

JOTEGO
Ping Pong
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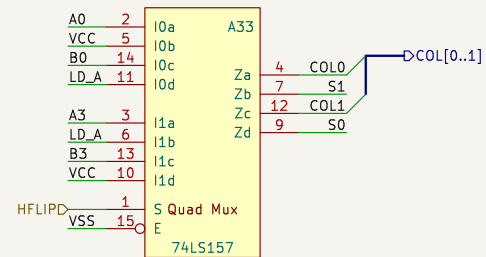
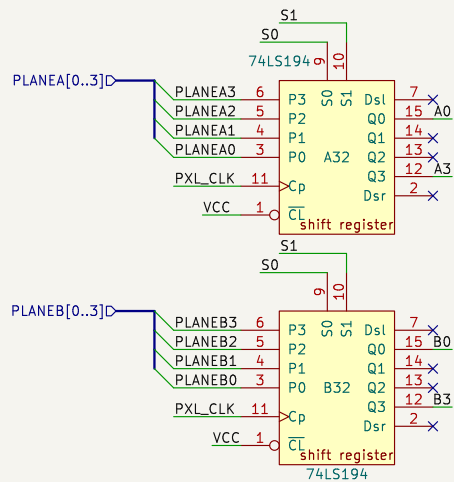
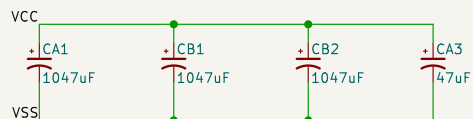
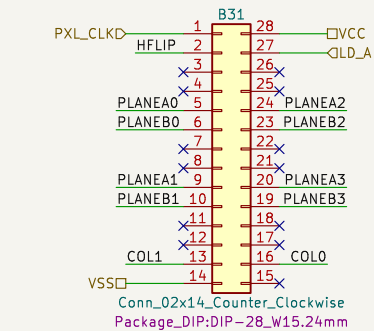
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Title: Character generator

