DOS INT 21h - DOS Function Codes

The follow abridged list of DOS interrupts has been extracted from a large list compiled by Ralf Brown. These are available on any Simtel mirror (e.g. sunsite.anu.edu.au) under the directory ms-dos/info/interNNp.zip

AH	Description	AH	Description
01	Read character from STDIN	02	Write character to STDOUT
05	Write character to printer	06	Console Input/Output
07	Direct char read (STDIN), no echo	08	Char read from STDIN, no echo
09	Write string to STDOUT	0A	Buffered input
0B	Get STDIN status	0C	Flush buffer for STDIN
0D	Disk reset	0E	Select default drive
19	Get current default drive	25	Set interrupt vector
2A	Get system date	2B	Set system date
2C	Get system time	2D	Set system time
2E	Set verify flag	30	Get DOS version
35	Get Interrupt vector		
36	Get free disk space	39	Create subdirectory
3A	Remove subdirectory	3B	Set working directory
3C	Create file	3D	Open file
3E	Close file	3F	Read file
40	Write file	41	Delete file
42	Seek file	43	Get/Set file attributes
47	Get current directory	4C	Exit program
4D	Get return code	54	Get verify flag
56	Rename file	57	Get/Set file date

AH = 01h - READ CHARACTER FROM STANDARD INPUT, WITH ECHO

Return: AL = character read

Notes:

- ^C/^Break are checked
- ^P toggles the DOS-internal echo-to-printer flag
- ^Z is not interpreted, thus not causing an EOF if input is redirected character is echoed to standard output

SeeAlso: AH=06h,AH=07h,AH=08h,AH=0Ah

AH = 02h -WRITE CHARACTER TO STANDARD OUTPUT

Entry: DL = character to write

Return: AL = last character output

Notes:

- ^C/^Break are checked
- the last character output will be the character in DL unless DL=09h on entry, in which case AL=20h as tabs are expanded to blanks
- if standard output is redirected to a file, no error checks (write- protected, full media, etc.) are performed

SeeAlso: AH=06h,AH=09h

AH = 05h - WRITE CHARACTER TO PRINTER

Entry: DL = character to print

Notes:

- keyboard checked for ^C/^Break
- STDPRN is usually the first parallel port, but may be redirected under DOS 2+
- if the printer is busy, this function will wait

SeeAlso: INT 17/AH=00h

AH = 06h - DIRECT CONSOLE OUTPUT

Entry: DL = character (except FFh)

Return: AL = character output

Notes: does not check ^C/^Break

SeeAlso: AH=02h,AH=09h

AH = 06h - DIRECT CONSOLE INPUT

Entry: AH = 06h DL = FFh

Return:

- ZF *set* if no character available and AL = 00h
- ZF *clear* if character available AL = character read

Notes:

- ^C/^Break are NOT checked
- if the returned character is 00h, the user pressed a key with an extended keycode, which will be returned by the next call of this function
- although the return of AL=00h when no characters are available is not documented, some programs rely on this behavior

SeeAlso: AH=0Bh

AH=07h - DIRECT CHARACTER INPUT, WITHOUT ECHO

Return: AL = character read from standard input

Notes: does not check ^C/^Break

SeeAlso: AH=01h,AH=06h,AH=08h,AH=0Ah

AH = 08h - CHARACTER INPUT WITHOUT ECHO

Return: AL = character read from standard input

Notes: ^C/^Break are checked

SeeAlso: AH=01h,AH=06h,AH=07h,AH=0Ah,AH=64h

AH = 09h - WRITE STRING TO STANDARD OUTPUT

Entry: DS:DX -> '$'-terminated string

Return: AL = 24h

Notes: ^C/^Break are checked

SeeAlso: AH=02h,AH=06h"OUTPUT"

AH = 0Ah - BUFFERED INPUT

Entry: DS:DX -> buffer (see below)

Return: buffer filled with user input

Notes:

- ^C/^Break are checked
- reads from standard input

SeeAlso: AH=0Ch

Format of DOS input buffer:

Offset	Size	Description
00	1	maximum characters buffer can hold
01	1	number of chars from last input which may be recalled OR number of characters actually read, excluding CR
02	n	actual characters read, including the final carriage return

AH=0Bh - GET STDIN STATUS

Return:

- AL = 00h if no character available
- AL = FFh if character is available

Notes: ^C/^Break are checked

SeeAlso: AH=06h"INPUT"

AH = 0Ch - FLUSH BUFFER AND READ STANDARD INPUT

Entry:

