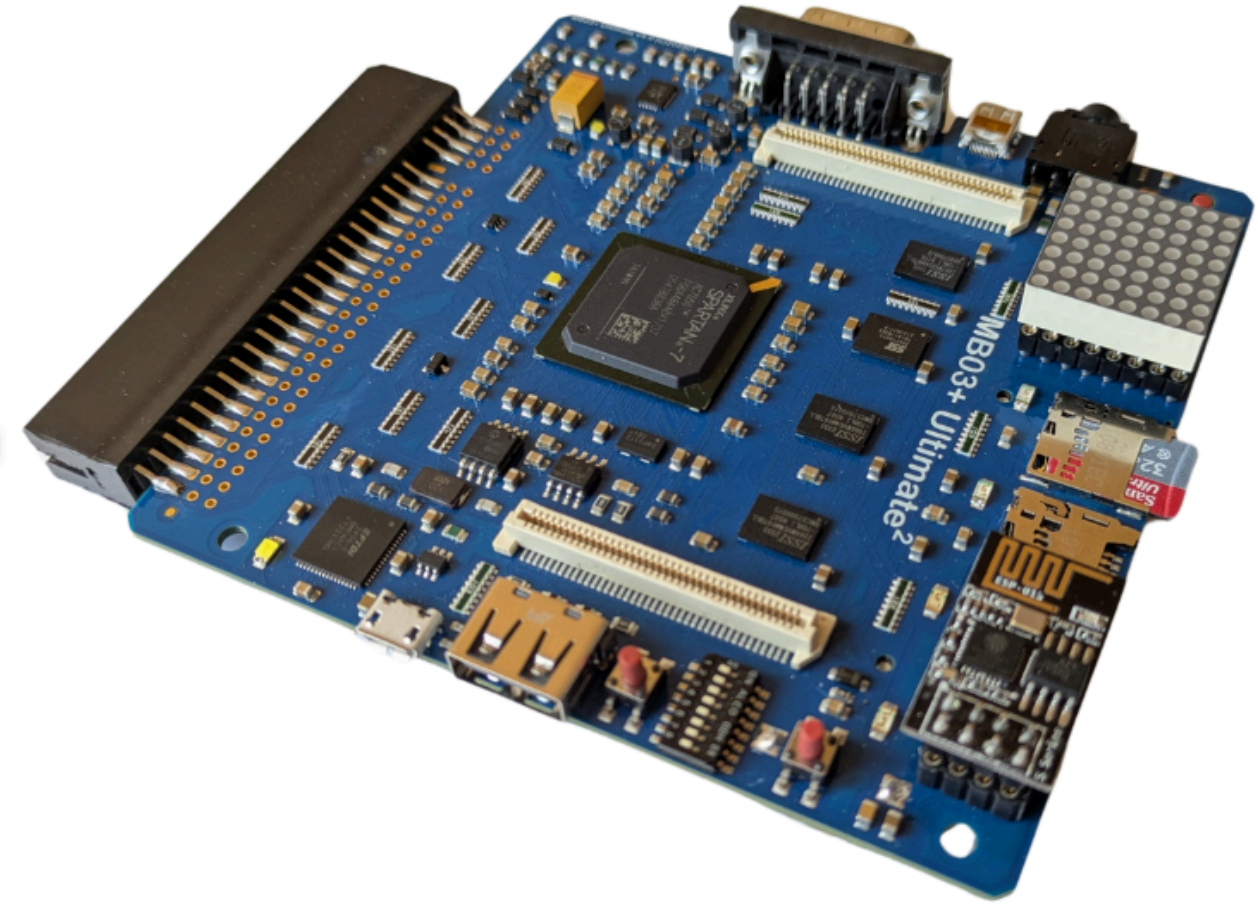
MB03+ Ultimate

Quick Start

LMN128 / Jan Kucera



updated: 2025-04-07

This booklet will help you quickly get used to working with the MB03+, its startup menu and its operating systems.

The instructions will show you how to run software from CF and SD cards and how to test all the major improvements made to the MB03+, especially the great video, sound and music improvements.

Important notice

- The MB03+ can be normally connected to the standard edge connector of your ZX Spectrum. Always keep all edge connectors clean! A dirty connector can cause malfunctions or data corruption. Use isopropyl alcohol to clean it. If the edge connector is damaged you should solder and use a *precibus* socket or a *precibus* reduction instead.
- Do not use the MB03+ with unsupported machines or interfaces.
- Don't plug/unplug anything to/from the edge connector while the ZX Spectrum is powered on!
- Don't insert or remove SD or CF cards while the ZX Spectrum is switched on!
- Only use a Kempston type joystick.
- Please take good care of your MB03+ Ultimate. Avoid shocks, dust, moisture etc.

Dear MB03+ owner,

Congratulations on your purchase! With the MB03+ you give your ZX Spectrum the best.

Your MB03+ Ultimate or Ultimate2 is

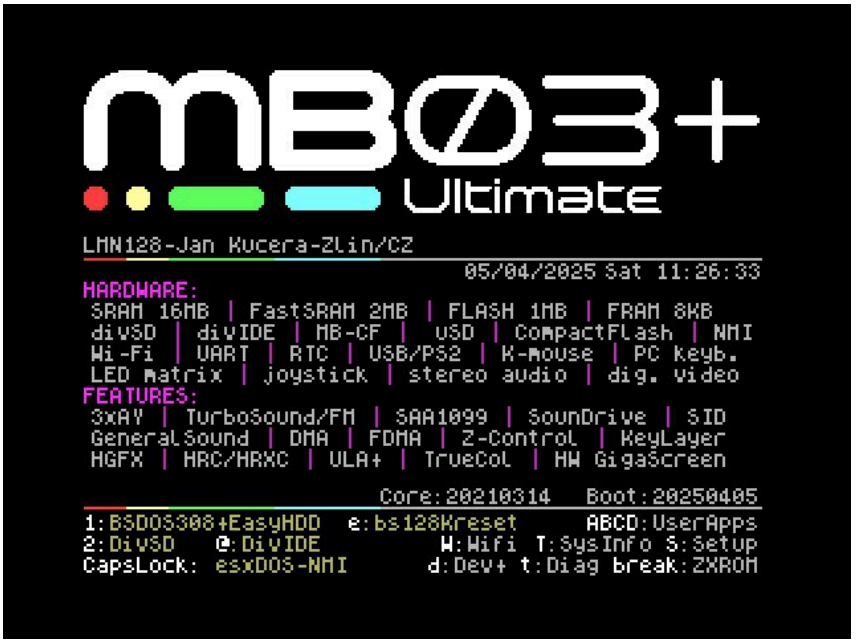
- a powerful and compact next-generation ZX Spectrum interface,
- based on modern and fast FPGA and other advanced chips,
- compatible with its predecessor MB02+ and other popular interfaces such as divMMC and divIDE,
- a modern all-in-one and compact solution which brings the functionality of many hardware and system add-ons to all ZX Spectrum models.

I used the experience gained in developing the MB03+ to design the most advanced ZX Spectrum-compatible clone, the **eLeMeNt ZX** computer.

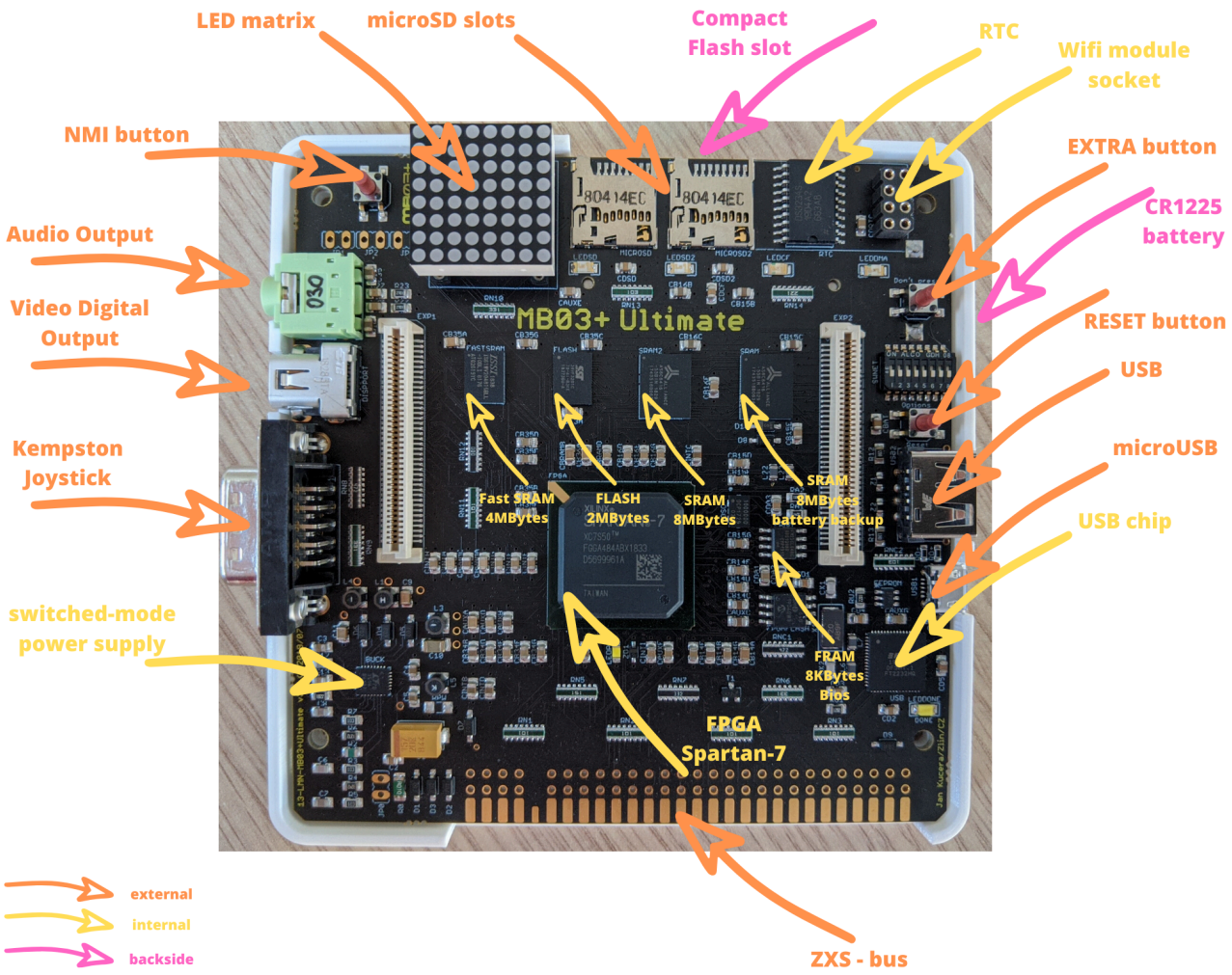
I am pleased to offer you a large number of shared features between the eLeMeNt ZX (computer) and eLeMeNt MB (interface) hardware branches, as far as the old hardware of the various computers (to which the MB03+ can be connected) allows. With the latest FPGA core, you can now run games modified for eLeMeNt HGFX graphics also on the MB03+.

I hope you enjoy your MB03+.

Jan Kučera



MB03+ Ultimate (2019)



MB03+ Ultimate2 (2025)

The second series MB03+ is 100% compatible, in terms of function and usage, with the first series. The Mk2 board includes the following modifications and improvements:

- microHDMI instead of DisplayPort directly on the board
- different types of memory (due to price reduction)
- extended RTC runtime on battery - SRAM power supply removed
- rechargeable Lithium battery instead of normal battery
- joystick connector more recessed into the case
- improved case design
- blue matrix display (replaceable)
- minor schematic and board improvement

MB03+ startup options



If you press this key, it will…

A, **B**, **C** or **D**	**run** one of installed UserApps or GameROMs
1	**install** the **BSDOS308a** system ROMs into the MB03+ + run EasyHDD utility to setup FAT32 formatted CompactFlash memory card
! *SYMB.SHIFT+1*	run EasyHDD utility to **setup** FAT32 formatted CompactFlash **memory card**
e	make the extended **BSROM reset** (like from the NMI menu) ! This is the fastest way to run BSDOS.
2	switch into the **divSD** (divMMC) mode and boot esxDOS
@ *SYMB.SHIFT+2*	switch into the **divIDE** mode and boot esxDOS
Caps Lock *CAPSSHIFT+2*	**esxDOS** (divSD) fast start
t	run ZX Spectrum **hardware test** and diagnostic ROM
W	run **Wi-Fi** connection setup (incl. setting the RTC online)
S	**SetUp** - allow you to modify initial startup parameters
T	**show** “user experience” and usage statistics, incl. internal HW counters: power on, reset and NMI
R	**restart** (use it if you have modified the setup)



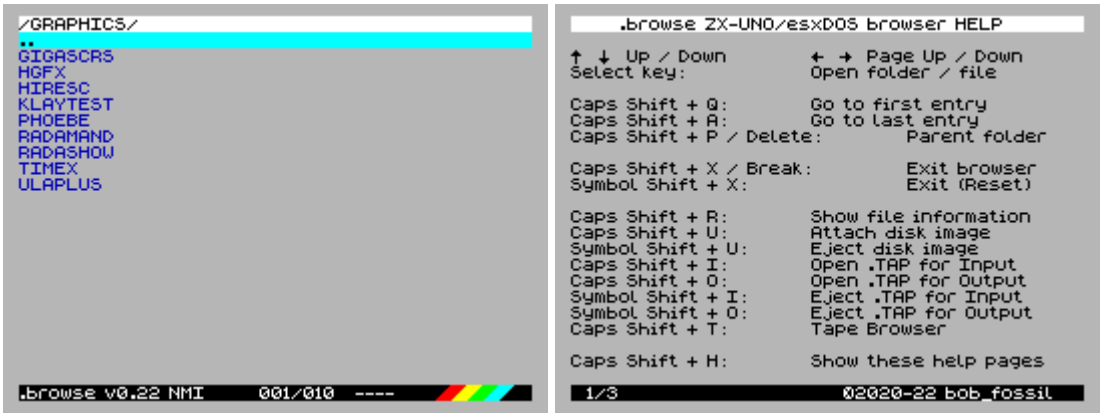


Note: There are also other options (eg. ***d*** for DevastACE+) on the start screen that are for development purposes only.

