Introduction

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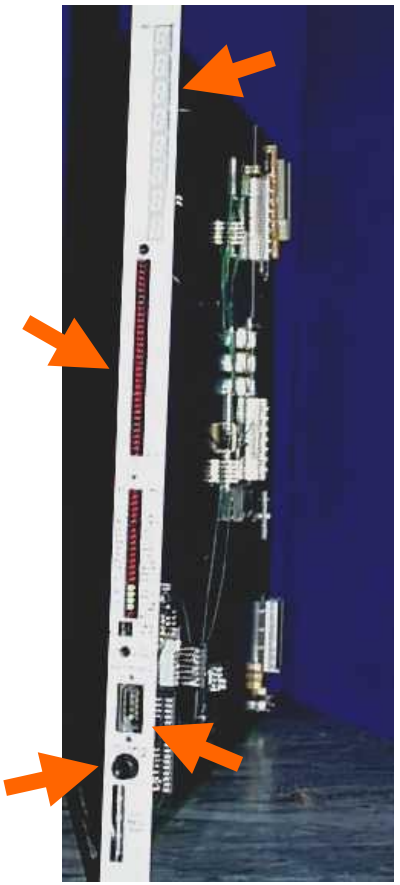
Electronics System Support

Layout of Talk

- What is the TCM?
- Problems with the TCM
- Status of the TCM
- Decisions we made
- Where we are now
- Further testing problems
- Future ALC Designs Considerations

What is the TCM

- 9U Module
- VME Hex Display
- VME LED Display
- TTC
- CAN Bus

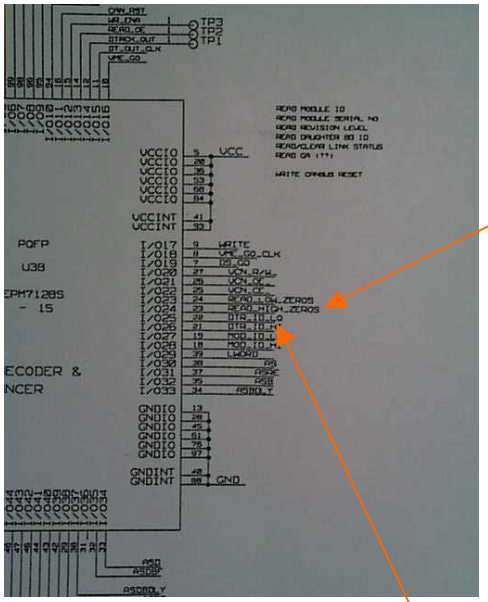


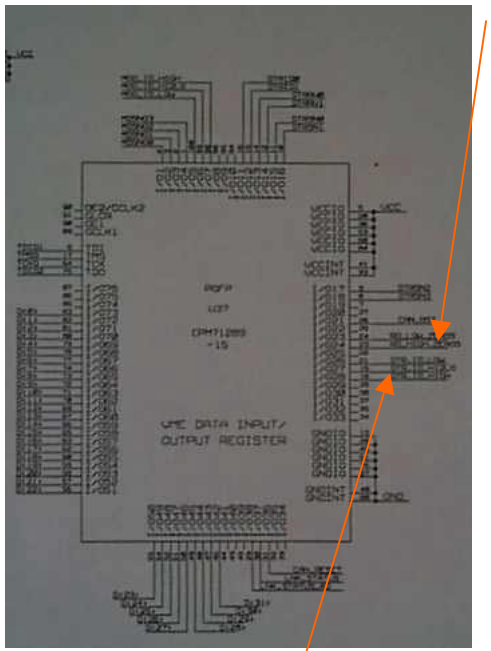
Problems with the TCM

- Connector
  - Incorrect wiring (Write*)
- VME Decoder
  - Net Names
  - Firmware(adddec)
- Register Decoder
  - Net Names
  - Firmware(en2reg)
- Dual Port Memory
  - Net names
  - Timing problems
- Hex Display
  - Firmware
  - Timing problems

Problem with the TCM

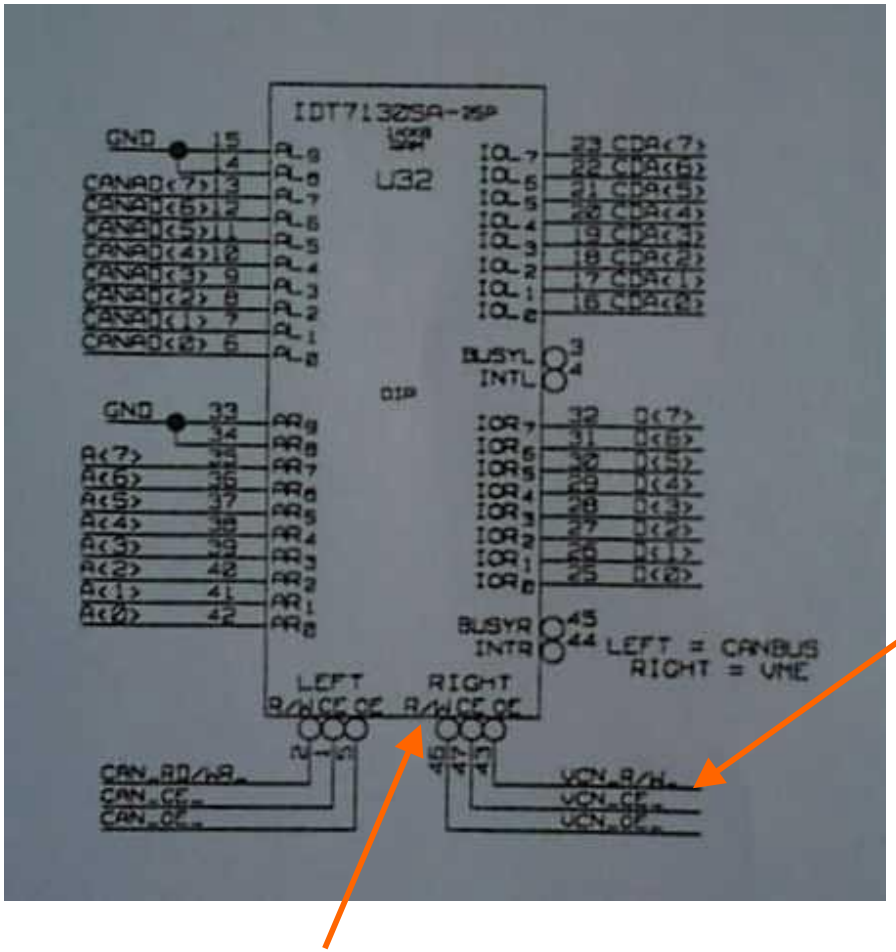
- Schematic
- READ_HIGH_ZEROS
- RD_HIGH_ZEROS
- DTR_ID_HI
- DTR_ID_HIGH





