

AccessionIndex: TCD-SCSS-T.20251216.001

Accession Date: 16-Dec-2025

Accession By: Dr.Brian Coghlan and Erturk Kocalar

Object name: Arduino shield for Intel 8080

Vintage: 2025

Synopsis: A board that enables execution of software by the 8080, Intel's second-generation 8-bit microprocessor.

Description:

This Retrosshield 8080 is one a series of Arduino shields (*retrosields*) designed by Erturk Kocalar [1] to not only host early microprocessors but also to execute their original native software, an approach he has termed "Breadboarding in Software".

The RetroShield 8080 [2] is a daughter card that plugs into a Teensy [4], see Fig.1. The Intel 8080 microprocessor [5] executes native 8080 code while the Teensy's Arduino emulates 8080 system hardware. The choice of emulated 8080 system hardware is done by uploading relevant Arduino code. This enables the experience of old computer systems, the learning of low-level aspects of the early microprocessors, the keeping of valuable historical software alive, and even changing original native software simply by changing C code in the Arduino IDE, and use with other Arduino shields and libraries.

The Teensy is a relatively expensive but fast platform with a 600MHz CPU that allows the retrosshield's early microprocessor to run at full speed (e.g. 1MHz), with over 512kB of emulated ROM. Emulated RAM capacity depends on the Teensy version, 256kB for Teensy 3.5 or 3.6, 1MB for Teensy 4.1. It includes a microSD slot that can be used to emulate disk drives. Other peripherals like a UART, PIA, Timer, etc. can be emulated by its Arduino, and other Arduino *shields* can be used to add new features. The Teensy operates at 3.3V, but plugs into a Teensy daughter card designed by Erturk Kocalar that provides onboard 3.3V-to-5V TTL level shifting & vice-versa. The retrosshield then plugs into that daughter card's digital input/output connector.

The 8080 was Intel's second-generation 8-bit microprocessor. It did have the big drawback that despite being fabricated in nMOS, it required +5V, -5V, and +12 V power supplies, and so eventually it was succeeded by Intel's 8085, again nMOS, but only needing one +5V power supply. However, the 8080 did make an advance since, thanks to its lead designer Federico Faggin, its 40-pin package marked a departure from Intel's previous policy of resistance to more than 16-pin packaging, and hence it was able to input and output desirable signals such as *Interrupt* and *Reset* on the extra pins. Its inputs and outputs were TTL-compatible. The Retrosshield 8080 must be coupled with the Teensy adapter board (NOT an Arduino Mega [3]) because the 8080 has a minimum clock requirement. The Retrosshield 8080 design files are at [6].

The Retrosshield 8080 can execute the native Intellec 8/Mod 8 ROM-resident monitor [7][8] that supports memory, a PROM programmer, a tape/punch, and a Teletype. An Editor/Assembler for this appears to have been lost. It emulates *CP/M 2.2*, *Altair DOS* and *Altair Extended BASIC*, using the Teensy SDCard as disk. The Retrosshield 8080 software is at [9].

Many thanks to Erturk Kocalar and Brian Coghlan for donating this item.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
 Click '*Accession Index*' (1st column listed) for related folder, or '*About*' for further guidance.
 Some of the items below may be more properly part of other categories of this catalog,
 but are listed here for convenience.

| Accession Index | Object with Identification |
|---|---|
| TCD-SCSS-T.20251216.001 | Arduino shield for Intel 8080. A board that enables execution of software by the 8080, Intel's second and very successful early 8-bit microprocessor, 2025. |
| TCD-SCSS-T.20250918.001 | Intel 8080 microprocessor and associated chips. Intel's second and very successful early 8-bit microprocessor. 1974. |
| TCD-SCSS-T.20251216.009 | Arduino shield for Intel 8085. A board that enables execution of software by the 8085, Intel's successor to their 8080 microprocessor, 2025 |
| TCD-SCSS-X.20250916.001 | Dr.Brian Coghlan's Collection of Early Microprocessors. An extensive and nearly complete set of unused 1970s microprocessor chips, most accompanied with documentation, some with demonstration boards. 1971. |
| | |

