NAME

mt - magnetic tape manipulating program

SYNOPSIS

mt [**-f** *tapename*] *command* [*count*]
mt [**-f** *tapename*] *command argument*

DESCRIPTION

The **mt** utility is used to command a magnetic tape drive for operations other than reading or writing data.

The **-f** option's *tapename* overrides the TAPE environment variable described below.

The available commands are listed below. Only as many characters as are required to uniquely identify a command need be specified.

The following commands optionally take a *count*, which defaults to 1.

weof Write *count* end-of-file (EOF) marks at the current position. This returns when the file mark has been written to the media.

weofi
Write *count* end-of-file (EOF) marks at the current position. This returns as soon as the command has been validated by the tape drive.

smk Write *count* setmarks at the current position (DDS drives only).

fsf Forward space *count* files.

fsr Forward space *count* records.

fss Forward space *count* setmarks (DDS drives only).

bsf Backward space *count* files.

bsr Backward space *count* records.

bss Backward space *count* setmarks (DDS drives only).

erase Erase the tape using a long (often very long) method. With a *count* of 0, it will erase the tape

using a quick method. Operation is not guaranteed if the tape is not at its beginning. The tape will be at its beginning upon completion.

The following commands ignore *count*.

rdhpos Read the hardware block position. The block number reported is specific for that hardware only. With drive data compression especially, this position may have more to do with the amount of data sent to the drive than the amount of data written to tape. Some drives do not support this.

rdspos Read the SCSI logical block position. This typically is greater than the hardware position by the number of end-of-file marks. Some drives do not support this.

rewind Rewind the tape.

offline, **rewoffl**
Rewind the tape and place the drive off line. Some drives are never off line.

load Load the tape into the drive.

retension Re-tension the tape. This winds the tape from the current position to the end and then to the beginning. This sometimes improves subsequent reading and writing, particularly for streaming drives. Some drives do not support this.

ostatus Output status information about the drive. For SCSI magnetic tape devices, the current operating modes of density, blocksize, and whether compression is enabled is reported. The current state of the driver (what it thinks that it is doing with the device) is reported. If the driver knows the relative position from BOT (in terms of filemarks and records), it outputs that. Note that this information is not definitive (only BOT, End of Recorded Media, and hardware or SCSI logical block position (if the drive supports such) are considered definitive tape positions).

Also note that this is the old status command, and will be eliminated in favor of the new status command (see below) in a future release.

errstat Output (and clear) error status information about this device. For every normal operation (e.g., a read or a write) and every control operation (e.g,, a rewind), the driver stores up the last command executed and it is associated status and any residual counts (if any). This command retrieves and outputs this information. If possible, this also clears any latched error information.

geteotmodel Output the current EOT filemark model. The model states how many filemarks will be written at close if a tape was being written.

eod, **eom** Wind the tape to the end of the recorded data, typically after an EOF mark where another file may be written.

rblim Report the block limits of the tape drive, including the minimum and maximum block size, and the block granularity if any.

The following commands may require an *argument*.

sethpos Set the hardware block position. The *argument* is a hardware block number to which to position the tape. Some drives do not support this.

setspos Set the SCSI logical block position. The *argument* is a SCSI logical block number to which to position the tape. Some drives do not support this.

blocksize Set the block size for the drive. The *argument* is the number of bytes per block, except 0 commands the drive to use variable-length blocks.

seteotmodel Set the EOT filemark model to *argument* and output the old and new models. Typically this will be 2 filemarks, but some devices (typically QIC cartridge drives) can only write 1 filemark. You may only choose a value of *1* or *2*.

status Output status information about the drive. For SCSI magnetic tape devices, the current operating modes of density, blocksize, and whether compression is enabled is reported. The current state of the driver (what it thinks that it is doing with the device) is reported.

If the driver knows the relative position from BOT (in terms of filemarks and records), it outputs that. If the tape drive supports the long form report of the SCSI READ POSITION command, the Reported File Number and Reported Record Number will be numbers other than -1, and there may be Flags reported as well.

The BOP flag means that the logical position of the drive is at the beginning of the partition.

The EOP flag means that the logical position of the drive is between Early Warning and End of Partition.

The BPEW flag means that the logical position of the drive is in a Programmable Early

Warning Zone or on the EOP side of Early Warning.

Note that the Reported Record Number is the tape block or object number relative to the beginning of the partition. The Calculated Record Number is the tape block or object number relative to the previous file mark.