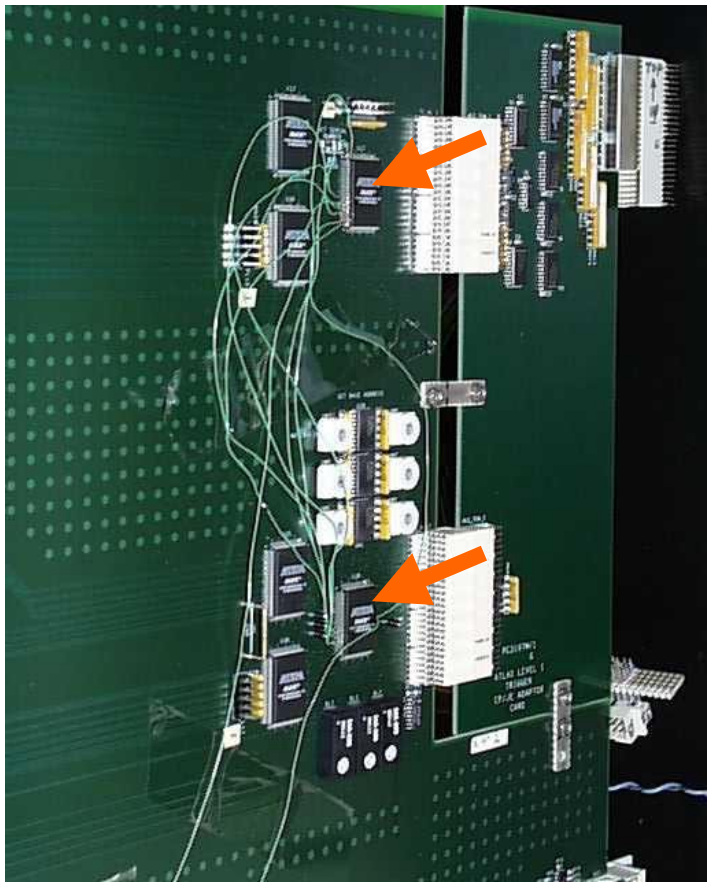
Problems with the TCM

- Nets mixed up
  - VCN_R/W
  - VCN_OE_



Problems with the TCM

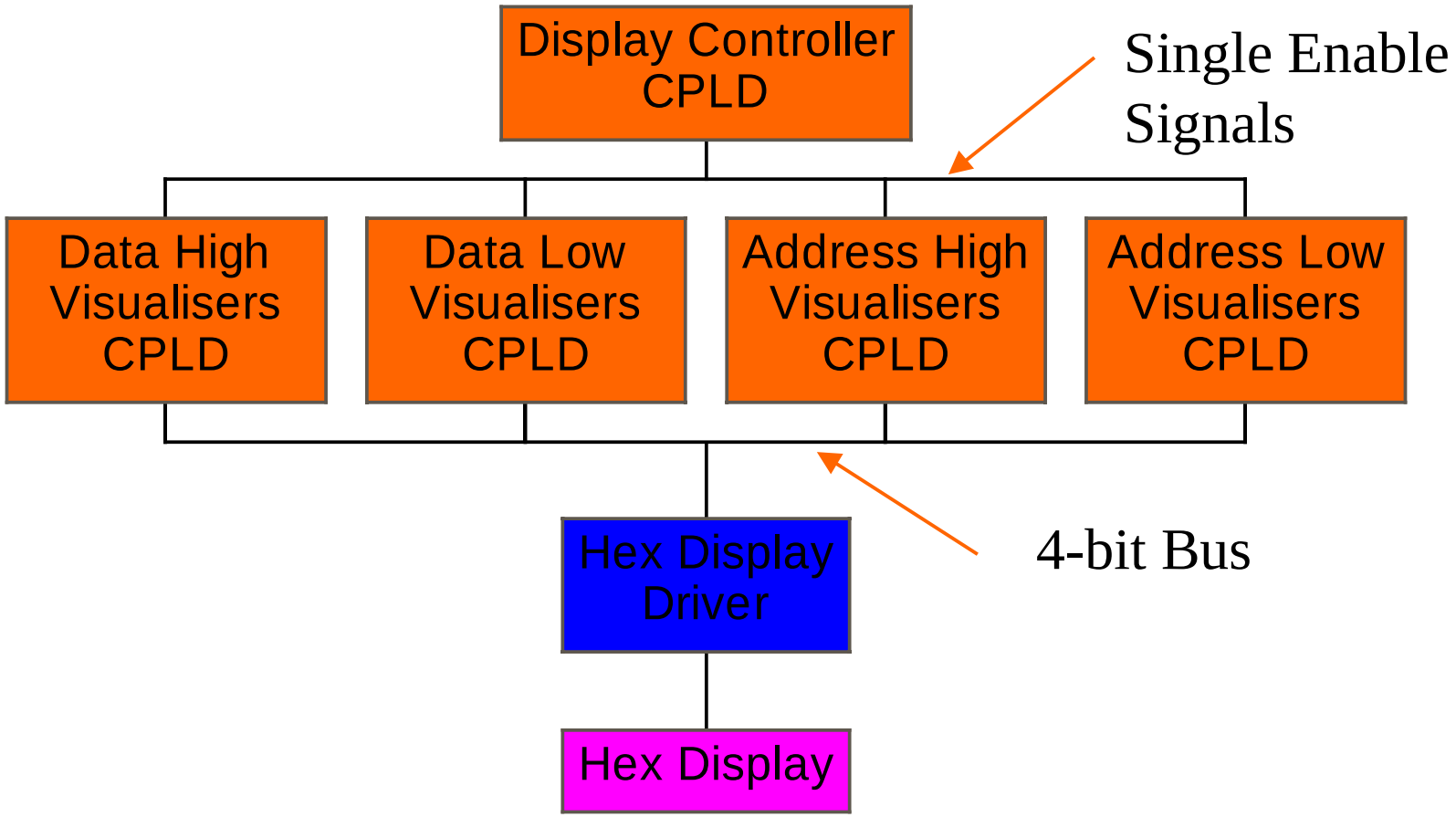
- 9 Wire Modifications
- VME Decoder
- Register Decoder



