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KIM 6530 Replacement

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03/07/2017

I tested the board in both U2 and U3 and it appears to work fine. Here it is in U3:

 Search ...

Upcoming Events

Vintage Computer Events

Lots of things are obviously on hold because of the COVID-19 pandemic, but once I start hearing of events being scheduled, I'll update this list again. VCF East 2021 has been scheduled!

Days until **Trenton Computer Festival (virtual)**, March 20: **0**

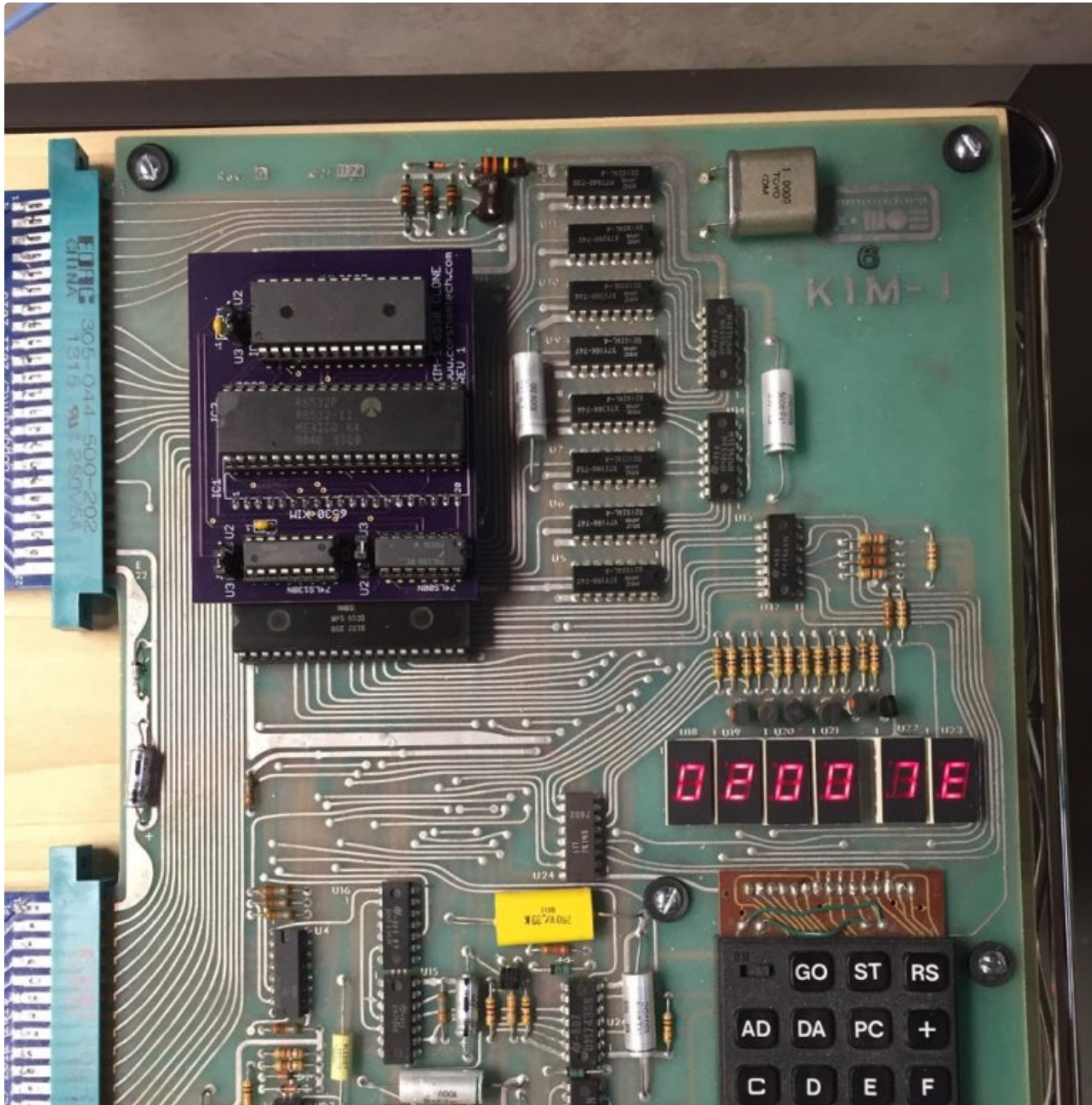
Days until **VCF Swap Meet (Wall, NJ)**, April 24, 2021: **0**

Days until **VCF East** (Wall, NJ)
October 8-10: **0**

Days until **Trenton Computer Festival 2020** (Trenton, NJ): **0**

Days until VCF Southeast (Atlanta, GA): **0**

Days until **VCF West** (Silicon Valley, CA): **0**



Days until [VCF Midwest](#) (Chicago, IL): 0

Days until [VCF Pacific-Northwest](#) (Seattle, WA): 0

Other Items

Days until Christmas: 0

Recent Posts

- [Arm updates, shipments, etc](#)
- [Update on arm, deliveries, etc](#)
- [Broke my arm, expect delays](#)
- [Parts Shortage Continues](#)
- [Orders are Getting Shipped Again!](#)

Archives

- [March 2022](#)
- [February 2022](#)
- [January 2022](#)



03/03/2017:

See the bottom of the page for the GERBER and EAGLE files.

