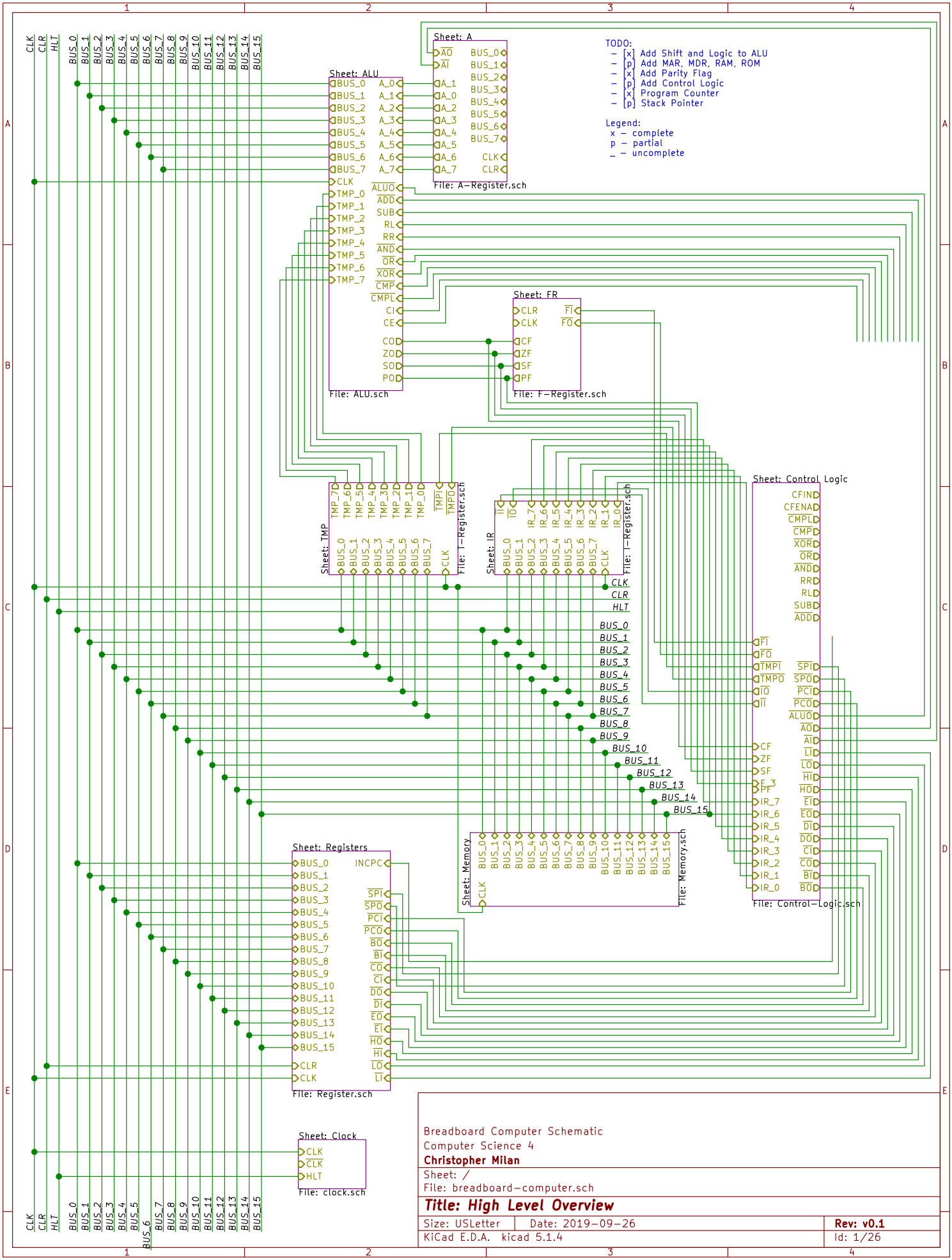
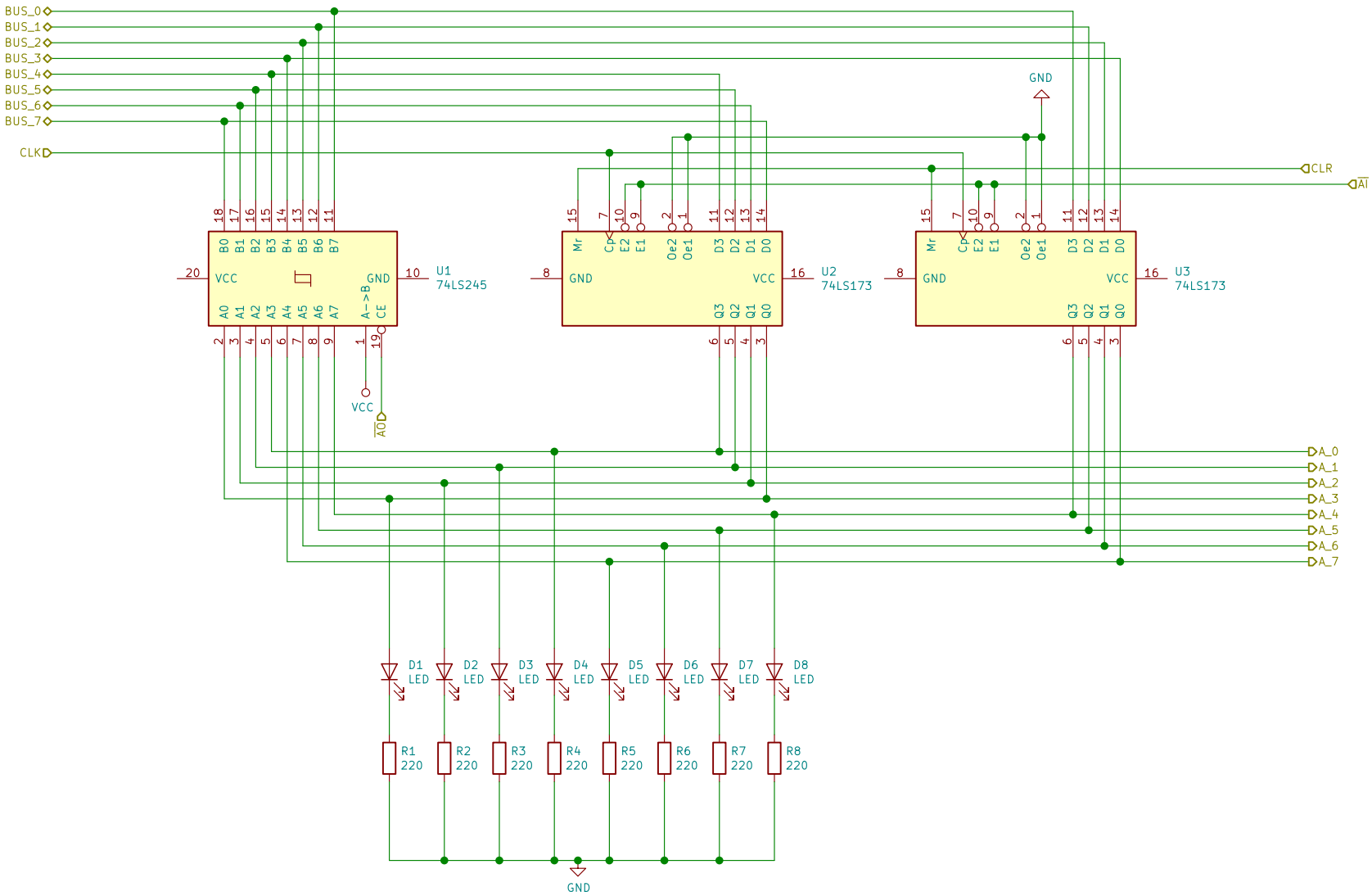

Sheet: A
File: A-Register.sch
Sheet: ALU
File: ALU.sch
Sheet: FR
File: F-Register.sch
Sheet: TMP
Sheet: IR
File: T-Register.sch
Sheet: Control Logic
File: Control-Logic.sch
Sheet: Memory
File: Memory.sch
Sheet: Registers
File: Register.sch
Sheet: Clock
File: clock.sch
TODO:
- [x] Add Shift and Logic to ALU
- [p] Add MAR, MDR, RAM, ROM
- [x] Add Parity Flag
- [p] Add Control Logic
- [x] Program Counter
- [p] Stack Pointer
Legend:
x - complete
p - partial
_ - uncomplete
Breadboard Computer Schematic
Computer Science 4
Christopher Milan
Sheet: /
File: breadboard-computer.sch
Title: High Level Overview
Size: USLetter
Date: 2019-09-26
Rev: v0.1
KiCad E.D.A. kicad 5.1.4
Id: 1/26

