Base Board Signal Name	Base Board Edge Pin	Berg Connectors	Alto Bus Bit	Dorado Connector Amp 204733-1
ACPI.0	E026	2	00 To Alto	A13
ACPIGnd.0	E027	3		B16
ACPI.1	E030	6	01 To Alto	A15
ACPIGnd.1	E031	7		A16
ACPI.2	E034	10	02 To Alto	C13
ACPIGnd.2	E035	11		C14
ACPI.3	E038	14	03 To Alto	C11
ACPIGnd.3	E039	15		B14
ACPI.4	E042	18	04 To Alto	B15
ACPIGnd.4	E043	19		A14
Spare	E046	22	05 To Alto	B13
SpareGnd	E047	23		C12
ACPBus.0*	E050	2	00 From Alto	B11
ACPGnd.00	E051	3		B12
ACPBus.1*	E054	6	01 From Alto	A11
ACPGnd.01	E055	7		A12
ACPBus.2*	E058	10	02 From Alto	C09
ACPGnd.02	E059	11		C10
ACPBus.3*	E062	14	03 From Alto	B09
ACPGnd.03	E063	15		B10
ACPBus.4*	E066	18	04 From Alto	A09
ACPGnd.04	E067	19		A10
ACPBus.5*	E070	22	05 From Alto	C07
ACPGnd.05	E071	23		C08
ACPBus.6*	E074	2	06 From Alto	B07
ACPGnd.06	E075	3		B08
ACPBus.7*	E078	6	07 From Alto	A07
ACPGnd.07	E079	7		A08
ACPBus.8*	E082	10	08 From Alto	C05
ACPGnd.08	E083	11		C06
ACPStrb*	E086	14	09 From Alto	B05
ACPGnd.09	E087	15		B06
ACPABus.0*	E090	18	10 From Alto	A05
ACPGnd.10	E091	19		A06
ACPABus.1*	E094	22	11 From Alto	C03
ACPGnd.11	E095	23		C04
ACPABus.2*	E098	2	12 From Alto	B03
ACPGnd.12	E099	3		B04
ACPBit13	E102	6	13 From Alto	A03
ACPGnd.13	E103	7		A04
ACPBit14	E106	10	14 From Alto	C01
ACPGnd.14	E107	11		C02
Spare	E110	14	15 From Alto	B01
SpareGnd	E111	15		B02

Note: All wires are white 26Ga

XEROX CSL	Project Dorado	Alto to Base Board Internal cabling	File D1Cab01.sil	Designer M.Overton	Rev A	Date 9/11/78	Page 1

Alto2 Printer Signal Name	Alto Bus Bit	Alto1 Printer Connector DC 37P	Alto2 Printer Connector DB 25P	Wire Color	Dorado Connector Amp 204746-1 Signal	Ref Gnd
GND	Ref Ground	25 & 26	1	Black		
GND	Ref Ground	27 & 28	2	Black		
PRDY*	05 To Alto	24	3	Violet	B13	B14
PPO*	02 To Alto	21	4	Orange	C13	C14
PPFRDY*	00 To Alto	17	5	Blue	A13	A14
PDATA2*	14 From Alto	15	6	Violet	C01	C02
PDATA8*	12 From Alto	13	7	White	B03	B04
PDATA32*	10 From Alto	11	8	Grey	A05	A06
PDATA128*	08 From Alto	9	9	Brown	C05	C06
PDATA512*	06 From Alto	7	10	Yellow	B07	B08
PCARSTR*	04 From Alto	5	11	Green	A09	A10
PRIB*	02 From Alto	3	12	White	C09	C10
PPFSTR*	00 From Alto	1	13	Violet	B11	B12
GND	Ref Ground	29	14	Black		
PCARRDY*	04 To Alto	23	15	Green	B15	B16
PCHRDY*	03 To Alto	22	16	Orange	C11	C12
PCHK*	01 To Alto	20	17	White	A15	A16
PDATA1*	15 From Alto	16	18	Grey	B01	B02
PDATA4*	13 From Alto	14	19	Red	A03	A04
PDATA16*	11 From Alto	12	20	Yellow	C03	C04
PDATA64*	09 From Alto	10	21	Green	B05	B06
PDATA256*	07 From Alto	8	22	Blue	A07	A08
PDATA1024*	05 From Alto	6	23	Red	C07	C08
PCHSTR*	03 From Alto	4	24	Brown	B09	B10
PREST*	01 From Alto	2	25	Grey	A11	A12

Note: The Reference grounds are the real Alto grounds in the Printer Cable but are only used as the reference levels for the differential line receivers in the Dorado, the Ground of the Alto never gets tied directly to the Ground of the Dorado. THIS IS VERY IMPORTANT

TO MAKE BASEBOARD PROMS (INTEL 2716)

1. INSTALL PERSONALITY MODULE
   PM 9052 INTEL 2716 WITH SWITCH IN FIXED MODE
2. CABLE UP TO THE ALTO, ALSO ERASE OLD EPROMS IF NECESSARY.
3. START UP AND BOOT PROM DISK.
4. TYPE @DORADOBASEROM-BLOW.CM
5. IF A CHANGE HAS BEEN MADE THEN TYPE @DORADOBASEROM-COMPILE.CM
   WHICH WILL GO TO MAXC AND GET THE NEW EPROM FILES
   THEN REPEAT STEP 4.
6. FOLLOW INSTRUCTIONS ON DISPLAY, THE NUMBERS FOR THE EPROMS ARE DISPLAYED IN HEX SO USE THE TOP 5 BITS TO TELL WHICH PROM YOU ARE BLOWING.

DORADO SCHEMATICS

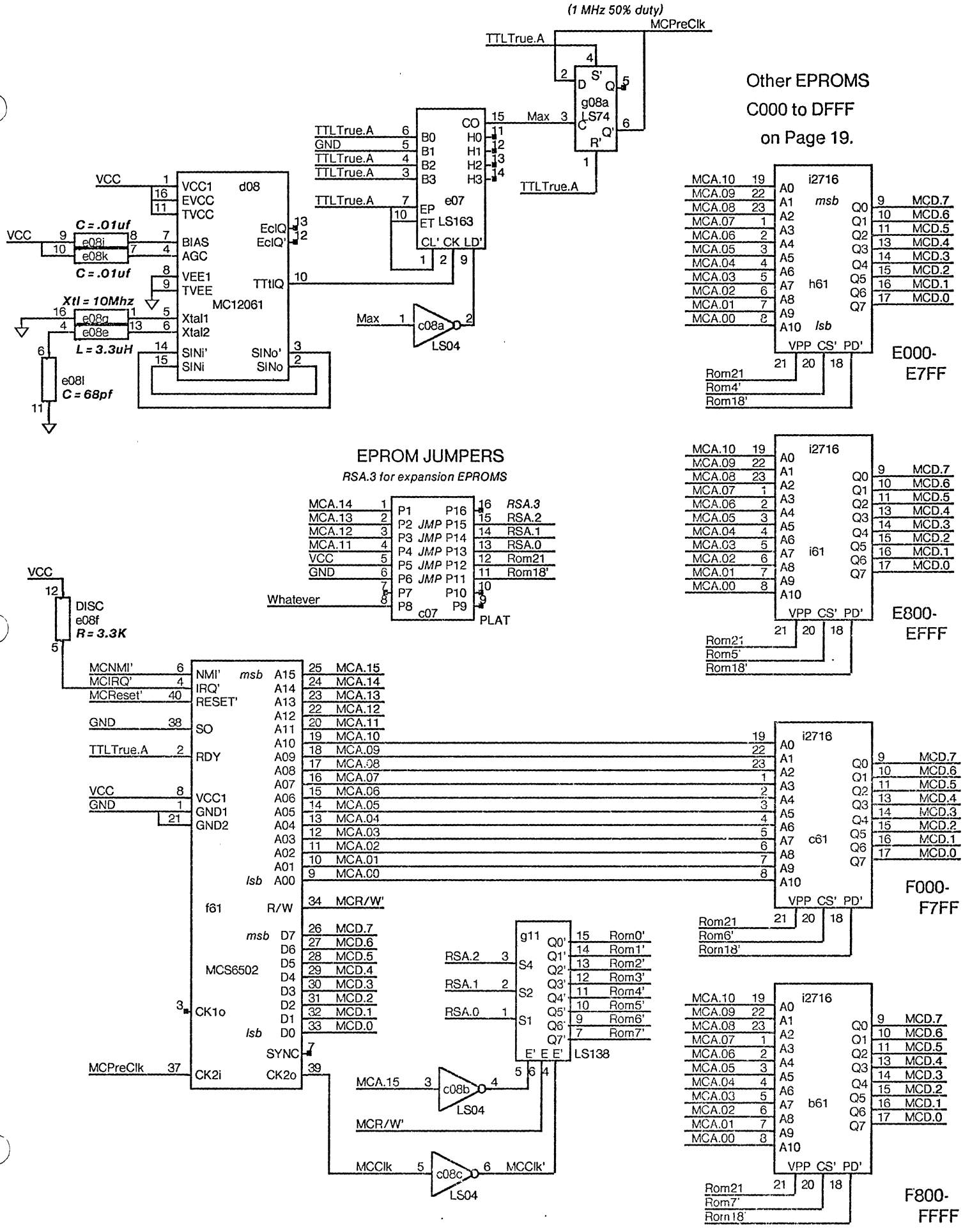
Base Board

Table of contents

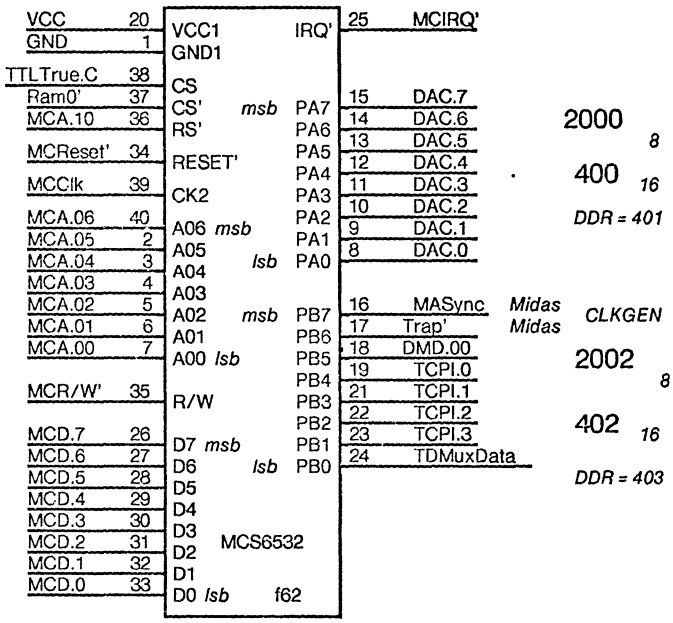
TITLE	Page
Microcomputer and EPROMS	01
RAM, Timers and I/O pins	02
CP Bus & Mux and RCPBus	03
Muffler and Manifold	04
Alto Control Bus Receivers	05
Alto Control Bus Drivers	06
Prototype Ram Module	07
Serial # and CP Bus Handoff	09
Clk Generator Ref. & Freq Comp	10
Clk Generator Loop Filter and VCO	11
Clk Generator & Backpanel Distributor	12
DAC and Current/Voltage Sensing	13
Temp Sense, PwrOn, & LED Ckts	14
Additional EPROMS & 7 Wire Interface	15
Layout	16
Loading Information	17

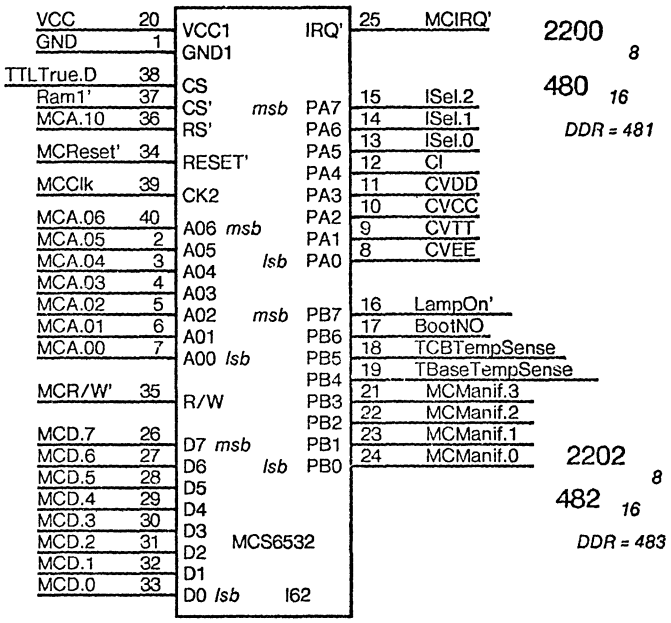
JUMP 114 - 113 → DON'T WAIT FOR DISK

XEROX PARC	Project	Reference	File	Designer	Rev	Date	Total Pages
	Dorado	Title Page	BaseBd-Rev-AI.sil	Sosinski	AI	10/04/79	17