Near the bottom is a picture of my board working in one of the KIMs here in the lab.

Introduction

Like many people, I have a KIM-1 in my collection with a dead 6530 chip. Fortunately mine wasn't too bad, but one of the I/O pins didn't work so the display always had one segment lit and the TTY port would not work. After many hours of searching for a way to replace this one defective chip with an equivalent circuit, it became apparent a lot of people were trying to do the same thing, some claiming to have a solution, some not, but no schematics ever appeared. Without schematics, there is no solution.

Rather than letting others go through all the effort to reverse engineer the 6530, I decided to make my own, and to publish the schematic. This work was heavily taken from Ruud's excellent tutorial on his efforts to

- [!\[\]\(e6ddc77b791299d975007937cebef274_img.jpg\) December 2021](#)
- [!\[\]\(ab52e27d061d76db54e182891376cff5_img.jpg\) November 2021](#)
- [!\[\]\(62325268b83c539c826661482098edc3_img.jpg\) October 2021](#)
- [!\[\]\(576eae82d6cd110cfd50d3e0356faa5a_img.jpg\) September 2021](#)
- [!\[\]\(433d19d9bdeac46075af10d8acb0c69a_img.jpg\) June 2021](#)
- [!\[\]\(6d7be85c6a97460dda8fae4160076286_img.jpg\) April 2021](#)
- [!\[\]\(6821accee9ffc315d041eee2faac4aff_img.jpg\) March 2021](#)
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- [!\[\]\(bea4b3fa5635883f1239b8b72dd62605_img.jpg\) January 2021](#)
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- [!\[\]\(ecd479e62f1363e87aead26faf205a95_img.jpg\) September 2020](#)
- [!\[\]\(ba74526c8235729b6ad929e178db2faa_img.jpg\) August 2020](#)
- [!\[\]\(7563260e3019136988171a990527c4eb_img.jpg\) July 2020](#)
- [!\[\]\(a95809289963925eae85dc780b0c8baf_img.jpg\) June 2020](#)
- [!\[\]\(47aa249298b8b31cd4b6f6d6f9304a42_img.jpg\) May 2020](#)
- [!\[\]\(b71b35d73f36844cb0226be4517a2074_img.jpg\) April 2020](#)
- [!\[\]\(319e737526a36345b32ba08608113467_img.jpg\) March 2020](#)
- [!\[\]\(8e131223322ddf9c25900bd0d7d53a07_img.jpg\) February 2020](#)
- [!\[\]\(4004f74752945675d089e227f7b8b0af_img.jpg\) January 2020](#)
- [!\[\]\(660cb907dd10ee5e24636ab5fd7945e2_img.jpg\) December 2019](#)






















replace a 6530 in a Commodore disk drive. Please go to his page for an explanation:

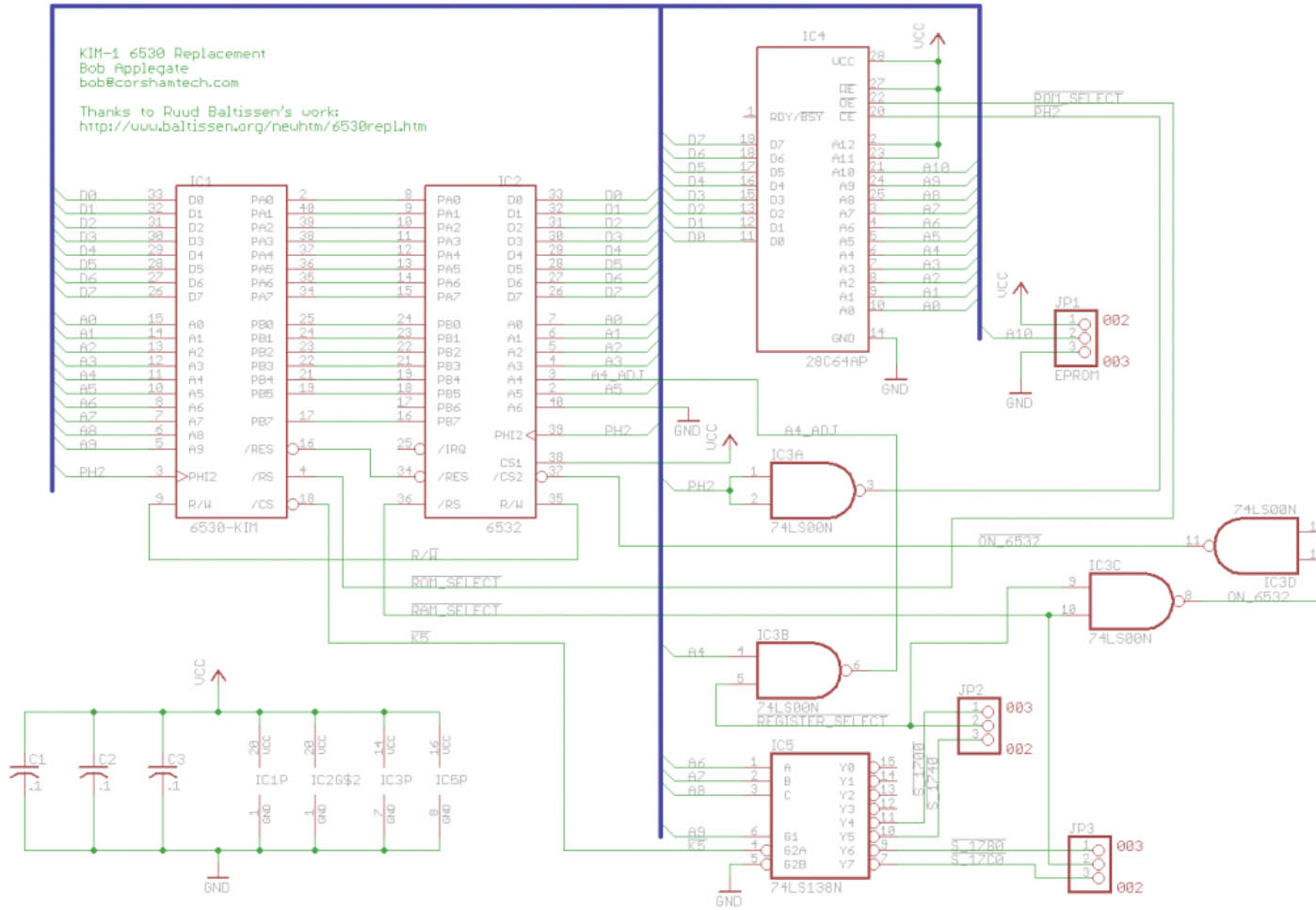
<http://www.baltissen.org/newhtm/6530repl.htm>

Since the 6530-002 and 6530-003 in the KIM have different mapping of ports, his exact schematic is not right for the KIM, so I borrowed some of his KIM-1 clone ideas and designed my board from it.

Saturday, Feb 18, 2017

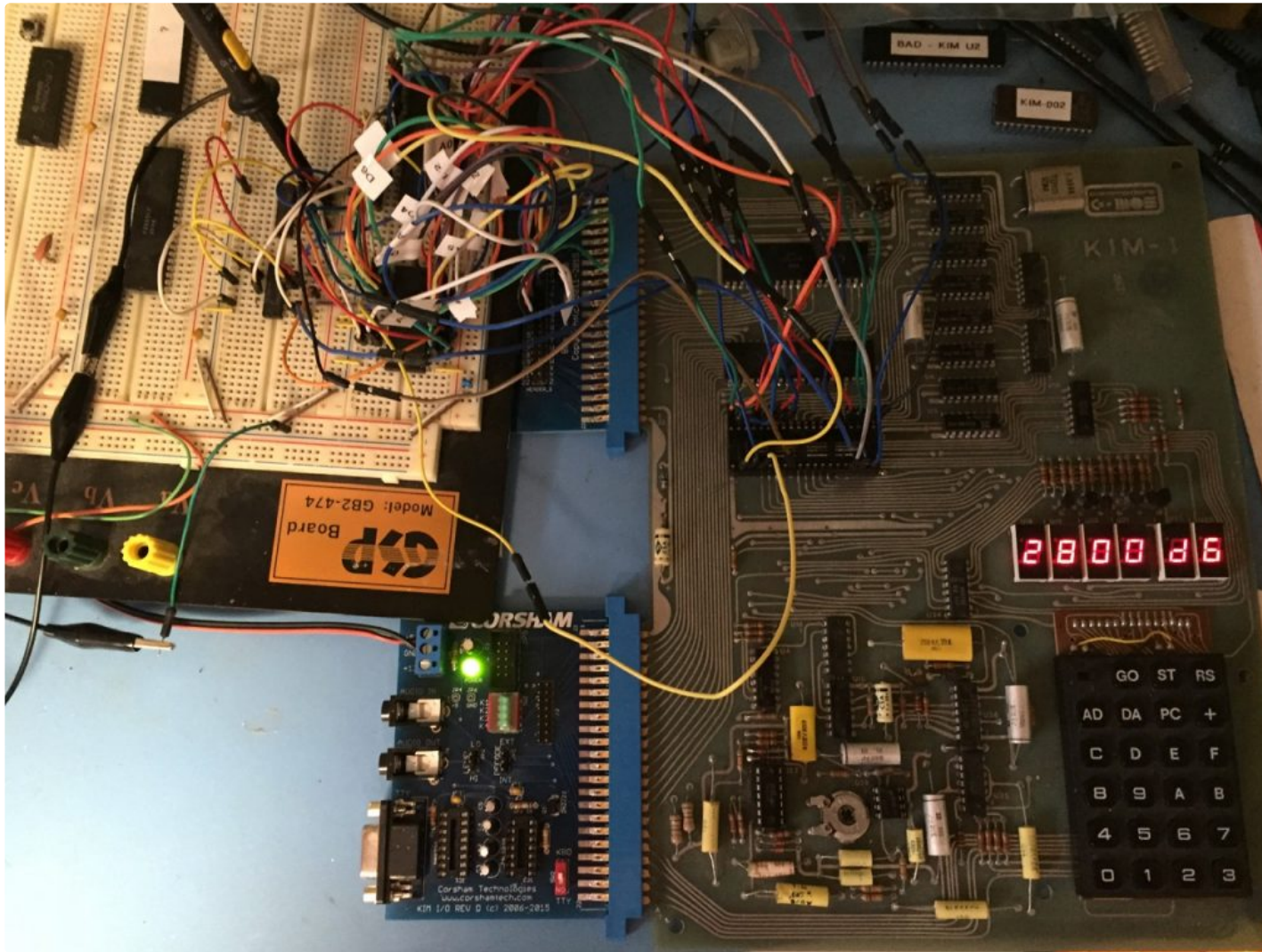
This is the current design that's breadboarded and running on one of my KIMs:

-  [November 2019](#)
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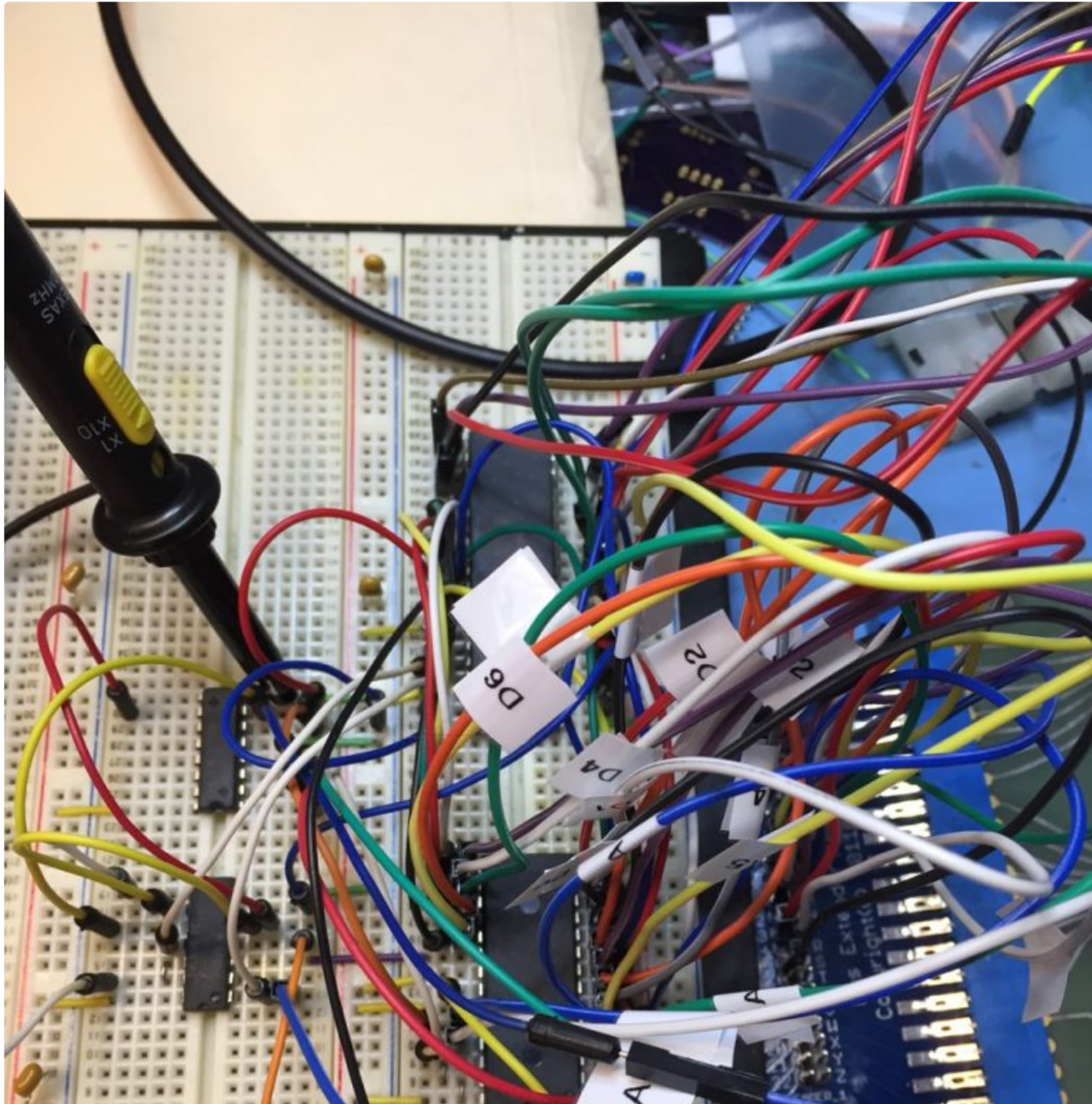
For those who think schematic diagrams are complicated, just wire it exactly like I did:

- 📁 [December 2017](#)
- 📁 [November 2017](#)
- 📁 [October 2017](#)
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- 📁 [August 2017](#)
- 📁 [July 2017](#)
- 📁 [June 2017](#)
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- 📁 [July 2016](#)
- 📁 [June 2016](#)
- 📁 [May 2016](#)
- 📁 [April 2016](#)



Need a slightly closer view?

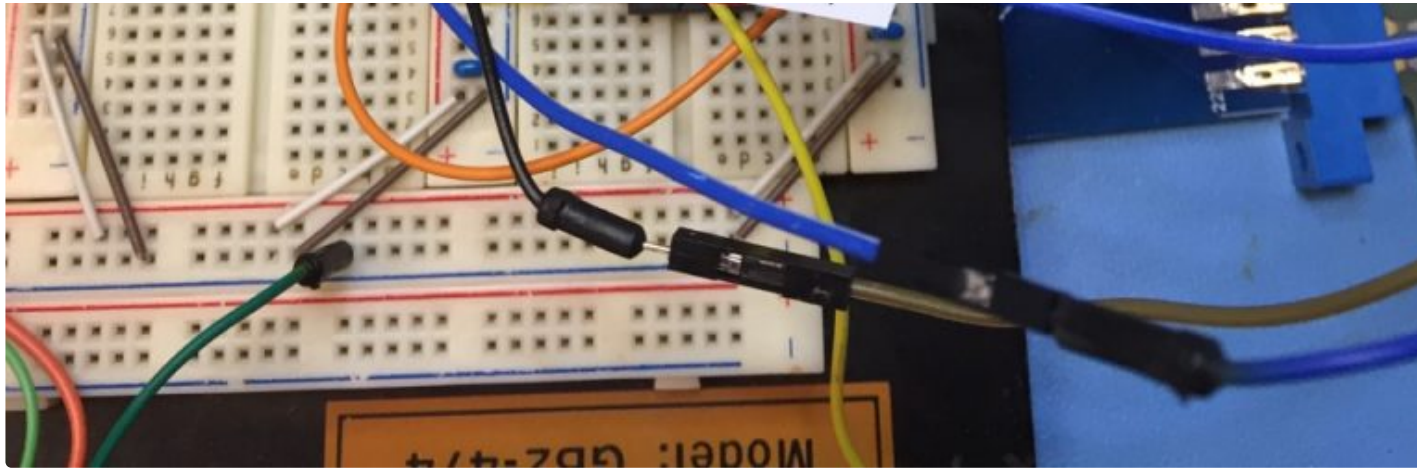
- [!\[\]\(9dc885fa0d6d341860a6e69645e59475_img.jpg\) March 2016](#)
- [!\[\]\(5d2b0686f24c91a69ec6f054f466d184_img.jpg\) January 2016](#)
- [!\[\]\(ef97c4cf774c94401d40a852a635219b_img.jpg\) December 2015](#)
- [!\[\]\(f8ef7bbfeae36453ca014751196aefd5_img.jpg\) November 2015](#)
- [!\[\]\(c16c1d45ae17c42d924e54c1f9be81dd_img.jpg\) October 2015](#)
- [!\[\]\(95b5024aa73784eeb3bbb283901425f3_img.jpg\) September 2015](#)
- [!\[\]\(a5b8b0c6037342750f3bb8e3ea46081a_img.jpg\) August 2015](#)
- [!\[\]\(1160f55bf8bdd53aa462eb354f999cab_img.jpg\) July 2015](#)
- [!\[\]\(1903e65d032c98e66c4d1da7ac2570d0_img.jpg\) May 2015](#)
- [!\[\]\(e0483cc7073b6b3e4678500e054c889b_img.jpg\) April 2015](#)
- [!\[\]\(55382d64ca56a56a8f0870bd19f4f257_img.jpg\) March 2015](#)
- [!\[\]\(c4bdef9dca38e6fdbd7ba5a69d1d03e9_img.jpg\) February 2015](#)
- [!\[\]\(0fa029eadcfd19b278c719b6d791f9d7_img.jpg\) January 2015](#)
- [!\[\]\(539800af26abf1ba50206e745a45ebb0_img.jpg\) December 2014](#)
- [!\[\]\(58f096c5077501ff2e4baeeaa8fe390c_img.jpg\) October 2014](#)
- [!\[\]\(bad07aeba50edc14cf7bf467a2e6a056_img.jpg\) September 2014](#)
- [!\[\]\(396b969d1a67d66ef7b8d275d9804854_img.jpg\) August 2014](#)
- [!\[\]\(26afef2dbbc75c603479f02f16bab80d_img.jpg\) July 2014](#)
- [!\[\]\(a50da7265fdb856fb87cc74eb8c6785f_img.jpg\) June 2014](#)
- [!\[\]\(a3e2c655611cb0caee80aab6067eec3e_img.jpg\) May 2014](#)
- [!\[\]\(3bbea91bde459cab3834f18492d1884b_img.jpg\) April 2014](#)



