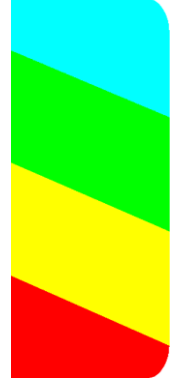# The
DivMMC EnJOY!
PRO ONE

SD card interface for the Sinclair ZX Spectrum

Dual configurable joystick ports

Auto detection of ZX Spectrum model

Throughput edge connector

Dual SD card sockets

Power off your ZX Spectrum before connecting this interface

No need to read the rest of this manual before using the DivMMC EnJOY! PRO ONE, just plug and play!

Manufactured by Ben Versteeg

BYTEDELIGHT

Overview

With the DivMMC EnJOY! PRO ONE you can load software from SD card to your ZX Spectrum easily!

The DivMMC EnJOY! PRO ONE has two configurable joystick ports, two full size SD card slots, a throughput edge connector and advanced auto detection features to make it plug-and-play. There is an NMI button for an easy NMI Browser menu with lots of functions, and there is a reset button.

The DivMMC EnJOY! PRO ONE comes with ESXDOS, which is FAT and FAT32 compatible, hence no additional pc software is needed.
The most used file type on ESXDOS is .TAP, which can contain a complete ZX Spectrum game in one file. Other supported formats are SNA and Z80 snapshot files and TRD files.
Check out www.worldofspectrum.org for many ZX Spectrum titles.
You can also load and save separate files directly from and to the SD card! Find out more about that in the ESXDOS paragraph in this manual.

Compatibility

The DivMMC EnJOY! PRO ONE has been successfully tested with:

- ZX Spectrum 16K board issues 1 and 2
- ZX Spectrum 48K all board issues
- ZX Spectrum 48K Plus all board issues
- ZX Spectrum 128K all board issues
- ZX Spectrum +2
- ZX Spectrum +2A
- ZX Spectrum +2B
- ZX Spectrum +3
- ZX Spectrum +3 with +3e ROMs
- Investronica ZX Spectrum 48K Plus*
- Investronica ZX Spectrum 128K
- Harlequin 48K rev.G
- Harlequin 48K rev.H
- Sparrow Lite rev.3 with Nebula
- ZX-HD HDMI interface
- ZX-AY external stereo sound interface
- Kempston Mouse Turbo 2017 interface

*The Investronica ZX Spectrum 48K Plus has an integrated joystick interface that conflicts with the Kempston mode on the PRO ONE. When using this ZX Spectrum model, select another joystick interface on the PRO ONE. Find out more in the Joystick interface paragraph.

In the box

Your DivMMC EnJOY! PRO ONE interface is delivered with an SD card and this manual.
The card is formatted and contains some ZX Spectrum games and demos for you to try instantly when you install your DivMMC EnJOY! PRO ONE for the first time, without having to download software first.

Connecting the DivMMC EnJOY!

1. Make sure the edge connector is clean

It's important that your ZX Spectrum has a clean edge connector before connecting any interface. Advised is to use cotton swabs with >95% pure (e.g. isopropol) alcohol.

2. Disconnect power from before connecting any interface!

When powered off, connect the DivMMC EnJOY! PRO ONE to your ZX Spectrum carefully and insert the SD card.
Now you can power up your ZX Spectrum.

Notification Leds

The DivMMC EnJOY! PRO ONE has two notification leds: the upper 'POWER' led indicating the system is powered on, and the lower 'CARD' led showing the SD card activity (blue for card1, red for card2).

Throughput edge connector

The DivMMC EnJOY! PRO ONE has a throughput edge connector for any device, such as the ZX-HD HDMI interface or ZX-AY external stereo audio interface (check out ZXSpectrum.shop for those).

Enabling or disabling ESXDOS

By default ESXDOS is enabled, making it possible to access the FAT or FAT32 formatted SD card with BASIC commands, and using the NMI Browser by pressing the NMI button.

However there are some situations you might need to disable ESXDOS, for example if you want to use the +3e ROMS which allow direct SD card access from +3 BASIC on a ZX Spectrum +3.

DIP SWITCH	
1	ON ESXDOS ENABLED (default)
	OFF ESXDOS DISABLED

Joystick interface

The DivMMC EnJOY! PRO ONE has two configurable joystick ports numbered '1' and '2'.
The default configuration is Kempston joystick for port 1, and Cursor joystick for port 2.

