

Episode 5: RetroChallenge Summary

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Good morning, everyone!

No, I'm not slacking or giving up. At this point I have a bit over 16 hours to play with my toys and (hopefully) accomplish something. The purpose of this summary is simply to document what I've managed to do over the last 31 days.

## Hardware:

IBM Model 024 Keypunch - This machine has been rather neglected. The parts I had ordered for an attempt at functional restoration never arrived, and the machine never made it out of storage. Hopefully, I can take some video or at least photograph the machine to document its condition before the day is out.

Wright Punch Model 2600 - Working well as demonstrated on video. Fine for data entry of numeric information. Difficult to use for alphabetic data. This is a very simple machine and was well-engineered for the intended purpose.

Wright Punch Model 2620 - Has a few issues with corrosion and lubrication. Working overall but still has some difficulty advancing the carriage reliably. After disassembling the machine, cleaning, and lubricating the punches it functions better, but still occasionally "hangs up" mid-card. I suspect the rack and ratchet assembly is either bent slightly or otherwise mis-aligned.

Documation M200 Card Reader - Really "wants" to work. Plastic and rubber components are seriously degraded and interfere with card "pick" and scan function. Rubber rollers are sticky and disintegrating. Interface logic is set up for a system other than the DEC CR-11 that I initially tried connecting it to. Using output to feed 13 GPIO pins on a Raspberry Pi gives me data, but timing issues (caused by the degraded rollers) can result in duplicate characters being sent and white space (blank characters) are an issue.

Allen Organ Card Reader - This is probably the most reliable device I have for reading cards. Unfortunately, it reads only one card at a time and can only read 10 of the 12 bits normally associated with Hollerith Code. The photoelectric pickups work well for sensing punches and the manual nature of this dead-simple machine makes it a good companion to the Wright card punches.

Fanuc / General Numeric Paper Tape Reader / Printer / Punch - After some cleaning, lubrication, and general maintenance, this rugged industrial version of the high-speed paper tape punch and reader is working well. The buffer and RS-232 interface are well-behaved and respond to control sequences sent by the terminal or host computer.

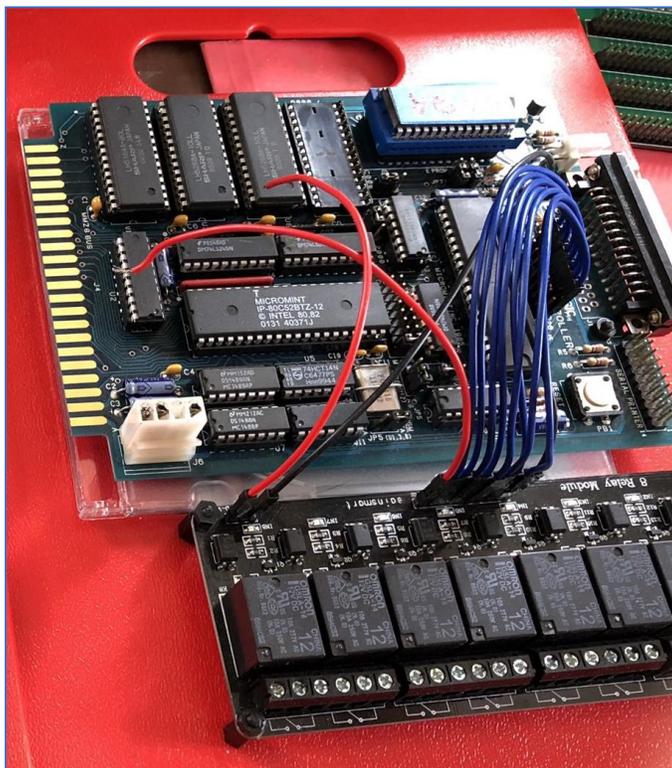
GE / Decitek Paper Tape Reader - Another well-built machine borrowed from heavy industry. No significant problems. Reads tape flawlessly and has a well-behaved RS-232 interface.

LSI-11 Minicomputer - Was briefly used in an attempt to connect the M200 reader via the CR-11 Interface card. Was unable to operate with the M200 due to a non-standard interface. Issues with console serial interface and RX02 disk system put this system on the "dead line" awaiting attention at some future date.

PDP-8a Minicomputer - Made a brief appearance yesterday to read some paper tape. Issues with memory access prevented loading or executing any programs. I suspect, but have yet to confirm, that the wire-wrap backplane is at fault. It's going back into storage with the LSI-11 to await repairs.

Raspberry Pi 4+ -- Not exactly vintage hardware but does a good job grabbing data from the GPIO pins and can talk to everything listed above. The Raspbian version of Linux is a good development environment and supports both C++ and Python. I must make a case for it one of these days.

Intel 80C52AH Development Board - This (almost) modern implementation of the 8052 BASIC microcontroller is a wonderful piece of gear from 1985. A favorite of legendary engineer Steve Ciarcia (also columnist for Byte Magazine,) this tiny machine can be programmed in BASIC, burn its own EPROM, and automatically boot to a BASIC program on startup. At the moment, it is replacing the Raspberry Pi as an interface to the M200 card reader.



IBM Card Gauge - While not exactly a data processing machine, this instrument is surprisingly handy for checking the registration, alignment, and critical dimension of punched cards. It also highlights the "human readability" of this medium and allows the interpretation of damaged cards that won't go through one of the card readers.

Epson DSmobile 620 - Not a "Retro" machine in the traditional sense but serves as a capable card reader when connected to a Windows laptop running Hamilton's software for photographic interpretation of punch cards. One can debate the efficiency of using a 620k PNG image file to store 80 characters of information, but that file can easily be deleted once processed.

## Software:

Much of the software I've been using to process cards is already posted on the index page at <http://punch.paleoferrosaurus.com/>. I'm still working on making human-readable versions of some other software to post on the site. This will take a few days and extend into the first week of November. I have a bad habit of writing bad code on machines that are not online. Tracking everything down and transferring it can be a problem at times.

READER.BAS - Running on the 8052 board, this program grabs a 12-bit value (0-4096) when the READY line on the M200 goes high. It stores that 12-bit value until 80 columns are read or an error condition occurs. It converts that 12-bit value to a formatted decimal string that it transmits over the RS-232 line to the host computer.

Spooler.cpp - Running on the host computer, this program receives the formatted decimal string from the 8052 board and stores it on disk in a spool file designated by the user. Each record in the spool file is a series of decimal numbers representing a card column. Up to 80 card columns may be present on a single card.

CardRead.cpp - Running on the host computer, this program converts the spooler file to an ASCII text file.

CardPunch.cpp - Although a card punch is not presently connected to the host computer, the CardPunch program generates a card image file from the specified ASCII text file. This can be used to test the CardRead program or transmitted to another device for card punching.