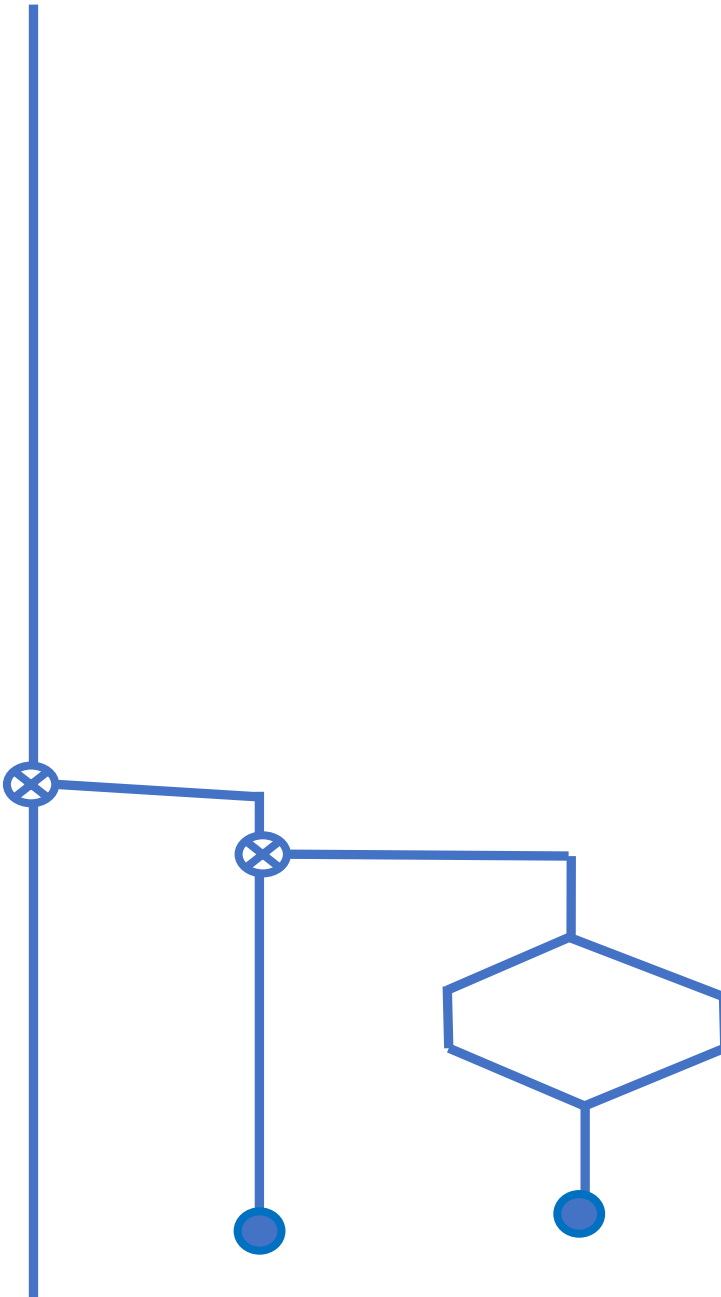


Through The Forth Jungle With Gun and Camera

Silicon Valley Forth
Interest Group
Oct. 23, 2021
Bill Ragsdale



Your Expedition Itinerary

Summary: We travel the bumpy road from a one-board, 6502 processor through a series of automation and control products to Win32Forth. We end with an overview of Bill Ragsdale's *Win32Forth Manual*.

The Quest

Dorado Systems made a wired logic, card access controller. (And remote monitoring.)

A 'next generation' was afoot.

We didn't need a computer.

We needed programmed logic and memory.

