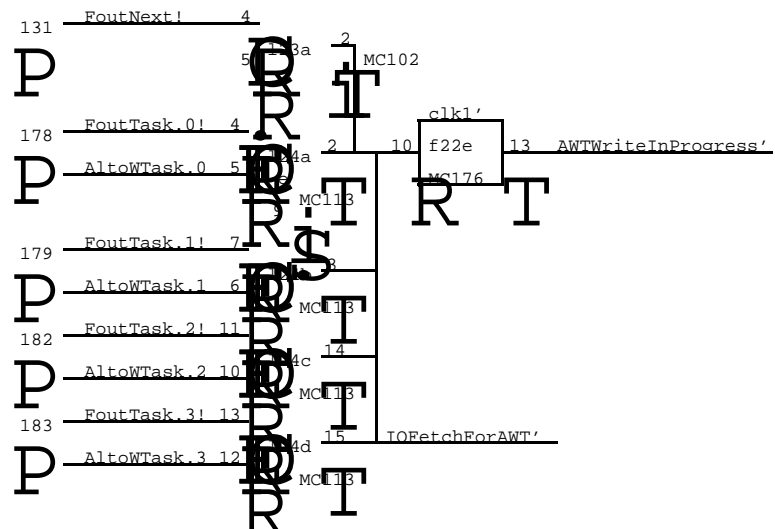
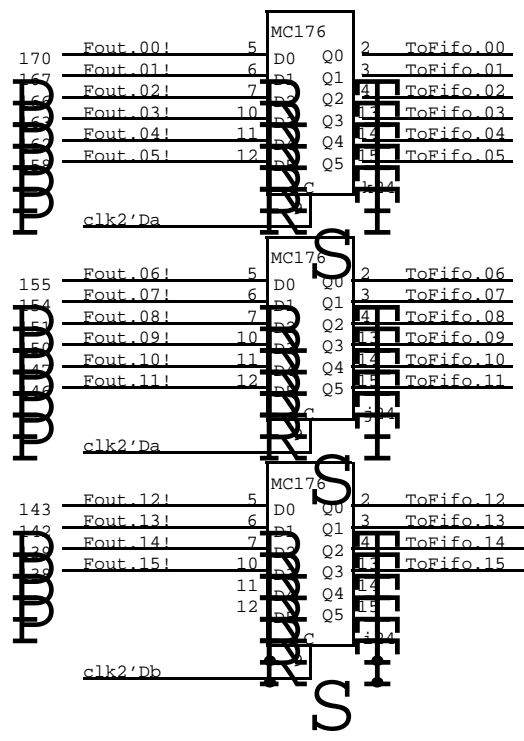
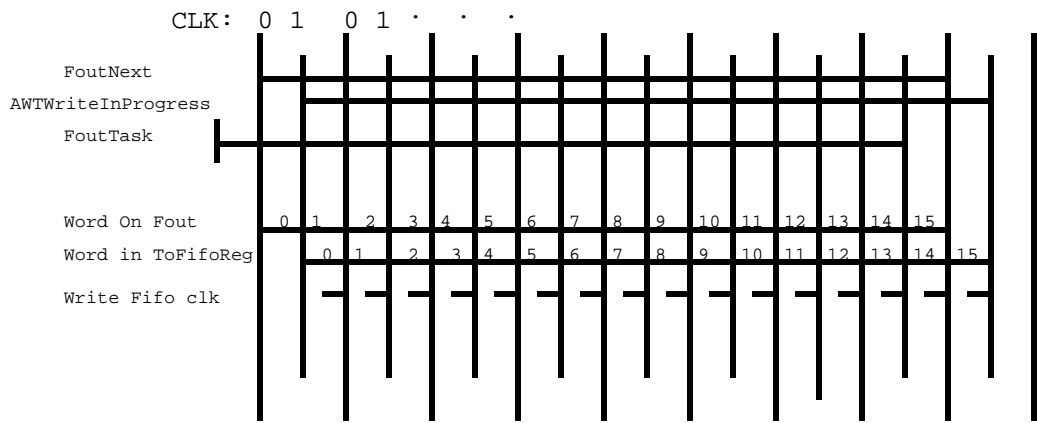


D O R A D O S C H E M A T I C S

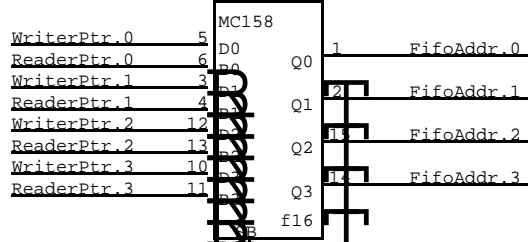
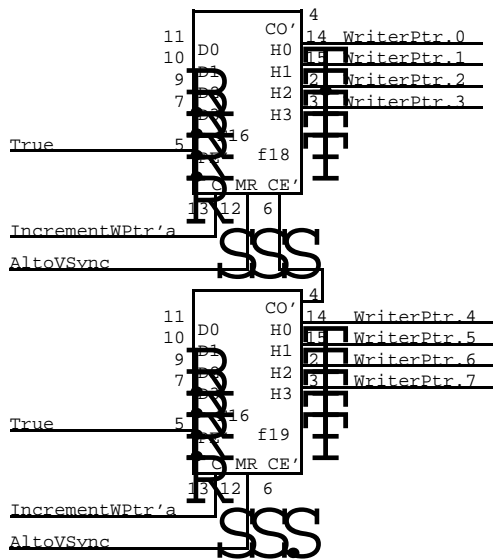
D i s p l a y M

Table of contents

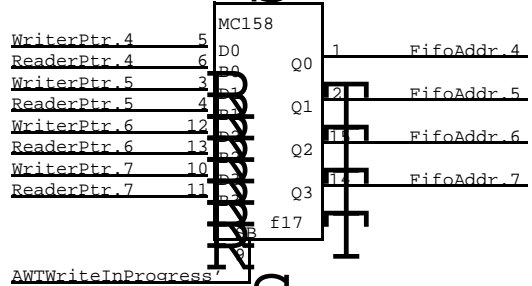
| <u>TITLE</u>                              | <u>Page</u> |
|---|-------------|
| Alto Display Controller Drawings          |             |
| Alto Controller FOUT interface            | 01          |
| Fifo Pointers and Address                 | 02          |
| Fifo, Intermediate Buffer, Shift Register | 03          |
| Left Margin and Vertical Control          | 04          |
| Line Control Block                        | 05          |
| Horizontal Control ROM                    | 06          |
| Flag Control logic and Spare locations    | 07          |
| Alto Word Task Wakeup logic               | 08          |
| Cursor Hardware                           | 09          |
| OIS Terminal interface                    | 10          |
| Alto Display Controller Cabling Summary   | 11          |
| Mixer Drawings                            |             |
| Mixer Buffers ABuf, BBuf, CBuf            | 12          |
| BMap                                      | 13          |
| CMap                                      | 14          |
| Mixer Address Drivers                     | 15          |
| Mixer Address Control logic               | 16          |
| Mixer - Blue byte                         | 17          |
| Mixer - Red byte                          | 18          |
| Mixer - Green byte                        | 19          |
| Mixer Output Register and IOB drivers     | 20          |
| Slow IO Interface                         | 21          |
| DACs - Red, Green, Blue                   | 22          |
| PLL Pulse Synthesizer                     | 23          |
| Clock Drivers                             | 24          |
| Pre Clock Drivers                         | 25          |
| Layout                                    | 26          |
| Mixer Block Diagram                       | 27          |
| DDC to DDM Interface Table                | 28          |
| Slow IO Device Formats                    | 29          |
| Configuration                             | 30          |
| Revision Record                           | 31          |



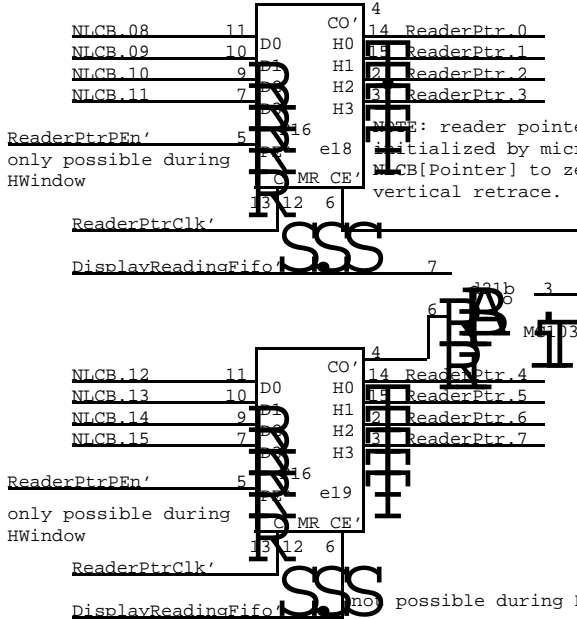
### Writer Pointer



careful about timing here - one half cycle ONLY



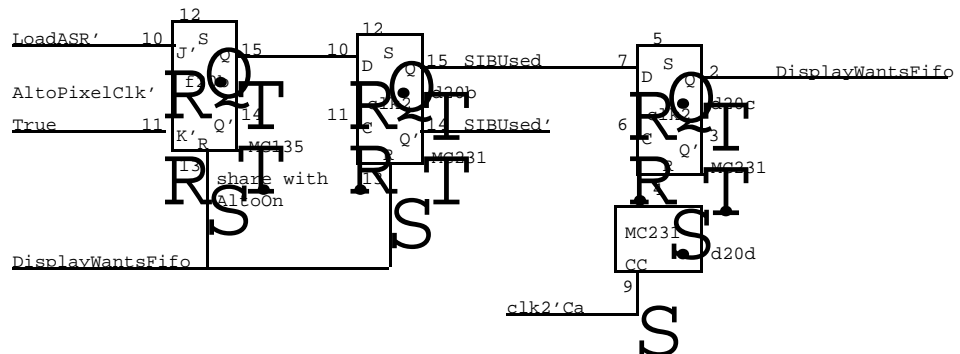
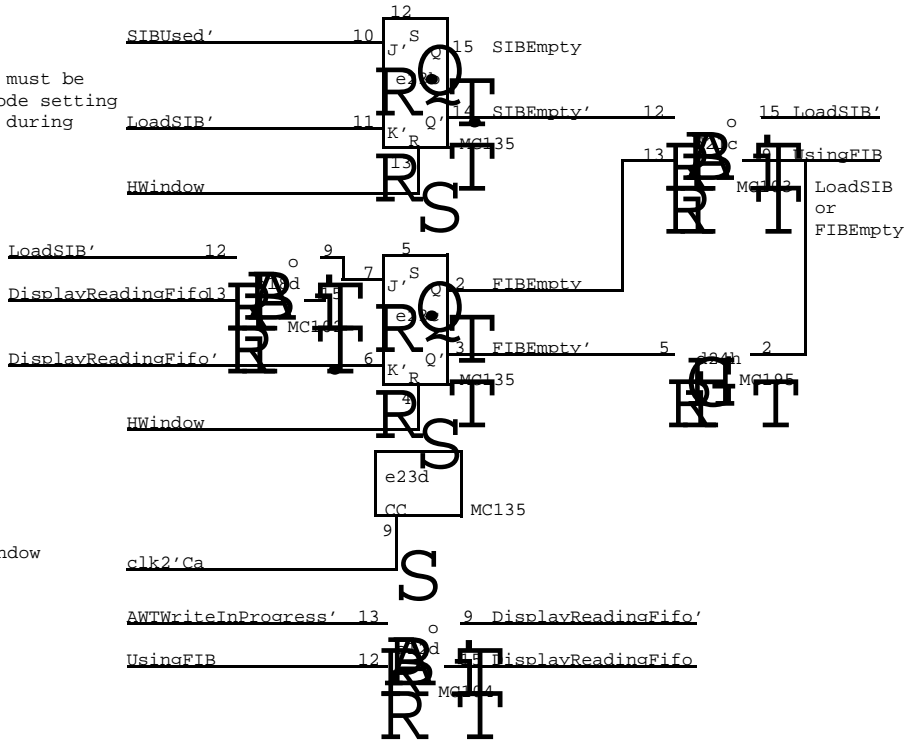
### Reader Pointer

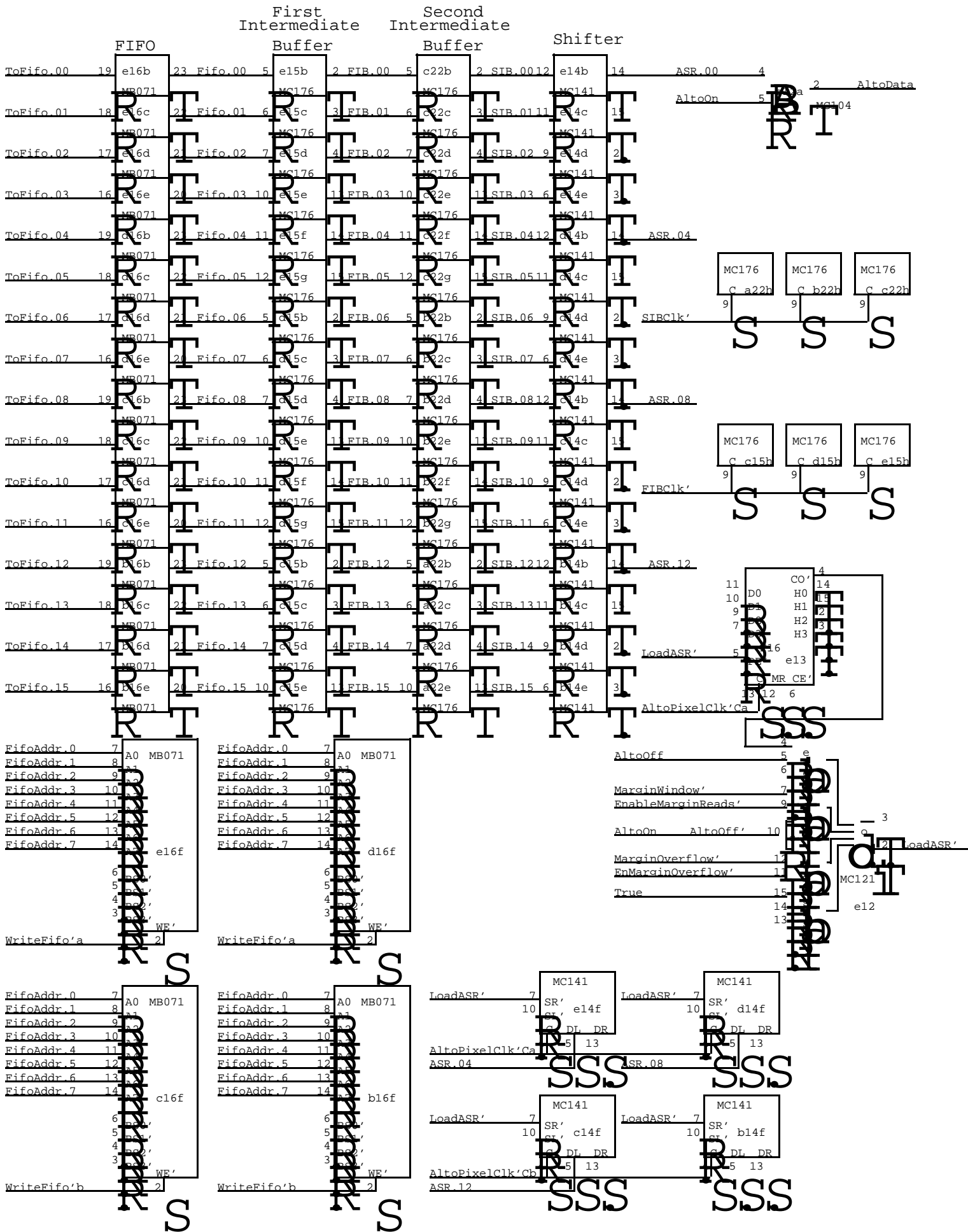


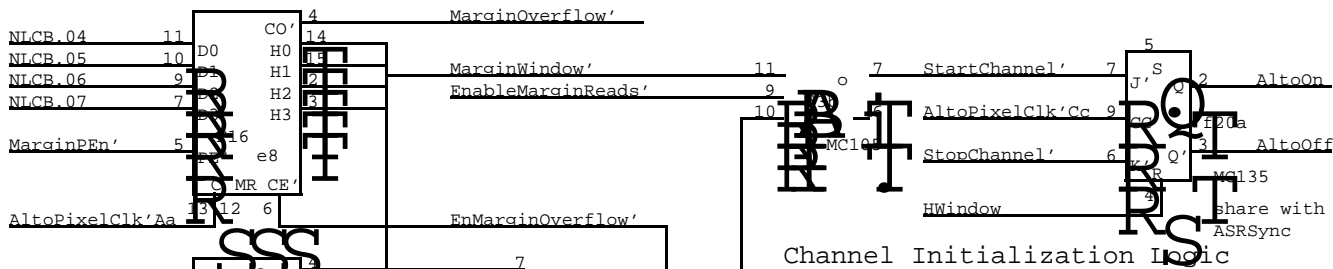
NOTE: reader pointers must be initialized by microcode setting NLCB[Pointer] to zero during vertical retrace.

only possible during HWindow

no possible during HWindow

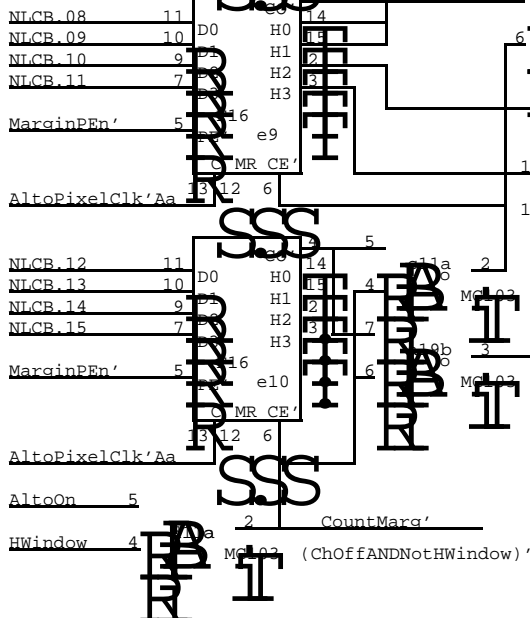




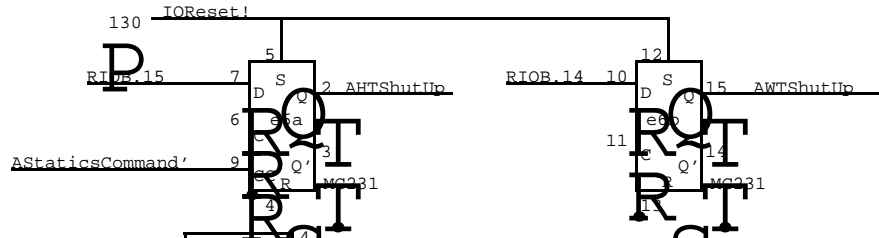


**Left Margin Counter**

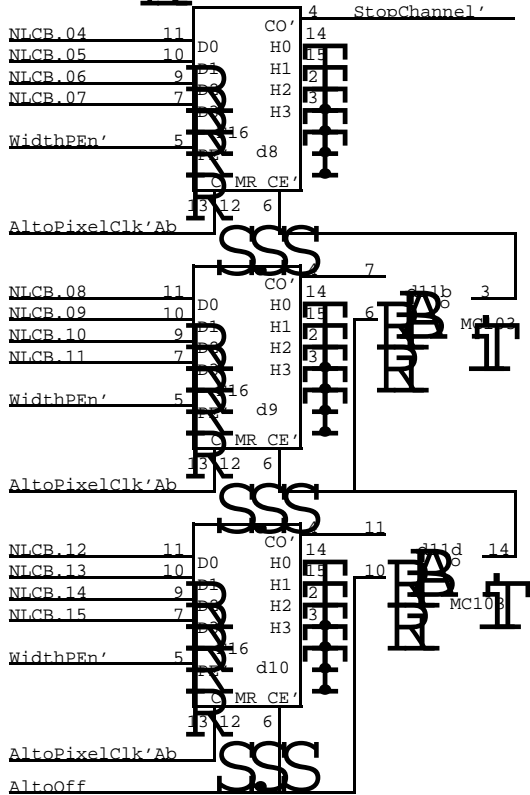
Counter loaded from NLCB. Starts counting after HWindow Overflow => initial read, 37B=>second read, 77B=>third and start the channel. Stop counting while channel is on. Resumes counting when channel goes off, but will not overflow. EnableMarginReads' again before end of scanline.



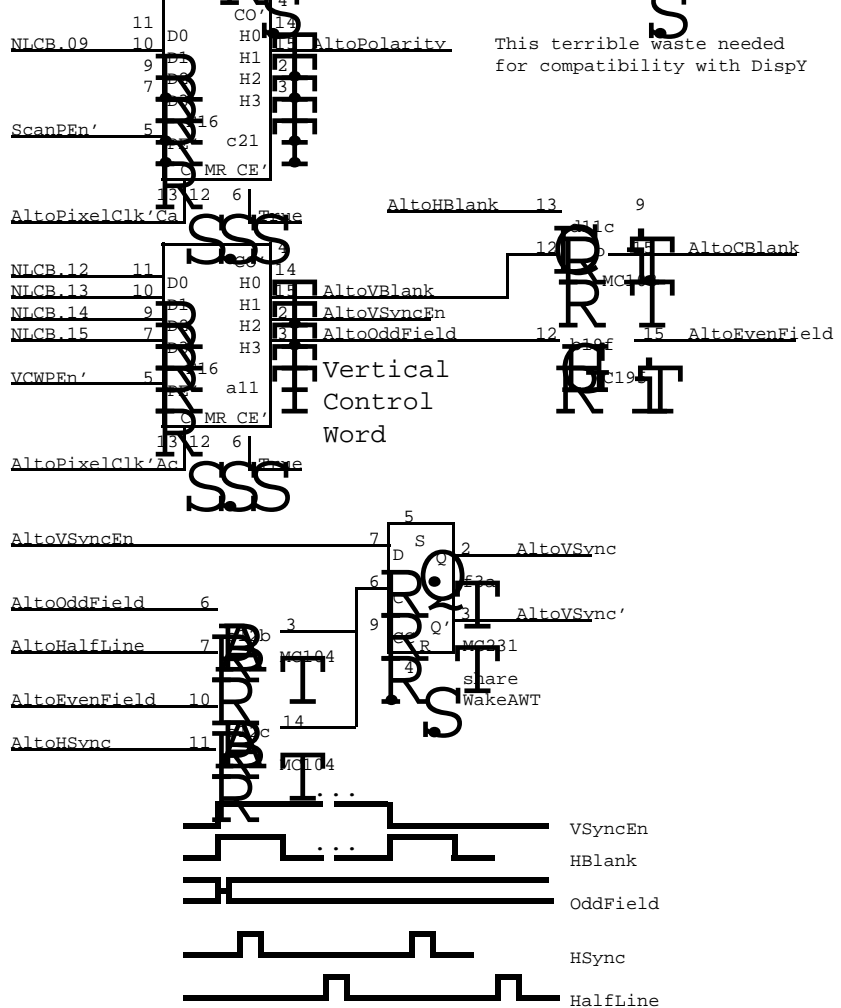
DCB Width Counter  
Stop channel when counter value is > 7400B

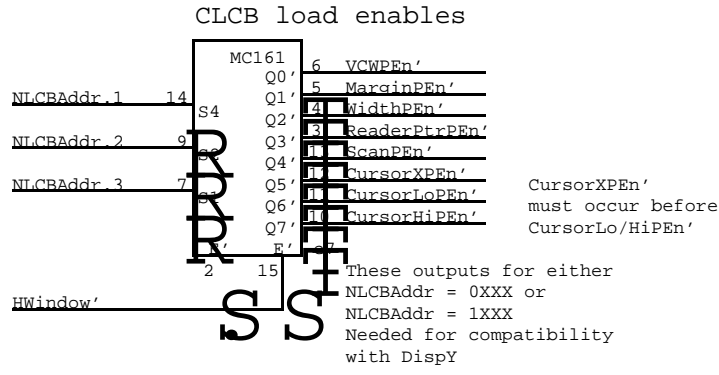
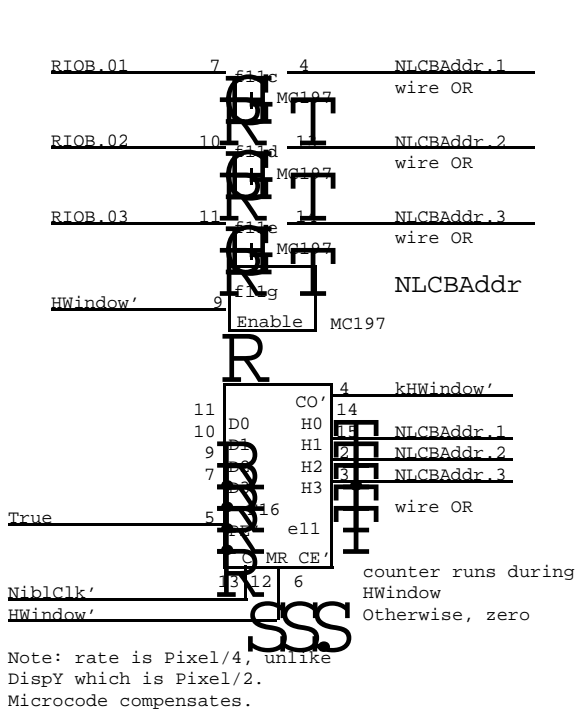


This terrible waste needed for compatibility with DispY

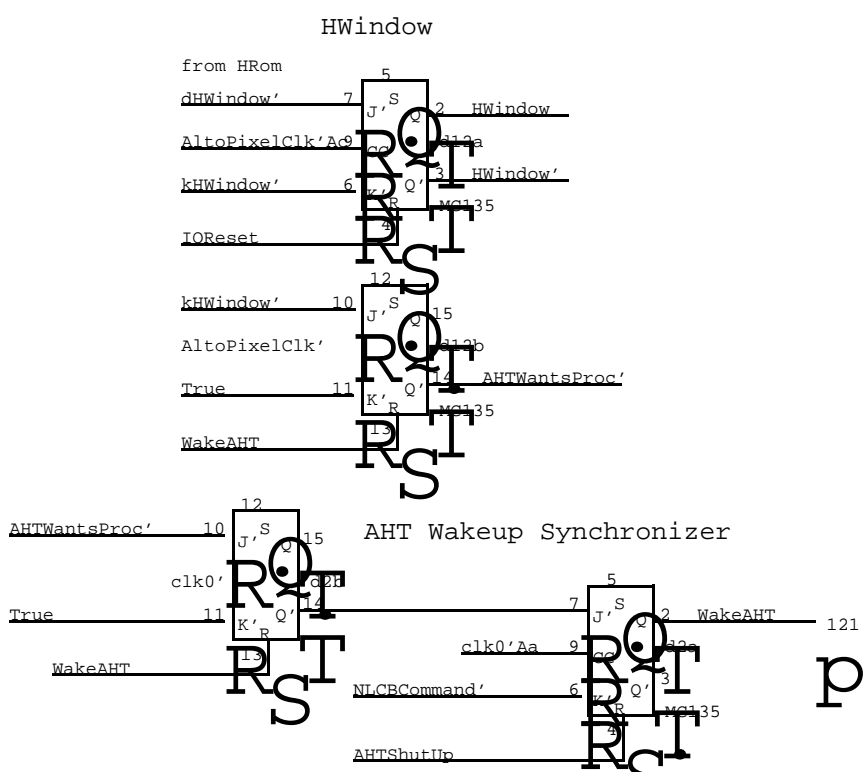
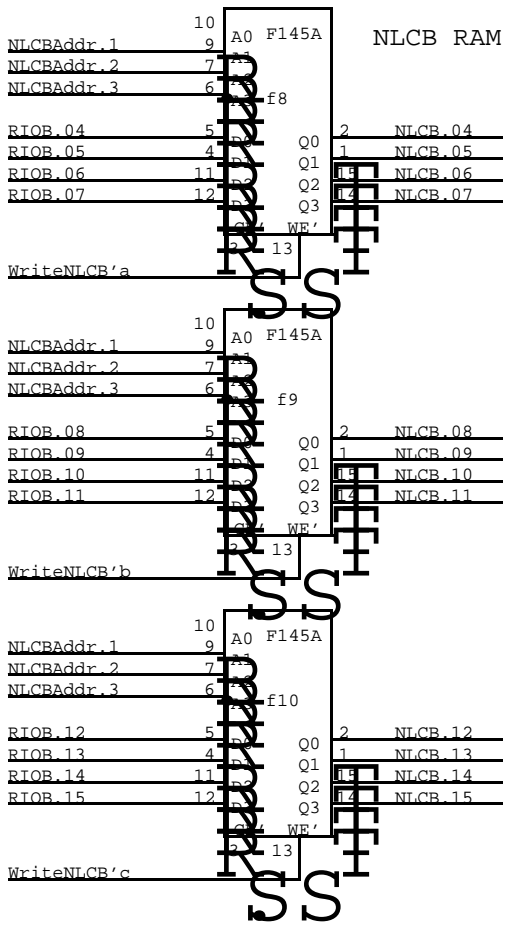


**Vertical Control Word**



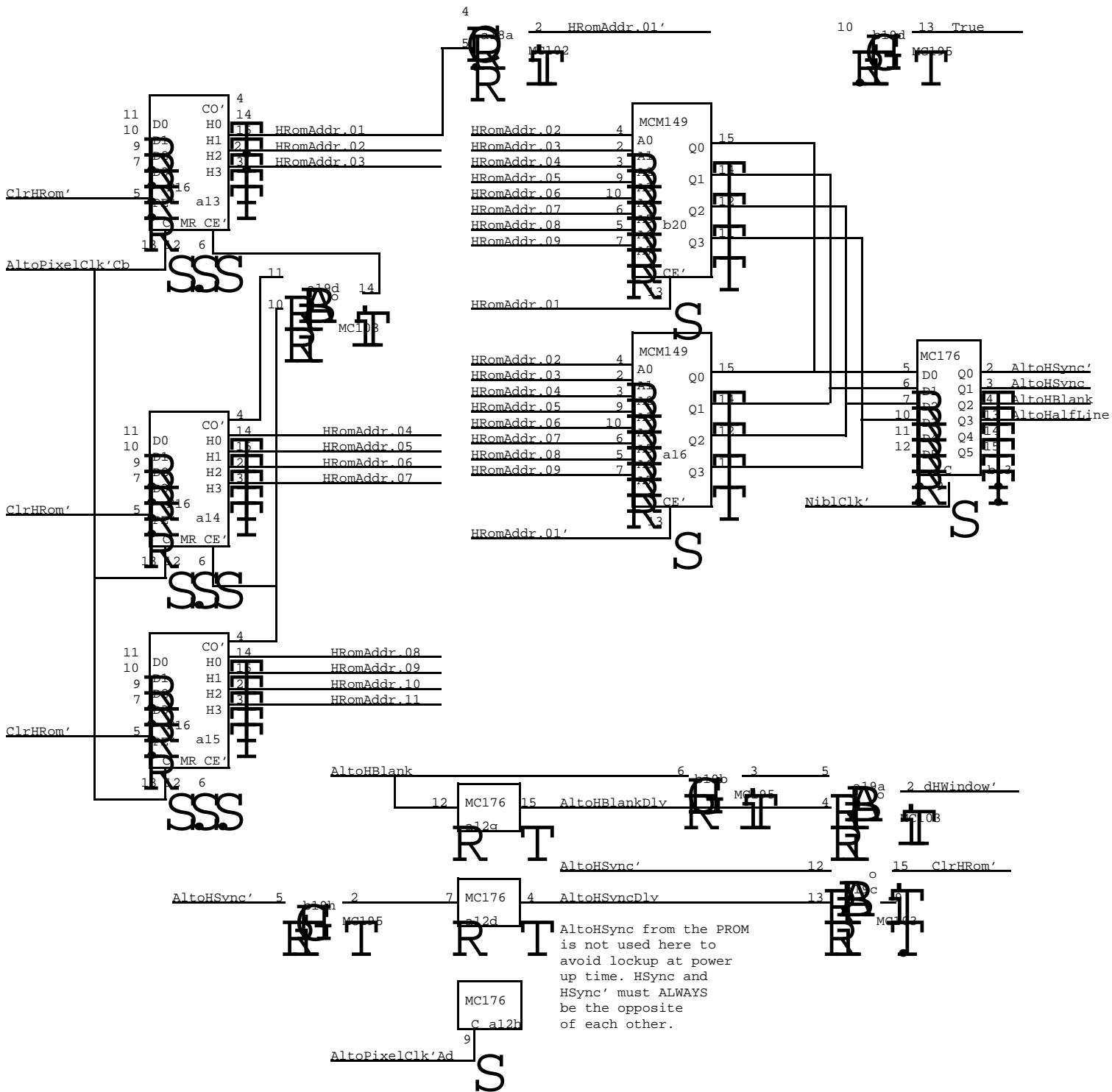


NOTE:  
 There are only 8 entries in NLCB.  
 The MSB (NLCBAddr.0) is ignored.  
 Outputs to 0XXX or 1XXX write words 0XXX of NLCB. During HWindow, CLCB entries are redundantly written twice, first when counter goes 00-07 and again when counter goes 10-17.



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.

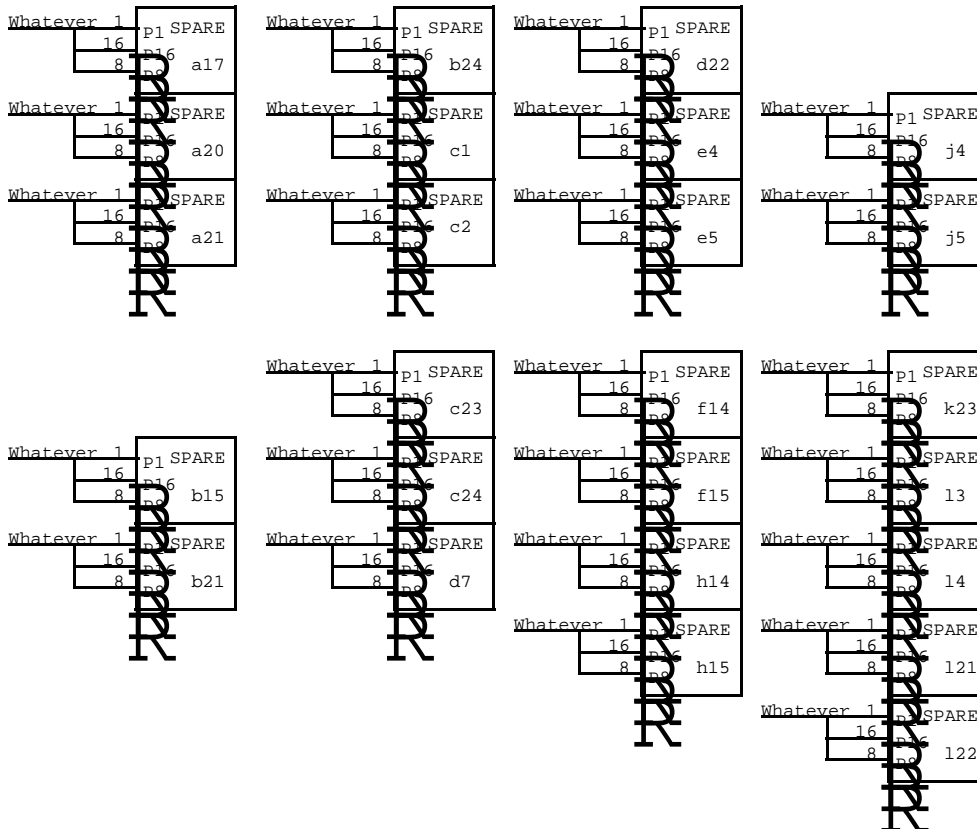
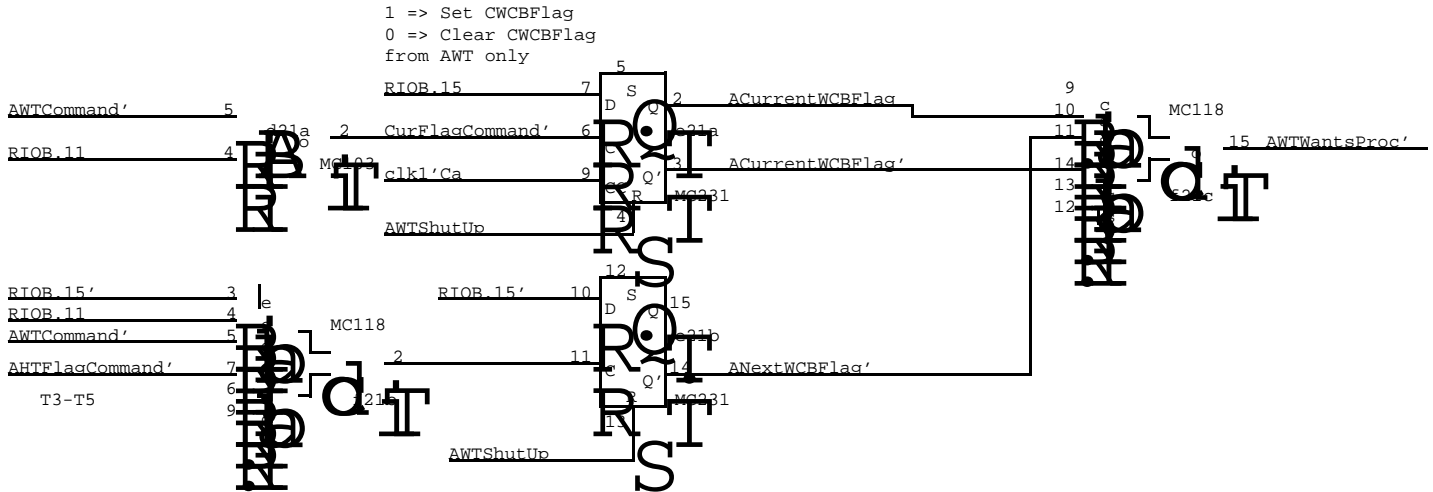
| For AWT Commands: |                                    | For AHT commands: |                  |
|-------------------|------------------------------------|-------------------|------------------|
| RIOB              | Means                              | RIOB              | Means            |
| =1c               | Set CWCBFlag and<br>Clear NWCBFlag | =0c               | Set ANextWCBFlag |
| =0c               | Clear CWCBFlag                     |                   |                  |

