FIELD MAINTENANCE PRINT SET

TABLE OF CONTENTS

UNIT VARIATIONS COVERED BY THIS PRINT SET
MCA2Ø

MCA2Ø

Field Maintenance Print Set

Digital Equipment Corporation

PRINT SET REORDER NO.:
MPØØ267

REVISIONS	REV.	CHG. NO.	DATE

USED ON OPTION/MODEL
MCA2Ø

SHEET I OF 1

DRN. M. Pacunski	DATE 3 Nov 76	digital
CHK'D M. Cychie	DATE 4 Nov 76	TITLE: CACHE UPGRADE KIT (KL1Ø-C)
PROJ. ENG.	DATE 4 Nov 76	
FIELD SERV. L. K. Chow	DATE 17 Nov 76	

SIZE	CODE	NUMBER	REV.
B	TC	MCA2Ø-Ø-1	

DIST.

DRB 124

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

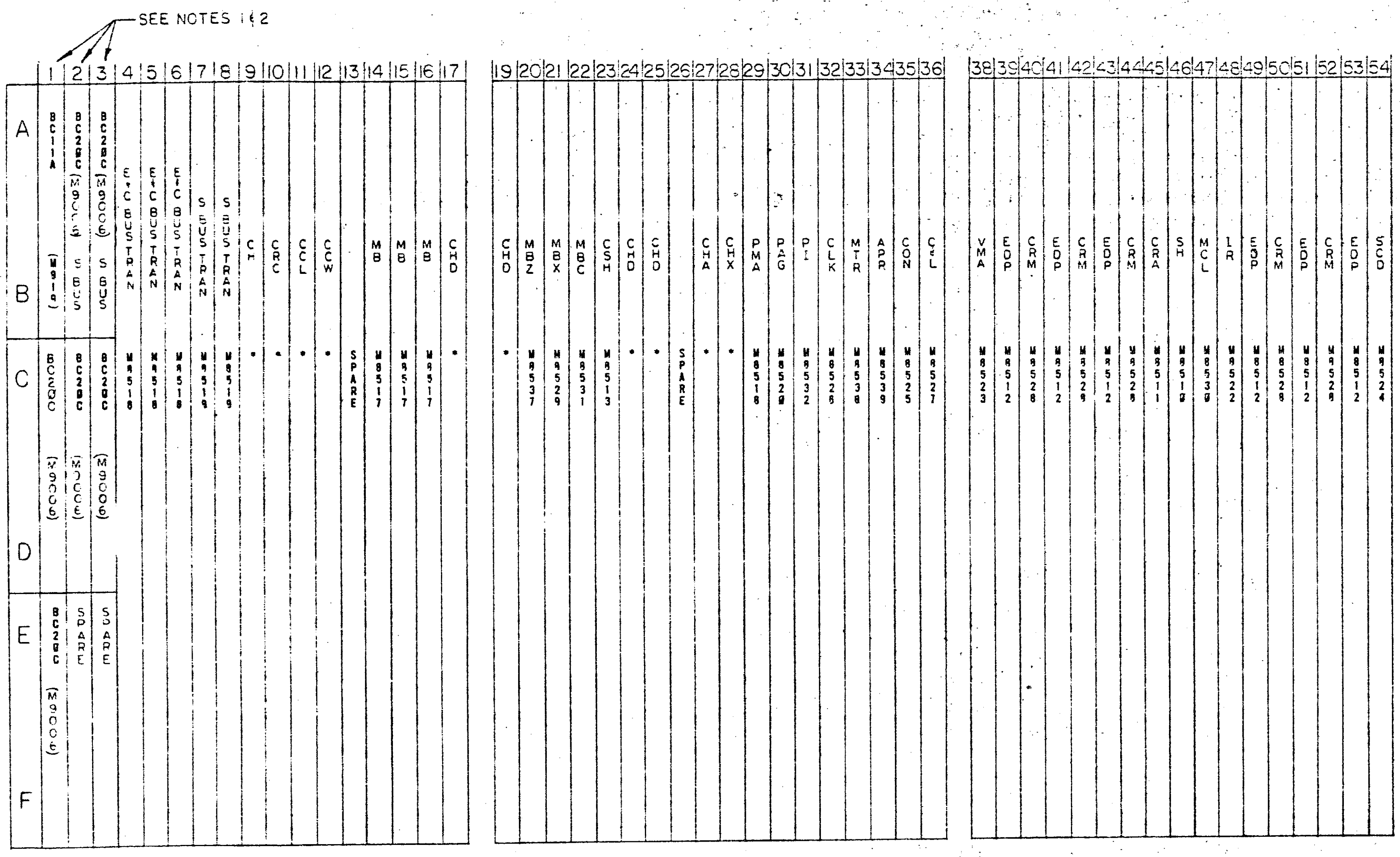
PARTS LIST

MADE BY M. PASCARELLI DATE 1 NOVEMBER 1976	CHECKED J. [illegible] DATE 4 Nov 76	SECTION
ENG [illegible] DATE 12 [illegible] 76	PROD W. Fahey DATE 12 Nov 76	ISSUED SECT.

ITEM NO.	DWG NO. / PART NO.	DESCRIPTION	QUANTITY VARIATION
1	D-UA-M8521-Ø-Ø	CACHE DATA	4
2	D-UA-M8515-Ø-Ø	CACHE EXTENSION	1
3	D-UA-M8514-Ø-Ø	CACHE DIRECTORY	1

TITLE CACHE UPGRADE KIT (KL1Ø-C)	ASSY NO. B-DD-MCA2Ø-Ø SHEET 1 OF 1	SIZE A	CODE PL	NUMBER MCA2Ø-Ø-Ø	REV.	ECO NO	DIST

DEC FORM DRA 110 DEC 16 (325)-1031-N870



REF. PIN SIDE
* SEE MODULE VARIATION TABLE

VARIATION MODULE LOCATION CHART			
SLOT	MODULE/VARIATION		
	CACHE NO CHANNEL	CHANNEL NO CACHE	CACHE & CHANNEL
9	M8549-YA	M8533	M8533
10	NONE	M8535	M8535
11	M8549 YD	M8538	M8538
12	M8549 YB	M8534	M8534
17	M8521	M8549-YH	M8521
18	NONE	NONE	NONE
19	M8521	M8549-YH	M8521
24	M8521	M8549-YH	M8521
25	M8521	M8549-YH	M8521
27	M8514	M8549-YE	M8514
28	M8515	M8549-YF	M8515
	KLIØ AA, AB REF	KLIØ CA, CB REF	KLIØ BA, BB, BC, BD REF

NOTES:

1. SLOT 2 & 3 (SBUS) BC20C CABLES FROM INTERNAL MEMORY, OR DMA20 OR EMPTY
2. SLOT 1 (E AND C BUS) BC11A & BC20C CABLES FROM DTE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

THIRD ANGLE PROJECTION

REMOVE BURRS AND BREAK SHARP CORNERS

DO NOT SCALE DWG

FIRST USED ON KLIØ

digital

TITLE MODULE UTILIZATION (CPU)

SIZE D CODE MU NUMBER KLIØ-Ø-CPU REV. A

The following are the procedureal steps in upgrading a non-cache 2Ø system to a cached 2Ø system. It is necessary to follow these steps in order.

Test equipment required:

1) Digital Voltmeter accuracy ± 0.05% or better DC voltages.
2) Oscilloscope (Teletronic type 465, 475, 7000 series, or equivaaccuracy).
3) 3 Probes of equal length.

1) Run all system diagnostics at CRØ, CSØ (25 MHZ) and CRØ, CS1 (28 MHZ). Follow Appendix A. If any failures occur in this step, problems must be resolved before continuing the upgrade procedure.

2) Power system down and remove the following modules:

M8549YH	Slot 17
M8549YH	Slot 19
M8549YH	Slot 24
M8549YH	Slot 25
M8549YF	Slot 27
M8549YF	Slot 28

3) Install the following modules:

M8521	Slot 17
M8521	Slot 19
M8521	Slot 24
M8521	Slot 25
M8514	Slot 27
M8515	Slot 28

Reference documentation for Steps 2 and 3.

KL10 - C/VOL. 2
Print KL1Ø-Ø-CPU
Module Utilization (CPU)

4) Add C backpanel wire from 4E43A1 to 4D44E1 (cache available).

5) Power up system and check all DC power in entire system at this point with digital voltmeter.

DC (TTL) voltage tolerance (Measured at module power) (pins.)	+5.Ø + or -0.023 volts -5.Ø + or -0.025 volts -15.Ø + or -0.075 volts +20.Ø + or -0.100 volts	± 5%
DC (ECL) Voltage tolerance (Measure at sense tabs on) (CPU Backplane.)	-5.2 + or -.050 volts -2.Ø + or -.050 volts	± 1%

6) Check timing following the MA2Ø/MB2Ø/RH2Ø adjustment procedure accompanying this document; Appendix B.
.If any timing is not within ± 1.0 Nsec of 50% points on the wave forms, readjust to within ± 1.0 Nsec before continuing with upgrade procedure.

7) Rerun all CPU, memory and system diagnostics as listed in Appendix A.

8) Run DFKFB (instruction timing test)at CRØ, CSØ (25 MHZ) and compare the output with the accompanying document Appendix C. The times should differ only in the least significant digit.

Appendix A

CPU Tests

1) DGKAA	-	E BOX test #1
2) DGKAB	-	E BOX test #2
3) DGKAB	-	M BOX test #1
4) DGKBB	-	Memory Control Test
5) DGKBC	-	Paging Logic Test
6) DGMCA	-	Cache Option Test
7) DGMCB	-	Ram Bunger test
8) DGKBD	-	Channel Logic test
9) DGKBE	-	Channel Loopback test
10) DGKCA	-	Meter Board Test
11) DFKBB	-	Cache Reliability
12) DFKAA	-	Basic Instruction test #1
13) DFKAB	-	Basic Instruction test #2
14) DFKAC	-	Basic Instruction test #3
15) DFKBA	-	Basic Instruction Reliability
16) DFKCA	-	Advanced Instructions
17) DFKDA	-	CPU/PI/Memory Reliability
18) DFKEA	-	Paging Hardware
19) DFKEB	-	MUUO and User Mode Test
20) DFKAD	-	Basic Instruction test #4

DTE 20 Tests

1) DGDTE	-	Basic DTE test
2) DFDTE	-	DTE Reliability test

DMA20/MA20/MB20 Tests

1) DDMMD	-	Memory Exerciser
2) DDMME	-	BLT test
3) DDMMF	-	Floating Ones & Zeros test
4) DDMMG	-	Memory Exerciser (Over 256K)
5) MARGN.CMD		Auto Memory Margins

LP20 Test

1) DZLPL	-	LP20 Logic & Printer Test

RH20 Tests

1) DFRHB	-	Tests RH20's - does not use any mass bus devices.
2) DFSXA	-	System 20 exerciser - tests RH20's with or without mass bus devices.

TU45/TM02 Tests

1) DFRHP	-	RH20 Fault Isolator
2) DFTUE	-	TU45 Device test
3) DFTUF	-	TU45 Multi-Device test

Appendix A (Continued)

RP04/RP05/RP06 Tests

1)	DFRPH	- RP04 Device Test
2)	DFRPJ	- RP05 Device Test
3)	DFRPK	- RP06 Device Test
4)	DDRPI	- RP04/RP05/RP06 Reliability Test

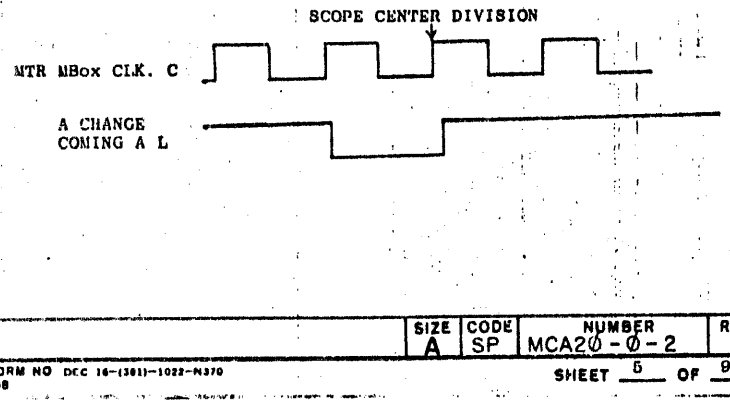
APPENDIX B

MA2Ø DESKEW PROCEDURE

Notes:
1. Use equal length probes with short ground clips.
2. Select CSØ, CRØ, (25MHZ) on KL1O.
3. The M8562 delay lines are arranged so that (A) clock is the top pot and (B) clock is the bottom pot.
4. A 7ØØØ series or equivalent scope should be used when deskewing the MA2Ø.
5. The scope sweep rate should be 5ns or less per CM.

MA2Ø DESKEW PROCEDURE (ON LINE)

1. Attach Channel A probe to Pin 4D33P1. The signal name is: MTR MBox Clk. C.
2. Attach Channel B to 4E22F2. The signal name is: A Change Coming A L. Set the scope to alternate trace.
3. Observe on the scope the relationship of the MTR MBox Clk. C to A Change Coming A L.
4. See the figure below. Set the signal position accordingly.
5. Now move Channel B probe to Pin 5D26A1. Adjust the upper delay line on the M8562 in EFØ' of the MA2Ø so that the leading edge 5Ø percent point crosses the previously set center division on the scope screen.
6. Now move Channel B probe to 5D29A1. Adjust the delay line on the M8562 in slot EF54 as in Step 5.
7. Next, move Channel B probe to Pin 5D26K1. Adjust the lower M8562 delay line in EFØ1 so that the leading edge aligns with the third MTR MBox Clk. C from which the clocks were previously aligned. Center the clock on a scope division line. Now align leading edges.
8. Now move Channel B Probe to 5D29K1. Adjust Clocks as in Step 7 for the M8562 in Slot EF54.



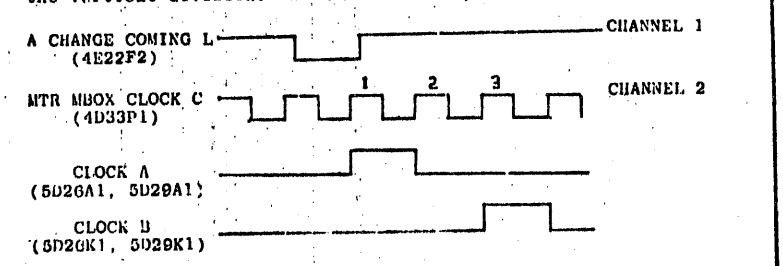
APPENDIX B

MB2Ø DESKEW PROCEDURE

Notes:
1. Use equal length probes with short ground clips.
2. Select clock rate Ø on KL1Ø (for on line deskew procedure).
3. The M8565 delay lines are arranged so that (A) clock is the top pot and (B) clock is the bottom pot.
4. A 7ØØØ series or equivalent scope should be used when deskewing the MB2Ø.
5. The scope sweep rate should be 5ns or less per CM.

MB2Ø DESKEW PROCEDURE (ON LINE)

1. Set clock rate to "CRØ", clock "source to "C5Ø", Type "FX1" to turn the clock on.
2. Place channel 1 probe on Pin 4E22F2 "A Change Coming A L", sync on channel 1.
3. Place channel 2 probe on Pin 4D33P1 "MTR MBox clock C".
4. Align the rising edge of the pulse designated as 1, so that the 5Ø% point crosses the second vertical division of the scope screen. Note this position.
5. Place channel 2 probe on Pin 5D26A1. Adjust the top delay on the M8565, slot 5EFØ1 so that the leading edge 5Ø% point crosses the second vertical division of the scope screen.
6. Place channel 2 probe on Pin 5D29A1. Adjust the top delay on the M8565, slot 5EFØ1 so that the leading edge 50% point crosses the second vertical division of the scope screen.
7. Replace channel 2 probe on Pin 4D33P1 "MTR MBox Clock C".
8. Align the leading edge of the pulse designated as 3, so that the 50% point crosses the nearest vertical division mark of the scope screen. Note this position.
9. Place Channel 2 probe on Pin 5D26K1. Adjust the bottom delay on the M8565. Slot 5EFØ1 so that the leading edge 50% point crosses the vertical division. Mark note in Step 8.
10. Place Channel 2 probe on Pin 5D29K1. Adjust the bottom delay on the M8565, Slot 5EF54 so that the leading edge 50% point crosses the vertical division. Mark Note in Step 8.



