

AccessionIndex: TCD-SCSS-T.20251017.001

Accession Date: 17-Oct-2025

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Object name: Cybernetic Mathiputer

Vintage: 1975

Synopsis: An early arithmetic learning toy for children that used the Fairchild PPS-25 chipset.

Description:

The Fairchild *Programmed Processor System* (PPS-25 or PPS25) [1][2][3] was one of the very earliest microprocessors, a 4-bit 25-digit multi-chip pMOS family introduced in 1971. In this Collection there is a chipset given by Fairchild Germany to Brian Coghlan in early 1973, along with documentation (see elsewhere in this catalog). The PPS-25 was reportedly used for scientific applications, such as the Walsh Spectrum Analyser of [4], an amazing example that shows the 1971 4-bit PPS-25 soundly outperforming the 1974 8-bit Intel 8080 at serious mathematics, the BCD addition execution time being: PPS-25: 62.5uS, 4004: 1704uS, and 8080: 230uS. Presumably its impressive performance advantage was due to its heavily overlapped “racetrack” *Register-Processor* architecture, as distinct from Intel’s traditional register-transfer and unified-bus *Digit-Processor* architectures.

The only verified commercial product was the Cybernetic *Mathiputer* [5], an early arithmetic learning toy for children. Its front panel settings were quite intuitive except for *Assignment*:

Setting	Function
Range	0-3: only numbers 0-3 4-6: only numbers 4-6 7-9: only numbers 7-9 0-9: all numbers 0-9
Mode	Add: addition Sub: subtraction Mult: multiplication Div: division
Assignment	10: ??? 25: ??? 50: ??? 100: ???

It appears to have been quite widely used in Californian classrooms, presumably for teaching mental arithmetic. It seems that a problem could be posed on the screen, e.g. subtraction of two numbers, and the student would key in a proposed answer, then it gave a smily face if correct or a frown if not. Hence it seems it was a tool for the youngest of primary school students.

The Mathiputer had two main parts:

- (1) **Base:** contained a power supply and keyboard. The power supply was very basic, just an on/off switch and fuse feeding a Stancor P-8180 117Vac 50-60Hz transformer with 25.2Vac centre-tapped secondary with two half-wave rectifiers and smoothing capacitors to generate +10 V, 0V and -10 V for the front panel. The keyboard only had keys for digits 0 to 9, plus an ENTER key.

- (2) **Front Panel:** contained the PPS-25 chipset and a few other components plus five 7-segment LED displays:

F3805	18-pin arithmetic logic unit (ALU)
F3806	24-pin timing and control
F3807	40-pin 32-key keyboard encoder
F3809	16-pin 256-bit memory (registers E, F, G)
F3810	16-pin 256 × 12-bit ROM
F3811	24-pin display output

Presumably the keyboard was scanned by the F3807 keyboard encoder for input to the PPS-25's F3805/F3806 arithmetic unit, then the F3811 generated BCD and digit select for the LED displays. Memory was provided by the F3809 read/write registers and F3810 read-only memory. In addition there were 7 medium-scale chips (presumably TTL), 21 transistors, quite a number of resistors and diodes, and one Motorola SC25268K2 power transistor, the latter presumably part of a voltage regulator circuit that reduces the +10V down to +5V for the PPS-25 chipset.

While it is a really cool iconic item, worthy of comparison to some of Sir Jonathan Ive's product designs like the elegant and stylish Apple iMac G4 (see elsewhere in this Collection), the principal claim to fame for the Mathiputer is that internally it used the PPS-25 chipset, a rare and notable case of "*PPS-25 inside*".

Thanks to Brian Coghlan for swiftly acquiring this item, funded by the Collection.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
Click 'Accession Index' (1st column listed) for related folder, or 'About' for further guidance.
Some of the items below may be more properly part of other categories of this catalog, but are listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-T.20251017.001	Cybernetic Mathputer. An early arithmetic learning toy for children that used the Fairchild PPS-25 chipset. 1975.
TCD-SCSS-T.20251005.001	Fairchild PPS-25 microprocessor and associated chips. Fairchild's first and very early 4-bit microprocessor. 1971.
TCD-SCSS-T.20190508.001	Apple iMac G4. Very elegant and stylish Apple desktop computer. 2002.

