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nes-bench

NES controller-port bridge, v1b

A

NES controller-port bridge, v1b

The UNO bridge between the Pi and an unmodified NES-001, and the Pi's hands on its reset and power.

Sheets

SHEET	TITLE	PAPER	HOW IT IS MADE
1	Cover and sheet index	letter	this sheet
2	Bridge v1b, sheet 1: the console side	letter	schematic
3	Bridge v1b, sheet 2: the bridge side	letter	schematic
4	Bridge v1b, sheet 3: the head's hands, reset and power	letter	schematic
5	Wiring diagram: every wire at right angles on the packages	ANSI B	schematic
6	Wiring diagram as built: grey is done, a ring needs a check	ANSI B	schematic
7	Wiring diagram, sheet 3: the head's hands at right angles	ANSI B	schematic
8	Breadboard: which hole each part and jumper goes in	ANSI B	schematic
9	Pin map: breakouts, head jumpers, UNO ribbon	letter	schematic, lab log, bring-up tool
10	Pin map: breakouts, head jumpers, UNO ribbon (continued)	letter	schematic, lab log, bring-up tool
11	Wiring list, v1b	letter	derived from the schematic
12	Wiring list, v1b (continued)	letter	derived from the schematic
13	Parts list	letter	derived from the schematic
14	U1, 74HCT04 hex inverter	letter	schematic pins, datasheet purposes
15	U2, 74HC165 shift register, the pad	letter	schematic pins, datasheet purposes
16	U3, 74HC595 output register	letter	schematic pins, datasheet purposes
17	Pin map, sheet 3: the head's jumpers, breakout	letter	schematic, lab log, bring-up tool
18	Pin map, sheet 3: the head's jumpers, breakout (continued)	letter	schematic, lab log, bring-up tool
19	OK1, PC817 module on the reset pads	letter	schematic pins, datasheet purposes
20	K1, relay module in the adapter lead	letter	schematic pins, datasheet purposes
21	Build sequence, sitting 3	letter	derived from the bring-up tool
22	Build sequence, sitting 3 (continued)	letter	derived from the bring-up tool
23	One poll, as timing lanes	ANSI B	schematic

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Cover and sheet index			
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 1 of 23
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWN BY bisenbek		SOURCE git 5a52db9	SCALE NTS
P	2026-09-23	two index titles shortened: they printed over th...				

