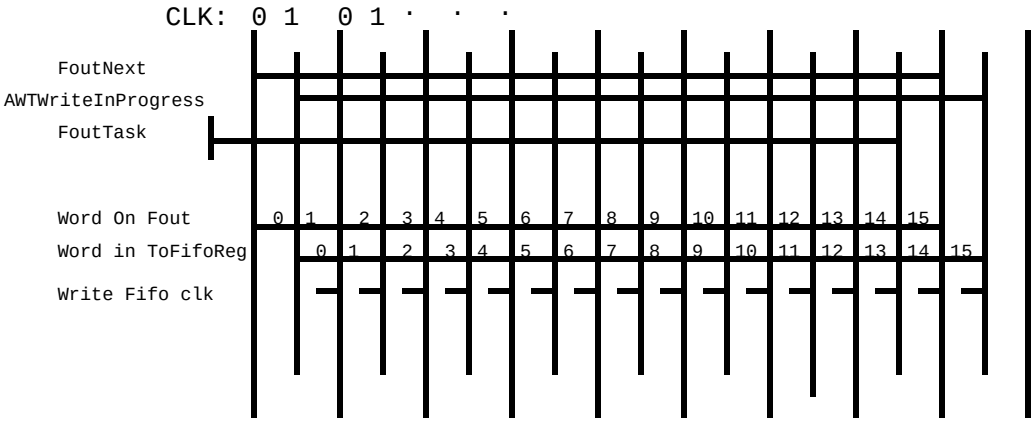
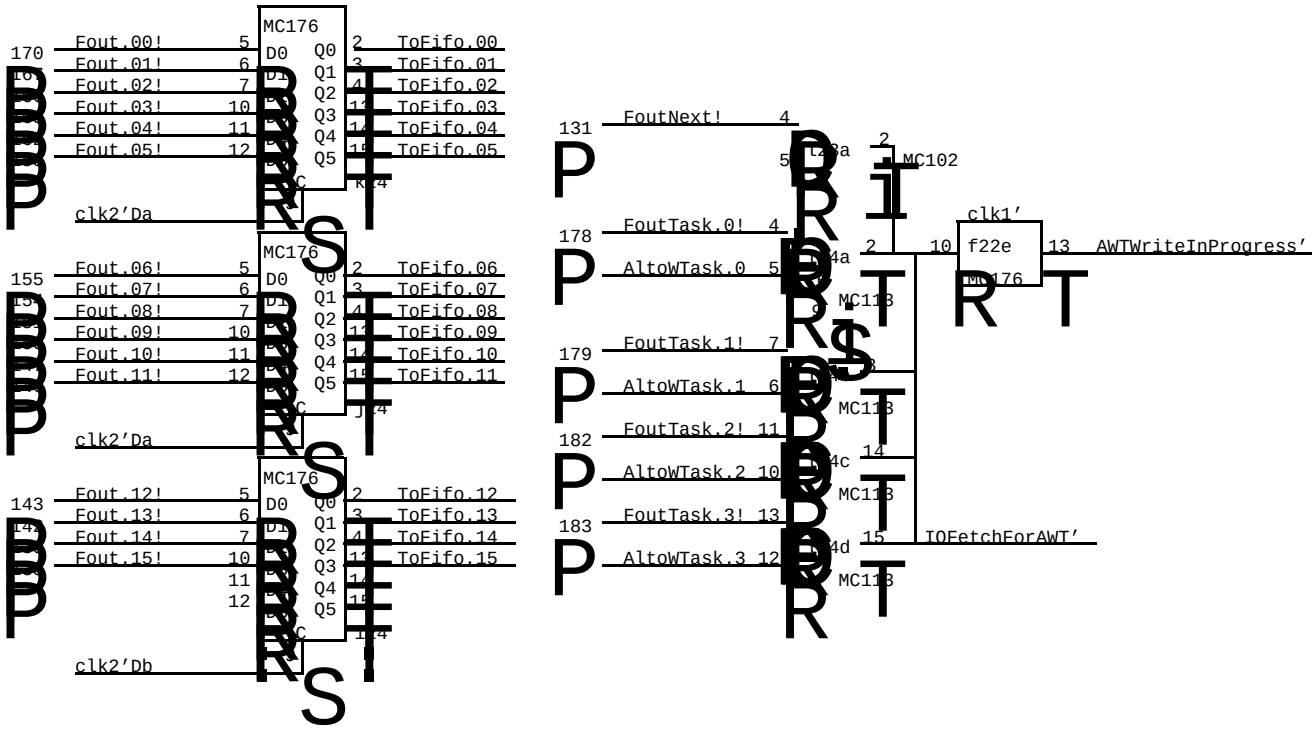
D O R A D O S C H E M A T I C S

D i s p l a y M

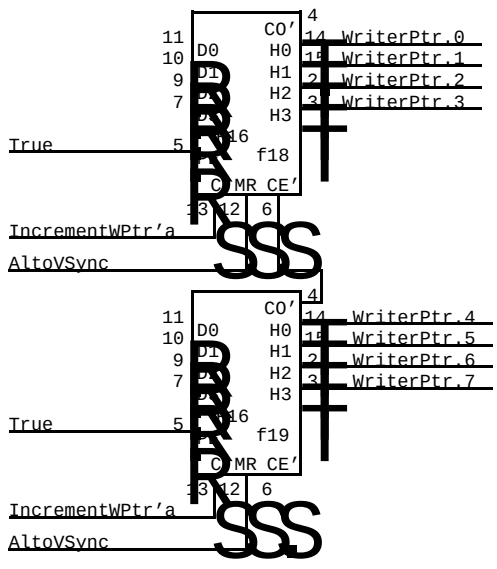
Table of contents

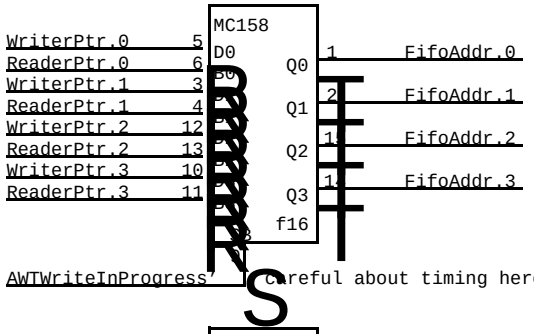


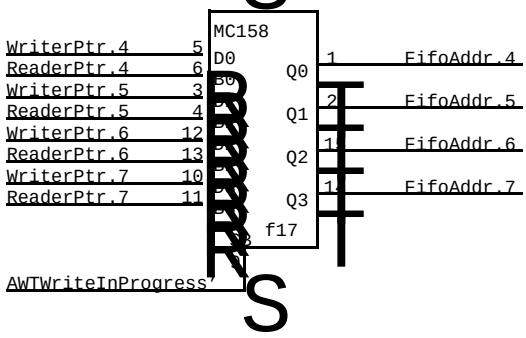


XEROX PARC	Project Dorado	Alto Display Controller FOUT interface	File DispM01.sil	Designer K. Pier	Rev Ch	Date 7/20/81	Page 01

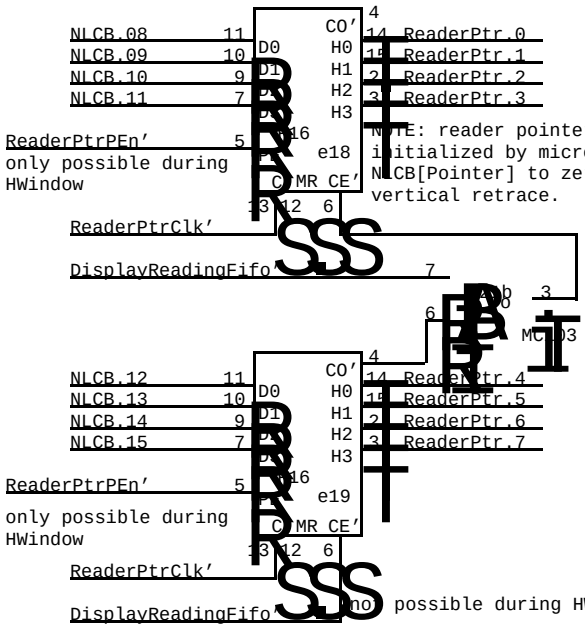
Writer Pointer





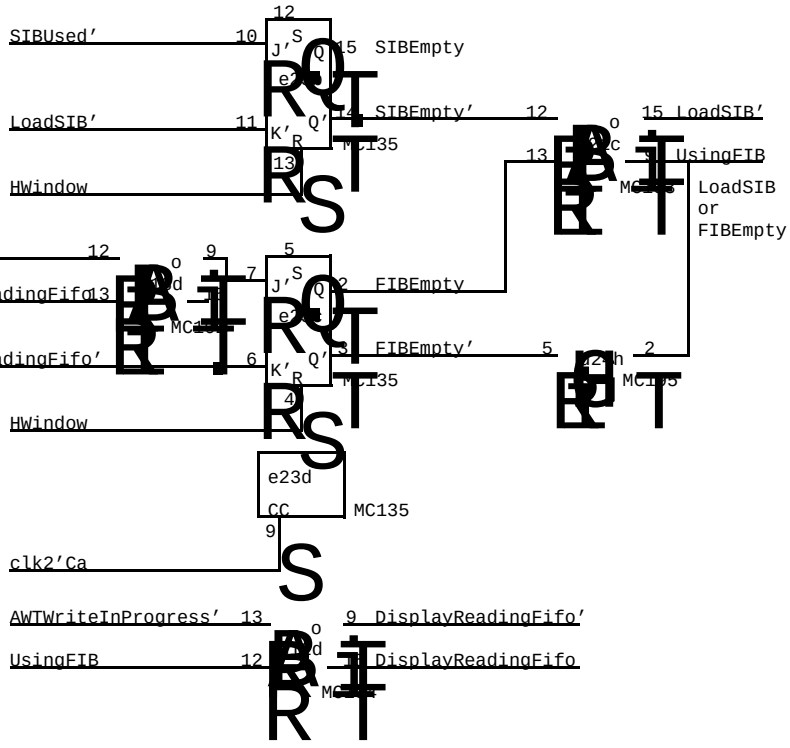


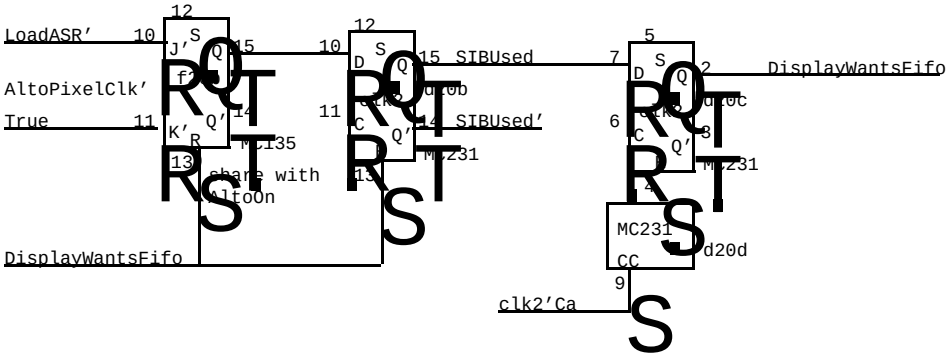
Reader Pointer



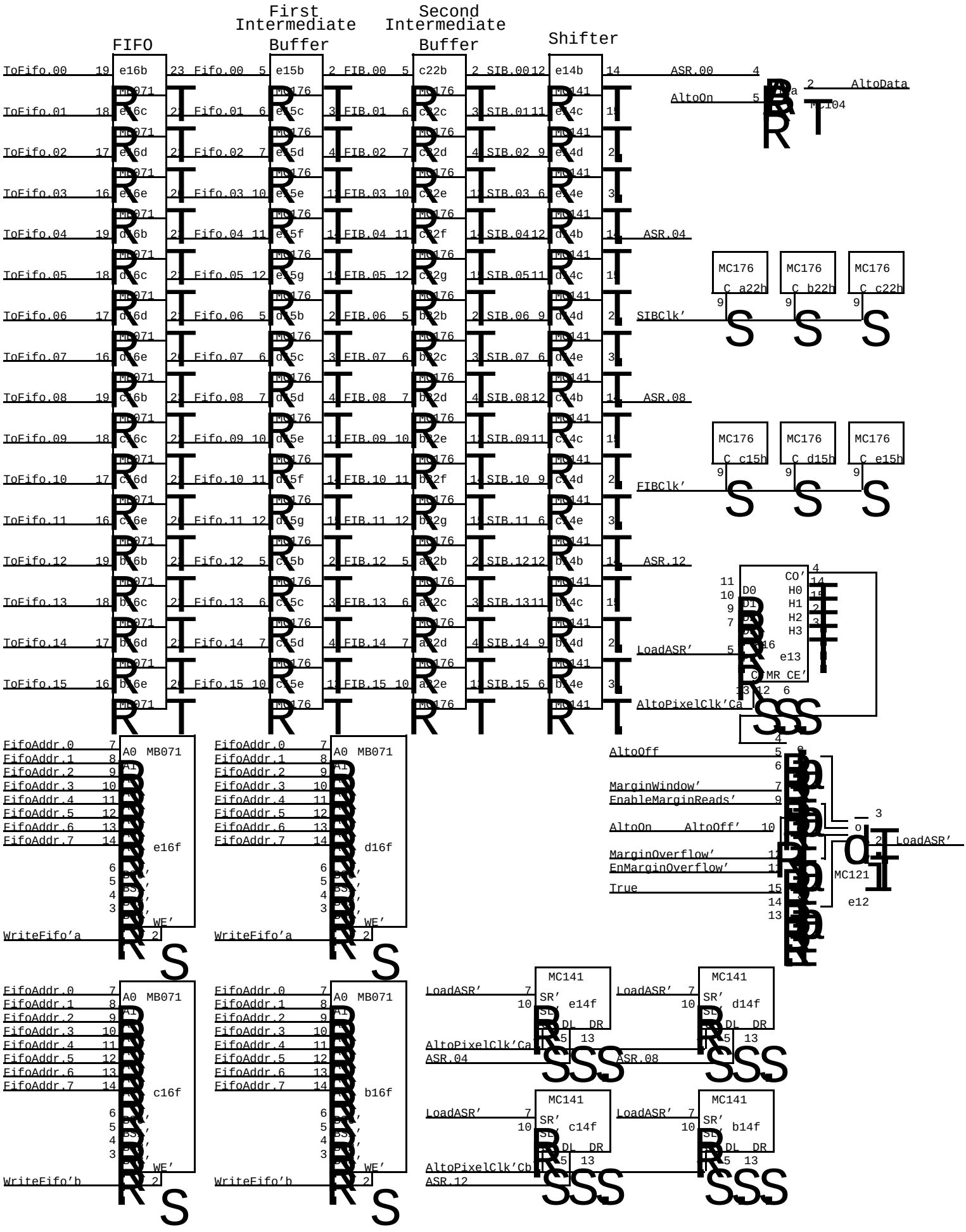
NOTE: reader pointers must be initialized by microcode setting NLCB[Pointer] to zero during vertical retrace.

