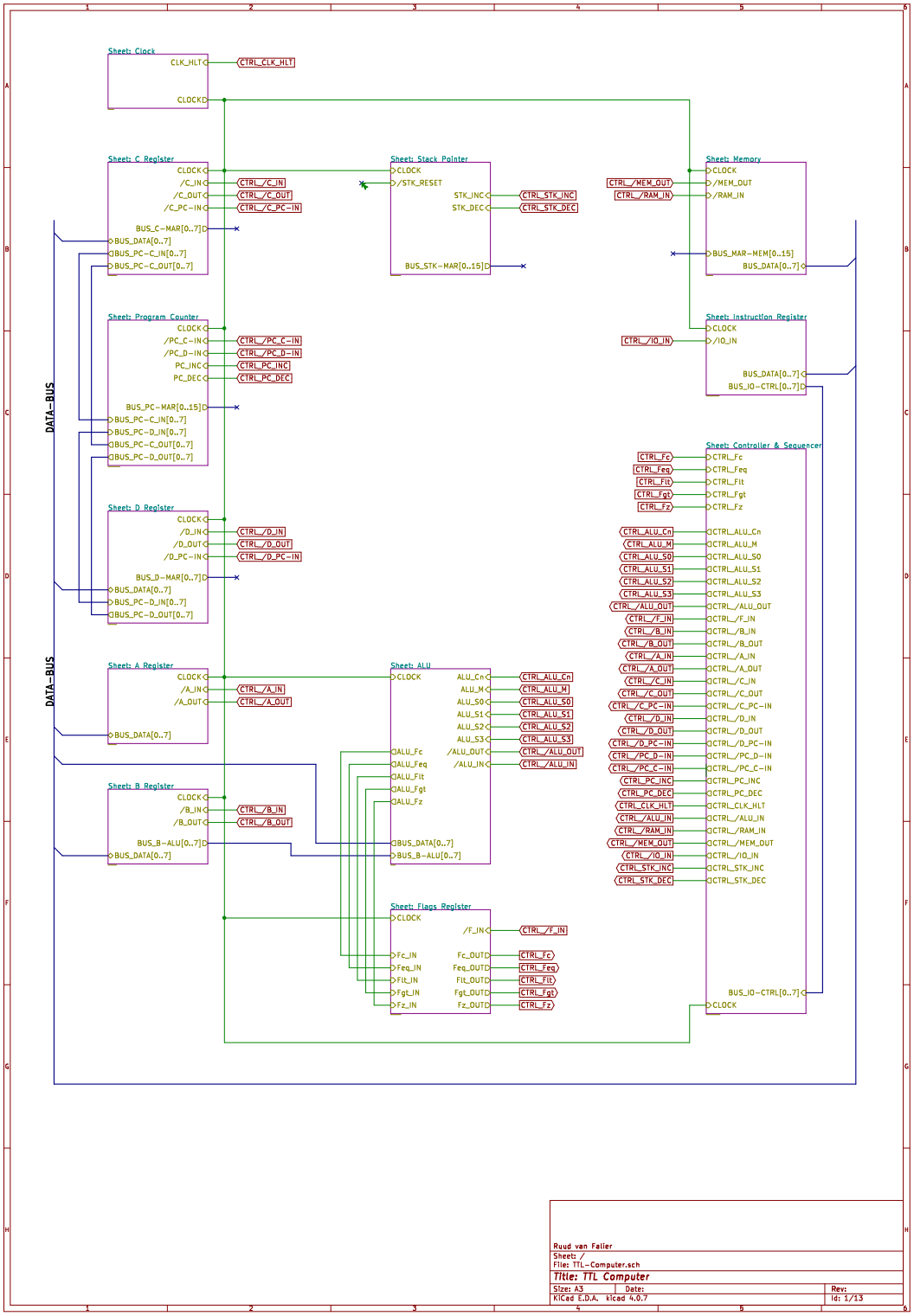
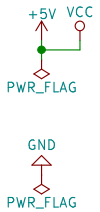
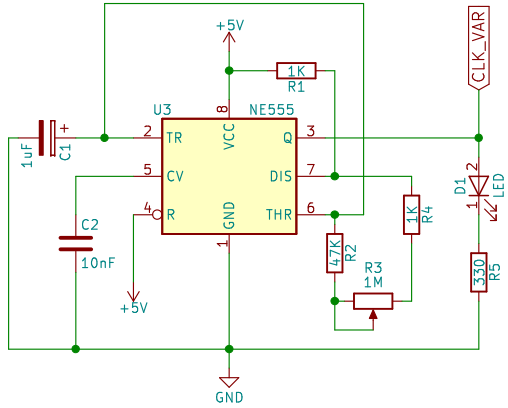


Ruud van Falier	
Sheet: /	
Files: TTL-Computer.sch	
Title: TTL Computer	
Size: A3	Date:
KiCad E.D.A. kicad 4.0.7	Id: 1/13

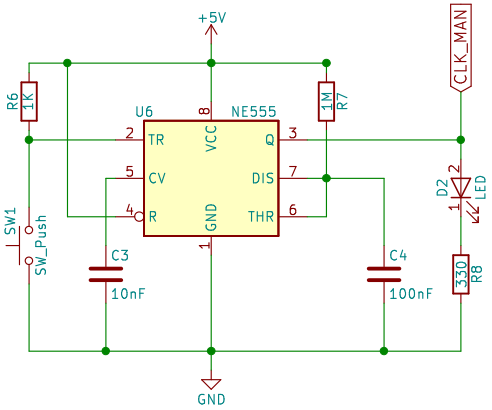
References



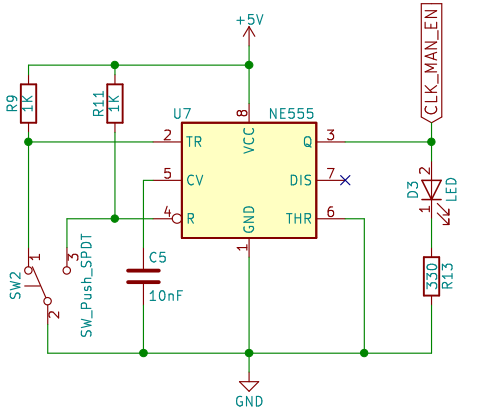
Variable clock (up to 15 Hz)



