Pico teletype loop interface — Rev A

Bill of materials · Dots & Dashes · Interfacing Teletypes and Paper Tape, Vol 7

Revision: A **Date:** 2026-11-03 **Lines:** 57 **Source:** https://dots-and-dashes.fubsypoly.com/interfacing-teletypes-and-paper-tape/vol-7/

USB to a 60 mA or 20 mA teletype loop: a Raspberry Pi Pico keys a MOSFET current sink through an optocoupler and reads the keyboard and printer loops through two more. Runs from a 48 V SELV adapter. Reference designators match pico_loop_interface.svg. The last group is the optional Design B driver (Vol 2), which replaces block A and the 48 V adapter. Not yet built by the author: check every row against the schematic before ordering.

Tick **Ord** when ordered, **Have** when it is in hand and checked against the part number, **Fit** when it is installed. Write the vendor, order number and price on the last page. Alternates for obsolete (EOL) parts are in **bold**.

Same The original part is still made — buy it. **EOL** Obsolete: buy new-old-stock or the substitute given. **Spec** The value matters more than usual — see the note.

Conflict The sources disagree — the value listed is the one checked against the board. **Choice** A builder's choice — the listed part is one that works; others will.

ORD HAVE FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
Logic								
☐ ☐ ☐	**1**	—	**Raspberry Pi Pico** RP2040, USB, 3.3 V logic	SC0915	Pico 2 SC1631 (same pinout; firmware builds for either)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=SC0915	**Same**	Solder pin headers or wire directly.
☐ ☐ ☐	**1**	R1	**Resistor 330 Ω** ¼ W 1 % metal film — U1 LED current ≈6 mA	Yageo MFR-25FBF52-330R		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-330R	**Same**	
☐ ☐ ☐	**2**	R11, R15	**Resistor 10 kΩ** ¼ W 1 % — sense-output pull-ups to 3V3	Yageo MFR-25FBF52-10K		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-10K	**Same**	
☐ ☐ ☐	**1**	R16	**Resistor 220 Ω** ¼ W — GP5 to J3 tip (motor relay)	Yageo MFR-25FBF52-220R		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-220R	**Same**	
Isolation								
☐ ☐ ☐	**3**	U1, U2, U3	**Optocoupler** phototransistor, CTR 100–200 % at 10 mA, 5.3 kV, DIP-4	Vishay SFH617A-3	Sharp/Everlight PC817 (CTR ≥50 %, check the pull-up still pulls down)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=SFH617A-3	**Same**	U1 keys the loop; U2 senses the keyboard loop; U3 senses the printer loop.

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Printer-loop keyer and current sink (block A)										
☐	☐	☐	**1**	Q1	**N-MOSFET 400 V** TO-220, linear duty ≈2.5 W at 60 mA — bolt to the case	`Vishay IRF740PBF`	IRF840PBF (500 V)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=IRF740PBF	**Same**	Use the insulating kit below; the tab is the drain.
☐	☐	☐	**1**	Q2	**NPN transistor** current-sense, TO-92	`onsemi 2N3904BU`	BC547B	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=2N3904BU	**Same**	
☐	☐	☐	**1**	R2	**Resistor 4.7 kΩ** ½ W — feeds the 12 V gate rail from +48 V	`Yageo MFR50SFTE52-4K7`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-4K7	**Same**	
☐	☐	☐	**1**	D2	**Zener 12 V** 1 W, DO-41 — gate rail	`onsemi 1N4742A`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N4742A	**Same**	
☐	☐	☐	**1**	R3	**Resistor 10 kΩ** ¼ W — gate pull-up	`Yageo MFR-25FBF52-10K`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-10K	**Same**	
☐	☐	☐	**1**	R4	**Resistor 1 kΩ** ¼ W — Q2 base	`Yageo MFR-25FBF52-1K`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-1K	**Same**	
☐	☐	☐	**1**	R5	**Resistor 33 Ω** ½ W 1 % — sets 20 mA (0.65 V / 33 Ω)	`Yageo MFR50SFTE52-33R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-33R	**Same**	
☐	☐	☐	**1**	R6	**Resistor 16 Ω** ½ W 1 % — with JP1 in, 33 ∥ 16 Ω sets 60 mA	`Yageo MFR50SFTE52-16R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-16R	**Same**	

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**1**	D3	**Rectifier diode** 1 A 1000 V — clamp	`onsemi 1N4007`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N4007	**Same**	
☐	☐	☐	**1**	D4	**Zener 47 V** 1 W, DO-41 — releases the magnet at ≈48 V	`onsemi 1N4756A`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N4756A	**Spec**	Clamp voltage ≈ supply voltage keeps marks and spaces equal (Vol 2).