However you can change these settings by changing DIP switch 2 and 3 at the right side of the DivMMC EnJOY! PRO ONE:

DIP switch			
2	3	PORT1	PORT2
ON	ON	KEMPSTON JOYSTICK	CURSOR JOYSTICK
ON	OFF	SINCLAIR1 JOYSTICK	SINCLAIR2 JOYSTICK
OFF	ON	KEMPSTON JOYSTICK	FULLER JOYSTICK
OFF	OFF	JOYSTICK INTERFACE DISABLED	

The ZX Spectrum +2, +2A, +2B or +3 have Sinclair1 and Sinclair2 ports already integrated, so for those you could select Kempston and Fuller joystick on the DivMMC EnJOY! PRO ONE (Cursor joystick will conflict with Sinclair1 or Sinclair 2 joystick as well).

When the DivMMC EnJOY! PRO ONE joystick ports are configured to Sinclair 1 and Sinclair 2 joystick, and the PRO ONE is connected to a ZX Spectrum +2A, +2B or +3, the joystick ports of the PRO ONE are automatically disabled to avoid conflicts.

Unfortunately there are 2 types of Fuller joystick standards. The DivMMC EnJOY! PRO ONE supports the older standards which most games that have Fuller support will work with.

Using the DivMMC EnJOY! PRO ONE

This DivMMC EnJOY! PRO ONE interface comes with ESXDOS.
When you power up your ZX Spectrum, you will see the ESXDOS boot screen, like shown here on the right. Read more about ESXDOS on the next page and further.

After the ZX Spectrum with DivMMC EnJOY! PRO ONE had finished the boot sequence, you will enter 48K BASIC in USR 0 mode.

USR 0 Mode
For ZX Spectrum 128K / +2 / +2A / +2B or +3 users: the DivMMC EnJOY! PRO ONE Starts the ZX Spectrum in USR 0 mode. This mode supports 128K software and using the 3-channel audio chip in 128K models.
ESXDOS currently does no support 128K BASIC (keep an eye on future upgrades).
128K programs will however run fine.

Loading a game with the NMI Browser
This is the simplest way of loading a game or program.
Press the NMI button at any time and the NMI Browser will appear. Press H for a help screen.
Use the cursor keys or CAPS SHIFT+6, CAPS SHIFT+7 to select a file. Press ENTER to load and run it.
More info about the NMI Browser is found in the separate 'NMI Browser' paragraph.

Getting software on the memory card
Disconnect power from your ZX Spectrum and pull the SD card from the DivMMC EnJOY! PRO ONE.
Put the SD card into a card reader on your PC or laptop and you are able to copy files to the SD card.

Please note that a maximum of 704 files per folder is supported.
When having more files than that, split the file-set in subfolders.

Visit **www.worldofspectrum.org** *to download lots of games and other software!*

Supported emulator file formats
The DivMMC EnJOY! PRO ONE with ESXDOS supports .TAP, .SNA, .Z80 and .SCR files, and has limited support for .TRD files.
There is however a limitation in snapshot files (.Z80 and .SNA): 128K snapshot files will often only work on the ZX Spectrum 128K ('toast rack') but not on the ZX Spectrum +2A, +2B and +3 because of ROM incompatibility.
The .TZX file format is not supported; this file format contains exotic loading systems (speed loaders, loaders with copy protections, etc.) which need a lot of CPU power to decode.

ESXDOS 0.8.5

Welcome to ESXDOS, the most advanced firmware for mass storage interfaces for the ZX Spectrum. ESXDOS is still being developed, thus being a future-safe choice for your ZX Spectrum interface.

Main ESXDOS features
- Full FAT16/FAT32 read and write support
- New BASIC commands
- Additional commands in BIN folder: see "DOT" commands
- Betadisk/TR-DOS emulation using .TRD files
- TAPE emulation: reading and writing .TAP files
- NMI menu: pressing H in the NMI menu brings up onscreen help

Advanced
- Device and file system abstraction layer; uses drivers to access file systems
- BASIC command integration using +3DOS headers for FAT file systems
- Provides RST 8 hooks for user applications
- POSIX-based API usable by .commands and external programs; functions available on rst $08: open, read, write, close, opendir, readdir, seek, sync, fstat, getcwd, chdir, unlink...
- Support for seamless IM2 loading/saving, from BASIC and machine code
- Possibility of getting absolute LBA sector and device on an opened file for direct I/O access
- Can attach and auto-LOAD .TRD files (check help screen)
- New/Updated Commands: .DivIDEo, .vdisk, .playwav, .dskprobe, .snapload, .gramon, .speakcz