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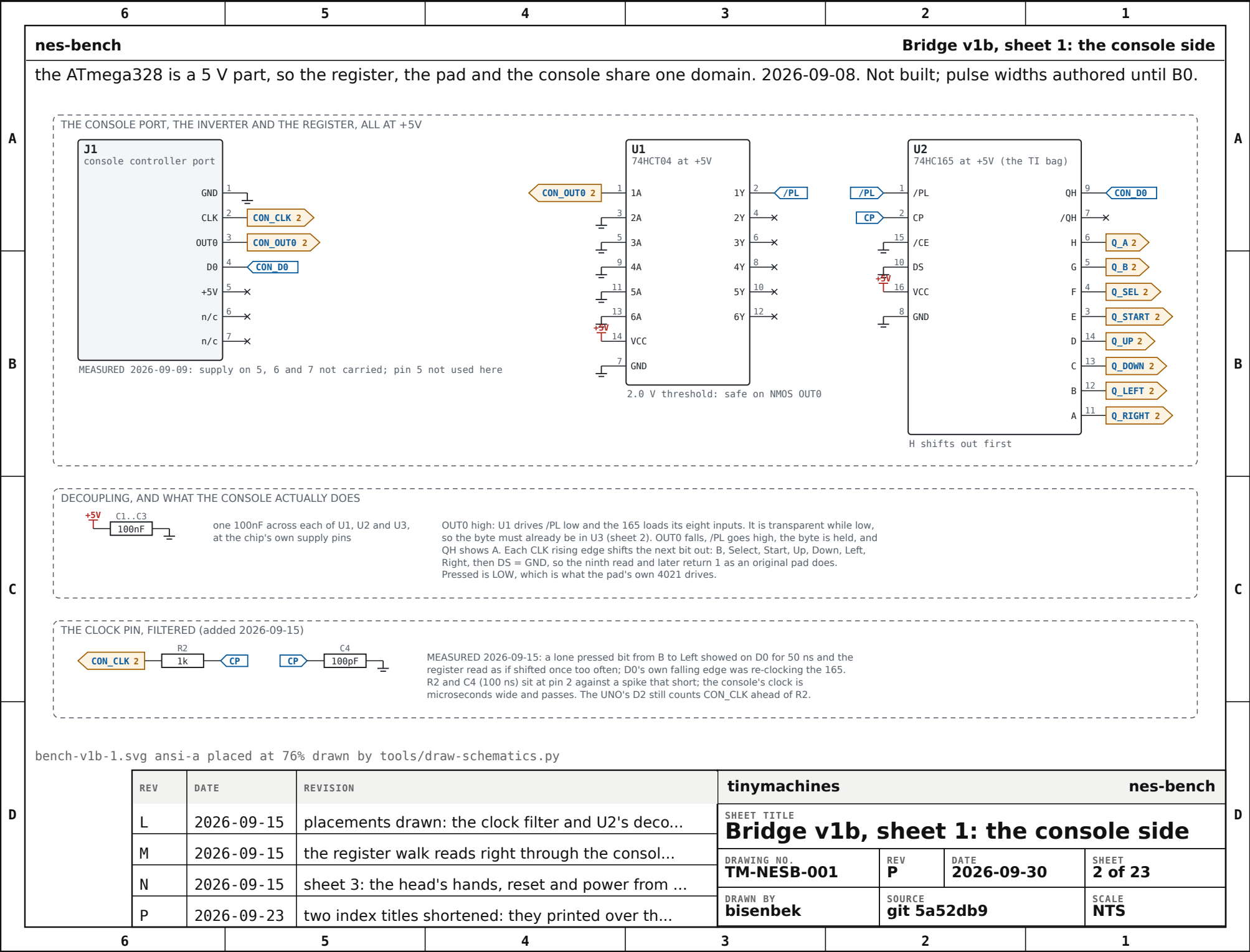
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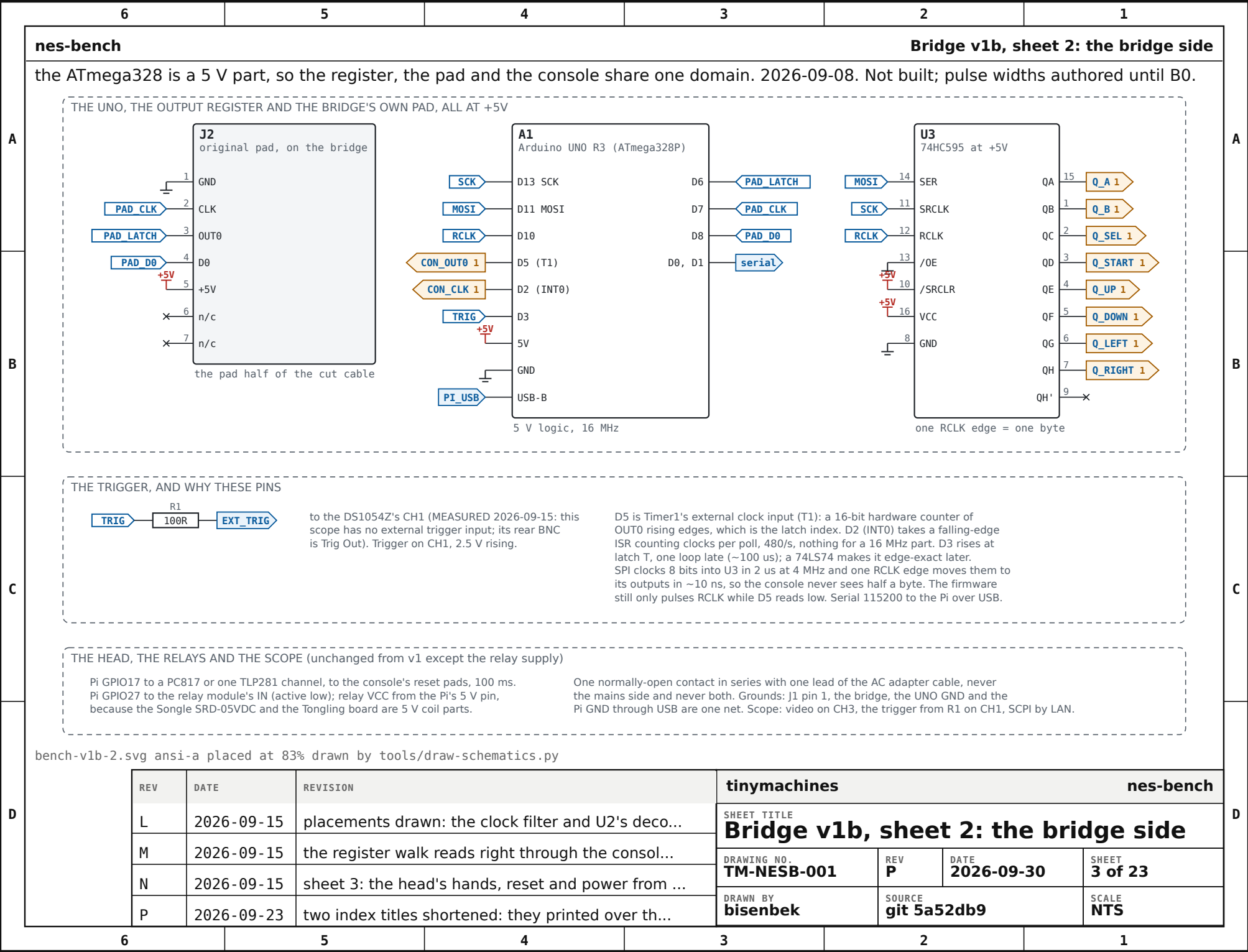
