

ARCAM

DELTA 120 POWER AMPLIFIER SERVICE MANUAL

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(Paul Newton March 91)

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CIRCUIT DESCRIPTION

Power amplifier

Q1 and Q2 form a differential input with Q7, Q8 providing a constant current source. Emitter followers Q3 and Q4 provide isolation between the differential input and the low and high current Class A stages Q5 and Q6 respectively. Q9 and Q10 form a current mirror for both Class A stages and Q11 is used as a common base amplifier to allow Q5 to function correctly without an excessive voltage drop across it.

The output from the Class A stage is fed to the driver transistors Q13 and Q14 and then onto the paralleled output transistors Q15,16 and Q17,18. The input low current stages of the power amp are derived from an RC filtered main supply rail and fuses FS1 and FS2 form an over current protection of the amplifier.

A DC servo formed by Z1 and it's associated components maintains the DC voltage on the speaker output at 0V. The circuit functions by having a large gain at DC but very little gain at audio frequencies. The DC servo is powered by the +/- 15V rails derived from the main rails via 15V zeners D110, D111 and the current limit resistors R143, 144. Feedback from the amplifier output is returned to the input via R6. Resistors R6 and R18 define the gain and R46 and C1 provide high frequency stability.

An electronic over current limit of 25 amps is formed by Q19 and R35, 33, 34. This circuit senses the current flowing in the output stage and if it gets too high causes the relays to cut out. C4 and R36 are an RC time delay to prevent the protection circuitry cutting in on large bass transients.

Input board circuit

The input board has 2 sets of input sockets AC and DC. The AC input is capacitively coupled by C1. This rolls off the low frequency response of the Delta 120 forming a -3dB filter at 3Hz. This prevents low frequency switching transients causing damage to speakers. The DC input gives a response down well below 1Hz. The mono switch parallels the inputs for use in a bi-amped system.

The Delta 120 can also be used in the bridged mode to provide a maximum output of over 300W's into 8 ohms. The bridge switch automatically mono's the inputs and the right hand channel is inverted by IC1 so that the left and right channels are now in antiphase. IC1 is powered by +/- 15V rails formed by 15V zeners D201,202 and current limit resistors R201,202 from the main +/- 55V rails.

Output board circuit

The output board contains the 4 output relays and the protection circuitry ic, IC1 (TA731P), and is bolted directly to the output speaker terminals.

The TA731P IC provides a switch on delay (RC network C2,R7), over current protection and DC offset detect. The switch on delay is set to about 4 seconds and prevents switch on thumps damaging speakers.

The DC voltage on the output is monitored via R2,R4 and if it rises too high the relays open to prevent DC voltages damaging speakers.

Over current protection, (see power amp description), also disconnects the relays to prevent damage to the amplifier. This can be caused by a short circuit on the speaker terminals or being driven at high levels into a low impedance load. In this case the relays open and then close again 4 seconds later to see if the short has been removed.

Power supply

Each channel of the power amplifier is powered by a separate toroidal transformer which provides +/- 58V rails when rectified and smoothed by power diodes D6,7,8,9 and 10,000uF capacitors C7,8. Each transformer has its own mains fuse. The power on LED is powered from the positive supply via current limit resistors R1 and R2.

CIRCUIT DIAGRAMS

No.	Title of Circuit
1	Power Amplifier
2	Input Board
3	Relay & Mute Circuit
4	LED Board & Transformer Wiring

CHANGE OF MAINS VOLTAGE

WARNING - The unit must be unplugged from the mains supply when changing the wiring or the mains fuses since the fuse is at mains potential even with the unit switched off.

To convert the Delta 120 to work at a different mains voltage requires changing the position of 2 wires from the primary winding of the transformer for 240V to 120V or 220V to 110V conversion and a change of fuse rating.

To convert to other variations, i.e 240V to 220v, requires a change of transformer.

