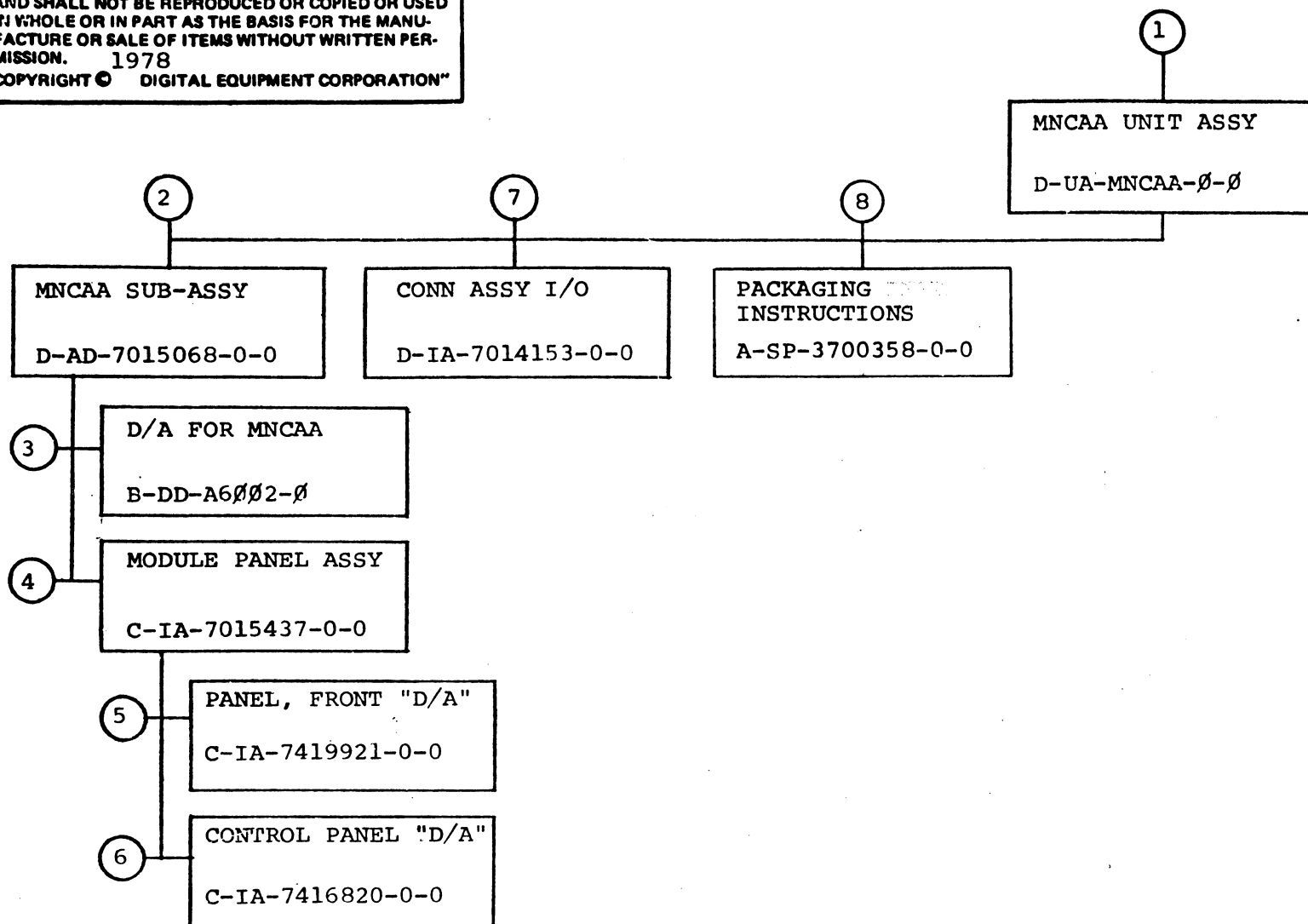


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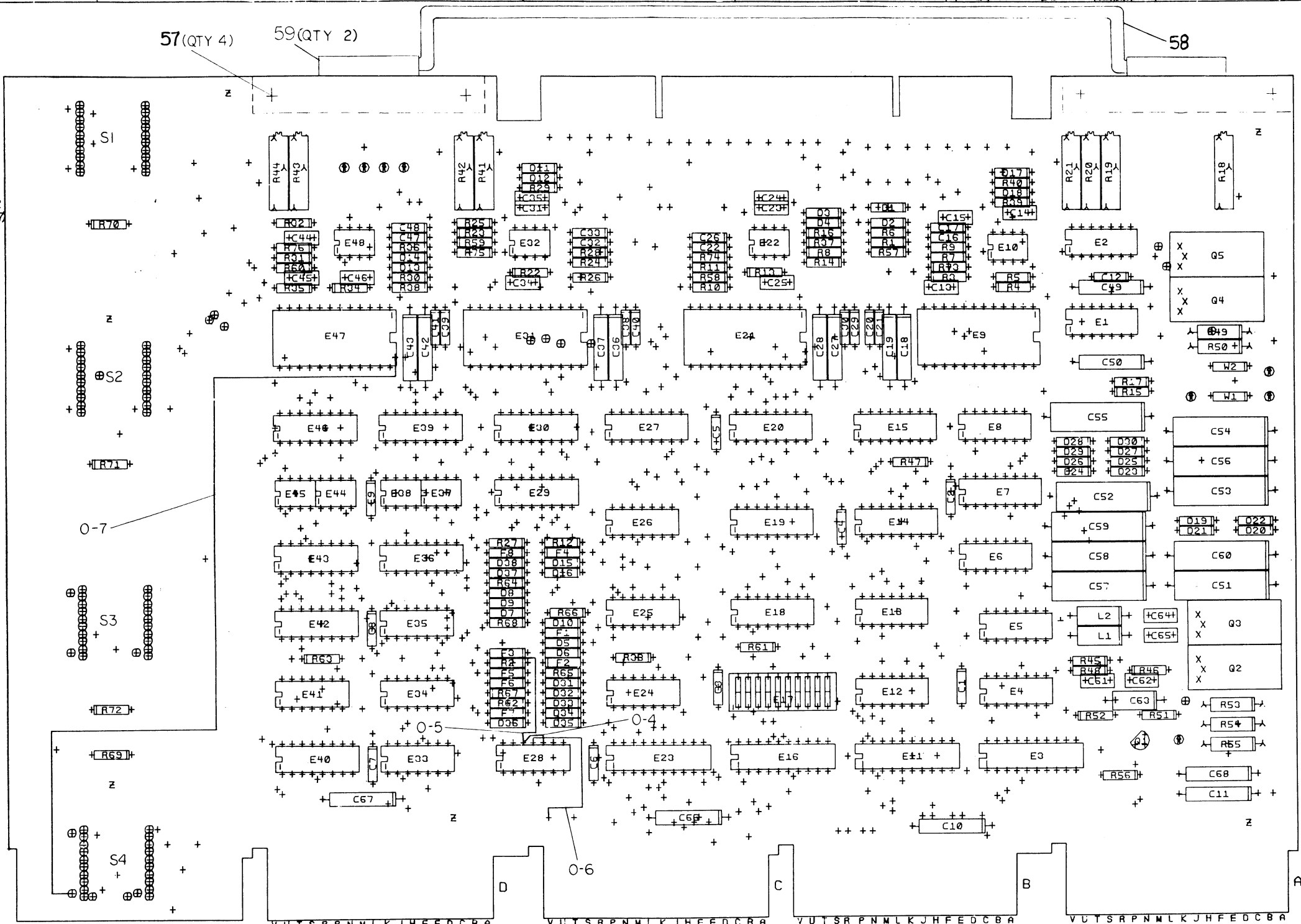
TITLE	MNCAA UNIT ASSY	SIZE CODE	NUMBER	REV
		B DD	MNCAA-Ø	B
	SHEET 2 OF 3			

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REWORK INSTRUCTIONS
FIRST RELEASE

ETCH CUTS, SIDE 1, AS SHOWN
O-1 & O-2 AT BOTH SIDES OF E28(12)
O-3 AT E28(11)

WIRE ADDS, SIDE 1, AS SHOWN
O-4 FROM E28(12) TO E28(10)
O-5 FROM E28(12) TO PTH BETWEEN F3 & R2
O-6 FROM E28(11) TO PTH BETWEEN E28 & E27
O-7 FROM PTH ABOVE AND TO THE RIGHT OF E47(24) TO S4