- AL = STDIN input function to execute after flushing buffer
- other registers as appropriate for the input function

Return: as appropriate for the specified input function

Note: if AL is not one of 01h,06h,07h,08h, or 0Ah, the buffer is flushed but no input is attempted

SeeAlso: AH=01h,AH=06h"INPUT",AH=07h,AH=08h,AH=0Ah

AH = 0Dh - DISK RESET

Notes: This function writes all modified disk buffers to disk, but does not update the directory information

SeeAlso: AX=5D01h

AH = 0Eh - SELECT DEFAULT DRIVE

Entry: DL = new default drive (0=A:, 1=B:, etc)

Return: AL = number of potentially valid drive letters

Notes: the return value is the highest drive present

SeeAlso: AH=19h,AH=3Bh,AH=DBh

AH = 19h - GET CURRENT DEFAULT DRIVE

Return: AL = drive (0=A:, 1=B:, etc)

SeeAlso: AH=0Eh,AH=47h,AH=BBh

AH = 25h - SET INTERRUPT VECTOR

Entry:

- AL = interrupt number
- DS:DX -> new interrupt handler

Notes: this function is preferred over direct modification of the interrupt vector table

SeeAlso: AX=2501h,AH=35h

AH = 2Ah - GET SYSTEM DATE

Return: CX = year (1980-2099) DH = month DL = day AL = day of week (00h=Sunday)

SeeAlso: AH=2Bh"DOS",AH=2Ch,AH=E7h

AH = 2Bh - SET SYSTEM DATE

Entry: CX = year (1980-2099) DH = month DL = day

Return:

- AL = 00 successful
- FFh invalid date, system date unchanged

Note: DOS 3.3+ also sets CMOS clock

SeeAlso: AH=2Ah,AH=2Dh

AH = 2Ch - GET SYSTEM TIME

Return: CH = hour CL = minute DH = second DL = 1/100 seconds

Note: on most systems, the resolution of the system clock is about 5/100sec, so returned times generally do not increment by 1 on some systems, DL may always return 00h

SeeAlso: AH=2Ah,AH=2Dh,AH=E7h

AH = 2Dh - SET SYSTEM TIME

Entry: CH = hour CL = minute DH = second DL = 1/100 seconds

Return:

- AL = 00h successful
- FFh if invalid time, system time unchanged

Note: DOS 3.3+ also sets CMOS clock

SeeAlso: AH=2Bh"DOS",AH=2Ch

AH = 2Eh - SET VERIFY FLAG

Entry: AL = new state of verify flag (00 off, 01h o)

Notes:

- default state at system boot is OFF
- when ON, all disk writes are verified provided the device driver supports read-after-write verification

SeeAlso: AH=54h

AH=30h - GET DOS VERSION

Entry: AL = what to return in BH (00h OEM number, 01h version flag)

Return:

- AL = major version number (00h if DOS 1.x)
- AH = minor version number

- BL:CX = 24-bit user serial number (most versions do not use this) if DOS <5 or AL=00h
- BH = MS-DOS OEM number if DOS 5+ and AL=01h
- BH = version flag bit 3: DOS is in ROM other: reserved (0)

Notes:

- DOS 4.01 and 4.02 identify themselves as version 4.00
- MS-DOS 6.21 reports its version as 6.20; version 6.22 returns the correct value
- Windows95 returns version 7.00 (the underlying MS-DOS)

SeeAlso: AX=3000h/BX=3000h,AX=3306h,AX=4452h

AH=35h - GET INTERRUPT VECTOR

Entry: AL = interrupt number

Return: ES:BX -> current interrupt handler

SeeAlso: AH=25h,AX=2503h

AH = 36h - GET FREE DISK SPACE

Entry: DL = drive number (0=default, 1=A:, etc)

Return:

- AX = FFFFh if invalid drive
- AX = sectors per cluster BX = number of free clusters CX = bytes per sector DX = total clusters on drive

Notes:

- free space on drive in bytes is AX * BX * CX
- total space on drive in bytes is AX * CX * DX
- "lost clusters" are considered to be in use
- this function does not return proper results on CD-ROMs; use AX=4402h"CD-ROM" instead

SeeAlso: AH=1Bh,AH=1Ch,AX=4402h"CD-ROM"

AH = 39h - "MKDIR" - CREATE SUBDIRECTORY

Entry: DS:DX -> ASCIZ pathname

Return:

- CF clear if successful AX destroyed
- CF set on error AX = error code (03h,05h)

Notes:

- all directories in the given path except the last must exist
- fails if the parent directory is the root and is full
- DOS 2.x-3.3 allow the creation of a directory sufficiently deep that it is not possible to make that directory the current directory because the path would exceed 64 characters

SeeAlso: AH=3Ah,AH=3Bh,AH=6Dh

AH = 3Ah - "RMDIR" - REMOVE SUBDIRECTORY

Entry: DS:DX -> ASCIZ pathname of directory to be removed

Return:

- CF clear if successful, AX destroyed
- CF set on error AX = error code (03h,05h,06h,10h)

Notes: directory must be empty (contain only '.' and '..' entries)

SeeAlso: AH=39h,AH=3Bh

AH = 3Bh - "CHDIR" - SET CURRENT DIRECTORY

Entry: DS:DX -> ASCIZ pathname to become current directory (max 64 bytes)

Return:

- CF clear if successful, AX destroyed
- CF set on error AX = error code (03h)

Notes: if new directory name includes a drive letter, the default drive is not changed, only the current directory on that drive

SeeAlso: AH=47h,AH=71h,INT 2F/AX=1105h

AH = 3Ch - "CREAT" - CREATE OR TRUNCATE FILE

Entry:

- CX = file attributes
- DS:DX -> ASCIZ filename

Return:

- CF clear if successful, AX = file handle
- CF set on error AX = error code (03h,04h,05h)

Notes: if a file with the given name exists, it is truncated to zero length

SeeAlso: AH=16h,AH=3Dh,AH=5Ah,AH=5Bh

AH = 3Dh - "OPEN" - OPEN EXISTING FILE

Entry:

- AL = access and sharing modes
- DS:DX -> ASCIZ filename

Return:

- CF clear if successful, AX = file handle
- CF set on error AX = error code (01h,02h,03h,04h,05h,0Ch,56h)

Notes:

- file pointer is set to start of file
- file handles which are inherited from a parent also inherit sharing and access restrictions
- files may be opened even if given the hidden or system attributes

SeeAlso: AH=0Fh,AH=3Ch,AX=4301h,AX=5D00h

AH = 3Eh - "CLOSE" - CLOSE FILE

Entry: BX = file handle

Return:

- CF clear if successful, AX destroyed
- CF set on error, AX = error code (06h)

Note: if the file was written to, any pending disk writes are performed, the time and date stamps are set to the current time, and the directory entry is updated

SeeAlso: AH=10h,AH=3Ch,AH=3Dh

AH = 3Fh - "READ" - READ FROM FILE OR DEVICE

Entry:

- BX = file handle
- CX = number of bytes to read
- DS:DX -> buffer for data

Return:

- CF clear if successful - AX = number of bytes actually read (0 if at EOF before call)
- CF set on error AX = error code (05h,06h)

Notes:

- data is read beginning at current file position, and the file position is updated after a successful read
- the returned AX may be smaller than the request in CX if a partial read occurred
- if reading from CON, read stops at first CR

SeeAlso: AH=27h,AH=40h,AH=93h

AH=40h - "WRITE" - WRITE TO FILE OR DEVICE

Entry:

- BX = file handle
- CX = number of bytes to write
- DS:DX -> data to write

Return:

- CF clear if successful -AX = number of bytes actually written
- CF set on error - AX = error code (05h,06h)

Notes:

- if CX is zero, no data is written, and the file is truncated or extended to the current position
- data is written beginning at the current file position, and the file position is updated after a successful write
- the usual cause for AX < CX on return is a full disk

SeeAlso: AH=28h,AH=3Fh

AH = 41H - "UNLINK" - DELETE FILE

Entry:

- DS:DX -> ASCIZ filename (no wildcards, but see notes)
- CL = attribute mask for deletion (server call only, see notes)

Return:

- CF clear if successful, AX destroyed (DOS 3.3) AL seems to be drive of deleted file
- CF set on error AX = error code (02h,03h,05h)

Notes:

- (DOS 3.1+) wildcards are allowed if invoked via AX=5D00h, in which case the filespec must be canonical (as returned by AH=60h), and only files matching the attribute mask in CL are deleted
- DOS does not erase the file's data; it merely becomes inaccessible because the FAT chain for the file is cleared
- deleting a file which is currently open may lead to filesystem corruption.