no possible during HWindow

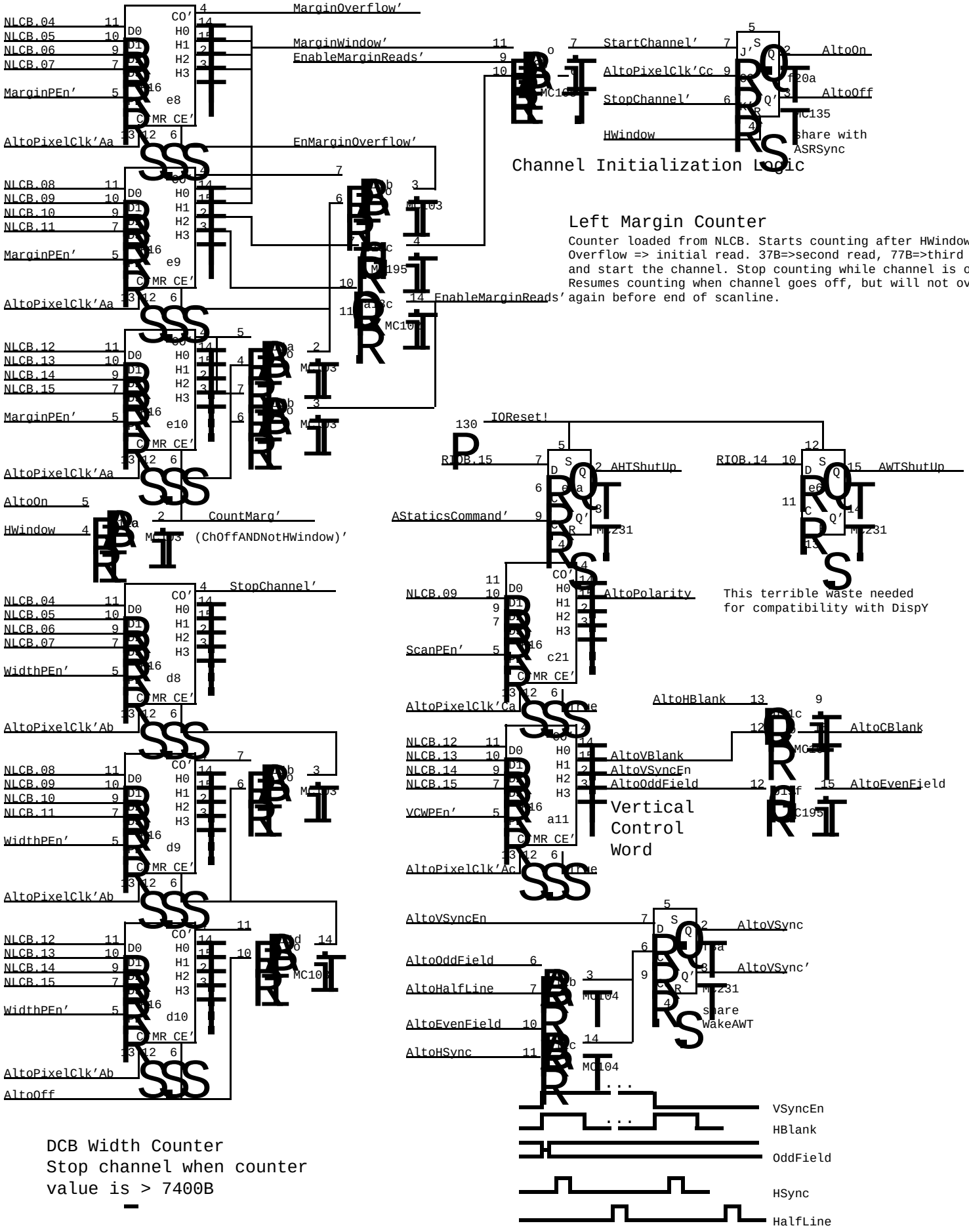




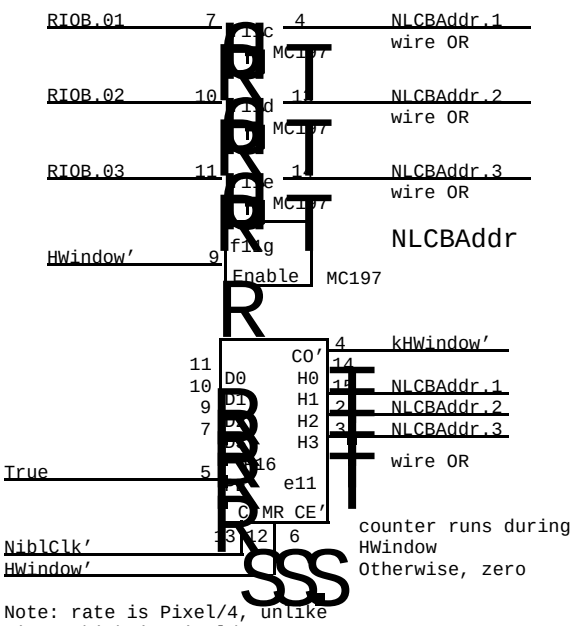
XEROX PARC	Project Dorado	Alto Display Controler Fifo Pointers and Address	File DispM02.sil	Designer K. Pier	Rev Ch	Date 7/15/81	Page 02



XEROX PARC	Project	Alto Display Controller	File	Designer	Rev	Date	Page
	Dorado	Fifo, Buffer, Shift Reg	DispM03.sil	K. Pier	Ch	7/04/81	03

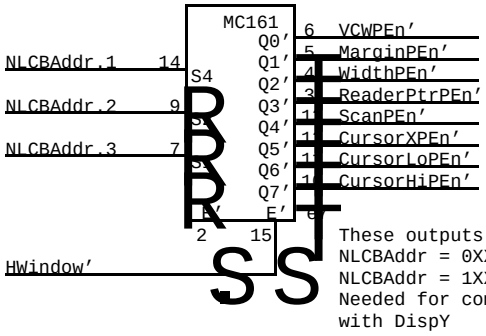


XEROX PARC	Project Dorado	Alto Display Interface Margin and Vertical Control	File DispM04.sil	Designer K. Pier	Rev Ch	Date 7/15/81	Page 04



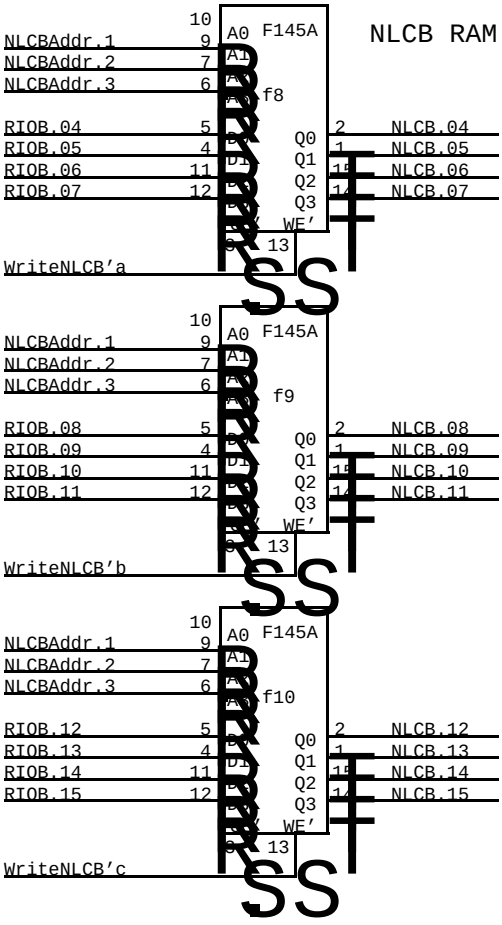
Note: rate is Pixel/4, unlike
DispY which is Pixel/2.
Microcode compensates.

CLCB load enables

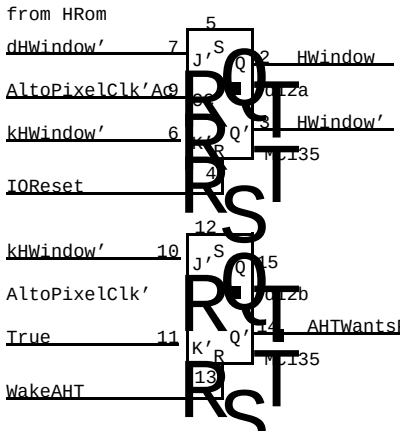


NOTE:
There are only 8 entries in NLCB.
The MSB (NLCBAddr.0) is ignored.
Outputs to 0XXX or 1XXX write
words 0XXX of NLCB. During HWindow,
CLCB entries are redundantly written
twice, first when counter goes 00-07
and again when counter goes 10-17.

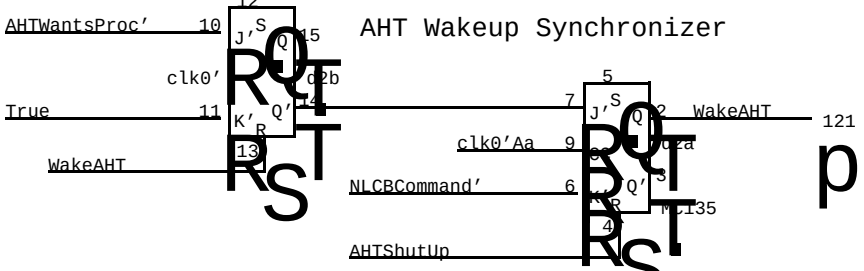
NLCB RAM



HWindow



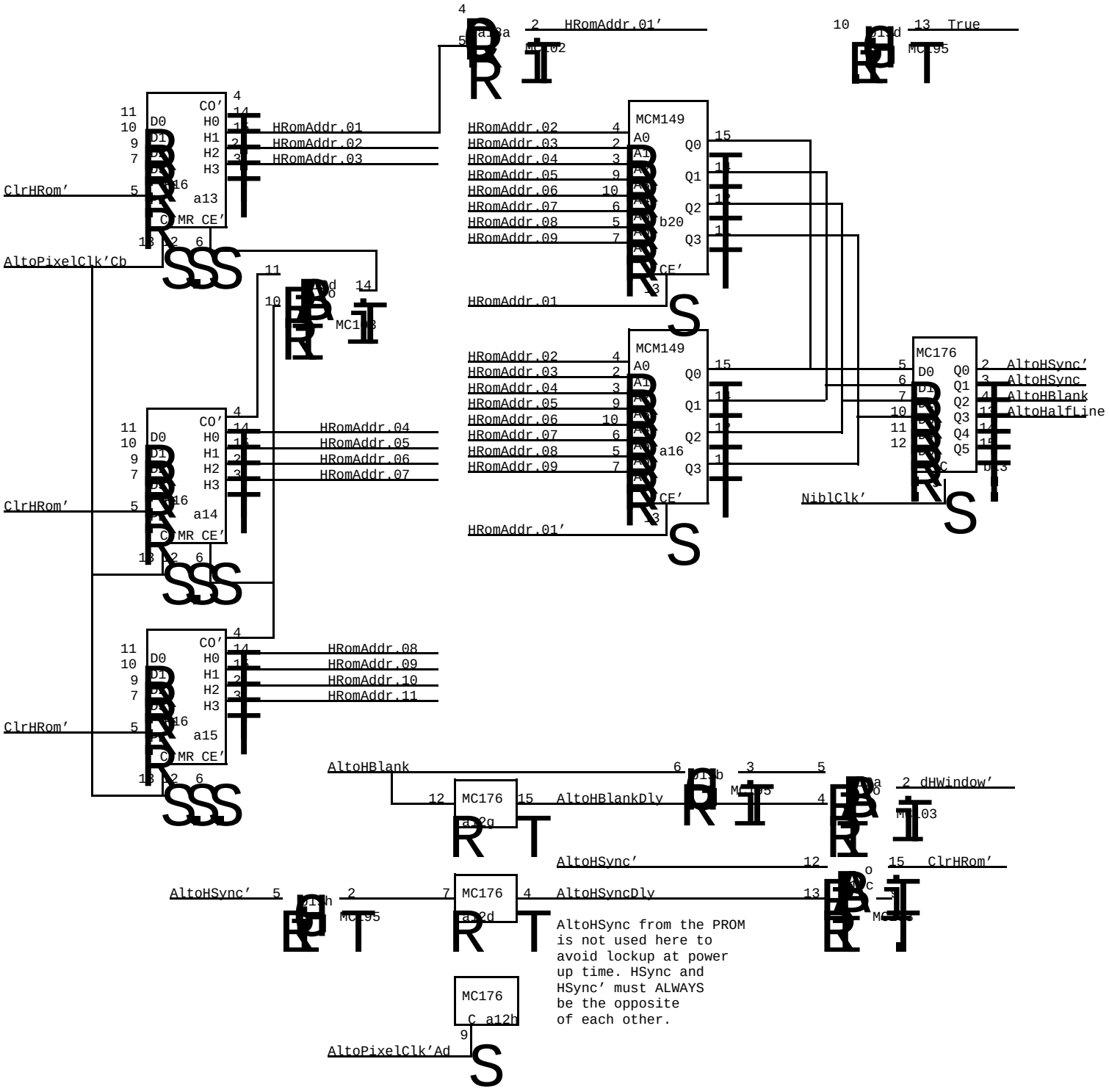
AHT Wakeup Synchronizer



For convenience, use NLCB Command
to kill wakeup. Assumes AHT will always
do some NLCB command whenever it is
awakened. Default would be to redundantly
load NLCB[0] with same data.

requries minimum 4 instruction loop

XEROX PARC	Project Dorado	Alto Display Line Control Block	File DispM05.sil	Designer K. Pier	Rev Ch	Date 7/20/81	Page 05



XEROX PARC	Project Dorado	Alto Display Horizontal ROM	File DispM06.sil	Designer K. Pier	Rev Ch	Date 7/20/81	Page 06

NEXT Word Control Block Flag (NextWCBFlag)
Current Word Control Block Flag (CurrentWCBFlag)

A Word Control Block is a pair of values called Address and MunchCount, for either the CURRENT or the NEXT scanline.

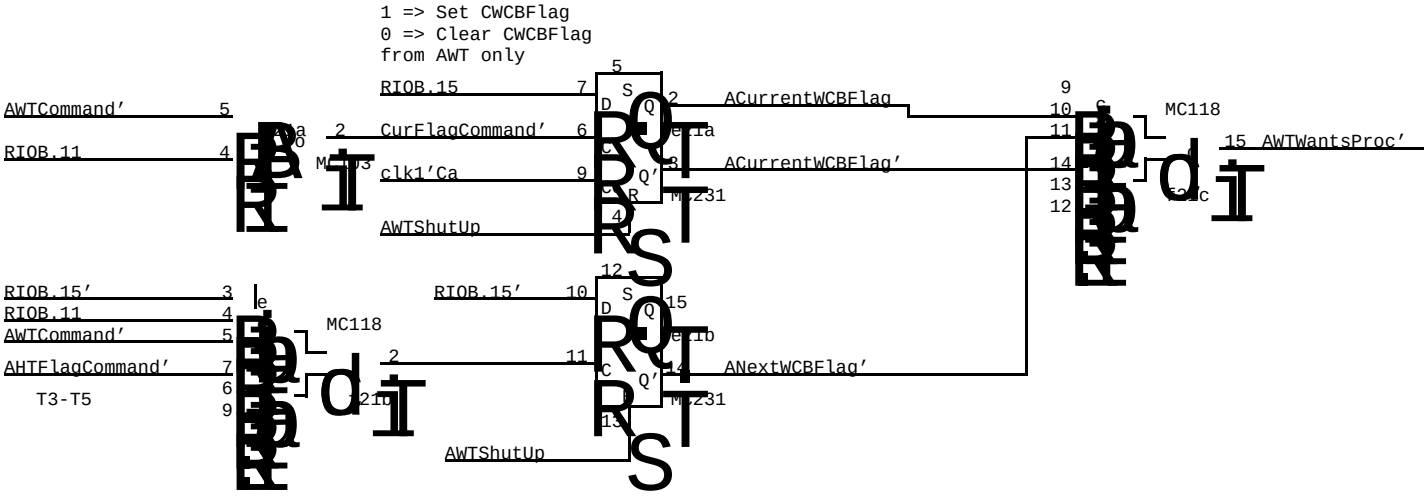
For AWT Commands:		For AHT commands:	
RIOB	Means	RIOB	Means
=1c	Set CWCBFlag and Clear NWCBFlag	=0c	Set ANextWCBFlag
=0c	Clear CWCBFlag		