NOTES: DO NOT INSERT R73 THRU R76, SPARES

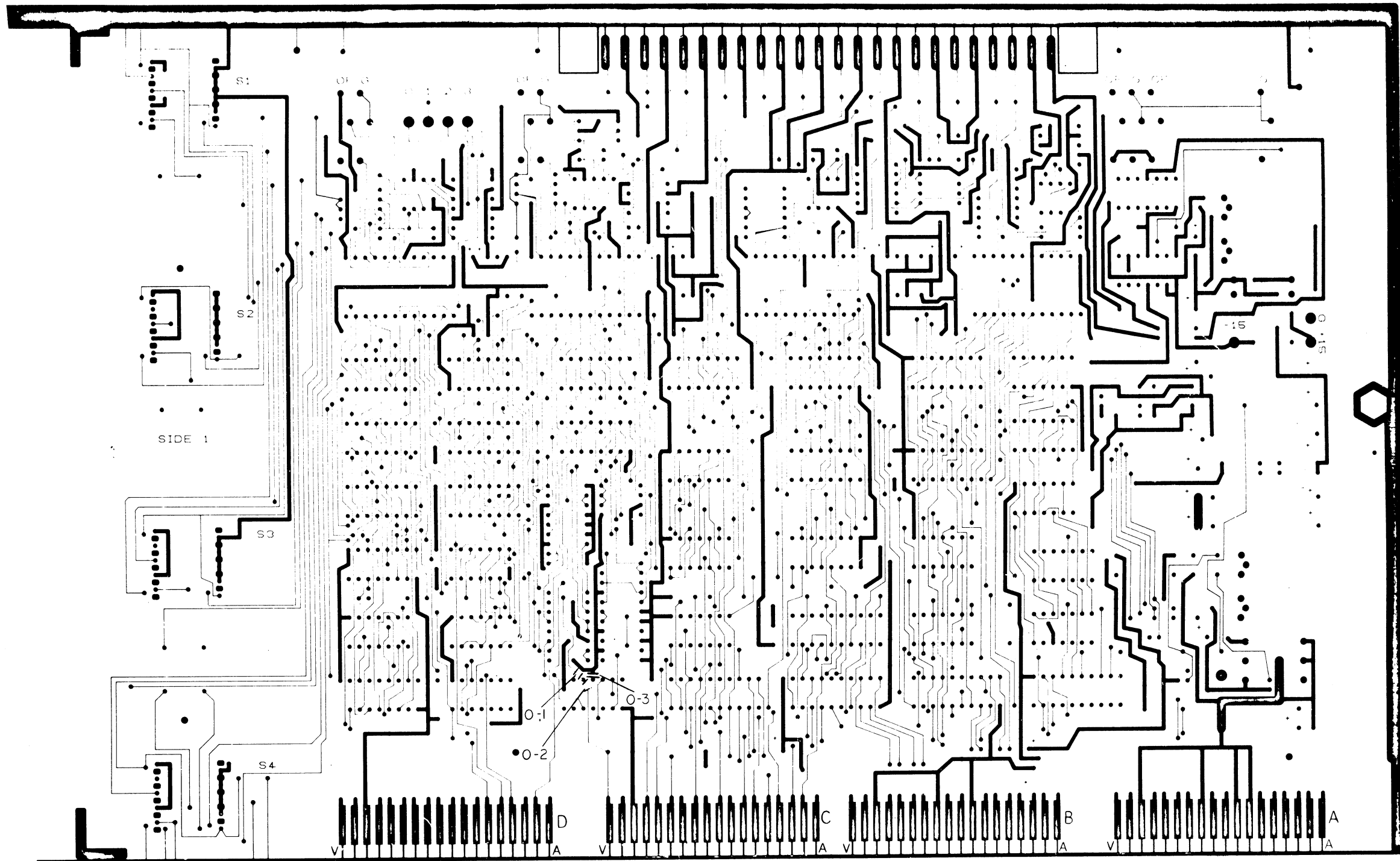
CHG	NO	REV

ETCH REV.	D
P.C. DESIGN DATA BASE REV.	D

SIGNATURES	DATE	digital
DRN.		
CHK'D.		TITLE
ENG. <i>AC</i>	3/1/78	D/A
PROJ. ENG. <i>W. Shum</i>	3/1/78	
PROD. <i>...</i>	3/1/78	
SCALE 2/1		SIZE CODE
SHT. 1 OF 4		NUMBER
NEXT HIGHER ASSY. B-DD-A6002-0		REV
		D UA A6002-0-0 C

1978

A6002-001

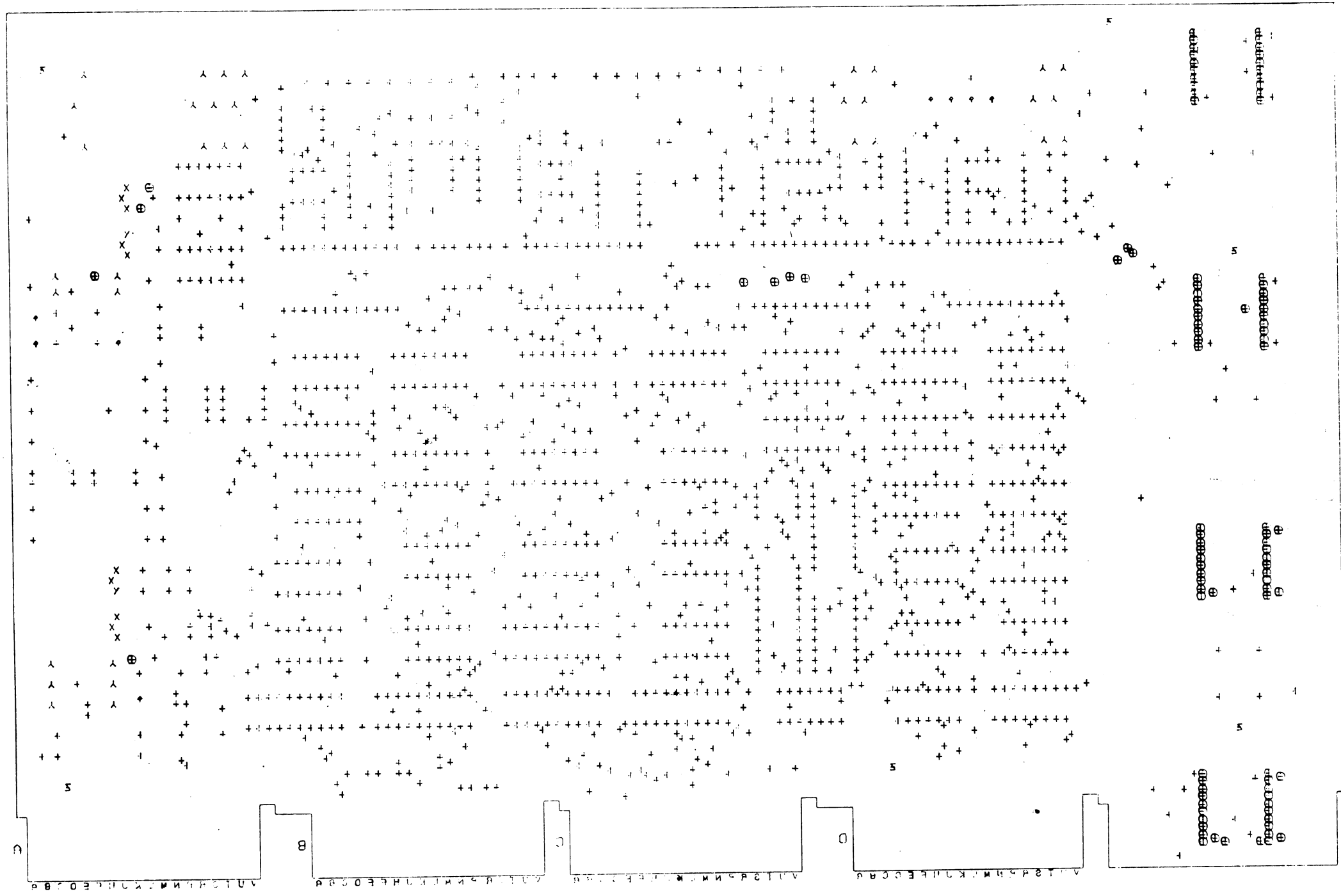


SIDE 1

REVISED		
NO.	DATE	BY

DATE	BY	NUMBER	REV
2/1	D/A	DUA A6002-0-0	C

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 1978



REVISIONS		
CHK	CHANGE NO	REV

TITLE	D/A	SIZE CODE	DUA	NUMBER	A6002-0-0	REV.	C
SCALE	2/1	SHEET	4	OF	4	DIST.	

LINE	ITEM	DOCUMENT NO.	PART NO.	DESCRIPTION	QTY	REFERENCE DESIGNATORS
1	1	D-MD-5012112-0-0	5012112-00	ETCH BD (A6002)	1	
2	2		1012784-00	.047 MFD 50V XZ CER. *	26	C1-C9,C12,C16,C17,C20,C21,C22, CONT C26,C29,C30,C32,C33,C38,C39, CONT C40,C41,C47,C48
3	3		1004812-00	15 MFD 20V 10% 150D S.TA (10-00)	15	C10,C11,C18,C19,C27,C28,C36, CONT C37,C42,C43,C49,C50,C66,C67, CONT C68
4	4		1001610-01	.01 MFD 100V OR 50V Z5U DISC/800PF MIN (10-00)	10	C13,C15,C24,C25,C34,C35,C44, CONT C45,C64,C65
5	5		1000015-00	82.0 MMF 100V 5%200PPM DM15S (10-00)	4	C14,C23,C31,C46
6	6		1002433-00	22 MFD 35V 20% 150D S.TA (10-00)	6	C51,C52,C54,C55,C59,C60
7	7		1005335-00	39 MFD 20V 10% 150D S.TA (10-00)	4	C53,C56,C57,C58
8	8		1001631-00	390.0 MMF 100V 5%200PPM DM15S (10-00)	2	C61,C62
9	9		1001776-00	1 MFD 35V 10% 150D S.TA (10-00)	1	C63
10	10		1105275-00	D 672 TR= 15NS PIV= 60V SP (10-00)	36	D1-D16,D19-D38
11	11		1109502-00	1N 4742 VZ= 12.0 10% 1W Y (10-00)	2	D17,D18
12	12		1303226-00	68.1 1/4W 1% RN55D-F 100PPM (13-00)	8	R1,R10,R23,R34,R69-R72
13	13		1300365-00	1 K 1/4W 5% CC (13-00)	18	R2,R12,R27,R33,R39,R40,R45, CONT R47,R51,R56,R61-R68
14	14		1300479-00	10 K 1/4W 5% CC (13-00)	6	R3,R13,R22,R35,R46,R48
15	15		1300207-00	50 1/4W 1% RN55C-F 50PPM (13-00)	4	R4,R11,R25,R31
16	16		1311653-00	2.15 K 1/4W 1% RN55D-F 100PPM (13-00)	4	R5,R14,R28,R32
17	17		1310881-02	47 1/4W 1% FUSIBLE (13-00)	4	R6,R16,R29,R36
18	18		1302398-00	470 K 1/4W 5% CC (13-00)	4	R7,R24,R30,R37
19	19		1309595-00	1 M 1/4W 5% CC (13-00)	4	R8,R9,R26,R38
20	20		1310881-00	1 K 1/4W 1% FUSIBLE (13-00)	2	R15,R17
21	21		1309143-05	200 3/4W10% POT 100PPM (13-00)	4	R18,R20,R41,R43
22	22		1309143-11	20 K 3/4W20% POT 100PPM (13-00)	4	R19,R21,R42,R44
23	23		1309444-00	2.7 1/2W 10% CC (13-00)	2	R49,R50
24	24		1300250-00	150 1/4W 5% CC (13-00)	1	R52

