

The HP 9808A/B Unicorn - The Product that almost was...

Chuck McCord

Background: The HP Technical Workstation Landscape



HP-85 Transportable (“luggable”)

- Integrated
 - Display,
 - Printer,
 - Tape drive,
 - Keyboard
- Software in ROM
 - Applications
 - HP Basic



HP-9836 Desktop Workstation (“immobile”)

- Integrated
 - Display,
 - Disk drives,
 - Keyboard
- Software on hard drive
 - Applications
 - HP-UX

Where the Integral PC Fit



18lbs

HP-85 Transportable (“luggable”)

- Integrated
 - Display,
 - Printer,
 - Tape drive,
 - Keyboard
 - HP-IB
- Software in ROM
 - Applications
 - HP Basic
- Intro Price: \$3,250



25lbs

HP Integral PC Transportable

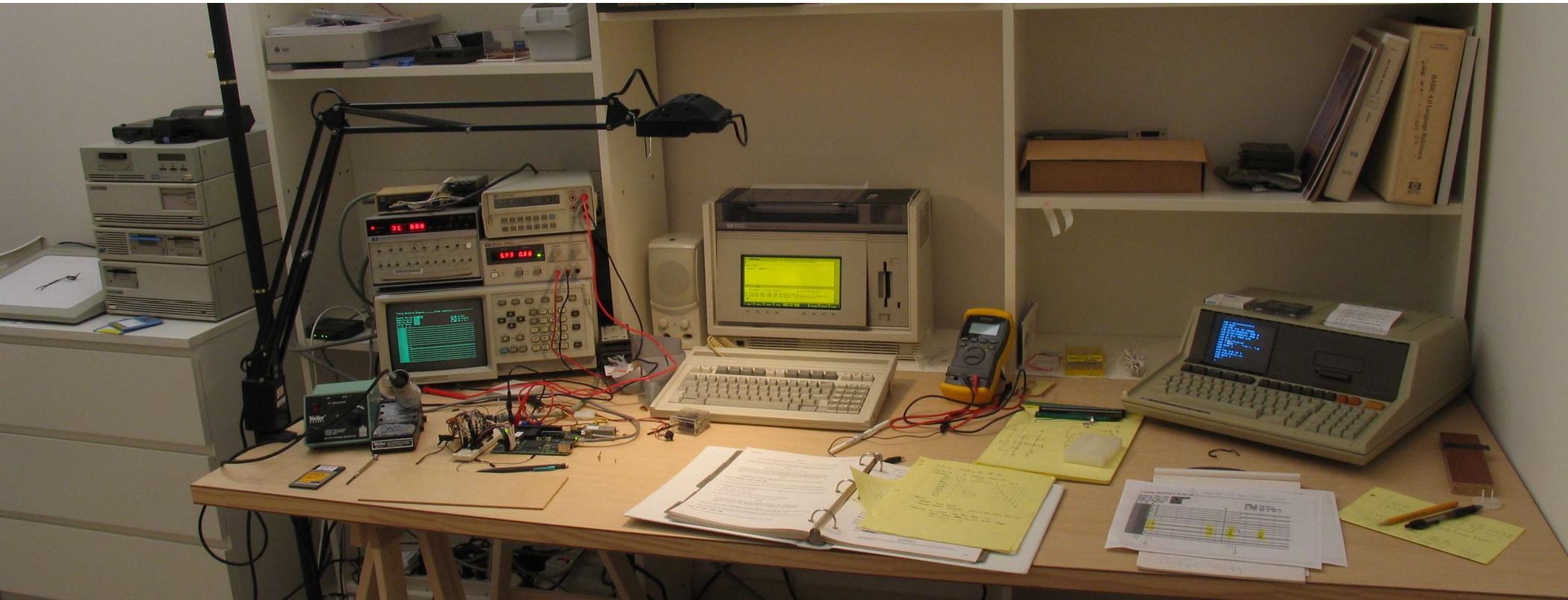
- Integrated
 - Display,
 - Printer,
 - Disk drive,
 - Keyboard
- Software in ROM
 - HP-UX
 - HP Basic
- Intro price \$4995
- Product life: 3/84 – 7/89



? lbs

HP-9836 Desktop Workstation (“immobile”)

- Integrated
 - Display,
 - Disk drives,
 - Keyboard
- Software on hard drive
 - Applications
 - Pascal, HP-UX
- Intro price: \$11,950



Integral PC Use Model



HP Unicorn

Unicorn Product Definition

“UNICORN is a low cost modular personal computer fully compatible with the INTEGRAL PC. It runs the UNIX operating system and UNIX compatible applications.”

