

a B-DOS limitation which may upset anyone with much more than 10,000 SAM floppy images to save.

[4] This spins DOWN when SAM starts up. To cure this, disconnect pin 1 on the cable or drive; it's believed to be an error in some old drives' interpretation of the RESET signal. The drive works fine without this connection (and, in this case, not with it). A similar fix cures similar problems with drives on Amigas, too. I diagnosed this by unplugging and replace the drive cable after resetting; once unplugged the drive spins up, and it stays up and signs on when I reconnect the cable. Don't try this unless you are confident about hot-swapping IDE cables.

I tested the following IDE removable read-only CD/DVD drives:

Make	Model	Buffer	Speed	ATAPI	Result
Acer	ROM-DRIVE-52MAX	128K	9152K	v2	Worked, noisy
LG (GoldStar)	CRD8240B	128K	4224K	v2	Worked fine
Liteon	LTN202	120K	3704K	v2	Worked OK [1]
Matsushita	DVD-ROM SR-8583	1408K	5632K	v3	Worked fine
Sony	CDU701	256K	2470K	v2	Worked fine
Tatung	CD-650E	256K	706K	v0	No CD-R(W) [1,2]

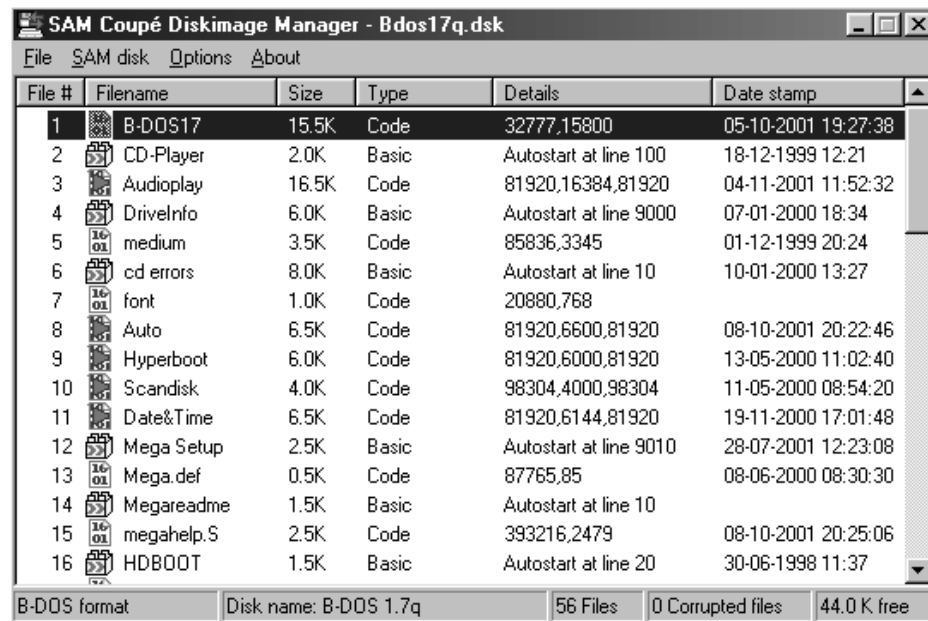
Notes

The speed value is the claimed maximum in K per second for the drive. Slower drives (even 2x ones) are faster in practice on SAM than 'modern' ones rated at 50+ times because they don't have to spin up and down like 'fast' ones (which typically take several noisy seconds to start and stop at each access) and use constant linear velocity (like CD audio) rather than a constant angular velocity which is less than half the rated speed at the start of the disk, where you're more likely to find data (as not all disks are full). However the older, smoother, drives are less likely to support all ATAPI v2 or v3 commands.

[1] Mono volume control (no separate left & right levels).

[2] This old ATAPI drive pre-dates CDR and CDR-W, but it was able to read manufactured CDs without any trouble.

Welcome to B-DOS 1.7n for SAM Coupé



B-DOS Version 1.7n Information · 1997/2001 by Martijn Groen & Edwin Blink
Additional informations about harddrives/CD-ROMs by Simon N. Goodwin
Booklet by Wolfgang Haller/SPC/Cologne

B-DOS Version 1.7n Information - 1997/2001 by Martijn Groen & Edwin Blink

Last updated: 26/12/2001

The B-DOS code and B-DOS information are FREEWARE. This is a fully functional DOS and there are no silly restrictions whatsoever. Please pass it on to other SAM users.

Enjoy B-DOS.

Martijn Groen & Edwin Blink.

Possible B-DOS drive configurations:

0: No Drives (I prefer tape-loading)

1: Floppy drive only*

2: Floppy drive, Harddisk (master)

3: Floppy drive, Harddisk (master) Harddisk (slave)

4: Floppy drive, Harddisk (master) CD-ROM drive (slave)

5: Floppy drive, CD-ROM drive (slave)*

* BOOT from floppy only

Always set the CD-ROM drive jumper to slave position. The following CD-ROM drives are ATAPI v2 and work with B-DOS;

FUNAI 8x

PHILIPS 32x (POKE DVAR 57 with 0)

LITE-ON 32x (POKE DVAR 57 with 0)

PIONEER 4x

MATSUSHITA

ACTIMA 36x (This one is ATAPI v0 and works with B-DOS!)

