HHC2024

It Escaped From the Lab – Part I

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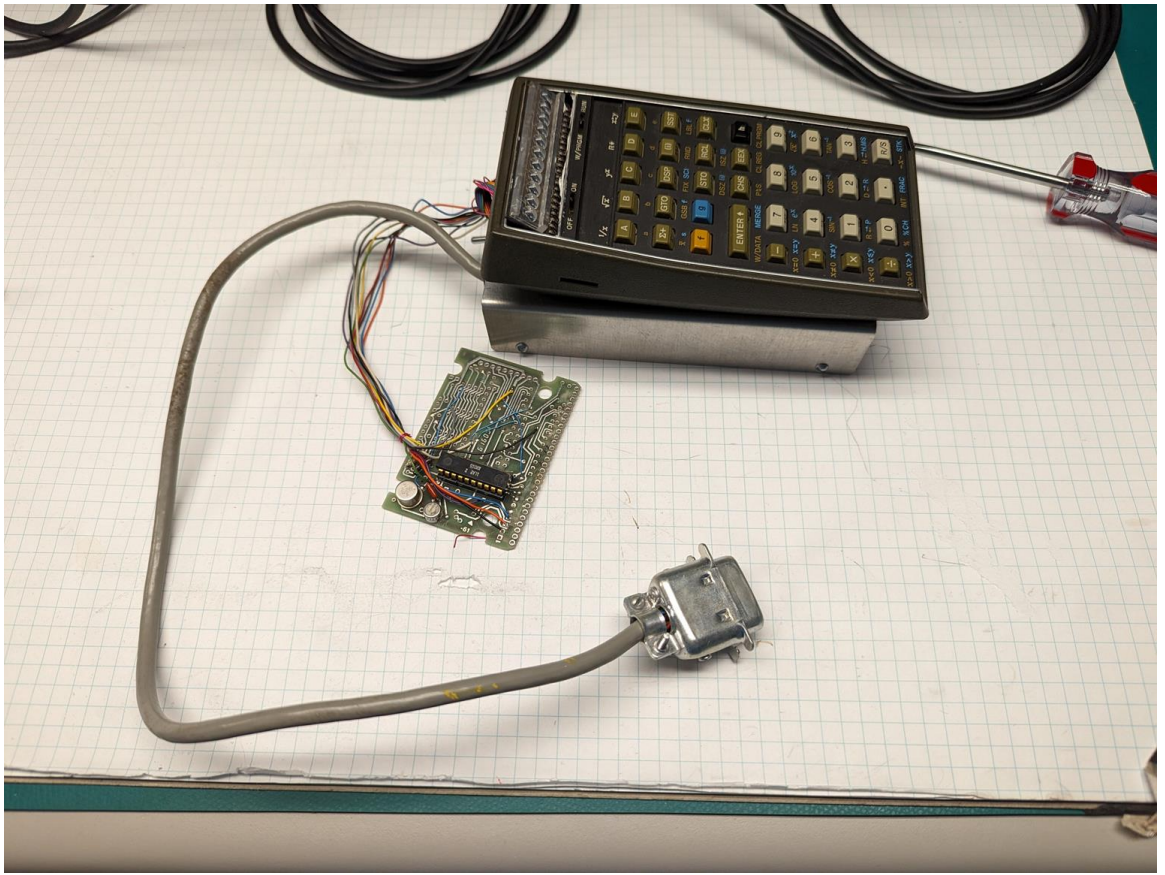
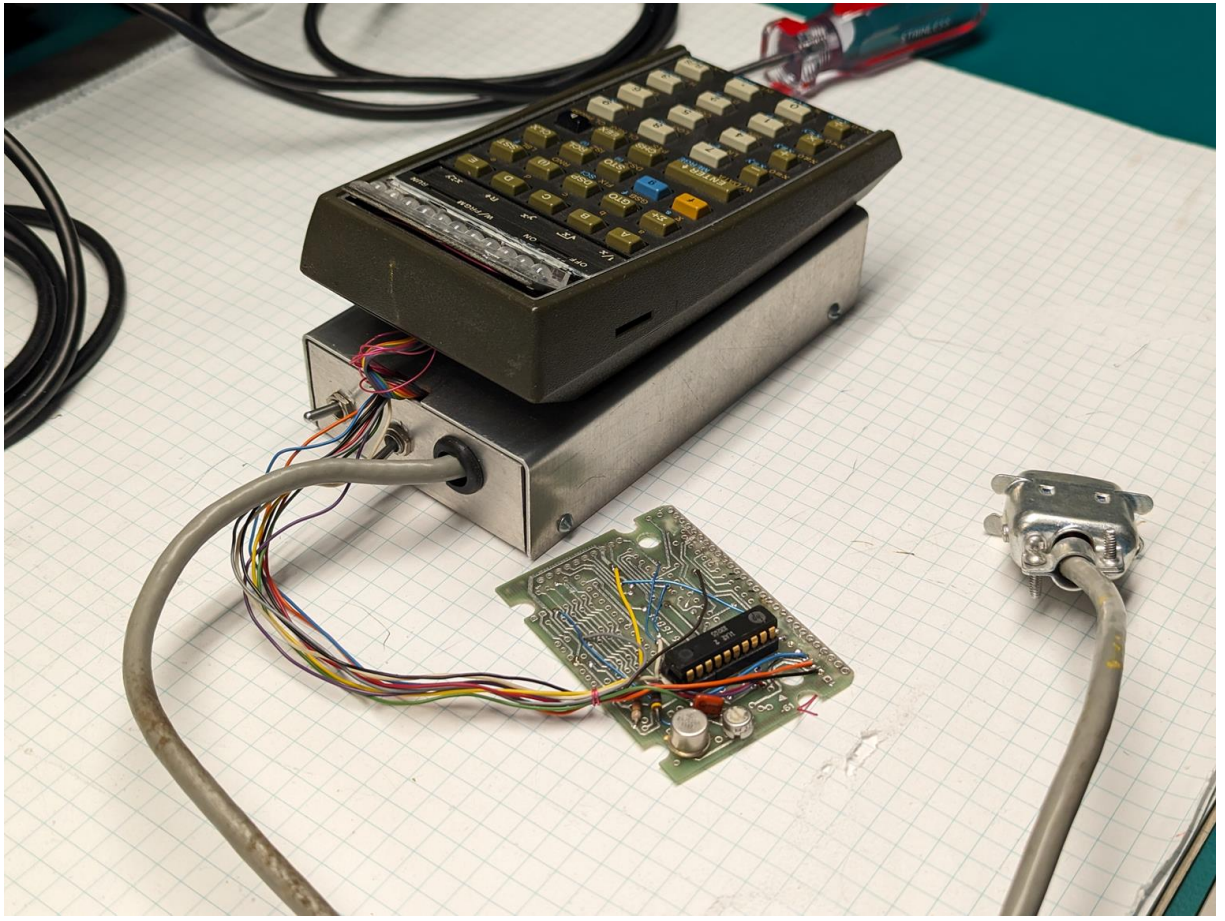
As with all tech companies, HP engineers create special “products”, including equipment used in R&D, manufacturing, testing, and repair, which are generally not offered for sale to the public.