“UNICORN(9808) is a System Processing Unit (SPU) which when combined with a monitor and an HPHIL keyboard becomes a modular personal computer for technical professionals. This includes support of our series 80 customer base in the low cost controller marketplace and as a low-end member of the series 200 family. “

I/L	February 1985
Release	September 1985



IPC / Unicorn Software Design Center

- ROM based operating environment
- HP-UX/RO
- Friendly user interface
- Multiple windows, menus & softkeys
- Supports ITF mouse
- Getting started Tutor S/W
- Foreign language localized

Optional Features

- HP Technical BASIC
- HP-IB, HP-IL, RS-232,BCD, GPIO
- HP-UX S/W tools
- Source control
- Editor, Debugger

Applications

- Word processor
- Graphics analysis
- Spread sheet
- Data base
- Presentation graphics
- Project management

Languages

- C
- Assembler
- Pascal
- FTN77



IPC Hardware Features

- 8 Mhz 68000 CPU
- 384KB ROM (Operating System)
- 512KB RAM with Memory Management
- One 710KB double-sided 3-1/2" floppy disk
- 16 bit Graphics Processing Unit custom CMOS IC
- 2 HPHIL ports
- Real time clock with battery backup
- Speaker
- 2 I/O slots
- HP-IB

Unicorn Hardware Deltas

- Memory Bounds checking
- Video output for 640x400 B&W monitor
- 128KB dedicated display memory
- Full size ITF keyboard (46021A)
- 4 I/O slots

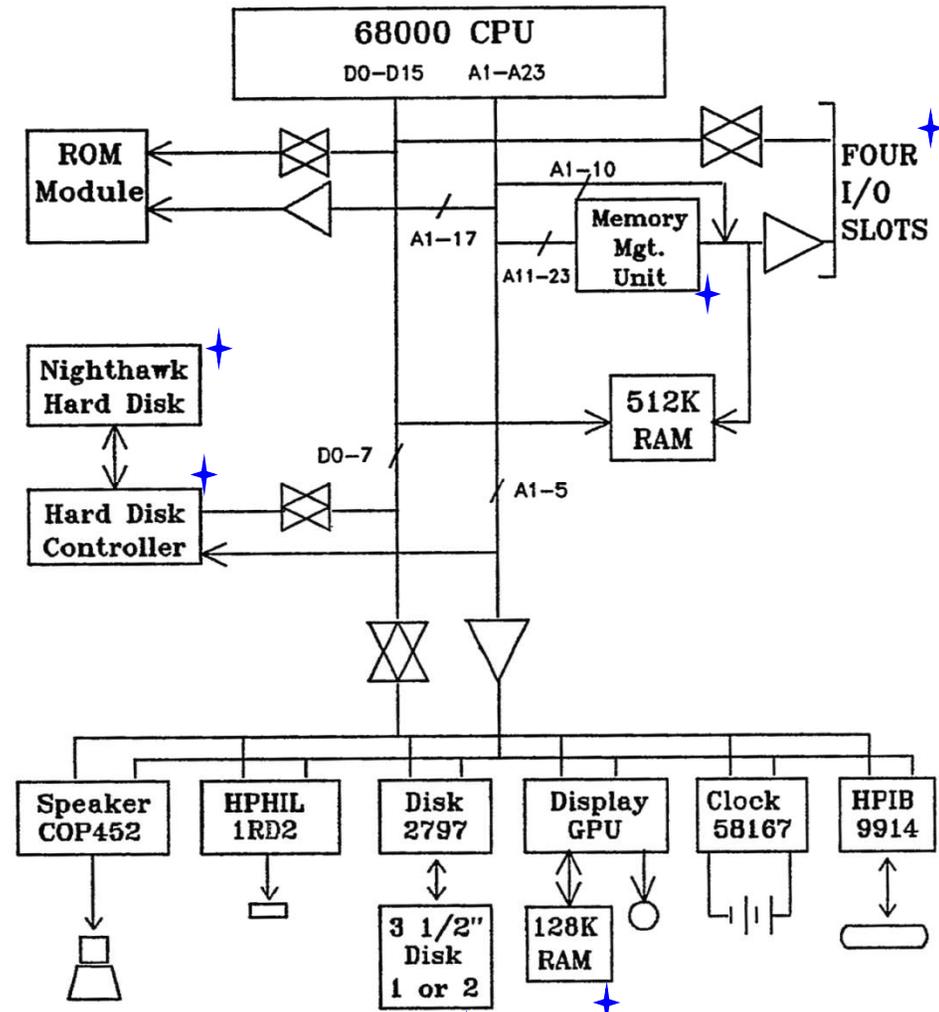
Optional H/W

- HPHIL devices
- INTEGRAL PC I/O:
 - HPIB
 - HP-IL
 - 1200 Baud MODEM
 - GPIO
 - RS-232
 - BCD
 - Current Loop
- BUS Expander
- HP BASIC in ROM
- 256KB/512KB/1MB RAM

Optional H/W

- Additional 512KB of internal RAM
- 35731A/B B&W Monitor w/ Touch Screen
- Second 3-1/2" floppy internal
- 20MB hard disk internal