In this version, the loading of spectrum files and the decimal point command are not supported anymore.

Also, the B-DOS logo-screen has been removed.

Before booting B-DOS 1.7n you should run the latest version of MakeBoot first. This allows you to set the Sectorcopy record which is needed when copying Record 0 to Record 0 (floppy drive only). If you don't have the HD BOOT ROM you have to set DVAR 32 manually.

SAM ATOM IDE interface test results

Simon N Goodwin, September 2003

I've tested about 30 IDE drives on Yarek's 2003 remix of the Atom interface for my 512K SAM. The following fixed hard disks appeared to sign on and work fine:

Maker	Model	Mb	Records	Size	Note
Conner	CP0174E	170	208	3.5"	
Conner	CP2061	63	79	2.5"	
Conner	CP30104	120	149	3.5"	
Maxtor	7040AT		40	53	3.5"
Maxtor	90680D4	6800	8301	3.5"	
Quantum	GO80A		80	106	2.5"
Quantum	Fireball 640A	640	784	3.5"	
Samsung	VG26483A	6480	7929	3.5"	
Seagate	ST9385AG	340	417	2.5"	
Seagate	ST9096	80	105	2.5"	[1]
Seagate	ST50180A	1083	1323	3.5"	
Seagate	ST31276A	1275	1564	3.5"	
Seagate	ST3144AT	120	160	3.5"	[4]
Seagate	ST351A/X	40	53	3.5"	[2]
Toshiba	MK2124FC	120	159	2.5"	
Western Digital	205AA	20500	10322	3.5"	[3]
Western Digital	AC2120M	125	153	3.5"	

Notes:

An unbranded IDE Compact Flash adapter that works with a QL (QUIBIDE interface) and Amigas and an x86 Linux box was not recognised by the Atom/B-DOS with either a 32M DaneElec or 4M generic CF card inserted.

An LS120 removable 'floptical' ATAPI drive was not noticed by the Atom/B-DOS whether connected as a master or a slave.

[1] I've got two of these - one worked and the other seemed to but reported an implausible 9712 cylinders (it should be 980) so it should only hold 105 records not the claimed 975.

[2] I tested two of these vintage drives - both worked OK.

[3] Only the first 8 Gb of this 20+ Gb drive was available for SAM records. This is

To read the Record LIST

```
10 LET BASE=DPEEK DVAR 21
20 LET OLD_RCD=DPEEK DVAR 25
30 ON ERROR GOTO 70
40 DPOKE DVAR 21,0
50 DPOKE DVAR 25,1
60 READ AT 2,0,2,81920,BASE-1
70 DPOKE DVAR 25,OLD_RCD
80 DPOKE DVAR 21,BASE
90 ON ERROR STOP
```

The first 16 bytes at 81920 is the name of record 1, the next 16 bytes of record 2, Etc. Etc. A CHR\$ 0 as a first character indicates the record has no name.

To read the BOOT SECTOR

```
10 LET BASE=DPEEK DVAR 21
20 LET OLD_RCD=DPEEK DVAR 25
30 ON ERROR GOTO 70
40 DPOKE DVAR 21,0
50 DPOKE DVAR 25,1
60 READ AT 2,0,1,81920
70 DPOKE DVAR 25,OLD_RCD
80 DPOKE DVAR 21,BASE
90 ON ERROR STOP
```

Note !!!

Make sure that DVAR 21 is restored to its old value before using the hard disk again. Otherwise reading or writing to the hard disk will be incorrect.

B-DOS 1.7n

To make using a hard disk as user friendly as possible, the hard disk works like a virtual second disk drive. The storage capacity of a hard disk is divided into 800K blocks. Such a 800K block is called a record and has the same format as a floppy disk. (10 sectors per track, 80 tracks and 2 sides). A record can be selected by number or by name.

BOOTING

When B-DOS is booted, it checks if a SAMBUS clock or a DALLAS clock is connected to the SAM. If so B-DOS will be set to use the clock for date stamping and date and time will be displayed at the top of each directory. After the clock test B-DOS will do a hard disk(s) and CD-ROM drive test. The DOS variables are automatically set to use the hard disk(s). So no manual settings are required.

DVAR ACCESS

To make access the DVARS from machine code a bit easier, the address of DVAR 0 is stored at the first 2 bytes in the DOS page. This address points to location C in memory (&8000-&BFFF)

```
example:      LD a,(&5BC2)
              OUT (&FB),A
              LD HL,(32768)
              LD BC,7      ;DVAR 7
              ADD HL,BC
              LD A,(HL)   ;A=B-DOS version number
```

The start address of the path is stored after the first two bytes in the DOS page. The path always begins with a slash and ends with a zero byte.

```
example:      LD a,(&5BC2)
              OUT (&FB),A
              LD HL,(32770) HL points to path string.
```

The next two bytes at 32772 & 32773 are used to determine which drives are connected to the IDE port:

```
32772:      1: no slave drive
            2: slave harddisk
            3: CD-ROM drive
            4: ZIP drive
```

32773: 1: no master drive, else master harddisk
 32774: 0: no clock connected
 1: Dallas clock
 15: Sambus clock

DATE STAMPING

B-DOS supports date stamping files. If a SAMBUS clock or a DALLAS clock is connected. If no clock is connected the date and time can be poked manually in DVARS 39 to 45 to to date stamp a file.