Loop sense networks (block B, two identical)

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**2**	R8, R12	**Resistor 100 Ω** ½ W 1 % — sense resistor	`Yageo MFR50SFTE52-100R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-100R	**Same**	
☐	☐	☐	**2**	R9, R13	**Resistor 47 Ω** ¼ W — in parallel via JP2/JP3 for 60 mA	`Yageo MFR-25FBF52-47R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-47R	**Same**	
☐	☐	☐	**2**	R10, R14	**Resistor 68 Ω** ¼ W — opto LED series resistor	`Yageo MFR-25FBF52-68R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-68R	**Same**	
☐	☐	☐	**2**	D5, D6	**Signal diode** reverse protection across the opto LED	`onsemi 1N4148`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N4148	**Same**	
☐	☐	☐	**1**	R7	**Resistor 2.2 kΩ 3 W** metal oxide — keyboard loop, ≈21 mA, dissipates ≈1 W	`Yageo RSF3WSJT-73-2K2`	any 3 W 2.2 kΩ metal-oxide or wirewound	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=RSF3WSJT-73-2K2	**Same**	Mount clear of the board.

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
Power										
☐	☐	☐	**1**	—	**48 V DC adapter** 25 W, 0.52 A, 2.1 × 5.5 mm centre-positive plug	`Mean Well GST25A48-P1J`	any 48 V 0.3 A+ SELV adapter with the same plug	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=GST25A48-P1J	**Choice**	
☐	☐	☐	**1**	J4	**DC power jack** 2.1 mm pin, panel mount	`Switchcraft 721A`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=721A	**Same**	
☐	☐	☐	**1**	F1	**Fuse 0.5 A slow** 5 × 20 mm, time-lag	`Littelfuse 0218.500MXP`	any 0.5 A T 5×20	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=0218.500MXP	**Same**	Plus a 5×20 panel or PCB holder.
☐	☐	☐	**1**	D1	**Rectifier diode** reverse-polarity protection	`onsemi 1N4007`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N4007	**Same**	
☐	☐	☐	**1**	C1	**Electrolytic 100 µF 100 V** radial	`Nichicon UVR2A101MPD`	any 100 µF ≥ 63 V	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=UVR2A101MPD	**Same**	
Connectors, hardware, motor control										
☐	☐	☐	**2**	J1, J2	**1/4-inch phone jack** 2-conductor (tip/sleeve), open frame	`Switchcraft 11`	Switchcraft 12A (3-conductor) if your cables are TRS	Digi-Key www.digikey.com/en/products/result?keywords=11 Mouser www.mouser.com/c/?q=11	**Same**	
☐	☐	☐	**1**	J3	**3.5 mm jack** motor-relay control output	`CUI Devices SJ1-3523N`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=SJ1-3523N	**Same**	
☐	☐	☐	**3**	JP1–JP3	**2-pin header + shunt** 0.1 in	`Sullins PRPC040SAAN-RC + SPC02SYAN`	any 0.1 in header and shunt	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=SPC02SYAN	**Same**	

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☐	☐	☐	**1**	—	**TO-220 insulating kit** Thermalsil pad, shoulder washer, screw	`Boyd 4880SG`	Boyd 4880MG (mica)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=4880SG	**Same**	
☐	☐	☐	**1**	—	**Enclosure** die-cast aluminium, 119 × 94 × 34 mm — also Q1's heatsink	`Hammond 1590BB`	any metal box ≥ 100 cm² of wall for Q1	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1590BB	**Same**	
☐	☐	☐	**1**	—	**Perfboard** 0.1 in, about 80 × 60 mm	–		any supplier	**Choice**	
☐	☐	☐	**1**	—	**Enclosed mains relay for the motor** 3–48 V DC control input, four outlets	`Digital Loggers IoT Relay II`		Digital Loggers www.digital-loggers.com/iot2faqs.html Adafruit www.adafruit.com/	**Choice**	Keeps all mains wiring inside a listed product.

Option: Design B asymmetric half-bridge driver (replaces block A and the 48 V adapter)

Reference designators match halfbridge_driver.svg (they restart from 1).

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**1**	—	**12 V DC adapter** 25 W, 2.1 × 5.5 mm centre-positive	`Mean Well GST25A12-P1J`	any 12 V 1 A SELV adapter	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=GST25A12-P1J	**Choice**	
☐	☐	☐	**1**	—	**HV boost module** 3.7–15 V in, 100–230 V adjustable out — set to 150 V	`Omnixie NCH6300HV`	NCH8200HV (fixed 170 V; set the TVS and bus parts to suit)	Omnixie www.omnixie.com/ Elecrow www.elecrow.com/	**Choice**	SHDN must be pulled high; no reverse-polarity protection.
☐	☐	☐	**1**	D1	**Schottky diode** 1 A 40 V — 12 V reverse protection	`onsemi 1N5819`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1N5819	**Same**	
☐	☐	☐	**1**	F1	**Fuse 0.5 A slow** 5 × 20 mm	`Littelfuse 0218.500MXP`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=0218.500MXP	**Same**	
☐	☐	☐	**1**	F2	**Fuse 100 mA fast** 5 × 20 mm, bus	`Littelfuse 0217.100MXP`	any 100 mA F 250 V	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=0217.100MXP	**Same**	