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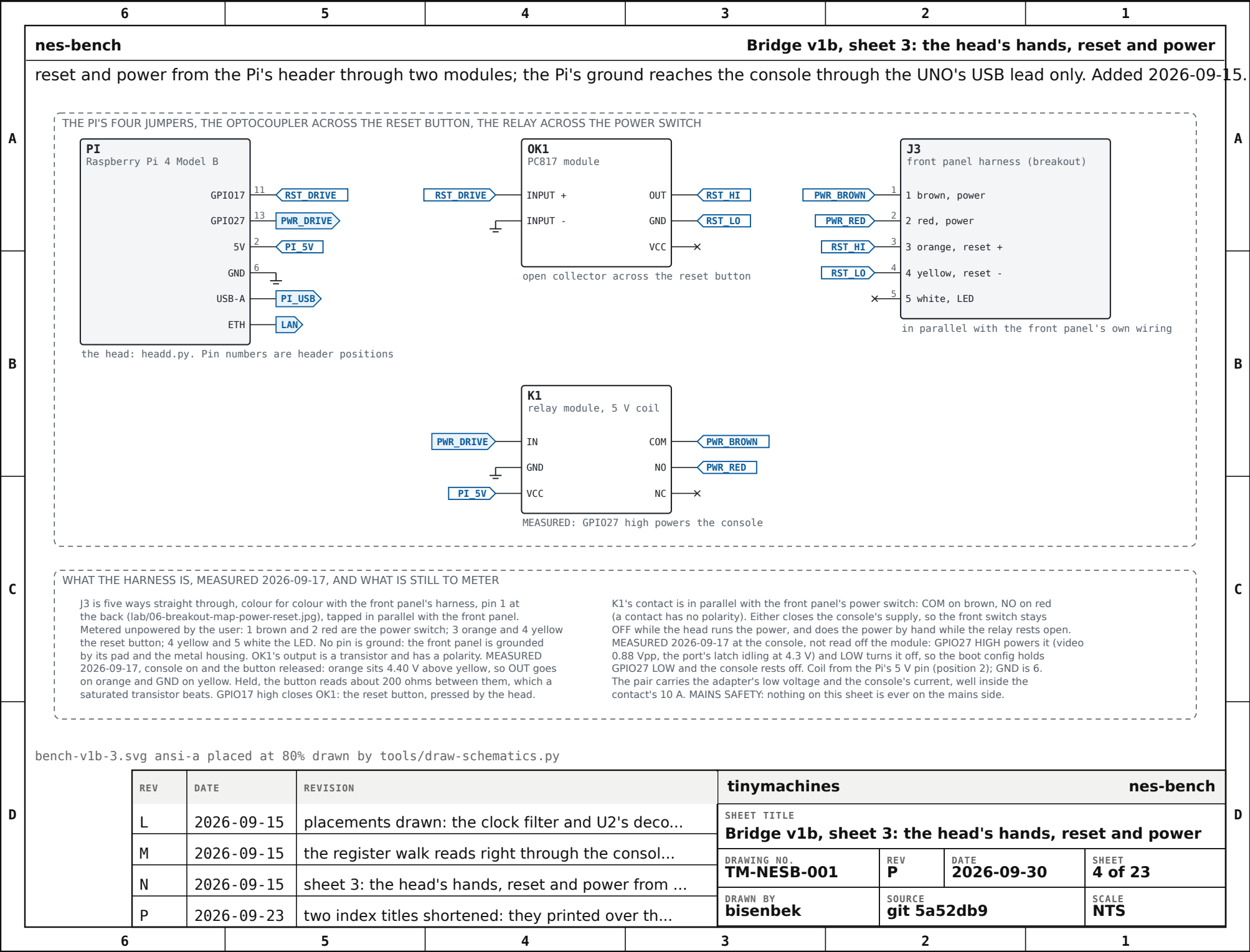
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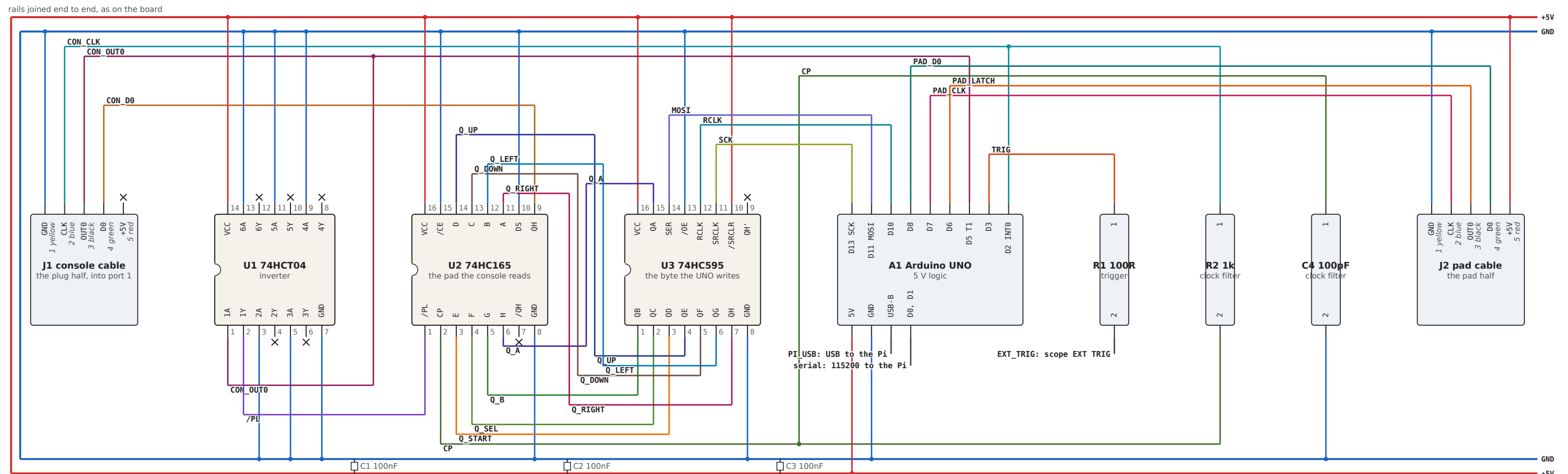