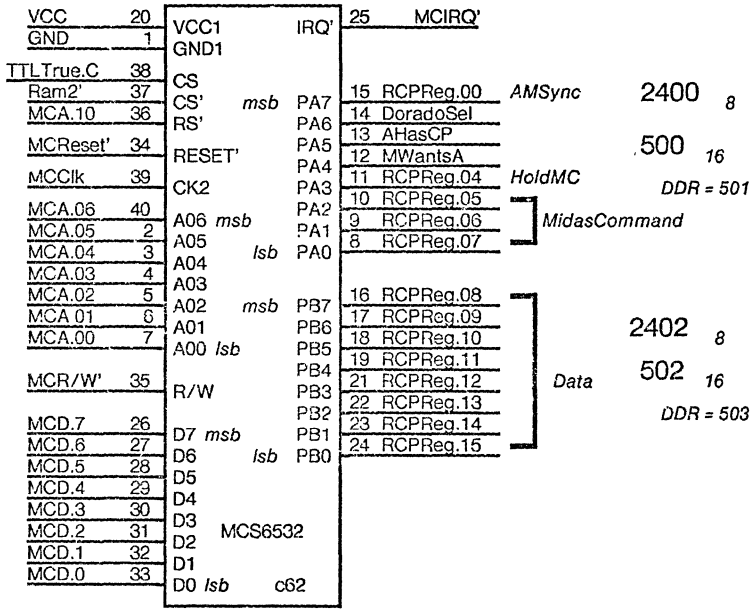


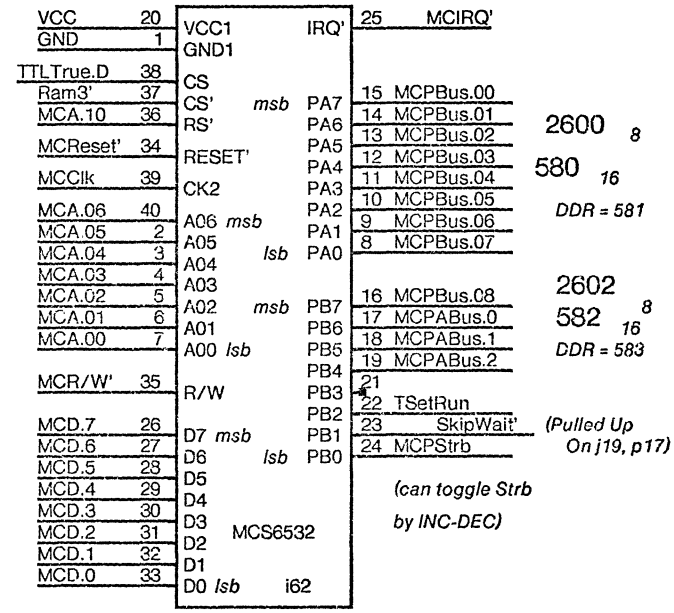
XEROX CSL	Project: Dorado	Dorado Base Board Microcomputer and Rom	File: Basebd01.sil	Designer: McCreight	Rev: AI	Date: 7/27/79	Page: 01

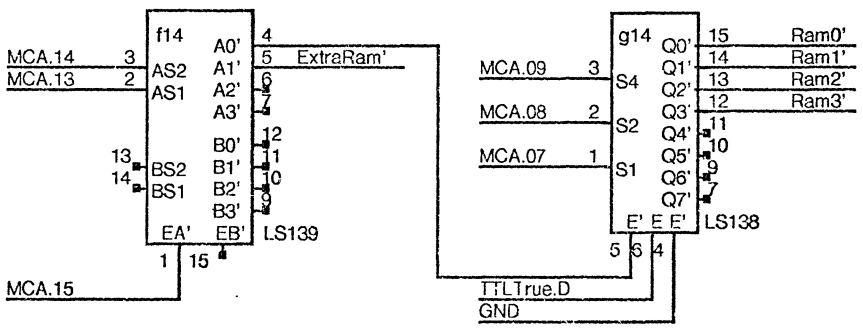




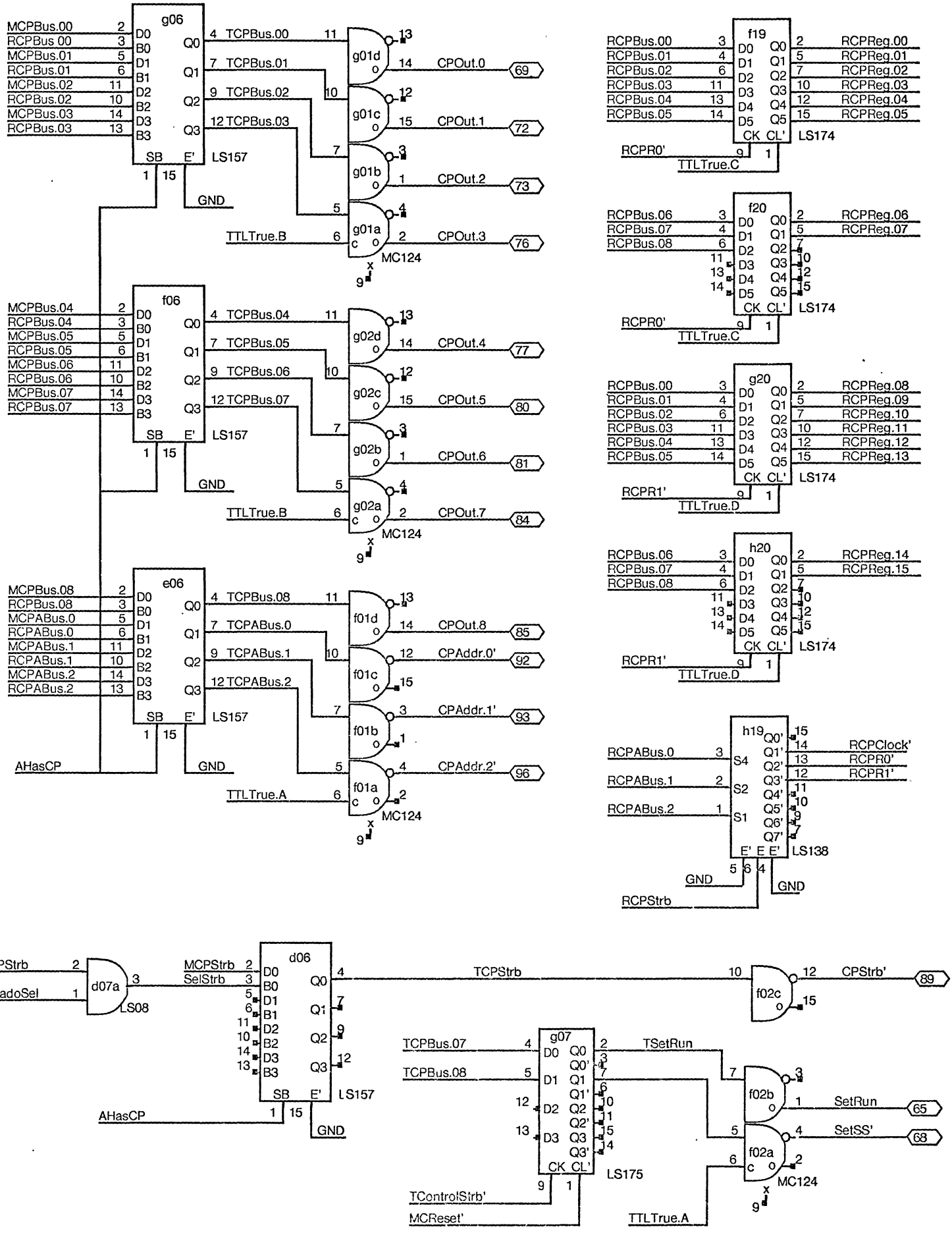
Basic Ram covers [0 16 , 1FF 16]