Note that the Calculated File and Record Numbers are not definitive. The Reported File and Record Numbers are definitive, if they are numbers other than -1.

-v Print additional status information, such as the maximum supported I/O size.

-x Print all available status data to stdout in XML format.

getdensity Report density support information for the tape drive and any media that is loaded. Most drives will report at least basic density information similar to that reported by **status** command. Newer tape drives that conform to the T-10 SSC and newer tape specifications may report more detailed information about the types of tapes they support and the tape currently in the drive.

-x Print all available density data to stdout in XML format. Because density information is currently included in the general status XML report used for **mt** status command, this will be the same XML output via "**mt** status **-x**"

param Display or set parameters. One of **-l**, **-s**, or **-x** must be specified to indicate which operation to perform. See sa(4) for more detailed information on the parameters.

-l List parameters, values and descriptions. By default all parameters will be displayed. To display a specific parameter, specify the parameter with **-p**.

-p *name* Specify the parameter name to list (with **-l**) or set (with **-s**).

-q Enable quiet mode for parameter listing. This will suppress printing of parameter descriptions.

-s *value* Specify the parameter value to set. The general type of this argument (integer, unsigned integer, string) is determined by the type of the variable indicated by the sa(4) driver. More detailed argument checking is done by the sa(4) driver.

-x Print out all parameter information in XML format.

protect Display or set drive protection parameters. This is used to control checking and reporting a per-block checksum for tape drives that support it. Some drives may only support some parameters.

-b *0|1* Set the Recover Buffered Data Protected bit. If set, this indicates that checksums are transferred with the logical blocks transferred by the RECOVERED BUFFERED DATA SCSI command.

-d Disable all protection information settings.

-e Enable all protection information settings. The default protection method used is Reed-Solomon CRC (protection method 1), as specified in ECMA-319. The default protection information length used with Reed-Solomon CRC is 4 bytes. To enable all settings except one more setting, specify the **-e** argument and then explicitly disable settings that you do not wish to enable. For example, specifying **-e -w** *0* will enable all settings except for LBP_W.

-l List available protection parmeters and their current settings.

-L *len* Set the length of the protection information in bytes. For Reed-Solomon CRC, the protection information length should be 4 bytes.

-m *num* Specify the numeric value for the protection method. The numeric value for Reed-Solomon CRC is 1.

-r *0|1* Set the LBP_R parameter. When set, this indicates that each block read from the tape drive will have a checksum at the end.

-v Enable verbose mode for parameter listing. This will include descriptions of each parameter.

-w *0|1* Set the LBP_W parameter. When set, this indicates that each block written to the tape drive will have a checksum at the end. The drive will verify the checksum before writing the block to tape.

locate Set the tape drive's logical position. One of **-b**, **-e**, **-f**, or **-s** must be specified to indicate the type of position. If the partition number is specified, the drive will first relocate to the given partition (if it exists) and then to the position indicated within that partition. If the partition number is not specified, the drive will relocate to the given position within the current partition.

-b *block_addr* Relocate to the given tape block or logical object identifier. Note that the block number is the Reported Record Number that is relative to the beginning of the partition (or beginning of tape).

-e Relocate to the end of data.

-f *fileno* Relocate to the given file number.

-p *partition* Specify the partition to change to.

-s *setmark* Relocate to the given set mark.

comp Set the drive's compression mode. The non-numeric values of *argument* are:

off	Turn compression off.
on	Turn compression on.
none	Same as *off*.
enable	Same as *on*.
IDRC	IBM Improved Data Recording Capability compression (0x10).
DCLZ	DCLZ compression algorithm (0x20).

In addition to the above recognized compression keywords, the user can supply a numeric compression algorithm for the drive to use. In most cases, simply turning the compression 'on' will have the desired effect of enabling the default compression algorithm supported by the drive. If this is not the case (see the **status** display to see which compression algorithm is currently in use), the user can manually specify one of the supported compression keywords (above), or supply a numeric compression value from the drive's specifications.

Note that for some older tape drives (for example the Exabyte 8200 and 8500 series drives) it is necessary to switch to a different density to tell the drive to record data in its compressed format. If the user attempts to turn compression on while the uncompressed density is selected, the drive will return an error. This is generally not an issue for modern tape drives.

density Set the density for the drive. For the density codes, see below. The density value could be given either numerically, or as a string, corresponding to the "Reference" field. If the string is abbreviated, it will be resolved in the order shown in the table, and the first matching entry will be used. If the given string and the resulting canonical density name do not match exactly, an informational message is output about what the given string has

been taken for.