Weapons

Jolt, tabletop, 1975

Jolt in the “Blue Box”, 1977

Dorado 6502 Board in the “Brick”, 1980

F83 by Laxon and Perry in a PC, 1983

ANSI Forth, 1985 onward

Win32Forth, 2000 on

Introducing **JOLT**

...the world's
lowest cost
computer system

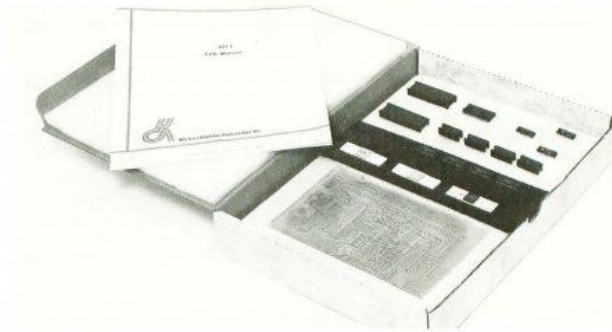
JOLT™ is the new, fully-tested microcomputer with the exclusive on-board **DEMON™** debug monitor. You can build it, plug it in and talk to it in three hours or less . . . for a price of just \$249!

The basic **JOLT™** card includes an 8-bit MOS Technology Model 6502 CPU, which requires no clock, can directly address 65k of memory, has two index registers, 58 instructions with 11 addressing modes, two interrupts and includes both single step and address halt capability. And that's only a part of it.

JOLT's™ CPU card is available IMMEDIATELY* in either kit form or assembled (\$249 for the kit in single quantity and \$348 assembled). Either way, the **JOLT™** CPU is completely tested prior to delivery. It comes complete with a terminal interface (TTY or EIA) and a unique software Debugger/MONitor called **DEMON™**, for which full documentation is provided. It is very easy to program, and any **JOLT™** delivery includes an easy-to-follow assembly instruction manual, showing you exactly how to put everything together . . . correctly. Complete assembly should take you no more than three hours if you choose the CPU in kit form. Besides the **JOLT™** CPU — the 6502 from MOS Technology — the basic **JOLT™** card has a fully static memory accommodating 512 bytes of the user RAM. The **JOLT™** CPU memory also has 64 bytes of interrupt vector RAM. ROM Program memory on the basic card consists of 1k bytes of monitor/debugger with an automatic Power-On bootstrap program — so you can start talking to **JOLT™** and it to you as soon as you plug it in to your terminal. On-board Input/Output devices on the **JOLT™** CPU card include TTY 20 milliamp current loop and an EIA interface, both full duplex. The card has high speed reader interface lines and 16 fully programmable user I/O lines with full TTL drive.

Nobody, but nobody, except MAI can offer you an on-board debugger/monitor like **DEMON™. It's fully documented, too.**

The exclusive **DEMON™** Debug Monitor really makes **JOLT™** one of the most outstanding computer systems offered at any time, at any price. Even without **DEMON™** and its superior software features, **JOLT™** is the lowest cost computer system in existence. And **DEMON™** is a bonus you'll have to use to believe. First, it self-adapts



All kits are delivered with a complete instruction manual and packaged for easy visual identification of parts to aid you in assembly.

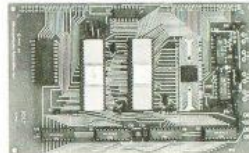
to any terminal speed from 10-30 CPS. With it, you can display and alter your CPU register and memory locations, plus you can read, write and punch Hex formatted data . . . with Write/Punch BNPF format data for PROM programmers. It has unlimited breakpoint capability along with separate non-maskable interrupt entry and identification. External device interrupts can be directed to any location you choose, or they can be defaulted to **DEMON™** recognition. **DEMON™** also gives you (1) a completely protected ROM resident debug/monitor; (2) the capability to begin execution at any location in memory; (3) the capability to bypass **DEMON™** entirely to permit full control by you over your system; (4) a high-speed 8-bit parallel input option; and (5) it includes user callable **DEMON™** I/O subroutines. MOST IMPORTANT, **DEMON™** IS INCLUDED AS STANDARD WITH ANY **JOLT™** CPU KIT OR ASSEMBLED BOARD!