APPENDIX B

RH20 DESKEW PROCEDURE

Use a 475 or a 4 trace scope.
All the RH20's are deskewed to MBOX CLK that produces CHTØ in the channel. Recheck skew whenever the CBUS cable or M8556 board is replaced. The pots to be adjusted are on the M8569 board. The top pot is for RH20 #0, second pot for RH20 #1 etc.

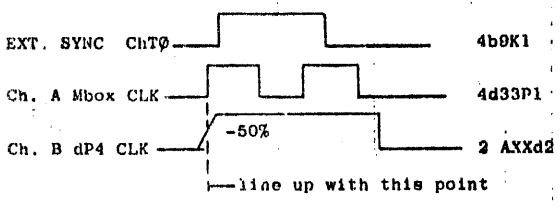
1) Load Micro Code. Set CSØ-CRØ, FX1.

2) Sync Positive - External sync on 4B9K1 --- Ch TØ H -- (Ch C1).

3) Ch A on 4D33P1 - MBOX CLK H - (MTR 2).

4) Ch B on 2 AXXD2 - DP1 CLK H - (DP4).

5) Align 1 AXXD2 with the 50% point of the MBOX CLK that happens approximately 10 ns before the CHTØ CLK.



RH20	PIN #
0	2 A36D2
1	2 A33D2
2	2 A30D2
3	2 A27D2
4	2 A24D2
5	2 A21D2
6	2 A18D2
7	2 A15D2

Appendix C

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PDP-10 KL10 INSTRUCTION TIMING TEST (DFKFB)
VERSION 0.1, SV=0.11, CPU#=0, MCV=126, MCO=0, HO=30, 60HZ

SWITCHES = 000000  000000
CLK SOURCE = NORMAL, CLK RATE + FULL, AC BLK 0, CACHE: 0 1 2 3

 1 - BASIC CLOCK CYCLE IS 40 NSEC.
 2 - INDEXING TAKES 40 NSEC.
 3 - INDIRECT TAKES 280 NSEC.
 4 - INDEXING AND INDIRECT TAKES 320 NSEC.
 5 - MOVEI TAKES 320 NSEC.
 6 - MOVE FROM AC TAKES 440 NSEC.
 7 - MOVE FROM MEMORY TAKES 480 NSEC.
 8 - HRR FROM MEMORY TAKES 520 NSEC.
 9 - SETOM 0 TAKES 560 NSEC.
10 - JRST TAKES 360 NSEC.
11 - JSR TAKES 680 NSEC.
12 - PUSHJ TAKES 840 NSEC.
13 - ADD FROM MEMORY TAKES 520 NSEC.
14 - MUL (9 ADD/SUB - 18 SHIFTS) TAKES 2.52 USEC.
15 - DIV TAKES 5.58 USEC.
16 - FIX A FLOATING POINT ONE TAKES 1.04 USEC.
17 - FLTR AN INTERGER ONE TAKES 1.84 USEC.
18 - FAD (1 RIGHT SHIFT) TAKES 1.88 USEC.
19 - FAD (8 SHIFT RIGHT - 3 LEFT) TAKES 2.16 USEC.
20 - FMP (7 ADD/SUB - 14 SHIFTS) TAKES 2.80 USEC.
21 - FDV TAKES 5.72 USEC.
22 - DMOVE FROM MEMORY TAKES 880 NSEC.
23 - DFAD (1 RIGHT SHIFT) TAKES 2.44 USEC.
24 - DFAD (8 SHIFT RIGHT - 1 LEFT) TAKES 2.44 USEC.
25 - DFMP (7 ADD/SUB - 32 SHIFTS) TAKES 4.92 USEC.
26 - DFDV TAKES 10.32 USEC.
27 - CONO PI TAKES 1.92 USEC.
28 - CONI PI TAKES 3.36 USEC.
29 - DATAO APR TAKES 1.56 USEC.
30 - DATAI APR TAKES 1.76 USEC.
31 - MOVE TO MEMORY TAKES 680 NSEC.
32 - LOGICAL SHIFT (35 PLACES LEFT) TAKES 640 NSEC.
33 - LOGICAL SHIFT (35 PLACES RIGHT) TAKES 760 NSEC.
34 - LOGICAL SHIFT COMBINED (71 PLACES LEFT) TAKES 1.12 USEC.
35 - LOGICAL SHIFT COMBINED (71 PLACES RIGHT) TAKES 1.16 USEC.
36 - INCREMENT BYTE POINTER TAKES 1.00 USEC.
37 - INCREMENT AND LOAD BYTE TAKES 1.44 USEC.
38 - INCREMENT AND DEPOSIT BYTE TAKES 1.80 USEC.
39 - JFCL TAKES 880 NSEC.
40 - CAI TAKES 480 NSEC.
41 - JUMP TAKES 480 NSEC.
42 - CAM TAKES 600 NSEC.
43 - EQV AC TO AC TAKES 480 NSEC.
44 - EQV MEMORY TO AC TAKES 520 NSEC.
45 - SETOB TAKES 680 NSEC.
46 - AOS TO MEMORY TAKES 840 NSEC.
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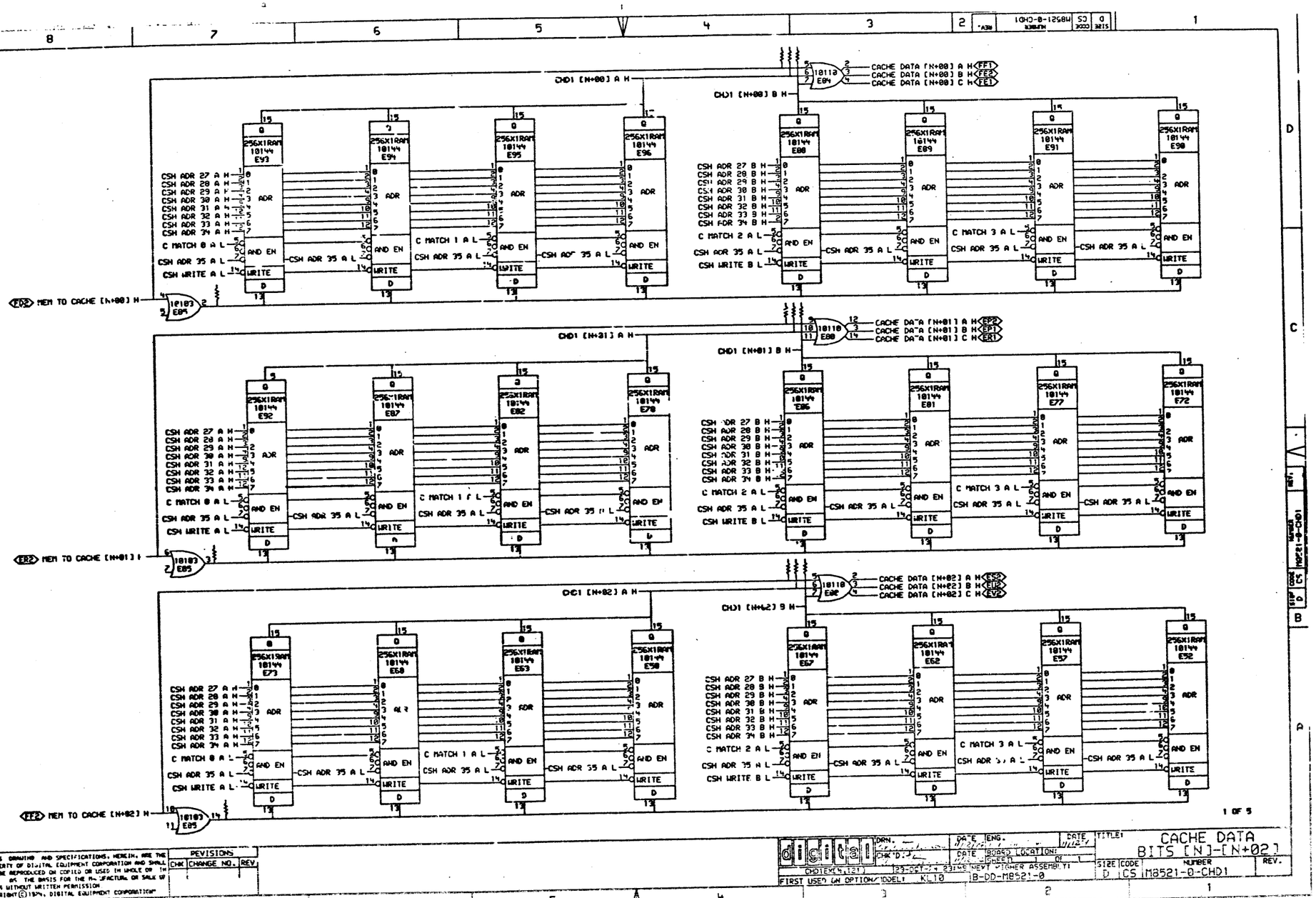
APPENDIX C (Continued)

47 - EXCHANGE AN AC WITH AN AC TAKES 640 NSEC.
48 - EXCHANGE AN AC WITH MEMORY TAKES 840 NSEC.
49 - EXECUTE TAKES 640 NSEC.
50 - BLT MEMORY TO MEMORY TAKES 1.92 USEC.
51 - BLT AC TO MEMORY TAKES 1.88 USEC.
52 - DATAI TAKES 10.00 USEC.
53 - DATAO TAKES 10.00 USEC.

TEST COMPLETED



1 OF 5

REVISIONS		
CHK	CHANGE NO.	REV
	1	

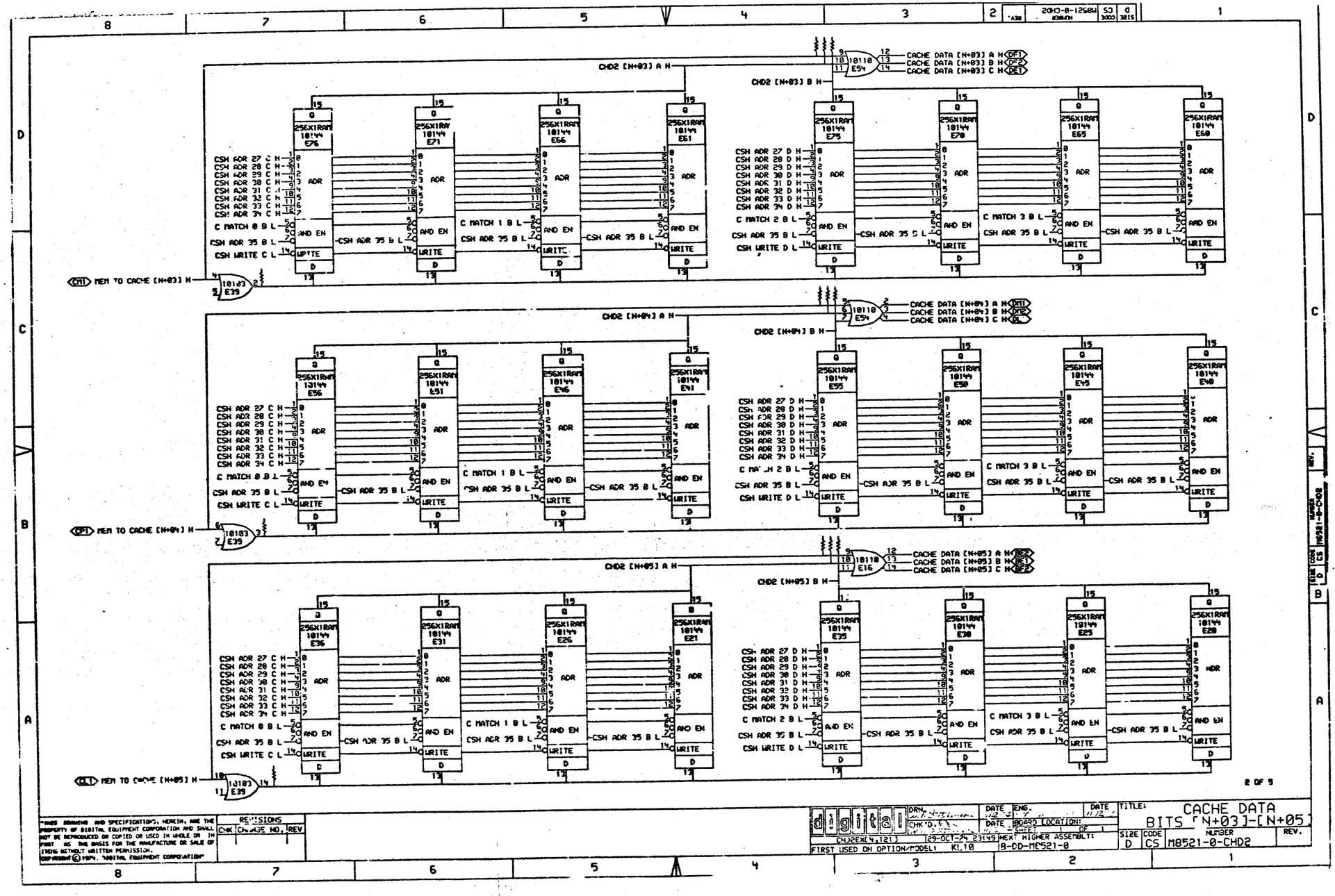
digital

DRN. — DATE — ENG. — DATE — DATE 11/17/74
CHK'D — DATE — BOARD LOCATION: — SHEET 1 OF 1

CHOICE=4,12) 23-OCT-74 23:46 NEXT HIGHER ASSEMBLY
FIRST USER (W OPTION/MODEL: KL10 B-DD-M8521-0

TITLE: CACHE DATA BITS [N]-[N+02]