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

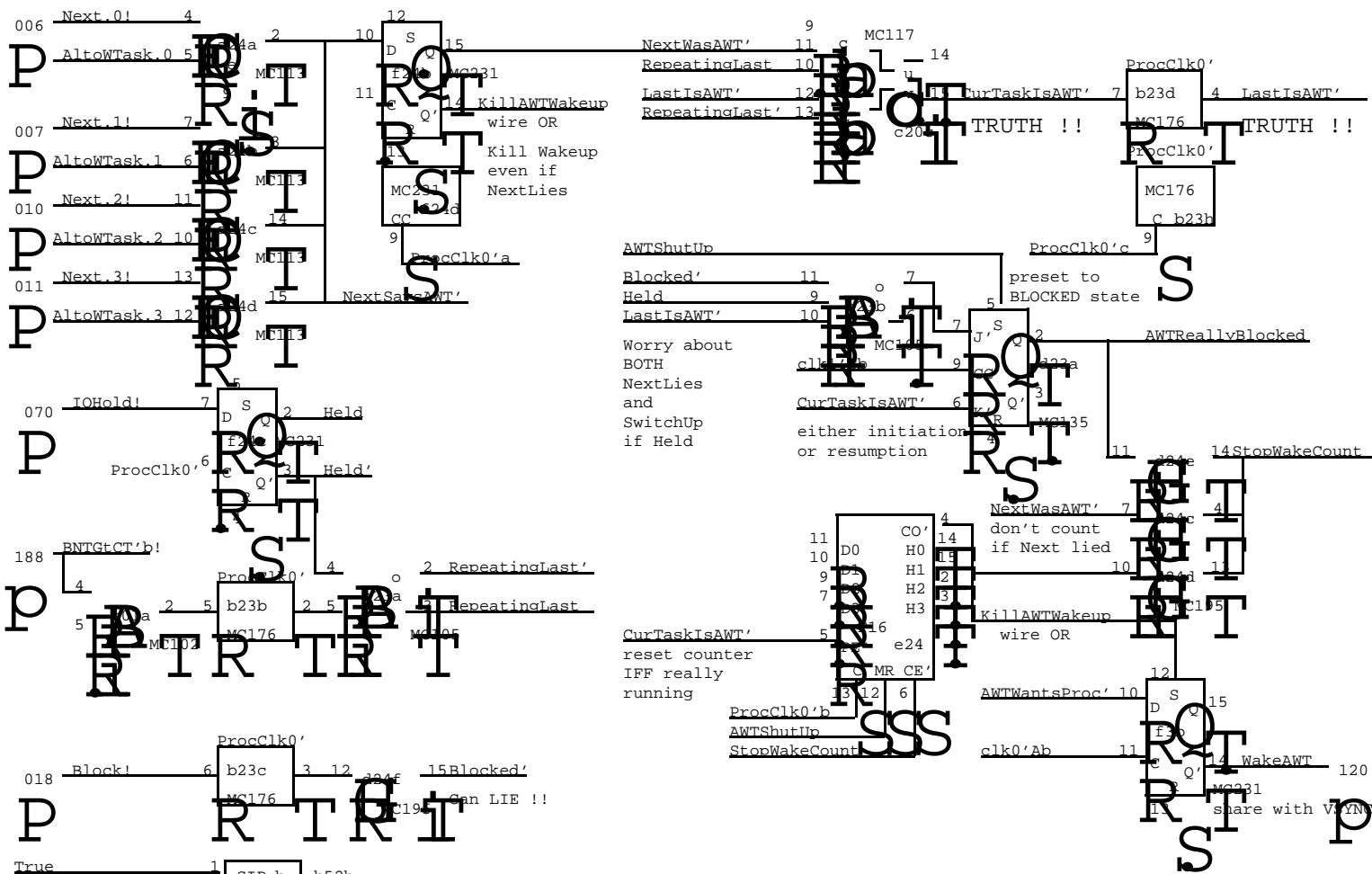
WakeUp conditions:

WakeAHT: at end of every HWindow

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





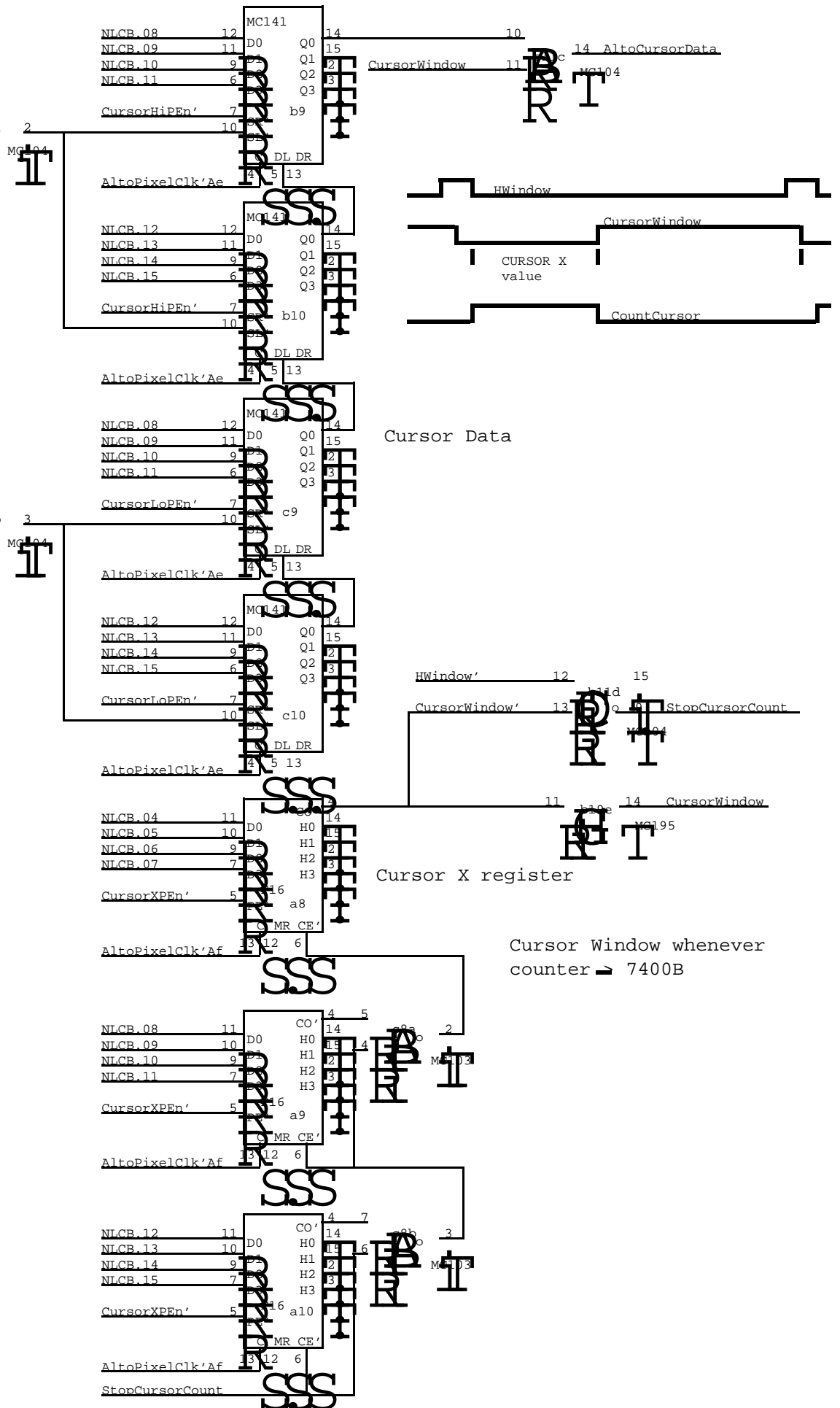


|             |   |       |      |
|-------------|---|-------|------|
| True        | 1 | SIP b | b52b |
| AltoWTask.0 | 1 | OP c  | b52c |
| AltoWTask.1 | 0 | OP d  | b52d |
| AltoWTask.2 | 0 | OP e  | b52e |
| AltoWTask.3 | 1 | OP f  | b52f |

For AWT Task = 9L = 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

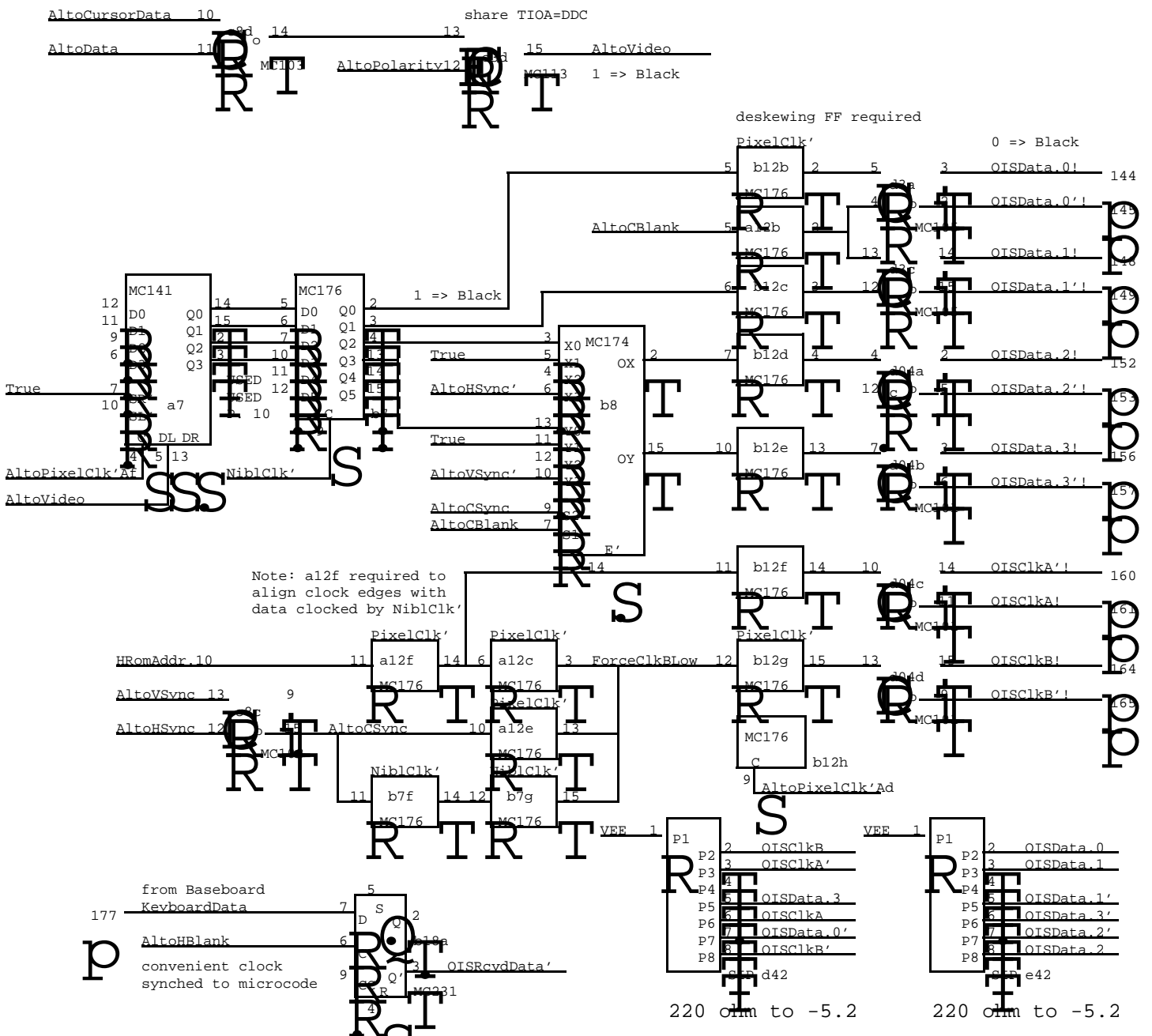
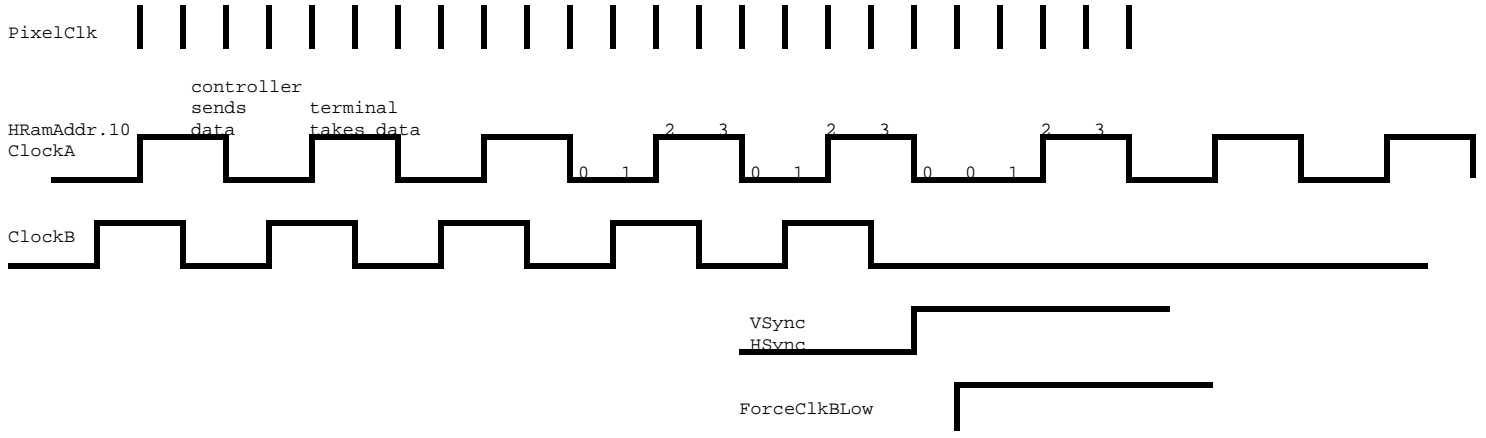
CursorLoPEn' 7  
 CursorWindow' 6