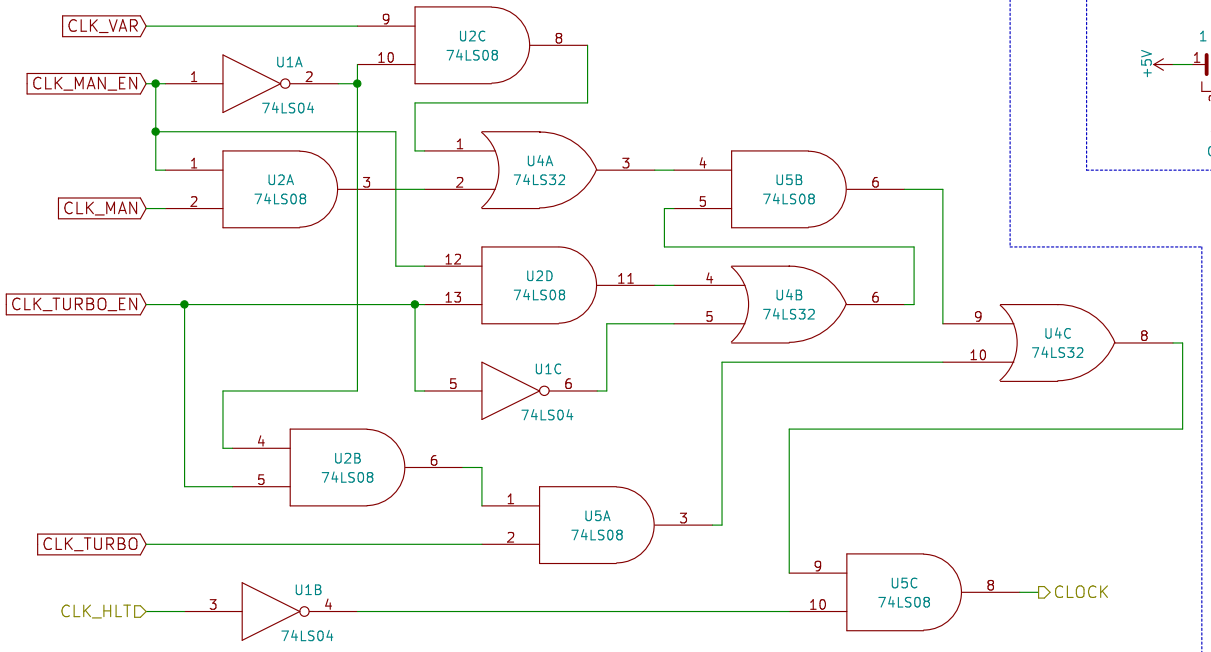
Manual (single-step) clock



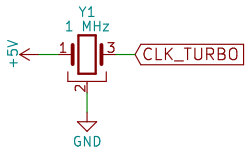
Manual (single-step) clock toggle switch



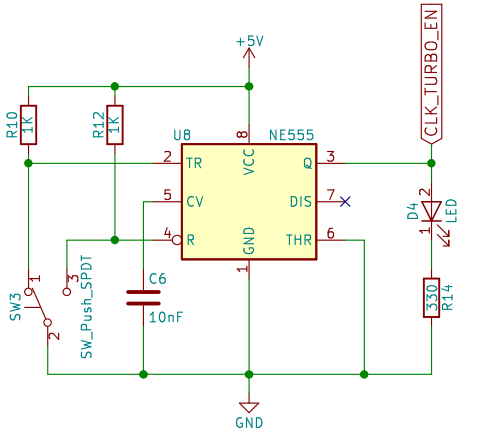
Clock mode toggle logic



Turbo clock (1 MHz)



Turbo clock toggle switch



The clock module can switch between different modes: Variable (slow) clock that can run at a maximum speed of 15 Hz, Turbo (fast) clock that runs at a constant speed of 1 MHz and Manual (single-step) clock for debug purposes. SW2 is used to toggle manual mode, SW3 is used to toggle turbo mode. While in manual mode, SW1 performs a single step.

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Sheet: /Clock/
File: Clock.sch