The initial version of the density table below was taken from the ‘Historical sequential access density codes’ table (A-1) in Revision 11 of the SCSI-3 Stream Device Commands (SSC) working draft, dated November 11, 1997. Subsequent additions have come from a number of sources.

The density codes are:

0x0 default for device
0xE reserved for ECMA

Value	Width mm	Width in	Tracks	Density bpmm	Density bpi	Code	Type	Reference	Note
0x01	12.7	(0.5)	9	32	(800)	NRZI	R	X3.22-1983	2
0x02	12.7	(0.5)	9	63	(1,600)	PE	R	X3.39-1986	2
0x03	12.7	(0.5)	9	246	(6,250)	GCR	R	X3.54-1986	2
0x05	6.3	(0.25)	4/9	315	(8,000)	GCR	C	X3.136-1986	1,3
0x06	12.7	(0.5)	9	126	(3,200)	PE	R	X3.157-1987	2
0x07	6.3	(0.25)	4	252	(6,400)	IMFM	C	X3.116-1986	1
0x08	3.81	(0.15)	4	315	(8,000)	GCR	CS	X3.158-1987	1
0x09	12.7	(0.5)	18	1,491	(37,871)	GCR	C	X3.180	2
0x0A	12.7	(0.5)	22	262	(6,667)	MFM	C	X3B5/86-199	1
0x0B	6.3	(0.25)	4	63	(1,600)	PE	C	X3.56-1986	1
0x0C	12.7	(0.5)	24	500	(12,690)	GCR	C	HI-TC1	1,6
0x0D	12.7	(0.5)	24	999	(25,380)	GCR	C	HI-TC2	1,6
0x0F	6.3	(0.25)	15	394	(10,000)	GCR	C	QIC-120	1,6
0x10	6.3	(0.25)	18	394	(10,000)	GCR	C	QIC-150	1,6
0x11	6.3	(0.25)	26	630	(16,000)	GCR	C	QIC-320	1,6
0x12	6.3	(0.25)	30	2,034	(51,667)	RLL	C	QIC-1350	1,6
0x13	3.81	(0.15)	1	2,400	(61,000)	DDS	CS	X3B5/88-185A	5
0x14	8.0	(0.315)	1	1,703	(43,245)	RLL	CS	X3.202-1991	5,11
0x15	8.0	(0.315)	1	1,789	(45,434)	RLL	CS	ECMA TC17	5,12
0x16	12.7	(0.5)	48	394	(10,000)	MFM	C	X3.193-1990	1
0x17	12.7	(0.5)	48	1,673	(42,500)	MFM	C	X3B5/91-174	1
0x18	12.7	(0.5)	112	1,673	(42,500)	MFM	C	X3B5/92-50	1
0x19	12.7	(0.5)	128	2,460	(62,500)	RLL	C	DLTapeIII	6,7
0x1A	12.7	(0.5)	128	3,214	(81,633)	RLL	C	DLTapeIV(20)	6,7
0x1B	12.7	(0.5)	208	3,383	(85,937)	RLL	C	DLTapeIV(35)	6,7
0x1C	6.3	(0.25)	34	1,654	(42,000)	MFM	C	QIC-385M	1,6
0x1D	6.3	(0.25)	32	1,512	(38,400)	GCR	C	QIC-410M	1,6