Size: A3 Date: 2022-03-28
KiCad E.D.A. 8.0.4

Rev: J. Tejada
Id: 4/11





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

PWB-400322

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

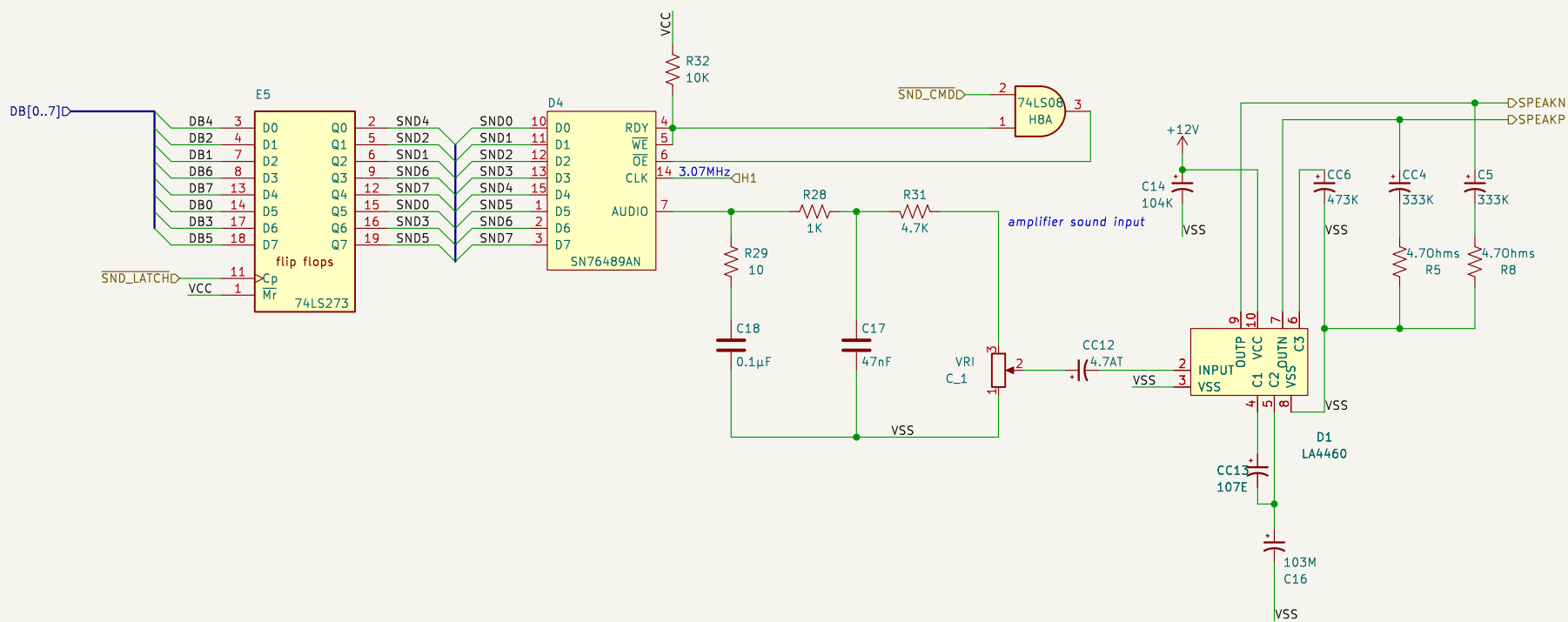
Title: Pixel shift register

Size: A4 Date: 2022-03-28

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Rev: J. Tejada

Id: 5/11



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Sheet: /sound/
File: sound.kicad_sch

Title: Sound generator

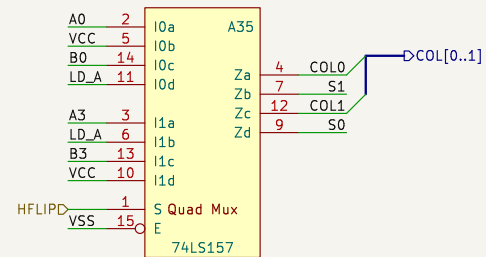
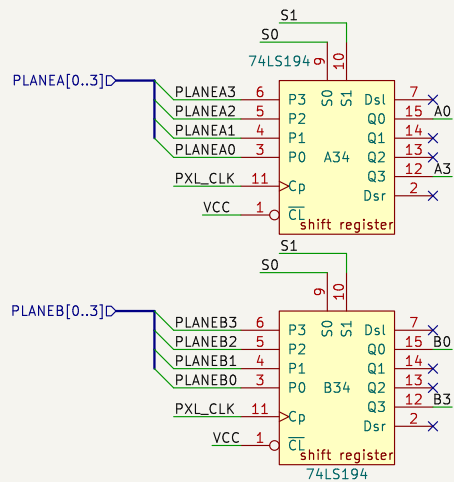
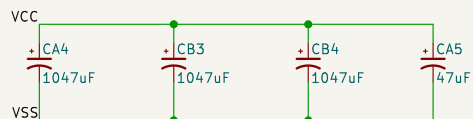
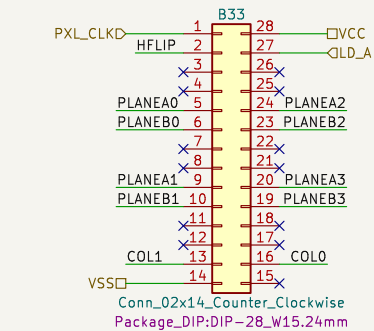
Size: A4 Date: 2022-03-28

KiCad E.D.A. 8.0.4

Rev: J. Tejada

Id: 6/11





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

PWB-400322

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Sheet: /object/pwb400322/
File: pwb400322.kicad_sch

Title: Pixel shift register

Size: A4 Date: 2022-03-28

KiCad E.D.A. 8.0.4

Rev: J. Tejada

Id: 8/11



Horizontal Counter

Vertical Counter

Horizontal Counter Details:

- Counter 1 (74LS161):**
 - Inputs: H1D (3.06MHz), PXL_CLK'D (6.17MHz), VCC, VSS.
 - Outputs: Q0 (H2), Q1 (H4), Q2 (H8), Q3 (H16), TC (H256), MR (H256).
- Counter 2 (74LS161):**
 - Inputs: H256, VCC, VSS.
 - Outputs: Q0 (H32), Q1 (H64), Q2 (H128), Q3 (H256), TC (H256), MR (H256).