References:

1. Wikipedia, *PPS-25 - Fairchild*, see:
<https://en.wikichip.org/wiki/fairchild/pps-25>
Last browsed to on 17-Oct-2025.
2. Fairchild, *PPS-25 Programmed Processor System*, see:
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20251017.001/Fairchild-PPS25-introduction-fromCatalog-withMicrograph-1972.pdf>
From: Fairchild, *OptiMOS Catalog*, 1972, see:
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20251017.001/FairchildSemiconductor-OPTIMOS-Catalog-197209-1972.pdf>
Last browsed to on 17-Oct-2025.
3. Fairchild, *PPS-25 Preliminary Users Manual*, 25th October, 1972see:
<https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20251017.001/Fairchild-PPS25-Preliminary-Users-Manual-25Oct1972.pdf>
Last browsed to on 17-Oct-2025.
4. R. Kitai, I. Renyi and F. Vajda, *Microprocessor Application in a Walsh Fourier Spectral Analyzer*, p.27, Vol.9, No.4, IEEE Computer, April 1976, see:
<https://ieeexplore.ieee.org/document/1647332>
Last browsed to on 17-Oct-2025.
5. The CPUShack Museum, *Fairchild PPS-25: 4-bit CPU for 25-digit precision*, p.27, Vol.9, No.4, IEEE Computer, April 1976, see:
<https://www.cpushack.com/2025/02/01/fairchild-pps-25-4-bit-cpu-for-25-digit-precision/>
Also: <https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20251017.001/Fairchild-PPS25-4bit-CPU-for-25digit-precision-1Feb2025.pdf>
Also: *Cybernetic Systems Inc. Mathputer*, see:
https://vintagecomputer.net/browse_thread.cfm?id=487
Also: <https://treasures.scss.tcd.ie/hardware/TCD-SCSS-T.20251017.001/CyberneticsystemsInc-Mathputer-vintagecomputerNET.pdf>
Last browsed to on 17-Oct-2025.