Obviously, the **JOLT™** basic card is a computer in and of itself. But you can add significantly to its capacity and versatility by adding 4k RAM **JOLT™** memories — in one card or a whole bunch. A RAM card kit is only \$265 (\$320 assembled). Now. 4096 Bit RAM 4K BYTE

The **JOLT™** memory card is a fully static 4,096-bit Random Access Memory (RAM) with 1 microsecond access time and on-board decoding. It is also available now.*

And the quantity of one price is what you might expect to pay in quantities of 100 . . . very inexpensive!

There's also a **JOLT™** I/O card for you, our Peripheral Interface Adapter. You can't beat the price — single kit 96 bucks — or the function.



Pictured above is the assembled **JOLT™** CPU card with **DEMON™**. Just plug it in and you're ready to go.

The **JOLT™** PIA (Peripheral Interface Adapter) I/O card includes two PIA LSI chips, 32 input/output lines, two interrupt lines, on-board decoding and standard TTL drive. It is also fully programmable and available IMMEDIATELY* in either kit or assembled form . . . at a very attractive single unit price (\$140 assembled).

Considering the function and capacity of the **JOLT™** Power Supply Card, you probably think the quantity of one price — \$145 — is a misprint. It isn't.

The **JOLT™** family also includes a power supply card, which operates at any of

Weapon Number One

A one board
computer for
\$275. In stock
now.

Jolt Resources

6052 CPU at 1 MHz.

Ram, 512 bytes Pages Zero & One.

DebugMonitor/TIM 1 K ROM, 2 Timers, 16 I/O lines.

PIA 6820 adds 16 I/O lines.

RS232 TTY interface, selected Baud rate.

Two interrupts, maskable and non-maskable.

ROM expansion 16 Kbyte.

RAM expansion. 4 K and 16 K byte.

Side Excursion

Saw the Byte ad for Jolt on Wednesday

Ordered on Thursday

MAI received DeMon on Friday.

Picked up on Saturday. Serial number 1.

Ran on Sunday.

Assembler: one pass, sorted symbol table, runs from 2k ROM. Buggy, no documentation.

Bob Selzer and I repaired and donated the result.

Wrote their line editor.

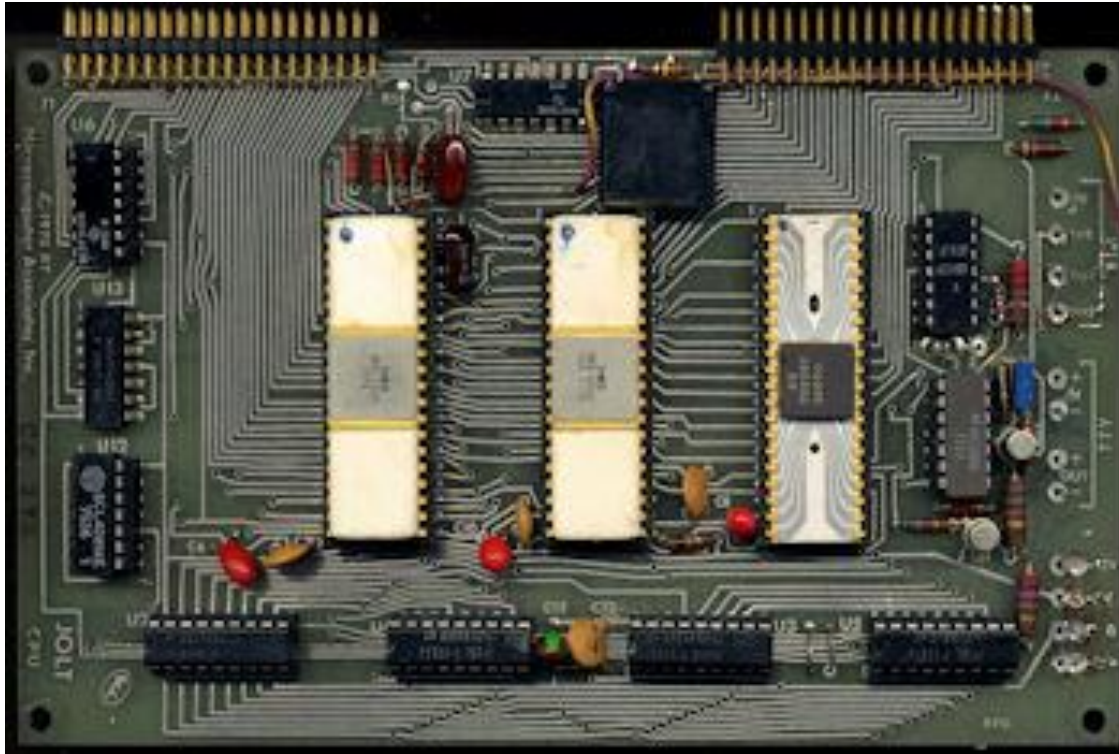
Began my Forth journey.

