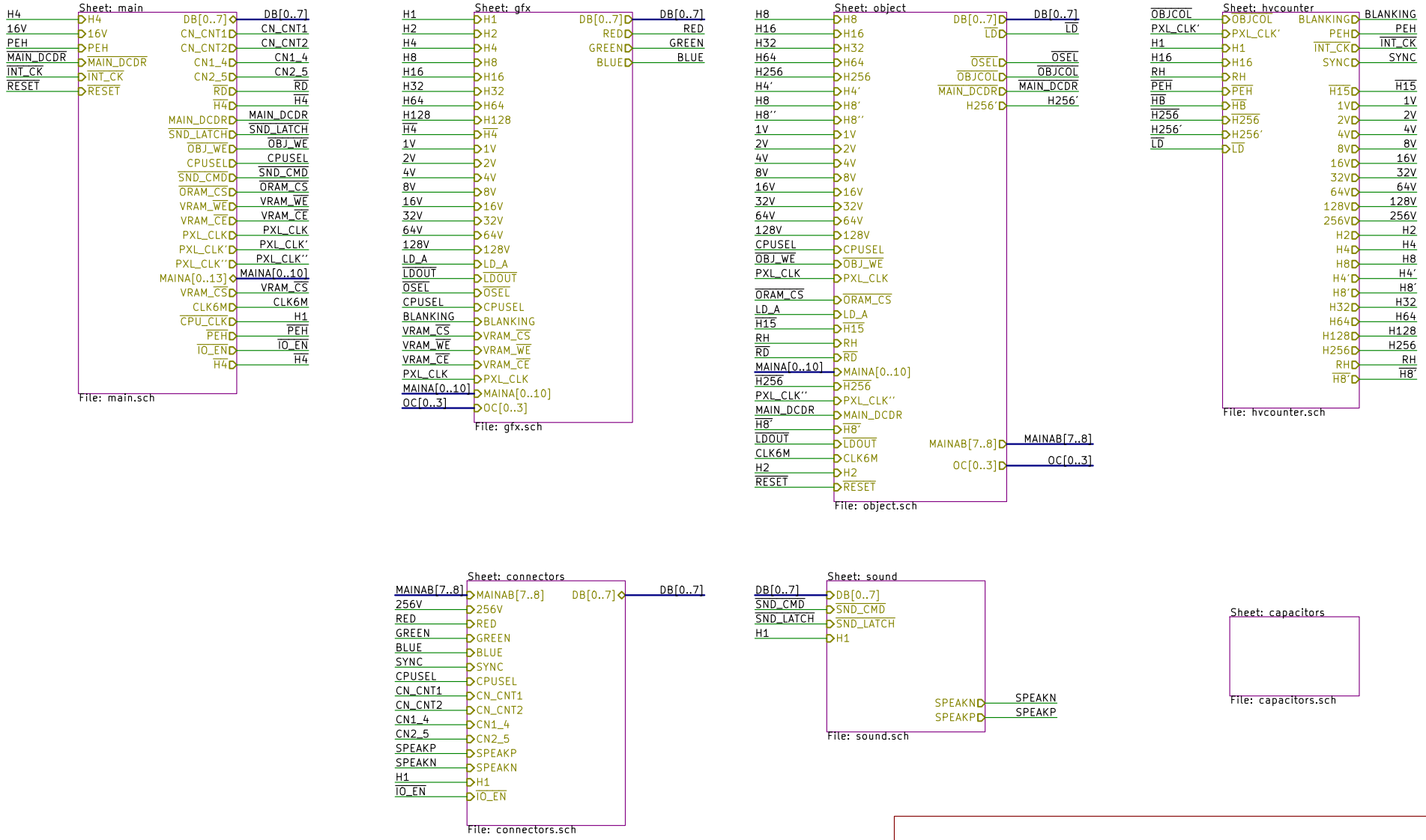
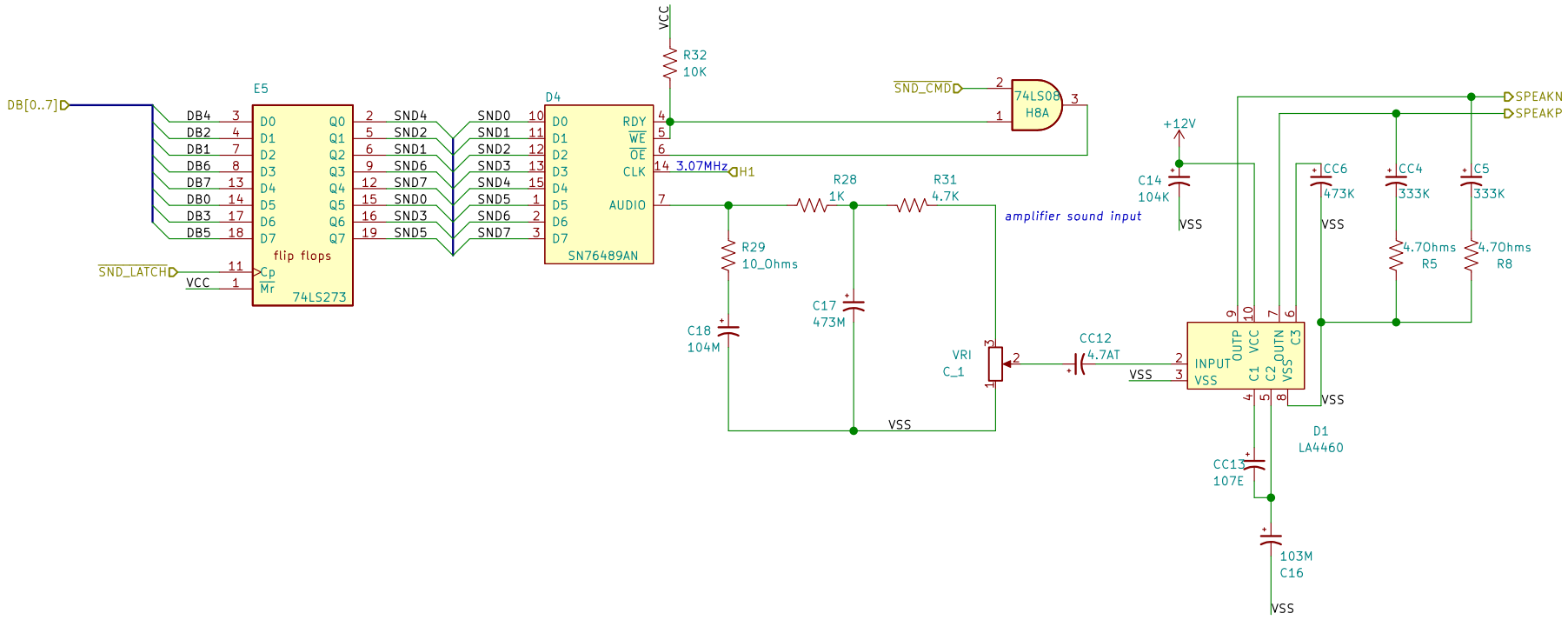