Problems with the TCM

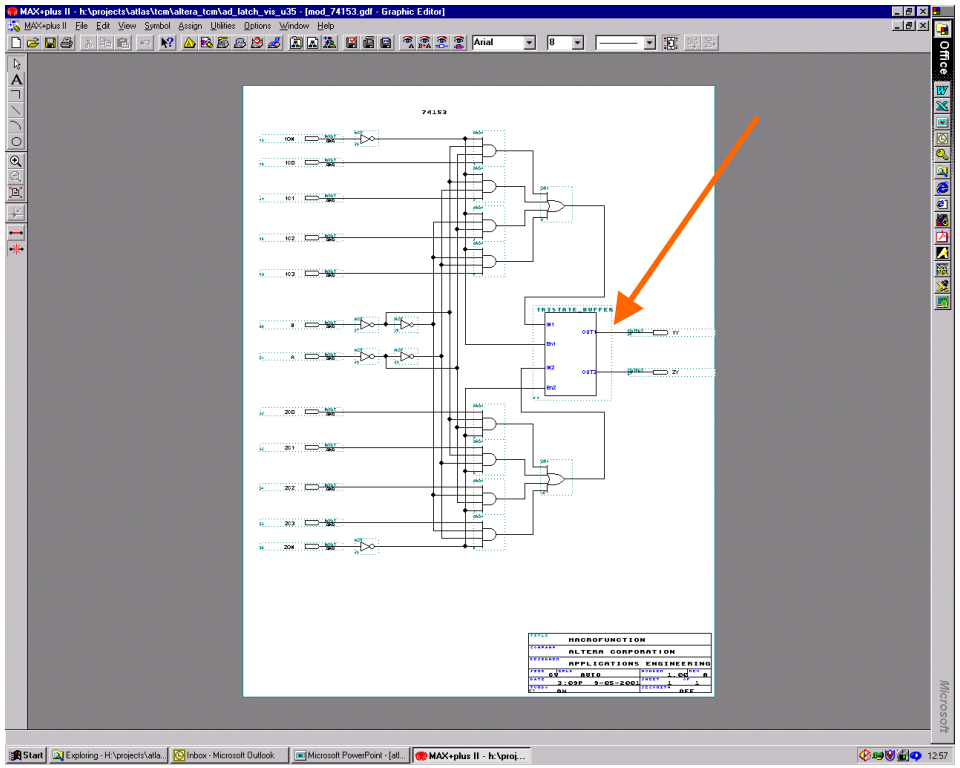
- Could these errors been avoided.?
  - Check schematic
  - Check net list
  - Check again
  - Is there a way of checking the net list automatically.? Yes there is...

Problems with the TCM



Problems with the TCM

- Tri_state buffer




```
TITLE "tristate_buffer";

SUBDESIGN tristate_buffer
(

IN1, IN2, En1, En2                  :INPUT;
OUT1, OUT2                          :BIDIR;
)

VARIABLE

OUT1_TNODE, OUT2_TNODE              :TRI_STATE_NODE;

BEGIN


OUT1_TNODE = TRI(IN1, En1);
OUT1 = OUT1_TNODE;

OUT2_TNODE = TRI(IN2, En2);
OUT2 = OUT2_TNODE;

END;
```

Status of the TCM

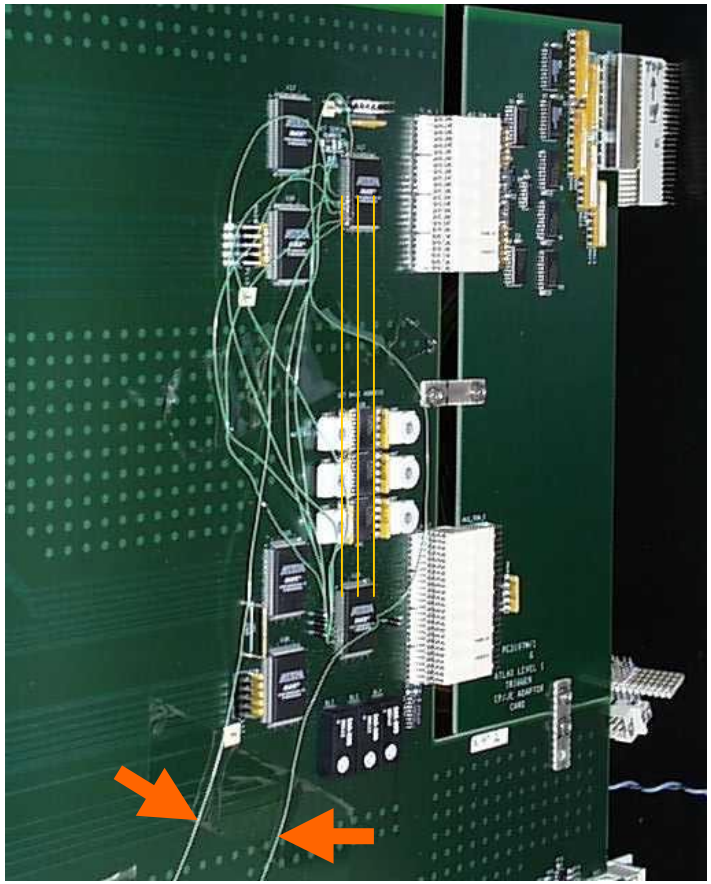
- Read Module ID Code “3195”
- Read Module Serial Number
- Read Daughter Serial Number
- CAN Micro controller Reset

Status of the TCM

- Write to DPM
- Read from DPM
- “Hex display” display’s Address
- “Hex display” display’s Data
- LED’s Display correct Data + Address

Decisions

- Do we need to make these modifications?
- Yes, but only two of them (link status)
- Use three enable signals for address decoding and eliminate 7 wire modifications.



Decisions

- Or, we could make the boards again taking into account the required modifications but keeping the original(ish) CPLD design.