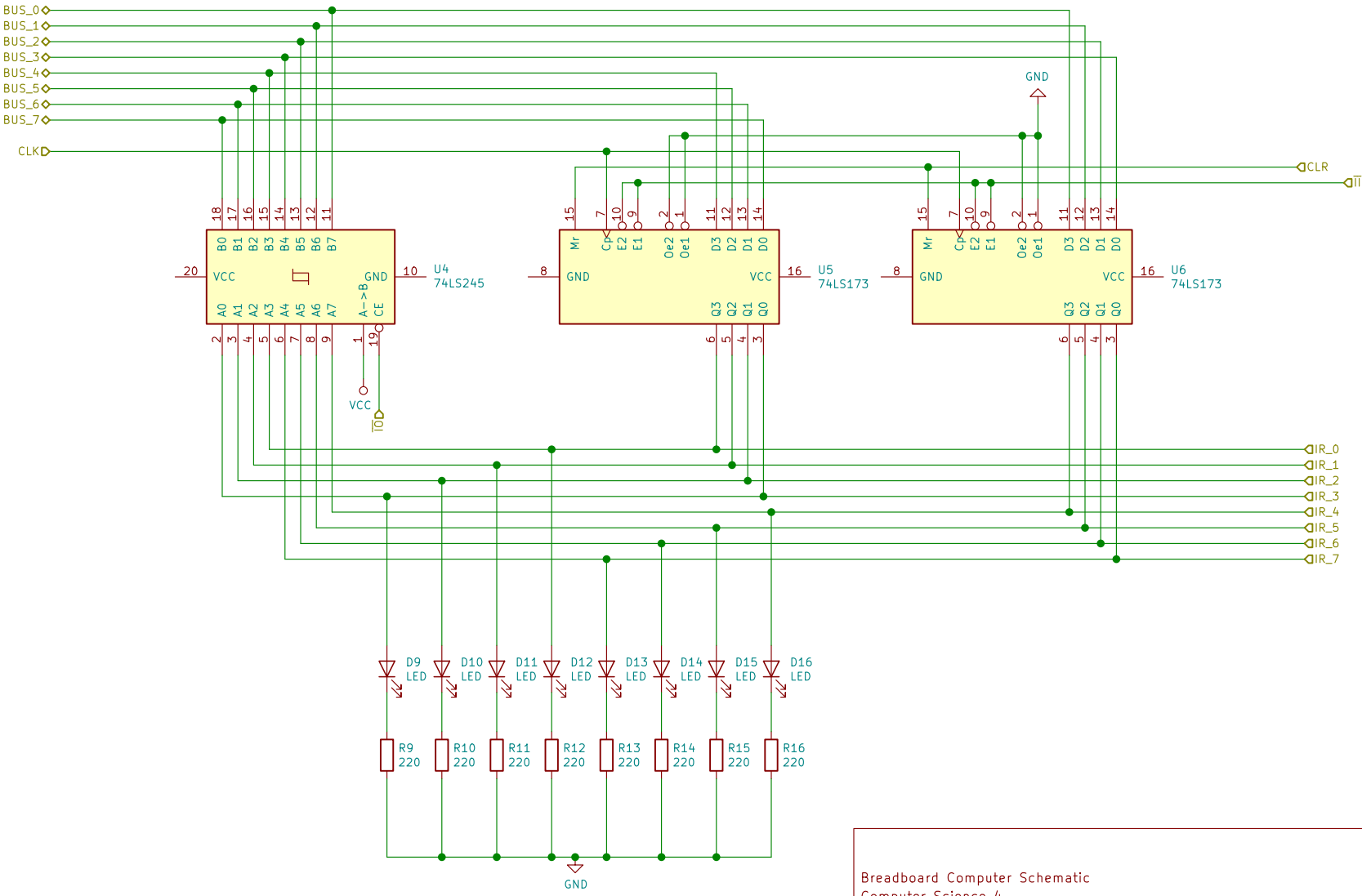


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

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

Title: Accumulator

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 2/26



Breadboard Computer Schematic
Computer Science 4
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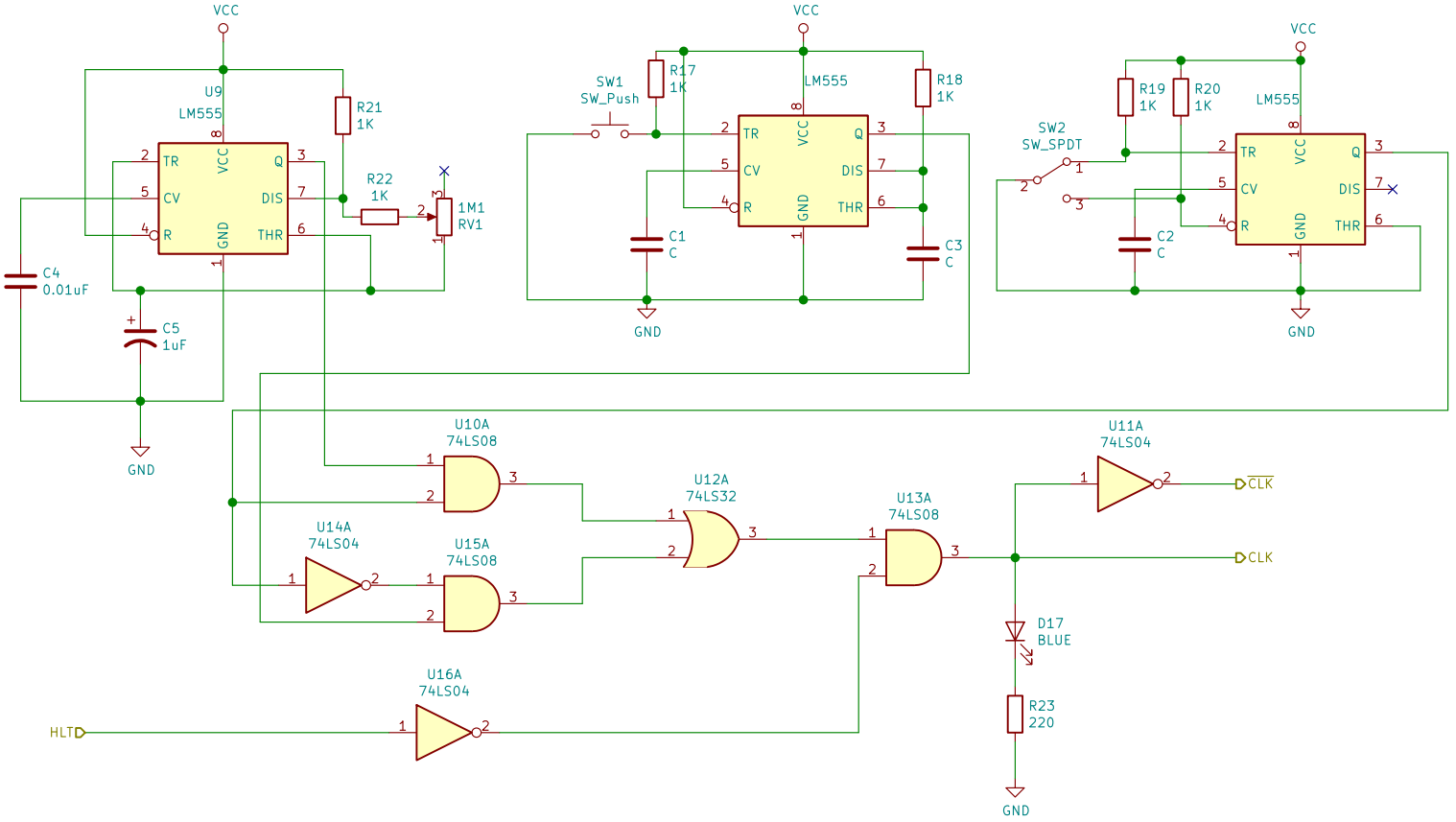
Sheet: /IR/
File: 1-Register.sch

Title:

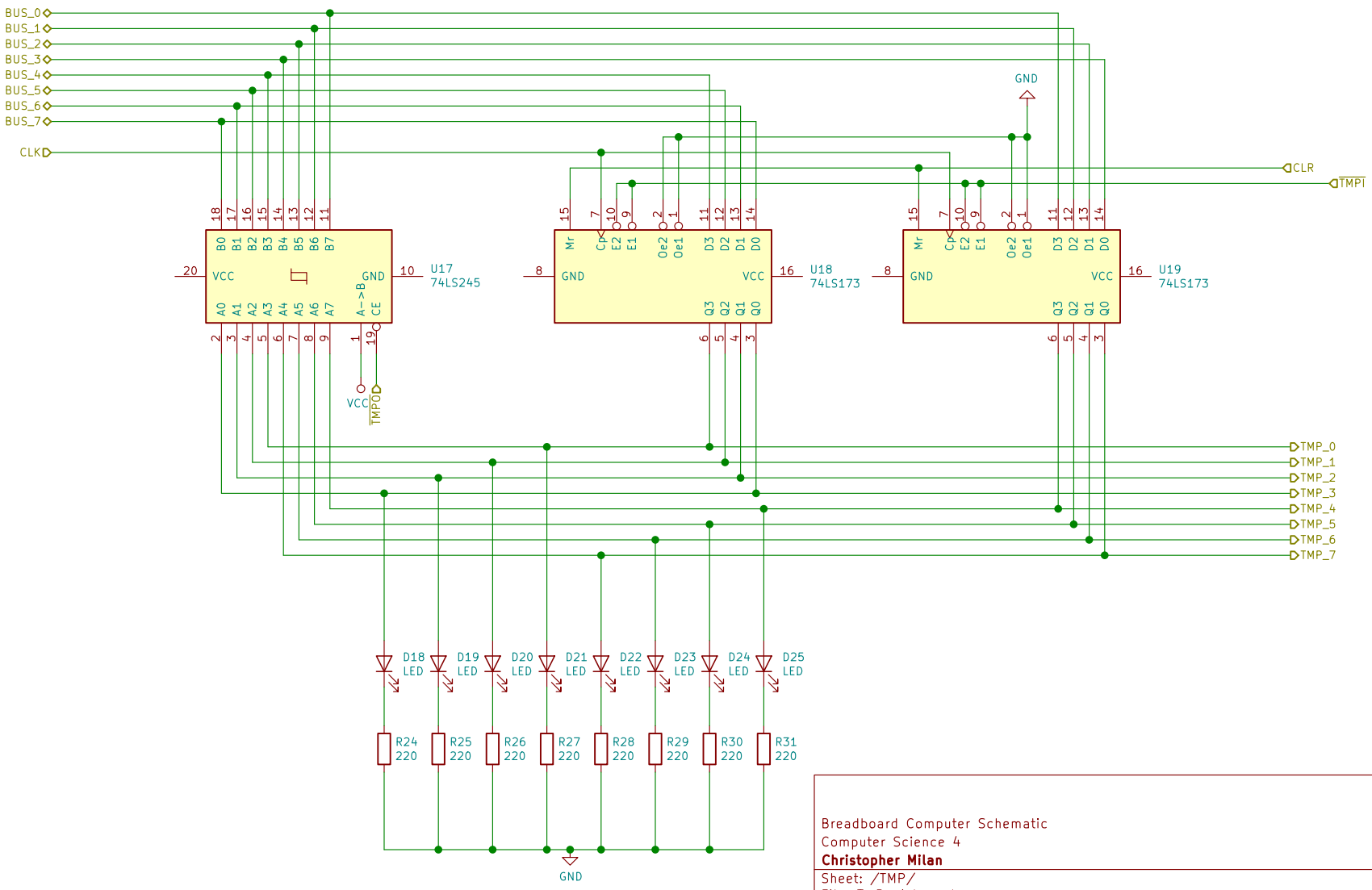
Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 3/26



Breadboard Computer Schematic
Computer Science 4
Christopher Milan
Sheet: /Clock/
File: clock.sch

Title: Clock

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 4/26

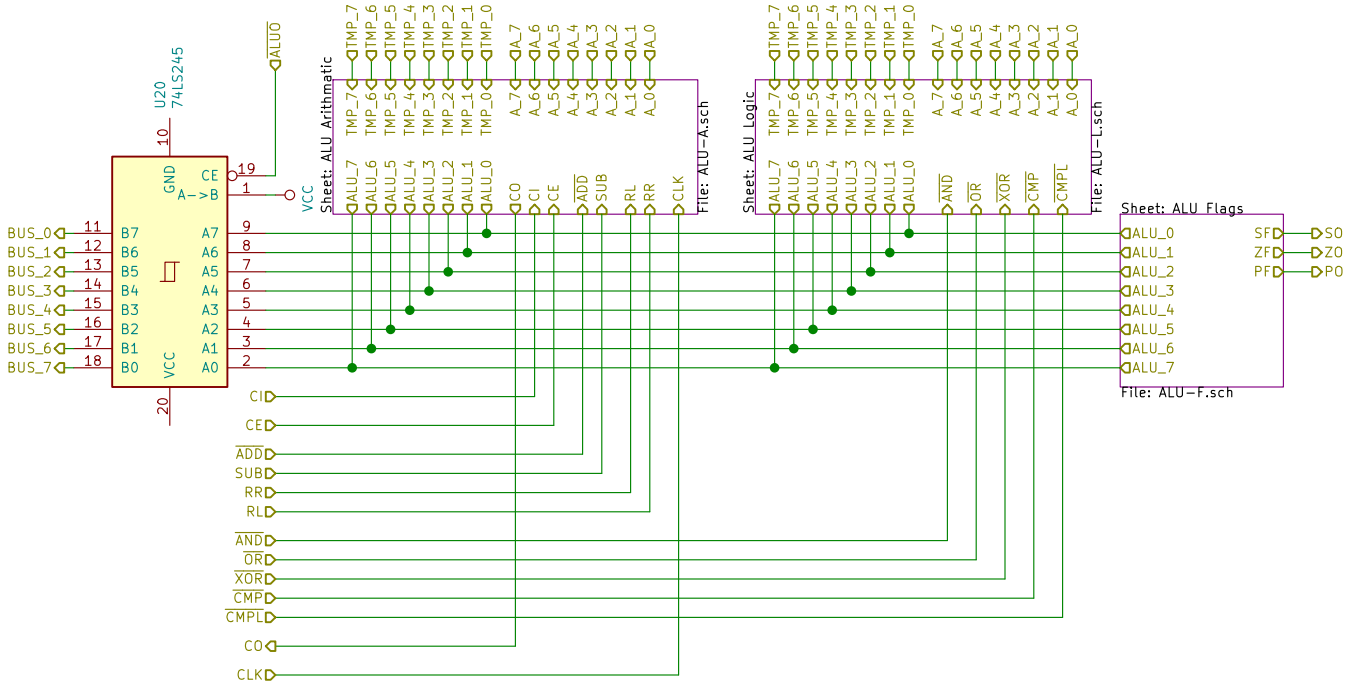


Breadboard Computer Schematic
Computer Science 4
Christopher Milan
Sheet: /TMP/
File: T-Register.sch