Sheet: main
H4
16V
PEH
MAIN_DCDR
INT_CK
RESET
DB[0..7]
CN_CNT1
CN_CNT2
CN1_4
CN2_5
RD
H4
MAIN_DCDR
SND_LATCH
OBJ_WE
CPUSEL
SND_CMD
ORAM_CS
VRAM_WE
VRAM_CE
PXL_CLK
PXL_CLK'
PXL_CLK''
MAINA[0..13]
VRAM_CS
CLK6M
CPU_CLK
H1
PEH
IO_EN
H4
File: main.sch
Sheet: gfx
H1
H2
H4
H8
H16
H32
H64
H128
H4
1V
2V
4V
8V
16V
32V
64V
128V
LD_A
LDOUT
OSEL
CPUSEL
BLANKING
VRAM_CS
VRAM_WE
VRAM_CE
PXL_CLK
MAINA[0..10]
OC[0..3]
DB[0..7]
RED
GREEN
BLUE
File: gfx.sch
Sheet: object
H8
H16
H32
H64
H256
H4'
H8
H8''
1V
2V
4V
8V
16V
32V
64V
128V
CPUSEL
OBJ_WE
PXL_CLK
ORAM_CS
LD_A
H15
RH
RD
MAINA[0..10]
H256
PXL_CLK''
MAIN_DCDR
H8'
LDOUT
CLK6M
H2
RESET
DB[0..7]
LD
OSEL
OBJCOL
MAIN_DCDR
H256'
MAINAB[7..8]
OC[0..3]
File: object.sch
Sheet: hvcounter
OBJCOL
PXL_CLK'
H1
H16
RH
PEH
HB
H256
H256'
LD
BLANKING
PEH
INT_CK
SYNC
H15
1V
2V
4V
8V
16V
32V
64V
128V
256V
H2
H4
H8
H4'
H8'
H32
H64
H128
H256
RH
H8'
File: hvcounter.sch
Sheet: connectors
MAINAB[7..8]
256V
RED
GREEN
BLUE
SYNC
CPUSEL
CN_CNT1
CN_CNT2
CN1_4
CN2_5
SPEAKP
SPEAKN
H1
IO_EN
DB[0..7]
File: connectors.sch
Sheet: sound
DB[0..7]
SND_CMD
SND_LATCH
H1
SPEAKN
SPEAKP
File: sound.sch
Sheet: capacitors
File: capacitors.sch
Esperanza D. Triana
Ping Pong
JOTEGO
Sheet: /
File: pingpong.sch
GX555
Title: Ping Pong
Size: A4
Date: 2022-03-28
Rev: J. Tejada
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1
Id: 1/11

