

The DOSFS ROM

User Guide

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Overview:

The internet has opened up a wealth of archived BBC software which can be downloaded at no charge. However, being able to transfer this software to the machine presents a serious problem because of the need to jump the gap from the PC to BBC micro.

The DOSFS ROM solves this problem by allowing the BBC micro to read and write PC format floppy discs including those from PCs running Windows which permits much longer filenames.

Diskettes can be either single or double density (this is 360k or 720k in DOS terminology) formatted with 9 sectors per track, either 5.25" or 3.5" in size.

In addition to all the normal filing system commands there are built-in commands to format and verify discs on your BBC Microcomputer.

What you'll need:

The ROM installation procedure is quite simple, though will be slightly different depending on which machine you are fitting the software into.

Hardware requirements:

A floppy disc drive (or drives) will be required, and it is recommended that a 3.5" drive is used as these are most common now with DOS and Windows machines and hence are readily available at low cost.

A suggested setup is to use 'drive 0' as the 5.25" drive for support for the normal Acorn filing systems (DFS and possibly ADFS) and install 'drive 1' as the 3.5" drive for DOSFS (and optionally ADFS).

The drive must be capable of double sided accesses and be switched to 80 track mode if there is an option between 40 and 80 track.

The filing system requires that the machine be fitted with a 1770 or 1772 disc controller (eg. BBC Master and BBC B+) or 1770 disc upgrade kit (eg. BBC B) to work.

You can easily determine which controller you have as follows

BBC model B users -

IC78 is a 40 pin socket which should contain a small carrier board with a 28 pin chip in it. If it contains a 40 pin chip labelled 8271 or is empty, then DOSFS will not work in this machine and you must purchase the carrier board separately.

BBC model B+ users -

IC16 is a 28 pin chip just south of the keyboard ribbon cable underneath the keyboard. Provision was also made for a 40 pin chip here, but this is unlikely to be installed.

Master users -

IC3 is a 28 pin chip under the keyboard where the ribbon cable joins the main board

What is:

A disc drive -

The disc drive contains a motor which spins at a constant speed and two heads (one for each side of the disc so that both sides can be accessed without needing to turn the disc over) for reading magnetically stored data from a diskette using the same principle as audio cassettes are played back by the heads of a tape machine.

A controller chip in the disc drive accepts special sequences of pulses from a disc controller chip in the computer which move the heads around on the disc and starts and stops the motor when required.

A disc -

Is a flat piece of plastic which has been coated with magnetic dust then sealed in a protective plastic jacket.

Before a disc can be used it must first be formatted so that it is laid out in a format which the computer can understand - much like painting road markings on a new road so that drivers can understand the layout.

The disc is first split into a series of concentric circles called tracks, which are then sliced up into a number of sectors (in the case of DOS and Windows discs there are 9 sectors per track on a floppy disc).

Each sector is further subdivided into single bytes (in the case of DOS and Windows discs there are 512 bytes per sector).

Additionally, some space on the disc is set aside for the directory listings and a 'file allocation table', or FAT. The FAT tells the computer where on the disc a file is saved so that when an attempt is made to load a file the computer knows in which sectors all of the bytes are stored.

This is why typing *FREE on a blank disc will show that some space has been used.

A disc filing system (eg.DOSFS) -

Is a complex piece of software used to coordinate all reading and writing to the disc.It is responsible for talking to the disc controller (which in turn talks to the disc drive) and performing many housekeeping tasks which the BBC micro asks of it - such as opening new files,deleting unwanted files etc...

A file -

Is simply a sequence of bytes saved on the disc and given a filename.The filename is required so the bytes can be referred to at a later date when they are next needed.

No file has any special significance,and it is up to the software which tries to load it to determine whether what was loaded was sensible - there's nothing stopping a user from loading a wordprocessor file into BASIC for example (though BASIC will complain that it's a bad program!).

An ambiguous file specification -

Some filing system commands allow either a single filename or an ambiguous filename to be supplied to them (these are marked with <afsp> in the "New commands" section later).

Ambiguous filenames contain special characters called wildcards which match one or more letters so the filing system command will apply to any matching files.