Target One – Demo



An ID badge, card reader demonstration for Honeywell.

Target One - Demo



Incidentally

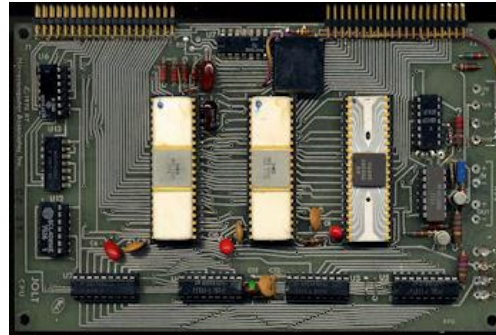
The Jolt was designed by Ray Hold and Manny Lemas of Microprocessor Associates, Inc.

They designed the DeMon/TIM for MOS Tech.

They inspired (designed?) the KIM-1 for MOS Tech.

They designed the Sym-1 for Synertec.

Target One - Demo



Our Kill Number One

Wowed Honeywell visitors reading magstripe cards by name and number.

After they had been let down by two other possible suppliers.

All edits and assembling done paper tape to paper tape. Scissors and glue.

Weapon Number Two fig-FORTH

We needed a development system.

Created my in-house Forth from
microForth 6800.

It grew to become fig-FORTH.

Along came the Forth Interest Group and
much more side effort.