0x1E 6.3 (0.25) 30 1,385 (36,000) GCR C QIC-1000C 1,6
0x1F 6.3 (0.25) 30 2,666 (67,733) RLL C QIC-2100C 1,6
0x20 6.3 (0.25) 144 2,666 (67,733) RLL C QIC-6GB(M) 1,6
0x21 6.3 (0.25) 144 2,666 (67,733) RLL C QIC-20GB(C) 1,6
0x22 6.3 (0.25) 42 1,600 (40,640) GCR C QIC-2GB(C) ?
0x23 6.3 (0.25) 38 2,666 (67,733) RLL C QIC-875M ?
0x24 3.81 (0.15) 1 2,400 (61,000) CS DDS-2 5
0x25 3.81 (0.15) 1 3,816 (97,000) CS DDS-3 5
0x26 3.81 (0.15) 1 3,816 (97,000) CS DDS-4 5
0x27 8.0 (0.315) 1 3,056 (77,611) RLL CS Mammoth 5
0x28 12.7 (0.5) 36 1,491 (37,871) GCR C X3.224 1
0x29 12.7 (0.5)
0x2A
0x2B 12.7 (0.5) 3 ? ? ? C X3.267 5
0x40 12.7 (0.5) 384 4,800 (123,952) C LTO-1
0x41 12.7 (0.5) 208 3,868 (98,250) RLL C DLTapeIV(40) 6,7
0x42 12.7 (0.5) 512 7,398 (187,909) C LTO-2
0x44 12.7 (0.5) 704 9,638 (244,805) C LTO-3
0x46 12.7 (0.5) 896 12,725 (323,215) C LTO-4
0x47 3.81 (0.25) ? 6,417 (163,000) CS DAT-72
0x48 12.7 (0.5) 448 5,236 (133,000) PRML C SDLTapeI(110) 6,8,13
0x49 12.7 (0.5) 448 7,598 (193,000) PRML C SDLTapeI(160) 6,8
0x4A 12.7 (0.5) 768 ? PRML C T10000A 10
0x4B 12.7 (0.5) 1152 ? PRML C T10000B 10
0x4C 12.7 (0.5) 3584 ? PRML C T10000C 10
0x4D 12.7 (0.5) 4608 ? PRML C T10000D 10
0x51 12.7 (0.5) 512 11,800 (299,720) C 3592A1 (unencrypted)
0x52 12.7 (0.5) 896 11,800 (299,720) C 3592A2 (unencrypted)
0x53 12.7 (0.5) 1152 13,452 (341,681) C 3592A3 (unencrypted)
0x54 12.7 (0.5) 2560 19,686 (500,024) C 3592A4 (unencrypted)
0x55 12.7 (0.5) 5120 20,670 (525,018) C 3592A5 (unencrypted)
0x56 12.7 (0.5) 7680 20,670 (525,018) C 3592B5 (unencrypted)
0x57 12.7 (0.5) 8704 21,850 (554,990) C 3592A6 (unencrypted)
0x58 12.7 (0.5) 1280 15,142 (384,607) C LTO-5
0x5A 12.7 (0.5) 2176 15,142 (384,607) C LTO-6
0x5C 12.7 (0.5) 3584 19,107 (485,318) C LTO-7
0x5D 12.7 (0.5) 5376 19,107 (485,318) C LTO-M8 14
0x5E 12.7 (0.5) 6656 20,669 (524,993) C LTO-8
0x60 12.7 (0.5) 8960 23,031 (584,987) C LTO-9
0x71 12.7 (0.5) 512 11,800 (299,720) C 3592A1 (encrypted)

0x72	12.7 (0.5)	896	11,800 (299,720)	C	3592A2 (encrypted)	
0x73	12.7 (0.5)	1152	13,452 (341,681)	C	3592A3 (encrypted)	
0x74	12.7 (0.5)	2560	19,686 (500,024)	C	3592A4 (encrypted)	
0x75	12.7 (0.5)	5120	20,670 (525,018)	C	3592A5 (encrypted)	
0x76	12.7 (0.5)	7680	20,670 (525,018)	C	3592B5 (encrypted)	
0x77	12.7 (0.5)	8704	21,850 (554,990)	C	3592A6 (encrypted)	
0x8c	8.0 (0.315)	1	1,789 (45,434)	RLL	CS	EXB-8500c 5,9
0x90	8.0 (0.315)	1	1,703 (43,245)	RLL	CS	EXB-8200c 5,9

Code	Description	Type	Description
NRZI	Non return to zero, change on ones	R	Reel-to-reel
GCR	Group code recording	C	Cartridge
PE	Phase encoded	CS	Cassette
IMFM	Inverted modified frequency modulation		
MFM	Modified frequency modulation		
DDS	DAT data storage		
RLL	Run length limited		
PRML	Partial Response Maximum Likelihood		

NOTES

1. Serial recorded.
2. Parallel recorded.
3. Old format known as QIC-11.
5. Helical scan.
6. This is not an American National Standard. The reference is based on an industry standard definition of the media format.
7. DLT recording: serially recorded track pairs (DLTapeIII and DLTapeIV(20)), or track quads (DLTapeIV(35) and DLTapeIV(40)).
8. Super DLT (SDLT) recording: 56 serially recorded logical tracks with 8 physical tracks each.
9. Vendor-specific Exabyte density code for compressed format.
10. bpi/bpmm values for the Oracle/StorageTek T10000 tape drives are not listed in the manual. Someone with access to a drive can supply the necessary values by running ’mt getdensity’.
11. This is Exabyte 8200 uncompressed format. The compressed format density code is 0x90.
12. This is Exabyte 8500 uncompressed format. The compressed format density code is 0x8c.
13. This density code (0x48) was also used for DAT-160.

