

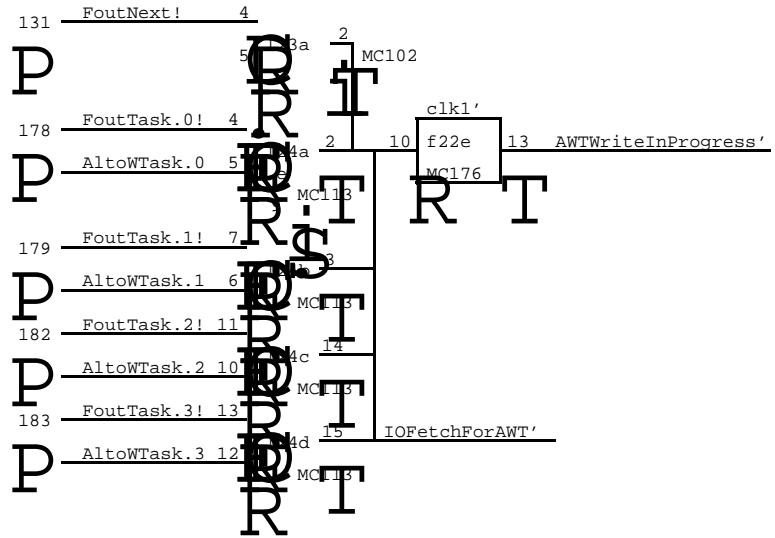
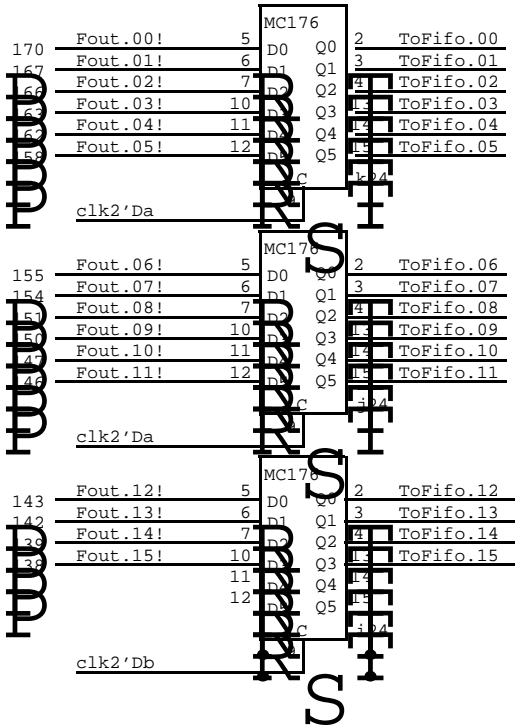
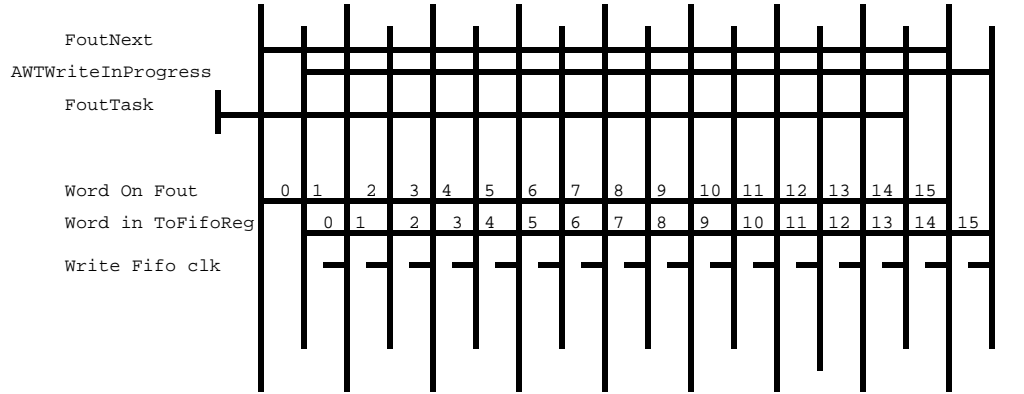
D O R A D O   S C H E M A T I C S

D i s p l a y   M

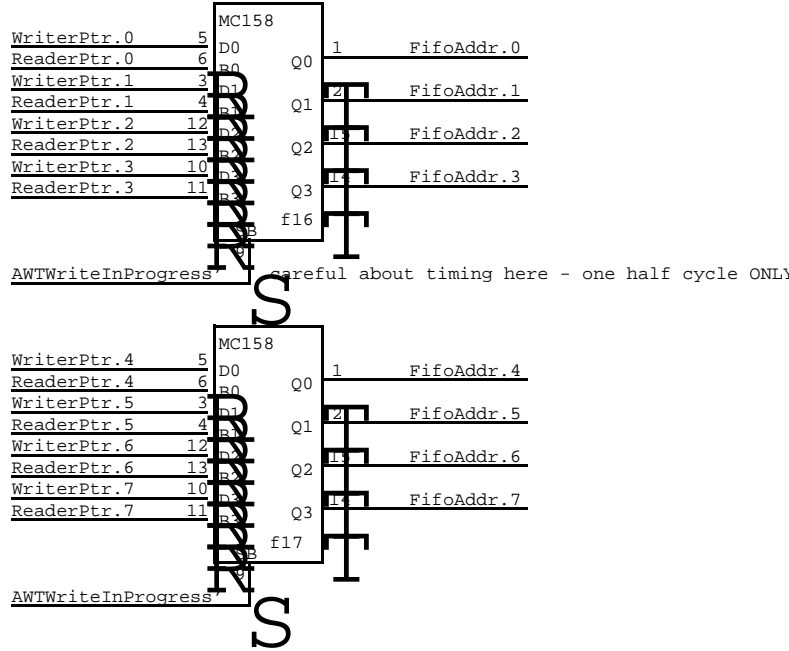
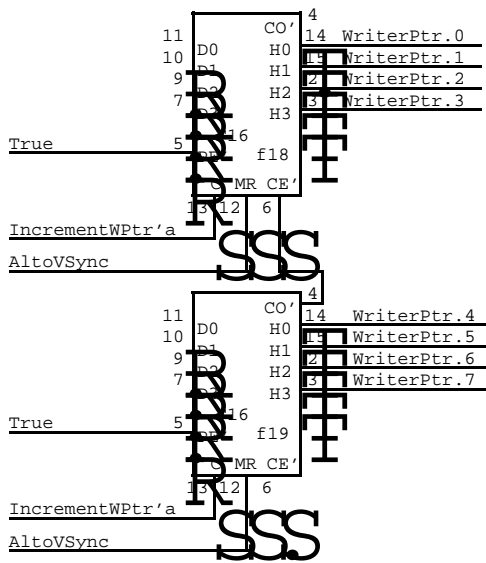
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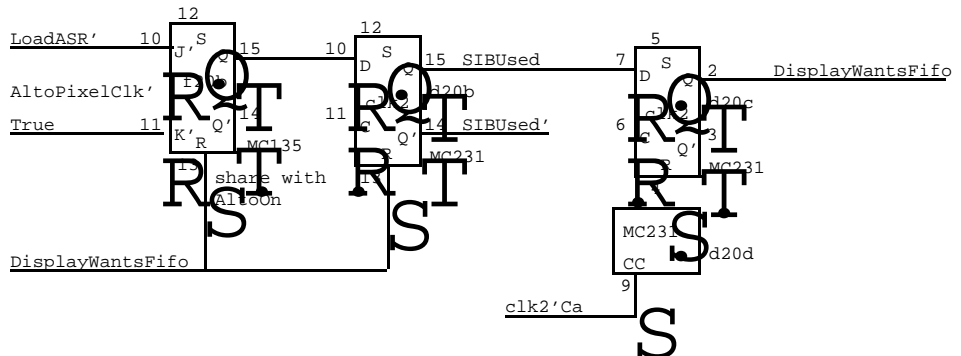
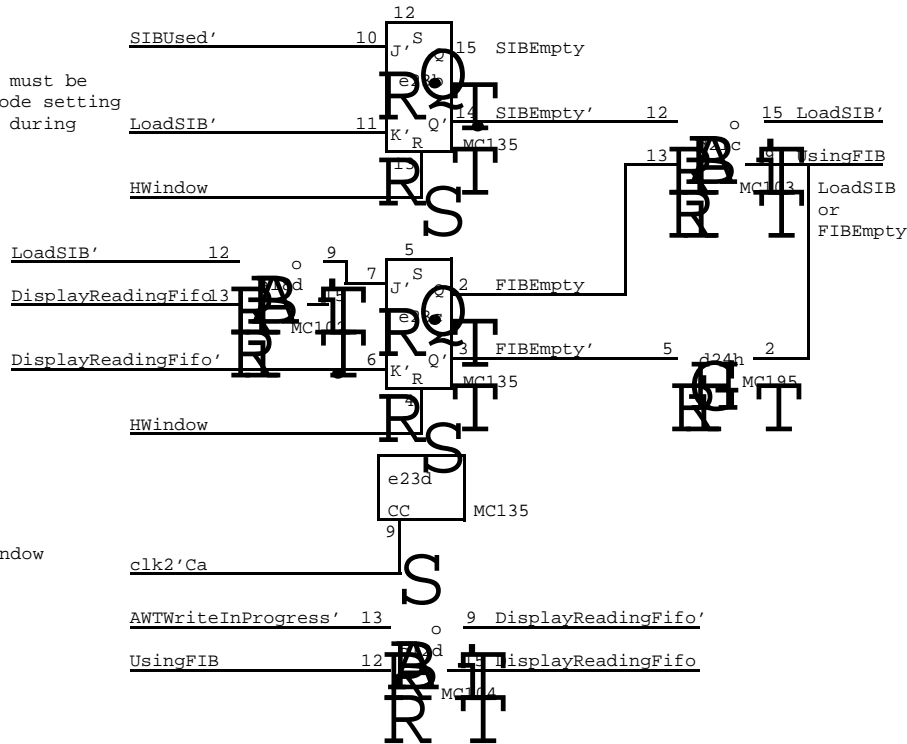
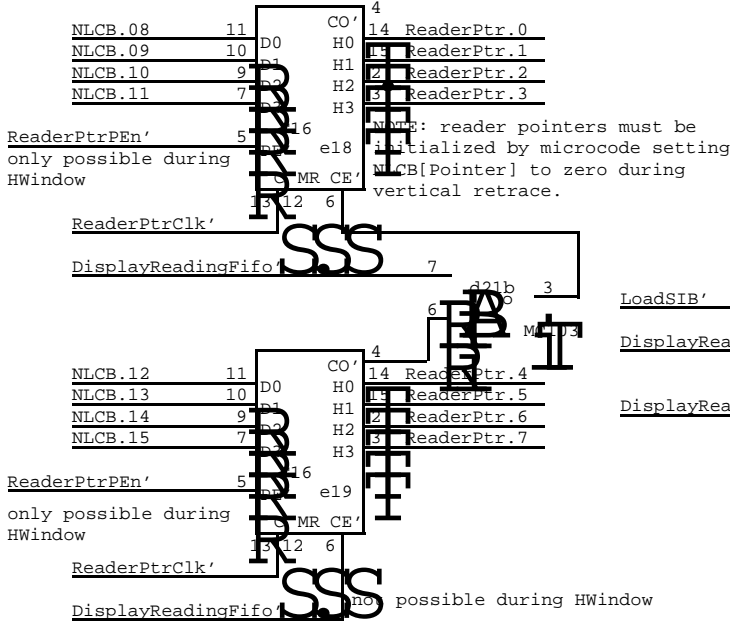
CLK: 0 1 0 1 . . .



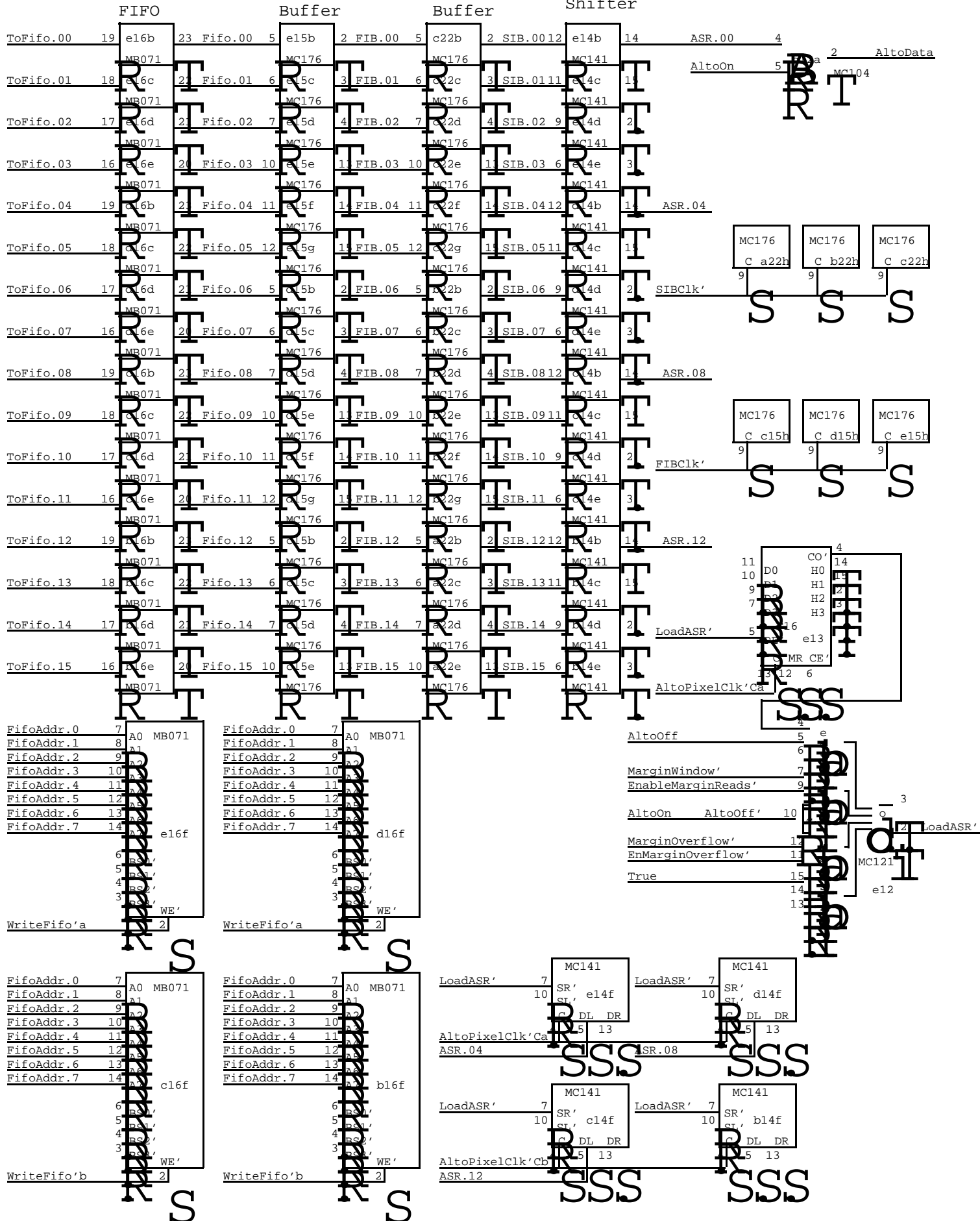
### Writer Pointer

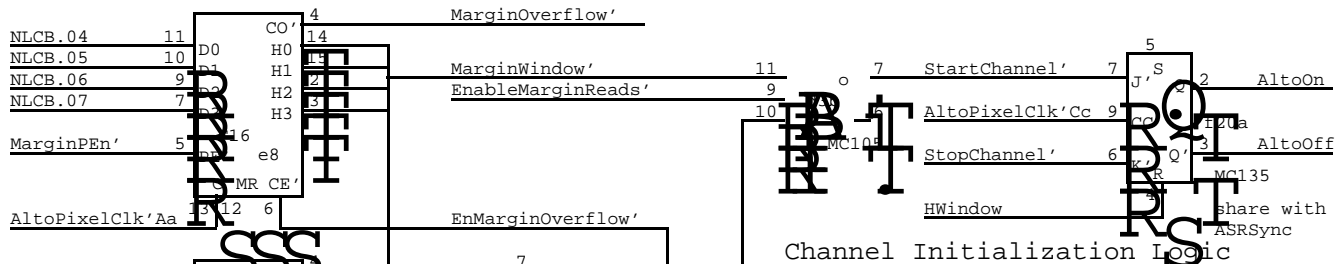


### Reader Pointer



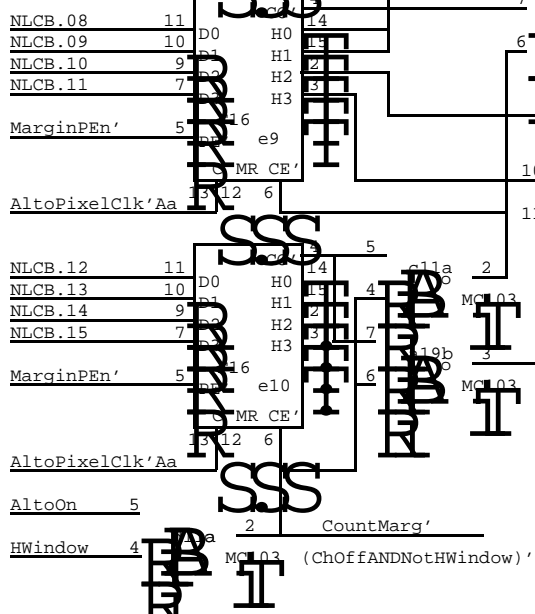
First Intermediate Buffer Second Intermediate Buffer Shifter



