The

DivMMC EnJOY! DUO

2 FULL SIZE SD CARD SLOTS

with *esxdos*

SD card interface for the Sinclair ZX Spectrum

Manual

Read this manual before using the DivMMC EnJOY! DUO *interface!*

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BYTEDELIGHT

Overview

With the DivMMC EnJOY! DUO you can load software from memory card into your ZX Spectrum easily!

The DivMMC EnJOY! DUO is the successor of the highly successful DivIDE interface, which nowadays is the most widely used storage interface for the ZX Spectrum. But the DivMMC EnJOY! DUO is the affordable alternative with SD card slot, and as many pc's have an SD card reader, it becomes easy to transfer software.

The DivMMC EnJOY! DUO has two full size SD card slots, and an integrated joystick interface for Atari-compatible joysticks and supports the Kempston or Sinclair joystick standard.
There is an NMI button for an easy break-in menu with lots of functions, and a reset button.
The DivMMC EnJOY! DUO has 128KB ram by default (4x the memory compared to the DivIDE).

The DivMMC EnJOY! DUO comes with ESXDOS, which is FAT and FAT32 compatible, and 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!

Compatibility

The DivMMC EnJOY! DUO is fully compatible with all Sinclair ZX Spectrum models:
16K, 48K, 48K+, 128K, +2, +2A, +2B, +3 and some clones.
The DivMMC EnJOY! DUO is not compatible with the Spanish Investronica ZX Spectrum 128K.

In the box

Your DivMMC EnJOY! DUO interface is delivered with an SD card and this manual.

The card is formatted and contains some ZX Spectrum games en demos for you to try instantly when you install your DivMMC EnJOY! DUO for the first time, without having to download software first.

Notification Leds

The DivMMC EnJOY! DUO has two notification leds.
The 'POWER' led indicates the ZX Spectrum with DivMMC EnJOY! DUO is powered on.
And the 'CARD' led shows the SD card activity (blue for card1, red for card2).

Please read these instructions carefully
before powering on your system with the DivMMC EnJOY!

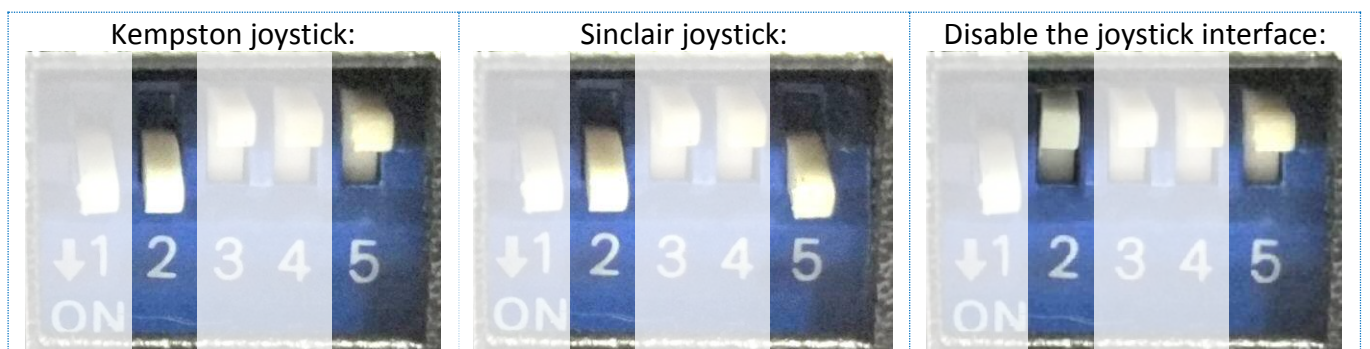## DIP switch configuration

DIP switch overview

5	On: Sinclair 1 joystick Off: Kempston Joystick
4	On: ZX Spectrum 128K+ (toastrack) Off: other
3	On: ZX Spectrum +2A/+2B/+3 Off: other
2	On: Joystick interface enabled Off: Joystick interface disabled
1	On: Normal operation Off: Flash (programming) mode

ZX Spectrum selection – DIP switches 3 & 4

ZX Spectrum 16K, 48K, 48K+ or (grey) +2:	ZX Spectrum 128K 'toastrack' model*:	ZX Spectrum +2A, +2B or +3:
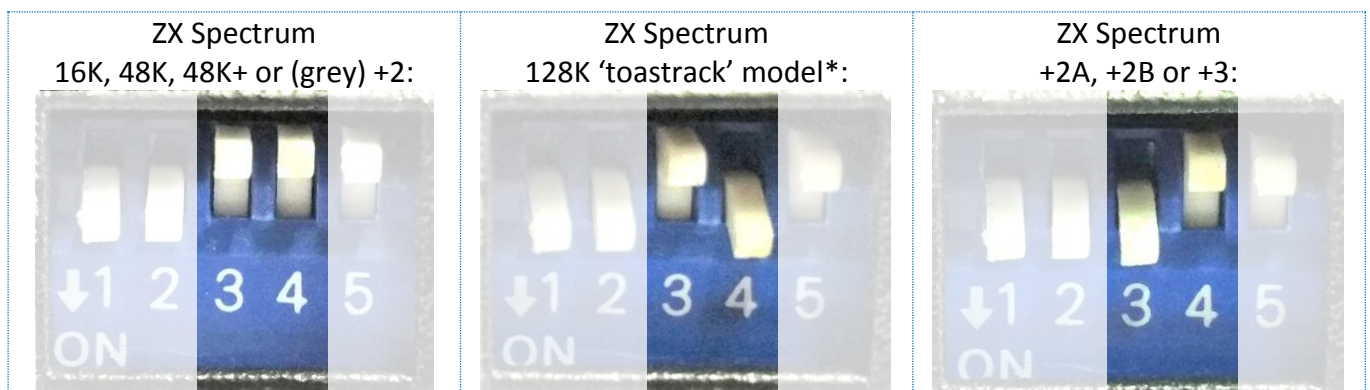
* Some ZX Spectrum 128K 'toastrack' models seem not to need switch 4 enabled. If you are using a ZX Spectrum 128K 'toastrack' and you are getting 'tape loading errors', disable switch 4.

