KENBAK-1 — my full-size TTL reproduction

Bill of materials · Kalinchuk reproduction board, Front Panel Express panels, Bud-pattern case

Revision: A **Date:** 2026-11-03 **Lines:** 59 **Source:** iconic-machines.fubsypoly.com/kenbak-1/vol-12/

Every part for the full-size build, in the order of Volume 12's bill of materials: the two 1404A memories, the 130 TTL chips, transistors, passives, sockets and connectors, the front panel with MX keys and LED lamps, the power supply, the case and the home-milled side rails. Volume 12 explains each change from the 1971 parts. Stock and prices change daily; part numbers are examples that meet the specification (availability read 2 November 2026).

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, or a direct equivalent, is still a standard item. **EOL** The original is obsolete: buy new old stock or the alternate given.

Spec The original list does not say enough, or the rating is wrong for a modern build. **Conflict** The lists, the schematic or the board disagree; the resolution is given. **Choice** A change made for this build.

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
Memory the one hard part: find it first										
☐	☐	☐	**2 (+2 spare)**	IC50, IC59	**1404A 1,024-bit dynamic shift register** 8-lead metal can; −5 V on pin 8	`Intel 1404A`	**AMD or Synertek second-source 1404A (same number). No modern equivalent is made. Not the 1401A.**	eBay	**EOL**	Check the markings; test each one with the Volume 12 memory test.
☐	☐	☐	**6**	IC50, IC59	**IC socket, 8-pin 0.300 in, machined (turned-pin)** Two on the board, two as Method A carriers (each can soldered into one), two spare			Jameco www.jameco.com Tayda www.taydaelectronics.com	**Choice**	
☐	☐	☐	**2**	IC50, IC59	**Round 8-contact socket, 0.200 in circle (Method B trial)** Needs an adapter under 12.7 mm along the column	`Mill-Max 917-43-108-41-005000 (TH)`	917-43-108-41-001000 (SMT, for the adapter). Not 917-…-208 (TO-100 circle).	Mouser www.mouser.com Digi-Key www.digikey.com	**Choice**	
☐	☐	☐	**2 (4)**	IC50, IC59	**Heat sink, round push-on TO-5** Ø12.7 mm — the cans are 12.7 mm apart	`Aavid 320205B00000G`	Aavid 325705B00000G. Not the 19 mm square 322505B00000G (two overlap).	Mouser www.mouser.com Digi-Key www.digikey.com	**Conflict**	
TTL logic standard 74-series only; never 74HC. 74LS alternates are pin-compatible but untested in this design: last resort										
☐	☐	☐	**46**	Throughout	**7400 quad 2-input NAND** DIP-14	`SN7400N (TI, active)`	74LS00 (untested)	Mouser www.mouser.com Digi-Key	**Conflict**	kenbak.com lists 45; Stockly's 46 fill the board exactly.
☐	☐	☐	**15**		**7410 triple 3-input NAND** DIP-14	`7410, new old stock`	**74LS10 (untested)**	Jameco www.jameco.com Unicorn Electronics www.unicornelectronics.com eBay	**EOL**	
☐	☐	☐	**13**	Registers I, W, K, L…	**7495 4-bit shift register** DIP-14	`7495 / 7495A, new old stock`	**74LS95B (different family; untested)**	Jameco Unicorn Electronics eBay	**EOL**	

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☐	☐	☐	**10**		**7474 dual D flip-flop** DIP-14	`7474, new old stock`	**74LS74A (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**10**	State logic	**7454 4-wide AND-OR-INVERT** DIP-14	`7454, new old stock only`	**NONE. The 74LS54 is not a substitute (different gate arrangement). Hunt this type first; buy spares.**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**10**		**7430 8-input NAND** DIP-14	`7430, new old stock`	**74LS30 (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**9**		**7420 dual 4-input NAND** DIP-14	`7420, new old stock`	**74LS20 (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**4**	IC125–IC128	**7442 BCD-to-decimal decoder** DIP-16: power on pins 16 and 8	`7442 / 7442A, new old stock`	**74LS42 (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**3**	Inverters	**7404 hex inverter** DIP-14	`SN7404N (TI, active)`		Mouser www.mouser.com Digi-Key	Same	
☐	☐	☐	**3**	IC80, IC114, IC115	**7416 hex inverter, open collector 15 V** DIP-14; sinks the lamps, drives the clock transistors	`SN7416N (TI, active)`	No HC equivalent	Mouser www.mouser.com Digi-Key	Same	
☐	☐	☐	**3**		**7486 quad XOR** DIP-14	`7486, new old stock`	**74LS86 (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**2**	IC102, IC103	**7403 quad NAND, open collector** DIP-14; wired logic	`7403, new old stock`	**74LS03 (open collector; untested). Not 74HC03 (open-drain CMOS).**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**1**		**7408 quad 2-input AND** DIP-14	`7408, new old stock`	**74LS08 (untested)**	Jameco Unicorn Electronics eBay	EOL	
☐	☐	☐	**1**		**7451 dual AND-OR-INVERT** DIP-14	`7451, new old stock`	**74LS51 (untested). Buy a spare.**	Jameco Unicorn Electronics eBay	EOL	