240/220V WIRING (1.25A ANTI-SURGE FUSE)

0	0	0
ORANGE	BROWN & RED	BLACK
	0	

120/110V WIRING (3.15A ANTI-SURGE FUSE)

0		0
ORANGE & BROWN		BLACK & RED
0		0

RESETTING/CHECK OF QUIESCENT CURRENT

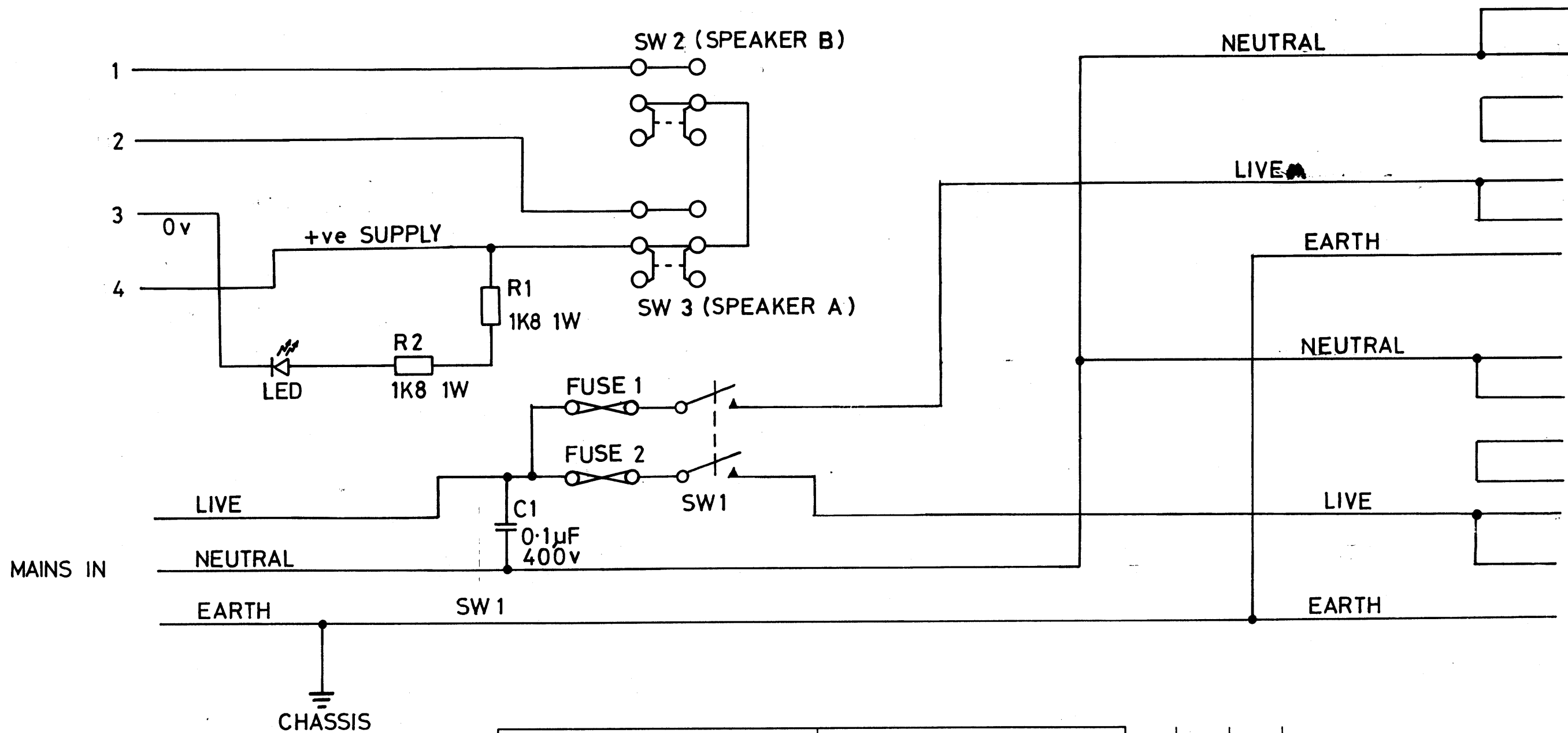
After repair of the power amplifier or replacement of active components within the D120 the quiescent current (IQ) should be checked and adjusted if necessary using presets P1, P101. The IQ is set by measuring the voltage drop across one of the 0.22R emitter resistors i.e R27 or R28. This voltage should be around 1 millivolt dc with no signal and no loads. This voltage should be checked when the unit has been switched on for about 15 minutes.