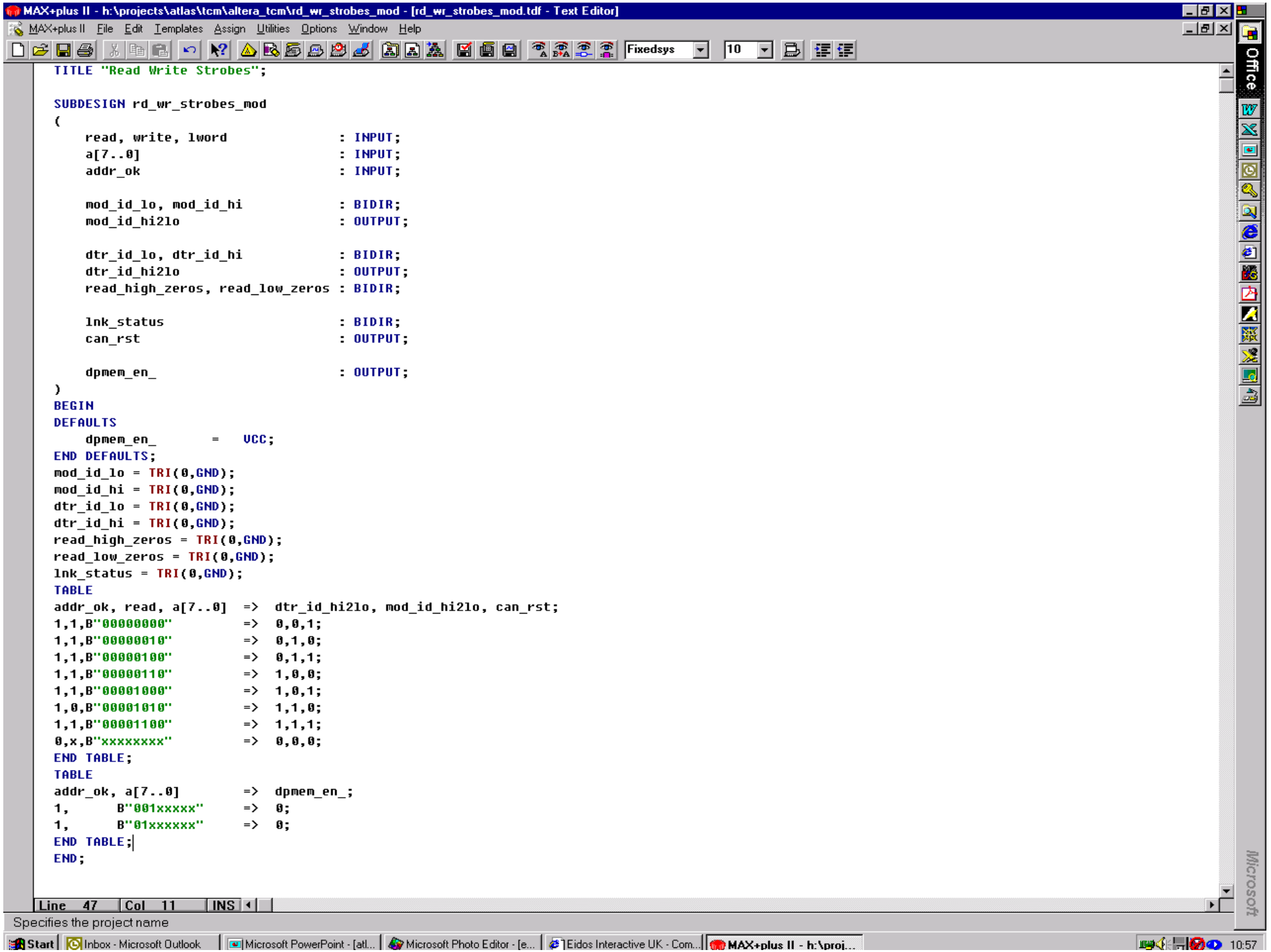
Decisions

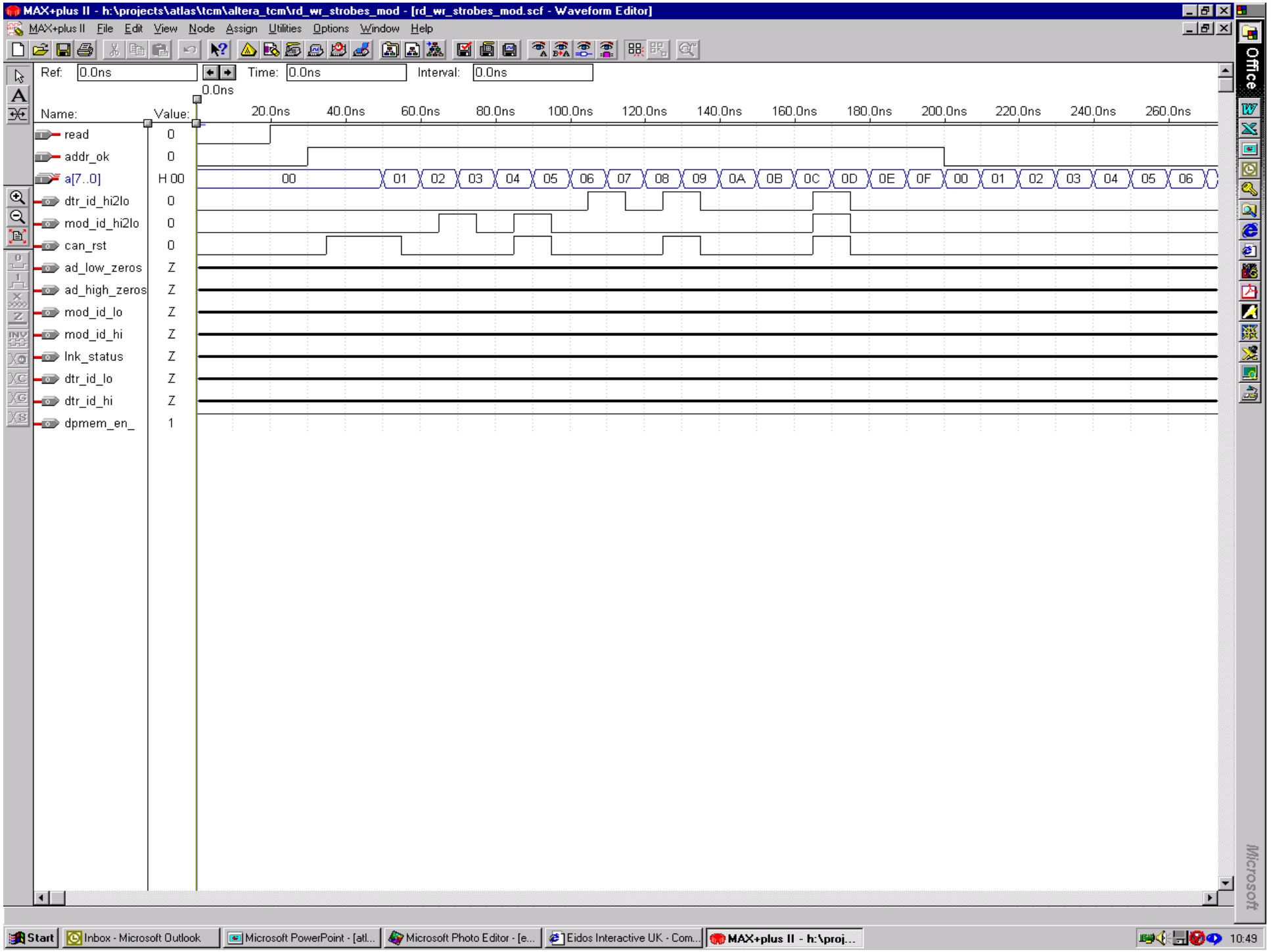
- Change CPLD Design
- Keep and use boards already made(7) - 3 populated
- New boards will have more recourses, allowing for expansion of design