Cursor Data

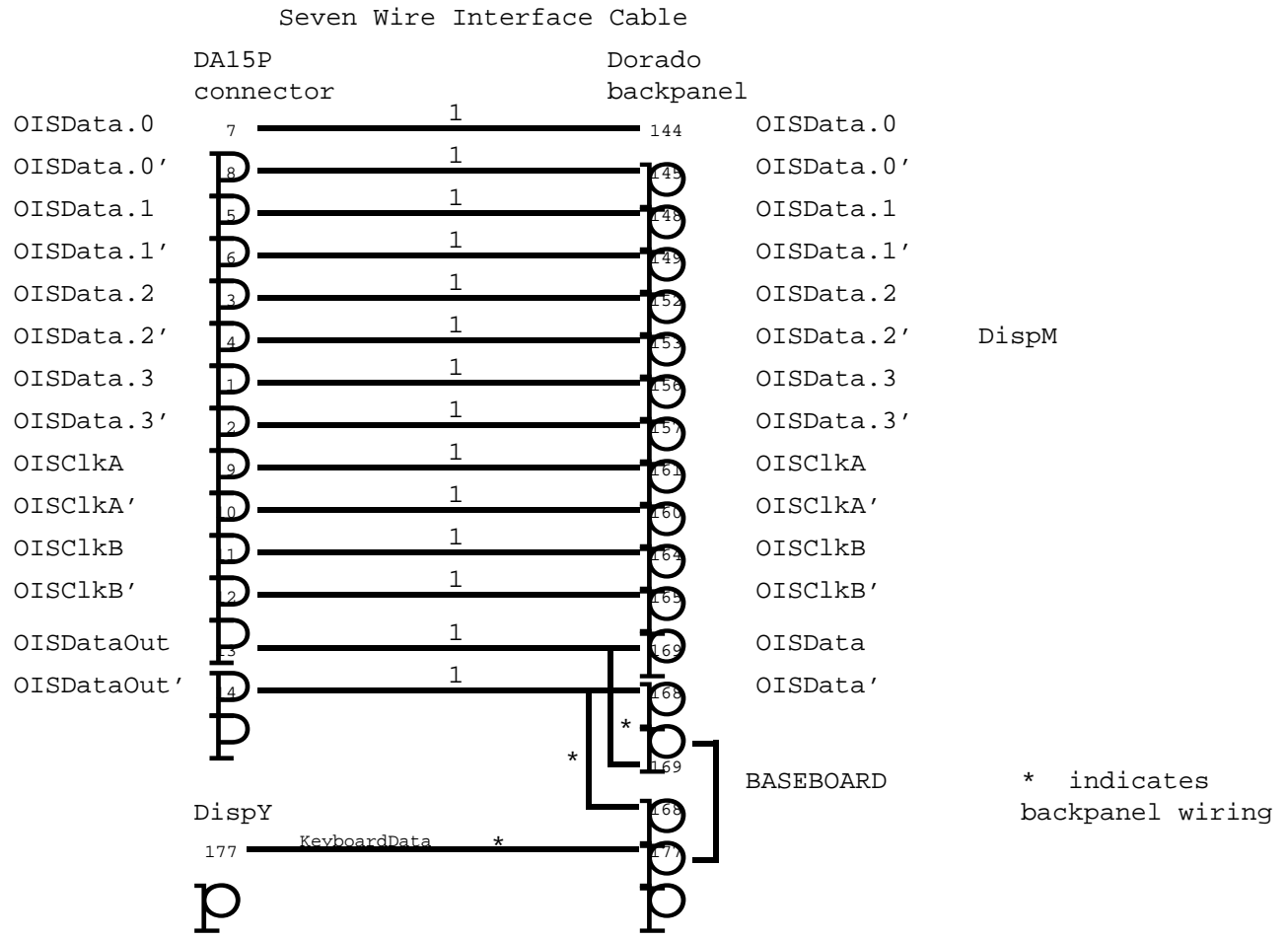
Cursor X register

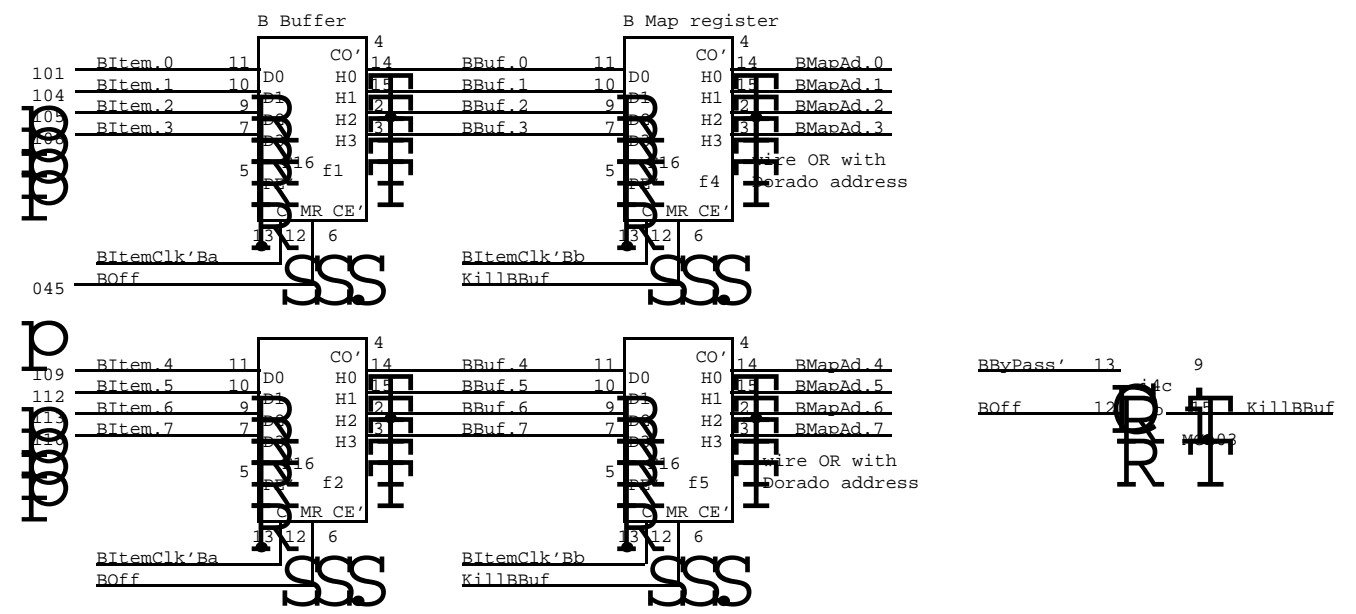
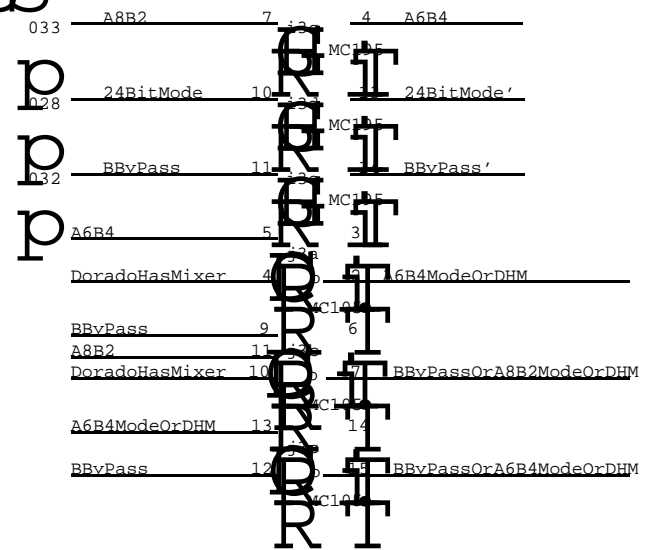
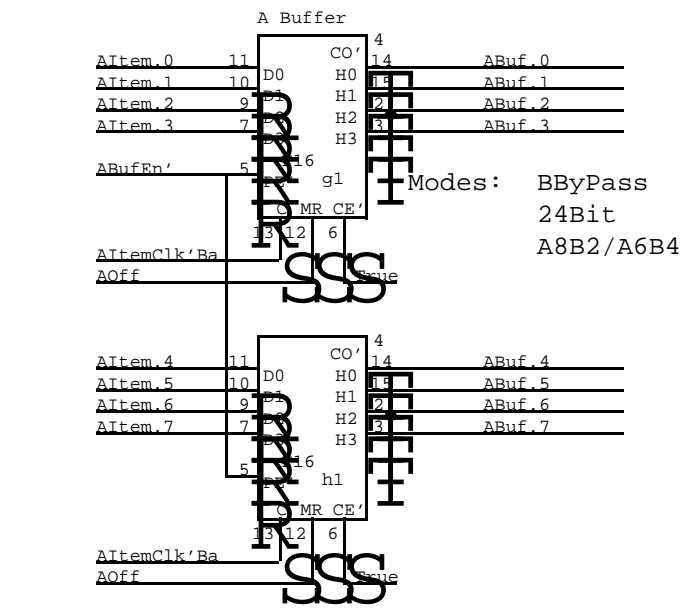
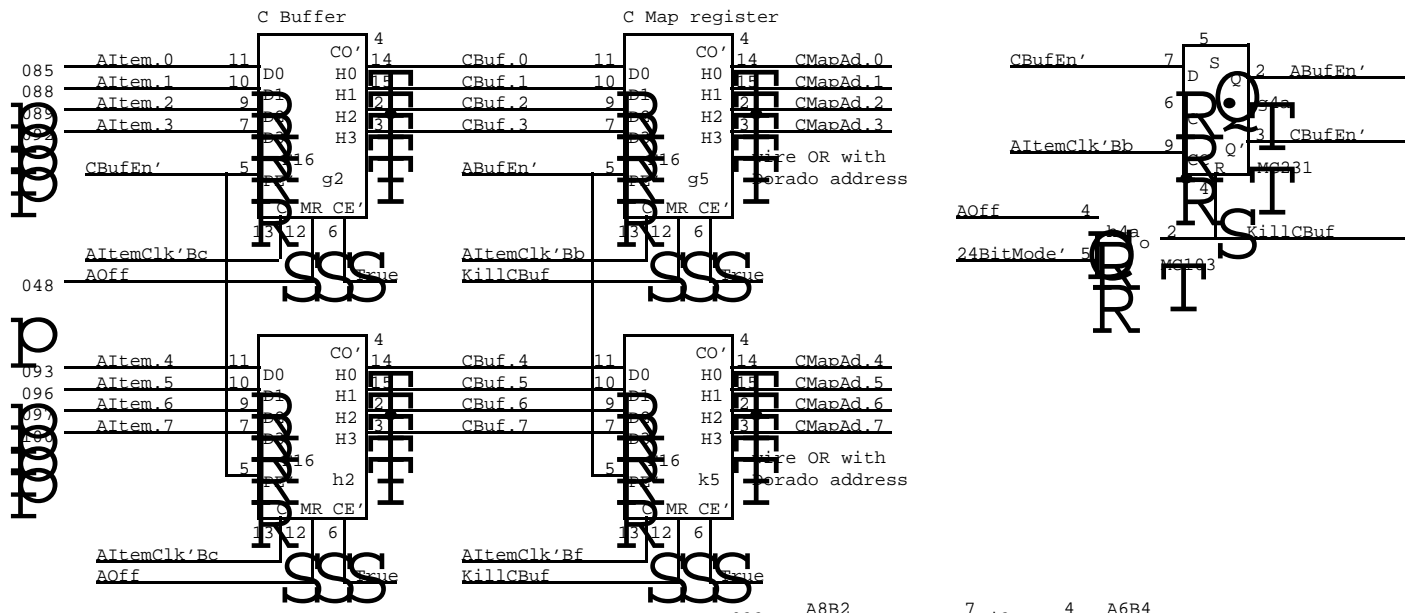
Cursor Window whenever  
 counter = 7400B



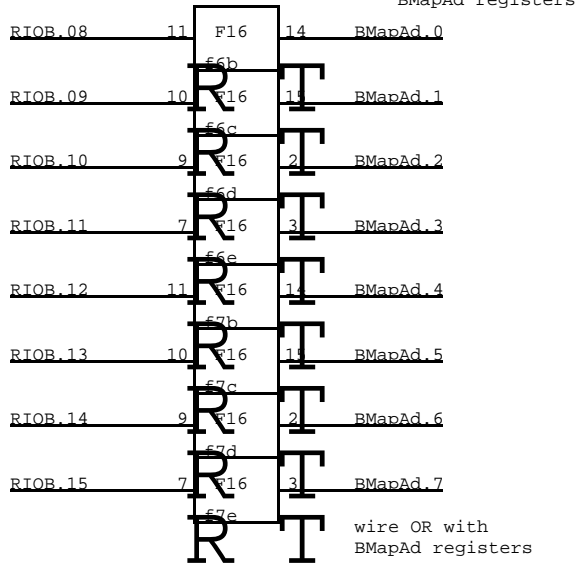
Alto Display Controller  
Next Line Control Block Format

| Address | Name                         | Format                         |
|---------|------------------------------|--------------------------------|
| 0       | VCW<br>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]            |

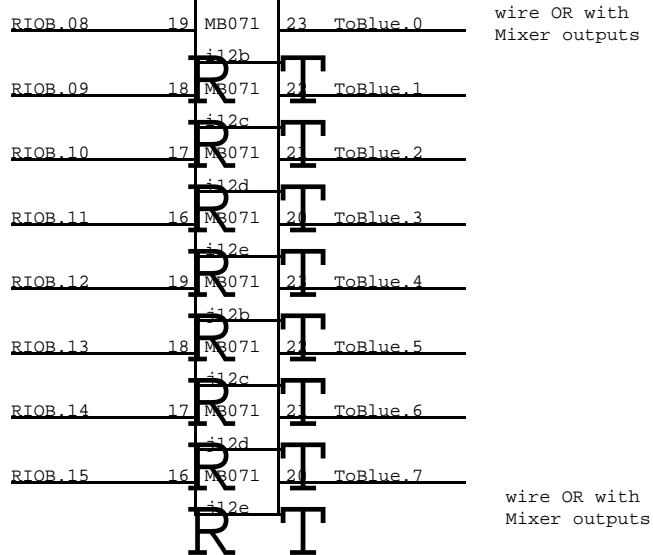




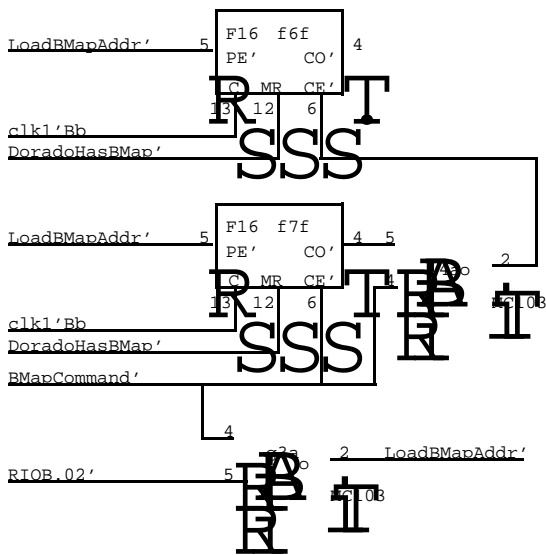
Dorado BMap address wire OR with BMapAd registers



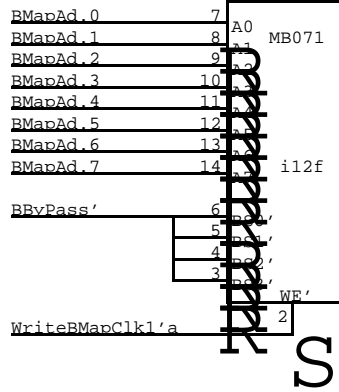
B Map



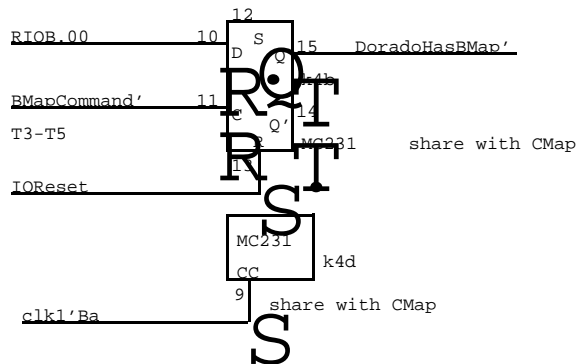
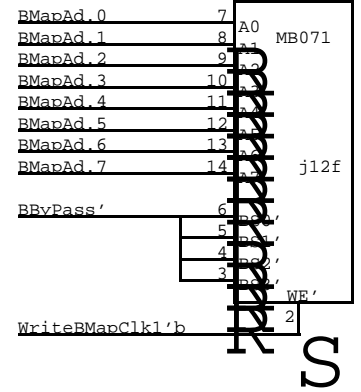
Dorado BMap address



B Map

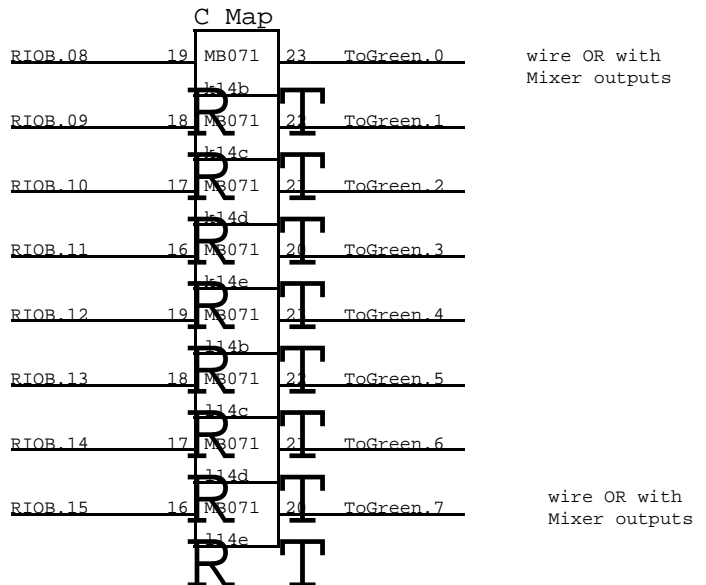
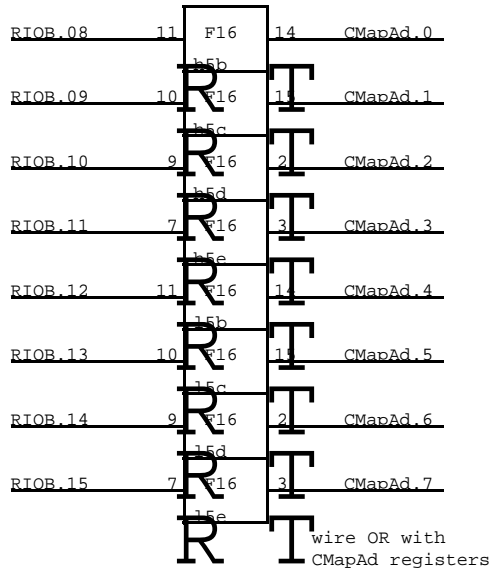


B Map

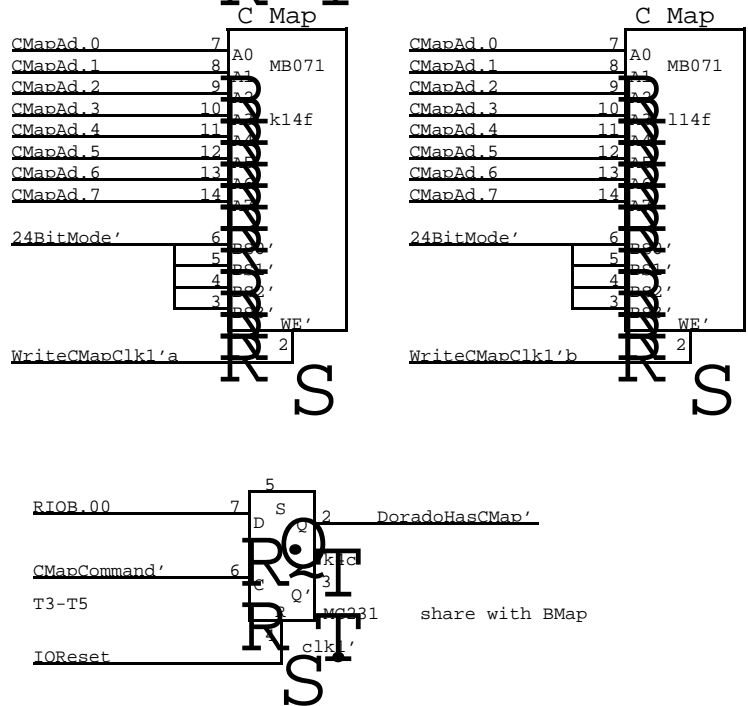
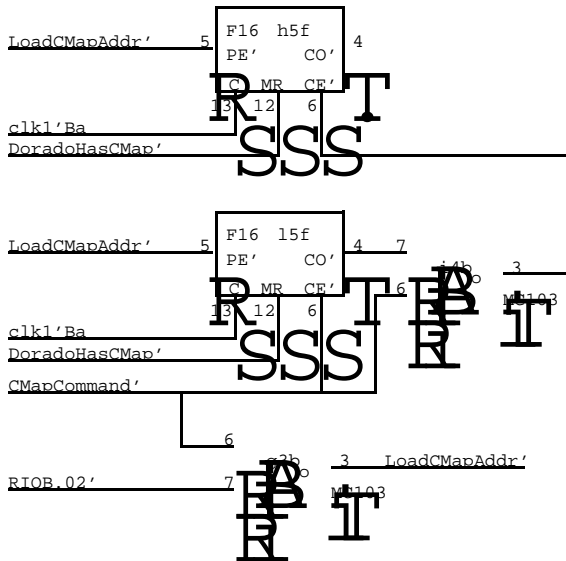


NOTE: in order to read/write BMap, BByPass mode must be ON and the B Channel must be OFF. This is inconvenient, but it does the right thing for real time mode switching.