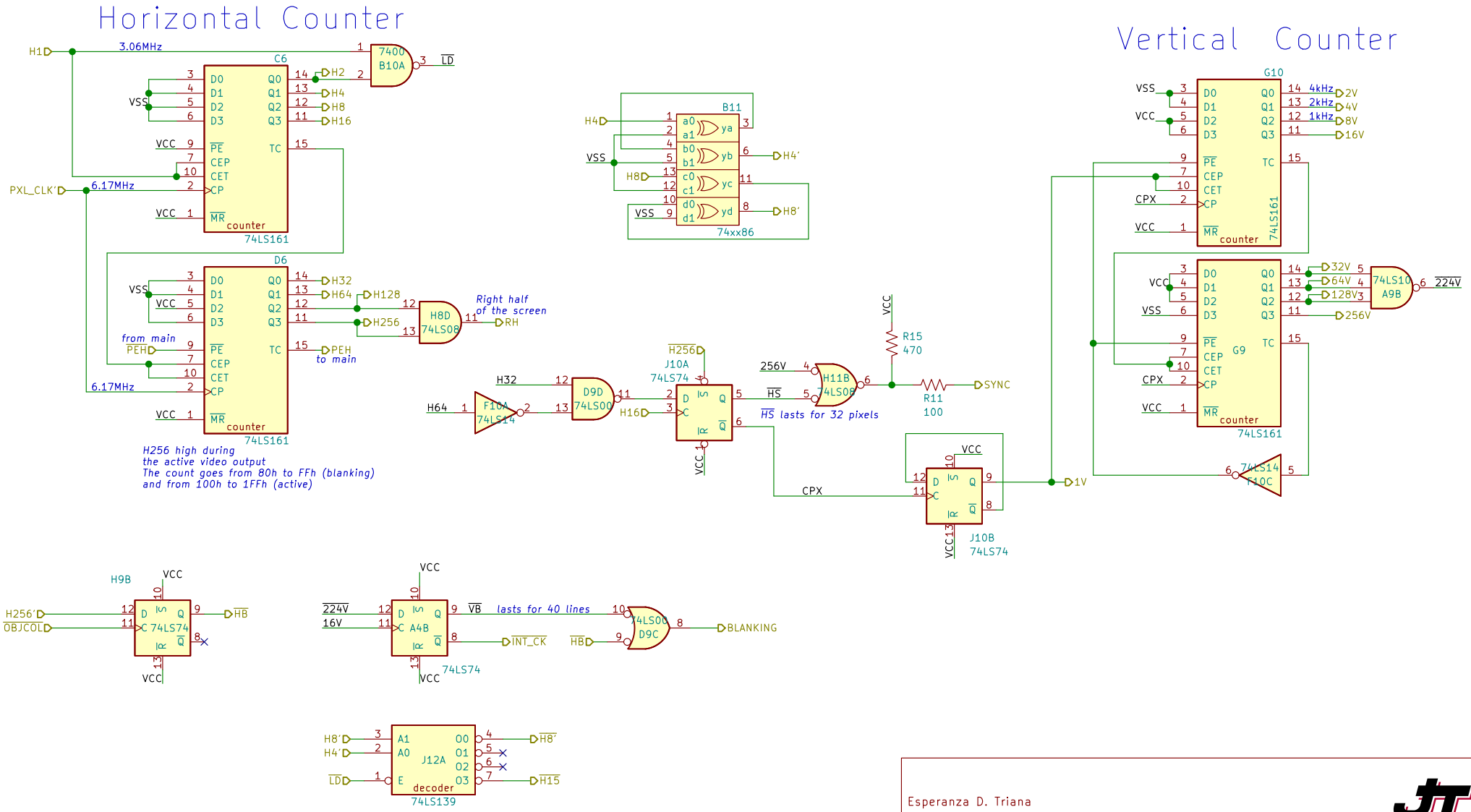


Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /sound/
File: sound.sch

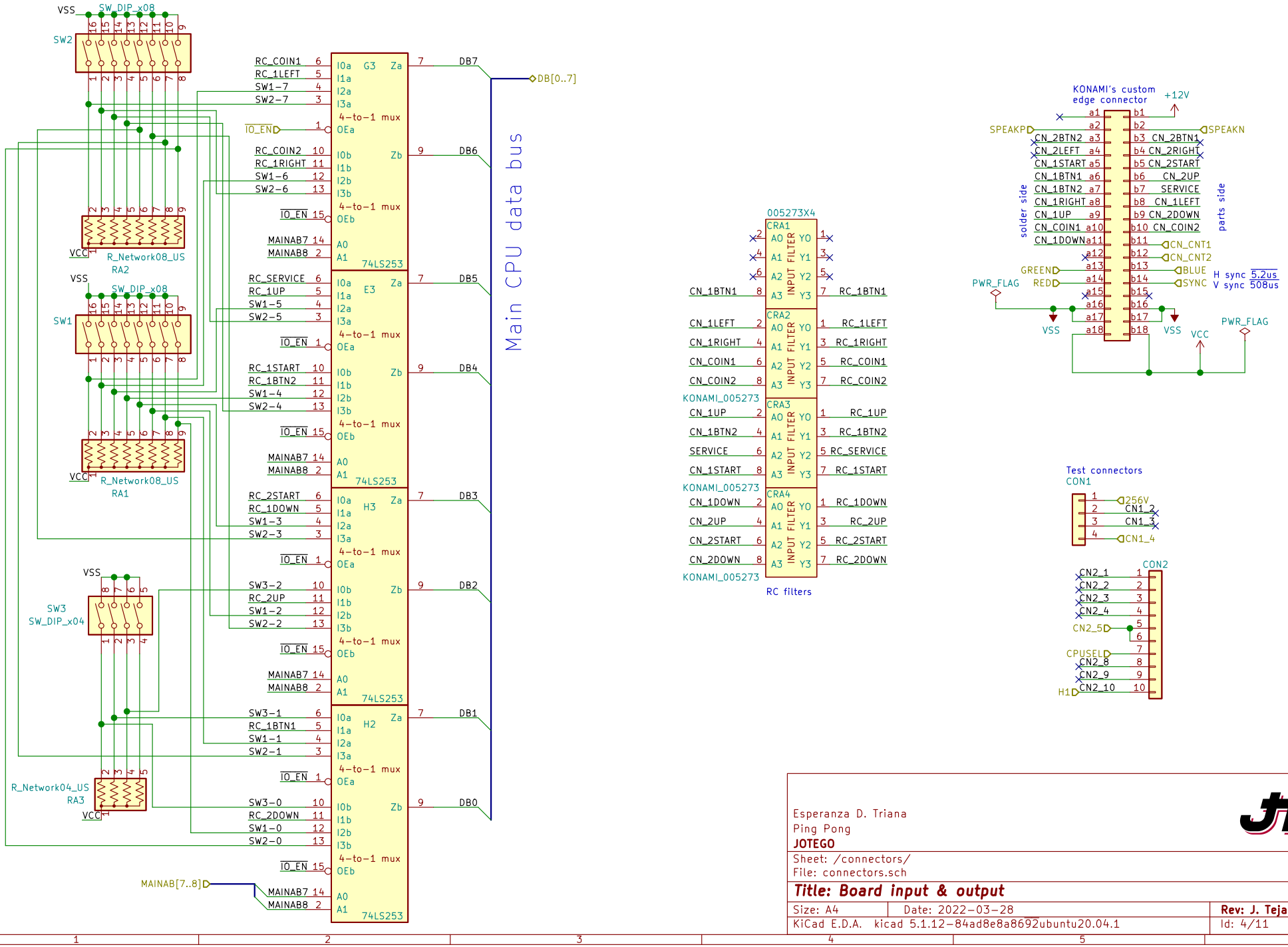
Title: Sound generator

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 2/11



Esperanza D. Triana Ping Pong **JOTEGO**	