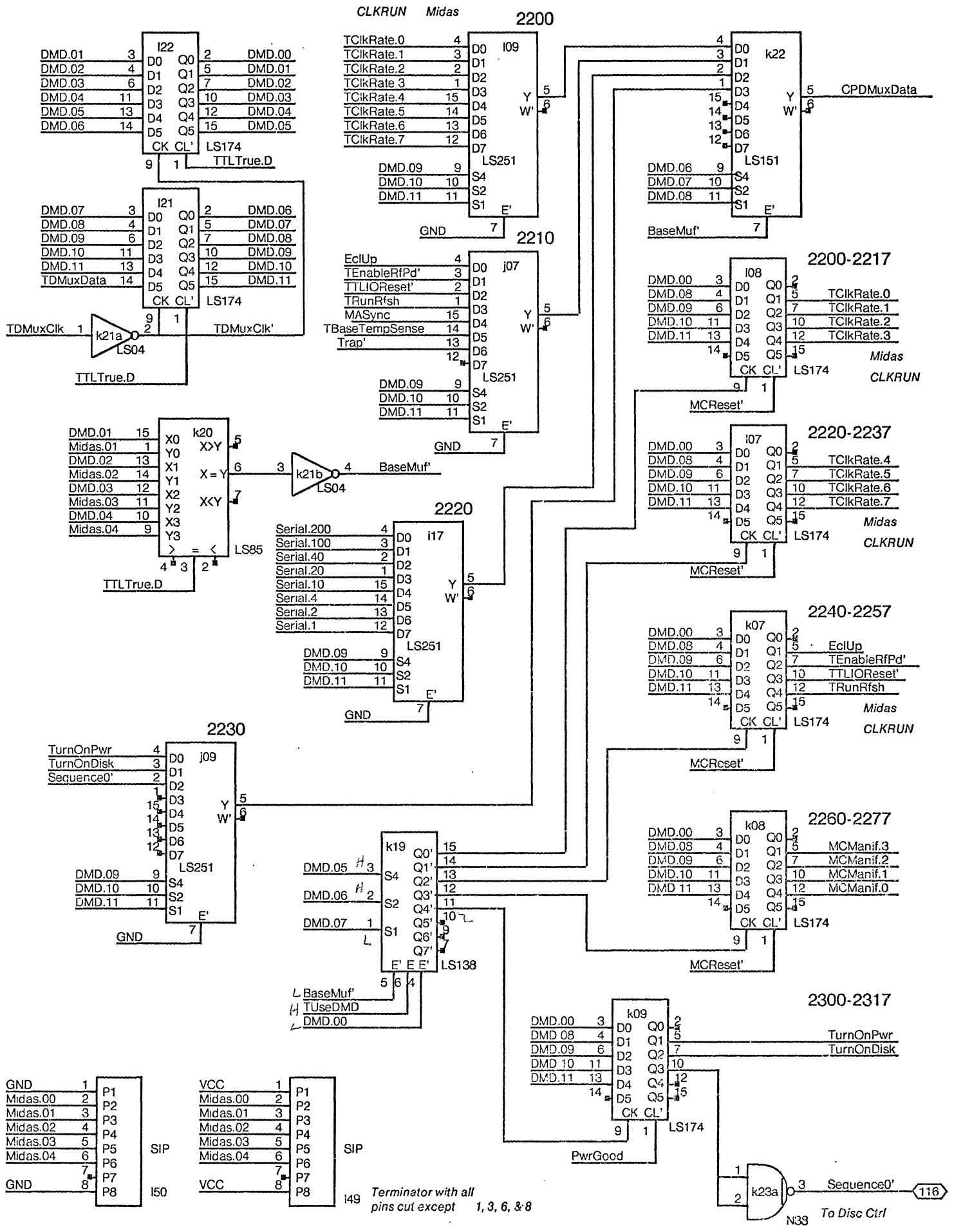




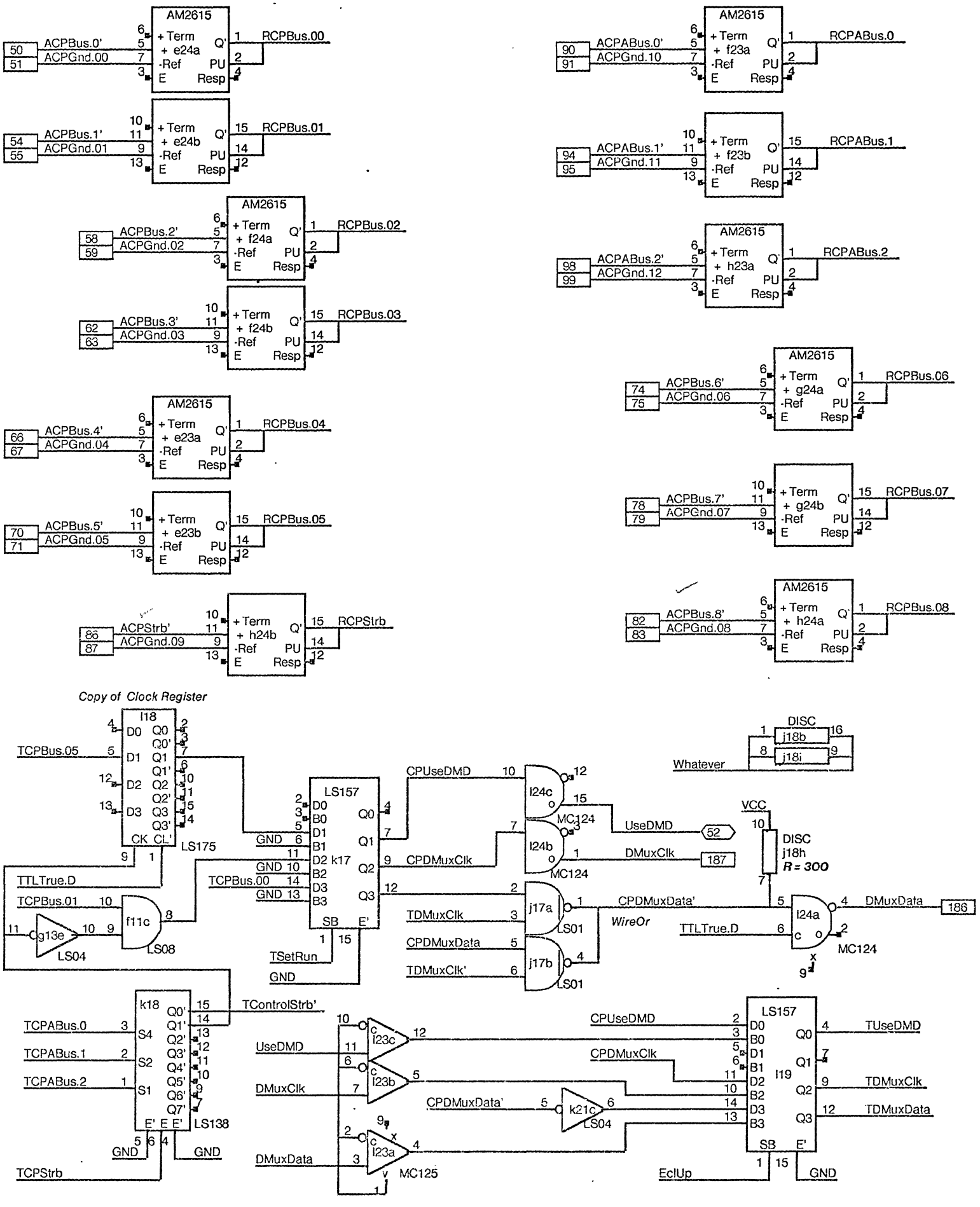
XEROX CSL	Project: Dorado	Dorado Base Board Ram, Timers, and I/O pins	File: Basebd02 sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 02



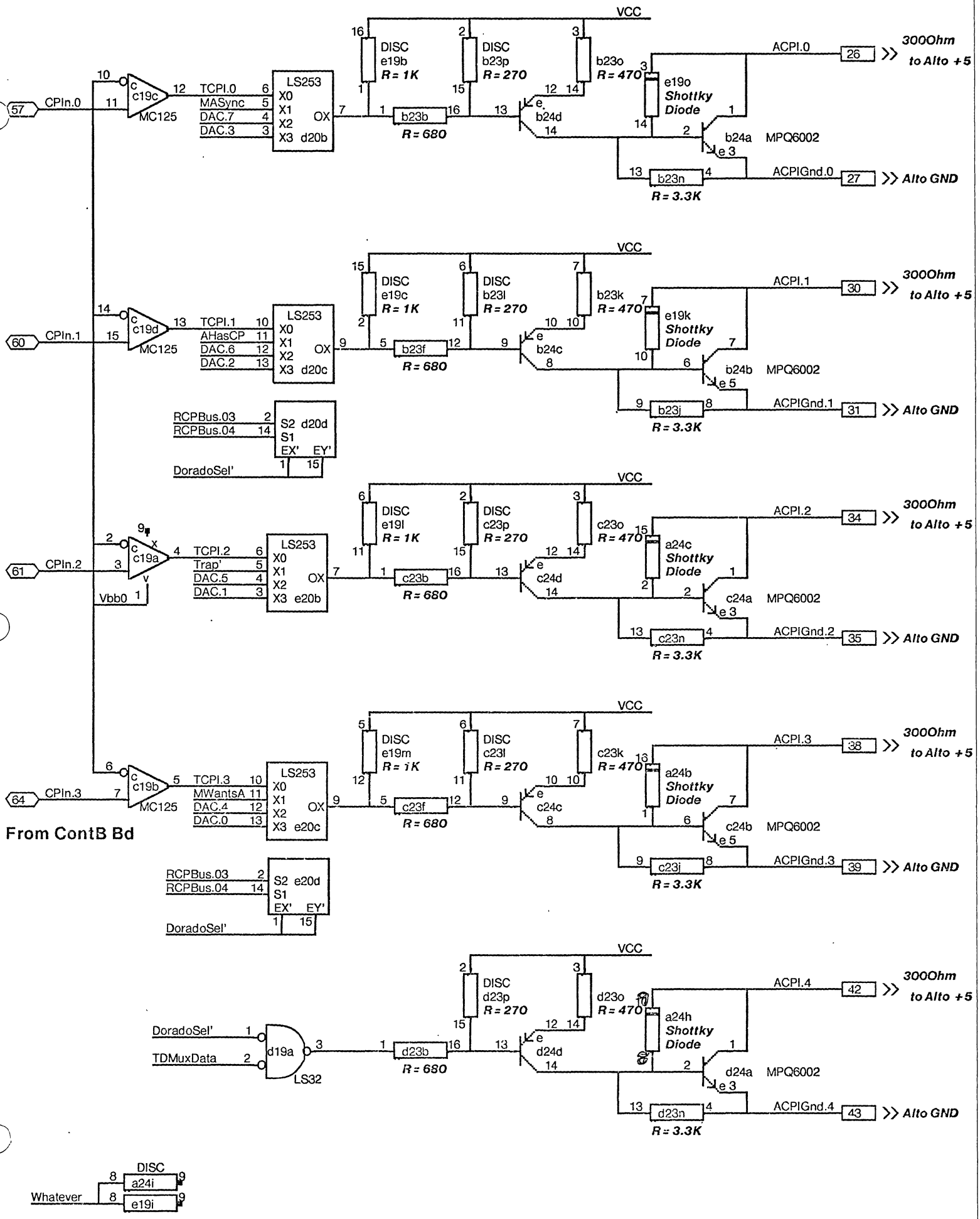
XEROX CSL	Project: Dorado	Dorado Base Board CP Bus Mpx & ABMux Rcv	File: Basebd03.sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 03



XEROX CSL	Project: Dorado	Dorado Base Board Muffler and Manifold	File: Basebd04.sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 04

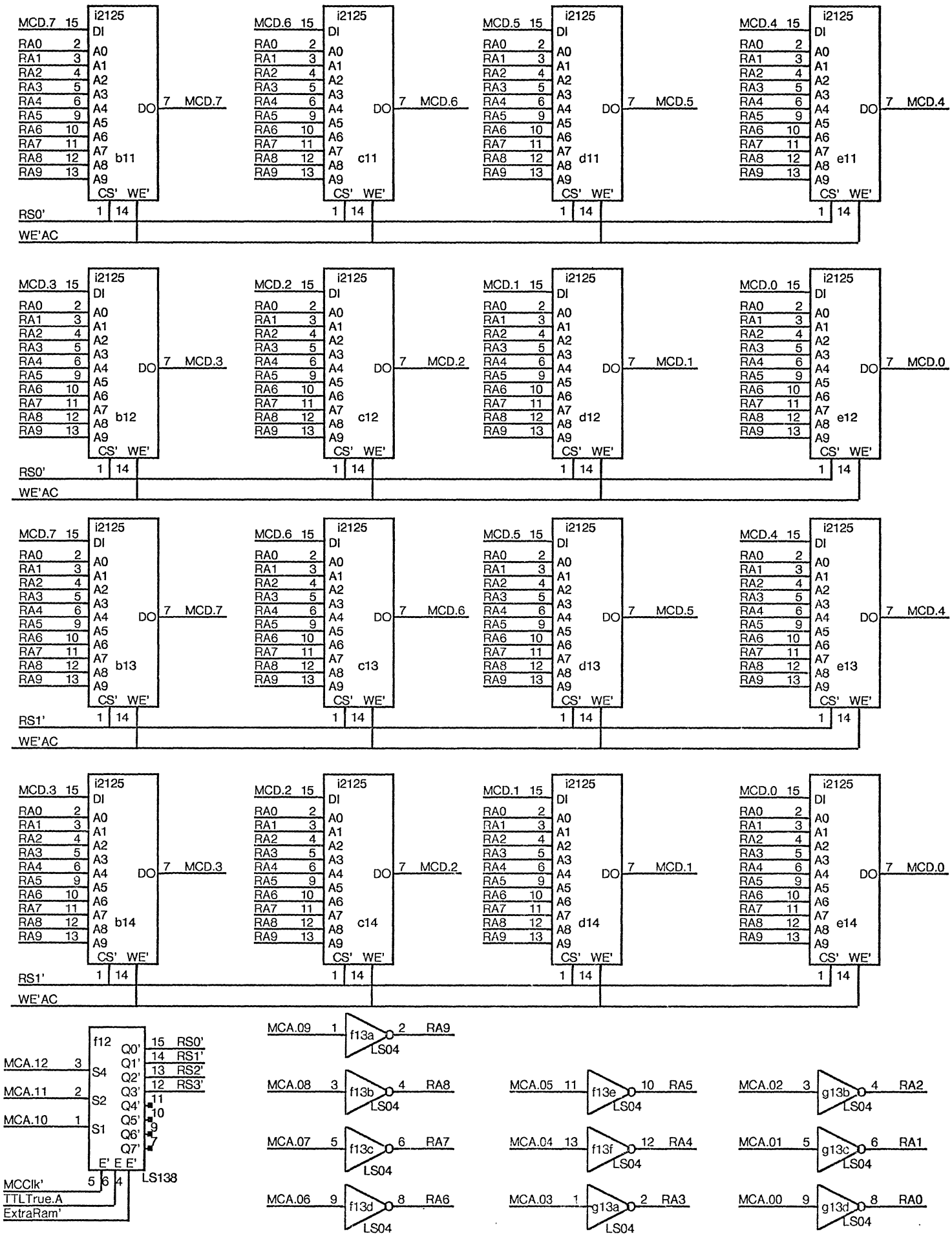


XEROX CSL	Project: Dorado	Dorado Base Board Alto Control Bus Receivers	File: Basebd05.sil	Designer: McCreight	Rev: AI	Date: 7/25/79	Page: 05

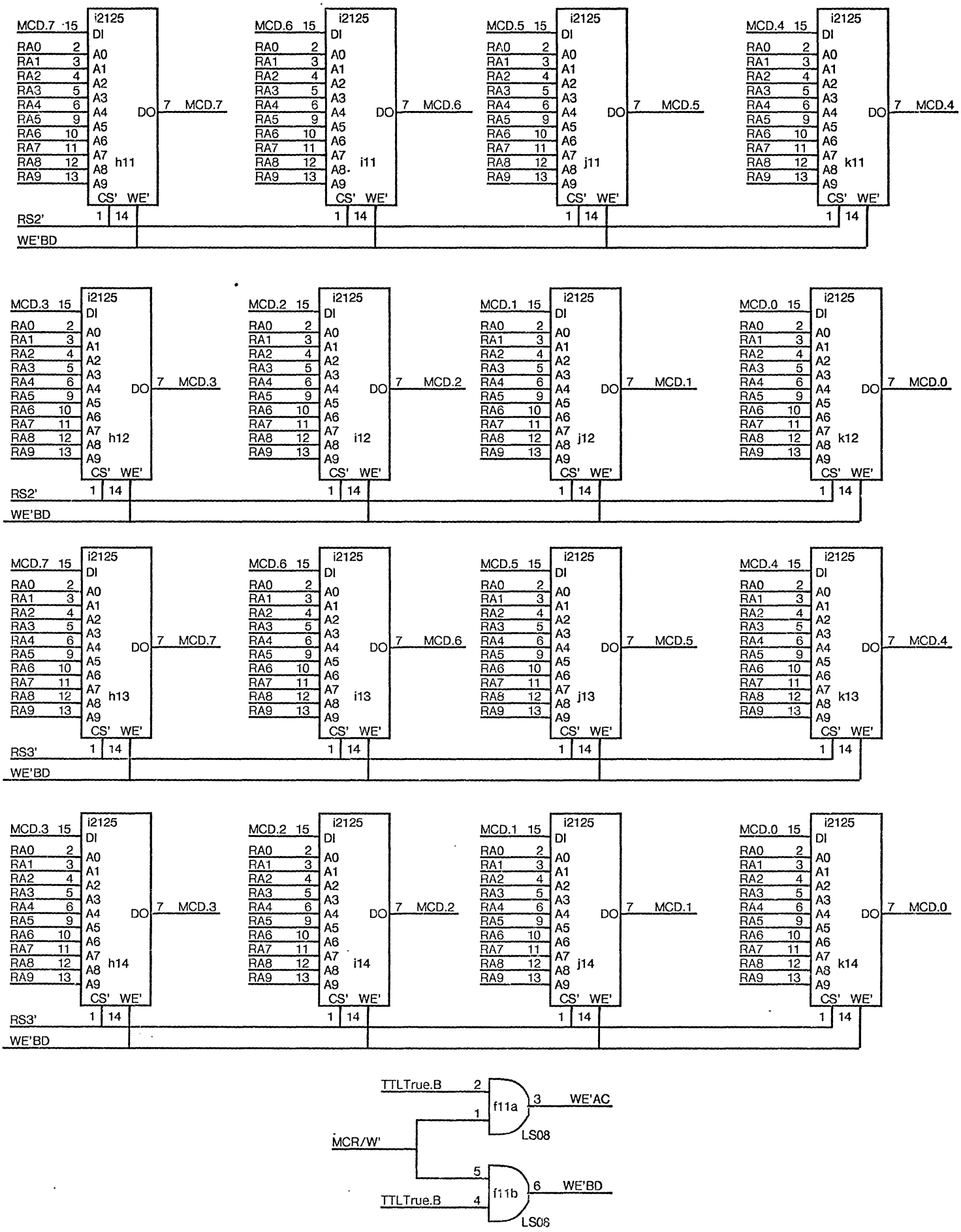


XEROX CSL	Project: Dorado	Dorado Base Board Alto Control Bus Drivers	File: Basebd06.sil	Designer: McCreight	Rev: AI	Date: 7/27/79	Page: 06