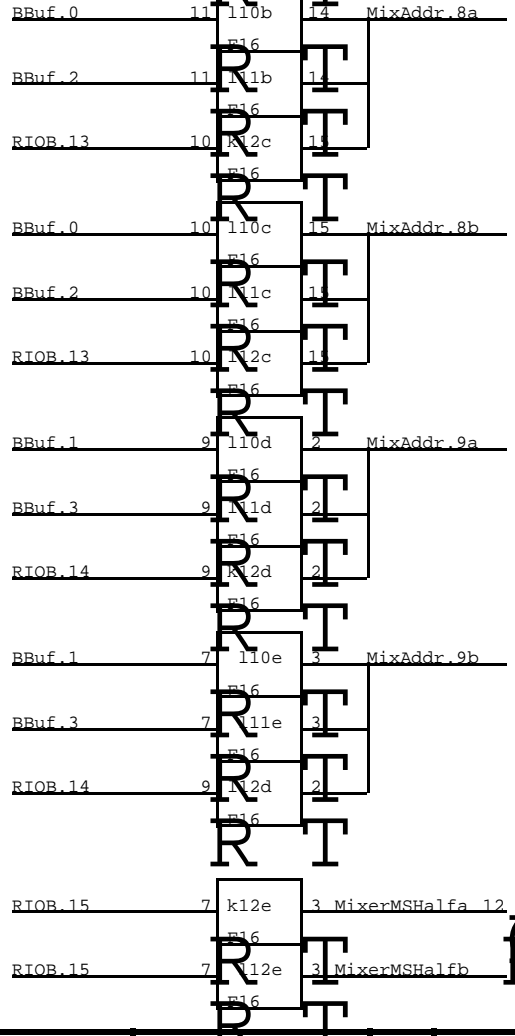
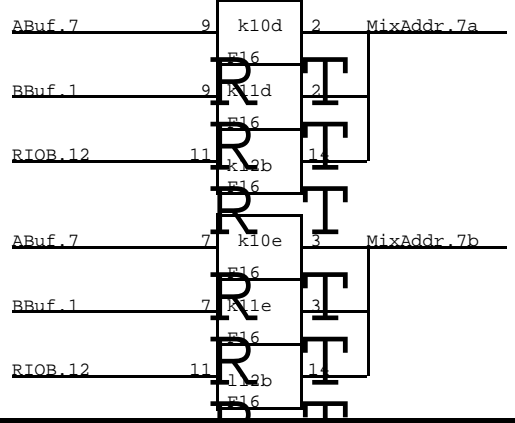
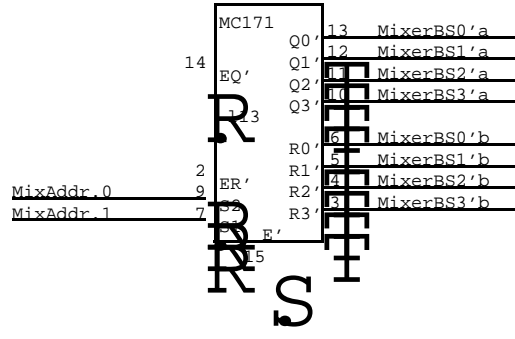
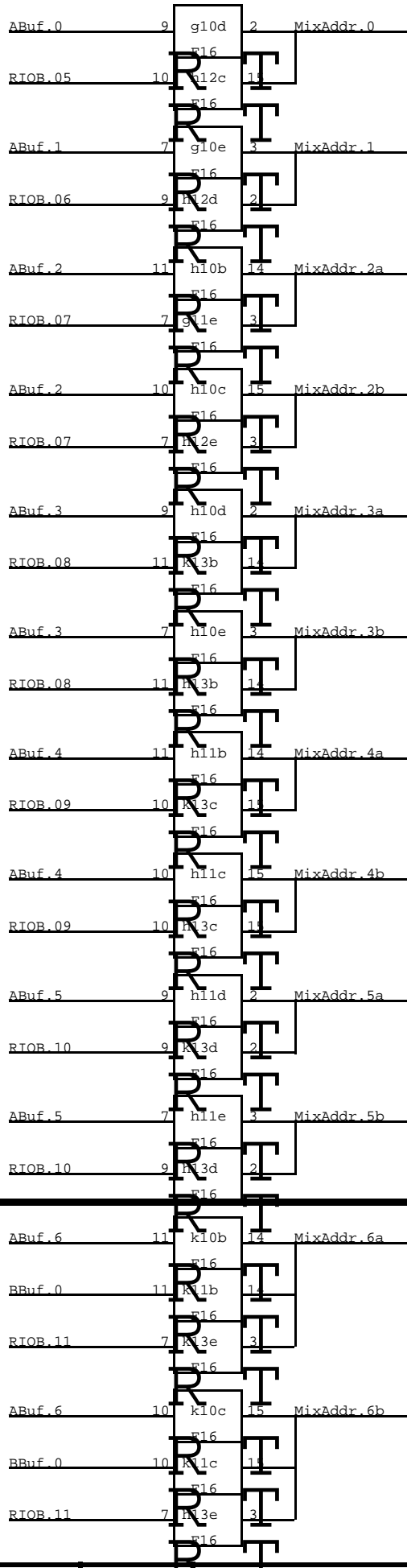
Dorado CMap address wire OR with CMapAd registers



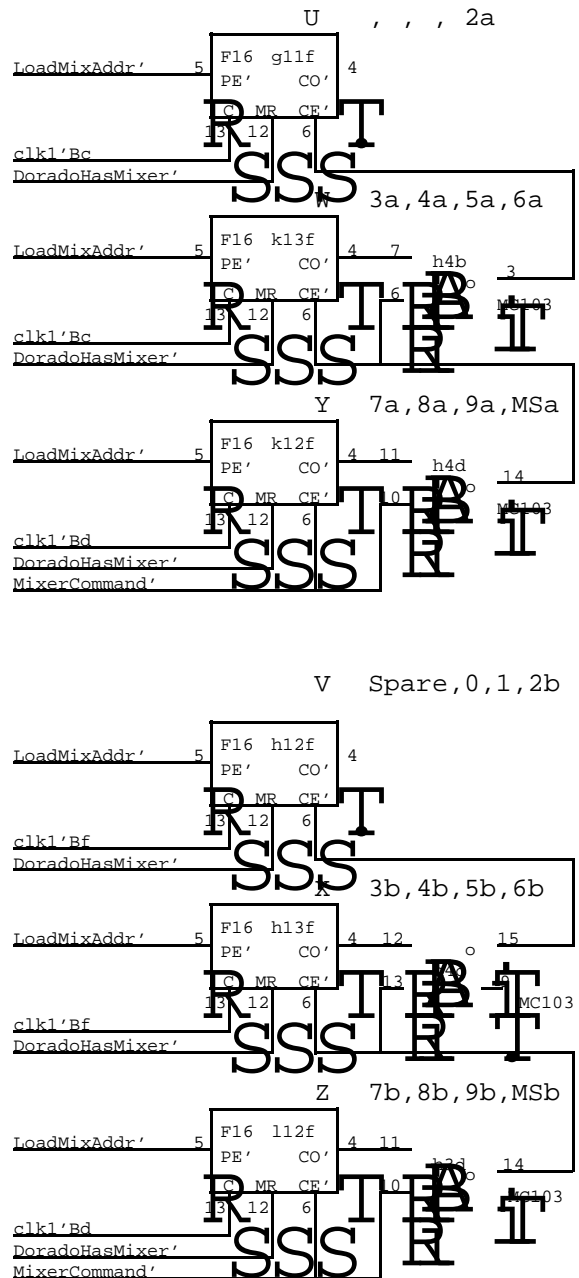
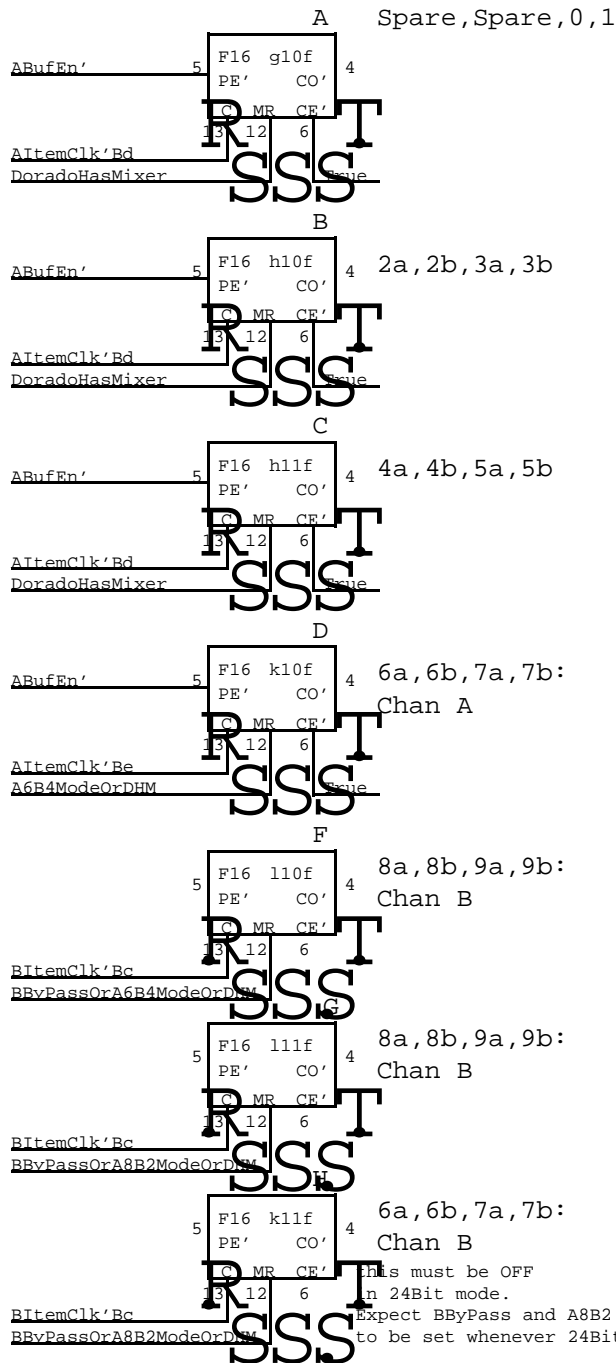
Dorado CMap address



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.

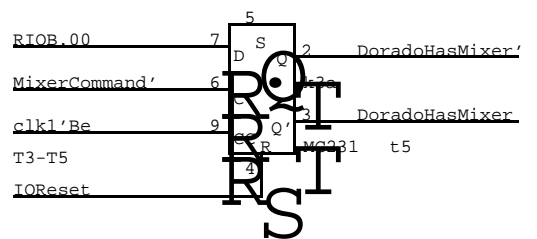
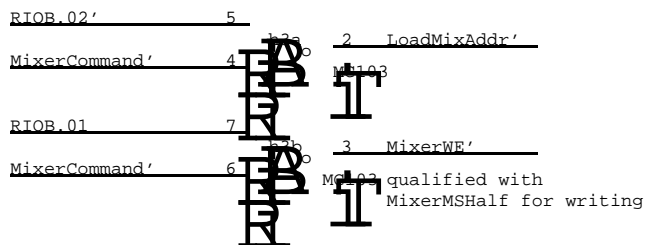


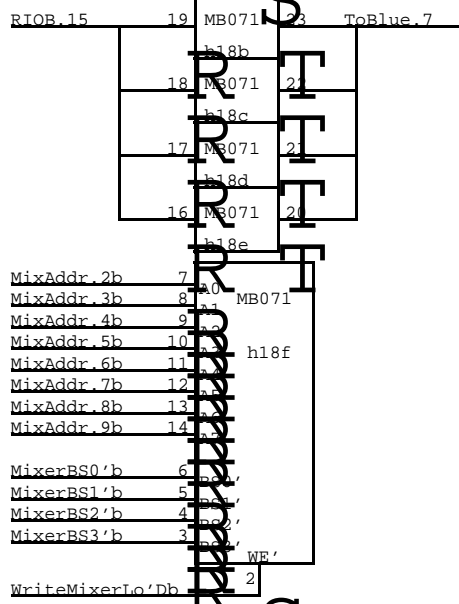
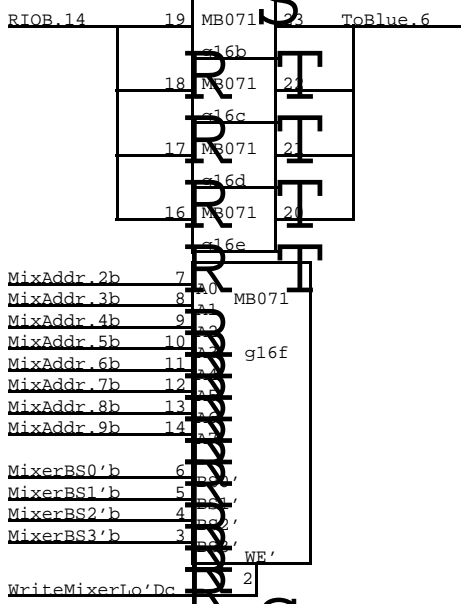
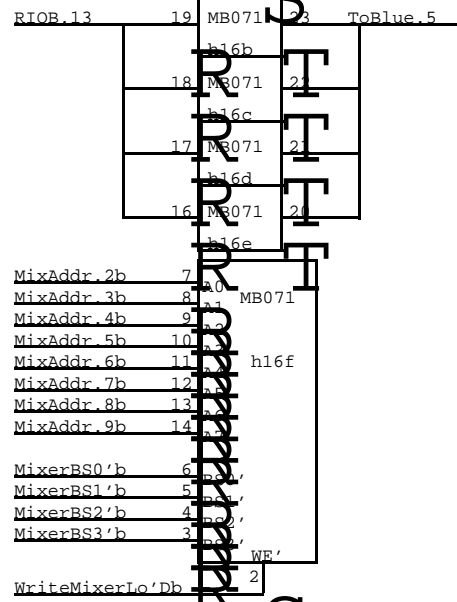
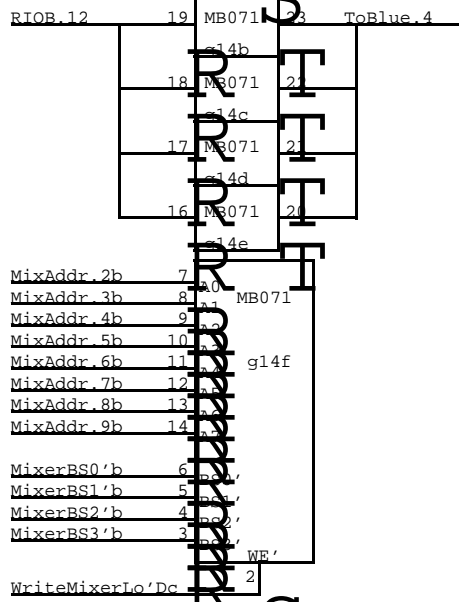
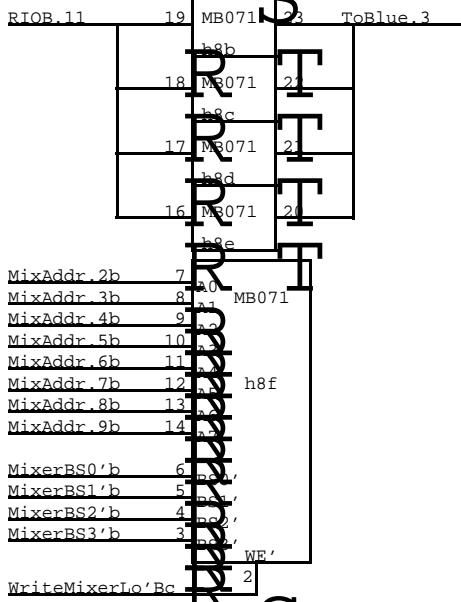
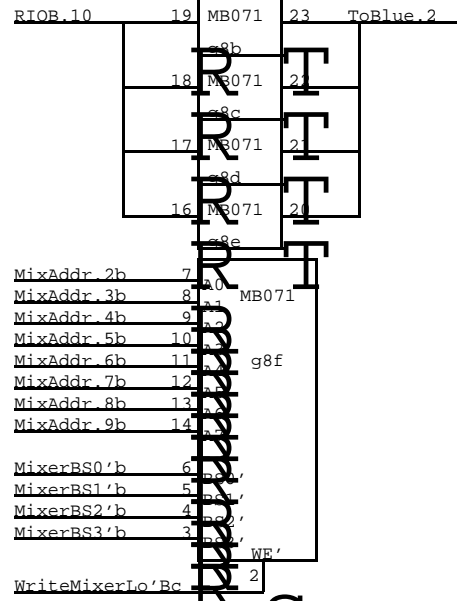
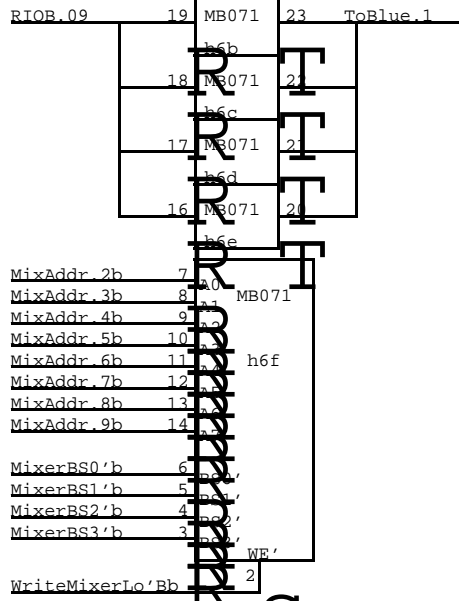
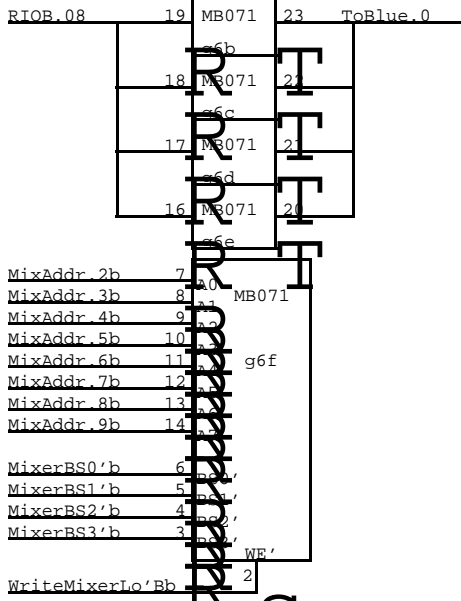