Title:

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 5/26

Instructions:
- [X] ADD/ADC/ADI
- [X] SUB/SBB/SUI
- [ ] INR/INX
- [ ] DCR/DCX
- [ ] DAD
- [X] ANA/ANI
- [X] ORA/ORI
- [X] XRA/XRI
- [X] CMA
- [X] CMP/CMI
- [X] RRC/RLC/RAR/RAL
- [ ] CMC
- [ ] STC



Breadboard Computer Schematic
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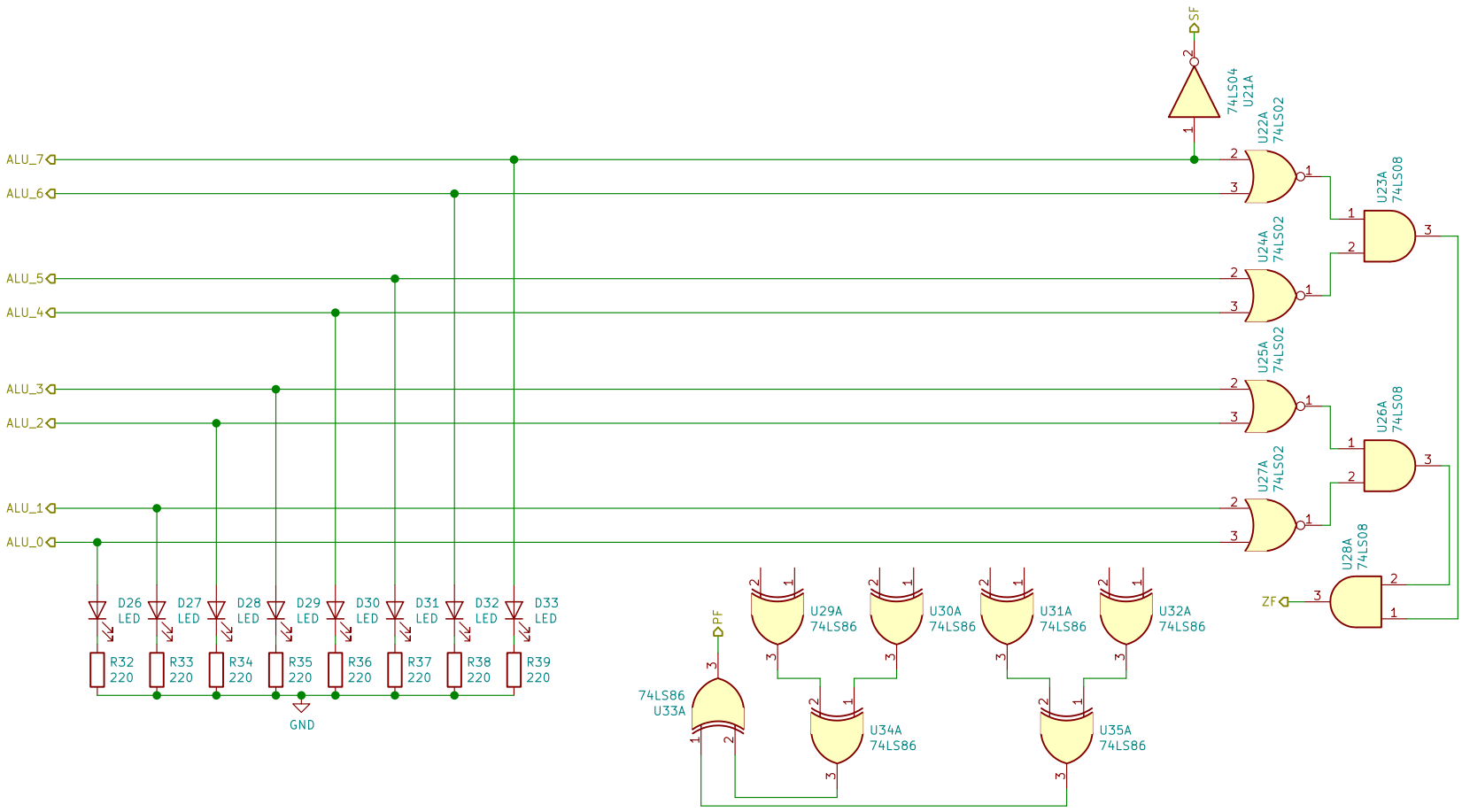
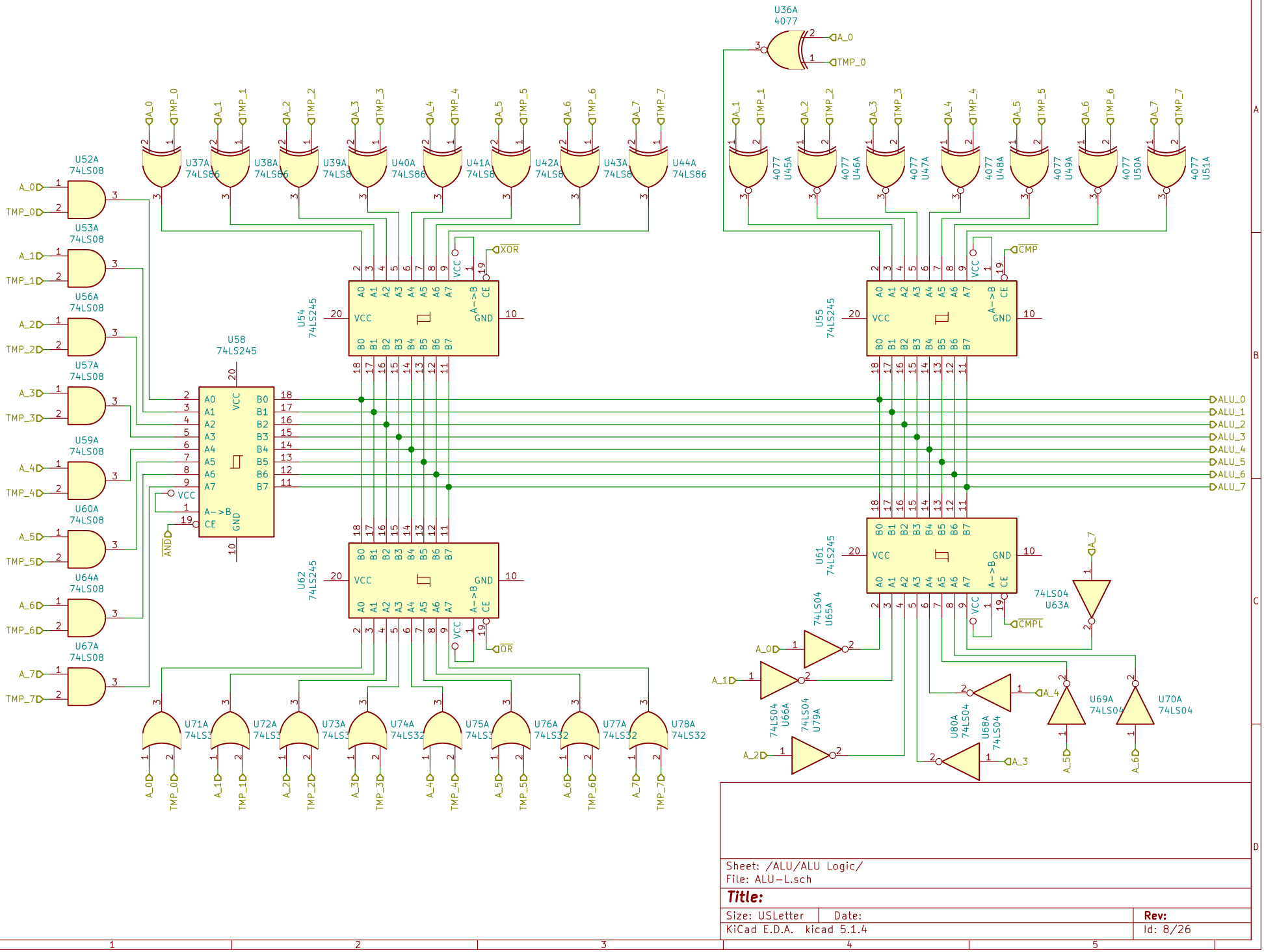
Sheet: /ALU/
File: ALU.sch

Title:

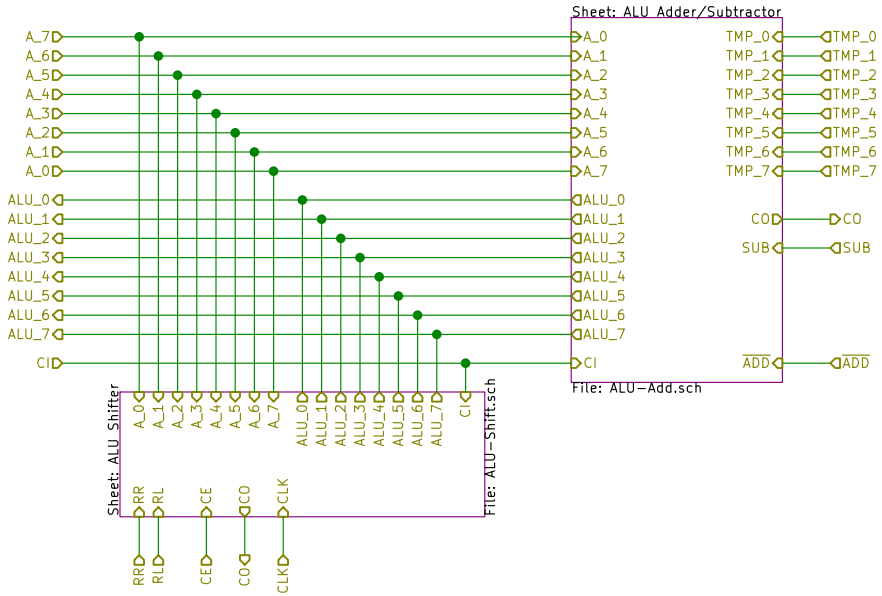
Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 6/26



Sheet: /ALU/ALU Flags/		
File: ALU-F.sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.4		Id: 7/26



Sheet: /ALU/ALU Logic/		
File: ALU-L.sch		
Title:		
Size: USLetter	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.4		Id: 8/26