Title: Clock Module

Size: A4	Date: 2018-04-12	**Rev: 1**
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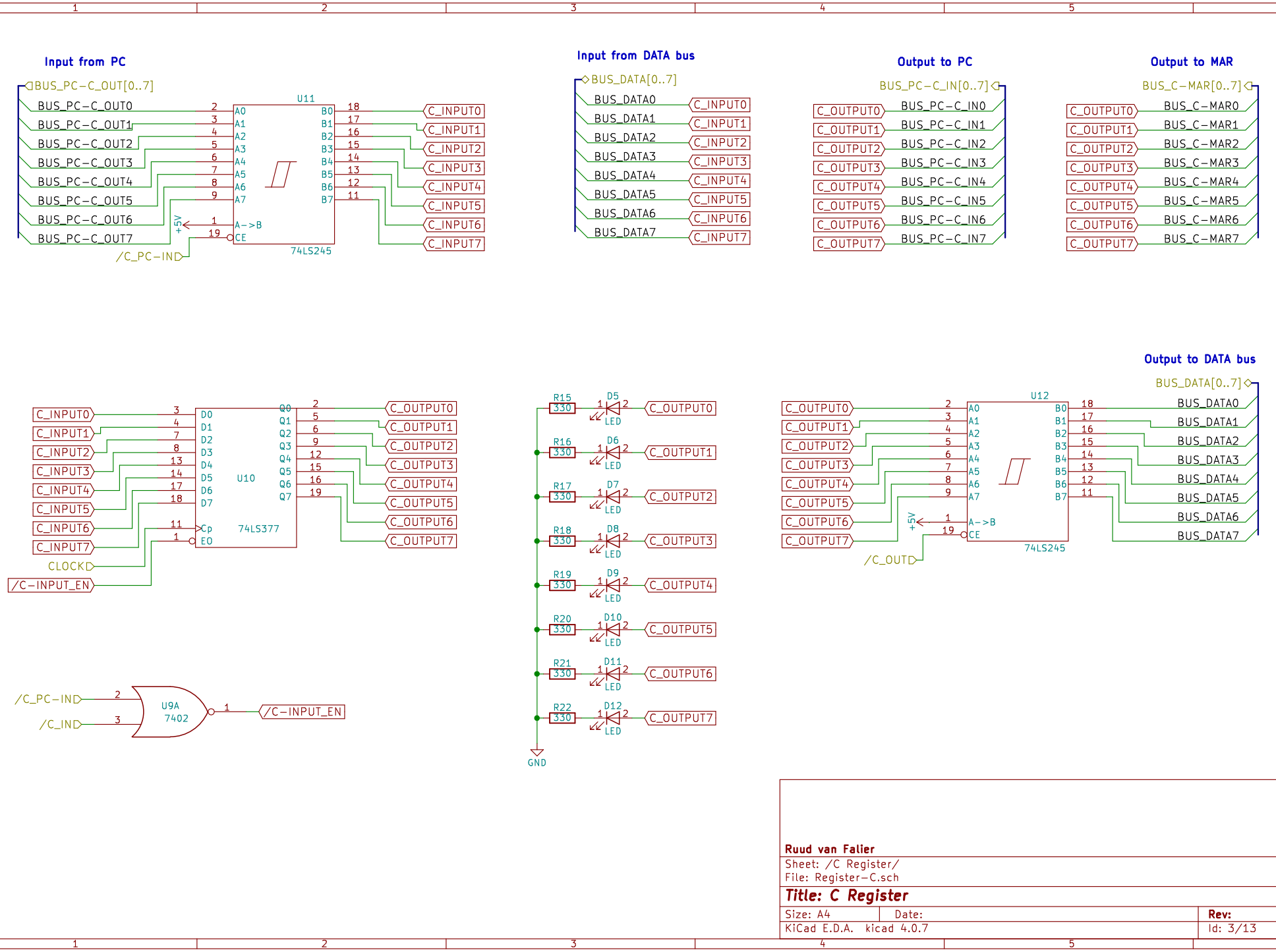
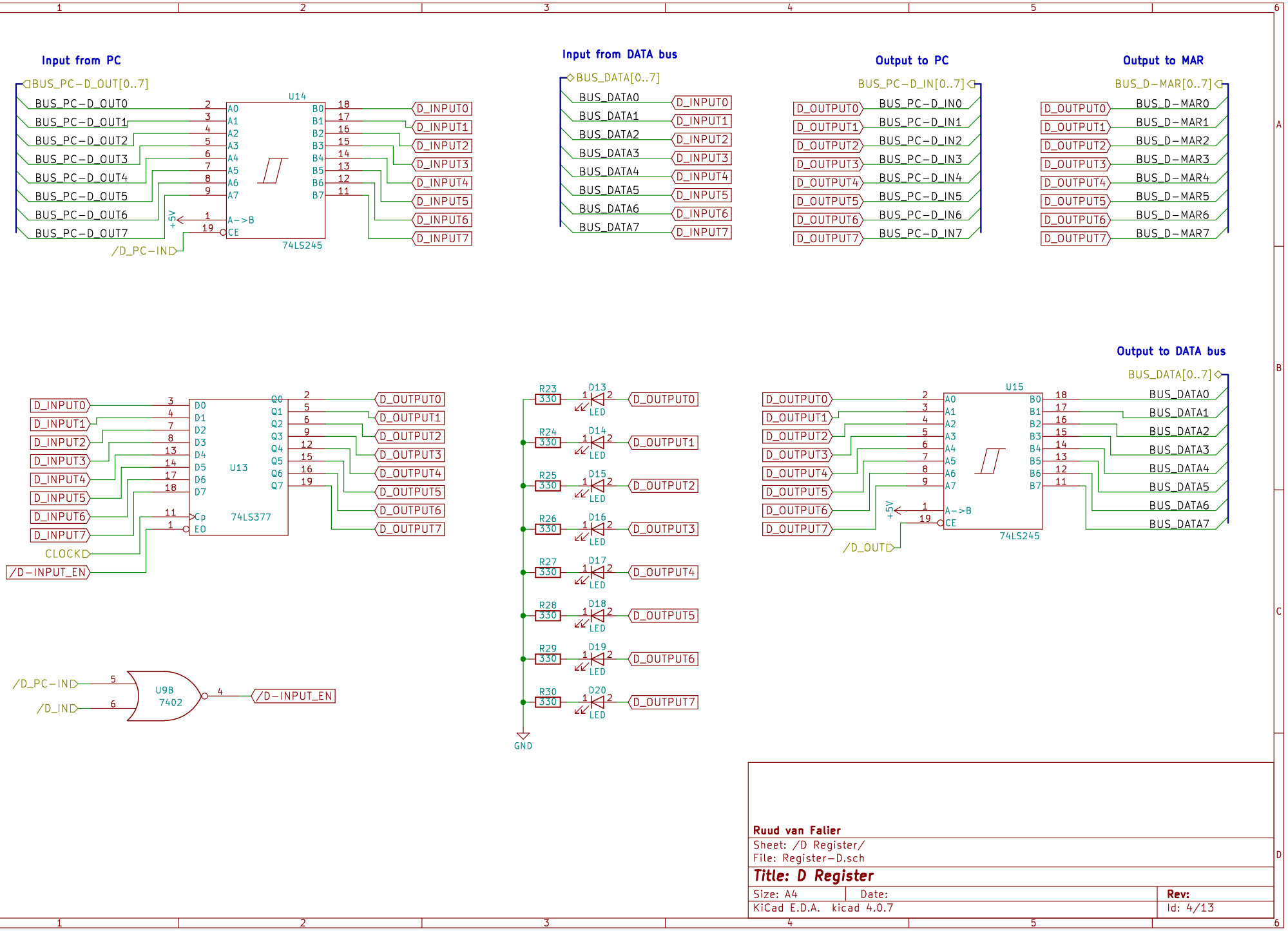
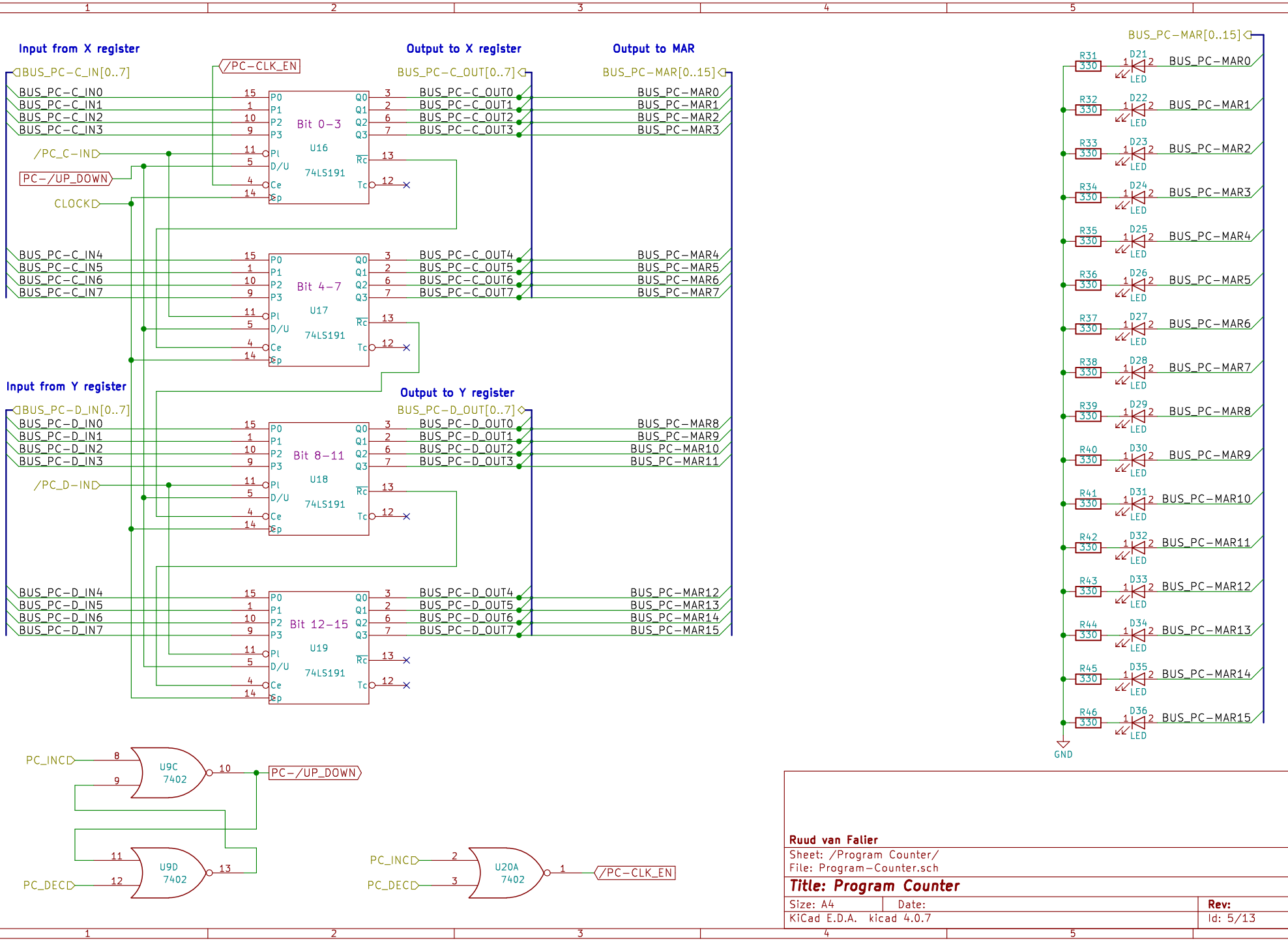