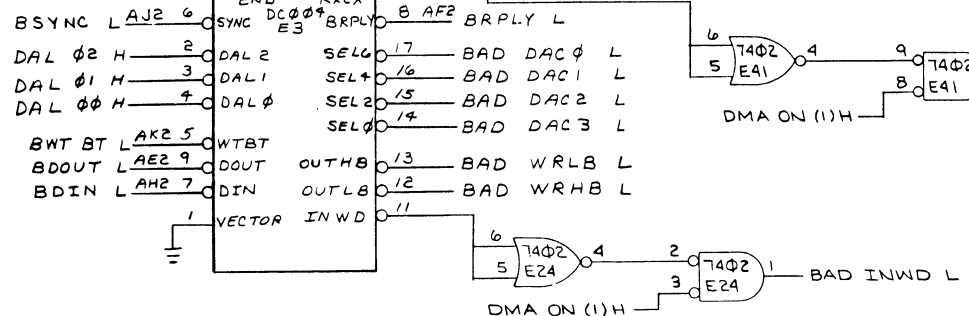
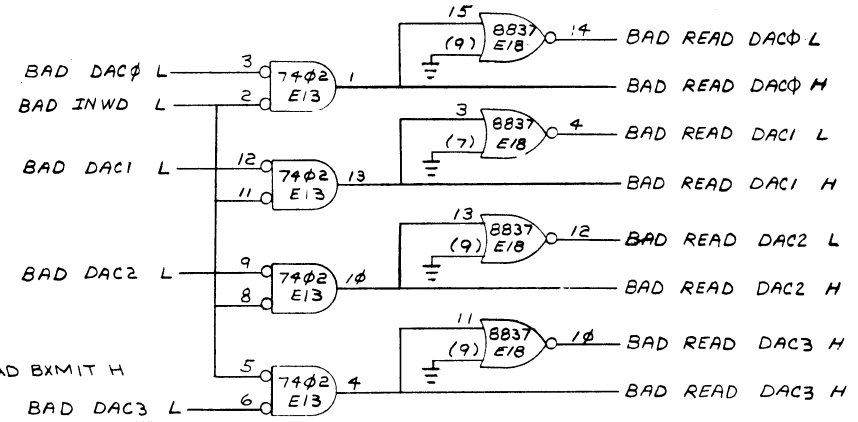
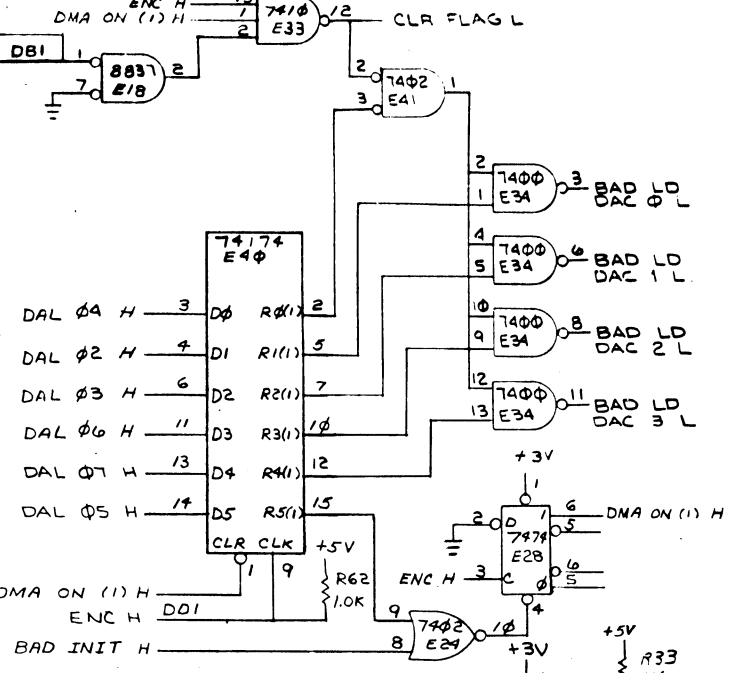
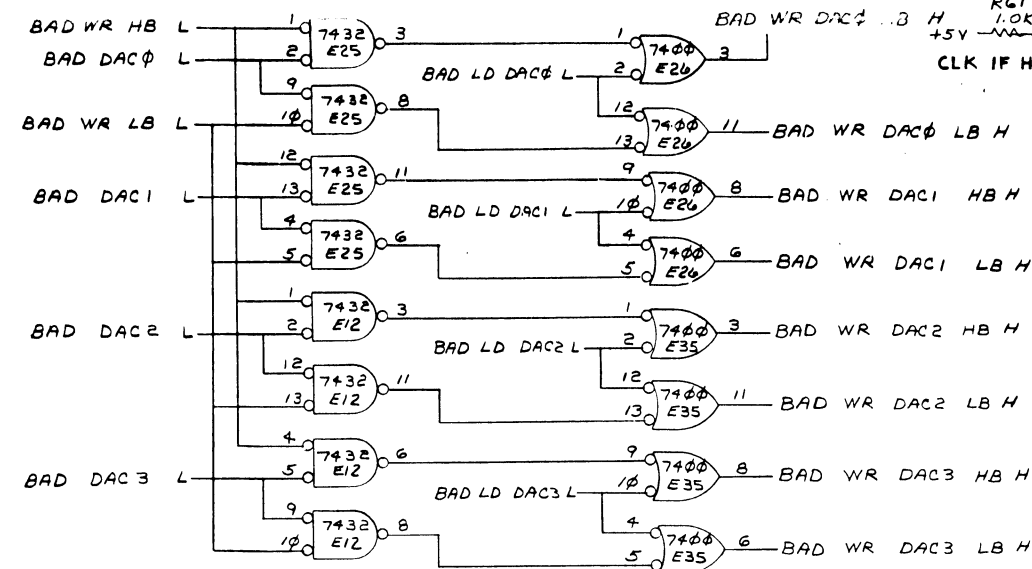
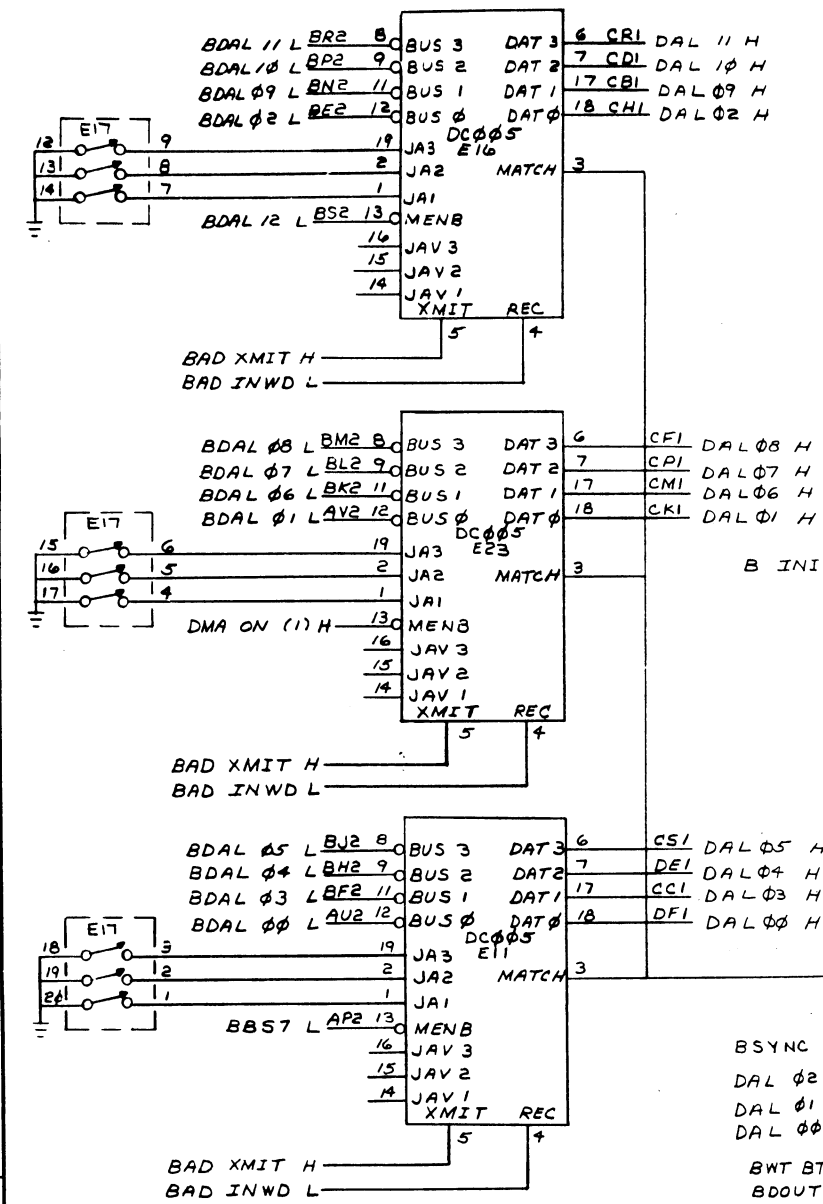
REVISION HISTORY			VARIATIONS FOR THIS ASSY.		
CHK	ECD NO	REV	FIRST USED ON:		DIGITAL EQUIPMENT CORPORATION
					MAYNARD, MASSACHUSETTS
---	INIT	C	MADE BY:	A STEVENS	DATE: 16-FEB-78
			CHECKED:	R.W.CAUNTER	DATE: 16-FEB-78
			DSN.ENG.:	A.E.FILZ	DATE: 29-MAR-78
			PROD.:	R.REBELLO	DATE: 29-MAR-78
			RESP.ENG.:	A.E.FILZ	DATE: 29-MAR-78
					TITLE
					PARTS LIST
					D/A
					SIZE CODE! DOCUMENT NUMBER! REV!
					K! FL! A6002-0-DBP! C!
					ASSY.NO.: D-UA-A6002-0-0! EDIT#!
					6!

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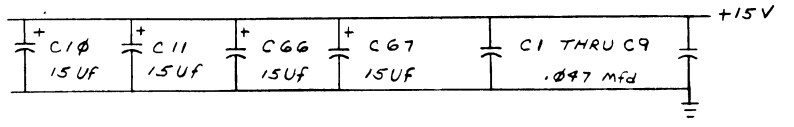
LINE ITEM	DOCUMENT NO.	PART NO.	DESCRIPTION	QTY	REFERENCE DESIGNATORS
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26	26	1301781-00	82 1/2W 5% CC (13-00	1	R55
27	27	1302873-00	261 1/4W 1% RN55D-F 100PFM (13-00	4	R57,R58,R59,R60
28	28	1503409-00	DEC6534D PNP 310MW SI 40 90 P	1	Q1
29	29	1510414-00	D 45C6 PNP 30WT SI 45 20 Y	1	Q2
30	30	1510171-00	D 44C3 NPN 30WT SI 30 20 Y	3	Q3,Q4,Q5
31	31	1603377-00	.22UH 10% 2.7A #WEE.22	2	L1,L2
32	32	1913218-00	325 VOLT.REG.FIX +/-15V 50MA 14	1	E1
33	33	1913219-00	AD 2700/L ANALOG SWITCH 10V PRECISION RE	1	E2
34	34	1912729-00	DC 004 PROTOCOL,REG. SELECTOR	1	E3
35	35	1909054-00	7493 COUNTER,ASYNCH UP,BINARY	1	E4
36	36	1909686-00	7404 INVERTER GATE-HEX 1IN	1	E5
37	37	1905576-00	7410 NAND GATE-TRIPLE 3IN	2	E6,E33
38	38	1910436-00	DEC 74123 ONE SHOT-DUAL,RETRIGGERABLE	1	E7
39	39	1910741-00	7406 INVERTER GATE-HEX 1IN,BUFFER,0	1	E8
40	40	1912401-00	AD562 DAC,12BIT,MULT	4	E9,E21,E31,E47
41	41	1911144-00	DEC 2505 OP AMP .1% SETTLE	4	E10,E22,E32,E48
42	42	1913040-00	DC 005 TRANSCEIVER 4BIT	3	E11,E16,E23
43	43	1911521-00	7432 OR GATE-QUAD 2IN, POSITIVE	2	E12,E25
44	44	1909004-00	DEC 7402 NOR GATE-QUAD 2IN	3	E13,E24,E41
45	45	1912951-00	DM 8556 COUNTER,BINARY,4BIT	12	E14,E15,E19,E20,E27,E29,E30,
				CONT	E36,E39,E42,E43,E46
46	46	1911116-00	DEC 8837 RECEIVER,BUS,HEX,UNIBUS	1	E18
47	47	1905575-00	7400 NAND GATE-QUAD 2IN	3	E26,E35,E34
48	48	1905547-00	DEC 7474 FF-D DUAL,EDGE TRIGGER,15MHZ	1	E28
49	49	1910645-00	75452 DRIVER,PERIPH,DUAL,NAND	2	E37,E44
50	50	1910406-00	75451 DRIVER,PERIPH,DUAL,AND	2	E38,E45
51	51	1910652-00	74174 FF-D HEX	1	E40
52	52	9006735-00	EYELET, FUNNEL FLANGE, .059 OD X .187 LG	8	TP1-TP8
53	53	9009122-00	FUSE, SUB-MINI, .062A, 125V, AXIAL LEAD	8	F1-F8
54	54	9009185-00	JUMPER, WIRE, INSULATED, BLACK BAND	2	W1,W2
55	55	1211164-06	SW,DIP 1P 1A 10POS \$	1	E17
56	56	1214354-00	SW,ROT 3P 4A 2 SECTION	4	S1-S4
57	57	9006732-00	EYELET, ROLLED FLANGE, .121 OD X .219 LG	4	
58	58	C-MD-7420191-0-0	7420191-00 HANDLE	1	
59	59	C-MD-7420192-0-0	7420192-00 HANDLE RETAINER	2	

