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M/DRIVE DOCTOR gives you some of the facilities normally found only on expensive disc-based systems. All its features are available from BASIC in the form of new commands that may be entered either directly or as a program line. To further the usefulness of M/DRIVE DOCTOR a sector editor is included in the package which allows on screen alteration of individual sectors (see EDITOR instructions).

USING M/DRIVE DOCTOR

When trying the program for the first time you are advised to use an unimportant cartridge until you are fluent with the use of each command. It is also advisable to make a back-up of the program using * MOVE, after the instructions have been read and understood, but please do not give copies away as many hours work have gone into developing the program.

To load M/DRIVE DOCTOR reset the computer, put the supplied cartridge into drive ONE, press 'R' and ENTER. When the drive stops the extra commands will be accessible from BASIC.

NOTE: Unlike earlier versions any numbers displayed are now in decimal number bases (excluding the * BIN command).

COMMAND SUMMARY

* MOVE	:	Full back-up of ANY cartridge.
* RESTORE	:	Individual sector restoration.
* ERASE	:	Individual sector erasure.
* INVERSE	:	Full program rename facility.
* MERGE	:	Merges even autostart programs.
* BIN	:	Cartridge status map display.
* CAT	:	Fast/full super catalogue.
* LLIST	:	Display faulty sector numbers.
* CHR$	:	ASCII display of any sector.
* FORMAT	:	Increases cartridge capacity.
* READ	:	Lists any filenames' sectors.
* POINT	:	Change default drive number.
* NEW	:	'NEW' but commands remain intact.

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USING PRINTERS WITH M/DRIVE DOCTOR

By default M/DRIVE DOCTOR commands put their output onto
the screen of your tv/monitor. This may be diverted to the
RS232 interface by typing 'OPEN #2,"T"' or a ZX type printer
with 'OPEN #2,"P"'. 'CLOSE #2' will restore screen output.

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* RESTORE This command may be used to mend faulty sectors
on a cartridge and requires the sector number to be restored
after it. The cartridge will be searched for the given sector &
(assuming it was faulty) replaced with an updated version. This
is useful on old cartridges and is best suited to PRINT/DATA
type files. EXAMPLE:- * RESTORE 140

* ERASE Follow this command with the sector number to be
erased. That sector will then be free for use and whatever data
it contained will be lost. * ERASE can be used to increase the
capacity of some cartridges but care must be taken as parts of
it may be faulty even if all appears o.k. EXAMPLE:- * ERASE 46

* LLIST This will list the numbers of any suspect sectors
and if a lot of numbers appear make a back-up using * MOVE
straight away. * LLIST should be used to see if any sectors
require editing/restoring/erasing. EXAMPLE:- * LLIST

* CAT A super catalogue that displays filename/ filetype/
start address/ length and any autostart line numbers. Cartridge
name and true space left are shown as well. It is also a good
deal faster than an ordinary catalogue. EXAMPLE:- * CAT

* MOVE This command requires two drives but will back-up
ANY cartridge. Put the cartride to be copied in drive number
one and a blank (or unwanted) one into drive two. The process
is fully automatic and will make a fast/faithful copy of your
programs. If 'Microdrive Full' appears then another cartridge
should be put in drive two as not all of the sectors have been
copied. This should happen very rarely. EXAMPLE:- * MOVE

* CHR$ Using this command will display any ASCII data that
is contained in the sector number that follows it. This makes
it ideal for PRINT files as you can find out exactly which
sector any given text is stored. EXAMPLE:- * CHR$ 32

* BIN * BIN displays a binary cartridge map. Zeroes denote
free sectors while ones mean a sector is either used or
non-existant. The numbers are read like a book, left to right,
and each digit represents a sector (0-255). EXAMPLE:- * BIN

* FORMAT This command will give cartridges a considerably
increased storage capacity. Formats are usually well in excess
of 100k and the command requires, as with the normal 'FORMAT',
a cartridge name to follow it. EXAMPLE:- * FORMAT "cartname"

* POINT Followed by a number (1 to 8) this command will alter the drive number that any subsequent M/DRIVE DOCTOR commands will act upon. When first loaded the default drive is one, but may be altered to suit. EXAMPLE:- * POINT 7

* NEW If a normal 'NEW' is performed M/DRIVE DOCTOR commands cease to be available. * NEW performs the same job but leaves the extra commands at your disposal. You will need to first type 'NEW', move the cursor left one space and then type '*'. This command is not available during runtime. EXAMPLE:- * NEW

* READ A very useful command that will list the sectors that any given file is stored on. For example, * READ "name" will display any sectors that contain the file 'name'. A WILDCARD facility is provided with '* READ'. That is to say that using, for instance, * READ "T" will display the sectors of ALL filenames beginning with 'T'. No error occurs if the file is not found. EXAMPLE:- * READ "freddy"

* INVERSE This is a command that many people feel should have been there in the first place. * INVERSE will rename a given file with any new name of your choice (up to 10 characters). While * INVERSE is executing the screen will become scrambled, this is normal and the computer has not crashed. To use, follow the command first with the file to be renamed and then with the new filename, you may even use a name that already exists. No error occurs if the file is not found. As with '* READ' wildcards may be used with this command. To differentiate between two similar filenames put a space after the one being renamed. EXAMPLE:- * INVERSE "f/name1 ","f/name2"

* MERGE Almost the same as a normal MERGE, use of this command will merge a BASIC program from microdrive even if it was saved with autostart. This is very useful with any programs you have protected that require altering. No 'WILD' filenames are available with '* MERGE'. EXAMPLE:- * MERGE "f/name"

The following commands are for more advanced users.

SYSTEM VARIABLE A new system variable is introduced by M/DRIVE DOCTOR. Its name is SECNO and resides in the normal sys/vars at address 23681. Sinclair claim this address is never used but this is not strictly true as the use of 'LLIST' or 'LPRINT' will obliterate its contents. Caution then must be shown when using these two commands alongside the next two.

* LOAD This command will load any sector into a buffer starting at 62892. The buffer is a copy of the 'M' channel used whilst loading the sector (addressed by the IX register pair). The sector number to be loaded needs to be POKEd into SECNO before using. EXAMPLE:- * LOAD

* SAVE The opposite of *** LOAD** this command will save, onto the sector pointed to by SECNO, any data in the previously mentioned buffer. All checksums are recalculated so data may be altered freely (buffer+82 to buffer+594). EXAMPLE:- *** SAVE**

As a further example, say you wanted to copy sector number 5 onto sector number 52. A line like this would do the trick...

          POKE 23681,5: * LOAD : POKE 23681,52: * SAVE

THE ZX MICRODRIVE SYSTEM

The system of storage Sinclair Research has developed is without doubt an ingenious method for the safe-keeping of computer data. However, like nearly all forms of data storage, it has its pitfalls. The fact that it works reliably at all is nothing short of a miracle and so the odd mishap is almost inevitable.

Each cartridge contains about 200 inches of good quality video tape joined at the ends to form a continuous loop. In each drive are two sets of read/write/erase heads that are used to send/recieve the signals that represent data. Data is stored on tape by using two tracks as opposed to most floppy tape systems which use only a single track. This makes the system faster and allows a greater density of information to be stored than would normally be expected. When a cartridge is formatted the tape is divided up into chunks (sectors), each one having its own number, which wil be used to store the data.

The number of sectors available depends on the length/ quality of the tape but there are usually around 190 sectors free for use on a new cartridge. In theory there could be up to 255 sectors on a cartridge, but in practice there are always parts of the tape unfit for data storage (where the ends meet for example). Alongside any data in each sector is some other information, filename/ cartridge name/ record number/ used or unused sector flag, etc. Some of their uses are obvious and most are analogous to the Spectrum cassette system. Also stored in each sector are a number of what are called checksums. These are used by the interface ROM to see if any sector has been read correctly making it more reliable than would otherwise have been possible. If these checksums do not match the system will reject any data recieved.

This is fine if the data eventually loads into the computer but does not allow for parts of the tape that have become faulty, for whatever reason, and allow you to correct them. M/DRIVE DOCTOR ignores these checksums and gives you a chance to recover, or at least load, any faulty sectors and the SECTOR EDITOR allows you to inspect/change them. Such a facility is not to be sneezed at and is indeed a part of most expensive computer users utilities where lost data equals time and money.

·Further information: 'SPECTRUM MICRODRIVE BOOK'-I.Logan.
    & 'MASTERING YOUR ZX MICRODRIVE'-Andrew Pennell.