Input from PC
BUS_PC-C_OUT[0..7]
BUS_PC-C_OUT0
BUS_PC-C_OUT1
BUS_PC-C_OUT2
BUS_PC-C_OUT3
BUS_PC-C_OUT4
BUS_PC-C_OUT5
BUS_PC-C_OUT6
BUS_PC-C_OUT7
U11
A0
A1
A2
A3
A4
A5
A6
A7
A->B
CE
B0
B1
B2
B3
B4
B5
B6
B7
+5V
/C_PC-IN
74LS245
C_INPUT0
C_INPUT1
C_INPUT2
C_INPUT3
C_INPUT4
C_INPUT5
C_INPUT6
C_INPUT7
Input from DATA bus
BUS_DATA[0..7]
BUS_DATA0
BUS_DATA1
BUS_DATA2
BUS_DATA3
BUS_DATA4
BUS_DATA5
BUS_DATA6
BUS_DATA7
Output to PC
BUS_PC-C_IN[0..7]
C_OUTPUT0
C_OUTPUT1
C_OUTPUT2
C_OUTPUT3
C_OUTPUT4
C_OUTPUT5
C_OUTPUT6
C_OUTPUT7
BUS_PC-C_IN0
BUS_PC-C_IN1
BUS_PC-C_IN2
BUS_PC-C_IN3
BUS_PC-C_IN4
BUS_PC-C_IN5
BUS_PC-C_IN6
BUS_PC-C_IN7
Output to MAR
BUS_C-MAR[0..7]
BUS_C-MAR0
BUS_C-MAR1
BUS_C-MAR2
BUS_C-MAR3
BUS_C-MAR4
BUS_C-MAR5
BUS_C-MAR6
BUS_C-MAR7
U10
D0
D1
D2
D3
D4
D5
D6
D7
Cp
EO
Q0
Q1
Q2
Q3
Q4
Q5
Q6
Q7
74LS377
CLOCK
/C-INPUT_EN
U9A
7402
/C_IN
R15
R16
R17
R18
R19
R20
R21
R22
330
D5
D6
D7
D8
D9
D10
D11
D12
LED
GND
Output to DATA bus
BUS_DATA[0..7]
U12
/C_OUT
BUS_DATA0
BUS_DATA1
BUS_DATA2
BUS_DATA3
BUS_DATA4
BUS_DATA5
BUS_DATA6
BUS_DATA7
Ruud van Falier
Sheet: /C Register/
File: Register-C.sch
Title: C Register
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 4.0.7
Id: 3/13



Ruud van Falier	
Sheet: /D Register/	
File: Register-D.sch	
Title: D Register	
Size: A4	Date:
KiCad E.D.A. kicad 4.0.7	Rev: Id: 4/13