First steps

When you power up your MB03+, you can quickly boot your favourite operating system by pressing the relevant key. The BSDOS and esxDOS (with TR-DOS support) systems are pre-installed by default, with a customised collection of software supplied on memory cards.

In esxDOS, you can browse the **software collection** and directories using file browsers, which you can access by pressing the NMI button. You'll find more info on this in the "*esxDOS tips*" section. The "*MB03+ software collection*" section describes how to start the selected software using BSDOS commands.



File Browser *(by bob_fossil) is a program that lets you easily look at everything on your SD/CF cards. It has a great* ***plugin*** *system, which lets you run or view almost any file.*

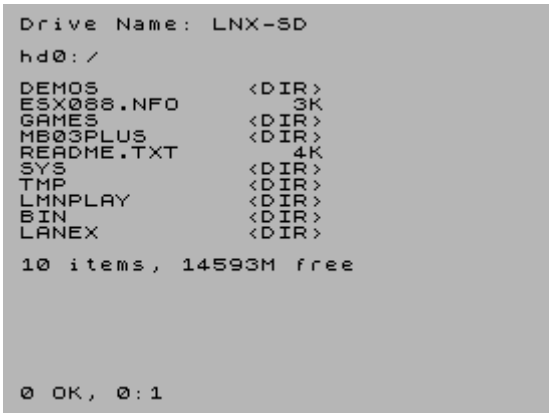
If you want to **change settings** of the MB03+ or **switch devices on or off** (it's like connecting and disconnecting many separate interfaces to your ZX Spectrum, instead of having only the MB03+), please go to the "*MB03+ SetUp*" section.

If you want to download files or **play games online**, check out the "*Wi-Fi connection*" section.

If you want to **replace some installed system** with another one (+divide, MDOS3), please refer to the "*How to update HW Core and Firmware*" section.

Working with CF and SD cards

The CF cards supplied with the MB03+ contain software for both BSDOS and esxDOS (divIDE). The SD card contains software for esxDOS (divSD/MMC).

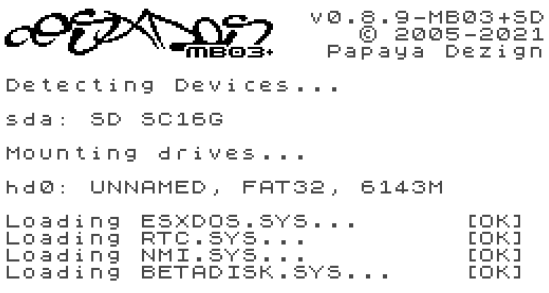




In the **esxDOS** system you work with a PC-like filesystem and FAT-formatted SD or CF cards, so the files are directly read- a writeable on both the PC and the ZX Spectrum. The older **BS-DOS** is originally enhanced floppydisk-based system, in the MB03+ works with disk-images stored on a CF card.

How to prepare a card for esxDOS

1. **Format** the CF card for DivIDE, SD card for DivMMC.
2. You must use a **FAT32** file system, if your card is **bigger than 4 GB**.
3. Download the newest backup of the CF or SD image (***CFxxxxxxxx.ZIP*** file or ***SDxxxxxxxx.ZIP*** file) from web page https://mb03.elementhw.com/download.
4. Copy the **SYS** and **BIN** (and create /**TMP** if using DivIDE) **directories**. It is recommended that you copy these directories and its files as first to a newly formatted media. This will help to achieve a maximum speed when working with files in esxDOS.
5. Now you can copy other files and directories…



Tips for esxDOS

There is a basic set of information in the installation package from http://esxdos.org/index.html. If you want to learn more, go to the forum http://board.esxdos.org/.

You can download games and demos in TAP and TRD files, which are originally intended for PC emulators, and put them on the card for your MB03+. They are easily executable in esxDOS!

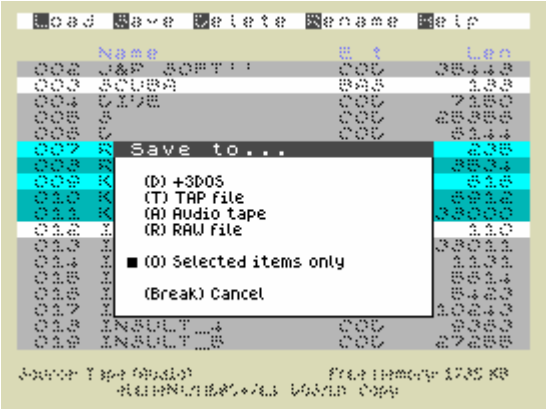
Note: Please study the files in the /SYS/CONFIG directory. The "AlwaysBoot=1" option set in TRDOS.CFG will load the TR-DOS Navigator even if there is no BOOT file on the TR-DOS disk. You should have DMA support enabled by setting "DMA=1" in ESXDOS.CFG, in order to speed up data transfers.

An alternative NMI-based **File Browser** by *bob_fossil* shows full, long file names (LFN) of files and directories and has many improvements and also a universal viewer based on plugins.

http://www.thefossilrecord.co.uk/wp-content/uploads/zx/BROWSE_latest.zip

MB03+ file-handling esxDOS apps

Two programs have been developed directly for the MB03+ and use its advanced features to provide functions on an eight-bit computer that were previously the domain of more powerful PCs.



LnxCopy is an esxDOS copy program, file manager and tape archive editor.

LnxCopy converts program recordings from tapes to SD/CF cards; creates, combines and also splits TAP format emulator files; renames and saves converted files according to file selections; works with PC media without complications and without conversions, creates and browses directories and stores speccy files in them... plus much more.

https://www.ilnx.cz/lnxcopy/



LnxCommander is an esxDOS, mouse-driven file manager that replaces the tedious typing of individual commands and file names in ZX BASIC.

