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MCS-8

i8008 CPU Test System
User's Manual

Overview

The MCS-8 test-system is intended to test the working condition of an Intel MCS-8 system's i8008 and compatible CPUs.

The MCS-8 test-system contains two boards.
- **mM8008-1 CPU board**:
  - **18-pin ZIF socket:** For i8008 CPU – provides easy replacement of the CPUs.
  - **Mini-USB power connector:**
    The test-system requires a single +5V power supply (300mA) provided through a mini-USB connector. The CPU board contains the DC-DC converter needed for providing the -9V power required by the CPU. There is a power failure indicator and short-circuit protection implemented on the board.
  - **Power switch**
  - **Indicator LEDs:** Power Good, Power Failure and SYNC signal.

- **mM8008-2 Test Board:**
  - (**RE)START Push button:** Start/Restart the test program.
  - **3-bit DIP switch (SW6):** Selects restart vector from 0 to 7.
  - **4 push buttons:** Input devices for selecting test pattern or other uses.
  - **8 LEDs**: Output devices.
  - **28 pin socket:** Supports a 2KB (2716) or 8KB (2764) EPROM that holds the test program. Selected by **JP1**
  - **STOPPED LED:** Indicated CPU is in the STOPPED state.

Test-system board layout and components
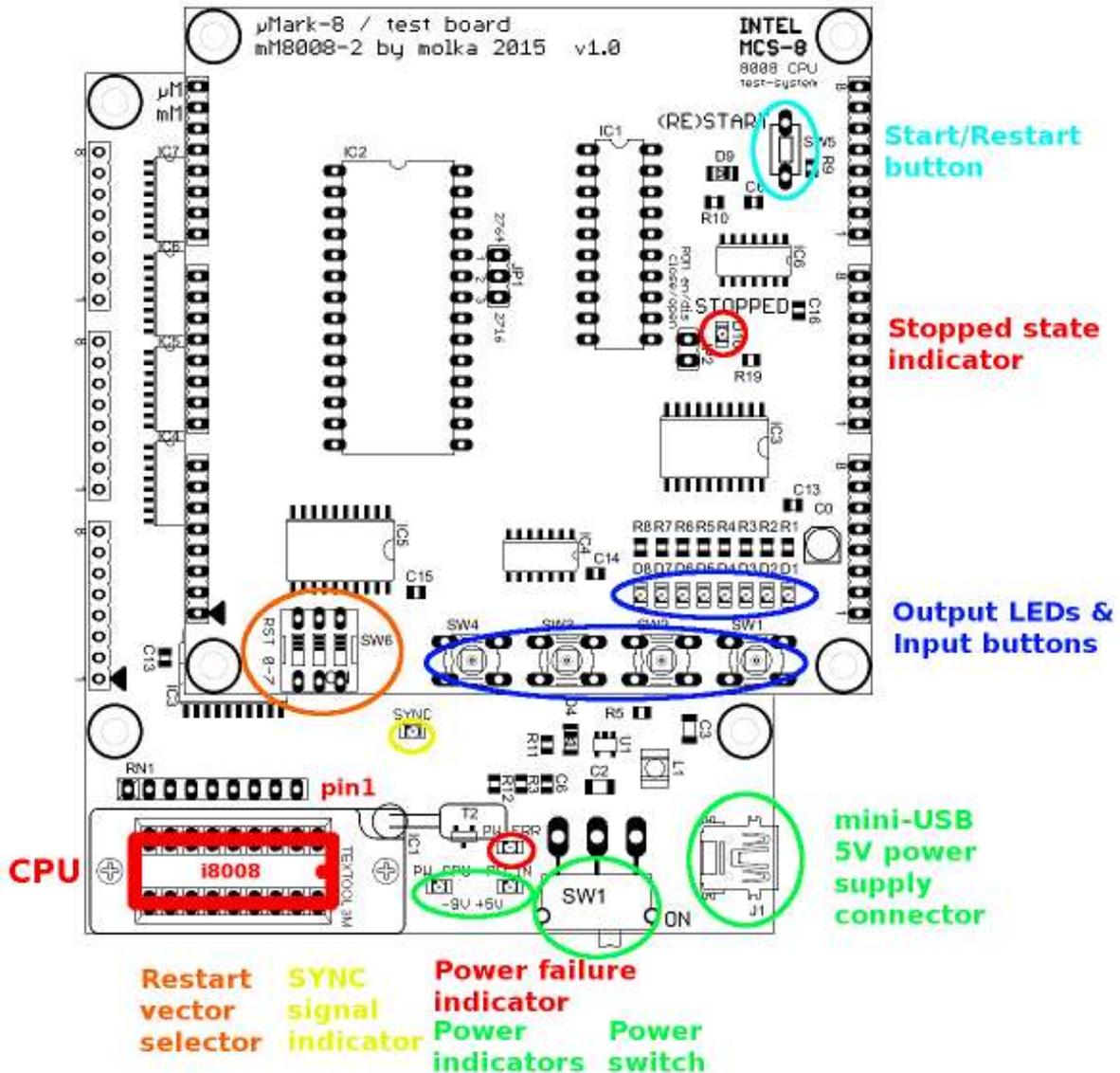
- **Mini-USB 5V power supply connector:** The test-system consumes around 300mA current so a computer USB connector or cell phone charger, that can provide at least 500mA (**800mA – 1A is recommended**), can be used as a power source.
- **Power switch, at the bottom right corner**: Turns off all power to the board.
- **Two LEDs, next to the power switch:** Indicate power level of +5V and -9V.
- **Red LED, above the power indicator LEDs:** Indicates power failure.
- **18-pin ZIF socket for the i8008 CPU:** Ensure proper CPU orientation!!! The pin-1 is at the upper-right corner, next to the release lever of the socket.
- **SYNC LED, upper the ZIF socket:** Indicates if the CPU generates the *synchron* signal.
- **3-bit DIP switch:** Selects the CPU restart vector. *The test program is at vector 0.*
- **(RE)START push button:** Triggers an interrupt signal to start the test program.
- **Eight output LEDs:** Shows simple animations/flashes to 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 (either unplug the USB or use the power switch). Both power indicator LEDs should be off!
– Place the CPU into the socket. Ensure proper orientation to prevent damage to the test board and/or 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 level down into the lock position.
– Connect the power through the USB connector. Turn on the power by sliding the power switch to the right.
– The two power indicator LEDs should be illuminated.
– When an i8008 CPU is powered it starts generating a synchronization signal (indicated by SYNC LED) and goes into the stopped state (indicated by STOPPED LED)
– To start executing program code the i8008 CPU must receive an interrupt request. The test program is at restart vector 0, so set the DIP switch (SW6) accordingly.
– Push the RE(START) button to start the test program execution.
– 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!
– 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.