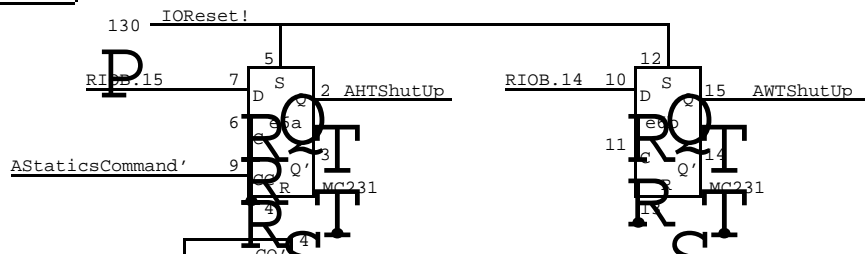


**Left Margin Counter**

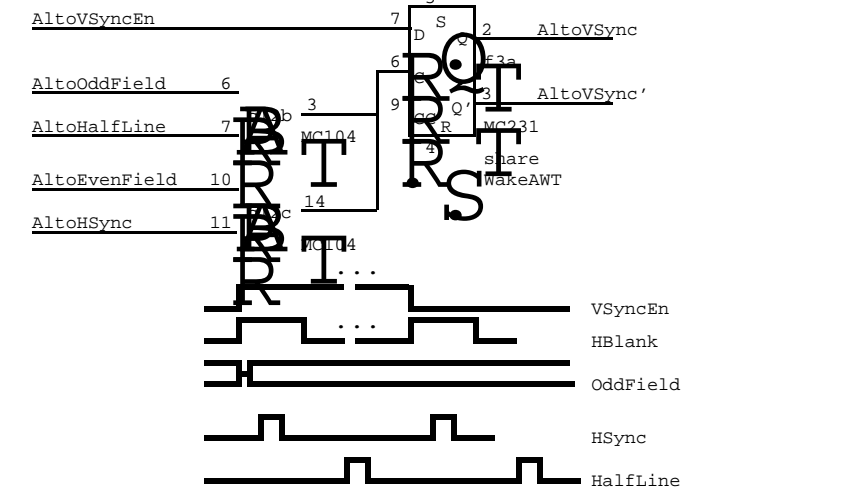
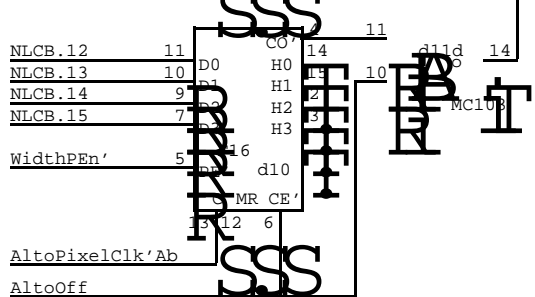
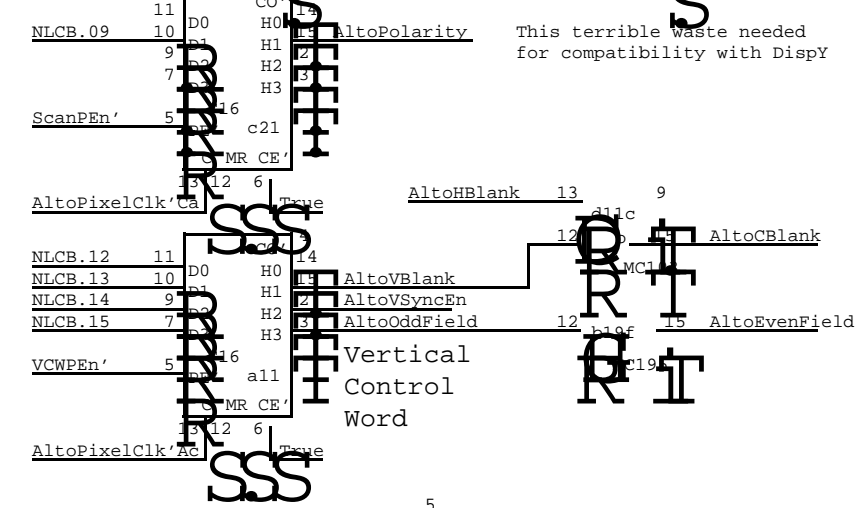
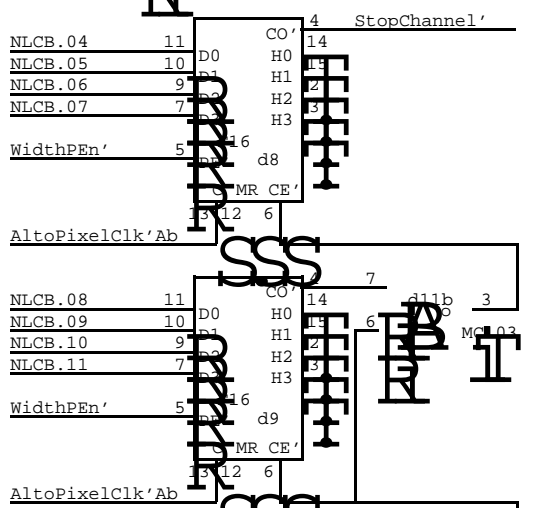
Counter loaded from NLCB. Starts counting after HWindow Overflow => initial read. 37B=>second read, 77B=>third and start the channel. Stop counting while channel is Resumes counting when channel goes off, but will not o EnableMarginReads' again before end of scanline.



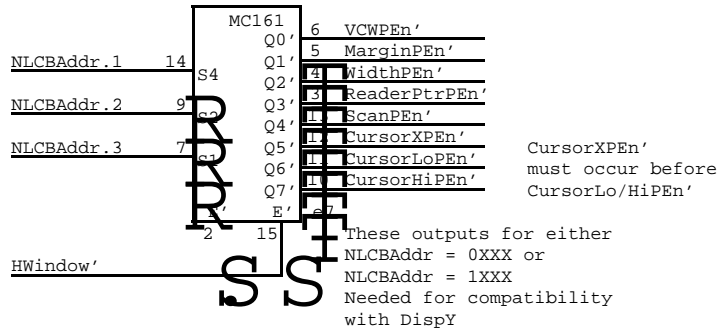
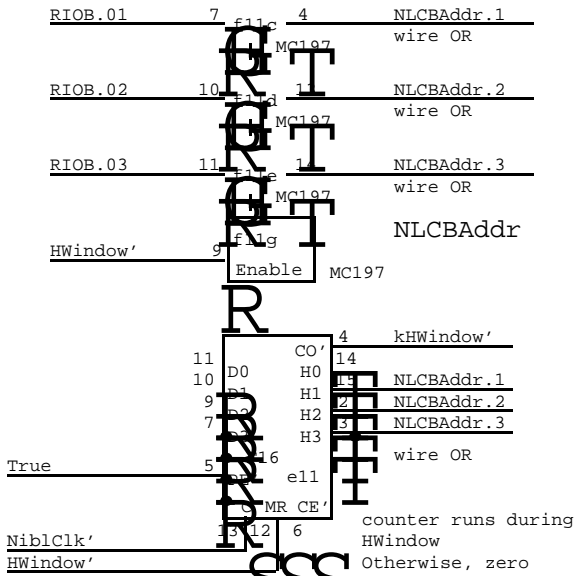
DCB Width Counter  
Stop channel when counter value is > 7400B



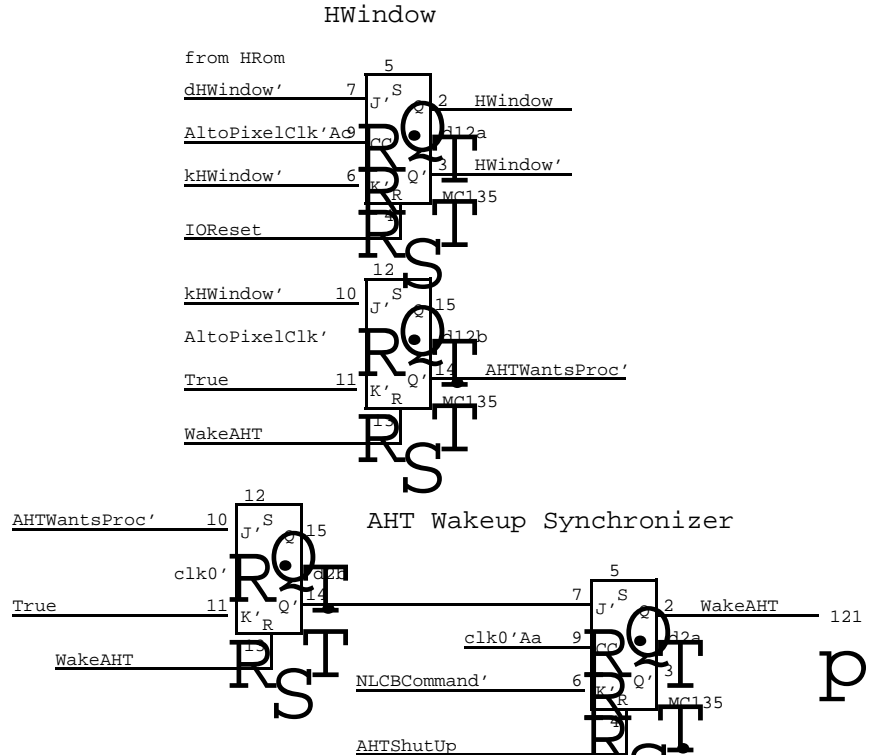
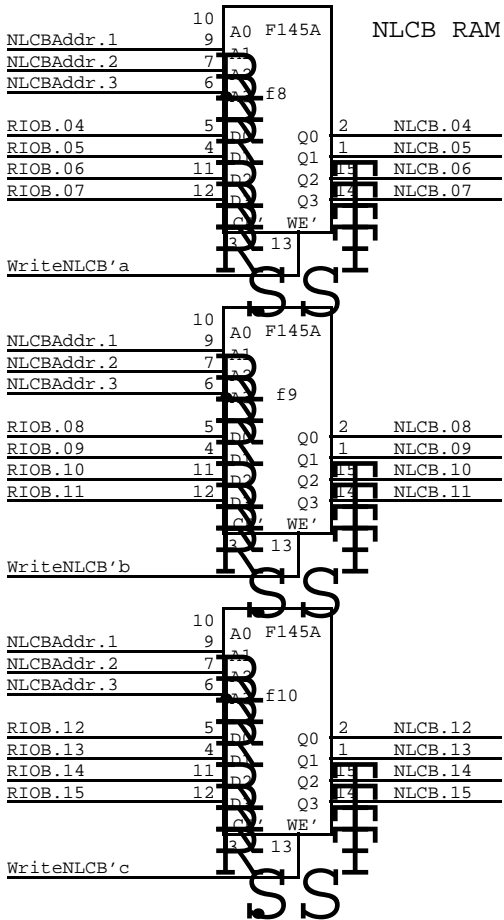
This terrible waste needed for compatibility with DispY



CLCB load enables

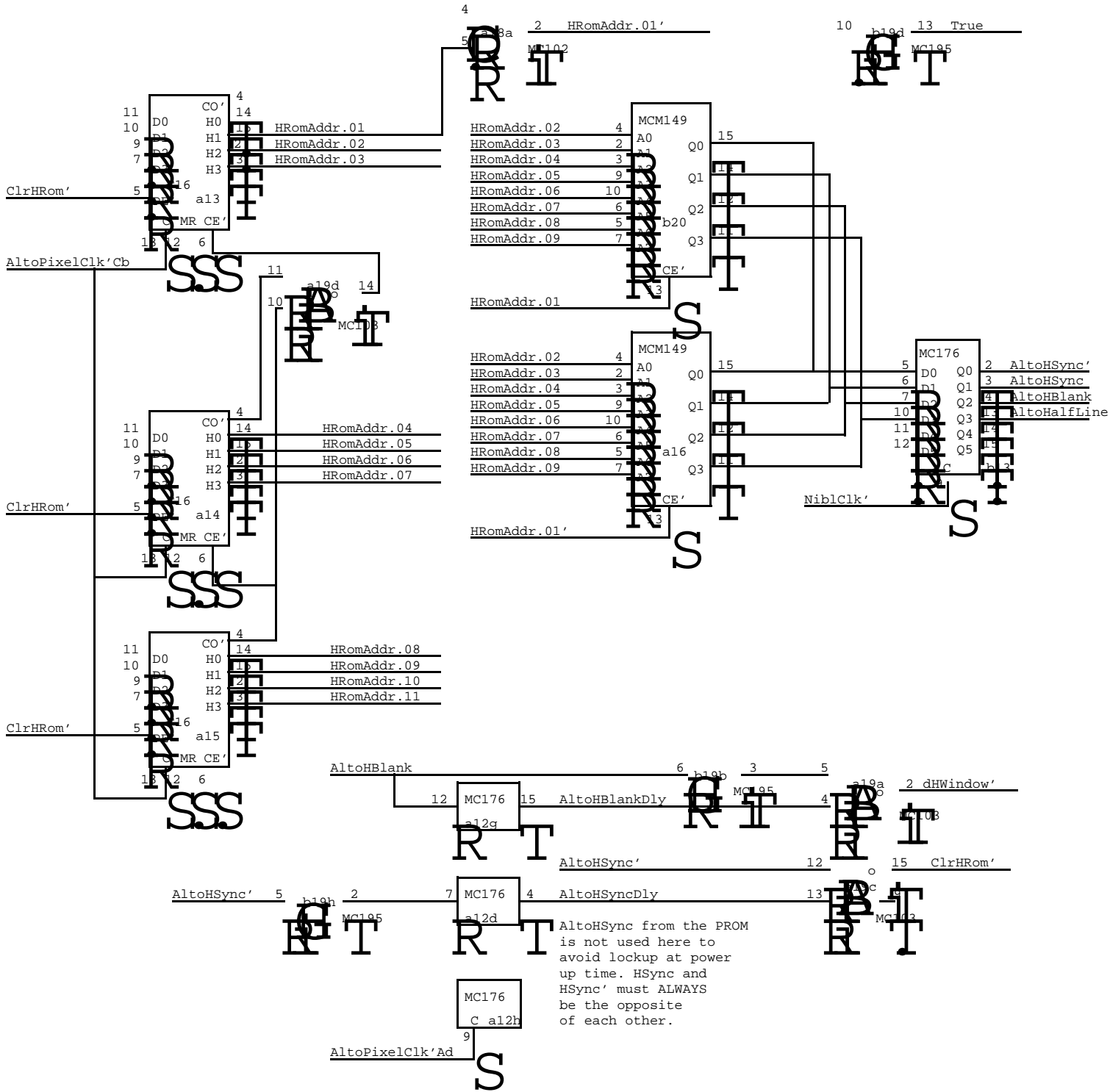


NOTE:  
 There are only 8 entries in NLCB.  
 The MSB (NLCBAddr.0) is ignored.  
 Outputs to 0XXX or 1XXX write words 0XXX of NLCB. During HWindow, CLCB entries are redundantly written twice, first when counter goes 00-07 and again when counter goes 10-17.



For convenience, use NLCBCommand 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.

requires minimum 4 instruction loop



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.

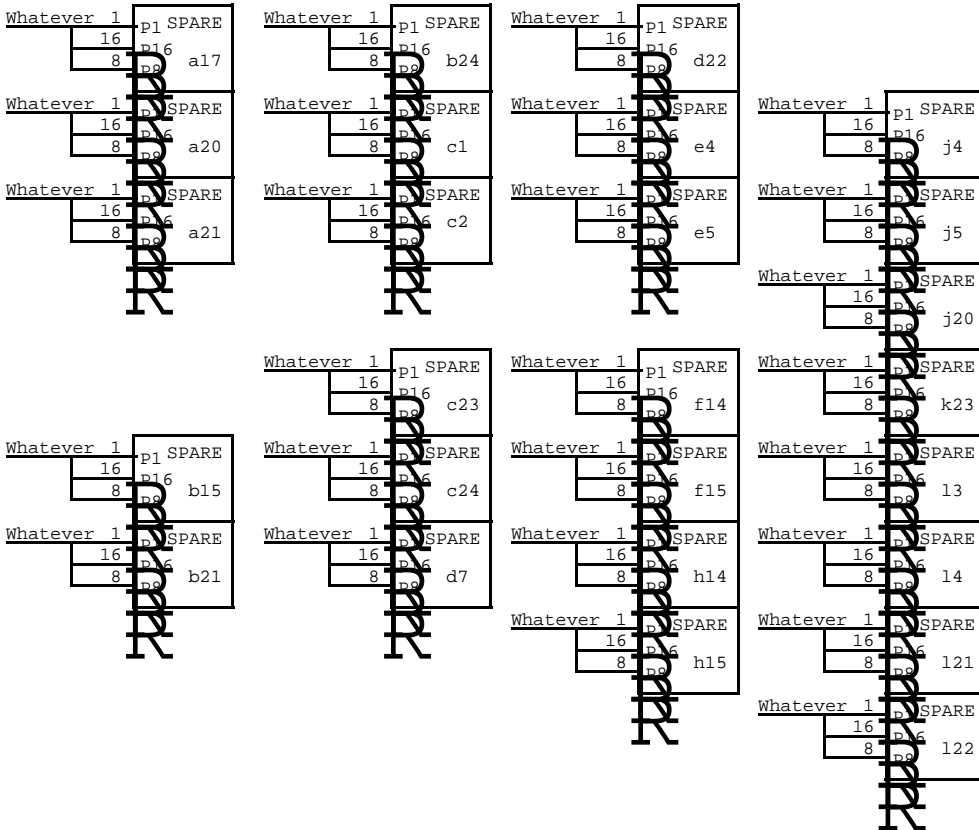
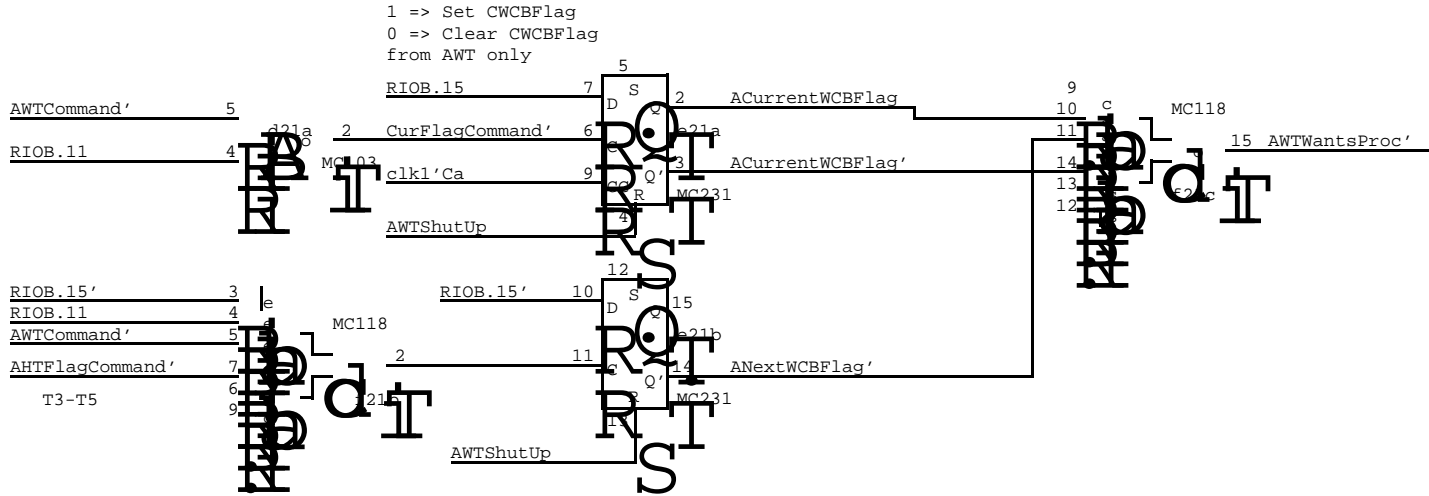
For AWT Commands:		For AHT commands:	
RIOB	Means	RIOB	Means
=1c	Set CWCBFlag and Clear NWCBFlag	=0c	Set ANextWCBFlag
=0c	Clear CWCBFlag		

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

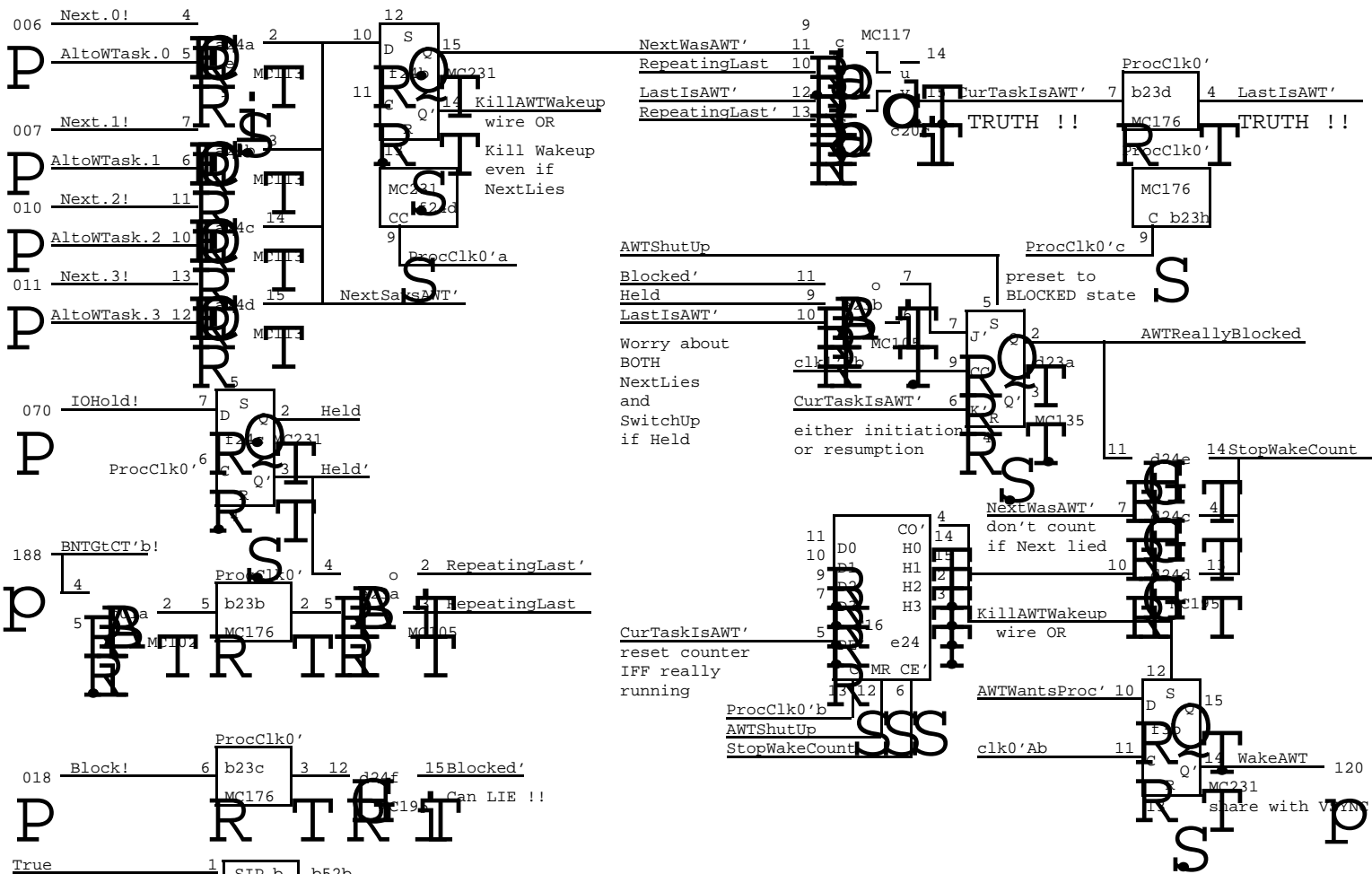
WakeUp conditions:

WakeAHT: at end of every HWindow

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





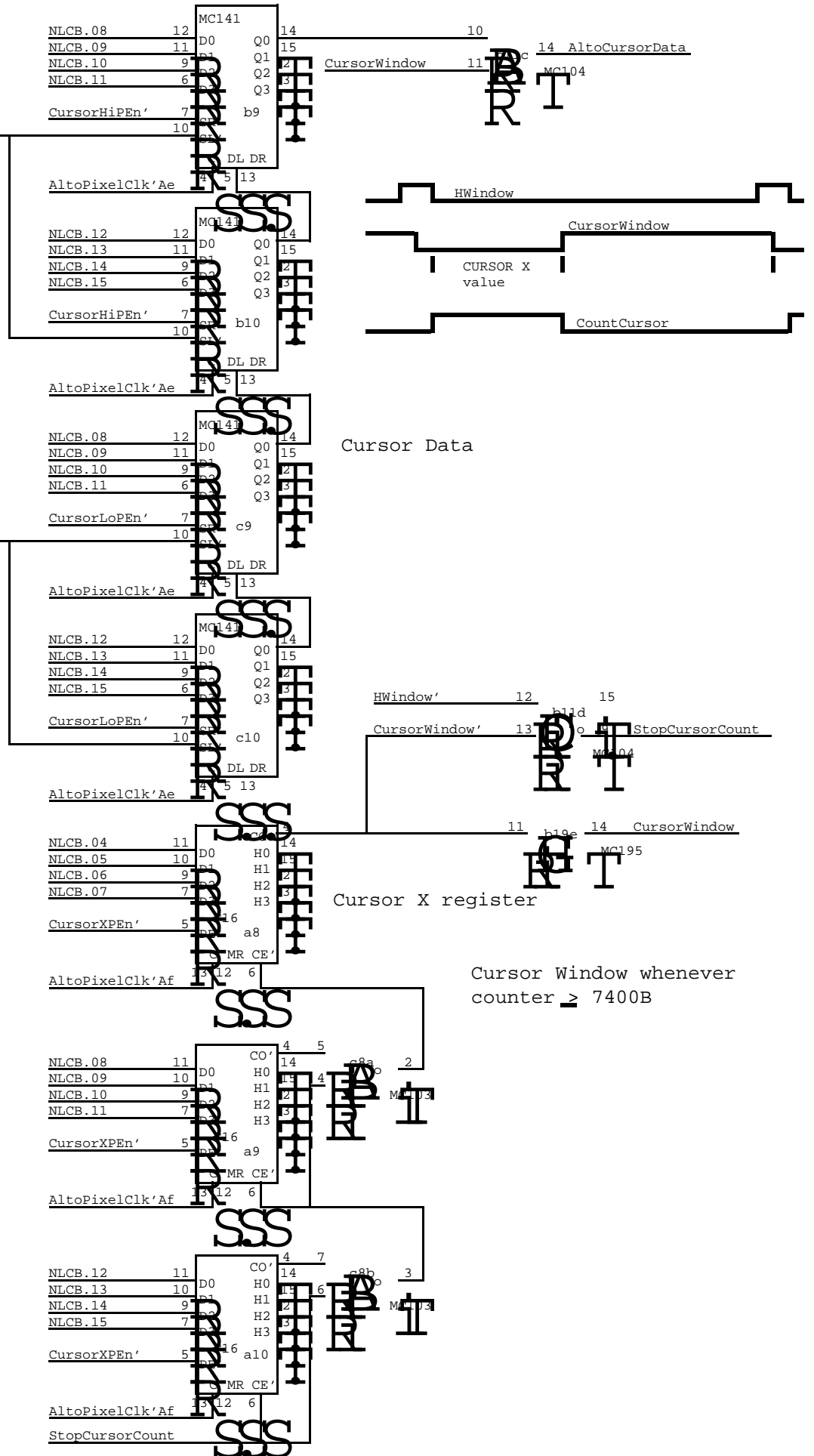


True	1	SIP b	b52b
AltoWTask.0	1	sP c	b52c
AltoWTask.1	0	sP d	b52d
AltoWTask.2	0	sP e	b52e
AltoWTask.3	1	sP f	b52f

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

CursorHiPEn' 5  
 CursorWindow' 4  
 during HWindow  
 CursorWindow must  
 go inactive  
 before loading  
 CursorHi/lo with  
 new data, so  
 CursorX is loaded  
 before CursorHi/Lo

CursorLoPEn' 7  
 CursorWindow' 6



Cursor Data

Cursor X register

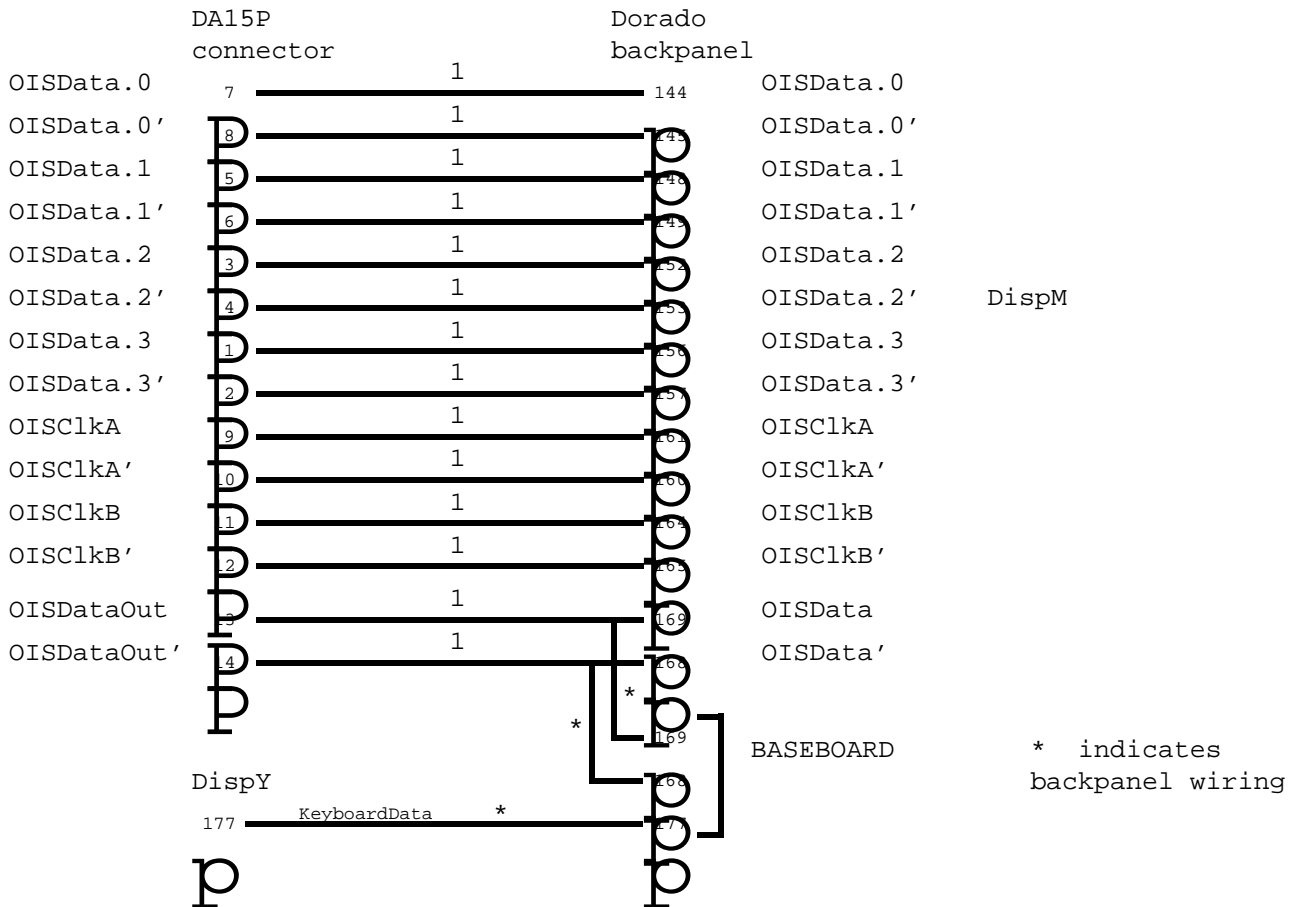
Cursor Window whenever  
 counter  $\geq$  7400B

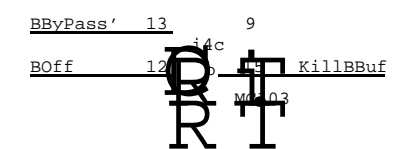
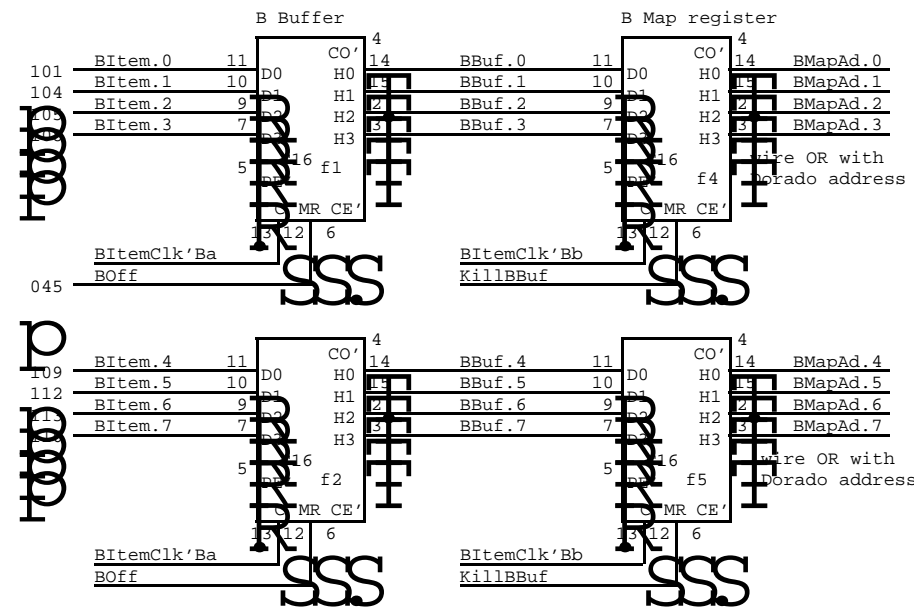
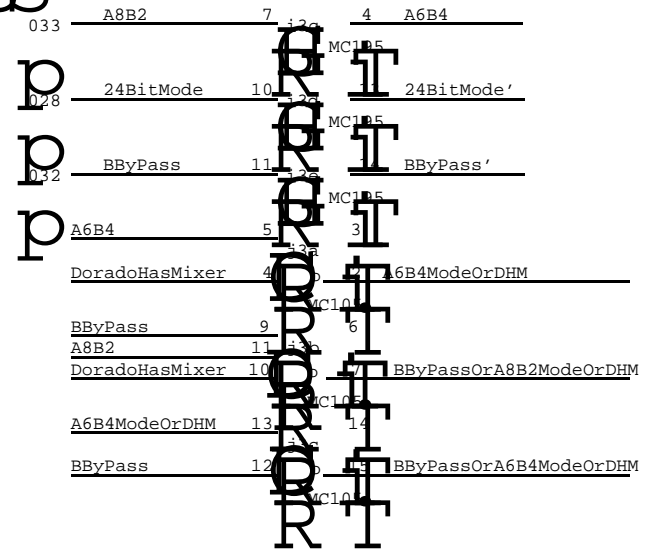
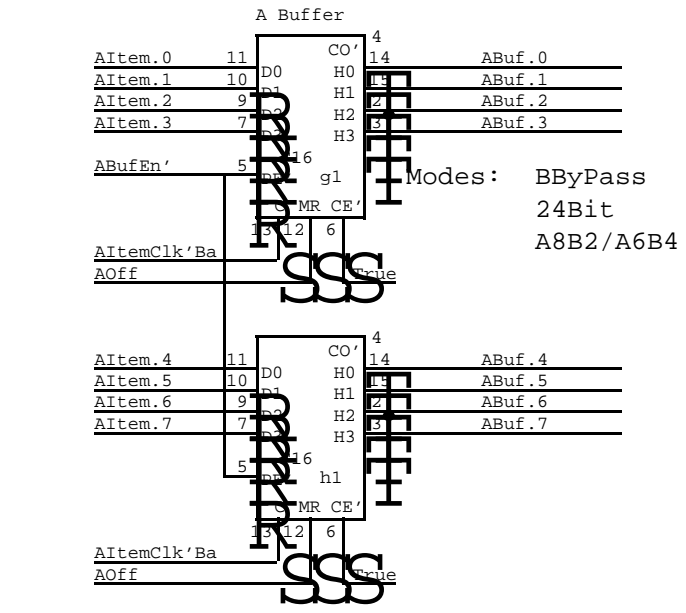
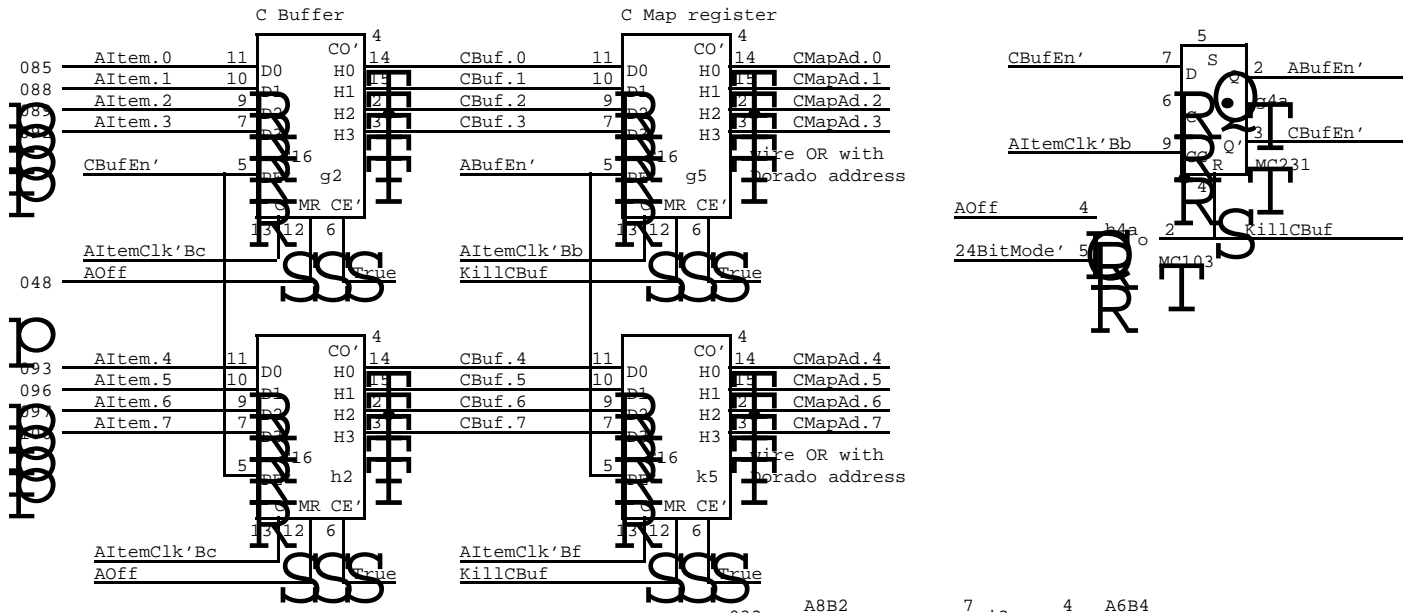