LnxCommander can manipulate and rename files and directories quickly and easily; can copy and move files on an SD card or between two SD cards; remembers the path to favorite directories in the form of bookmarks; uses a 14 MB RamDisk for file transfers between divIDE/CF and divMMC/SD cards.

https://www.ilnx.cz/lnxcmd/

How to prepare a CF card for BSDOS

Please use a CF card with a maximum capacity of 4GB. If you have one larger than 4GB, you must create partitions on it, with a maximum size of 4GB.

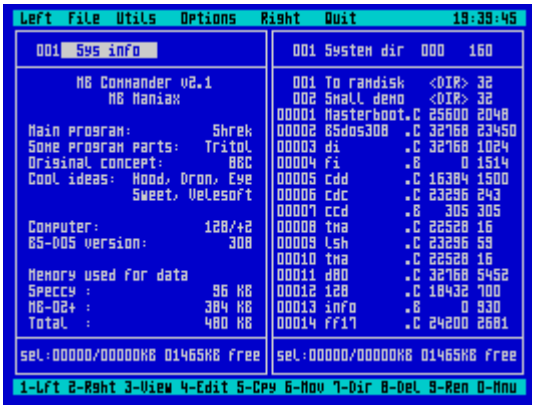
1. **Format** the CF card, use a **FAT16** file system!
2. Download the latest backup of the CF image (***CFxxxxxxxx.ZIP*** file) from web page https://mb03.elementhw.com/download
3. Copy the files **003.mbd** to **256.mbd** from the ZIP file to the CF card. It is very important to copy these files first to a newly formatted media, one by one, in the right order - please check that all listed MBD files in the ZIP archive are sorted by name, 003.mbd, 004.mbd, etc. to 256.mbd.
4. After MDB files, you can copy other files or directories (if needed, all other than MBD files are intended for DivIDE only)
5. The next time, for the future updates, if you want update only some MBD files, just **overwrite** the selected file with a new one, e.g. copy only 200.mbd from a ZIP card backup archive to your current CF.

Note: Read the *MB-02plusEnglishManual.doc* to learn and familiarize yourself with a powerful set of BSDOS commands and utilities, https://mb03.elementhw.com/docs.

Other file-handling tools

The esxDOS system works directly with the SD or CF card and its FAT16/FAT32 directories as they are formatted and used on the PC. Some other systems work with files that are images of diskettes or tapes and require special import/export or conversion utilities.

- plugins for Total Commander (PC), *MBD, TAP, SCL, TRD and others*: https://totalcmd.net/authors/6888865.html
- MB Commander (BSDOS): https://hood.speccy.cz/dwnld/mbc22info.htm
- D/D48 Copier (+divide): https://www.biehold.nl/rudy/divide/index.htm
- +divide Manager (PC): https://s-huehn.de/spectrum/software.htm
- MDOS File Commander (MDOS3):
- https://mts.speccy.cz/_mfc.htm



MB03+ SetUp

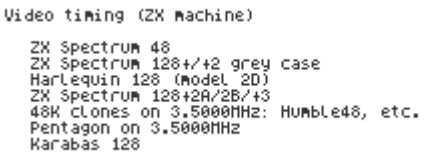


The SetUp allows you to modify the MB03+ start-up parameters. These are always used when the unit is switched on or reset. You can change the parameters at any time, as SetUp is also a separate programme.

Use the cursor keys and Enter. Confirm the changed parameters by restarting with **CapsShift**+**R**. To return to the default parameters (and restart), press **CapsShift**+**L**.

StartUp mode

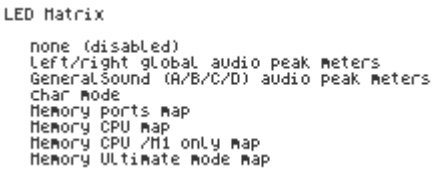
Choose between standard and fast boot to your favourite operating system. You can always return to the MB03+ initial screen by pressing and holding the Enter key at start-up (and after reset).



Machine (video timing) selection

Select the model your MB03+ is connected to. This option will ensure 100% synchronised digital audio and video output, meaning that software that requires specific model-specific timing will be displayed and run correctly.

Note: Setting up a 128K model on a computer with only 48KB of memory will cause the MB03+ to maintain a second video RAM at address 49152 and do some 128K double screen tricks in games and demos.



LED Matrix settings

The built-in 8x8 dots LED shows what is happening in your computer when you run different types of software. Use the EXTRA button to switch between two audio-peak-meters modes, a "char-mode", three memory maps, or turn the LED display off completely.

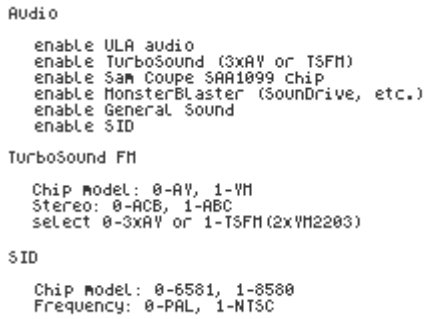
Memory Ports Map option: one dot displays one page. See the table of 8 LED map rows.

Row	Machine	Port
1	ZX Spectrum 128K	h7FFD
2	ZX Spectrum +2A/B/+3	h1FFD
3	divRAM (divSD/IDE/MMC)	hE3
4	first 32 pages of MB03+ (MB02)	h17
5-8	128K or Pentagon 512K	

Memory CPU Map: one dot displays 1KB of 64KB. The red dot shows an address which is accessed when the CPU reads/writes from/to the memory.

Memory CPU/M1 Only Map: one dot on the LCD panel represents 1 KB in the memory. The LED map shows memory address where the CPU reads the instruction of the running program (program counter - pointer). Same as the previous mode, but without read/write.

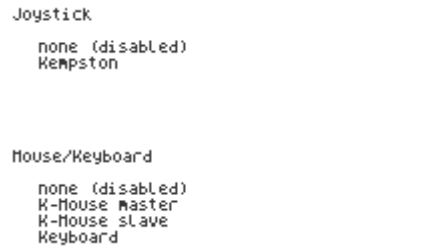
Memory Ultimate Map presents a set of Ultimate Memory registers (see *ProgRef* for details).



Audio expansions

The MB03+ brings together most of the audio interfaces available for the ZX Spectrum and combines their audio output into one stereo or HDMI output.

ZX sound options range from the old good (ULA) **beeper** through **3xAY-3-819x** sound chips or **2xAY/YM2203** sound chips with FM synthesis to a **StereoDAC**, a 4-channel Amiga-like **General Sound** and the Sound Interface Device (**SID**, old and new, PAL and NTSC).

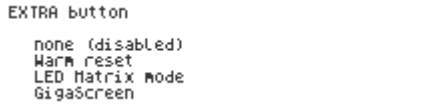


Joystick, mouse and keyboard

Use an Atari type joystick with up to 3 buttons.