Sheet: /hvcounter/ File: hvcounter.sch	
Title: Horizontal and vertical counters	
Size: A4	Date: 2022-03-28
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1	Id: 3/11

Rev: J. Tejada

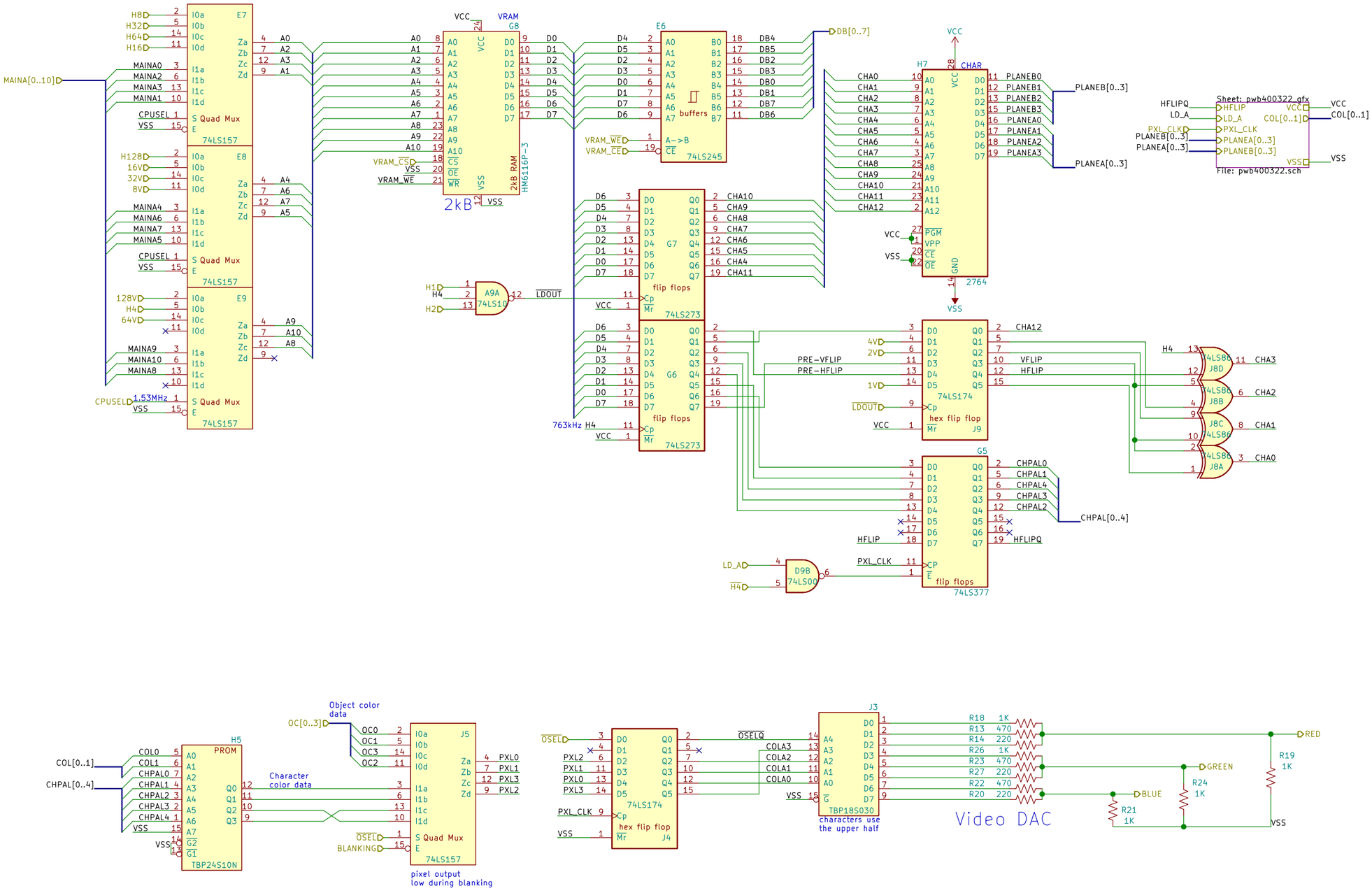


Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /connectors/
File: connectors.sch