Breadboard Computer Schematic
Computer Science 4
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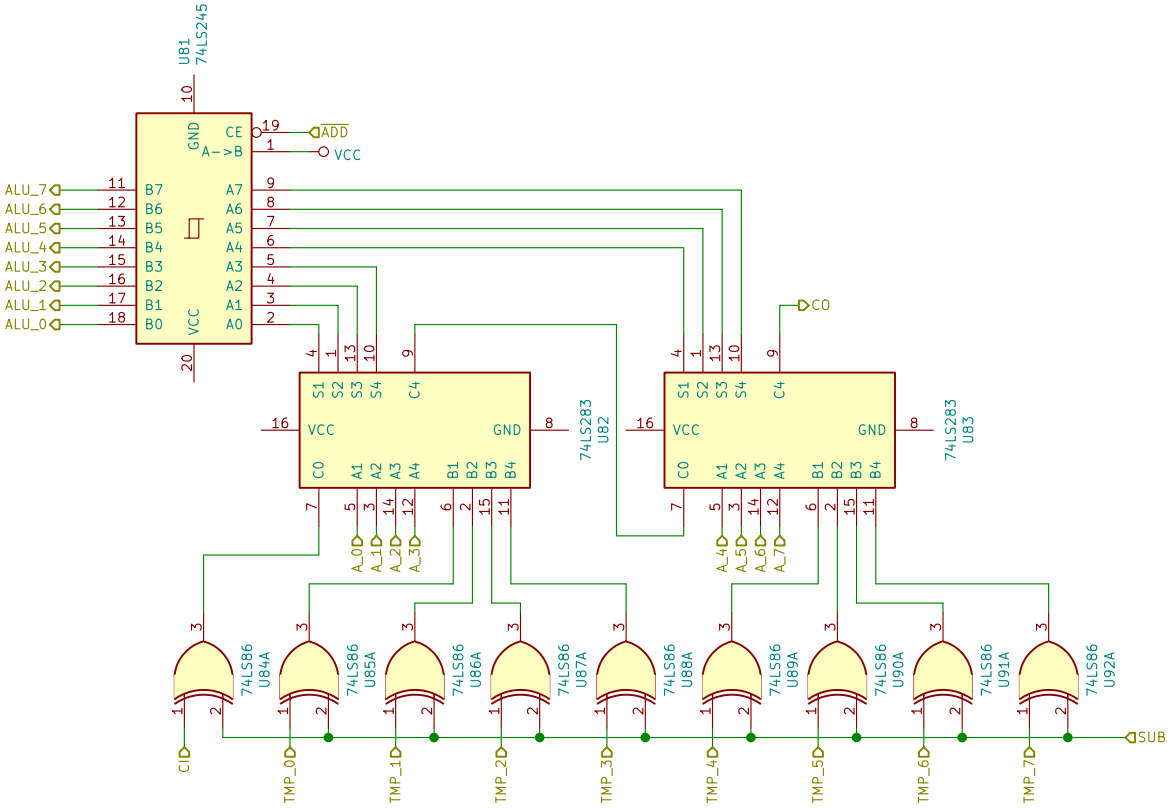
Sheet: /ALU/ALU Arithmatic/
File: ALU-A.sch

Title:

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 9/26

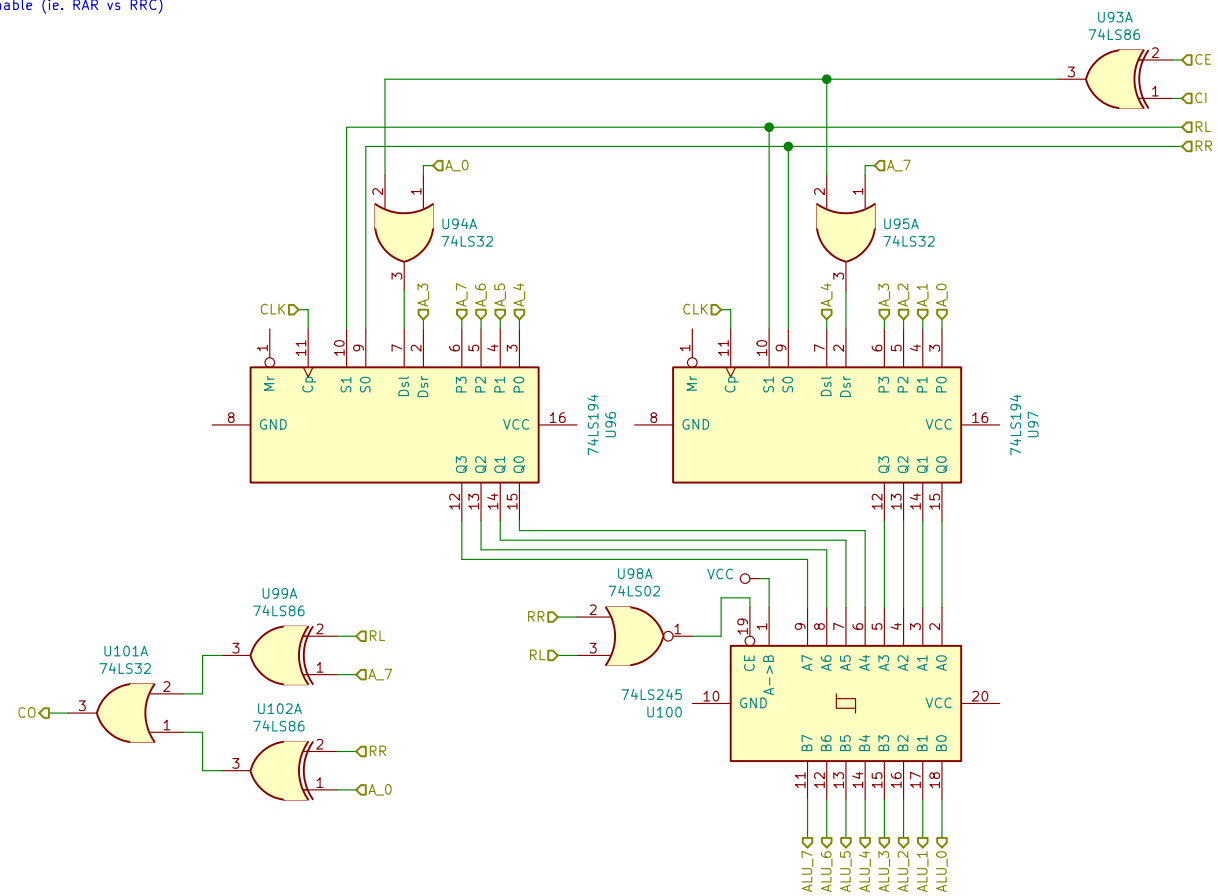


Sheet: /ALU/ALU Arithmatic/ALU Adder/Subtractor/
File: ALU-Add.sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.4		Id: 10/26

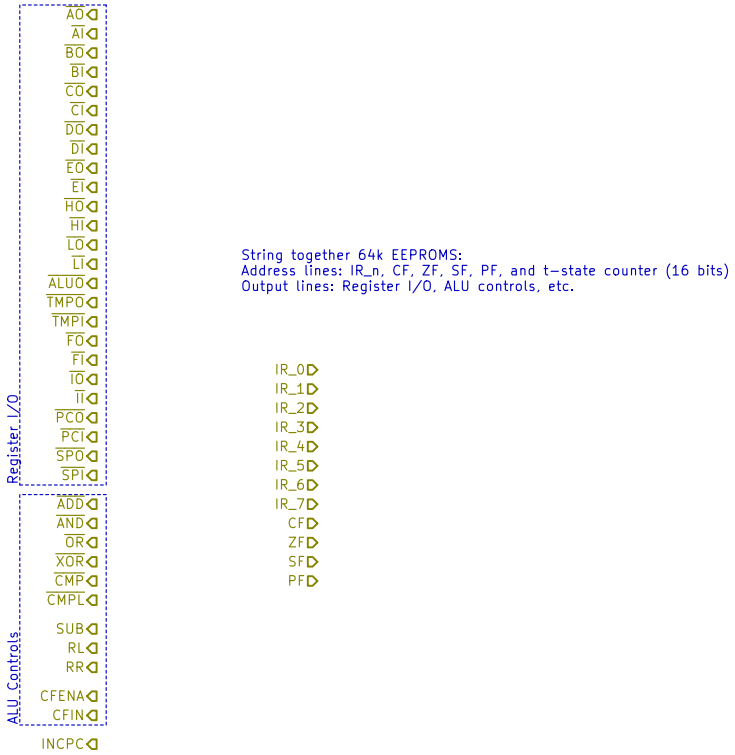
CI – Carry Flag In
CO – Carry Flag Out
CE – Carry Enable (ie. RAR vs RRC)



Sheet: /ALU/ALU Arithmatic/ALU Shifter/
File: ALU-Shift.sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 5.1.4		Id: 11/26



String together 64k EEPROMS:
Address lines: IR_n, CF, ZF, SF, PF, and t-state counter (16 bits)
Output lines: Register I/O, ALU controls, etc.

IR_0
IR_1
IR_2
IR_3
IR_4
IR_5
IR_6
IR_7
CF
ZF
SF
PF

Breadboard Computer Schematic
Computer Science 4
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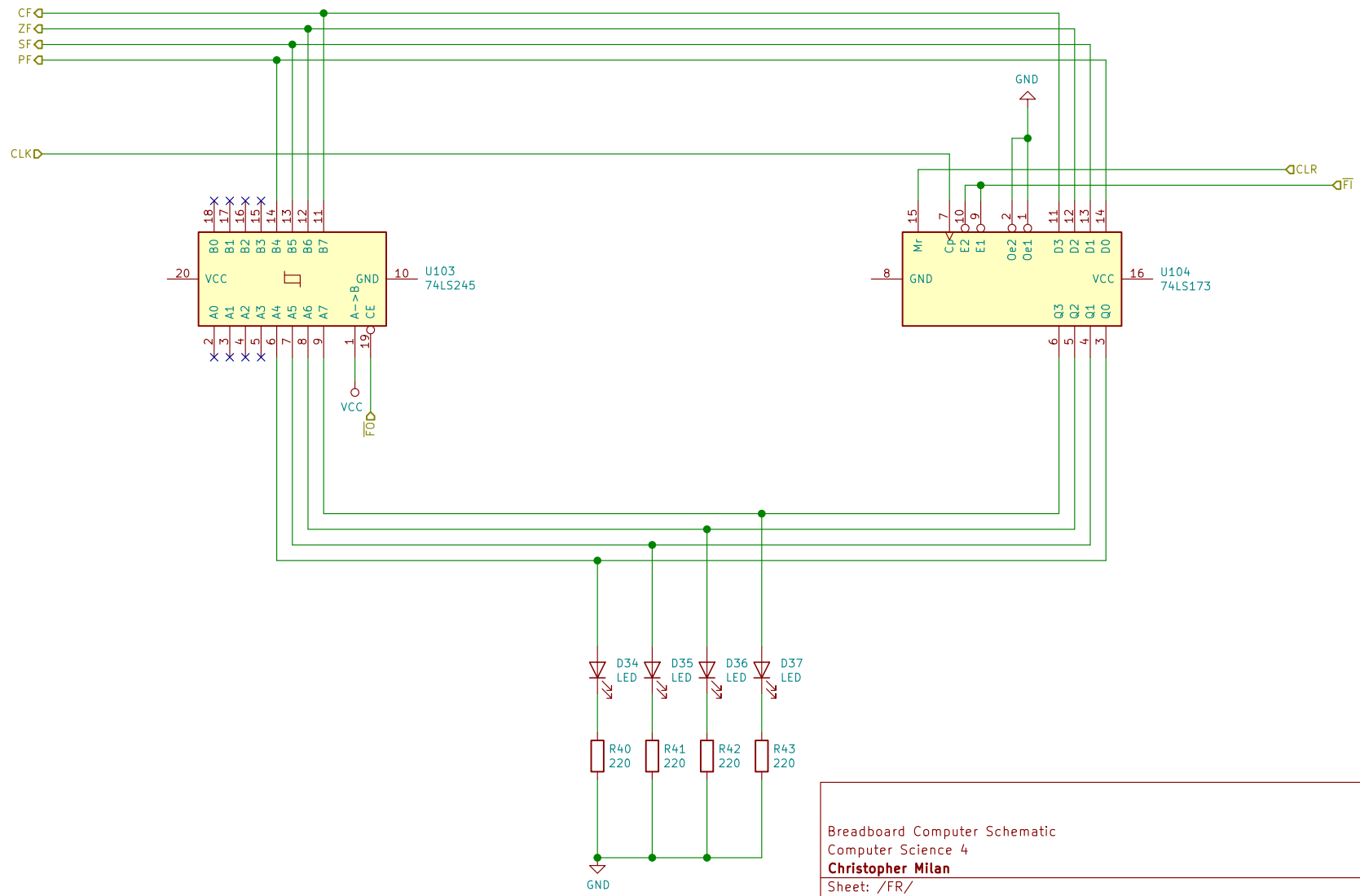
Sheet: /Control Logic/
File: Control-Logic.sch

Title:

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 12/26

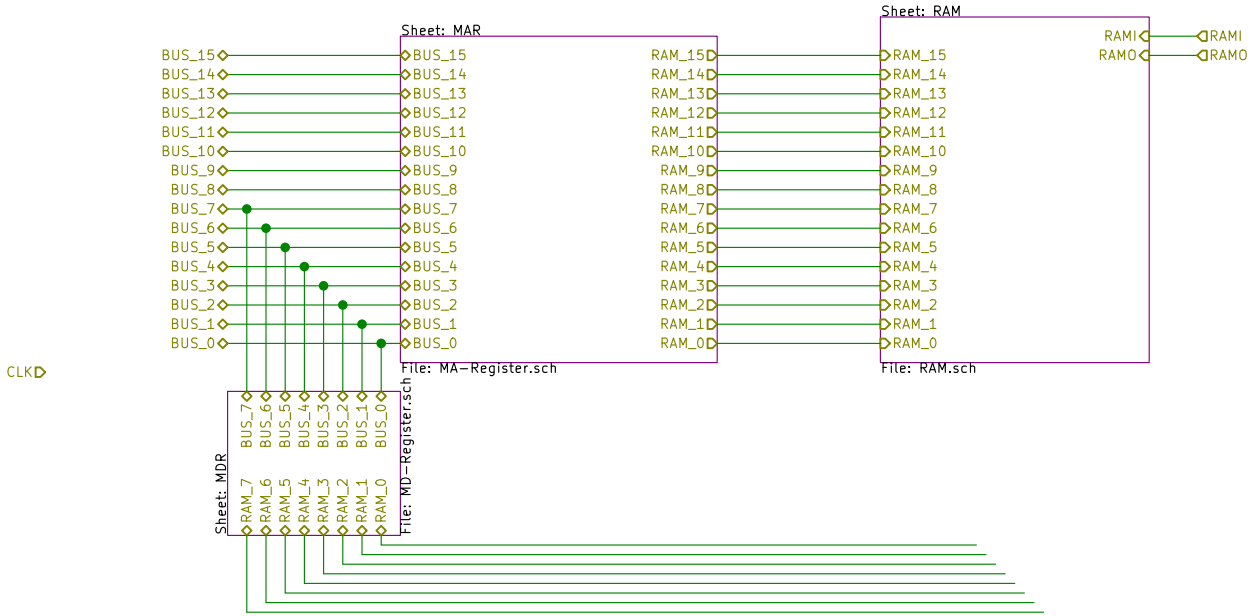


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

Sheet: /FR/
File: F-Register.sch

Title: Flags Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 13/26



Breadboard Computer Schematic
Computer Science 4
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Sheet: /Memory/
File: Memory.sch

Title: Memory

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 14/26

BUS_0
BUS_1
BUS_2
BUS_3
BUS_4
BUS_5
BUS_6
BUS_7
BUS_8
BUS_9
BUS_10
BUS_11
BUS_12
BUS_13
BUS_14
BUS_15

RAM_0
RAM_1
RAM_2
RAM_3
RAM_4
RAM_5
RAM_6
RAM_7
RAM_8
RAM_9
RAM_10
RAM_11
RAM_12
RAM_13
RAM_14
RAM_15

Breadboard Computer Schematic
Computer Science 4
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Sheet: /Memory/MAR/
File: MA-Register.sch

Title:

Size: A4	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 15/26

BUS_0
BUS_1
BUS_2
BUS_3
BUS_4
BUS_5
BUS_6
BUS_7

RAM_0
RAM_1
RAM_2
RAM_3
RAM_4
RAM_5
RAM_6
RAM_7

Breadboard Computer Schematic
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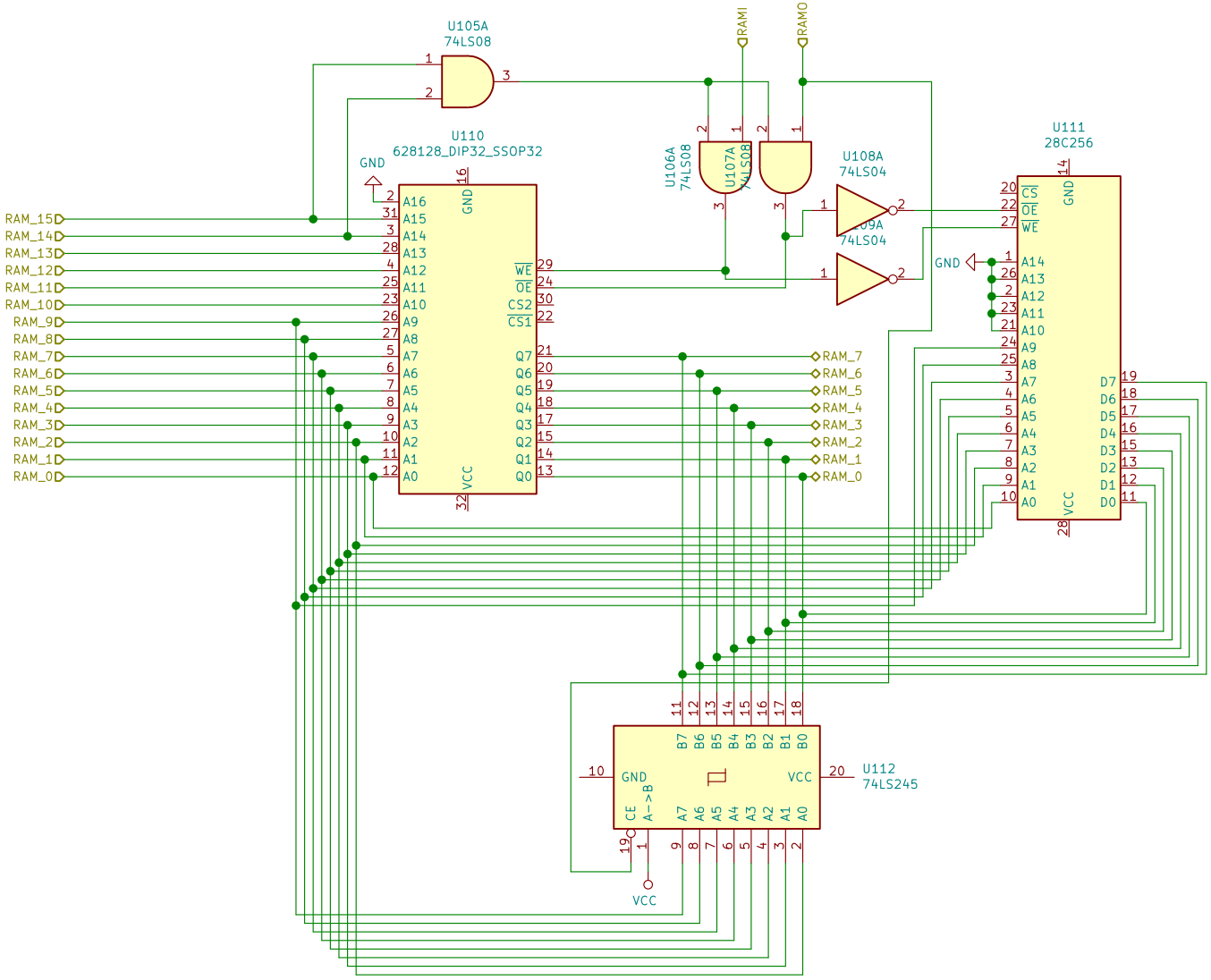
Sheet: /Memory/MDR/
File: MD-Register.sch

Title:

Size: A4	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 16/26



Breadboard Computer Schematic
Computer Science 4
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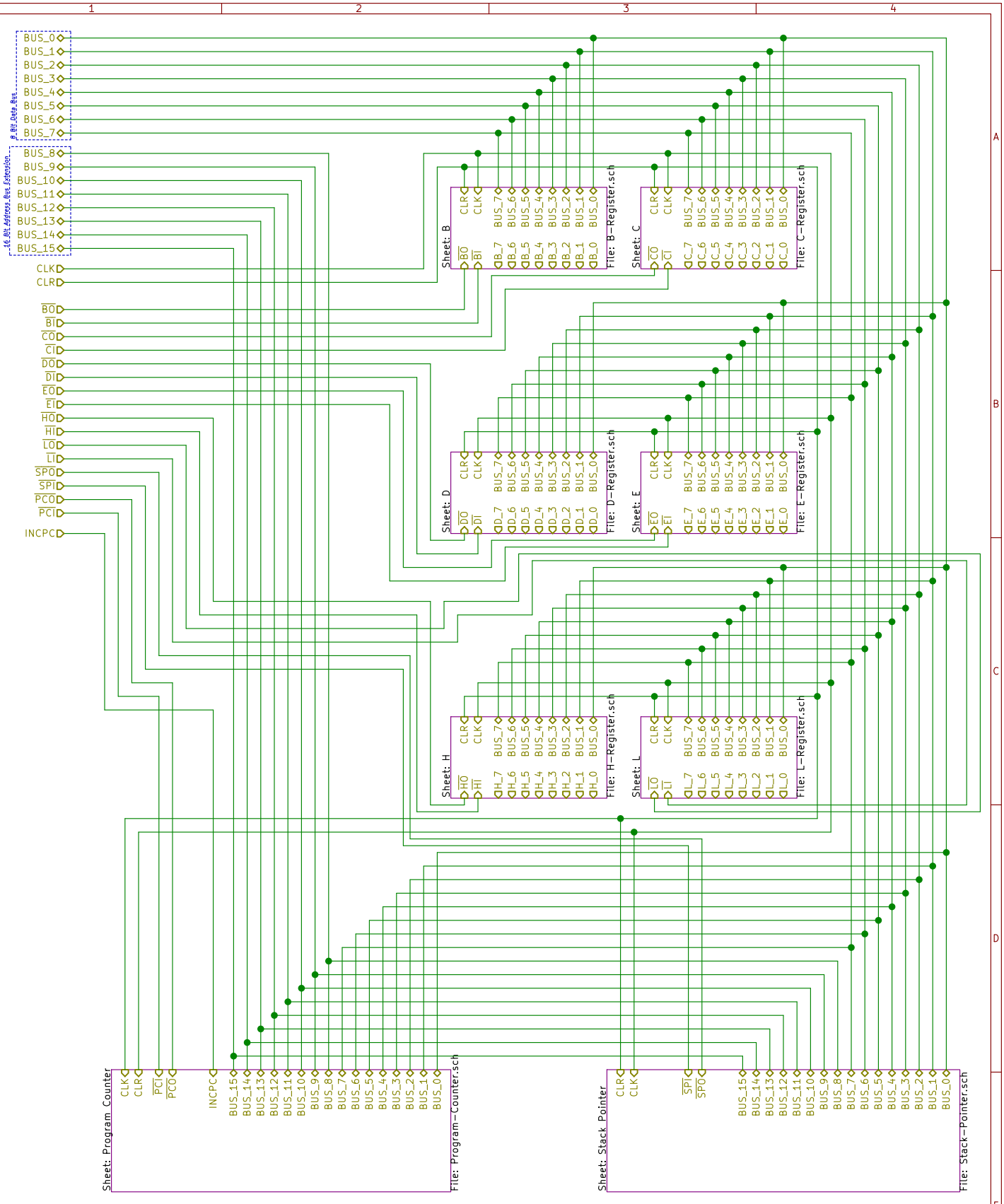
Sheet: /Memory/RAM/
File: RAM.sch