- Modify Boards
- Don't spend time modifying CPLD design
- Easier to debug
- Using design to full extent and as it was originally intended

Decisions

- Recommendations
- Redesign the CPLD's
- 6 boards only need wire 2 modifications
- New boards with modifications increasing recourses if necessary


MAX+plus II - h:\projects\atlas\tcm\altera_tcm\rd_wr_strobes_mod - [rd_wr_strobes_mod.tdf - Text Editor]
MAX+plus II File Edit Templates Assign Utilities Options Window Help
Fixedsys
10
TITLE "Read Write Strobes";
SUBDESIGN rd_wr_strobes_mod
(
read, write, lword : INPUT;
a[7..0] : INPUT;
addr_ok : INPUT;
mod_id_lo, mod_id_hi : BIDIR;
mod_id_hi2lo : OUTPUT;
dtr_id_lo, dtr_id_hi : BIDIR;
dtr_id_hi2lo : OUTPUT;
read_high_zeros, read_low_zeros : BIDIR;
lnk_status : BIDIR;
can_rst : OUTPUT;
dpmem_en_ : OUTPUT;
)
BEGIN
DEFAULTS
dpmem_en_ = VCC;
END DEFAULTS;
mod_id_lo = TRI(0,GND);
mod_id_hi = TRI(0,GND);
dtr_id_lo = TRI(0,GND);
dtr_id_hi = TRI(0,GND);
read_high_zeros = TRI(0,GND);
read_low_zeros = TRI(0,GND);
lnk_status = TRI(0,GND);
TABLE
addr_ok, read, a[7..0] => dtr_id_hi2lo, mod_id_hi2lo, can_rst;
1,1,B"00000000" => 0,0,1;
1,1,B"00000010" => 0,1,0;
1,1,B"00000100" => 0,1,1;
1,1,B"00000110" => 1,0,0;
1,1,B"00001000" => 1,0,1;
1,0,B"00001010" => 1,1,0;
1,1,B"00001100" => 1,1,1;
0,x,B"xxxxxxxx" => 0,0,0;
END TABLE;
TABLE
addr_ok, a[7..0] => dpmem_en_;
1, B"001xxxxx" => 0;
1, B"01xxxxxx" => 0;
END TABLE;
END;
Line 47 Col 11 INS
Specifies the project name
Start
Inbox - Microsoft Outlook
Microsoft PowerPoint - [atl...
Microsoft Photo Editor - [e...
Eidos Interactive UK - Com...
MAX+plus II - h:\proj...
10:57