Transistors and diodes

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**6**	Q1, Q3, Q4, Q5, Q7, Q8	**NPN, clock drivers and multivibrator** Original TI 2N5449	`2N4401 (onsemi and others)`	**2N4401 from any maker; Stockly's choice since 2007**		EOL	Lead order varies between TO-92 types: check against the board outline.

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**2**	Q2, Q6	**PNP, common-base clock stages** Original TI 2N5447	`MPS3702 if found`	**2N3906 (40 V, faster), the usual substitute**		EOL	Check the bought part's data sheet for E-B-C order.
☐	☐	☐	**8**	CR1–CR8	**Small-signal diode** Original 1N914	`1N4148`			Same	
☐	☐	☐	**1**	CR9	**Zener 5.1 V, 1 W (−5 V for the memories)** DO-41; fits 0.055 in holes	`1N4733A`	Not a 0.5 W zener		Spec	kenbak.com's 'IN7433' is a typo for 1N4733.
Resistors carbon or metal film, ¼ W unless noted										
☐	☐	☐	**27**	R1, R2, R9, R11, R15, R17, R20, R27–R46	**1 kΩ** brown-black-red				Same	
☐	☐	☐	**4**	R3–R6	**3 kΩ** orange-black-red; memory TTL loads				Same	
☐	☐	☐	**4**	R7, R14, R21, R22	**270 Ω** red-violet-brown				Same	
☐	☐	☐	**2**	R8, R13	**220 Ω, ½ W** red-red-brown; pull-downs to −12 V				Same	
☐	☐	☐	**4**	R10, R12, R18, R19	**120 Ω** brown-red-brown				Same	
☐	☐	☐	**2**	R25, R26	**68 Ω** blue-grey-black				Same	
☐	☐	☐	**1**	R47	**56 Ω, 2 W, −5 V dropper** Metal oxide or wirewound; stand it off the board				Spec	Dissipates 0.85–1 W: 2 W is the minimum.
☐	☐	☐	**1**	R15	**3 kΩ spare for R15** Fit 1 kΩ first		kenbak.com used 3 kΩ; Stockly 1 kΩ		Conflict	Socket pins in R15's holes make the swap easy.
Capacitors +5 V node ≥10 V; −12 V node ≥25 V; −5 V node ≥16 V. On the negative rails the + lead goes to ground										
☐	☐	☐	**25**	C2, C3, C5–C8, C11–C13, C20–C22 + bypass	**0.1 µF 50 V X7R** 0.2 in lead spacing				Same	
☐	☐	☐	**2 (+ tuning)**	C18, C19	**1,500 pF C0G/NP0** Sets the 2 MHz multivibrator		Also 1,000 and 2,200 pF to tune		Spec	
☐	☐	☐	**2**	C16, C17 (underside)	**6,800 pF silver mica or C0G** 0.2 in spacing		kenbak.com machines run without them		Conflict	
☐	☐	☐	**4**	C1, C10, C14, C15	**100 µF 25 V, 105 °C** Radial electrolytic		Stockly listed 100 V: needlessly large		Spec	

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☐	☐	☐	**2**	C4, C9	**100 µF 25 V** Radial electrolytic				Same	
☐	☐	☐	**3 + 1 + 1**	C1, C4, C9, C14, C15 alternates	**33 µF, 100 µF, 220 µF** 25 V or more (never kenbak.com's 6.3 V)				Spec	
☐	☐	☐	**(2)**	Store / Read Memory switches	**Debounce capacitors — leave off at first** Value never recorded				Spec	Fit only if the switches double-act.

