

DESIGNS DEPARTMENT HANDBOOK

No. 3.261(81)

MX3/5 Audio Mixer Card

C O N T E N T S

- 1. INTRODUCTION
- 2. OPERATION
- 3. PERFORMANCE
- 4. CIRCUIT DESCRIPTION
- 5. MAINTENANCE AND ALIGNMENT

D R A W I N G S

Circuit	D 48606 A2
Parts List	D 48607 A4
P.B. Comp. Loc.	D 48612 A2

DESIGNS DEPARTMENT HANDBOOKNo. 3.261(81)MX3/5 Audio Mixer Card1. INTRODUCTION

The MX3/5 is a general purpose audio mixing card. It is supplied as a 4U BMM size P.C.B. fitted with an edge connector. It was originally used in the EP5M/15 chassis; part of the EP10/18 Radio Continuity Equipment. There are 12 inputs designated 'A' to 'M' (excluding I) and 5 output 'S', 'T', 'U', 'V' and 'Z'.

The various through paths are arranged as follows.

<u>Inputs</u>	<u>Outputs</u>
A)	
B)	S
C)	
D)	
E)	T
F)	
G)	
H)	U
J)	
K)	
L)	V
M)	

All inputs also appear on outputs 'Z'.

2. OPERATION

The MX3/5 has fixed gain and has no operational controls.

3. PERFORMANCE

Gain	0.0 dB $\pm$ 0.1 dB
Frequency Response	40 Hz to 15 kHz $\pm$ 0.1 dB w.r.t. response at 1 kHz.

Overload	>+18 dBu into high $z$ in the frequency range 40 Hz to 15 kHz.
Output Noise	With the inputs terminated with 300 $\Omega$ , the output noise should be less than -80 dB <sub>4</sub> .
Harmonic Distortion	In the frequency range of 40 Hz to 15 kHz at output levels of 0 dBu and +16 dBu the T.H.D. should be less than 0.1% (-60 dB) relative to output level.
Crosstalk	Crosstalk between 'channels' at 10 kHz should be better than 90 dB.
Input Impedance	>66 k $\Omega$ T.E.R.
Output Impedance	94 $\Omega$ T.E.R.
Power Requirement	$\pm$ 12.5 V at 60 mA $\pm$ 10 mA.

#### 4. CIRCUIT DESCRIPTION

The MX3/5 is a general purpose audio mixing card. It is supplied as a 4U BMM size P.C.B. fitted with an edge connector.

There are four separate 'mixing paths' consisting of three inputs to one output, plus a main output (Z) which combines all the inputs. Further circuit description will be made in conjunction with the circuit diagram of the MX3/5, D 48606 A2. Input signals are applied via T.E.R. (Transmitted Earth Reference) network to a number of HA1-4741 quad integrated circuits. The T.E.R. circuit has been designed to minimise the effect of stray pick-up of interference signals in the input cables. Equal amplitude but of opposite phase signal currents flow in the cable under normal operating conditions. Hence any interference source which induces equal currents in the two input cables will have negligible effect due to cancellation.

Following the unity gain input stage there follows a phase-reversal IC (IC1a etc) and finally a virtual earth mixer (IC7, IC8 etc.). The output IC drives other equipment via T.E.R. terminations (2 x 47  $\Omega$ ), 10 pF capacitors across the feedback resistors of the mixing stage increase the overall stability of the system. IC7 to 13 use operational amplifiers (LF356) requiring very low bias current (typically 30 pA). This makes it possible to connect the non-inverting input to 0 volt line without the usual bias resistor.

#### 5. MAINTENANCE AND ALIGNMENT

The following readings are included to assist fault location.

D.C. Conditions

<u>Location</u>	_____	<u>Reading</u>
IC1, 2, 3, 4, 5, 6	pin 4	+12.5 volts
IC1, 2, 3, 4, 5, 6	pin 11	-12.5 volts
IC1, 2, 3, 4, 5, 6	pins 1 7 8 14	0 volts $\pm 0.1$ volts
IC7, 8, 9, 10, 11, 12, 13	pin 4	-12.5 volts
IC7, 8, 9, 10, 11, 12, 13	pin 7	+12.5 volts
IC7, 8, 9, 10, 11, 12, 13	pin 6	0 volts $\pm 0.1$ volts

Signal Conditions

Input 0 dBu at 1 kHz

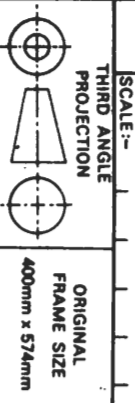
Signal to 6W, earthy connection to 5W (etc.)

<u>Location</u>		<u>Reading</u>
IC1, 2, 3, 4, 5, 6	pins 1 7 8 14	0 dB $\pm 0.1$ dB
IC7, 8, 9, 10, 11, 12, 13	pin 6	0 dB $\pm 0.1$ dB

Check signal output at the connector S, T, Z, U, V = all 0 dB  $\pm 0.1$  dB

There are no operational controls on the MX3/5.