14. Officially known as LTO-8 Type M, abbreviated M8. This is a pristine LTO-7 cartridge initialized with a higher density format by an LTO-8 drive. It cannot be read by an LTO-7 drive. Uncompressed capacity is 9TB, compared to 6TB for LTO-7 and 12TB for LTO-8.

NOTE ON QIC STREAMERS

The following is a table of Data Cartridge types as used in the 1/4 inch tape drives such as the Archive Viper 150, Wangtek 5525ES, and Tandberg TDC4220 tape drives:

Value	Reference	Format	Cartridge Type	Capacity	Tracks	Length
0x05		QIC-11	DC300	15MB	4	300ft
0x05		QIC-11	DC300XL/P	20MB	4	450ft
0x05		QIC-11	DC600	27MB	4	600ft
0x05	X3.136-1986	QIC-24	DC615A	15MB	9	150ft
0x05	X3.136-1986	QIC-24	DC300XL/P	45MB	9	450ft
0x05	X3.136-1986	QIC-24	DC600A	60MB	9	600ft
0x0F	QIC-120	QIC-120	DC600A/DC6150	120MB	15	620ft
0x10	QIC-150	QIC-150	DC600XTD/DC6150	150MB	18	620ft
0x10	QIC-150	QIC-150	DC6250	250MB	18	1,020ft
0x11	QIC-320	QIC-525	DC6320	320MB	26	620ft
0x11	QIC-320	QIC-525	DC6525	525MB	26	1,020ft
0x1E	QIC-1000C	QIC-1000	DC9100/DL9135	1.0GB	30	760ft
0x1E	QIC-1000C	QIC-1000	DC9150	1.2GB	30	950ft
0x22	QIC-2GB(C)	QIC-2GB	DC9200	2.0GB	42	950ft
0x22	QIC-2GB(C)	QIC-2GB	DC9250	2.5GB	42	1,200ft

Notes:

QIC-24, QIC-120, QIC-150 use fixed blocksize of 512 bytes, QIC-525, QIC-1000 and QIC-2GB can use blocksize of 1,024 bytes. DDS (DAT) drives generally use variable blocks.

QIC-02 and QIC-36 are interface standards for tape drives. The QIC-02 and QIC-36 streamers such as the Wangtek 5250EQ are otherwise identical to their SCSI versions (i.e.: Wangtek 5250ES).

It seems that the 150MB and larger streamers cannot write QIC-24 9 track formats, only read them.

DC600A cartridges marked "10,000ftpi" can only be used as QIC-11, QIC-24, and QIC-120 format. DC600A cartridges marked 12,500ftpi can be used as both QIC-120 and QIC-150 format.

Some manufacturers do not use "DC" on their cartridges. Verbatim uses DL, Maxell uses MC, Sony uses QD, Quill uses DQ.

3M/Imation & Fuji use DC. Thus a DL6250, MC-6250, QD6250, DQ6250 are all identical media to a DC6250.

QIC tape media is not "connected" to the take up reels and will de-spool if the tape drive has dust covering the light sensor that looks for the end of tape holes in the media.

ENVIRONMENT

TAPE This is the pathname of the tape drive. The default (if the variable is unset, but not if it is null) is */dev/nsa0*. It may be overridden with the **-f** option.

FILES

*/dev/*sa[0-9]** SCSI magnetic tape interface

DIAGNOSTICS

The exit status will be 0 when the drive operations were successful, 2 when the drive operations were unsuccessful, and 1 for other problems like an unrecognized command or a missing drive device.

COMPATIBILITY

Some undocumented commands support old software.

SEE ALSO

dd(1), ioctl(2), mtio(4), sa(4), environ(7)

HISTORY

The **mt** command appeared in 4.3BSD.

Extensions regarding the st(4) driver appeared in 386BSD-0.1 as a separate **st** command, and have been merged into the **mt** command in FreeBSD 2.1.

The former **eof** command that used to be a synonym for **weof** has been abandoned in FreeBSD 2.1 since it was often confused with **eom**, which is fairly dangerous.

BUGS

The utility cannot be interrupted or killed during a long erase (which can be longer than an hour), and it

is easy to forget that the default erase is long.

Hardware block numbers do not always correspond to blocks on the tape when the drive uses internal compression.

Erasure is not guaranteed if the tape is not at its beginning.

Tape-related documentation is poor, here and elsewhere.