References:

1. Erturk Kocalar, *8bitforce*, erturkk@8bitforce.com, see:
<https://8bitforce.com/>
Also: <https://gitlab.com/8bitforce>
Last browsed to on 18-Sep-2025.
2. Erturk Kocalar, *Retrosshield 8080*, see:
<https://www.tindie.com/products/8bitforce/retrosshield-8080-for-arduino-mega/>
Last browsed to on 18-Sep-2025.
3. Arduino, *Arduino MEGA*, see:
<https://store-usa.arduino.cc/products/arduino-mega-2560-rev3>
Last browsed to on 18-Sep-2025.
4. PJRC, *Arduino Teensy*, see:
<https://www.pjrc.com/teensy/>
Last browsed to on 18-Sep-2025.
5. Wikipedia, *Intel 8080*, see:
https://en.wikipedia.org/wiki/Intel_8080
Last browsed to on 18-Sep-2025.
6. Erturk Kocalar, *Retrosshield-HW Design Files*, see:
<https://gitlab.com/8bitforce/retrosshield-hw>
Last browsed to on 18-Sep-2025.
7. Wikipedia, *Intellec*, see:
<https://en.wikipedia.org/wiki/Intellec>
Last browsed to on 18-Sep-2025.
8. Herb Johnson, *Intel MON-80 PROMs and systems*, 2024, see:
https://www.retrotechnology.com/restore/mon80_proms.html
Last browsed to on 18-Sep-2025.
9. Erturk Kocalar, *Retrosshield 8080 Source Code*, see:
<https://gitlab.com/8bitforce/retrosshield-teensy/-/tree/master/t8080>
Last browsed to on 18-Sep-2025.