DIGITAL EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS	TITLE I/A	PARTS LIST	SIZE K	CODE PL	DOCUMENT NUMBER A6002-0-DBP	REV C
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NOTE:
 1. UNLESS OTHERWISE SPECIFIED, THE FOLLOWING PIN NUMBERS APPLY:
 PACKAGE TYPE VCC GND -VCC
 16 PIN DIP 16 7 -
 14 PIN DIP 14 7 -
 DEC DC 02 20 10 -
 DEC DC 05 20 10 -
 2505 7 10 -
 AD2700 13 7 -

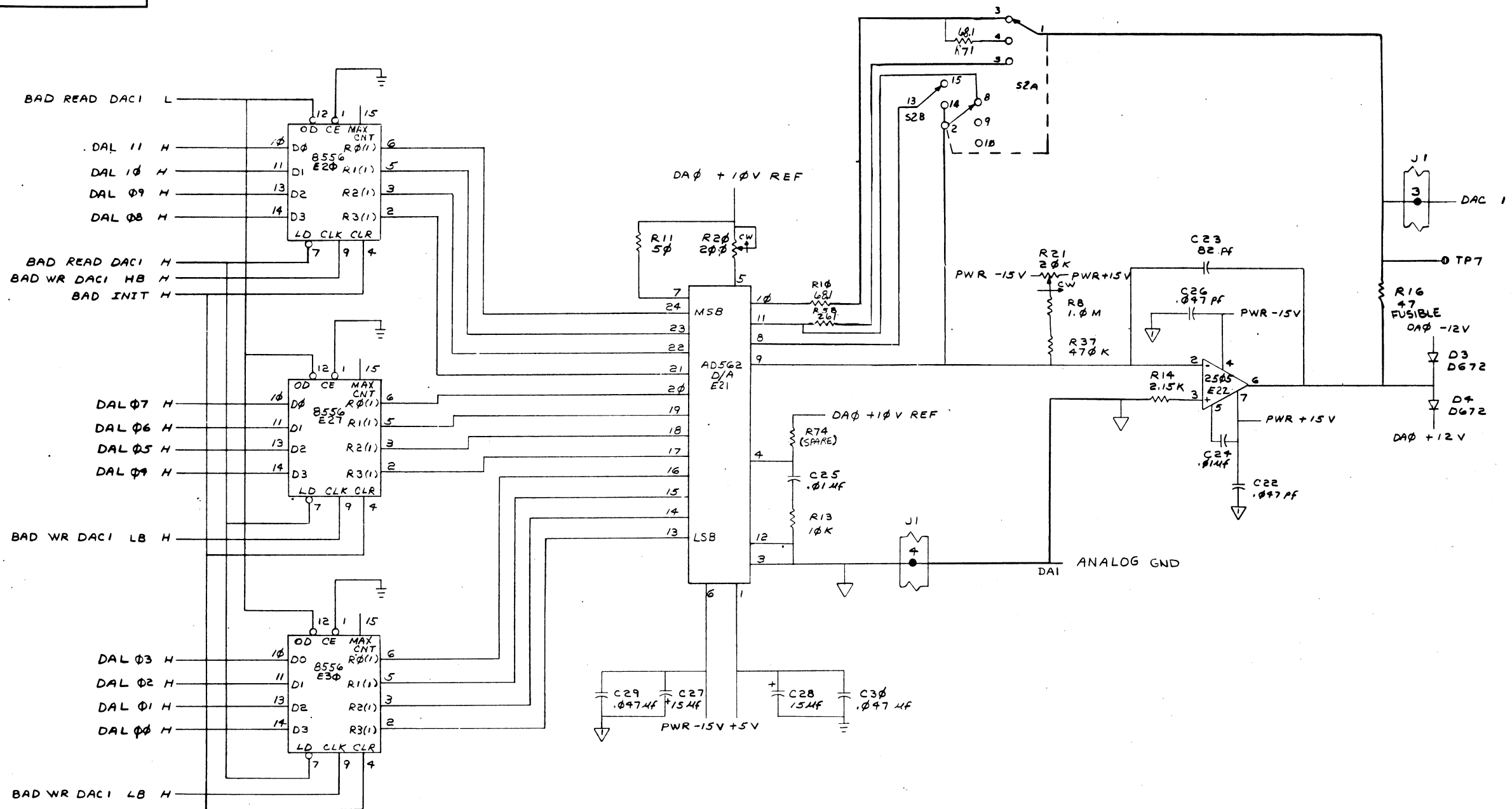


AC2, BC2
 AJ1, BJ1
 AM1, BM1
 AT1, BT1
 CC2, DC2
 CT1, DT1
 AH1

BUS ADDRESS & DATA

DRG: <i>William Scott</i>	FIRST USED ON	digital
CHK'D: <i>W. Scott</i>	TITLE	4 CHANNEL D-A
ENG: <i>W. Scott</i>	PROJ. ENG: <i>W. Scott</i>	(BAD)
PROD: <i>W. Scott</i>	NEXT HIGHER ASSY.	
B-DD-A6002-0	SIZE CODE	NUMBER
SCALE NONE	D	CSA6002-0-1
SHEET 1 OF 7	DIST.	REV. C

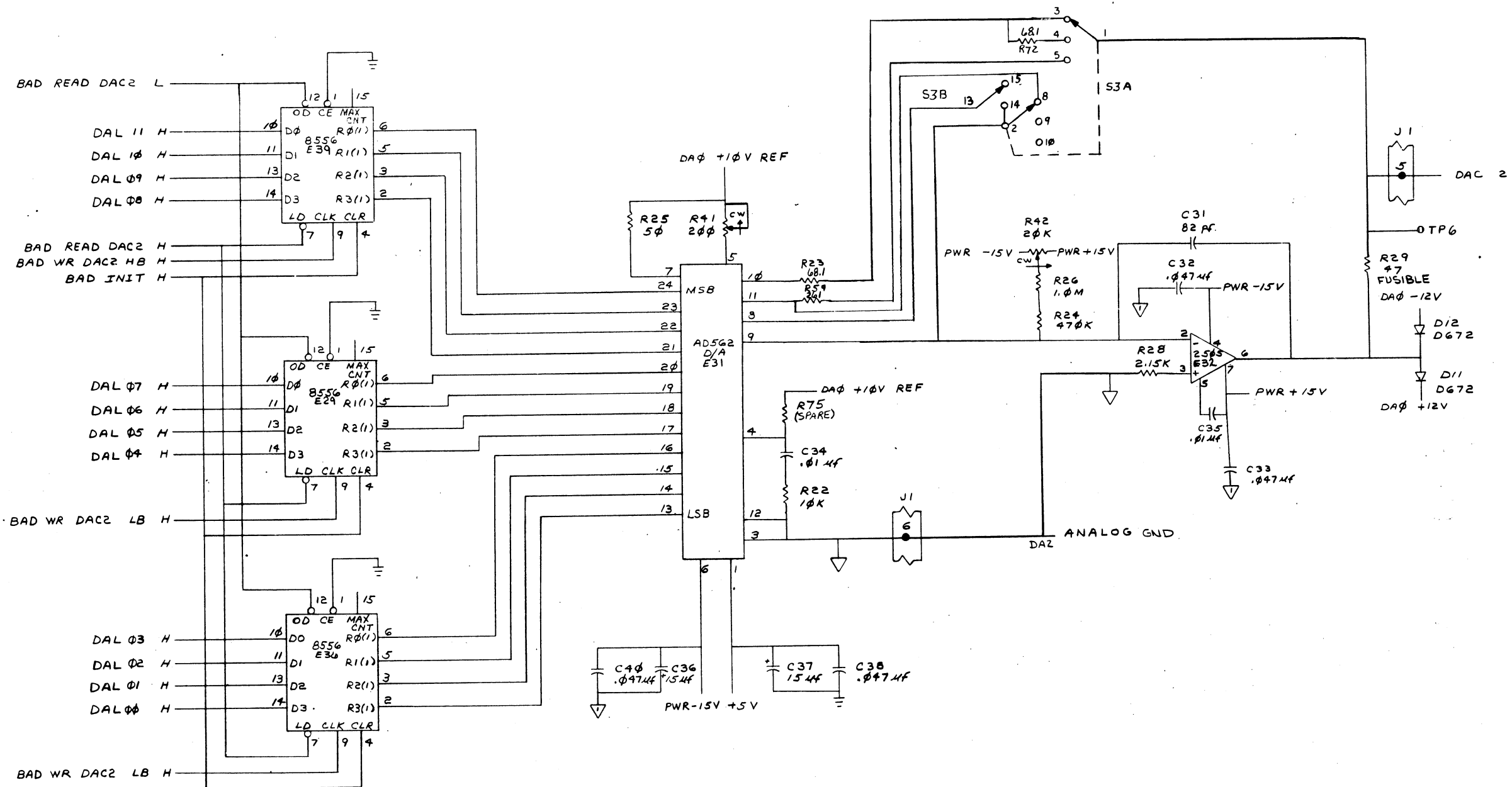
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REVISIONS		
CHK	CHANGE NO.	REV.