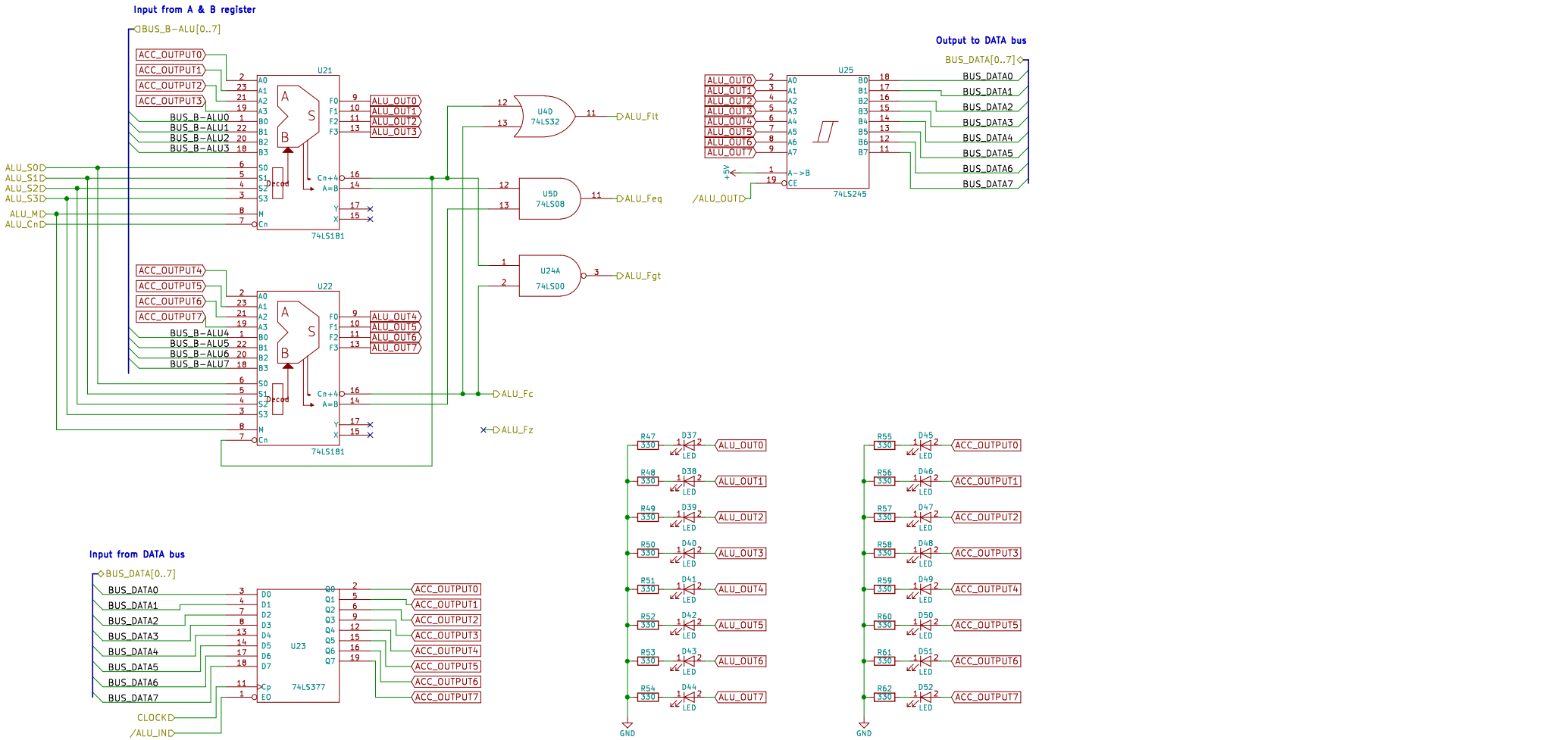


Ruud van Falier

Sheet: /Program Counter/
File: Program-Counter.sch

Title: Program Counter

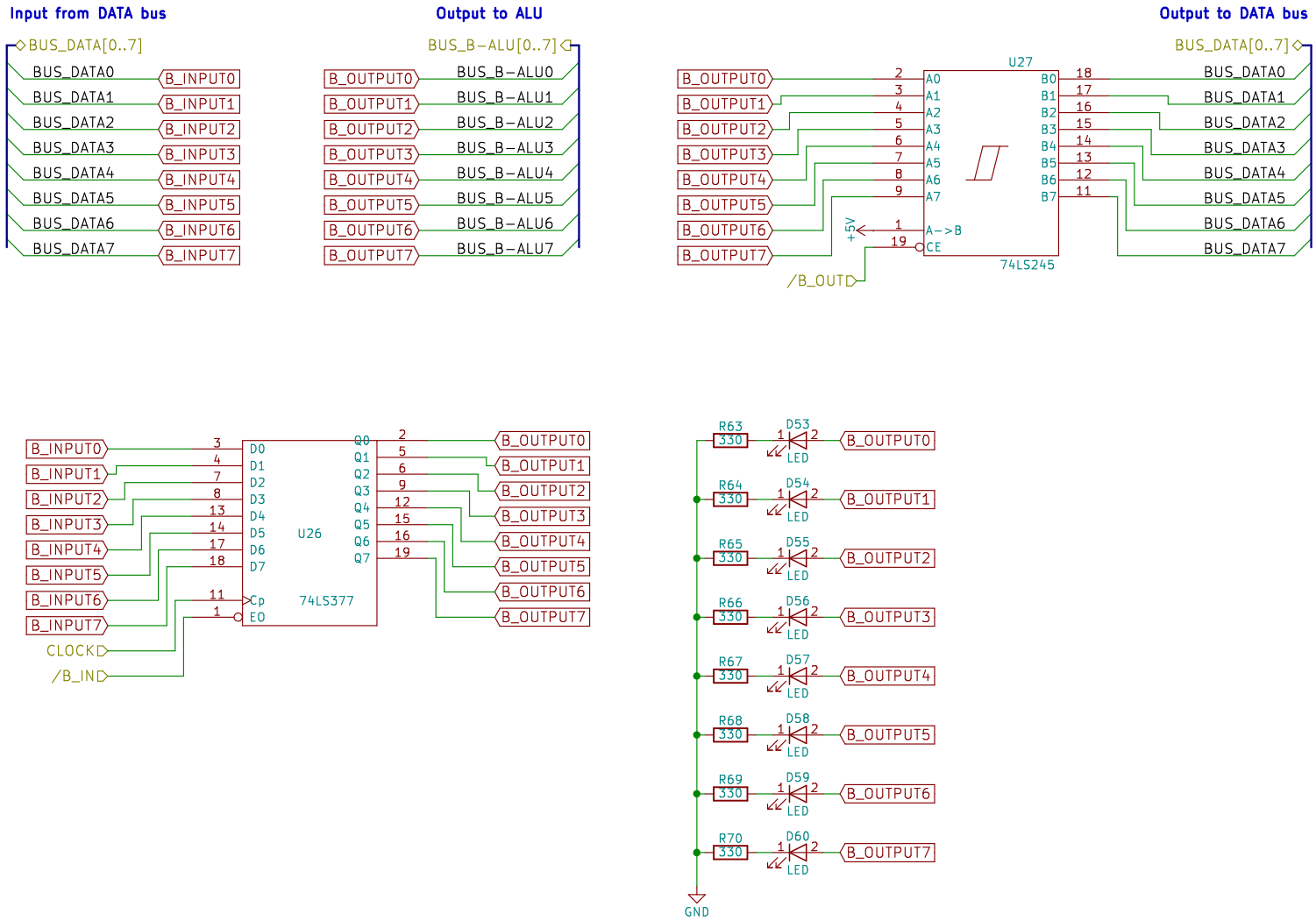
Size: A4	Date:	Rev:
KiCad E.D.A. kicad 4.0.7		Id: 5/13