Alto Display Controller  
Next Line Control Block Format

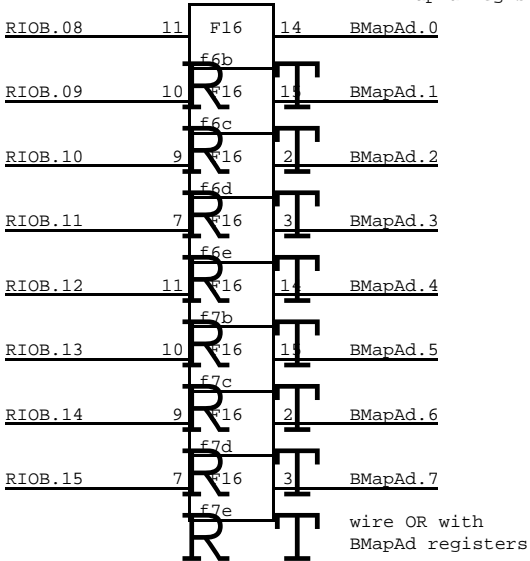
Address	Name	Format
0	VCW vertical control word	0,..0, VBlank, VSync, OddField
1	Margin	LMarg[00..11]
2	Width	Width[00..11]
3	FifoAddr	FifoAddr[0..7] *must be even
4	Scan	AltoPolarity,0,0,0,0,0,0,
15	CursorX	CursorXCount[0..11]
16	CursorLo	CursorLoByte[4..11]
17	CursorHi	CursorHiByte[4..11]

Seven Wire Interface Cable

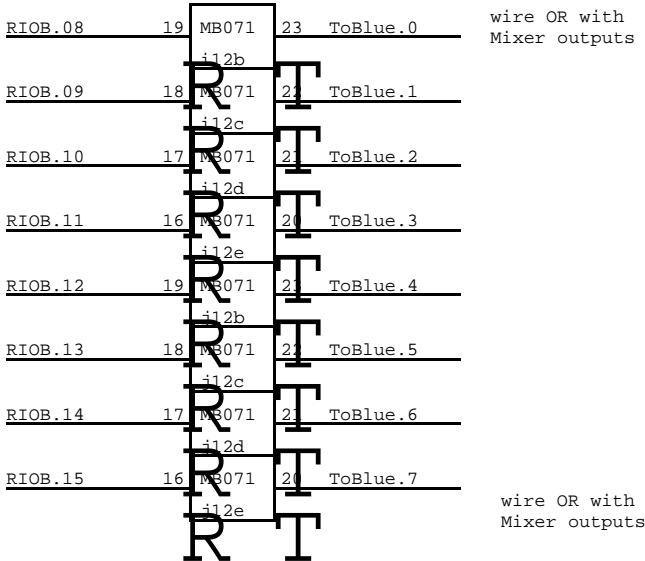




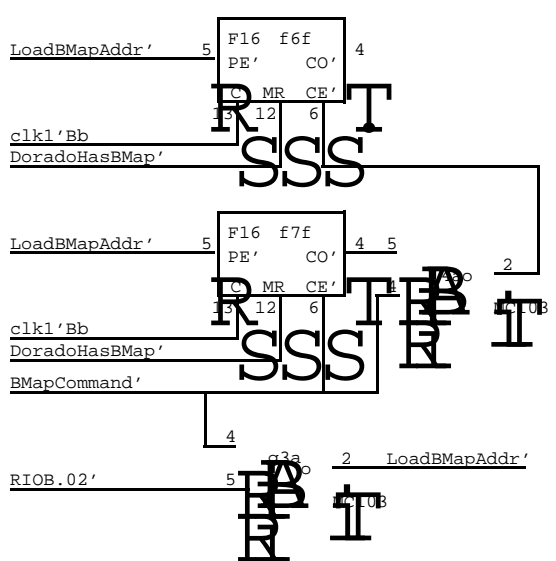
Dorado BMap address wire OR with BMapAd registers



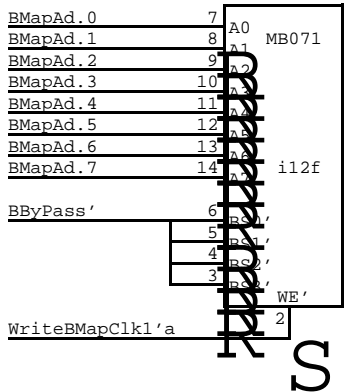
B Map



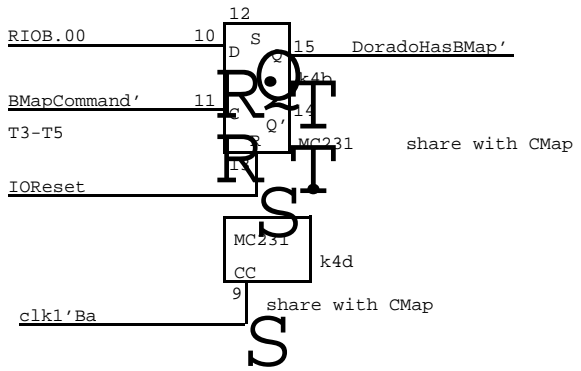
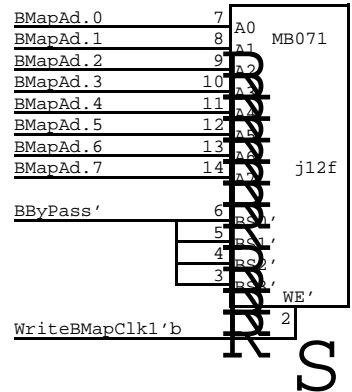
Dorado BMap address



B Map



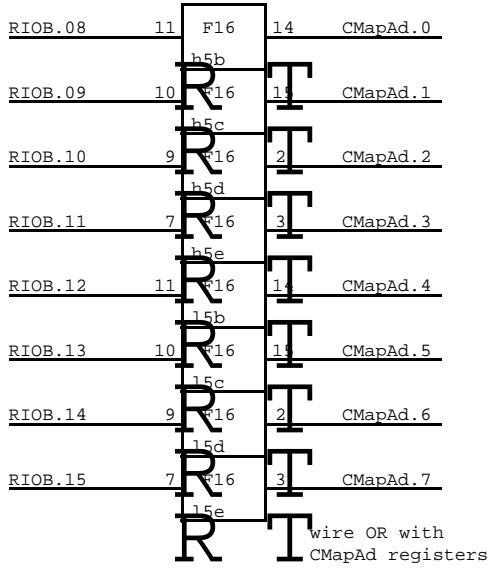
B Map



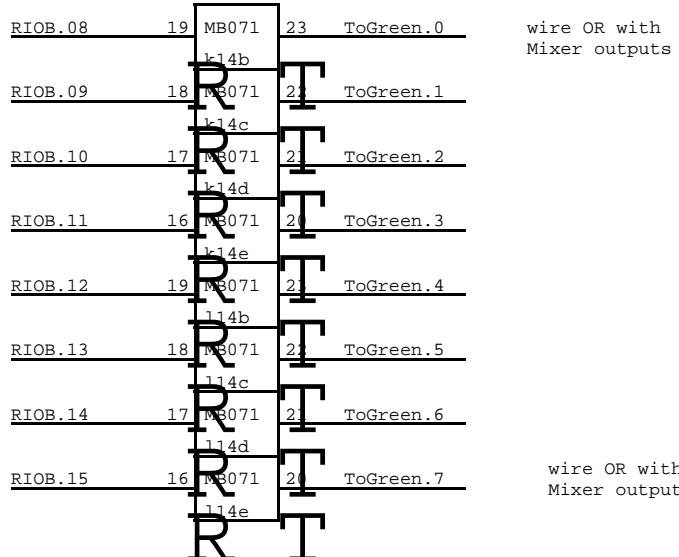
NOTE: in order to read/write BMap, BByPass mode must be ON and the B Channel must be OFF. This is inconvenient, but it does the right thing for real time mode switching.

Dorado CMap address

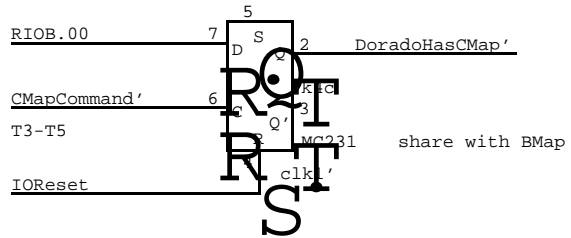
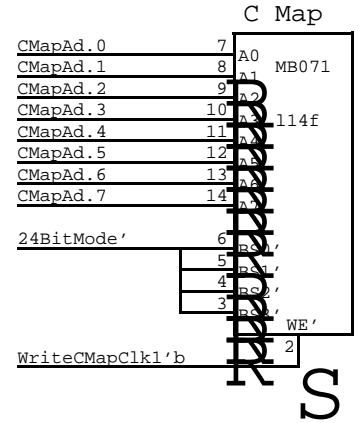
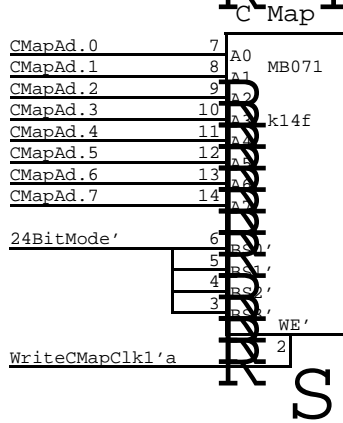
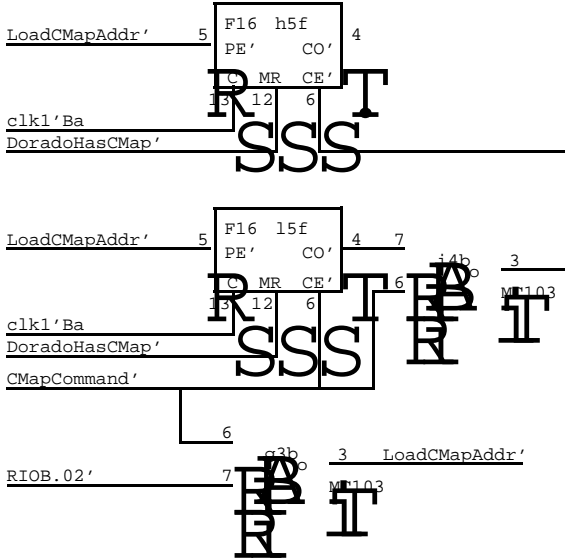
wire OR with  
CMapAd registers



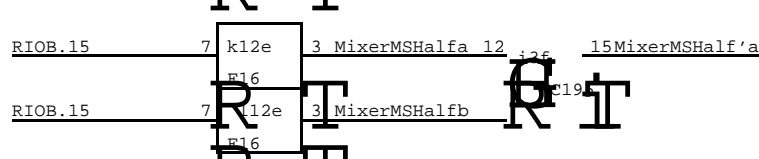
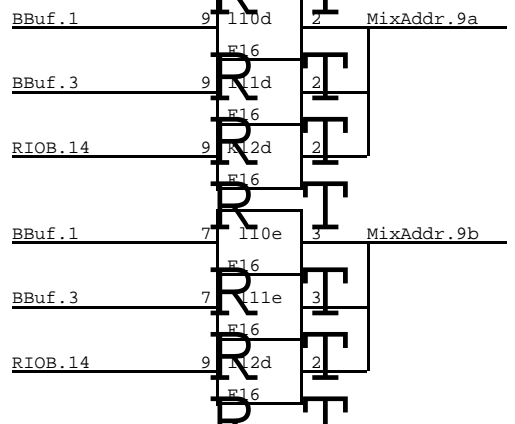
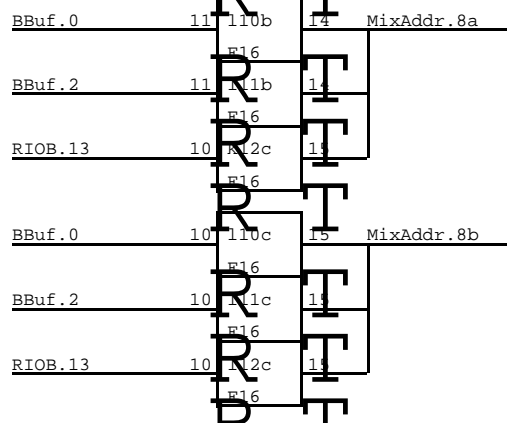
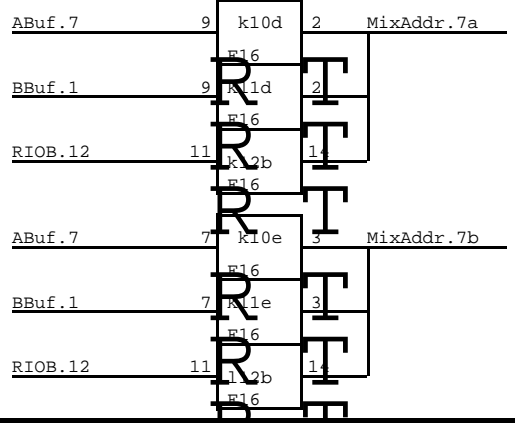
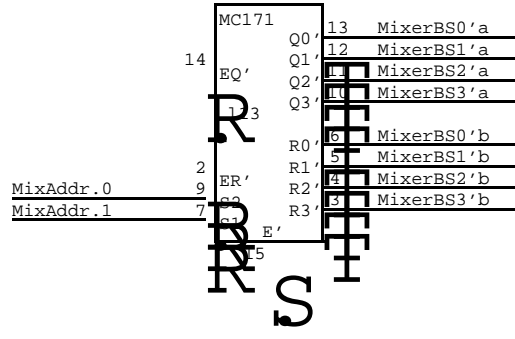
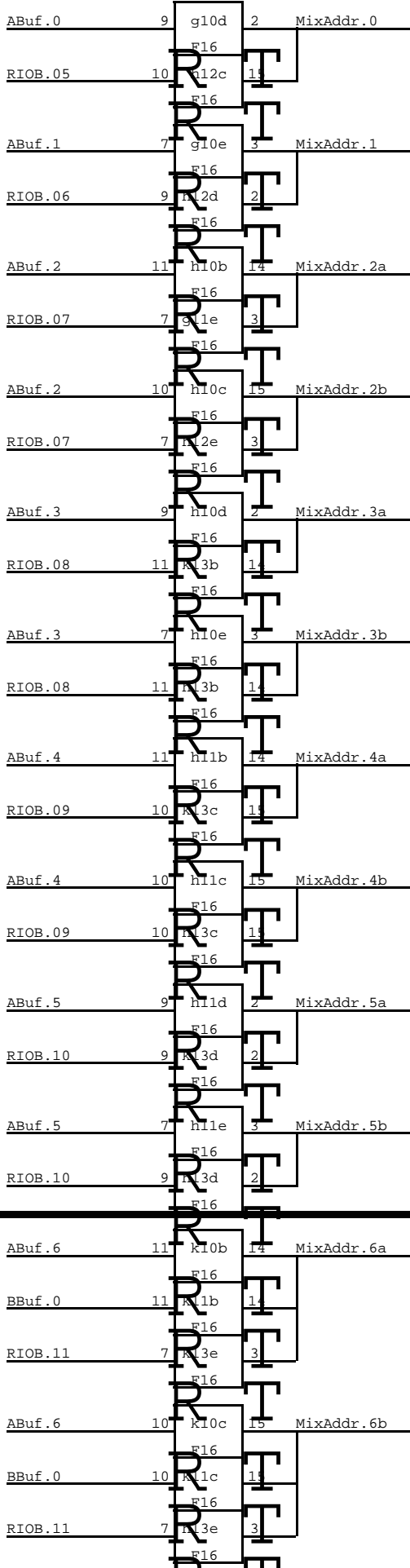
C Map