UNICORN BLOCK DIAGRAM



HP Unicorn

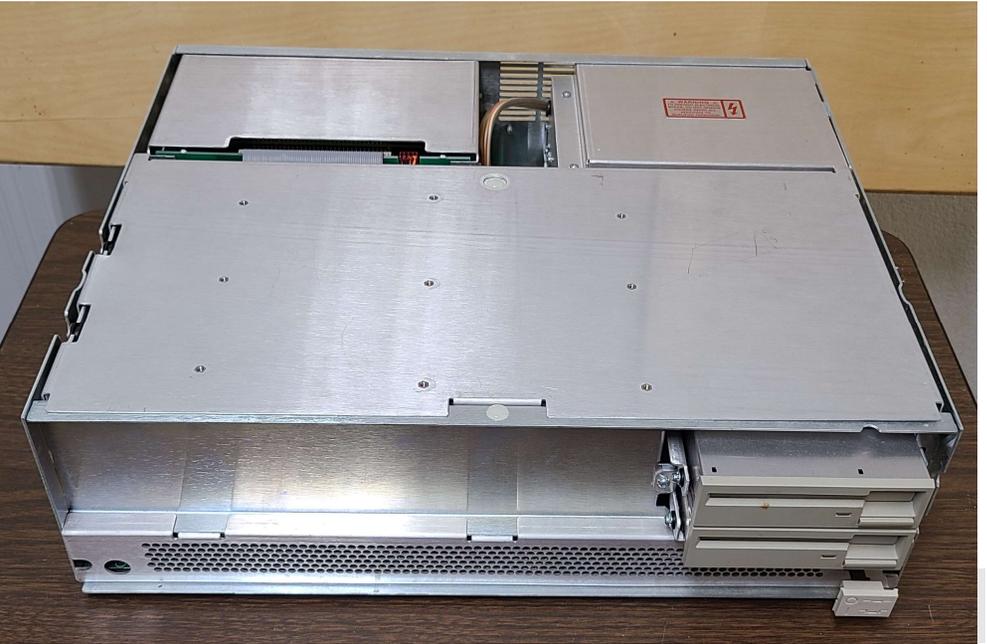
“The product contains a 16 bit (68000) CPU with 512K bytes of RAM and up to 1MB of ROM.

The UNICORN SPU includes the following built-in I/O devices:

- up to 2 floppy disks,
- optional hard disk,
- real-time clock,
- HPiB,
- video output,
- HPHIL port, and
- speaker.

In addition, UNICORN supports four external I/O ports, expandable to 12 ports by adding two 829014 I/O expanders to the system.”