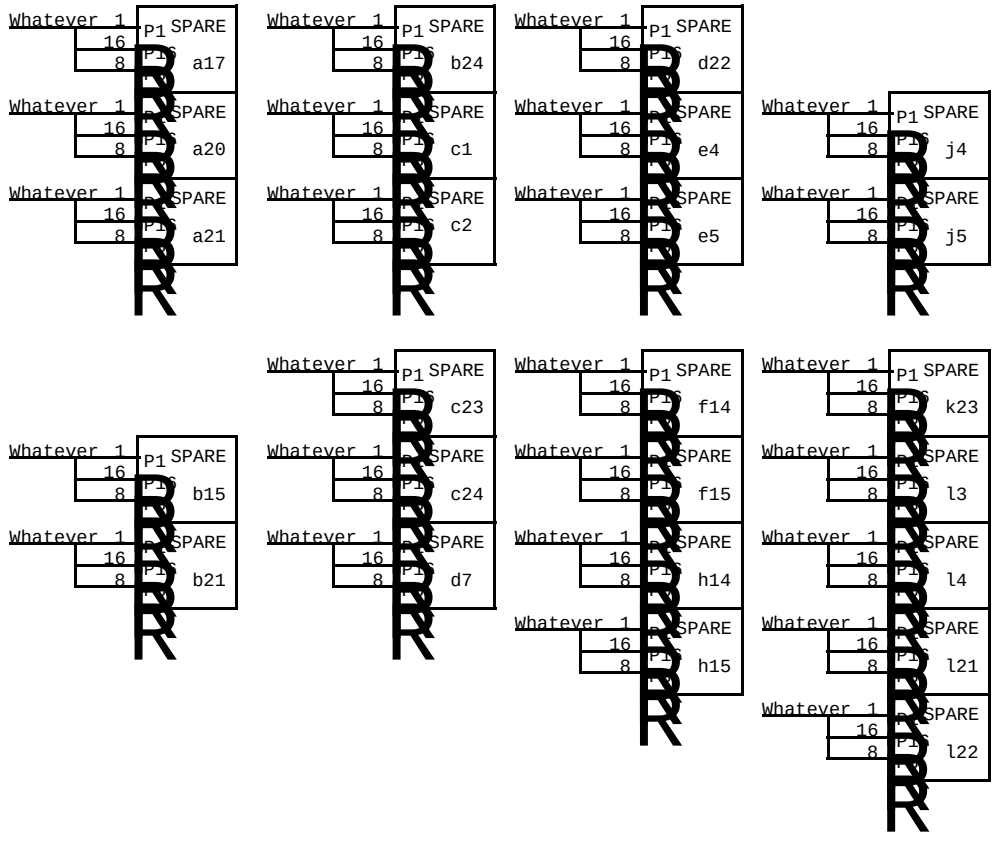
Flag management	SET	CLEARED
NextWCBFlag	by AHT when it has filled the NextWCB	by AWT when it has copied NextWCB into CurrentWCB
CurrentWCBFlag	by AWT when it has copied NextWCB into CurrentWCB	by AWT when it has sent out all the data from the CurrentWCB

WakeUp conditions:

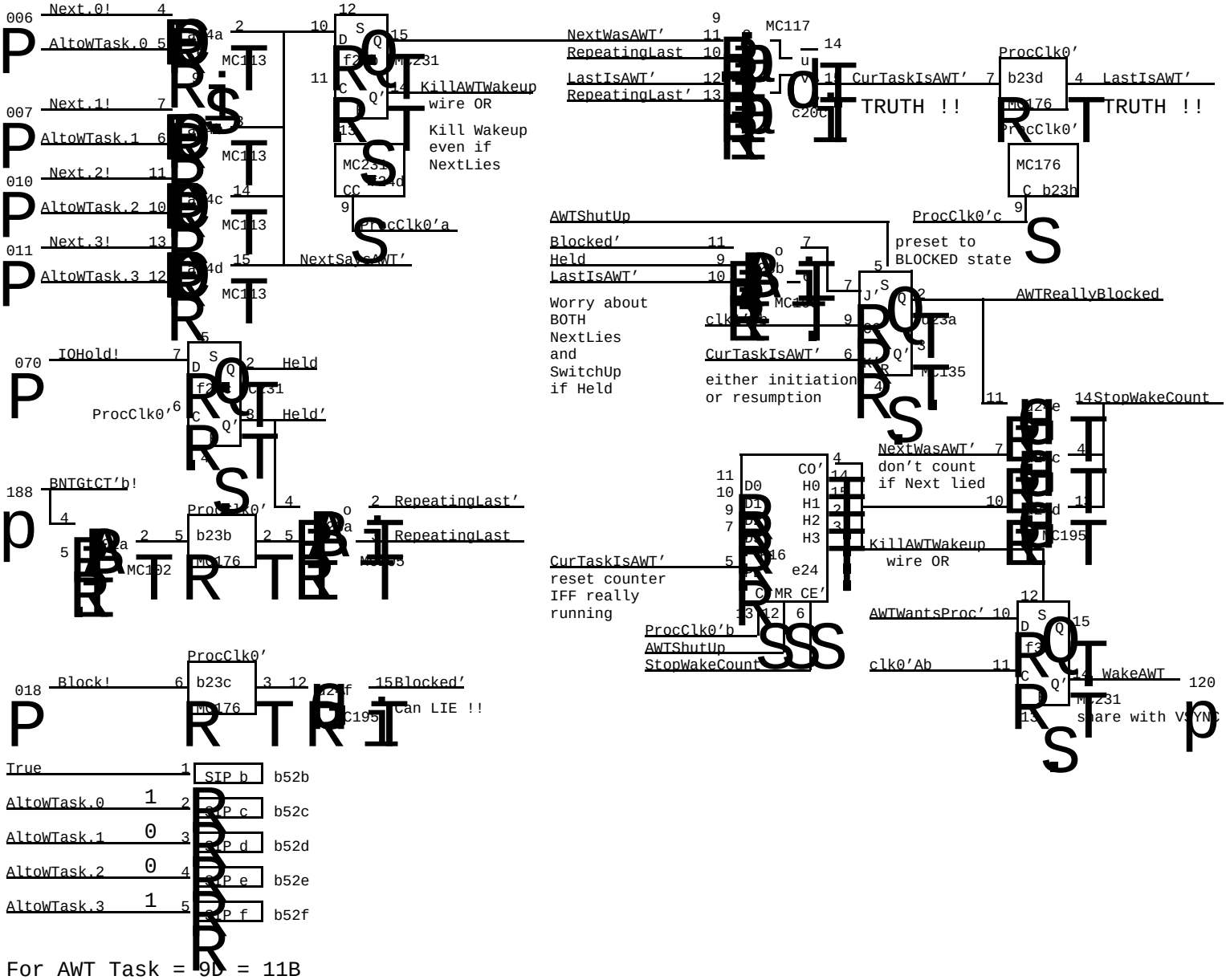
WakeAHT: at end of every HWindow

WakeAWT: (CurrentWCBFlag) OR (NextWCBFlag AND NOT(CurrentWCBFlag))



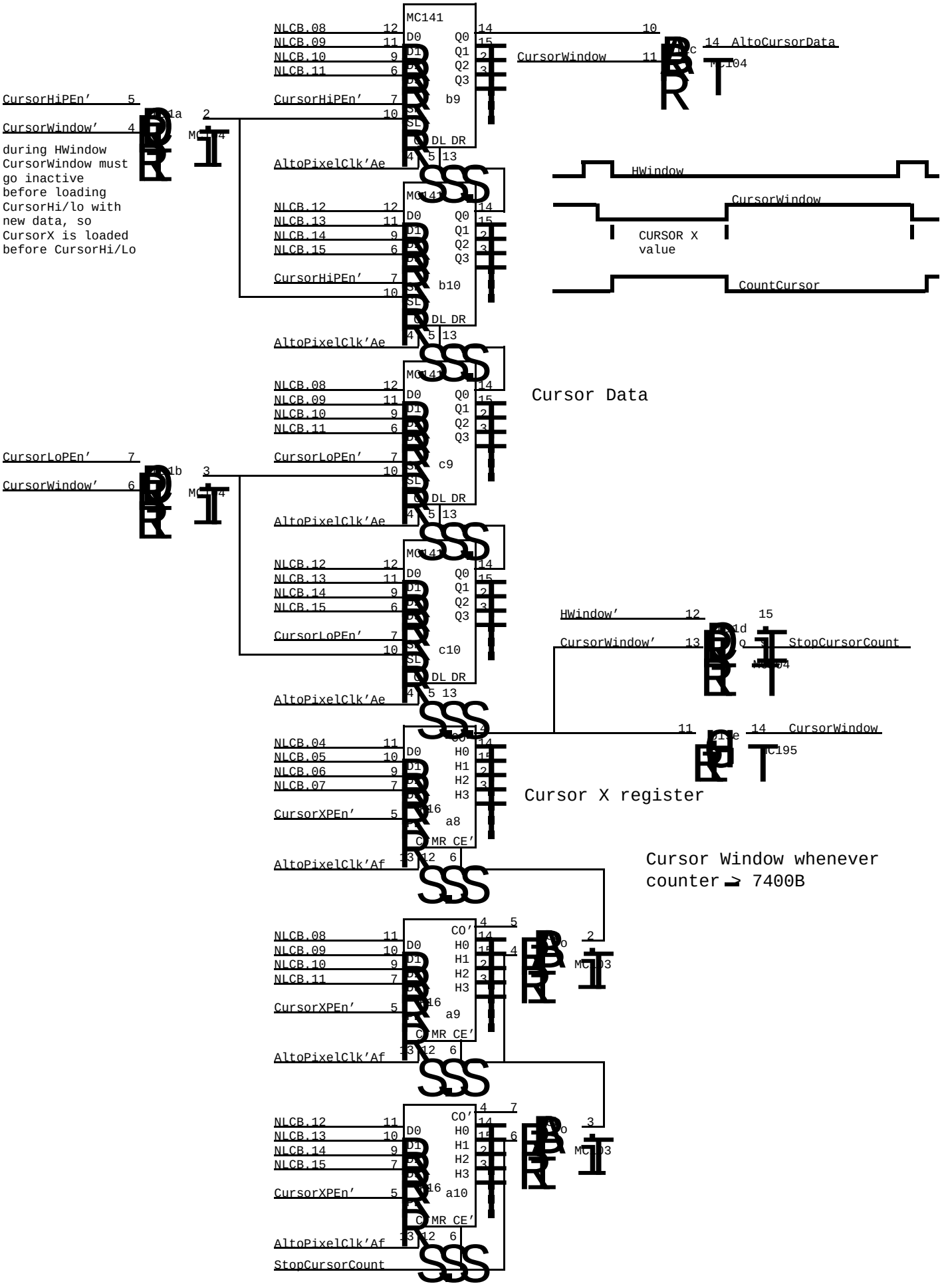


XEROX PARC	Project: Dorado	Alto Display Controller Flag control logic	File: DispM07.sil	Designer: K. Pier	Rev: Ch	Date: 11/09/82	Page: 07

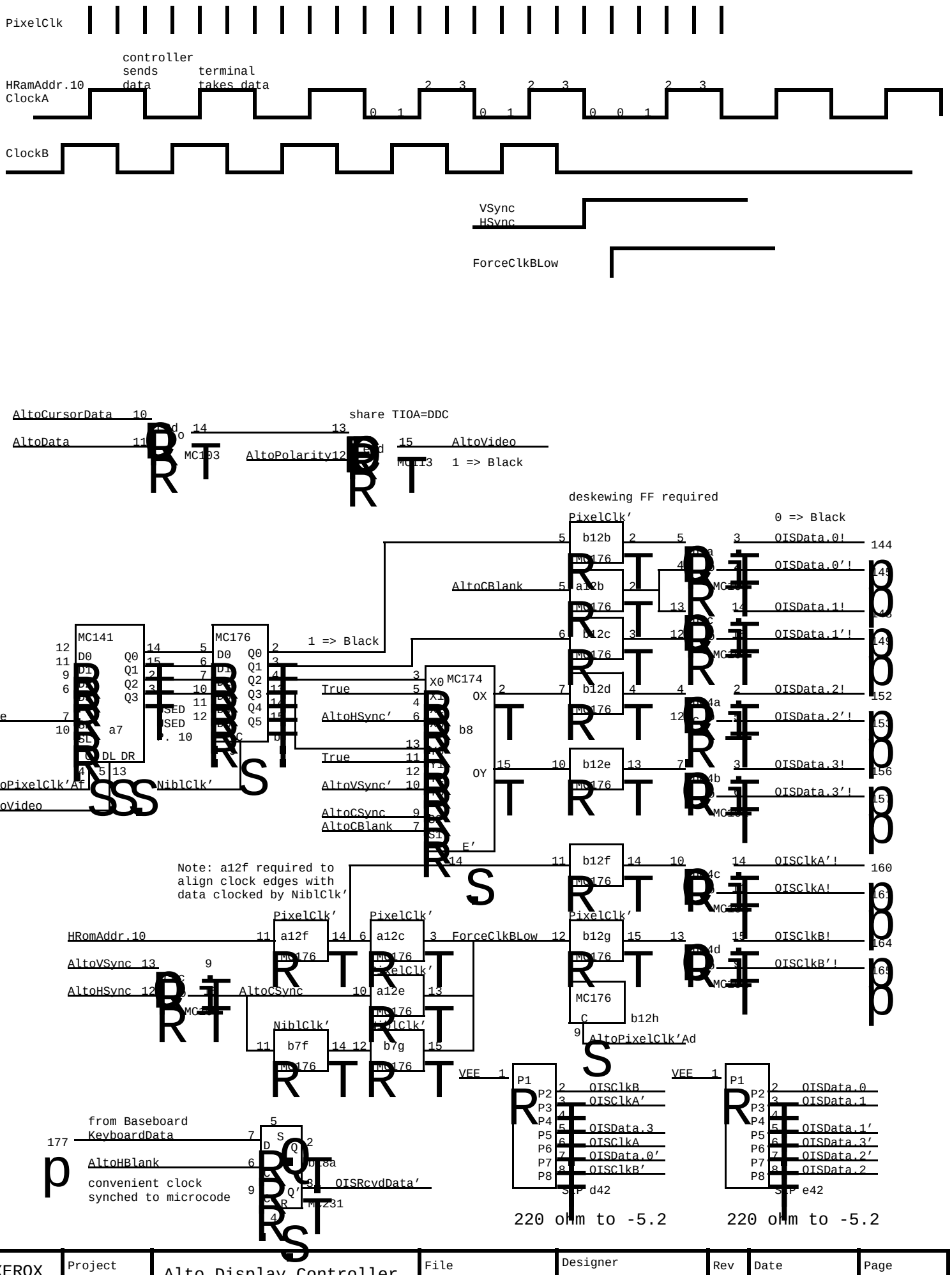


For AWT Task = 9D = 11B
cut legs 3 and 4

XEROX PARC	Project Dorado	Alto Display Controller Word Task Wakeup Logic	File DispM08.sil	Designer K. Pier	Rev Ch	Date 4/23/80	Page 08



XEROX PARC	Project Dorado	Alto display Controller Cursor Hardware	File DispM09.sil	Designer K. Pier	Rev Ch	Date 4/01/80	Page 09

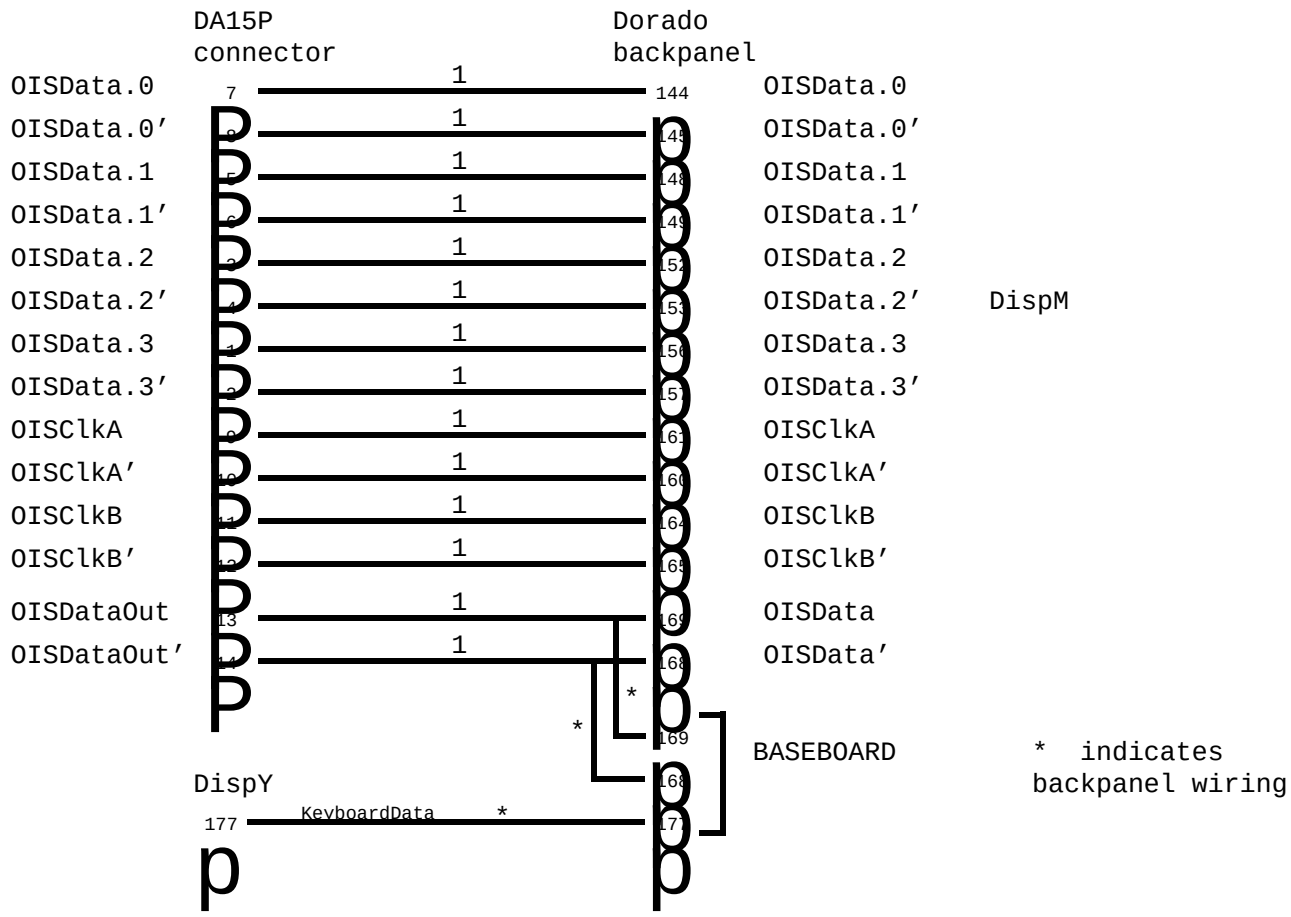


XEROX PARC	Project	Alto Display Controller OIS Terminal Interface	File	Designer	Rev	Date	Page
	Dorado		DispM10.sil	K. Pier	Ch	7/20/81	10