Intel 8080 Architecture

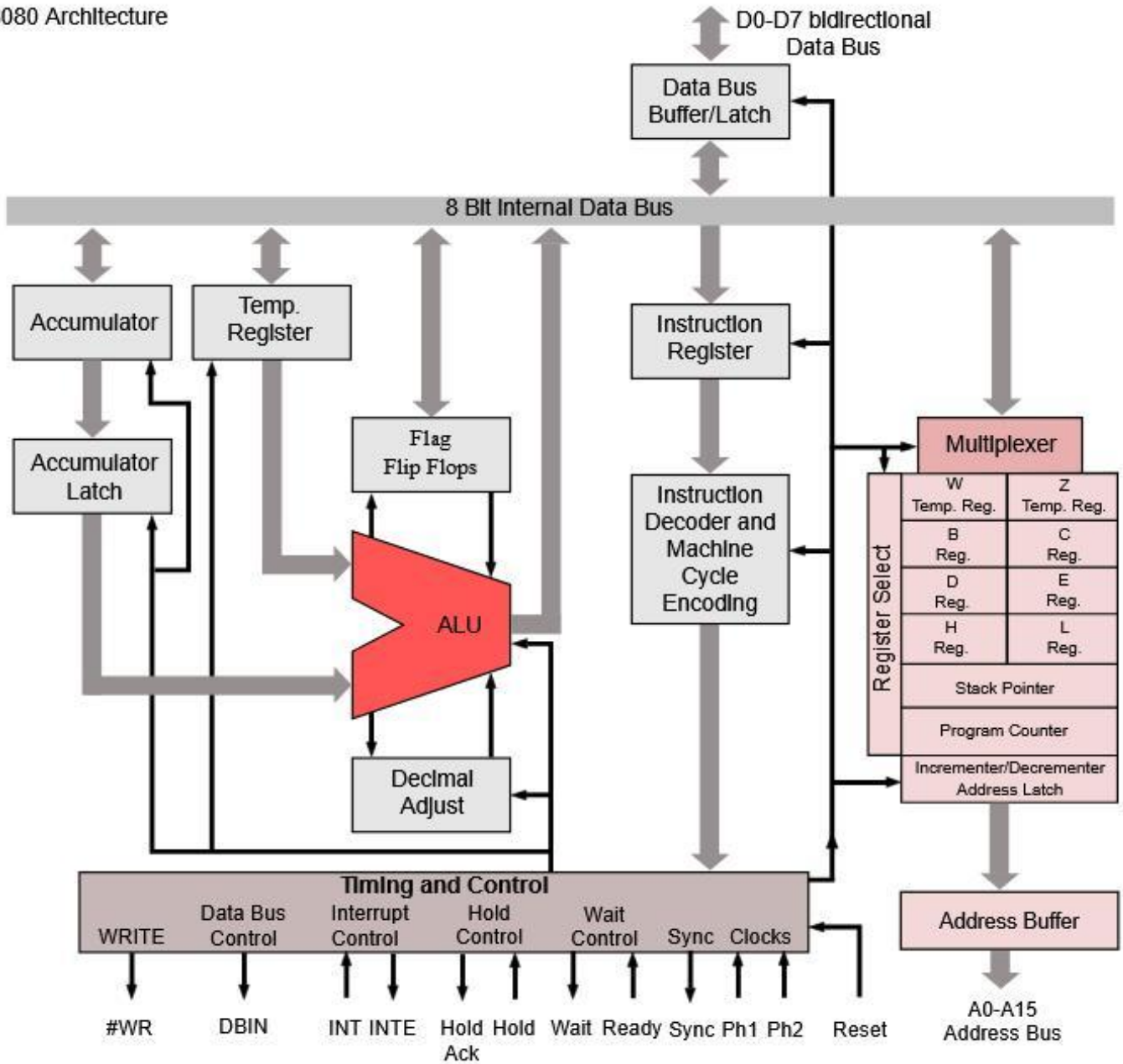


Figure 1: Intel 8080 architecture (from Wikipedia).

Intel 8080 registers

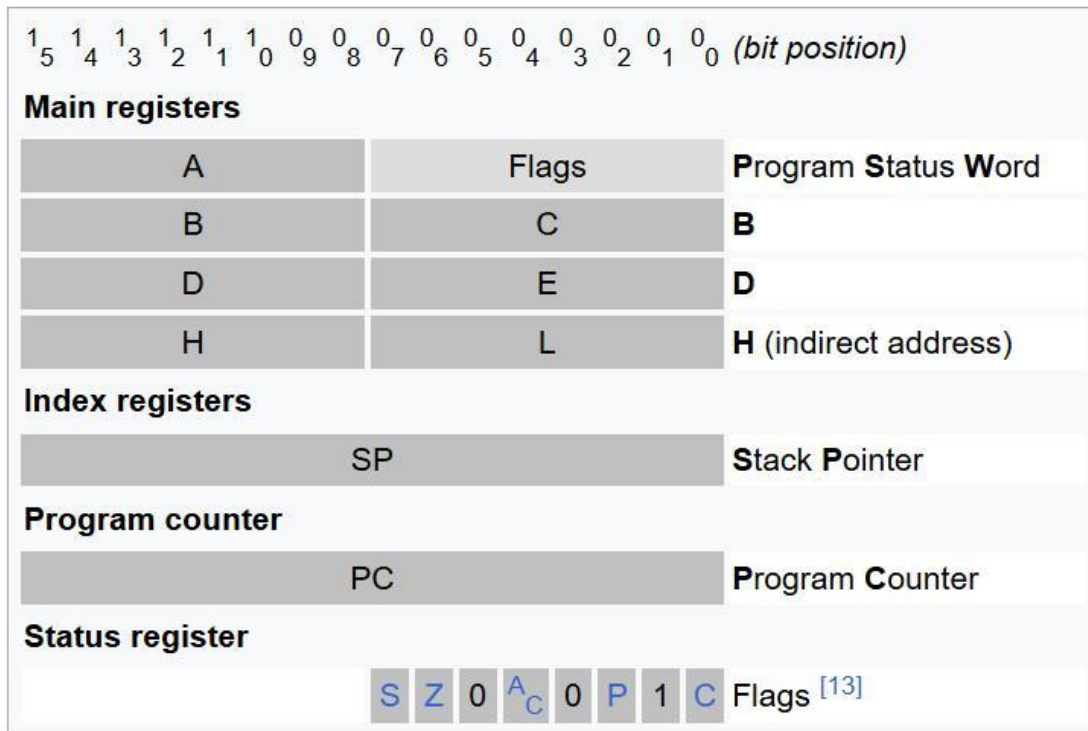


Figure 2: Intel 8080 registers (from Wikipedia).