MAX+plus II - h:\projects\atlas\tcm\altera_tcm\rd_wr_strobes_mod - [rd_wr_strobes_mod.scf - Waveform Editor]
MAX+plus II File Edit View Node Assign Utilities Options Window Help
Ref: 0.0ns
Time: 0.0ns
Interval: 0.0ns
0.0ns
Name:
Value:
20.0ns 40.0ns 60.0ns 80.0ns 100.0ns 120.0ns 140.0ns 160.0ns 180.0ns 200.0ns 220.0ns 240.0ns 260.0ns
read 0
addr_ok 0
a[7..0] H 00
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 00 01 02 03 04 05 06
dtr_id_hi2lo 0
mod_id_hi2lo 0
can_rst 0
ad_low_zeros Z
ad_high_zeros Z
mod_id_lo Z
mod_id_hi Z
lnk_status Z
dtr_id_lo Z
dtr_id_hi Z
dpmem_en_ 1
Start
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Microsoft PowerPoint - [atl...
Microsoft Photo Editor - [e...
Eidos Interactive UK - Com...
MAX+plus II - h:\proj...
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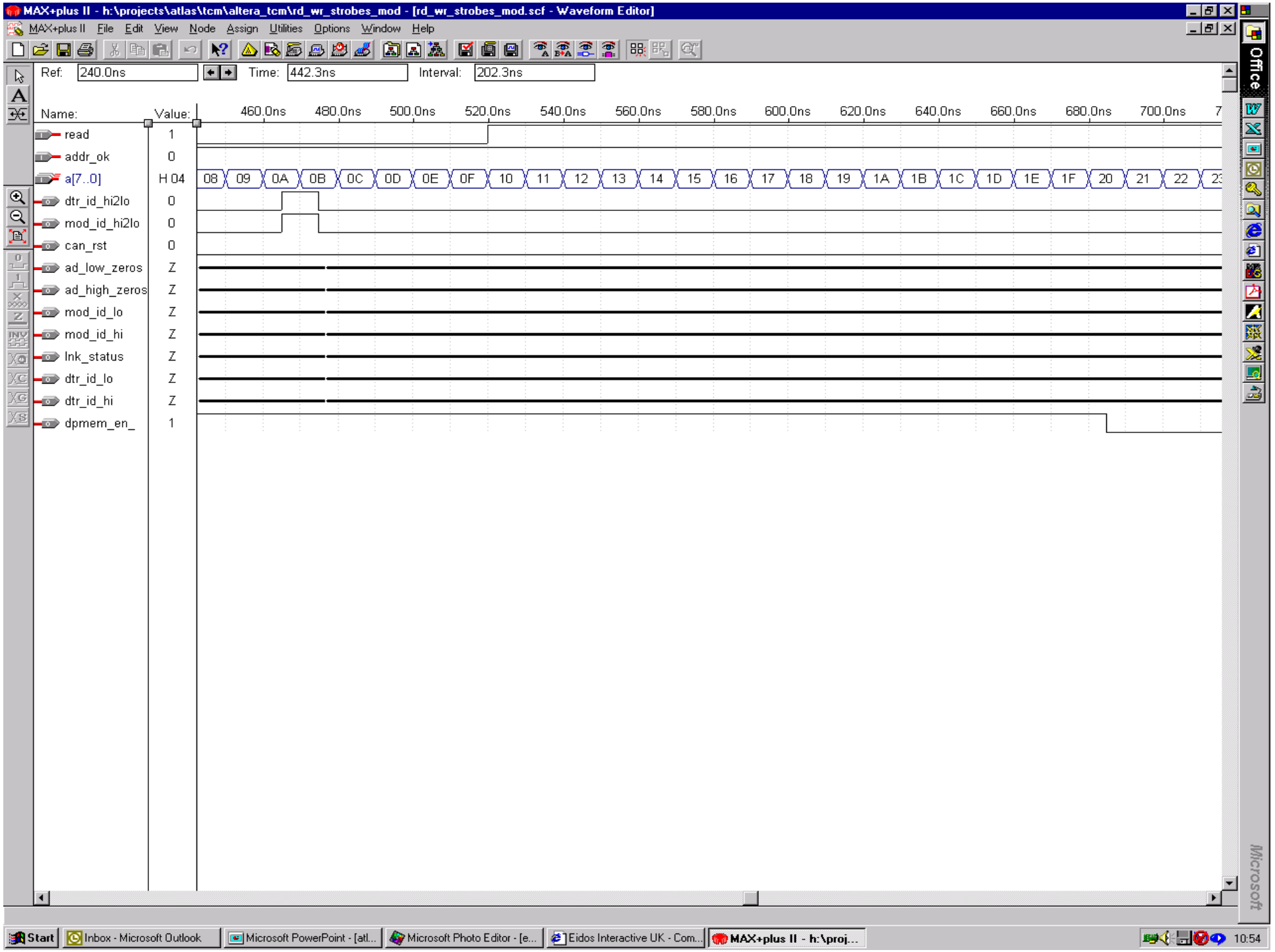
MAX+plus II - h:\projects\atlas\tcm\altera_tcm\rd_wr_strobes_mod - [rd_wr_strobes_mod.scf - Waveform Editor]
MAX+plus II File Edit View Node Assign Utilities Options Window Help
Ref: 240.0ns
Time: 442.3ns
Interval: 202.3ns
Name:
Value:
460.0ns 480.0ns 500.0ns 520.0ns 540.0ns 560.0ns 580.0ns 600.0ns 620.0ns 640.0ns 660.0ns 680.0ns 700.0ns
read 1
addr_ok 0
a[7..0] H 04
08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22
dtr_id_hi2lo 0
mod_id_hi2lo 0
can_rst 0
ad_low_zeros Z
ad_high_zeros Z
mod_id_lo Z
mod_id_hi Z
lnk_status Z
dtr_id_lo Z
dtr_id_hi Z
dpmem_en_ 1
Start
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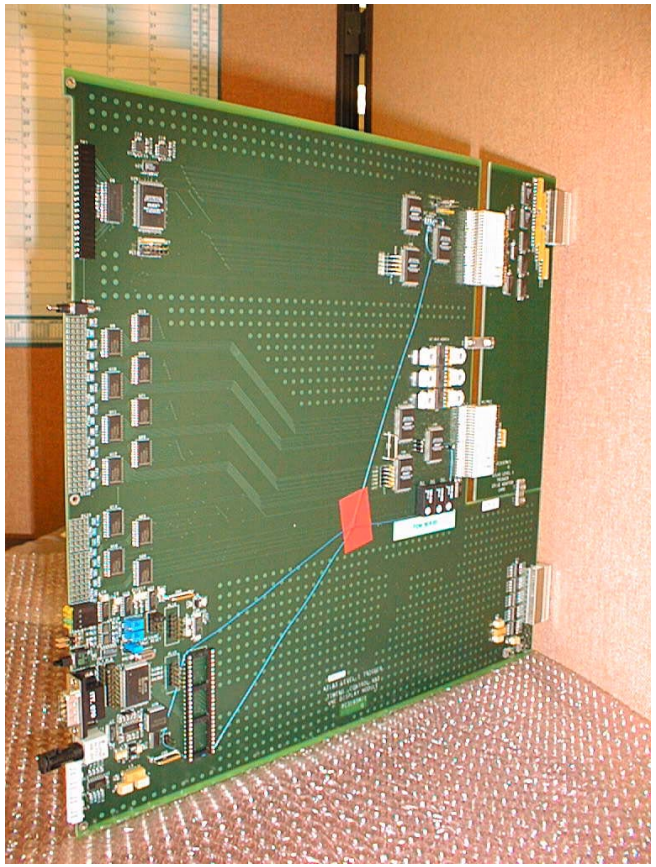
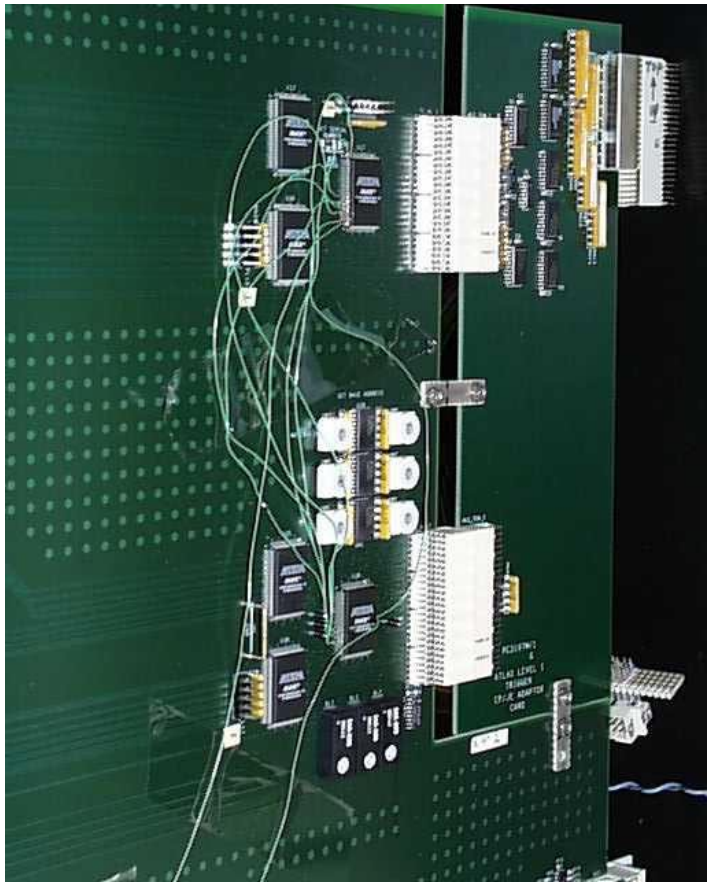
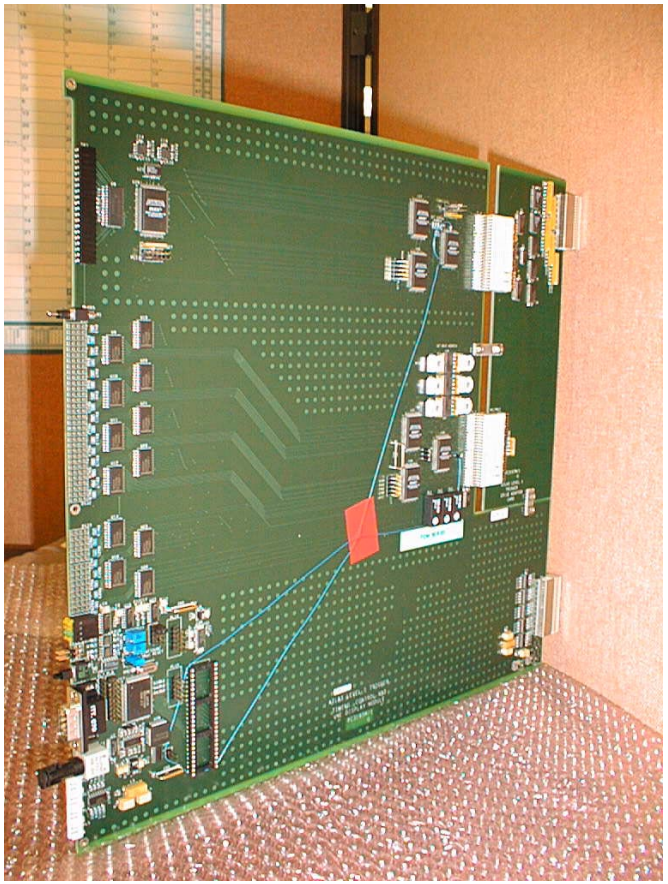
Now where are we.?