- 📁 [March 2014](#)
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Okay, the schematic is much easier to follow 😊 Notice that I use one of our 22/44 pin extenders to access the data and address busses so there are fewer jumpers to the original 6530 socket on the main KIM board. It's also a great way to get access to test points, like pin 1 which has the 6502 SYNC pin which pulses high on every opcode fetch. I kept one scope probe on that pin to make sure the processor was still running after making circuit changes. Also note that I label each wire coming from the KIM so it's easier to double-check and debug later.

Notes

- No, the schematic is not pretty. I can spend some time and shuffle parts around to make the parts placement neater, but if you're contemplating building this, I'm sure you'll have no problems following the schematic.
- Pin usage has not been optimized. This was breadboarded but the PC board design is not done so some of the pins on the 74LS00 might change.

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- There are three jumpers with U2 and 003. The intent was to be able to replace either of the two 6530s on the KIM and both U2 and U3 have been tested.
- A 28C64 EPROM was chosen because (A) they're readily available, (B) common USB programmers can program them, and (C) the offset in an Intel HEX file for the KIM PROMs will be at the proper offset when you load the files into your programmer's memory. Ie, the 002 device's offset at 1C00 will be at offset 1C00 in the EEPROM.

EEPROM Contents

The basic KIM has an 8K memory map so using an 8K EPROM/EEPROM makes things easier because the address in the HEX file is exactly the right offset into the EPROM. If you don't understand this, don't worry, you don't need to.

I deleted the two individual hex files and replaced it with a single file that covers both halves of the KIM PROM:

[KIM-ROM.HEX](#)

The image is a raw dump from a working KIM, not re-assembled from source. Note that I had to add an extension of txt so that WordPress would allow me to upload them, but take off that extension when you save them to your computer.

Design Files

Bare boards are on their way, but these are the files you can use to generate your own. First, this is the GERBER file from the revision 1 boards I sent to have boards produced. If you want to make your own boards

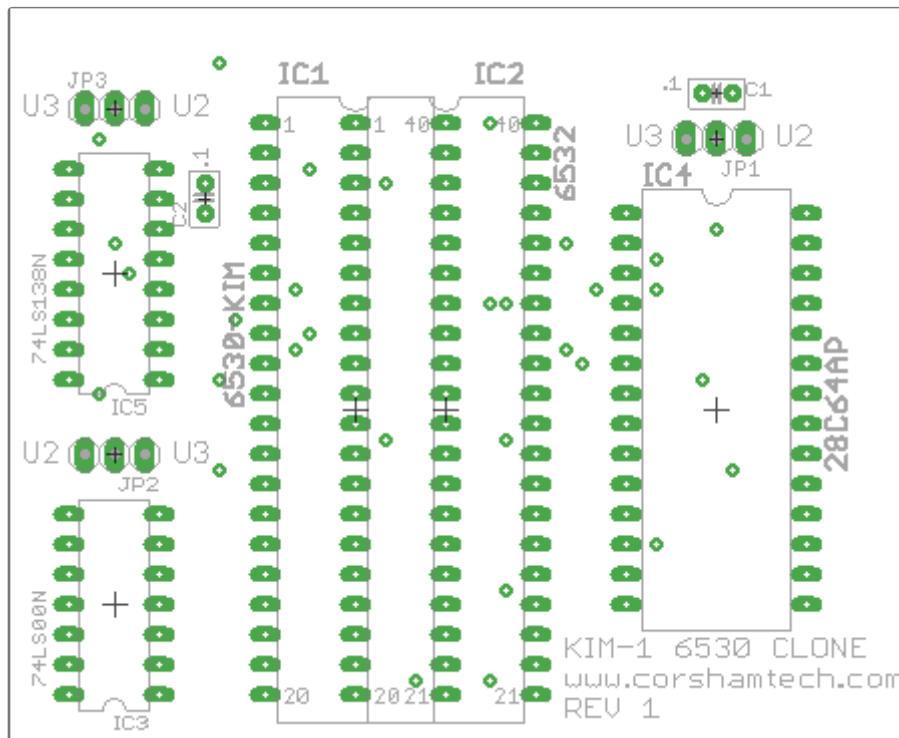
without any modifications then just upload this file to your favorite PC board manufacturer and they can give you a quote:

[KIM_6530_rev_1](#)

If you use the EAGLE CAD package, here are the files needed for the project. This has the epf, brd and sch files:

[EAGLE_6530_rev_1](#)

BTW, this is what the top layer of the board looks like, minus any traces:



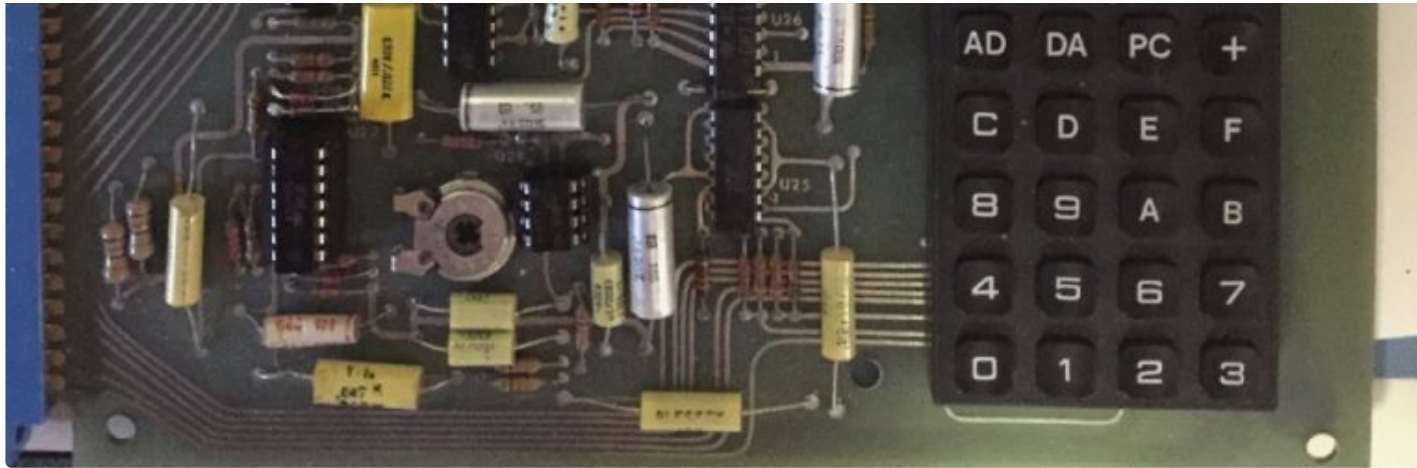
Just like Ruud's original design, this has the 6530 header and 6532 socket overlapping each other. For the header that is soldered to the underside of the PC board and plugs into the KIM, I suggest a header with narrow pins. I used CNC Tech part number 220-1-40-006, available from [Digikey as part number 1175-1527-5-ND](#). Be aware that the cross-pieces of the IC socket and the header will block the pins for the other, so you'll need to cut them from either the socket or the header (whichever you solder last).

VERY IMPORTANT: Notice that IC3 and IC5 are polarized exactly opposite from the others! When you insert sockets and chips, double-check you've got them oriented in the right direction!

