



FOR USE WITH STATUNG Einstein COLOUR MICRO COMPUTER

KUMMA

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**
**          DISCMOD          **
**
**      A Disc Utility for the  **
**
**          TATUNG  EINSTEIN   **
**
**      by Dr. B. R. Gladman.  **
**
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DISCMOD - DISC UTILITY FOR THE TATUNG EINSTEIN

DISCMOD is a utility program which allows you to inspect and modify the contents of DOS discs on the Tatung Einstein computer. This program must be used with great care since it is easy to overwrite and hence destroy the information stored on the disc which you are investigating. To load the program simply enter the command DISCMOD.

Inspecting Sectors

To inspect a 128 byte DOS disc sector simply enter the track and sector numbers separated by a comma and terminated by a carriage return (CR). For example: 2,0 CR will show the 0th sector of track two, the first directory track. Each disc contains 40 logical tracks numbered 0 to 39, each of which contains 40 logical sectors numbered 0 to 39. Entering a CR on its own will display the next disc sector in sequence (an immediate CR after entering will start at sector 0 of track 0).

If desired a particular disc can be inspected by adding a normal DOS disc reference in front of the track and sector information, for example: 1:1,0 will use the disc on drive 1. Once selected in this way a drive remains selected until a new reference is provided.

After a sector has been read its contents are held in a buffer area for inspection or modification. Entering an L followed by CR will regenerate the display of the current buffer contents.

For reference there are 40 physical tracks on each side of a disc. Each physical track contains 10 physical sectors of 512 bytes each, 200K bytes in all.

Modifying and Writing Sectors

After a sector has been read into the buffer and displayed as indicated above, entering an M followed by a CR allows the buffer contents to be modified. The cursor keys can be used to move around the displayed bytes and the keys 0-9 and A-F can be used to enter hexadecimal digits as appropriate. Press ESC when you have finished buffer modification.

Modification is normally undertaken using hexadecimal notation but typing a CTRL-C while in modify changes to character mode in which any subsequent characters typed will be interpreted as characters rather than hexadecimal digits; these will replace the bytes in the buffer, one byte per character. Note that you must be on the first digit of a displayed byte when you enter CTRL-C; if you are on the second digit it will be ignored. A second CTRL-C cancels this mode of operation.

After the buffer contents have been modified it can be written back to disc by entering a W followed by CR. This will write the sector at the address from which it was read. To write to a new position on a disc use W followed by a track and sector reference, for example W3,1 or W1:3,1 (disc 1). Note that the disc drive may not perform a write operation immediately since the DOS system saves disc read and write operations until they can be performed efficiently.

Exiting to DOS

To return to DOS simply enter X followed by CR. You can also use CTRL-C but if you do then some of your modifications may not be performed (those which remain in the DOS buffers).

Useful Information About DOS

The DOS system itself resides on tracks 0 and 1 of the disc if it is a master, this area being unused otherwise. The disc directory is on sectors 0 to 15 of track two; each 128 byte sector of this directory area containing four 32 byte File Control Blocks (FCB). Byte 0 of an FCB is zero if the block specifies a valid file or E5 hexadecimal if not. To delete a file DOS simply changes this first byte. Provided there have been no intervening write operations, a wrongly deleted file can thus be recovered by simply setting this first byte back to zero.

Bytes 1 to 8 of an FCB contain the DOS filename and bytes 9 to 11 the filename extension (the top bits of these bytes are used for special purposes, for example to indicate a read-only or system file). Byte 12 gives the 'extent' number and byte 15 the written record count (0-128) for this extent.

Non-zero values for bytes 16 to 31 taken in pairs give the numbers of the disc storage blocks allocated to the file, each such block containing 2048 bytes (16 logical or 4 physical sectors). There are 2.5 storage blocks on each track with storage block 0 starting at sector 0 of track 2 (this storage block is used for the directory information as indicated above). The storage blocks used for files start with block 1 (sector 16, track 2) and finish with block 94 (sector 24, track 39). To calculate the position of storage block n use:

$$\text{track number} = \text{integer part}[(2*n+10)/5]$$

$$\text{sector number} = 8 * \text{remainder}[(2*n+10)/5]$$

Given the track number (t) and the sector number (s) the storage block number can be calculated using:

$$\text{storage block number} = \text{integer part}[(40*t+s-80)/16]$$

Note that since there are eight pairs of bytes for storage allocation, each of which represents a 2K byte block, a directory entry points to a maximum of 16K bytes. Thus files

longer than 16K bytes will have multiple directory entries. These 16K byte parts of files are called 'extents'. In DOS each extent has a new directory entry (this is not true with CP/M generally).

At the start of the disc there is a four sector boot area of which the first four bytes give the start and finish addresses for loading DOS (e.g. bytes 00 E1 00 FA indicate that DOS occupies 0E100H to 0FAFFH in memory). DOS code itself starts at track 0 sector 4 and continues onto track one.