The day, month, year, hour, minute, second and day of the week are saved with a file. Date and time are displayed in a directory if the screen mode 3 is active and bit 0 of DVAR 38 is set to 1.

Using date and time can be done by peeking at DVARS 39 to DVARS 45. The clock is read and the DVARS are updated whenever DVAR 39 is addressed.

This small program will print the date and time at the top left of the screen and is printed again until a key is pressed:

```
10 PRINT AT 0,0; PEEK DVAR 39;" / ";PEEK DVAR 40;" / ";1900+
  PEEK DVAR 41;" " ;PEEK DVAR 42;" : ";PEEK DVAR 43;" : ";PEEK
  DVAR 44;" " "
20 IF INKEY$="" THEN GOTO 10
```

Day to minute values are valid for Masterdos files.
 Day to minute values are valid for files saved by all previous versions of B-DOS.
 Day to second values are valid for CD-ROM files.

B-DOS 1.7a or higher support all date & time values. As there is only room to store five date & time bytes in each directory entry, the seven date & time bytes are stored encoded (except for day & year). The 5 bytes at offset 245 in dir entry:

245: if 0 or >=32 then the file has no date & time stamp, else day
 246: if bit 7=0 then this is the month
 if bit 7=1 then date & time were stored encoded
 encoded: bits 6-3 hold the month and bits 2-0 hold the day of the week code
 247: year (add 1900 for correct year)
 invalid if 255 or <80
 248: not encoded, then hour
 encoded: bits 7-3 hold the hour and bits 2-0 hold the lower 3 bits of minute

IX = number of sectors
 Multiple sectors only works with 512 bytes sectors.
 Restores last used drive head to track 0 ignored by hard disk
 164 &A4 HREST
 Restores last used drive head to track 0 ignored by hard disk
 165 &A5 HDIR
 Clears the screen and outputs a directory to screen.
 A register: =2 short dir,= 4 detailed dir
 166 &A6 HERAZ
 Erase file which name is at IX+1 to IX+10

COMPATIBILITY NOTES

Programms which POKE or CALL directly into SAMDOS will not work correctly with B-DOS and B-DOS can not be joined with Masterbasic.

Some Tips

To detect if B-DOS is in memory:

```
IF PEEK DVAR 7<20 THEN PRINT "B-DOS BOOTed"
```

Test if a hard disk present:

```
IF DPEEK DVAR 23 THEN PRINT "Hard disk present"
```

Test if a hard disk is in sleep mode

```
IF NOT PEEK DVAR 2 AND DPEEK DVAR 23 THEN PRINT "Zzz
Zzz"
```

To format a non B-DOS record to B-DOS format.

```
10 DPOKE DVAR 25,record number
20 FORMAT OVER
```

record number =min. 1, max. DPEEK DVAR 23

Get record number from record name

```
10 RECORD name$
20 LET number = DPEEK DVAR 25
```

header bytes are saved to the file. Before using this hook poke &5BB9 with 0 to overite existing file.

148 &44 HSBYT Save Byte in the A register to the file opened with HOFLE.

149 &45 HWSAD Write a single sector.
A=drive number
D = track, E=sector
HL =memory address (16384 to 65024)

150 &46 HSVBK Save a Block to file opened with HOFLE. Saves A pages and DE bytes from page selected in location C starting at HL. HI points also to location C in memory.
Note that this hookcode must be used only in location B (&4000 to &7FFF).

152 &48 HCFSM Close file sector map. Closes the file opened with HOFLE and the file is made in the directory.

154 &9A HSELHD Selects harddisk in A register.
A = 1 : select floppy drive
A = 2 : select master harddisk
A = 3 : select slave harddisk

155 &9B Reserved ...

156 &9C B HRECORD Select a record. If A = 0 then select record number HL. Else select record by name. HL points to the 16 char. name.

157 &9D B HVEBK Verifies a block. See HSVBK for more details.

158 &9E HGFLE Get file ...

159 &9F B HLBYT Load byte in D register from file.

160 &A0 HRSAD Read sector
A=drive number
D = track, E=sector
HL =memory address (16384 to 65024)

161 &A1 HLDBK Load a block from file. See HSVBK for more details.

162 &A2 M HMRSAD Read Multiple sectors
A = drive number
D = track, E=sector
C = memory page
HL = memory offset (32768 to 49151)
IX = number of sectors
Multiple sectors only works with 512 bytes sectors.

163 &A3 M HMWSAD Write multiple sectors
A = drive number
D = track, E=sector
C = memory page
HL = memory offset (32768 to 49151)

249: not encoded, then minute
encoded: bits 7-5 hold the upper 3 bits of minute and bits 4-0 hold second/2

If a disk/record is formatted or renamed by B-DOS then the first directory entry holds extra information:

210-219: disk/record name first 10 chars
232-235: BDOS (bdos id)
250-255: disk/record name last 6 chars

BDOS BASIC COMMANDS

Note. All between brackets is optional and should be entered without the brackets.

