

The Hazeltine 1500

Bruce Nikkel, Bern University of Applied Sciences

The Hazeltine 1500 Video Display Terminal is an early smart CRT serial terminal from Hazeltine Corporation (founded in 1924 by Alan Hazeltine 1886-1964). It was introduced in 1977 and intended to compete with other computer terminals used to connect to S-100 bus computers, UNIX systems, and other mini-computers with a serial interface.

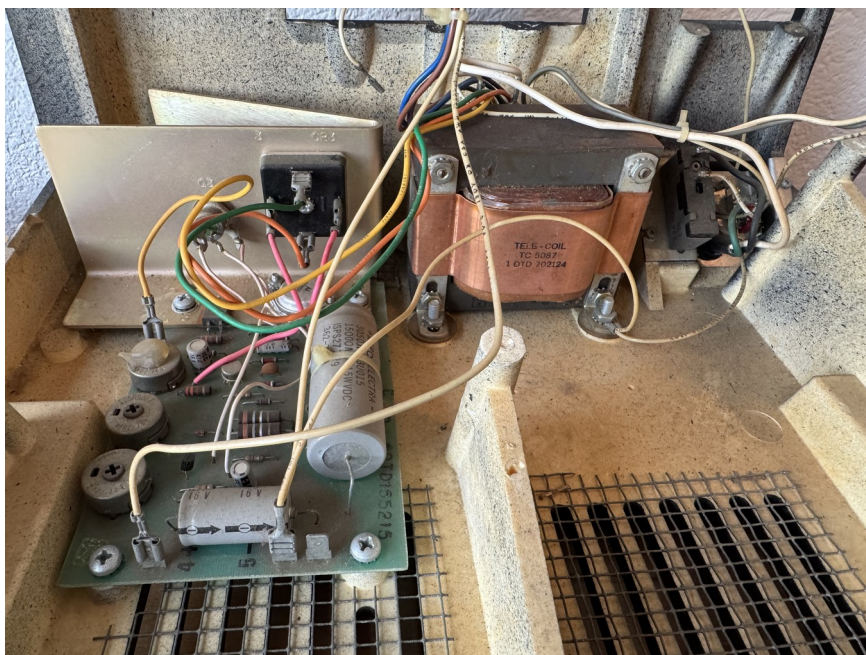


Most serial terminals of the 1970s were “dumb” and provided a basic interface to computer systems. The Hazeltine 1500 was “smart” and equipped with a CPU, ROM, RAM, and even the possibility for expansion. The terminal was designed to combine the CRT screen, keyboard, external interfaces, internal circuit boards, and power supply into a single enclosure.

The Hazeltine 1500 is somewhat famous for being featured on the cover of Kraftwerk's Computerwelt music album, released in 1981.



The Hazeltine weighs 16kg and has dimensions of 40cm wide, 34cm high, and 52cm deep. The power consumption is 120 watts, using a linear power supply located underneath the logic board. The terminal is fanless and silent.



The CRT is a 12 inch monochrome white P4 phosphor screen. The display is 80 characters wide by 24 lines, with no high resolution graphic support. Internally a separate circuit board converts the vertical, horizontal, and video signals from the logic board to the high voltages needed for managing the deflection and intensity on the CRT screen.



The CPU is an Intel 8080A running at 2 Mhz. The Intel 8224 and 8228 support chips manage the clock, reset, bus access, and interrupts. A 2k ROM chip contains the executable code used to initialize (boot) the terminal and manage the screen, keyboard, and serial I/O. The 8080 executable assembly language routines are presented as flow charts in the maintenance manual. The code in the ROM is located at address zero of the memory map and executed on power-up or reset. The 2k of static RAM starts at address 0x3000H and contains the current contents of the display memory and a scratchpad area with various runtime variables. The terminal also allows for remote commands to be sent from the host which control the cursor, clear the screen, and other ASCII terminal display functions.

The video display circuitry operates independently of the CPU using DMA (Direct Memory Access) to copy individual character lines, convert them into a stream of pixels, and send them to the CRT as vertical, horizontal, and video signals. A second character generator ROM chip contains the pixel bitmaps for each ASCII character.



A removable lid exposes a row of dip switches for configuration of the terminal. This includes serial settings (Baud rates of 110-19200, parity, duplex), and selecting support for EIA (RS-232) or Current Loop for older Teletype serial connections. Other settings specify linefeed, upper/lower case support, and reverse video. An adjustable contrast knob and status LED are also located here.

The full sized keyboard has 74 keys soldered directly to the logic board. This includes a separate numeric keypad and a row of four control keys. After being held for 0.8 seconds, the keys auto-repeat at 15 characters per second. Internally, the CPU is periodically checking for pressed keys and executing routines to manage the key presses.

The back of the terminal has two DB25 interfaces for the serial I/O, the power switch and cable, and a reset switch (which only interrupts the power). The sturdy enclosure is designed to be well ventilated, with airflow slits on the top, bottom, and rear.



The Hazeltine 1500 can be viewed at the ENTER Technikwelt in Solothurn.

Hazeltine Manuals and ROMs can be found here: <https://bitsavers.org/pdf/hazeltine/H1500/>

Photos are from a defective Hazeltine 1500 I purchased on eBay and restored to working condition.

The original English text can be found here: <https://digitalforensics.ch/enter/hazeltine1500.pdf>