

654321

nes-benchNES controller-port bridge, v2b

NES controller-port bridge, v2b

A

The two-port bridge. It is v1b plus a second port with its own register, a second output register on the same SPI chain, and an LM1881 sync separator whose 5 V outputs go straight into the UNO, so a poll can be placed against a field and a line rather than only against a latch index. Everything is still on one 5 V rail and there is not one level shifter on any sheet.

This is a drawing, not a build. Nothing here has been made; v1b is the one on the bench. What this package is for is ordering the parts, cutting the board, and having something to build from when v1b's fourteen steps are done.

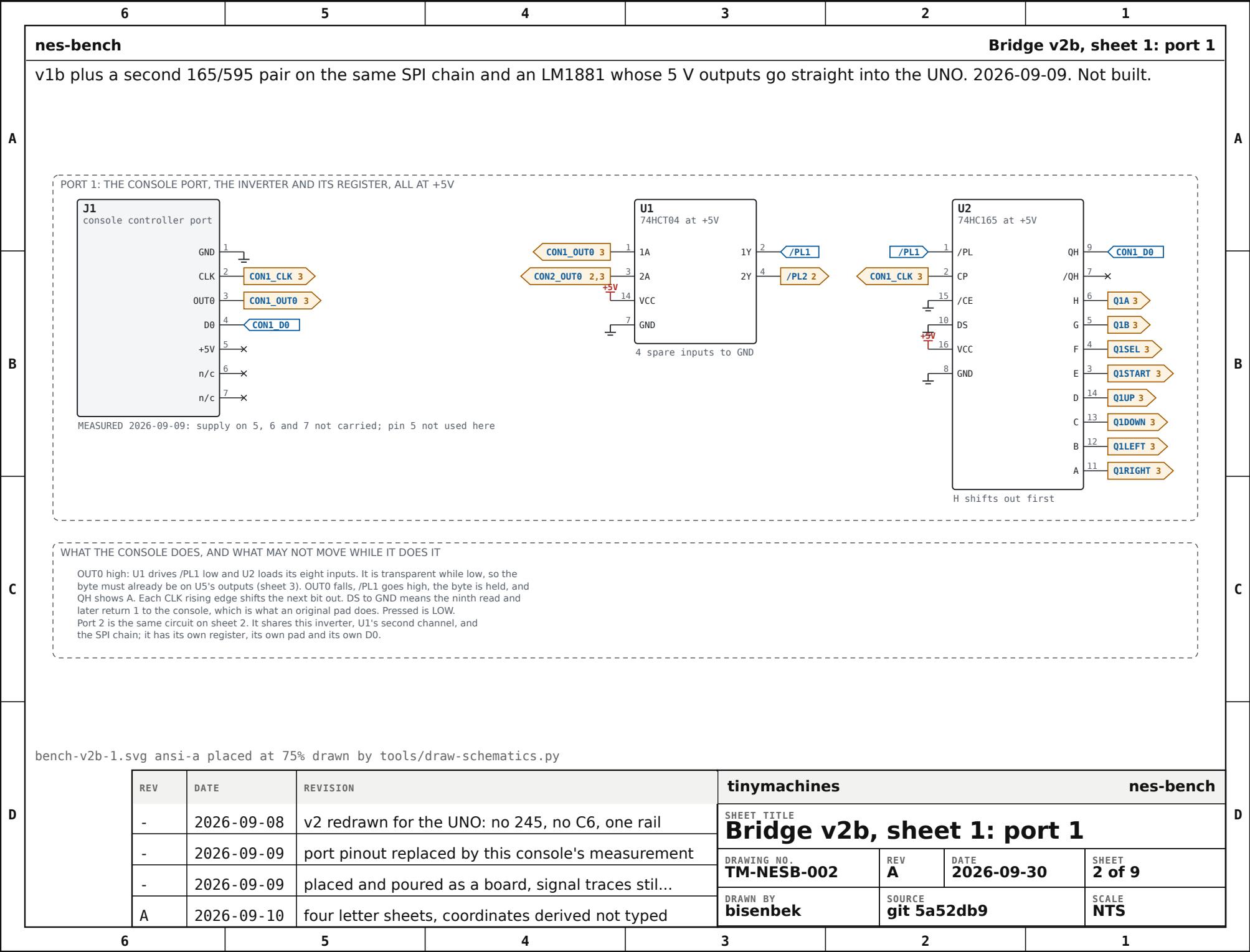
Nothing is placed or typed by hand. The schematic's arrangement is authored and its coordinates come from the parts' own measured sizes; the wiring list and the parts list are read back out of that same file. A sheet that would print its smallest text below 5 pt is refused rather than shrunk, which is why this schematic is on four sheets: eleven parts and 42 nets do not fit on one page anybody can print.