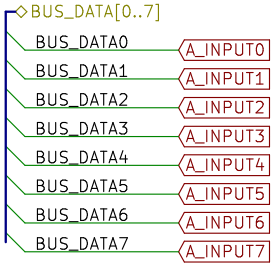
Sheet: /ALU/
File: ALU.sch

Title: Arithmetic Logic Unit

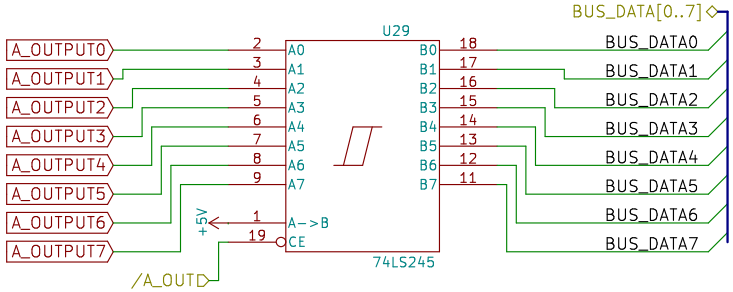
Size: A3	Date:	Rev:
KiCad E.D.A. kicad 4.0.7		Id: 6/13

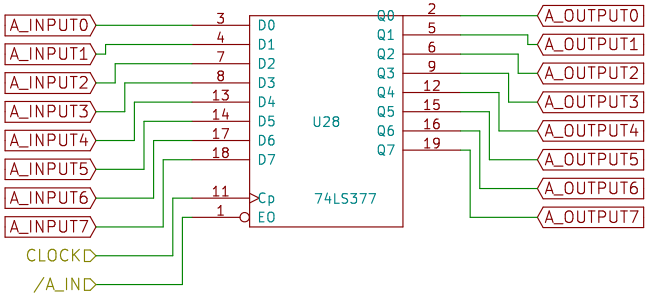

Input from DATA bus
BUS_DATA[0..7]
BUS_DATA0
BUS_DATA1
BUS_DATA2
BUS_DATA3
BUS_DATA4
BUS_DATA5
BUS_DATA6
BUS_DATA7
B_INPUT0
B_INPUT1
B_INPUT2
B_INPUT3
B_INPUT4
B_INPUT5
B_INPUT6
B_INPUT7
Output to ALU
BUS_B-ALU[0..7]
B_OUTPUT0
B_OUTPUT1
B_OUTPUT2
B_OUTPUT3
B_OUTPUT4
B_OUTPUT5
B_OUTPUT6
B_OUTPUT7
BUS_B-ALU0
BUS_B-ALU1
BUS_B-ALU2
BUS_B-ALU3
BUS_B-ALU4
BUS_B-ALU5
BUS_B-ALU6
BUS_B-ALU7
U27
A0
A1
A2
A3
A4
A5
A6
A7
A->B
CE
B0
B1
B2
B3
B4
B5
B6
B7
74LS245
+5V
/B_OUT
Output to DATA bus
BUS_DATA[0..7]
BUS_DATA0
BUS_DATA1
BUS_DATA2
BUS_DATA3
BUS_DATA4
BUS_DATA5
BUS_DATA6
BUS_DATA7
U26
D0
D1
D2
D3
D4
D5
D6
D7
Cp
EO
Q0
Q1
Q2
Q3
Q4
Q5
Q6
Q7
74LS377
CLOCK
/B_IN
R63
R64
R65
R66
R67
R68
R69
R70
330
D53
D54
D55
D56
D57
D58
D59
D60
LED
GND
Ruud van Falier
Sheet: /B Register/
File: Register-B.sch
Title: B Register
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 4.0.7
Id: 7/13

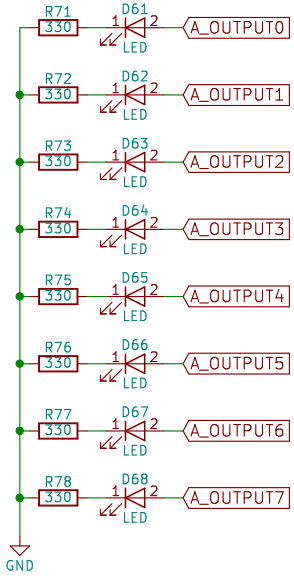
Input from DATA bus



Output to DATA bus







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Sheet: /A Register/
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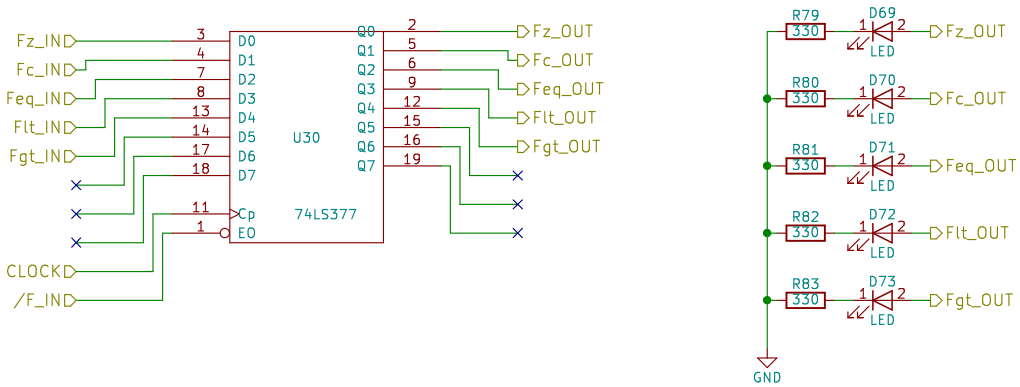
Title: A Register