SIZE	CODE	NUMBER	REV.
D	CS	M8521-0-CHD1	



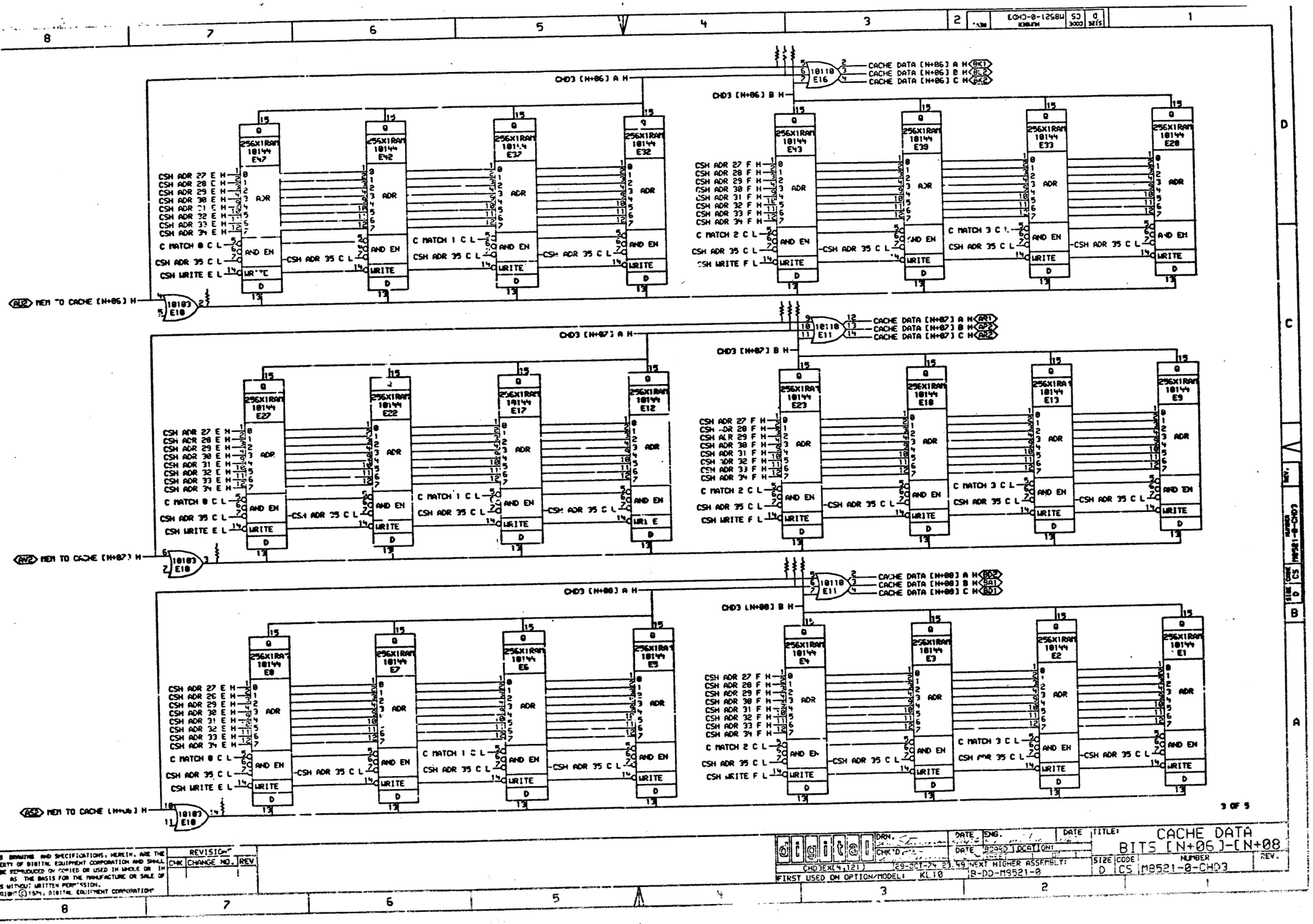
REVISIONS		
CHK	CHANGE NO.	REV

DRN. CHK'D. ENG. DATE

CHJPEX[4,121] 29-OCT-84 23:49 NEXT HIGHER ASSEMBLY:
FIRST USED ON OPTION/MODEL: KL10 B-DD-M8521-0

TITLE: CACHE DATA BITS [N+03]-[N+05]

SIZE	CODE	NUMBER	REV.
D	CS	M8521-0-CHD2	



REVISION

CHK	CHANGE NO.	REV
	1	

DRN. | CHK'D | DATE | ENG. | DATE | DATE | APPRD | DCAT | QAI

CHD3EXL4,121) 29-SEP-74 23:49 NEXT HIGHER ASSEMBLY: 8-DD-M9521-0

FIRST USED ON OPTION/MODEL: KL10

TITLE: CACHE DATA BITS [N+06]-[N+08]

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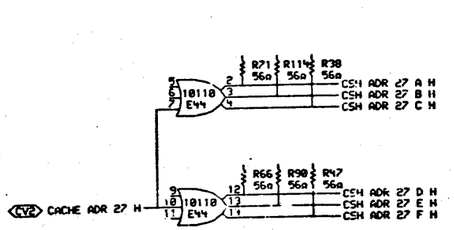
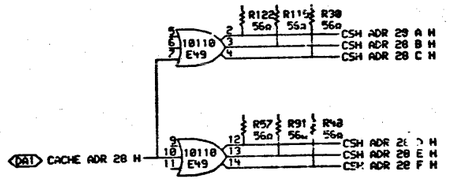
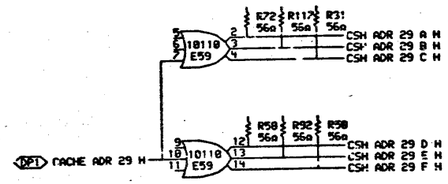
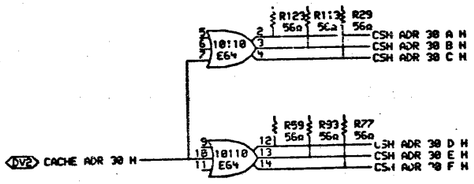
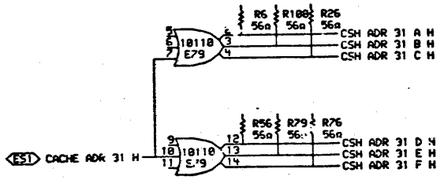
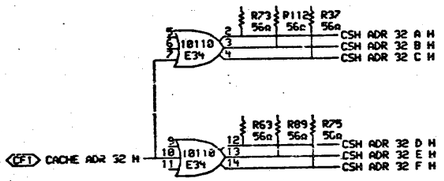


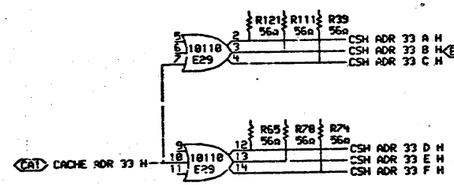


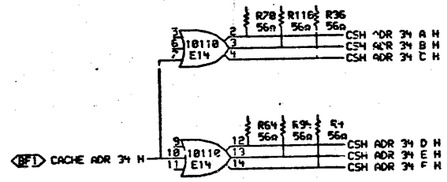


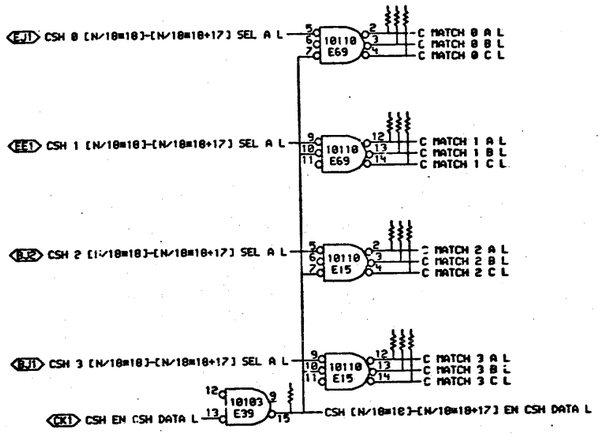


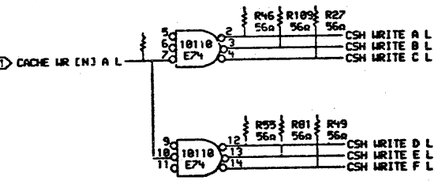


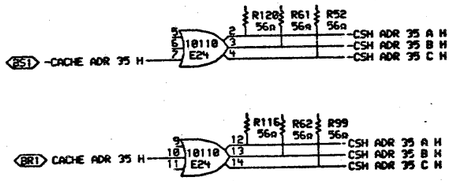












REVISIONS

CHK	CHANGE NO.	REV

digital

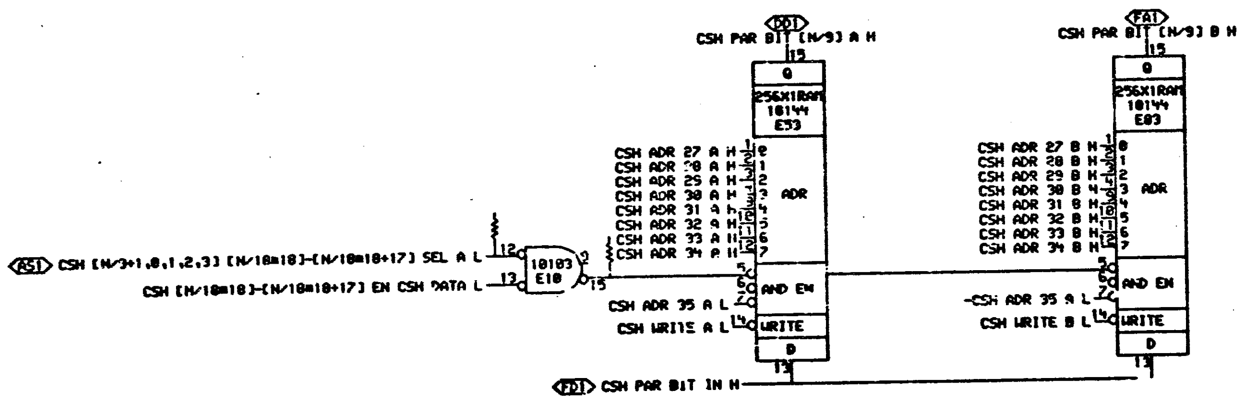
DRN. DATE
CHK'D DATE
CACHEEX 4.1213 OPTION-24 13145
FIRST USED ON OPTION/MODEL: KL10

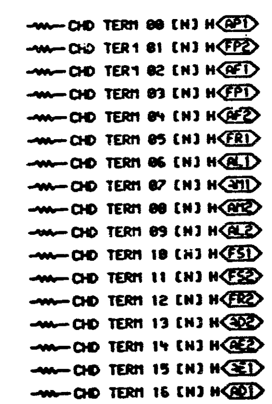
ENG. DATE
BOARD LOCATION:
SHEET 1 OF 1
NEXT HIGHER ASSEMBLY: B-DD-M8521-0

DATE

TITLE: CACHE DATA ADDRESSING LOGIC

SIZE	CODE	NUMBER	REV.
D	CS	M8521-0-CHD4	





NOTE:
1. CHD TERM 00 [N] H THRU CHD TERM 16 [N] H ARE TERMINATORS WHICH ARE USED TO TERMINATE BACKPANEL SIGNALS

5 OF 5

REVISIONS		
CHK	CHANGE NO.	REV

digital

DRN: | DATE | ENG. | DATE
CHK: | DATE | BOARD LOCATION: SHEET 1 OF 1

CHDSEX(4,121) 30-OCT-74 11:14

NEXT HIGHER ASSEMBLY: B-DD-M8521-0

FIRST USED ON OPTION/MODEL: KL10

TITLE: CACHE DATA PARITY BITS

SIZE: D | CODE: CS | NUMBER: M8521-0-CHD5 | REV.

8
7
6
5
4
3
2
1
D
C
B
A
-5.2V
-2.0V
GND
ECL GND
C1 10nF 100V
C2 10nF 100V
C3 10nF 100V
C4 10nF 100V
C5 10nF 100V
C6 10nF 100V
C7 10nF 100V
C8 10nF 100V
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C33 10nF 100V
C34 10nF 100V
C35 10nF 100V
C36 10nF 100V
C37 10nF 100V
C38 10nF 100V
C39 10nF 100V
C40 10nF 100V
C41 10nF 100V
C42 10nF 100V
C43 10nF 100V
C44 10nF 100V
C45 10nF 100V
C46 10nF 100V
C47 10nF 100V
C48 10nF 100V
C49 10nF 100V
C50 10nF 100V
C51 10nF 100V
C52 10nF 100V
C53 13nF 100V
C54 10nF 100V
C55 10nF 100V
C56 10nF 100V
C57 10nF 100V
C58 10nF 100V
C59 10nF 100V
C60 10nF 100V
C61 10nF 100V
C62 10nF 100V
C63 10nF 100V
C64 10nF 100V
C65 10nF 100V
C66 10nF 100V
C67 10nF 100V
C68 10nF 100V
C69 10nF 100V
C70 10nF 100V
C71 10nF 100V
C72 10nF 100V
C73 10nF 100V
C74 10nF 100V
C75 10nF 100V
C76 10nF 100V
C77 10nF 100V
C78 10nF 100V
C79 10nF 100V
C80 10nF 100V
C81 10nF 100V
C82 10nF 100V
C83 10nF 100V
C84 10nF 100V
C85 10nF 100V
C86 10nF 100V
C87 10nF 100V
C88 10nF 100V
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C90 10nF 100V
C91 10nF 100V
C92 10nF 100V
C93 10nF 100V
C94 10nF 100V
C95 10nF 100V
C96 10nF 100V
C153 68uF 15V
C154 68uF 15V
C159 68uF 15V
C160 68uF 15V
C161 68uF 15V
C162 68uF 15V
C97 10nF 100V
C98 10nF 100V
C99 10nF 100V
C100 10nF 100V
C101 10nF 100V
C102 10nF 100V
C103 10nF 100V
C104 10nF 100V
C105 10nF 100V
C106 10nF 100V
C107 10nF 100V
C108 10nF 100V
C109 10nF 100V
C110 10nF 100V
C111 10nF 100V
C112 10nF 100V
C113 10nF 100V
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C115 10nF 100V
C116 10nF 100V
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C122 10nF 100V
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C125 10nF 100V
C126 10nF 100V
C127 10nF 100V
C128 10nF 100V
C129 10nF 100V
C130 10nF 100V
C131 10nF 100V
C132 10nF 100V
C133 10nF 100V
C134 10nF 100V
C135 10nF 100V
C136 10nF 100V
C137 10nF 100V
C138 10nF 100V
C139 10nF 100V
C140 10nF 100V
C141 10nF 100V
C142 10nF 100V
C143 10nF 100V
C144 10nF 100V
C145 10nF 100V
C146 10nF 100V
C147 10nF 100V
C148 10nF 100V
C149 10nF 100V
C150 10nF 100V
C151 10nF 100V
C152 10nF 100V
C153 10nF 100V
C154 10nF 100V
C155 10nF 100V
C156 10nF 100V
C157 10nF 100V
C158 10nF 100V
C165 330uF 6V
C166 330uF 6V
C167 330uF 6V
C168 330uF 6V
C169 330uF 6V
C170 330uF 6V
NC
NOTE:
1. THE FOLLOWING PIN NUMBERS APPLY TO ECL ^IP PACKAGES
GND -5.2 MANUFACTURES' PART NUMBER
1 8 ALL 10,000 SERIES UNLESS OTHERWISE SPECIFIED
1 8 10110 & 10210
15
16
16 8 10150 & 10173
REVISIONS
CHK CHANGE NO. REV
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digital
DRN.
DATE
ENG.
DATE
CHK'D.
DATE
BOARD LOCATION:
SHEET C2
CHOSEN,4,121) 31-OCT-74 08:40 NEXT HIGHER ASSEMBLY:
FIRST USED ON OPTION/MODEL: KL10 B-DD-M8521-0
TITLE:
CACHE DATA
POWER, GND, CAP
SIZE D
CODE CS
NUMBER M8521-0-CHD6
REV.