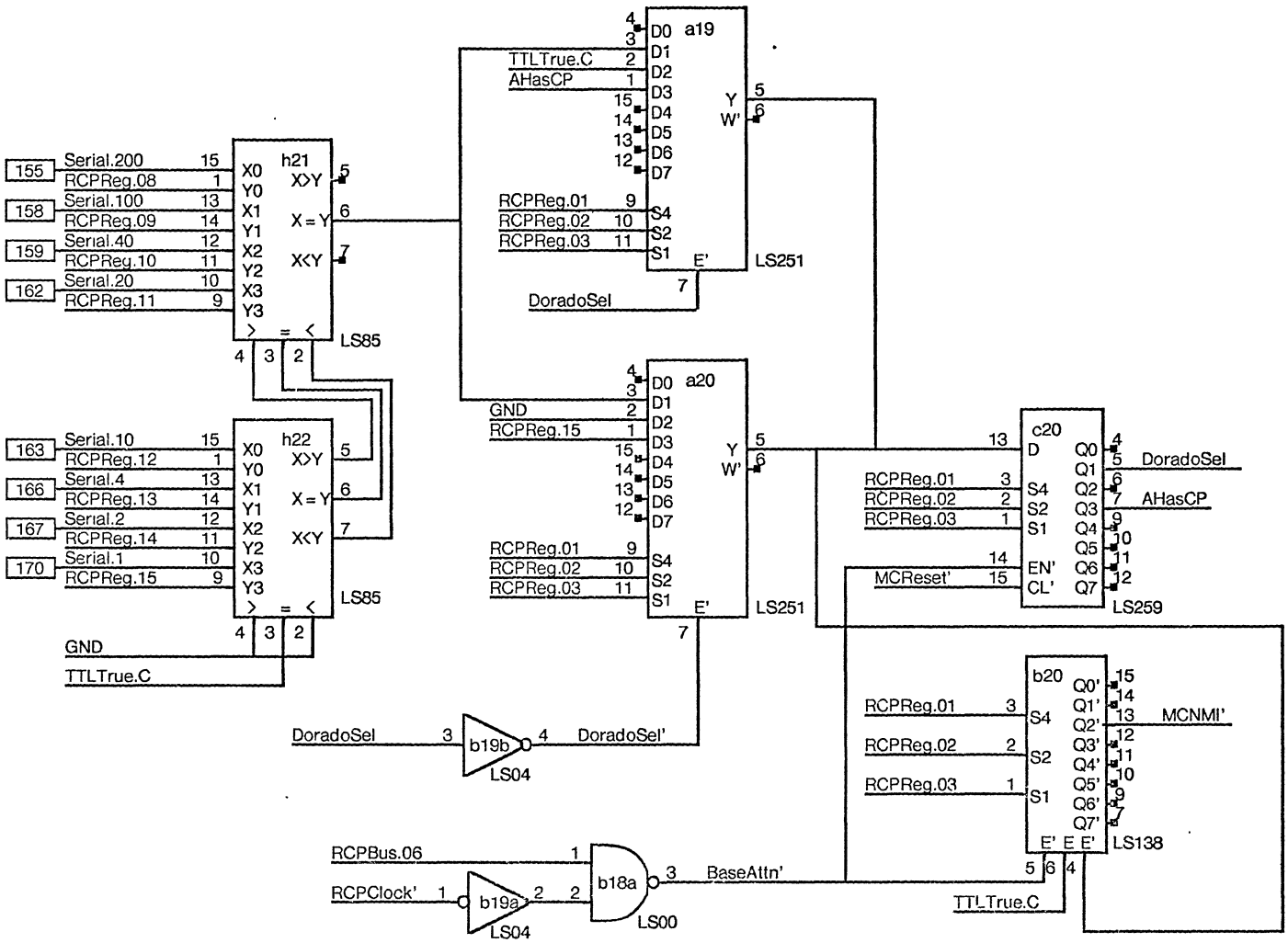
RAMS ARE OPTIONAL



XEROX CSL	Project: Dorado	Dorado Base Board Prototype Ram Module	File: BaseBd07.sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 07



XEROX CSL	Project: Dorado	Dorado Base Board Prototype Ram Module	File: BaseBd08.sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 08



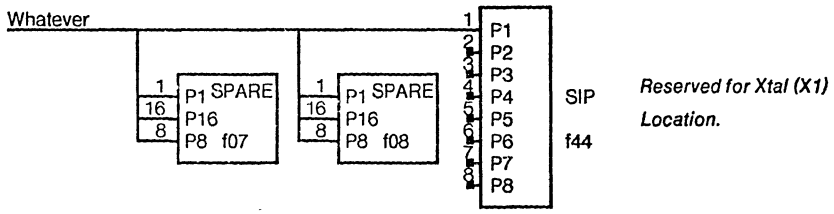
0 => No change
1 => Select Dorado from RCPReg[8-15]
2 => Break microcomputer if Dorado is selected
3 => CPBus control ← If Dorado is selected:

If RCPReg.15 = 1, Alto has Bus

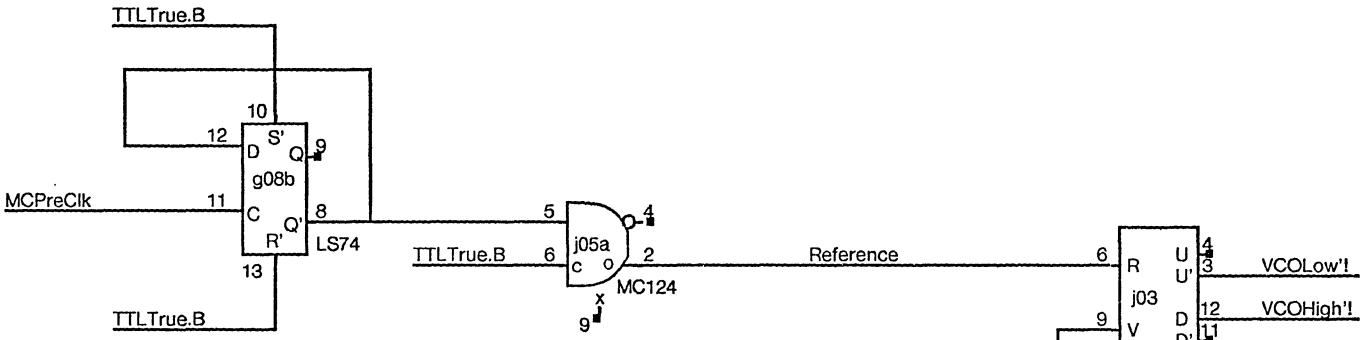
If RCPReg.15 = 0, Microcomputer has Bus

Else No Change

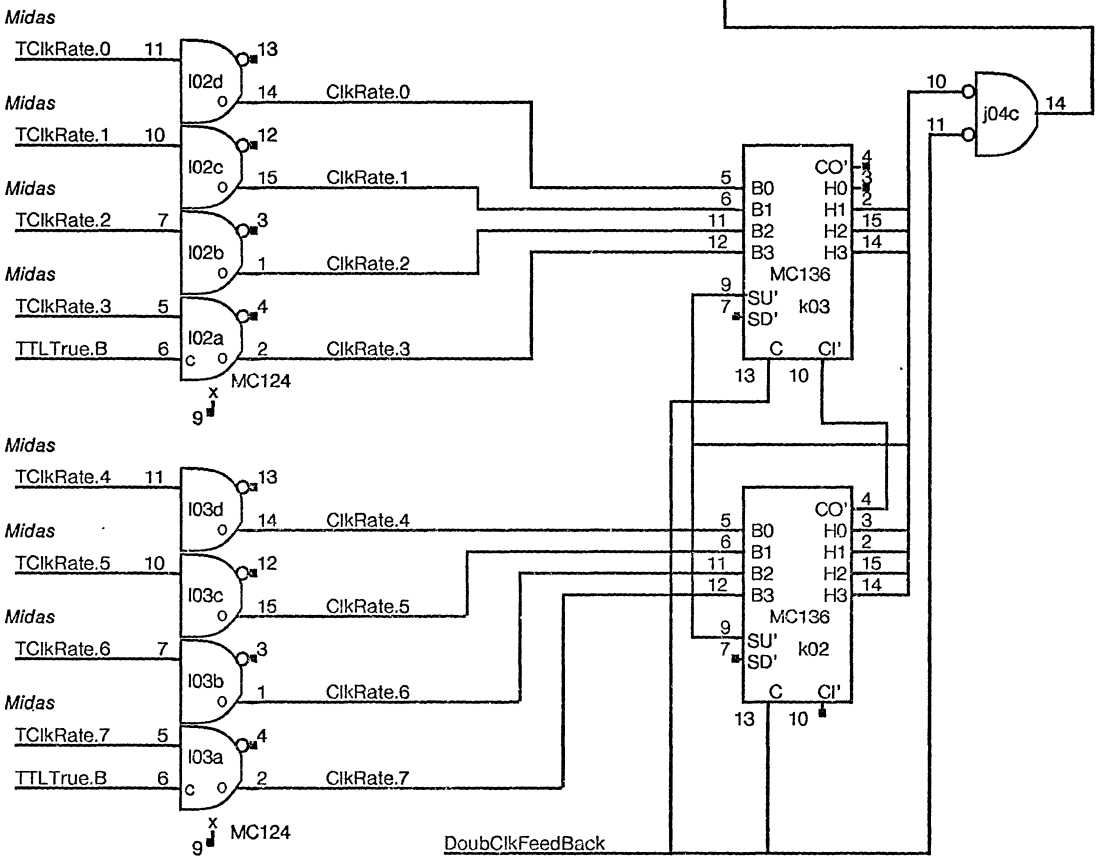
XEROX CSL	Project Dorado	Dorado Base Board CP Bus Handoff	File Base3d09.sil	Designer McCreight	Rev AI	Date 7/24/79	Page 09



Reserved for Xtal (X1) Location.



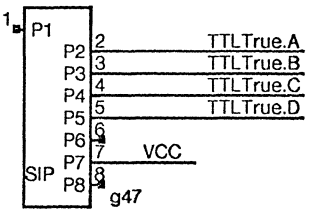
CLKRUN

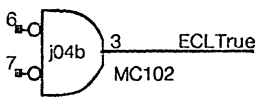


This circuit multiplies the basic 490kHz reference signal by the integer ClkRate + 1.