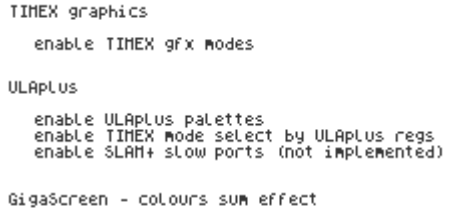
Tons of software written or patched for old Kempston Mouse and new K-Mouse (Turbo) interfaces. The popular utility software Artist 2 or Art Studio also support with a mouse driver.

Note: See the "*Hardware Compatible with MB03+*" section for compatible mice and keyboards.



EXTRA button

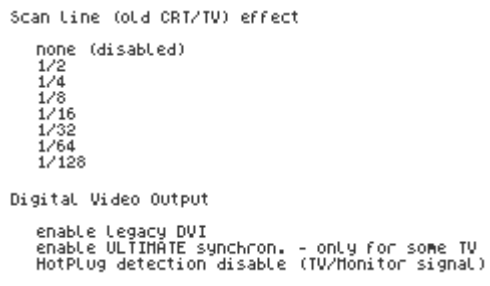
Link the EXTRA button to a function you will use most often.



Legacy Video modes

Switch on **Timex graphics, HiColor and HiRes** modes and/or **ULA+** palette (256 colours).

The graphic effects of **Gigascreen** is created by quick change of image screens in order to get a colour mix. Video RAMs (or video buffers) are processed in advance in the MB03+, then a digital output is generated, which provides a perfect display, without any flickering image.



Digital Video (HDMI), and CRT effects

Try seven levels of the old **CRT/TV scanline effect**. You can switch between **DVI and HDMI** (default) modes or enable **ultimate screen synchronisation**. This ensures that every frame on the screen is perfectly synced with the interrupt (INT) signal from your ZX Spectrum. Keep in mind that this option might not work with some TVs.

Note: For legacy reasons, there is an old DVI option switched on, and no sound is available with the DVI. If you're using a **newer HDMI monitor**, **set the DVI to value 0**.

```
SD/MMC

   enable

Z-Controller SD

   none (disabled)
   on first SD slot
   on second SD slot

divSD

   select ROM: 0-FPGA(rescue esxDOS), 1-FLASH
   swap order first/second SD
```

SD/MMC

Disable SD slots if they interfere with another device. When connecting the MB03+ to the eLeMeNt ZX, see page 19.

You can connect the Z-controller SD interface, supported by programs for Pentagon, ZX-Evo, etc., to one SD slot at the same time. Also, you can swap the first and second SD card slots.

```
UART (Wi-Fi)

   enable
   set lower RF power of Wi-Fi


UART (Wi-Fi) type

   internal USB-UART - microUSB
   WiFi - ESP01 module
```

UART (Wi-Fi)

The ESP8266 module is connected via the UART interface. Instead of Wi-Fi, serial communication via USB cable is also possible.

See the "*Wi-Fi Connection*" section for RTC settings.

```
DMA

   enable MB03+ DMA
   enable detection other DMA e.g. in eLeMeNt ZX
```

DMA

The Z80-DMA chip is necessary to support esxDOS and BSDOS systems, as well as some software.

Custom ROMs

Here you can switch the ZX BASIC ROM and change your computer´s original ROM with another alternative Custom ROM and even on 16 KB ROM models use larger 64K ROM system, identical to the ZX Spectrum +3/+2A.

```
Custom ROMs

   none (disabled)
   Crom0    (16KB mode)
   Crom1    (16KB mode)
   Crom2    (16KB mode)
   Crom3    (16KB mode)
   Crom4    (16KB mode)
   Crom5    (16KB mode)
   Crom6    (16KB mode)
   Crom7    (16KB mode)
   Crom0-3  (64KB mode)
   Crom4-7  (64KB mode)
```

There is a space reserved in your MB03+, for these combinations:

- eight 16KB ROMs,
- two 64KB ROM
- four 16KB ROM and one 64KB ROM.

While BSDOS already has its BSROM, this option lets you set an alternative ZX BASIC ROM for the esxDOS. You can find esxDOS-compatible ROMs in the Annex.

To set one of 16KB ROMs, choose slots named **Crom0** to **Crom7** in the SetUp. For one of two 64KB ROM systems, choose Crom0-3 or Crom4-7. After selecting a custom ROM, press R (Shift+r). There are four 16KB ROMs already installed, in Crom0 to Crom3, and one 64 KB system, DerbyPRO, in Crom4-7.

You can flash other ROMs, to any slot. Press any letter from O to V while flashing by **ReFlasher** utility. Remember that when you flash the 64K ROM for +3/+2A models, you must always flash it continuously into the first (O, P, Q, R) or second half (S, T, U, V) of Crom slots.

There are also W, X, Y and Z slots for user applications, accessible from the Setup menu.



RTC time zone

Switch to zone +1 for summer time.

See the section *RTC and Battery for your MB03+* for RTC settings.



Diagnostic

Various visual indicators in the wider border area.

Other settings: SafeNMI, Interrupts etc.

For testing purposes.

Want to know more about the features of MB03+ and how to program them?

Check out the second MB03+ manual ***Programmer's Reference*** (known as ***ProgRef***): https://mb03.elementhw.com/docs

MB03+ software collection

With your MB03+ and its operating systems you can easily load and run a huge number of ZX Spectrum programs, incl. those that require special hardware add-ons, such as memory and expansions, graphics effects, mouse, game controller and sound interfaces.

Commands for a CF cards with **BSDOS** files are: @, $, NEW). Type **z** (DIR) for listing file-directories You can browse and run the **esxDOS** software on the SD card in two simple ways: by listing file catalogues and starting files in the **File (LFN) Browser** or by using the simple commands DIR, .CD, and LOAD * "*name*".

MB03+ software collection is for download in the directory https://mb03.elementhw.com/download. The description is given in the *README.TXT* file.

Setup ROMs

Change the configuration of most MB03+ parts using the SetUp. The control philosophy is simple: imagine if you had to change and plug individual interfaces to a ZX Spectrum bus. Now you only have the MB03+ and you should switch on/off these devices "installed" inside the MB03+.

The Wi-Fi communication has a special setting. The Wi-Fi SetUp utility selects access points, communication speed and updates the date and time over the network. There is also a terminal for displaying commands.

In addition to ROMs, both Setups are also available as standalone applications.