RESISTOR LOC	PIN	SHOWN ON DRW NO	TERMINATES SIGNAL
R 88	1	CHD3	%E18(14)
R 7	1	CHD5	%E18(15)
R 2	1	CHD3	%E18(2)
R 1	1	CHD3	%E18(3)
R 33	1	CHD2	%E39(14)
R 35	1	CHD2	%E39(2)
R 34	1	CHD2	%E39(3)
R 9	1	CHD1	%E05(14)
R 110	1	CHD1	%E05(2)
R 10	1	CHD1	%E05(3)
R 8	1	CHD4	-C MATCH 1 A H
R 32	1	CHD4	-C MATCH 0 B H
R 20	1	CHD4	-C MATCH 0 C H
R 19	1	CHD4	-C MATCH 1 A H
R 28	1	CHD4	-C MATCH 1 B H
R 16	1	CHD4	-C MATCH 1 C H
R 119	1	CHD4	-C MATCH 2 A H
R 67	1	CHD4	-C MATCH 2 B H
R 5	1	CHD4	-C MATCH 2 C H
R 45	1	CHD4	-C MATCH 3 A H
R 68	1	CHD4	-C MATCH 3 B H
R 3	1	CHD4	-C MATCH 3 C H

RESISTOR LOC	PIN	SHOWN ON DRW NO	TERMINATES SIGNAL
R 107	1	CHD4	-CACHE WR [N] A H
R 98	1	CHD5	CHD TERM 00 [N] H
R 127	1	CHD5	CHD TERM 01 [N] H
R 86	1	CHD5	CHD TERM 02 [N] H
R 124	1	CHD5	CHD TERM 03 [N] H
R 87	1	CHD5	CHD TERM 04 [N] H
R 125	1	CHD5	CHD TERM 05 [N] H
R 88	1	CHD5	CHD TERM 06 [N] H
R 97	1	CHD5	CHD TERM 07 [N] H
R 96	1	CHD5	CHD TERM 08 [N] H
R 95	1	CHD5	CHD TERM 09 [N] H
R 126	1	CHD5	CHD TERM 10 [N] H
R 129	1	CHD5	CHD TERM 11 [N] H
R 128	1	CHD5	CHD TERM 12 [N] H
R 83	1	CHD5	CHD TERM 13 [N] H
R 85	1	CHD5	CHD TERM 14 [N] H
R 84	1	CHD5	CHD TERM 15 [N] H
R 82	1	CHD5	CHD TERM 16 [N] H
R 68	1	CHD1	CHD1 [N+00] A H
R 69	1	CHD1	CHD1 [N+00] B H
R 17	1	CHD1	CHD1 [N+01] A H
R 48	1	CHD1	CHD1 [N+01] B H

RESISTOR LOC	PIN	SHOWN ON DRW NO	TERMINATES SIGNAL
R 10	1	CHD1	CHD1 [N+02] A H
R 41	1	CHD1	CHD1 [N+02] B H
R 103	1	CHD2	CHD2 [N+03] A H
R 102	1	CHD2	CHD2 [N+03] B H
R 104	1	CHD2	CHD2 [N+04] A H
R 105	1	CHD2	CHD2 [N+04] B H
R 54	1	CHD2	CHD2 [N+05] A H
R 53	1	CHD2	CHD2 [N+05] B H
R 15	1	CHD3	CHD3 [N+06] A H
R 14	1	CHD3	CHD3 [N+06] B H
R 12	1	CHD3	CHD3 [N+07] A H
R 11	1	CHD3	CHD3 [N+07] B H
R 22	1	CHD3	CHD3 [N+08] A H
R 96	1	CHD4	-CSH [N/10#10]-[N/10#10+17] EN CSH DATA H
R 51	1	CHD5	-CSH [N/9+1,8,1,2,3] [N/10#10]-[N/10#10+17] SEL A
R 42	1	CHD1	MEM TO CACHE [N+00] H
R 43	1	CHD1	MEM TO CACHE [N+01] H
R 44	1	CHD1	MEM TO CACHE [N+02] H
R 100	1	CHD2	MEM TO CACHE [N+03] H
R 101	1	CHD2	MEM TO CACHE [N+04] H
R 23	1	CHD2	MEM TO CACHE [N+05] H
R 25	1	CHD3	MEM TO CACHE [N+06] H
R 2.	1	CHD3	MEM TO CACHE [N+07] H
R 21	1	CHD3	MEM TO CACHE [N+08] H

NOTE:

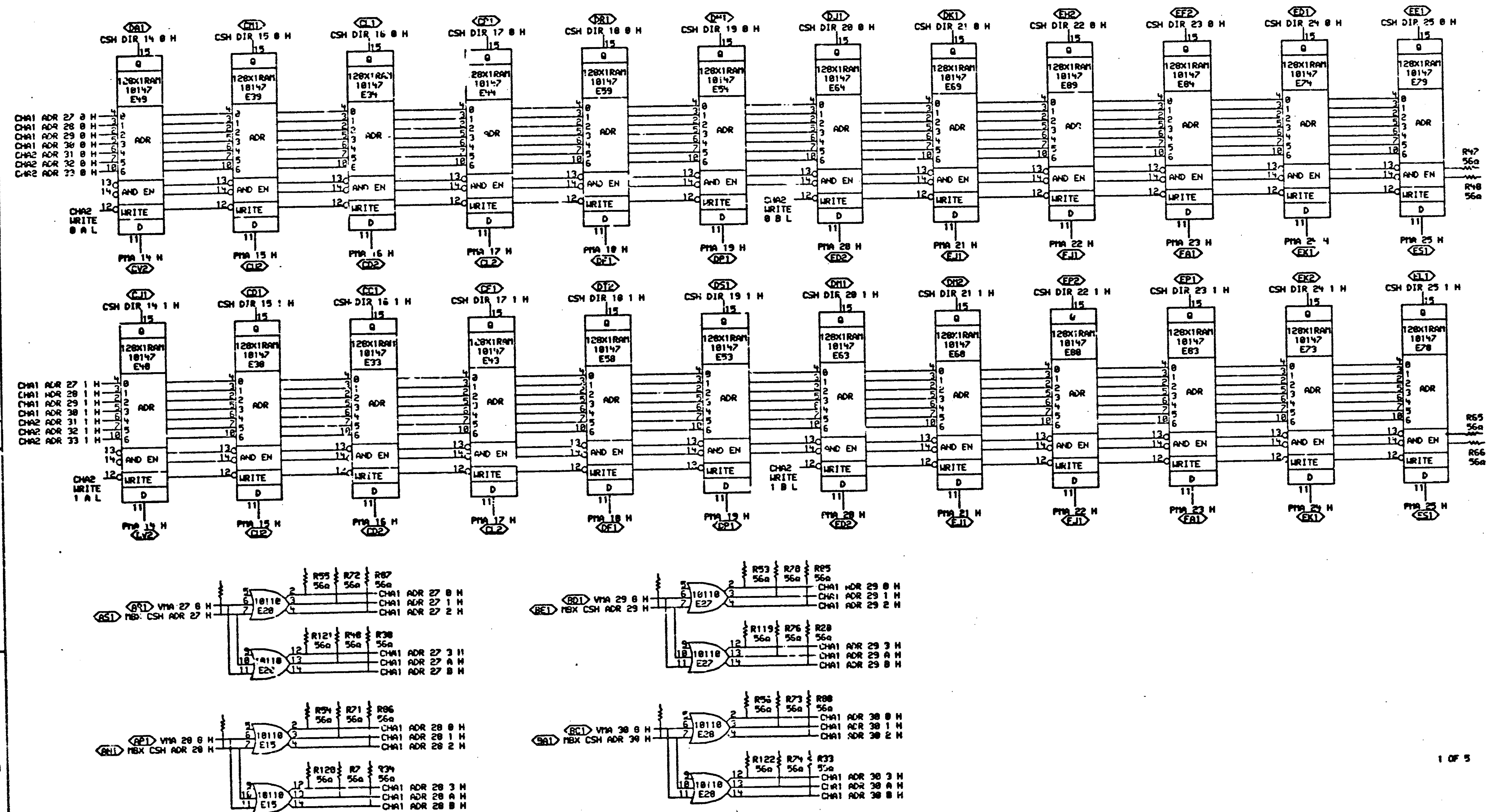
1. ENTRIES ARE SORTED BY SIGNAL NAME
2. ALL TERMINATION RESISTORS ARE 68Ω 1/4W 5% AND ARE CONNECTED TO -2.0V UNLESS OTHERWISE SPECIFIED
3. % INDICATES OUTPUT OF DIP LOC AND () INDICATES PIN NUMBER

REVISIONS		
CHK	CHANGE NO.	REV

DRN. C Smith DATE 11-OCT-84 ENG. DATE
CHK'D DATE BOARD LOCATION:
M8521(4,427) DS-MO-24 02.11 NEXT HIGHER ASSEMBLY
FIRST USED ON OPTION/MODEL: KL10 B-DD-M8521-0
SHEET 1 OF 1

TITLE: CHACHE DATA TERMINATORS

SIZE	CODE	NUMBER	REV.
D	CS	M8521-0-RES	


CSH DIR 14 0 H
CSH DIR 15 0 H
CSH DIR 16 0 H
CSH DIR 17 0 H
CSH DIR 18 0 H
CSH DIR 19 0 H
CSH DIR 20 0 H
CSH DIR 21 0 H
CSH DIR 22 0 H
CSH DIR 23 0 H
CSH DIR 24 0 H
CSH DIR 25 0 H
128X1RAM
10147
ADR
AND EN
WRITE
CHA1 ADR 27 0 H
CHA1 ADR 28 0 H
CHA1 ADR 29 0 H
CHA1 ADR 30 0 H
CHA2 ADR 31 0 H
CHA2 ADR 32 0 H
CHA2 ADR 33 0 H
CHA2 WRITE 0 A L
CHA2 WRITE 0 B L
PMA 14 H
PMA 15 H
PMA 16 H
PMA 17 H
PMA 18 H
PMA 19 H
PMA 20 H
PMA 21 H
PMA 22 H
PMA 23 H
PMA 24 H
PMA 25 H
CSH DIR 14 1 H
CSH DIR 15 1 H
CSH DIR 16 1 H
CSH DIR 17 1 H
CSH DIR 18 1 H
CSH DIR 19 1 H
CSH DIR 20 1 H
CSH DIR 21 1 H
CSH DIR 22 1 H
CSH DIR 23 1 H
CSH DIR 24 1 H
CSH DIR 25 1 H
CHA1 ADR 27 1 H
CHA1 ADR 28 1 H
CHA1 ADR 29 1 H
CHA1 ADR 30 1 H
CHA2 ADR 31 1 H
CHA2 ADR 32 1 H
CHA2 ADR 33 1 H
CHA2 WRITE 1 A L
CHA2 WRITE 1 B L
VMA 27 0 H
MBX CSH ADR 27 H
10110
CHA1 ADR 27 0 H
CHA1 ADR 27 1 H
CHA1 ADR 27 2 H
CHA1 ADR 27 3 H
CHA1 ADR 27 A H
CHA1 ADR 27 B H
VMA 29 0 H
MBX CSH ADR 29 H
CHA1 ADR 29 0 H
CHA1 ADR 29 1 H
CHA1 ADR 29 2 H
CHA1 ADR 29 3 H
CHA1 ADR 29 A H
CHA1 ADR 29 B H
VMA 28 0 H
MBX CSH ADR 28 H
CHA1 ADR 28 0 H
CHA1 ADR 28 1 H
CHA1 ADR 28 2 H
CHA1 ADR 28 3 H
CHA1 ADR 28 A H
CHA1 ADR 28 B H
VMA 30 0 H
MBX CSH ADR 30 H
CHA1 ADR 30 0 H
CHA1 ADR 30 1 H
CHA1 ADR 30 2 H
CHA1 ADR 30 3 H
CHA1 ADR 30 A H
CHA1 ADR 30 B H
56Ω