Example: DIR 1 (!) Enter: DIR 1 or: DIR 1!

Device selection

CALL DEVICE nr.	This command does not apply to CD-ROM drive.
nr = 1:	select floppy drive
nr = 2:	select master harddisk
nr = 3:	select slave harddisk

Hard disk power management (motor control)

DEVICE ON	Puts the hard disk in idle mode (Motor on).
DEVICE ON,n	As above and sets the APD counter (Auto Power Down). The hard disk enters stand-by mode when the time set by the APD counter has elapsed. n=0 disable APD counter n=12/240 APD active after n * 5 seconds. Note. The APD commands may work different or not work at all with some hard disks.
DEVICE OFF	Puts the hard disk in stand-by mode (Motor off) Idle mode is entered as soon as a new command is issued.
DEVICE OFF,n	As above and sets the APD counter.
DEVICE STOP	Puts hard disk in sleep mode (motor off and hard disk is no longer accessable. Also DEVICE D2 is set to 'not available' and the DEVICE is set to D1. Use DEVICE ON to re-activate.
RESTORE DEVICE	Resets hard disk logic and selects DEVICE D2

RECORDs

A record must be selected before it can be used. A record can be selected by:

RECORD n Selects record number 'n' as permanent record
RECORD "name" Selects record named "name" as permanent record
RECORD 0 Selects Floppy. (Same as DEVICE D1)

Before a record is selected and DEVICE D2 is set a test is made if that record is available to B-DOS. (Records can be reserved for other uses). The 'Invalid record' report will be given if a record is not available to B-DOS.(See FORMAT for more info).

RECORD can be used in combination with other commands. In such a case a record is only selected to be used by that command and can be in three forms:

RECORD, RECORD n or RECORD "name".

If RECORD 0 is used the floppy disk is used instead of the hard disk (Same as "D1:*"). To make things easier The RECORD keyword can be entered at once by pressing SYMBOL Z.

Records and disks can also be named with a name up to 16 characters (See RENAME). The following command can be used to list all records with a name:

RECORD Will list all named records with their record number. Record names which start with a CHR\$ 0 (no name) will not be displayed.
RECORD (#s) Same as above but output to stream s
RECORD (#s),"*" Same as above but using wildcards

DIRECTORY

DIR only or DIR added with '!' at the end will perform a short directory (file names printed only). In all other cases a detailed directory will be displayed.

DIR
DIR drive (!)
DIR RECORD (!)
DIR drive,"*" (!)
DIR RECORD ,"*" (!)
DIR #stream,drive (!)

HOOK CODES

B-DOS offers several hook codes including the SAMDOS hookcodes.

All other codes which are not included in this list are ignored by B-DOS (Just a RETURN from DOS). The hook codes followed with a 'B' are B-DOS specific. A 'M' indicates compatibility with Masterdos. All other hookcodes are compatible with both SAMDOS and Masterdos.

128 &80 INIT Same as HAUTO
129 &81 HGTHD Get file header.IX points to a tape like header (file name at IX+1 to IX+14). File name may include "D1:" or "D2:"
The loaded header can be found at &4B50 in the system page.
130 &82 HLOAD Load data from from file which is selected with HGTHD.
Destination page paged at location C
Destination offset (32768 - 49151)
C =length in 16K pages (0 - 31)
DE =Modulo length (0 - 16383)
131 &83 HVERY Verify data from from file which is selected with HGTHD.
Destination page paged at location C
Destination offset (32768 - 49151)
C =length in 16K pages (0 - 31)
DE =Modulo length (0 - 16383)
132 &84 HSAVE Save file. IX should point to a 48 bytes header containing
type, name and file specific information.
134 &86 B HVMSAD Verify multiple sectors
A = drive number
D = track, E=sector
C = memory page
HL = memory offset (32768 to 49151)
IX = number of sectors
Multiple sectors only works with 512 bytes sectors.
135 &87 B HDINIT Re-initialize B-DOS,prints BDOS logo re-inits clock,hard
disk and DVARS.
136 &88 HAUTO Loads "AUTO*" file. The "AUTO*" file can be BASIC or
CODE type
139 &8 B HVAR Expects the DVAR number on the calculator stack.
Restacks the basic address of the required DVAR. If
dvar 39 is addressed the clock DVARS are updated.
B-DOS also puts the DVAR offset in the 1st two bytes
of the DOS page.(See DVARS)
147 &43 HOFLE Open a new file. IX points to a 48 byte header and 9