Opening the Unicorn

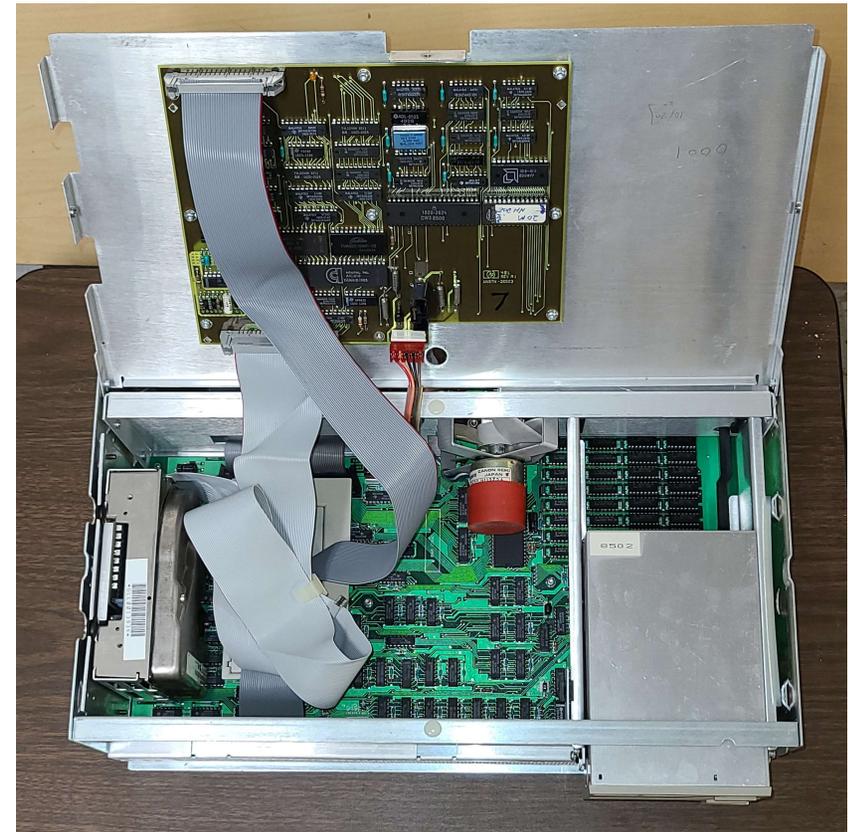


Unicorn Internals

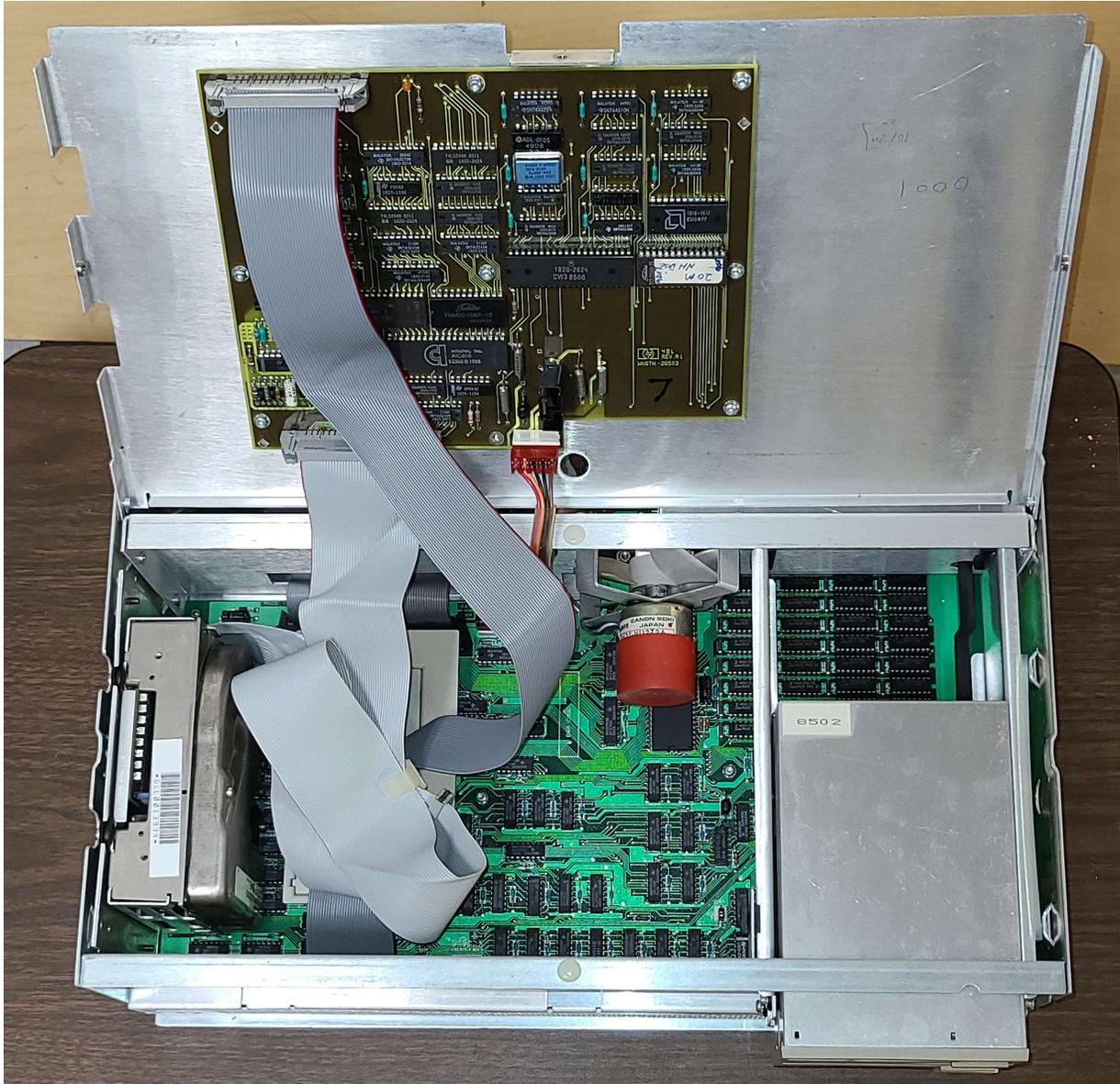
“Electrically, UNICORN is divided into 2 major printed circuit assemblies, the power supply (an off-line switcher that supplies +5, +12, -12, +15, +18 Volts) and Logic PCA.

Additionally, there are 2 minor PCAs: the ROM plug-in assembly, and the I/O connector assembly. The ROM assembly contains the ROM ICs, a chip select decoder, and decoupling capacitors; the other assembly contains no logic at all.

UNICORN is forced air cooled by a DC fan in the center of the unit running off the +15V supply.”