1 OF 5

REVISIONS

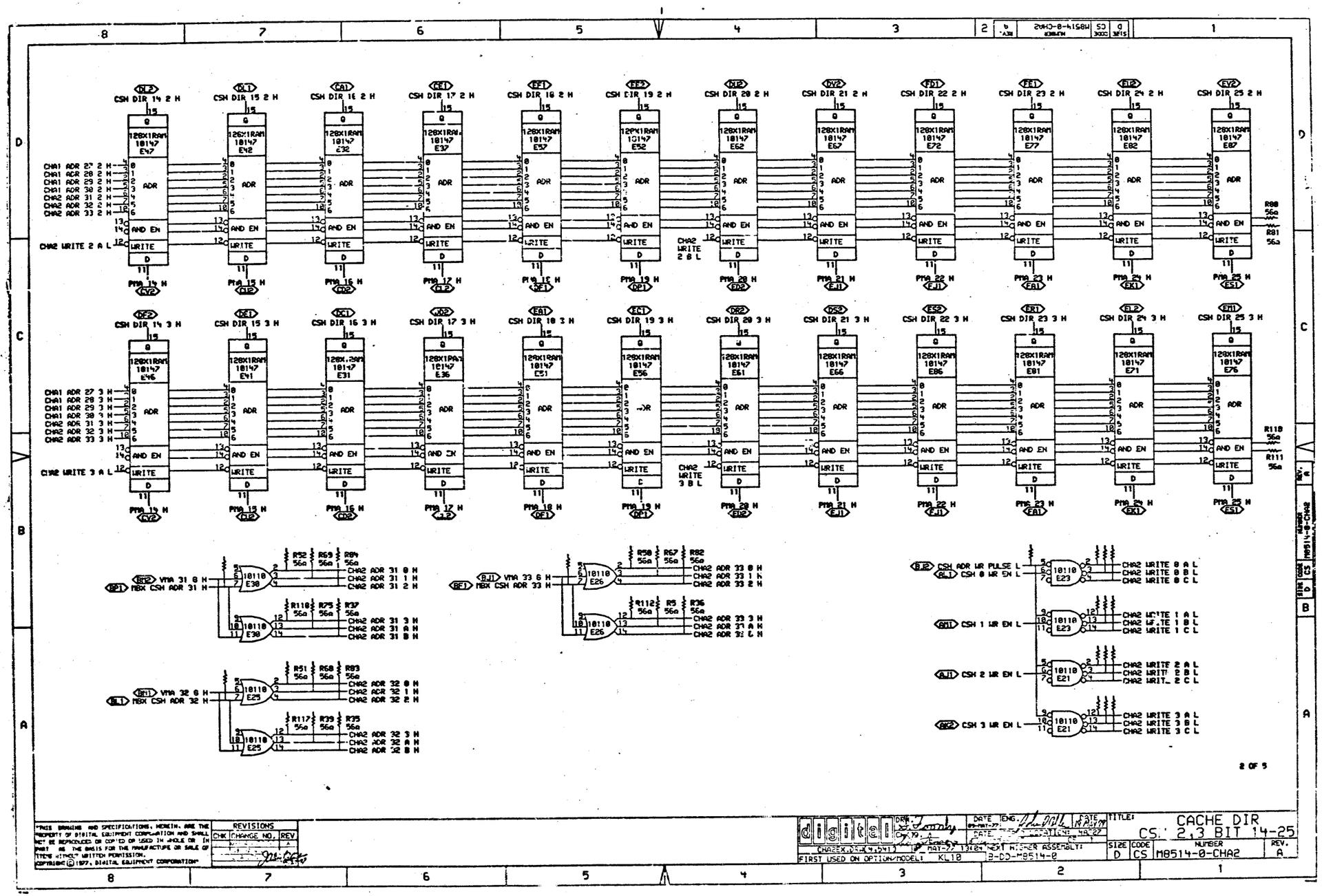
digital

FIRST USED ON OPTION/MODEL: KL10

NEXT HIGHER ASSEMBLY: D-DD-M8514-0

TITLE: CACHE DIR CSH 0,1 BIT 14-25

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-CHA1	A

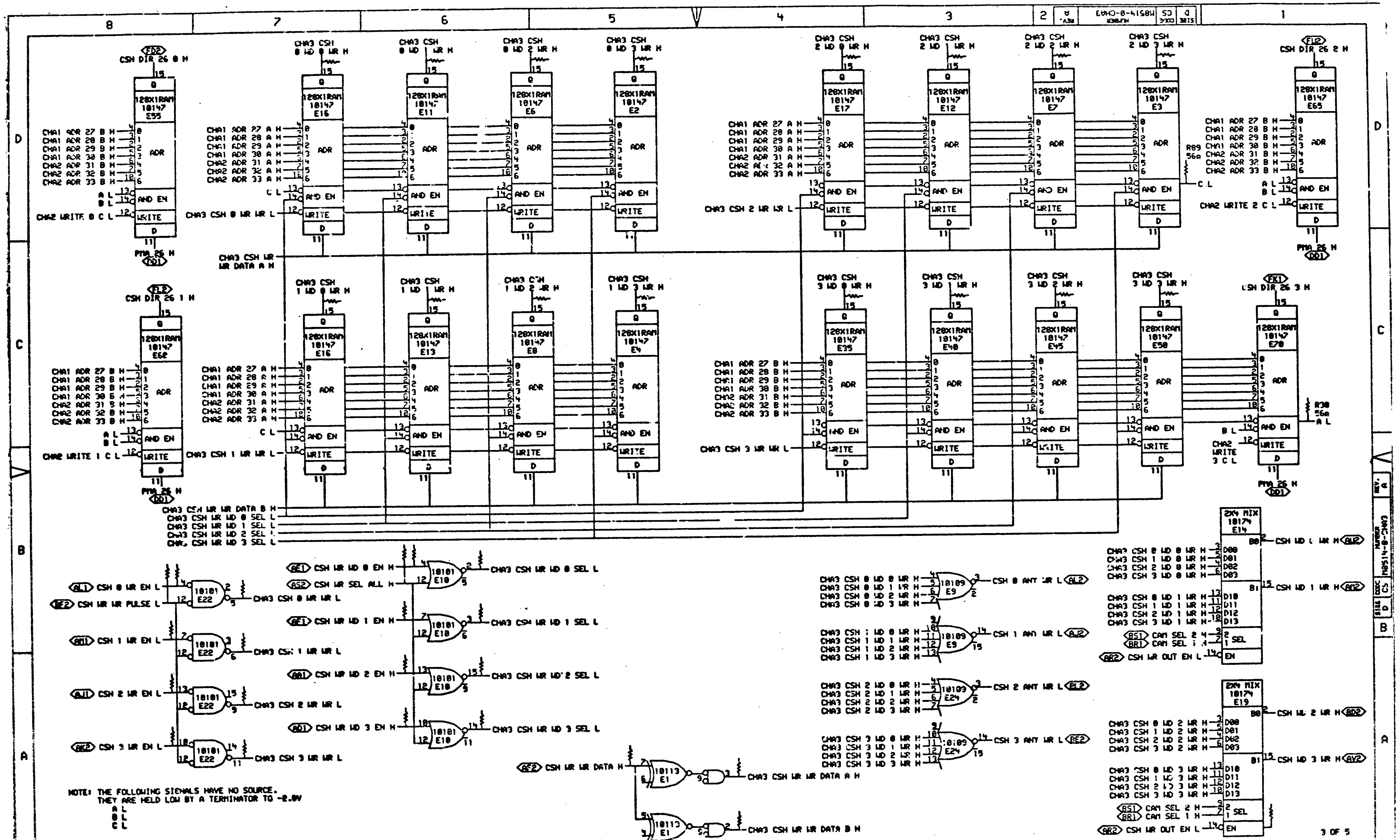


REVISIONS		
CHK	CHANGE NO.	REV

DRN: [illegible] DATE: 09-MAY-77
ENG: [illegible] DATE: [illegible]
CHADEX.254(4,5413) 09-MAY-77 13:24 TEST MICHER ASSEMBLY
FIRST USED ON OPTION/MODEL: KL10
B-DD-M8514-0

TITLE: CACHE DIR
CS: 2,3 BIT 14-25

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-CHA2	A



REVISIONS

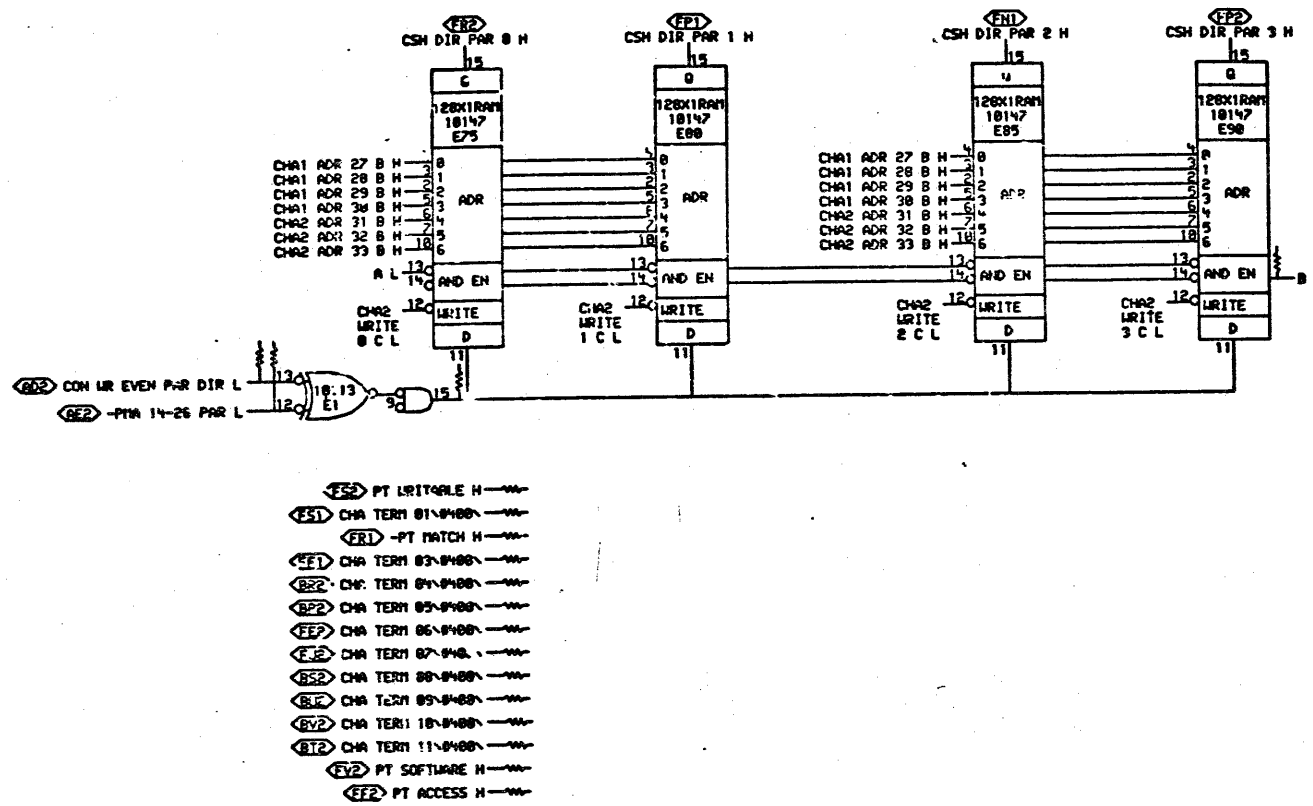
digital

TITLE: CACHE DIR BIT 26 & WR BITS

NEXT HIGHER ASSEMBLY: B-DD-M8514-0

FIRST USED ON OPTION/MODEL: KL10

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-CHA3	A



NOTE: CHA TERMS ARE SPARE TERMINATORS

4 OF 5

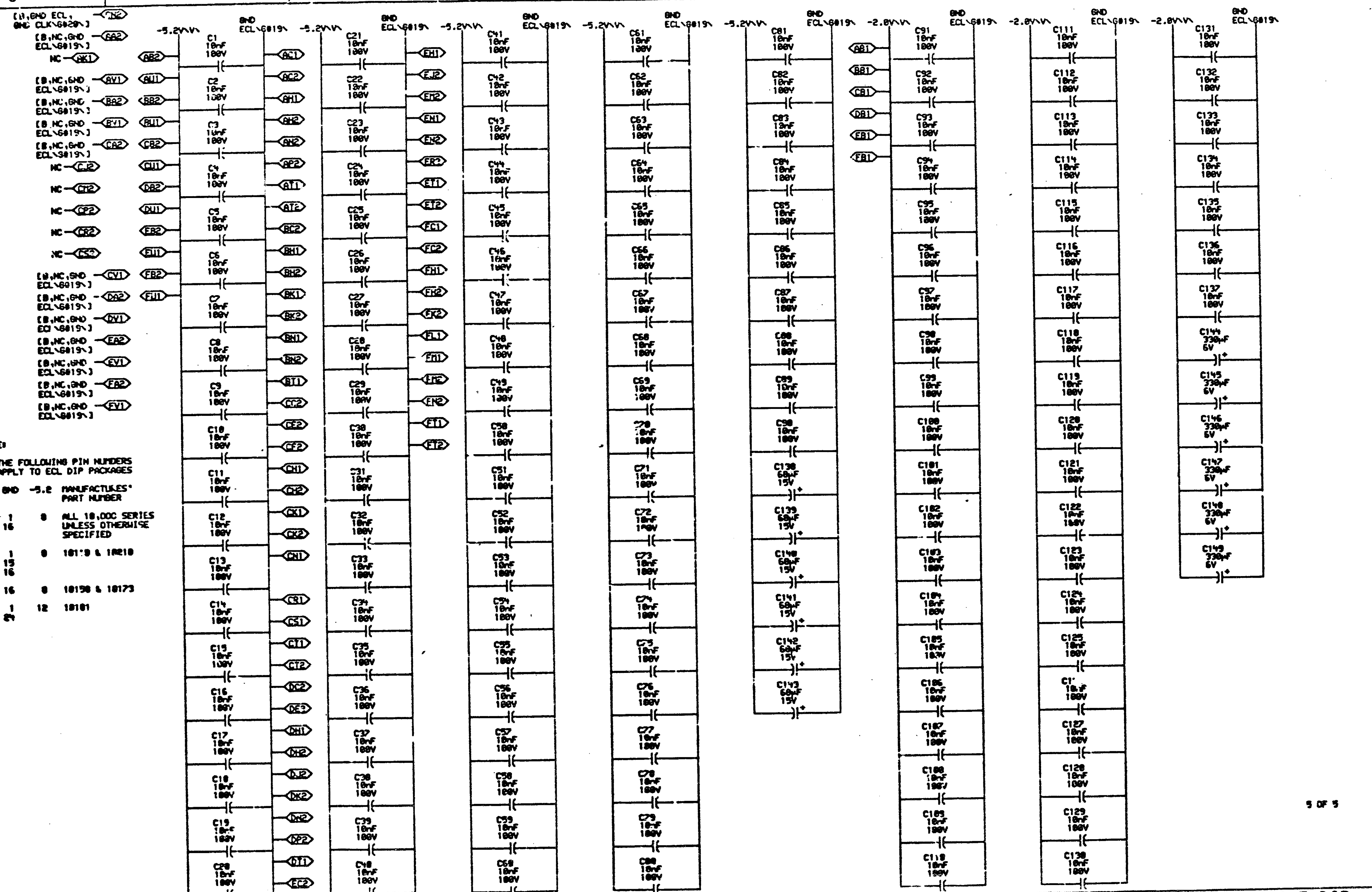
digital

FIRST USED ON OPTION/MODEL: KL10

NEXT HIGHER ASSEMBLY: B-DD-M8514-0

TITLE: CACHE DIR PARITY BITS

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-CHA4	A



NOTE:

1. THE FOLLOWING PIN NUMBERS APPLY TO ECL DIP PACKAGES

GND	-5.2	MANUFACTURES' PART NUMBER
1, 16	8	ALL 10,00C SERIES UNLESS OTHERWISE SPECIFIED
1, 15, 16	8	101?8 & 10210
16	8	10150 & 10173
1, 24	12	10101

REVISIONS

CHK	CHANGE NO.	REV

digital

CHASEX, DRUK 4,5+1 — FIRST USED ON OPTION/MODEL: KL10 — NEXT HIGHER ASSEMBLY: B-DD-M8514-0

DATE 06-MAY-77 — ENG. — LOCATION: MA?27

TITLE: CACHE DIR POWER, GND, CAP

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-CHA5	A

RESISTOR LOC(PIN)	SHOWN DRW#	ON REF	VALUE	TERMINATES SIGNAL
R32(1)	CHA4	C6	68Ω	%E1(15)
R110(1)	CHA2	B1	56Ω	%E31(13)
R111(1)	CHA2	B1	56Ω	%E31(14)
R80(1)	CHA2	D1	56Ω	%E32(13)
R81(1)	CHA2	D1	56Ω	%E32(14)
R65(1)	CHA1	B1	56Ω	%E33(13)
R66(1)	CHA1	B1	56Ω	%E33(14)
R47(1)	CHA1	D1	56Ω	%E34(13)
R48(1)	CHA1	C1	56Ω	%E34(14)
R30(1)	CHA3	C1	56Ω	-A H
R29(1)	CHA4	C3	68Ω	-B H
R89(1)	CHA3	D2	56Ω	-C H
R124(1)	CHA4	C6	68Ω	CHA TERM 02
R115(1)	CHA4	B6	68Ω	CHA TERM 03
R105(1)	CHA4	B6	68Ω	CHA TERM 04
R104(1)	CHA4	B6	68Ω	CHA TERM 05
R116(1)	CHA4	B6	68Ω	CHA TERM 06
R113(1)	CHA4	B6	68Ω	CHA TERM 07
R106(1)	CHA4	B6	68Ω	CHA TERM 08
R102(1)	CHA4	P5	68Ω	CHA TERM 09
R103(1)	CHA4	B6	68Ω	CHA TERM 10
R107(1)	CHA4	B6	68Ω	CHA TERM 11
R55(1)	CHA1	B7	56Ω	CHA1 ADR 27 0 H
R72(1)	CHA1	B7	56Ω	CHA1 ADR 27 1 H
R87(1)	CHA1	B7	56Ω	CHA1 ADR 27 2 H
R121(1)	CHA1	A7	56Ω	CHA1 ADR 27 3 H
R40(1)	CHA1	A7	56Ω	CHA1 ADR 27 A H
R38(1)	CHA1	A7	56Ω	CHA1 ADR 27 B H
R54(1)	CHA1	A7	56Ω	CHA1 ADR 28 0 H
R71(1)	CHA1	A7	56Ω	CHA1 ADR 28 1 H
R86(1)	CHA1	A7	56Ω	CHA1 ADR 28 2 H
R120(1)	CHA1	A7	56Ω	CHA1 ADR 28 3 H
R7(1)	CHA1	A7	56Ω	CHA1 ADR 28 A H
R34(1)	CHA1	A7	56Ω	CHA1 ADR 28 B H
R53(1)	CHA1	B5	56Ω	CHA1 ADR 29 0 H
R70(1)	CHA1	B4	56Ω	CHA1 ADR 29 1 H
R85(1)	CHA1	B4	56Ω	CHA1 ADR 29 2 H
R119(1)	CHA1	A5	56Ω	CHA1 ADR 29 3 H
R76(1)	CHA1	A4	56Ω	CHA1 ADR 29 A H
R20(1)	CHA1	A4	56Ω	CHA1 ADR 29 B H