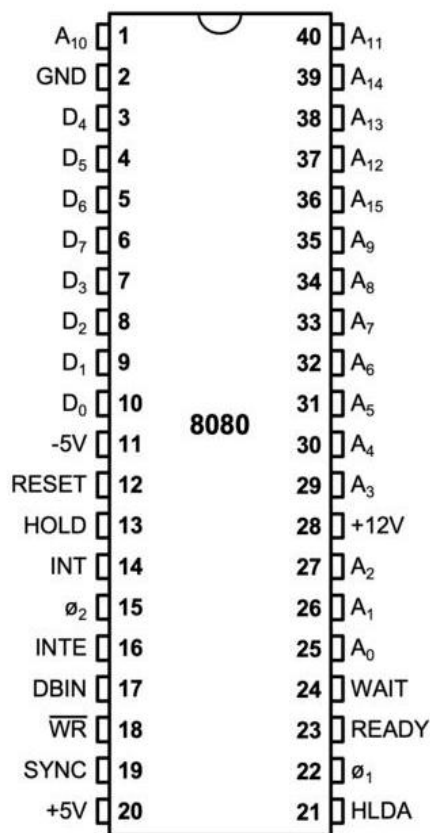


Figure 3: Intel 8080 pinout (from Wikipedia).

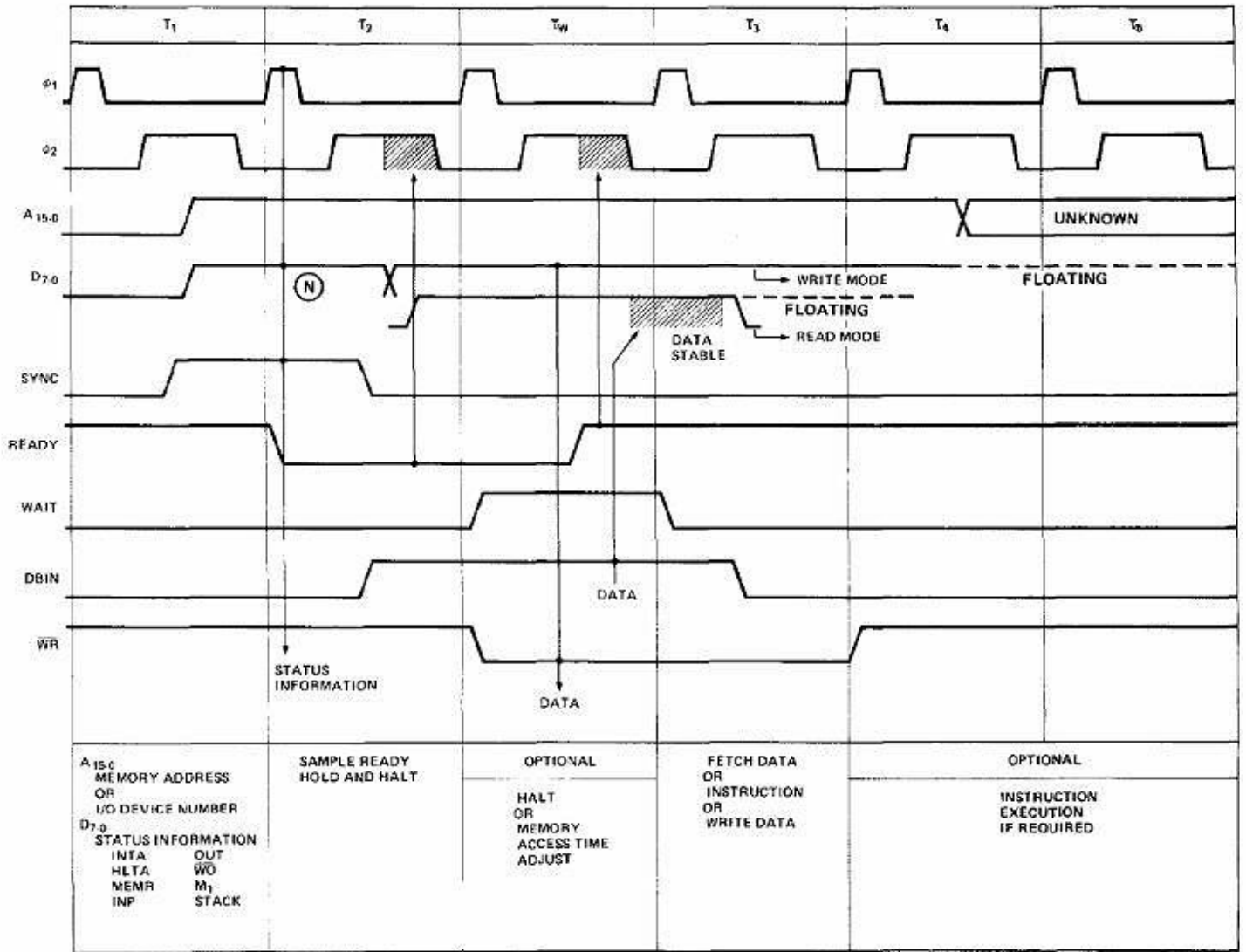


Figure 4: Intel 8080 instruction