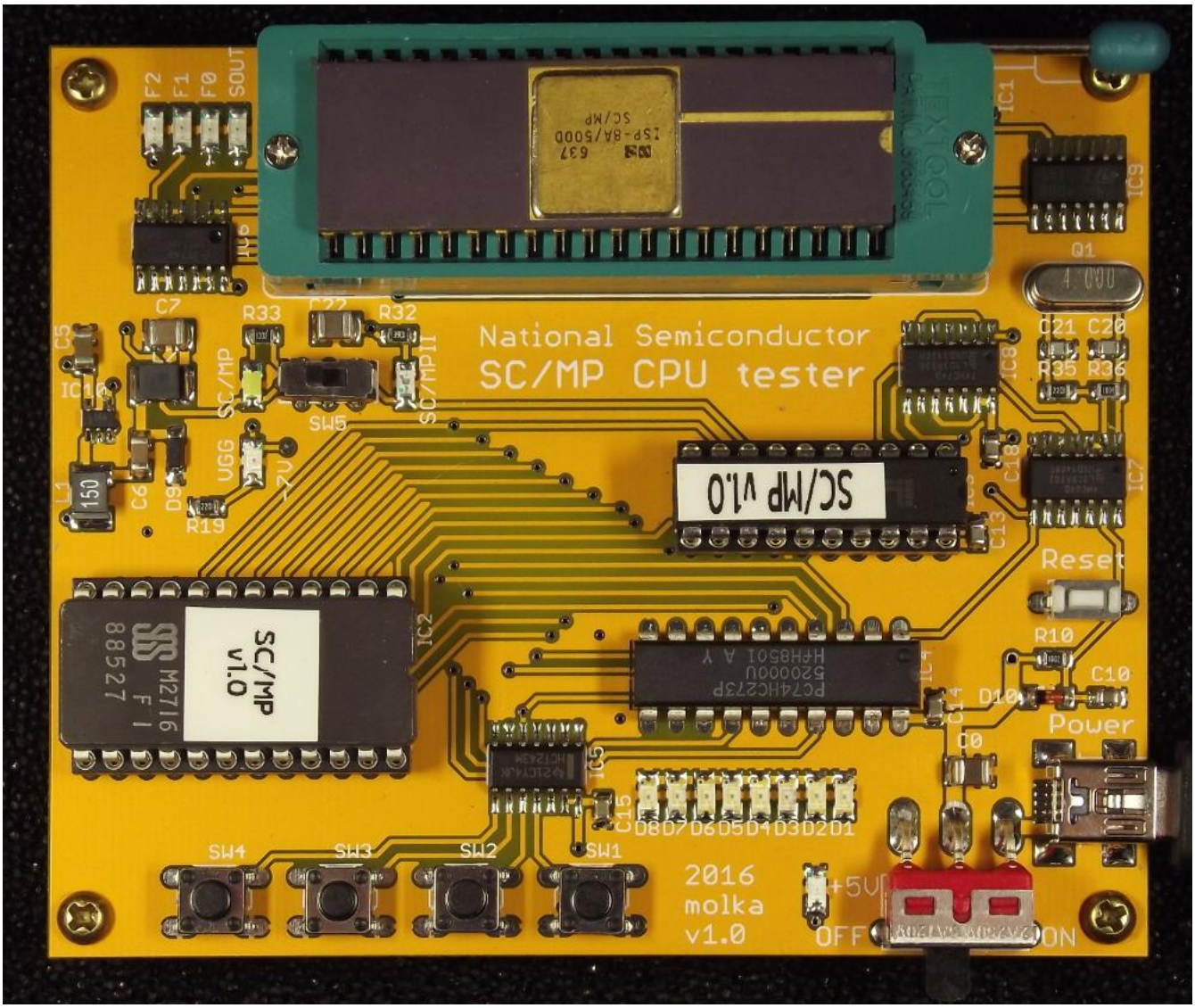
# National Semiconductor
# SC/MP and SC/MP II




# SC/MP CPU Test board
# User's Manual

**2016-Jan-24 Ver.1.0**
**by molka**

# Overview

The SC/MP test board is intended to test the working condition of SC/MP (ISP-8A/500) or SC/MP II (INS8060 - ISP-8A/600) CPUs.
The board consists of the base components of SC/MP test system:

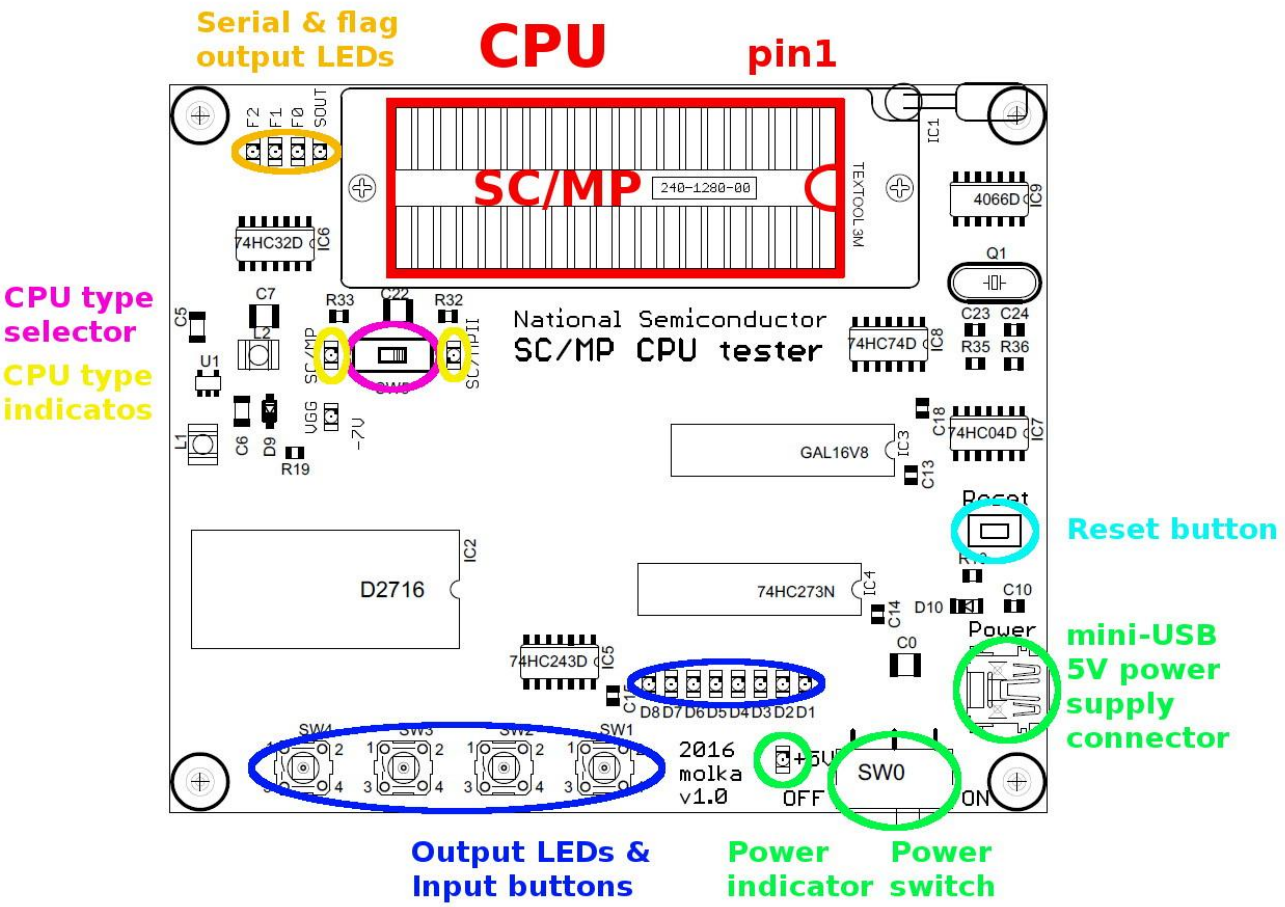
- 40-pin ZIF socket – for SC/MP CPU – provides easy replacement of the CPUs.
- 4MHz crystal oscillator for generating 1 or 2 MHz system clock.
- Single 5V power for SC/MP II CPUs and a DC/DC converter providing -7V +5V power for SC/MP

Only one switch (SW1) is required for SC/MP and SC/MP II CPU type selection. The SC/MP and SC/MP II are architecturally the same; however the SC/MP is manufactured in NMOS and supports a higher clock the original PMOS SC/MP. The supply voltages are different because of the difference in manufacturing process (NMOS vs. PMOS).

A 2716 2KB EPROM holds the test program. This program supports 4 push buttons as inputs, and 8 LEDs, as output devices. It also provides basic and special feature test routines.

The board requires a single +5V power supply (400mA) provided through a mini-USB connector.
There is a power switch and power indicator LED in the upper left corner of the test board.

# Board layout and parts




- **Mini-USB 5V Power Supply Connector:** The board consumes around 400mA current so a computer USB connector or cell phone charger that can provide at least 500mA should be used as power source.
- **Switch:** Power supply can be turned on and off by the sliding switch at the bottom right corner.
- **Green LED:** Next to the power switch, indicates the power level of +5V.
- **Reset Button:** The board contains a Power-Up reset circuit, but may be reset manually by pressing the Reset button.
- **40-pin ZIF socket**: for the SC/MP CPU. Ensure proper CPU orientation!!! The pin-1 is at upper-right corner, next to the release lever of the socket.
- **CPU Type Selector** (**SW5**) provides the proper settings of the CPU to be tested. (Ensure switch is set correctly for the CPU to be tested, or damage may occur)
- **Red LEDs:** Labeled **SOUT**, **F0**, **F1**, **F2**, indicate the status of the CPUs serial output and flag outputs.
- **Eight Output LEDs:** – Show simple animations, flashes – indicate that the CPU is working.
- **Four Push Buttons:** Used for testing inputs and changing animation sequences.

# Usage

- Before changing the CPU in the ZIF socket, make sure the power is off. The power indicator LED should be off!
- Set CPU type selector (**SW5**) according to the CPU to be tested. Slide **SW5** to left for SC/MP or slide **SW5** to right for SC/MP II CPU. Take extra care of setting SW5 properly! **Wrong setting of SW5 may cause damage to the tested CPU and the test board.**
- Place the CPU into the socket (socket lever should be in the **UP** position). Ensure proper orientation to prevent damage to the test board and CPU! Pin 1 must be at the upper-right corner, next to the release lever of the ZIF socket. Then lock the socket by moving the lever down into the lock position.
- Connect the power through the USB connector and switch the power switch to ON.
- The green power indicator LED and the selected CPU type indicator LED should be illuminated.
- If the CPU is in working condition the 8 output LEDs should be flashing (1s on/1s off pattern).
- At this point the CPU can be considered WORKING. Congrats!

## Base function test

- When you press any of the four push buttons (SW1 – 4) the output LEDs copy the state of the buttons, duplicated in the low and high nibbles.
- Releasing the buttons causes one of the four different animation sequences to start, corresponding to the button released last.

## Special feature test

This test checks the SC/MP CPU's serial output/input, flag output and sense input pins.
To activate the special feature test **SW1** and **SW4** should be pressed together and held for about 3 seconds.

- First **SOUT** and **SENSE A** pins are tested. **LED SOUT** should flash, and the result is shown on **LED D1** & **D5**.
- Then the **FLAG 0** and **SIN** pins are tested. **LED F0** should flash, and the result is shown on **LED D2** & **D6**.
- Finally **FLAG 1** and **SENSE B** pins are tested. **LED F1** should flash, and the result is shown on **LED D3** & **D7**.

D1 – **SOUT / SENSE A** pins work correctly.
D2 – **FLAG 0 / SIN** pins work correctly.
D3 – **FLAG 1 / SENSE B** pins work correctly.

D5 – in case of failure.
D6 – in case of failure.
D7 – in case of failure.

## Troubleshooting

- After connecting the power supply the power indicator LED remains off.
  Turn off the power immediately!

  This may be caused by:
  - The power supply is unable to provide enough current. Check that it can provide at least 400mA. (500-600mA recommended)
  - Thin, poor quality USB cable can also cause this problem.
  - There is short-circuit (fault) in the CPU.

- The 8 output LEDs do not start flashing.
  - Press the Reset button. If the output LEDs continue to remain off then the CPU may be faulty.
  - The CPU Type switch (**SW5**) is not set properly, ensure it matches the CPU to be tested.

## Tested CPUs:

| Manufacturer | Variant |
| --- | --- |
| National Semiconductor | SC/MP - ISP-8A/500D |
| | SC/MP II - INS8060N / ISP-8A/600N |

Other compatible** CPU’s should be testable as well, but have not yet been verified.

**Signetics was the authorized second source for the SC/MP and SC/MP II line but there is no evidence they actually produced any.

## Thanks to CPUShack for review and advises!

Feel free to write an e-mail to me at molnar.kalman@freemail.hu or send a PM to molka at CPU-World forum if you have any question.