



DESIGNS DEPARTMENT

DESIGNS DEPARTMENT HANDBOOK

No. 3.259(81)

MX3/3 and MX3/3A, Stereo/Mono Converter

**BRITISH BROADCASTING CORPORATION
ENGINEERING DIVISION**

DESIGNS DEPARTMENT HANDBOOK

No. 3.259(81)

MX3/3 and MX3/3A, Stereo/Mono Converter

.....
(W.T. Shelton)
for Head of Designs Department

Written by: M.B. Dubenski

DESIGNS DEPARTMENT HANDBOOK

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MX3/3 and MX3/3A, Stereo/Mono Converter

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DESIGNS DEPARTMENT HANDBOOK

No. 1.259(81)

MX3/3 and MX3/3A, Stereo/Mono Converter

1. INTRODUCTION

The MX3/3 is a 12 channel stereo to mono converter. It is supplied as a 4U BMM unsupported P.C.B. with an edge connector. It was originally used in the EP5M/19 chassis; part of the EP10/18 Radio Continuity Equipment.

The MX3/3A is basically similar to the MX3/3 in all respects except that its gain is 3 dB higher. It is intended to be used as a two into one audio mixer.

2. OPERATION

This unit has fixed gain and has no operational controls.

3. PERFORMANCE

Gain

MX3/3 (one input) -3 dB \pm 0.1 dB

MX3/3A (one input) 0 dB \pm 0.1 dB

Frequency Response 40 Hz to 15 kHz within 0.1 dB relative to response at 1 kHz.

Overload $>$ +18 dBu into high Z with both inputs of any channel terminated with 300 Ω ,

Output Noise The output noise measured with an EP14/1 should be $<$ -80 dB₄.

Harmonic Distortion 40 Hz to 15 kHz at output level of 0 dBu and +16 dBu T.H.D. should be $<$ -60 dB relative to the output.

Crosstalk $>$ 80 dB at 10 kHz between channels provided non-driven inputs are terminated with 300 Ω .

Input Impedance $>$ 40 k Ω T.E.R.

Power Requirements \pm 12.5 volts at 100 mA \pm 10 mA

4. CIRCUIT DESCRIPTION

The MX3/3 is a 12 channel stereo to mono converter supplied as a 4U BMM unsupported P.C.B. As all channels are identical only one channel (16W-16C left, 5W-5C right) will be described in some detail.

Input signals are applied to 1IC1c and b via a T.E.R. (Transmitted Earth Reference) network. This was designed to minimise the pick-up of stray signals by the input cables. This is achieved by a cancelling effect at the input stage necessitating the use of precision resistors for exact signal balance at the inverting and non-inverting inputs.

Following the unity gain first stage (1IC1c and 1IC1b) the two signals are combined in a virtual earth mixer, 1IC1a, to give an output 2.3 dB above the input. The output stage 1IC2 raises the signal level to +3 dB above the input. 1R16 and 1R17 constitute a T.E.R. source impedance of 94 Ω . The fourth IC in a 4741 (1IC1d) package is unused.

5. MAINTENANCE AND ALIGNMENT

Fault units can be repaired by checking D.C. or A.C. conditions and replacing malfunctioning components.

D.C. Conditions

<u>Location</u>	<u>Reading</u>
1IC1 pin 4	+12.5 volts
1IC1 pin 11	-12.5 volts
1IC1 pins 8, 1, 7	0 volts ± 0.1 volts
1IC2 pin 7	+12.5 volts
1IC2 pin 4	-12.5 volts
1IC2 pin 6	0 volts ± 0.1 volts

A.C. Conditions

<u>Location</u>	<u>Reading</u>
Input; left and right CH.	0 dB, 1 kHz
1IC1c, pin 8	0 dB
1IC1b, pin 7	0 dB
1IC1a, pin 1	+2.3 dBu
1IC2, pin 6	+3 dB ± 0.1 dB