BBC  
 DS/A2/1  
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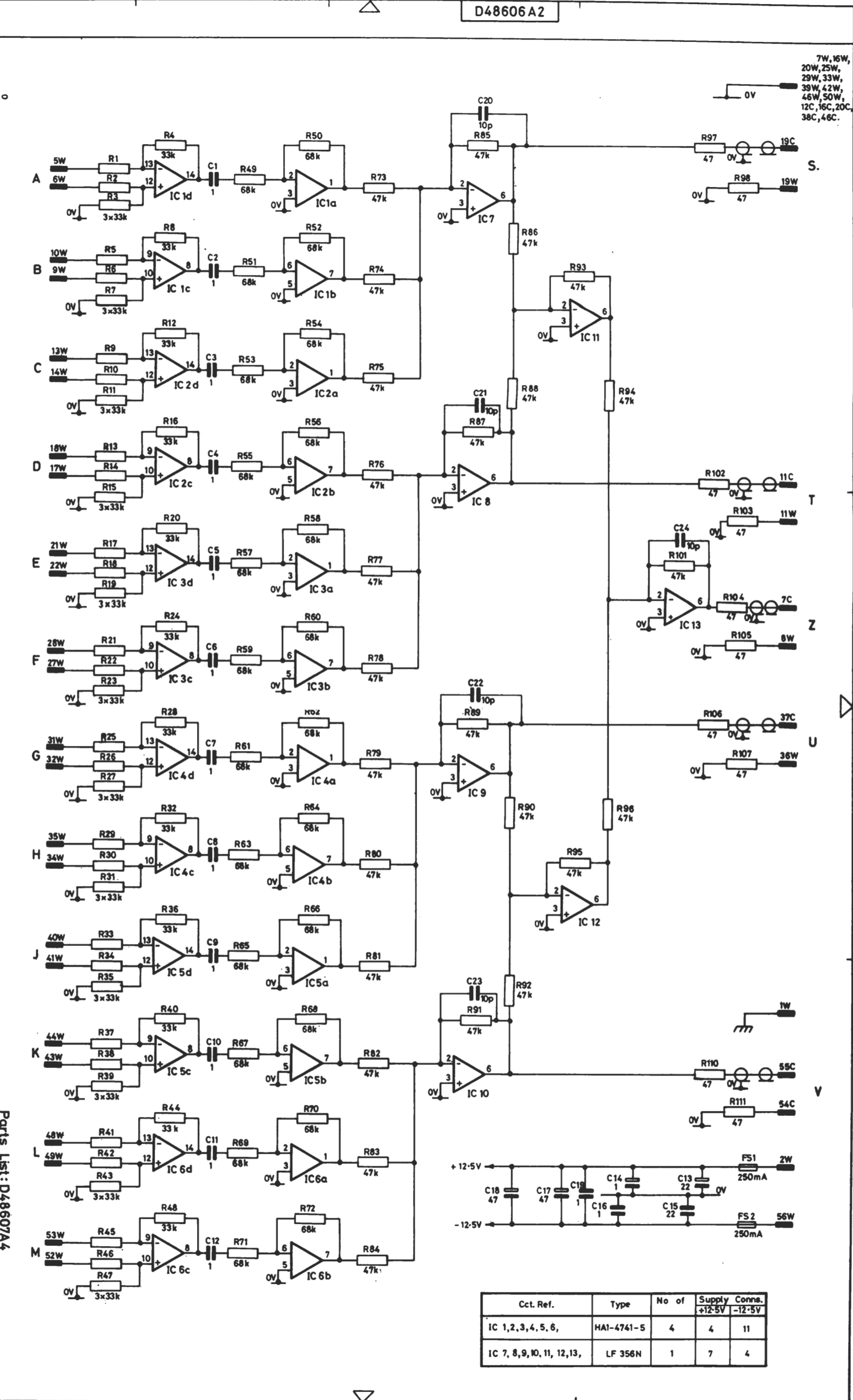


SCALE: 1:1

CHG	NO	DATE	BY	CHKD	APPD
1	26-2-81				

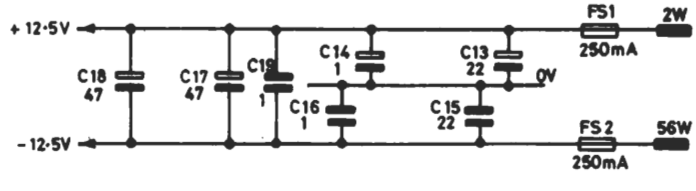
MX 3/5  
 AUDIO MIXER  
 CIRCUIT.