The wildcards are: # match any one letter
 * match zero or more letters

For example

*INFO :0.\$ABC## gets info on any 5 letter filename
 beginning with ABC on drive 0,in dir \$
*INFO :0.\$AB*C gets info on filenames of any length
 which start AB and end with a C

Note that the drive number is the only part of the filename specification (abbreviated 'fsp') which may not be replaced by a wildcard.

Fitting the chip:

With the machine turned off,remove the fixing screws.

If you have a proprietary ROM board fitted,follow the guidelines given in its user guide and skip the next sections

BBC B users -

With the lid off,loosen the left hand keyboard screw and completely remove the right hand one.Pivot the keyboard to reveal a row of 5 sockets underneath.

Place the DOSFS ROM in any free socket,although for speed reasons it is customary to keep the socket next to the OS for the DFS chip.

BBC B+ users -

Having removed the lid,this will reveal 6 sockets.The top right socket is the OS and BASIC and should not be moved.

Referring to the diagram,the OS/BASIC are normally paged into sockets 14 & 15 (or 0 & 1 if link 13 is south).The other 5 sockets are in fact 32k ROM sockets,but they can be configured to take 16k by altering option links.A=link 18;B=link 15;C=link 12;D=link 11;E=link 9.Pick an empty socket,and ensure that the corresponding link is in the WEST position.The ROM will then appear in the odd numbered socket according to the following pairings A=10&11;B=8&9;C=6&7;D=4&5;E=2&3.If you also have SWR fitted then it is usually mapped into 12,13,0,1 (unless link 13 is moved in which case it appears in 12,13,14,15).

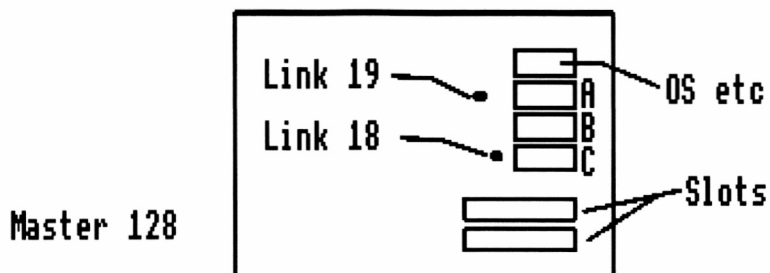
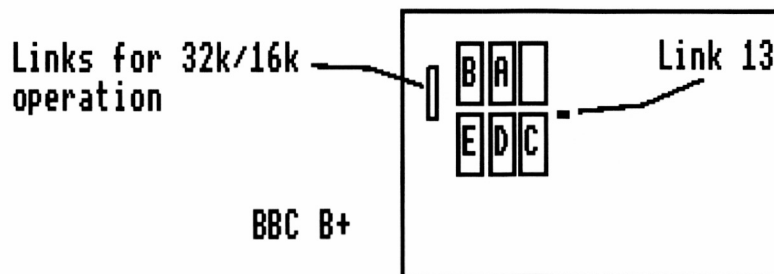
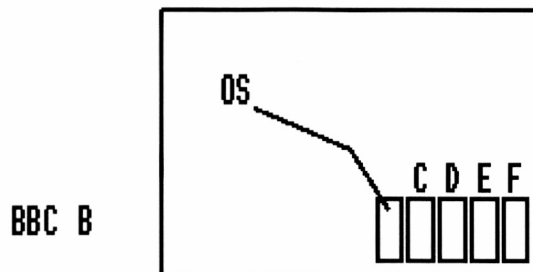
Master users -

Having removed the lid,this reveals 4 sockets on the right. Referring to the diagram,the OS and other built-in ROMS are not to be moved.ROMs 0-3 are the cartridge slots in the lid of the machine.DOSFS may be kept in an external cartridge if it is being used only periodically during transfers from a DOS or Windows machine.

The slots A,B,C are for ROMs,although only B is for 16k chips,the others are normally sideways RAM which must be link deselected before they can be used as ROMs.

Use socket B if possible,or alter Link 19 to East to use A or alter Link 18 to East to use C.This will result in a loss of sideways RAM,however.

Diagrams:



Final installation:

Once the ROM has been inserted,replace the machine's lid.

On a Master,you'll need to *INSERT the appropriate socket to enable the software,if you haven't done so already.