Currently unsupported features / known bugs
- No long file names
- No wildcards yet in BASIC commands
- No 64K clusters
- No extended partitions
- BASIC/Tape Emulator: You can overwrite ESXDOS system using LOAD CODE that crosses $2000
- Commands: Proper argument/syntax checking is not done yet on most commands
- FAT Driver: +3DOS header is set on file creation and never updated when file size changes
- FAT Driver: rename() isn't even remotely posix compliant
- FAT Driver: Directories read-only attribute isn't always respected
- BIOS: version of system file isn't checked against the ROM version (beware of a mismatch)
- TR-DOS: FORMAT and MOVE commands don't work yet + too many to list ;)

Cold start
To perform a cold start without powering off your ZX Spectrum, press the reset-button and hold the SPACE key while resetting.
This way ESXDOS reinitializes.

Drive Naming Convention
For the first SD card it is hd0.
For the second SD card it is hd1.

You can see a list of drive names when ESXDOS runs its initial BIOS drive detection (on a cold start).

BASIC commands
On all BASIC commands that use a drive parameter, you can use * for the current drive.
[...] means it's an optional parameters.

GOTO [drive] ["path"]
        Example:
        GOTO hd0"demos"
        This will change the current drive and directory to hd0:/demos.
        You can use it to change the current drive, dir, or both.

CAT [drive]
        Example:
        CAT, CAT *, CAT hd1
        Without specifying a drive a fast CAT is done (no speccy header info is displayed).

LOAD drive "path/filename" [CODE]|[SCREEN$]
        MERGE drive "path/filename"
        Example:
        LOAD *"/test/blabla", etc

SAVE drive "path/filename" [LINE]|[CODE]|[SCREEN$]
        Example:
        SAVE *"filename" SCREEN$, etc

ERASE [drive] "path/filename"
        Example:
        ERASE "filename", ERASE *"filename", etc

System commands
Files located in the /BIN directory are system commands.
These system commands can be executed from BASIC by typing: ".command <args>".

Each .command has 7.5K of RAM available and may call any ESXDOS syscall.
Commands can also exit to BASIC with a custom error message.

Most commands are self-explanatory or show onscreen help when run without arguments (or with the -h parameter).
An example of the onscreen help:
.tapeout
tapeOUT v0.1 (c) phoenix

Usage: tapeout [args] [tapfile]

-c: Close file
-o: Overwrite file

.ls
Show directory listing

.cd somedir
Change directory

.tapein somefile.tap
Attach .tap file for reading

.tapeout somefile.tap
Attach .tap file for writing

.chmod +h somefile.sys
Set/unset attributes on file/dir

New commands in v0.8.5:
.divideo (currently unsupported for the DivMMC
EnJOY!)
.vdisk
.playwav

.mkdir newdir
Create a new directory

.mv oldname newname
Rename/move file/dir

.cp source target
Copy file

.more textfile
Display the contents of a textfile

.dskprobe
.snapload
.gramon
.speakcz

TR-DOS emulator
Either use the NMI browser to attach/auto-LOAD .TRDs, or use the .vdisk command:
.vdisk unit <filename>

Unit 0 = Drive A, Unit 1 = Drive B, etc.
If you specify just the unit, it will eject the virtual drive.
You can use .dskprobe to check the contents of the vdisk.
Instructions on how to use TR-DOS are out of the scope of this document.

Note: TR-DOS emulation is not available in MapRAM mode (BETADISK.SYS will not be loaded)

NMI Browser
Pressing the NMI button will bring up the NMI file selector menu.
From that menu the following keyboard shortcuts can be used.

<u>Up, Down</u>
Move cursor on page

<u>Left, Right</u>
Change page

<u>Enter</u>
RUN .sna, .z80, files with ZX header of type 'basic', view screen (same as 'v' except for .sna files),
attach .tap file to input slot and soft reset with autoload

<u>r</u>
Reset(Warm)

<u>s</u>
Create snapshot (auto incrementing name starting with snap0000.sna on initialisation of ESXDOS).
If you get ERROR 18 it's because file already exists, try again.

<u>1</u>
Go to parent directory (chdir to '..')

<u>v</u>
Show screen from .scr and .sna files (or files with ZX header of type 'CODE')

<u>i</u>
Attach tape file to input slot

<u>Space</u>
Exit from NMI mode

<u>H</u>
Onscreen help

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ZXSpectrum.shop
ByteDelight.com