

AccessionIndex: TCD-SCSS-T.20251216.010

Accession Date: 16-Dec-2025

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Object name: Arduino shield for National Semiconductor SC/MP

Vintage: 2025

Synopsis: A board that enables execution of software by the SC/MP, NatSemi's earliest 8-bit microprocessors.

Description:

This Retrosshield SC/MP 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 SC/MP [2] is a daughter card that plugs into an Arduino Mega [3] or Teensy [4]. The National Semiconductor SC/MP microprocessor [5] executes native SC/MP code while the Arduino emulates SC/MP system hardware. The choice of emulated SC/MP 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 Arduino Mega is an inexpensive platform with a 16MHz CPU that allows the retrosshield's early microprocessor to run at about up to 400kHz, with over 200kB of emulated ROM and about 6kB of emulated RAM (reserving 2kB for the Arduino stack/heap). Peripherals like a UART, PIA, Timer, etc. can be emulated by the Arduino, and other Arduino *shields* can be used to add new features. The Arduino Mega operates at 5V TTL levels. The retrosshield plugs into the Arduino Mega digital input/output connector.

The Teensy is a more expensive but faster 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 the 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 in the same way that it would into an Arduino Mega digital input/output connector.

National Semiconductor's SC/MP was designed to allow systems to be implemented with the minimum number of additional support chips. There were three generations: the pMOS SC/MP-1, the nMOS SC/MP-2, and later by the nMOS SC/MP-3. This retrosshield is for the SC/MP-2 (ISP-8A/600, also known as INS8060) [5][6]. The SC/MP had a 16 x 4kB paged/segmented memory address space, somewhat like a PDP-8, and index registers, auto-indexed addressing, automatically handled interrupts, included an internal R/C clock oscillator (4MHz on SC/MP-2), and included serial input/output. The SC/MP-2 was fully compatible with the SC/MP-1 in pinout, object code and software. The Retrosshield SC/MP design files are at [7].

The Retrosshield SC/MP can execute *KitBug* [8], *NIBL* [9], and *tiny Basic* [10]. Kitbug and NIBL use software serial I/O routines that assume a 1200/2400 baud rate. The Retrosshield SC/MP software is at [11].

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/>
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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.20251216.010 | Arduino shield for National Semiconductor SC/MP. A board that enables execution of software by the SC/MP, NatSemi's earliest 8-bit microprocessors, 2025. |
| TCD-SCSS-T.20251006.002 | National Semiconductor's SC/MP microprocessors. NatSemi's earliest 8-bit microprocessors. 1976. |
| 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 16-Dec-2025.
2. Erturk Kocalar, *Retrosshield SC/MP*, see:
<https://www.tindie.com/products/8bitforce/retrosshield-SC/MP-for-arduino-mega/>
Last browsed to on 16-Dec-2025.
3. Arduino, *Arduino MEGA*, see:
<https://store-usa.arduino.cc/products/arduino-mega-2560-rev3>
Last browsed to on 16-Dec-2025.
4. PJRC, *Arduino Teensy*, see:
<https://www.pjrc.com/teensy/>
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5. Wikipedia, *National Semiconductor SC/MP*, see:
https://en.wikipedia.org/wiki/National_Semiconductor_SC/MP
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6. National Semiconductor, *SC/MP-2 INS8060 Datasheet*, 1978, see:
<https://www.scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20251216.010/NatSemi-SCMP2-INS8060-datasheet-1978.pdf>
Last browsed to on 6-Oct-2025.
7. Erturk Kocalar, *Retrosshield-HW Design Files*, see:
<https://gitlab.com/8bitforce/retrosshield-hw>
Last browsed to on 16-Dec-2025.
8. National Semiconductor, *SC/MP Kit Users Manual*, March 1976, see:
<https://www.scss.tcd.ie/SCSSTreasuresCatalog/hardware/TCD-SCSS-T.20251216.010/NatSemi-4200113A-SCMP-Kit-UsersManual-Mar1976.pdf>
Also see [9].
Last browsed to on 6-Oct-2025.
9. Wikipedia, *NIBL*, see:
<https://www.moria.de/tech/scmp/software/>
Last browsed to on 6-Oct-2025.
10. Wikipedia, *Tiny BASIC*, see:
https://en.wikipedia.org/wiki/Tiny_BASIC
Last browsed to on 6-Oct-2025.
11. Erturk Kocalar, *Retrosshield SC/MP Source Code*, see:
<https://gitlab.com/8bitforce/retrosshield-arduino/-/tree/master/k8060>
Last browsed to on 16-Dec-2025.

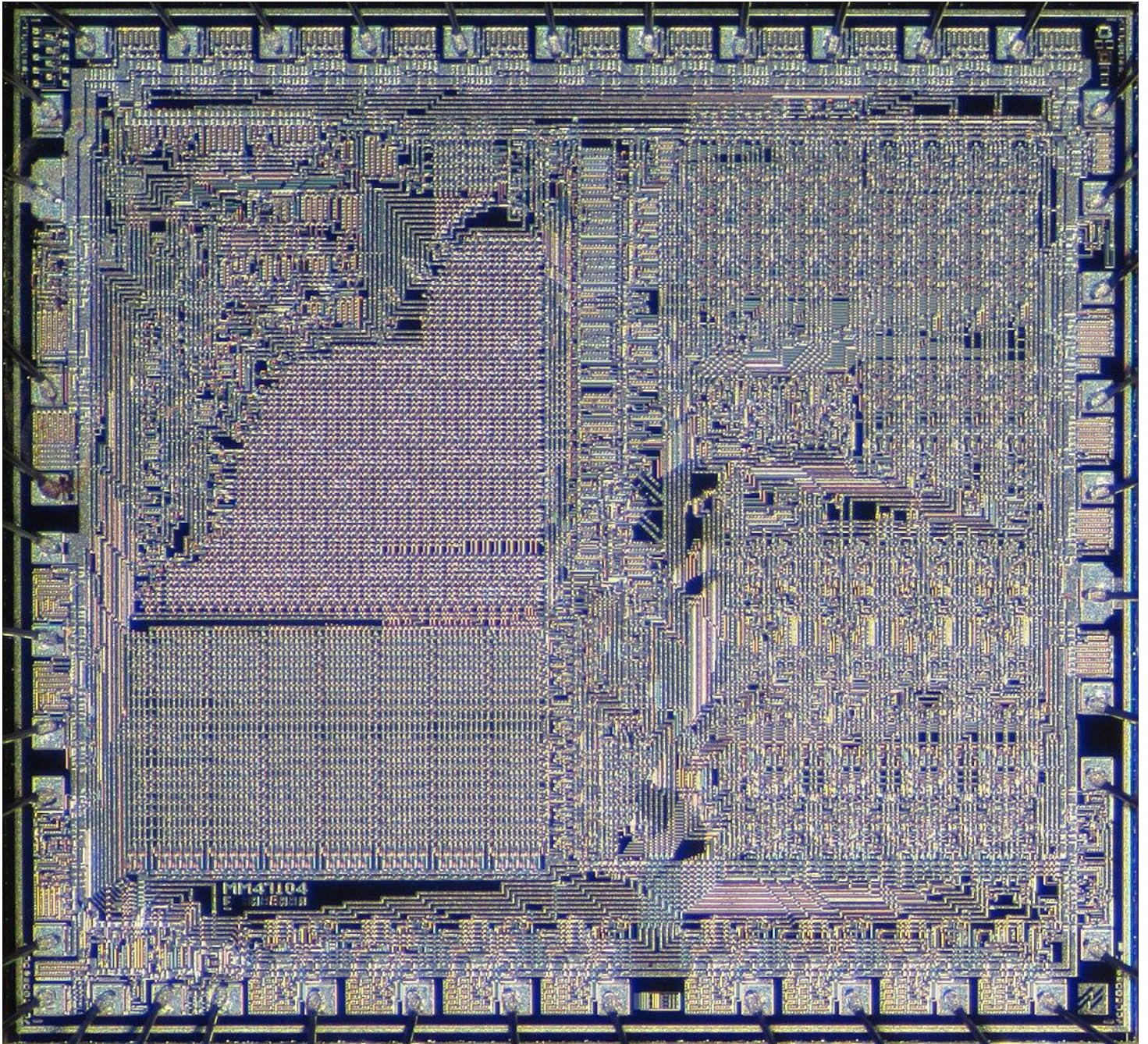


Figure 1: National Semiconductor SC/MP-2 (INS8060) micrograph (from Wikipedia).

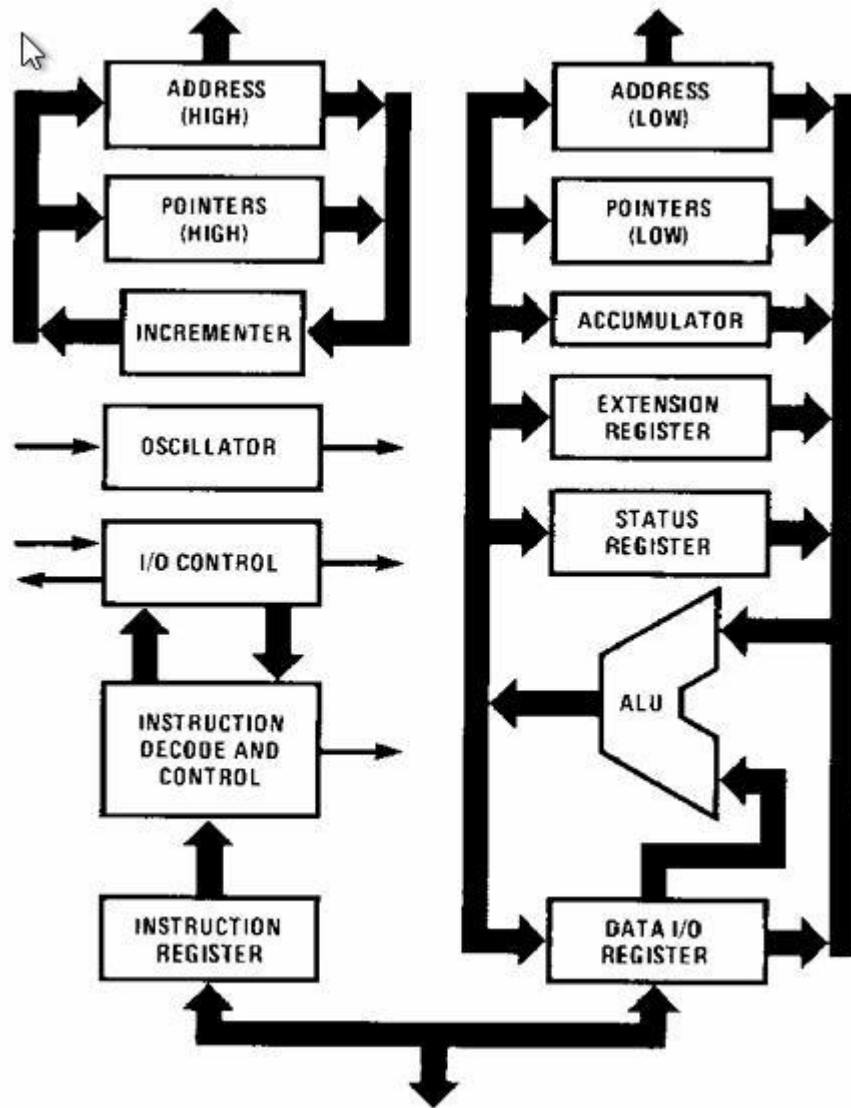


Figure 2: National Semiconductor SC/MP architecture (from datasheet).

NS SC/MP registers

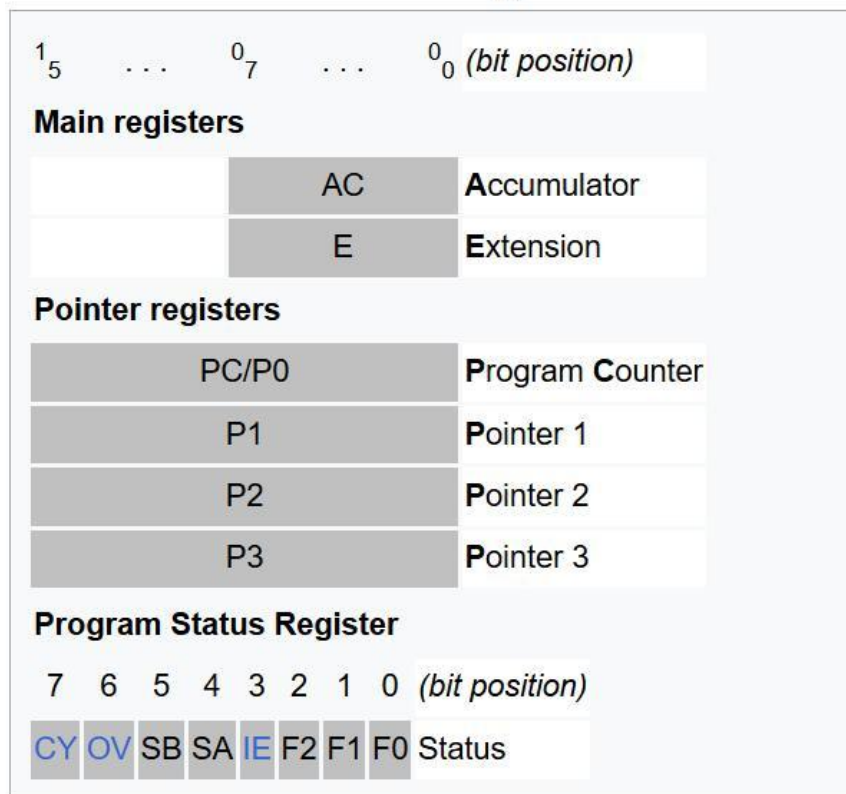


Figure 3: National Semiconductor SC/MP registers (from Wikipedia).

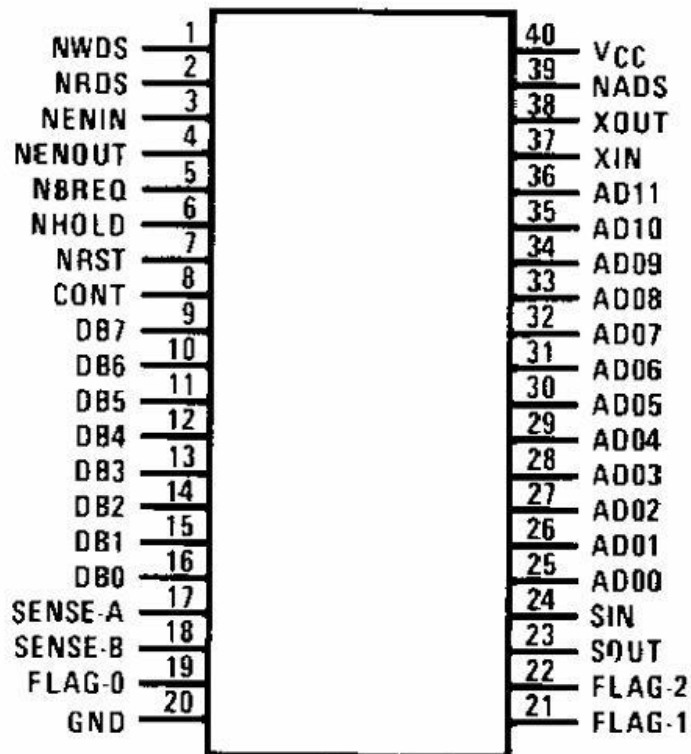


Figure 4: National Semiconductor SC/MP pinout (from datasheet).

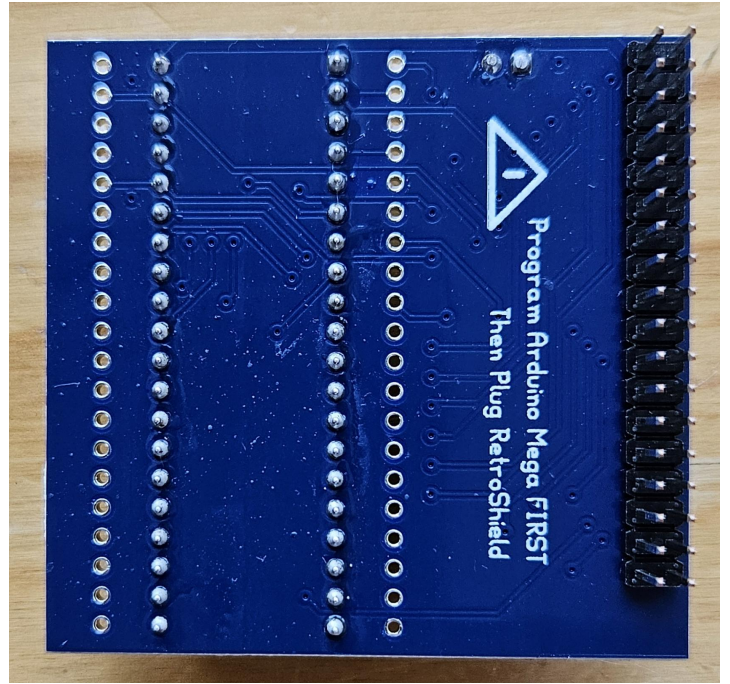
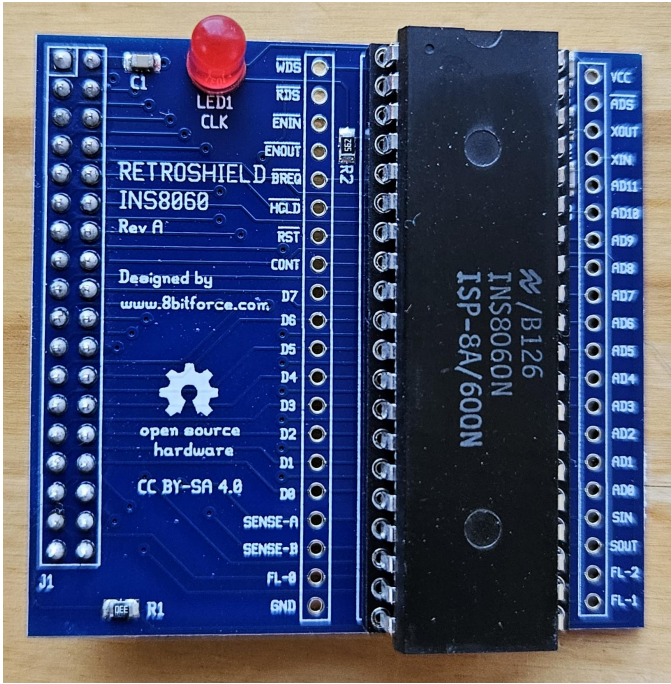


Figure 5: 8bitforce Retrosshield SC/MP.

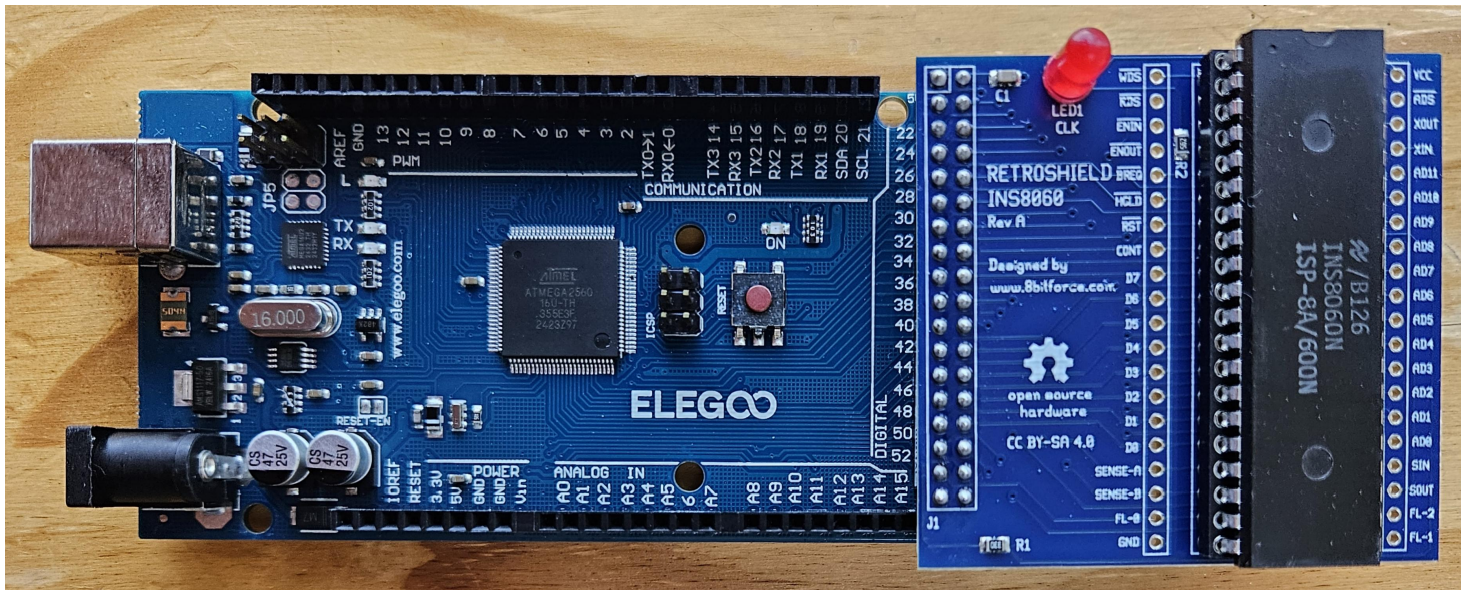


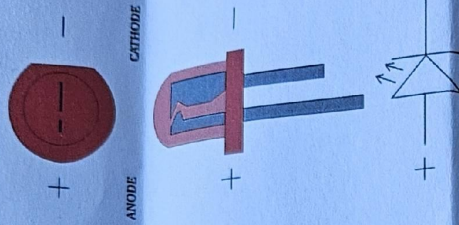
Figure 6: 8bitforce Retrosshield SC/MP coupled to an Arduino Mega.

RetroShield SC/MP II Assembly Instructions
 Rev A, 2023/10/02
 Copyright 2023, 8BitForce.com

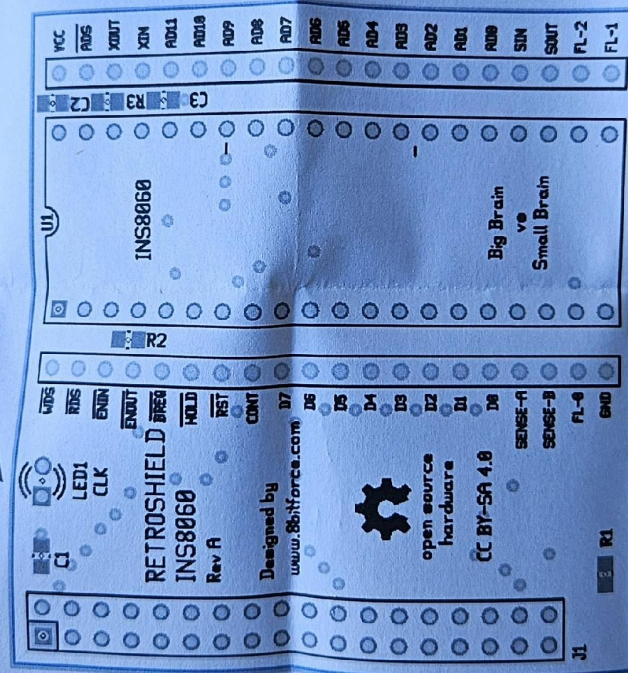
8060:
 Solder parts in this order:
 C1 = 100nF
 C2 = 100nF
 C3 = 22pF
 R1 = 33 ohm
 R2 = 5.6 kohm
 R3 = 680 ohm

U1 socket
 J1 header
 LED1 = Red

LED (+) pin goes to square hole.



https://commons.wikimedia.org/wiki/File:%2B-_of_LED_2.svg



Probe points

If you want to attach headers, then be careful b/c access to SMD components will be difficult.

Figure 7: 8bitforce Retroshield SC/MP assembly instructions.