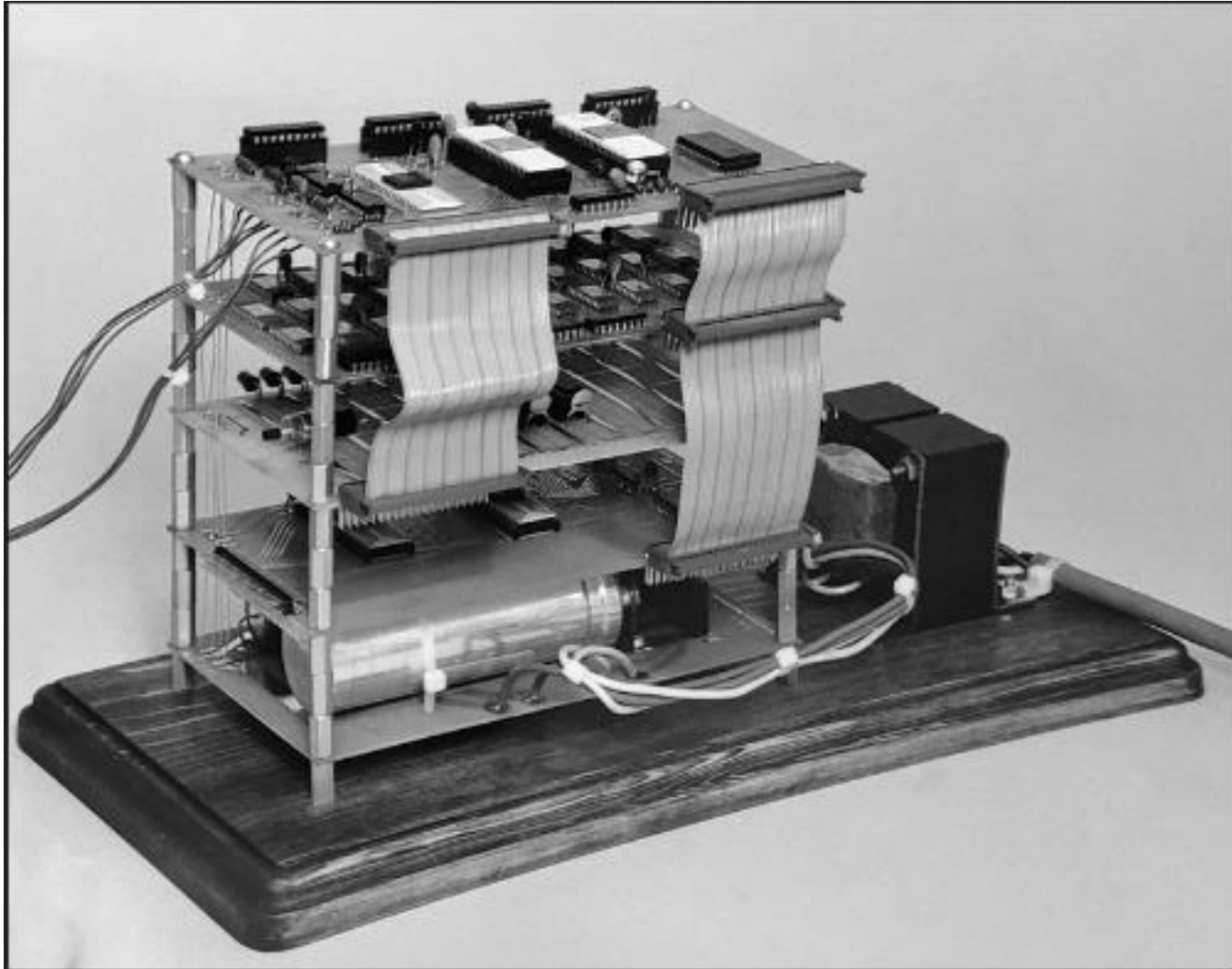
Speaking of FIG



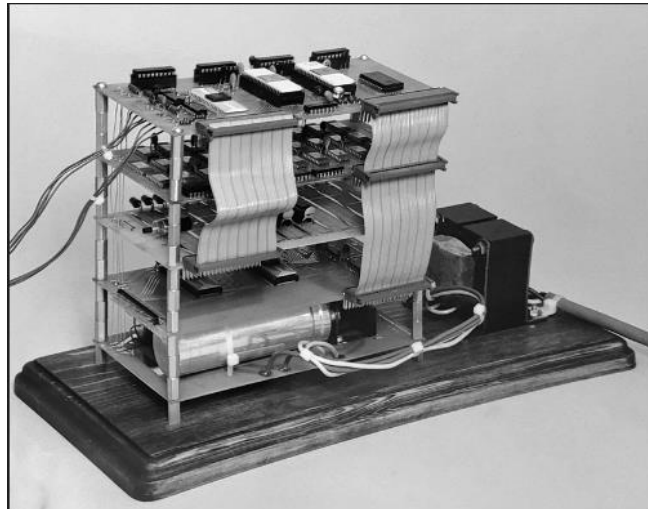
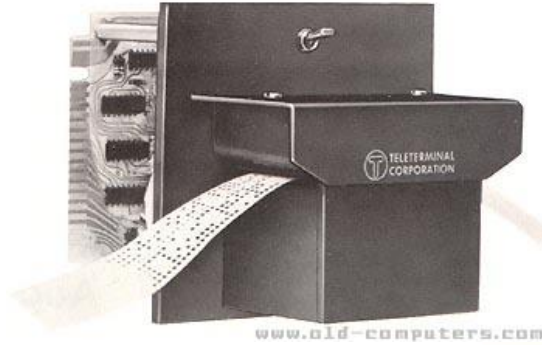
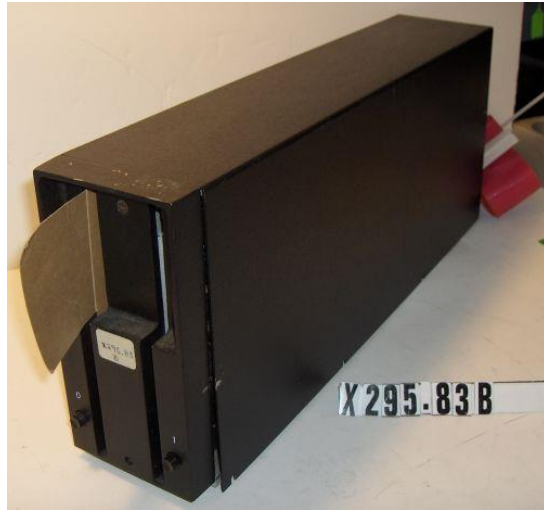
Weapon Number Three, Blue Box

The Jolt system was integrated with a Persci dual floppy drive, high speed paper tape reader and an ADM-3A Terminal.

Inside the Blue Box



Inside the Blue Box