RESISTOR LOC(PIN)	SHOWN DRW#	ON REF	VALUE	TERMINATES SIGNAL
R55(1)	CHA1	A5	56Ω	CHA1 ADR 30 0 H
R73(1)	CHA1	A4	56Ω	CHA1 ADR 30 1 H
R90(1)	CHA1	A4	56Ω	CHA1 ADR 30 2 H
R122(1)	CHA1	A5	56Ω	CHA1 ADR 30 3 H
R74(1)	CHA1	A4	56Ω	CHA1 ADR 30 A H
R33(1)	CHA1	A4	56Ω	CHA1 ADR 30 B H
R52(1)	CHA2	B7	56Ω	CHA2 ADR 31 0 H
R69(1)	CHA2	B7	56Ω	CHA2 ADR 31 1 H
R84(1)	CHA2	B6	56Ω	CHA2 ADR 31 2 H
R118(1)	CHA2	B7	56Ω	CHA2 ADR 31 3 H
R75(1)	CHA2	B7	56Ω	CHA2 ADR 31 A H
R37(1)	CHA2	B6	56Ω	CHA2 ADR 31 B H
R51(1)	CHA2	A7	56Ω	CHA2 ADR 32 0 H
R68(1)	CHA2	A7	56Ω	CHA2 ADR 32 1 H
R83(1)	CHA2	A6	56Ω	CHA2 ADR 32 2 H
R117(1)	CHA2	A7	56Ω	CHA2 ADR 32 3 H
R39(1)	CHA2	A7	56Ω	CHA2 ADR 32 A H
R35(1)	CHA2	A6	56Ω	CHA2 ADR 32 B H
R50(1)	CHA2	B5	56Ω	CHA2 ADR 33 0 H
R67(1)	CHA2	B4	56Ω	CHA2 ADR 33 1 H
R82(1)	CHA2	B4	56Ω	CHA2 ADR 33 2 H
R112(1)	CHA2	B5	56Ω	CHA2 ADR 33 3 H
R5(1)	CHA2	B4	56Ω	CHA2 ADR 33 A H
R36(1)	CHA2	B4	56Ω	CHA2 ADR 33 B H
R46(1)	CHA2	B2	68Ω	-CHA2 WRITE 0 A H
R49(1)	CHA2	B2	68Ω	-CHA2 WRITE 0 B H
R27(1)	CHA2	B2	68Ω	-CHA2 WRITE 0 C H
R63(1)	CHA2	B2	68Ω	-CHA2 WRITE 1 A H
R64(1)	CHA2	B2	68Ω	-CHA2 WRITE 1 B H
R127(1)	CHA2	B2	68Ω	-CHA2 WRITE 1 C H
R78(1)	CHA2	A2	68Ω	-CHA2 WRITE 2 A H
R79(1)	CHA2	A2	68Ω	-CHA2 WRITE 2 B H
R128(1)	CHA2	A2	68Ω	-CHA2 WRITE 2 C H
R108(1)	CHA2	A2	68Ω	-CHA2 WRITE 3 A H
R109(1)	CHA2	A2	68Ω	-CHA2 WRITE 3 B H
R31(1)	CHA2	A2	68Ω	-CHA2 WRITE 3 C H
R3(1)	CHA3	D7	68Ω	CHA3 CSH 0 WD 0 WR H
R4(1)	CHA3	D6	68Ω	CHA3 CSH 0 WD 1 WR H
R13(1)	CHA3	D5	68Ω	CHA3 CSH 0 WD 2 WR H
R15(1)	CHA3	D5	68Ω	CHA3 CSH 0 WD 3 WR H

RESISTOR LOC(PIN)	SHOWN DRW#	ON REF	VALUE	TERMINATES SIGNAL
R98(1)	CHA3	B7	68Ω	-CHA3 CSH 0 WR WR H
R2(1)	CHA3	C7	68Ω	CHA3 CSH 1 WD 0 WR H
R1(1)	CHA3	C6	68Ω	CHA3 CSH 1 WD 1 WR H
R14(1)	CHA3	C5	68Ω	CHA3 CSH 1 WD 2 WR H
R10(1)	CHA3	C5	68Ω	CHA3 CSH 1 WD 3 WR H
R6(1)	CHA3	A7	68Ω	-CHA3 CSH 1 WR WR H
R16(1)	CHA3	D4	68Ω	CHA3 CSH 2 WD 0 WR H
R17(1)	CHA3	D3	68Ω	CHA3 CSH 2 WD 1 WR H
R19(1)	CHA3	D2	68Ω	CHA3 CSH 2 WD 2 WR H
R18(1)	CHA3	D2	68Ω	CHA3 CSH 2 WD 3 WR H
R57(1)	CHA3	A7	68Ω	-CHA3 CSH 2 WR WR H
R8(1)	CHA3	C4	68Ω	CHA3 CSH 3 WD 0 WR H
R9(1)	CHA3	C3	68Ω	CHA3 CSH 3 WD 1 WR H
R42(1)	CHA3	C2	68Ω	CHA3 CSH 3 WD 2 WR H
R11(1)	CHA3	C2	68Ω	CHA3 CSH 3 WD 3 WR H
R26(1)	CHA3	A7	68Ω	-CHA3 CSH 3 WR WR H
R20(1)	CHA3	B6	68Ω	-CHA3 CSH WR WD 0 SEL H
R22(1)	CHA3	B6	68Ω	-CHA3 CSH WR WD 1 SEL H
R23(1)	CHA3	A6	68Ω	-CHA3 CSH WR WD 2 SEL H
R24(1)	CHA3	A6	68Ω	-CHA3 CSH WR WD 3 SEL H
R56(1)	CHA3	A4	68Ω	CHA3 CSH WR WR DATA A H
R25(1)	CHA3	A4	68Ω	CHA3 CSH WR WR DATA B H
R91(1)	CHA4	C7	68Ω	-CON WR EVEN PAR DIR H
R44(1)	CHA3	B8	68Ω	-CSH 0 WR EN H
R41(1)	CHA3	B8	68Ω	-CSH 1 WR EN H
R60(1)	CHA3	A8	68Ω	-CSH 2 WR EN H
R61(1)	CHA3	A8	68Ω	-CSH 3 WR EN H
R43(1)	CHA2	B2	68Ω	-CSH ADR WR PULSE H
R12(1)	CHA3	A1	68Ω	-CSH WR OUT EN H
R98(1)	CHA3	B6	68Ω	CSH WR SEL ALL H
R96(1)	CHA3	B6	68Ω	CSH WR WD 0 EN H
R97(1)	CHA3	B6	68Ω	CSH WR WD 1 EN H
R95(1)	CHA3	A6	68Ω	CSH WR WD 2 EN H
R94(1)	CHA3	A6	68Ω	CSH WR WD 3 EN H
R93(1)	CHA3	A5	68Ω	CSH WR WR DATA H
R59(1)	CHA3	B8	68Ω	-CSH WR WR PULSE H
R99(1)	CHA1	B7	68Ω	MBX CSH ADR 27 H
R100(1)	CHA1	A7	68Ω	MBX CSH ADR 28 H
R62(1)	CHA1	B5	68Ω	MBX CSH ADR 29 H
R45(1)	CHA1	A5	68Ω	MBX CSH ADR 30 H

RESISTOR LOC(PIN)	SHOWN DRW#	ON REF	VALUE	TERMINATES SIGNAL
R21(1)	CHA2	B7	68Ω	MBX CSH ADR 31 H
R101(1)	CHA2	A7	68Ω	MBX CSH ADR 32 H
R77(1)	CHA2	B5	68Ω	MBX CSH ADR 33 H
R92(1)	CHA4	C7	68Ω	PMA 14-26 PAR H
R114(1)	CHA4	B6	68Ω	PT ACCESS H
R123(1)	CHA4	C6	68Ω	-PT MATCH H
R126(1)	CHA4	B6	68Ω	PT SOFTWARE H
R125(1)	CHA4	C6	68Ω	PT WRITABLE H

NOTE:

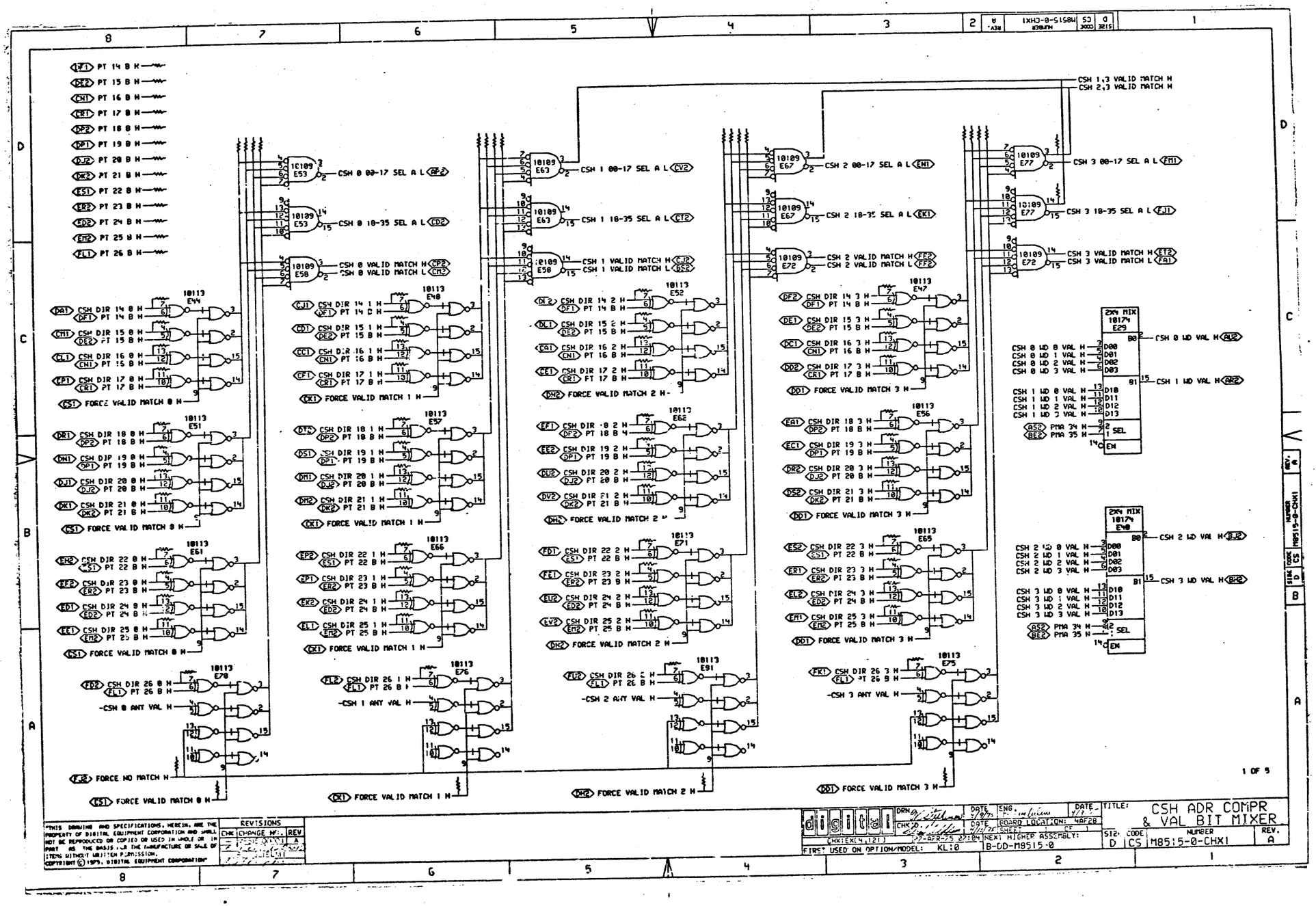
1. ALL TERMINATORS HAVE PIN TWO CONNECTED TO -2.0V AND ARE 5% 1/4WATT UNLESS OTHERWISE SPECIFIED
2. ENTRIES ARE SORTED BY SIGNAL NAME
3. % INDICATES OUTPUT OF DIP LOC AND
   ( ) INDICATES PIN NUMBER

REVISIONS | CHK | CHANGE NO. | REV

digital | DRN. C Smith | DATE 03-MAY-77 | ENG | DATE
FIRST USED ON OPTION/MODEL: KL10 | NEXT HIGHER ASSEMBLY: B-DD-M8514-0

TITLE: CACHE DIR TERMINATORS

SIZE	CODE	NUMBER	REV.
D	CS	M8514-0-RES	A



REVISIONS

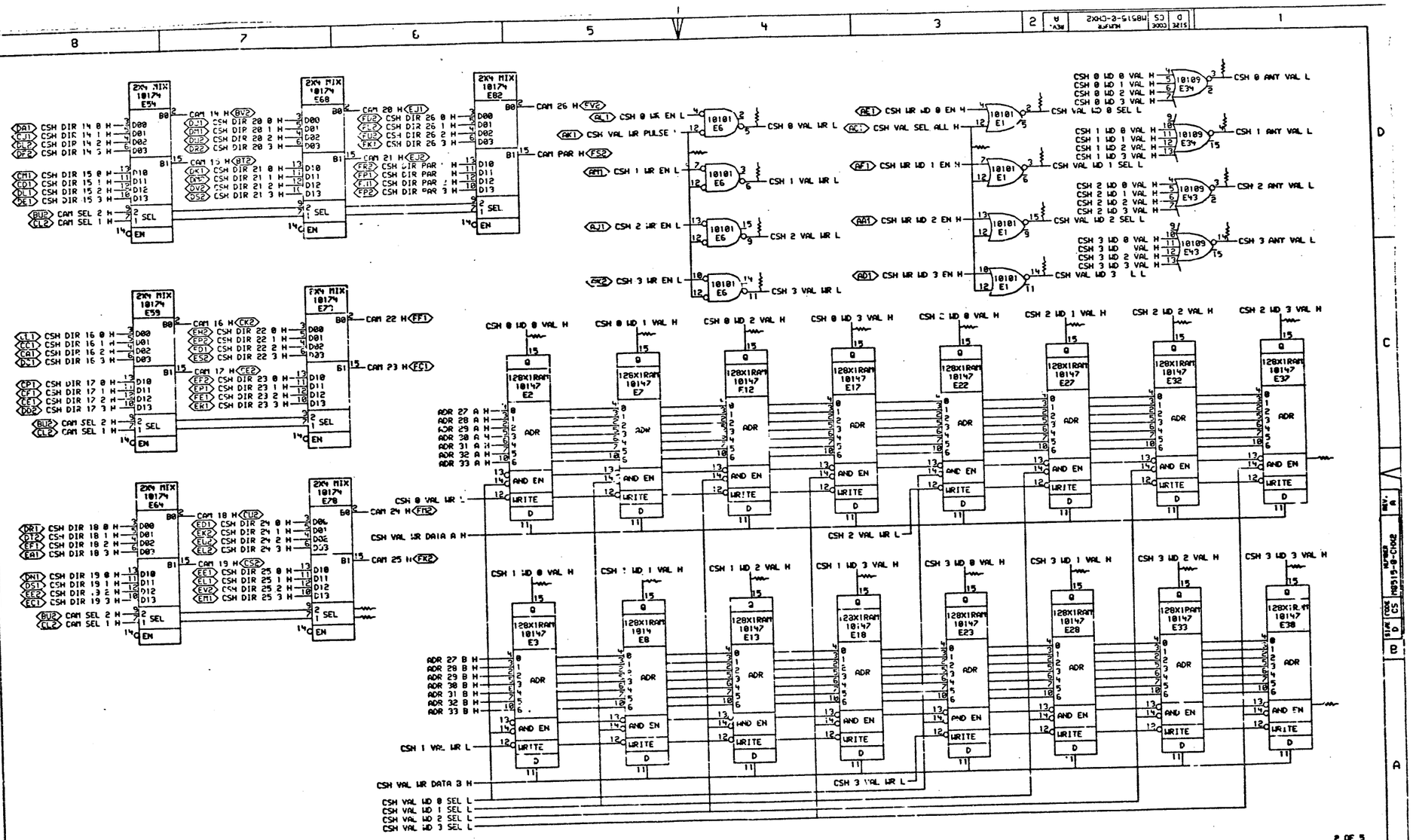
CHK	CHANGE NO.	REV
		A

digital

DRN [illegible] DATE 7/9/79 ENG. [illegible] DATE 7/7
CHK'D. [illegible] DATE 7/10/79 BOARD LOCATION: 4AF28
CHX1 EX(4,121) 27-APR-79 07:04 SHEET 1 OF 1 NEXT HIGHER ASSEMBLY:
FIRST USED ON OPTION/MODEL: KL10 B-DD-M9515-0