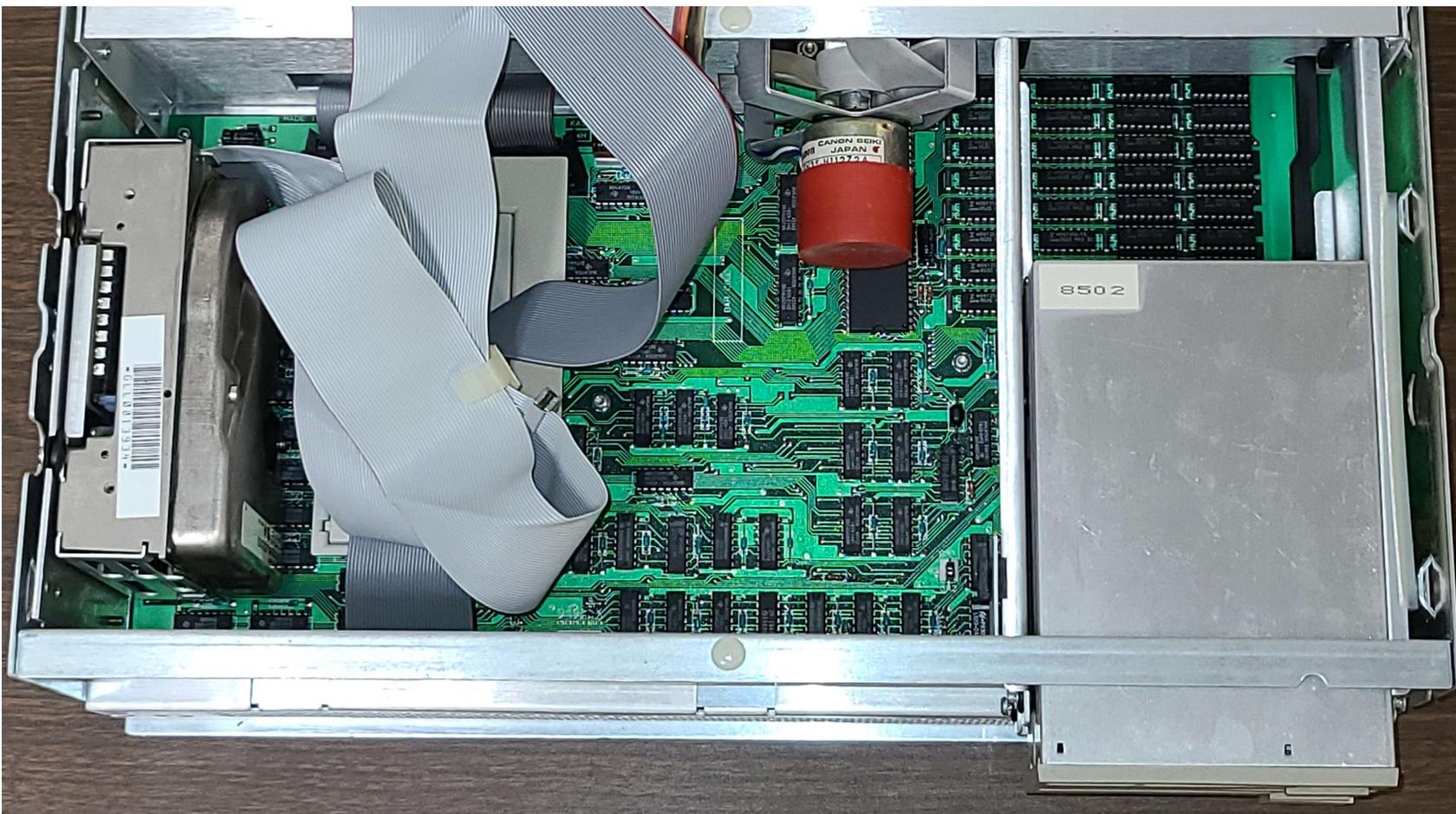


Opening the Unicorn



HP Unicorn

Unicorn Product Specifications



CPU

- 16 bit 8MHz 68000 Processor
- 1 MIPS from ROM
- .8 MIPS from internal RAM
- .7 MIPS from external memory
- Interrupt latency 10 μ sec typical

Unicorn Product Specifications



ROM

- 384KB User Replaceable built-in standard
- 500 ns cycle time
- 1MB max capacity built-in, 5MB max capacity via I/O

RAM

- Memory mapped: 4 Segments
- 512KB built-in
- Sockets for 2nd Bank of 512KB
- 625 ns cycle time
- 7.5MB max capacity



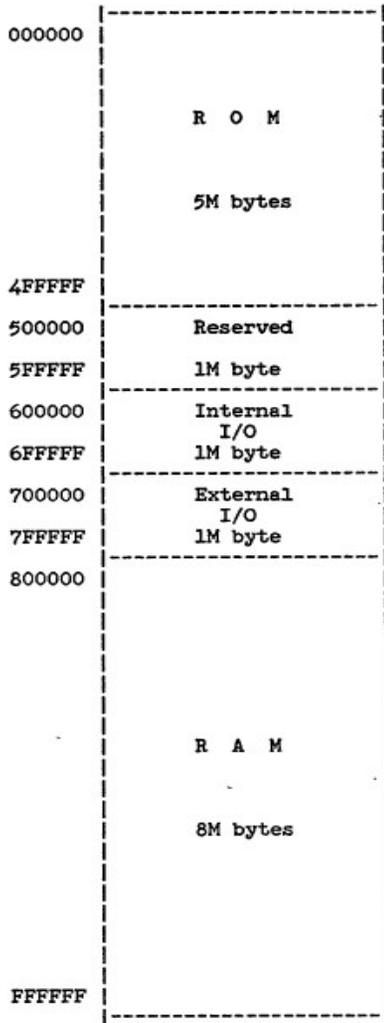
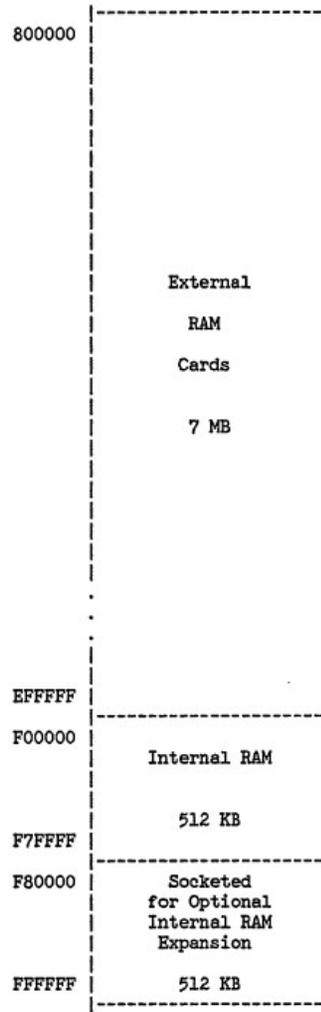