Although such devices are intended for use only within HP, sometimes these “escape” to the outside world. One common example known to HP calculator aficionados is diagnostic ROM modules.

A very strange calculator… Looks like an HP-67, but what's in the metal box? What is the loose board? And the connector? Maybe a never-before-seen HP-67S?



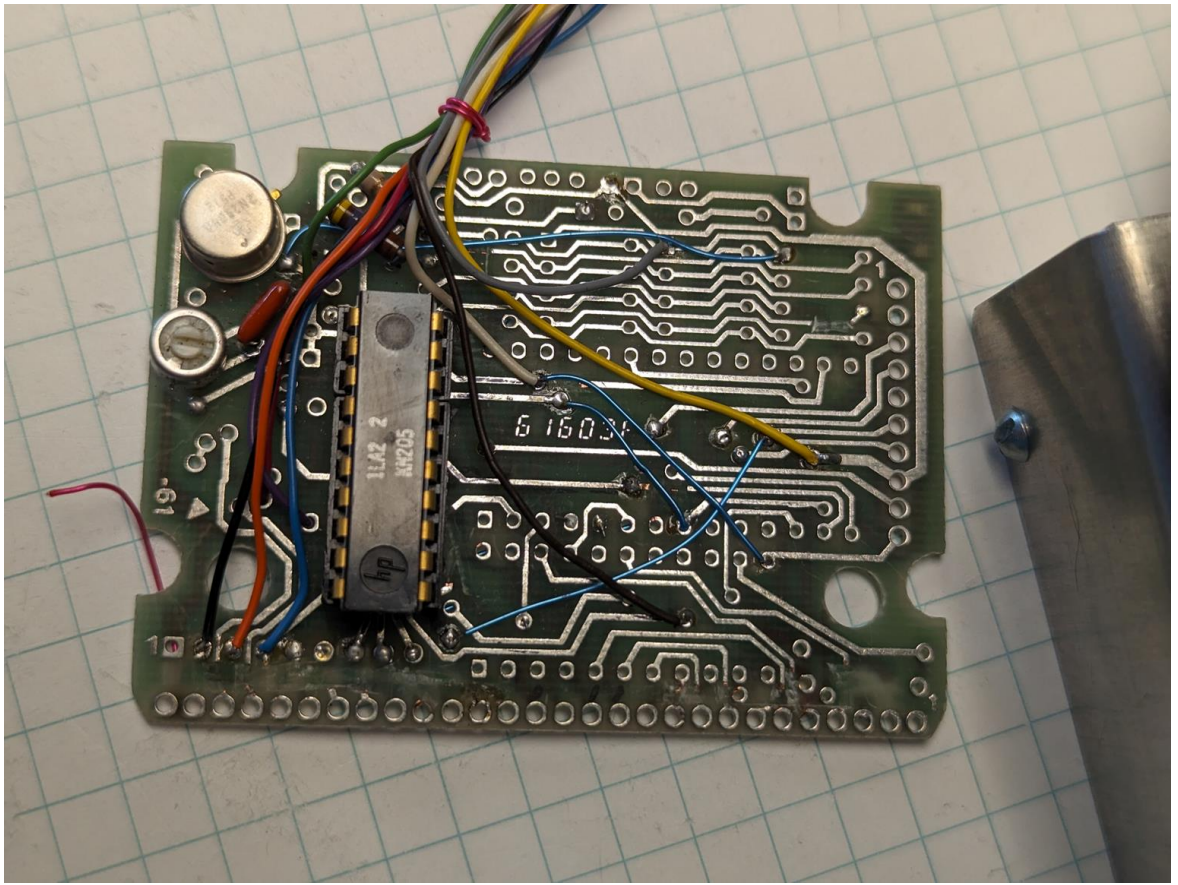
Another view. What are the toggle switches?



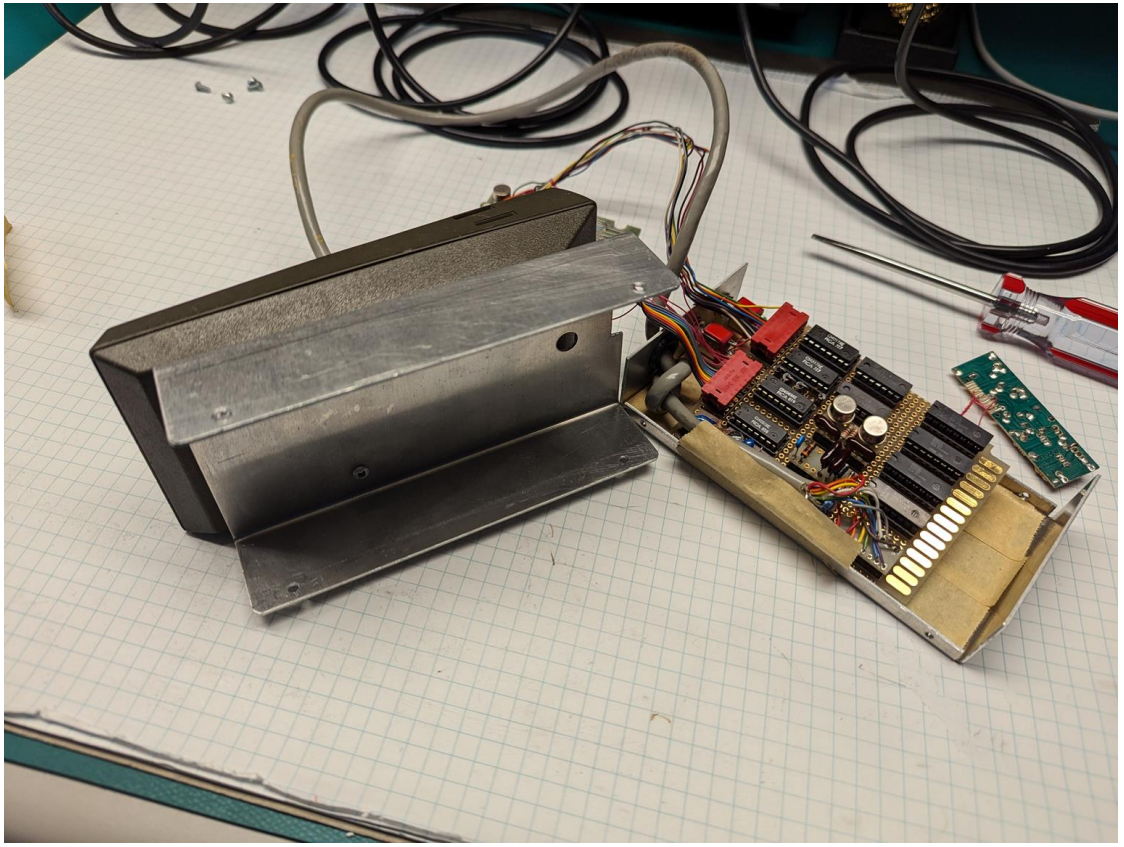
Top view – definitely looks like an HP-67. What's with the display, though? No red filter, eleven magnifier bubbles. Wrong number of digits? Ten digits plus mantissa sign? No slide switches! This is like no other HP-67 I've ever seen!