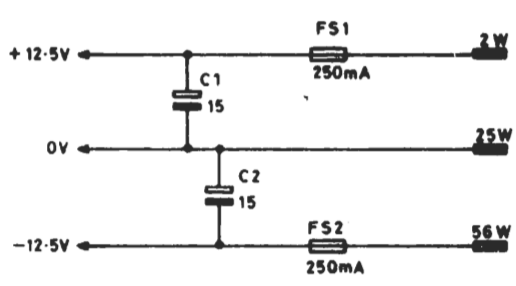
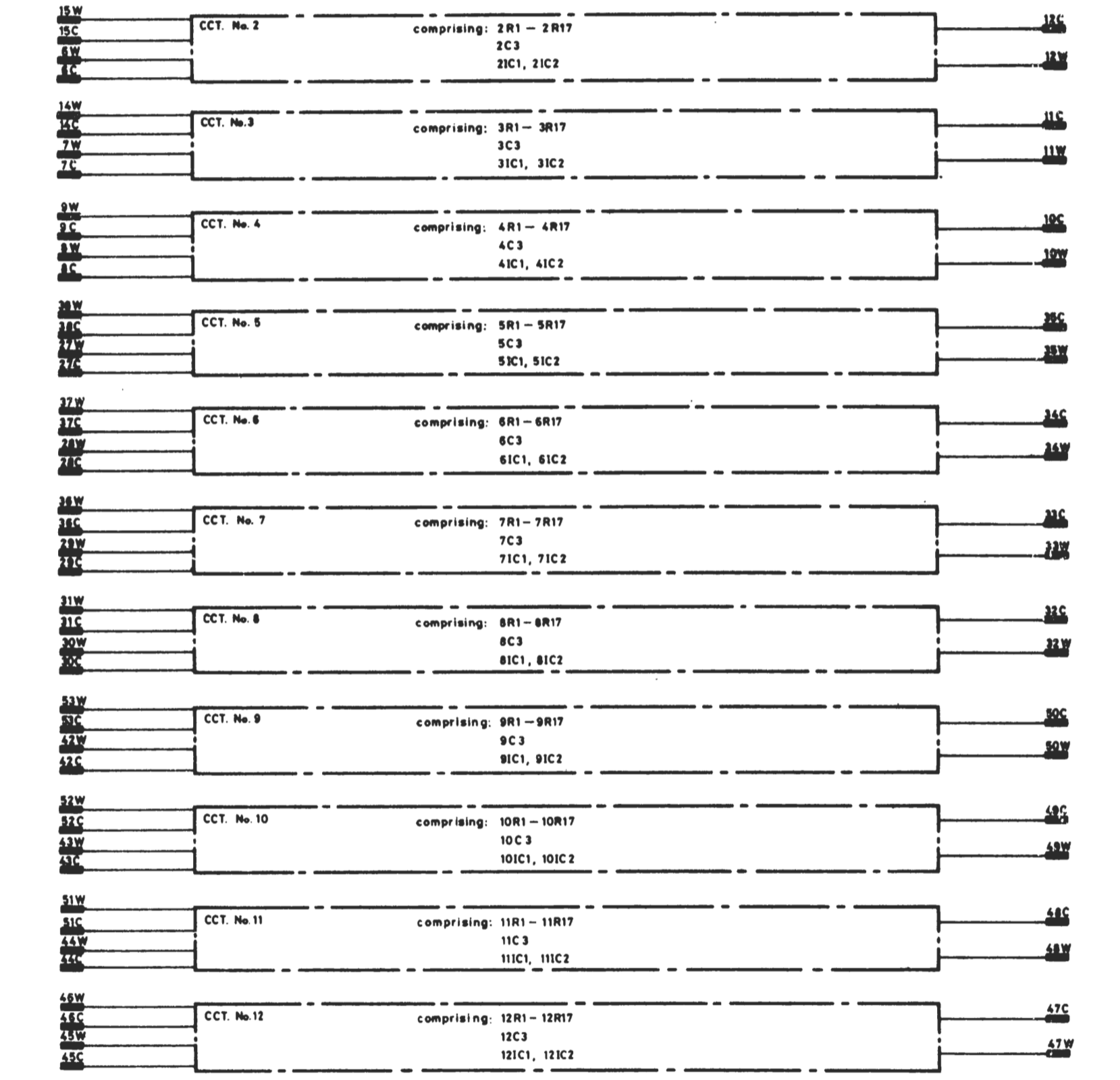