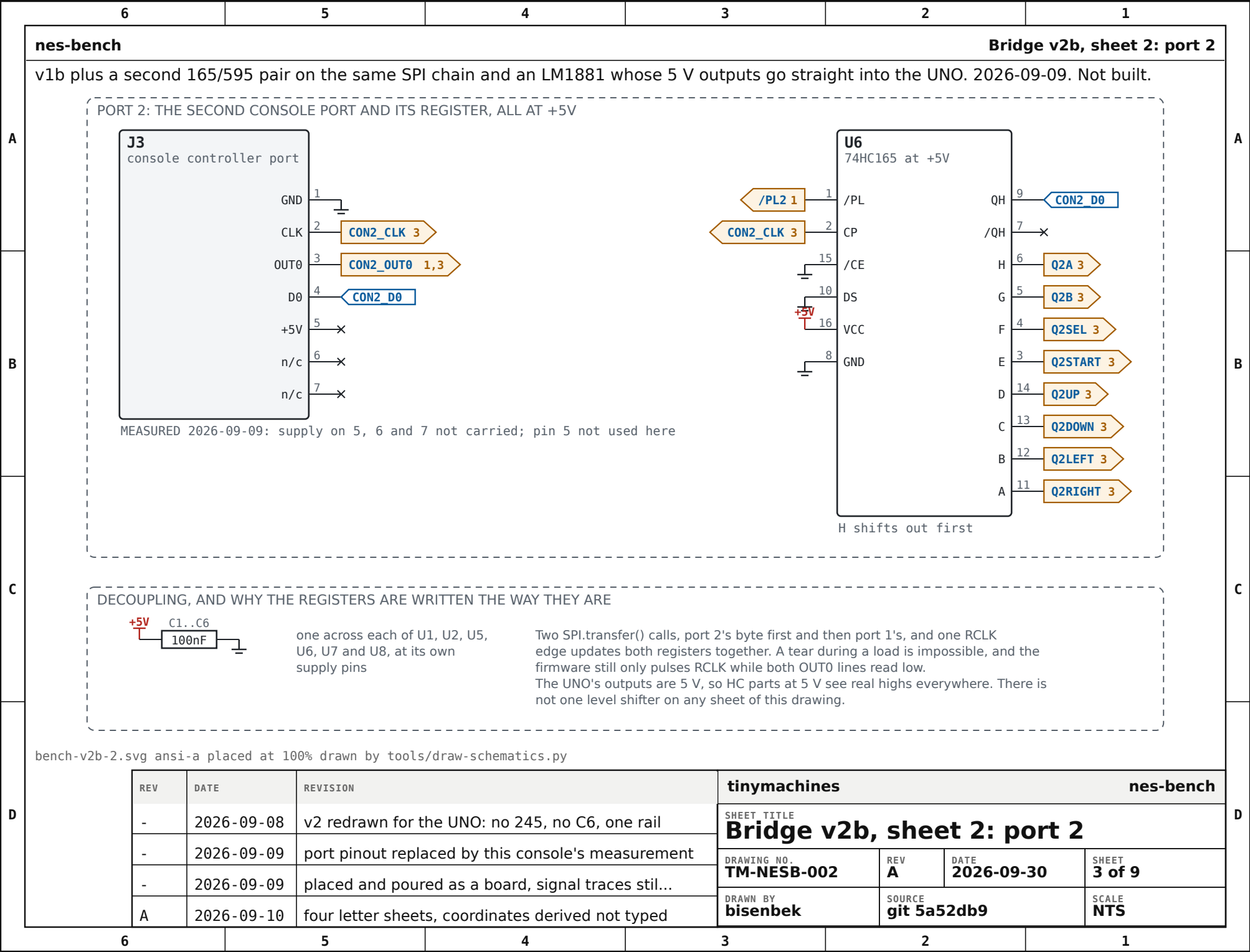
Sheets

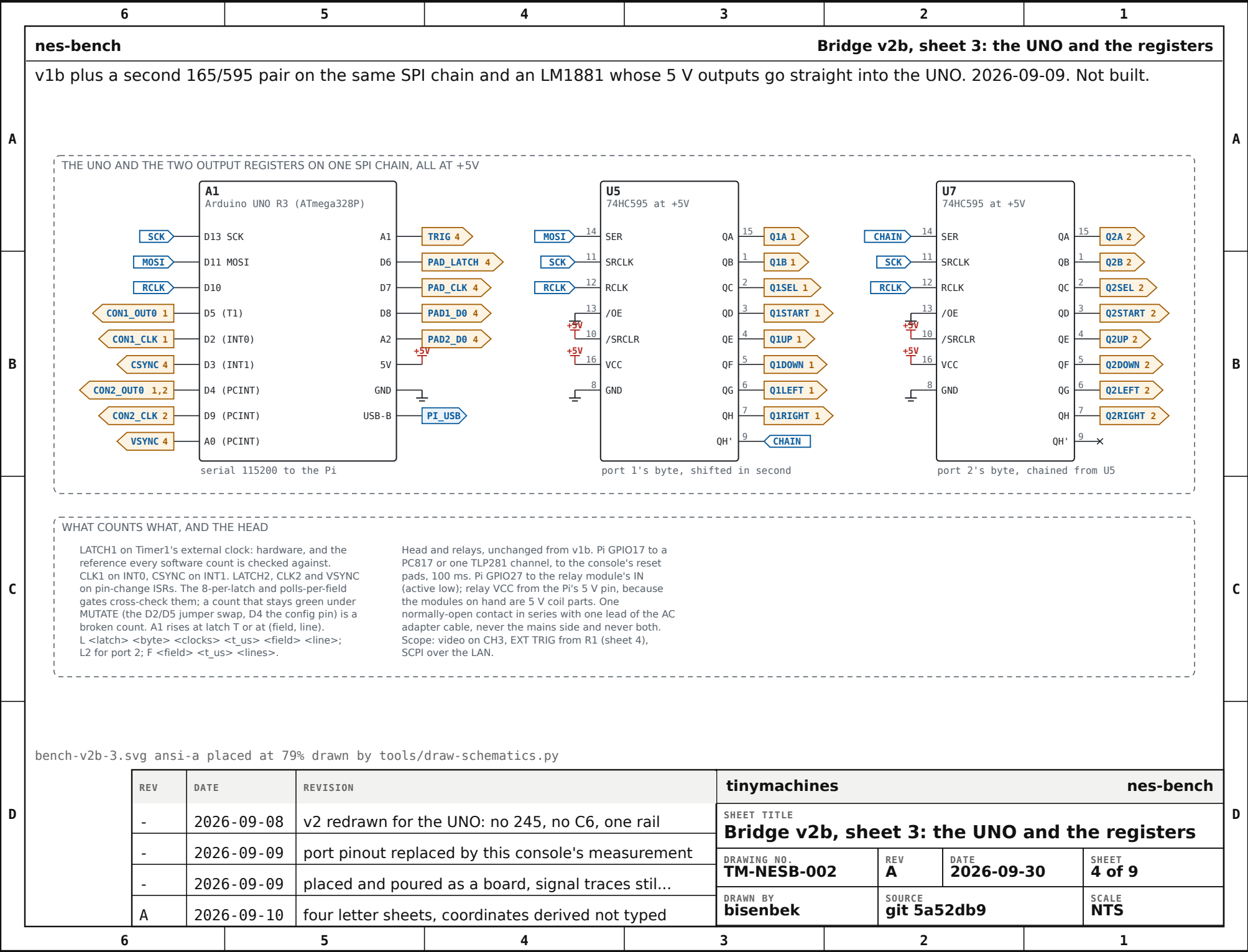
| SHEET | TITLE                                               | PAPER  | HOW IT IS MADE             |
|-------|-----------------------------------------------------|--------|----------------------------|
| 1     | Cover and sheet index                               | letter | this sheet                 |
| 2     | Bridge v2b, sheet 1: port 1                         | letter | schematic                  |
| 3     | Bridge v2b, sheet 2: port 2                         | letter | schematic                  |
| 4     | Bridge v2b, sheet 3: the UNO and the registers      | letter | schematic                  |
| 5     | Bridge v2b, sheet 4: sync, the pads and the trigger | letter | schematic                  |
| 6     | Wiring list, v2b                                    | letter | derived from the schematic |
| 7     | Wiring list, v2b (continued)                        | letter | derived from the schematic |
| 8     | Parts list                                          | letter | derived from the schematic |
| 9     | One poll, as timing lanes                           | ANSI B | schematic                  |