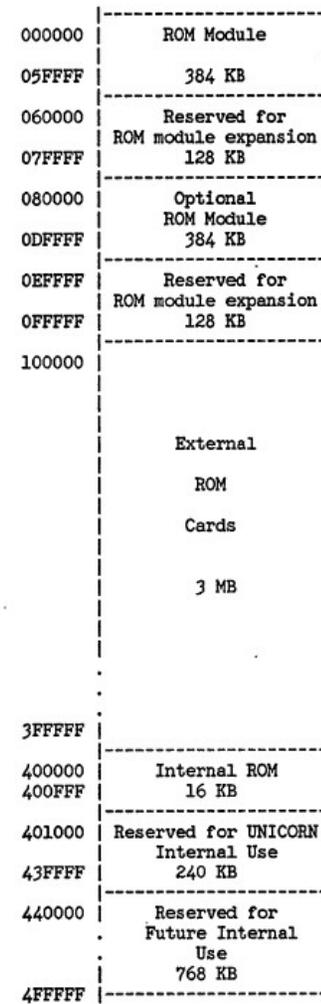
Figure 6.2. Physical Address Map

10/23/2021



Reserved on IPC

Figure 6.3. RAM Physical Address Map Detail

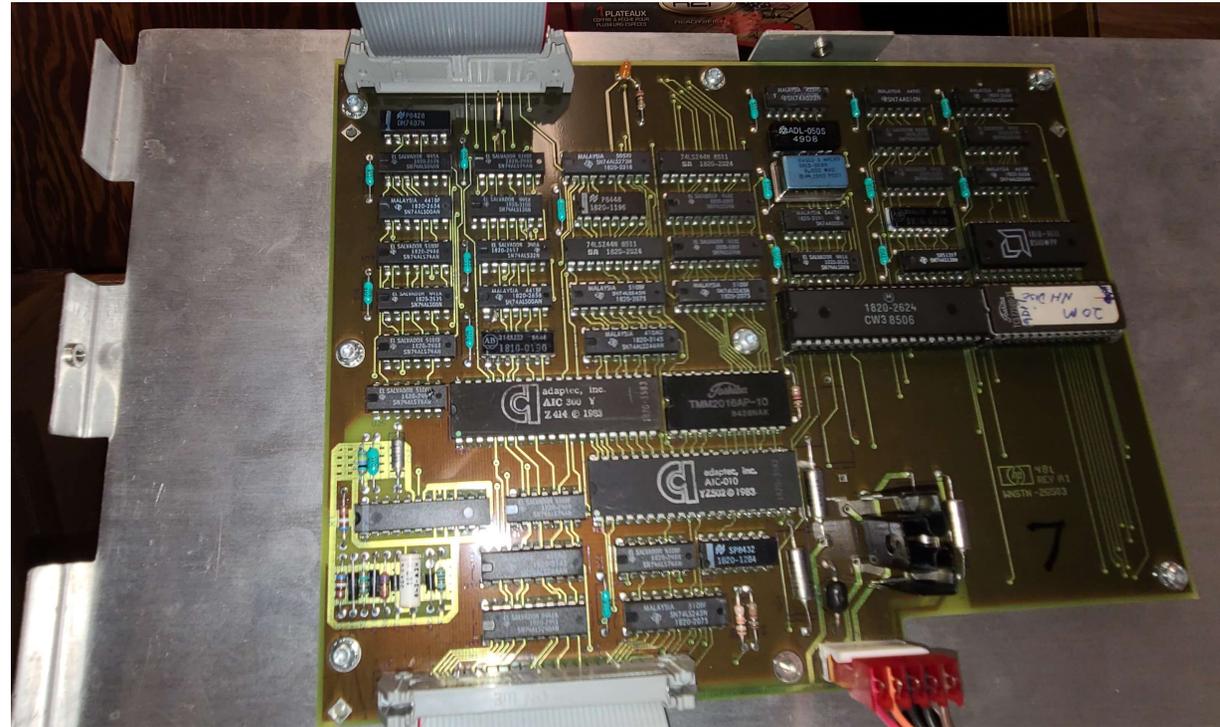


Unicorn Memory Maps

3FFFFFF-4FFFF External on IPC

Figure 6.4. ROM Physical Address Map Detail

Unicorn Product Specifications



HARD DISK

- 20MB Nighthawk drive
- Standard in 9808B, Optional upgrade for 9808A



Floppy Disk

- 3-1/2" Micro-Floppy disk drive
- 62.5 KB/sec burst transfer rate
- Encoding: MFM
- Rotational Speed: 600 rpm
- Available Tracks per Surface: 77
- Spare Tracks per Surface: 2
- Total Tracks per surface: 80
- Surface per disk: 2
- Interleave factor: 1
- Three modes supported:
 - Bytes per Sector: 256B 512B 1024B
 - Sectors per Track: 16 9 5
 - Capacity: 630KB 709KB 788KB
- Default format mode: 709KB Capacity
- Optional 2nd 3-1/2" Micro-Floppy disk drive

Unicorn Product Specifications

PHYSICAL

- Dimensions: 425mm W x 400mm D x 132.56mm H
- Weight: 25 lbs.
- Keyboard Footprint: 455mm W x 220mm D



Keyboard

46021A keyboard from PCs

Detachable low profile (30 mm)