TITLE		DAI		SIZE CODE		NUMBER		REV.	
4 CHANNEL D-A (DAD2)		DCS		A6002-01		C			
SCALE		SHEET 3 OF 7		DIST.					

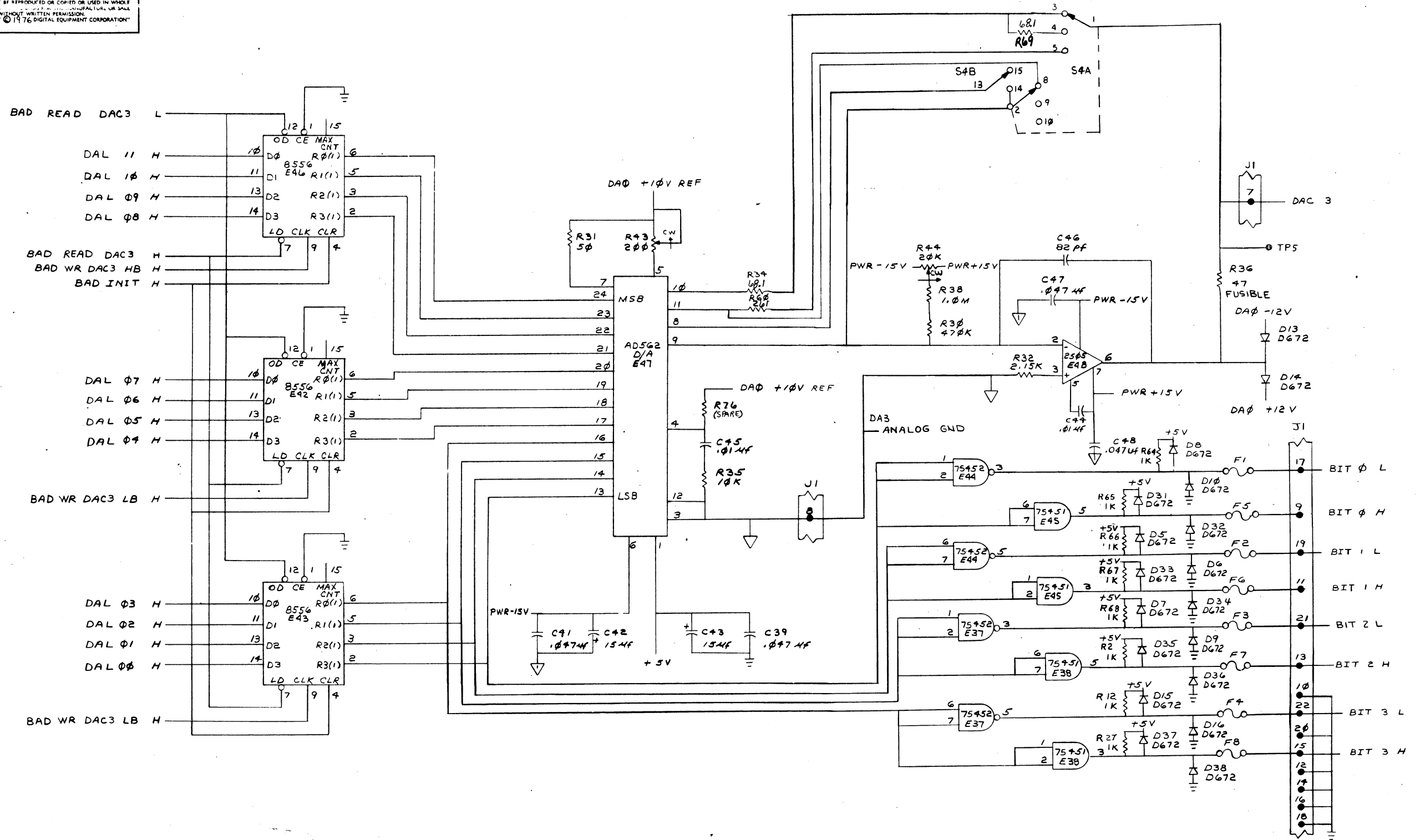
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REVISIONS		
CHK	CHANGE NO.	REV.

DA2		TITLE	4 CHANNEL D-A (DAY1)	SIZE CODE	NUMBER	REV.
					DCSA6002-0-1	C
		SCALE		SHEET	4 OF 7	

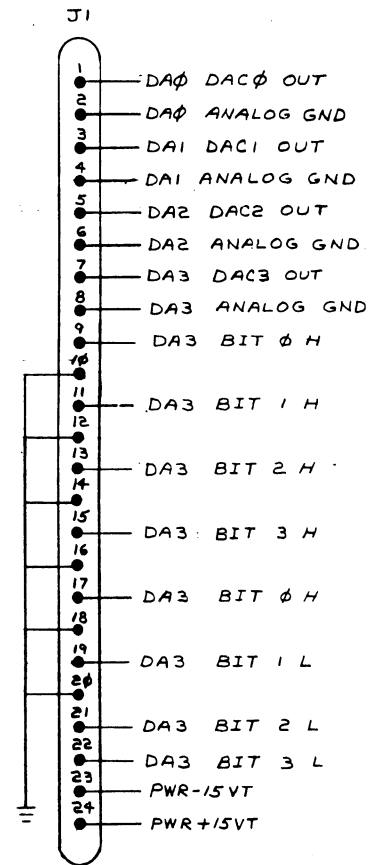
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REVISIONS		
CHK	CHANGE NO.	REV.

TITLE		DA3		SIZE CODE		NUMBER		REV.	
4 CHANNEL		D-A		DCS		AG002-0-1		C	
SCALE		SHEET 5 OF 7		DIST.					

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REVISIONS		
CHK	CHANGE NO.	REV.

TITLE	4 CHANNEL D-A	SIZE CODE	DCS A6002-0-1	NUMBER	C	REV.	C
SCALE	→	SHEET	7 OF 7	DIST.			