- Binary decoded addressing has been implemented and all registers work OK.
- Takes only 1 - 2 hours to modify and program CPLD's.



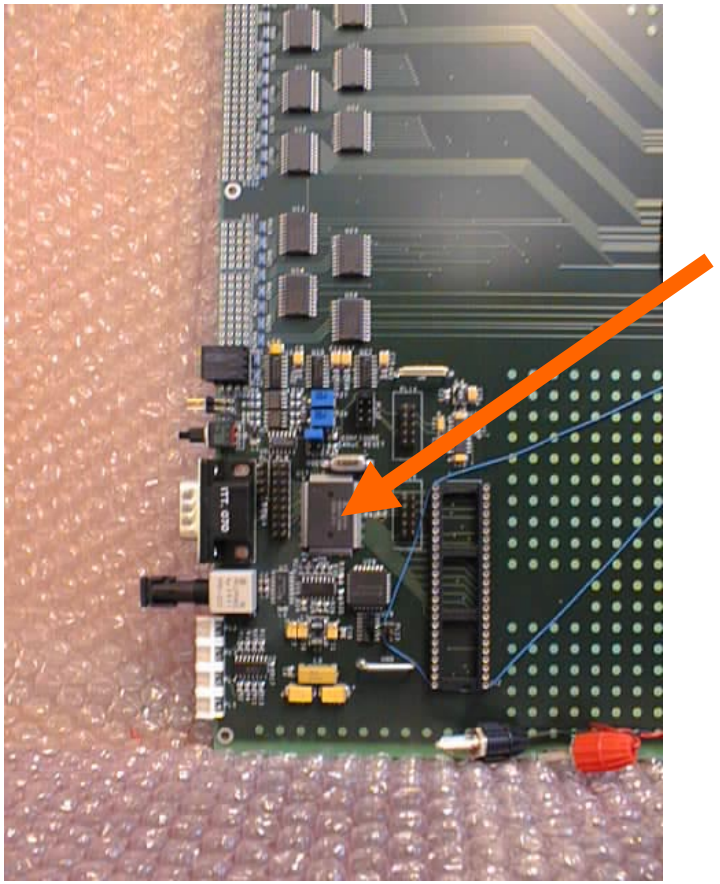
The Improvement





Further Testing Problems

- Can not download to the CAN micro on the "old board".
- New board can obtain connection, continue tests with new board, maybe.!