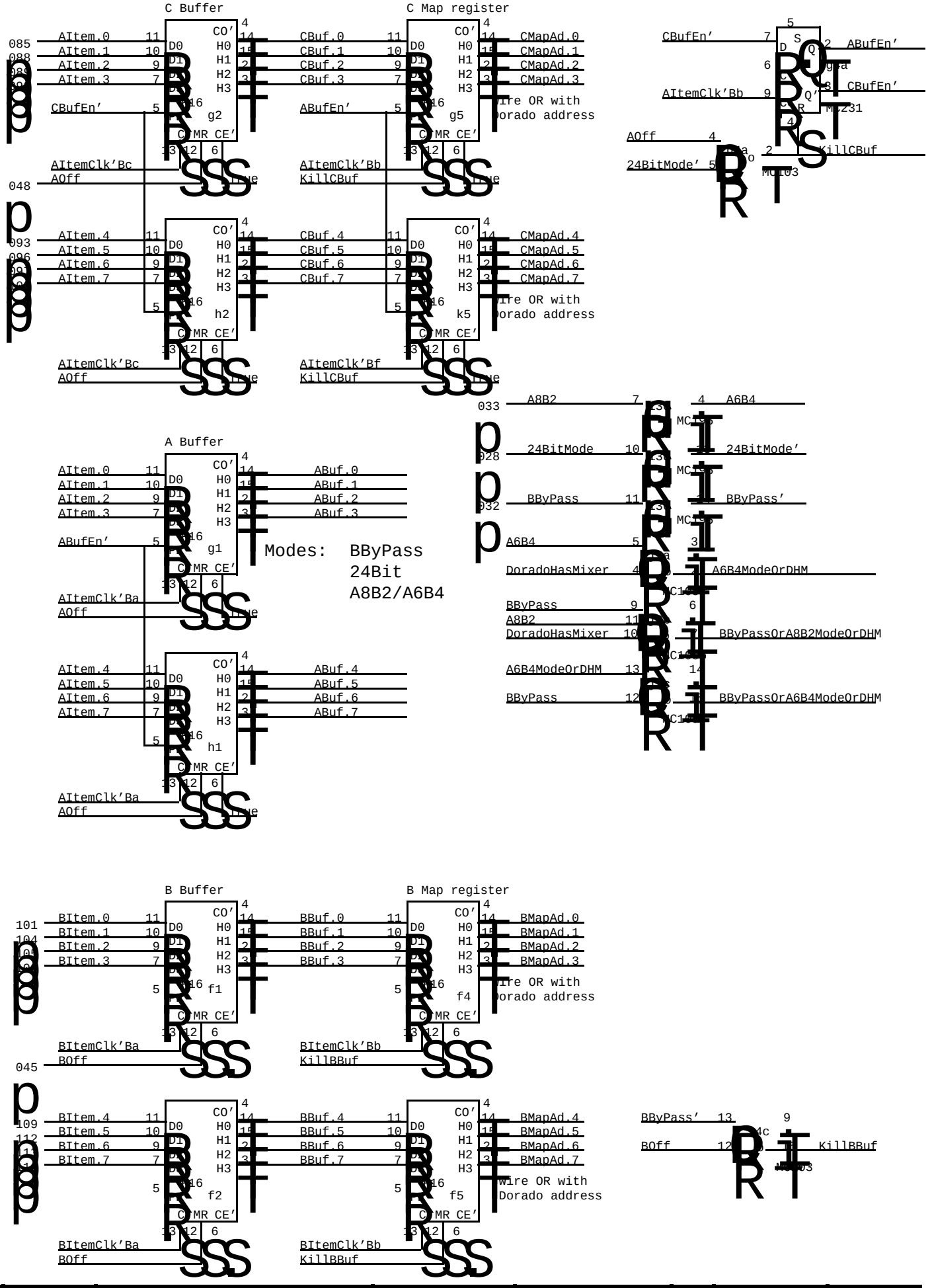
Alto Display Controller
Next Line Control Block Format

Address	Name	Format
0	VCW vertical control word	0,..0, VBlank, VSync, OddField
1	Margin	LMarg[00..11]
2	Width	Width[00..11]
3	FifoAddr	FifoAddr[0..7] *must be even
4	Scan	AltoPolarity,0,0,0,0,0,0,
15	CursorX	CursorXCount[0..11]
16	CursorLo	CursorLoByte[4..11]
17	CursorHi	CursorHiByte[4..11]

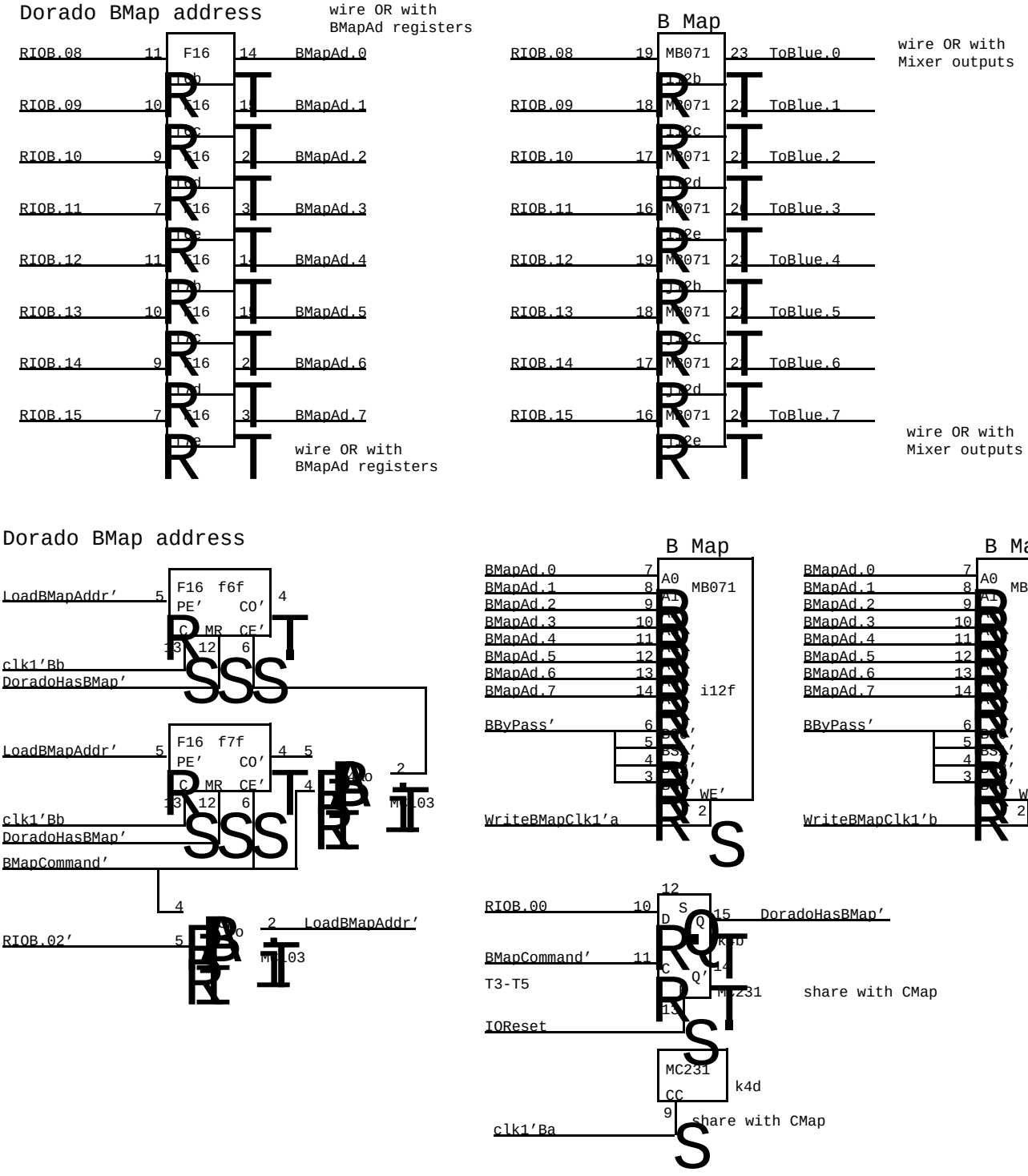
Seven Wire Interface Cable



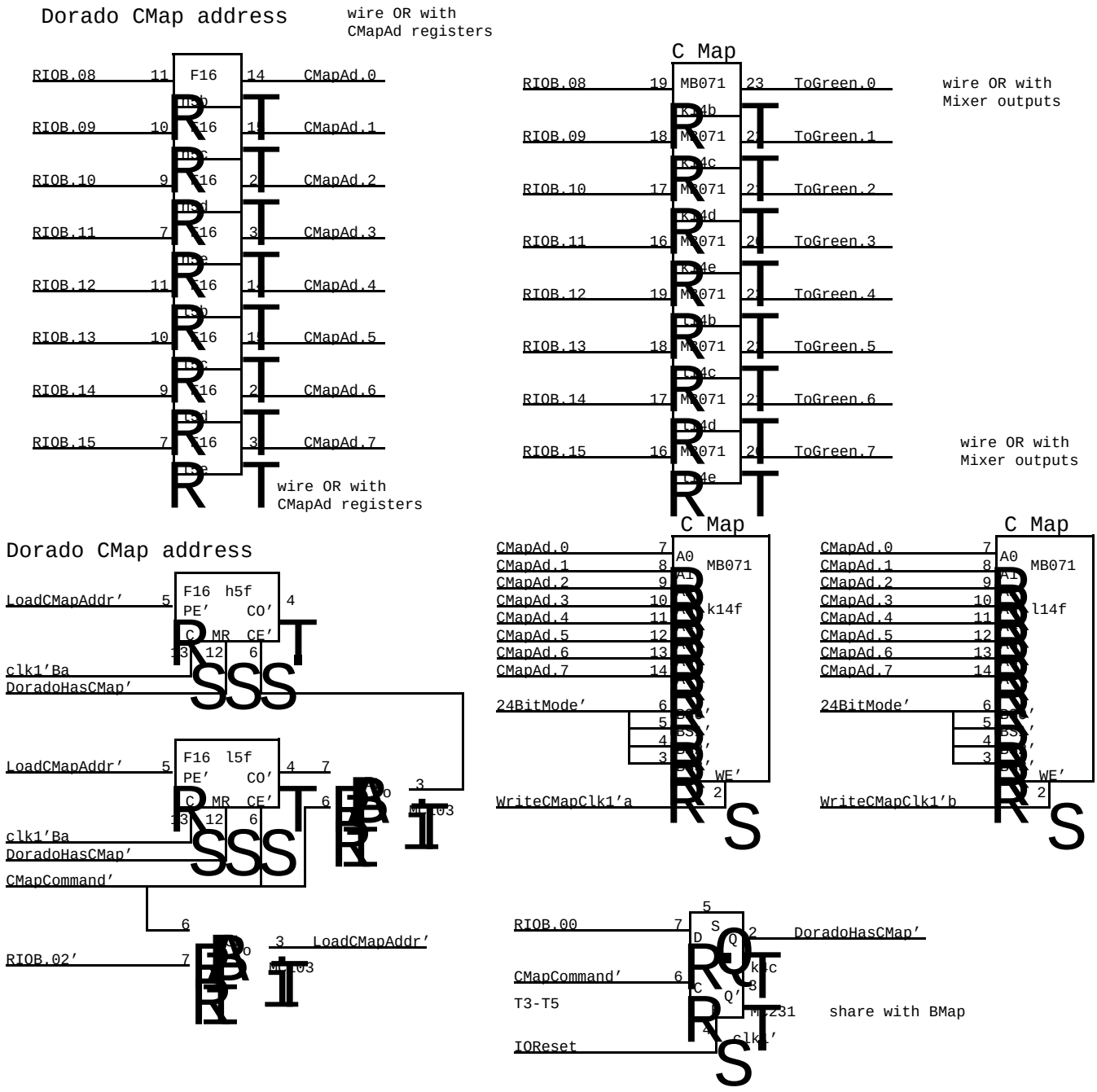
XEROX PARC	Project	Reference	File	Designer	Rev	Date	Page
	Dorado	Alto Display Controller Cabling	DispM11.sil	K. Pier	Ch	4/10/80	11



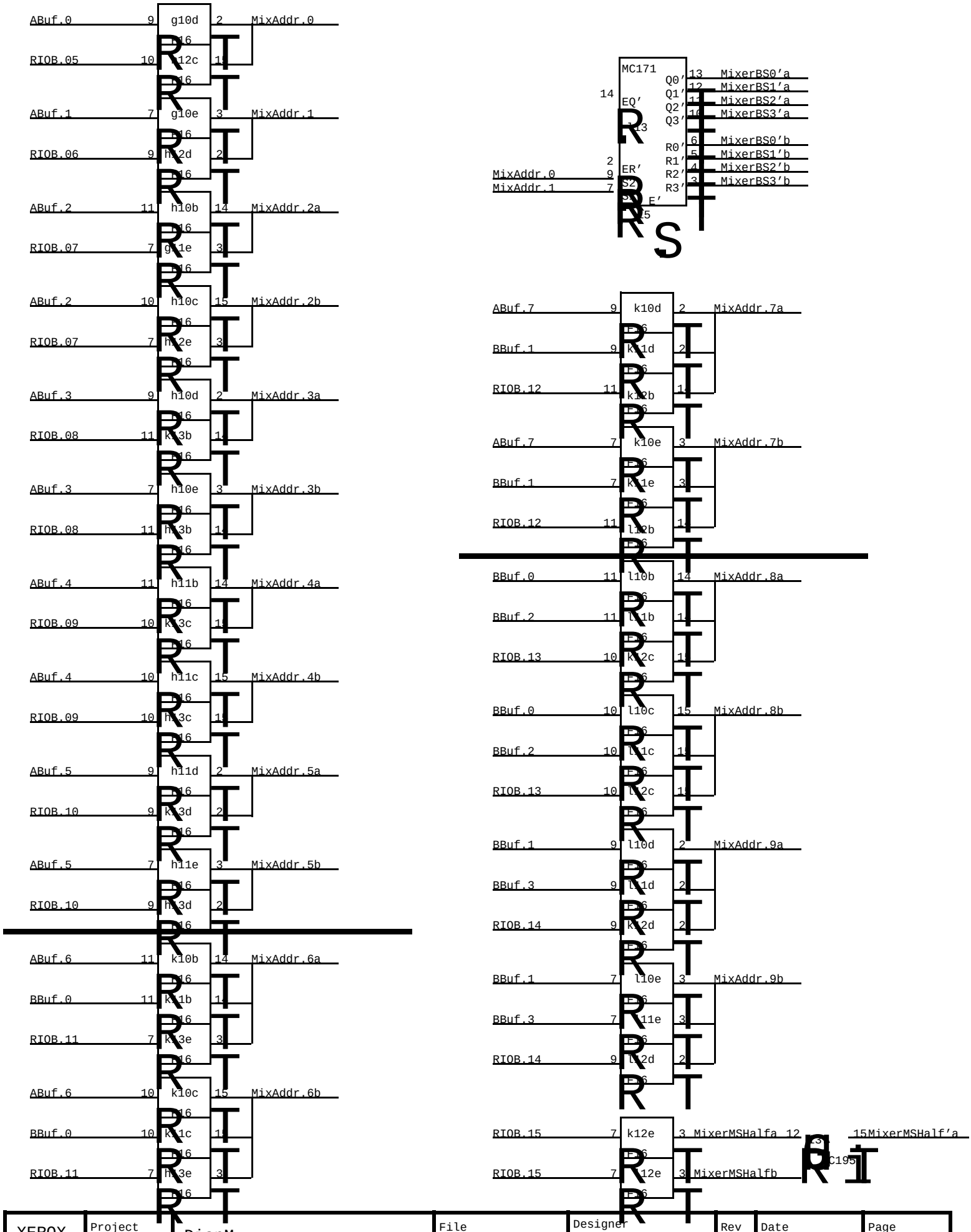
XEROX PARC	Project		File	Designer	Rev	Date	Page
	Dorado	DispM Mixer Buffers	DispM12.sil	K. Pier	Ch	7/07/80	12



