"MDOS1 2 PC" Copy Utilities Set

(By Tomáš Nestorovič, 2014)

The purpose of this "mini toolkit" is to facilitate the transfer of Didaktik computer data stored on 3.5" or 5.25" floppies to PC. The toolkit consists currently of three utilities (some of which ship along with their legacy versions), intended for single or two Didaktik drives computer configurations. Each of the utilities carries out a sector-based data copying of MDOS1-formatted (aka PC-incompatible) floppies to PC-compatible floppies. Below, usage of each of the utilities is described.

Utilities Overview

This mini toolkit contains:

- *1DRV.OBJ* Copying of data on a single drive.
  Recommended for transferring already compressed data, e.g. by *Proxima*
- *1DRVLZW1.OBJ* Compressed copying of data on a single drive (LZW algorithm, initial sequential implementation).
- *1DRVLZW2.OBJ* Compressed copying of data on a single drive (LZW algorithm, binary search above LZW dictionary).
- *1DRVLZW3.OBJ* Compressed copying of data on a single drive (LZW algorithm, LZW dictionary stored in an AVL tree).
- *1DRVLZW31.OBJ* Compressed copying of data on a single drive (LZW algorithm, optimized LZW dictionary stored in an AVL tree).
  Recommended to transfer uncompressed data, e.g. BASIC apps, cliparts, etc.
- *2DRVS.OBJ* Copying of data on two drives.

Table 1: Number of disk swaps and times of utilities run in an emulator performing at approximately half the speed of a real Didaktik/Spectrum computer (i.e., divide all times by two).

Title (Publisher)	Capacity Format	# of swaps uncompressed	# of swaps compressed	LZW v.1 minutes	LZW v.2 minutes	LZW v3.1 minutes
Public Domain #5 (Proxima)	285.696 31x9	6	4	29	12	6
Public Domain #8 (Proxima)	389.120 38x10	8	6	44	17	9
Poster Maker disk #1 (Perpetum)	737.280 80x9	15	13	99	39	18
Pedro na ostrove… (Ultrasoft)	819.200 80x10	17	3	20	16	12
ZX 603 + Utilities (Miroslav Beníček)	368.640 40x9	8	6	43	17	8
Color Draw (JHCS)	322.560 35x9	7	3	21	10	6
BASIC Apps & Pics (my work)	737.280 80x9	15	8	72	31	15

To illustrate, Table 1 compares the number of disk swaps and times needed to copy selected titles using different single-drive utilities contained in this toolkit. Note that these times involve both compression and decompression, and were obtained by running the utilities (with all user interaction disabled) in an emulator *performing at approximately half the speed of a real Didaktik computer*. Thus, their real runtime may be estimated by dividing the measured times by two.

Getting the Utilities into Your Didaktik/Spectrum Computer

In order to use any of the utilities on your Didaktik/Spectrum computer, you need to store its binary file (with the .OBJ extension) either to a tape or a floppy disk.

To store it to and load it from a tape:

1. Open an emulator with binary files support.
2. Load the binary file to the address 16384 (0x4000h).
3. Save it to a PC-connected tape recorder by typing the command
   `SAVE "MDOS2PC" SCREEN$`
4. Load it to a Didaktik/Spectrum computer by typing the command
   `LOAD "MDOS2PC" SCREEN$`

To store it to and load it from a disk:

1. Open the *Real Spectrum* emulator configured to support Didaktik drives.
2. Format a floppy disk to comply with Didaktik file system using *Real Spectrum* (Ctrl+F6 hot key).
3. Load the binary file to the address 16384 (0x4000h).

(continued on the next page)

Table 2: Border colour codes and their meaning.

Colour	Meaning
White	Everything is OK and no user intervention is needed.
Green	Insert the source disk into drive A and hit a key.
Cyan	Confirm the source disk's detected format (in *hexa-numbers*) by hitting the P key.
Yellow	Insert the target disk into drive A and hit a key.
Black	Sector read/write error (each error accompanied by its own beep).