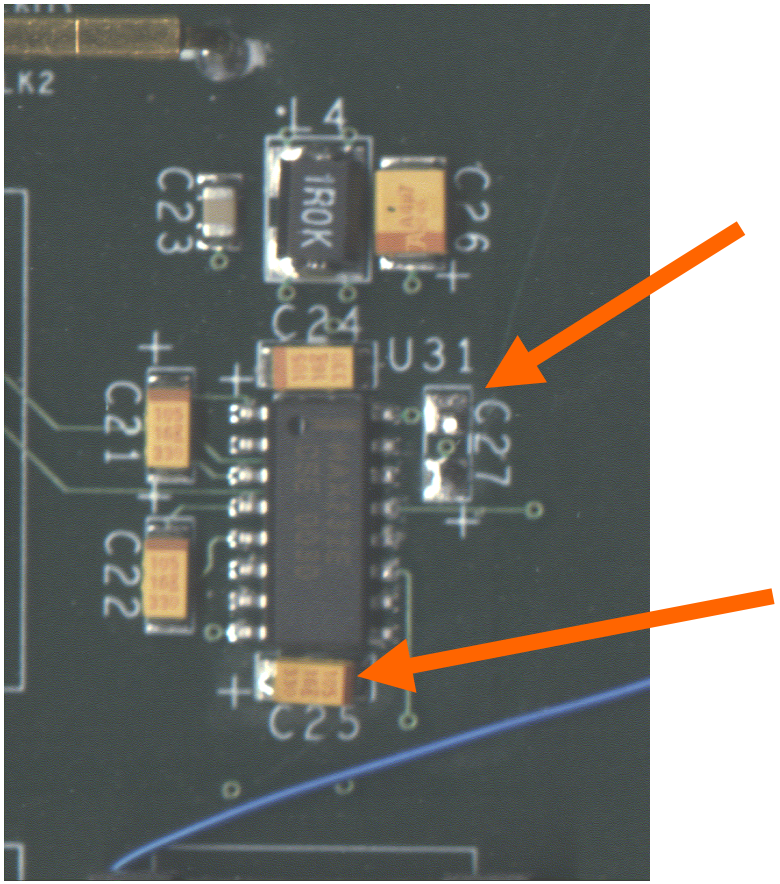


Further Testing Problems

- Microprocessor responds correctly to serial commands.
- MAX232 was found to be dead, not giving output.
- Capacitors C27 and C25 were placed on the schematic the wrong. Pulling down internally generated voltage supply.

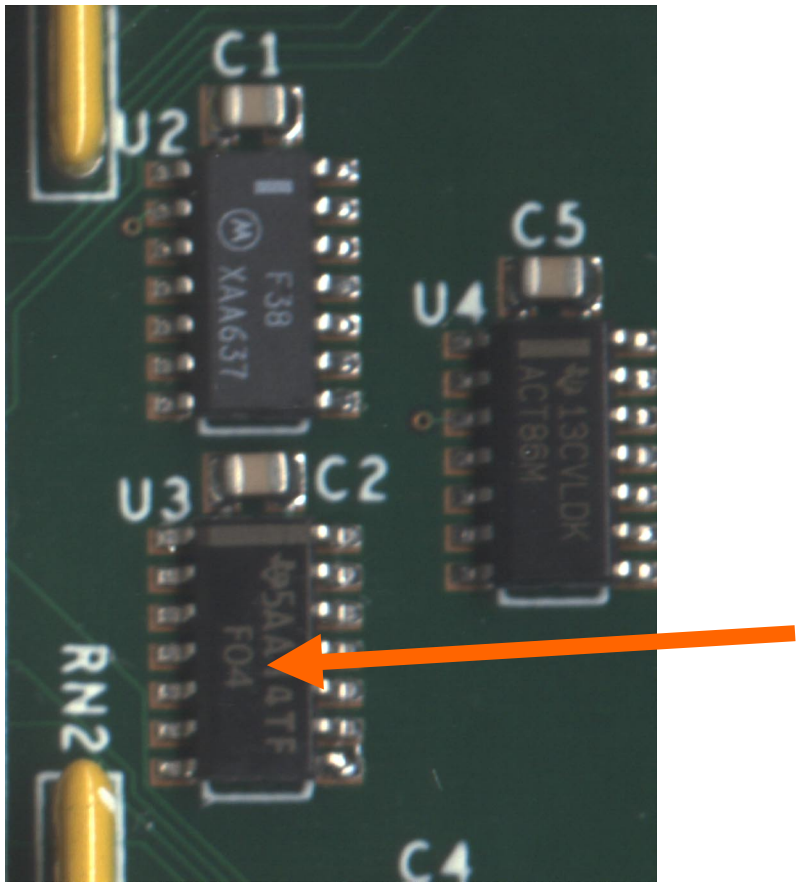
Further Testing Problems

- Capacitors around the wrong way.!
- C27 de-couple +5V on board. Bang.!!
- C25 de-couple internal 232 supply.



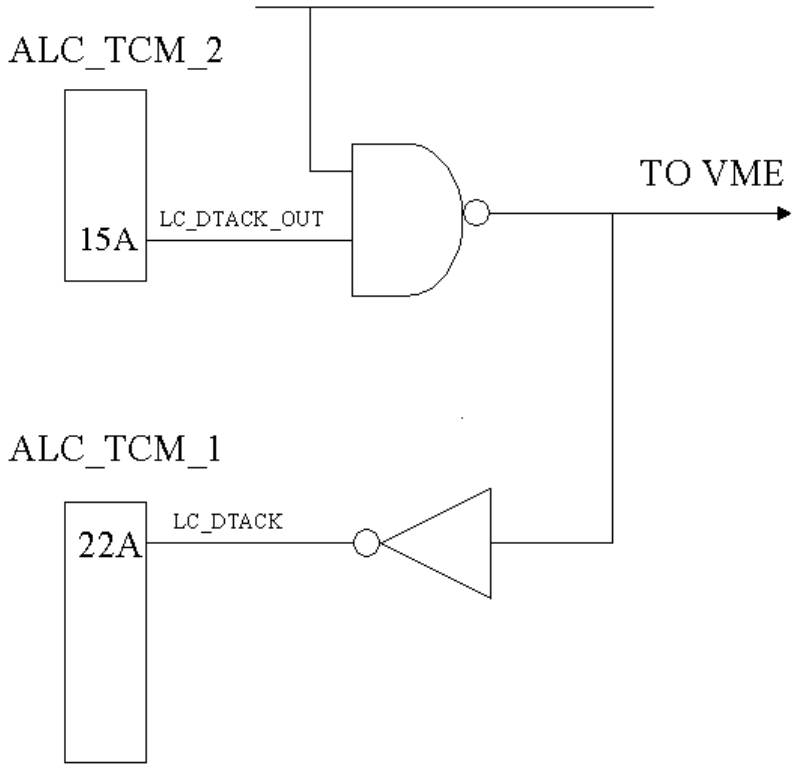
Future ALC Designs

- No Need for U3 to feed back DTACK signal.
- It is generated on-board.!



ALC Design Considerations

- Circuit not required.
- No need to feed signal back to ALC_TCM_1.
- DTACK is generated on board.



Finally

- PECL Distribution, OK.
- CAN Buss download, OK

- Left to test:-
  - CAN controller.
  - Works in the new crate.

Time Scales

- Do We get the other boards populated?
- CAN Buss Interface working?
- ??????