At this point I have an hypothesis, but I'm not blurting it out just yet, in case I'm way off base.

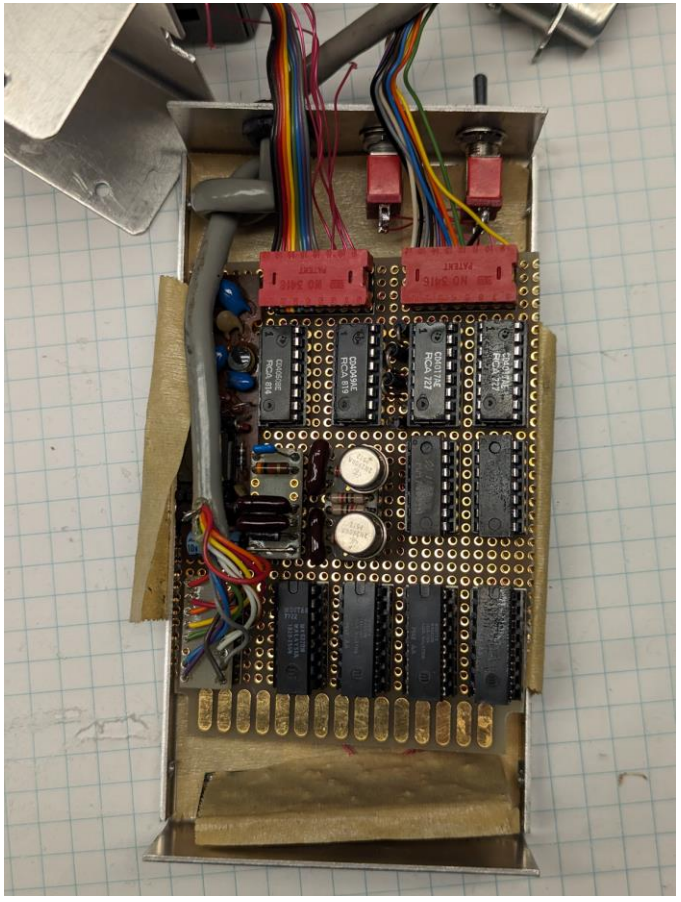
And a weird board hanging out of it. Looks like an HP-67 logic board, but there's only one chip on it!



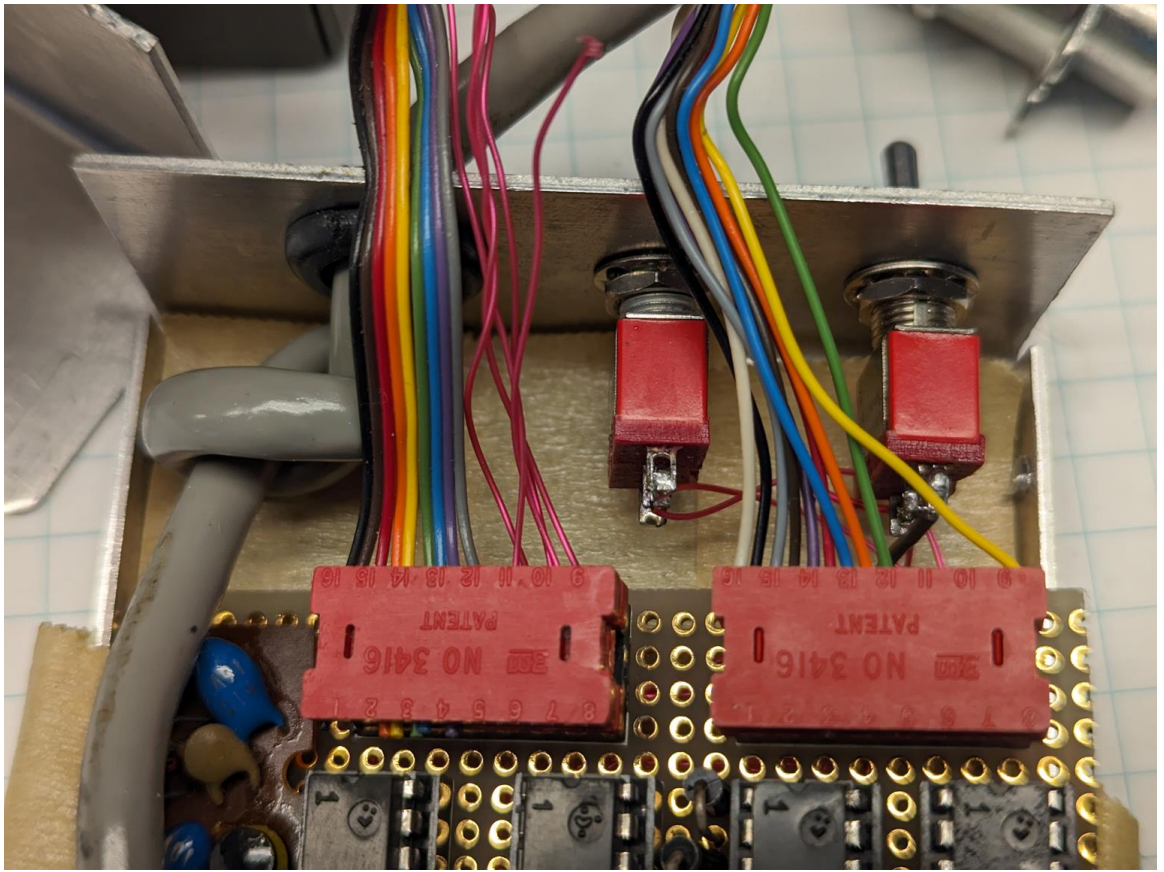
Let’s take apart the metal box. Definitely some weird stuff. A kludge board, and a PC board.