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<<M/DRIVE DOCTOR SECTOR EDITOR>>

The SECTOR EDITOR enhances the usefulness of M/DRIVE DOCTOR
by allowing you to individually alter any sector. These will
normally be corrupted sectors and so should be used alongside
the * LLIST command. Care and patience are required by this
program as it is very easy to change an otherwise perfect
sector. Thus it is advisable to put an unimportant cartridge
into drive one, when using the program for the first time,
and get used to its features by experimentation.

USING M/DRIVE DOCTOR SECTOR EDITOR

To load the program use LOAD *"M";1;"EDITOR". The editor will
autostart and is fully menu driven. If the program ever stops
with an error simply type 'RUN' and 'ENTER' to restart.
   On loading you will be asked for the sector number that is
to be edited (you should already have a list of the sectors
you are interested in). This number may be between 0-255 but
sector numbers above around 190 are normally non-existant as
is sector zero. After putting the cartridge you are working
on into drive one and pressing 'ENTER' the program will then
search for and load the required sector, if it exists.
   When the sector has been loaded sector number, sector name
and cartridge name will appear as will a formatted display of
its first nine bytes of data. The numbers running down the
left-hand side of the screen denote the byte number within
the sector. These range between 1-512 as there are 512 bytes
of data contained in each sector. The other two columns show
the data that is held in that part of the sector, first the
numerical value (0-255), then if necessary its ASCII
equivalent. The white band running across the screen is
called the edit line, this is the byte being worked on.
   You now need only four keys (or a cursor controlled joystick
if required) to edit the sector. Key '6' moves the edit line
onto the next byte. '7' moves the edit line back one byte.
'5' decreases the value of any data within the byte. '8'
increases the value of of any data within the byte.
   When finished editing press 'q', for quit, .to exit the
editor. You will then be asked if the updated sector is to be
resaved and then if you have finished with that sector. At no
time are you commited to save the sector you are working on.

MEMORY MAP

0-16383	16384-23295	23296-23551	23552-23791
ROM	Display File	Printer Buffer	System Vars

23792-59999	60000-65206	65207-65367	65368-65535
BASIC+Chans	MDRIVE DOCTOR	Spare	UDG Area

SOME TIPS & EXAMPLES

When having cartridge trouble the first thing to do is perform a * LLIST. Note any faulty sector numbers and repeat the operation. This will verify if any sectors are indeed faulty as the cartridge may need a run through to align the tape.

The display may give... 98 45 2

Now type '* RESTORE 98: * RESTORE 45: * RESTORE 2' which will try to recover the suspect sectors. Do another * LLIST to see if the sectors now appear to be alright and if so check if the cartridge now functions correctly.

Most of the time it should do but if the sectors contained machine-code it will be necessary to load the SECTOR EDITOR to do a bit of surgery on them. Obviously this requires time, patience and a knowledge of assembly language & if you have none of these then this is as good an incentive as you are ever likely to get. If the sectors contained text you should now be able to alter it with either the program that produced it or again by using the SECTOR EDITOR.

If the sector/s contained nothing important, use the editor to find out, it would be a good idea to * ERASE them & if the screen is choc-a-block full of numbers then a * FORMAT, normal FORMAT and a strong cup of coffee is recommended as the cartridge is almost totally corrupted.

If you want to back up some code you can find out its start address and length by using * CAT or you may clone a whole cartridge with * MOVE. The cartridge supplied was produced with this command. NOTE THAT COPIES WILL NOT PERFECTLY CLONE AGAIN.

Now say you had a file on cartridge called 'A' and it contains a chess program. It would be far better to call it something like 'CHESS'. To achieve this type * INVERSE "A","CHESS".

A protected BASIC program can now be merged by using * MERGE. Autostart programs usually give give a 'Merge error' but this is not the case with the new command. To load a file called 'run' type '* MERGE "run"'.

Don't forget that if * POINT is used make sure that the number that follows it refers to a drive that actually exists. Otherwise you will keep getting a 'Microdrive not found' error.

Remember * MOVE erases anything that was on the cartridge in drive two and * ERASE will obliterate a sectors contents.

Even though you now have an improved CAT command a sense of order should be kept when saving files. Your author uses upper case characters for BASIC programs and lower case for any machine-code (* CAT the cartridge and see). It is also worth pointing out that keywords may be used in filenames and they take up the equivalent of one character each.