Title:

Size: A4	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 17/26



Breadboard Computer Schematic
Computer Science 4
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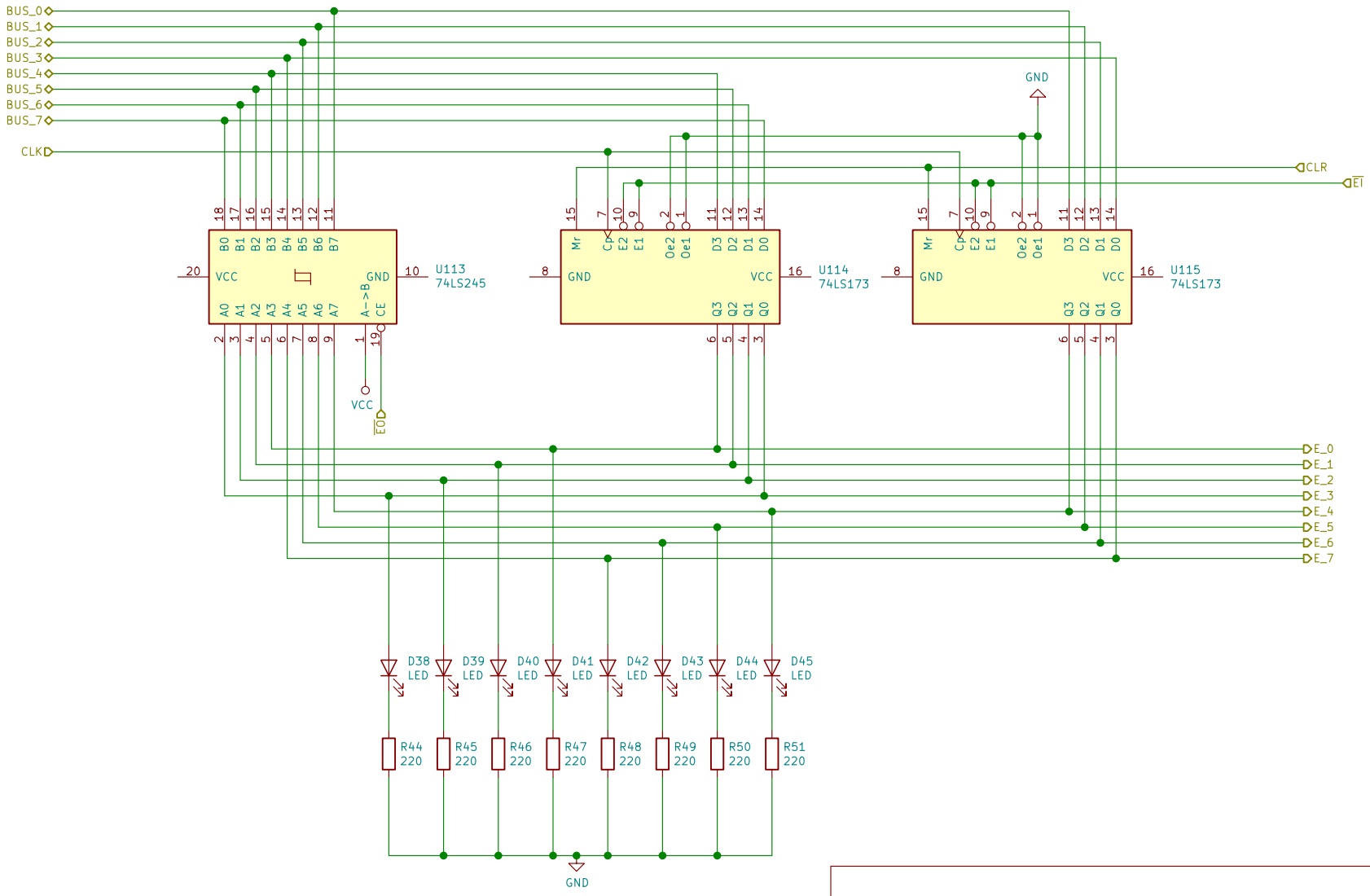
Sheet: /Registers/
File: Register.sch

Title: Register Block

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 18/26

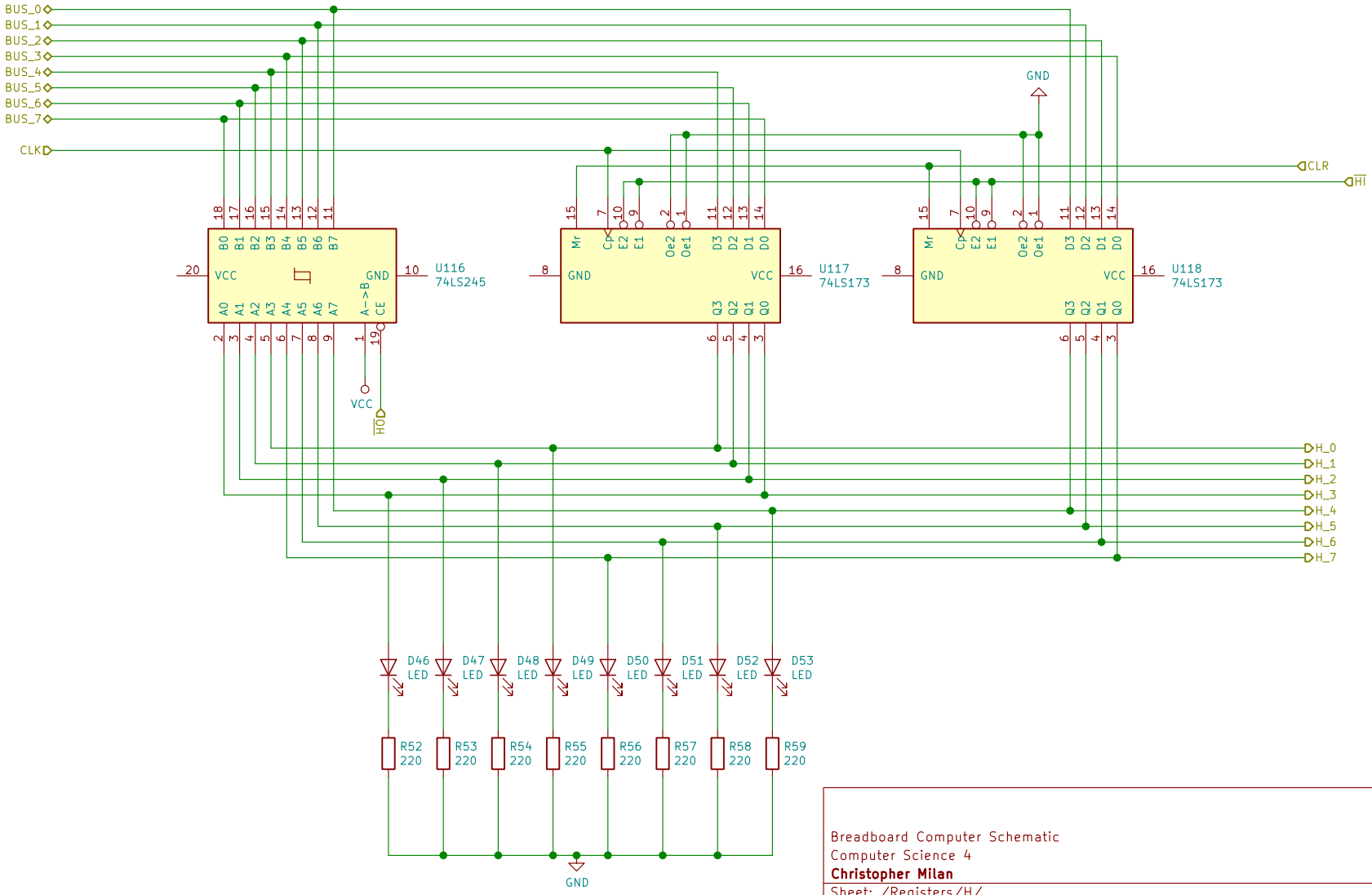


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

Sheet: /Registers/E/
File: E-Register.sch

Title: E Register

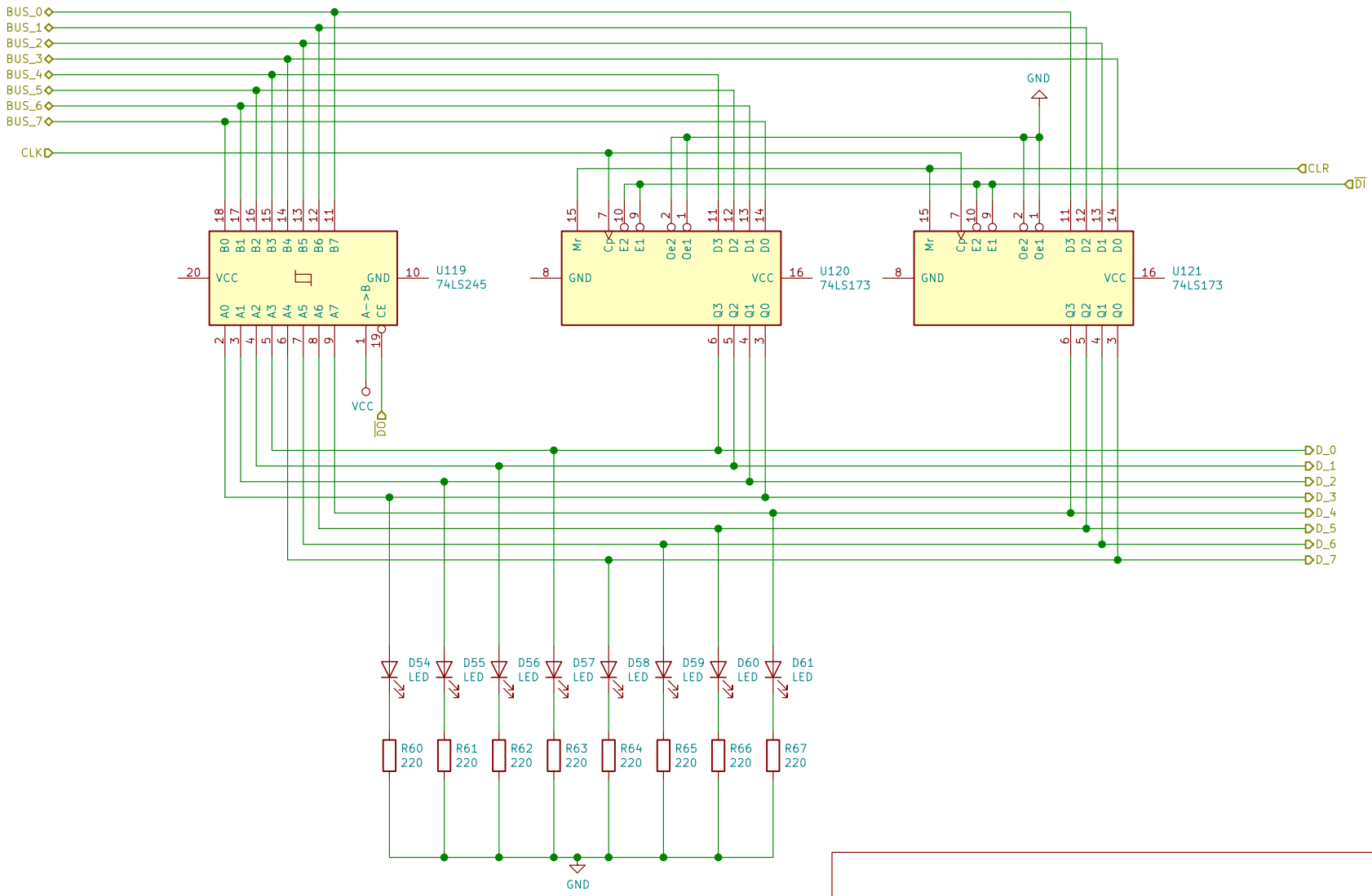
Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 19/26