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Wiring diagram: every wire at right angles on the packages

Notch left, pin 1 bottom left, numbered as the package is. One track and one colour per net, named at its left end; a dot is a junction, a crossing is nothing. Every wire is read out of the schematic.

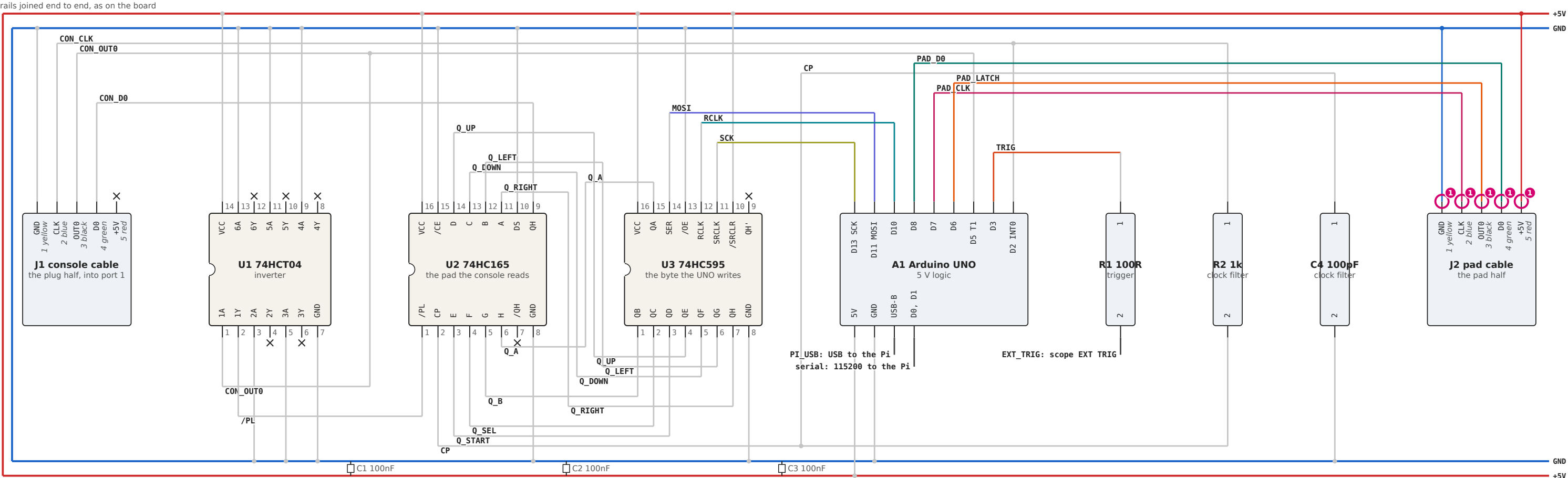


20 nets on tracks, 7 of them crossing the row; 27 supply pins on the rails. drawn by tools/wiring-diagram.py

wiring-v1b.svg ansi-b placed at 63% drawn by tools/wiring-diagram.py

REV	DATE	REVISION	tinymachines				nes-bench
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE				
M	2026-09-15	the register walk reads right through the consol...	Wiring diagram: every wire at right angles on the packages				
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWING NO.	REV	DATE	SHEET	
P	2026-09-23	two index titles shortened: they printed over th...	TM-NESB-001	P	2026-09-30	5 of 23	
			DRAWN BY	SOURCE		SCALE	
			bisenbek	git 5a52db9		NTS	

Grey: built and seen in the right hole. A ring and a number: needs a check, the note under the rails says what. Full colour: not built yet, or not part of this pass.



Needs a check (1)

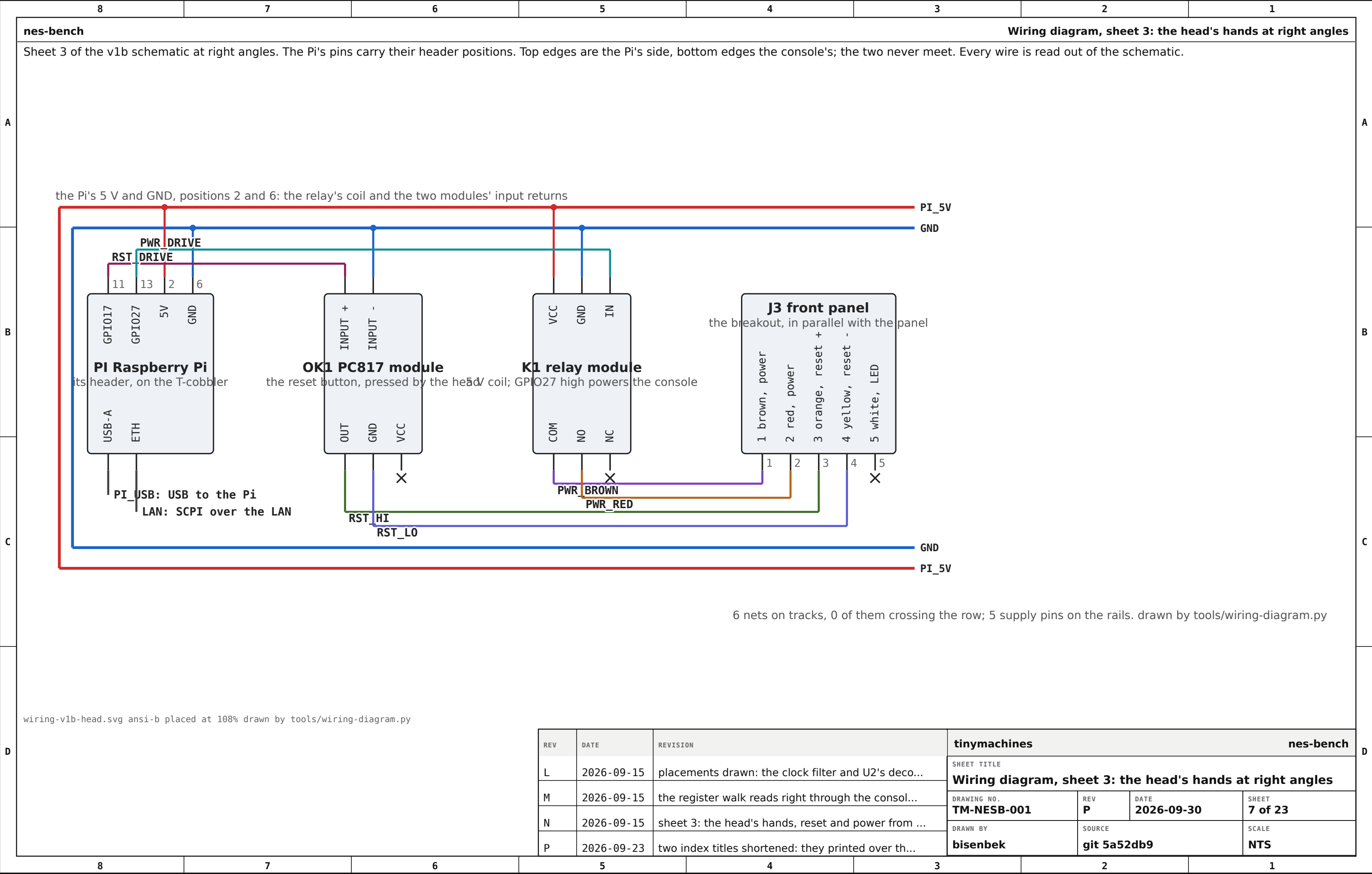
1. J2, the pad-side housing: LOCATED 2026-09-15 (the pointer): a black housing lying in row j of the middle board's rails side across columns 15 to 10, with the UNO's white, yellow and orange pad leads and the pad cable's five-colour bundle going into it from the frame's right. Which position carries which lead cannot be read from above (the leads enter the housing's Seen, not on this sheet's nets:

- RIG, SECOND POSE: the boards shifted right on the frame; the map re-read automatically (tools/board-overlay.py --read) and every view re-aimed; the rings sit on the holes out to column 50.
- The middle board is mapped (its rows read the other way up: a to e toward the right board, f to j toward its own rails, the pair below). The five-way housing at columns 9 to 13 is the power and reset breakout's, parked, joined to nothing (the user, 2026-09-15); a 2-by-4 black header stands at the board's left end (columns 58 to 60, rows f to h) and a 4-way header on its rail rows near columns 50 to
- The Q pairing is PROVEN 2026-09-15 23:00: the walk of every single bit through the 595 came back on D0 at its own position, so each grey line joins the 595 output to the 165 input the sheet says.
- The UNO now sits at the frame's top right on a blue screw-terminal shield, its leads running direct: a bundle (purple, blue, cream, red) down over the top rail to U3's rails side and on, a red to the +5V rail at column 5, and white, yellow and orange to the pad's housing on the middle board. The screw shield hides the header's pin labels, so which UNO pin each lead leaves is not readable on camera.
- The two-pin black header across the rail rows at column 27 is a probe point for metering the rail voltage (the user, 2026-09-15): its two pins are not joined to each other, and it is not the UNO's feed.
- Orientation settled: the notch and the pin-1 dot of U1, U2 and U3 all face the high-column end, as the map places them.
- Two yellow ceramic capacitors stand across the rails at columns 28 and 17; the plan puts one 100 nF beside each chip. The value is not readable on camera.
- A red link from the top GND rail row at column 12 runs down to the board's other rail pair: correct but red.

20 nets on tracks, 7 of them crossing the row; 27 supply pins on the rails. drawn by tools/wiring-diagram.py

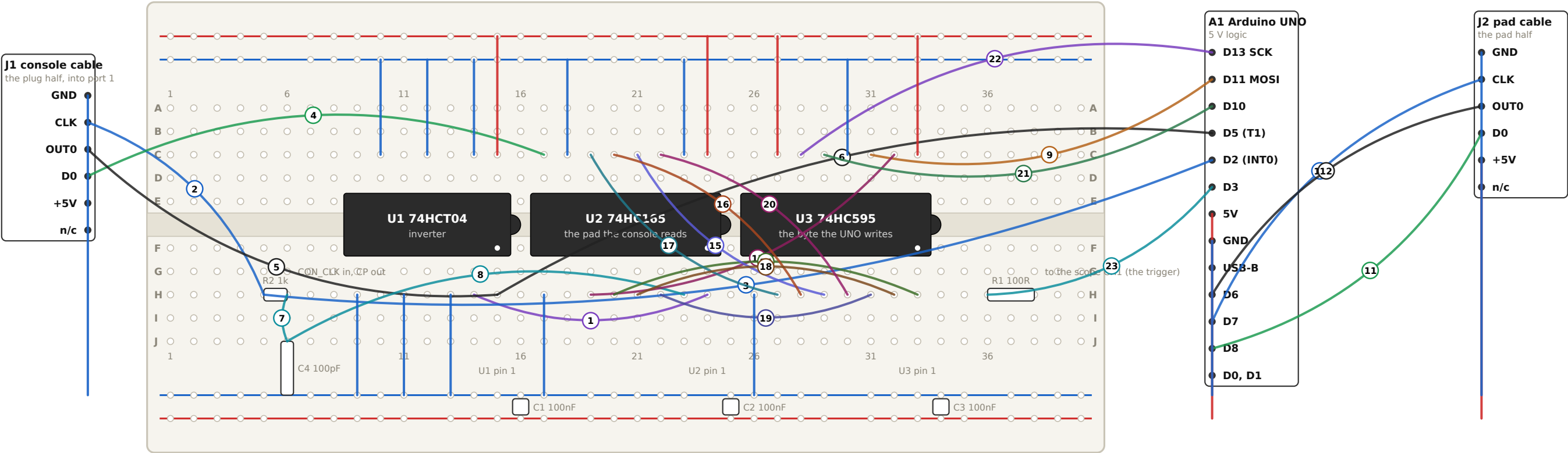
wiring-v1b-build.svg ansi-b placed at 63% drawn by tools/wiring-diagram.py

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Wiring diagram as built: grey is done, a ring needs a check			
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 6 of 23
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWN BY bisenbek		SOURCE git 5a52db9	SCALE NTS
P	2026-09-23	two index titles shortened: they printed over th...				



Bridge v1b on the breadboard: where everything goes

Placement is the board as built on 2026-09-11, read off its photographs: notches toward the high columns, pin 1 lower right. Every wire is read out of the schematic, so this cannot show a connection it does not have.



23 numbered jumpers, and 20 short wires to the rails

Every one of these is read out of the schematic. Red stubs go to the nearest + rail, blue stubs to the nearest - rail; they are not numbered because they are all the same instruction.