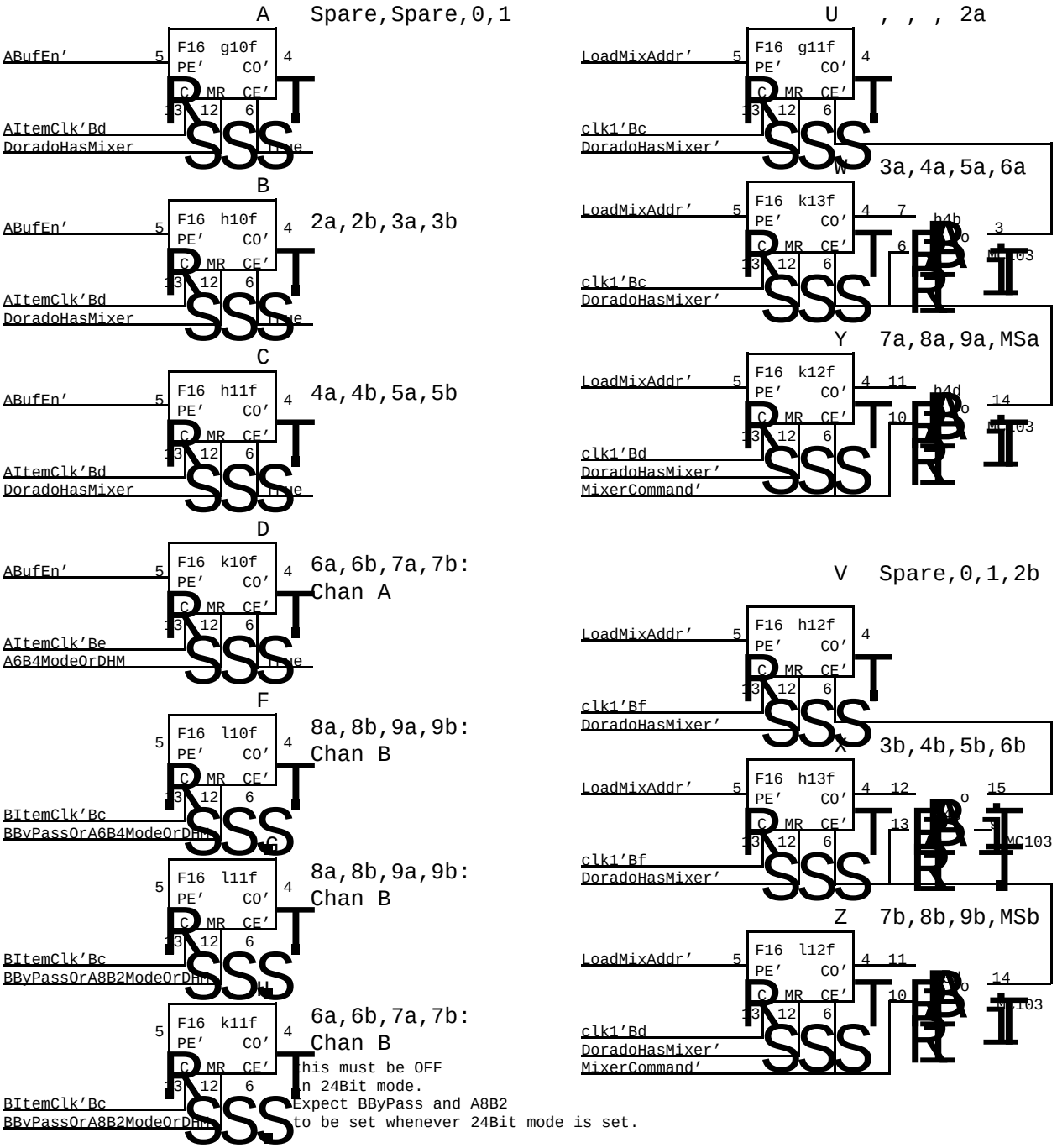
NOTE: in order to read/write BMap, BByPass mode must be ON and the B Channel must be OFF. This is inconvenient, but it does the right thing for real time mode switching.



NOTE: in order to read/write CMap, 24BitMode must be ON and The A channel must be OFF. This is inconvenient, but it does the right thing for real time mode switching.

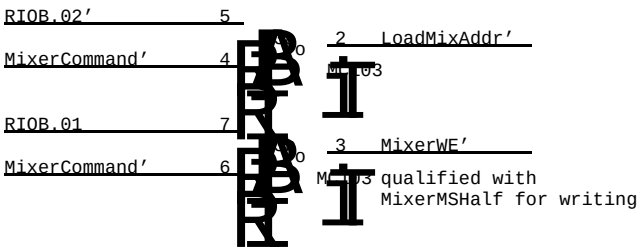


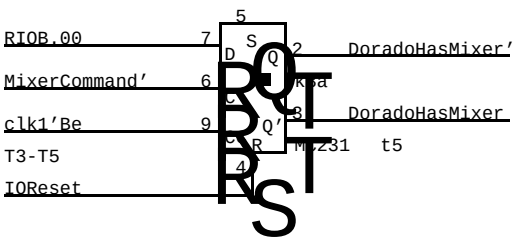
XEROX PARC	Project: Dorado	DispM Mixer Address Drivers	File: DispM15.sil	Designer: K. Pier	Rev: Ch	Date: 4/01/80	Page: 15



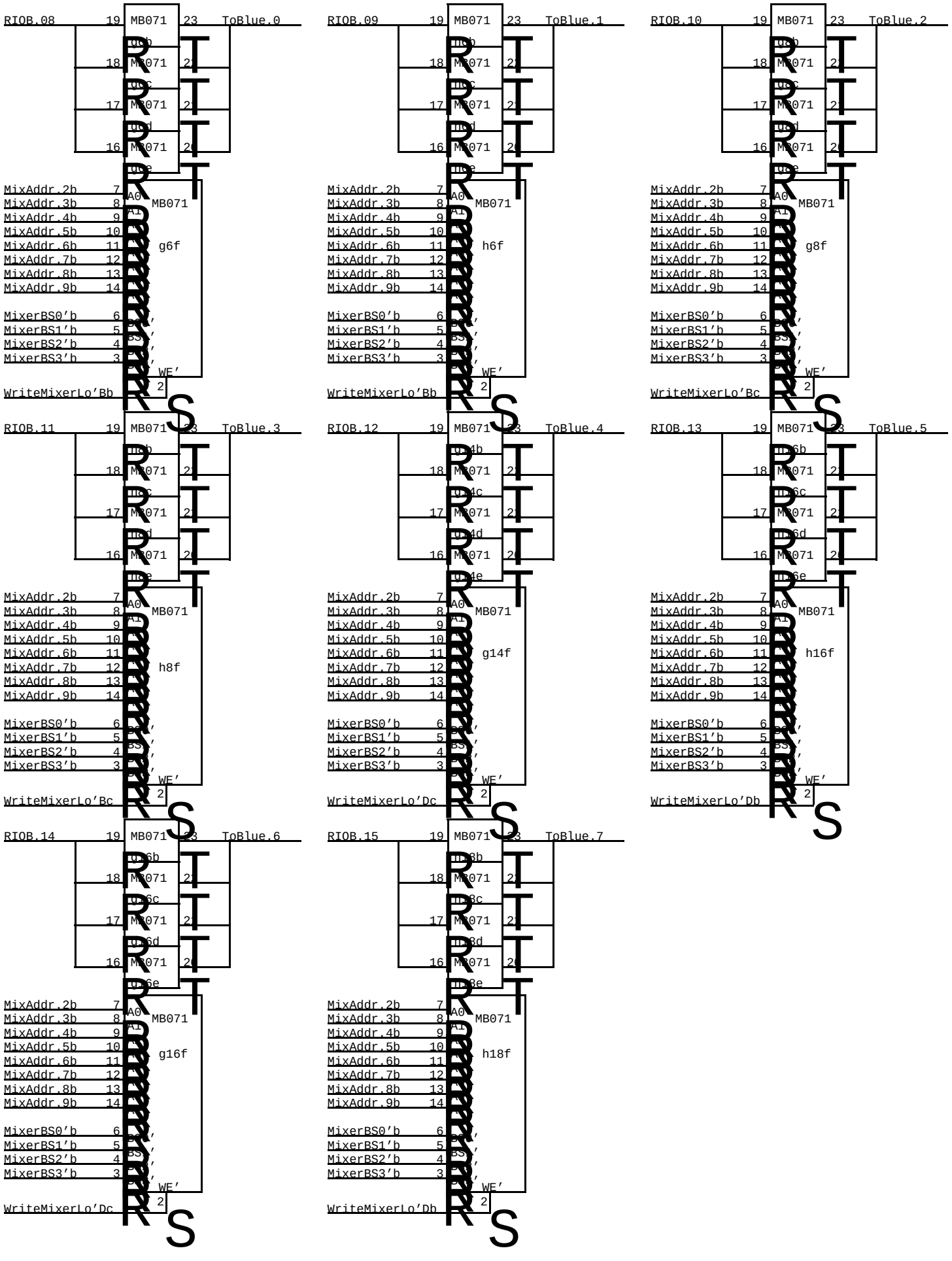
NOTE: B Channel must be started by microcode
one pixel clk tick earlier than A channel
for 24BitMode to align properly.

NOTE: Pixel clock must run at 2X rate for
24BitMode to work across entire screen !!

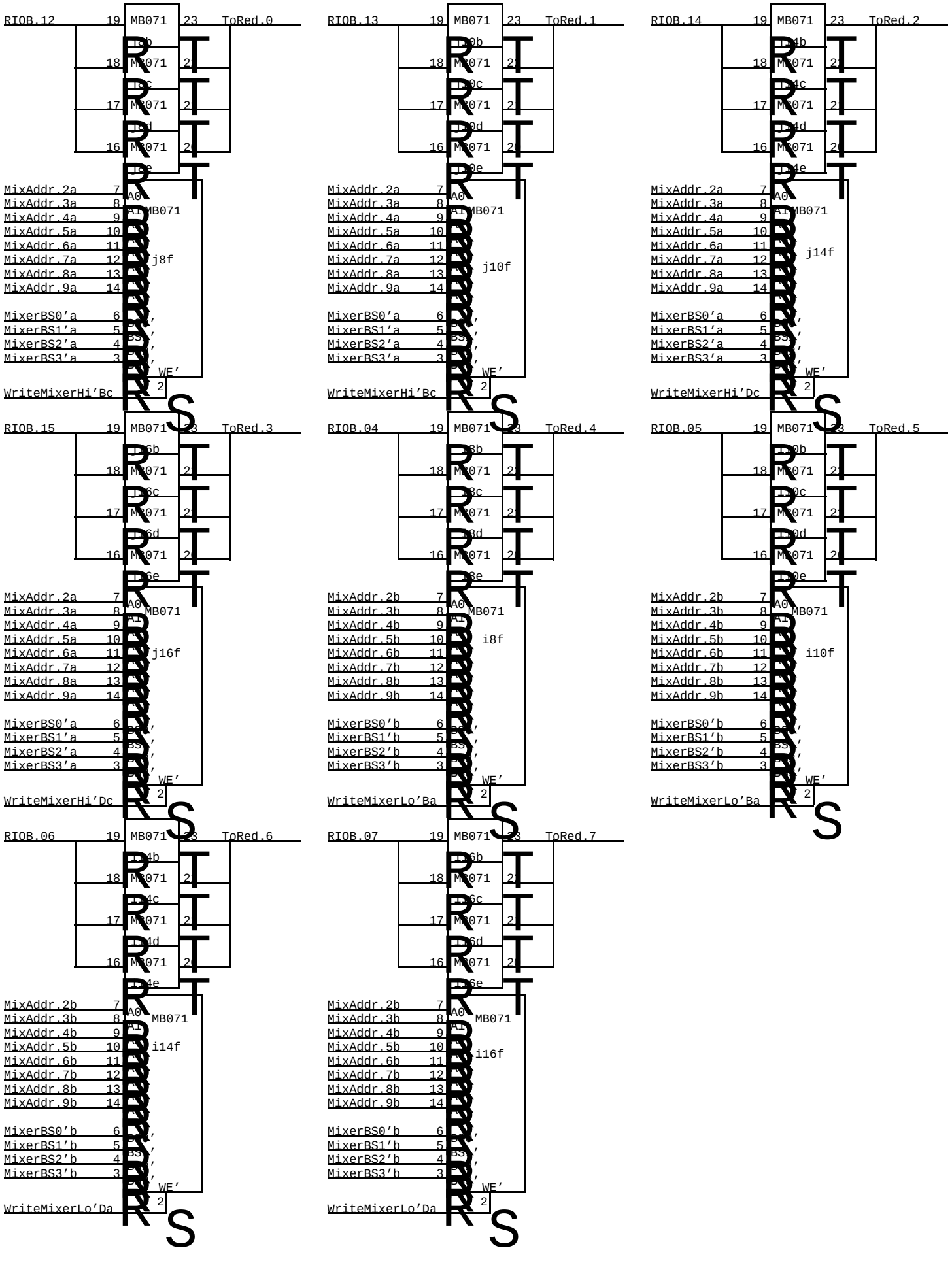




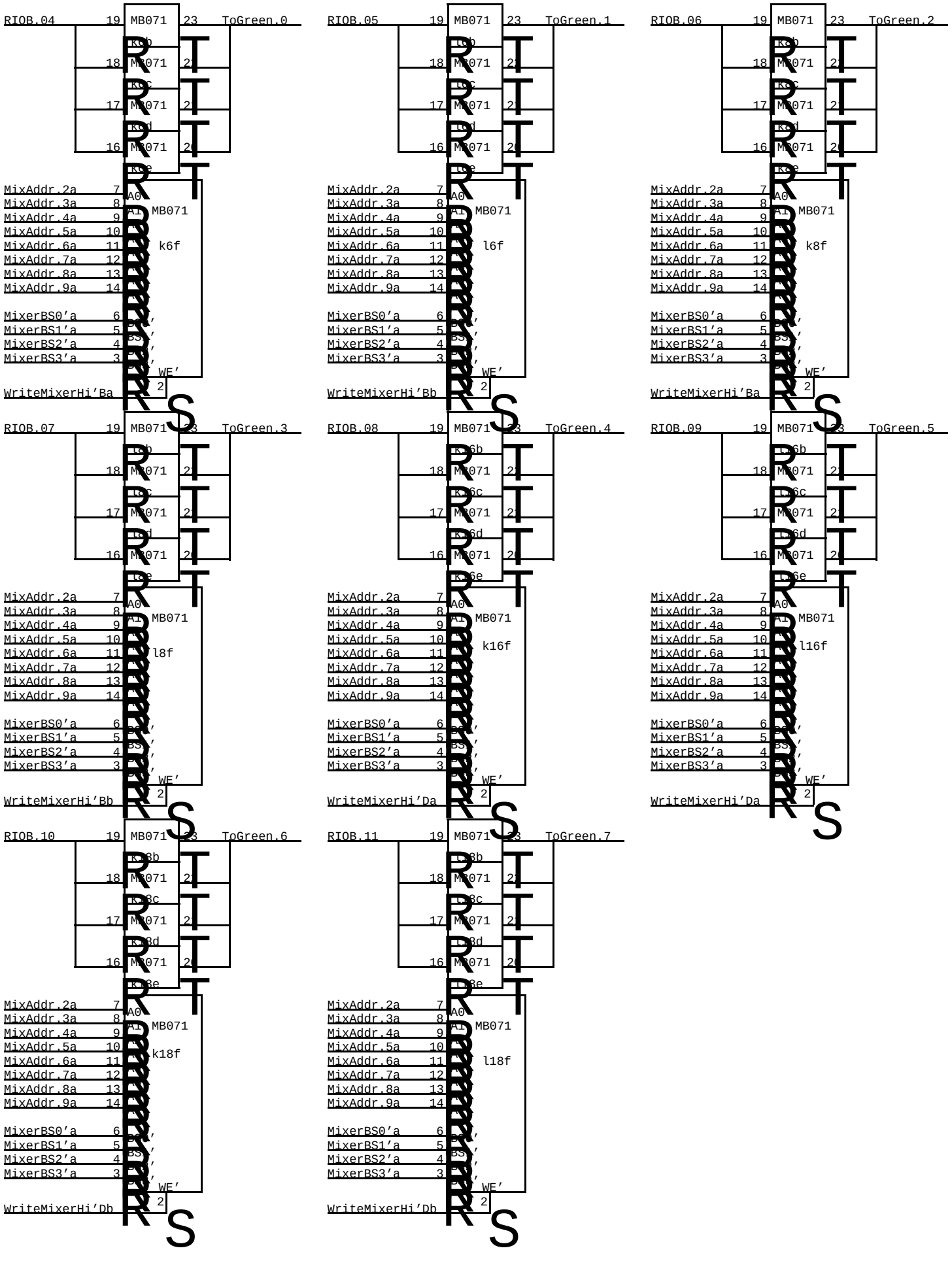
XEROX PARC	Project Dorado	DispM Mixer Address Control	File DispM16.sil	Designer K. Pier	Rev Ch	Date 7/07/80	Page 16