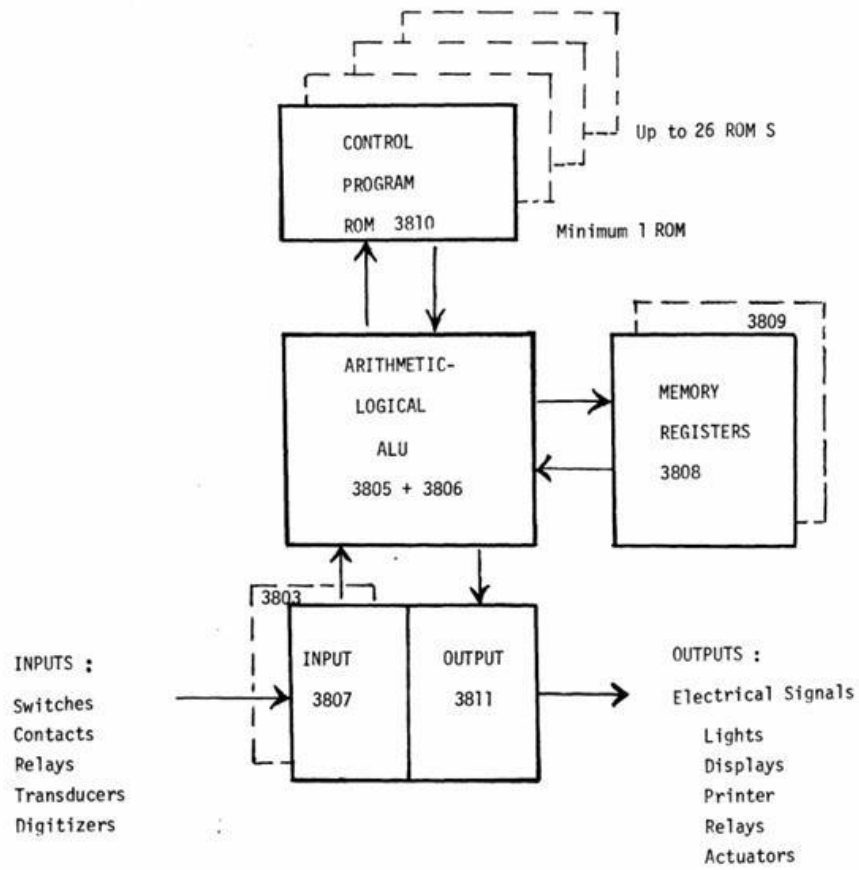


Figure 1: Fairchild PPS-25 architecture.



Figure 2: Cybernetic Mathputer left, rear and right views



Figure 3: Cybernetic Mathputer front view



Figure 4: Cybernetic Mathiputer base opened

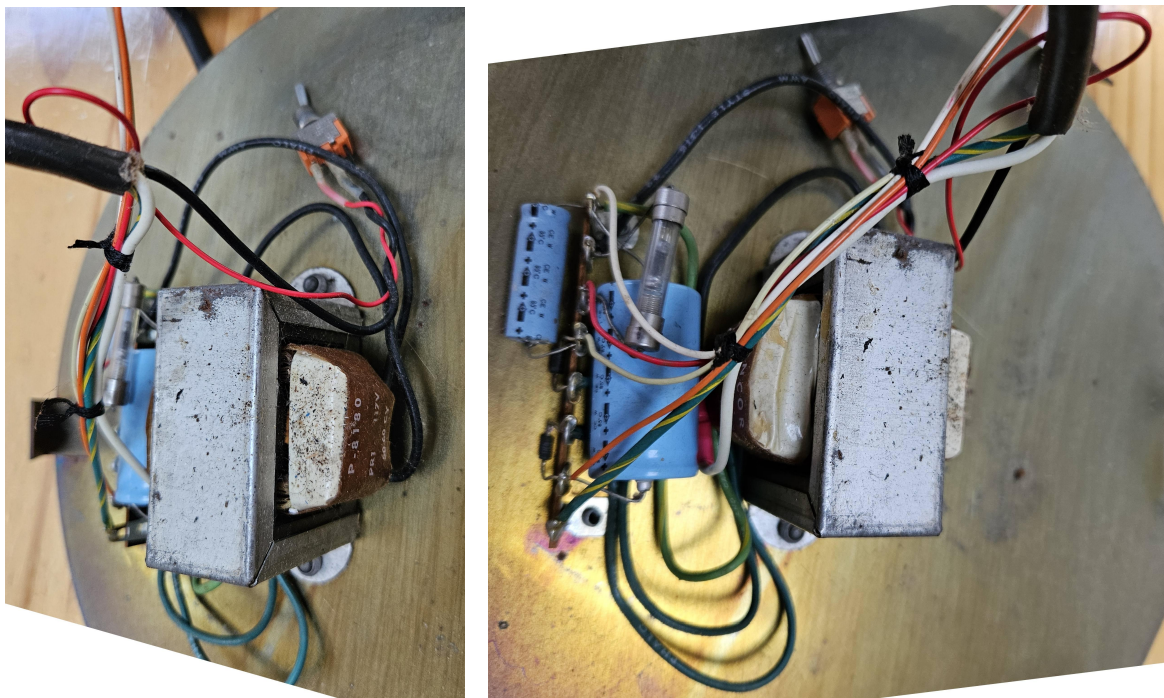


Figure 5: Cybernetic Mathiputer 110VAC 60Hz base power supply left and right views