20: Door closed, 120 mm CD-ROM (CD-R) Hybrid disc (Photo CD)
 21: Door closed, 80 mm CD-ROM (CD-R) data only
 22: Door closed, 80 mm CD-DA (CD-R) audio only
 23: Door closed, 80 mm CD-ROM (CD-R) data and audio combined
 24: Door closed, 80 mm CD-ROM (CD-R) Hybrid disc (Photo CD)
 32: Door closed, medium type (CD-E) size unknown
 33: Door closed, 120 mm CD-ROM (CD-E) data only
 34: Door closed, 120 mm CD-DA (CD-E) audio only
 35: Door closed, 120 mm CD-ROM (CD-E) data and audio combined
 36: Door closed, 120 mm CD-ROM (CD-E) Hybrid disc (Photo CD)
 37: Door closed, 80 mm CD-ROM (CD-E) data only
 38: Door closed, 80 mm CD-DA (CD-E) audio only
 39: Door closed, 80 mm CD-ROM (CD-E) data and audio combined
 40: Door closed, 80 mm CD-ROM (CD-E) Hybrid disc (Photo CD)
 48: Door closed, medium type unknown
 49: Door closed, 120 mm Hybrid disc
 53: Door closed, 80 mm Hybrid disc

112: Door closed, no disc present
 113: Door open
 114: Door closed, medium format error

56 Disc type. The READ MODE command must always be issued before PEEKing DVAR 56!!! Disc Type Descriptions:

0: no disc present/error
 1: CD-DA or CD-ROM with first track in MODE 1
 2: CD-i disc
 3: CD-ROM XA disc with first track in MODE 2

57 CD-ROM drive speed (factor), 2 = double speed (default)
 Use values of: 1,2,3,4,5,6,8,12,16,24,32,36,40 etc.
 0 = maximum speed supported by drive.
 Note that some modern CD-ROM drives may behave abnormally at single or double speed. Instead use the maximum speed. This will not affect the speed of audio-play operations.

58 CD-ROM drive lock state. The READ DEVICE command must always be issued before PEEKing DVAR 58!!!
 0: unlocked state
 1: locked state

Note: When DVAR 39 (Day) is addressed from basic or hook code HVAR the clock is read and DVARS 39 to 45 are updated.

DIR #stream,RECORD (!)
 DIR #stream,drive,"*" (!)
 DIR #stream,RECORD,"*" (!)

DIR drive/record ("*") filetype
 filetype can be: CODE, LINE or SCREEN\$

Example: DIR RECORD 11 LINE
 This will display all BASIC files in RECORD 11

RECORD may be: 'RECORD'only, 'RECORD n' or 'RECORD "name"'

The file number of a file is printed in inverse if that file is protected. In screen mode 3 the execute address of a CODE file is also printed (third number). If BIT 0 of DVAR 38 and screen mode 3, date and time will be printed if the file has a valid date.

ERASING FILES

ERASE "filename" (?) Erases normal file
 ERASE OVER "filename" (?) Erases a protected file

(?) will activate 'Erase "" (Y/N/C/E) ?' request for each file to copy press Y to copy the file, N to skip the file,C to continue copying without the request, E to end the command. Any other key will be seen as 'N'.

PROTECTING FILES/RECORDS

PROTECT "filename" Protects a file
 PROTECT OFF "filename" Unprotects a file
 PROTECT RECORD \n"name" Software write protect to protect a complete record against any write operation (FORMAT too).
 PROTECT OFF RECORD \n"name" Removes record write protect.

HIDING FILES

HIDE "filename" "filename" will not be displayed in a DIR.
 HIDE OFF "filename" To undo a HIDE

LOAD n LOAD a file by number. As given in a detailed DIR.

SECTOR COMMANDS

READ AT d,t,s,a,n Reads 'n' sectors from drive 'd' starting at track 't',sector 's' to ram at 'a'

Note 'n' must be in the range of 16384 to 540671. All sector formats (128/256/512 or 1024) can be read. However multiple sectors will only work correctly with standard disk format (10 sectors per track numbered 1 to 10).

WRITE AT d,t,s,a,n Writes sectors to disk. See READ AT also.

VERIFY AT d,t,s,a,n Checks if contents of sectors is the sameas in ram. See READ AT also.

RENAMING FILES/RECORDS

RENAME "oldname" to "newname" Renames "oldname" to "newname"
Note. The new name can be the same as the old name to allow Case changes.

RENAME TO "Label" Renames a disk/record to "Label"

RENAME RECORD TO "label" Renames record to "Label"

(RECORD can be: RECORD, RECORD n or RECORD "name")

Use CHR\$ 0 as "label" to remove a disk/record name

Note. There is no check if records have the same name.

FORMATTING DISKS/RECORDS

FORMAT (DIR) (OVER) (RECORD) ("name") (NEXT nr)

DIR Fast format: clears directory sectors only
OVER Formats immediately without request message
RECORD may be: RECORD Formats last selected record
RECORD n Formats record number n
RECORD "name" formats record named "name"
"name" Names disk/record with name "name". If 1st chr of name is a CHR\$ 0 or no name is given, the disk/record will not be named.
NEXT nr nr = number of records to format (harddisk only).

43 1 Minutes
44 1 Seconds
45 1 day of the week code:
0: Sunday 1: Monday 2: Tuesday 3: Wednesday
4: Thursday 5: Friday 6: Saturday
46 Number of audio-tracks on medium
47 First audio-track available
48 Status key: 0 = error/medium not present
1 = play operation in progress
2 = play operation paused
3 = play operation completed
4 = play operation stopped due to error
5 = current position at audio-track (medium present/play stopped)
6 = current position at data-track (medium present/play stopped)
Values of 3 & 4 should not be used to determine whether the play operation has stopped, as values 3 & 4 are returned only once by CD-ROM drives.