- 1

/PL: U1-2 (col 14 row H) to U2-1 (col 24 row H)
- 2

CON_CLK, the blue lead: J1 CLK to R2 col 5 row H
- 3

CON_CLK, the blue lead: R2 col 5 row H to A1 D2 (INT0)
- 4

CON_D0, the green lead: J1 D0 to U2-9 (col 17 row C)
- 5

CON_OUT0, the black lead: J1 OUT0 to U1-1 (col 15 row H)
- 6

CON_OUT0, the black lead: U1-1 (col 15 row H) to A1 D5 (T1)
- 7

CP: R2 col 6 row H to C4 col 6 row J
- 8

CP: C4 col 6 row J to U2-2 (col 23 row H)
- 9

MOSI: U3-14 (col 31 row C) to A1 D11 MOSI
- 10

PAD_CLK, the blue lead: A1 D7 to J2 CLK
- 11

PAD_D0, the green lead: A1 D8 to J2 D0
- 12

PAD_LATCH, the black lead: A1 D6 to J2 OUT0
- 13

Q_A: U2-6 (col 19 row H) to U3-15 (col 32 row C)
- 14

Q_B: U2-5 (col 20 row H) to U3-1 (col 33 row H)
- 15

Q_DOWN: U2-13 (col 21 row C) to U3-5 (col 29 row H)
- 16

Q_LEFT: U2-12 (col 20 row C) to U3-6 (col 28 row H)
- 17

Q_RIGHT: U2-11 (col 19 row C) to U3-7 (col 27 row H)
- 18

Q_SEL: U2-4 (col 21 row H) to U3-2 (col 32 row H)
- 19

Q_START: U2-3 (col 22 row H) to U3-3 (col 31 row H)
- 20

Q_UP: U2-14 (col 22 row C) to U3-4 (col 30 row H)
- 21

RCLK: U3-12 (col 29 row C) to A1 D10
- 22

SCK: U3-11 (col 28 row C) to A1 D13 SCK
- 23

TRIG: R1 col 36 row H to A1 D3

breadboard-v1b.svg ansi-b placed at 77% drawn by tools/breadboard.py

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Breadboard: which hole each part and jumper goes in			
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 8 of 23
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWN BY bisenbek		SOURCE git 5a52db9	SCALE NTS
P	2026-09-23	two index titles shortened: they printed over th...				

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Pin map: breakouts, head jumpers, UNO ribbon

A

The controller port: pin, NES harness, breakout

Pin numbers are the ones moulded into this console's port housing and the signals are the schematic's, MEASURED 2026-09-09 (the supply is on 5, not 7). Harness colours from the lab log, step 1.1 (2026-09-08). Breakout leads rung out 2026-09-09 with the cable out of the console; the pad half of the cut carries the same five colours. Use the lead, not the colour rule.

PIN	SIGNAL	NES HARNESS	BREAKOUT LEAD	ON THE BRIDGE
1	GND	brown	yellow	the GND rail
2	CLK	red	blue	R2-1, A1 D2 (INT0)
3	OUT0	orange	black	U1-1, A1 D5 (T1)
4	D0	yellow	green	U2-9
5	+5V	white	red	not used: the bridge runs from the UNO's 5 V
6	n/c	blue	not carried	
7	n/c	purple	not carried	

B

The power and reset breakout

Five ways straight through, colour for colour with the front panel's harness (docs/lab/06-breakout-map-power-reset.jpg), metered 2026-09-17. No way is ground: the front panel is grounded by its pad and housing.

PIN	NES HARNESS	BREAKOUT LEAD	WHAT IT IS
1	brown	brown	power switch
2	red	red	power switch
3	orange	orange	reset, + side (4.40 V)
4	yellow	yellow	reset, - side, and LED
5	white	white	LED

The head's four jumpers

Four Dupont leads off the Pi's header, no breakout (2026-09-10). Header positions are the Pi's own numbering. No wire from here to the console: the Pi's ground reaches it through the UNO's USB cable only.

PI PIN	POS.	TO	ROLE
GPI017	11	PC817 module INPUT +	reset, 100 ms high
GPI027	13	relay module IN	power: high is on
5V	2	relay module VCC	the coil's supply
GND	6	PC817 IN-, relay GND	the one ground lent

C

D

generated from tools/cheatsheet.py: the schematic, the lab log and tools/bringup.py's lead and ribbon tables

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Pin map: breakouts, head jumpers, UNO ribbon			
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 9 of 23
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWN BY bisenbek	SOURCE git 5a52db9		SCALE NTS
P	2026-09-23	two index titles shortened: they printed over th...				

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	6	5	4	3	2	1																																								
nes-benchPin map: breakouts, head jumpers, UNO ribbon (continued)																																														
A	The UNO ribbon Nine Dupont wires from the UNO's digital header, colour per pin as read off the header (2026-09-11). The net and the far end come from the schematic.						A																																							
	<table><thead><tr><th>UNO PIN</th><th>COLOUR</th><th>NET</th><th>TO</th></tr></thead><tbody><tr><td>D2</td><td>blue</td><td>CON_CLK</td><td>J1-2, R2-1</td></tr><tr><td>D3</td><td>green</td><td>TRIG</td><td>R1-1</td></tr><tr><td>D5</td><td>yellow</td><td>CON_OUT0</td><td>J1-3, U1-1</td></tr><tr><td>D6</td><td>orange</td><td>PAD_LATCH</td><td>J2-3</td></tr><tr><td>D7</td><td>red</td><td>PAD_CLK</td><td>J2-2</td></tr><tr><td>D8</td><td>brown</td><td>PAD_D0</td><td>J2-4</td></tr><tr><td>D10</td><td>black</td><td>RCLK</td><td>U3-12</td></tr><tr><td>D11</td><td>white</td><td>MOSI</td><td>U3-14</td></tr><tr><td>D13</td><td>grey</td><td>SCK</td><td>U3-11</td></tr></tbody></table>						UNO PIN	COLOUR	NET	TO	D2	blue	CON_CLK	J1-2, R2-1	D3	green	TRIG	R1-1	D5	yellow	CON_OUT0	J1-3, U1-1	D6	orange	PAD_LATCH	J2-3	D7	red	PAD_CLK	J2-2	D8	brown	PAD_D0	J2-4	D10	black	RCLK	U3-12	D11	white	MOSI	U3-14	D13	grey	SCK	U3-11
UNO PIN	COLOUR	NET	TO																																											
D2	blue	CON_CLK	J1-2, R2-1																																											
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	6	5	4	3	2	1																																								