XEROX PARC	Project Dorado	DispM Mixer - Blue byte	File DispM17.sil	Designer K. Pier	Rev Ch	Date 4/01/80	Page 17

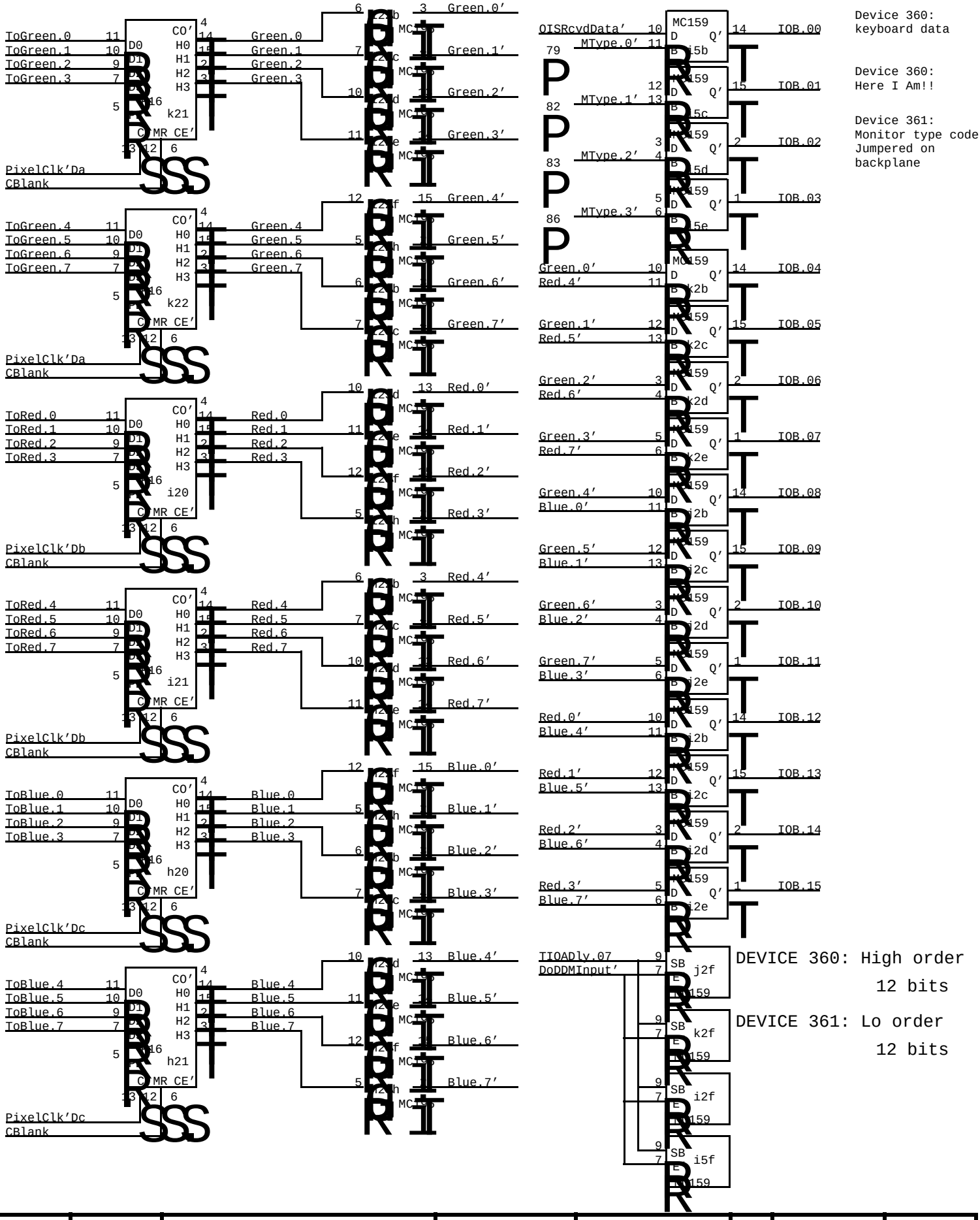


XEROX PARC	Project Dorado	DispM Mixer - Red byte	File DispM18.sil	Designer K. Pier	Rev Ch	Date 4/01/80	Page 18



XEROX PARC	Project Dorado	DispM Mixer - Green byte	File DispM19.sil	Designer K. Pier	Rev Ch	Date 4/01/80	Page 19

No Parity supplied
Use InputNoPE



Device 360:
keyboard data

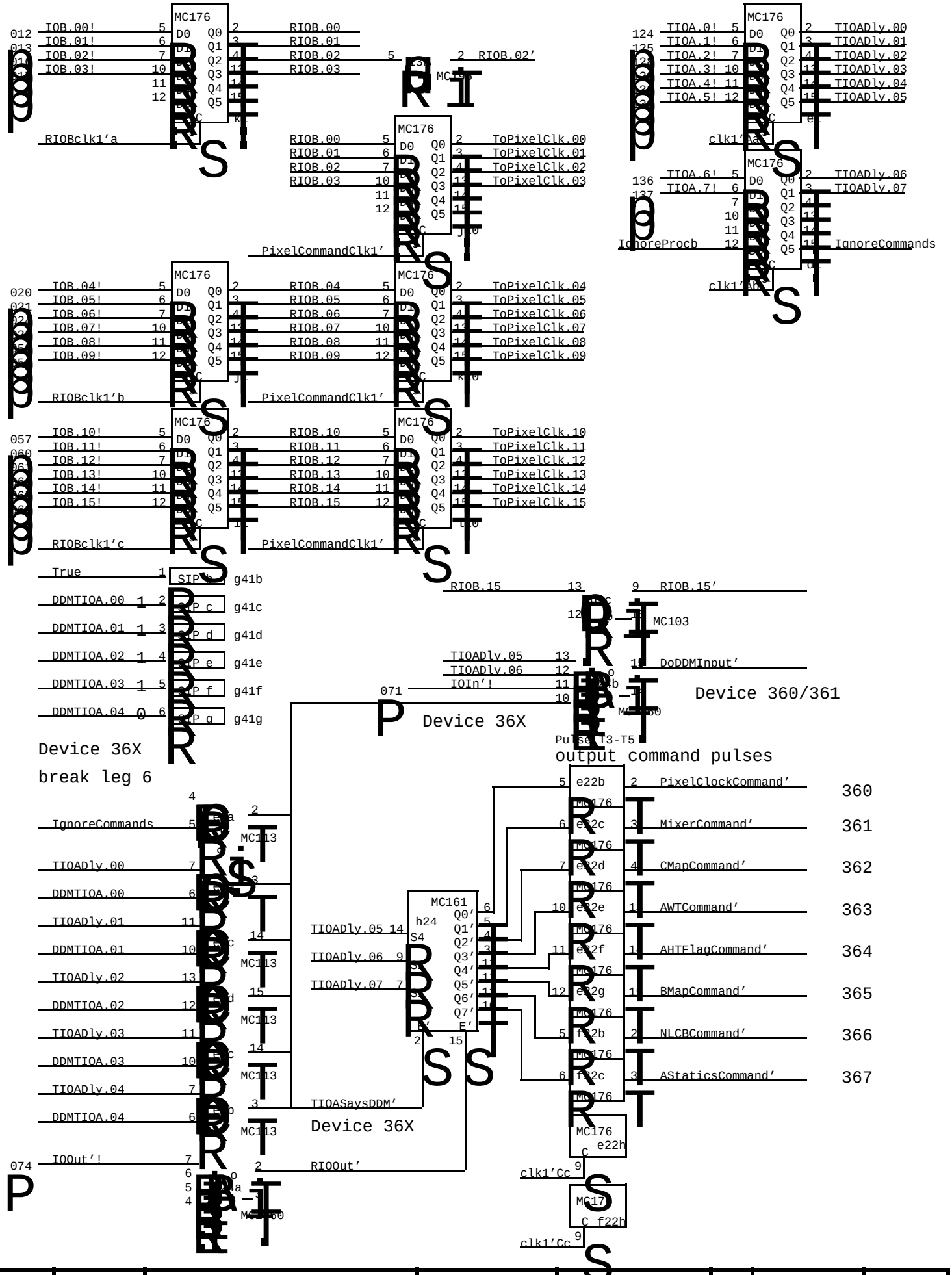
Device 360:
Here I Am!!

Device 361:
Monitor type code
Jumpered on
backplane

DEVICE 360: High order
12 bits

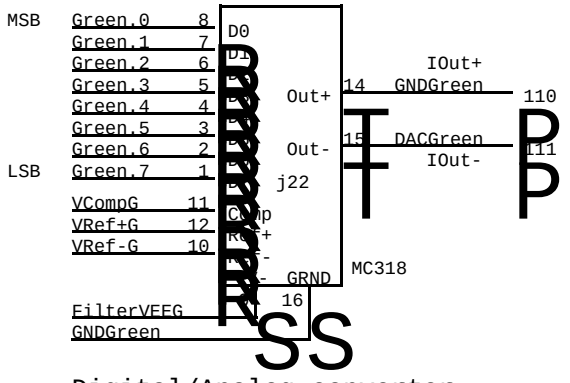
DEVICE 361: Lo order
12 bits

XEROX PARC	Project		File	Designer	Rev	Date	Page
	Dorado	DispM Mixer Output Register	DispM20.sil	K. Pier	Ch	7/06/81	20

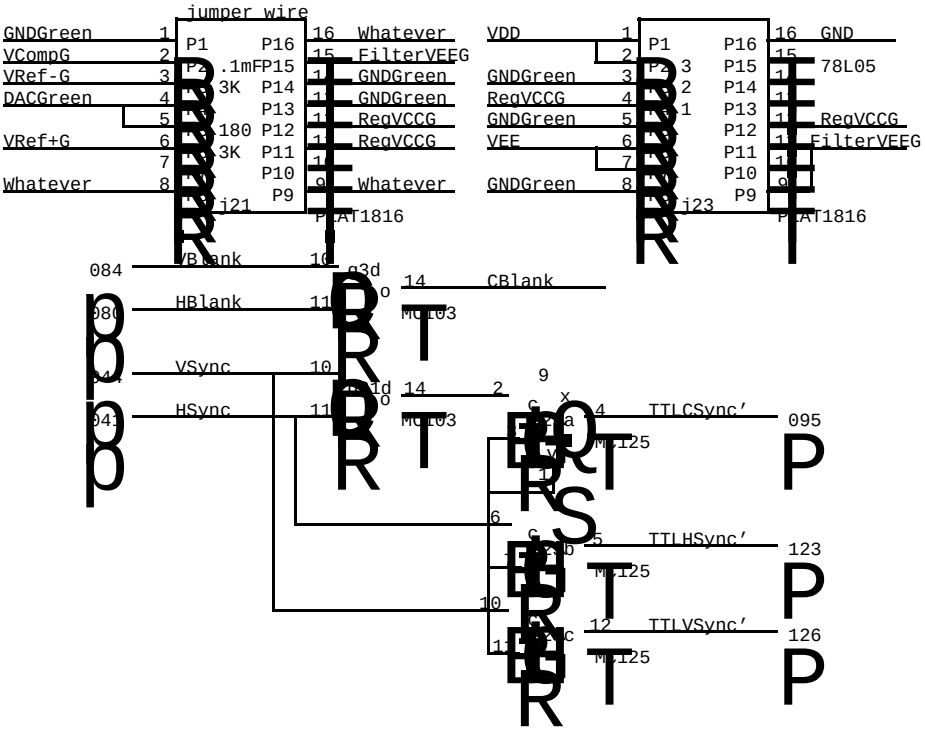


XEROX PARC	Project	File	Designer	Rev	Date	Page
	Dorado DispM Slow IO Interface	DispM21.sil	K. Pier	Ch	11/09/82	21

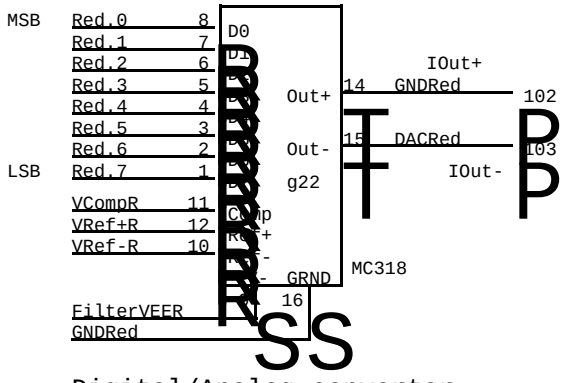
NOTES:
GNDGreen is
used as single point GND
for DAC system



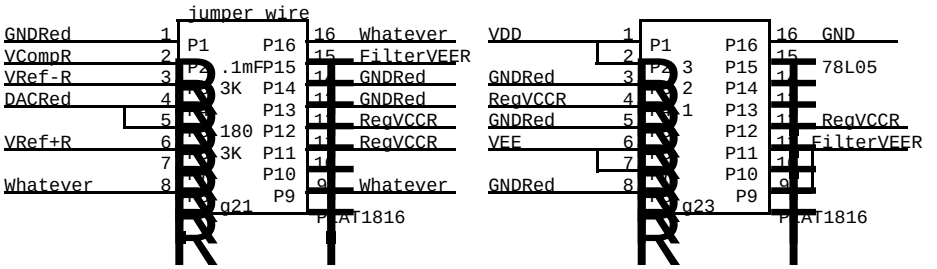
Digital/Analog converter



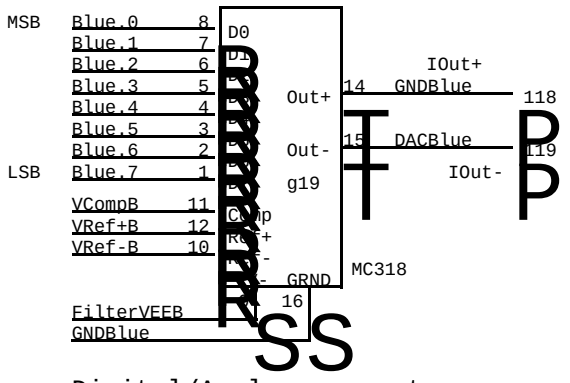
NOTES:
GND RED is
used as single point GND
for DAC system