4. Save it to the floppy from Step 2 by typing the command
   `SAVE* "MDOS2PC" SCREEN$`
5. Load it to a Didaktik/Spectrum computer by typing the command
   `LOAD* "MDOS2PC" SCREEN$`

Re-launching the Utility of Choice

Each of the utilites is to be (re-)launched by typing and entering `RANDOMIZE USR 16384`. To operate the utility, please **read** its corresponding instructions below!

Using Utility *1DRV.OBJ* for Copying Data on a Single Drive

This utility is intended for copying of data on a single drive and I recommend it as the primary choice for any kind of data that has already been compressed (e.g. floppies by *Proxima*). The utility fills each corner of available RAM, VideoRAM, and DRAM with sectors read from the source disk (see Version History section below for the exact number). Once the target disk has been plugged in, it writes the sectors to it.

Here is how to operate this utility in detail.

- When launched, the utility beeps and the border turns Green. Beeping and border colouring are the only possible channels to communicate with the user, given that the screen is later occupied by read source data. The initial Green border indicates the utility demands a source disk plugged into drive A and a key be hit when ready. Table 2 shows a complete list of border colour codes used.
- Once a key has been pressed, the source disk format is detected and shown in the *hexadecimal* format – thus 28xA means 40 tracks with 10 sectors on each side (the number of sides is not displayed). The border turns Cyan and the utility expects the detected format to be either confirmed (by the P key, standing for "Proceed"), or disapproved (by hitting any other key). In the latter case, the utility terminates by returning to Basic. You can override the source disk's number of tracks (see Additional Settings below), however the number of sectors cannot be overriden.
- With the format capacity confirmed, the utility proceeds to the data transfer while showing the progress in the form of a green-black bar, representing the ratio of the number of transferred (vs. all formatted) sectors on the source disk.
- Once all memory has been filled up (or sectors loaded), the border turns Yellow, indicating the target disk is expected in drive A. When ready, any key is to be hit.

Additional Settings

- POKE 16643,*A*
  Sets the number of attempts to read/write a sector before reporting an error; the default value is 3.
- POKE 16791,*T*
  Sets the default number of tracks on the target disk in drive A; the default value is 80.
- POKE 16792,*S*
  Sets the default number of sectors per track on the target disk in drive A; the default value is 9.
- POKE 16793,*X*
  Non-zero *X* overrides the number of tracks on the source disk; this is helpful when dealing with a 40-tracks disk in an 80-tracks drive (in such case, set *X*=41 to avoid MDOS difficulties); with *X*=0 you withdraw any overriding made earlier and let the utility determine the value from the floppy's boot sector; the default value is 0.

Using Utilities *1DRVLZW*.OBJ* for Compressed Copying of Data on a Single Drive

This utility aims to lower the number of disk swaps in a single drive by storing sectors in a compressed form in the memory (using the LZW algorithm – see its performance samples in Table 1). Once the target disk has been plugged in, it decompresses the sectors to it.

Here is how to operate this utility in detail.

- When launched, the utility beeps and the border turns Green. Beeping and border colouring are the only possible channels to communicate with the user, given that the screen is later occupied by the LZW dictionary. The initial Green border indicates the utility demands a source disk plugged into drive A and a key be hit when ready. Table 2 shows a complete list of border colour codes used.
- Once a key has been pressed, the source disk format is detected and shown in the *hexadecimal* format – thus 28xA means 40 tracks with 10 sectors on each side (the number of sides is not displayed). The border turns Cyan and the utility expects the detected format to be either confirmed (by the P key, standing for "Proceed"), or disapproved (by hitting any other key). In the latter case, the utility terminates by returning to Basic. You can override the source disk's number of tracks (see Additional Settings below), however the number of sectors cannot be overriden.
- With the format capacity confirmed, the utility proceeds to the data transfer while showing the progress in the form of two green-black bars. The upper bar shows the ratio of consumed memory, whereas the lower bar represents the ratio of the number of transferred (vs. all formatted) sectors of the source disk. (Note that the utility moves itself to DRAM before engaging with compression – hence, do not panic seeing it overwrites itself on the screen. Once the transfer is complete, the utility moves itself back to the screen so that it can be easily re-launched.)
- Once all memory has been filled up (or sectors compressed), the border turns Yellow, indicating the target disk is expected in drive A. When ready, any key is to be hit.