Title: Board input & output

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 4/11



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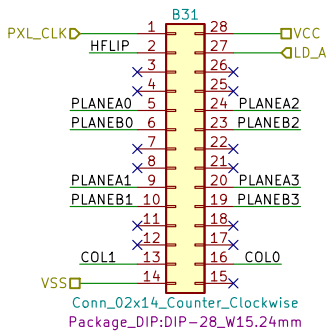
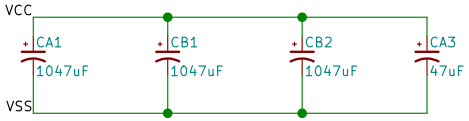
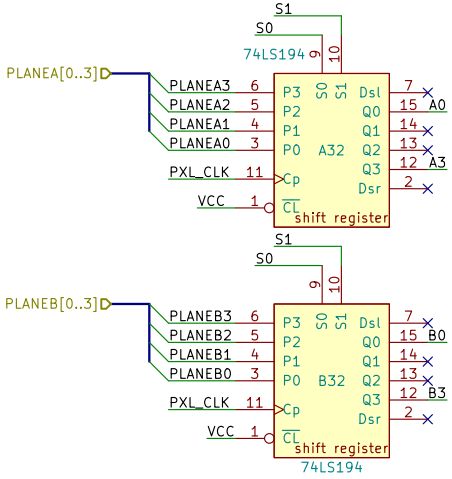
Sheet: /gfx/
File: gfx.sch

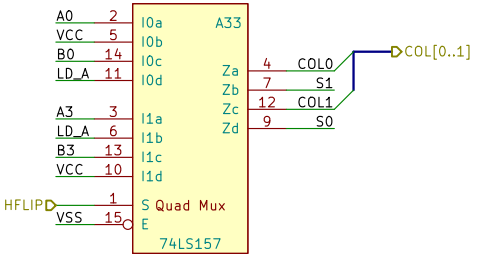
Title: Character generator

Size: A3	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 5/11









This is a small board soldered to a DIP-28 footprint. It appears twice in the design

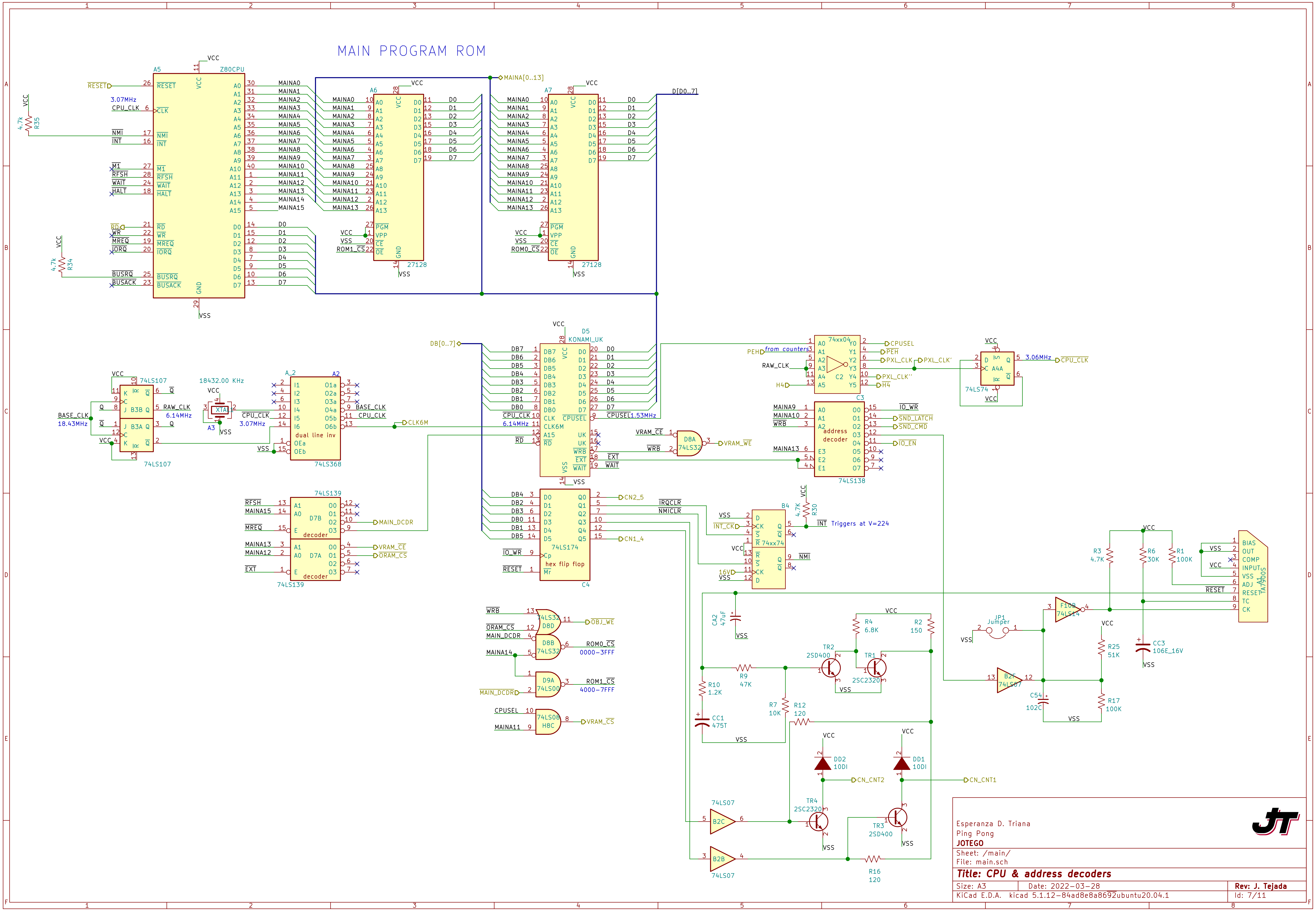
PWB-400322

Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /gfx/pwb400322_gfx/
File: pwb400322.sch