6		5		4		3		2		1	
nes-bench										Wiring list, v1b	
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								
	+5V	9	U1-14, U2-16, C1-1, C2-1, C3-1, J2-5, A1 5V, U3-10, U3-16								
	GND	18	J1-1, U1-3, U1-5, U1-9, U1-11, U1-13, U1-7, U2-15, U2-10, U2-8, C1-2, C2-2, C3-2, C4-2, J2-1, A1 GND, U3-13, U3-14, U3-15, U3-16								
	/PL	2	U1-2, U2-1								
B	CON_CLK	3	J1-2, R2-1, A1 D2 (INT0)								
	CON_D0	2	J1-4, U2-9								
	CON_OUT0	3	J1-3, U1-1, A1 D5 (T1)								
	CP	3	U2-2, R2-2, C4-1								
	EXT_TRIG	1	R1-2								
	MOSI	2	A1 D11 MOSI, U3-14								
	PAD_CLK	2	J2-2, A1 D7								
	PAD_D0	2	J2-4, A1 D8								
	PAD_LATCH	2	J2-3, A1 D6								
	PI_USB	1	A1 USB-B								
	Q_A	2	U2-6, U3-15								
	Q_B	2	U2-5, U3-1								
C	Q_DOWN	2	U2-13, U3-5								
	Q_LEFT	2	U2-12, U3-6								
	Q_RIGHT	2	U2-11, U3-7								
	Q_SEL	2	U2-4, U3-2								
	Q_START	2	U2-3, U3-3								
	Q_UP	2	U2-14, U3-4								
	RCLK	2	A1 D10, U3-12								
	SCK	2	A1 D13 SCK, U3-11								
	TRIG	2	A1 D3, R1-1								
	D										
6		5		4		3		2		1	

REV	DATE	REVISION	tinymachines nes-bench						
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Wiring list, v1b						
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001REV PDATE 2026-09-30SHEET 11 of 23						
N	2026-09-15	sheet 3: the head's hands, reset and power from ...							
P	2026-09-23	two index titles shortened: they printed over th...							
				DRAWN BY bisenbek		SOURCE git 5a52db9		SCALE NTS	

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Wiring list, v1b

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
serial	1	A1 D0, D1

A

B

B

C

C

D

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Wiring list, v1b			
M	2026-09-15	the register walk reads right through the consol...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 12 of 23
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWN BY bisenbek		SOURCE git 5a52db9	SCALE NTS
P	2026-09-23	two index titles shortened: they printed over th...				

D

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	6	5	4	3	2	1
	nes-bench					Parts list
A	Everything that has to be in a drawer					
	Parts from every sheet, deduplicated. The status column is the only authored thing in this package's tables.					
	PART		STATUS	NOTE		
	74HCT04		on hand	SN74HCT04N, the tube that arrived 2026-09-09		
	74HC165		on hand	the TI bag. v2b needs a second one		
	100nF		on hand	v2b runs seven		
	1k		on hand	R2, the clock pin's series element, placed 2026-09-15		
	100pF		on hand	C4, the clock pin's filter, placed 2026-09-15		
	Arduino UNO R3 (ATmega328P)		on hand	the pile		
	74HC595		on hand	the box of 30		
B	100R		on hand	the trigger		
C						
D						
		6	5	4	3	2
						1

REV	DATE	REVISION	tinymachines nes-bench			
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	6	5	4	3	2	1																																																																									
nes-bench							U1, 74HCT04 hex inverter																																																																								
U1: 74HCT04 at +5V																																																																															
Hex inverter, six independent gates. HCT inputs switch at TTL levels (high from 2.0 V), which is why it sits on the console's NMOS OUT0 line: OUT0 high loads the register, so its inversion is the 165's active-low load. One gate is used. The other five inputs are CMOS and must not float: tie each spare A input to GND and leave its Y open.																																																																															
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nes-bench

Pin map, sheet 3: the head's jumpers, breakout

Every wire on sheet 3

One row per net, read off the schematic. RST_HI is 3 orange and RST_LO is 4 yellow, the reset button, orange the higher of the two. PWR_BROWN and PWR_RED put the relay across the front panel's power switch, which stays off while the head runs the power.

NET	FROM	TO
LAN	PI ETH	SCPI over the LAN
PI_USB	PI USB-A	USB to the Pi
PWR_BROWN	K1 COM	J3-1 1 brown, power
PWR_DRIVE	PI GPIO27 (position 13)	K1 IN
PWR_RED	K1 NO	J3-2 2 red, power
RST_DRIVE	PI GPIO17 (position 11)	OK1 INPUT +
RST_HI	OK1 OUT	J3-3 3 orange, reset +
RST_LO	OK1 GND	J3-4 4 yellow, reset -
GND	PI GND (position 6)	OK1 INPUT -; K1 GND
PI 5V	PI 5V (position 2)	K1 VCC

generated from tools/cheatsheet.py: the schematic, the lab log and tools/bringup.py's lead and ribbon tables

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4

3

2

1

nes-bench

Pin map, sheet 3: the head's jumpers, breakout (continued)

The head's four jumpers

Four Dupont leads off the Pi's header, no breakout (2026-09-10). Positions are the Pi's own numbering, odd on the inside row; the far end is read off sheet 3. No wire from here to the console: the Pi's ground reaches it through the UNO's USB cable only.

PI PIN	POS.	TO	ROLE
5V	2	the PI_5V rail	the coil's supply
GND	6	the GND rail	the one ground lent
GPI017	11	OK1 INPUT +	reset, 100 ms high
GPI027	13	K1 IN	power: high is on

The power and reset breakout, J3

Five ways straight through, colour for colour with the front panel's harness, pin 1 at the back, tapped in parallel with the panel. What each way is was metered 2026-09-17; no way is ground. Orange sits 4.40 V above yellow with the console on and the button released (2026-09-17), so OK1's OUT goes on orange and its GND on yellow.