BOARD MODIFICATIONS

INPUT PCB

From serial number 771 onwards

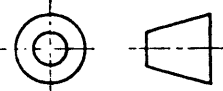
C1,101 changed from 10uF electrolytic to to u47 tantalum to provide a -3dB filter at 12 Hz on the AC coupled input only.

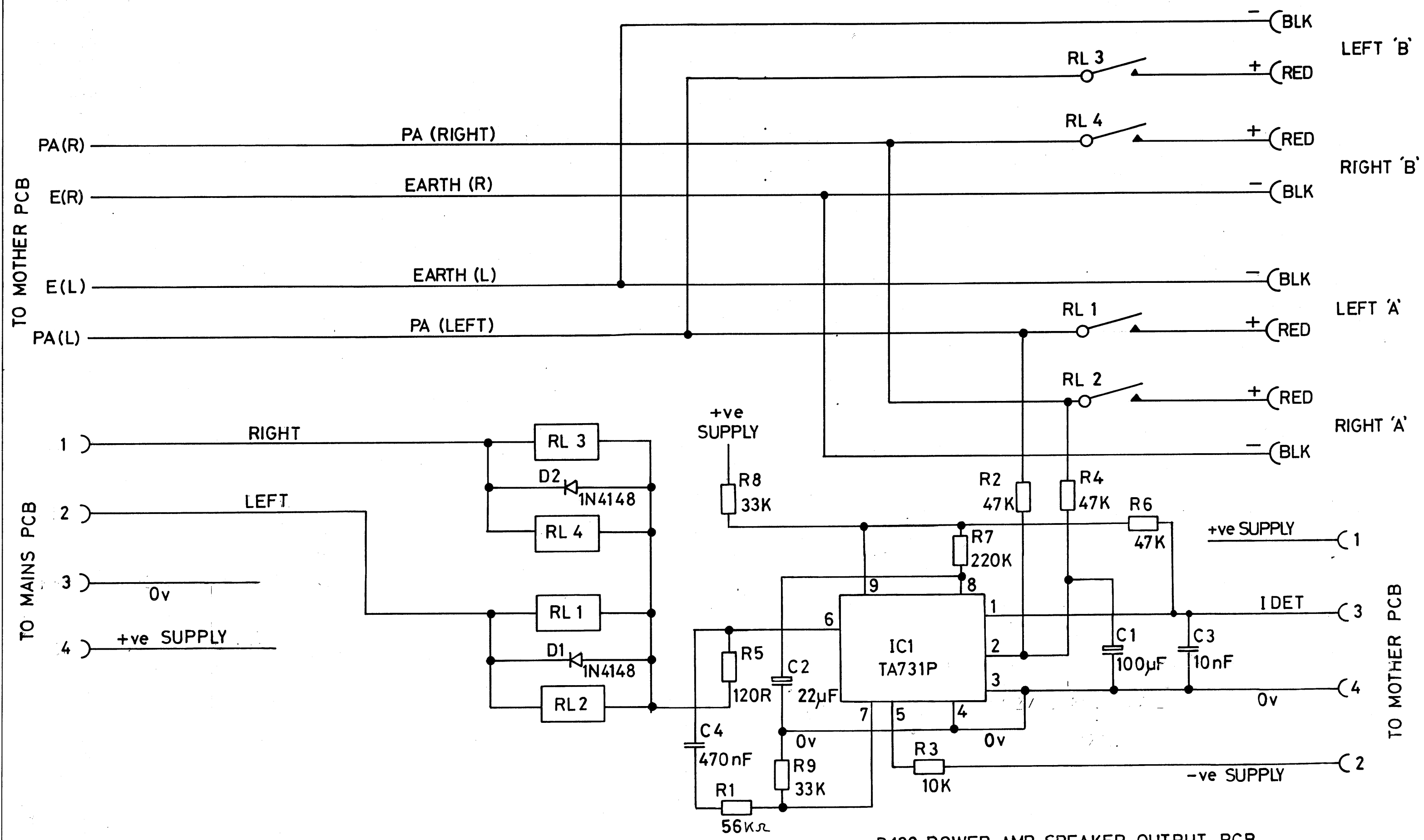


110v	220v
120v	240v
ORG	ORG
BRN	—
—	RED
—	BRN
RED	—
BLK	BLK
GRN/YEL	GRN/YEL
ORG	ORG
BRN	—
—	RED
—	BRN
RED	—
BLK	BLK
GRN/YEL	GRN/YEL
110v	220v
120v	240v