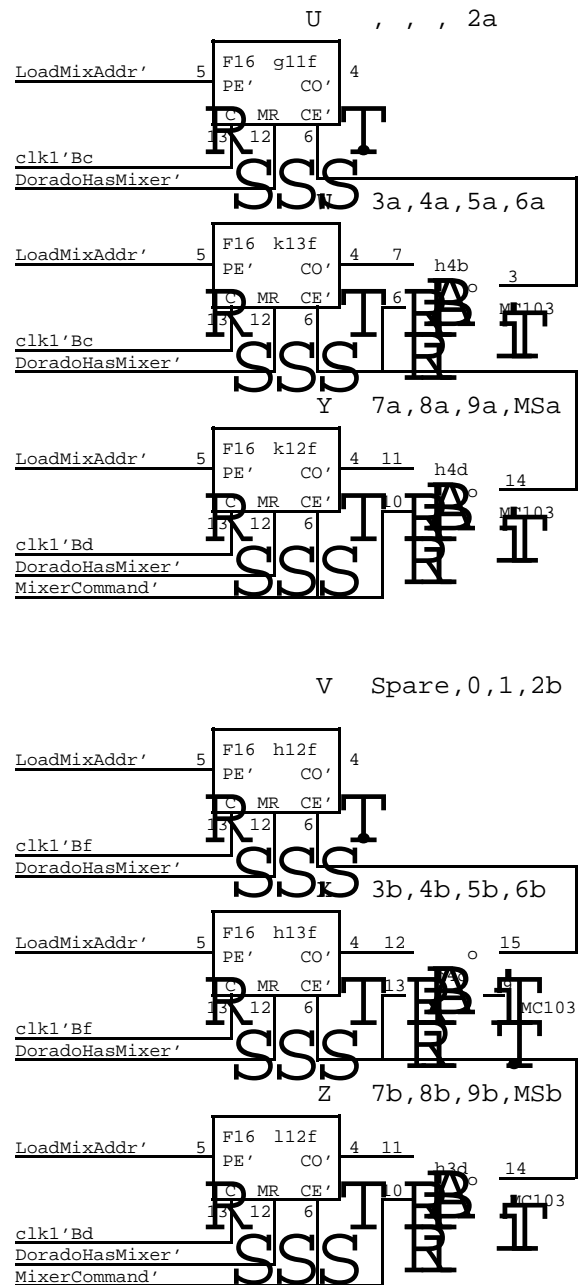
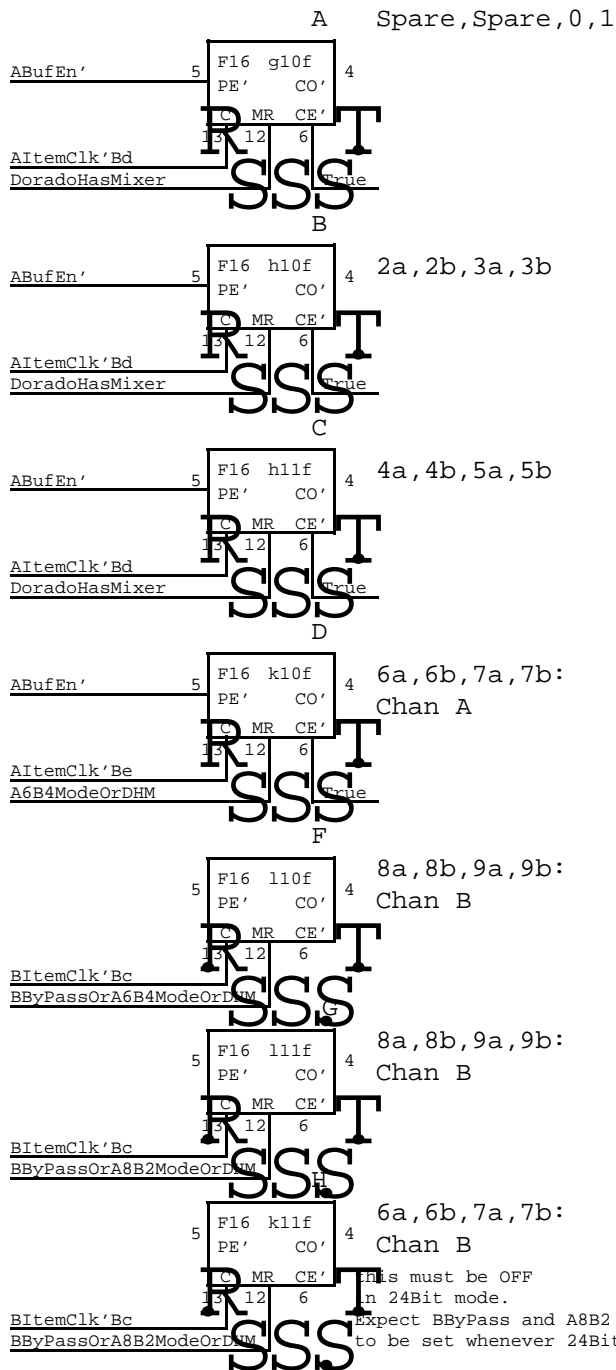
Dorado CMap address



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.

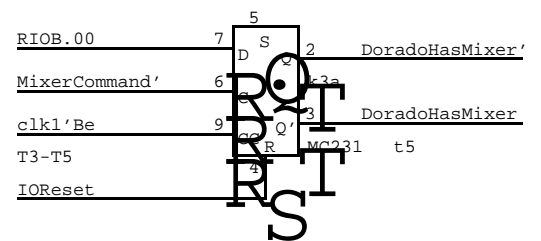
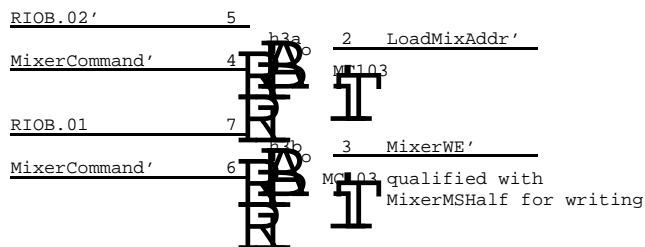


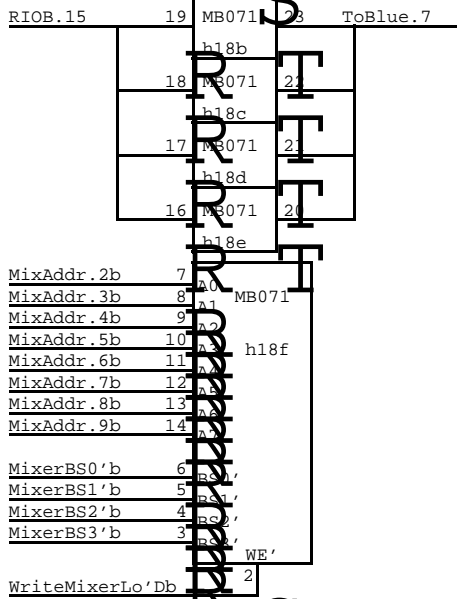
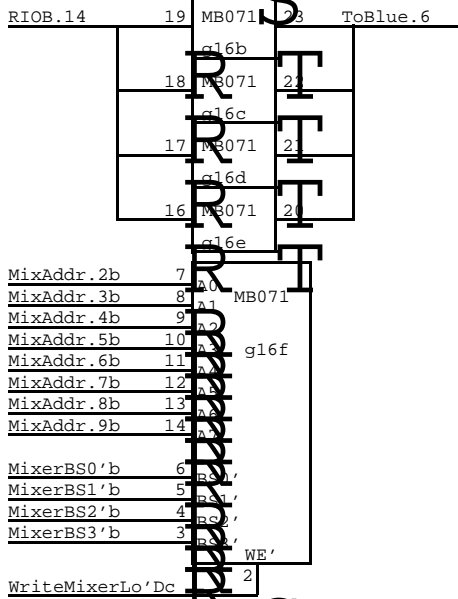
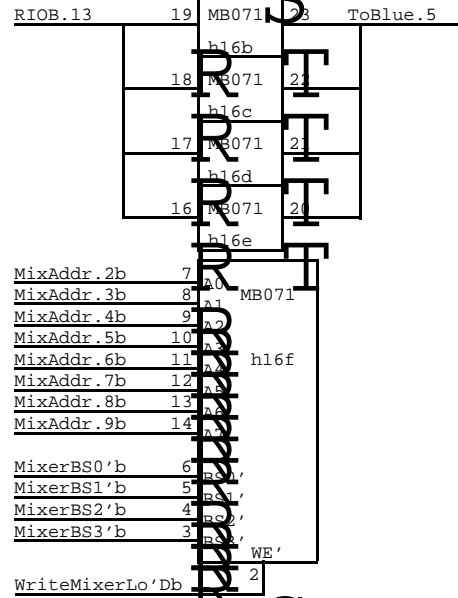
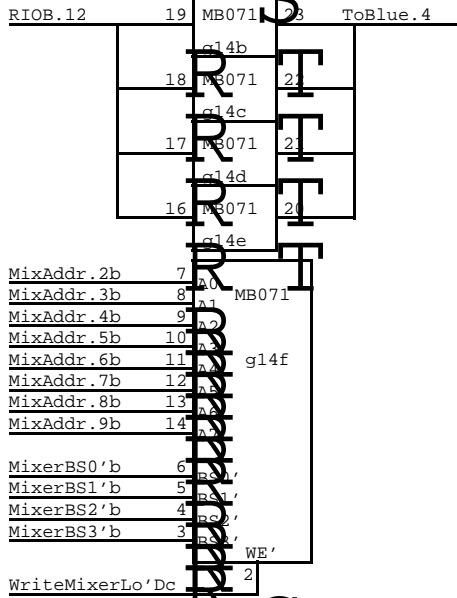
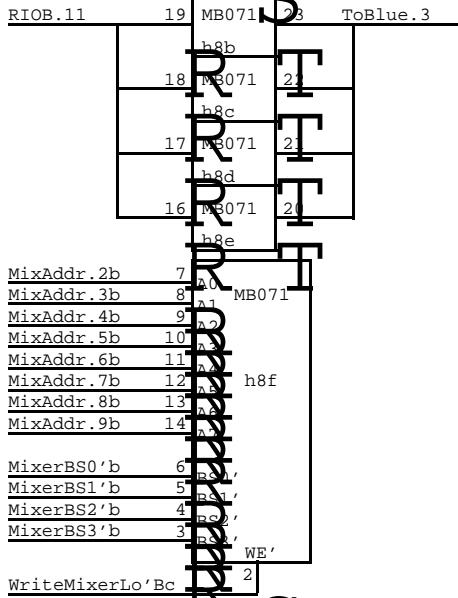
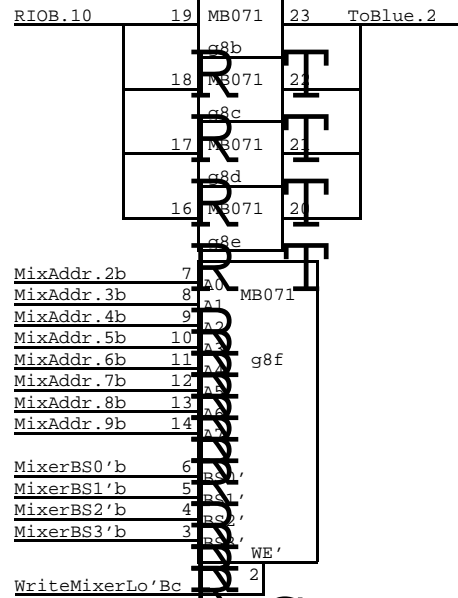
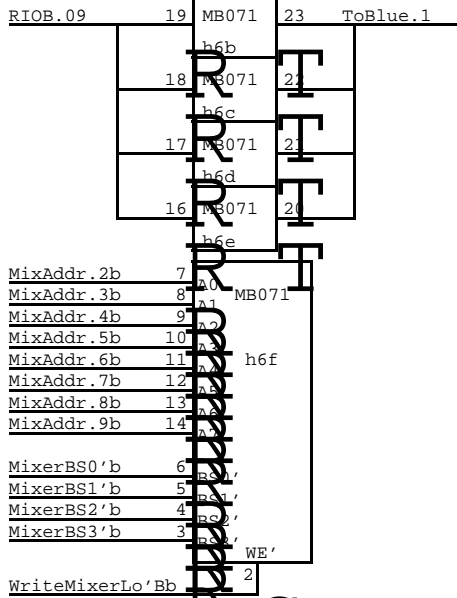
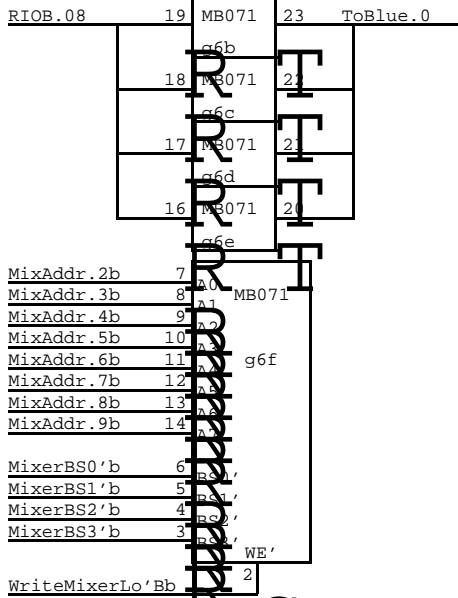