TITLE: CSH ADR COMPR & VAL BIT MIXER

SIZE	CODE	NUMBER	REV.
D	CS	M8515-0-CHX1	A



2 OF 5

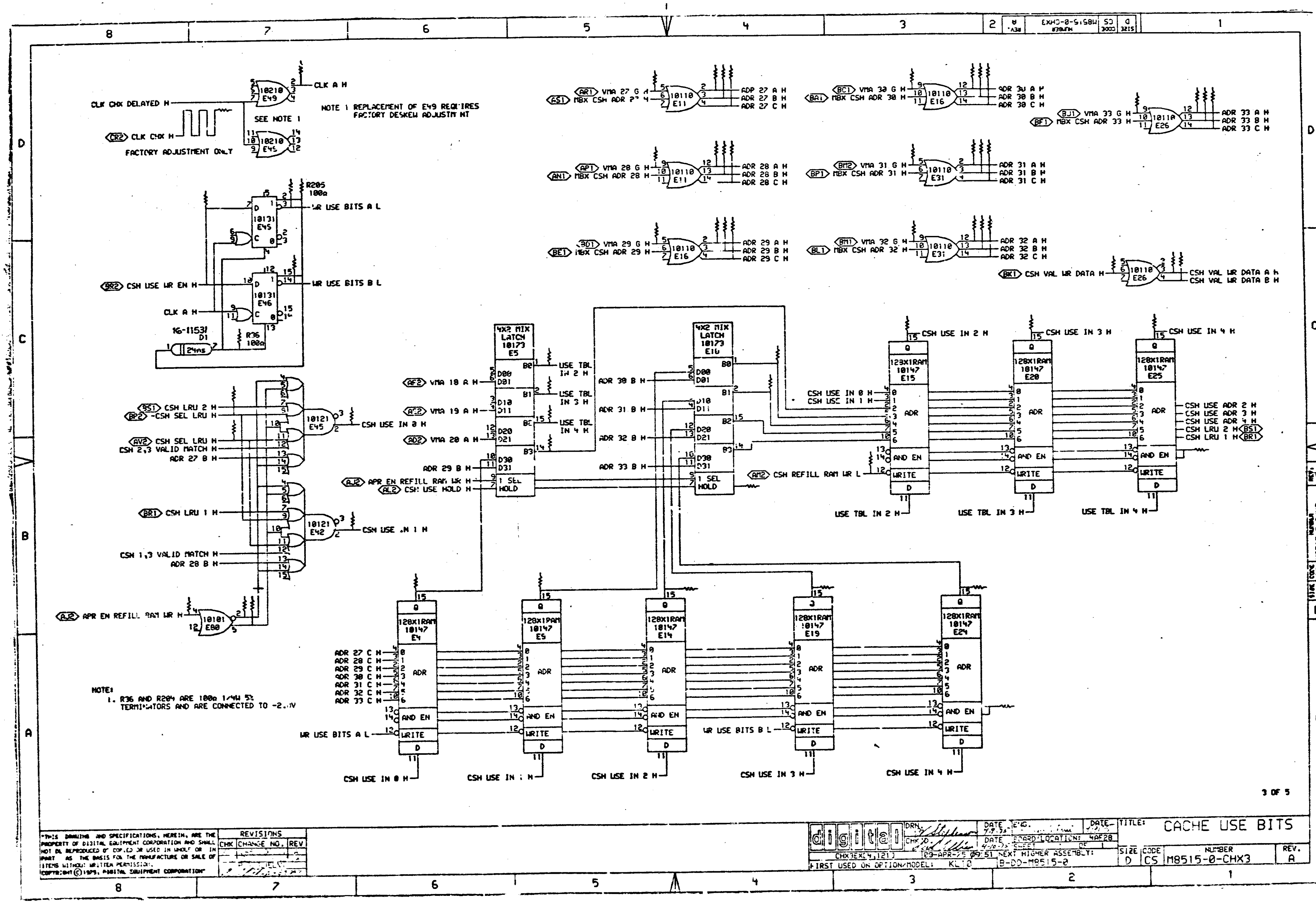
REVISIONS		
CHK	CHANGE NO.	REV
		A

digital

DRN	DATE	ENG.
CHK	DATE	APPR.
CHK2EXLN.12[1]	18-APR-75 02:43	LOCATION: MAP28
FIRST USED ON OPTION/MODEL: KL10		NEXT HIGHER ASSEMBLY: B-DD-M8515-0

TITLE: CSH VALID BITS AND ADR MIXERS

SIZE	CODE	NUMBER	REV.
D	CS	M8515-0-CHX2	A


NOTE 1 REPLACEMENT OF E49 REQUIRES FACTORY DESKEW ADJUSTMENT
CLK CHX DELAYED H
CLK CHX H
FACTORY ADJUSTMENT ONLY
CLK A H
SEE NOTE 1
R205 100Ω
WR USE BITS A L
WR USE BITS B L
CSH USE WR EN H
4X2 MIX LATCH 10173 E5
4X2 MIX LATCH 10173 E10
128X1RAM 10147
CSH LRU 2 H
CSH SEL LRU H
CSH SEL LRU H
CSH 2,3 VALID MATCH H
CSH USE IN 0 H
CSH USE IN 1 H
CSH USE IN 2 H
CSH USE IN 3 H
CSH USE IN 4 H
CSH 1,3 VALID MATCH H
APR EN REFILL RAM WR H
CSH USE HOLD H
CSH REFILL RAM WR L
CSH VAL WR DATA H
USE TBL IN 2 H
USE TBL IN 3 H
USE TBL IN 4 H
NOTE:
1. R36 AND R204 ARE 100Ω 1/4W 5% TERMINATORS AND ARE CONNECTED TO -2.0V
3 OF 5
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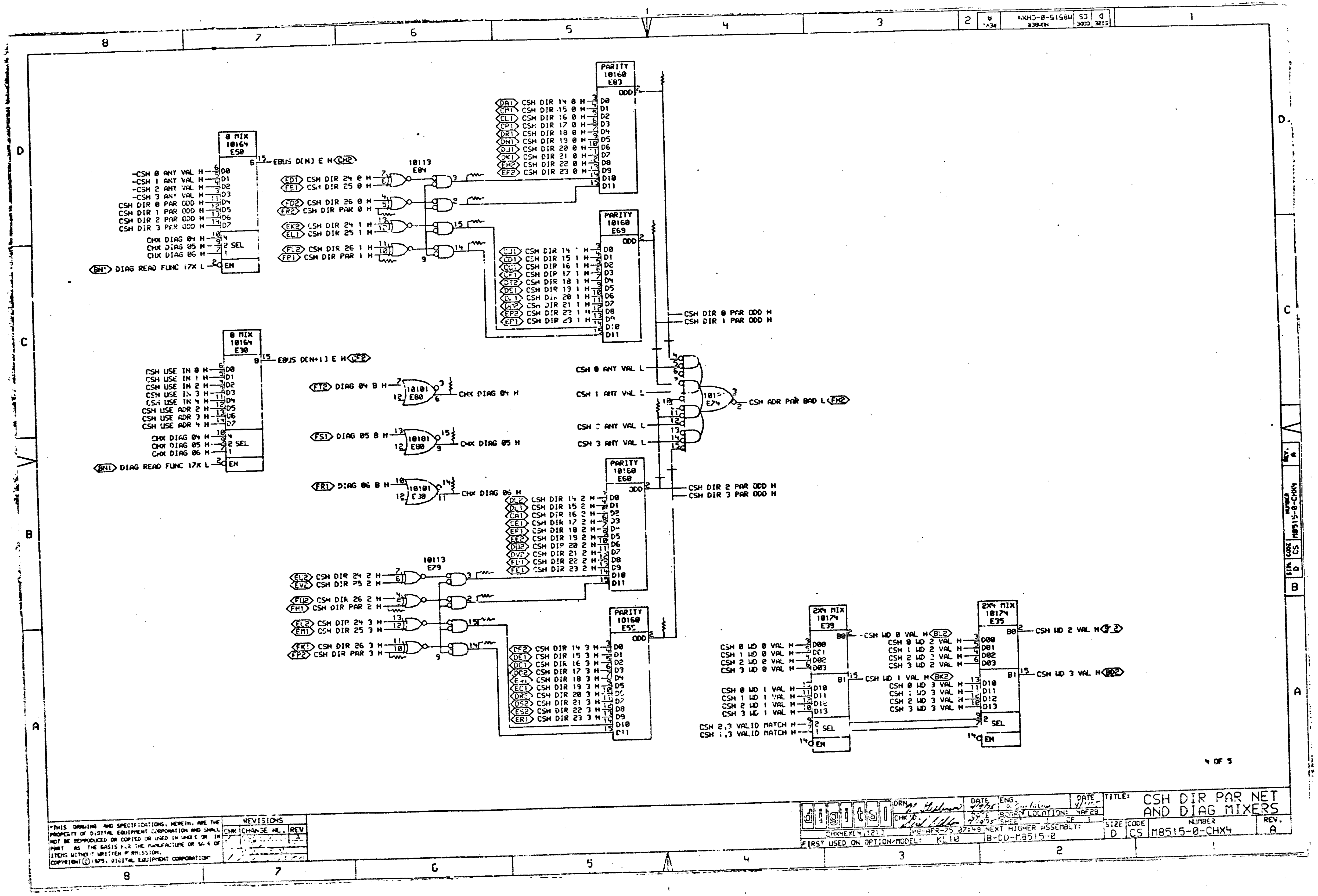
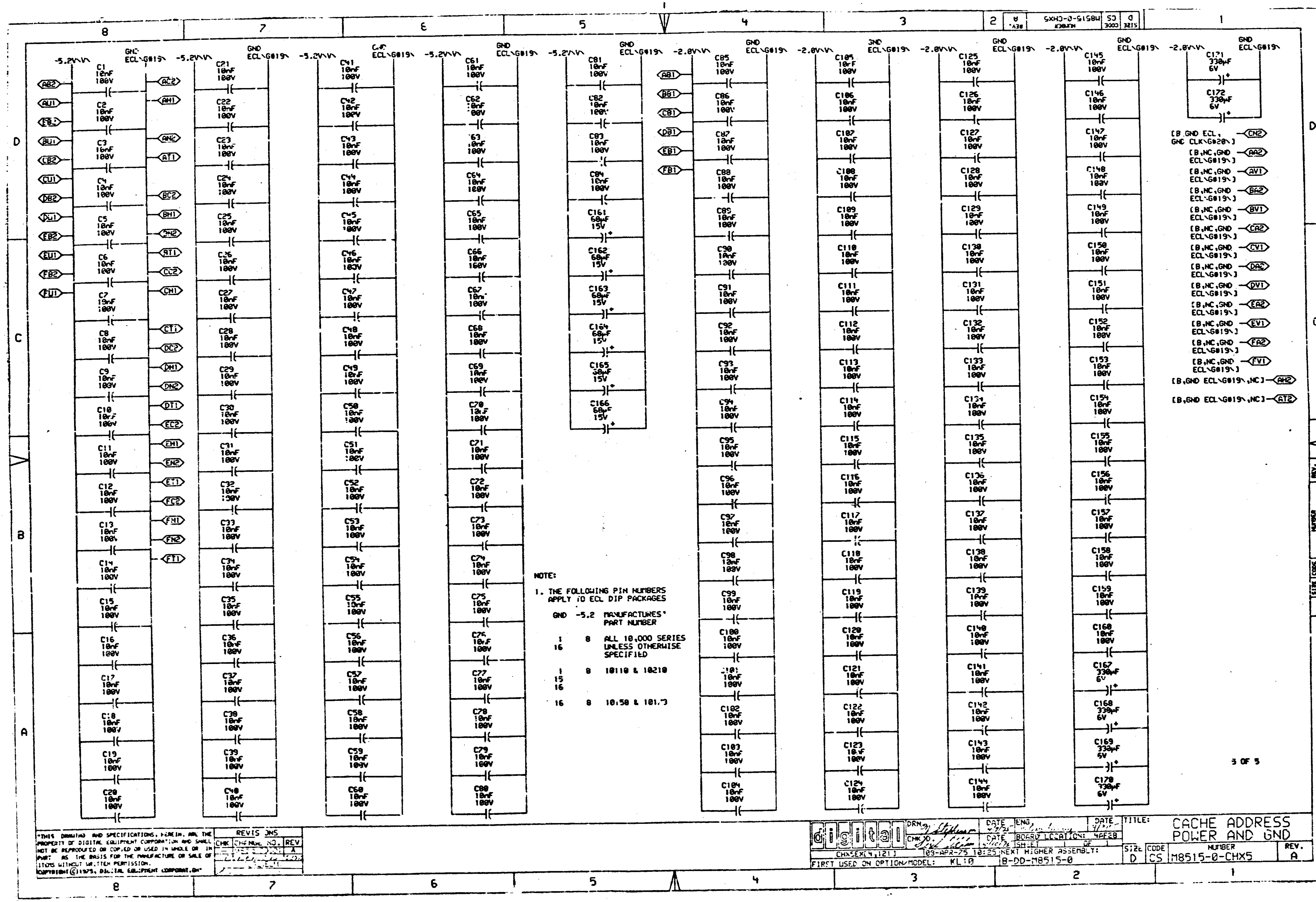
COPYRIGHT © 1975, DIGITAL EQUIPMENT CORPORATION"
REVISIONS
digital
TITLE: CACHE USE BITS
NEXT HIGHER ASSEMBLY: B-DD-M8515-0
FIRST USED ON OPTION/MODEL: KL10
SIZE D
CODE CS
NUMBER M8515-0-CHX3
REV. A



CSH DIR PAR NET AND DIAG MIXERS
SIZE D
CODE CS
NUMBER M8515-0-CHX4
REV. A
4 OF 5
NEXT HIGHER ASSEMBLY: B-CD-M8515-0
FIRST USED ON OPTION/MODEL: KL10
BOARD LOCATION: 4AF28
8 MIX 10164 E50
8 MIX 10164 E30
PARITY 10160 E83
PARITY 10160 E69
PARITY 10160 E60
PARITY 10160 E55
2X4 MIX 10174 E39
2X4 MIX 10174 E35
EBUS D(N) E H
EBUS D(N+1) E H
CSH ADR PAR BAD L
DIAG READ FUNC 17X L
CSH DIR 0 PAR ODD H
CSH DIR 1 PAR ODD H
CSH DIR 2 PAR ODD H
CSH DIR 3 PAR ODD H
CSH WD 2 VAL H
CSH WD 3 VAL H
CHX DIAG 04 H
CHX DIAG 05 H
CHX DIAG 06 H


NOTE:
1. THE FOLLOWING PIN NUMBERS APPLY TO ECL DIP PACKAGES
GND -5.2 MANUFACTURES' PART NUMBER
1 16 8 ALL 10,000 SERIES UNLESS OTHERWISE SPECIFIED
1 15 16 8 10110 & 10210
16 8 10158 & 101.3
3 OF 5
digital
BOARD LOCATION: 4AF28
CHXSEX[4,121] 03-APR-75 10:25
NEXT HIGHER ASSEMBLY: B-DD-M8515-0
FIRST USED ON OPTION/MODEL: KL10
TITLE: CACHE ADDRESS POWER AND GND
SIZE D CODE CS NUMBER M8515-0-CHX5 REV. A

RESISTOR LOC(PIN)	SHOWN ON DRW# REF	VALUE	TERMINATES SIGNAL
R9(1)	CHX3EX B4	68a	%E14(15)
R3(1)	CHX3EX B4	68a	%E19(15)
R166(1)	CHX2EX B1	68a	%E2(13)
R97(1)	CHX3EX A2	68a	%E24(13)
R8(1)	CHX3EX B3	68a	%E24(15)
R14(1)	CHX3EX B1	68a	%E25(13)
R133(1)	CHX2EX A1	68a	%E30(13)
R2(1)	CHX3EX B6	68a	%E4(15)
R141(1)	CHX1EX D7	68a	%E44(14)
R36(1)	CHX3EX C7	100a	%E46(13)
R205(1)	CHX3EX D7	100a	%E46(15)
R153(1)	CHX1EX D2	68a	%E47(14)
R145(1)	CHX1EX D6	68a	%E48(14)
R140(1)	CHX1EX D7	68a	%E51(3)
R148(1)	CHX1EX D4	68a	%E52(14)
R154(1)	CHX1EX D2	68a	%E56(14)
R144(1)	CHX1EX D6	68a	%E57(3)
R130(1)	CHX1EX D7	68a	%E61(3)
R146(1)	CHX1EX D4	68a	%E62(14)
R152(1)	CHX1EX D2	68a	%E65(14)
R143(1)	CHX1EX D5	68a	%E66(3)
R139(1)	CHX1EX D7	58a	%E70(15)
R150(1)	CHX1EX D4	68a	%E71(14)
R147(1)	CHX1EX D2	68a	%E75(15)
R142(1)	CHX1EX D5	68a	%E76(3)
R42(1)	CHX4EX A6	68a	%E79(14)
R43(1)	CHX4EX A6	68a	%E79(15)
R51(1)	CHX4EX B6	68a	%E79(2)
R53(1)	CHX4EX B6	68a	%E79(3)
R109(1)	CHX3EX B7	68a	%E80(2)
R112(1	CHX3EX B7	68a	%E80(5)
R149(1)	CHX1EX D4	68a	%E81(15)
R62(1)	CHX4EX C6	68a	%E84(14)
R61(1)	CHX4EX D6	68a	%E84(15)
R123(1)	CHX4EX D6	68a	%E84(2)
R127(1)	CHX4EX D6	68a	%E84(3)
R10(1)	CHX3EX B5	68a	%C9(15)
R169(1)	CHX3EX D4	63a	ADR 27 A H
R113(1)	CHX3EX D4	68a	ADR 27 B H
R101(1)	CHX3EX D4	68a	ADR 27 C H