SeeAlso: AH=13h,AX=4301h,AX=4380h,AX=5D00h,AH=60h,AH=71h

AH=42h - "LSEEK" - SET CURRENT FILE POSITION

Entry:

- AL = origin of move 00h start of file 01h current file position 02h end of file
- BX = file handle
- CX:DX = offset from origin of new file position

Return:

- CF clear if successful, DX:AX = new file position in bytes from start of file
- CF set on error, AX = error code (01h,06h)

Notes:

- for origins 01h and 02h, the pointer may be positioned before the start of the file; no error is returned in that case, but subsequent attempts at I/O will produce errors
- if the new position is beyond the current end of file, the file will be extended by the next write (see AH=40h)

SeeAlso: AH=24h

AH=43 - GET FILE ATTRIBUTES

Entry:

- AL = 00h
- DS:DX -> ASCIZ filename

Return:

- CF clear if successful CX = file attributes
- CF set on error, AX = error code (01h,02h,03h,05h)

BUG: Windows for Workgroups returns error code 05h (access denied) instead of error code 02h (file not found) when attempting to get the attributes of a nonexistent file.

SeeAlso: AX=4301h,AX=4310h,AX=7143h,AH=B6h

AH=43 - "CHMOD" - SET FILE ATTRIBUTES

Entry:

- AL = 01h
- CX = new file attributes
- DS:DX -> ASCIZ filename

Return:

- CF clear if successful, AX destroyed
- CF set on error, AX = error code (01h,02h,03h,05h)

Notes:

- will not change volume label or directory attribute bits, but will change the other attribute bits of a directory
- MS-DOS 4.01 reportedly closes the file if it is currently open

SeeAlso: AX=4300h,AX=4311h,AX=7143h,INT 2F/AX=110Eh

Bitfields for file attributes:

Bits	7	6	5	4	3	2	1	0
Description	shareable	-	archive	directory	vol. label	system	hidden	read-only

AH = 47h - "CWD" - GET CURRENT DIRECTORY

Entry:

- DL = drive number (00h = default, 01h = A:, etc)
- DS:SI -> 64-byte buffer for ASCIZ pathname

Return:

- CF clear if successful
- CF set on error, AX = error code (0Fh)

Notes:

- the returned path does not include a drive or the initial backslash

- many Microsoft products for Windows rely on AX being 0100h on success

SeeAlso: AH=19h,AH=3Bh,AH=71h

AH = 4Ch - "EXIT" - TERMINATE WITH RETURN CODE

Entry: AL = return code

Return: never returns

Notes: unless the process is its own parent, all open files are closed and all memory belonging to the process is freed

SeeAlso: AH=00h,AH=26h,AH=4Bh,AH=4Dh

AH = 4Dh - GET RETURN CODE (ERRORLEVEL)

Return:

- AH = termination type (00=normal, 01h control-C abort, 02h=critical error abort, 03h terminate and stay resident)
- AL = return code

Notes:

- the word in which DOS stores the return code is cleared after being read by this function, so the return code can only be retrieved once
- COMMAND.COM stores the return code of the last external command it executed as ERRORLEVEL

SeeAlso: AH=4Bh,AH=4Ch,AH=8Ah

AH = 54h - GET VERIFY FLAG

Return: AL = verify flag (00h=off, 01h=on, i.e. all disk writes verified after writing)

SeeAlso: AH=2Eh

AH = 56h - "RENAME" - RENAME FILE

Entry:

- DS:DX -> ASCIZ filename of existing file (no wildcards, but see below)
- ES:DI -> ASCIZ new filename (no wildcards)
- CL = attribute mask (server call only, see below)

Return:

- CF clear if successful
- CF set on error, AX= error code (02h,03h,05h,11h)

Notes:

- allows move between directories on same logical volume
- this function does not set the archive attribute

- open files should not be renamed
- (DOS 3.0+) allows renaming of directories

AH = 57h - GET FILE'S LAST-WRITTEN DATE AND TIME

Entry:

- AL = 00h (Get attribute)
- BX = file handle

Return:

- CF clear if successful, CX = file's time DX = file's date
- CF set on error, AX = error code (01h,06h)

SeeAlso: AX=5701h

Bitfields for file time:

Bits	15-11	10-5	4-0
Description	hours	minutes	seconds

Bitfields for file date:

Bits	15-9	8-5	4-0
Description	year (1980-)	month	day

AH = 57h - SET FILE'S LAST-WRITTEN DATE AND TIME

Entry:

- AL =01h (Set attributes)
- BX = file handle
- CX = new time
- DX = new date

Return:

- CF clear if successful
- CF set on error AX = error code (01h,06h)

SeeAlso: AX=5700h

This page is maintained by Barry Wilks.