timing (from Intel datasheet).

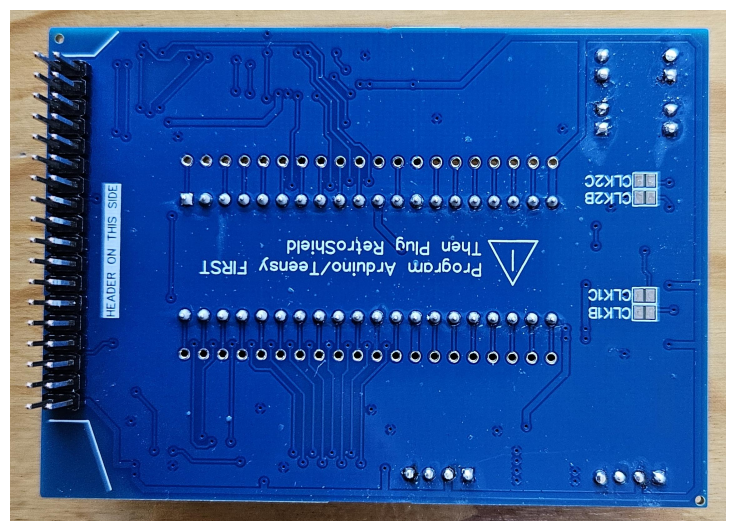
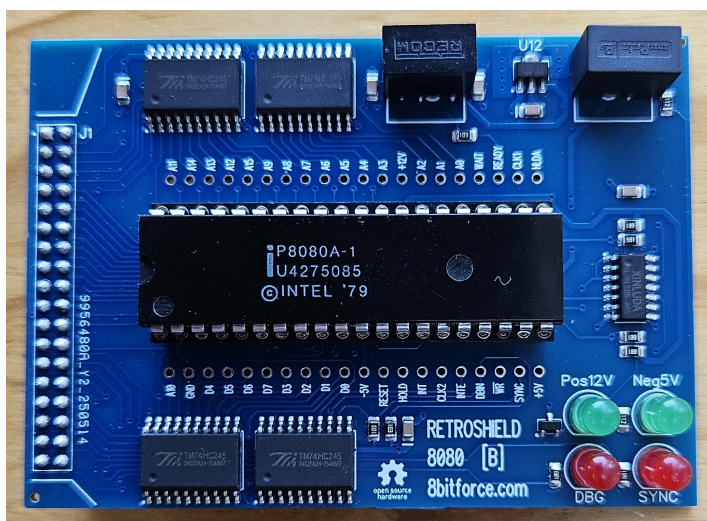


Figure 5: 8bitforce Retroshield 8080.