NOTE:

1. ALL TERMINATORS HAVE PIN TWO CONNECTED TO -2.0V AND ARE 5% 1/4WATT UNLESS OTHERWISE SPECIFIED
2. ENTRIES ARE SORTED BY SIGNAL NAME
3. % INDICATES OUTPUT OF DIP LOC AND ( ) INDICATES PIN NUMBER

RESISTOR LOC(PIN)	SHOWN ON DRW# REF	VALUE	TERMINATES SIGNAL
R168(1)	CHX3EX D4	68a	ADR 28 A H
R111(1)	CHX3EX D4	68a	ADR 28 B H
R180(1)	CHX3EX D4	38c	ADR 28 C H
R167(1)	CHX3EX C4	68a	ADR 29 A H
R1(1)	CHX3EX C4	68a	ADR 29 B H
R102(1)	CHX3EX C4	68a	ADR 29 C H
R170(1)	CHX3EX D3	68a	ADR 30 A H
R11(1)	CHX3EX D2	68a	ADR 30 B H
R95(1)	CHX3EX D2	68a	ADR 30 C H
R158(1)	CHX3EX D3	68a	ADR 31 A H
R5(1)	CHX3EX D2	68a	ADR 31 B H
R91(1)	CHX3EX D2	68a	ADR 31 C H
R159(1)	CHX3EX C3	68a	ADR 32 A H
R6(1)	CHX3EX C2	68a	ADR 32 B H
R93(1)	CHX3EX C2	68a	ADR 32 C H
R161(1)	CHX3EX D1	68a	ADR 33 A H
R4(1)	CHX3EX D1	68a	ADR 33 B H
R94(1)	CHX3EX D1	68a	ADR 33 C H
R202(1)	CHX3EX B7	66a	APR EN REFILL RAM WR H
R157(1)	CHX2EX B6	68a	CAM SEL 1 H
R155(1)	CHX2EX B6	68a	CAM SEL 2 H
R20(1)	CHX4EX C6	68a	CHX DIAG 04 H
R99(1)	CHX4EX B6	68a	CHX DIAG 05 H
R23(1)	CHX4EX B5	68a	CHX DIAG 06 H
R35(1)	CHX3EX D7	68a	CLK A H
R137(1)	CHX3EX D7	68a	CLK CHX H
R200(1)	CHX2EX D1	68a	-CSH 0 ANY VAL H
R162(1)	CHX2EX D4	68a	-CSH 0 VAL WR H
R110(1)	CHX2EX C5	68a	CSH 0 WD 0 VAL H
R105(1)	CHX2EX C5	68a	CSH 0 WD 1 VAL H
R26(1)	CHX2EX C4	68a	CSH 0 WD 2 VAL H
R106(1)	CHX2EX C4	68a	CSH 0 WD 3 VAL H
R103(1)	CHX2EX D1	68a	-CSH 1 ANY VAL H
R132(1)	CHX2EX D4	68a	-CSH 1 VAL WR H
R100(1)	CHX2EX B5	68a	CSH 1 WD 0 VAL H
R107(1)	CHX2EX B5	68a	CSH 1 WD 1 VAL H
R22(1)	CHX2EX B4	68a	CSH 1 WD 2 VAL H
R104(1)	CHX2EX B4	68a	CSH 1 WD 3 VAL H
R27(1)	CHX1EX D2	68a	CSH 1,3 VALID MATCH H
R188(1)	CHX2EX D1	68a	-CSH 2 ANY VAL H

RESISTOR LOC(PIN)	SHOWN ON DRW# REF	VALUE	TERMINATES SIGNAL
R165(1)	CHX2EX D4	68a	-CSH 2 VAL WR H
R33(1)	CHX2EX C3	68a	CSH 2 WD 0 VAL H
R34(1)	CHX2EX C2	68a	CSH 2 WD 1 VAL H
R31(1)	CHX2EX C2	68a	CSH 2 WD 2 VAL H
R21(1)	CHX2EX C1	68a	CSH 2 WD 3 VAL H
R28(1)	CHX1EX D2	68a	CSH 2,3 VALID MATCH H
R203(1)	CHX2EX C1	68a	-CSH 3 ANY VAL H
R135(1)	CHX2EX C4	68a	-CSH 3 VAL WR H
R25(1)	CHX2EX B3	68a	CSH 3 WD 0 VAL H
R32(1)	CHX2EX B2	68a	CSH 3 WD 1 VAL H
R29(1)	CHX2EX B2	60a	CSH 3 WD 2 VAL H
R30(1)	CHX2EX B1	68a	CSH 3 WD 3 VAL H
R40(1)	CHX4EX D4	68a	CSH DIR 0 PAR ODD H
R37(1)	CHX4EX C4	68a	CSH DIR 1 PAR ODD H
R122(1)	CHX1EX C8	68a	CSH DIR 14 0 H
R67(1)	CHX1EX C6	68a	CSH DIR 14 1 H
R52(1)	CHX1EX C5	68a	CSH DIR 14 2 H
R49(1)	CHX1EX C3	68a	CSH DIR 14 3 H
R138(1)	CHX1EX C8	68a	CSH DIR 15 0 H
R68(1)	CHX1EX C6	68a	CSH DIR 15 1 H
R53(1)	CHX1EX C5	68a	CSH DIR 15 2 H
R46(1)	CHX1EX C3	68a	CSH DIR 15 3 H
R128(1)	CHX1EX C8	68a	CSH DIR 16 0 H
R69(1)	CHX1EX C6	68a	CSH DIR 16 1 H
R54(1)	CHX1EX C5	68a	CSH DIR 16 2 H
R47(1)	CHX1EX C3	68a	CSH DIR 16 3 H
R156(1)	CHX1EX C8	68a	CSH DIR 17 0 H
R71(1)	CHX1EX C6	68a	CSH DIR 17 1 H
R56(1)	CHX1EX C5	68a	CSH DIR 17 2 H
R50(1)	CHX1EX C3	68a	CSH DIR 17 3 H
R129(1)	CHX1EX C8	68a	CSH DIR 18 0 H
R70(1)	CHX1EX C6	68a	CSH DIR 18 1 H
R55(1)	CHX1EX C5	68a	CSH DIR 18 2 H
R48(1)	CHX1EX C3	68a	CSH DIR 18 3 H
R151(1)	CHX1EX B8	68a	CSH DIR 19 0 H
R65(1)	CHX1EX B6	68a	CSH DIR 19 1 H
R58(1)	CHX1EX B5	68a	CSH DIR 19 2 H
R116(1)	CHX1EX B3	68a	CSH DIR 19 3 H
R38(1)	CHX4EX C4	68a	CSH DIR 2 PAR ODD H
R126(1)	CHX1EX B8	68a	CSH DIR 20 0 H

RESISTOR LOC(PIN)	SHOWN ON DRW# REF	VALUE	TERMINATES SIGNAL
R66(1)	CHX1EX B6	68a	CSH DIR 20 1 H
R118(1)	CHX1EX B5	68a	CSH DIR 20 2 H
R119(1)	CHX1EX B3	68a	CSH DIR 20 3 H
R125(1)	CHX1EX B8	68a	CSH DIR 21 0 H
R64(1)	CHX1EX B6	68a	CSH DIR 21 1 H
R57(1)	CHX1EX B5	69a	CSH DIR 21 2 H
R120(1)	CHX1EX B3	68a	CSH DIR 21 3 H
R124(1)	CHX1EX B8	68a	CSH DIR 22 0 H
R59(1)	CHX1EX B6	68a	CSH DIR 22 1 H
R45(1)	CHX1EX B5	68a	CSH DIR 22 2 H
R41(1)	CHX1EX B3	68a	CSH DIR 22 3 H
R121(1)	CHX1EX B8	68a	CSH DIR 23 0 H
R60(1)	CHX1EX B6	68a	CSH DIR 23 1 H
R117(1)	CHX1EX B5	68a	CSH DIR 23 2 H
R44(1)	CHX1EX B3	68a	CSH DIR 23 3 H
R87(1)	CHX1EX B8	68a	CSH DIR 24 0 H
R81(1)	CHX1EX B6	68a	CSH DIR 24 1 H
R82(1)	CHX1EX B5	68a	CSH DIR 24 2 H
R74(1)	CHX1EX B3	68a	CSH DIR 24 3 H
R88(1)	CHX1EX B8	68a	CSH DIR 25 0 H
R79(1)	CHX1EX B6	68a	CSH DIR 25 1 H
R77(1)	CHX1EX B5	68a	CSH DIR 25 2 H
R73(1)	CHX1EX B3	68a	CSH DIR 25 3 H
R85(1)	CHX1EX A8	68a	CSH DIR 26 0 H
R83(1)	CHX1EX A6	68a	CSH DIR 26 1 H
R75(1)	CHX1EX A4	68a	CSH DIR 26 2 H
R76(1)	CHX1EX A3	68a	CSH DIR 26 3 H
R72(1)	CHX4EX A4	68a	CSH DIR 3 PAR ODD H
R86(1)	CHX4EX D6	68a	CSH DIR PAR 0 H
R84(1)	CHX4EX C6	68a	CSH DIR PAR 1 H
R80(1)	CHX4EX B6	68a	CSH DIR PAR 2 H
R78(1)	CHX4EX A6	68a	CSH DIR PAR 3 H
R15(1)	CHX3EX B3	68a	-CSH REFILL RAM WR H
R114(1)	CHX3EX B7	68a	CSH SEL LRU H
R115(1)	CHX3EX C7	68a	-CSH SEL LRU H
R17(1)	CHX3EX B5	68a	CSH USE ADR 2 H
R18(1)	CHX3EX C4	68a	CSH USE ADR 3 H
R19(1)	CHX3EX C4	68a	CSH USE ADR 4 H
R7(1)	CHX3EX B4	58a	CSH USE HOLD H
R92(1)	CHX3EX C6	68a	CSH USE IN 0 H

REVISIONS		
CHK	CHANGE NO.	REV
-	[illegible]	A

digital

DRN. C. Smith DATE 07-APR-75 ENG. DATE
CHK. DATE BOARD LOCATION: 4AF28 SHEET 1 OF 2
M8515I(4,427) 07-APR-75 14:25 NEXT HIGHER ASSEMBLY: B-DD-M8515-0
FIRST USED ON OPTION/MODEL: KL10

TITLE: CACHE EXTENSION TERMINATORS

SIZE D CODE CS NUMBER M8515-0-RES REV. A

RESISTOR LOC(PIN)	SHOWN ON DRW#	REF	VALUE	TERMINATES SIGNAL
R89(1)	CHX3EX	B6	68Ω	CSH USE IN 1 H
R183(1)	CHX3EX	C3	68Ω	CSH USE IN 2 H
R24(1)	CHX3EX	C2	68Ω	CSH USE IN 3 H
R58(1)	CHX3EX	C1	68Ω	CSH USE IN 4 H
R39(1)	CHX3EX	D7	68Ω	CSH USE WR EN 4
R189(1)	CHX2EX	D3	68Ω	CSH VAL SEL ALL H
R163(1)	CHX2EX	D2	68Ω	-CSH VAL WD 0 SEL H
R134(1)	CHX2EX	D2	68Ω	-CSH VAL WD 1 SEL H
R164(1)	CHX2EX	D2	68Ω	-CSH VAL WD 2 SEL H
R136(1)	CHX2EX	C2	68Ω	-CSH VAL WD 3 SEL H
R195(1)	CHX3EX	C2	68Ω	CSH VAL WR DATA H
R168(1)	CHX3EX	C1	68Ω	CSH VAL WR DATA A H
R131(1)	CHX3EX	C1	68Ω	CSH VAL WR DATA B H
R198(1)	CHX2EX	D4	68Ω	-CSH VAL WR PULSE H
R186(1)	CHX1EX	A8	68Ω	FORCE NO MATCH H
R159(1)	CHX1EX	A7	68Ω	FORCE VALID MATCH 0 H
R184( )	CHX1EX	A6	68Ω	FORCE VALID MATCH 1 H
R185(1)	CHX1EX	A4	68Ω	FORCE VALID MATCH 2 H
R2?1(1)	CHX1EX	A3	68Ω	FORCE VALID MATCH 3 H
R173(1)	CHX1EX	D8	68Ω	PT 14 B H
R172(1)	CHX1EX	D9	68Ω	PT 15 B H
R171(1)	CHX1EX	D8	68Ω	PT 16 B H
R174(1)	CHX1EX	D8	68Ω	PT 17 B H
R177(1)	CHX1EX	D8	68Ω	PT 18 B H
R176(1)	CHX1EX	D8	68Ω	PT 19 B H
R175(1)	CHX1EX	D8	68Ω	PT 20 B H
R178(1)	CHX1EX	D8	68Ω	PT 21 B H
R181(1)	CHX1EX	D8	68Ω	PT 22 B H
R180(1)	CHX1EX	D8	68Ω	PT 23 B H
R179(1)	CHX1EX	D8	68Ω	PT 24 B H
R182(1)	CHX1EX	C8	68Ω	PT 25 B H
R187(1)	CHX1EX	C8	68Ω	PT 26 B H
R12(1)	CHX3EX	C5	68Ω	USE TBL IN 2 H
R13(1)	CHX3EX	C5	68Ω	USE TBL IN 3 H
R16(1)	CHX3EX	C5	68Ω	USE TBL IN 4 H
R191(1)	CHX3EX	D5	68Ω	VMA 27 6 H
R192(1)	CHX3EX	D5	68Ω	VMA 28 6 H
R193(1)	CHX3EX	C5	68Ω	VMA 29 6 H
R194(1)	CHX3EX	D3	68Ω	VMA 30 6 H
R197(1)	CHX3EX	D3	68Ω	VMA 31 6 H
R190(1)	CHX3EX	C3	68Ω	VMA 32 6 H
R196(1)	CHX3EX	D2	68Ω	VMA 33 6 H
R98(1)	CHX3EX	D7	68Ω	-WR USE BITS A H
R96(1)	CHX3EX	C7	68Ω	-WR USE BITS B H

NOTE:

1. " " TERMINATORS HAVE PIN TWO CONNECTED TO -2.0V AND ARE 5% 1/4WATT UNLESS OTHERWISE SPECIFIED
2. ENTRIES ARE SORTED BY SIGNAL NAME
3. % INDICATES OUTPUT OF DIP LOC AND
   () INDICATES PIN NUMBER

REVISIONS: CHK | CHANGE NO. | REV

digital — DRN. C. Smith, DATE 07-APR-75; CHK; ENG.; BOARD LOCATION: 4AF23; SHEET 2 OF 2

M8515 2(4,427) 07-APR-75 14:09 NEXT HIGHER ASSEMBLY: B-DD-M8515-0

FIRST USED ON OPTION/MODEL: KL10

TITLE: CACHE EXTENSION TERMINATORS

SIZE D | CODE CS | NUMBER M8515-0-RES | REV. A