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7		Id: 8/13

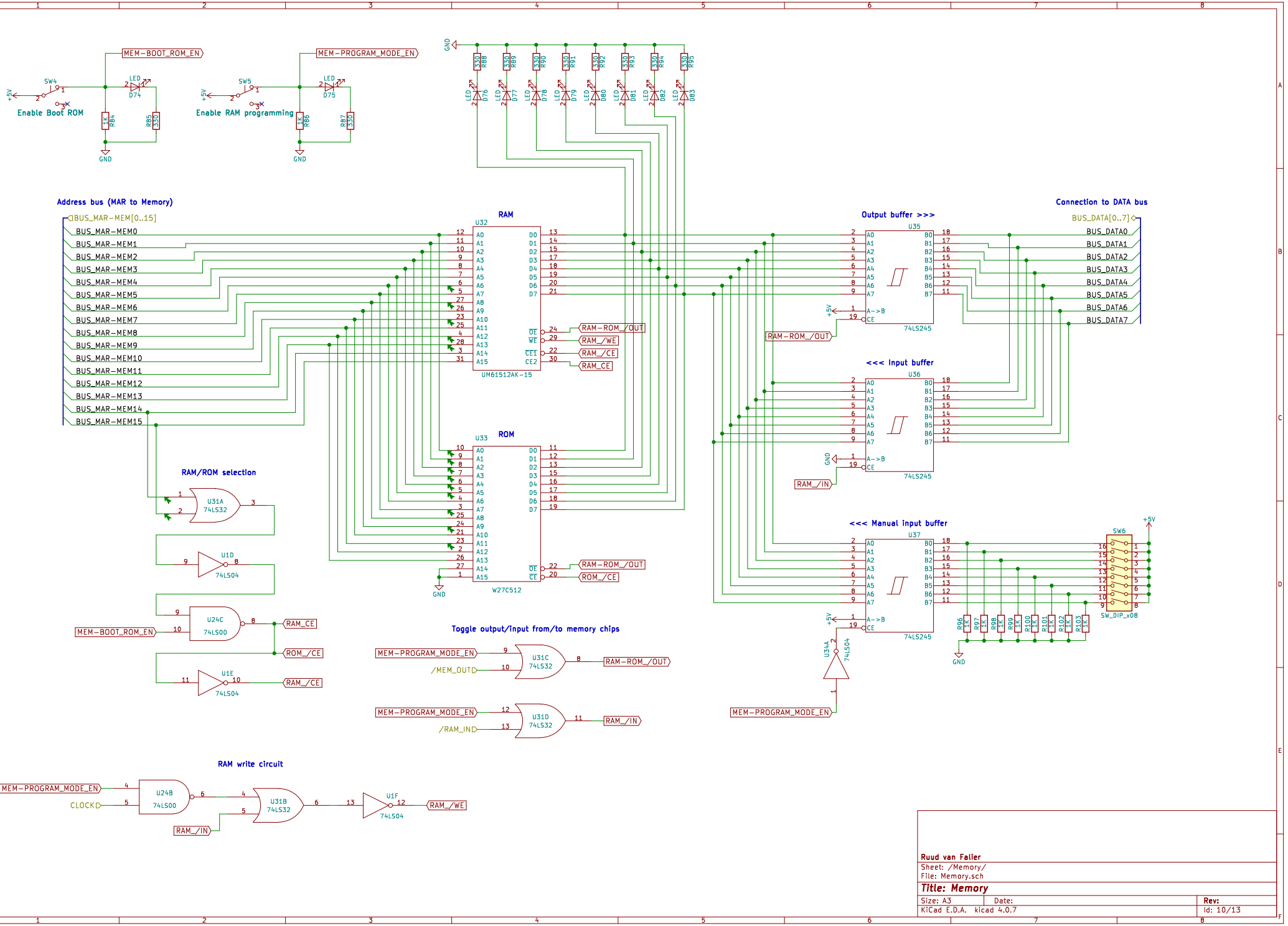


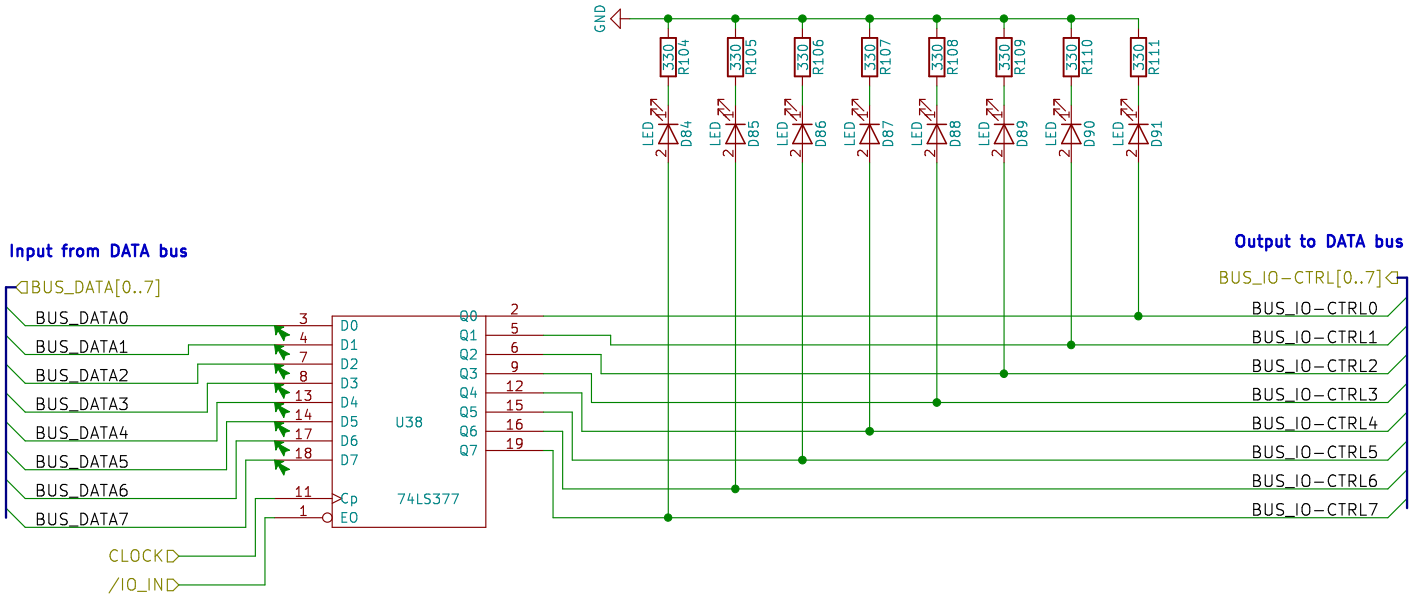
Ruud van Falier

Sheet: /Flags Register/
File: Register-Flags.sch

Title: Flags Register

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7		Id: 9/13


MEM-BOOT_ROM_EN
MEM-PROGRAM_MODE_EN
Enable Boot ROM
Enable RAM programming
Address bus (MAR to Memory)
BUS_MAR-MEM[0..15]
RAM
ROM
UM61512AK-15
W27C512
RAM/ROM selection
Output buffer >>>
<<< Input buffer
<<< Manual Input buffer
Connection to DATA bus
BUS_DATA[0..7]
74LS245
Toggle output/input from/to memory chips
RAM write circuit
RAM-ROM_/OUT
RAM_/WE
RAM_/CE
ROM_/CE
RAM_/IN
/MEM_OUT
/RAM_IN
CLOCK
Ruud van Faller
Sheet: /Memory/
File: Memory.sch
Title: Memory
Size: A3
Date:
Rev:
KiCad E.D.A. kicad 4.0.7
Id: 10/13