107 keys, ITF layout

Keyboard uses HPHIL electronic interface

One HPHIL compatible input jack on rear of product support

HPHIL input devices



I/O

- 625 ns minimum cycle time
- 4 Plug-in Expansion slots
- Allows three 3 Watt cards and one 6 Watt card
- Supports up to two 8290I,A Bus Expanders in bottom 2 slots only

HP-IB

- Maximum Transfer Rate: 135 KB/sec
- Meets IEEE 488

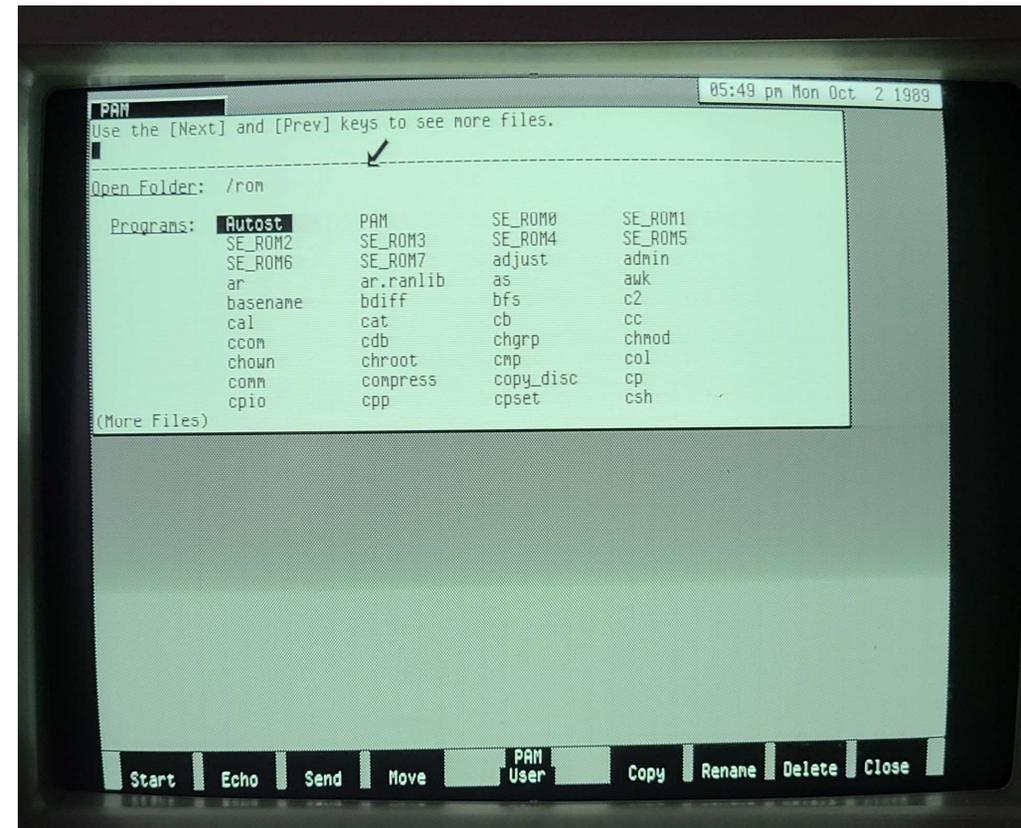
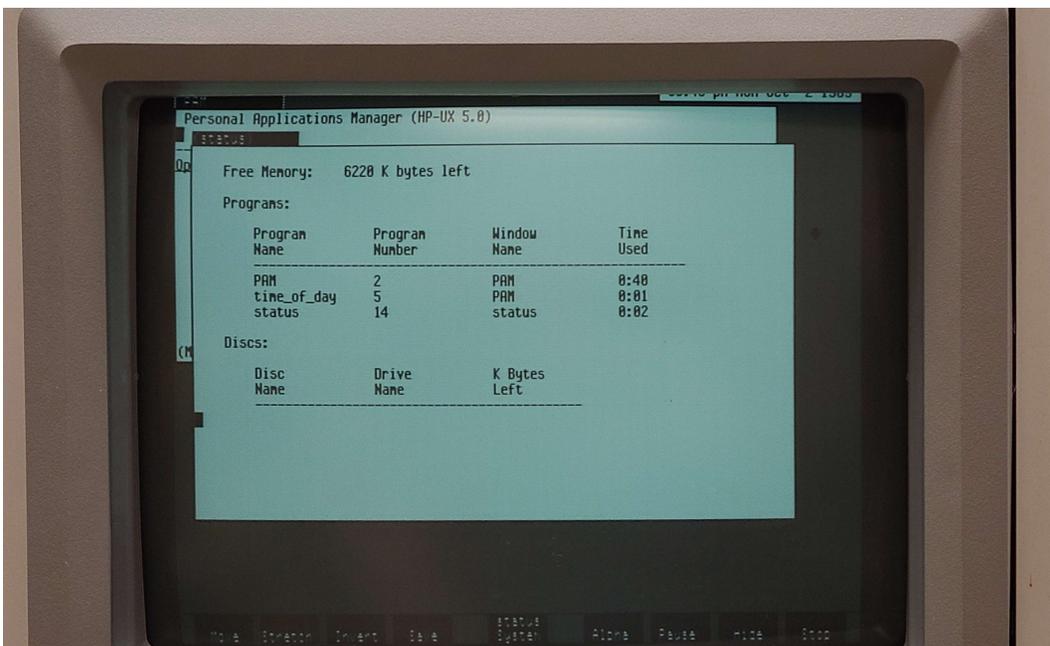