5

1

7

1

1

1

1

1

1

1

1

1

1

1

1

1

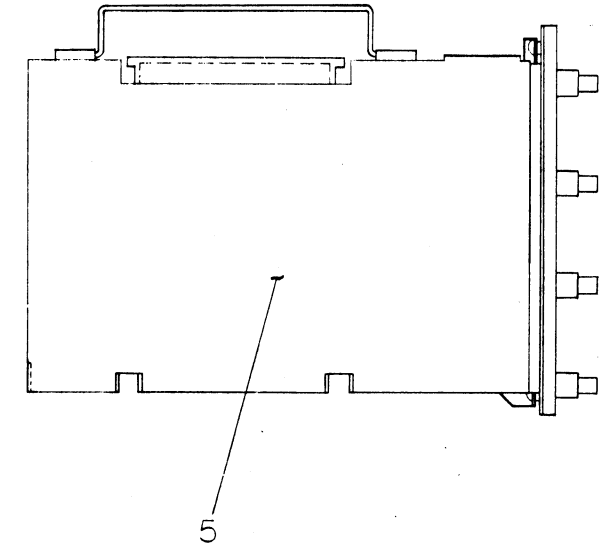
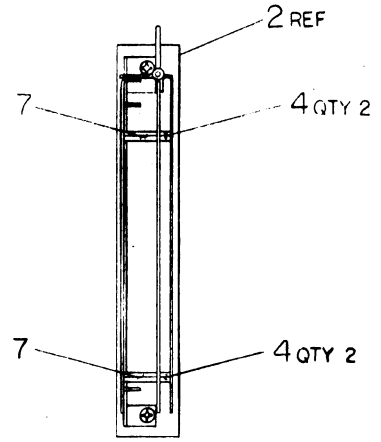
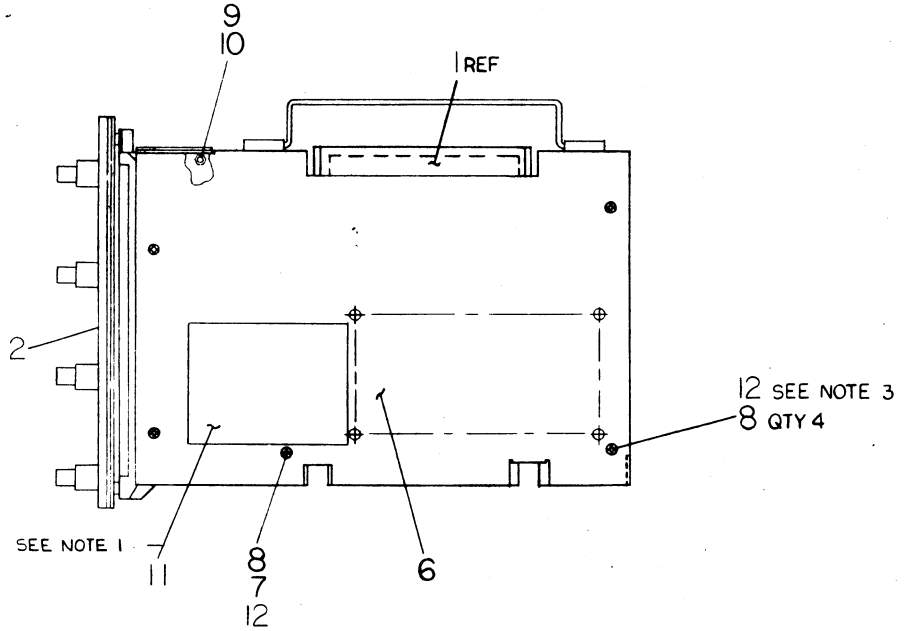
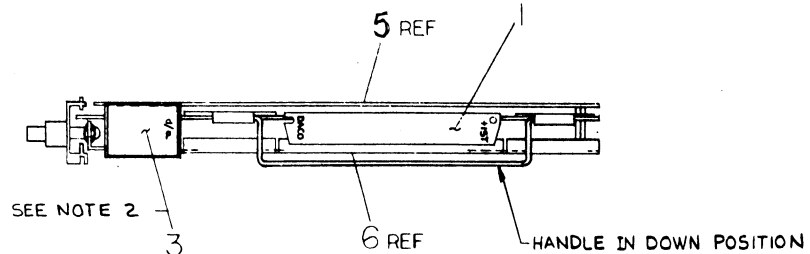
1

PART LOGIC NUMBER

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NOTES:

1. ITEM #11 IS PUT ON BY ALIGNING THE RIGHT HAND EDGE OF DECAL UP AGAINST HOLES AND BOTTOM EDGE JUST ABOVE MOUNTING HOLE.
2. ITEM #3 IS PUT ON BY ALIGNING THE TOP EDGE AND RIGHT HAND EDGE EVEN WITH THE TOP EDGE AND RIGHT HAND EDGE OF ITEM #5.
3. USING ITEM #12 ADD ONE DROP TO EACH LOCATION.

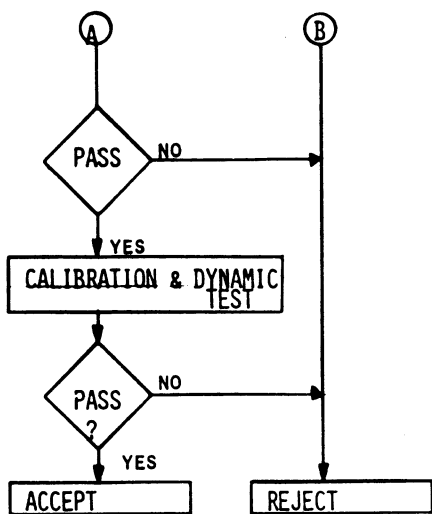


1	PACKAGING INSTRUCTIONS	A-SP-3700358-C6	14
REF	CHKOUT # ACCEPT. PROCEDURE	A-SP-MNCAA-0-3	13
A/R	LOCKTITE	9009321	12
1	DECAL, INFORMATION (MNCAA)	A-DC-3615264-3-0	11
1	NUT, KEPS #6-32	9008185	10
1	WASHER, FLAT	9006653	9
5	SCR, FLAT HD #6-32 x .25	9006020-02	8
3	SPACER, THREADED #6-32 x .88	9006861	7
1	PLATE, COMP. SIDE	D-MD-7419869-0-0	6
1	PLATE, ETCH. SIDE	D-1A-7419868-0-0	5
4	SPACER, THREADED #6-32 x .25	9006841	4
1	DECAL, I/O SCHEMATIC	A-DC-3615260-3-0	3
1	MNCAA SUB-ASSY	D-AD-7015068-0-0	2
1	CONN ASSY, I/O	D-1A-7014153-3-0	1

REV.	CHANGE NO.	CHK
1	1	EDP
2	1	TOP
3	1	AEI

THIRD ANGLE PROJECTION		FIRST USED ON	
REMOVE BURRS AND BREAK SHARP CORNERS		MATERIAL SEE PARTS LIST	
DO NOT SCALE DWG		FINISH NONE	
DRN. <i>[Signature]</i>	CHK'D <i>[Signature]</i>	ENG. <i>[Signature]</i>	PROJ. ENG. <i>[Signature]</i>
NEXT HIGHER ASSY.		SCALE 1/2	SHEET 1 OF 1
TITLE MNCAA UNIT ASSY		SIZE CODE D UA	NUMBER MNCAA-0-0
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		REV. A	DIST.

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE



SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

2.0 INSTALLATION

2.1 Address

The four DAC addresses are selected through the single switch pack mounted on the PC board and accessible through the component side cover.

The four addresses are consecutive and are set by selecting the first address on the 10 position switch pack. Each remaining address is always 2 octals higher than the previous address.

Base Address:

DAC0 Octal Address 17WXY0

DAC1 Octal Address 17WXY2

DAC2 Octal Address 17WXY4

DAC3 Octal Address 17WXY6

Select and set the Base Address, refer to decal on component side cover.

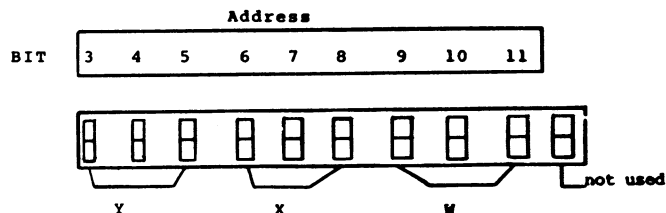


Figure 2.1 Address Switch Pack

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

2.2 Location

The MNCAA is considered a digital option and can be inserted into any of the 8 available MINC slots. Up to 8 MNCAA options can be plugged into the MINC-11 system. With power off insert the MNCAA option into the selected slot.

If any MNCAD option is in the MINC-11 system then the MNCAA option must be inserted to the right of the MNCAD option.

2.3 Test Module

If the MNCAA test module is available, it should be plugged into the I/O connector fingers on the top of the MNCAA; at this point before power to the MINC-11 is applied.

2.3.1 No Test module

If no test module is available, plug the standard I/O connector into the I/O fingers.

2.4 Power Up

All other options to be tested and any of their test modules should be mounted in the system, then power may be applied.

2.5 Diagnostics

The MNCAA Diagnostic (DVMND-A) should now be loaded into memory (refer MAINDEC11-DVMND-A). There are 2 starting locations. Starting location 200 is used for initial start up, and location 204 is used for restarting program after a halt.