Vertical Counter Details:

- Counter 3 (74LS161):**
 - Inputs: VSS, VCC, CPX, CP.
 - Outputs: Q0 (4kHz), Q1 (2kHz), Q2 (1kHz), Q3 (16V), TC, MR.
- Counter 4 (74LS161):**
 - Inputs: VCC, VSS, CPX, CP.
 - Outputs: Q0 (32V), Q1 (64V), Q2 (128V), Q3 (256V), TC, MR.

Other Components:

- 7400 B10A:** AND gate for H1D and H2.
- 74xx86:** XOR gates for H4D, H8D, and H16D.
- 74LS08:** AND gates for H256 and H256D.
- 74LS00:** NAND gates for H256 and H256D.
- 74LS14:** Inverter for H256.
- 74LS74:** D flip-flop for H256.
- 74LS139:** 3-to-8 decoder for H8D, H4D, and H16D.
- 74LS44:** Monostable multivibrator for H256.
- 74LS10:** NAND gate for H256.
- 74LS11:** NAND gate for H256.
- 74LS12:** NAND gate for H256.
- 74LS13:** NAND gate for H256.
- 74LS14:** Inverter for H256.
- 74LS15:** NAND gate for H256.
- 74LS16:** NAND gate for H256.
- 74LS17:** NAND gate for H256.
- 74LS18:** NAND gate for H256.
- 74LS19:** NAND gate for H256.
- 74LS20:** NAND gate for H256.
- 74LS21:** NAND gate for H256.
- 74LS22:** NAND gate for H256.
- 74LS23:** NAND gate for H256.
- 74LS24:** NAND gate for H256.
- 74LS25:** NAND gate for H256.
- 74LS26:** NAND gate for H256.
- 74LS27:** NAND gate for H256.
- 74LS28:** NAND gate for H256.
- 74LS29:** NAND gate for H256.
- 74LS30:** NAND gate for H256.
- 74LS31:** NAND gate for H256.
- 74LS32:** NAND gate for H256.
- 74LS33:** NAND gate for H256.
- 74LS34:** NAND gate for H256.
- 74LS35:** NAND gate for H256.
- 74LS36:** NAND gate for H256.
- 74LS37:** NAND gate for H256.
- 74LS38:** NAND gate for H256.
- 74LS39:** NAND gate for H256.
- 74LS40:** NAND gate for H256.
- 74LS41:** NAND gate for H256.
- 74LS42:** NAND gate for H256.
- 74LS43:** NAND gate for H256.
- 74LS44:** Monostable multivibrator for H256.
- 74LS45:** NAND gate for H256.
- 74LS46:** NAND gate for H256.
- 74LS47:** NAND gate for H256.
- 74LS48:** NAND gate for H256.
- 74LS49:** NAND gate for H256.
- 74LS50:** NAND gate for H256.
- 74LS51:** NAND gate for H256.
- 74LS52:** NAND gate for H256.
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- 74LS64:** NAND gate for H256.
- 74LS65:** NAND gate for H256.
- 74LS66:** NAND gate for H256.
- 74LS67:** NAND gate for H256.
- 74LS68:** NAND gate for H256.
- 74LS69:** NAND gate for H256.
- 74LS70:** NAND gate for H256.
- 74LS71:** NAND gate for H256.
- 74LS72:** NAND gate for H256.
- 74LS73:** NAND gate for H256.
- 74LS74:** D flip-flop for H256.
- 74LS75:** NAND gate for H256.
- 74LS76:** NAND gate for H256.
- 74LS77:** NAND gate for H256.
- 74LS78:** NAND gate for H256.
- 74LS79:** NAND gate for H256.
- 74LS80:** NAND gate for H256.
- 74LS81:** NAND gate for H256.
- 74LS82:** NAND gate for H256.
- 74LS83:** NAND gate for H256.
- 74LS84:** NAND gate for H256.
- 74LS85:** NAND gate for H256.
- 74LS86:** NAND gate for H256.
- 74LS87:** NAND gate for H256.
- 74LS88:** NAND gate for H256.
- 74LS89:** NAND gate for H256.
- 74LS90:** NAND gate for H256.
- 74LS91:** NAND gate for H256.
- 74LS92:** NAND gate for H256.
- 74LS93:** NAND gate for H256.
- 74LS94:** NAND gate for H256.
- 74LS95:** NAND gate for H256.
- 74LS96:** NAND gate for H256.
- 74LS97:** NAND gate for H256.
- 74LS98:** NAND gate for H256.
- 74LS99:** NAND gate for H256.