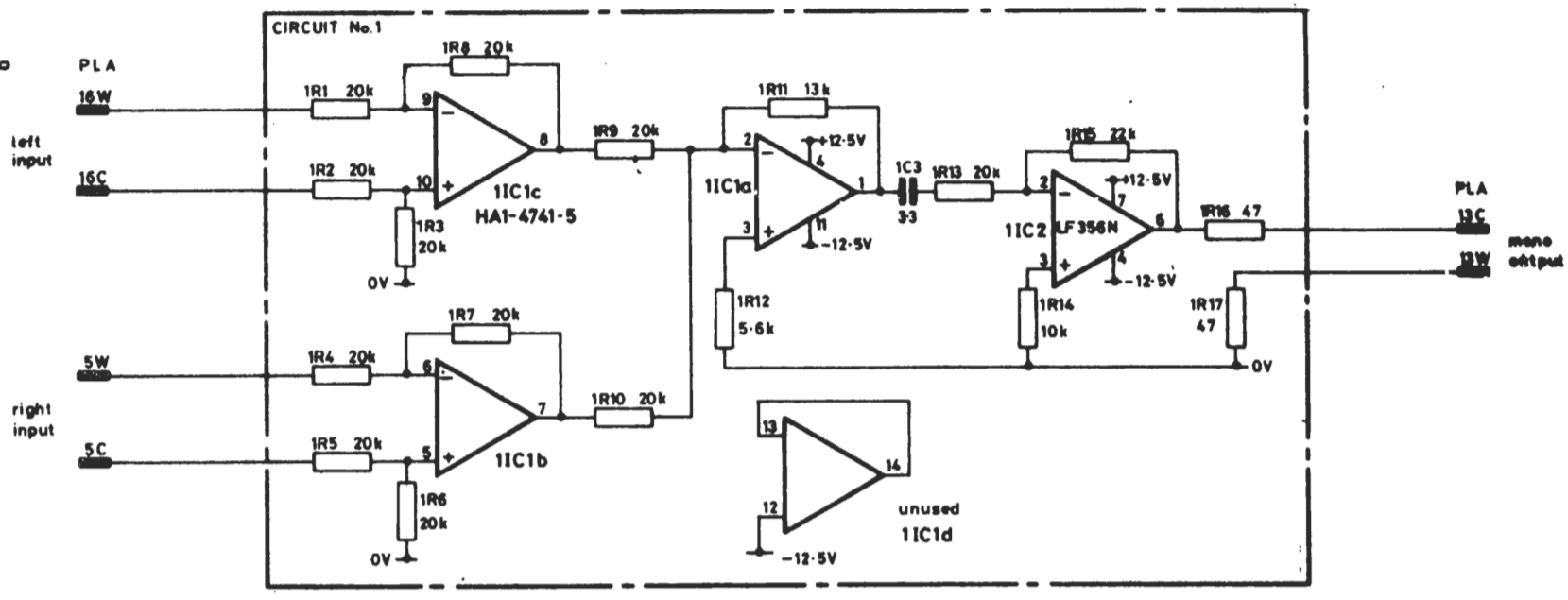
There are no operational controls on the MX3/3.