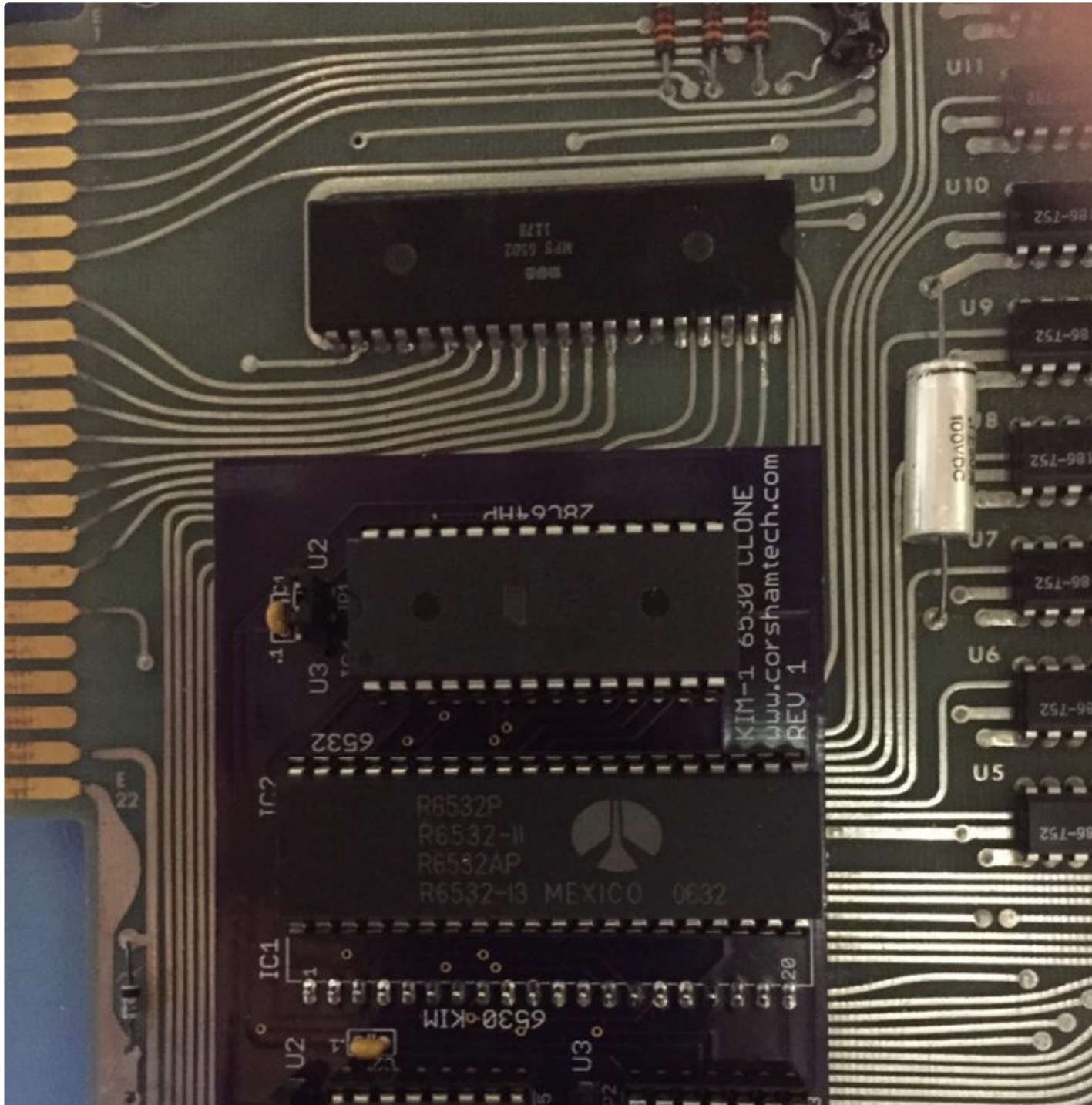
Prototype Boards Added 03/03/2017

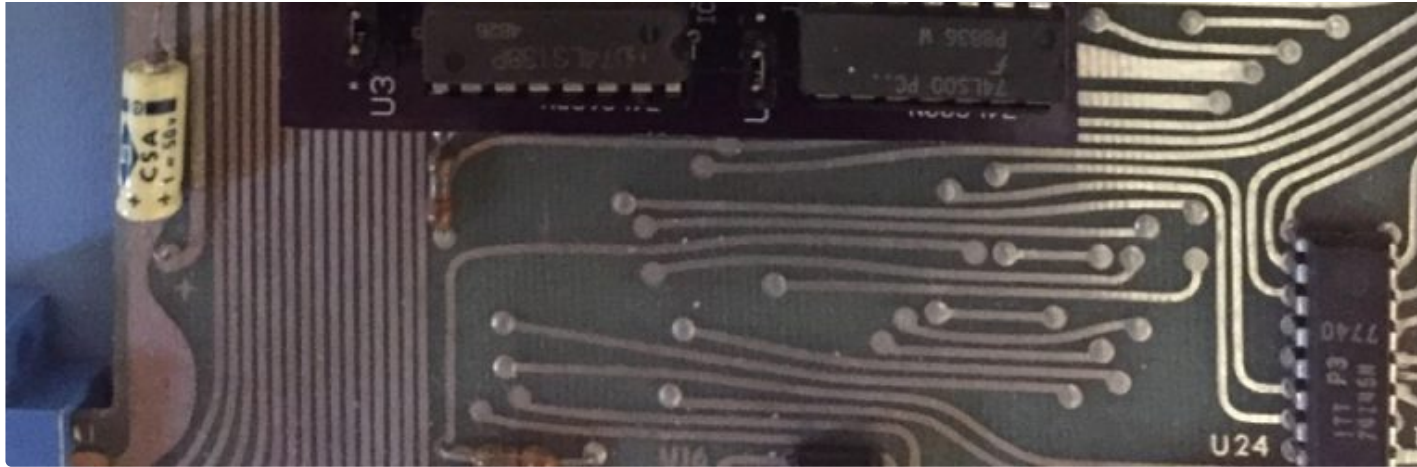
Prototypes arrived yesterday and work perfectly:





A close-up shot:





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