ClkRate (hex)	*Half clock*
70	*18 ns*
66	*20 ns*
5D	*22 ns*
52	*25 ns*
44	*30 ns*

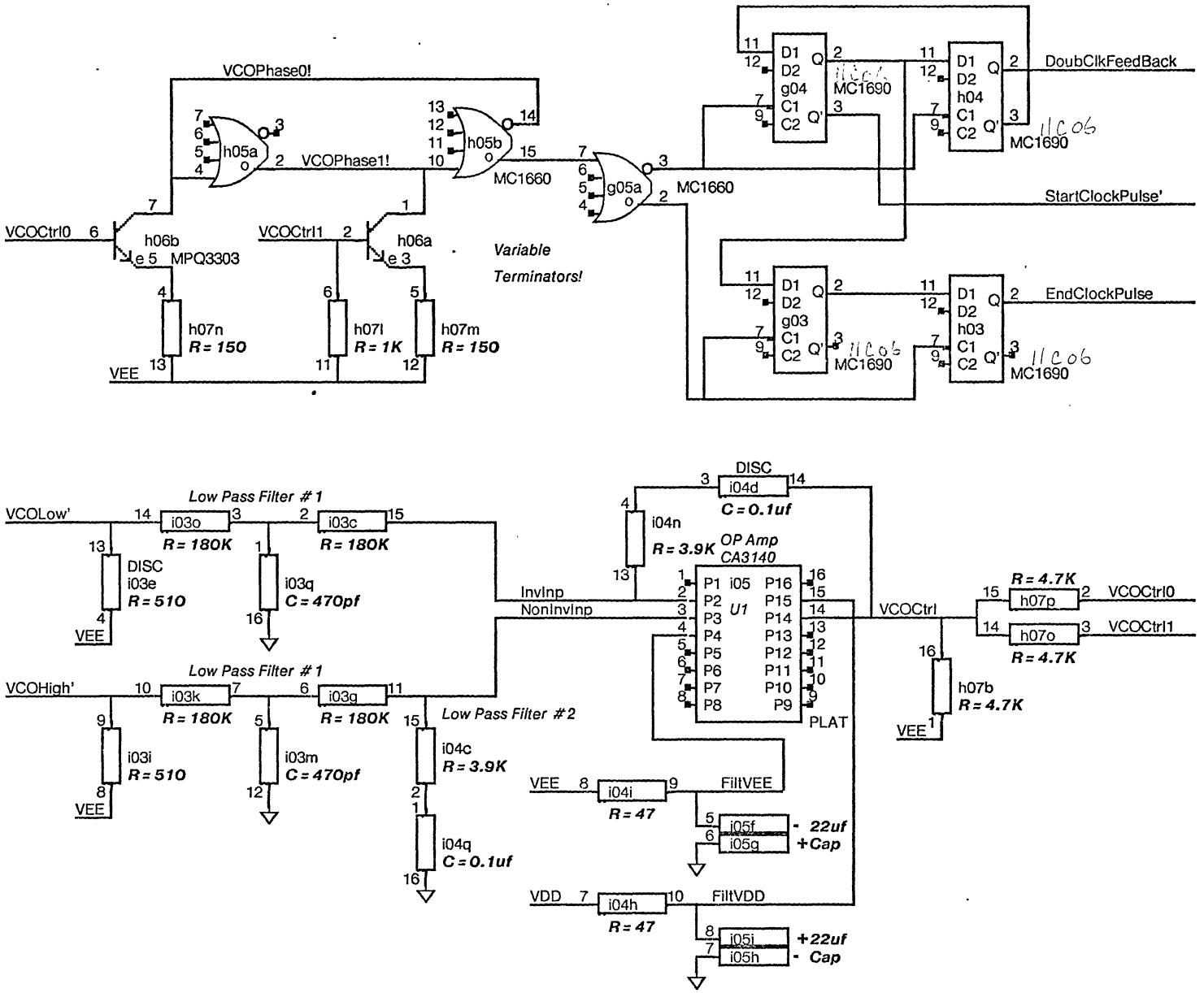
TTL True Generation





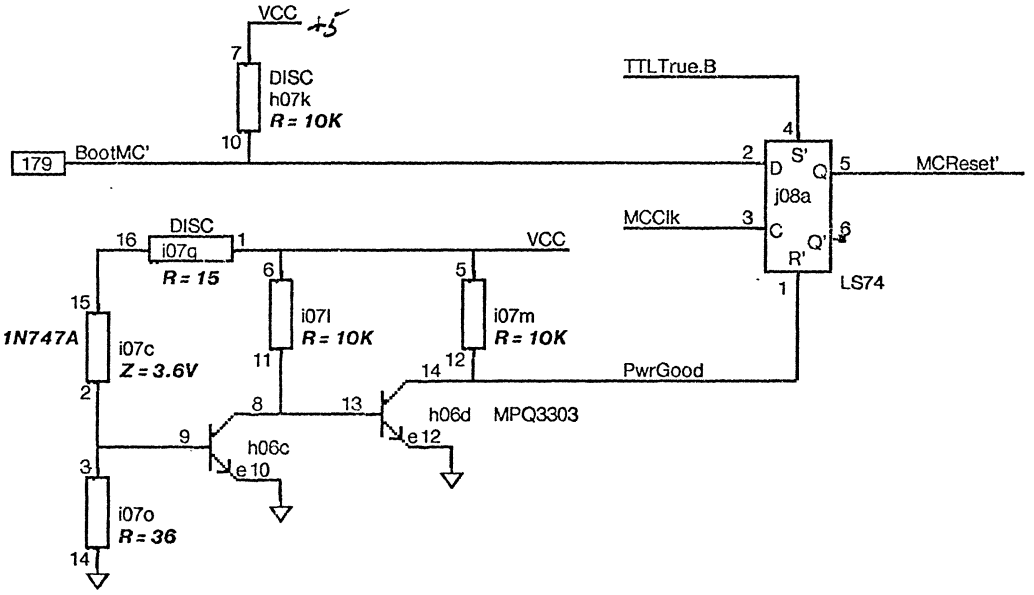
ECL True Generation

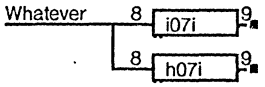
XEROX CSL	Project: Dorado	Clock Generator Reference & Freq Comp	File: BaseBd10.sil	Designer: McCreight	Rev: AI	Date: 7/24/79	Page: 10



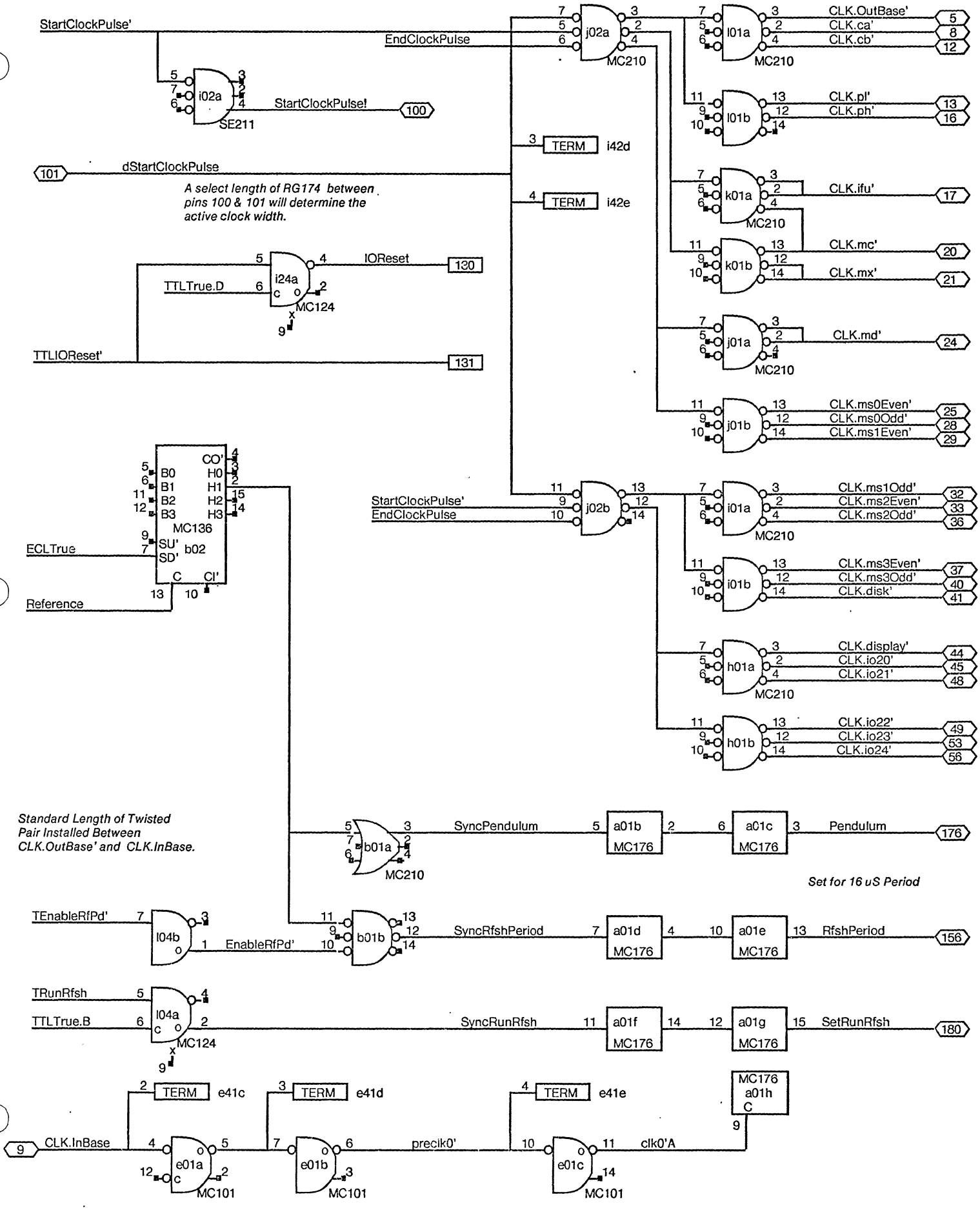
Loop Filter and System VCO

Power On Reset
Power Good at 4.5V

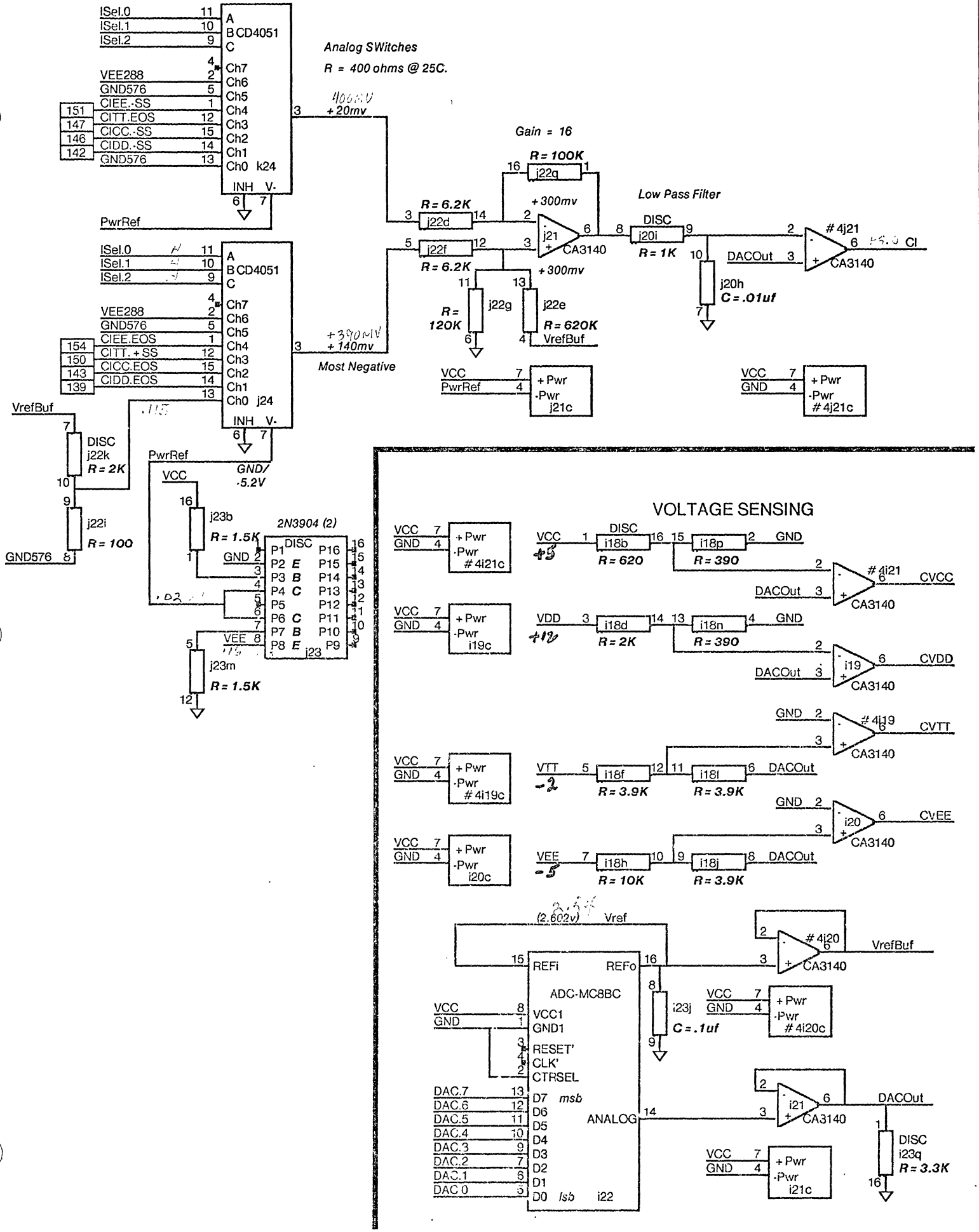




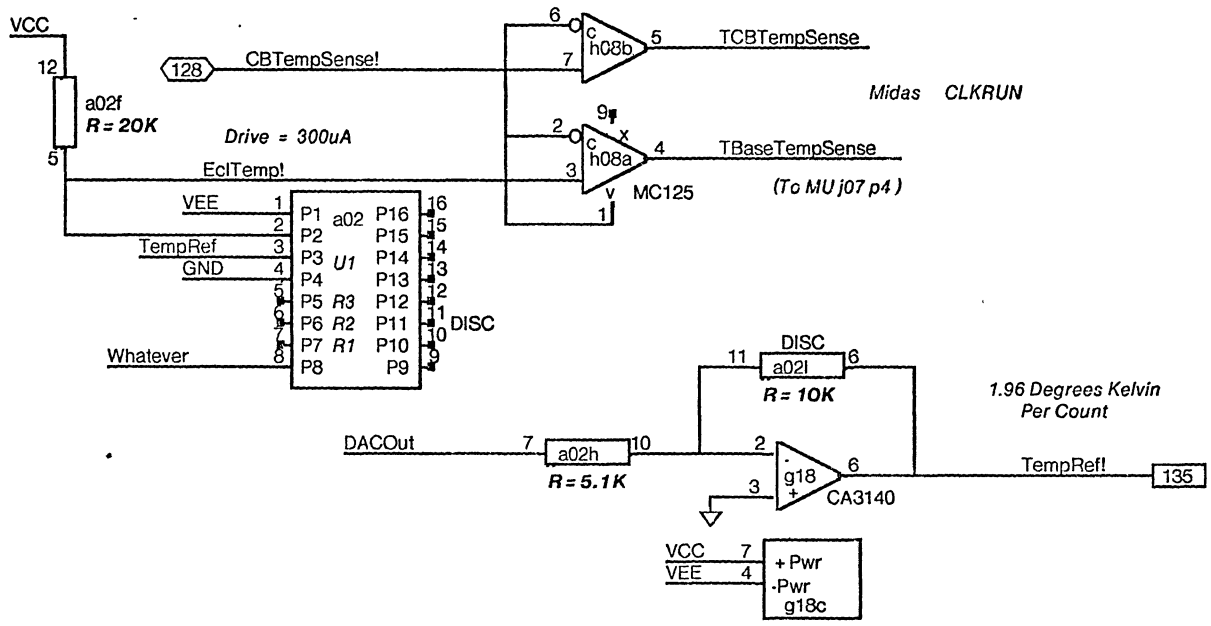
XEROX CSL	Project: Dorado	Clock Generator Loop filter and VCO	File: BaseBd11.sil	Designer: McCreight	Rev: AI	Date: 7/31/79	Page: 11