When DVAR 48 (Status) is addressed from basic or hook code (HVAR) 48 then the CD-ROM audio status is read and DVARS 48 to 54 are updated.

49 Current audio-track
50 Absolute track time: minute
51 Absolute track time: second
52 Relative track time: minute
53 Relative track time: second
54 Relative track time: frame
55 CD-ROM medium type code. The READ DEVICE command must always be issued before PEEKing DVAR 55!!!
Medium Type Codes & Descriptions:
0: Door closed, medium type size unknown
1: Door closed, 120 mm CD-ROM data only
2: Door closed, 120 mm CD-DA audio only
3: Door closed, 120 mm CD-ROM data and audio combined
4: Door closed, 120 mm CD-ROM Hybrid disc (Photo CD)
5: Door closed, 80 mm CD-ROM data only
6: Door closed, 80 mm CD-DA audio only
7: Door closed, 80 mm CD-ROM data and audio combined
8: Door closed, 80 mm CD-ROM Hybrid disc (Photo CD)
16: Door closed, medium type (CD-R) size unknown
17: Door closed, 120 mm CD-ROM (CD-R) data only
18: Door closed, 120 mm CD-DA (CD-R) audio only
19: Door closed, 120 mm CD-ROM (CD-R) data and audio combined

DVARS (DOS VARIABLES)

DVARS 0,1,2,5 and 7 are compatible with SAMDOS and masterdos. All other DVARS are B-DOS specific.

0	1	Border mask 0=no border change, 1-7 border changed
1	1	Drive 1 data (normaly 208 for 2*80 tracks)
2	1	Drive 2 data master(0 if in sleep mode, otherwise 208)
3	1	Default device chr. Set when BDOS has been booted
4	1	Default device no. Set when BDOS has been booted
5	1	Space replacement character (DIR).
6	1	Drive 2 data slave(0 if in sleep mode, otherwise 208)
7	1	Version number divided by 10 minus 10 (version 1.1 = 1)
8	1	Hard disk base sector of current record
9	1	Hard disk number of sectors per track + 1
10	1	Hard disk base head of current record
11	1	Hard disk number of heads
12	2	Hard disk base cylinder of current record
14	2	Hard disk number of cylinders
16	2	Hard disk heads * sectors
18	2	Total number of sectors on hard disk MOD 65536
20	1	Total number of sectors on hard disk / 65536
21	2	Number of reserved sectors on hard disk for BOOT sector and RECORD list. Equal to INT ((records+63)/32). May be altered to access the Record names list. This DVAR must be restored to its old value before the hard disk is used again.
23	2	Total number of records available
25	2	current record selected. May be DPOKEd manually to select a record. The write protect status of a record is not updated if this DVAR is DPOKEd.
27	1	Write protect status of current record. Note only updated if a record is selected using the RECORD command.
28	2	Temporarily record number
30	2	Alternative record number
32	2	Record number used by Copy/Move Record 0 TO Record 0 command
34	1	Hard disk select (&A0 Master/&B0 slave)
35	3	Call this dvar to re initialize Master/slave hard disk. RECORD 1:POKE DVAR 34,&B0: CALL DVAR 35 to use slave hard disk.
38	1	Date flag bit 0 = 1 Prints dates on a detailed directory in screen mode 3
39	1	Day. DVARS 39/43 are used to date stamp a file if day
40	1	Month <> 0. All values are decimal.
41	1	Year (2000=100)
42	1	Hour

Example: FORMAT DIR RECORD 100 NEXT 5

This will fast format Record 100 to Record 104. Notice that all records are renamed with CHR\$ 0 (no name) and any protected Records are automatically skipped, unless the OVER command was used.

Important !!!!

A device specifier ("D1:*") is not allowed inside the name. Use RECORD 0 for "D1:" and RECORD for "D2:"

Before a disk is formatted a check is made if the disk has been formatted before and if so 'FORMAT "" (Y/N)' is displayed. B-DOS formats both sides at the same track at once (SAMDOS/MASTERDOS formats all tracks on side first and then side two) which makes a format faster. According to my real time clock it took 65 seconds to format/verify a floppy disk.

Note.1 Hard disks are hard sectored and can not be formatted. B-DOS will fill all 1600 sectors in a record with zeros instead.

Note.2 B-DOS sets an BDOS ID in the first directory entry. Before a record is selected a check is made for this ID. If the ID is not there. The record is not selected. This allows records to be reserved for non B-DOS use.

To select a record without an ID you can DPOKE the record number directly in DVAR 25 and do a POKE DVAR 27,0 to disable a possible software write protect from the last selected record.

To set the ID in that record you can enter FORMAT OVER or RENAME TO CHR\$ 0 (or any other name you like).

COPYING FILES

COPY (OVER) (DEVICE) source TO (DEVICE) target (?) (NEXT nr)

OVER Will inhibit the 'OVERWRITE "" (Y/N)' request if a file on the target disk/record has the same name as the file to copy.