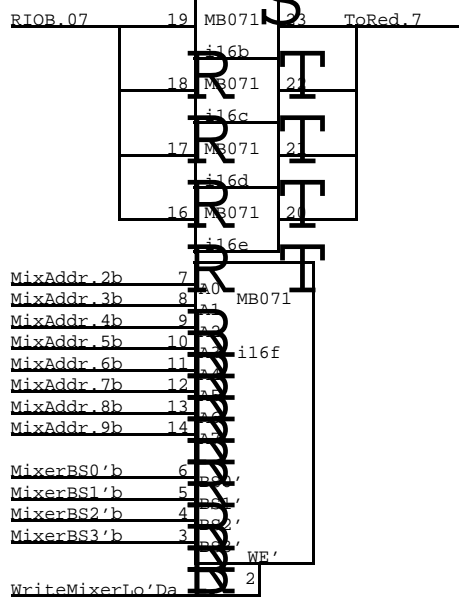
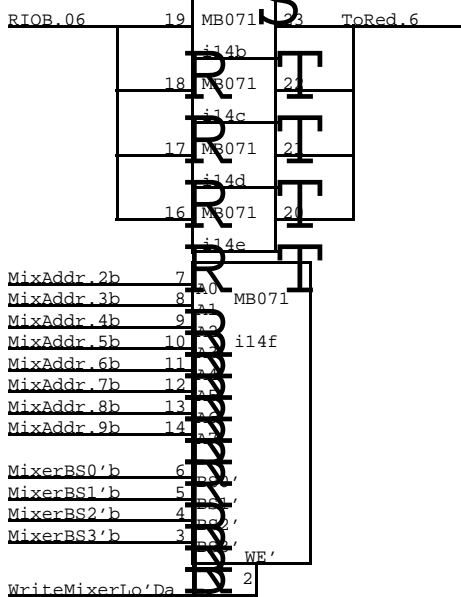
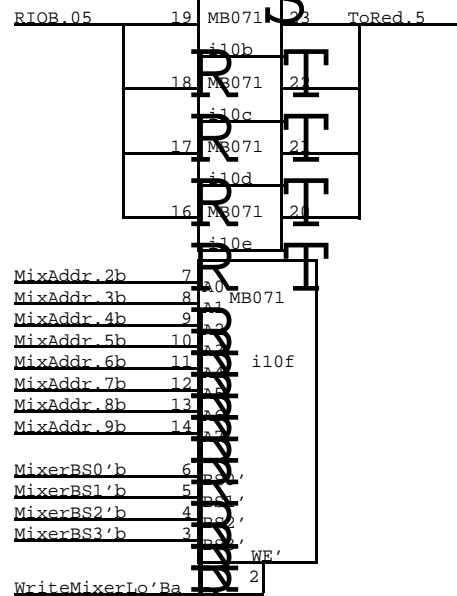
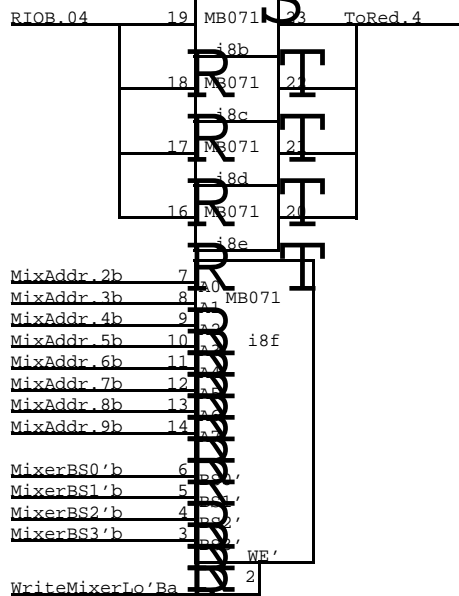
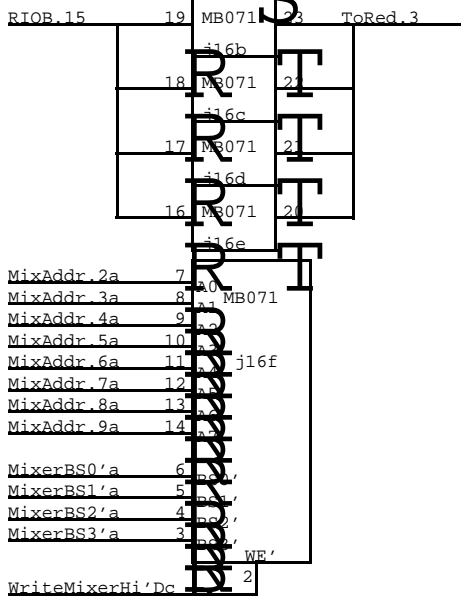
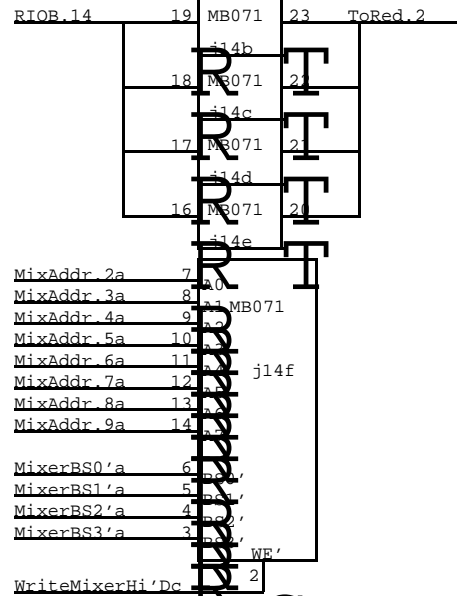
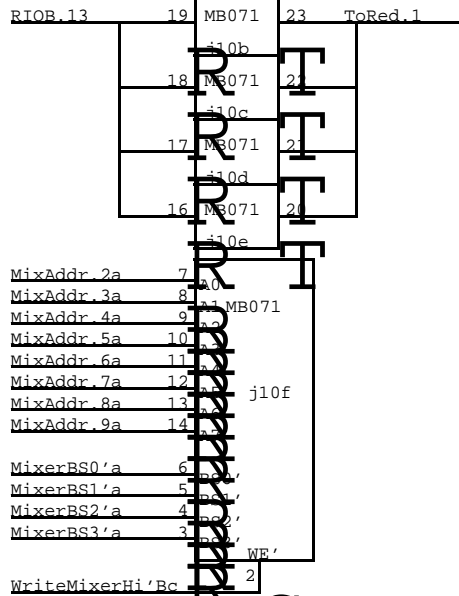
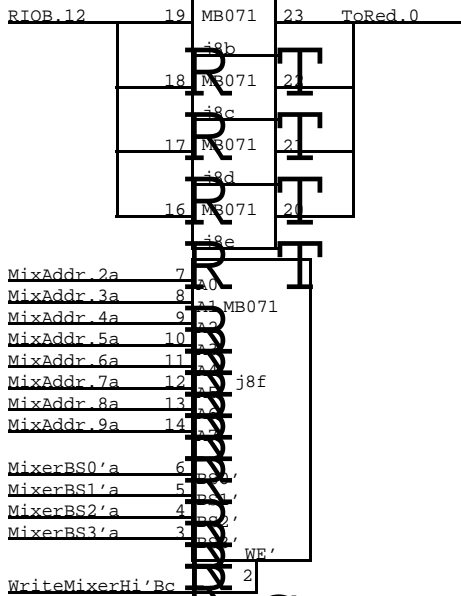


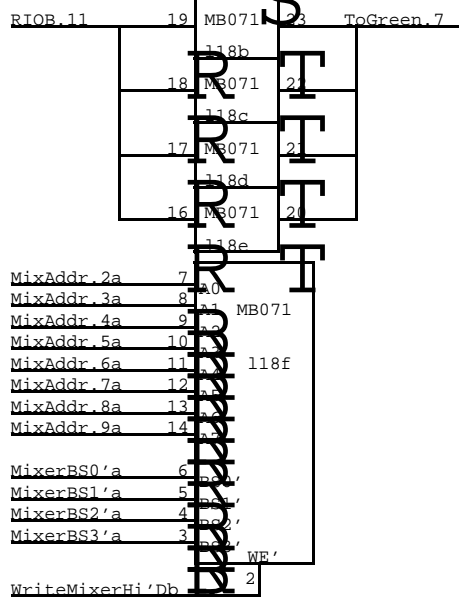
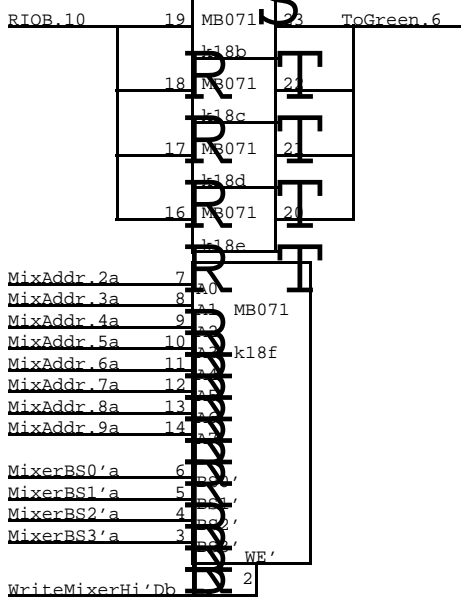
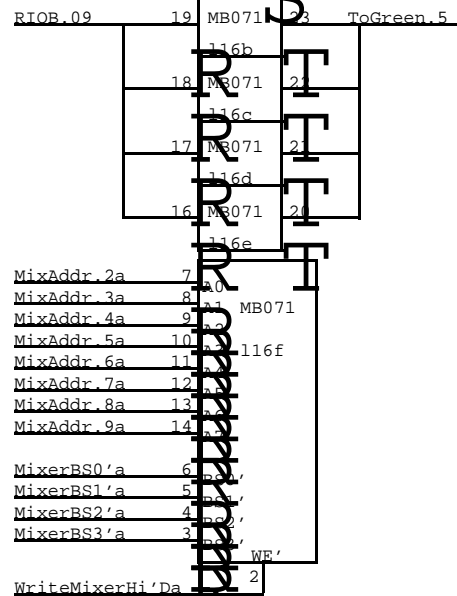
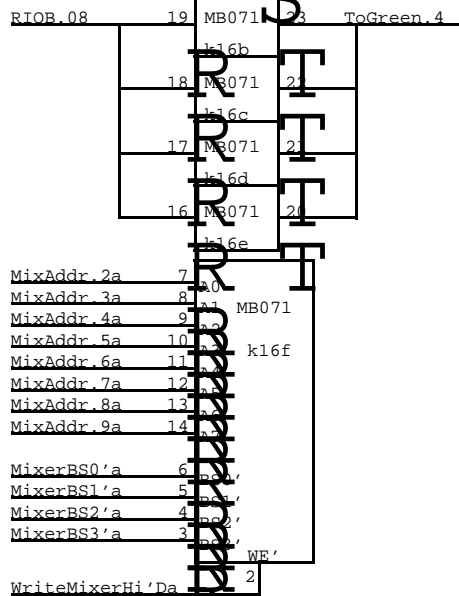
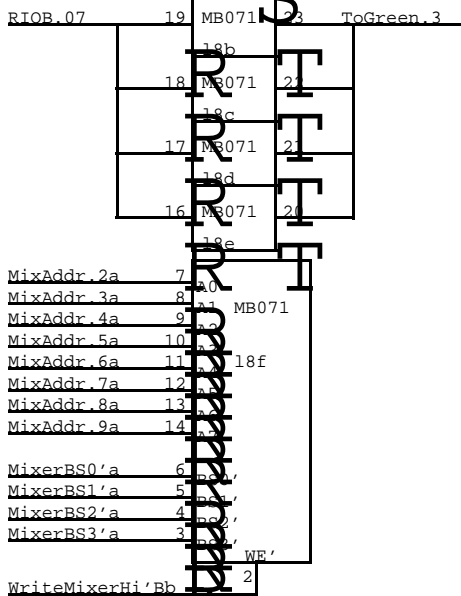
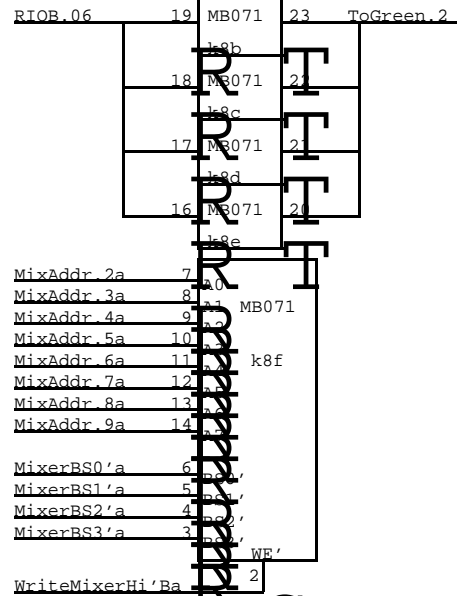
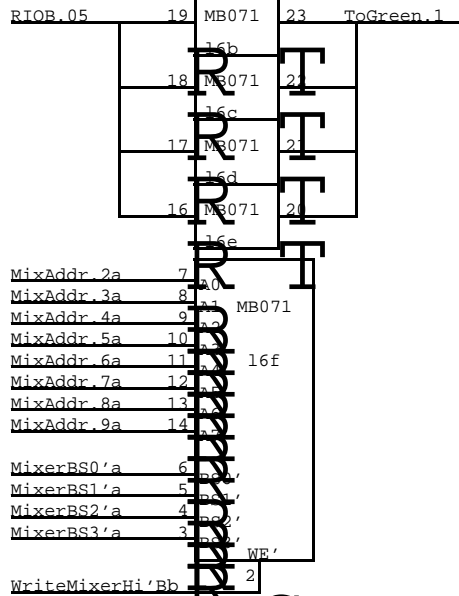
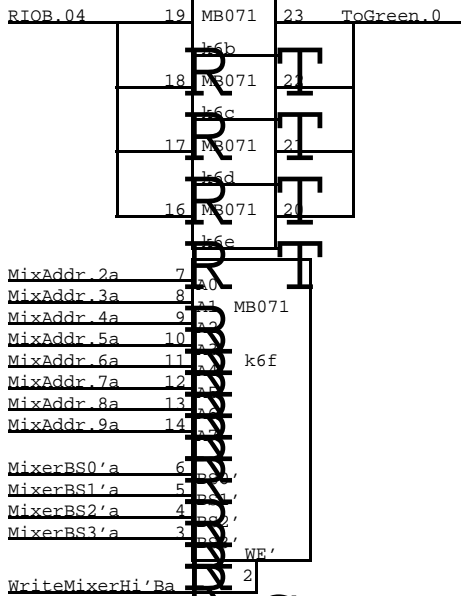
NOTE: B Channel must be started by microcode one pixel clk tick earlier than A channel for 24BitMode to align properly.

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

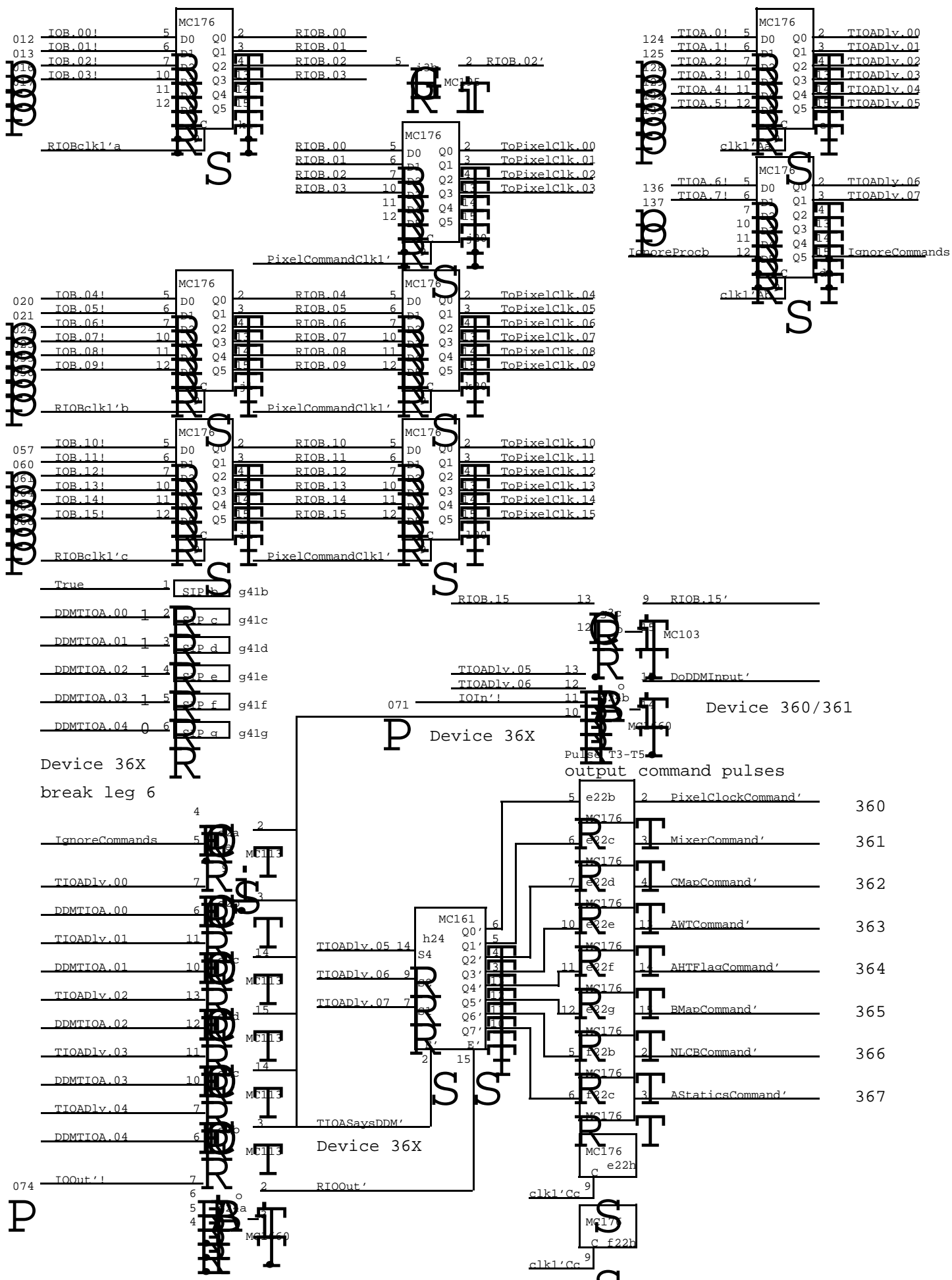




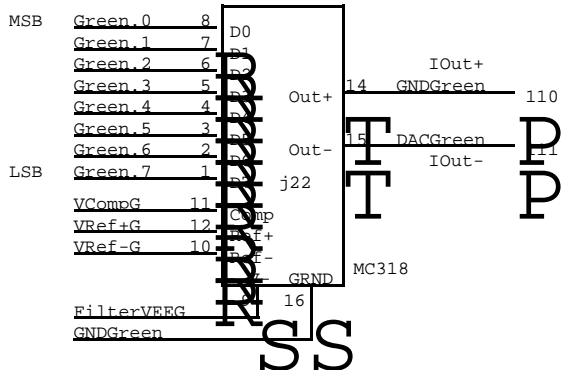




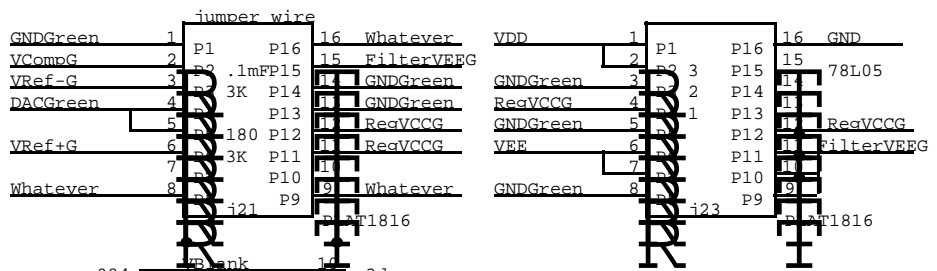




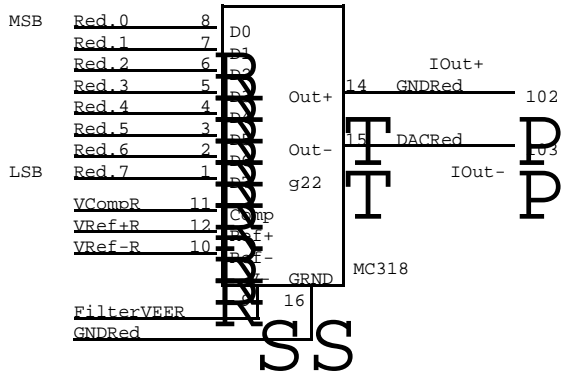
NOTES:  
 GNDGreen is  
 used as single point GND  
 for DAC system