Using DOSFS for the first time:

Having installed the ROM you can now select DOSFS. To do this you should type

```
*DOS
```

Once selected you can start work with a disc by first MOUNTing it when inserted into the appropriate drive, type

```
*MOUNT
```

this command is assuming you have the disc in 'drive 0', but if this is not the case the drive to use can be specified by putting the drive number after the *MOUNT command:

```
*MOUNT 0
```

```
*MOUNT 1
```

for drives '0' and '1' here respectively.

Thereafter all of the normal file manipulation commands are available and any programs which read or write to a disc should operate just as though they were using a native Acorn disc format.

Once you have finished working with a disc, you must be sure to DISMOUNT it to make sure DOSFS writes any information it was keeping in memory to the disc, see the "Loss of data" section below.

New commands (ALL USERS):

Syntax: *ACCESS <afsp> <LRIW>

Set a file's attributes to be Locked/Readable/Writeable, though all files will always be readable. Minimum abbreviation is *AC.

Syntax: *BACKUP <source> <dest>

Takes a backup of drive 'source' and puts it on drive 'dest', prompting for disc changes if the source and destination are the same drive. Minimum abbreviation is *BAC.

Syntax: *COPY <afsp|fsp> <dest>

Copy one or more files, if an 'afsp' is given then 'dest' is a drive/dir pair, but if a single 'fsp' is given then 'dest' must be a full drive/dir/filename

- Syntax: ***DELETE** <fsp>
Delete a single file
Minimum abbreviation is ***DE**.
- Syntax: ***DESTROY** <afsp>
Delete files, prompting for confirmation of the batch
Minimum abbreviation is ***DES**.
- Syntax: ***DIR** :drive.directory
Set current directory, see also "Compatibility"
section
- Syntax: ***DISMOUNT**
Flush any buffers to the currently mounted disc
Minimum abbreviation is ***DISM**.
- Syntax: ***DRIVE** <drive#>
The drive# must be a drive that is appropriate
for the hardware in use.
This command does in fact perform exactly the same
function as ***MOUNT** and is included only for
compatibility, as ***DRIVE** is a 'deprecated' command
Minimum abbreviation is ***DR**.
- Syntax: ***LIB** :drive.directory
Set current library, see also "Compatibility"
section
- Syntax: ***ENABLE**
Skips warnings before 'dangerous' commands
Minimum abbreviation is ***ENA**.
- Syntax: ***FORM** <720|360> <drive>
Formats the specified drive to 720 or 360k
Minimum abbreviation is ***FO**.
- Syntax: ***FREE**
Show free space statistics
Minimum abbreviation is ***FR**.
- Syntax: ***HELP**
Reports issues of the ROMs in your machine.
Minimum abbreviation is ***H**.
- Syntax: ***HELP DOSFS**
Gives a reminder of the version and purpose of the
DOSFS software
Minimum abbreviation is ***H.DOSFS**

- Syntax: ***INFO** <afsp>
Show info on the given file
Minimum abbreviation is ***I**.
- Syntax: ***MAP**
Show free space map fragmentation
- Syntax: ***MOUNT** <drive>
Mount a new disc
Minimum abbreviation is ***MOU**.
- Syntax: ***RENAME** <oldfsp> <newfsp>
Rename the given file
Minimum abbreviation is ***REN**.
- Syntax: ***TITLE** <disctitle>
Set media title
Minimum abbreviation is ***TIT**.
- Syntax: ***WIPE** <afsp>
Delete files, prompting for confirmation for each
Minimum abbreviation is ***W**.
- Syntax: ***VERIFY** <drive>
Verifies all sectors on the specified drive
Minimum abbreviation is ***V**.

New commands (NON MASTER USERS ONLY):

- Syntax: ***CLOSE**
Close all files
Minimum abbreviation is ***CL**.

New commands (MASTER USERS ONLY):

- Syntax: ***EX** <dir>
Examines the given directory, or the current directory
if none is specified
- Syntax: ***CONFIGURE** FDRIVE <speed>
Sets the drive head step speed, refer to the 'Tuning
the speed of your drive' section
Minimum abbreviation is ***CONFIG.FDRIVE**
- Syntax: ***STATUS** FDRIVE
Gives just the status of CMOS FDRIVE speed settings
Minimum abbreviation is ***ST.FDRIVE**

Tuning the speed of your drive:

At this point the knowledge of whether your machine has a 1770 or 1772 disc controller chip fitted is required - refer to the "Hardware requirements" section earlier for details of how to do this.