Breadboard Computer Schematic
Computer Science 4
Christopher Milan
Sheet: /Registers/H/
File: H-Register.sch

Title: H Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 20/26

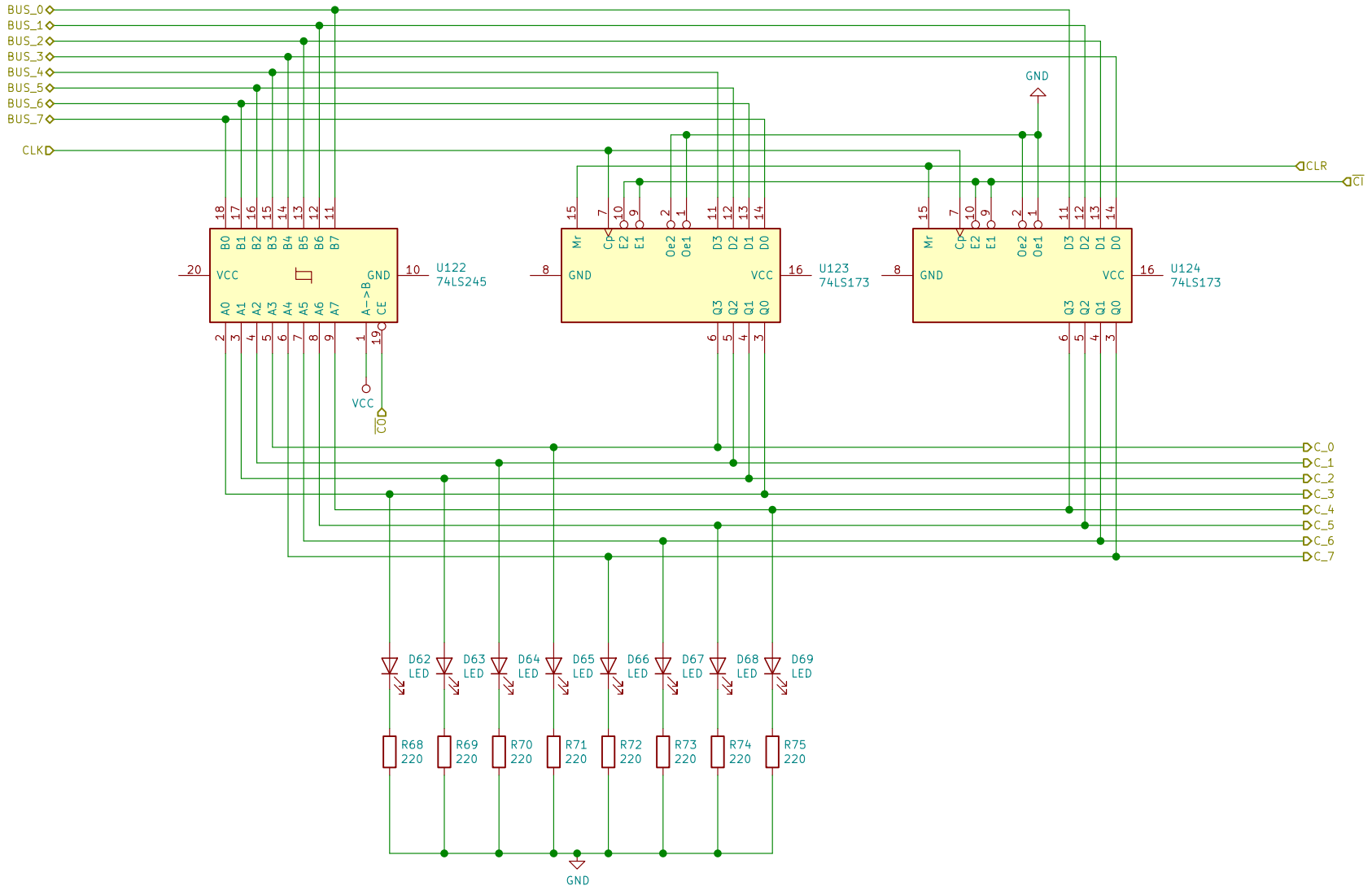


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

Sheet: /Registers/D/
File: D-Register.sch

Title: D Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 21/26

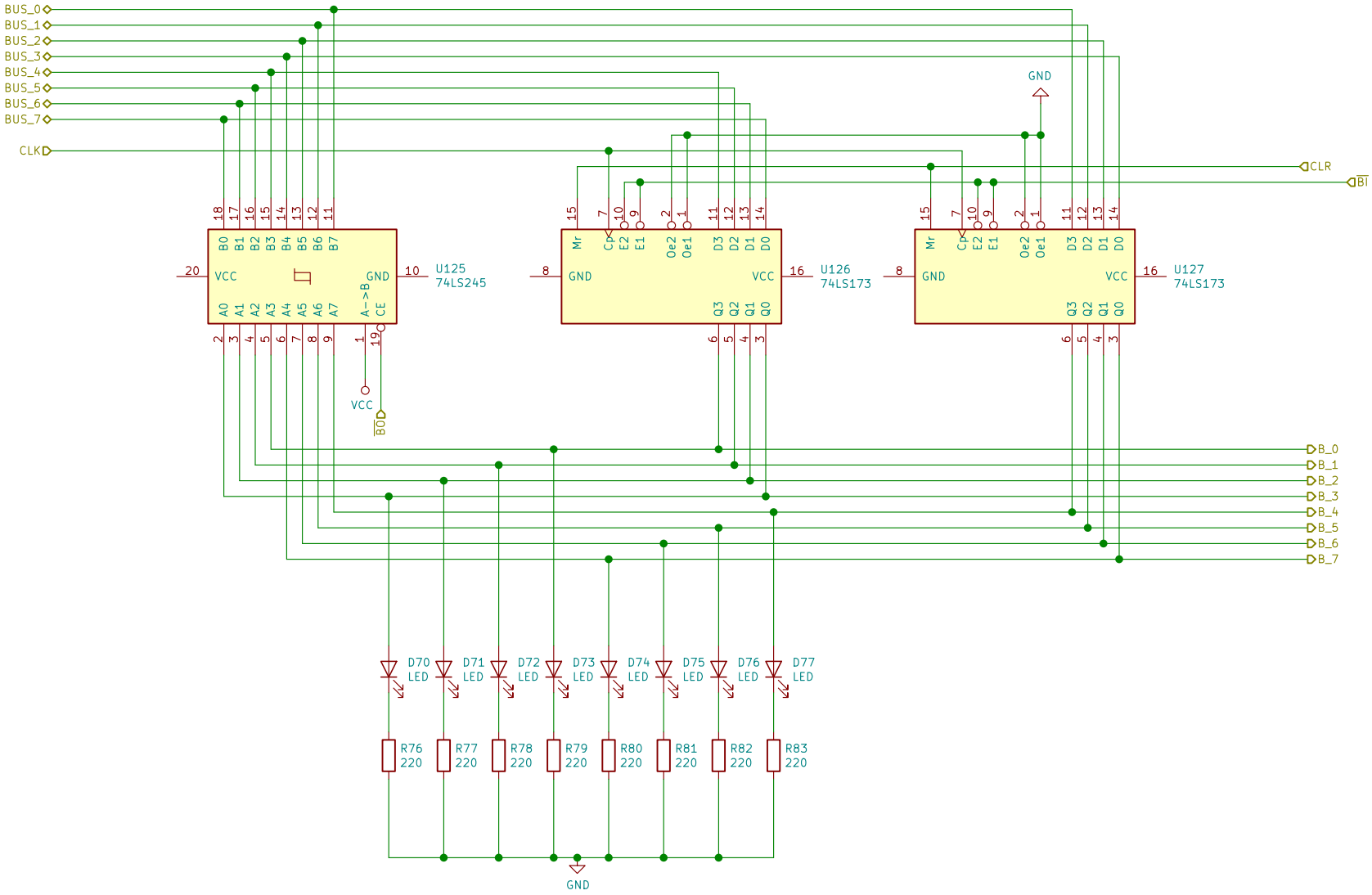


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

Sheet: /Registers/C/
File: C-Register.sch

Title: C Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 22/26

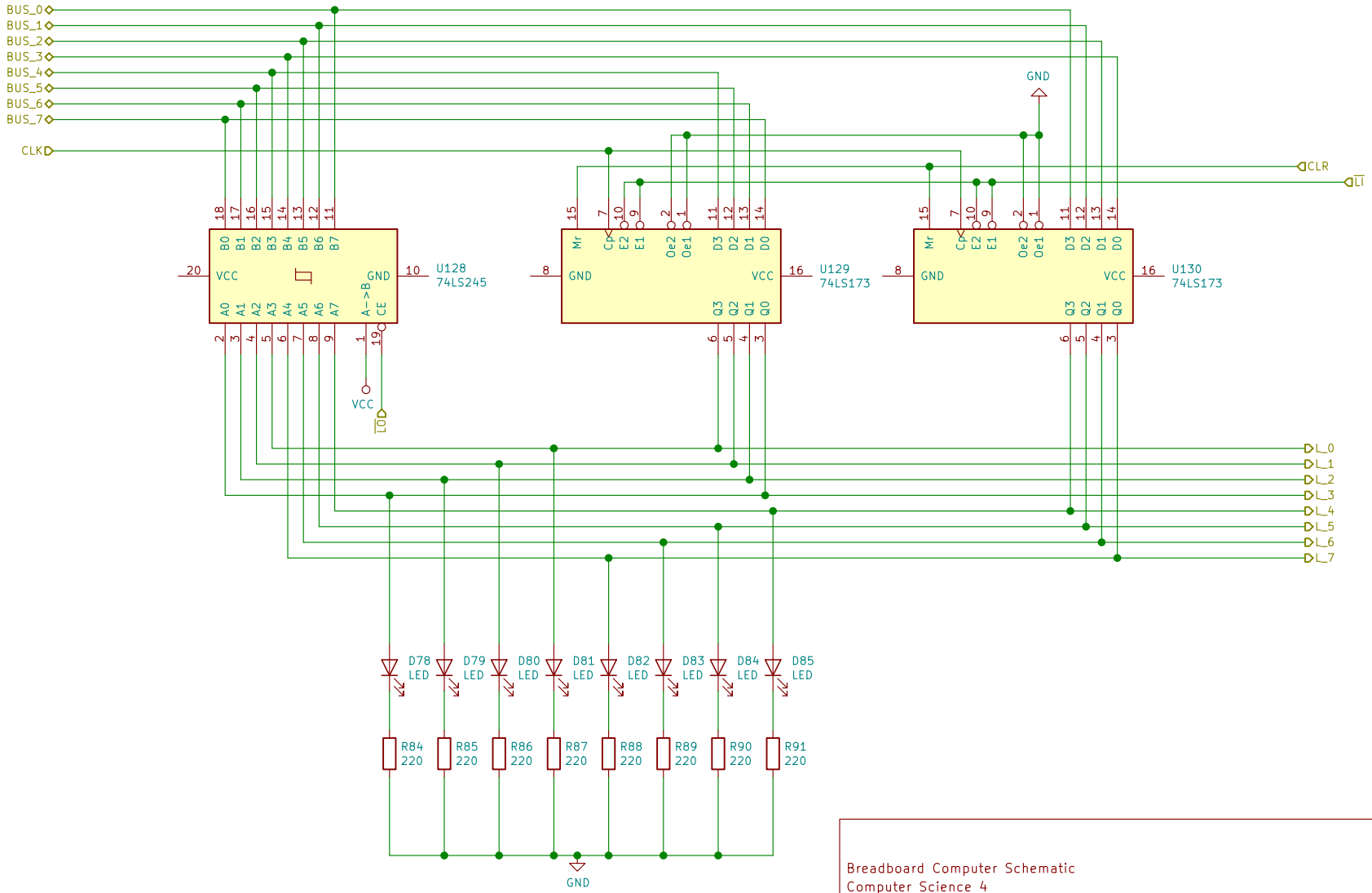


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

Sheet: /Registers/B/
File: B-Register.sch

Title: B Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 23/26



Breadboard Computer Schematic
Computer Science 4
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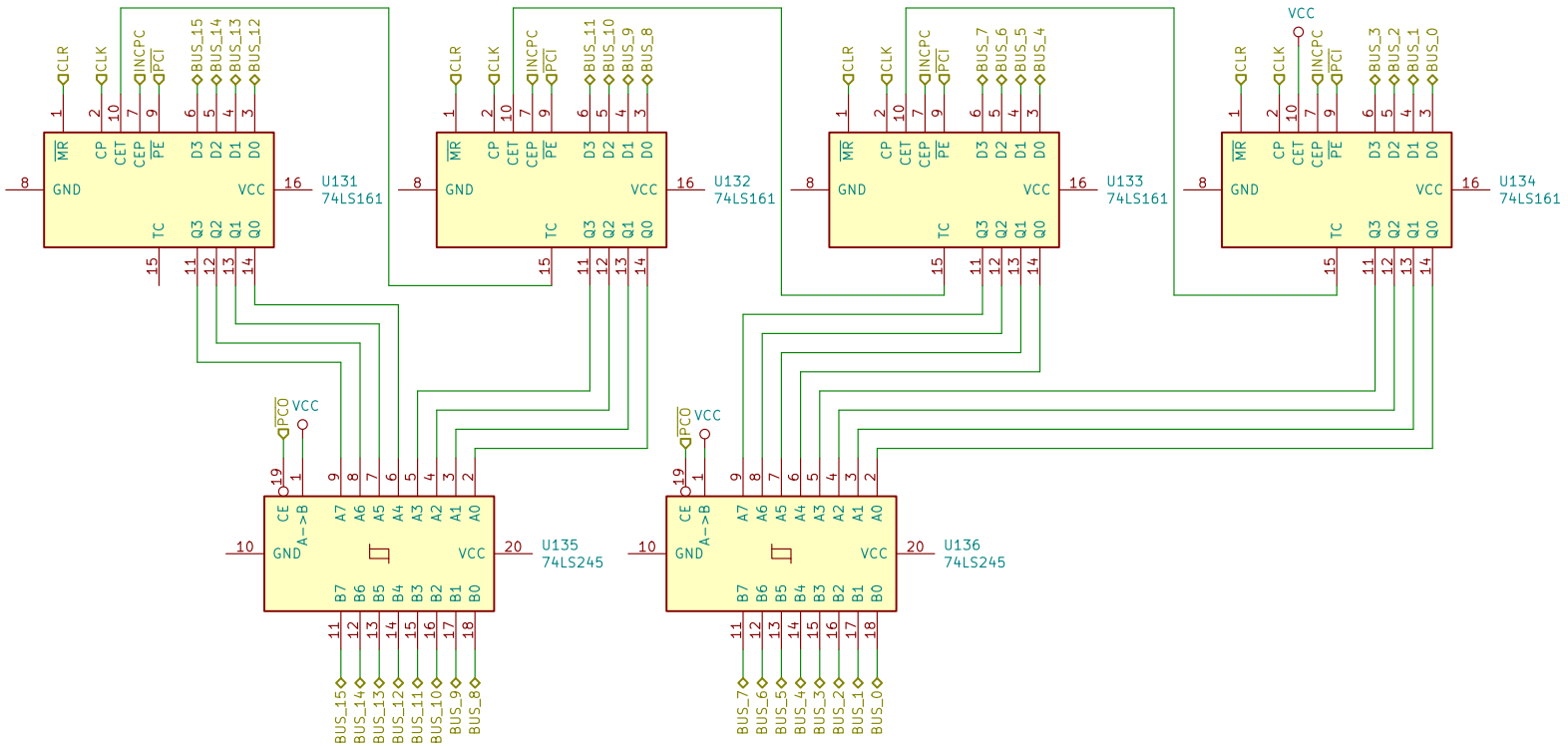
Sheet: /Registers/L/
File: L-Register.sch

Title: L Register

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 24/26

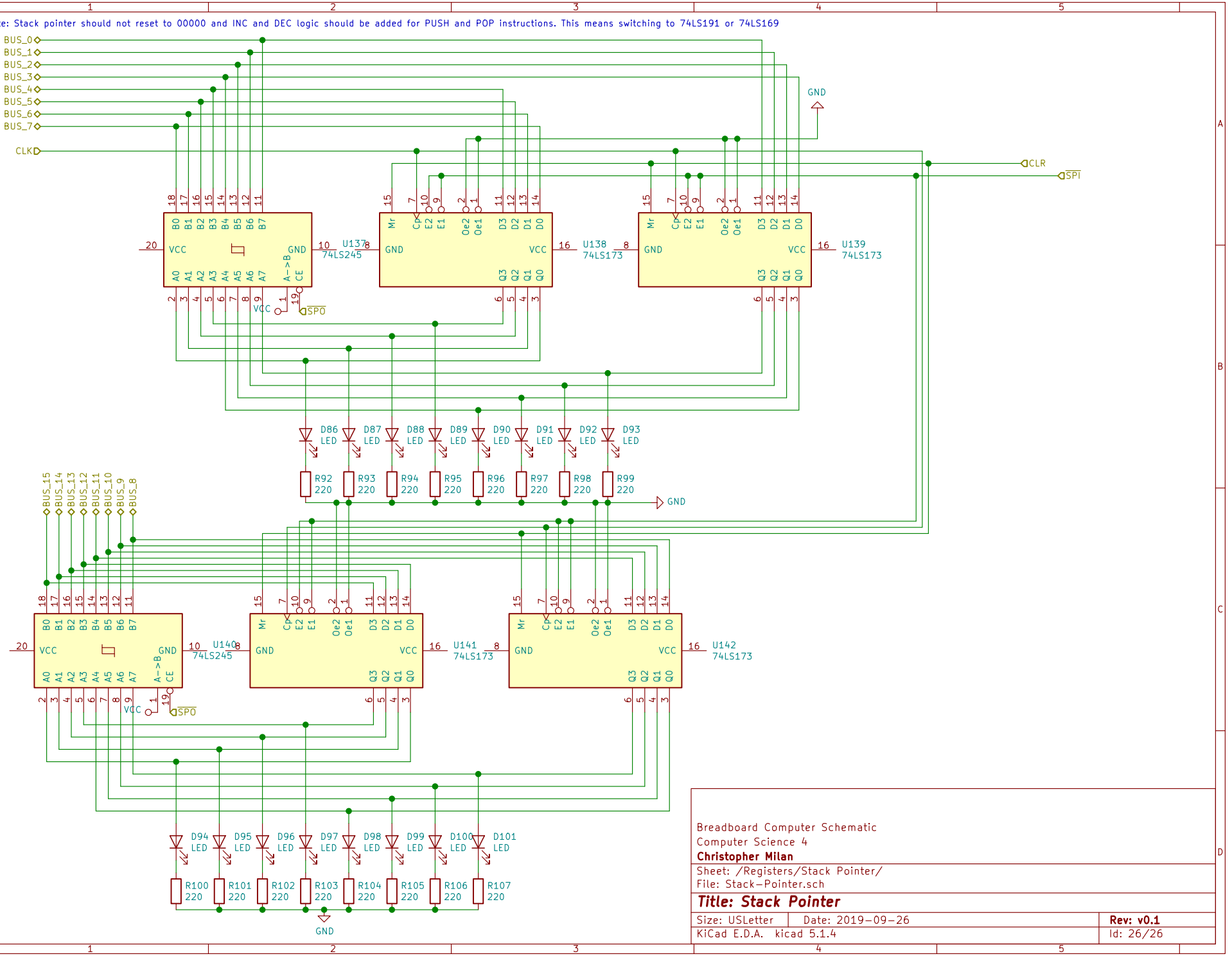


Breadboard Computer Schematic
Computer Science 4
Christopher Milan

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

Title: Program Counter

Size: USLetter	Date: 2019-09-26	**Rev: v0.1**
KiCad E.D.A. kicad 5.1.4		Id: 25/26


Note: Stack pointer should not reset to 00000 and INC and DEC logic should be added for PUSH and POP instructions. This means switching to 74LS191 or 74LS169
BUS_0
BUS_1
BUS_2
BUS_3
BUS_4
BUS_5
BUS_6
BUS_7
CLK
GND
CLR
SPI
U137
74LS245
U138
74LS173
U139
74LS173
SPO
D86 LED
D87 LED
D88 LED
D89 LED
D90 LED
D91 LED
D92 LED
D93 LED
R92 220
R93 220
R94 220
R95 220
R96 220
R97 220
R98 220
R99 220
BUS_15
BUS_14
BUS_13
BUS_12
BUS_11
BUS_10
BUS_9
BUS_8
U140
74LS245
U141
74LS173
U142
74LS173
SPO
D94 LED
D95 LED
D96 LED
D97 LED
D98 LED
D99 LED
D100 LED
D101 LED
R100 220
R101 220
R102 220
R103 220
R104 220
R105 220
R106 220
R107 220
GND
Breadboard Computer Schematic
Computer Science 4
Christopher Milan
Sheet: /Registers/Stack Pointer/
File: Stack-Pointer.sch
Title: Stack Pointer
Size: USLetter
Date: 2019-09-26
Rev: v0.1
KiCad E.D.A. kicad 5.1.4
Id: 26/26