The Second Kill

A four door control panel.

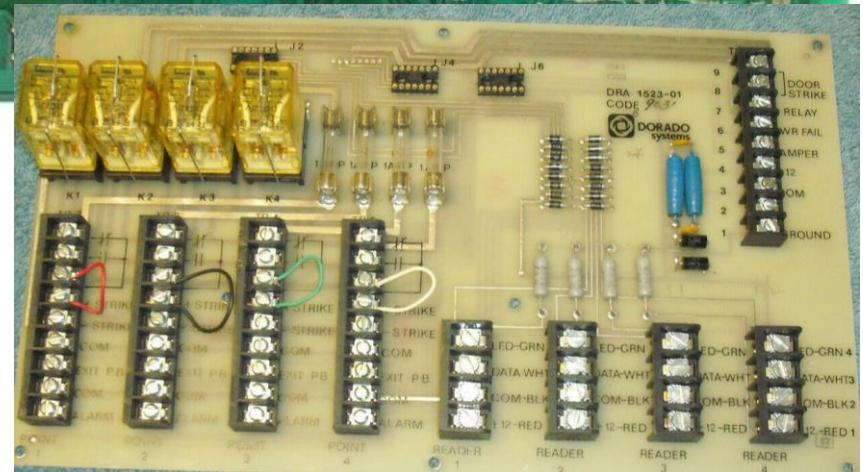
DC battery backed-up.

Reports to Honeywell Alpha 3000.

Programed in sub-routine threaded Forth
tethered to the “Brick” development
system.

Over ~2,000 sold, world-wide. BZR, San
Onofre, Denver Stapleton Airport.

Four Door Controller



Weapon Number Four, F-83

Forth-83 by Henry Laxon and Mike Perry.