In most cases for modern drives it is safe to use the fastest setting for a given controller, but consult your floppy disc drive specification for more information.

It is also possible to temporarily make speed changes using OSByte 255 followed by a soft reset - refer to the user guide for more information on the use of OSByte.

For Non Master users -

There are a set of 8 switches in the bottom right corner of the keyboard (though the switch may not be soldered in, a suitable 8 way DIP switch is available from most electronic component suppliers).

Simply set the switches as follows, followed by a hard or power on reset:

Switch 3	Switch 4	1770 speed	1772 speed
Open	Open	6ms	6ms
Open	Closed	12ms	12ms
Closed	Open	20ms	2ms
Closed	Closed	30ms	3ms

For Master users -

Simply set the 'FDRIVE' configuration as in the following table, followed by a hard or power on reset:

Fdrive configuration	1770 speed	1772 speed
0	6ms	6ms
1	12ms	12ms
2	20ms	2ms
3	30ms	3ms

Loss of data:

Note that a hard or power-on reset has the effect of immediately clearing both of the cached areas, and any data in them that was not written to the disc by first DISMOUNTing it will probably be lost.

Some disc operations (specifically, *COPY, *FORM and *BACKUP) make use of the memory immediately above OSHWM to speed the operation up. As a result, you should be sure to save anything you were working on before using such commands.

Compatibility:

This software is a complete filing system implementation, however there are some key differences between DOSFS and other filing systems available for the BBC:

Only files in the root directory of the DOS disc can be accessed. There may be typically 112 files in the root directory catalogue.

The media title can be up to 11 letters long.

When specifying a drive, you may select either drive '0' or '1'.

File attributes under DOS are slightly different from those on Acorn filing systems so

- any 'System' or 'Hidden' files are reported as 'Locked' against deletion rather than being hidden as with DOS
- all files are readable
- 'Read only' files are marked as not being writeable
- the DOS 'Archive' attribute is ignored

By default access is set to local RW access when creating a new file.

If the machine has a clock fitted and it returns a date after 1980 then this will be used as the creation date of any new files created. If however no clock is available, or it

returns a date pre 1980 the filing system will force the file's creation time to be "Fri,31 Dec 1999.23:59:58".

There is no facility to store load and execution addresses in the PC disc catalogue,so you may not *RUN anything from DOSFS.As a result of this a message will be issued and the library will not be checked,though for compatibility the *LIB command is present.

The 3 letter file extensions used by DOS must be separated by a '/' character rather than a '.' as this is used on the BBC to separate directories,and any illegal characters in the filename will be substituted for an underscore.

Windows theoretically allows filenames up to 819 letters long,but these could not be manipulated on the BBC micro because several of the operating system interfaces assume that results will fit in one page (256 bytes) of memory. To get around this a sensible maximum of 26 characters is imposed by DOSFS,any files with names longer than this can still be accessed using their "8.3" style DOS name.

Enquiries :

Any enquiries should be made in writing to:

R.P.Sproyson,
6 Bollinbrook road,
MACCLESFIELD,
Cheshire.
SK10 3DJ.

Address correct Sep 2001.

Error messages:

- "Type mismatch" - the source and destination drives for a *BACKUP did not contain discs of the same density, eg. one 720k and one 360k
- "Escape" - the user aborted something waiting for his input
- "Bad address" - when *LOADing files a target address must be given
- "Bad FS map" - a request was made to read a cluster off the end of the current free space map, which implies it is inconsistent
- "Is a dir" - tried to perform an operation on a directory which doesn't make sense eg. trying to load it
- "No directory" - an attempt was made to read/write before any disc has been mounted
- "Outside file" - an attempt was made to set the PTR for a read only file beyond the end of the file
- "Cat full" - no free slots could be found in the disc catalogue, despite there probably being space on the disc for the data itself
- "Too many open" - only 3 files may be open at once
- "Read only" - a write to a file not open for writing was made
- "Open" - the file involved is already open
- "Locked" - an attempt to delete, rename, or overwrite a locked file was made
- "Exists" - renaming a file to the name of another file on the disc is forbidden
- "Disc full" - no free space was found for the operation
- "Disc not recognised" - tried to mount a disc not formatted for use with DOSFS
- "Disc changed" - the original disc has changed and needs dismounting before the chosen operation can continue (eg. mounting another disc)
- "Disc read only" - the write protect tab has prevented a write
- "Bad option" - only OPT0, OPT1, OPT4 are allowed
- "Bad name" - the name given contained forbidden characters or was too long
- "Bad drive" - a drive number other than 0 or 1 was used

