DAVE CORNEY'S CONFIGURATION

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The OPUS DISCOVERY is a highly useable floppy disc system but
the drive supplied as standard is a single sided 40 track unit
offering a meagre 178K on a 3.5" disc. On a larger capacity
drive the same floppy can hold as much as 800K !!!

If it's any consolation, it is possible to squeeze up to 199K
out of a standard drive. (without any new hardware)

For more storage it's necessary to splash out on drives with a
larger capacity. Up to two 1 Megabyte drives can be fitted to
Discovery, giving 1.6 Mb of disc space. (the other 400K is used
during formatting)

Discoveries disc operating system (dos) has been written with
expansion in mind. It can be configured to use any BBC (shugart
compatable) drive, either 3", 3.5" or 5.25", double or single
sided.

A second drive makes disc copying more easy, but the main reason
for adding more drives is for extra disc space.

Although less sturdy than 3.5" discs, 5.25" floppies are,
currentley cheaper, and if you have a lot of stuff to archive,
the `60.00 + you will have to fork out for a 5.25" unit may be
worthwhile.

Mere mortals with one drive who wish to enjoy these advantages
must plug in a 6116 static ram chip, (for fitment see issue 1)

What's the extra ram for? DOS makes extensive use of the look-up
tables, normally held in a rom where they can't be altered. At
switch on, DOS checks for the ram and, if fitted, copies some of
these tables onto it. Here they can be modified.

The program actually saves 8 files onto disc, they are:

1) defaultram - Start up data.

2) boot - For fast installation of your configuration.

3) config - The main configuration program.

4-7) floppy 128, floppy 512, floppy 1024, ram 1024.
              These are example configurations

8) load me - Pass this on to your mates, it saves all the above
files onto a disc.

I stress at the outset that even the wildest eyed hackers will

be hard put to find a use for some of the multitude of options.
Buy you never know!!

When you load the main config program, a menu listing a number
of floppy and ram drives will appear. Plus a system option.
Curser keys move the bar up and down the list to select a drive.
Pressing enter will display the current configuration of a
particular drive.

Before we get stuck in, a bit of background info. Although the
hardware can only support two physical disc drives, DOS can keep
track of four logical drives, prompting for the correct disc to
be inserted if a user refers to drives 3 or 4.

Each of these logical drives can be configured independently,
DOS keeps a separate table for each.

Note that drive 4 and 6 are only available on version 2.2 of the
Discovery rom (or 2.22). Drive 6 (paged ram) only applies to
128K Spectrums.

Information is stored on a disc in 256 byte blocks called
sectors. DOS can be set up to use other sector sizes – 128, 256,
512 or 1024 bytes.

A larger sector size gives a noticeable increase in speed of
disc operations. However, when a disc is read from or written to
DOS sets up a buffer in Spectrum memory. Forget Opus blurb about
"uses no memory", it uses some Spectrum ram on a temporary basis
whilst accessing discs or other DOS functions. A disc with a
larger sector size needs a larger buffer. In this case you will
normally set an error message, "out of memory".

A disc with 1K sectors needs slightly more than 1K of free space
between the end of basic workspace and ramtop. Tasword III for
example, clears ramtop so low that it cant save text to a disc
with a sector size over 256 bytes. Multiface 1 can cope with a
256 byte sector size but gives an error report if faced with a
disc using 1K sectors. It pays to mark the config details on the
disc label where it's easily checked if a problem occurs.

Where a space is really tight, a disc with a 128 byte sectors
can almost always be accessed, in contrast microdrive always
need a 512 byte buffer. It's a good idea to persuade your Opus
owning friends to fit the Ram chip or they wont be able to run
your discs.

Take a look at the table for floppy drive 1. Again, curser keys
move the bar up or down, pressing enter selects the option. At
the base of the screen are 5 more options.

1) Write – transfer drive table to ram chip.

2) Abort – return to main menu.

3) Load - load a previous config title.

4) Save - save the current config file.

5) Copy - print screen on a ZX printer.(or any printer that uses copy)

To format a disc with 512 byte sectors (199K). Press L and when the prompt appears, type 1 and Enter. Now input the filename of the example config file you want to load, in this case floppy 512.

Assuming you had the right disc in drive 1, the drive table will be redisplayed, with some changes. Can you see what has been altered? What is the sector size now?

These changes wont take effect until you press W to write to the configuration to the ram. Do that and press Break to get back into basic. Then format a disc, dont do any other disc operations between pressing break and formatting or 512 will be lost. To format the disc type FORMAT 1; " big one " CAT 1. The result should be a disc with 199K of space, because the 1/2K sector makes more efficient use of the disc surface.