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Sheet: /Instruction Register/
File: Register-Instruction.sch

Title: Instruction Op-Code Register

Size: A4	Date:	**Rev:**
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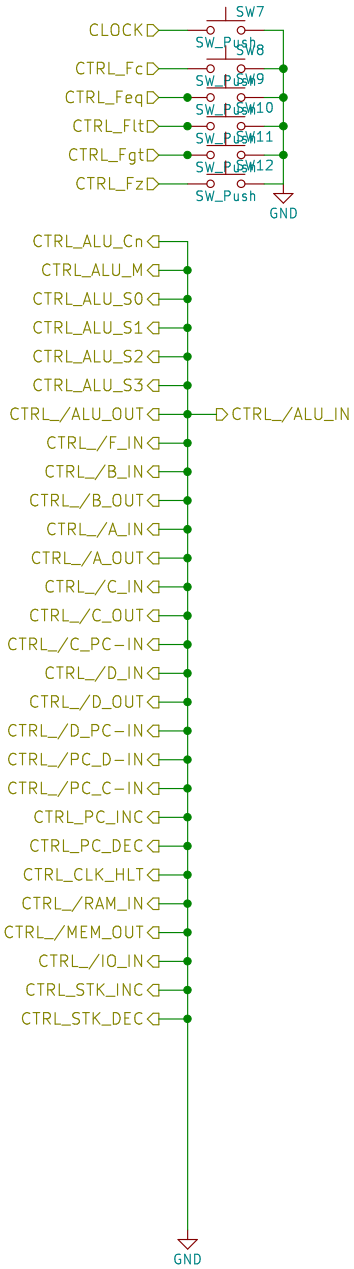
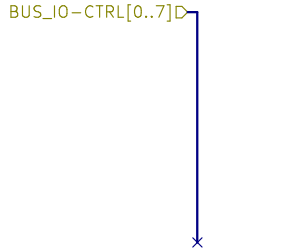
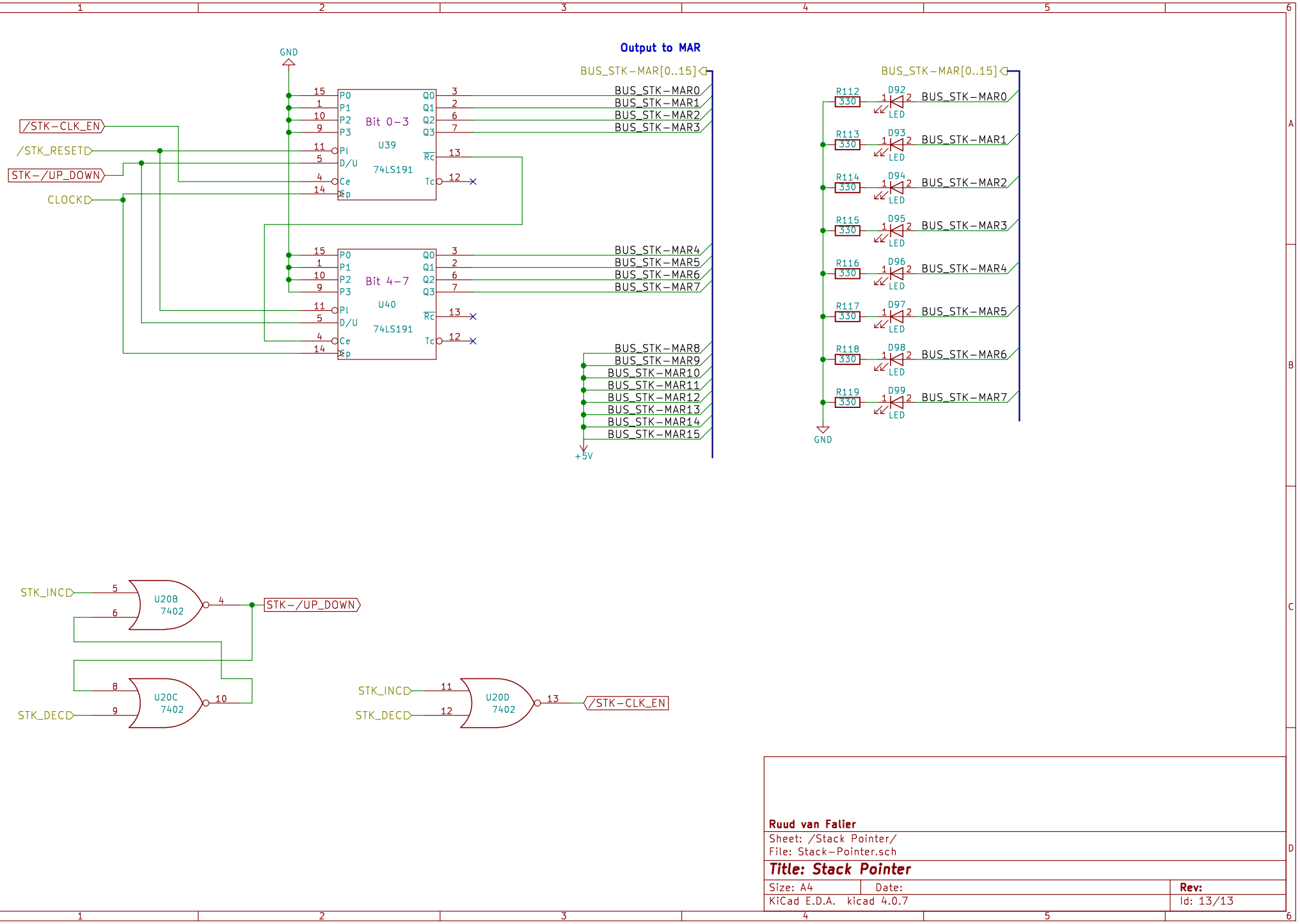


Input from Instruction Op-Code Register



Ruud van Falier		
Sheet: /Controller & Sequencer/ File: Controller-Sequencer.sch		
Title: Controller & Sequencer		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 4.0.7		Id: 12/13



Ruud van Falier	
Sheet: /Stack Pointer/	
File: Stack-Pointer.sch	
Title: Stack Pointer	
Size: A4	Date: **Rev:**
KiCad E.D.A. kicad 4.0.7	Id: 13/13