BB
08/7/71

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SCALE: 0
THIRD ANGLE PROJECTION
ORIGINAL FRAME SIZE 400mm x 574mm

CHANGE
1 27-7-81



MX3/3 STEREO TO MONO CONVERTER CIRCUIT

DESIGNS DEPARTMENT

D48390A2

Parts list: D48391A4

D48391A4

Sht. 1 of 8 Shts.

ISS	1
CHANGE	27-2-81
	I.H. 30/9/81
	2

MX3/32A, STEREO TO MONO CONVERTER

PARTS LIST

ITEM No.	QTY OFF	DESCRIPTION	CCT REF.	BBC REF. OR DRG. No.
DRAWING NUMBERS				
		Circuit	D48390A2	
		Parts List	D48391A4	
		Assembly	D48392A2	
		Details	D48393A4	
		P.B.Roundel	D48396A1	
		P.B.Wiring	D48394A1	
		P.B.Wiring Comp.Side	D48395A1	
		P.B.Blanking	D48397A1	
		P.B.Comp.Loc	D48398A2	
		P.B.Drilling	D48399A3	
FURTHER INFORMATION REQUIRED FOR MANUFACTURE				
		Unit Assembly Information	EAL0484	
		Unit Wiring Information	EAL0140	
		Coding Plate	D32564A4-CP	
		Screen	D38762A2-CP	
		Handle	D31303A3-CP	
1	1	Printed Board TO SPEC ED/PB/MX3/3/PTH		0431756 D48394A1, D48395A1, D48396A1 D48397A1, D48398A2 D48399A3
2	1	Coding Plate SLOT POS ARE 1, 15, 41 Modified BY BBL. W/S BEFORE ISSUE TO CONTRACTOR		D32564A4-CP 0326593 D48393A4
3	1	Handle VERO 21-1884E		D31303A3-CP 0328160
4				
5	1	Screen		D38762A2-CP Det.3
6				
7				
8	2	Spacer, Br. Ni. P. 5mm O/D x 5mm Lg. Tapped M2.5		S58285-0207406
9	1	" Insulating 5mm O/D x 5mm Lg. " "		S58287-0325667
10				
11				
SCREWS, METRIC, COARSE FOR FIXING ITEMS				
12	1	M2.5 x 5 Lg. Csk. Hd. M.S. Zn. P.	9	
13	2	M2.5 x 12 Lg. Csk. Hd. M.S. Zn. P.	2 & 8	
14	6	M2.5 x 6 Lg. Pan Hd. M.S. Zn. P.	5	
15				
16				
NUTS, METRIC, COARSE				
17	2	M2.5 Hex. Full M.S. Zn. P.	2 & 8	
18				
19				
WASHERS				
20	8	Plain, Insulating	1, 2, 5 & 8	S38151-0241226
21				
22				
RIVETS				
23	2	1.6mm Dia. x 6.35mm Lg. Oval Hd. Semi-Tubular, Copper. Tower Manuf. Ltd.	3	

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BBC

MX3/32A
STEREO TO MONO CONVERTER
PARTS LIST

DRN.	RBA
TPD.	
CKD.	
APPD.	

DESIGNS DEPARTMENT

D48391A4

Sht. 1 of 8 Shts

BMM158A4

ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
101	2	* Fuseholder, Printed Wiring	S22252-0345142
102			
103			
104			
105			
CAPACITORS			
106	12	* 3.3uF, 5%, 63V dc, Capacitor, Tubular Polycarbonate (1) 1C3 (1) 2C3 (1) 3C3 (1) 4C3 (1) 5C3 (1) 6C3 (1) 7C3 (1) 8C3 (1) 9C3 (1) 10C3 (1) 11C3 (1) 12C3	S21031-020567X
107	2	* 15uF, 20%, 20V dc, Capacitor, Solid Tantalum (2) C1, C2	S21124-0209372
108			
109			
110			
RESISTORS			
111	24	* 47 ohm, 2%, Resistor, Metal Film, 0.4W. (2) 1R16, 1R17 (2) 2R16, 2R17 (2) 3R16, 3R17 (2) 4R16, 4R17 (2) 5R16, 5R17 (2) 6R16, 6R17 (2) 7R16, 7R17 (2) 8R16, 8R17 (2) 9R16, 9R17 (2) 10R16, 10R17 (2) 11R16, 11R17 (2) 12R16, 12R17	S26877-0099291