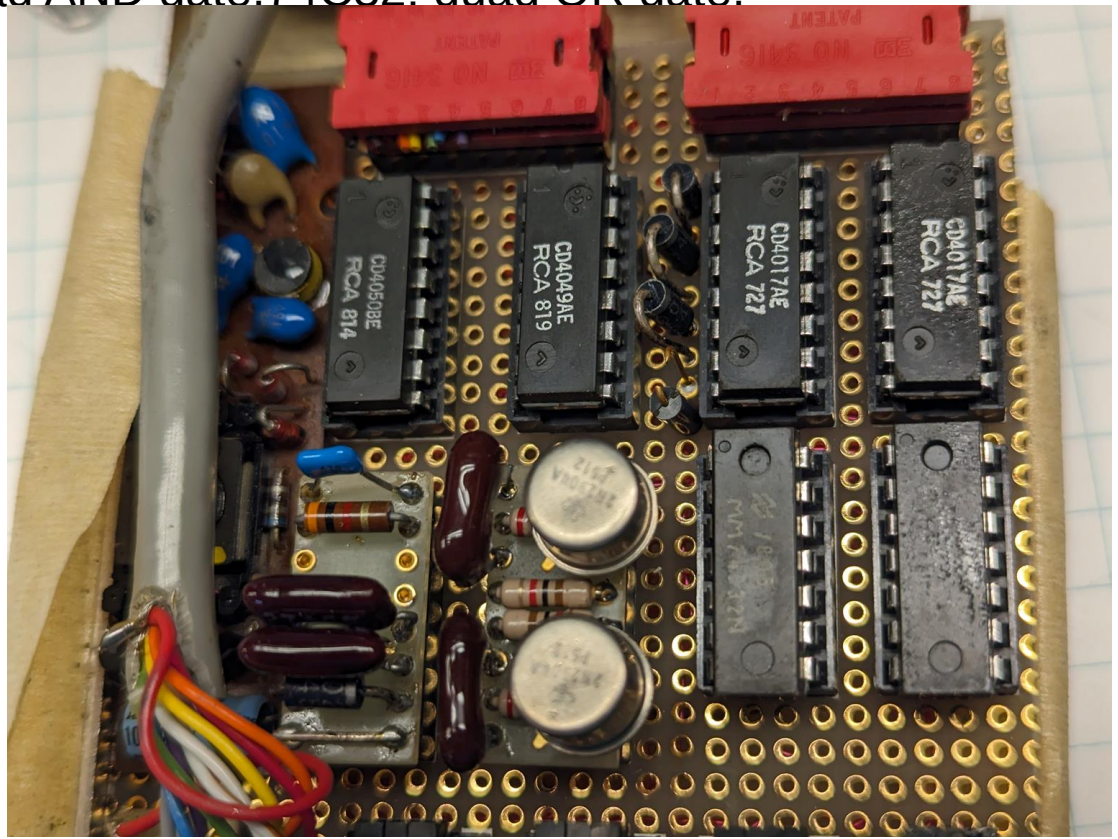
Let’s look a bit closer at the kludge board.



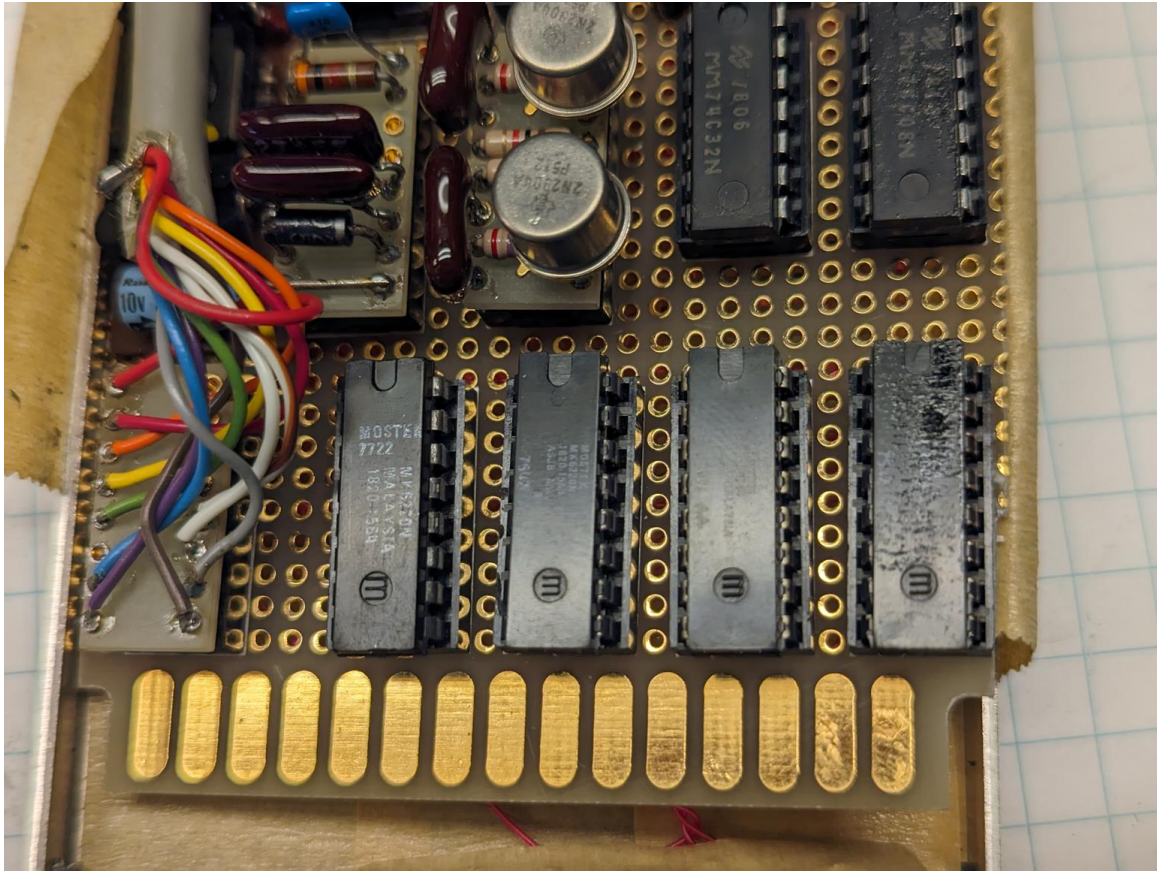
The connector and switch end. One DIP plug connects to the external board, and the other into the HP-67 calculator body. The gray-jacketed cable goes to the CHAMP connector.