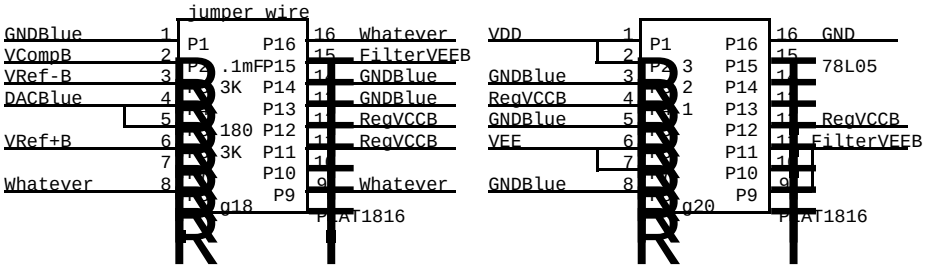
Digital/Analog converter



NOTES:
GNDBlue is
used as single point GND
for DAC system



Digital/Analog converter



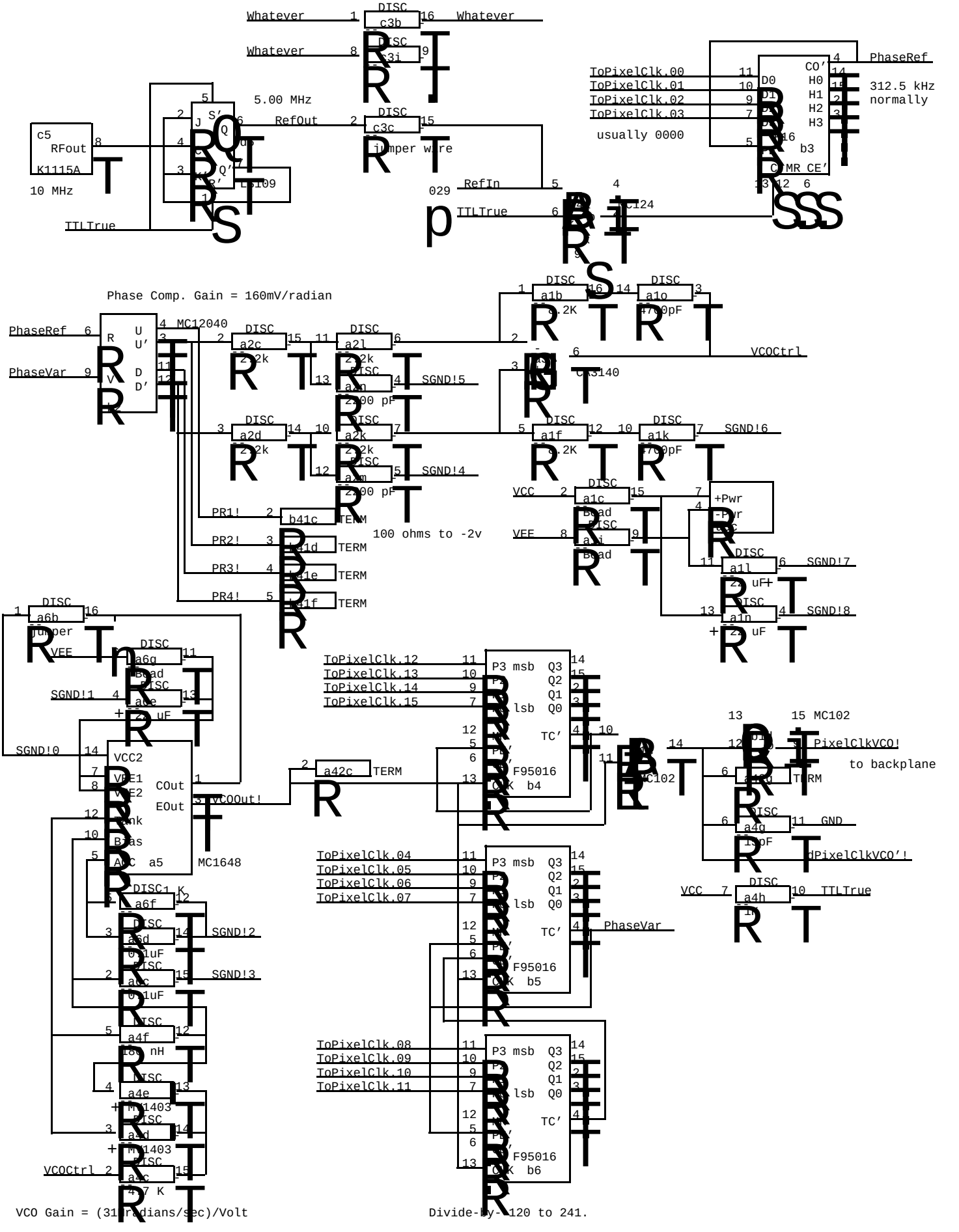
1	jumper wire	16
2	0.1mFarad	15
3	3 KOhm	14
4		13
5	180 Ohm	12
6	3 KOhm	11
7		10
8		09

locations g18,g21,j21

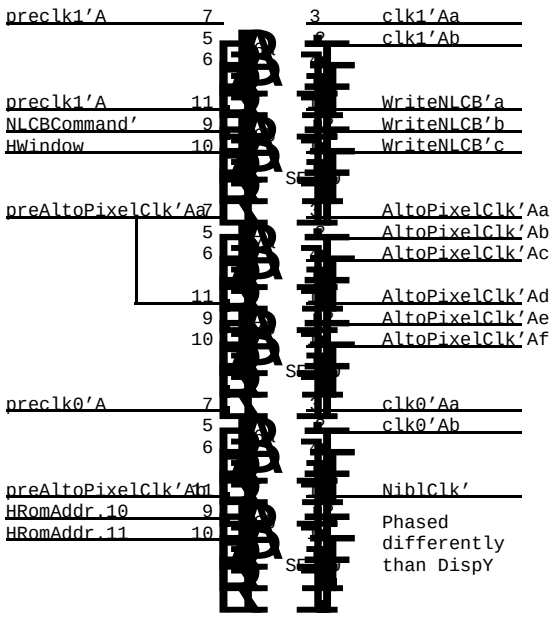
1	0.1mFarad	16
2	in 3 78L05	15
3	gnd 2	14
4	out 1	13
5	0.1mFarad	12
6	12 mHnry	11
7	2 ohm	10
8	+ 22 mF	09

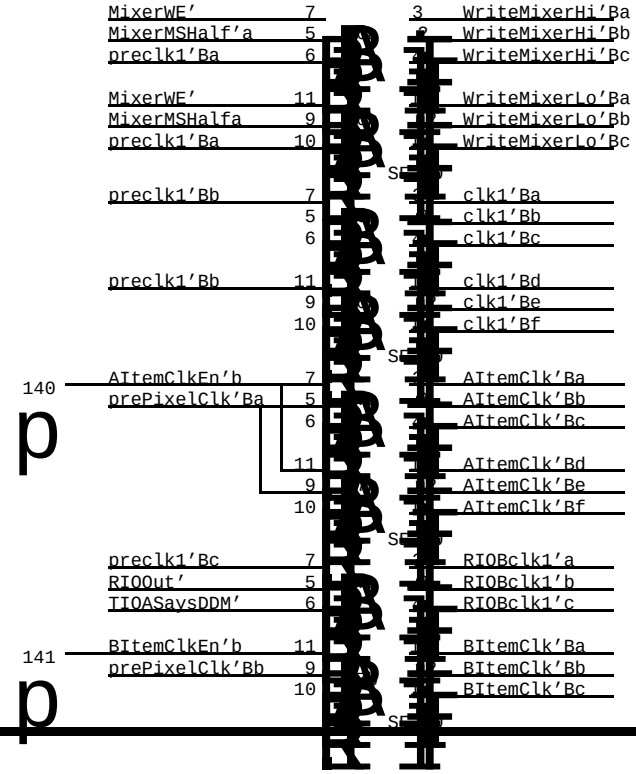
locations j23,g23,g20

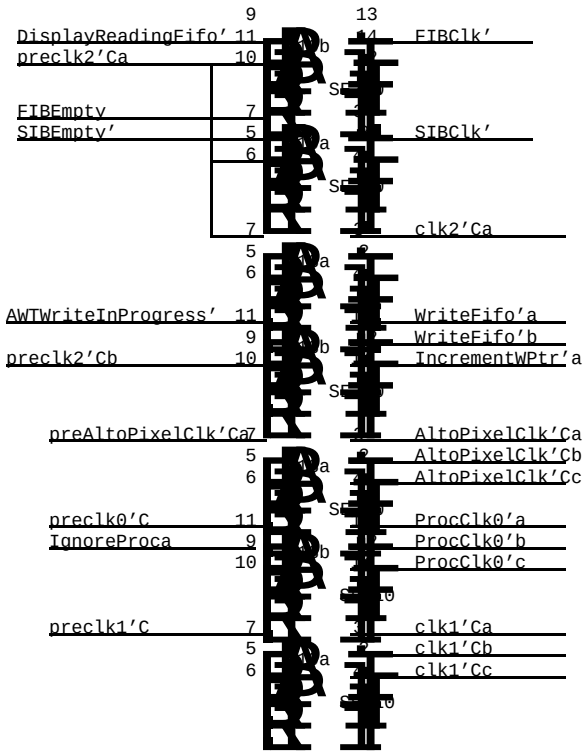
XEROX PARC	Project Dorado	DispM DACs	File DispM22.sil	Designer K. Pier	Rev Ch	Date 7/08/81	Page 22

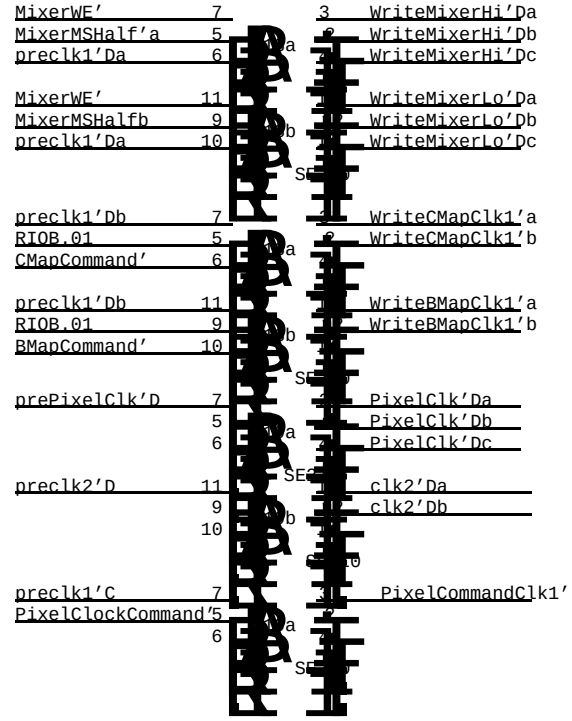


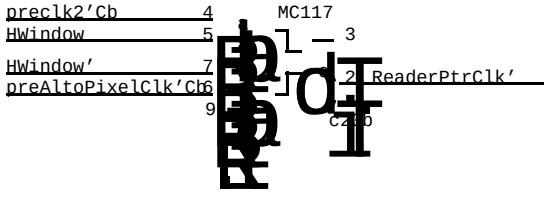
XEROX PARC/CSL	Project	Synthesized Pulse Generator	File	Designer	Rev	Date	Page
	DispM	Phase-locked synthesis loop	DispM23.sil	McCreight	Ch	11/09/82	23











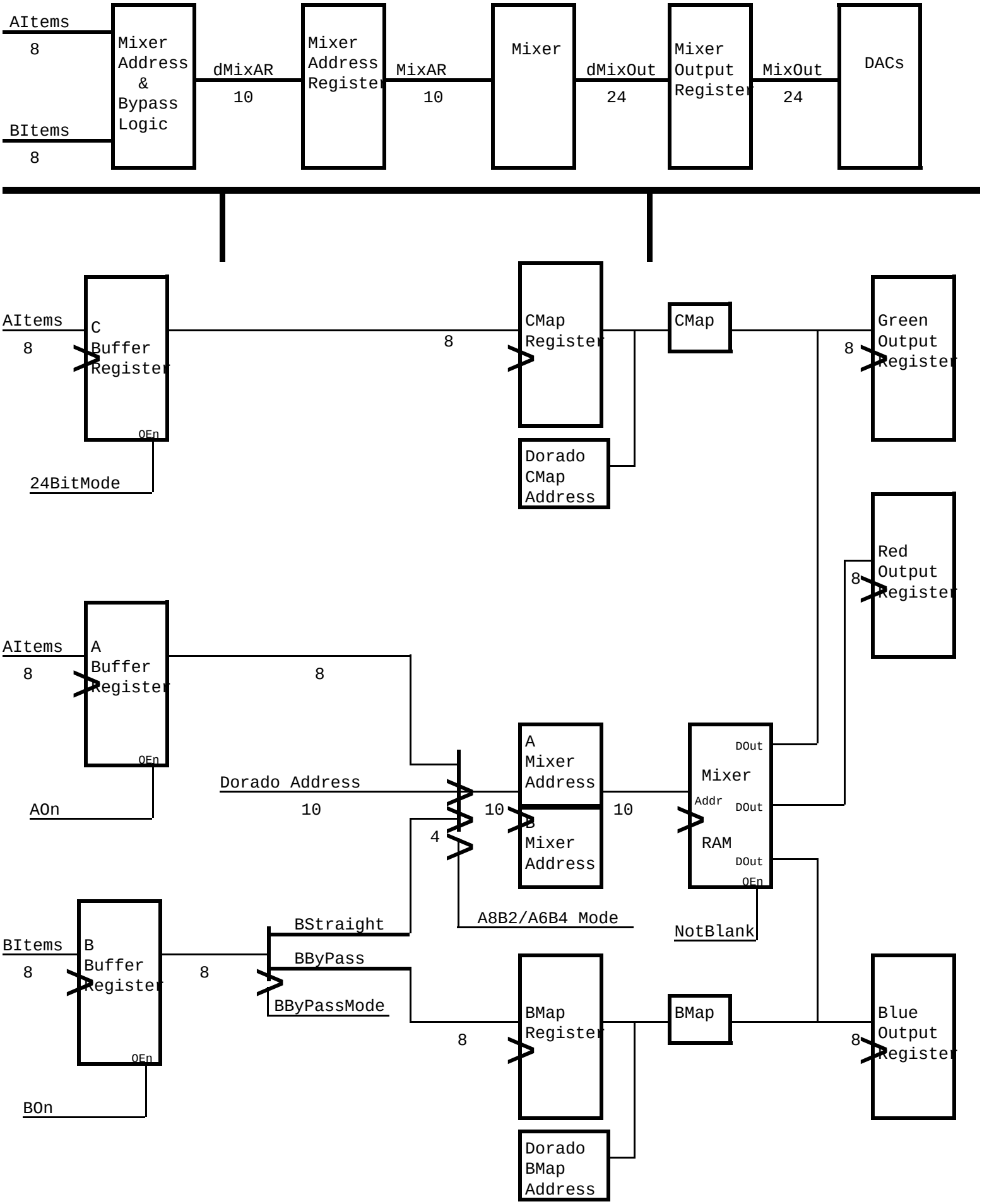
XEROX PARC	Project: Dorado	DispM Clock Drivers	File: DispM24.sil	Designer: K. Pier	Rev: Ch	Date: 7/20/81	Page: 24

XEROX PARC	Project	File	Designer	Rev	Date	Page
	Dorado	DispM25.sil	K. Pier	Ch	4/23/80	25