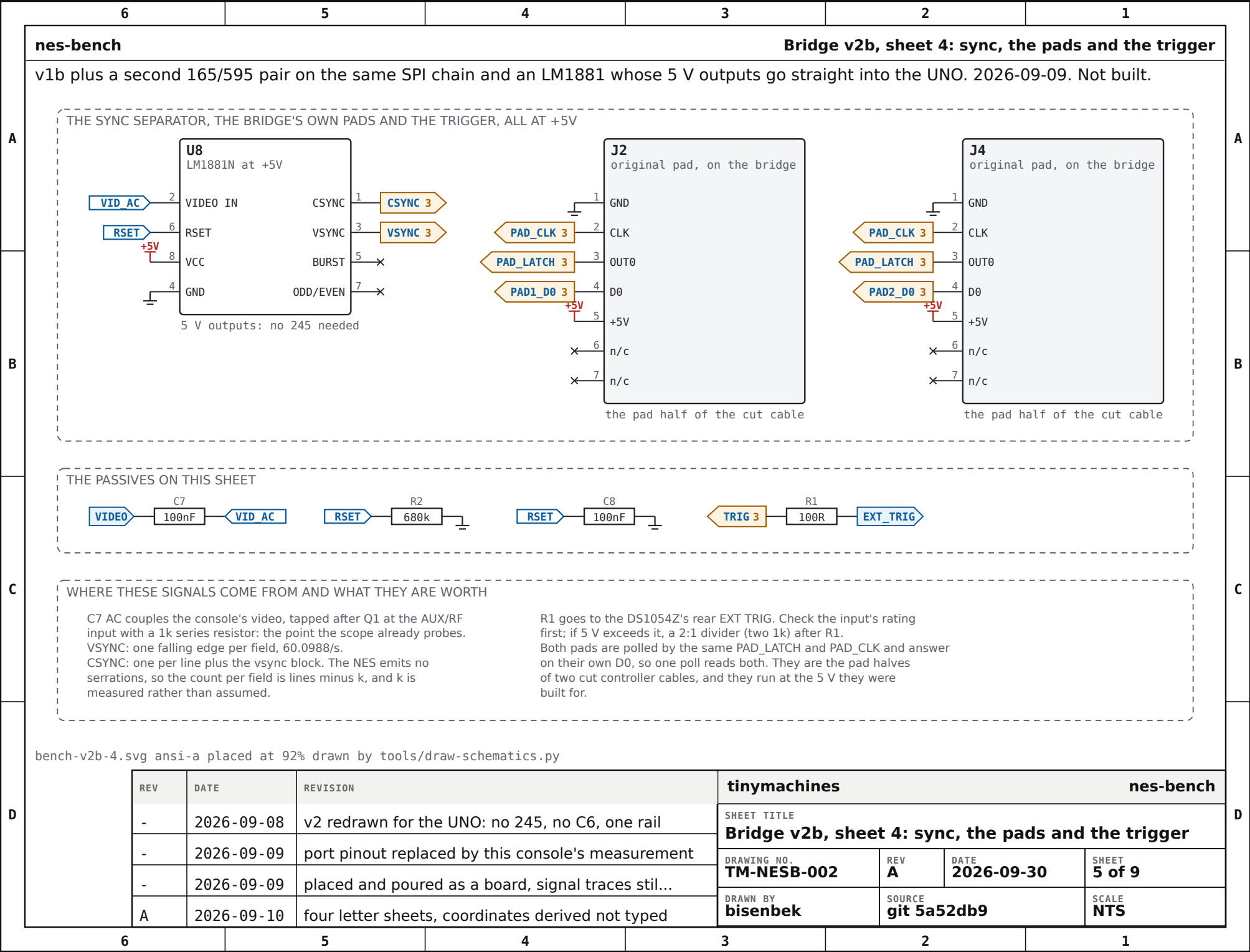
| REV | DATE       | REVISION                                            | tinymachinesnes-bench                |                       |                    |                 |
|-----|------------|-----------------------------------------------------|--------------------------------------|-----------------------|--------------------|-----------------|
| -   | 2026-09-08 | v2 redrawn for the UNO: no 245, no C6, one rail     | SHEET TITLE<br>Cover and sheet index |                       |                    |                 |
| -   | 2026-09-09 | port pinout replaced by this console's measurement  | DRAWING NO.<br>TM-NESB-002           | REV<br>A              | DATE<br>2026-09-30 | SHEET<br>1 of 9 |
| -   | 2026-09-09 | placed and poured as a board, signal traces stil... |                                      |                       |                    |                 |
| A   | 2026-09-10 | four letter sheets, coordinates derived not typed   | DRAWN BY<br>bisenbek                 | SOURCE<br>git 5a52db9 |                    | SCALE<br>NTS    |