DESIGNS DEPT.  
**D48606A2**



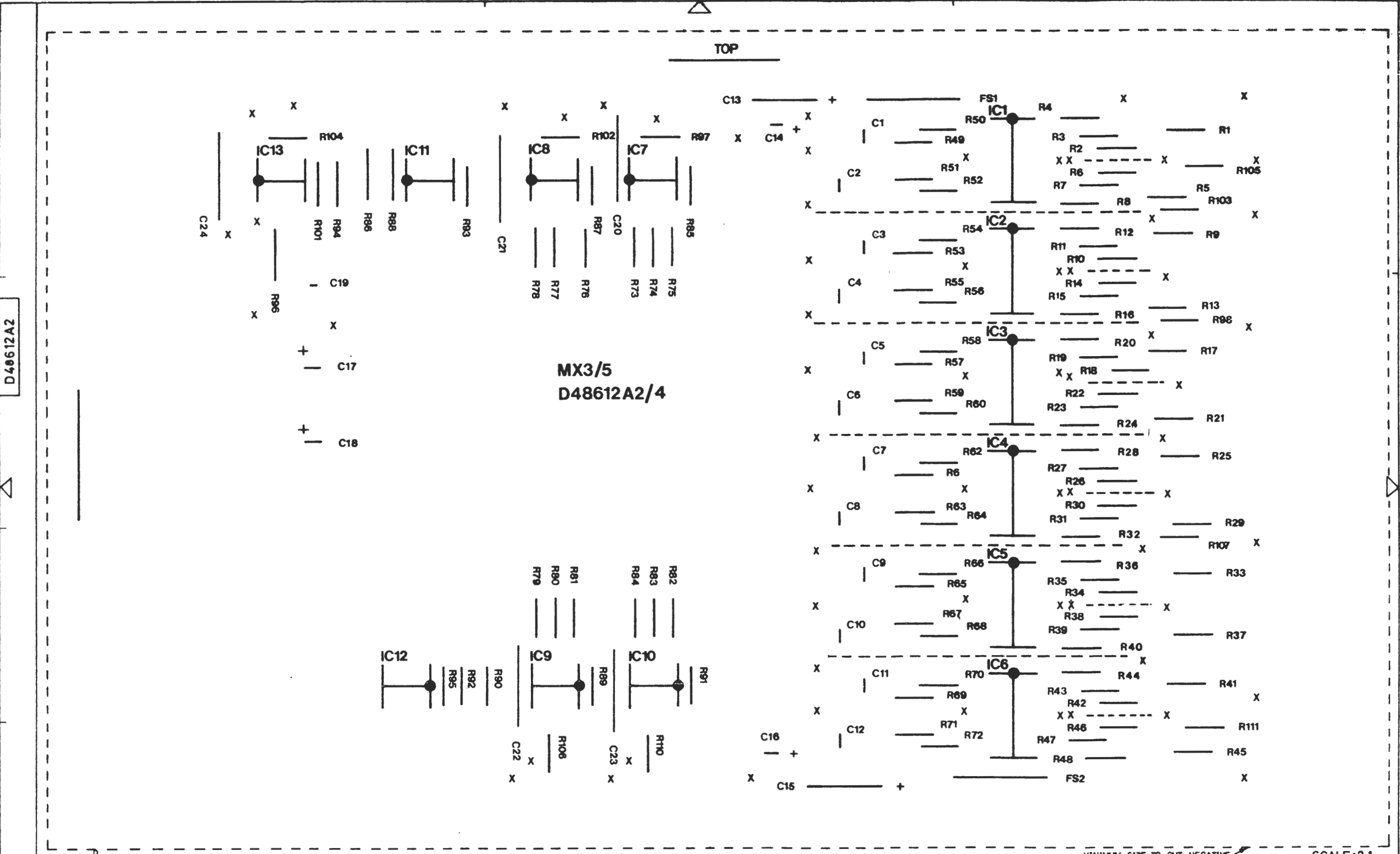
7W, 16W,  
 20W, 25W,  
 29W, 33W,  
 39W, 42W,  
 46W, 50W,  
 12C, 16C, 20C,  
 38C, 46C.

Parts List: D48607A4



Cct. Ref.	Type	No of	Supply Conns.
			+12.5V -12.5V
IC 1, 2, 3, 4, 5, 6,	HA1-4741-5	4	4 11
IC 7, 8, 9, 10, 11, 12, 13,	LF 356N	1	7 4

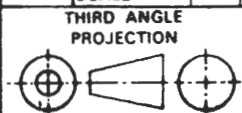
D48612A2



SCALE:-

MINIMUM SIZE TO CUT NEGATIVE

SCALE:2 1



THIRD ANGLE PROJECTION

ORIGINAL FRAME SIZE  
400mm x 574mm

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CHANGE	DATE	BY	REASON
1	10-08-81		
2	08-07-82		
3	08-03-80		

Characters and lines to be printed in black.  
Printed wiring on this side of board is D 48611A2  
Printed wiring on reverse side of board is D48610A2

**MX3/5**

PRINTED BOARD COMPONENT LOCATION

All dimensions in millimetres unless otherwise stated Normal tolerances:	DRN	DESIGNS DEPT.
no decimal place - ± 1 mm unless stated	TCD	<b>D48612A2</b>
one decimal place - ± 0.3 mm unless stated	CKD	
two decimal place - ± 0.1 mm unless stated	APPD	