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ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG. No.
112	12	* 5.6kohm, 2%, Resistor, Metal Film, 0.4W. (1) 1R12 (1) 2R12 (1) 3R12 (1) 4R12 (1) 5R12 (1) 6R12 (1) 7R12 (1) 8R12 (1) 9R12 (1) 10R12 (1) 11R12 (1) 12R12	S26877-0228019
113	12	* 10kohm, 2%, Resistor, Metal Film, 0.4W. (1) 1R14 (1) 2R14 (1) 3R14 (1) 4R14 (1) 5R14 (1) 6R14 (1) 7R14 (1) 8R14 (1) 9R14 (1) 10R14 (1) 11R14 (1) 12R14	S26877-0099224
114	12	* 13kohm, 2%, Resistor, Metal Film, 0.4W. (FOR STANDARD VERSION ONLY) (1) 1R11 (1) 2R11 (1) 3R11 (1) 4R11 (1) 5R11 (1) 6R11 (1) 7R11 (1) 8R11 (1) 9R11 (1) 10R11 (1) 11R11 (1) 12R11	S26877-0228051

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ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG.No.
115	132	* 20kohm, 2%, Resistor, Metal Film, 0.4W. (11) 1R1, 1R2, 1R3, 1R4, 1R5, 1R6, 1R7, 1R8, 1R9, 1R10, 1R13 (11) 2R1, 2R2, 2R3, 2R4, 2R5, 2R6, 2R7, 2R8, 2R9, 2R10, 2R13 (11) 3R1, 3R2, 3R3, 3R4, 3R5, 3R6, 3R7, 3R8, 3R9, 3R10, 3R13 (11) 4R1, 4R2, 4R3, 4R4, 4R5, 4R6, 4R7, 4R8, 4R9, 4R10, 4R13 (11) 5R1, 5R2, 5R3, 5R4, 5R5, 5R6, 5R7, 5R8, 5R9, 5R10, 5R13 (11) 6R1, 6R2, 6R3, 6R4, 6R5, 6R6, 6R7, 6R8, 6R9, 6R10, 6R13 (11) 7R1, 7R2, 7R3, 7R4, 7R5, 7R6, 7R7, 7R8, 7R9, 7R10, 7R13 (11) 8R1, 8R2, 8R3, 8R4, 8R5, 8R6, 8R7, 8R8, 8R9, 8R10, 8R13 (11) 9R1, 9R2, 9R3, 9R4, 9R5, 9R6, 9R7, 9R8, 9R9, 9R10, 9R13 (11) 10R1, 10R2, 10R3, 10R4, 10R5, 10R6, 10R7, 10R8, 10R9, 10R10, 10R13 (11) 11R1, 11R2, 11R3, 11R4, 11R5, 11R6, 11R7, 11R8, 11R9, 11R10, 11R13 (11) 12R1, 12R2, 12R3, 12R4, 12R5, 12R6, 12R7, 12R8, 12R9, 12R10, 12R13	S26877-022806X
116	12	* 22kohm, 2%, Resistor, Metal Film, 0.4W. (FOR STANDARD VERSION ONLY) (1) 1R15 (1) 2R15 (1) 3R15 (1) 4R15 (1) 5R15 (1) 6R15 (1) 7R15 (1) 8R15 (1) 9R15 (1) 10R15 (1) 11R15 (1) 12R15	S26877-0228078
117	12	* 20kohm, 2% RESISTOR METAL FILM 0.4W (FOR 'A' VERSION ONLY) 1 R 11 AND 1 R 15 2 R 11 AND 2 R 15 3 R 11 AND 3 R 15 4 R 11 AND 4 R 15 5 R 11 AND 5 R 15 6 R 11 AND 6 R 15 7 R 11 AND 7 R 15 8 R 11 AND 8 R 15 9 R 11 AND 9 R 15 10 R 11 AND 10 R 15 11 R 11 AND 11 R 15 12 R 11 AND 12 R 15	