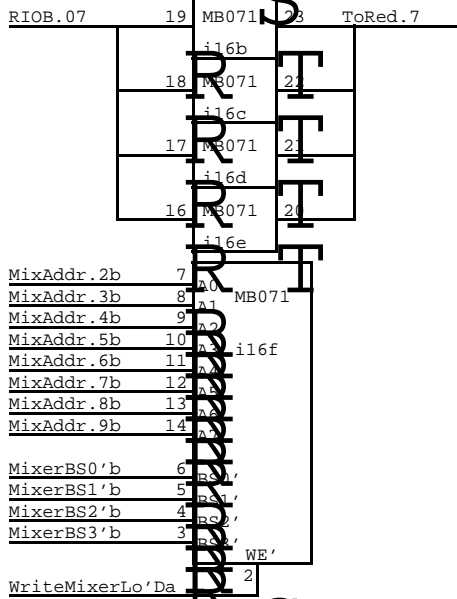
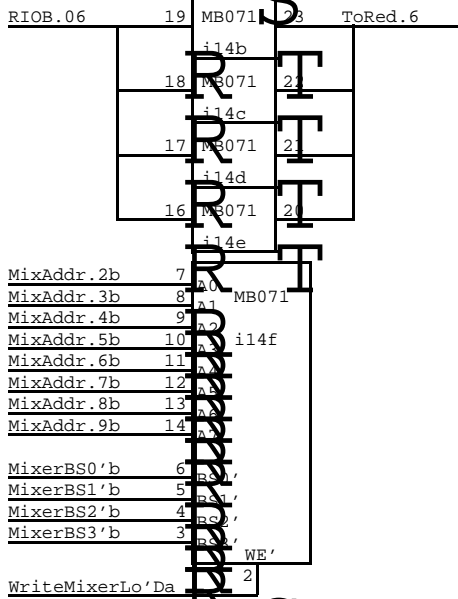
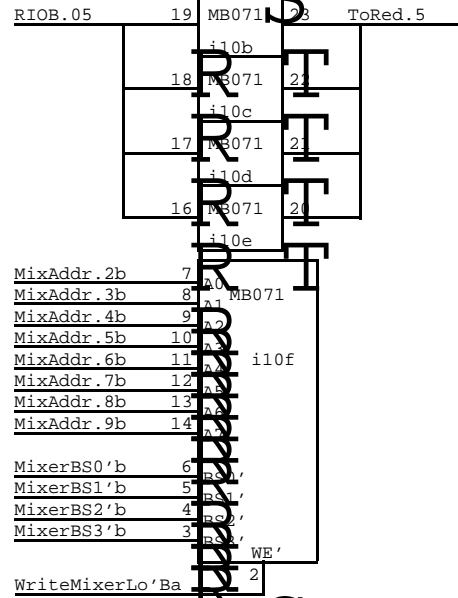
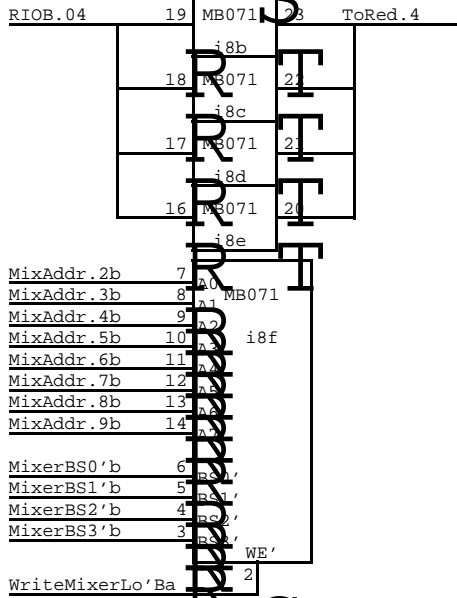
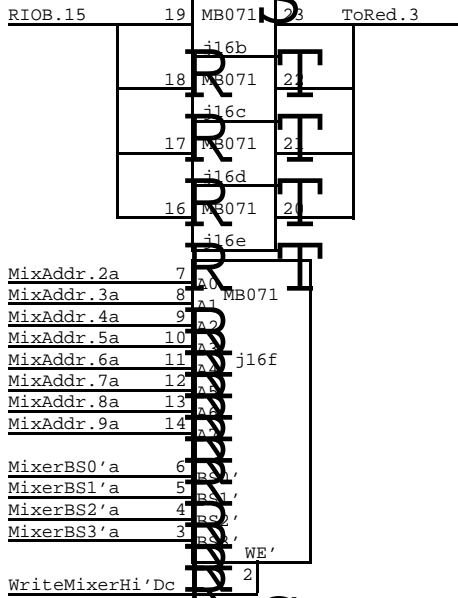
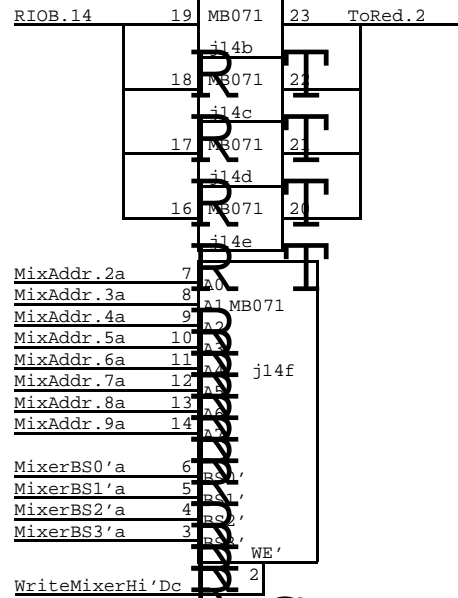
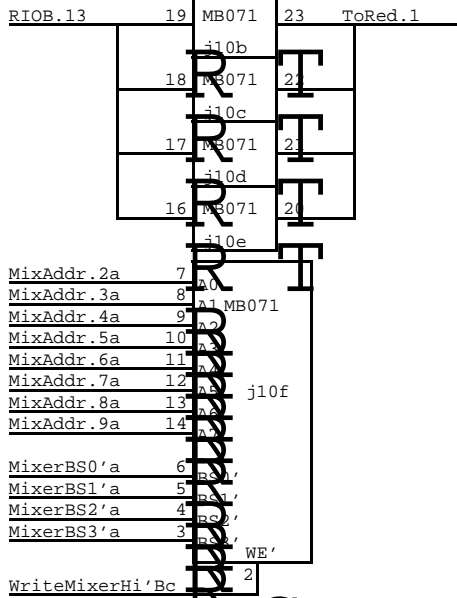
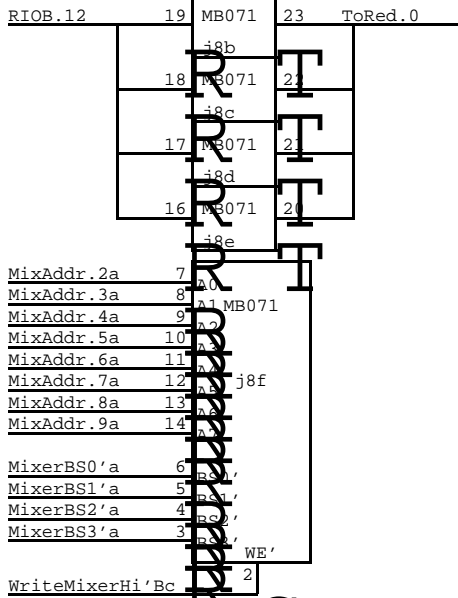


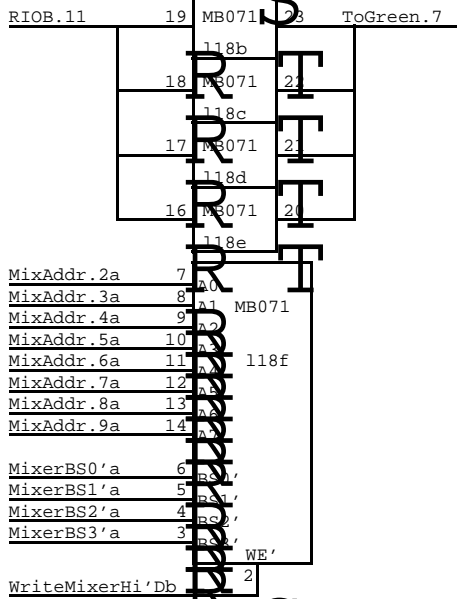
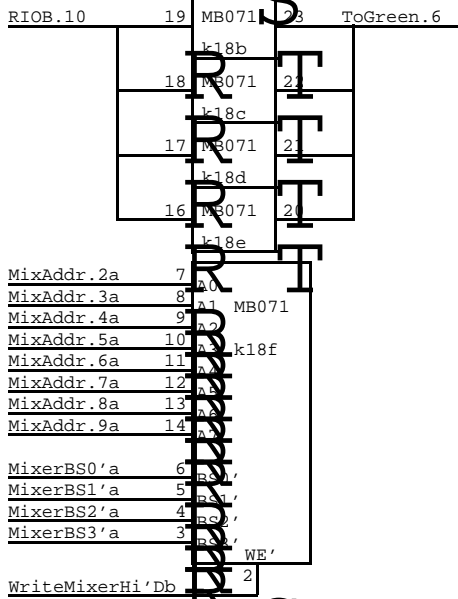
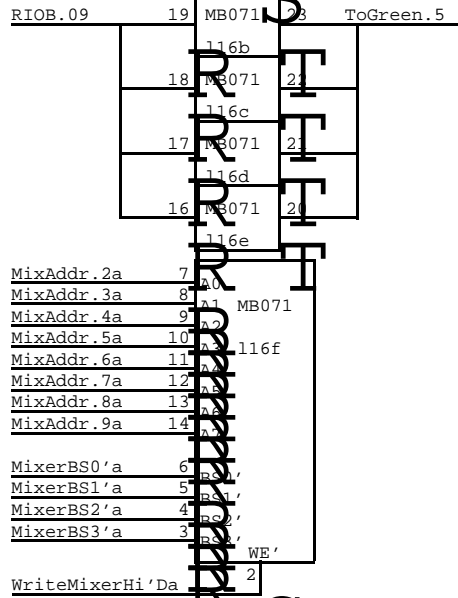
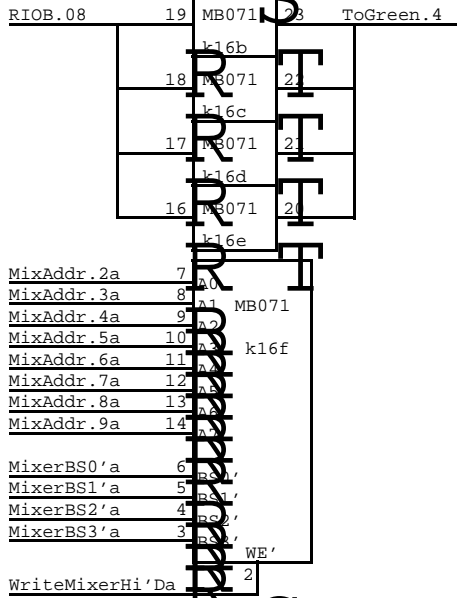
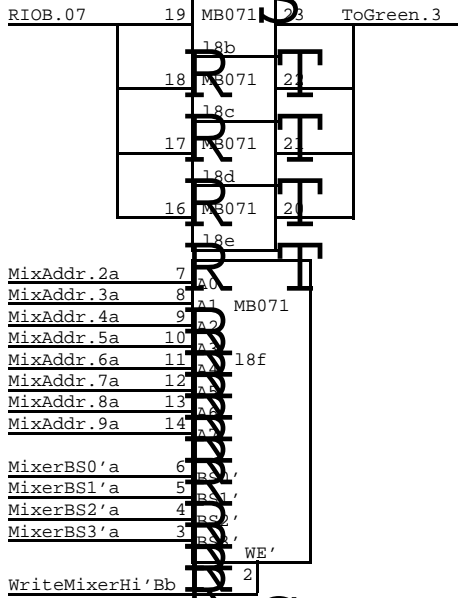
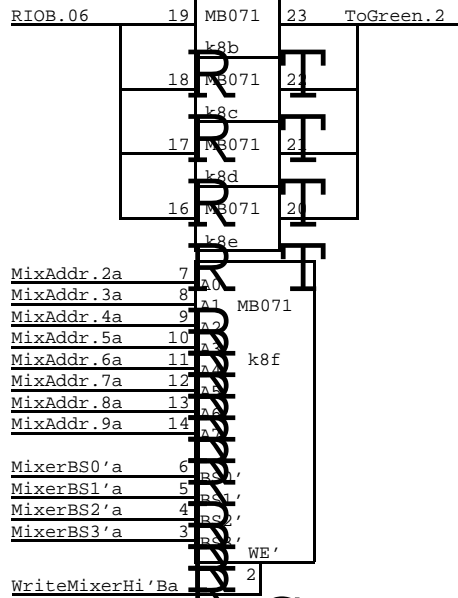
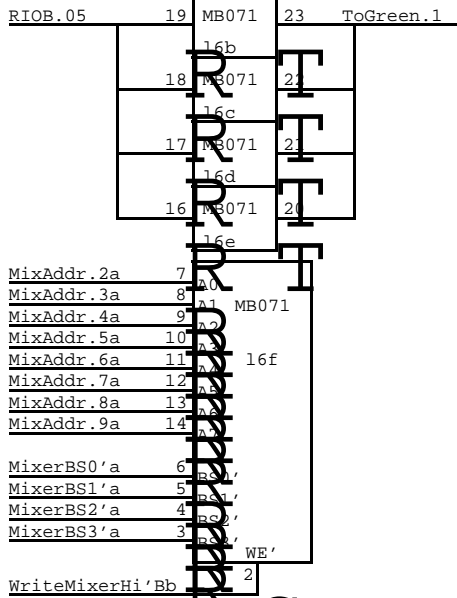
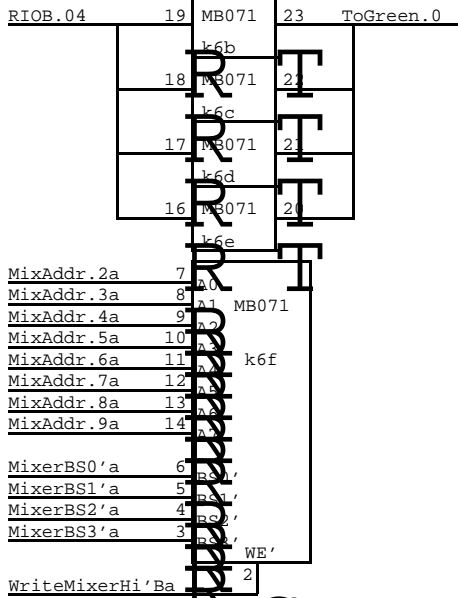
NOTE: B Channel must be started by microcode one pixel clk tick earlier than A channel for 24BitMode to align properly.