User Apps and Game ROMs

In the main startup screen press **A, B, C** or **D** (uppercase) for:

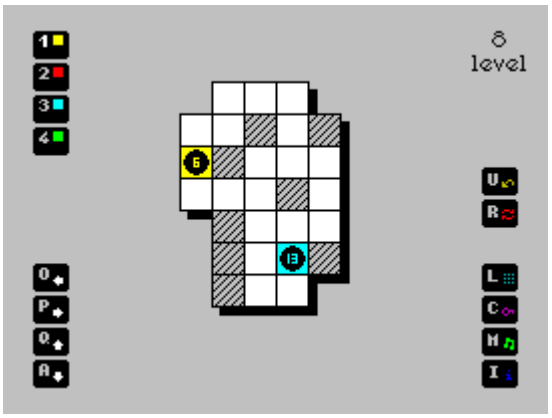
DiagROM by Retroleum

ZX48 ROM 1K Intro Collection by Busy

puzzle game **Coloristic** by SinDiKat

classic game **Space Raiders** by Psion

Note: It is possible to change the pre-flashed binaries by the ReFlasher utility (change slots W, X, Y and Z).





MB03+ Audio

MB3+ is a record-breaking interface that among al zx-hardware add-ons provides the largest number of audio devices: TurboSound (FM), 3xAY chip, SAA1066 (SAM Coupe), DAC, Covox & SounDrive, mighty GeneralSound and the fabulous SID.

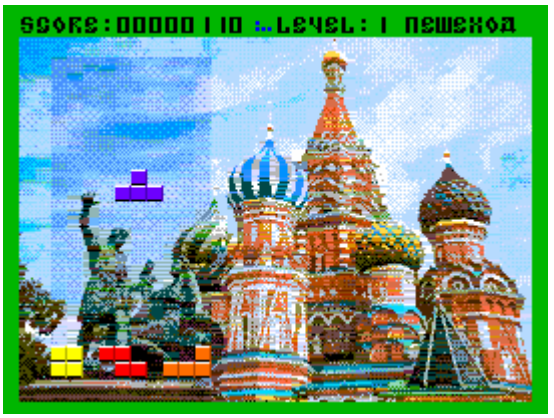
There are many ZX games complemented by rich music and sounds from Amiga and PC (General Sound interface) and even some for the SID chip.

Old graphics enhancements and effects

Old modes and effects are listed in the MB03+ SetUp. They are also fully configurable via IN and OUT commands (also in BASIC).

Timex graphic modes offer more details and colours, especially in conjunction with ULA+. They are better usable than time-consuming software graphics modes Nirvana, Bifrost, etc. Both ULA+ and Gigascreen offer a wider colour palette.

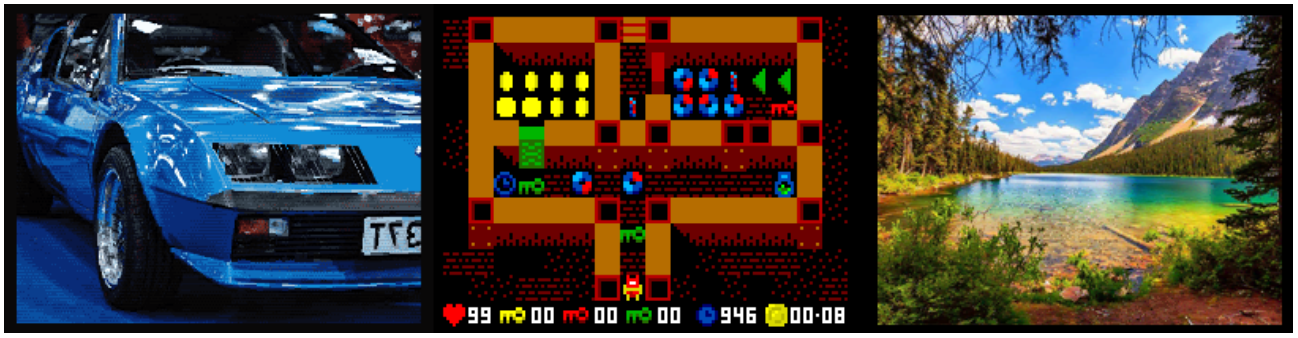
The MB03+ is one of the few devices that is able to offer a gigascreen on a screen that does not blink.



*Game **SlamTris+** uses Timex HiColor, ULA+ and TurboSound.*

New Enhanced Graphics modes

Enhanced graphics are not, unlike the old modes and effects listed in the SetUp. However, they are fully configurable via IN and OUT commands (also in BASIC).



The **KeyLayer graphic mode** allows to display image data from the second video RAM at the place of one selected colour in the video RAM no.1.

Radastan mode provides 128*96 pixels in 16 colours, without an attributes clash.

HRC and **HRXC** modes add attributes to the HiRes linear mode of 512*192 pixels. A **true-colour palette** is available for the HRXC.

HGFX

The HGFX planar system, powerful, with multiple pixel resolutions and **up to 256 colours** from a **TrueColour palette**, but still using the ZX-like screen matrix. Already familiar from the eLeMeNt ZX computer, it is also available for all ZX Spectrums, in the MB03+ interface.

The possibilities of the HGFX are almost endless. First of all, it offers several resolutions, from 256*192, 512*192 and 512*384 up to **720*546**. It also allows a selectable number of colours in each mode. Last but not least, it allows different display modes, including **HAM** (similar to Amiga) and **FILL** (similar to Apple II GS).

All this makes it possible to improve programs and games even for the simple ZX Spectrum 48K, including colouring 3D games. Modified games are even faster than the original.



If you want to learn more about the capabilities of HGFX, check out the first few episodes of this informative documentation series on how hgfx works: https://mb03.elementhw.com/docs.

eZXCP/M

Thanks to HGFX you can run extended CP/M with the NZ-COM, in multiple character modes (up to 85*48 characters), on any ZX Spectrum.

The eZXCP/M system is loaded from esxDOS, but after booting it works with large **8MB disk partitions** on the SD card. Data can be transferred between the PC FAT structure of esxDOS and eZXCP/M using the *FD.COM* (FAT DIR) and *F2C.COM* (FAT to CP/M) commands.

Wi-Fi connection

The MB03+ uses the popular **ESP8266** module for wireless transmission. You can enable/disable the Wi-Fi module in the setup.

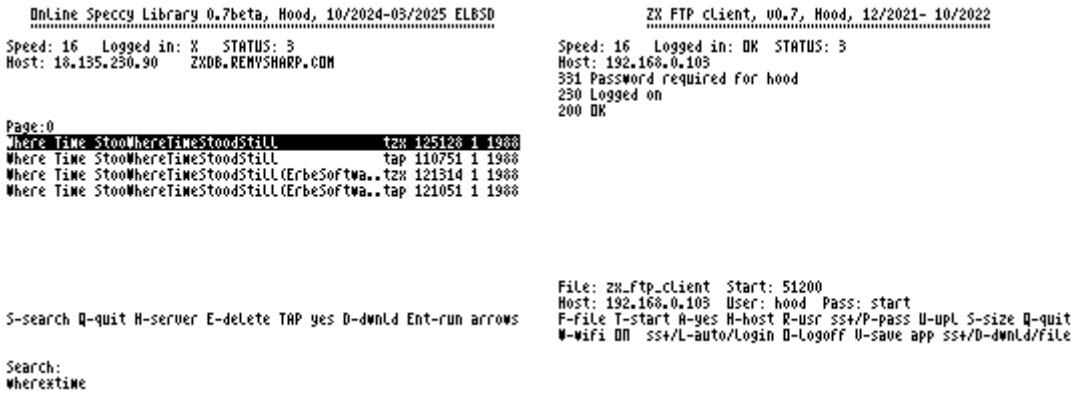
There is a complex **WiFi SetUp** utility that is also available as part of the MB03's firmware. A full description can be found at https://hood.speccy.cz/dwnld/wifi_setup_MB03_info.htm

The default transfer rate is 115200 baud. A safe method of changing the speed is using the WiFi SetUp utility.