PIN	NES HARNESS	BREAKOUT LEAD	WHAT IT IS
1	brown	brown	power switch
2	red	red	power switch
3	orange	orange	reset, + side (4.40 V)
4	yellow	yellow	reset, - side, and LED
5	white	white	LED

generated from tools/cheatsheet.py: the schematic, the lab log and tools/bringup.py's lead and ribbon tables

REV	DATE	REVISION	tinymachines nes-bench			
L	2026-09-15	placements drawn: the clock filter and U2's deco...	SHEET TITLE Pin map, sheet 3: the head's jumpers, breakout			
M	2026-09-15	the register walk reads right through the consol...				
N	2026-09-15	sheet 3: the head's hands, reset and power from ...	DRAWING NO. TM-NESB-001	REV P	DATE 2026-09-30	SHEET 18 of 23
P	2026-09-23	two index titles shortened: they printed over th...	DRAWN BY bisenbek	SOURCE git 5a52db9		SCALE NTS

6

5

4

3

2

1

	6	5	4	3	2	1																															
nes-bench							OK1, PC817 module on the reset pads																														
OK1: PC817 module																																					
One optocoupler on a carrier: an LED behind a series resistor on the input side, a phototransistor on the output side, nothing joining the two but light. The carrier adds a pull-up from OUT to VCC; with VCC left open OUT is the bare collector and GND the emitter, so the output side is a switch to its own GND and nothing more: the reset button, closed by the head. INPUT + high (3.3 V from a Pi pin is enough) lights the LED and closes the switch.																																					
<table><tr><th>SIDE</th><th>PIN</th><th>ON THE PART</th><th>ON THIS BENCH</th></tr><tr><td>input</td><td>INPUT +</td><td>LED anode via the series resistor: high turns it on</td><td>RST_DRIVE: PI GPIO17 (position 11)</td></tr><tr><td>input</td><td>INPUT -</td><td>LED cathode, the input side's return</td><td>the GND rail</td></tr><tr><td>output</td><td>OUT</td><td>collector: pulled to GND while the LED is lit</td><td>RST_HI: J3-3</td></tr><tr><td>output</td><td>GND</td><td>emitter, the output side's own ground</td><td>RST_LO: J3-4</td></tr><tr><td>output</td><td>VCC</td><td>pull-up supply for OUT; open, so OUT is open collector</td><td>no connection: left open on purpose</td></tr></table>														SIDE	PIN	ON THE PART	ON THIS BENCH	input	INPUT +	LED anode via the series resistor: high turns it on	RST_DRIVE: PI GPIO17 (position 11)	input	INPUT -	LED cathode, the input side's return	the GND rail	output	OUT	collector: pulled to GND while the LED is lit	RST_HI: J3-3	output	GND	emitter, the output side's own ground	RST_LO: J3-4	output	VCC	pull-up supply for OUT; open, so OUT is open collector	no connection: left open on purpose
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A	K1: relay module, 5 V coil							A																															
	A 5 V coil relay on a carrier with an opto-isolated input, driving the coil's transistor. The coil takes about 80 mA from VCC, which is why it is on the Pi's 5 V pin and not a GPIO. The contact is a changeover, COM to NO or NC. MEASURED 2026-09-17 at the console rather than read off the module: GPIO27 HIGH powers the console and LOW turns it off, which is why the boot config rests it low.																																						
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A	The bridge, built The breadboard, in two halves that are tested apart before they are joined. 1. 3.1 U1 and U2 on the board, links on H..A, the pattern on QH 2. Console OFF. Build only the console-facing half on the breadboard: 3. The supply is the UNO's own 5 V pin, fed by its USB from the Pi, and NOT the console's pin 7. v1b is one 5 V domain (the schematic's first sheet says so), and the console shares only ground: its pin 1 to the UNO's GND. That is also the only 5 V available, because the breakout does not bring pin 7 out.					A																															
B	4. Leads, from step 1.1's rung-out map: yellow GND, blue CLK, black OUT0, green D0, red +5V. Use the marks on the leads, not the port pin numbers, and not the published pinout. 5. 74HCT04 (U1): pin 14 to the UNO's 5V, pin 7 to GND, pin 1 from the BLACK lead (OUT0). 6. 74HC165 (U2): pin 16 to the UNO's 5V, pin 8 to GND, pin 15 (/CE) to GND, pin 10 (DS) to GND, pin 1 (/PL) from U1 pin 2, pin 2 (CP) from the BLUE lead (CLK), pin 9 (QH) to the GREEN lead (D0). 7. The YELLOW lead is the ground the UNO shares with the console. Nothing goes on the RED lead: it is the console's own 5 V and this bridge runs from the UNO's.					B																															
C	8. 100 nF across each chip's supply pins. 9. Wire links on the eight inputs to make a KNOWN byte. In pad order A, B, Select, Start, Up, Down, Left, Right those are pins 6, 5, 4, 3, 14, 13, 12, 11, and LOW is pressed. 10. Scope CH1 still on OUT0, CH2 moved to QH (U2 pin 9). Console on, game running. 11. 4.1 The UNO drives the 595, measured on its outputs 12. Console OFF and its port half left alone. On the UNO's side of the board: 13. 74HC595 (U3): pin 16 to the UNO's 5V, pin 8 to GND, pin 13 (/OE) to GND, pin 10 (/SRCLR) to 5V, pin 14 (SER) from UNO D11, pin 11 (SRCLK) from UNO D13, pin 12 (RCLK) from UNO D10.					C																															
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The bridge, built The breadboard, in two halves that are tested apart before they are joined. Continued from the previous sheet. A 14. 100 nF across its supply pins. 15. Do NOT join U3's outputs to U2's inputs yet. Meter on QA (pin 15), black on GND. 16. 4.2 The original pad polled by the bridge at 5 V 17. This is the PAD HALF of the cut controller cable, the one that does NOT beep to the console's board header, with the pad on the end of it. 18. Its leads carry the same colours as the plug half, because it is the same cable: yellow GND, blue CLK, black OUT0, green D0, red +5V. 19. yellow to GND, RED to the UNO's 5V (the pad's supply comes from the bridge here, and red IS the supply lead on this cable), black (OUT0) to UNO D6, blue (CLK) to UNO D7, green (D0) to UNO D8. 20. Console still off. The bridge drives this half; the console drives the other. 21. You will be asked to hold buttons; the bridge's own poll should follow them.																																																																				
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