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

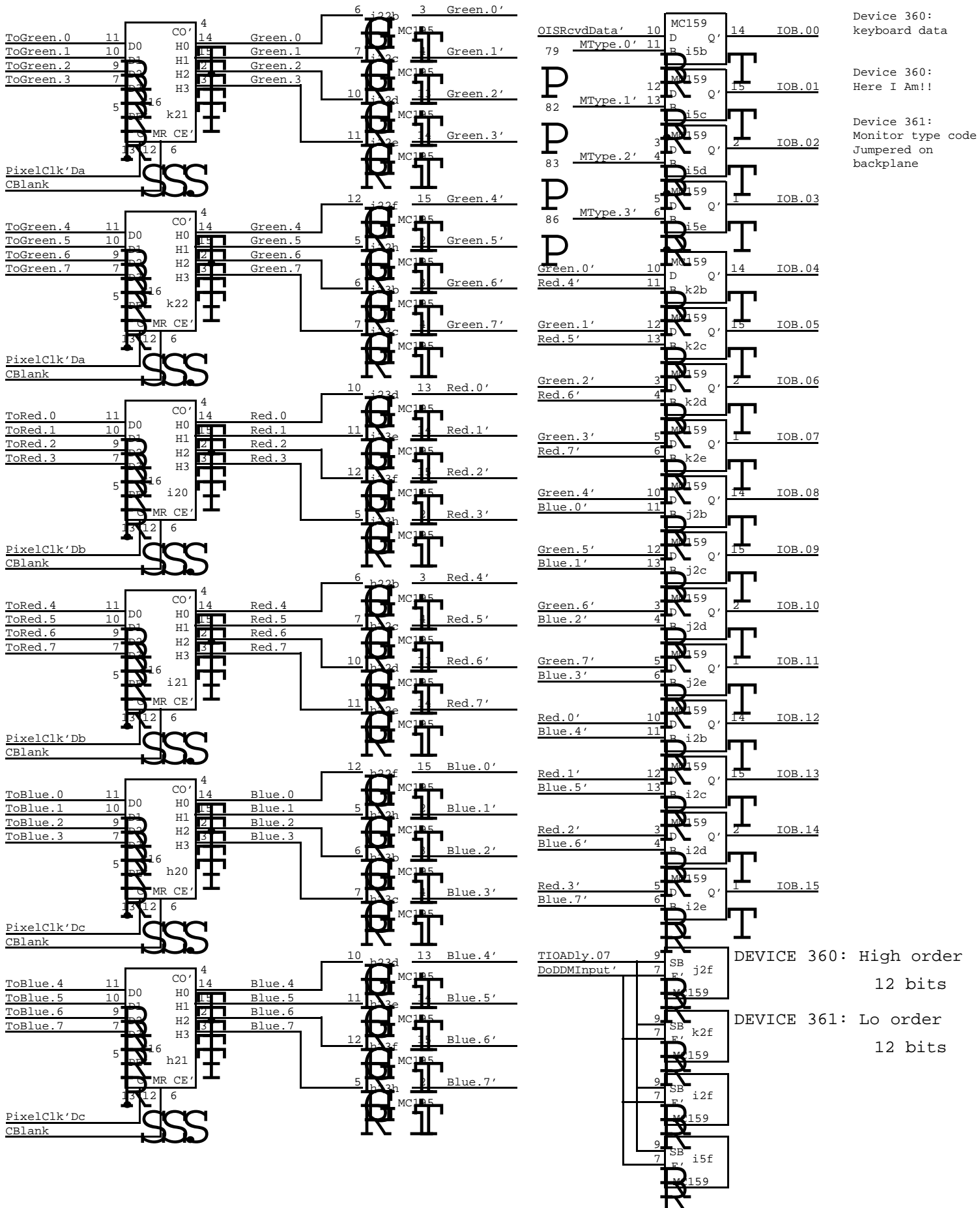


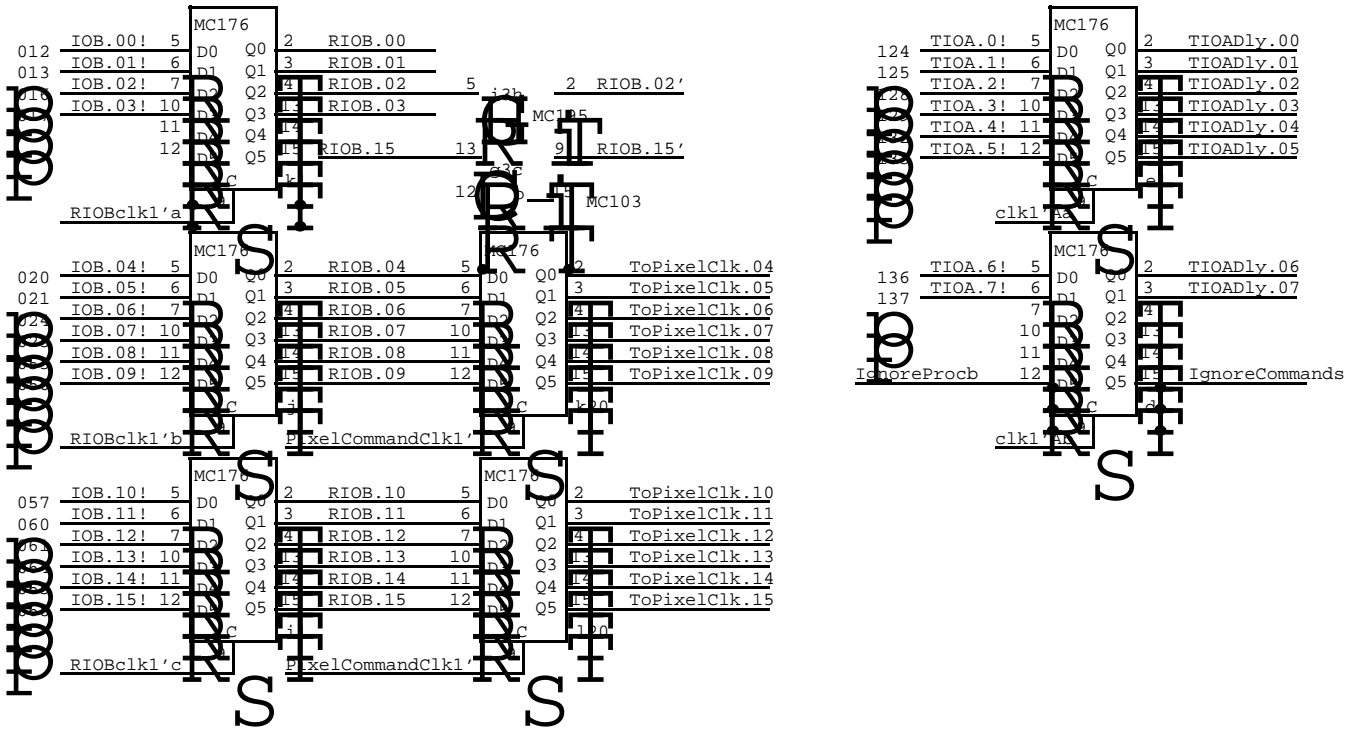






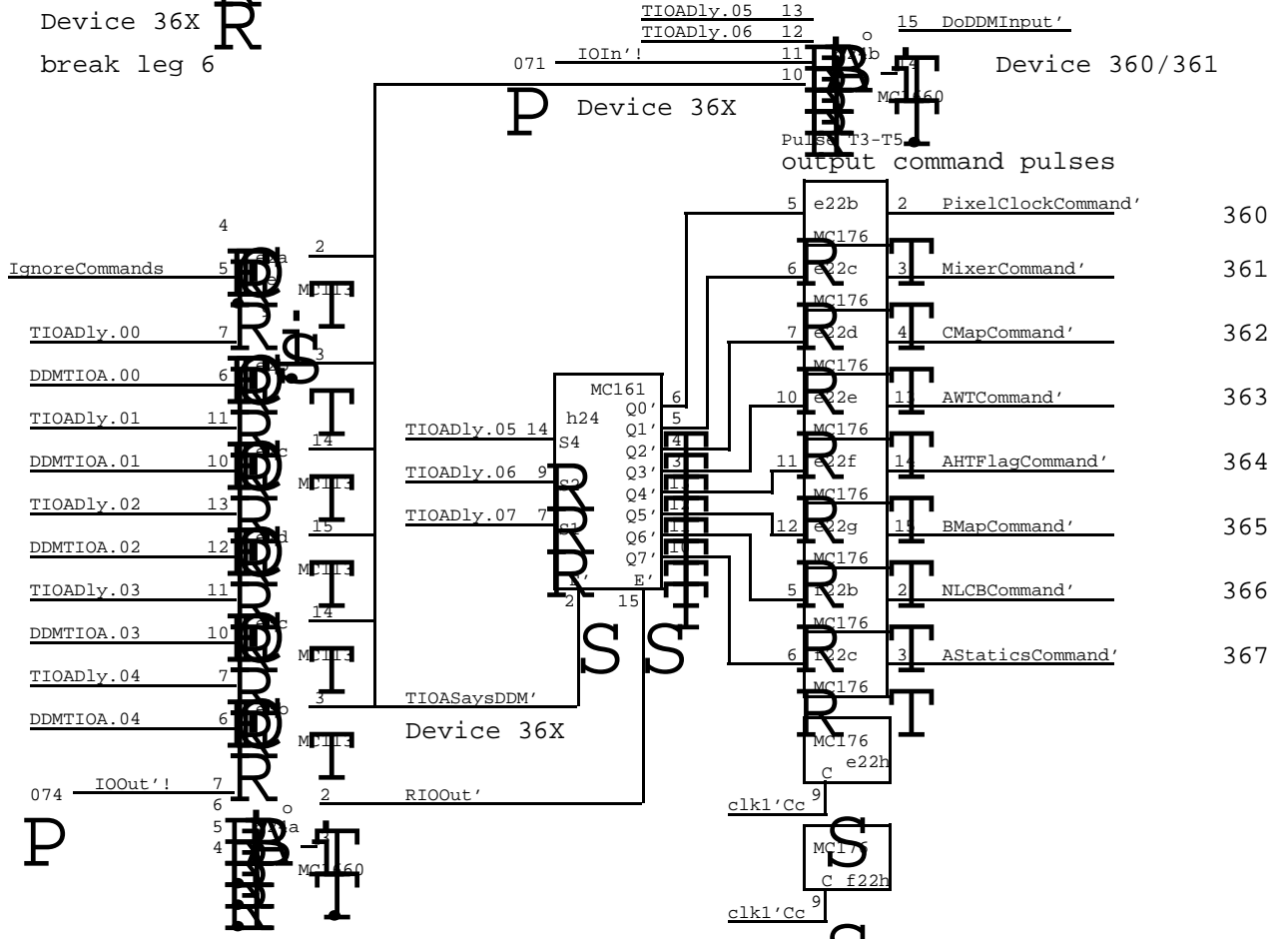
No Parity supplied  
Use InputNOPE





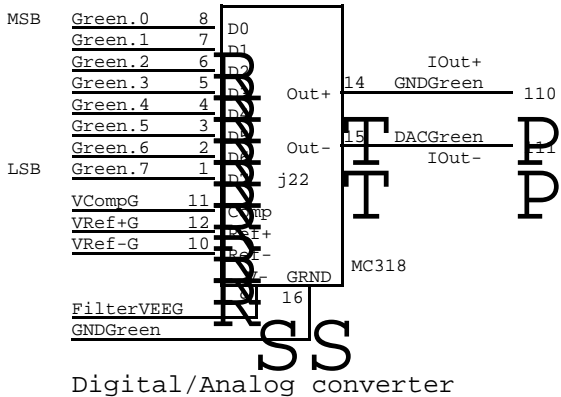
True	1	SIP b	g41b
DDMTIOA.00	1	SIP c	g41c
DDMTIOA.01	1	SIP d	g41d
DDMTIOA.02	1	SIP e	g41e
DDMTIOA.03	1	SIP f	g41f
DDMTIOA.04	0	SIP g	g41g

Device 36X  
break leg 6



NOTES:

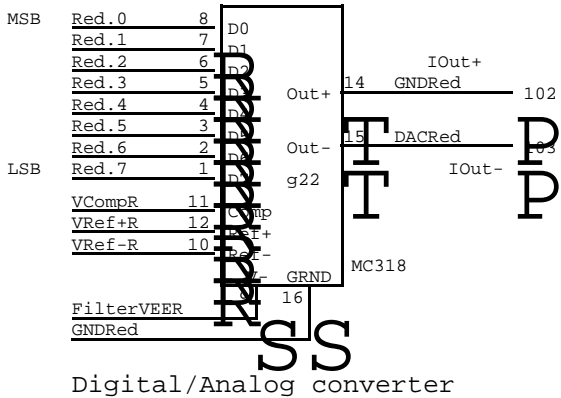
GNDGreen is used as single point GND for DAC system



Digital/Analog converter

NOTES:

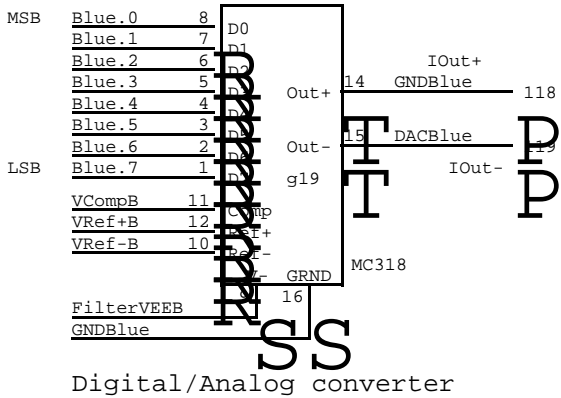
GND RED is used as single point GND for DAC system



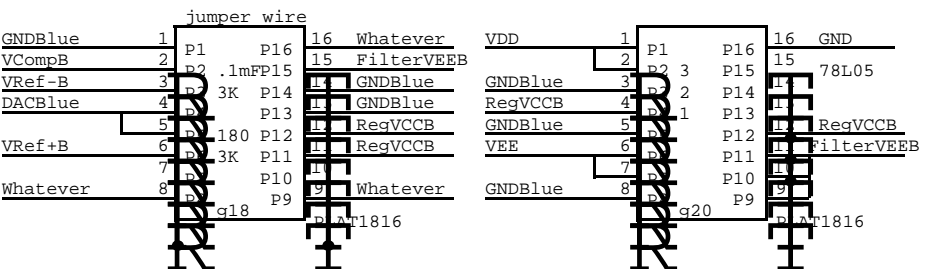
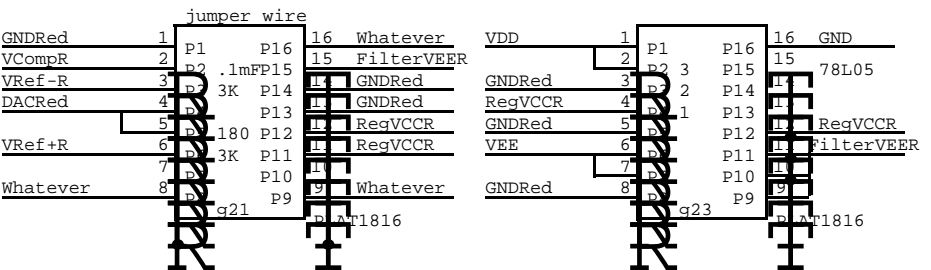
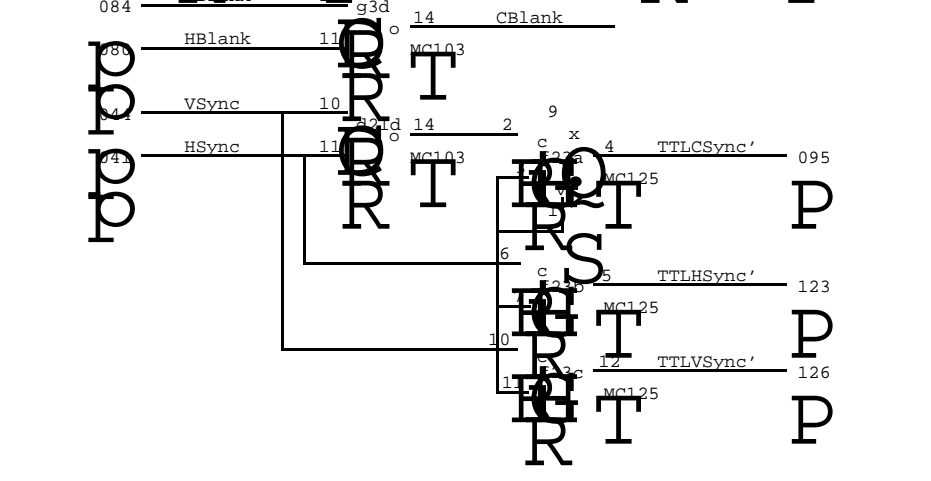
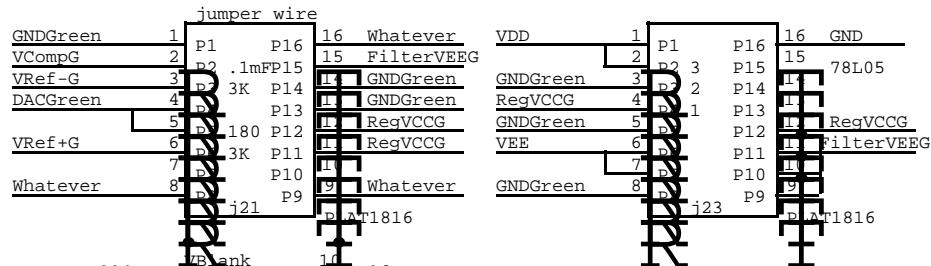
Digital/Analog converter

NOTES:

GNDBlue is used as single point GND for DAC system



Digital/Analog converter

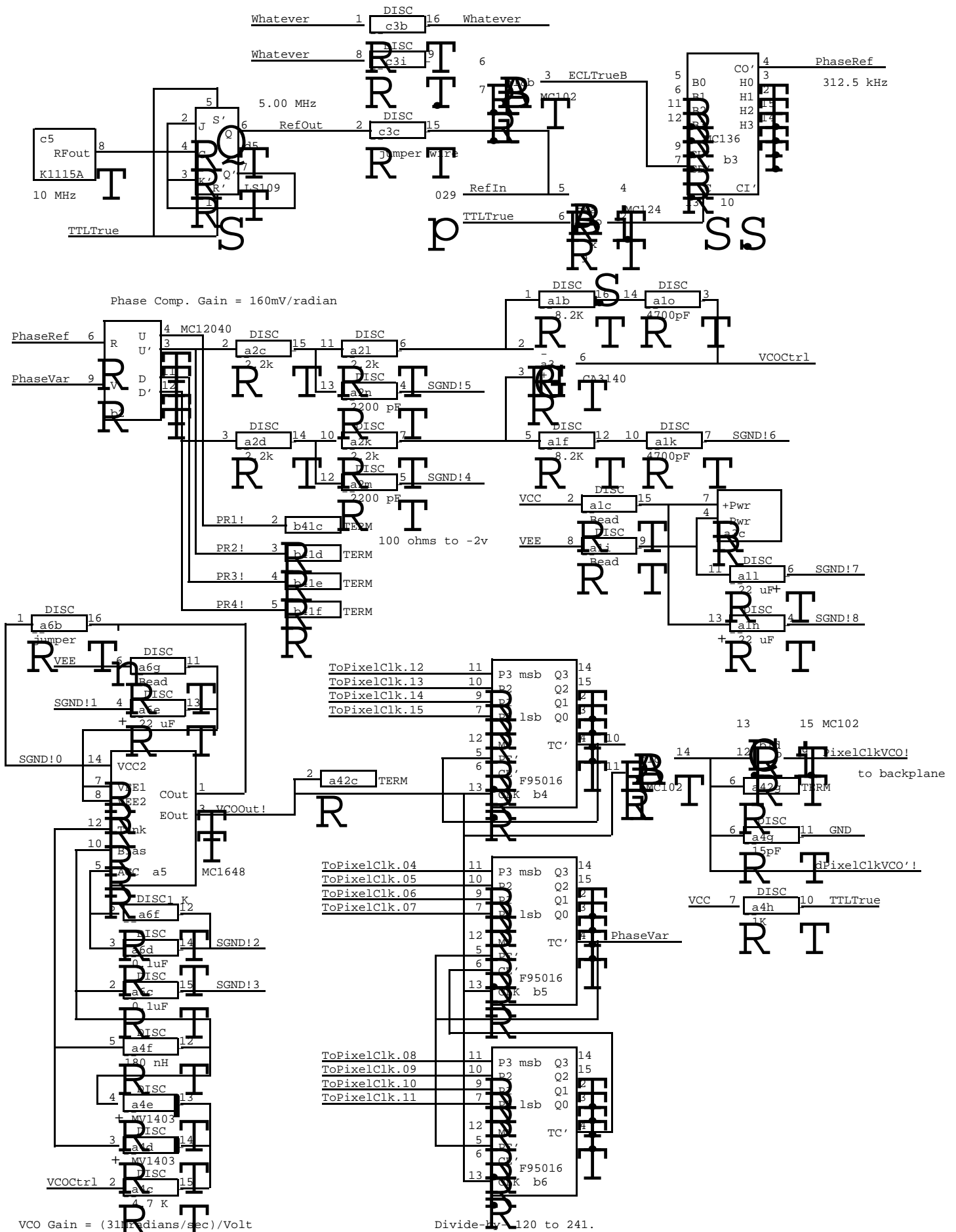


1	jumper wire	16
2	0.1mFarad	15
3	3 KOhm	14
4		13
5	180 Ohm	12
6	3 KOhm	11
7		10
8		09