You can also change the power of the Wi-Fi module. If the RF power option is set in the MB03+ SetUp, the signal power is reduced to 50 percent.

Other handy tools include the **ZX FTP Client** and the **Online Speccy Library** (ZXDB Downloader), which allows you to download and even run Speccy programs directly from remote (online) storages.

https://hood.speccy.cz/dwnld/zxftpclient07_info.htm
https://hood.speccy.cz/dwnld/ZXDBdownloader_info.htm



A simple yet powerful tool is the **UART22F** command. This terminal enables you all basic work with your Wi-Fi module, incl. input of AT commands: https://hood.speccy.cz/dwnld/uart.htm

For a complete list of AT commands, please see the *"ESP8266 AT Instruction Set"* manual in https://mb03.elementhw.com/docs.

You can easily update the ESP module's firmware with the command: AT+CIUPDATE The update AT command will not work, unless you have a newer ESP module, please check: AT version 1.3.0.0, SDK version 2.0.0.

The command AT+UART_CUR changes a speed temporalily, it is valid only till the computer/module is turned off.

Warning: be careful when setting the communication speed manually by the command AT+UART_DEF. A new value must be compatible with ESP module settings. Using a value that is not supported by the module can lead to a hang-up and needs to reflash the module!

All Wi-Fi programs for the MB03+ and eLeMeNt ZX use an universal common core for Wi-Fi services - **Wi-Fi BIOS**, which can be modified for various Wi-Fi modules. This makes possible to use all programs on different, even future hardware devices, without having software to be modified. (More info about this BIOS and a Wi-Fi programming is in the *ProgRef*).

RTC and Battery for your MB03+

The battery powers the RealTimeClock (RTC) chip. If your MB doesn't display the time correctly, check the battery first. Inside the MB03+, there are also ports and registers from the RTC72421 chip, which is used in older divIDE/divMMC and MB02+ interfaces.

The **MB03+ Ultimate (2019)** requires a coin-sized lithium 3V battery, either **CR 1220** or **CR 1225**. The CR1225 is thicker (0.5mm) and has higher mAh rating (approximately 25% more), meaning it should last longer.

The newer **MB03+ Ultimate2 (2025)** uses a rechargeable 3V battery **ML 1220**.

How to set time and date

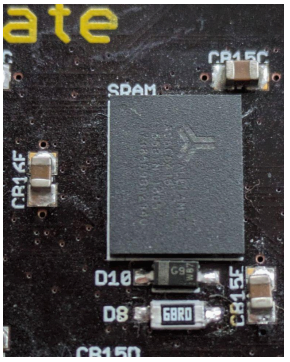
There are two simple ways to set the time and date:

- use Wi-Fi SetUp utility to get the correct data on-line
- set the time and date values manually in the BASIC program

```
10 FOR i=0 TO 6: OUT 28731,i: READ a: OUT 30523,a: NEXT i
20 DATA 0, mins, hours, week day, day, month, year
```

The data for RTC can't be clearly displayed in decimal form. In units and tens, it can be expressed in hexadecimal form, e.g. the **year 2023 as 23h** (in the decimal system it is the number 35). If you are using modified BASIC ROMs, like ZXDIR ROM or BSROM, you can enter hexadecimal values directly, starting with the sign **&**.

Note on Rechargeable batteries for the Mk1 board (2019)



Another suitable battery is a rechargeable (coin) 3V CMOS battery ML 1220. However, if you don't use the MB03+ daily for several hours, this battery won't charge sufficiently in the old Ultimate board (2019).

To enable **quick charging for the ML 1220 battery** on your MB03 Mk1 motherboard, you need to make a small adjustment.

Please note that after making this adjustment, you will **no longer be able to use classic CR batteries.**

Hardware compatible with MB03+

See the *List of (eLeMeNt ZX/MB) compatible peripherals* at https://mb03.elementhw.com/docs

This list contains:

- tested PC keyboards compatible with MB03+
- tested PC mice compatible with MB03+
- ZX computers tested with MB03+
- ZX interfaces tested with MB03+
- CF cards tested with MB03+ CF slot

MB03+ with eLeMeNt ZX

1. When using the eLeMeNt ZX with the MB03+, connect your TV or monitor to the eLeMeNt ZX. Do not connect the MB03+ to the computer yet.

2. Make sure you have the divSD option disabled in the eLeMeNt ZX SetUp.

3. Connect the MB03+ to the eLeMeNt ZX.

4. Make sure that the DMA detection option is enabled in the MB03+ SetUp.



The MB03+ interface adds to the eLeMeNt ZX several hardware extras, especially:

- Real Time Clock,
- UART port
- Wi-Fi ESP module (already installed)
- Sega controller support
- IDE interface and CF card slot
- General Sound interface (soundcard with 2MB RAM and 28 MHz Z80-CPU)
- more RAM
- CustomROMs
- LED map (volume bars, indicators, counters, messages and debugging info)

On the contrary, the eLeMeNt ZX adds to the MB03+ a faster CPU, the ability to connect an external keyboard and k-mouse simultaneously (or use both master and slave k-mouse), more joysticks or Sega controllers.

MB03+ and SpecNext

Here is a series of commands that will enable the system bus of the Next and allow, after a reset, to control the MB03+ connected to it:

```
Reg 130,3: Reg 131,0: Reg 132,0: Reg 128,8
```

How to update HW Core and Firmware

It is suggested to **update the Firmware before the Core**. Both Firmware and Core updates are done with the ZX Spectrum utilities. An old method of the Core update from a PC system, through an USB cable, is also available.

The latest Firmware and Core you can find on the webpage

https://mb03.elementhw.com/download

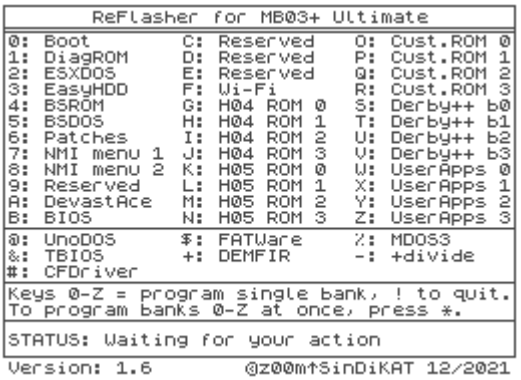
For a Firmware update, use the **ReFlasher** utility. Update at least **both BOOT and BIOS files.**

After every, even partial update you have to

- reset computer
- go into the SetUp
- press CS+L (for Load Defaults).

Note: If your MB03+ has not been updated for a long time (e.g. you have a CORE version older than 20200522), please update to COREs 20200522 and 20200825 first and then repeat the update with the latest CORE.

Firmware (SW) Flashing

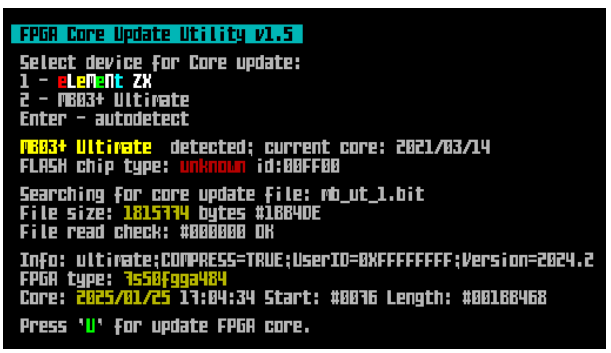


Use the **ReFlasher** utility for partial or complete FIRMWARE updates.

1. Download the file *UPDATE20XXXXXX.zip* file, which contains the *Reflashr.tap* file. Extract this file to a folder on a CF card or a SD card.
2. Insert the card into your MB03+ and connect the MB03+ to the ZX Spectrum, then boot the system.
3. Run the *Reflashr.tap* file. At the prompt of this utility, press the key corresponding to a number or a letter or *** (asterisks) for all slots** flashing. Be aware: upper and lower case letters are treated differently.

Core (HW) Update

Use the **elCoreUp** utility to update CORE.



1. Download the file *UPDATE20XXXXXX.zip*. This ZIP file contains the *elCoreUp.tap* file. Extract this file to a folder on a CF or SD card.

2. Put the card into your MB03+ and connect the MB03+ to the ZX Spectrum. Then boot the divSD/esxDOS system.

3. Run the *elCoreUp.tap* file, following the instructions on the screen

Old (selective) Firmware FLASH

Single system TAP files are are no longer supported. For a partial updates, use the *Reflasher* tool instead.

Core Update using a USB cable

1. Download the file *mbloader.zip*. You can find it in the directory *Archive/MB03plusFPGA.* Extract the contents of this zip file into a folder named MBLOADER.

   (The password is ***spectrum.***)

2. Download the file *hwcoreXXXXXXXX.zip* and extract it also to the folder MBLOADER.

3. Disconnect your MB03+ from the computer. Connect the MB03+´s micro USB socket with a proper cable to your PC computer.

4. Run a command line in MBLOADER directory and enter this command:
   `mbloader -p mb_loader.bin -f ultimate.bin`

5. Do not disconnect the cable until the update process is complete! Follow the instructions on the cmd screen.

Notes:

The utility **mbloader.exe** works with both Windows and Linux operating systems. You must compile a source code package for Linux. Debian, Ubuntu and Linux Mint have been tested, please follow the guidelines in the README.MD file.

You can also run Windows in a virtual machine on VirtualBox (https://www.virtualbox.org) or VMware Player (https://www.vmware.com). The MB03+ attached via USB will be detected perfectly in a virtual machine.

If the system does not work as intended

The MB03+ has a built-in **RESCUE MODE** that you can use if you overwrite or damage important parts of the firmware in the FLASH memory and your favourite system won't start or boot. In this mode, the device always reliably runs the backup version of the esxDOS v0.8.9 system.

To activate **RESCUE MODE**, follow these steps:

- Open the interface case and find several switches on the right side of the board.
- Turn the eighth DIP lever (located on the far right) to the ON position.
- Connect the MB03+ board to your ZX Spectrum and turn it on.
- While resetting, hold the BREAK key. The MB03+ will then boot into rescue divSD mode.
- Re-flash any damaged or non-functional areas by selecting a TAP file for the desired system or slot, and follow the instructions in the "*How to update HW Core and Firmware*" section.
- If you're unsure about what needs fixing, flash all the basic firmware parts in slots 0 to B.
- Finally, put the DIP switch back and close the MB03+ case.

What else should I look at?

https://mb03.elementhw.com/docs
- updated version of this Quick Start
- list of (eLeMeNt ZX/MB) compatible peripherals

https://www.elementhw.com/ - documents, core and firmware updates, software collection

https://www.facebook.com/mb02plus/ - MB02+ and MB03+ news

https://faqwiki.zxnet.co.uk/wiki/MB03%2B_Ultimate - MB03+ wikipage

https://www.ilnx.cz/lnxsp/ - **LnxSpectrum**, dev-studio with MB03+ and eLeMeNt ZX emulation

https://t.me/eLeMeNt_forum - forum

http://esxdos.zxfiles.net/ - FAT-based esxDOS software collection, also for MB03+

https://github.com/LMN128 - firmware source codes

Annex - 16KB and 64KB ROMs

Game ROMs

see the webpage Game ROMs and Cassette Conversions:
http://www.fruitcake.plus.com/Sinclair/Interface2/Cartridges/Interface2_RC_Cartridges.htm

Demo ROMs

ZX48 ROM 1K Intro Collection by Busy

ZX BASIC System ROMs compatible with esxDOS

64Char ROM, 16KB, modified by Busy

BSROM v1.40**,** 16K modified by Busy

Derby PRO, 64KB**,** modified by A. Owen

GAMA81 ROM, 16KB, modified by M. Pikula

GOSH Wonderful ROM, 16KB, modified by G. Wearmouth

GROOT ROM, 16KB, modified by H. de Groot

IMC ZX ROM, 16KB, modified by I. Collier

"Pretty" ROM, 16KB, modified by E. Likov

Note: all modified ROMs are available with documentation, except for the GAMA81, here is its characteristics: bugfixes and improvements, arrows up/down in command-line editing, line numbers from 0 to 16383, POKE with unlimited number of byte, word and string arguments, e.g. *POKE 50000, 33;16384,1;6144,201,"test";USR(50000)*, jump to the position of error on the line, simple disassembler (using COPY/SYS *address).

Test ROMs

ZX Spectrum Diagnostics by Brendan Alford and Dylan Smith

DiagROM by Phil Ruston (Retroleum)

TESTROM3 by Velesoft

48k and 128k testroms by Alioth

Sinclair ZX Spectrum Test ROM by Ian Logan

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