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ITEM No.	Qty	DESCRIPTION AND CIRCUIT REFERENCE	BBC REF. or DRG. No.
INTEGRATED CIRCUITS			
120	12	* HA1-4741-5 (1) 1IC1 (1) 2IC1 (1) 3IC1 (1) 4IC1 (1) 5IC1 (1) 6IC1 (1) 7IC1 (1) 8IC1 (1) 9IC1 (1) 10IC1 (1) 11IC1 (1) 12IC1	0184061
121	12	* LF356N (1) 1IC2 (1) 2IC2 (1) 3IC2 (1) 4IC2 (1) 5IC2 (1) 6IC2 (1) 7IC2 (1) 8IC2 (1) 9IC2 (1) 10IC2 (1) 11IC2 (1) 12IC2	0184930
122	1	* BLACK LABEL NO. 8 GREEN	
123	1	CARDBOARD CARTON	
124			
FUSES			
125	2	* Fuse, Cartridge, Anti-Surge, Glass, 250mA (2) FS1, FS2	822425-0397322

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CIRCUIT REFERENCE INDEX

C1 107	2R6 115	5R2 115	7R16 111	10R12 112
C2 107	2R7 115	5R3 115	7R17 111	10R13 115
	2R8 115	5R4 115		10R14 113
1C3 106	2R9 115	5R5 115	8R1 115	10R15 116
	2R10 115	5R6 115	8R2 115	10R16 111
2C3 106	2R11 114	5R7 115	8R3 115	10R17 111
	2R12 112	5R8 115	8R4 115	
3C3 106	2R13 115	5R9 115	8R5 115	11R1 115
	2R14 113	5R10 115	8R6 115	11R2 115
4C3 106	2R15 116	5R11 114	8R7 115	11R3 115
	2R16 111	5R12 112	8R8 115	11R4 115
5C3 106	2R17 111	5R13 115	8R9 115	11R5 115
		5R14 113	8R10 115	11R6 115
6C3 106	3R1 115	5R15 116	8R11 114	11R7 115
	3R2 115	5R16 111	8R12 112	11R8 115
7C3 106	3R3 115	5R17 111	8R13 115	11R9 115
	3R4 115		8R14 113	11R10 115
8C3 106	3R5 115	6R1 115	8R15 116	11R11 114
	3R6 115	6R2 115	8R16 111	11R12 112
9C3 106	3R7 115	6R3 115	8R17 111	11R13 115
	3R8 115	6R4 115		11R14 113
10C3 106	3R9 115	6R5 115	9R1 115	11R15 116
	3R10 115	6R6 115	9R2 115	11R16 111
11C3 106	3R11 114	6R7 115	9R3 115	11R17 111
	3R12 112	6R8 115	9R4 115	
12C3 106	3R13 115	6R9 115	9R5 115	12R1 115
	3R14 113	6R10 115	9R6 115	12R2 115
1R1 115	3R15 116	6R11 114	9R7 115	12R3 115
1R2 115	3R16 111	6R12 112	9R8 115	12R4 115
1R3 115	3R17 111	6R13 115	9R9 115	12R5 115
1R4 115		6R14 113	9R10 115	12R6 115
1R5 115	4R1 115	6R15 116	9R11 114	12R7 115
1R6 115	4R2 115	6R16 111	9R12 112	12R8 115
1R7 115	4R3 115	6R17 111	9R13 115	12R9 115
1R8 115	4R4 115		9R14 113	12R10 115
1R9 115	4R5 115	7R1 115	9R15 116	12R11 114
1R10 115	4R6 115	7R2 115	9R16 111	12R12 112
1R11 114	4R7 115	7R3 115	9R17 111	12R13 115
1R12 112	4R8 115	7R4 115		12R14 113
1R13 115	4R9 115	7R5 115	10R1 115	12R15 116
1R14 113	4R10 115	7R6 115	10R2 115	12R16 111
1R15 116	4R11 114	7R7 115	10R3 115	12R17 111
1R16 111	4R12 112	7R8 115	10R4 115	
1R17 111	4R13 115	7R9 115	10R5 115	11C1 120
	4R14 113	7R10 115	10R6 115	11C2 121
2R1 115	4R15 116	7R11 114	10R7 115	
2R2 115	4R16 111	7R12 112	10R8 115	21C1 120
2R3 115	4R17 111	7R13 115	10R9 115	21C2 121
2R4 115		7R14 113	10R10 115	
2R5 115	5R1 115	7R15 116	10R11 114	31C1 120