Additional Settings

Addresses apply to *1DRVLZW31.OBJ* only. Previous versions are no longer supported.

- POKE 16576,A_R
  Sets the number of attempts to read a sector before reporting an error; the default value is 3.
- POKE 17160,A_W
  Sets the number of attempts to write a sector before reporting an error; the default value is 3.
- POKE 17339,*T*
  Sets the default number of tracks on the target disk in drive A; the default value is 80.
- POKE 17340,*S*
  Sets the default number of sectors per track on the target disk in drive A; the default value is 9.
- POKE 17341,*X*
  Non-zero *X* overrides the number of tracks on the source disk; this is helpful when dealing with a 40-tracks disk in an 80-tracks drive (in such case, set *X*=41 to avoid MDOS difficulties); with *X*=0 you withdraw any overriding made earlier and let the utility determine the value from the floppy's boot sector; the default value is 0.

Using Utility *2DRVS.OBJ* for Copying Data on Two Drives

This utility is intended for copying of data on two Didaktik drives computer configurations. It gives all necessary instructions at its run time (including disk/drive errors, reported using standard MDOS messages), and will therefore be left here without closer description.

Additional Settings

- POKE 16680,*A*
  Sets the number of attempts to read/write a sector before reporting an error; the default value is 3.
- POKE 16851,*T*
  Sets the default number of tracks on the target disk in drive A; the default value is 80.
- POKE 16852,*S*
  Sets the default number of sectors per track on the target disk in drive A; the default value is 9.
- POKE 16853,*X*
  Non-zero *X* overrides the number of tracks on the source disk; this is helpful when dealing with a 40-tracks disk in a 80-tracks drive (in such case, set *X*=41 to avoid MDOS difficulties); with *X*=0 you withdraw any overriding made earlier and let the utility determine the value from the floppy's boot sector; the default value is 0.

Limitations and Work Yet To Be Done

Although each of the utilities has been thoroughly tuned up to perform at the maximum speed possible (regarding especially the LZW compression algorithm), there are yet few things to be done. First, none of the utilities *1DRV*.OBJ* currently handles drive errors (e.g. disk not inserted, etc.), partly because MDOS1 routines are written chaotically (altough they sub-call the related testings, they do not evaluate the returned result), and partly because I did not want to bother myself with implementing extra testing calls (i.e. feature to be added in some of further versions, if there is enough memory left for them to be implemented). And

second, none of the utilities currently makes use of extended 128k memory. Nevertheless, I do not take this as a significant drawback, given that Didaktik computers in vast majority of cases disposed merely with 48k RAM.

Version History

- **Project closed.**
- 1.5 (October 2014)
  – fixed bug with single-side floppy detection
  – added Poke to override the number of tracks of the source disk
  – minor improvements to the LZW compression and decompression, yielding nearly identical run times with Version 3 (see Version 3.1 in Table 1)
  – improved (and debugged) documentation
- 1.4 (July 2014)
  – improved LZW compression (see Version 3 in Table 1)
- 1.3 (June 2014)
  – improved LZW compression (see Version 2 in Table 1)
  – improved utility for uncompressed single-drive transfer to accommodate one sector more (97 sectors per turn)
  – changed confirmation of detected format from Y to P key to be in consistence with other MDOS messages ("P=Proceed")
- 1.2 (May 2014)
  – restructured utility for uncompressed single-drive transfer to increase its efficiency (96 sectors per turn)
- 1.1 (May 2014)
  – added utitlity for uncompressed data transfer using a single drive (81 sectors per turn)
  – improved text printing routines in each of the utilites
- 1.0 (March 2014)
  – initial release, 10 bits LZW, missing disk/drive error testings