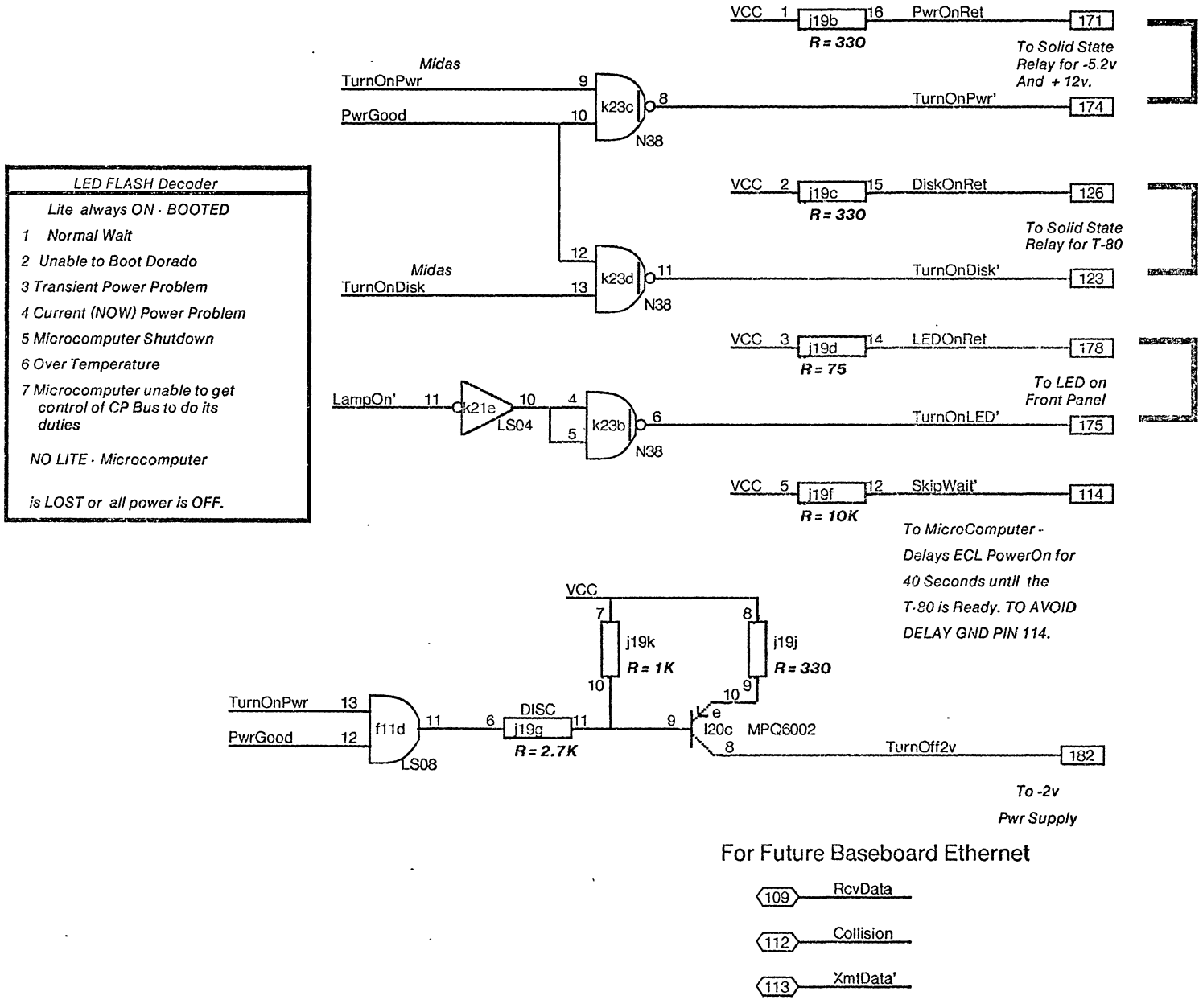


XEROX CSL	Project: Dorado	Clock Generator Backpanel distributor	File: BaseBd12.sil	Designer: McCreight	Rev: AI	Date: 7/25/79	Page: 12



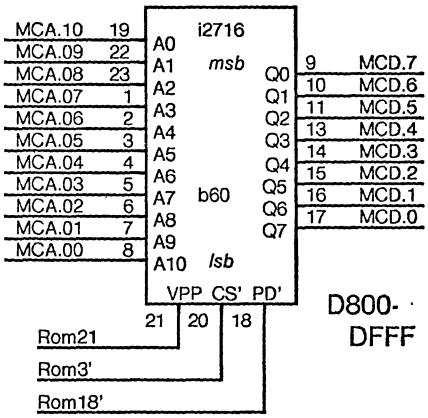
XEROX CSL	Project: Dorado	Dorado Base Board Analog/Digital Conversion	File: BaseBd13.sil	Designer: McCreight	Rev: AI	Date: 7/27/79	Page: 13

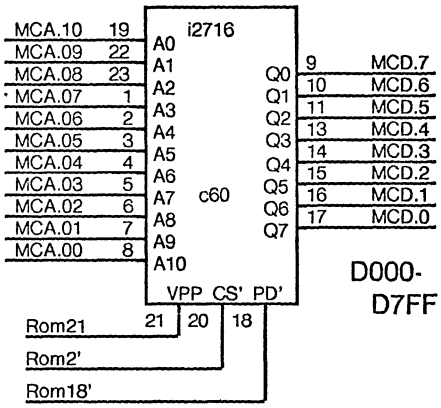


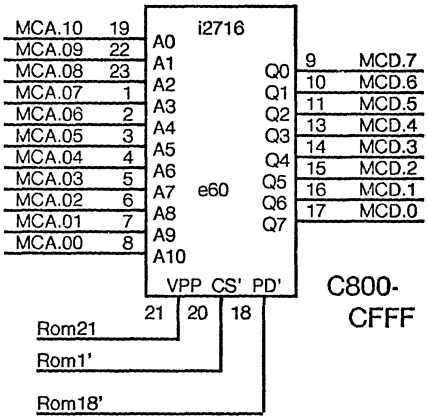


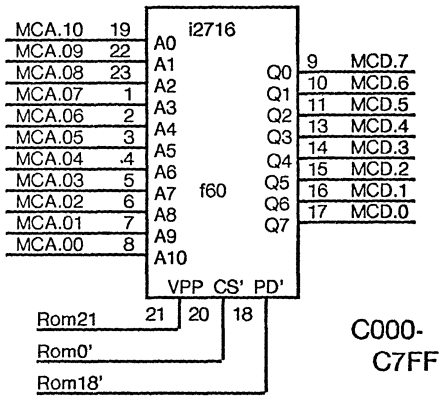
XEROX CSL	Project Dorado	Temp Sense, Pwr On, And LED Ckts	File BaseBd14.sil	Designer McCreight	Rev AI	Date 7/27/79	Page 14

Expansion EPROMS

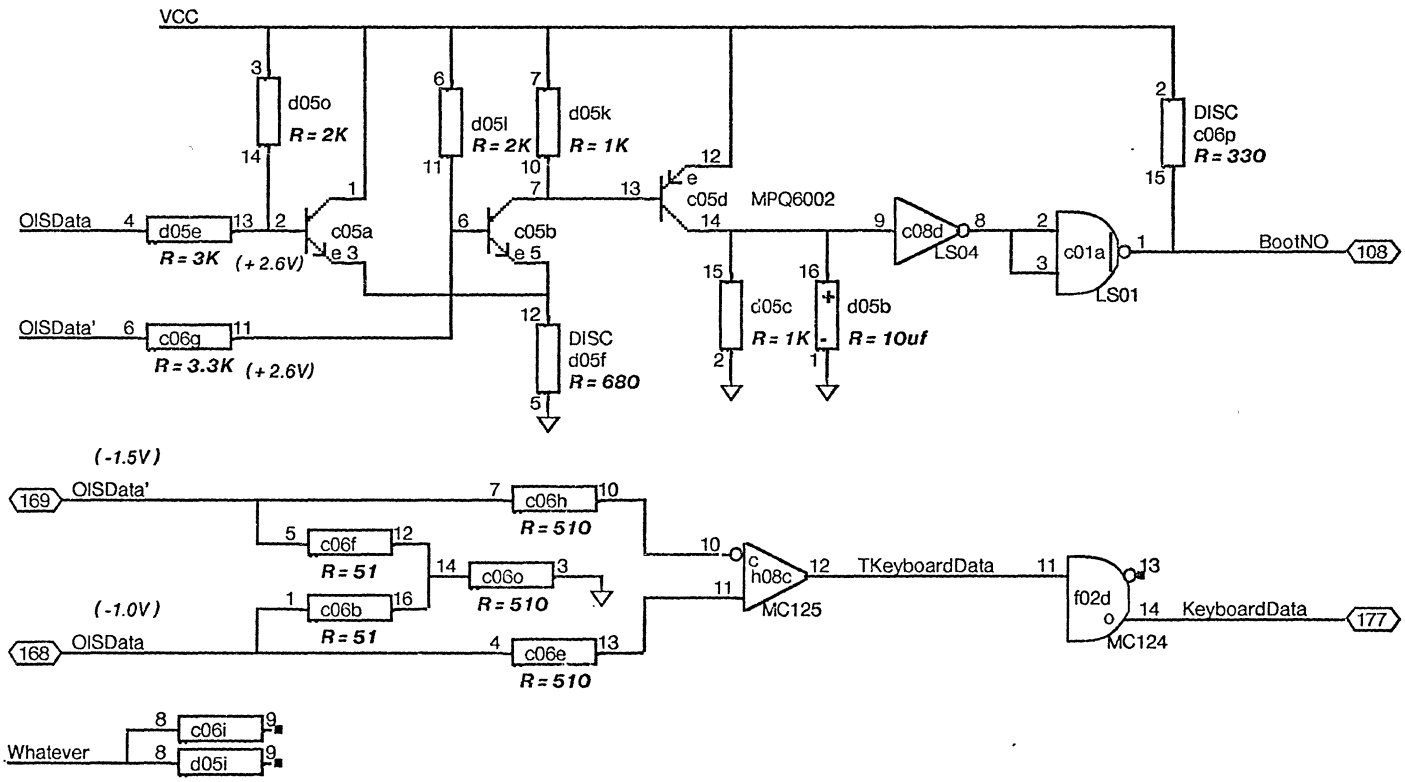






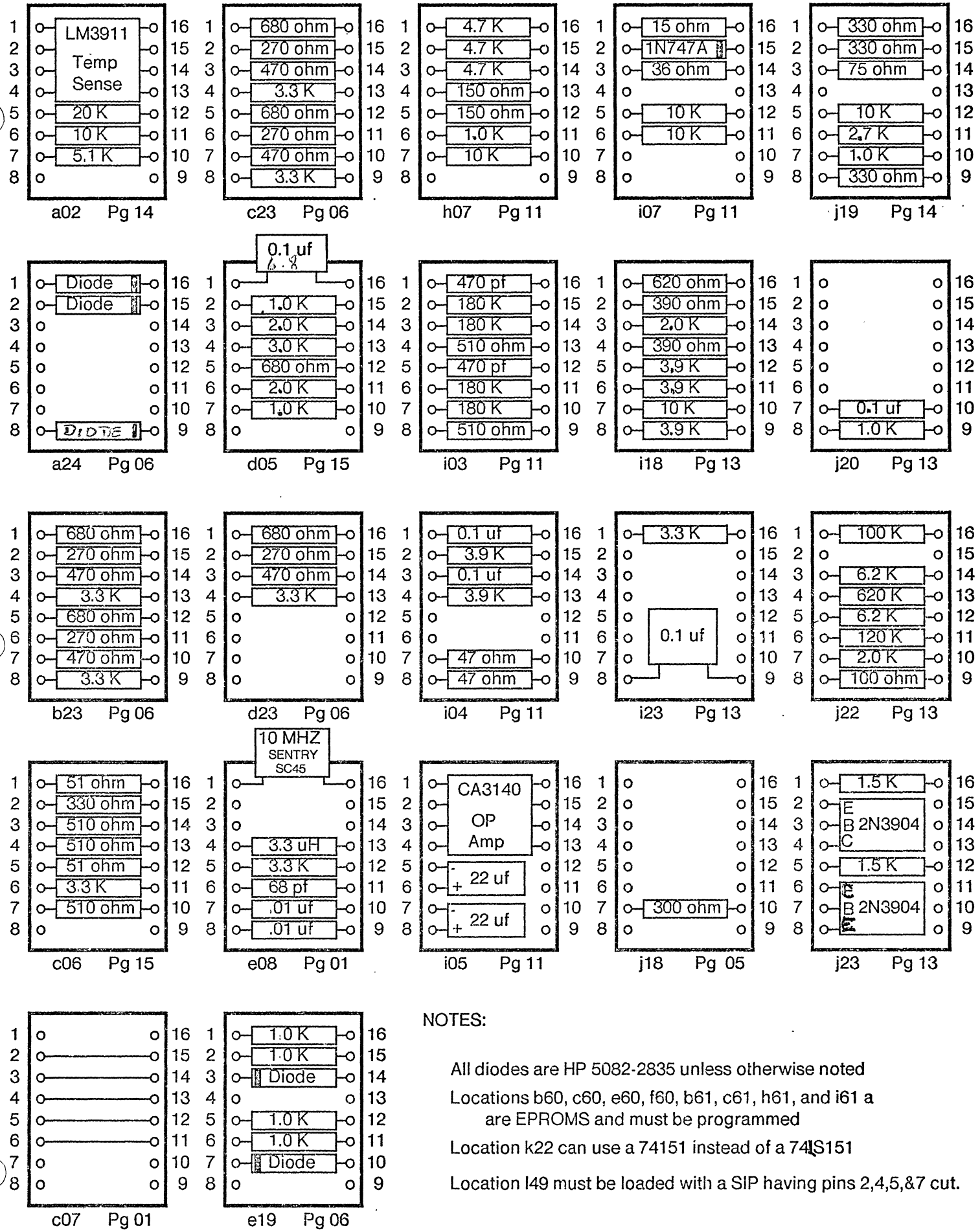


Differential Receivers for 7 wire Interface



	a 181	b 168	c 153	d 137	e 124	f 109	g 93	h 80	i 64	j 48	k 33	l 20	
1	RunRfsh Pendulum 176 14	Pendulum RfshPeriod 210 14	BootNO 19,b,c,d Ls01 19		CLK.INBase 14,14,14,d 101	CPBus 124 3	CPBus 124 3	CLK.xx 210 14	CLK.xx 210 14	CLK.xx 210 14	CLK.xx 210 14	CLK.xx 210 14	1
2	BaseTemp Sense plat 17	Pendulum 136 14				CPBus 3,3,3,19 124	CPBus 124 3		StClkPulse 14,b SE211	Clk delay 210 14	ClkRate 136 11	ClkRate.0 to .3 124 11	2
3	b60 D800-DFFF	c60 D000-D7FF	C800-CFFF	e60	f60 C000-C7FF		EndClockPulse //C06 1690 12	//C06 1690 12	Low pass filter 1 12	VCO Contr 12040 11	ClkRate 136 11	ClkRate.4 to .7 124 11	3
4	24 Pins i2716 19	24 Pins i2716 19	24 Pins i2716 19	24 Pins 19	24 Pins i2716 19		StartClock Pulse' //C06 1690 12	DoubClk FeedBack //C06 1690 12	Low pass filter 2 12	ECL True a,11,11,d 102		RunRfsh 14,14,c,d 124	4
5			KbData MPQ6002 PLAT 19	KbData discretes PLAT 19			VCO 12,b 1660	1660 12	Op-amp CA3140 12	Reference 11,b,c,d 124			5
6			KbData discretes PLAT 19	LS157 3	TCP BUS LS157 3	LS157 3	LS157 3	MP03303 PwrGood' array 14					6
7			EPROMS Jmps Plat 1	SelStrb 3,b,c,d LS08 3	Max LS163 1	Reserve For Xtal Location 1	TsetRun TSetSS LS175 3	Transistor discretes 12	PwrGood' Discretes 12	MUffler 2210-2217 LS251 4	manifold 2240-2257 LS174 4	manifold 2220-2237 LS174 4	7
8			1,1,1,19,e,f LS04	uProc Clk 12061 1	Clk Discretes 1	Reserve For Xtal Location 1	MCPreClk 1,11 LS74	TBaseTemp 17,17,19,d 125		MCReset' 12,b LS74	manifold 2260-2277 LS174 4	manifold 2200-2217 LS174 4	8
9	EPROM b61 F800-FFFF	EPROM c61 F000-F7FF	MicroComputer 40 pins f61				EPROM h61 E000-E7FF	EPROM i61 E800-EFFF		MUffler 2230-2237 LS251 4	manifold 2300-2317 LS174 4	MUffler 2200-2207 LS251 4	9
10	24 Pins i2716 1	24 Pins i2716 1	6502 1				24 Pins i2716	24 Pins i2716 1					10
11		Bit 7	6	5	4	WE'AC,BD 9,9,5,17 LS08	ROM0'-7' LS138 1	Bit 7	6	5	4		11
12		3	2 1st 2K	1	0	RS0'-3' LS138 8		3	2 2nd 2K	1	0		12
13		7 i2125	RAMS 6	RAMS 5	4 i2125	RA9-4 LS04 8	RA3-0 8,8,8,8,5,f LS04	7 i2125	RAMS 6	RAMS 5	4 i2125		13
14		3	2	1	0 3	ExtraRam LS139 2	RAM0'-3' LS138 2	3	2	1	0 9		14
15		500 16	c62		400 16	f62		580 16	i62		480 16	l62	15
16	6532	40 pins	2	6532	40 pins	2		6532	40 pins 2	6532	40 pins	2	16
17									MUffler 2220-2227 LS251 2	CPDMuxData 5,5c,d LS01	Midas LS157 5		17
18		BaseAttn' 10,b,c,d LS00					TempRef CA3140 17		CV Discretes 15	Pullups Plat 5	Stuff LS138 4	LS175 5	18
19	DoradoSel' LS251 10	BaseAttn. 10,10,c,d, LS04	TCPI.x 125 6	TDMuxData 6,b,c,d LS32	Pullups PLAT 6	LS174 3		RCPClock' LS133 3	CVDD CVTT CA3140	Discretes TurnOnPwr LED 17	LS138 4	LS157 5	19
20	LS251 10	Dorado Sel LS138 10	DoradoSel LS259 10	TACPI.x LS253 6	TACPI.x LS253 6	CAB LS174 3	MUX LS174 3	LS174 3	CVEE VrefBuf CA3140 15	CI Low Pass PLAT 15	LS85 4	TurnOff2v MPQ6002 17	20
21		FUTURE HOME OF MORE BIG CHIPS						Serial # LS85 10	DACOUT CVCC CA3140	CI op-amp CA3140 15	4,4.5,d 14,f LS04	DMD Gen LS174 4	21
22		THESE LOCATIONS b-163						0-377 LS85 10	DAC 8BC	Discretes 15	MUf MUX 74151 4	LS174 4	22
23		ACPI0 & 1 Discretes 6	ACPI2 & 3 Discretes 6	ACPI4 Discretes 6	RCPBus04 RCPBus05 AM2615 5	RCPABus.1 RCPABus.0 AM2615 5		RCPABus.2 AM2615 5	Discretes 15	PwrRef 2N3904 PLAT 15	LED,Seq0, Relay Dvr N38 17	5,5,5,d 125	23
24	Schottky Diodes Plat 6	ACPI0 & 1 MPQ6002 Xistor 6	ACPI2 & 3 MPQ6002 Xistor 6	ACPI4 MPQ6002 Xistor 6	RCBus00 RCPBus01 AM2615 5	RCPBus02 RCPBus03 AM2615 5	RCPBus06 RCPBus07 AM2615 5	RCPBus08 RCPStrb AM2615 5	IOReset 4.b.c.d 124	CITT CIEE CD4051 15	CIDD CICC CD4051 15	5,5,5,d 124	24
	a	b	c	d	e	f	g	h	i	MC14051	MC14051	l	

XEROX CSL	Project Dorado	Reference Board Layout	File BaseBd16.sil	Designer McCreight	Rev AI	Date 7/25/79	Page 16



NOTES:

All diodes are HP 5082-2835 unless otherwise noted

Locations b60, c60, e60, f60, b61, c61, h61, and i61 a are EPROMS and must be programmed

Location k22 can use a 74151 instead of a 74LS151

Location l49 must be loaded with a SIP having pins 2,4,5,&7 cut.

Page Numbers: Yes First Page: 1
Columns: 2 Edge Margin: .8" Between Columns: .0"
Heading:
BaseBd-Rev-A1.ps
COMPONENTS:

ADC-MC8BC:	13					
AM2615:	5					
CA3140:	13	14				
CD4051:	13					
DISC:	1	5	6	11	13	14
	15					
i2125:	7	8				
i2716:	1	15				
LS00:	9					
LS01:	5	15				
LS04:	1	4	5	7	9	14
	15					
LS08:	3	5	8	14		
LS138:	1	2	3	4	5	7
	9					
LS139:	2					
LS151:	4					
LS157:	3	5				
LS163:	1					
LS174:	3	4				
LS175:	3	5				
LS251:	4	9				
LS253:	6					
LS259:	9					
LS32:	6					
LS74:	1	10	11			
LS85:	4	9				
MC101:	12					
MC102:	10					
MC12040:	10					
MC12061:	1					
MC124:	3	5	10	12	15	
MC125:	5	6	14	15		
MC136:	10	12				
MC1660:	11					
MC1690:	11					
MC176:	12					
MC210:	12					
MCS6502:	1					
MCS6532:	2					
MPQ3303:	11					
MPQ6002:	6	14	15			
N38:	4	14				
PLAT:	1	11				
SE211:	12					
SIP:	4	10				
SPARE:	10					
TERM:	12					

SIGNAL NAMES:

+:	1(1)	2(1)	3(1)	4(1)	6(1)	7(1)
	8(1)	9(1)	10(1)	11(1)	12(1)	15(1)
ACPABus.0':	5(1)					
ACPABus.1':	5(1)					
ACPABus.2':	5(1)					
ACPBus.0':	5(1)					
ACPBus.1':	5(1)					
ACPBus.2':	5(1)					
ACPBus.3':	5(1)					
ACPBus.4':	5(1)					
ACPBus.5':	5(1)					
ACPBus.6':	5(1)					
ACPBus.7':	5(1)					
ACPBus.8':	5(1)					
ACPGnd.00:	5(1)					
ACPGnd.01:	5(1)					
ACPGnd.02:	5(1)					
ACPGnd.03:	5(1)					

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ACPGnd.04:       5(1)
ACPGnd.05:       5(1)
ACPGnd.06:       5(1)
ACPGnd.07:       5(1)
ACPGnd.08:       5(1)
ACPGnd.09:       5(1)
ACPGnd.10:       5(1)
ACPGnd.11:       5(1)
ACPGnd.12:       5(1)
ACPI.0:          6(1)
ACPI.1:          6(1)
ACPI.2:          6(1)
ACPI.3:          6(1)
ACPI.4:          6(1)
ACPIGnd.0:       6(1)
ACPIGnd.1:       6(1)
ACPIGnd.2:       6(1)
ACPIGnd.3:       6(1)
ACPIGnd.4:       6(1)
ACPStrb':        5(1)
AHasCP:          2(1)    3(2)    6(1)    9(2)
BaseAttn':       9(1)
BaseMuf':        4(3)
BootMC':        11(1)
BootNO:          2(1)   15(1)
CBTempSense!:   14(1)
CI:              2(1)   13(1)
CICC.-SS:       13(1)
CICC.EOS:       13(1)
CIDD.-SS:       13(1)
CIDD.EOS:       13(1)
CIEE.-SS:       13(1)
CIEE.EOS:       13(1)
CITT.+SS:       13(1)
CITT.EOS:       13(1)
CLK.ca':        12(1)
CLK.cb':        12(1)
CLK.disk':      12(1)
CLK.display':   12(1)
CLK.ifu':       12(1)
CLK.InBase:     12(1)
CLK.io20':      12(1)
CLK.io21':      12(1)
CLK.io22':      12(1)
CLK.io23':      12(1)
CLK.io24':      12(1)
CLK.mc':        12(1)
CLK.md':        12(1)
CLK.ms0Even':   12(1)
CLK.ms0Odd':    12(1)
CLK.ms1Even':   12(1)
CLK.ms1Odd':    12(1)
CLK.ms2Even':   12(1)
CLK.ms2Odd':    12(1)
CLK.ms3Even':   12(1)
CLK.ms3Odd':    12(1)
CLK.mx':        12(1)
CLK.OutBase':   12(1)
CLK.ph':        12(1)
CLK.pl':        12(1)
clk0'A:         12(1)
ClkRate.0:      10(1)
ClkRate.1:      10(1)
ClkRate.2:      10(1)
ClkRate.3:      10(1)
ClkRate.4:      10(1)
ClkRate.5:      10(1)
ClkRate.6:      10(1)
ClkRate.7:      10(1)
Collision:      14(1)
CPAddr.0':       3(1)
CPAddr.1':       3(1)
CPAddr.2':       3(1)
CPDMuxClk:       5(2)
CPDMuxData:      4(1)    5(1)
CPDMuxData':     5(2)
```