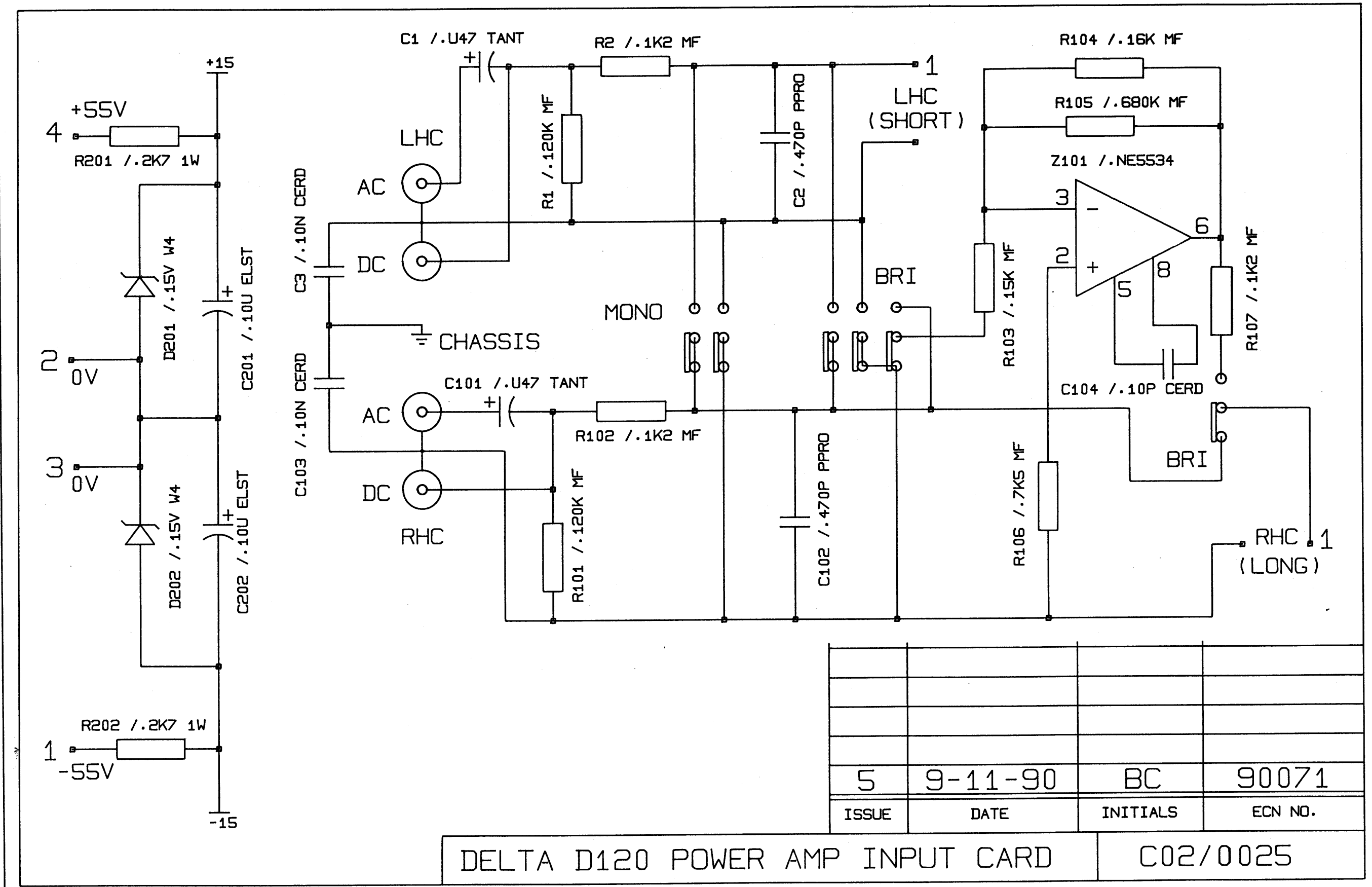
TRANS 2

VOLTAGE	FUSE
110v	
120v	
220v	
240v	

<h1>ARCAM</h1> <p>A&R Cambridge Limited</p>		TITLE DELTA D.120 POWER AMP, DISPLAY PCB CIRCUIT DIA'	
DRAWN WITH REFERENCE TO BS 308		DRG. TYPE CIRCUIT DIAGRAM	
PROJECTION THIRD ANGLE 		PART NO. ORIGINAL SCALE	
ALL DIMENSIONS MILLIMETRES UNLESS OTHERWISE STATED			
TOLERANCES UNLESS OTHERWISE STATED			
MATERIAL		ISSUE DATE INITIALS CHANGE	
FINISH		DRAWN BY B.C. CHECKED BY APPROVED BY DATE 9-6-89 DATE DATE	
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SHEET 1 OF 1 . © A&R Cambridge Ltd		DRAWING NUMBER CO2/0009	