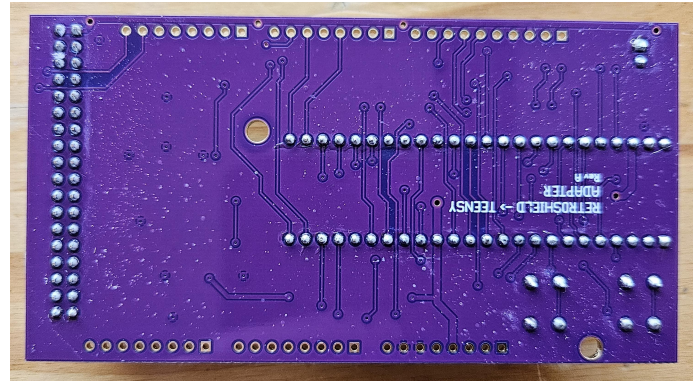
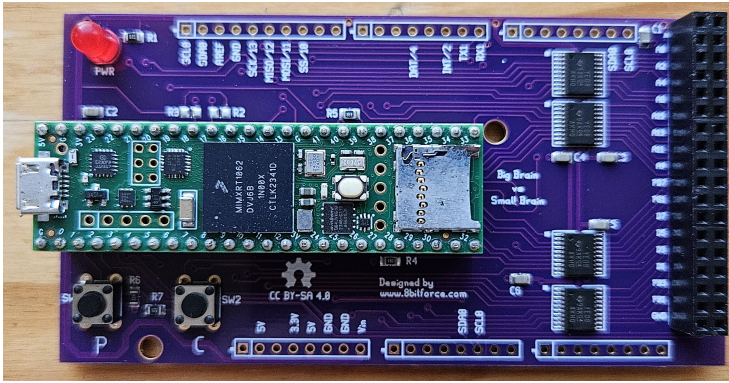


Figure 6: 8bitforce Teensy.

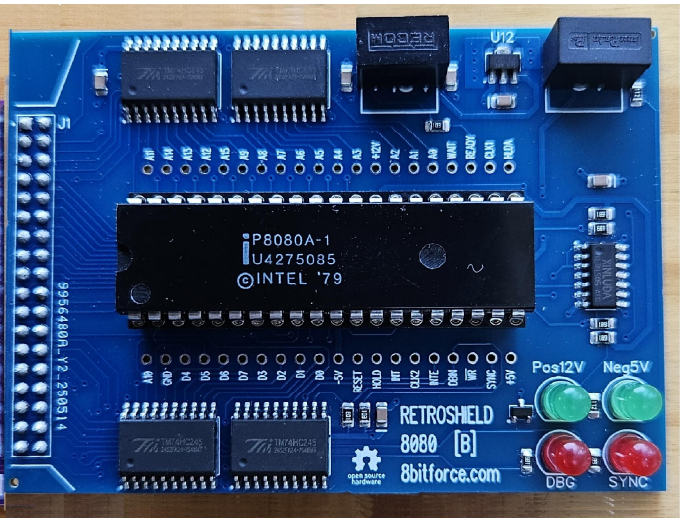
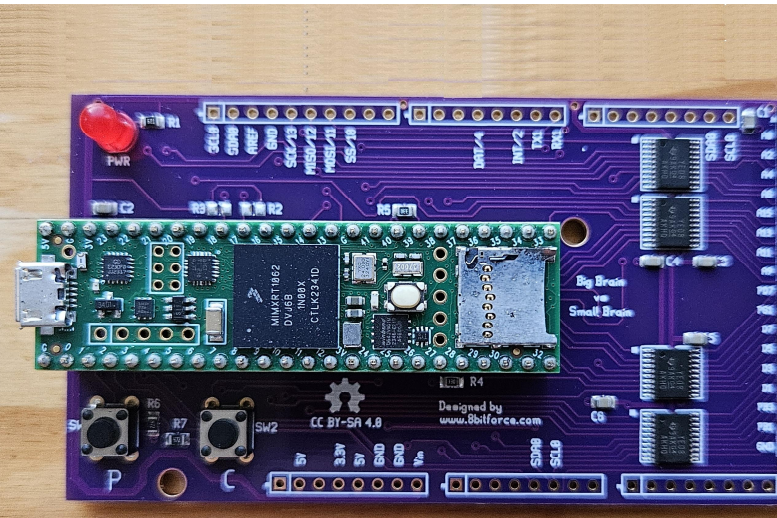


Figure 7: 8bitforce Retroschild 8080 coupled with a Teensy.

RetroShield 8080 Assembly Instructions

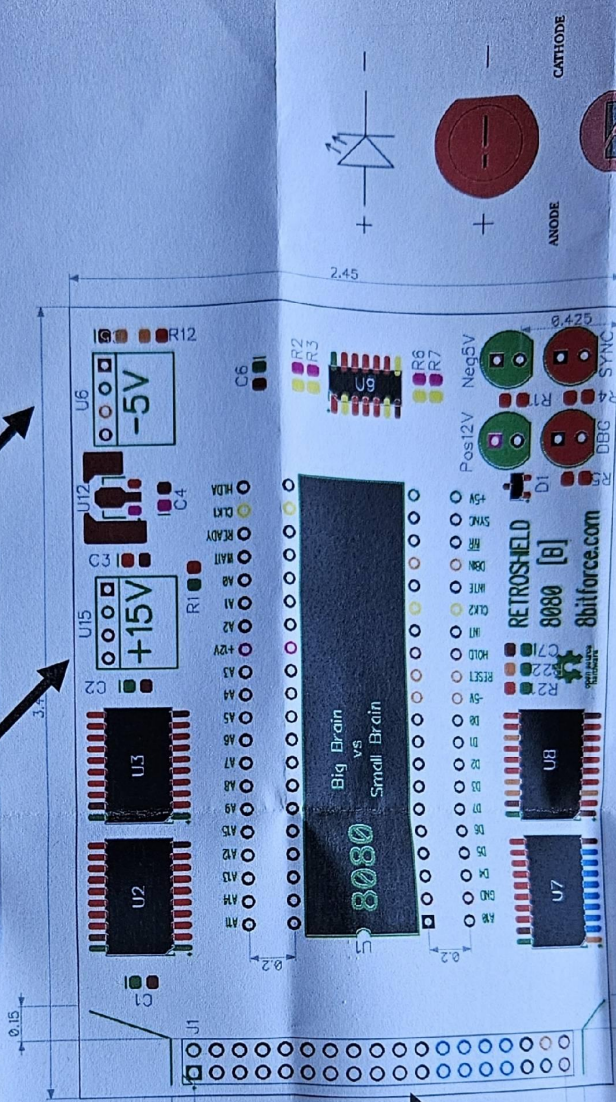
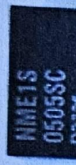
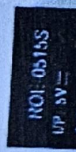
Rev B, 2025/06/12

Copyright 2025, 8BitForce.com

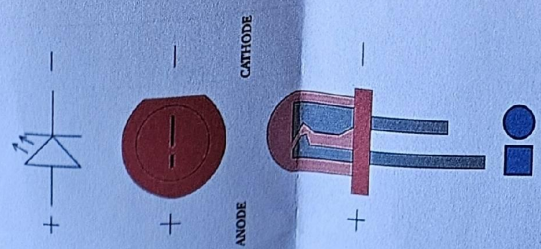
Solder parts from shortest to tallest:

- Socket = U1 socket.
- LEDs = Match colors as shown.
- U15 = DC/DC with "0515" marking.
Markings towards pcb edge.
- U6 = DC/DC with "0505" marking.
Markings towards pcb edge.
- J1 = Goes on bottom side.

"0515" goes to 15V.



LED (+) pin goes to square hole.



Header installed on bottom side.

