF	450V	electrolytic	
C2	47µF	100V	electrolytic		C8	33µF	450V	electrolytic	
C3	330pF	630V	polystyrene	2%	C9	0.1µF	630V	polypropylene	10%
C4	0.022µF	630V	polypropylene	10% (WIMA)	C10	0.1µF	630V	polypropylene	10%
C5	0.022µF	630V	polypropylene	10% (WIMA)	C11	1µF	630V	polypropylene	10%
C6	33µF	450V	electrolytic		C12	1µF	630V	polypropylene	10%

V1	ECC83/12AX7
V2	ECC81/12AT7
V3	ECC82/12AU7
V4	KT88 Gold Lion
V5	KT88 Gold Lion

0.121 5% 1.0

100 pf 113 263 2 off ✓
022 Mf 114 581 4 off ✓
~~100 K 167 686 2 off~~ ✓
(2K2) 2.2K 166 093 6 off ✓
~~100Ω 164 801 2 off~~ ✓
(5K6) ~~5.6K 166 481 2 off~~ ✓
(4.75) 4.7K 166–419 4 off ✓

15K 135 241 8 off
15K 135–409 8 off

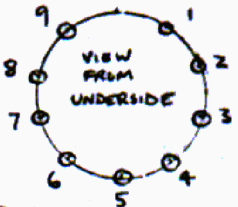
100K
100Ω
100K
100K ×2
100Ω
100Ω
39K
56K

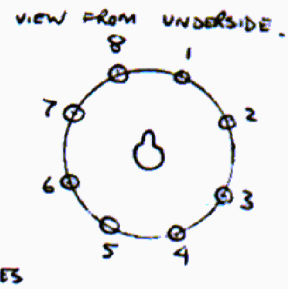
BBA R

B13 Radiospares
Cirkpone

P100 – TABLE OF OPERATING VOLTAGES AND SIGNAL LEVELS. AT 580V. RAIL

	1 A	2 G	3 K	4 H	5 H	6 A'	7 G'	8 K'	9 HCT	PIN DESIGNATION
V1 ECC83 (12AX7)	165	0	1.00	0	0	165	0	1.00	0	TYPICAL D.C. VOLTAGES WITH NO INPUT
V2 ECC81	340	15	20	0	0	340	15	20	0	
V3 ECC82	540	—	210	0	0	540	—	210	0	
V1 ECC83 (12AX7)	1–2.3	0.5	0.5	3.05	3.05	1–2.3	0.5	0.5	3.05	TYPICAL A.C. VOLTAGES (R.M.S.) WHEN DRIVING 90W INTO 8Ω AT 1kHz
V2 ECC81	50–65	1	0.5	3.05	3.05	60·65	2.3	0.5	3.06	
V3 ECC82	·5–1.00	50–65	50–65	3.05	3.05	·5–1.00	50·65	50·65	3.05	



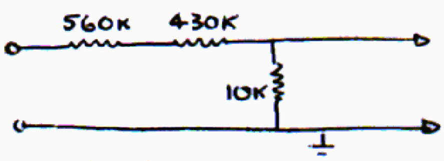


	1 BASE SHELL	2 H	3 A	4 G2	5 G1	6 NO PIN	7 H	8 K	PIN DESIGNATION
V4/5 KT88	0	0	580	580	-70	580	0	0.5	TYPICAL D.C. VOLTAGES WITH NO INPUT
V4/5 KT88	0	3.05	315	133	60	125	3.05	1.8	TYPICAL A.C. VOLTAGES (RMS) WHEN DRIVING 90W INTO 8 OHMS AT 1kHz

<u>WARNING</u>! This equipment operates at high voltages, so take care to avoid electric shocks. Test equipment may be damaged unless suitable precautions are taken during measurement. The peak voltage at any point on the main board will not normally exceed 650V. Many oscilloscopes and probes are rated at 500V.

The voltages found at the anodes of the output valves approach 1.1KV on load and 2KV off load. Somewhat lower voltages are found on screen grids (G2).

It may be sufficient to connect a 0.01μF 1KV blocking capacitor in series with the probe to remove the D.C. component from the signal. Alternatively, a 100:1 attenuator may be used to protect test equipment.



100 : 1 ATTENUATOR.