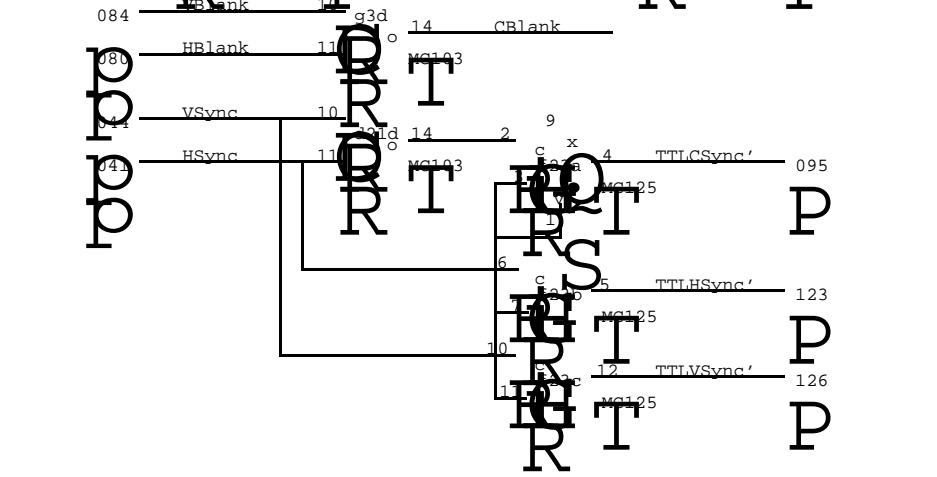
Digital/Analog converter



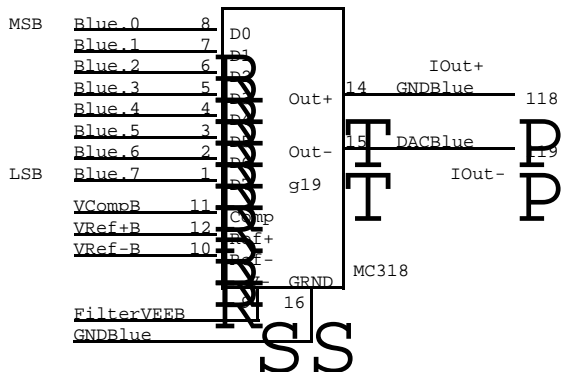
NOTES:  
 GND RED is  
 used as single point GND  
 for DAC system



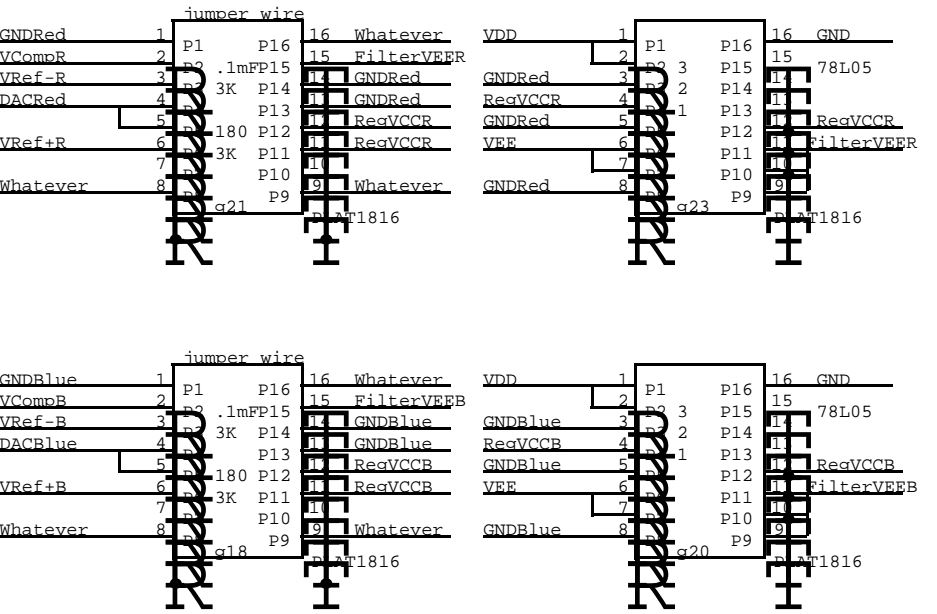
Digital/Analog converter



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



Digital/Analog converter

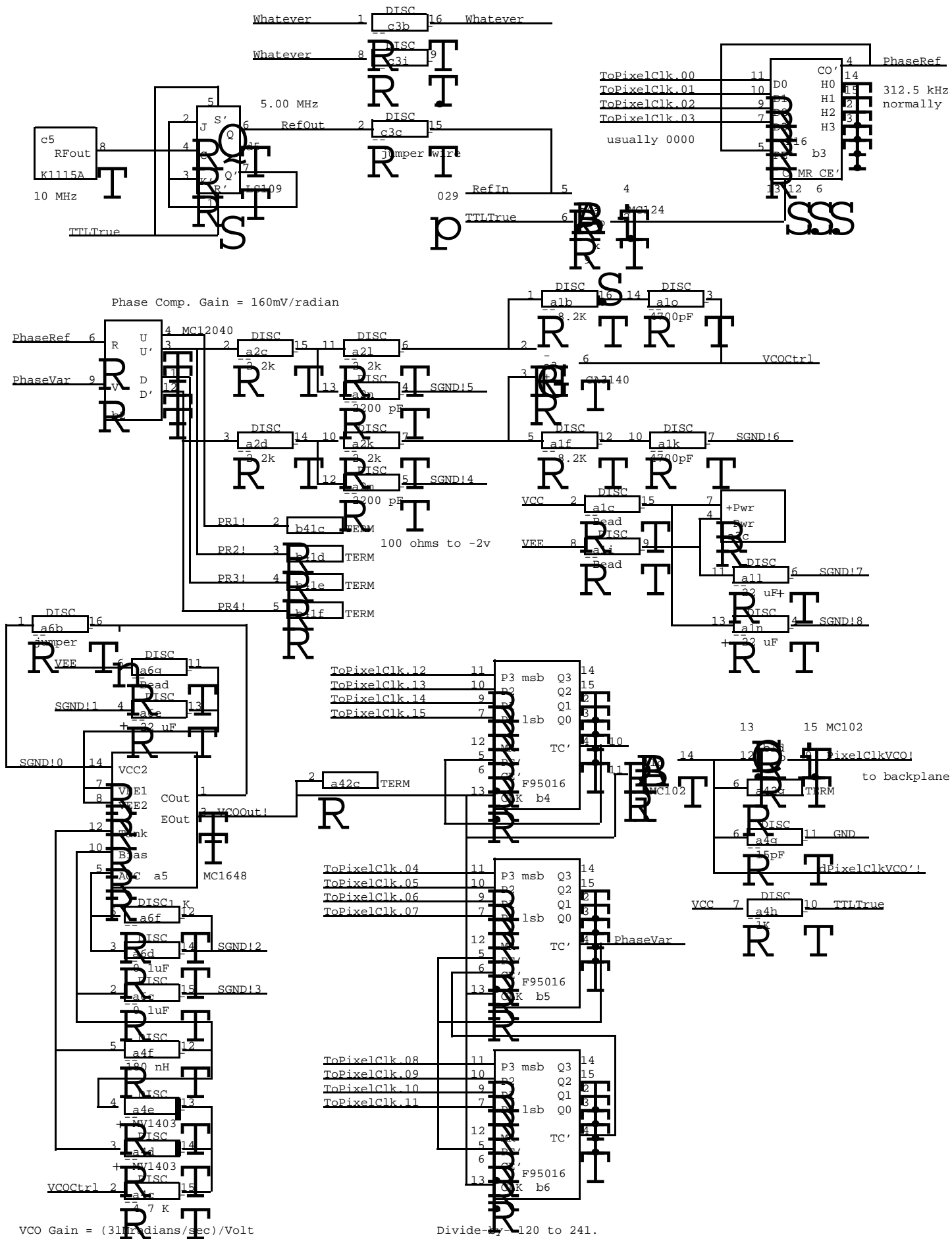


|   |             |    |
|---|-------------|----|
| 1 | jumper wire | 16 |
| 2 | 0.1mFarad   | 15 |
| 3 | 3 KOhm      | 14 |
| 4 |             | 13 |
| 5 | 180 Ohm     | 12 |
| 6 | 3 KOhm      | 11 |
| 7 |             | 10 |
| 8 |             | 09 |

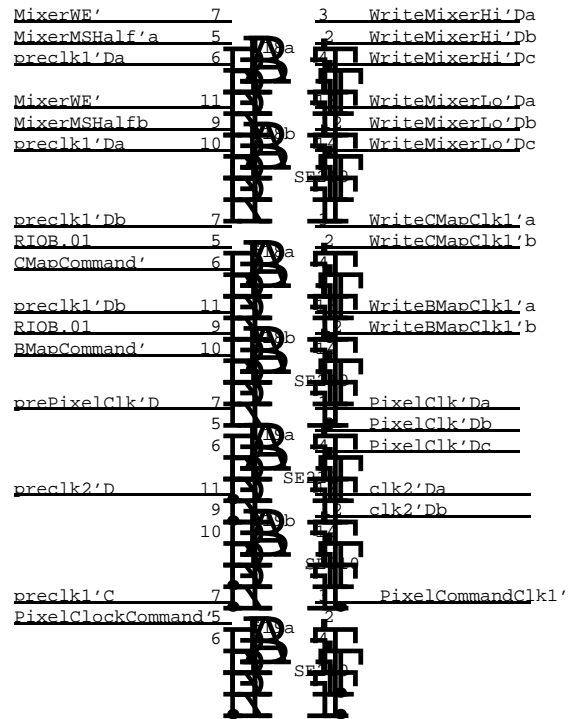
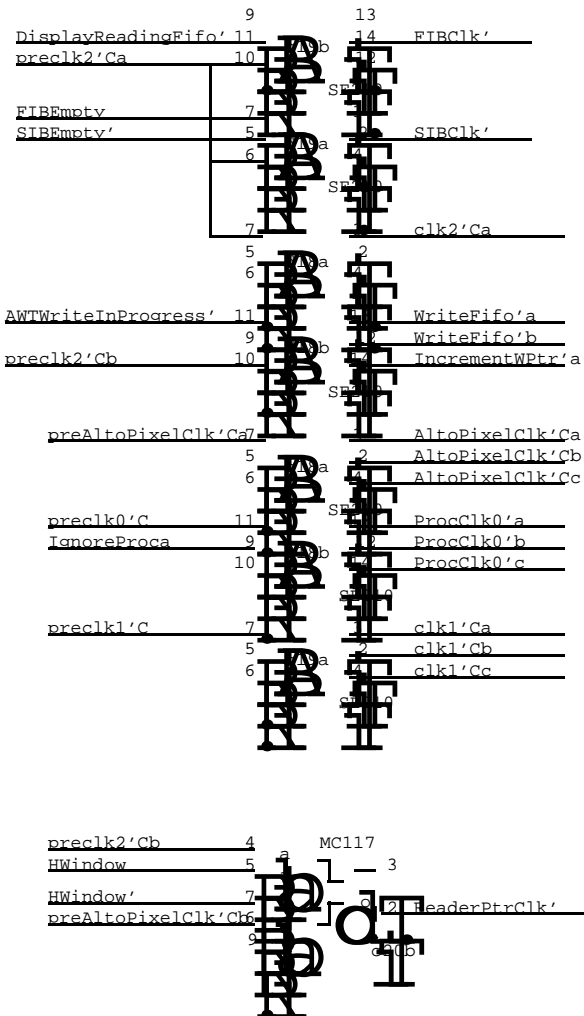
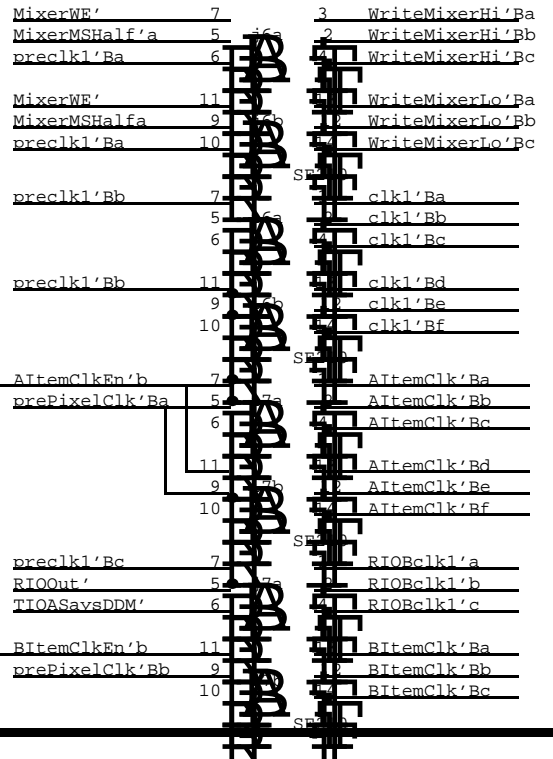
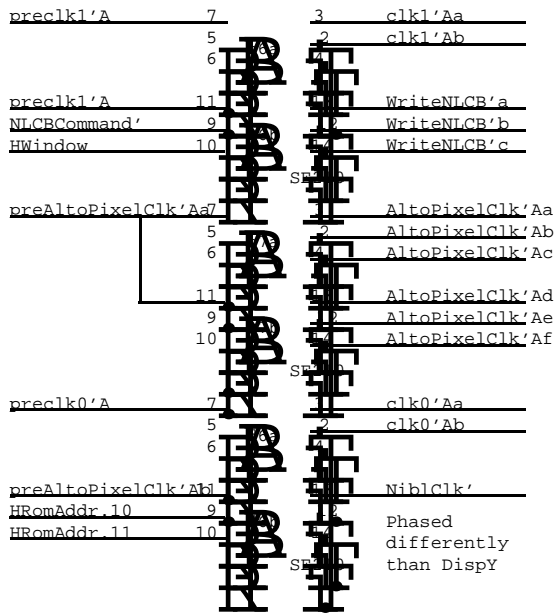
|   |                  |          |
|---|------------------|----------|
| 1 | 0.1mFarad        | 16       |
| 2 | in <sup>3</sup>  | 78L05 15 |
| 3 | gnd <sup>2</sup> | 14       |
| 4 | out <sup>1</sup> | 13       |
| 5 | 0.1mFarad        | 12       |
| 6 | 12 mHnry         | 11       |
| 7 | 2 ohm 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