- "Bad dir" - the only directory considered valid is the root directory "\$"
- "Bad attribute" - a file which is marked read only or locked was opened for writing, or the attribute supplied to *ACCESS was invalid
- "Not found" - the requested file was not present on the disc
- "Channel" - a call was made with a handle which is either illegal or has already been closed
- "Bad string" - either no text was entered where some was expected, or there are an inappropriate number of quote marks
- "Bad command" - the syntax of the entered command is incorrect or an attempt was made to *RUN a file on a DOS disc
- "Disc error XX" - the disc controller has returned an error from the following list
- &0A=Late DMA
 - &0C=ID field failed CRC
 - &0E=Data field failed CRC
 - &18=Sector not found
 - &08,&10,&12,&14=Reserved

Technical information:

This information may be of interest to programmers who wish to work with the DOSFS software, or to understand it further:

The 'cycle number' does not increment with each write to the disc, instead it is a 'number of files currently open' status byte, taking the value 0-3.

Up to 3 files may be open at once for any mixture of input, output, random access

The SPOOL/EXEC files are not held open over a filing system change.

The only valid boot option for PC format discs is zero (off).

One page (256 bytes) of memory is claimed as private workspace below OSHWM in the BBC, or in the hidden RAM on a Master. This contains pointers etc... that DOSFS uses, and must not be tampered with.

Ten pages (2560 bytes) of memory are claimed as shared workspace with other filing systems in the machine to hold a cache of part of the currently mounted disc's root directory and buffers for the three open files.

The filing system id is 43 for DOSFS.

When reading the load and execution addresses you will receive some limited information

LOAD----EXEC----

&FFFFFFcctttttttt where &cctttttttt is a five byte time offset in centiseconds from 1900 that the file was created on.

If storing a time offset in centiseconds in this format by writing the load and execution addresses for the file, remember that the time given will be converted to a DOS format time which is accurate to only the nearest 2s - hence it may be automatically rounded by DOSFS.

Machine code calls:

OSArgs

- Y=0 A=0 (read fs id)
- Y=0 A=1 (read address of *RUN parameters)
- Y=0 A=255 (update all files to media)
- Y=handle A=0 (read sequential pointer)
- Y=handle A=1 (write sequential pointer)
- Y=handle A=2 (read file length)
- Y=handle A=255 (update this file to media)

OSBGet

- Y=handle,byte returned in A is valid only if C=0

OSBPut

- Y=handle,A=byte to write

OSFile

- A=0 (save a section of memory) if this call fails due to lack of disc space and the <filename> given already existed,the result will be the deletion of <filename>

A=1 (write cat info)

A=2 (returns the object type only)

A=3 (returns the object type only)

A=4 (write attributes for an object)

A=5 (read cat info)

A=6 (delete given file)

A=255 (load named file,using given address only)

OSGbPb

A=1,2 (put bytes to media)

A=3,4 (get bytes from media)

A=5 (read media title and boot option)

A=6 (read device name and current dir)

A=7 (read device name and current lib)

A=8 (read names from current dir)

OSFind

A=0 (close file,or files)

A=&40 (openin an existing file)

A=&80 (openout a file,deleting the old if it already exists)

A=&C0 (openup an existing file)

OSFSControl

A=0 (set option)

X=0,Y=0 (reset default OPTions)

X=1,Y=0/1 (turn off/on extended messages)

X=4,Y=0 (turn off boot option)

A=1 (test for EOF)

A=2/3/4 (run the given file,though this will of course fail)

A=5 (produce catalogue)

A=6 (shut down filing system)

A=7 (return handle range)

A=8 (command about to be executed)

A=9 (do a *EX)

A=10 (do a *INFO)