Sockets and connections

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**126**	14-pin positions	**IC socket, 14-pin 0.300 in, machined (turned-pin)** Machined (turned-pin) only: better contact and retention, robust through re-seating			Jameco Tayda	Choice	
☐	☐	☐	**4**	IC125–IC128	**IC socket, 16-pin 0.300 in, machined (turned-pin)** Machined (turned-pin) only: better contact and retention, robust through re-seating			Jameco Tayda	Choice	
☐	☐	☐	**1 strip**	SW1, SW2, LAMP, +5 V, GND	**0.1 in single-row header, ~32 pins** 8 + 8 + 14 + 1 + 1				Choice	
☐	☐	☐	**5 + 50**	Panel harness	**Molex KK 254 housings + crimp contacts**	`22-01-3087 (8), 22-01-3147 (14), 08-50-0114`	Generic 0.1 in 'Dupont' housings and pins	Mouser www.mouser.com Digi-Key	Choice	KK has no 1-way housing: use a 2-way with one cavity empty.
☐	☐	☐	**1**	J1	**Insulated wire link**				Same	

Front panel and controls

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**1**		**Front panel, 2 mm, engraved** Kalinchuk's design file, github.com/kalinchuk/kenbak_1 (Case/)			Front Panel Express www.frontpanelexpress.com	Choice	
☐	☐	☐	**1**		**Rear panel** Kalinchuk's design file			Front Panel Express www.frontpanelexpress.com	Choice	
☐	☐	☐	**15**	Keys	**MX-style plate-mount keyswitch + tall square cap** 13.97 mm square cutout	`Cherry MX (any MX-compatible)`	Gateron, Kailh MX-compatible. Original Raytheon KBSR reed switches are gone.		Spec	2 mm panel: test-fit; pocket the back to 1.5 mm or glue.
☐	☐	☐	**12**	8 data + 4 control lamps	**3 mm LED with built-in 5 V resistor** Replaces the Type 680 bulb (5 V 60 mA)	`Kingbright WP710A10YD5V (yellow)`	Any T-1 LED rated for 5 V with an internal resistor. Never a bare LED.	Digi-Key www.digikey.com Mouser	Choice	The 7416 has no series resistor. Anode to the +5 V common.

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☐	☐	☐	**12**	Lamp holes Ø5.9 mm	**LED holder, chrome, 3 mm** Chrome-plated brass with nut; 6 ±0.2 mm hole	`Tayda A-6044`	Tayda A-661 (5.7 mm hole) + A-7116 insert; Switch Electronics 3 mm prominent bezel (5.8 mm)	Tayda Electronics www.taydaelectronics.com/electromechanical/l…	**Choice**	Check the stated hole before ordering.
☐	☐	☐	**1**	LOCK	**Mini toggle, SPST + white boot** ¼ in bushing (hole ~6.3 mm)				**Same**	
☐	☐	☐	**1**	Power	**Mains-rated toggle** 125/250 VAC, 3 A+; 15/32 in bushing (11.75 mm hole)				**Spec**	

Power and hardware

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**1**	Supply	**Triple-output switching supply** +5 V 5 A, +12 V 2.8 A, −12 V 0.5 A; 129 × 98 × 38 mm	`Mean Well RT-65B`	Not the RT-65A (−5 V output). Kalinchuk used Integrated Power Designs (Digi-Key 1010417CHCO; unchecked).	Mouser www.mouser.com Digi-Key	**Choice**	Trim +5 V to 5.0–5.1 V at the board.
☐	☐	☐	**1 + 2**	Fuse	**3AG fuse holder + slow-blow fuses** 1.5–2 A slow-blow	`Littelfuse 313 series`	Bussmann MDL		**Spec**	A fast ¾ A fuse blows on the switcher's inrush.
☐	☐	☐	**1**	Mains lead	**3-wire cord + strain relief** Earth to the chassis				**Same**	
☐	☐	☐	**3**	Board mounting	**#4-40 × ½ in standoffs, screws, nylon washers** Three 0.125 in holes				**Same**	
☐	☐	☐	**6 + spares**	Rails	**M3 × 10 low-head socket cap screws**	`DIN 7984`	#6-32 will not pass the case's 3.2 mm holes		**Conflict**	
☐	☐	☐	**4**		**Rubber feet, square**	`Bud 9653 (original)`				

Case and side rails

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**2**		**Case top and bottom (clamshell)** Sheet metal to the Bud MD-1 drawings			PCBWay www.pcbway.com/project/shareproject/KENBAK_1…	**Choice**	
☐	☐	☐	**2**	Side rails	**Side rail, Bud 148 pattern** 20.6 × 14.3 × 266.7 mm; machined from bar		Original Bud 148 extrusion is gone		**Choice**	I am cutting these on my mini mill — Volume 12, 'Making the Side Rails'. Drill the screw holes last, from the case.
☐	☐	☐	**24 in**		**Aluminium bar for the rails** 6061-T6511, 5/8 × 1 in	`Speedy Metals 2289`		Speedy Metals www.speedymetals.com		
☐	☐	☐	**1 set**		**Rail cutters** R8 saw arbor; 3 in × 1/32 and × 3/32 in HSS slitting saws; ½ in 60° chamfer mill; 3/32 in long-reach end mill; M3 tap					

Orders

VENDOR	ORDER NO.	DATE	TOTAL	RECEIVED	LINES / NOTES

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

Notes