DEVICE 1 ; not supported, use RECORD 0 instead

DEVICE 2 ; master harddisk

DEVICE 3 ; slave harddisk

; A RECORD command must follow after any DEVICE command.

(?) will activate 'COPY "" (Y/N/C/E) ?' request for each file. To copy press Y to copy the file, N to skip the file, C to continue copying without the request, E to end the command. Any other key will be seen as 'N'.

Source and target may be any of the following:

"" ; All files using the current device.
 "d1:.*" ; All files using drive 1
 "d2:.*" ; All files using current hard disk record
 RECORD ; As above
 RECORD, "" ; As above
 RECORD 1 ; As above but using record 1
 RECORD 1, "" ; As above
 RECORD "name" ; As above but using record named "name"
 RECORD "name", "" ; As above

"" May be replaced with a string to copy selected files.

NEXT nr ; nr = number of records to copy (harddisk only).
 ; copies complete record(s) (always 800k).
 ; only needs two free 16k pages (32k).

You cannot copy multiple records from floppy drive to harddisk or from harddisk to floppy drive (count will be set to 1).

Example:

COPY DEVICE 3 RECORD 10 TO DEVICE 2 RECORD 100 NEXT 3

This will copy Record 10 to Record 100, Record 11 to Record 101 and Record 12 to Record 102 (from slave to master harddisk).

If the source record and the target record are both 0 then the source disk is first copied to the 'Sectorcopy Record' and after this you'll be prompted to insert the target disk. Hereafter the Sectorcopy Record' will be copied to target disk. The 'Sectorcopy Record' can be set using the latest version of MakeBoot or by changing DVAR 32: DPOKE DVAR 32, record nr. The value of DVAR 32 applies to master harddisk as well as slave harddisk, so choose a record that exists on both harddisks.

Warnings: reading from the source record(s) starts at once and destinations records are not checked whether they are valid or protected records.

MOVE (OVER) (DEVICE) source TO (DEVICE) target (?) (NEXT nr)

20 (91)	Invalid device.	A unknown device is selected.
21 (90)	Invalid stream number	the stream number was not in the range of 0 to 15.
29	Not understood.	General syntax error.
30	Integer out of range.	The RAM address of a READ / WRITE or VERIFY AT command was smaller than 16384.
81	Invalid record.	The record selected does not exist or is no BDOS format.
82	Record not found	Record could not be selected by name. Because the name is not in use.
83	Trk .. Sct .. not found	The sector .. at track ..does not exist (any longer).
84	ESC requested	ESC key was pressed during a disk operation.
85	Trk .. Sct .. error	Sector .. at track .. could not be read.
86	Trk .. Sct .. lost	Sector .. at track .. is damaged.
87	Invalid track	The audio-command could not be executed, because the track is not an audio track.
		The CD-ROM command could not be executed, because the track is not a data track.
88	Track not found	audio-track is not available
89	Path not found	specified subdirectory not found
90	Missing medium	medium was not detected
91	Medium error	flaw in the medium or error in the recorded data or a non-recoverable hardware failure.
92	ATAPI error	(all other CD-ROM(drive) errors)
93	Verify failed	File contents is not the same as in memory.
94	Wrong file type	The file could not be handled
95	Invalid LBA	Logical block out of range
96	Invalid mode	Illegal mode for this track
97	HD error	An error occurred during copying or moving a record on harddisk.
101	No AUTO file	There is no AUTO file on the disk.
103	No such drive	The drive selected does not exist.
104	Protected record	Floppy disk or record is write protected.
105	Record full	There is not enough disk space left to store the file.
106	Directory full	The 80 directory slots are all being used.
107	File not found	The file doesn't exist.
108	End of file	File is corrupted or track 0 sector 0 was selected.
109	File name used	File name already exists.

Yellow Book: CD-ROM Mode 2 (only used to define other standards)

12 bytes of sync. data
4 bytes of header data
2336 bytes of user data

Error correction: CIRC (Cross-Interleaved Reed-Solomon Code)

Green Book, White Book & Extended Yellow Book:

CD-ROM XA/CD-I Mode 2 Form 1 (programs & data):

12 bytes of sync. data
4 bytes of header data
8 bytes of sub-header data
2048 bytes of user data
4 bytes of EDC code
276 bytes of ECC code

Error correction: EDC (Error Detection Code) and ECC (Error Correction Code)

Green Book, White Book & Extended Yellow Book:

CD-ROM XA/CD-I Mode 2 Form 2 (audio & video):

12 bytes of sync. data
4 bytes of header data
8 bytes of sub-header data
2324 bytes of user data
4 bytes of EDC code

Error correction: EDC (Error Detection Code)

ERROR CODES

Some BDOS error reports are slightly different from those used by SAMDOS and MasterDOS. The number between brackets is the report number used by SAMDOS and MasterDOS.

1	Out of memory.	There are no pages available for the COPY command to use as a copy buffer.
18 (89)	Invalid file name	The file name or record name was a null string or too long

See Copy command for explanation of parameters.

File move: After a file has been copied, the source file will be erased.