Troubleshooting

– After connecting the power supply the power indicator LEDs remains off or power failure indicator LED is illuminated. **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 500mA. **(800mA to 1A recommended)**
   – Thin, poor quality USB cable can also cause this problem.
   – There is short-circuit (fault) in the CPU.

– The SYNC LED and STOPPED LED are not illuminated.
   – Check the CPU pins, if they are dirty or dusty clean them, and try testing again.

– The 8 output LEDs do not start flashing.
   – Press the (RE)START button. If the output LEDs continue to remain off then the CPU may be faulty.

HW settings

The mM8008-2 test control board contains a socket for an EPROM holding the test program. The supported EPROM types are 2Kbyte (2716) or 8Kbyte (2764). **JP1** must be set according to the inserted EPROM type. (Default is 2716). 2716 must be inserted in the **lower 24 pins** of the socket. The EPROM is mapped at memory address 0000h and can be enabled or disabled with **JP2**. (Default is closed, meaning enabled)

SW1-**SW4** push buttons are the input device of the test program. They are at I/O address 7. So they can be accessed by IN 7 instruction.
D1-**D8** LEDs are the output of the test program. They are at I/O address 31, therefore they can be accessed by OUT 31 instruction.

SW6 3-bit DIP switch is for the restart vector selection. The board triggers an interrupt and forces the selected restart instruction when the (RE)START button is pressed.

The CPU test program can be executed by selecting **RST0** with the **SW6** DIP switch and triggering an interrupt by pressing the (RE)START button.

Restart instruction	SW6 DIP switch	Action	D1-D6 LEDs
RST0		Continues LED animation selected by SW1-SW4	
RST1		LED D2 lighted CPU in STOPPED state	
RST2		LED D3 lighted CPU in STOPPED state	
RST3		LED D4 lighted CPU in STOPPED state	
RST4		LED D5 lighted CPU in STOPPED state	
RST5		LED D6 lighted CPU in STOPPED state	
RST6		LED D7 lighted CPU in STOPPED state	
RST7		LED D8 lighted CPU in STOPPED state	
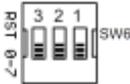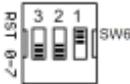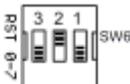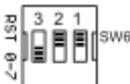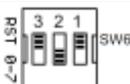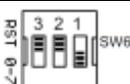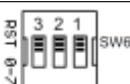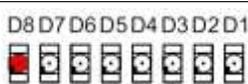
Tested CPUs:

Manufacturer	Variant
Intel	C8008, C8008-1, D8008, D8008-1

Clones:

Microsystems International	MF8008R
Siemens	SAB8008-1C
MME	U808D

Thanks to CPUShack for review and advice!

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.