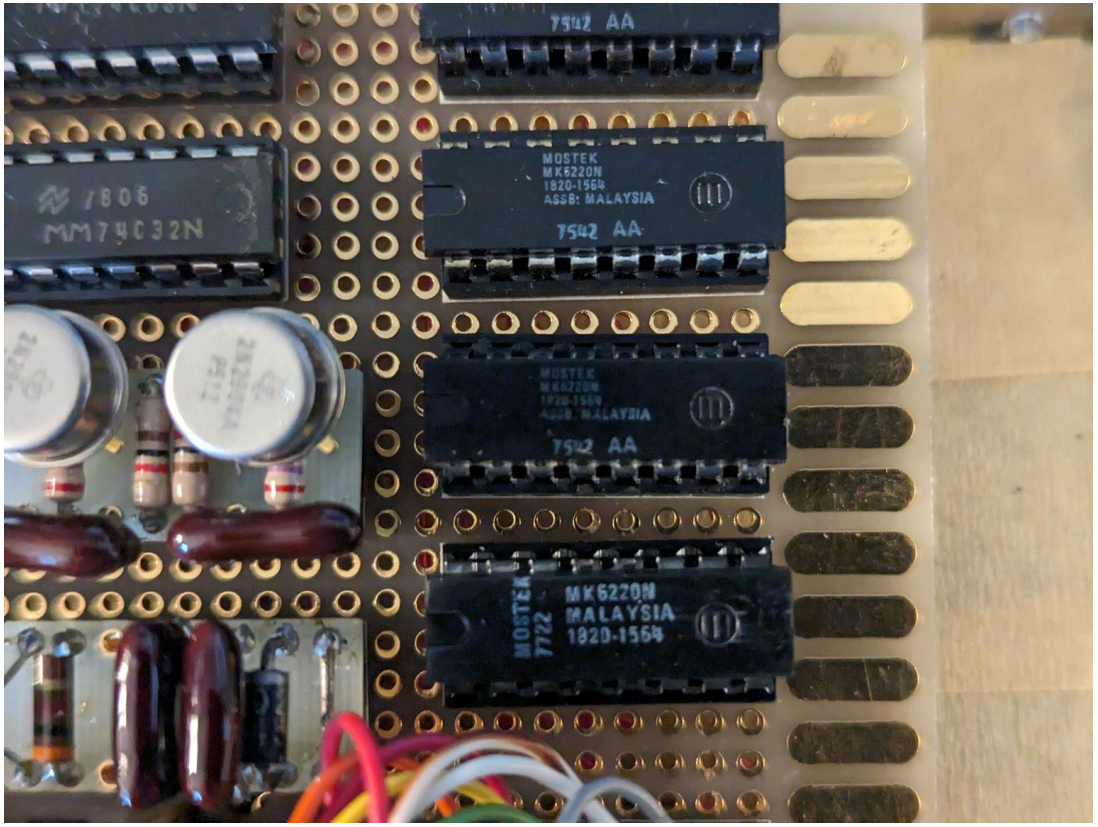
Some chips, transistors, and passives near the middle. CD4060: binary counter with oscillator. CD4069: hex inverter. Two CD4017: CMOS decade counters with decoded outputs. 74C08: quad AND gate.74C32: quad OR gate.



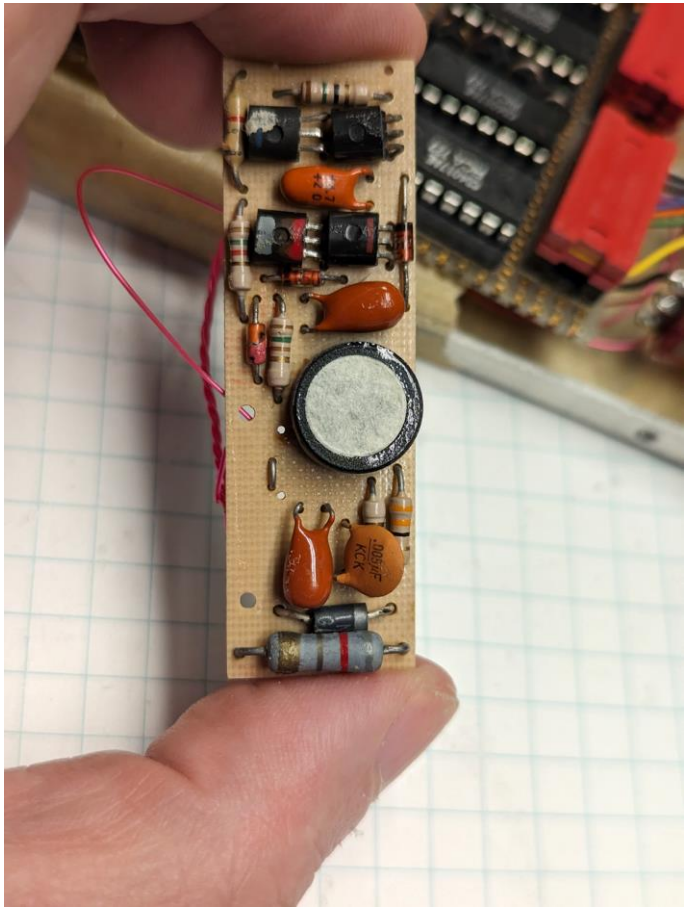
Lower end: more chips, and the DIP plug wired to the CHAMP connector.