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☐	☐	☐	**1**	C1	**Electrolytic 47 µF 250 V** bus capacitor, radial	`Nichicon UVR2E470MHD`	any 47 µF ≥ 250 V	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=UVR2E470MHD	Same	
☐	☐	☐	**1**	R1	**Resistor 100 kΩ 1 W** bus bleeder	`Yageo RSF100JB-73-100K`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=RSF100JB-73-100K	Same	
☐	☐	☐	**1**	D5	**TVS 1.5KE200A** 171 V standoff — bus clamp	`Littelfuse 1.5KE200A`	1.5KE220A	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=1.5KE200A	Spec	Choose the standoff above the bus voltage you set.
☐	☐	☐	**2**	Q1, Q2	**N-MOSFET 400 V** TO-220 — high and low side; no heatsink needed	`Vishay IRF740PBF`	IRF840PBF	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=IRF740PBF	Same	
☐	☐	☐	**2**	D2, D3	**Ultrafast diode** 1000 V 1 A, 75 ns — energy-return diodes	`Vishay UF4007-E3/54`	any ≥ 400 V ultrafast 1 A	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=UF4007-E3/54	Same	
☐	☐	☐	**1**	U6	**Photovoltaic MOSFET driver** 8.4 V open-circuit, fast turn-off, SOP-4 — high-side gate	`Vishay VOM1271T`	VOMDA1271T (automotive grade)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=VOM1271T	Same	SMD: mount on a SOP-4/SOIC adapter board for perfboard work.
☐	☐	☐	**1**	U1	**Current-mode PWM controller** near-100 % duty, CS ≈ 1 V, PDIP-8	`Texas Instruments UCC28C43P`	UC3843 (bipolar original)	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=UCC28C43P	Same	
☐	☐	☐	**1**	U5	**Optocoupler** DIP-4 — COMP shutdown	`Vishay SFH617A-3`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=SFH617A-3	Same	

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☐	☐	☐	**2**	Q3, Q4	**NPN transistor** TO-92 — COMP pull-down; LED driver	`onsemi 2N3904BU`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=2N3904BU	**Same**	
☐	☐	☐	**1**	R2	**Resistor 47 Ω** ½ W 1 % — sense, 20 mA	`Yageo MFR50SFTE52-47R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-47R	**Same**	
☐	☐	☐	**1**	R3	**Resistor 24 Ω** ½ W 1 % — with JP1, 63 mA	`Yageo MFR50SFTE52-24R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-24R	**Same**	
☐	☐	☐	**1**	R4	**Resistor 10 Ω** ¼ W — gate	`Yageo MFR-25FBF52-10R`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-10R	**Same**	
☐	☐	☐	**1**	R5	**Resistor 1 kΩ** ¼ W — CS filter	`Yageo MFR-25FBF52-1K`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-1K	**Same**	
☐	☐	☐	**1**	C2	**Capacitor 470 pF** C0G, 50 V — CS filter	–	any C0G 470 pF	any supplier	**Choice**	
☐	☐	☐	**2**	RT, R6	**Resistor 10 kΩ** ¼ W — oscillator, Q3 bias	`Yageo MFR-25FBF52-10K`		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-10K	**Same**	
☐	☐	☐	**1**	CT	**Capacitor 2.2 nF** C0G or film — sets frequency (check the datasheet curve)	–	any C0G 2.2 nF	any supplier	**Choice**	
☐	☐	☐	**2**	—	**Capacitor 0.1 µF + 1 µF** VREF and VDD bypass	`KEMET C320C104K5R5TA`	any	Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=C320C104K5R5TA	**Choice**	

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☐	☐	☐	**1**	R7	**Resistor 150 Ω** ¼ W — LED string ≈16 mA	Yageo MFR-25FBF52-150R		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-150R	**Same**	
☐	☐	☐	**1**	R8	**Resistor 1 kΩ** ¼ W — Q4 base	Yageo MFR-25FBF52-1K		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR-25FBF52-1K	**Same**	
☐	☐	☐	**1**	—	**Resistor 680 Ω** ½ W — keyboard loop from 12 V, ≈15 mA	Yageo MFR50SFTE52-680R		Digi-Key www.digikey.com/en/products/result?keywords=… Mouser www.mouser.com/c/?q=MFR50SFTE52-680R	**Same**	

Orders

VENDOR	ORDER NO.	DATE	TOTAL	RECEIVED	LINES / NOTES

Build total: _____ **Started:** _____ **First power-up:** _____

Notes