HP Unicorn

Unicorn System Pictures



Screen Shots



References

- Unicorn Hardware Design Document 3/11/85
- www.old-computers.com
- http://www.hpmuseum.net/display_item.php?hw=122
- Scanned HP Documentation:

 Quick Reference Guide for HP Calculator

 Getting Started with Datacomm (s).pdf

 Getting Started with MicroTrak.pdf

 HP Mouse Owners Guide (s).pdf

 HPUX Documentation Roadmap.pdf

 Intro to IPC Technical BASIC Graphics.pdf

 IPC HPIL Interface.pdf

 IPC RAM Enhancements Install.pdf

 IPC Serial Interface Owners Manual.pdf

 IPC Using Datacomm.pdf

 Quick Reference Guide to Memomaker (s).pdf

 Setting You Free with Memomaker HPUX.pdf

 TKSolver Instruction Manual.pdf

 Using MemoMaker HPUX.pdf

 Alpha Graphics Window Reference Manual.pdf

 Getting Started with Datacomm.pdf

 Getting Started with the HP82987A SW Enginee...

 HP Mouse Owners Guide.pdf

 HPUX Portability Guide.pdf

 IPC Comprehensive Guide.pdf

 IPC Memory Modue Install (s).pdf

 IPC Serial Interface Opt 1 Install (s).pdf

 IPC Setup Guide.pdf

 MicroTrak HPUX.pdf

 Quick Reference Guide to Memomaker.pdf

 SW Engineering ROM Modue - BAD.pdf

 TKSolver Reference Manual.pdf

 Using Your IPC.pdf

 bigbanner.pdf

 Getting Started With HPUX C.pdf

 Getting Started with TKSolver.pdf

 HPGL Reference Manual.pdf

 HPUX Technical BASIC Getting Started Guide.pdf

 IPC Drivers Writers Reference Manual.pdf

 IPC Memory Modue Install.pdf

 IPC Serial Interface Opt 1 Install.pdf

 IPC SW Engr ROM Update.pdf

 Multiplan HPUX.pdf

 Setting You Free with HP Calculator.pdf

 SW Upgrade Notes.pdf

 Using Datacomm box cover.pdf

 Window Manager Reference Manual.pdf

 Connecting Peripherals to Your IPC.pdf

 Getting Started with MicroTrak (s).pdf

 HP MC68000 Ref Man covers.pdf

 HPUX Assembler Ref and Supporting Docume...

 HPUX Technical BASIC Ref Manual Vol 1.pdf

 IPC GPIO Interface Owners Manual.pdf

 IPC RAM Enhancements Install (s).pdf

 IPC Serial Interface Owners Manual ed 1.pdf

 IPC Users Guide.pdf

 Progammers Guide.pdf

 Setting You Free with Memomaker HPUX (s).pdf

 Term0 Reference Manual.pdf

 Using HP Calculator.pdf

Reflections on the Integral PC and Unicorn

Alan Barrow reports :

Interesting comment on the expense. The IPC was priced comparable to the mac, had double the memory and a printer to boot. It wrapped a user friendly windowing system around Unix in a portable fashion that did not require program recompile, etc. Faster CPU, expandable memory.... the list of advantages goes on! The "fat mac" which matched the memory was more money. HP simply did not market the IPC well. There was internal competition with the "bobcat" series workstations (9000/3xx).

In fact, the IPC has dual serial ports in the hardware, but the driver was rewritten for only one to work, as the IPC could not have a "mux" to avoid competition with the 9000's. Also, the IPC motherboard was only half populated with memory, as are many of the add on memory cards due to internal competition issues.

[The killer IPC that was killed before final release was the mythical "Unicorn", which had a built in hard drive and more memory. It was to have sold for \\$4995, if I remember correctly.](#) At one point I knew two people that had pre-production "unicorns". Remember this was not too much after the Apple Lisa sold for \$10k, the initial mac was more, and the AT was brand new and expensive as well.

The addition of the "stone tools" rom which effectively added a mainstream Unix command set to the existing kernel and basic commands made the box a powerful package. The base OS was Unix kernel, basic Unix commands, and a windowing system called "PAM". It had a file manager, text editor, etc., and would happily display character mode Unix programs, as each window emulated a terminal. (Much like X windows developed much later) No networking was allowed, alas. I did use this system via slip and KA9Q code however.

The IPC would work with any of the HP CS-80 drives and tapes, and the 9133H was a common accessory. The two I/O slots could be expanded to six with a chassis expander, which was required for the 5.5 Mb. Mice, graphics tablets, and larger keyboards could be connected via the HP-HIL port (Human Interface Link).

A full Unix command set was available via floppy, and could be loaded on the hard drive in typical HP-UX locations. Fix your PATH variable, and you had a nice Unix system for it's day. Remember that the kernel was in rom, so boot was quick, and so was much of the command access. It could create ram-disk as needed as well, so you were not as dependent on the floppy.

The main intent and success of the IPC was as an instrument controller. It made a nice package, and was a good replacement for the HP-85.

<https://www.old-computers.com/museum/doc.asp?c=145>