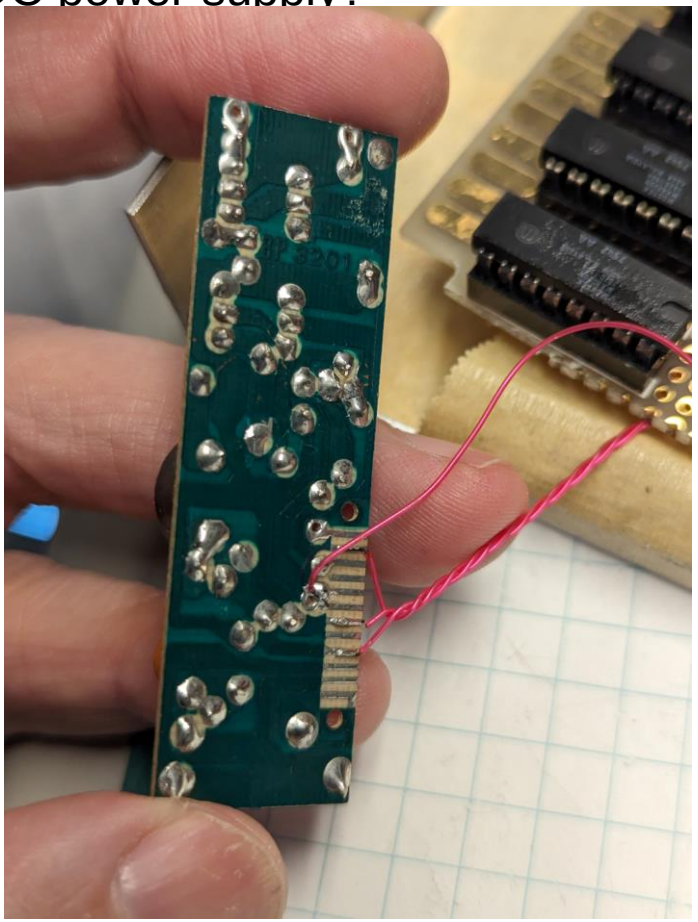


Trying to get a better view of the PMOS chips. All four are Mostek MK6220, HP 1820-1564. What the heck is that. [Checks my own web site…] It's an 8-register RAM chip for a Woodstock processor. Whatever this is, it has 32 registers OUTSIDE of the calculator.

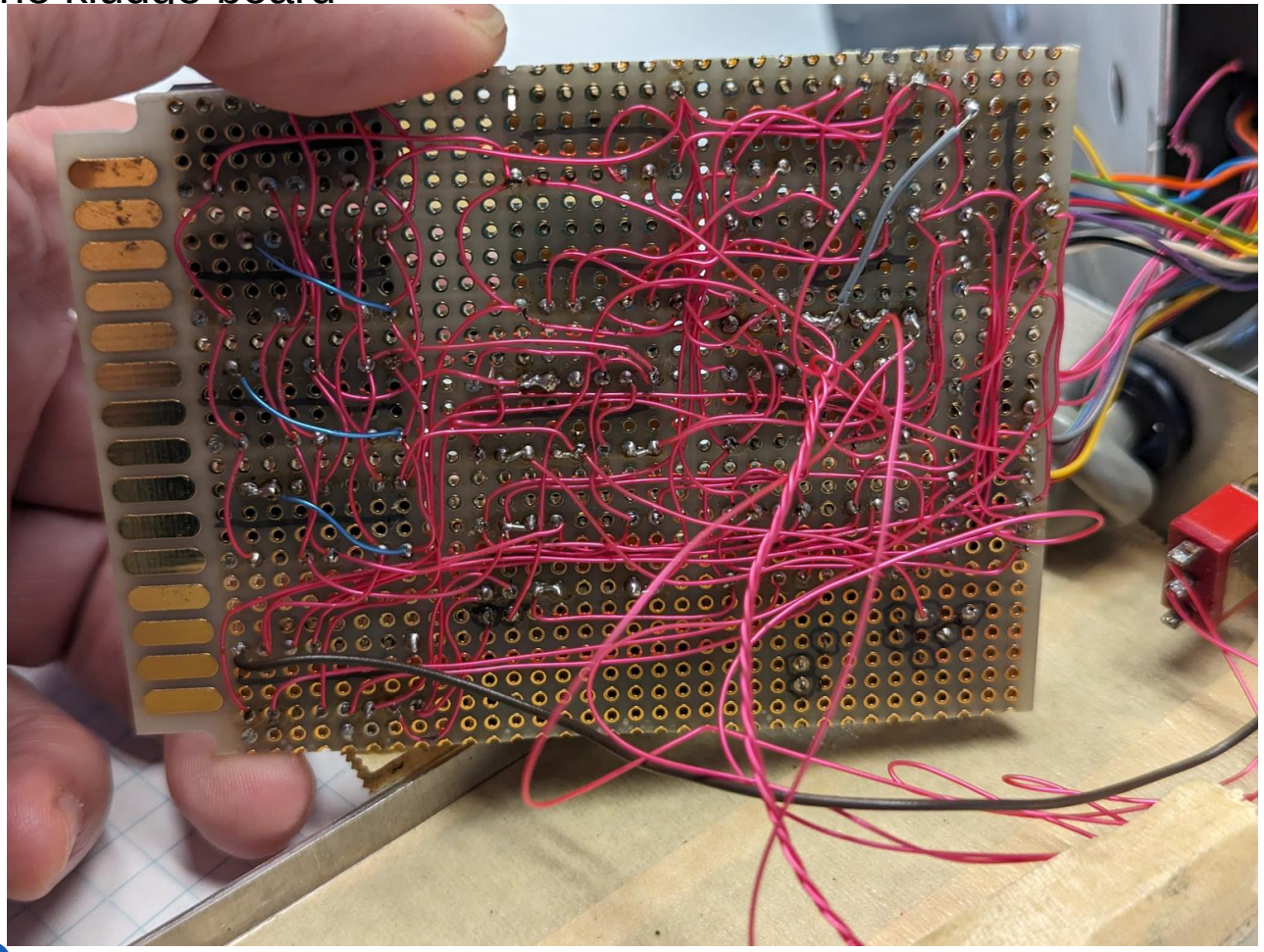


What else is in the box? Looks like a DC-DC power supply?