continued on next sheet

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CIRCUIT REFERENCE INDEX (Continued)

3IC2 121		8IC1 120	10IC2 121	
	6IC1 120	8IC2 121		FS1 125
4IC1 120	6IC2 121		11IC1 120	FS2 125
4IC2 121		9IC1 120	11IC2 121	
	7IC1 120	9IC2 121		
5IC1 120	7IC2 121		12IC1 120	
5IC2 121		10IC1 120	12IC2 121	

END OF CIRCUIT REFERENCE INDEX.

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BBC
 VM424A4

STEREO TO MONO CONVERTER MX3/3BA
 BBC: DESIGNS DEPARTMENT.

DD Ref: U580B-DLS3/RBA
 SHEET 7 OF PARTS LIST D48391 A4



ORIGINAL
FRAME SIZE
190mm x 277mm

ALL DIMENSIONS IN MILLIMETRES UNLESS
OTHERWISE STATED

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SHT.	ISS.	DETAILS OF CHANGE	SHT.	ISS.	DETAILS OF CHANGE
1	2	*R2+ADDED ITEM 1 SPEL ADDED ITEM 2 REVISED ITEM 3 TYPE NO. ADDED			
3	2	ITEM 114 "FOR STANDARD VERSION ONLY" ADDED			
4	2	ITEM 116 "FOR STANDARD VERSION ONLY" ADDED ITEM 117 ADDED (CF12975)			
5	2	ITEMS 12 & 13 ADDED *R2+NOTES ADDED I.H. 30/9/81			