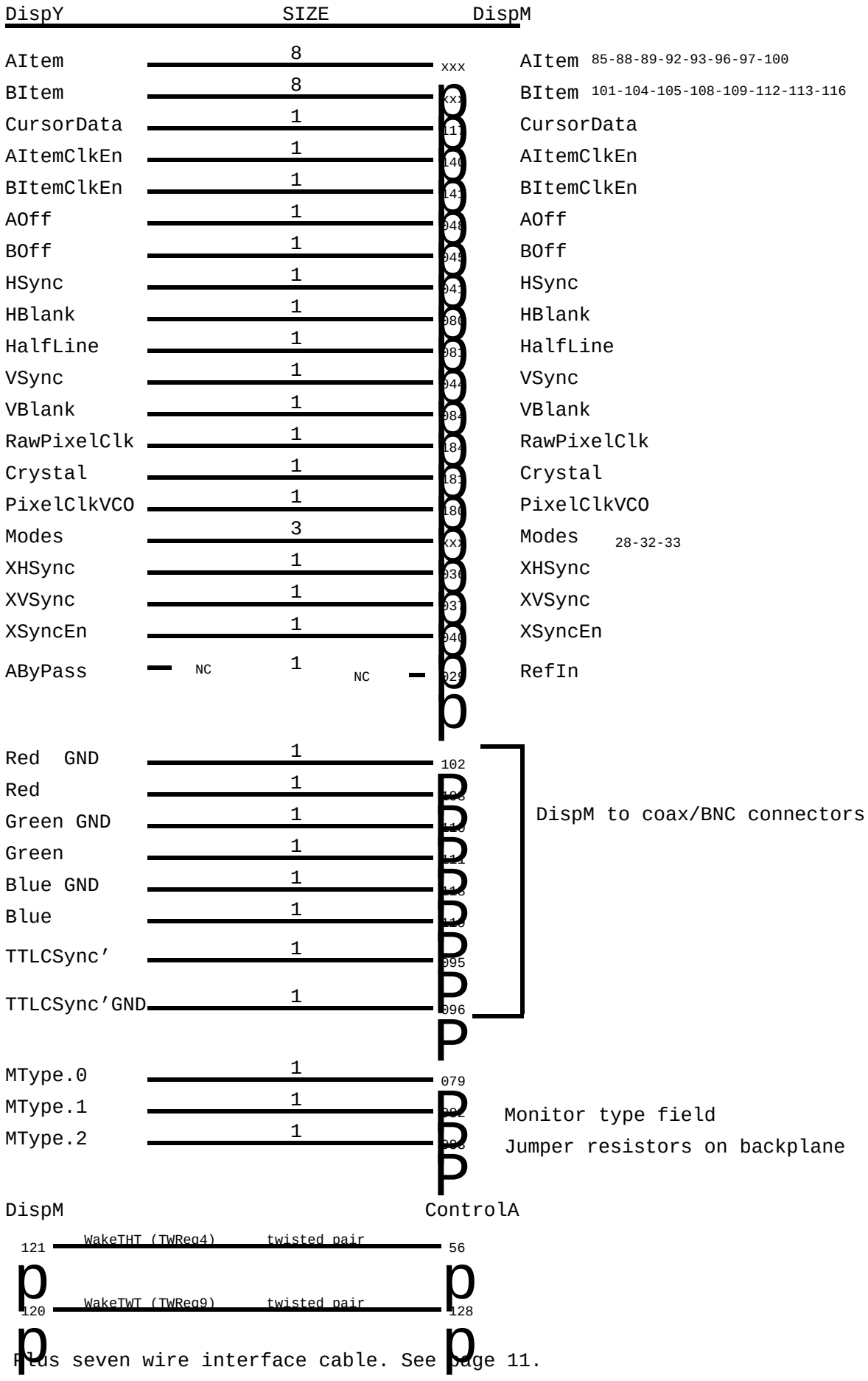
DispM
Pre Clock logic

	CONNECTOR		CONNECTOR		TIOA TW		CONNECTOR		IOBLo	CONNECTOR		IOBHi CLK	
	B>Ct a 181	b 168	c 153	d 137	e 124	f 109	93 g	80 h	64 i	48 j	33 k	20 l	
1	DISC VCO 23	PCLK 8,25,23,23 102		TIOA 176 21	TIOA 176 21	BBuf F16 12	ABuf F16 12	ABuf F16 12	RIOB 176 21	RIOB 176 21	RIOB 176 21	25 SE231	1
2	DISC VCO 23	12040 VCO 23		WakeAHT 135	TIOA=D 113	BBuf F16 12	CBuf F16 12	CBuf F16 12	DIOB 159 20	DIOB 159 20	DIOB 159 20	25 SE210	2
3	3140 VCO 23	F16 VCO 23	DISC 23	OISDrvr 10,4,10 105	TIOA=D A,21,21,10 113	WakeAWT AVSync 231	MapLd 13,14,21, 103 22	MixLd 16,16,20, 103 16	Modes B,12,12 12,15, 195	DHM 21 105 12	DHMix 231 16,B		3
4	DISC VCO 23	95016 VCO 23	VCO 124 23	OISDrvr 101 10		BMapAd F16 12	ABufEn 231 12,B	ORs 12,16,16, 103 16	13,14,12,D 103		DHMap 231 13,14		4
5	1648 VCO 23	95016 VCO 23	K1115 VCO 23	LS109 VCO 23		BMapAd F16 12	CMapAd F16 12	DCMapAd F16 14	IOB 159 20		CMapAd F16 12	DCMapAd F16 14	5
6	DISC VCO 23	95016 VCO 23	Clock 210 24	Clock 210 24	ShutUp 231 4	DBMapAd F16 13	Mixer B0 17	Mixer B1 17	Clock 210 24	Clock 210 24	Mixer G0 19	Mixer G1 19	6
7	AltoStoP 141 10	Nibble 176 10	Clock 210 24		CLCBDcd 161 5	DBMapAd F16 13	--	--	Clock 210 24	Clock 210 24	--	--	7
8	CursorX F16 9	OIS 174 10	OIS 9,9,10,10 103	Width F16 4	LMarg F16 4	NLCB 145A 5	Mixer B2 17	Mixer B3 17	Mixer R4 18	Mixer R0 18	Mixer G2 19	Mixer G3 19	8
9	CursorX F16 9	CursorHi 141 9	CursorLo 141 9	Width F16 4	LMarg F16 4	NLCB 145A 5	--	--	--	--	--	--	9
10	CursorX F16 9	CursorHi 141 9	CursorLo 141 9	Width F16 4	LMarg F16 4	NLCB 145A 5	MixAddr F16 15	MixAddr F16 15	Mixer R5 18	Mixer R1 18	MixAddr F16 15	MixAddr F16 15	10
11	VCW F16 4	Cursor 104 9	Width 4,4,6,4 103	LMarg 103 4	NLCBAddr F16 5	NLCBAddr 197 5	MixAddr F16 15	MixAddr F16 15	--	--	MixAddr F16 15	MixAddr F16 15	11
12	PixClk 10,1,6 176 10,F,6	OISSkew 176 10	3,4,4,2 104	HWindow 135 5	LoadASR 121 3	Clock 210 25	Clock 210 25	MixAddr F16 15	BMap 13	BMap 13	MixAddr F16 15	MixAddr F16 15	12
13	HRomAddr 6	HRomOut 176 6	TTLtoEcl 25	Xtal K1115 25	LoadASR F16 3	Clock 212 25	Clock 210 25	MixAddr F16 15	--	--	MixAddr F16 15	BSel 171 15	13
14	HRomAddr 6	ASR 141 3	ASR 141 3	ASR 141 3	ASR 141 3		Mixer B4 17		Mixer R6 18	Mixer R2 18	CMap	CMap	14
15	HRomAddr 6		FIB 176 3	FIB 176 3	FIB 176 3		--		--	--	--	--	15
16	HRom MC149 6	Fifo 3	Fifo 3	Fifo 3	Fifo 3	FifoAd 158 2	Mixer B6 17	Mixer B5 17	Mixer R7 18	Mixer R3 18	Mixer G4 19	Mixer G5 19	16
17		--	--	--	--	FifoAd 158 2	--	--	--	--	--	--	17
18	6,4,4,2 102	OISRcvd 231 10,B	Clock 210 24	Clock 210 24	RPtr 2	WPtr 2	BlDac Plat 22	Mixer B7 17	Clock 210 24	Clock 210 24	Mixer G6 19	Mixer G7 19	18
19	6,4,6,6 103	6,4,6 9,4,6 195	Clock 210 24	Clock 210 24,B	RPtr 2	WPtr 2	BlDac 10318	--	Clock 210 24	Clock 210 24	--	--	19
20		HROM MC149 6	RdrPtrClk CTisAWT 117 24,8	ASRSync 231 2		AOn ASRSync 135 2,4	BlDac Plat 22	Blue 20	Red 20	PXLCLK 176 21	176 21	176 21	20
21			SCAN F16 4	7,2,2,22 103	Flags 231 7	Flags 118 7	RdDac Plat 22	Blue 20	Red 20	GrDac Plat 22	Green 20		21
22	SIB 176 3	SIB 176 3	SIB 176 3		CMND 176 21	CMND 176 21	RdDac 10318	Color' 195 20	Color' 195 20	GrDac 10318	Green 20		22
23	8,8,C 105	ProcClk0 176 8		blocked 135 8	ASRSync 135 2	TTLCSync 22 125	RdDac Plat 22	Color' 195 20	Color' 195 20	GrDac Plat 22		1,B,C,D 102	23
24	NextAWT 176 8			WakeCnt B,4*8,2 195	WakeCnt F16 8	Hold 231 8	IOInOut 1660 21	TIOA=D 161 21	Fout 176 1	Fout 176 1	Fout 176 1	FtTsk 113 1	24
	a 11 NEXT	b 26 SubT BLK	c 39	d 55 FIN	e 70	Hold f 86 IOin/out	99 g	114 h CONNECTOR	129 i IOR FNXT	143 j FOUT	159 k	174 l FTsk	DMux

XEROX PARC	Project	Reference	File	Designer	Rev	Date	Page
	Dorado	DispM Board Layout	DispM26.sil	K. Pier	Ch	11/09/82	26



XEROX PARC	Project	Reference	File	Designer	Rev	Date	Page
	Dorado	DispM Block Diagram	DispM27.sil	K. Pier	Ch	4/01/80	27

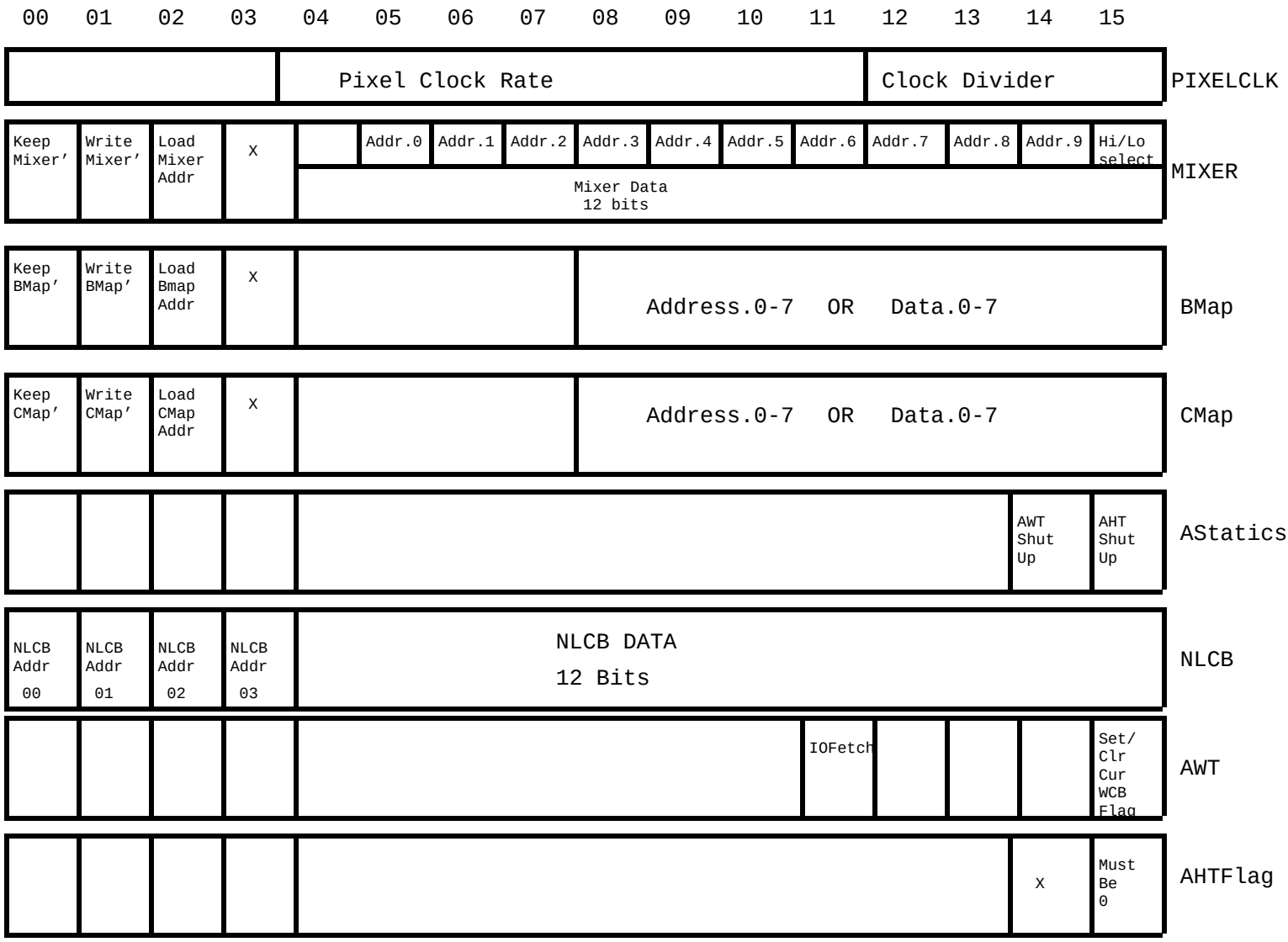


Plus seven wire interface cable. See page 11.

XEROX PARC	Project	Reference	File	Designer	Rev	Date	Page
	Dorado	DDC to DDM Interface	DispM28.sil	K. Pier	Ch	7/04/81	28

DDC Slow IO System

DEVICE	TIOA	I/0	TASK	FORMAT and COMMENTS
AStatics	367	O	AHT	
NLCB	366	O	AHT	
BMap	365	O	CHT, EMU	Keep,Write,LoadAddr,0,DataOrAddr8-15
AHTFlag	364	O	AHT	
AWT	363	O	AWT	
CMap	362	O	CHT, EMU	Keep,Write,LoadAddr,0,DataOrAddr8-15
MIXER	361	O	CHT, EMU	Keep,Write,LoadAddr,0,Data.4-15
PIXELCLK	360	O	CHT, EMU	Pixel clock rate
STATUS	361	I	CHT, EMU	MType.0-3,Green.0-7,Red.0-3
STATUS	360	I	CHT, EMU	Keyboard,1,1,1,Red.4-7,Blue.0-7

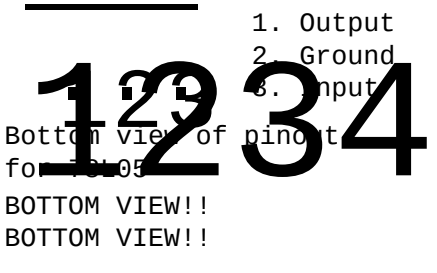


1	jumper wire	16
2	0.1mFarad	15
3	3 KOhm	14
4	120 Ohm	13
5	180 Ohm	12
6	3 KOhm	11
7		10
8		09

locations
g18,g21,j21
3 identical copies

1	0.1mFarad	16
2	in[3] 78L05	15
3	gnd [2]	14
4	out [1]	13
5	0.1mFarad	12
6	12 mHnry	11
7	2 ohm	10
8	+ 22 mF	09

locations
j23,g23,g20
3 identical copies



1. Output
2. Ground
3. Input

Bottom view of pinout for 78L05

SIP in location g41 is 100 ohm terminator with leg 6 cut (making DDMTIOA = 360B)

SIP in location b52 is 100 ohm terminator with legs 3 and 4 cut for Task 9D=11B

SIPs in locations d42 and e42 are 220 ohm value instead of 100 ohm (terminators for 7 wire in

Crystal oscillators, type K1115A:
location c5, value 10 MHz, for VCO
location d13, value 20 Mhz for Alto
value 50 MHz for LF

Horizontal PROM, type MC149
location a16 and b20 for LF display
location b20 ONLY for Alto style display
programmed for each monitor type

1	8.2 KOhm	16
2	Bead	15
3	4700 pF	14
4	22 microF +	13
5	8.2 KOhm	12
6	+ 22 microF	11
7	4700 pF	10
8	Bead	09

location a1

1		16
2	2.2 KOhm	15
3	2.2 KOhm	14
4	2200pF	13
5	2200pF	12
6	2.2 KOhm	11
7	2.2 KOhm	10
8		09

location a2

1		16
2	4.7 KOhm	15
3	+MV1403-	14
4	+MV1403-	13
5	180 nH	12
6	15 pF	11
7	1 KOhm	10
8		09

location a4

1	jumper wire	16
2	0.1microF	15
3	0.1microF	14
4	+ 22 microF	13
5	1 KOhm	12
6	Bead	11
7		10
8		09

location a6

1		16
2	jumper wire	15
3		14
4		13
5		12
6		11
7		10
8		09

location c3

Rev.	Date	Page	Revisions
Ch	11/07/82	7, 21, 23, 26	Expanded pixel clock buffer.
		30	Added 120 ohm resistor to position 4 of Platform for g18, g21
		31	Added Revision Record Page