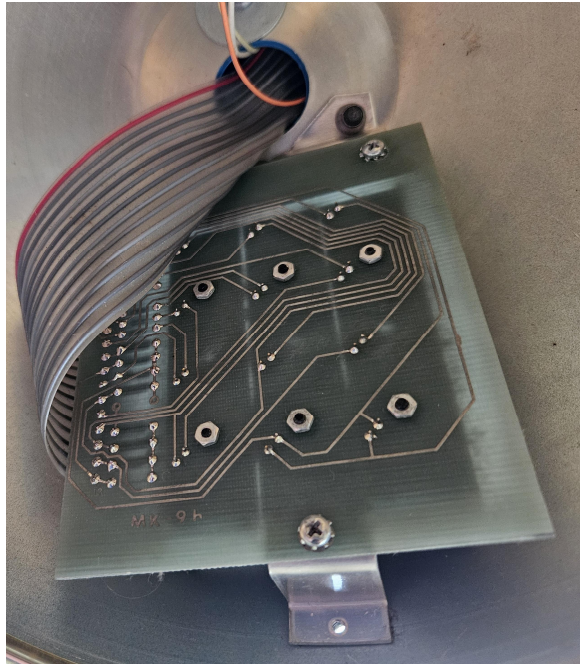


Figure 6: Cybernetic Mathiputer base keypad rear view



Figure 7: Cybernetic Mathiputer front panel opened, front views



Figure 8: Cybernetic Mathputer front panel opened, rear view

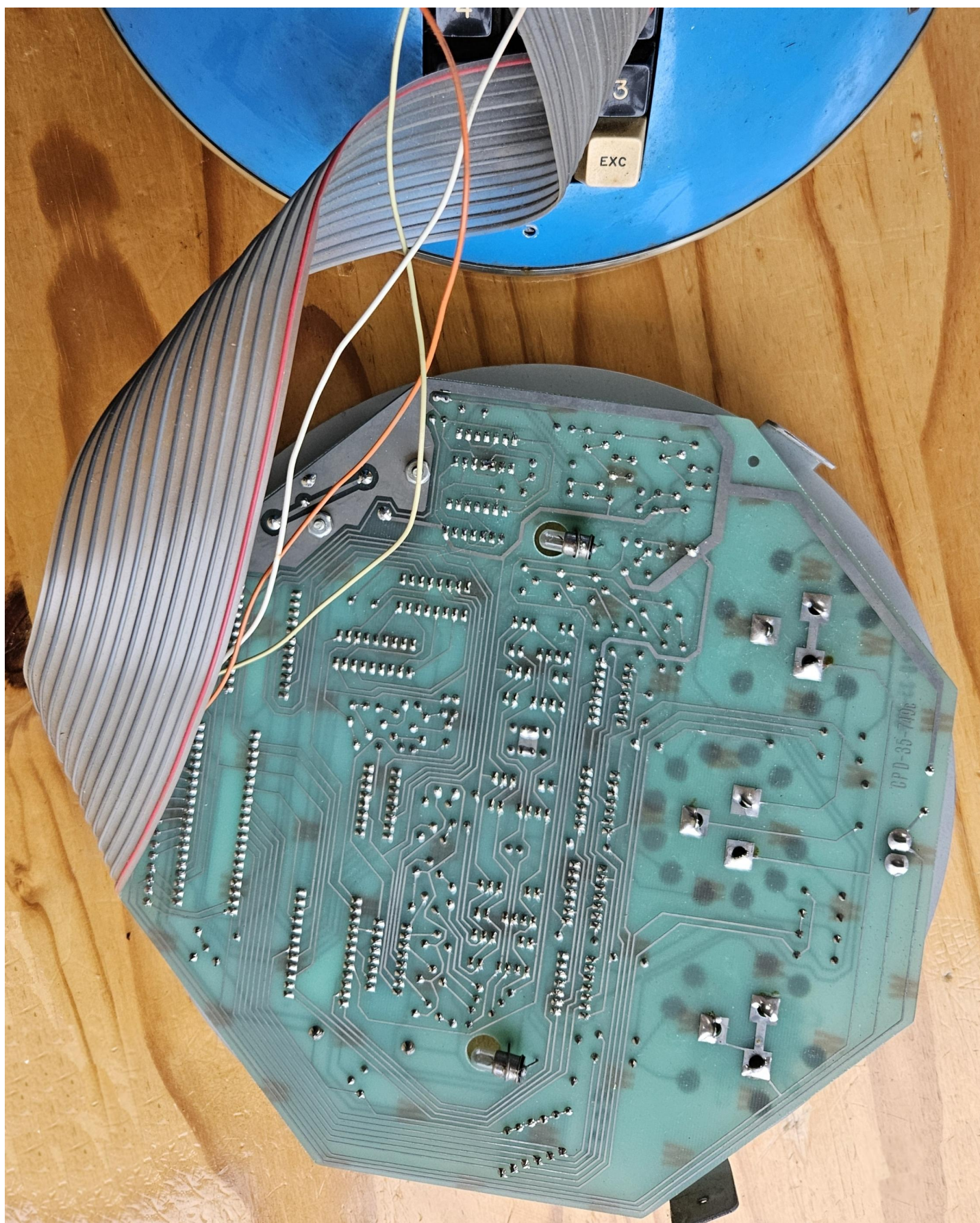


Figure 9: Cybernetic Mathputer front panel rear view

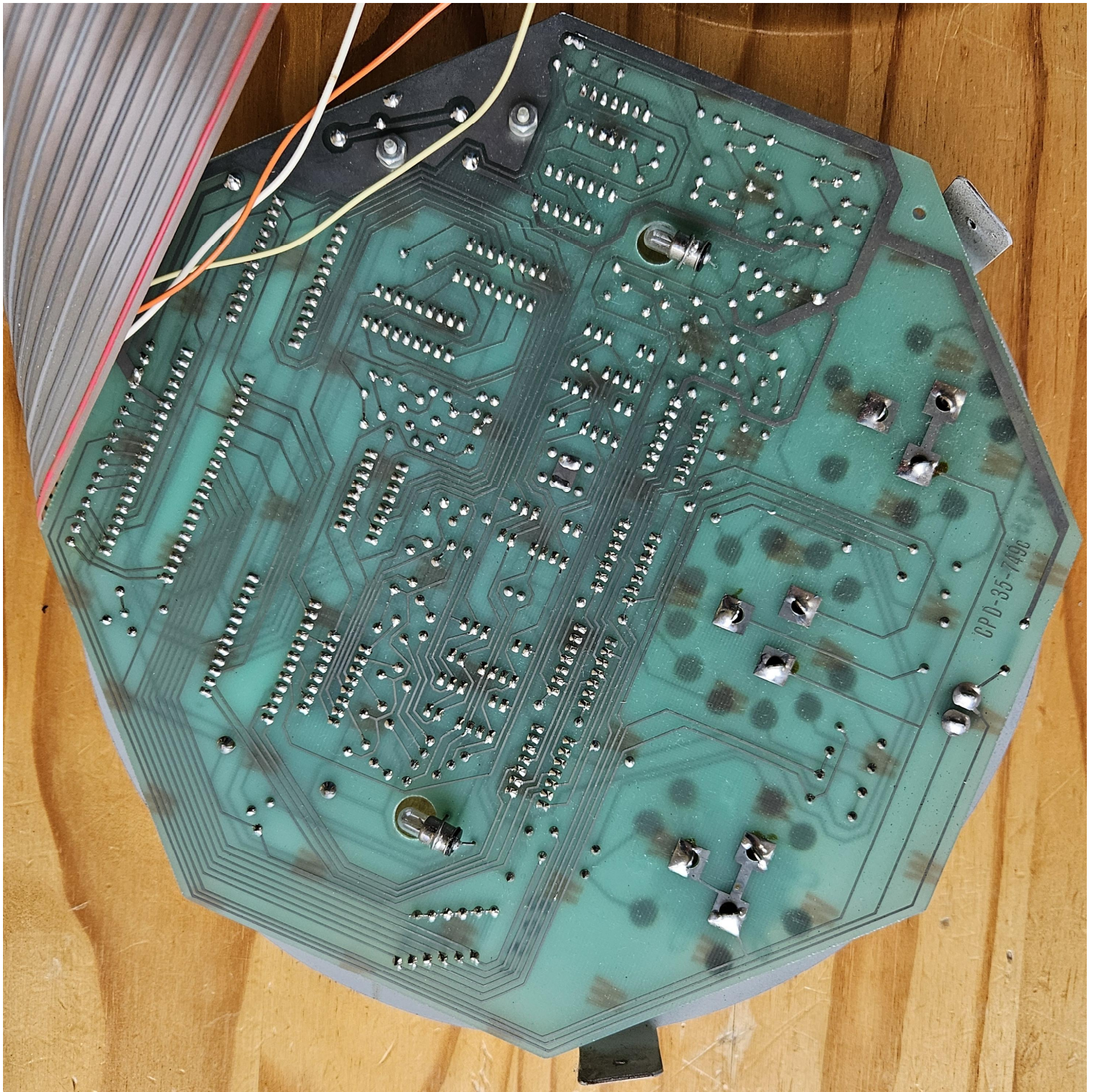


Figure 10: Cybernetic Mathputer front panel rear view closeup

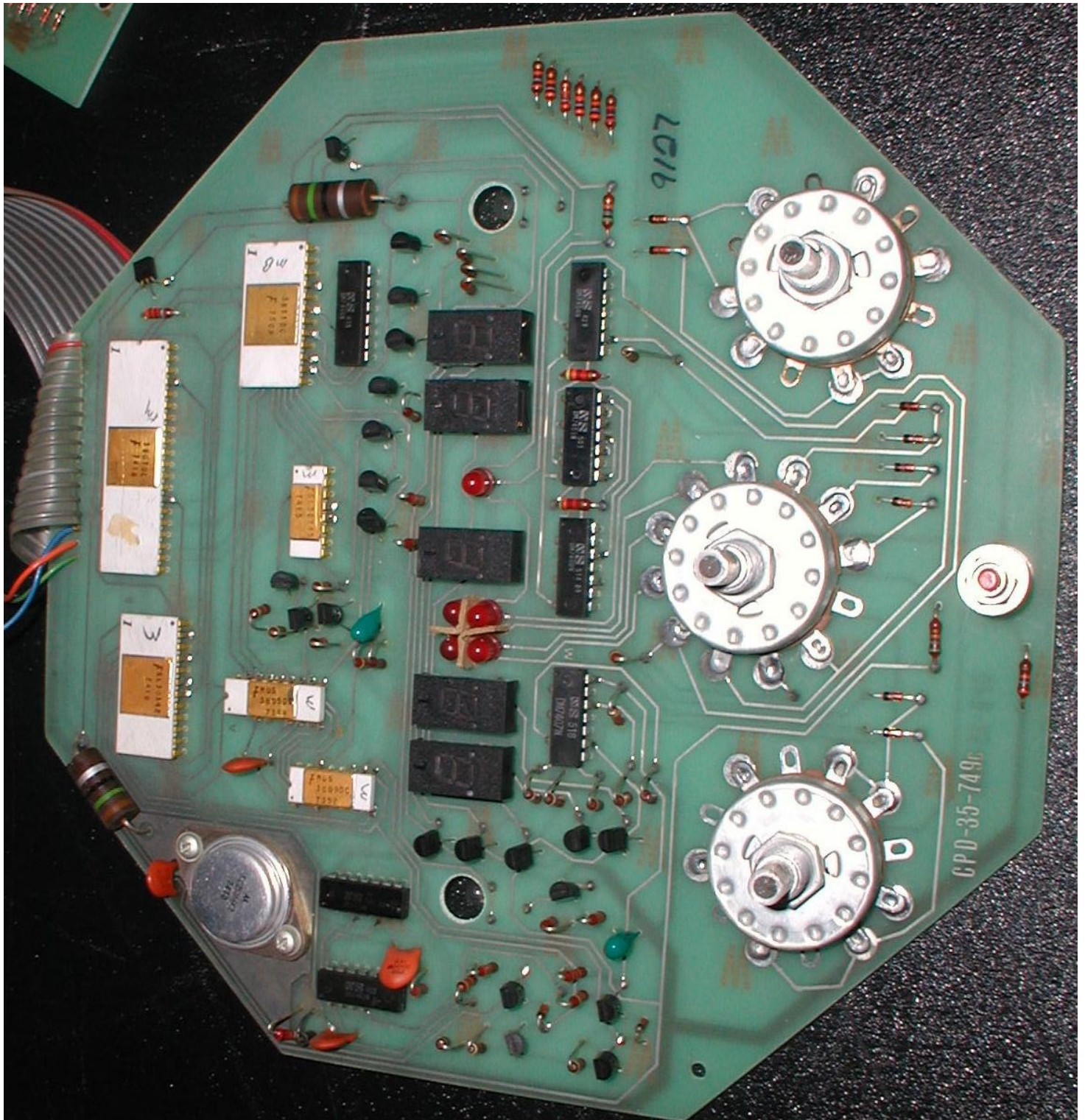


Figure 11: A Cybernetic Mathputer front panel component side

From: <https://www.cpushack.com/2025/02/01/fairchild-pps-25-4-bit-cpu-for-25-digit-precision/>