```
CPIn.0:          6(1)
CPIn.1:          6(1)
CPIn.2:          6(1)
CPIn.3:          6(1)
CPOut.0:         3(1)
CPOut.1:         3(1)
CPOut.2:         3(1)
CPOut.3:         3(1)
CPOut.4:         3(1)
CPOut.5:         3(1)
CPOut.6:         3(1)
CPOut.7:         3(1)
CPOut.8:         3(1)
CPStrb':         3(1)
CPUseDMD:        5(2)
CVCC:            2(1)   13(1)
CVDD:            2(1)   13(1)
CVEE:            2(1)   13(1)
CVTT:            2(1)   13(1)
DAC.0:           2(1)    6(1)   13(1)
DAC.1:           2(1)    6(1)   13(1)
DAC.2:           2(1)    6(1)   13(1)
DAC.3:           2(1)    6(1)   13(1)
DAC.4:           2(1)    6(1)   13(1)
DAC.5:           2(1)    6(1)   13(1)
DAC.6:           2(1)    6(1)   13(1)
DAC.7:           2(1)    6(1)   13(1)
DACOut:         13(6)   14(1)
DiskOnRet:      14(1)
DMD.00:          2(1)    4(7)
DMD.01:          4(3)
DMD.02:          4(3)
DMD.03:          4(3)
DMD.04:          4(3)
DMD.05:          4(3)
DMD.06:          4(4)
DMD.07:          4(4)
DMD.08:          4(8)
DMD.09:          4(11)
DMD.10:          4(11)
DMD.11:          4(11)
DMuxClk:         5(2)
DMuxData:        5(2)
DoradoSel:       2(1)    3(1)    9(3)
DoradoSel':      6(3)    9(1)
DoubClkFeedBack:         10(1)   11(1)
dStartClockPulse:        12(1)
EclTemp!:       14(1)
ECLTrue:        10(1)   12(1)
EclUp:           4(2)    5(1)
EnableRfPd':    12(1)
EndClockPulse:  11(1)   12(2)
ExtraRam':       2(1)    7(1)
FiltVDD:        11(1)
FiltVEE:        11(1)
GND:             1(4)    2(5)    3(6)    4(6)    5(7)    9(2)
                13(13)  14(1)
Gnd:             1(1)    2(1)    3(1)    4(1)    5(1)    6(1)
                 7(1)    8(1)    9(1)   10(1)   11(1)   12(1)
                13(1)   14(1)   15(1)
GND576:         13(4)
InvInp:         11(1)
IOReset:        12(1)
ISel.0:          2(1)   13(2)
ISel.1:          2(1)   13(2)
ISel.2:          2(1)   13(2)
KeyboardData:   15(1)
LampOn':         2(1)   14(1)
LEDOnRet:       14(1)
MASync:          2(1)    4(1)    6(1)
Max:             1(2)
MCA.00:          1(4)    2(4)    7(1)   15(4)
MCA.01:          1(4)    2(4)    7(1)   15(4)
MCA.02:          1(4)    2(4)    7(1)   15(4)
MCA.03:          1(4)    2(4)    7(1)   15(4)
MCA.04:          1(4)    2(4)    7(1)   15(4)
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MCA.05:	1(4)	2(4)	7(1)	15(4)		
MCA.06:	1(4)	2(4)	7(1)	15(4)		
MCA.07:	1(4)	2(1)	7(1)	15(4)		
MCA.08:	1(4)	2(1)	7(1)	15(4)		
MCA.09:	1(4)	2(1)	7(1)	15(4)		
MCA.10:	1(4)	2(4)	7(1)	15(4)		
MCA.11:	1(2)	7(1)				
MCA.12:	1(2)	7(1)				
MCA.13:	1(2)	2(1)				
MCA.14:	1(2)	2(1)				
MCA.15:	1(2)	2(1)				
MCClk:	1(1)	2(4)	11(1)			
MCClk':	1(1)	7(1)				
MCD.0:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.1:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.2:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.3:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.4:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.5:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.6:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCD.7:	1(5)	2(4)	7(4)	8(4)	15(4)	
MCIRQ':	1(1)	2(4)				
MCManif.0:	2(1)	4(1)				
MCManif.1:	2(1)	4(1)				
MCManif.2:	2(1)	4(1)				
MCManif.3:	2(1)	4(1)				
MCNMI':	1(1)	9(1)				
MCPABus.0:	2(1)	3(1)				
MCPABus.1:	2(1)	3(1)				
MCPABus.2:	2(1)	3(1)				
MCPBus.00:	2(1)	3(1)				
MCPBus.01:	2(1)	3(1)				
MCPBus.02:	2(1)	3(1)				
MCPBus.03:	2(1)	3(1)				
MCPBus.04:	2(1)	3(1)				
MCPBus.05:	2(1)	3(1)				
MCPBus.06:	2(1)	3(1)				
MCPBus.07:	2(1)	3(1)				
MCPBus.08:	2(1)	3(1)				
MCPreClk:	1(2)	10(1)				
MCPStrb:	2(1)	3(1)				
MCR/W':	1(2)	2(4)	8(1)			
MCReset':	1(1)	2(4)	3(1)	4(4)	9(1)	11(1)
Midas.00:	4(2)					
Midas.01:	4(3)					
Midas.02:	4(3)					
Midas.03:	4(3)					
Midas.04:	4(3)					
MWantsA:	2(1)	6(1)				
NonInvInp:	11(1)					
OISData:	15(2)					
OISData':	15(2)					
Pendulum:	12(1)					
preclk0':	12(1)					
PwrGood:	4(1)	11(1)	14(2)			
PwrOnRet:	14(1)					
PwrRef:	13(3)					
RA0:	7(17)	8(16)				
RA1:	7(17)	8(16)				
RA2:	7(17)	8(16)				
RA3:	7(17)	8(16)				
RA4:	7(17)	8(16)				
RA5:	7(17)	8(16)				
RA6:	7(17)	8(16)				
RA7:	7(17)	8(16)				
RA8:	7(17)	8(16)				
RA9:	7(17)	8(16)				
Ram0':	2(2)					
Ram1':	2(2)					
Ram2':	2(2)					
Ram3':	2(2)					
RCPABus.0:	3(2)	5(1)				
RCPABus.1:	3(2)	5(1)				
RCPABus.2:	3(2)	5(1)				
RCPBus.00:	3(3)	5(1)				
RCPBus.01:	3(3)	5(1)				

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RCPBus.02:        3(3)    5(1)
RCPBus.03:        3(3)    5(1)    6(2)
RCPBus.04:        3(3)    5(1)    6(2)
RCPBus.05:        3(3)    5(1)
RCPBus.06:        3(3)    5(1)    9(1)
RCPBus.07:        3(3)    5(1)
RCPBus.08:        3(3)    5(1)
RCPClock':        3(1)    9(1)
RCPR0':           3(3)
RCPR1':           3(3)
RCPReg.00:        2(1)    3(1)
RCPReg.01:        3(1)    9(4)
RCPReg.02:        3(1)    9(4)
RCPReg.03:        3(1)    9(4)
RCPReg.04:        2(1)    3(1)
RCPReg.05:        2(1)    3(1)
RCPReg.06:        2(1)    3(1)
RCPReg.07:        2(1)    3(1)
RCPReg.08:        2(1)    3(1)    9(1)
RCPReg.09:        2(1)    3(1)    9(1)
RCPReg.10:        2(1)    3(1)    9(1)
RCPReg.11:        2(1)    3(1)    9(1)
RCPReg.12:        2(1)    3(1)    9(1)
RCPReg.13:        2(1)    3(1)    9(1)
RCPReg.14:        2(1)    3(1)    9(1)
RCPReg.15:        2(1)    3(1)    9(2)
RCPStrb:          3(2)    5(1)
RcvData:         14(1)
Reference:       10(1)   12(1)
RfshPeriod:      12(1)
Rom0':            1(1)   15(1)
Rom1':            1(1)   15(1)
Rom18':           1(5)   15(4)
Rom2':            1(1)   15(1)
Rom21:            1(5)   15(4)
Rom3':            1(1)   15(1)
Rom4':            1(2)
Rom5':            1(2)
Rom6':            1(2)
Rom7':            1(2)
RS0':             7(3)
RS1':             7(3)
RS2':             7(1)    8(2)
RS3':             7(1)    8(2)
RSA.0:            1(2)
RSA.1:            1(2)
RSA.2:            1(2)
SelStrb:          3(1)
Sequence0':       4(2)
Serial.1:         4(1)    9(1)
Serial.10:        4(1)    9(1)
Serial.100:       4(1)    9(1)
Serial.2:         4(1)    9(1)
Serial.20:        4(1)    9(1)
Serial.200:       4(1)    9(1)
Serial.4:         4(1)    9(1)
Serial.40:        4(1)    9(1)
SetRun:           3(1)
SetRunRfsh:      12(1)
SetSS':           3(1)
SkipWait':        2(1)   14(1)
StartClockPulse!:        12(1)
StartClockPulse':        11(1)   12(2)
SyncPendulum:    12(1)
SyncRfshPeriod:  12(1)
SyncRunRfsh:     12(1)
TBaseTempSense:   2(1)    4(1)   14(1)
TCBTempSense:     2(1)   14(1)
TClkRate.0:       4(2)   10(1)
TClkRate.1:       4(2)   10(1)
TClkRate.2:       4(2)   10(1)
TClkRate.3:       4(2)   10(1)
TClkRate.4:       4(2)   10(1)
TClkRate.5:       4(2)   10(1)
TClkRate.6:       4(2)   10(1)
TClkRate.7:       4(2)   10(1)
```

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TControlStrb':   3(1)    5(1)
TCPABus.0:       3(1)    5(1)
TCPABus.1:       3(1)    5(1)
TCPABus.2:       3(1)    5(1)
TCPBus.00:       3(1)    5(1)
TCPBus.01:       3(1)    5(1)
TCPBus.02:       3(1)
TCPBus.03:       3(1)
TCPBus.04:       3(1)
TCPBus.05:       3(1)    5(1)
TCPBus.06:       3(1)
TCPBus.07:       3(2)
TCPBus.08:       3(2)
TCPI.0:          2(1)    6(1)
TCPI.1:          2(1)    6(1)
TCPI.2:          2(1)    6(1)
TCPI.3:          2(1)    6(1)
TCPStrb:         3(1)    5(1)
TDMuxClk:        4(1)    5(2)
TDMuxClk':       4(1)    5(1)
TDMuxData:       2(1)    4(1)    5(1)    6(1)
TempRef:        14(1)
TempRef!:       14(1)
TEnableRfPd':    4(2)   12(1)
TKeyboardData:  15(1)
Trap':           2(1)    4(1)    6(1)
TRunRfsh:        4(2)   12(1)
TSetRun:         2(1)    3(1)    5(1)
TTLIOReset':     4(2)   12(1)
TTLTrue.A:       1(7)    3(2)    7(1)   10(1)
TTLTrue.B:       3(2)    8(2)   10(6)   11(1)   12(1)
TTLTrue.C:       2(2)    3(2)    9(3)   10(1)
TTLTrue.D:       2(3)    3(2)    4(3)    5(2)   10(1)   12(1)
TurnOff2v:      14(1)
TurnOnDisk:      4(2)   14(1)
TurnOnDisk':    14(1)
TurnOnLED':     14(1)
TurnOnPwr:       4(2)   14(2)
TurnOnPwr':     14(1)
TUseDMD:         4(1)    5(1)
UseDMD:          5(2)
Vbb0:            6(1)
VCC:             1(5)    2(4)    4(2)    5(1)    6(5)   10(1)
                11(2)   13(11)  14(7)   15(1)
VCOCtrl:        11(1)
VCOCtrl0:       11(2)
VCOCtrl1:       11(2)
VCOHigh':       11(1)
VCOHigh'!:      10(1)
VCOLow':        11(1)
VCOLow'!:       10(1)
VCOPhase0!:     11(1)
VCOPhase1!:     11(1)
VDD:            11(1)   13(1)
VEE:            11(5)   13(2)   14(2)
VEE288:         13(2)
Vref:           13(1)
VrefBuf:        13(3)
VTT:            13(1)
WE'AC:           7(4)    8(1)
WE'BD:           8(5)
Whatever:        1(1)    5(1)    6(1)   10(1)   11(1)   14(1)
                15(1)
XmtData':       14(1)
```