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

3.0 ACCEPTANCE

3.1 General Information

Upon loading the diagnostic and starting at 200, the diagnostic will type out the old software switch register and what the new software switch register should be. Refer to DVMND-A for explanation of software switches. After inputting the desired switch settings and pressing a carriage return the program will then type the following menu:

- L = LOGIC TEST
- R = RAMP OUTPUT TEST
- S = STATIC CALIBRATION TEST
- D = DYNAMIC CALIBRATION TEST
- B = BASE ADDRESS CHANGE
- O = OUTPUT DWARD LED LOOP
- G = GET NEW SWITCH REGISTER VALUE
- H = HELP THE OPERATOR AND RETYPE THIS LIST

A CNTRL C is used to abort the run of any of the above tests and get the user back to the statement "Type the Test Character" then depress "return key".

A CNTRL G is used at any time during the running of a test to change the software switch register.

3.2 Logic Test

Type "L" to start the Logic Test. The following message will be typed:

PROGRAM DETECTED "X" MNCAA(D/A)'S

At this point X will be a numeric value from 1 to 8 depending on how many MNCAAs are in the MNC-11 system. If no errors are detected then the following will be typed:

END PASS # A; TOTAL ERROR COUNT = Y

A = Pass Number

Y = Total Errors Detected

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

ENGINEERING SPECIFICATION CONTINUATION SHEET

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

A minimum of 10 passes should be run to ensure that the Logic section of the MNCAA is working properly.

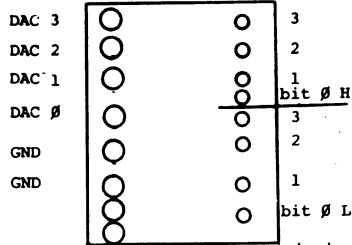
3.3 Output Test

Upon completion of Logic Test type a CNTRL C. The following message will then be typed out:

"TYPE THE "TEST CHARACTER" THEN DEPRESS "RETURN KEY"

3.3.1 Type "0" and carriage return. This will check out the 4 data bits of DAC3 that are brought out to the I/O converter.

There are 8 LED's mounted on top of the MNCAA module. See Figure 1 below.



3.3.2 The diagnostic will turn Bit Ø L off and Bit Ø H on. The program will then go to Bit 1 then 2 then 3 and then repeat itself. After running this test and insuring the 4 data bits High and Low are working properly, type CNTRL C.

3.4 Ramp Test

Type "R" and carriage return. The program is now ready to run the Ramp Output Loop.

3.4.1 Set all front panel switches, large knob to 5 and small knob to +.

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

ENGINEERING SPECIFICATION CONTINUATION SHEET

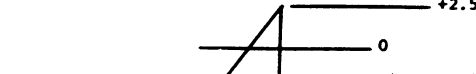
TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

3.4.2 The program generates a ± 5 volt ramp on all four D/A's. To observe the ramp connect an oscilloscope to DACØ (yellow plug) and the gnd strap to gnd (black plug). The ramp should look as shown -

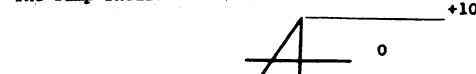


repeat this step for DAC1, DAC2, and DAC3.

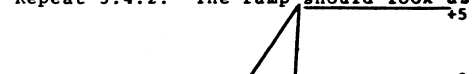
3.4.3 Set large knob to "2.5" small knob to "+" repeat 3.4.2. The ramp should look as shown.



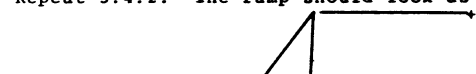
3.4.4 Set large knob to "10" small knob to "+" repeat 3.4.2. The ramp should look as shown.



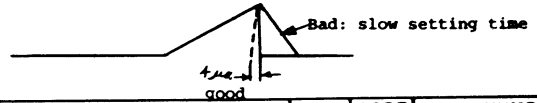
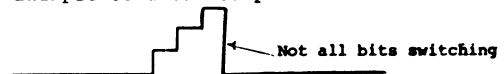
3.4.5 Set large knob to "0-5", set small knob to "+". Repeat 3.4.2. The ramp should look as shown.



3.4.6 Set large knob to "0-10". Set small knob to "+". Repeat 3.4.2. The ramp should look as shown.



3.4.7 Example of a bad ramp.



SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

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TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

3.4.8 Set all front panel switches; large knob to "5"; small knob to "+".

3.5 Calibration Test

After completing the ramp test to insure that all channels are working properly, type a "CNTRL C". Type a "S" carriage return in response to the question type on the terminal.

This test loads the octal number generated in the software switch register, by use of CNTRL G, into the 4 D/A's. To monitor the D/A output range use a five digit DVM, (refer to Figure 1 for proper connection to DAC outputs), to measure the DAC output.

NOTE: All voltages monitored at test jack on test module (if test module is not available refer to Table 1 for pin assesment).

3.5.1 To adjust the D/A converter, type CNTRL G, then type the appropriate octal number as shown in Table 2 and adjust the proper potentiometer to the desired voltage as shown.

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

ENGINEERING SPECIFICATION CONTINUATION SHEET

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

TABLE 1

Signal Name	I/O Connector
DAC Ø	1
Analog Gnd	2
DAC 1	3
Analog Gnd	4
DAC 2	5
Analog Gnd	6
DAC 3	7
Analog Gnd	8
Bit Ø H	9
Logic Gnd	10
Bit 1 H	11
Logic Gnd	12
Bit 2 H	13
Logic Gnd	14
Bit 3 H	15
Logic Gnd	16
Bit Ø L	17
Logic Gnd	18
Bit 1 L	19
Logic Gnd	20
Bit 2 L	21
Bit 3L	22
-15T	23
+15T	24

SIZE	CODE	NUMBER	REV
A	SP	MNCAA-0-4	

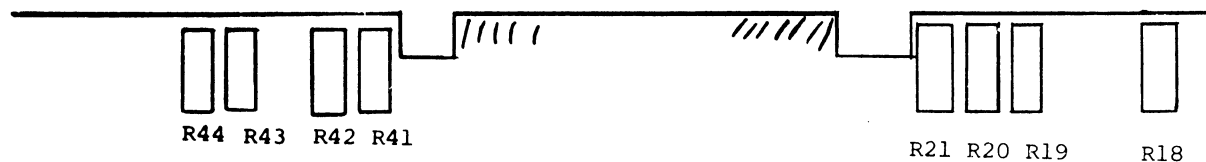
ENGINEERING SPECIFICATION

CONTINUATION SHEET

TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

TABLE 2

IN	LOAD	DAC0	DAC1	ADJUST DAC2	DAC3	FOR.
Offset	Adj 0000	R19	R21	R42	R44	-5.1200
Gain	Adj 7777	R18	R20	R41	R43	+5.1175



The output should be adjusted to the desired voltage with a tolerance better than $\pm 1mV$.

3.6 Dynamic Test

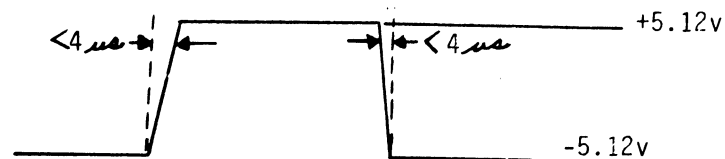
After completing the Calibration Test type a "CNTRL C". Type "D" carriage return in response to the question typed on the terminal.

3.6.1 This test checks for settling errors of the 4 D/A's.

3.6.2 Type "CNTRL G" - type 7777 in response to question and then a carriage return.

3.6.3 Connect an oscilloscope to the output of the D/A's (refer to Figure 1).

3.6.4 The output signal should be switching from -5.12V to +5.12V.



SIZE A	CODE SP	NUMBER MNCAA-0-4	REV
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ENGINEERING SPECIFICATION

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TITLE MNCAA INSTALLATION/ACCEPTANCE PROCEDURE

4.0 ACCEPTANCE WITHOUT TEST MODULE

If MNCAA-TA Test Module is not available, use the I/O connector 7014153-3-0 supplied with option. Refer to Table 1 for correct pin locations. Repeat Section 3.0 using the I/O connector.

4.1 When implementing Section 3.3.1 use an oscilloscope to check that the data bits at switching.

SIZE A	CODE SP	NUMBER MNCAA-0-4	REV
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