For the Mathputer in this Collection:

(a) The PCB number is the same: CPD-35-749c

(b) The serial number is: 8057

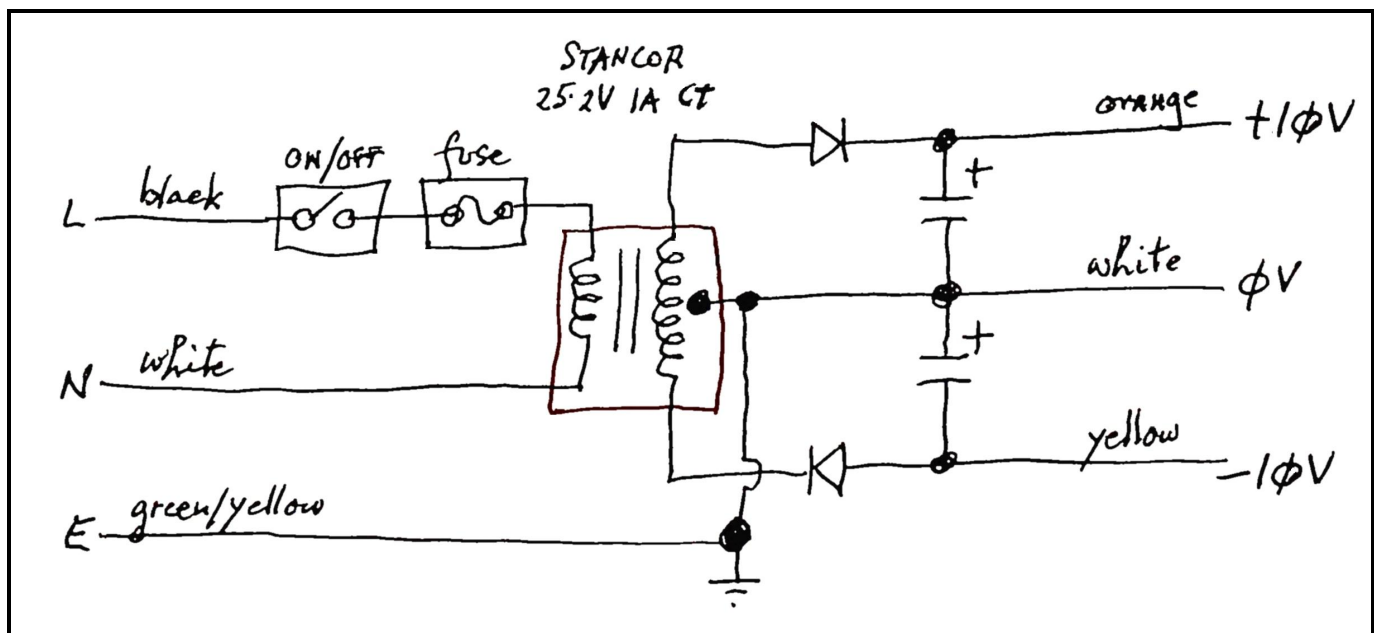


Figure 12: Cybernetic Mathputer power supply schematic