654321









|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  |                                 |              |
|------------------------------------------------------------------------------------------------------|-----------|-----|------|------------|--------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------|--|---------------------------------|--------------|
|                                                                                                      | 6         | 5   | 4    | 3          | 2                                                                                                                  | 1                                                   |                  |  |                                 |              |
| nes-bench                                                                                            |           |     |      |            |                                                                                                                    |                                                     | Wiring list, v2b |  |                                 |              |
| Every wire on the board, net by net                                                                  |           |     |      |            |                                                                                                                    |                                                     |                  |  |                                 |              |
| Connect everything on a row together. Read back out of the schematic, so it cannot disagree with it. |           |     |      |            |                                                                                                                    |                                                     |                  |  |                                 |              |
| A                                                                                                    | NET       |     | ENDS |            | JOIN THESE                                                                                                         |                                                     |                  |  |                                 | A            |
|                                                                                                      | +5V       |     | 17   |            | U1-14, U2-16, U6-16, C1-1, C2-1, C3-1, C4-1, C5-1, C6-1, A1 5V, U5-10, U5-16, U7-10, U7-16, U8-8, J2-5, J4-5       |                                                     |                  |  |                                 | J4-5         |
|                                                                                                      | GND       |     | 25   |            | J1-1, U1-7, U2-15, U2-10, U2-8, J3-1, U6-15, U6-10, U6-8, C1-2, C2-2, C3-2, C4-2, C5-2, C6-2, A1 GND, U5-13, U5-14 |                                                     |                  |  |                                 | U5-13, U5-14 |
|                                                                                                      | /PL1      |     | 2    |            | U1-2, U2-1                                                                                                         |                                                     |                  |  |                                 |              |
|                                                                                                      | /PL2      |     | 2    |            | U1-4, U6-1                                                                                                         |                                                     |                  |  |                                 |              |
| B                                                                                                    | CHAIN     |     | 2    |            | U5-9, U7-14                                                                                                        |                                                     |                  |  |                                 | B            |
|                                                                                                      | CON1_CLK  |     | 3    |            | J1-2, U2-2, A1 D2 (INT0)                                                                                           |                                                     |                  |  |                                 |              |
|                                                                                                      | CON1_D0   |     | 2    |            | J1-4, U2-9                                                                                                         |                                                     |                  |  |                                 |              |
|                                                                                                      | CON1_OUT0 |     | 3    |            | J1-3, U1-1, A1 D5 (T1)                                                                                             |                                                     |                  |  |                                 |              |
|                                                                                                      | CON2_CLK  |     | 3    |            | J3-2, U6-2, A1 D9 (PCINT)                                                                                          |                                                     |                  |  |                                 |              |
|                                                                                                      | CON2_D0   |     | 2    |            | J3-4, U6-9                                                                                                         |                                                     |                  |  |                                 |              |
|                                                                                                      | CON2_OUT0 |     | 3    |            | U1-3, J3-3, A1 D4 (PCINT)                                                                                          |                                                     |                  |  |                                 |              |
|                                                                                                      | CSYNC     |     | 2    |            | A1 D3 (INT1), U8-1                                                                                                 |                                                     |                  |  |                                 |              |
| C                                                                                                    | EXT_TRIG  |     | 1    |            | R1-2                                                                                                               |                                                     |                  |  |                                 | C            |
