



**Note:** This IBM PC BIOS API call is for DOS/Win16 personality only. Use [Family API](#) for portability.

**Note:** [osFree Macro Library](#) provides macros for most of functions

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# Int 13H, AH=02H

## Version

IBM 5150 and higher

## Brief

Read sector

## Family API

[DosRead](#)

## Input

- AH = 02h
- AL = number of sectors to read (must be nonzero)
- CH = low eight bits of cylinder number
- CL = sector number 1-63 (bits 0-5) high two bits of cylinder (bits 6-7, hard disk only)
- DH = head number
- DL = drive number (bit 7 set for hard disk)
- ES:BX → data buffer

## Return

- CF set on error
  - if AH = 11h (corrected ECC error), AL = burst length
- CF clear if successful
- AH = status (see #00234)
- AL = number of sectors transferred (only valid if CF set for some BIOSes)

## Macro

```
INCLUDE BIOS.INC
```

```
@DskRead 0, 0, 0, 1, 1, offset buf
```

## Notes

- errors on a floppy may be due to the motor failing to spin up quickly enough; the read should be retried at least three times, resetting the disk with AH=00h between attempts
- most BIOSes support “multitrack” reads, where the value in AL exceeds the number of sectors remaining on the track, in which case any additional sectors are read beginning at sector 1 on the following head in the same cylinder; the MSDOS CONFIG.SYS command MULTITRACK (or the Novell DOS DEBLOCK=) can be used to force DOS to split disk accesses which would wrap across a track boundary into two separate calls
- the IBM AT BIOS and many other BIOSes use only the low four bits of DH (head number) since the WD-1003 controller which is the standard AT controller (and the controller that IDE emulates) only supports 16 heads
- AWARD AT BIOS and AMI 386sx BIOS have been extended to handle more than 1024 cylinders by placing bits 10 and 11 of the cylinder number into bits 6 and 7 of DH
- under Windows95, a volume must be locked (see INT 21/AX=440Dh/CX=084Bh) in order to perform direct accesses such as INT 13h reads and writes
- all versions of MS-DOS (including MS-DOS 7 [Windows 95]) have a bug which prevents booting on hard disks with 256 heads (FFh), so many modern BIOSes provide mappings with at most 255 (FEh) heads
- some cache drivers flush their buffers when detecting that DOS is bypassed by directly issuing INT 13h from applications. A dummy read can be used as one of several methods to force cache flushing for unknown caches (e.g. before rebooting).
- When reading from floppies, some AMI BIOSes (around 1990-1991) trash the byte following the data buffer, if it is not arranged to an even memory boundary. A workaround is to either make the buffer word aligned (which may also help to speed up things), or to add a dummy byte after the buffer.
- MS-DOS may leave interrupts disabled on return from this function.
- Apparently some BIOSes or intercepting resident software have bugs that may destroy DX on return or not properly set the Carry flag. At least some Microsoft software frames calls to this function with PUSH DX, STC, INT 13h, STI, POP DX.
- on the original IBM AT BIOS (1984/01/10) this function does not disable interrupts for harddisks (DL >= 80h). On these machines the MS-DOS/PC DOS IO.SYS/IBMBIO.COM installs a special filter to bypass the buggy code in the ROM (see CALL F000h:211Eh)

## Note

Text based on [Ralf Brown Interrupt List Release 61](#)

| IBM PC BIOS API |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| Video I/O       | <b>INT 10H:</b> 00H, 01H, 02H, 03H, 05H, 06H, 07H, 08H, 09H, 0AH, 0BH, 0CH, 0DH, 0EH, 0FH |
| Hardware info   | <b>INT 11H, INT 12H</b>                                                                   |
| Serial I/O      | <b>INT 14H:</b> 00H, 01H, 02H, 03H                                                        |
| Tape I/O        | <b>INT 15H:</b> 00H, 01H, 02H, 03H                                                        |
| Keyboard I/O    | <b>INT 16H:</b> 00H, 01H, 02H                                                             |
| Printer I/O     | <b>INT 17H:</b> 00H, 01H, 02H                                                             |
| Disk I/O        | <b>INT 13H:</b> 00H, 01H, 02H, 03H, 04H, 05H                                              |
| Date and Time   | <b>INT 1AH:</b> 00H, 01H                                                                  |