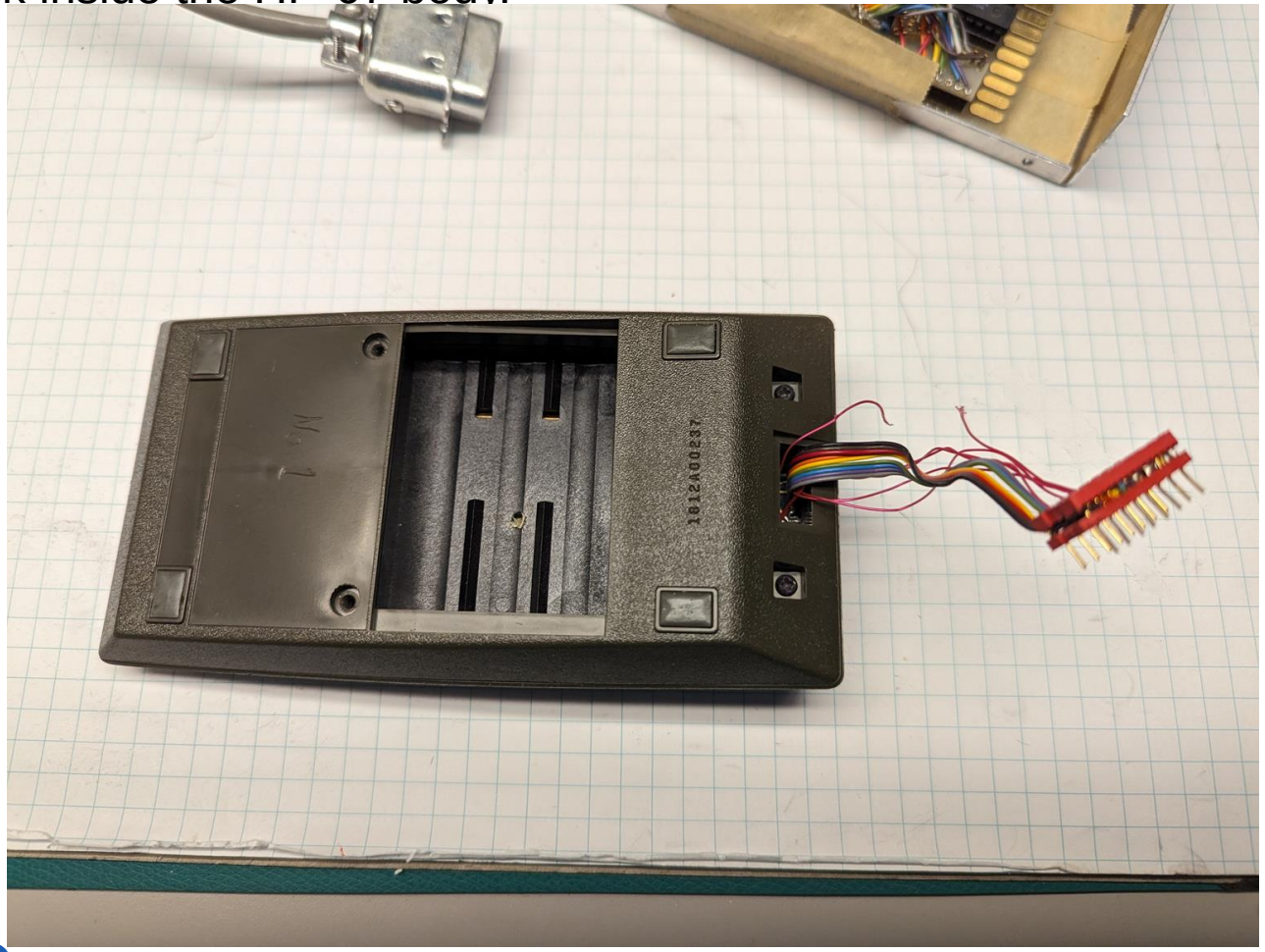




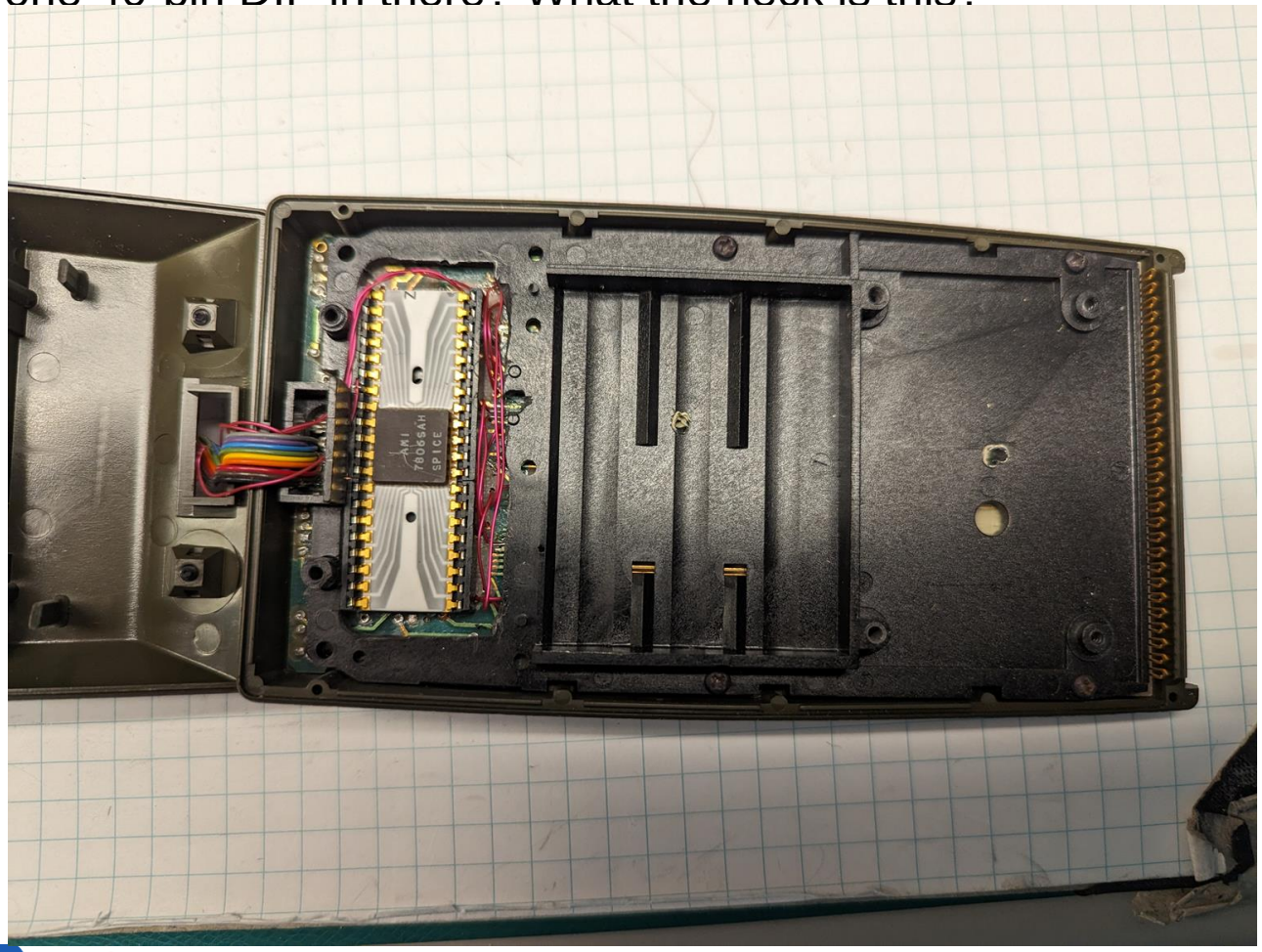
Bottom of the kludge board



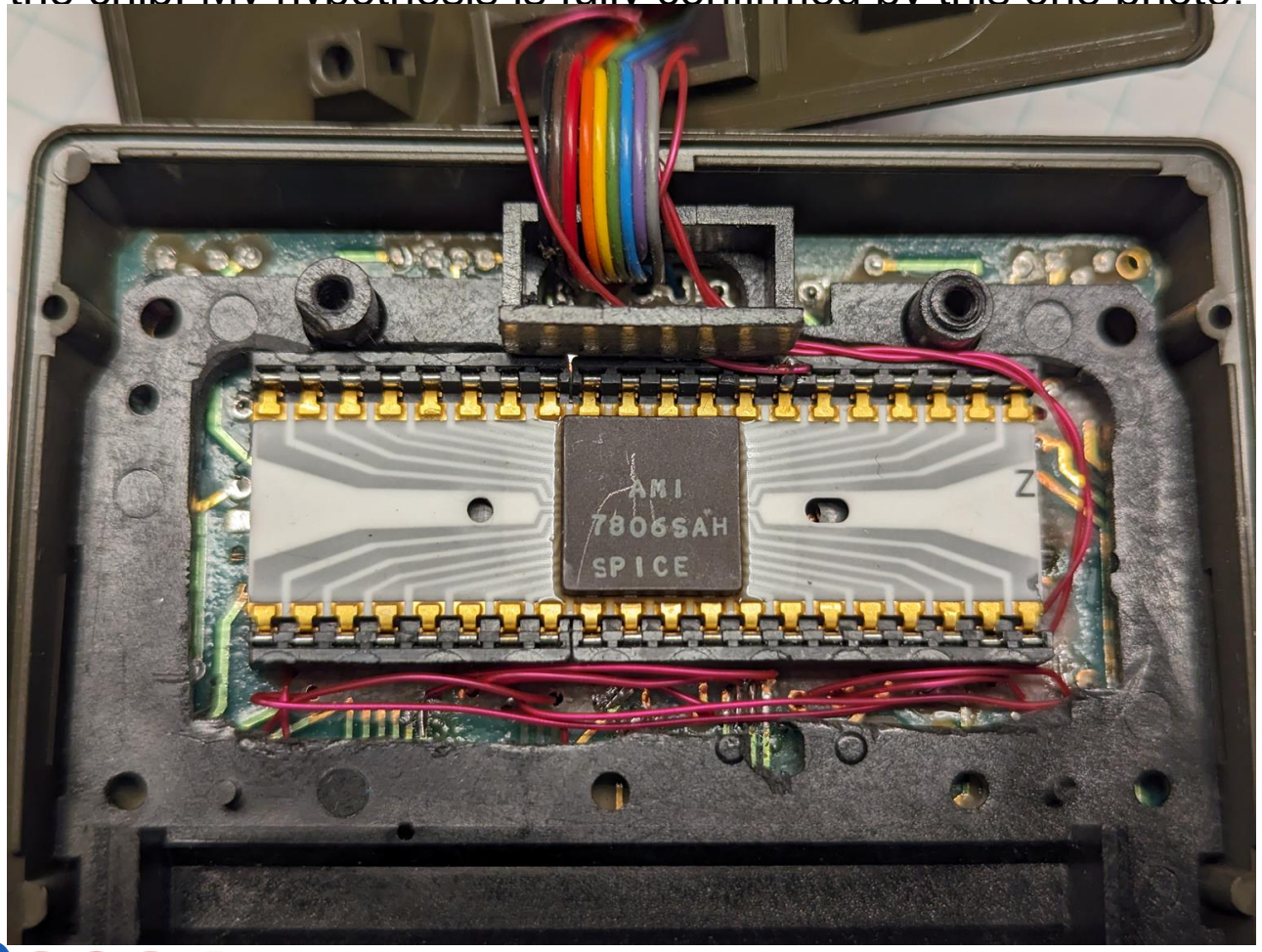
Time to look inside the HP-67 body.



Wait, only one 40-pin DIP in there? What the heck is this?



Closeup of the chip. My hypothesis is fully confirmed by this one photo!



Guessed it yet? This was a software debug handset for prototyping the 30-series calculators, code-named “Spice”. The 40-pin chip in the HP-67 housing is labelled “SPICE” identifying it as a prototype Spice processor. The display is a ten digit plus mantissa sign display. The chip on the external PC board appears to be a cathode driver, possibly only used to get the “RCD” (reset column drive) signal that may be useful for debugging. The CHAMP connector would plug into a ROM emulator (or more elaborate debug host). The circuitry on the kludge board interfaces the ROM emulator and the RAM chips to the Spice CPU.

I suspect that the prototype Spice CPU either does not have the internal ROM that actual Series-30 Spice processor chips contain, or that the ROM in it is somehow disabled, but I have not confirmed this.