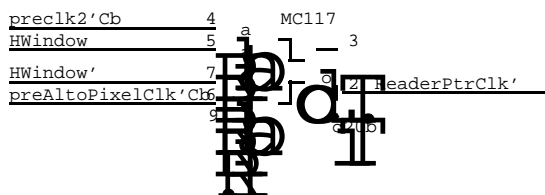
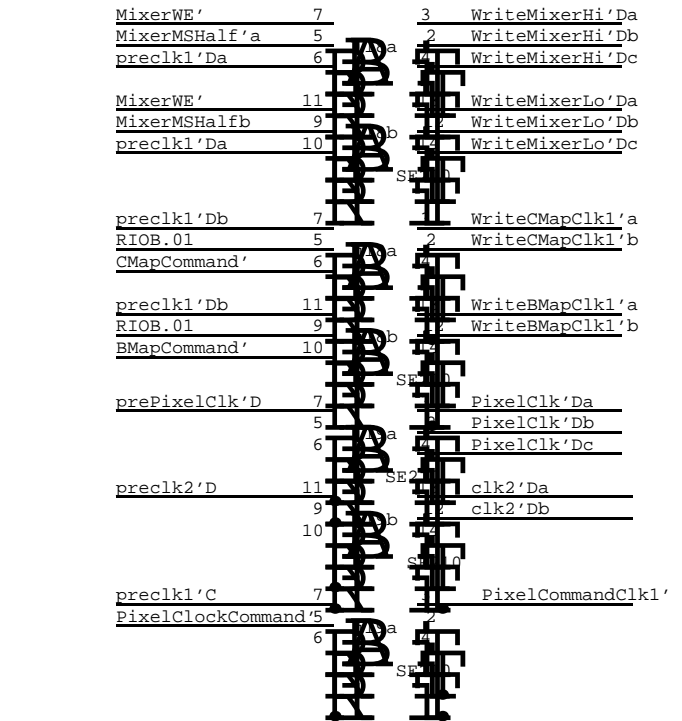
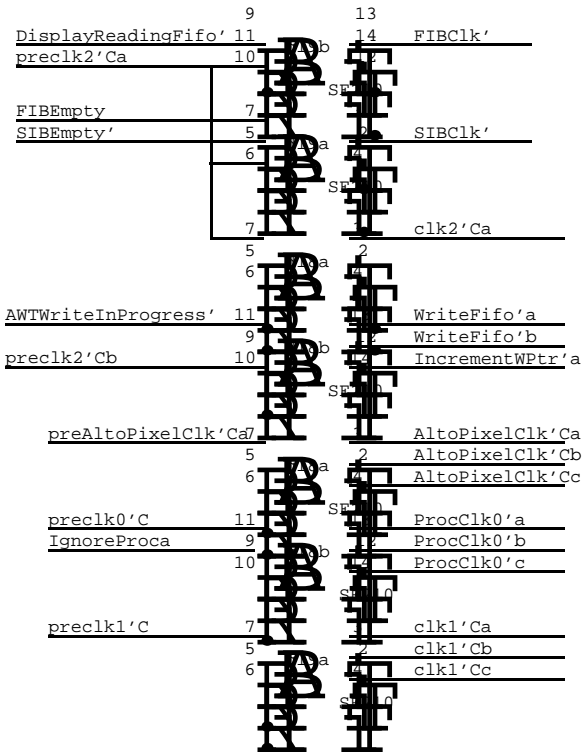
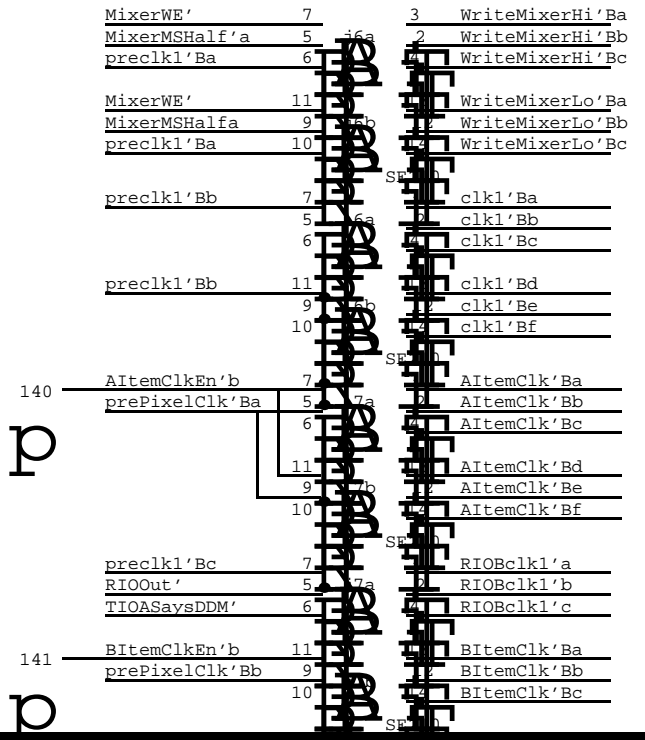
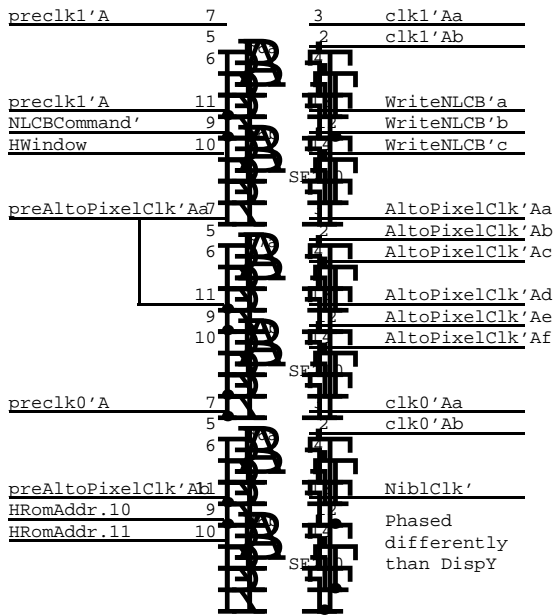
1	0.1mFarad	16
2	in3 78L05	15
3	gnd	14
4	out 1	13
5	0.1mFarad	12
6	12 mHnry	11
7	2 ohm	10
8	+ 22 mF	09

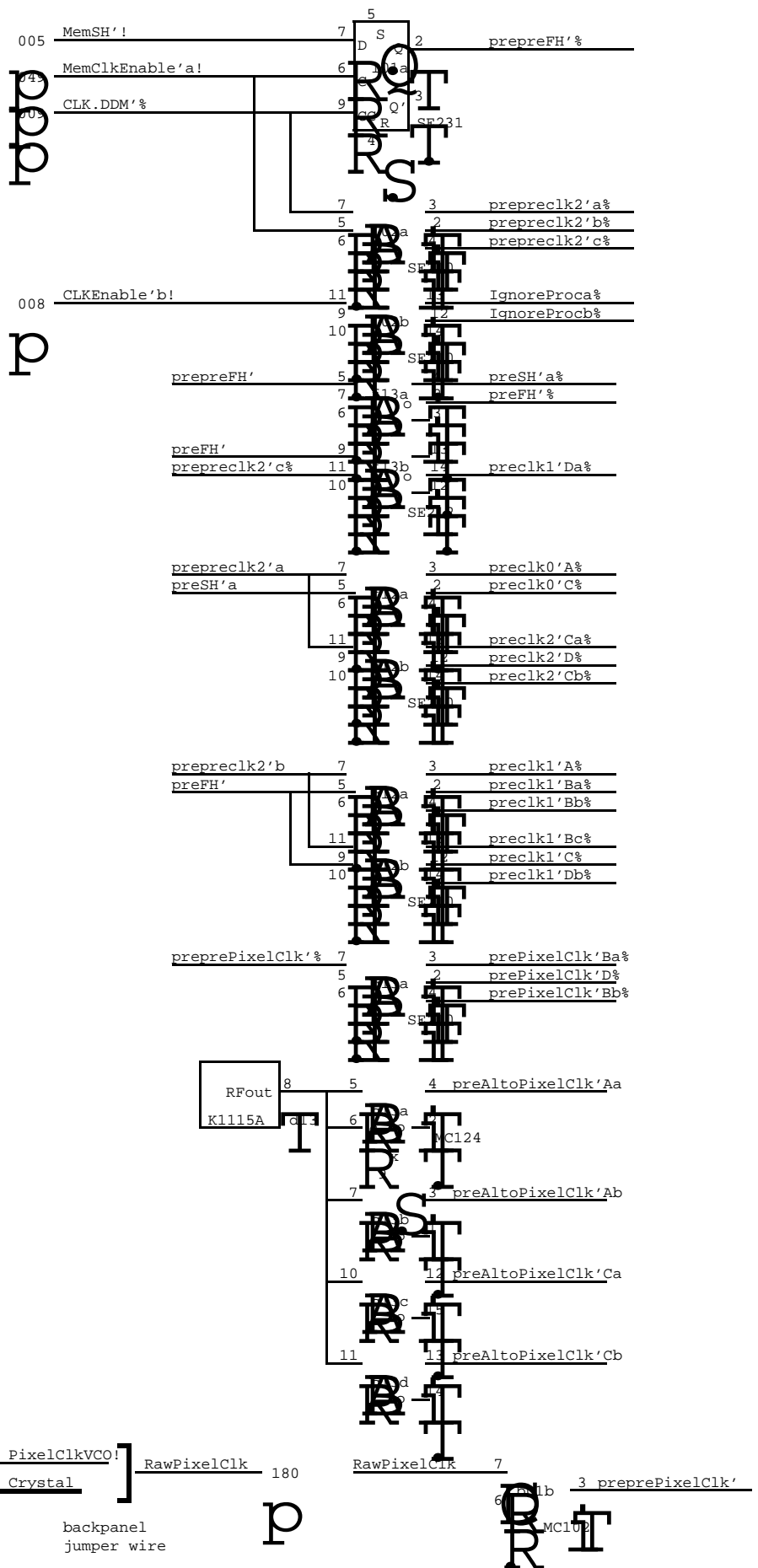
locations g18,g21,j21

locations j23,g23,g20





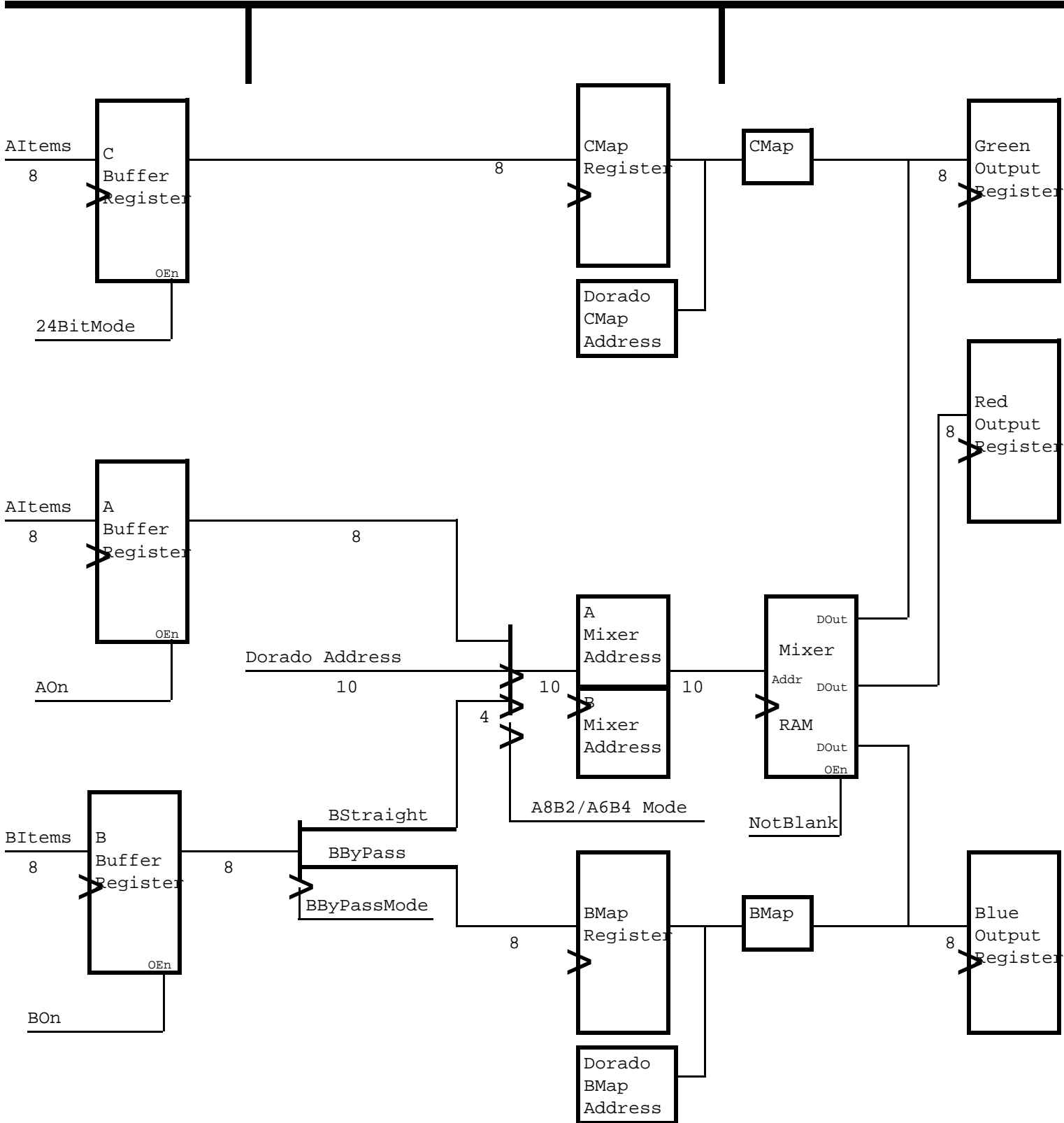
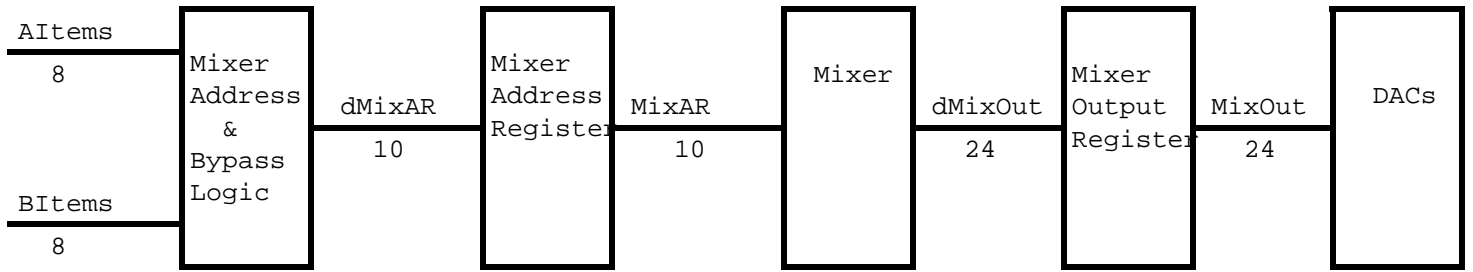




C	CONNECTOR		CONNECTOR		TIOA	TW	CONNECTOR		IOBLo	CONNECTOR		IOBHi	CLK	C
A	B>C	a 181	b 168	c 153	d 137	e 124	f 109	93 g	80 h	64 i	48 j	33 k	20 l	B
1	DISC VCO	PCLK 8,25,23,23 102			TIOA 176 21	TIOA 176 21	BBuf F16 12	ABuf F16 12	ABuf F16 12	RIOB 176 21	RIOB 176 21	RIOB 176 21	25 SE231	1
2	DISC VCO	12040 23 VCO			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	136 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,12,12 195 12,15,	DHM 21 105 12	DHMix 231 16,B		3
4	DISC VCO	95016 23 VCO	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	95016 23 VCO	K1115 23 VCO		LS109 23 VCO		BMapAd F16 12	CMapAd F16 12	DCMapAd F16 14	IOB 159 20		CMapAd F16 12	DCMapAd F16 14	5
6	DISC VCO	95016 23 VCO	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	Nibble 141 10	Clock 210 24			CLCBDecd 161 5	DBMapAd F16 13	--	--	Clock 210 24	Clock 210 24	--	--	7
8	CursorX	OIS F16 9	OIS 174 10		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	CursorHi F16 9	CursorLo 141 9		Width F16 4	LMarg F16 4	NLCB 145A 5	--	--	--	--	--	--	9
10	CursorX	CursorHi F16 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	Cursor F16 4	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	PixelClk	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	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	ASR 141 3	ASR 141 3		ASR 141 3	ASR 141 3		Mixer B4 17		Mixer R6 18	Mixer R2 18	CMap 19	CMap 19	14
15	HRomAddr		FIB 176 3		FIB 176 3	FIB 176 3		--		--	--	--	--	15
16	HRomAddr	Fifo MCL149 6	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	6,4,6,4,2	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	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 MCL149 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	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	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	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				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

C	a 11	b 26	c 39	d 55	e 70	f 86	99 g	114 h	129 i	143 j	159 k	174 l	D
E	NEXT	SubT	BLK	FIN	IOIn/out	CONNECTOR	IOF	FNXT	FOUT	FTsk	DMux	E	

PEROX PARC	Project Dorado	Reference DispM Board Layout	File DispM26.sil	Designer K. Pier	Rev Cg	Date 7/20/81	Page 26
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DispY	SIZE	DispM
AItem	8	AItem 85-88-89-92-93-96-97-100
BItem	8	BItem 101-104-105-108-109-112-113-116
CursorData	1	CursorData
AItemClkEn	1	AItemClkEn
BItemClkEn	1	BItemClkEn
AOff	1	AOff
BOff	1	BOff
HSync	1	HSync
HBlank	1	HBlank
HalfLine	1	HalfLine
VSync	1	VSync
VBlank	1	VBlank
RawPixelClk	1	RawPixelClk
Crystal	1	Crystal
PixelClkVCO	1	PixelClkVCO
Modes	3	Modes 28-32-33
XHSync	1	XHSync
XVSync	1	XVSync
XSyncEn	1	XSyncEn
ABypass	1	RefIn

Red GND	1	102	DispM to coax/BNC connectors
Red	1	103	
Green GND	1	107	
Green	1	111	
Blue GND	1	115	
Blue	1	119	
TTLCSync'	1	123	
TTLCSync' GND	1	126	

MType.0	1	079	Monitor type field Jumper resistors on backplane
MType.1	1	087	
MType.2	1	083	

DispM ControlA

121 WakeTHT (TWReg4) twisted pair 56

120 WakeTWT (TWReg9) twisted pair 128

Plus seven wire interface cable. See page 11.

DDC Slow IO System

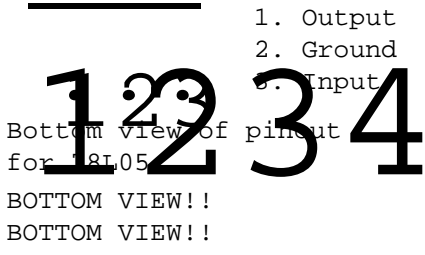
DEVICE	TIOA	I/O	TASK	FORMAT and COMMENTS
AStatics	367	0	AHT	
NLCB	366	0	AHT	
BMap	365	0	CHT, EMU	Keep,Write,LoadAddr,0,DataOrAddr8-15
AHTFlag	364	0	AHT	
AWT	363	0	AWT	
CMap	362	0	CHT, EMU	Keep,Write,LoadAddr,0,DataOrAddr8-15
MIXER	361	0	CHT, EMU	Keep,Write,LoadAddr,0,Data.4-15
PIXELCLK	360	0	CHT, EMU	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

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15

				Pixel Clock Rate								Clock Divider				PIXELCLK	
Keep Mixer'	Write Mixer'	Load Mixer Addr	x		Addr.0	Addr.1	Addr.2	Addr.3	Addr.4	Addr.5	Addr.6	Addr.7	Addr.8	Addr.9	Hi/Lo select	MIXER	
Mixer Data 12 bits																	
Keep BMap'	Write BMap'	Load Bmap Addr	x									Address.0-7 OR Data.0-7				BMap	
Keep CMap'	Write CMap'	Load CMap Addr	x									Address.0-7 OR Data.0-7				CMap	
															AWT Shut Up	AHT Shut Up	AStatics
NLCB Addr 00	NLCB Addr 01	NLCB Addr 02	NLCB Addr 03	NLCB DATA 12 Bits												NLCB	
											IOFetch					Set/Clr Cur WCB Flag	AWT
															x	Must Be 0	AHTFlag

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

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



locations  
g18,g21,j21  
3 identical copies

locations  
j23,g23,g20  
3 identical copies

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 i

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	6
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	5
3		14
4		13
5		12
6		11
7		10
8		09

location c3