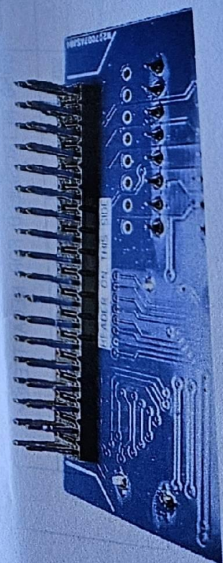
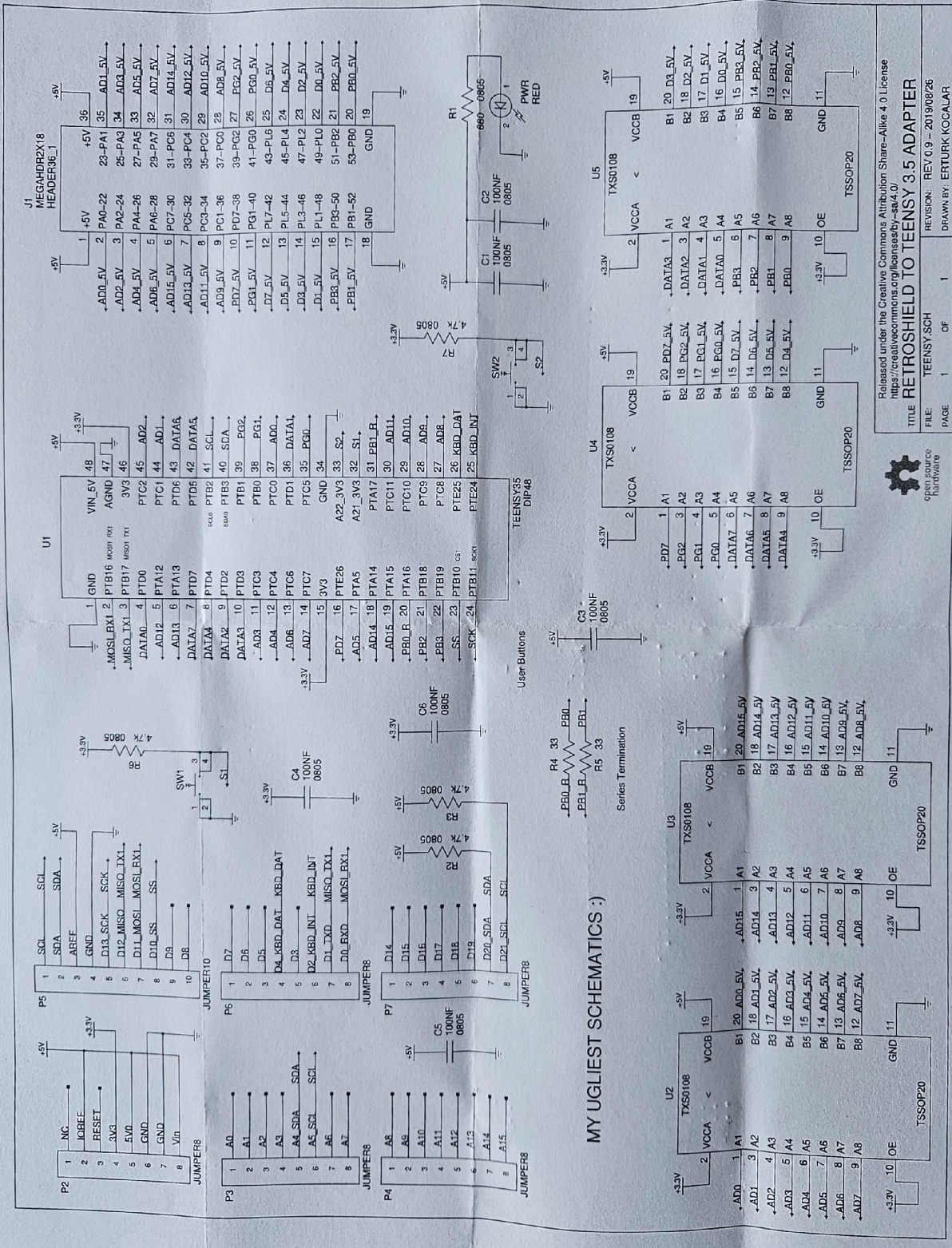


Figure 8: 8bitforce Retrosshield 8080 assembly instructions.



MY UGLIEST SCHEMATICS :)



Figure 10: 8bitforce Teensy schematic.