Title: Pixel shift register

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 6/11


MAIN PROGRAM ROM
A5 Z80CPU
RESET
CPU_CLK 3.07MHz
NMI
INT
M1
RFSH
WAIT
HALT
RD
WR
MREQ
IORQ
BUSRQ
BUSACK
MAINA0 … MAINA15
D0 … D7
MAINA[0..13]
D[D0..7]
A6 27128
A7 27128
ROM1_CS
ROM0_CS
VCC
VSS
R35 4.7k
R34 4.7k
DB[0..7]
D5 KONAMI_UK
CPUSEL 1.53MHz
CLK6M
6.14MHz
74LS107
B3B
B3A
BASE_CLK 18.43MHz
RAW_CLK 6.14MHz
18432.00 KHz
XTAL1
A3
A2 74LS368 dual line inv
74LS139 D7B decoder
MAIN_DCDR
74LS139 D7A decoder
VRAM_CE
ORAM_CS
EXT
74xx04 C2
from counters
CPUSEL
PEH
PXL_CLK
PXL_CLK'
PXL_CLK''
H4
A4A 74LS74
3.06MHz
CPU_CLK
C3 74LS138 address decoder
IO_WR
SND_LATCH
SND_CMD
IO_EN
D8A 74LS32
VRAM_WE
C4 74LS174 hex flip flop
CN2_5
IRQCLR
NMICLR
CN1_4
B4 74xx74
INT Triggers at V=224
INT_CK
16V
D8D 74LS32
OBJ_WE
D8B 74LS32
ROM0_CS 0000-3FFF
D9A 74LS00
ROM1_CS 4000-7FFF
H8C 74LS08
VRAM_CS
CA2 47uF
R4 6.8K
R2 150
TR2 2SD400
TR1 2SC2320
R9 47K
R10 1.2K
CC1 475T
R7 10K
R12 120
DD2 10DI
DD1 10DI
CN_CNT2
CN_CNT1
74LS07 B2C
74LS07 B2B
TR4 2SC2320
TR3 2SD400
R16 120
JP1 Jumper
F10B 74LS14
B2F 74LS07
C54 102C
R25 51K
R17 100K
R3 4.7K
R6 30K
R1 100K
CC3 106E_16V
A1 TA7900S
BIAS
OUT
COMP
INPUT
ADJ
TC
CK
Esperanza D. Triana
Ping Pong
JOTEGO
Sheet: /main/
File: main.sch
Title: CPU & address decoders
Size: A3
Date: 2022-03-28
Rev: J. Tejada
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1
Id: 7/11

OBJRAM

MAINA[0..10]

192kHz H16
781kHz H4
385kHz H8
96kHz H32

MAINA2 MAINA0 MAINA1 MAINA3
CPUSEL VSS
S Quad Mux
74LS157

16.1kHz H256
47.6kHz H64
16.1kHz RH
VSS
MAINA6 MAINA4 MAINA5 MAINA7
CPUSEL VSS
S Quad Mux
74LS157

VSS
MAINA10 MAINA9 RD MAINA8
1.54MHz CPUSEL VSS
S Quad Mux
74LS157

AA2 AA0 AA1 AA3
AA6 AA4 AA5 AA7
AA10 AA9 OEB AA8

VCC
A8
HM6116P-3
AA0..AA10 VSS OEB OE WR OBJ_WE
DA0..DA7
2kB RAM
OBJECT TABLE

24 objects read
in order from
the first 24x4 bytes

A10
DA7..DA0 OBJ_WE1 ORAM_CS
buffers
74LS245
DB7..DB0
DB[0..7]

DA1 DA3 DA5 DA7 DA6 DA4 DA2 DA0
H15 VCC
E11
flip flops
74LS273
ATTR1 ATTR3 ATTR5 ATTR7 ATTR6 ATTR4 ATTR2 ATTR0

PRE_LINE HFLIP ATTR4 ATTR0 ATTR1 ATTR2 ATTR3
PXL_CLK OBJCOL
74LS377
flip flops
G11
LINECS HFLIP' PAL4 PAL0 PAL1 PAL2 PAL3

COL[0..1]
COL0 COL1 PAL0 PAL1 PAL2 PAL3 PAL4 VSS
J11
PROM
TBP24S10N
Color PROM
IC[0..3]
IC3 IC2 IC1 IC0

E10
ATTR6 ATTR7 MAINA8 MAINA7
H8' VSS
74LS367
DN6 (hflip)
DN7 (vflip)
MAINAB8 MAINAB7
MAINAB[7..8]

DA7 DA5 DA3 DA1 DA0 DA2 DA4 DA6
H8' H8''
A11
3-state
flip flops
74LS374
DN7 DN5 DN3 DN1 DN0 DN2 DN4 DN6

DN7 DN6 DN5 DN4 DN3 DN2 DN1 DN0
128V 64V 32V 16V 8V 4V 2V 1V
A12
V/HFLIP XOR ed
OBJV8 OBJH8 OBJH4 OBJV4 OBJV2 OBJV1
OBJDATA OBJCOL HFLIP LINE_CS H8 H4 LD
(input)
17383kHz H8'
16766kHz H4'
KONAMI_503
OBJ5 OBJ4 OBJ3 OBJ2 OBJ1 OBJ0
OBJDATA OBJCOL HFLIP PRE_LINE

OBJ0 OBJ1 OBJ2 OBJ3 OBJ4 OBJ5 OBJ6 OBJ7 OBJ8 OBJ9 OBJ10 OBJ11 OBJ12
C12
VCC
VPP CE OE GND VCC
2764
8kB
OBJD0 OBJD1 OBJD2 OBJD3 OBJD4 OBJD5 OBJD6 OBJD7
OBJD[0..7]