D.120 POWER AMP, SPEAKER OUTPUT PCB

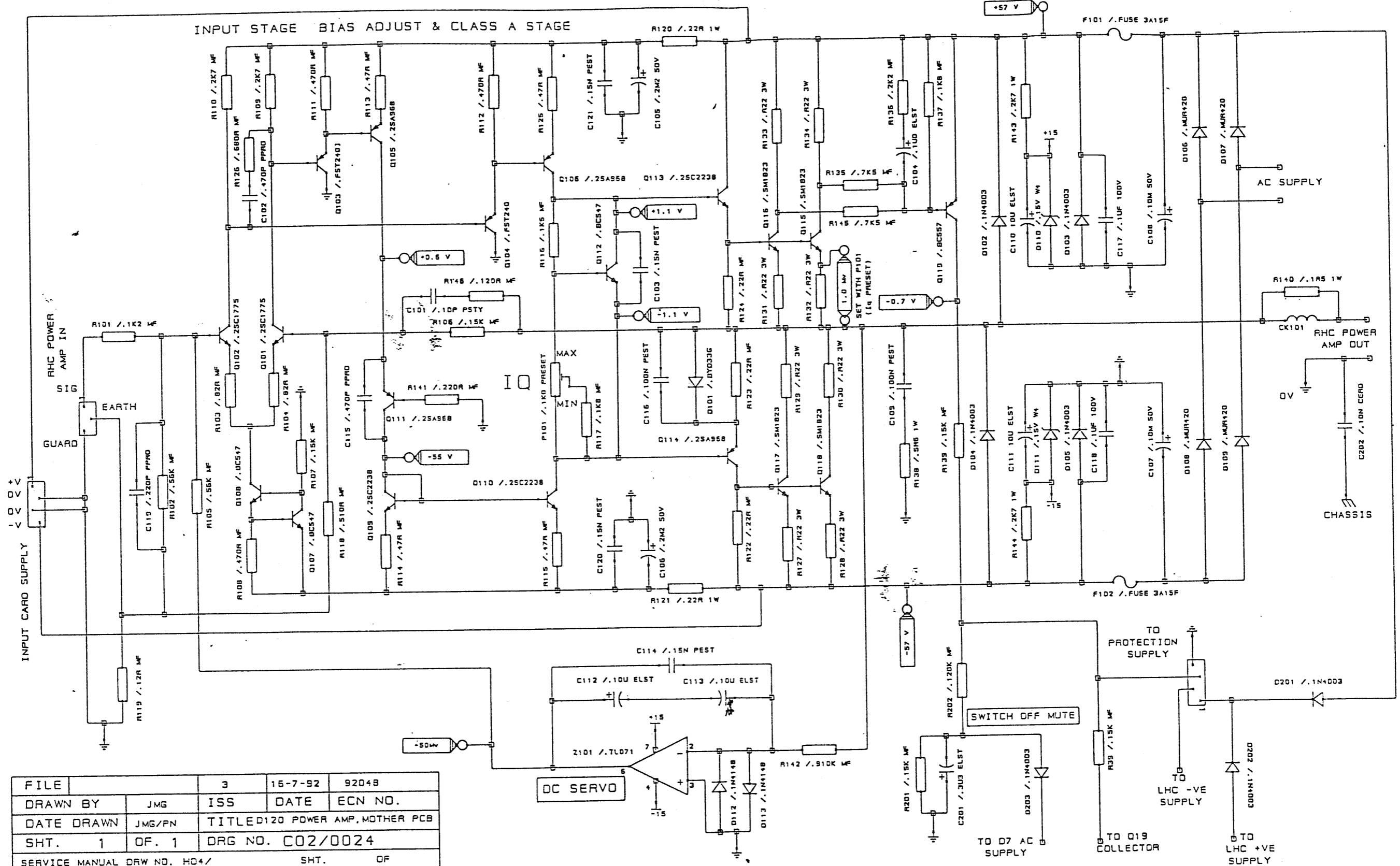


5	9-11-90	BC	90071
ISSUE	DATE	INITIALS	ECN NO.

DELTA D120 POWER AMP INPUT CARD C02/0025

MK II ONLY.

DRIVER & OUTPUT STAGE



FILE		3	16-7-92	92048
DRAWN BY	JMG	ISS	DATE	ECN NO.
DATE DRAWN	JMG/PN	TITLED120 POWER AMP, MOTHER PCB		
SHT. 1	OF. 1	DRG NO.	C02/0024	
SERVICE MANUAL DRW NO. HD4/		SHT.	OF	
ARCAM, A & R CAMBRIDGE LTD, CB5 9PB				