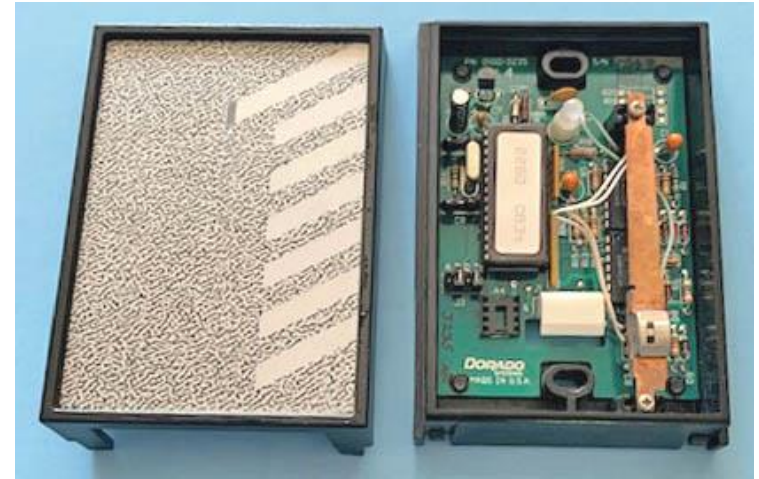
Dorado Systems retired the “Brick” and moved to PC systems.

Archives now on files, not blocks.

8” floppy to 5-1/4” floppy to 3-1/2” floppy.

And hard drives, at last.

Kill Number Three



Magstripe Card Reader

80C51 Processor

One time programmable

With security bit to block ROM memory read.

Sold industry wide. 4,000 at Denver International.

Can be found on eBay now!

Kill Number Four, Cybernaut

Energy controller for Retail stores.

~300 installed in Lucky Food Stores.

Installed cost \$5,000. Saved \$1,000 per month.

On/off/auto/cycle for 24 channels.

Dial up access by an Apple][computer, off hours.

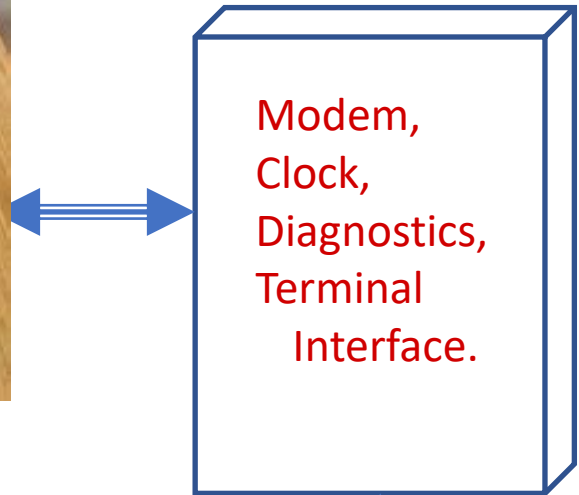
CPU was Synertec Sym-1.

Added store interface, modem, real-time clock, battery backup, local and remote terminal access. And Forth!

Sym-1, Cybernaut CPU



Cybernaut Layout



Dial-up telco.



Project Management

No specification.

Customer, “I don’t know what I want, but I’ll know when I see it”.

Met the customer representative, a field engineer, every three days.

: Project
begin
demo evaluate suggestions
program review ?happy
until ;

After The Expedition, Leisure Time

Recreational Shooting

Win32 Forth by Andrew McKewan and
Tom Zimmer 1995

Updated in early 2000 by European team.

ANS Compliant.

A 'frozen' system as no additions have
been made.

Primarily, user interface updates and the
use of later Windows internal functions.

Armament

New to me, since F-83:

Use of files (I was in the Block generation).

Catch and Throw

N-way Multi-threaded dictionaries

[IF] [ELSE] [THEN]

Standard messages

Floating point & stack, trig, transcendentals.

Defer, postpone.

Object oriented programming.

Execution chains.

Heap, memory management.

Tools: see, view and debug.

The expanded definition header.

As I encountered W32F elements I took notes which expanded into the current 80 page Word document.

Let's Look At W32F Guide

Credits

- Andrew McKewan and Tom Zimmer for Win32Forth.
- The European team who updated it in the early 2000s.
- All the effort of Forth Fanciers around the world.

References

- https://github.com/BillRagsdale/Forth_Projects
- <https://github.com/BillRagsdale/WIN32Forth-Guide>