|                                                                                                      | MOSI      |     | 2    |            | A1 D11 MOSI, U5-14                                                                                                 |                                                     |                  |  |                                 |              |
|                                                                                                      | PAD1_D0   |     | 2    |            | A1 D8, J2-4                                                                                                        |                                                     |                  |  |                                 |              |
|                                                                                                      | PAD2_D0   |     | 2    |            | A1 A2, J4-4                                                                                                        |                                                     |                  |  |                                 |              |
|                                                                                                      | PAD_CLK   |     | 3    |            | A1 D7, J2-2, J4-2                                                                                                  |                                                     |                  |  |                                 |              |
|                                                                                                      | PAD_LATCH |     | 3    |            | A1 D6, J2-3, J4-3                                                                                                  |                                                     |                  |  |                                 |              |
|                                                                                                      | PI_USB    |     | 1    |            | A1 USB-B                                                                                                           |                                                     |                  |  |                                 |              |
|                                                                                                      | Q1A       |     | 2    |            | U2-6, U5-15                                                                                                        |                                                     |                  |  |                                 |              |
|                                                                                                      | Q1B       |     | 2    |            | U2-5, U5-1                                                                                                         |                                                     |                  |  |                                 |              |
|                                                                                                      | Q1DOWN    |     | 2    |            | U2-13, U5-5                                                                                                        |                                                     |                  |  |                                 |              |
| D                                                                                                    | Q1LEFT    |     | 2    |            | U2-12, U5-6                                                                                                        |                                                     |                  |  |                                 | D            |
|                                                                                                      | Q1RIGHT   |     | 2    |            | U2-11, U5-7                                                                                                        |                                                     |                  |  |                                 |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  |                                 |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  |                                 |              |
|                                                                                                      |           | REV |      | DATE       |                                                                                                                    | REVISION                                            |                  |  | tinymachines nes-bench          |              |
|                                                                                                      |           | -   |      | 2026-09-08 |                                                                                                                    | v2 redrawn for the UNO: no 245, no C6, one rail     |                  |  | SHEET TITLE<br>Wiring list, v2b |              |
|                                                                                                      |           | -   |      | 2026-09-09 |                                                                                                                    | port pinout replaced by this console's measurement  |                  |  | DRAWING NO.<br>TM-NESB-002      |              |
|                                                                                                      |           | -   |      | 2026-09-09 |                                                                                                                    | placed and poured as a board, signal traces stil... |                  |  | REV<br>A                        |              |
|                                                                                                      |           | A   |      | 2026-09-10 |                                                                                                                    | four letter sheets, coordinates derived not typed   |                  |  | DATE<br>2026-09-30              |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  | SHEET<br>6 of 9                 |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  | DRAWN BY<br>bisenbek            |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  | SOURCE<br>git 5a52db9           |              |
|                                                                                                      |           |     |      |            |                                                                                                                    |                                                     |                  |  | SCALE<br>NTS                    |              |
|                                                                                                      | 6         | 5   | 4    | 3          | 2                                                                                                                  | 1                                                   |                  |  |                                 |              |

