# GENERAL INFORMATION

Information is stored on floppy discs on concentric tracks, the number of tracks per disc is controlled by the floppy disc drive. Most current drives have 40 or 80 tracks, although some early drives have 35 tracks.

Each track is divided into sectors, the BBC microcomputer employs 10 sectors per track, with 256 data bytes stored in each sector. Thus the storage capacity of a forty track disc is 40 x 10 x 256 bytes on one surface of a disc. i.e. 100k bytes.

The standard DFS uses two sectors to store the catalogue information about the tiles on a disc. This limits the number of files which may be stored on a disc to thirty one.

Before any data may be stored on a disc the disc must be formatted. This may be performed by inserting the utility disc and typing

*FORMAT

The program will prompt you for the drive number and the number of tracks.

Alternatively the command *FORMAT may be followed with the drive number, number of tracks, start-up option, and disc title. The order does not matter. The formatting program will print up the options selected and ask for confirmation.

The blank disc should be inserted into the disc drive and the appropriate drive selected, this is normally drive 0. After about thirty seconds the disc will be formatted, and is capable of saving programs.

# DISC FILES

Every file held on a disc must be given a name, filenames are made up of seven characters which must not include the characters:. # and * as these all have special uses.

In addition to the seven letter filename a single letter extension is used, this is called the directory.

Every file must have a different filename from any other files in the same directory, however files in different directories can have the same names.

In order to fully specify a file, the disc drive number is also included in the file specification.

This full file specification is written as follows:—

:<drive number> .<directory>..<filename> eg.

:1.A.FIRST

specifies file with the name FIRST in directory A on drive 1.

If no drive number is supplied the current drive is assumed, initially this is set to O. If no directory is supplied the current directory is assumed, initially this is set to $.

## Wildcards

Some DFS commands can operate on a number of files simultaneously, this is achieved by the use of two characters referred to as wildcards.

The character # can stand for any single character in a filename, or for the directory, thus

#.FRED

will match files called FRED in any directory.

A.FRE#

will match files in directory A which have four characters starting with FRE, such as A.FRED, A.FREE etc.

The character * can stand for any number of characters at the end of a field, thus

A.FR*

will match A.FRED, A.FRESH, etc.

In the description of commands if a single file must be specified this is shown by <fsp>, which stands for file specification.

If multiple files are required matching a specification which contains wildcards this is shown by <afsp>, which stands for ambiguous file specification.

# GETTING STARTED

## Fitting the Disc Drive

The BBC Microcomputer can have a maximum of two disc drives connected. Each of these disk drives can be single sided or double sided, and 35 track, 40 track or 80 track per side.

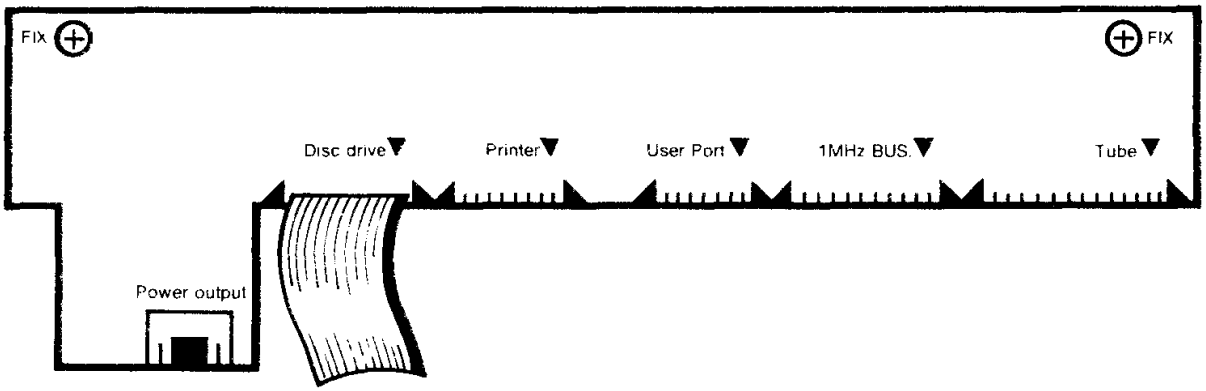
If only one disc drive is fitted, it is normally configured to be drive 0, if it is double sided the other surface of the disc is treated by the BBC Microcomputer as another drive, drive 2.

If two drives are fitted, one drive is configured to be drive 0 and the other drive is configured to be drive 1. If the drives are double sided, then the other side of drive O is treated by the BBC Microcomputer as drive 2, and the other side of drive 1 is treated as drive 3.

Connected to the disc drive are two cables, a flat ribbon cable and a power cable. The power cable may be a mains lead or a low voltage power lead with a 6 way connector on the end. If it is a mains lead connect a suitable mains plug fitted with a 5 amp fuse.

Turn off the computer and remove the mains plug.

Underneath the computer identify the connector marked disc drive, and note that the East end of the connector has a triangular arrow identifying it. This marks pin 1 of the connector. Observe that the ribbon cable from the disc drive has an identifying red stripe down one edge. This identifies pin one of the cable. Carefully insert the connector on the cable into the connector under the Computer marked disc drive, making sure that the red coloured stripe on the edge of the cable goes to the side of the connector marked as pin one by the arrow mark. The cable should come down from the connector when it is correctly orientated. Some plugs have a polarising lug which prevents incorrect insertion.




If your disc drive has a low voltage power supply lead with a 6 pin connector, insert it into the auxiliary power socket underneath the BBC Microcomputer. This connector is polarised so it cannot be incorrectly inserted. If your drives have a mains power supply we can now plug in the computer and the disc drives and after a final check switch on.

## Using the Disc Drive

Open the disc drive door, inside you will probably find a protective packing card, which is inserted into the drive during transit to protect the heads. Remove the card and store in a safe place for future use.

Before a disc can be used to save programs or data it must first be formatted. Supplied with the disc drive and this booklet is a utility disc. Among the programs on the disc is a program to format new discs.

Take the disc and look atthe edge of it There will be a notch in the side which may be covered with a small piece of tape. This is known as a write protect notch, and as long as the notch is covered with tape the disc cannot be written onto. If your disc does not have tape covering the write notch then cover it now. Write protect labels are supplied with boxes of new discs.

If you are using 3” microdrives, the write protection is operated by a little plastic lever. Lay the 3” disc down with the A side upwards, and the label towards you. In the far left hand corner of the disc is a small hole which may be covered by a red plastic lever. This lever can be pushed across by a ballpoint pen. When the hole is exposed, the disc is write protected and may not be written to. If the disc is not write protected move the lever across.

## