The Retro Hacker - TRHMSX – Quick Usage Guide – Rev 1.6

Just like you, I love MSX, and this computer was carefully built in my lab for you. I don't make a living selling these things on the Internet, it's my hobby, and all the profits go to building new projects and keeping MSX alive.

Please, if you have any problems with the computer, let me know immediately. I want you to have the same experience I want for me as a buyer.

This MSX2+ FPGA-based hardware represents a straightforward implementation, taking inspiration from the original 1chipMSX circuit, but featuring several improvements and a new PCB design for enhanced functionality.

TRHMSX Features:

- **MSX2+ compatibility:** Replicating the MSX2+ architecture, ensuring compatibility with a wide range of software and games.

- **Expanded Memory Options:** Choose between 2MB or 4MB of mapped RAM, providing flexibility for diverse computing needs and applications.

- **9958 Video Processor (VDP):** Incorporating the VDP 9958 for crisp graphics and enhanced visual performance, providing an authentic MSX experience.

- **FM & SCC Sound Capabilities:** Featuring FM synthesis and SCC sound to reproduce the iconic audio characteristics of MSX systems, enhancing the overall gaming and multimedia experience.

- **Programmable Sound Generator (PSG):** Including the original PSG for standard MSX audio output.

- **Keyboard Compatibility:** Support for USB keyboards.

- **MicroSD Card Support:** Integration of a microSD card slot for convenient storage and easy access to files, games, and software.

- **MSX Cartridge Slots:** Equipped with two MSX cartridge slots, allowing users to explore a vast library of MSX cartridges for a wide range of applications and games.

- **Dual Joystick Ports:** Featuring two joystick ports for multiplayer gaming and compatibility with classic MSX peripherals.

- **Wireless Network Support:** Incorporating support for wireless networking through ESP8266, enabling online connectivity and expanding possibilities for networked applications.

- **12V Cartridge Lines:** Providing dedicated 12V lines for cartridges, ensuring compatibility with a variety of peripherals and accessories.

- **MIDI Output:** Generates MIDI output via Joystick Port 2 (requires a custom cable and MIDI player).

This guide is designed to help you get started with setting up and using your new computer. It comes already configured with 2MB of RAM and a pre-configured microSD card that has MSXDOS 2 and the

latest version of SofaRUN ready to use. I've even included some ROM files from my own collection so you can immerse yourself in the MSX experience from the get-go.

Power Supply

Your computer is equipped with a 5/6V 2A (center positive) power supply, which is connected via a 2.1mm jack. It is essential to exercise caution if you consider using a different power source, as connecting power supplies with higher voltages can damage the computer, leading to the need for repairs. Always use the supplied power supply or an equivalent one (5/6V 2A) to ensure the safety and proper operation of your computer.

Configuration (Dipswitch)

On your computer, you'll notice an eight-position dip switch (in red). This handy feature allows you to customize various settings for your TRHMSX. Please refer to the table below for a detailed description of each available configuration.

DIP-SW	FUNÇÃO	OPÇÃO	DESCRIÇÃO
1	CPU Clock	OFF	Standard mode 3.58MHz
		ON	Custom Speed Mode 4.10MHz to 8.06MHz (10.74MHz on the system bus) • Press the [F12] key to change the clock type (3.58MHz >> 5.37MHz >> Custom Speed) • The external clock is set to [Sync to CPU] by default • [Turbo Pana] is 5.37MHz as the original specification • A special hybrid clock [Turbo MegaSD] is enabled by default
2/3	Video Output	OFF/OFF	S-Video • NTSC, 50Hz+60Hz, interlaced video signal
		OFF/ON	RGB with audio output (a mono signal inside the video cable) • 15kHz, 50Hz+60Hz, interlaced video signal, requires a VGA to SCART cable
		ON/OFF	VGA mode for LED TV or LED Display • 31kHz / 50Hz+60Hz progressive video signal with the ability to set the pixel ratio 1:1 at 60Hz
		ON/ON	VGA+ to Monitor Mode (Legacy Output) • Progressive video signal 31kHz / 50Hz+60Hz / SETSMART -D0 must be run to force 60Hz
4	Cartridge Slot-1	OFF	External Slot-1 • Recommended as standard
		ON	Internal ESE-MegaSCC+ 1024kB (shared with the second half of Slot-2 ESE-MegaSCC+) • External Slot-1 is disabled • Memo: the CMT toggle is the [Scroll Lock] key (disabled by default)
5/6	Cartridge Slot-2	OFF/OFF	Slot-2 External • Recommended as standard
		OFF/ON	ESE-MegaRAM ASCII-8K 1024kB Internal • External Slot-2 is disabled
		ON/OFF	ESE-MegaSCC+ 2048kB Internal • External Slot-2 is disabled
		ON/ON	ESE-MegaRAM ASCII-16K 2048kB Internal • External Slot-2 is disabled
7	Internal mapper	OFF	2048kB Internal RAM • Recommended as standard
		ON	4096kB Internal RAM
8	microSD card	OFF	Disabled
		ON	Enabled • Recommended as standard

By default, your computer is set to 3.58Mhz, to generate VGA video with 31Khz, enable the microSD card and have 2 MB of RAM. If you want to modify these settings, simply adjust the positions of the corresponding dipswitches. The default position of each dipswitch is shown in gray.

Video Output

By default, your computer is configured for VGA video output at 31Khz (dipswitches 2/3 in ON/OFF), which provides the best video quality for TRHMSX. This setting is recommended. The VGA standard is supported by most LED/LCD displays with a DH15 connector. For displays that only support HDMI, you can use a VGA-to-HDMI converter for optimal results.

The S-Video output also offers excellent quality and can be activated by changing switches 2 and 3 to the OFF position.

Keyboard

TRHMSX is compatible with most USB keyboards available on the market.

Although several USB keyboards have been successfully tested on the computer without any issues, it is not possible to guarantee compatibility with all USB keyboards. It is advisable to avoid gaming keyboards or those that do not adhere to USB standards, such as those that require special drivers to operate on Windows, as they are likely to be incompatible with TRHMSX.

There are a few keyboard shortcuts that can be used with TRHMSX, the following table documents these shortcuts:

Key or Combination	Function
END	MSX STOP key
ALT	MSX GRAPH key
Windows	Space (when playing, it is recommended to use the Windows key to shoot instead of space to avoid problems with diagonally moving objects)
F6	MSX GRAPH key
F7	MSX KANA key
F8	MSX SELECT key
F9	Increase the volume of PSG
SHIFT + F9	Turns down the PSG volume
F10	Increases the volume of the SCC
SHIFT + F10	Decreases SCC volume
F11	Increases the volume of the OPL
SHIFT + F11	Decreases OPL volume
PAGE UP	Increases overall volume
PAGE DOWN	Decreases overall volume
F12	Changes turbo mode: 3,58 Mhz -> 5,37 Mhz -> Custom
PRINT SCREEN	Toggles video output mode: VGA 31Khz -> RGB 15Khz -> SVIDEO
SCROLL LOCK	Enable/Disable Cassette Mode
SHIFT + F12	Switches Slot 1 mode: External -> MegaSCC+ 1024kB
SHIFT + SCROLL LOCK	Switches Slot 2 mode: External -> MegaRAM ASCII-8K -> MegaSCC+ 2048kB -> MegaRAM ASCII-16K

[LCTRL+F12]	Warm reset	
[LCTRL+SHIFT+F12]	Cold reset	

LEDs de Status

On the printed circuit board, you'll find a bank of LEDs that serve as diagnostic indicators, allowing you to track your computer's performance and identify potential issues. The table below provides a detailed description of each LED, allowing you to fully understand their respective meanings.

LED	Status	Description
10	Blinking	USB keyboard activity (active by default)
9	Blinking	Activity with the microSD card
8	OFF	2MB Memory Mapper
	ON	4MB Memory Mapper
7/6	OFF/OFF	Slot 2 External Enabled
	OFF/ON	8K ASCII MegaRAM enabled
	ON/OFF	MegaSCC+ enabled
	ON/ON	16K ASCII MegaRAM enabled
5	OFF	External Slot 1 enabled
	ON	SCC+ enabled
4/3	OFF/OFF	S-Video enabled
	OFF/ON	RGB with audio output (a mono signal inside the video cable) enabled
	ON/OFF	VGA mode for LED TV or LED Display enabled
	ON/ON	VGA+ to Monitor mode (legacy output) enabled
2/1	OFF/OFF	Standard mode 3.58MHz enabled
	OFF/ON	[Turbo Pana] 5.37MHz mode enabled
	ON/OFF	Custom Clock enabled

MicroSD Card

Your microSD card comes pre-configured with dynamic BIOS and all the files needed to boot into the MSXDOS2. When you power up your TRHMSX with dip switch 8 enabled, the dynamic BIOS kicks in, and the operating system loads, taking you to the MSXDOS2 environment.

In addition, the card includes SofaRun 8 along with a curated collection of files, providing everything you need to start using your computer right away. Simply run SR8\SR to launch SofaRun and start exploring the content.

Network

By default, your computer comes with Wi-Fi capability enabled, although without the network configuration required to establish a connection. To begin the setup process and connect your computer to your local wireless network, you will need to perform the initial setup.

To configure your network settings, turn on your computer and press F1 during the boot sequence. You'll see a message confirming that you've started the network setup process. From there, navigate to the appropriate option to set up wireless access. You will be prompted to select your network name (SSID) and your corresponding password to establish a connection.

After the initial setup, subsequent boots will automatically connect your computer to the designated wireless network.

The jumper located near the ESP8266 enables or disables the network card. You can choose to disable this feature by removing the jumper from the board.

The microSD card has a collection of networking tools available in the NETWORK folder. Explore these programs as they offer a way to download and use programs obtained from the internet.

Tips and Tricks

- If you are going to use disk interfaces, be sure to enable the external cartridge slots and disable the microSD card, as this setting may interfere with the external disk controller.
- If you want to connect a cassette device, you need to disable the internal microSD drive by changing dipswitch 8 to OFF. Then turn on your computer and press SCROLL LOCK once. Plug your cassette unit into the audio input and use the appropriate basic commands.
- Want to explore advanced topics and have fun with your MSX computer? Check out the following references:
    - https://github.com/cayce-msx/msxpp-quick-ref/wiki
    - https://github.com/ducasp/MSX-Development/blob/master/FPGA/ocm-pld%20v3.9x/docs/

Solving Basic Problems

- **Problem:** TRHMSX does not turn on. **Solution:** Is the power cord properly connected? Is the power supply compatible? The TRHMSX needs a 5V/2A center positive power supply. Do not attempt to power the drive using the USB connector, you may damage the computer.
- **Problem:** TRHMSX is turned on, but it doesn't display anything on the screen. **Solution:** Is it properly connected to the monitor? Is the connector/cable faulty? Does the appropriate status LED light up correctly? If you can't get video from a specific connector, try changing the setting and connecting to another monitor using a different cable/connector. Through combinations of dipswitches 2 and 3, you can change the display modes. If the screen does not display anything and no hardware issues are detected, check the settings of the dipswitches.
- **Problem:** The keyboard doesn't work. **Solution:** Is the keyboard connected to the correct PS/2 port or USB port? Only keyboards that are compatible with the PS/2 protocol can be used with TRHMSX. Try another keyboard.
- **Problem:** The ROM cartridge does not work. **Solution:** Is the cartridge dirty? Clean the cartridge and slot if the cartridge does not work. Some cartridges need to be started with the shift key pressed.
- **Problem:** The microSD card is not working. **Solution:** Is dipswitch 8 turned off? Is the card formatted with FAT16?
- **Problem:** The joysticks are not working. **Solution:** Is the joystick (gamepad) compatible with MSX?