|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
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| 6                                                                                                                                       |         | 5 |      | 4 |                          | 3 |  | 2 |  | 1 |                  |
| nes-bench                                                                                                                               |         |   |      |   |                          |   |  |   |  |   | Wiring list, v2b |
| Every wire on the board, net by net                                                                                                     |         |   |      |   |                          |   |  |   |  |   |                  |
| Connect everything on a row together. Read back out of the schematic, so it cannot disagree with it. Continued from the previous sheet. |         |   |      |   |                          |   |  |   |  |   |                  |
| A                                                                                                                                       | NET     |   | ENDS |   | JOIN THESE               |   |  |   |  |   |                  |
|                                                                                                                                         | Q1SEL   |   | 2    |   | U2-4, U5-2               |   |  |   |  |   |                  |
|                                                                                                                                         | Q1START |   | 2    |   | U2-3, U5-3               |   |  |   |  |   |                  |
|                                                                                                                                         | Q1UP    |   | 2    |   | U2-14, U5-4              |   |  |   |  |   |                  |
|                                                                                                                                         | Q2A     |   | 2    |   | U6-6, U7-15              |   |  |   |  |   |                  |
|                                                                                                                                         | Q2B     |   | 2    |   | U6-5, U7-1               |   |  |   |  |   |                  |
|                                                                                                                                         | Q2DOWN  |   | 2    |   | U6-13, U7-5              |   |  |   |  |   |                  |
|                                                                                                                                         | Q2LEFT  |   | 2    |   | U6-12, U7-6              |   |  |   |  |   |                  |
|                                                                                                                                         | Q2RIGHT |   | 2    |   | U6-11, U7-7              |   |  |   |  |   |                  |
|                                                                                                                                         | Q2SEL   |   | 2    |   | U6-4, U7-2               |   |  |   |  |   |                  |
|                                                                                                                                         | Q2START |   | 2    |   | U6-3, U7-3               |   |  |   |  |   |                  |
|                                                                                                                                         | Q2UP    |   | 2    |   | U6-14, U7-4              |   |  |   |  |   |                  |
| B                                                                                                                                       | RCLK    |   | 3    |   | A1 D10, U5-12, U7-12     |   |  |   |  |   |                  |
|                                                                                                                                         | RSET    |   | 3    |   | U8-6, R2-1, C8-1         |   |  |   |  |   |                  |
|                                                                                                                                         | SCK     |   | 3    |   | A1 D13 SCK, U5-11, U7-11 |   |  |   |  |   |                  |
|                                                                                                                                         | TRIG    |   | 2    |   | A1 A1, R1-1              |   |  |   |  |   |                  |
|                                                                                                                                         | VIDEO   |   | 1    |   | C7-1                     |   |  |   |  |   |                  |
|                                                                                                                                         | VID_AC  |   | 2    |   | U8-2, C7-2               |   |  |   |  |   |                  |
|                                                                                                                                         | VSYNC   |   | 2    |   | A1 A0 (PCINT), U8-3      |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
| C                                                                                                                                       |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
| D                                                                                                                                       |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
|                                                                                                                                         |         |   |      |   |                          |   |  |   |  |   |                  |
| 6                                                                                                                                       |         | 5 |      | 4 |                          | 3 |  | 2 |  | 1 |                  |