BBC

DESIGNS DEPARTMENT

CODE:-MX3/3BA

30/9/81

VH418/A4

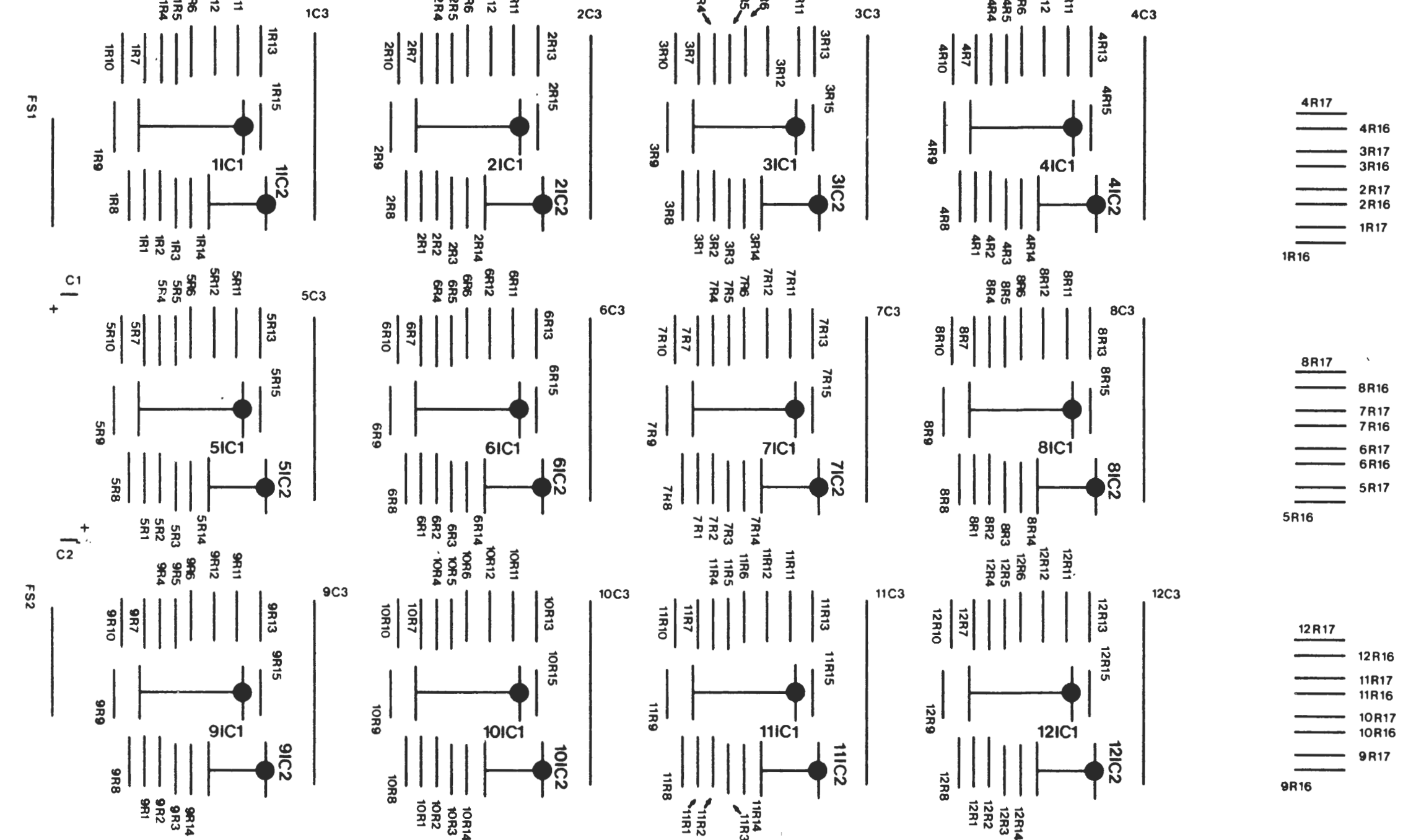
PARTS LIST CHANGE RECORD, ISSUE:-2

D48391 A4

SHEET 8

TOP

MX3/3 D48398A2/1

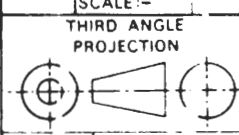


2V86E87D

MINIMUM SIZE TO CUT NEGATIVE

CHARACTERS AND LINES TO BE PRINTED IN BLACK
 PRINTED WIRING ON REVERSE SIDE OF BOARD IS D48394A1
 PRINTED WIRING ON COMPONENT SIDE OF BOARD IS D48395A1

SCALE 2:1



THIRD ANGLE PROJECTION
 ORIGINAL FRAME SIZE
 400mm x 574mm

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 DS/A2.1

CHANGING
 0481110 1
 SSI

MX3/3 PRINTED BOARD COMPONENT LOCATION

All dimensions in millimetres unless otherwise stated
 Normal tolerances
 no decimal place ± 1 mm unless
 one decimal place ± 0.2 mm otherwise

DRN	
TCD	I.L.
CKD	

DESIGNS DEPARTMENT

D48398A2

2

3

4