DA6 DA2 DA3 DA4 DA5 DA0 DA1 DA7
H8'' VCC
C13
flip flops
74LS273
OBJ12 OBJ8 OBJ9 OBJ10 OBJ11 OBJ6 OBJ7 OBJ13

OBJDATA
H9A
ATTR5 VCC
74LS74
OE_OF OE_M

C11
ONLY FOOTPRINT
VPP CE OE GND VCC
27128
16kB

Sheet: pwb400322
OBJD[4..7] OBJD[0..3] PXL_CLK HFLIP' LD_A
PLANEA[0..3] PLANEB[0..3] PXL_CLK HFLIP LD_A
VCC COL[0..1] VSS
File: pwb400322.sch

Sheet: linebuffer
PXL_CLK'' DA[0..7] LINECS H2 LD OBJCOL MAIN_DCDR H8' LDOUT H256 CLK6M IC[0..3] RESET
PXL_CLK'' DA[0..7] LINECS H2 LD OBJCOL MAIN_DCDR H8' LDOUT H256 CLK6M IC[0..3] RESET
OC[0..3] OSEL H256 H8'' LD_A H256' MAIN_DCDR
OC[0..3] OSEL H256 H8'' LD_A H256' MAIN_DCDR
File: linebuffer.sch

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Ping Pong
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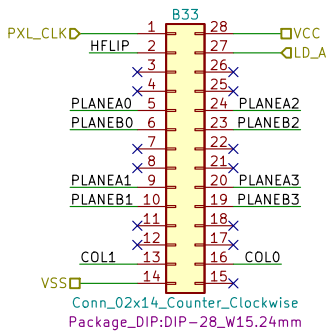
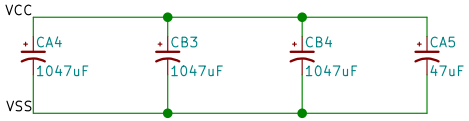
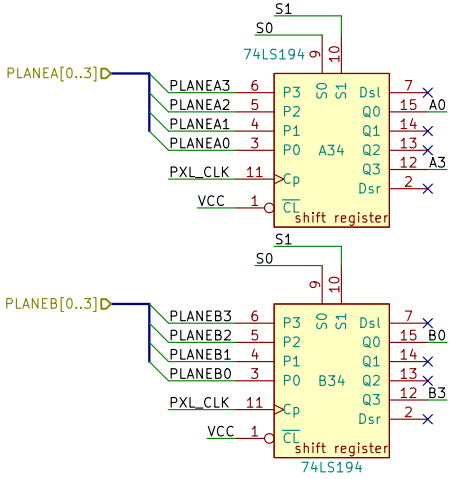
Sheet: /object/
File: object.sch

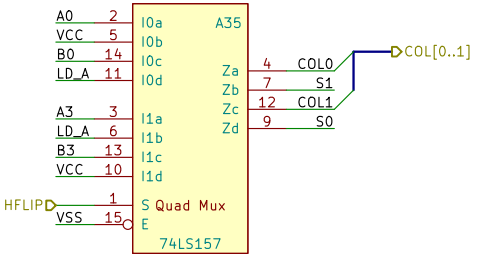
Title: Object generator

Size: A3	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 8/11









This is a small board soldered to a DIP-28 footprint. It appears twice in the design