The diagram illustrates the logic for a Ping Pong game, featuring two main counters: a Horizontal Counter and a Vertical Counter.

Horizontal Counter: Utilizes two 74LS161 counters. The first counter (C6) is clocked by a 3.06MHz signal (H1D) and outputs H2, H4, H8, and H16. The second counter (D6) is clocked by a 6.17MHz signal (PXL_CLK'D) and outputs H32, H64, H128, and H256. A 7400 B10A NAND gate (C6) is used to generate a signal from H1D. A 74LS08 (H8D) is used to generate H256 from H64. A 74LS00 (F10A) is used to generate H64 from H32. A 74LS74 (J10A) is used to generate H256 from H128. A 74LS00 (H11B) is used to generate H5 from H256. A 74LS14 (F10C) is used to generate a signal from H5. A 74LS10 (A9B) is used to generate a signal from H5. A 74LS139 (J12A) is used as a decoder for H8, H4, and H16.

Vertical Counter: Utilizes two 74LS161 counters. The first counter (G10) is clocked by a 4kHz signal (D2V) and outputs Q0, Q1, Q2, and Q3. The second counter (G9) is clocked by a 1kHz signal (D4V) and outputs Q0, Q1, Q2, and Q3. A 74LS10 (A9B) is used to generate a signal from Q0, Q1, and Q2. A 74LS14 (F10C) is used to generate a signal from Q0, Q1, and Q2. A 74LS10 (A9B) is used to generate a signal from Q0, Q1, and Q2. A 74LS14 (F10C) is used to generate a signal from Q0, Q1, and Q2.

Other Components: A 74LS00 (D9D) is used to generate a signal from H32 and H64. A 74LS00 (H11B) is used to generate a signal from H256 and H5. A 74LS14 (F10C) is used to generate a signal from H5. A 74LS10 (A9B) is used to generate a signal from H5. A 74LS139 (J12A) is used as a decoder for H8, H4, and H16. A 74LS74 (J10A) is used to generate H256 from H128. A 74LS00 (H11B) is used to generate H5 from H256. A 74LS14 (F10C) is used to generate a signal from H5. A 74LS10 (A9B) is used to generate a signal from H5. A 74LS139 (J12A) is used as a decoder for H8, H4, and H16.

Legend:

- H256 high during the active video output. The count goes from 80h to FFh (blanking) and from 100h to 1FFh (active).
- H5 lasts for 32 pixels.
- VB lasts for 40 lines.
- INT_CRK
- BLANKING
- H8'
- H4'
- H15

Metadata:

- JOTEGO Ping Pong
- Sheet: /hvcouter/
- File: hvcouter.kicad_sch
- Title: Horizontal and vertical counters
- Size: A4
- Date: 2022-03-28
- Rev: J. Tejada
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