Record move: After a record has been copied, the source record will be fast formatted and removed from the record list.

ZX FILES

B-DOS prevents ZX files to be in the first directory entry (the one starting with number one in a detailed directory). The first directory entry holds part of the disk/record name at the same place as ZX file info. (As with Masterdos. However Masterdos allows ZX files to be in the first directory entry). A ZX file with corrupted file info will be corrected by B-DOS when copied.

CD-ROM drive issues & commands

If you have trouble booting B-DOS 1.7n with a CD-ROM drive connected you might try the following BASIC program (only works with B-DOS 1.7a or higher!):

```
10 CLEAR 32767
20 LOAD "B-DOS17" CODE 32777
30 POKE 32964,1 (standard value = 0)
40 SAVE OVER "B-DOS17" CODE 32777,15800
```

Run the program and re-boot! This will skip the ATAPI-drive detection in B-DOS 1.7n and therefore assumes a CD-ROM drive is always connected.

OPEN DEVICE	opens CD-ROM drive tray (Symbol O,M) ejects ZIP disk from ZIP drive
CLOSE DEVICE	closes CD-ROM drive tray (Symbol I,M)
READ RECORD	Use this command if you started audio-play using the CD-ROM drive's front pannel buttons. This command will then set DVAR 46 & 47 (set by all READ RECORD commands). play audio-track nr (1-99). If nr = 0 then all audio-tracks are played. With mixed-mode CD-ROM's, any data-tracks are skipped.
READ RECORD nr.	play audio-track nr (1-99). If nr = 0 then all audio-tracks are played. With mixed-mode CD-ROM's, any data-tracks are skipped.
PAUSE ON	pauses audio-play
PAUSE OFF	resumes audio-play
READ OFF	stops audio-play Notice that the PAUSE ON/OFF commands have no effect after this command.

READ ON plays current track again from the beginning. If no audio-track was played before this command was issued, then the first available track will be played.

DEVICE PROTECT ON prevent medium removal (if the CD-ROM drive supports a locking mechanism). Some drives will only lock the drive if a medium is inserted in the drive. There will be no error report when the OPEN DEVICE command is issued and the drive is in a locked state.

DEVICE PROTECT OFF allow medium removal (also after hardware reset)

DIR /, DIR \ enter & display root directory

DIR * display all files & dirs in the current directory

DIR "*"name*" display files & dirs in current directory using wildcards

DIR "*"*. *" display all files, but not subdirectories unless a subdir has an extended name.

DIR ="name" enter & display new directory

DIR = display current path name(s)

DIR . enter & display previous directory

DIR ="/", DIR ="\\" same as DIR / or DIR \

DIR = "." same as DIR .

DIR ? displays whether a track on the medium is a data or an audio track. One of the 3 following symbols is shown:
 > = play operation in progress
 | = play operation paused
 * = no play operation/position in audio or data track
 If no symbol is shown then the position will be in the lead-in area or in a transition area or in the lead-out area of the medium.

LOAD "*"name";address load file from CD-ROM. Filenames can be up to 127 characters. The asterisk (*) may be used in the filename.

LOAD "*"name" load file from CD-ROM. Start address shall be 16384.

COPY "*"name.DSK" TO RECORD nr/name (LABEL)

This will copy a .DSK file from CD-ROM to a harddisk record. The LABEL parameter is optional. If it's used then the record gets a B-DOS ID after copying and the diskname will be updated in the record list.

The following commands will NOT stop an audio-play operation: READ RECORD, DEVICE PROTECT ON/OFF, READ DEVICE, READ MODE, DIR= and DIR?

You may use the asterisk (*) in pathnames, for example:

DIR =***\software" instead of:
 DIR ="sinclair\spectrum\software

DIR ="testing\one2three" search from current directory
 DIR ="\testing\one2three" search from root directory (1st char = \)

In MODE 3 long filenames and date & time are also printed.

Currently B-DOS supports CD-DA, CD-ROM (Mode 1), CD-ROM XA (Mode 2, Form 1) and Mixed Mode CD-ROM. Sector layouts: (all sectors have a total of 2352 bytes)

Red Book: CD Digital Audio

Each Sector has 2352 data bytes, Music
 Each sector can be divided into 98 frames
 Each frame contains 24 bytes (98 frames*24 bytes=2352)

Each sector can be divided into 588 cells
 Each cell has the following 4-byte structure:
 byte 0: Left Channel, Lower Byte
 byte 1: Left Channel, Upper Byte
 byte 2: Right Channel, Lower Byte
 byte 3: Right Channel, Upper Byte
 (4 bytes*6 samples=24 (1 frame))
 (588 cells*4 bytes=2352 (1 sector))

75 sectors (blocks) can be read per second.
 588 cells*75 sectors = 44100 hertz sampling rate
 Error correction: CIRC (Cross-Interleaved Reed-Solomon Code)

Yellow Book: CD-ROM Mode 1

12 bytes of sync. data
 4 bytes of header data
 2048 bytes of user data
 4 bytes of EDC code
 8 bytes (all zero)
 276 bytes of ECC code

Error correction: EDC (Error Detection Code) and ECC (Error Correction Code)