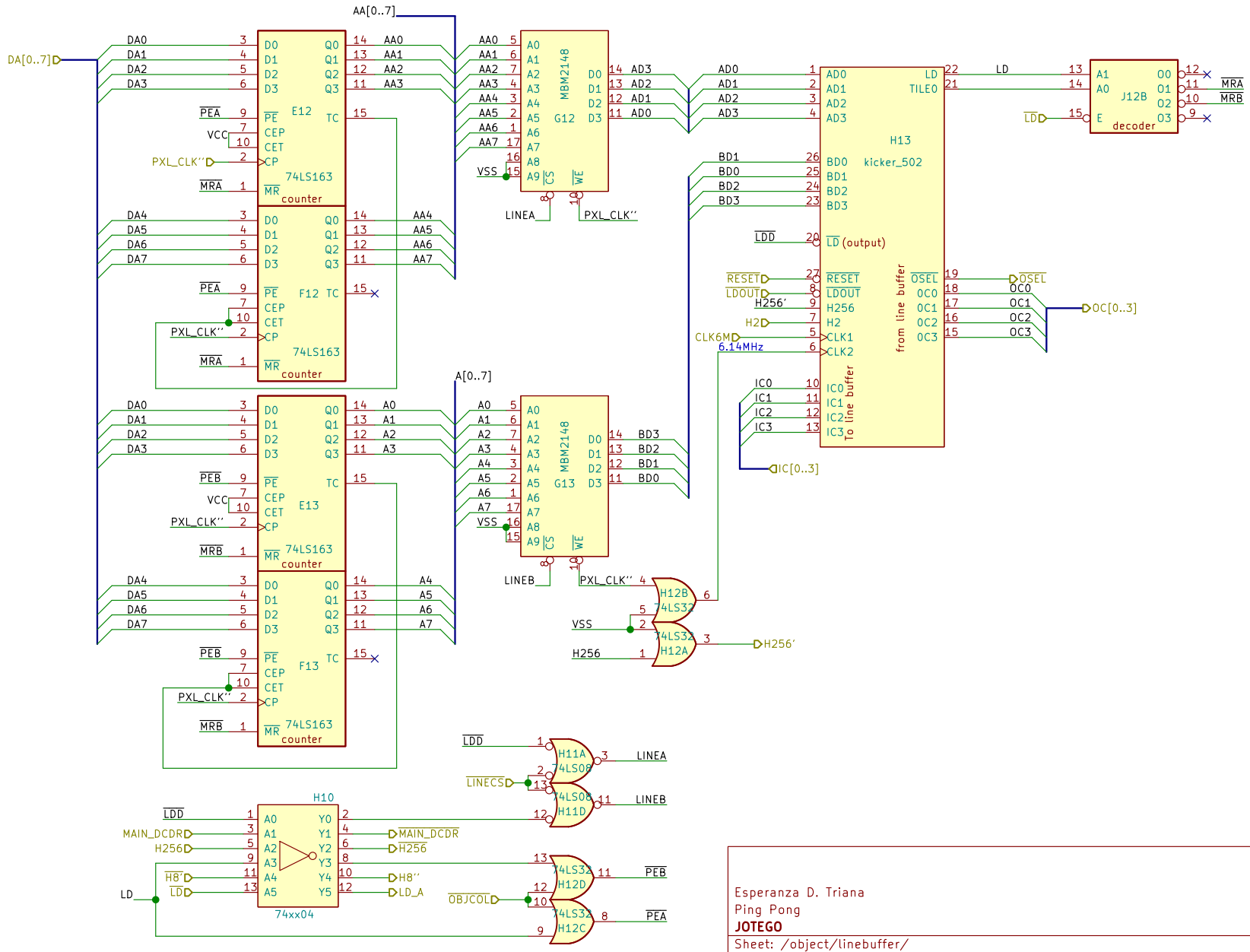
PWB-400322

Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /object/pwb400322/
File: pwb400322.sch

Title: Pixel shift register

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 9/11

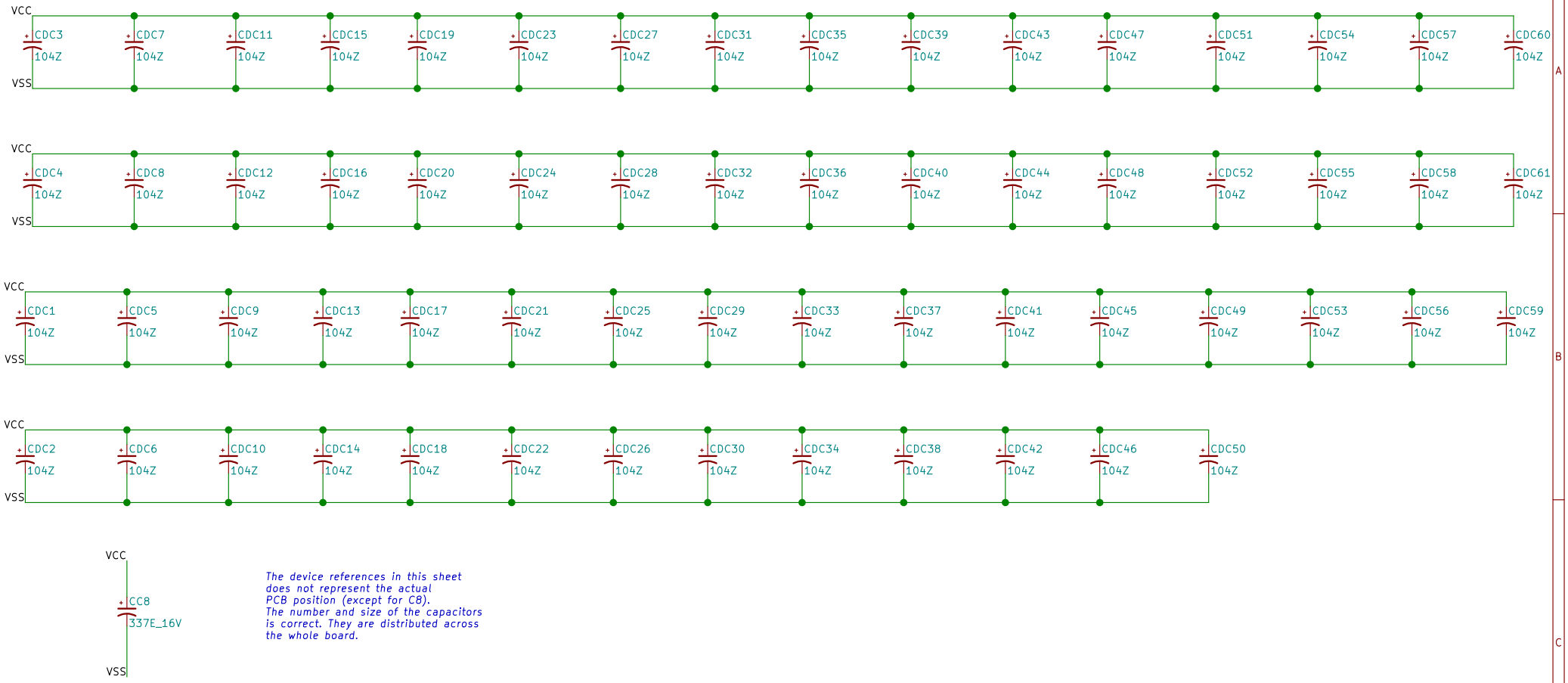


Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /object/linebuffer/
File: linebuffer.sch

Title: Doube line buffer

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A.	kicad 5.1.12-84ad8e8a8692ubuntu20.04.1	Id: 10/11



The device references in this sheet does not represent the actual PCB position (except for C8). The number and size of the capacitors is correct. They are distributed across the whole board.

Esperanza D. Triana
Ping Pong
JOTEGO

Sheet: /capacitors/
File: capacitors.sch

Title: Decoupling capacitors

Size: A4	Date: 2022-03-28	**Rev: J. Tejada**
KiCad E.D.A. kicad 5.1.12-84ad8e8a8692ubuntu20.04.1		Id: 11/11