### osFree Macro Library

|                |                                                                                                                                                                                                                    |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Video I/O      | @SetMode @SetCurSz @SetCurPos @GetCur @SetPage @ScrollUp @ScrollDn @Scroll @GetChAtr @PutChAtr @PutCh @SetPalet @SetColor @SetDot @GetDot @WrtTTY @VideoState @GetMode @GetDisplay @GetVideoState @GetEGAInfo @Cls |
| Hardware info  | @Equipment @MemSize                                                                                                                                                                                                |
| Serial I/O     | @AuxInit @AuxSendChar @AuxRecieveChar @AuxStatus                                                                                                                                                                   |
| Tape I/O       | @TapeOn @TapeOff @TapeRead @TapeWrite                                                                                                                                                                              |
| Keyboard I/O   | @KbdStatus @CharIn @CharPeek                                                                                                                                                                                       |
| Printer I/O    | @PrnPrint @PrnInit @PrnStatus                                                                                                                                                                                      |
| Disk I/O       | @DskReset @DskStatus @DskRead @DskWrite @DskVerify @DskFormat                                                                                                                                                      |
| Date and Time  | @SetTime @GetTime                                                                                                                                                                                                  |
| Mouse          | @MouInit @MouShowPointer @MouStatus @MouSetPos @MouSetMickey @MouRegion                                                                                                                                            |
| Memory manager | @ModBlok SET_BLOCK                                                                                                                                                                                                 |

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| Family API |                 |                                                                                                                                                                                                                                                                                                                                                                              |
|------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DOS        | Process Manager | DosBeep DosExit DosSleep DosExecPgm                                                                                                                                                                                                                                                                                                                                          |
|            | File Manager    | DosChDir DosChgFilePtr DosClose DosDelete DosDupHandle DosMkDir DosMove DosQCurDir DosQCurDisk DosSetFileMode DosOpen DosQFileInfo DosRead DosQFileMode DosQFSInfo DosQVerify DosRmdir DosSelectDisk DosFindClose DosFindFirst DosFindNext DosSetFileInfo DosSetVerify DosWrite DosFileLocks DosSetFHandState DosNewSize DosBufReset DosQFHandState DosSetFSinfo DosShutdown |
|            | Memory Manager  | DosFreeSeg DosSubAlloc DosSubFree DosSubSet DosAllocHuge DosAllocSeg DosReallocHuge DosReallocSeg DosGetHugeShift DosCreateCSAlias                                                                                                                                                                                                                                           |
|            | NLS             | DosCaseMap DosGetCtryInfo DosGetDBCSEv DosSetCtryCode DosGetCollate DosGetMessage DosInsMessage DosPutMessage                                                                                                                                                                                                                                                                |
|            | Date and Time   | DosSetDateTime DosGetDateTime                                                                                                                                                                                                                                                                                                                                                |
|            | Devices         | DosDevConfig DosDevIOCtl DosDevIOCtl2                                                                                                                                                                                                                                                                                                                                        |
|            | Signals         | DosHoldSignal DosSetSigHandler                                                                                                                                                                                                                                                                                                                                               |
| KBD        | Misc            | BadDynLink DosGetEnv DosGetMachineMode DosGetVersion DosError DosErrClass DosSetVec                                                                                                                                                                                                                                                                                          |
|            |                 | KbdCharIn KbdFlushBuffer KbdGetStatus KbdSetStatus KbdStringIn KbdPeek                                                                                                                                                                                                                                                                                                       |

| Family API |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VIO        | <a href="#">VioGetBuf</a> <a href="#">VioGetConfig</a> <a href="#">VioGetCurPos</a> <a href="#">VioGetCurType</a> <a href="#">VioGetPhysBuf</a><br><a href="#">VioReadCellStr</a> <a href="#">VioReadCharStr</a> <a href="#">VioScrollUp</a> <a href="#">VioScrollDn</a> <a href="#">VioScrollLf</a> <a href="#">VioScrollRt</a><br><a href="#">VioScrUnLock</a> <a href="#">VioSetCurPos</a> <a href="#">VioSetCurType</a> <a href="#">VioSetMode</a> <a href="#">VioGetMode</a> <a href="#">VioShowBuf</a><br><a href="#">VioWrtCellStr</a> <a href="#">VioWrtCharStr</a> <a href="#">VioWrtCharStrAtt</a> <a href="#">VioWrtNAttr</a> <a href="#">VioWrtNCell</a><br><a href="#">VioWrtNChar</a> <a href="#">VioWrtTTY</a> <a href="#">VioScrLock</a> <a href="#">VioPopUp</a> |
| Tools      | <a href="#">BIND</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Modules    | <a href="#">DOSCALLS.DLL</a> <a href="#">VIOCALLS.DLL</a> <a href="#">KBDCALLS.DLL</a> <a href="#">MSG.DLL</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Libraries  | <a href="#">API.LIB</a> <a href="#">OS2386.LIB</a> <a href="#">FAPI.LIB</a> <a href="#">DOSCALLS.LIB</a> <a href="#">SUBCALLS.LIB</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

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