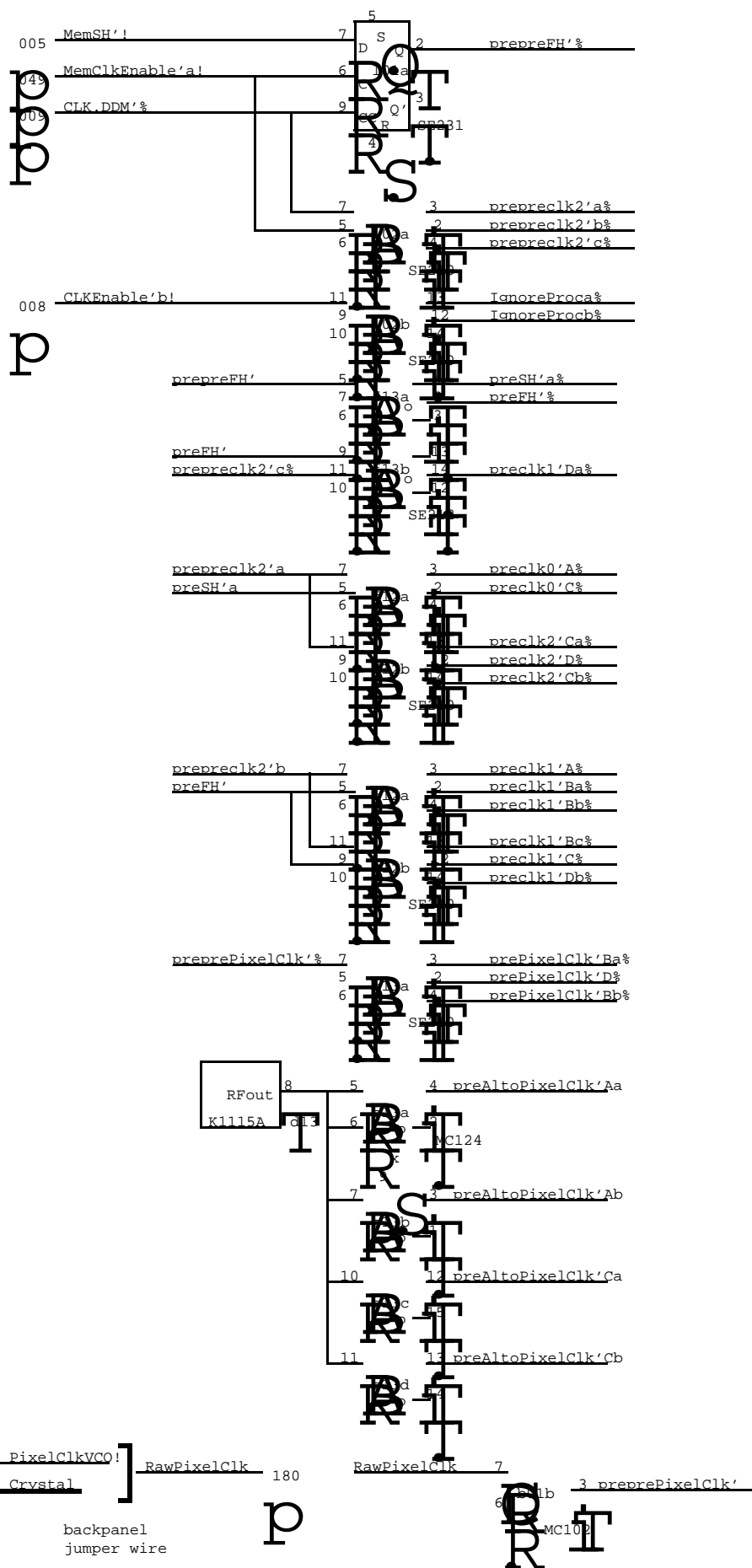
locations g18,g21,j21

locations j23,g23,g20





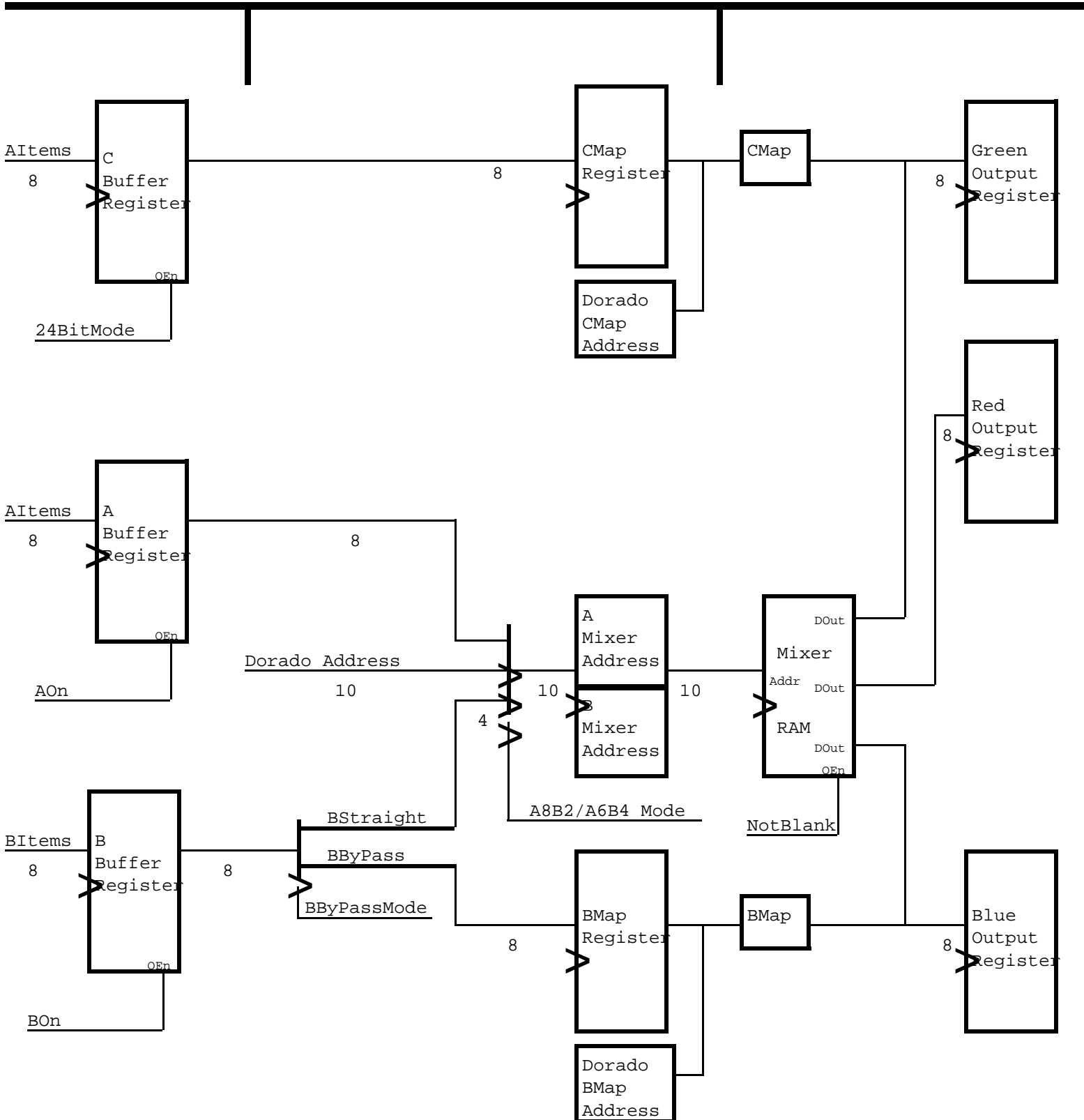
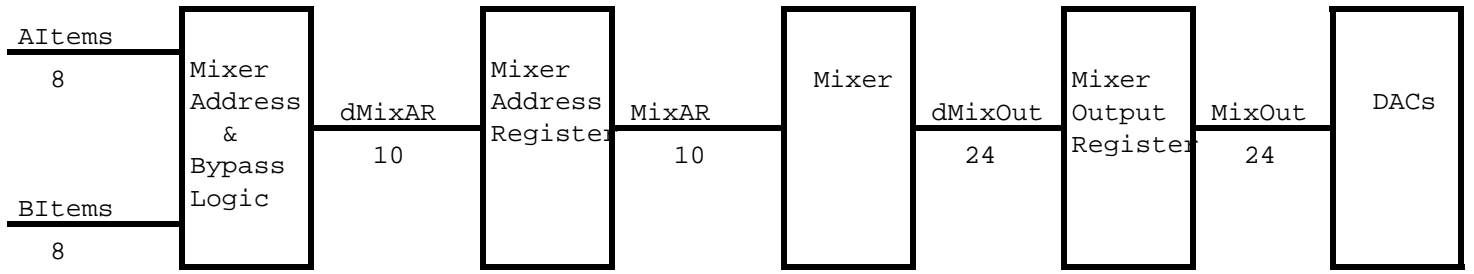




| C    | CONNECTOR          |                           | CONNECTOR                        |                           | TIOA                        | TW                        | CONNECTOR                    |                              | IOBLo                          | CONNECTOR        |                         | IOBHi             | CLK | C  |
|------|--------------------|---------------------------|----------------------------------|---------------------------|-----------------------------|---------------------------|------------------------------|------------------------------|--------------------------------|------------------|-------------------------|-------------------|-----|----|
| B>Ct | a 181              | b 168                     | c 153                            | d 137                     | e 124                       | f 109                     | 93 g                         | 80 h                         | 64 j                           | 48 i             | 33 k                    | 20 l              | 19  | B  |
| 1    | DISC VCO<br>23     | PCLK<br>8,25,23,23<br>102 |                                  | TIOA<br>176 21            | TIOA<br>176 21              | BBuf<br>F16 12            | ABuf<br>F16 12               | ABuf<br>F16 12               | RIOB<br>176 21                 | RIOB<br>176 21   | RIOB<br>176 21          | 25<br>SE231       |     | 1  |
| 2    | DISC VCO<br>23     | 12040<br>VCO<br>23        |                                  | WakeAHT<br>135            | TIOA=D<br>113               | BBuf<br>F16 12            | CBuf<br>F16 12               | CBuf<br>F16 12               | DIOB<br>159 20                 | DIOB<br>159 20   | DIOB<br>159 20          | 25<br>SE210       |     | 2  |
| 3    | 3140 VCO<br>23     | F16<br>VCO<br>23          | DISC<br>23                       | OISDrvr<br>10,4,10<br>105 | TIOA=D<br>A,21,21,10<br>113 | WakeAWT<br>AVSync<br>231  | MapLd<br>13,14,21,<br>103 22 | MixLd<br>16,16,20,<br>103 16 | Modes<br>B,12,12<br>195 12,15, | DHM<br>21 105 12 | DHMix<br>231 16,B       |                   |     | 3  |
| 4    | DISC VCO<br>23     | 95016<br>VCO<br>23        | VCO<br>124<br>23                 | OISDrvr<br>101 10         |                             | BMapAd<br>F16 12          | ABufEn<br>231 12,B           | ORs<br>12,16,16,<br>103 16   | 13,14,12,D<br>103              |                  | DHMap<br>231 13,14      |                   |     | 4  |
| 5    | 1648 VCO<br>23     | 95016<br>VCO<br>23        | K1115<br>VCO<br>23               | LS109<br>VCO<br>23        |                             | BMapAd<br>F16 12          | CMapAd<br>F16 12             | DCMapAd<br>F16 14            | IOB<br>159 20                  |                  | CMapAd<br>F16 12        | DCMapAd<br>F16 14 |     | 5  |
| 6    | DISC VCO<br>23     | 95016<br>VCO<br>23        | Clock<br>210 24                  | Clock<br>210 24           | ShutUp<br>231 4             | DBMapAd<br>F16 13         | Mixer<br>B0 17               | Mixer<br>B1 17               | Clock<br>210 24                | Clock<br>210 24  | Mixer<br>G0 19          | Mixer<br>G1 19    |     | 6  |
| 7    | AltoStoP<br>141 10 | Nibble<br>176 10          | Clock<br>210 24                  |                           | CLCBDecd<br>161 5           | DBMapAd<br>F16 13         | --                           | --                           | Clock<br>210 24                | Clock<br>210 24  | --                      | --                |     | 7  |
| 8    | CursorX<br>F16 9   | OIS<br>174 10             | OIS<br>9,9,10,10<br>103          | Width<br>F16 4            | LMarg<br>F16 4              | NLCB<br>145A 5            | Mixer<br>B2 17               | Mixer<br>B3 17               | Mixer<br>R4 18                 | Mixer<br>R0 18   | Mixer<br>G2 19          | Mixer<br>G3 19    |     | 8  |
| 9    | CursorX<br>F16 9   | CursorHi<br>141 9         | CursorLo<br>141 9                | Width<br>F16 4            | LMarg<br>F16 4              | NLCB<br>145A 5            | --                           | --                           | --                             | --               | --                      | --                |     | 9  |
| 10   | CursorX<br>F16 9   | CursorHi<br>141 9         | CursorLo<br>141 9                | Width<br>F16 4            | LMarg<br>F16 4              | NLCB<br>145A 5            | MixAddr<br>F16 15            | MixAddr<br>F16 15            | Mixer<br>R5 18                 | Mixer<br>R1 18   | MixAddr<br>F16 15       | MixAddr<br>F16 15 |     | 10 |
| 11   | VCW<br>F16 4       | Cursor<br>104 9           | Width<br>4,4,6,4<br>103          | LMarg<br>103 4            | NLCBAddr<br>F16 5           | NLCBAddr<br>197 5         | MixAddr<br>F16 15            | MixAddr<br>F16 15            | --                             | --               | MixAddr<br>F16 15       | MixAddr<br>F16 15 |     | 11 |
| 12   | PixelClk<br>176 10 | OISSkew<br>176 10         | 3,4,4,2<br>104                   | HWindow<br>135 5          | LoadASR<br>121 3            | Clock<br>210 25           | Clock<br>210 25              | MixAddr<br>F16 15            | BMap<br>13                     | BMap<br>13       | MixAddr<br>F16 15       | MixAddr<br>F16 15 |     | 12 |
| 13   | HRomAddr<br>6      | HRomOut<br>176 6          | TTLtoEcl<br>25                   | Xtal<br>K1115<br>25       | LoadASR<br>F16 3            | Clock<br>212 25           | Clock<br>210 25              | MixAddr<br>F16 15            | --                             | --               | MixAddr<br>F16 15       | Bsel<br>171 15    |     | 13 |
| 14   | HRomAddr<br>6      | ASR<br>141 3              | ASR<br>141 3                     | ASR<br>141 3              | ASR<br>141 3                |                           | Mixer<br>B4 17               |                              | Mixer<br>R6 18                 | Mixer<br>R2 18   | CMap                    | CMap              |     | 14 |
| 15   | HRomAddr<br>6      |                           | FIB<br>176 3                     | FIB<br>176 3              | FIB<br>176 3                |                           | --                           |                              | --                             | --               | --                      | --                |     | 15 |
| 16   | HRomAddr<br>6      | Fifo<br>3                 | Fifo<br>3                        | Fifo<br>3                 | Fifo<br>3                   | FifoAd<br>158 2           | Mixer<br>B6 17               | Mixer<br>B5 17               | Mixer<br>R7 18                 | Mixer<br>R3 18   | Mixer<br>G4 19          | Mixer<br>G5 19    |     | 16 |
| 17   |                    |                           |                                  |                           |                             | FifoAd<br>158 2           | --                           | --                           | --                             | --               | --                      | --                |     | 17 |
| 18   | 6,4,4,2<br>102     | OISRevd<br>231 10,B       | Clock<br>210 24                  | Clock<br>210 24           | RPtr<br>2                   | WPtr<br>2                 | Bldac<br>Plat 22             | Mixer<br>B7 17               | Clock<br>210 24                | Clock<br>210 24  | Mixer<br>G6 19          | Mixer<br>G7 19    |     | 18 |
| 19   | 6,4,6,6<br>103     | 6,4,6<br>9,4,6<br>195     | Clock<br>210 24                  | Clock<br>210 24,B         | RPtr<br>2                   | WPtr<br>2                 | Bldac<br>10318               | --                           | Clock<br>210 24                | Clock<br>210 24  | --                      | --                |     | 19 |
| 20   |                    | HRom<br>MC149 6           | RdrPtrClk<br>CTisAWT<br>117 24,8 | ASRSync<br>231 2          |                             | AOn<br>ASRSync<br>135 2,4 | Bldac<br>Plat 22             | Blue<br>20                   | Red<br>20                      |                  | PXLCLK<br>176 21 176 21 | 176 21            |     | 20 |
| 21   |                    |                           | SCAN<br>F16 4                    | 7,2,2,22<br>103           | Flags<br>231 7              | Flags<br>118 7            | RdDac<br>Plat 22             | Blue<br>20                   | Red<br>20                      | GrDac<br>Plat 22 | Green<br>20             |                   |     | 21 |
| 22   | SIB<br>176 3       | SIB<br>176 3              | SIB<br>176 3                     |                           | CMND<br>176 21              | CMND<br>176 21            | RdDac<br>10318               | Color'<br>195 20             | Color'<br>195 20               | GrDac<br>10318   | Green<br>20             |                   |     | 22 |
| 23   | 8,8,C<br>105       | ProcClk0<br>176 8         |                                  | blocked<br>135 8          | ASRSync<br>135 2            | TTLCSync<br>22 125        | RdDac<br>Plat 22             | Color'<br>195 20             | Color'<br>195 20               | GrDac<br>Plat 22 |                         | 1,B,C,D<br>102    |     | 23 |
| 24   | NextAWT<br>112 8   |                           |                                  | WakeCnt<br>B,4*8,2<br>195 | WakeCnt<br>F16 8            | Hold<br>231 8             | IOInOut<br>1660 21           | TIOA=D<br>161 21             | Fout<br>176 1                  | Fout<br>176 1    | Fout<br>176 1           | FtTsk<br>113 1    |     | 24 |

| C | a 11 | b 26 | c 39 | d 55 | e 70     | Hold f 86 | 99 g     | 114 h | 129 i | 143 j | 159 k | 174 l | D |
|---|------|------|------|------|----------|-----------|----------|-------|-------|-------|-------|-------|---|
| E | Next | Subt | BLK  | FIN  | IOin/out | CONNECTOR | IOB FNXT | FOUT  | FTsk  | DMux  | E     |       |   |

|                 |                   |                                 |                     |                     |           |                  |            |
|-----------------|-------------------|---------------------------------|---------------------|---------------------|-----------|------------------|------------|
| PROJECT<br>PARC | Project<br>Dorado | Reference<br>DispM Board Layout | File<br>DispM26.sil | Designer<br>K. Pier | Rev<br>Ch | Date<br>11/09/82 | Page<br>26 |
|-----------------|-------------------|---------------------------------|---------------------|---------------------|-----------|------------------|------------|



| 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 | 104 |                              |
| Green         | 1 | 105 |                              |
| Blue GND      | 1 | 106 |                              |
| Blue          | 1 | 107 |                              |
| TTLCSync'     | 1 | 108 |                              |
| TTLCSync' GND | 1 | 109 |                              |

|         |   |     |   |
|---------|---|-----|---|
| MType.0 | 1 | 079 | Monitor type field<br>Jumper resistors on backplane |
| MType.1 | 1 | 080 |   |
| MType.2 | 1 | 081 |   |

DispM ControlA

121 WakeTHT (TWReg4) twisted pair 56

120 WakeTHT (TWReg9) twisted pair 128

Plus seven wire interface cable. See page 11.

DDC Slow IO System

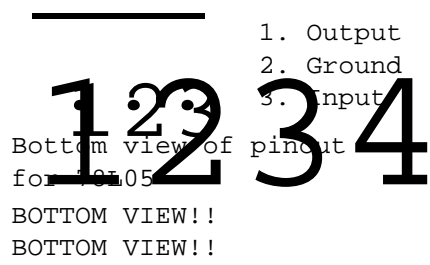
| DEVICE   | TIOA | I/O | TASK     | FORMAT and COMMENTS                  |
|----------|------|-----|----------|--------------------------------------|
| AStatics | 367  | 0   | AHT      |                                      |
| NLCB     | 366  | 0   | AHT      |                                      |
| 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<br>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<br>12 Bits    |        |        |        |        |        |         |        |               |                      |              | NLCB     |
|                       |              |                 |              |                         |        |        |        |        |        | IOFetch |        |               | Set/Clr Cur WCB Flag | AWT          |          |
|                       |              |                 |              |                         |        |        |        |        |        |         |        |               | X                    | Must Be 0    | AHTFlag  |

|   |              |    |
|---|--------------|----|
| 1 | jumper wir@6 |    |
| 2 | 0.1mFarad    | 15 |
| 3 | 3 KOhm       | 14 |
| 4 | 120 Ohm      | 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 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 wir@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 wire5 |    |
| 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<br>30<br>31 | Expanded pixel clock buffer.<br>Added 120 ohm resistor to position 4 of Platform for g18, g21<br>Added Revision Record Page |