Joystick interface configuration – DIP switches 2 and 5

| Kempston joystick:	Sinclair joystick:	Disable the joystick interface:

When combining the DivMMC EnJOY! DUO with another interface that also has a Kempston / Sinclair joystick port, you can disable the internal joystick port on the DivMMC EnJOY!

Programming configuration – DIP switch 1

The 'FLASH' switch is normally in the 'OFF' position when using the DivMMC EnJOY!.
When upgrading to a newer version of the ESXDOS firmware, download and run the programming files and read the on screen instructions carefully - the programming software will indicate when to put the 'FLASH' switch to the OFF position and when to place it back to the ON position again.

Normal operation:	Flash / programming mode:
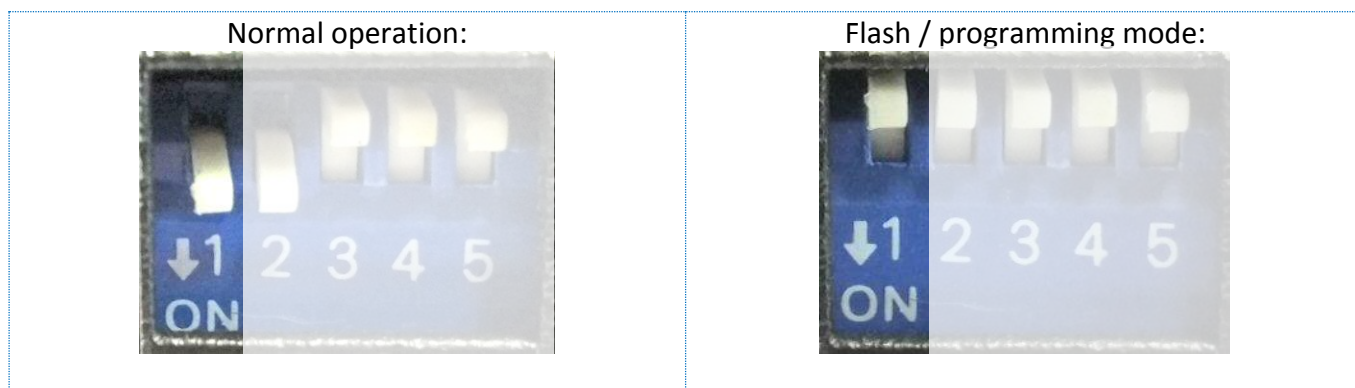
Please note that the EEPROM on the DivMMC EnJOY! DUO is write protected by default, to avoid unintentional programming. When an firmware update fails and shows that the ROM is protected, download and run the unprotect utility first.

Make sure the edge connector is clean!

It's important that your ZX Spectrum has a clean edge connector where the DivMMC EnJOY! DUO will be connected to. Advised is to use cotton swabs with pure alcohol.

Connecting the DivMMC EnJOY!
Always disconnect the power from your ZX Spectrum before connecting any interface!

Connect the DivMMC EnJOY! DUO to your ZX Spectrum carefully and insert the SD card.
Now you can power up your ZX Spectrum.

Using the DivMMC EnJOY!

This DivMMC EnJOY! DUO 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! DUO 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! DUO 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 menu
This is the simplest way of loading a game or program.
Press the NMI button at any time and the NMI menu 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 menu is found in the separate 'NMI Menu' paragraph.

Getting software on the memory card
Disconnect the power from your ZX Spectrum.
Pull the SD card from the DivMMC EnJOY!
Put the SD card into a card reader on your PC or laptop and copy your 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! DUO with ESXDOS supports .TAP, .SNA, .Z80 and .SCR files.
There is however a limitation in snapshot files (.Z80 and .SNA): 128K snapshot files will often only work on the ZX Spectrum 128K ('toastrack') 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 continuously in development, 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   .mkdir newdir
Show directory listing   Create a new directory

.cd somedir   .mv oldname newname
Change directory   Rename/move file/dir

.tapein somefile.tap   .cp source target
Attach .tap file for reading   Copy file

.tapeout somefile.tap   .more textfile
Attach .tap file for writing   Display the contents of a textfile

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

New commands in v0.8.5:   .dskprobe
.divideo (currently unsupported for the DivMMC EnJOY!)   .snapload
.vdisk   .gramon
.playwav   .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 menu
Pressing the NMI button will bring up the NMI file selector menu.
From that menu the following keyboard shortcuts can be used.

Up, Down
Move cursor on page

Left, Right
Change page

Enter
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

r
Reset(Warm)

s
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.

1
Go to parent directory (chdir to '..')

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

i
Attach tape file to input slot

Space
Exit from NMI mode

H
Onscreen help

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