RHC ONLY SHOWN FOR COMPONENT REFERENCES SUBTRACT 100 IE Q101 = RHC & Q1 = LHC

LHC C12+C13 OPPOSITE POLARITY TO RHC
RHC AS C02 DRAWING

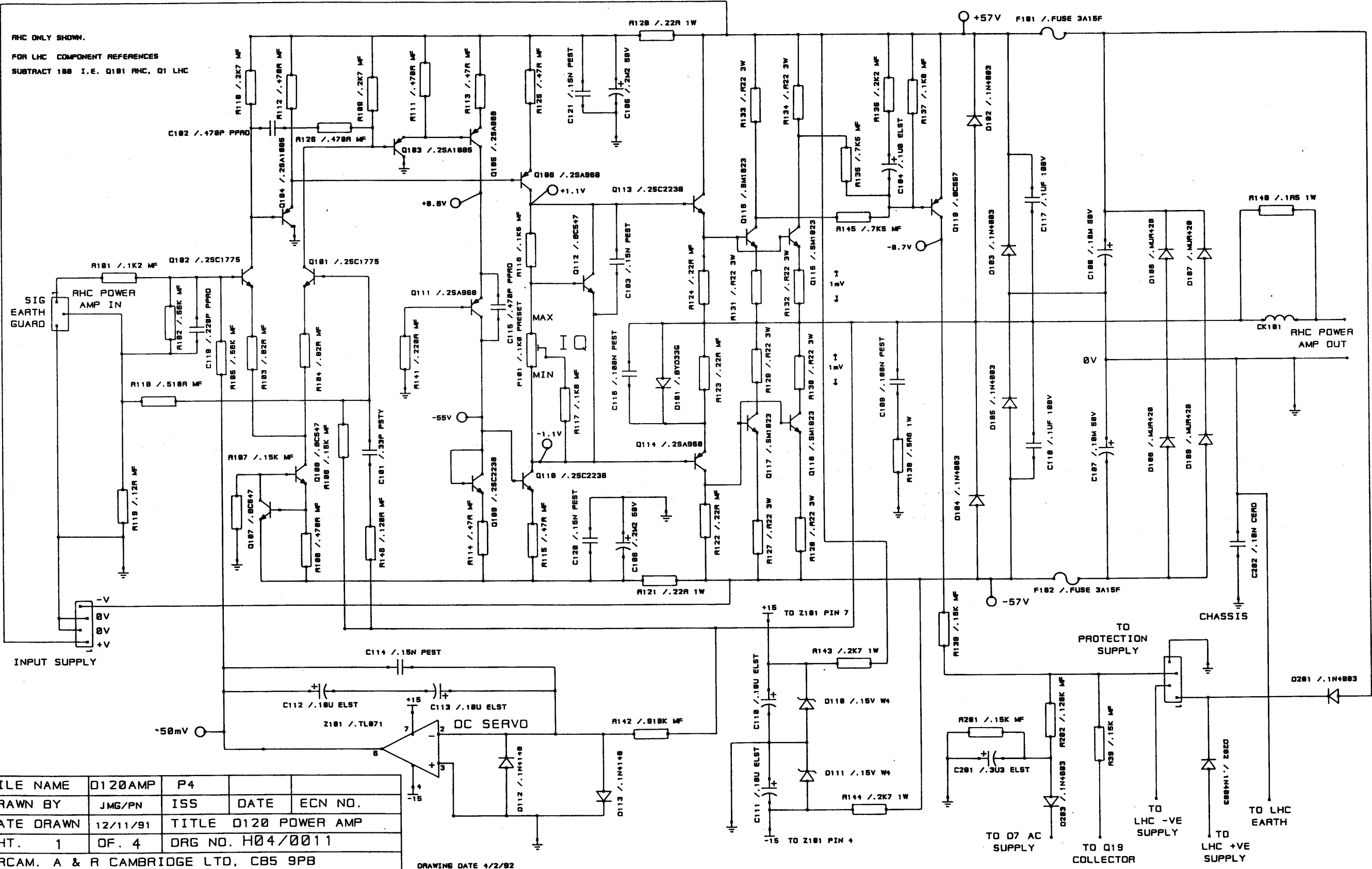
INPUT STAGE

BIAS ADJUST & CLASS A

DRIVER STAGE

OUTPUT STAGE

RHC ONLY SHOWN.
FOR LHC COMPONENT REFERENCES
SUBTRACT 100 I.E. Q101 RHC, Q1 LHC



FILE NAME	D120AMP	P4		
DRAWN BY	JMG/PN	ISS	DATE	ECN NO.
DATE DRAWN	12/11/91	TITLE	D120 POWER AMP	
SHT.	1	OF.	4	
ARCAM.	A & R CAMBRIDGE LTD, CB5 9PB		DRG NO.	H04/0011

DRAWING DATE 4/2/82