However, a part of each disc must be used to store a catalogue. To squeeze the maximum space from the disc we have cut the number of sectors available for the catalogue from the usual 6 to just 1. Type GOTO 9200 to restart the program and take a look at the catalogue sectors entry in the drive 1 table.

As it stands, your 199K disc has enough catalogue space for only 30 files, to get more you must sacrifice file space and re format with more catalogue sectors.

As a general rule, those items printed in the table in cyan are of use to those with standard drives only. The ones higher on the list are the most useful. If you have fitted other drives, the green options will also be of interest. For now, you're unlikely to want to alter the red items.

The Boot program's purpose in life is to save the hapless Discovery user from the dreadful fate of fumbling through the config routines every time you switch on. Boot loads up a previously saved configuration automatically.

To use boot a special file must be saved from within config, using the save ram image option on the main menu. This is not the same as the save option displayed when viewing an individual drive table.

A ram image file is simply the contents of the Opus 2K ram, or the drive tables themselves.

Start by copying boot to a new disc (you could rename it run and make things easier). Now load config and enter your configuration details. Press W to write the information to the Opus ram chip. You will be returned to the main menu. You can now save the ram image onto the disc you've copied boot onto. Press S to do this. You will be prompted to enter a drive number and filename - as supplied, boot looks for a file called defaultram so, for the moment, give this name to your file.
NOTE: There's a file called defaultram on the original disc, don't overwrite this.

Reset the Spectrum and load the copy of boot that you have just made. IT will auto-run and read the defaultram file, transfering your configuration to the 2K ram. So, to install that particular configuration from now on, you have only to load boot. The file that boot looks for is specified in LINE 10, so this can be changed if you want to change the name of the defaultram file. If you wish to store a range of ram images on one disc, alter line 10 of boot to prompt for a filename.

You only need to install your ram image once, at power up, as it wont be affected by resetting the Spectrum. However, a crash could corrupt the ram, so it's safest to reload the image if one occurs. The USR 14070 command also resets the ram.

Although boot makes it easier to set up your system, certain parts of a floppy configuration are stored on the disc itself. These items will be detected by DOS whenever the catalogue of a particular disc is read. They are as follows...

1) Number of sectors per track 2) Number of tracks per side

3) Number of sides per disc   4) Sector size

These 4 are stored on every disc when it's formatted. So if you load the relevant ram image and format a disc immediately, DOS will know what values apply to that disc whenever, for example you cat the disc. If you find yourself unsure of the contents of a particular ram image file, the fastest way to check is to load ram image option on the main menu of Config. Then look at each of the drive and system tables to see what set up the image specifies.

<div align="center">DISCOVERY FLOPPY TABLES</div>

Here follows a summary of the entry points for each of the floppy disc tables.

UPDATED BY CATALOGUE ACCESS, means DOS reads this item whenever the catalogue is accessed, and sets itself up to suit, so, if you read a file from a disc and then insert a disc with a different sector size, DOS adjusts automatically.
NB. Catalogue access doesn't only refer to CAT command since DOS has to update the catalogue when, for example, a file is saved.

Those items which relate to only one version of the Discovery rom, are marked accordingly. The version 2,22 ROM is identical to version 2.2 except that the step rate defaults to 12ms not 6. With reference to drives, PHYSICAL means the actual disc drive sitting on your desk. LOGICAL refers to a drive number, e.g. CAT1 and CAT3 will access the same physical drive but promrt for a disc change.

If in doubt, try it. Dont use a disc with important information on, just in case!

SECTOR SIZE: The number of bytes in a disc sector. The channel size in Spectrum memory will reflect this value. Useful for optimising access speed v Spectrum memory useage- larger sectors are faster but use more memory to read/write. Used by read, write and format routines and is updated by a catalogue access.

SECTORS/TRACK: The number of sectors which will fit on one track of the disc. This value depends directly on the sector size and density. Used by read, write and format routines and is updated by catalogue access.

CATALOGUE SECTORS: The number of sectors which will be used by the catalogue. Each file entry in the catalogue =16 bytes. An empty catalogue always has two entries marking the catalogue itself and the end of the disc. Useful for optimising disc space v number of files. Default =7 sectors, allowing: 7*256 (sector size) /16 bytes=112 - 2 entries= 110 files. Used by format routine.

SECTOR SKEW: The number of sectors between each consecutively numbered sector on a track. An 18 sector track with a skew of 13 has the sectors in the order, 0,7,14,3,10,17,6,13,2,9,16,5,12,1, 8,15,4,11.

Having read sector 0 the drive head will be positioned over sector 1 by the time DOS is ready to read it. Useful for optimising access speed. Used by format routine.

TRACK SKEW: The skew between consecutive tracks. Useful for optimising access speed, though effect is minimal. Used by format routine.

ANCHOR SECTOR: The first accessable sector on a disc, i. e. Where the catalogue starts. Standard discs reserve 1 sector for configuration information. Useful for creating sub-volumes on a disc, if anyones feeling adventurous. Used by read, write and format routines.

DATA ADDRESS MARK: Each sector may be written with either a normal or deleted Data Address Mark. Reading a sector with a deleted Data Address Mark will give an i/o error, though the sector will have been read correctly. Useful for data protection

schemes. Used by read and write routines.

SECTOR OFFSET: The number of the lowest sector on each track. Useful for data protection schemes. Used by read, write and format routines.

DENITY: The format in which clock pulses are inserted between date bits written to disc. Sometimes referred to as double (MFM) or single (FM) density. Useful for reading or writing discs intended for other computer systems. Used by read, write and format routines.

UNUSED (V2.1): The high byte of the current track parameter – not setable.

UNUSED (V2.2): Maybe used in future versions.

TRACKS/SIDE: The number of tracks on the disc. Useful for 80 track drives. Used by read, write and format routines and is up dated by a catalogue access.

SIDES/DISC: The number of sides on which data maybe recorded on a disc. Useful for double sided drives. Used by read, write and format routines and is updated by a catalogue access.

STEP RATE (ms): The time in milliseconds allowed for the drive to move the head between tracks. Useful for drives which step the head more slowly, such as old 5.25" types. Used by read, write and format routines.

HEAD SETTLE DELAY: A pause of 30 milliseconds may be inserted just before each sector read or write. Useful for some types of drives. Used by read, write and format routines.

MOTOR ON DELAY, TYPE 1 (disc'y only): Wait one second for the disc motor to reach full speed on a track seek. Useful for some types of drive. Used by read, write and format routines.

MOTOR ON DELAY,TYPE 2 (disc 'y only): Wait one second for the disc motor to reach full speed on a read or write command. Useful for some types of drive. Used by read, write and format routines.

VERIFY ON SEEK: Verify the head is on the correct track after a seek command. Useful for optimising access speed v reliability. i.e. Faster if no verify. Used by read and write routines.

WRITE COMPENSATION: Data written to a disc will be delayed or advanced by 125 nanoseconds after certain combinations of bit patterns. Useful for some types of drive. Used by write and format routines.

IDENTITY MASK (V2.2): A bitwise AND operation on the identity mask and drive mask (from the system table) will give the

physical drive select. Only 1 bit in the byte should be set after this operation. For example, if the identity mask is 10 and the drive mask is 3, the drive select will be 2, meaning the second physical drive will be used. Useful for adding more than two physical drives to a system. (Though a hardware modification is needed to Discovery for this to operate).

WARNING: Misuse of this field may result in more than one drive being selected at the same time.

A bitwise AND operation on the identity mask and the secondary mask allows more than one logical drive to access the same physical drive. If the result of this operation is different from the previous time this secondary mask was used, then DOS will prompt for the correct disc to be inserted. Useful for adding more secondary drives to a one drive system. Used by read, write and format routines, it is not changed when reading a new configuration as it's drive specific.

SECONDARY MASK (V2.2): Logical drives with the same secondry mask will prompt for the correct disc whenever a drive with a different identity mask is accessed. Drives which share a secondary mask should access the same physical drive. Secondary masks which differ should not have any of the same bits set in the drive mask. Useful for adding a second drive to a one drive system. Used by read, write and format routines, it is not changed when reading a new configuration as it's drive specific.

IDENTITY MASK (V2.1): Similar to the 2.2 version except that the drive mask is always 3 (bits 0 and 1) Bit 2 is the secondary mask for the secondary identity which is bit 3.

Users wishing to investigate this paameter are advised to upgrade to version 2.2. Used by read, write and format routines, it is not changed when reading a new configuration as it's drive specific.

CURRENT TRACK OFFSET (V2.1): Gives the offset to the current track memory location. Of no practical use and highly dangerous to play with since likely to corrupt memory! Used by read, write and format routines, and again is drive specific.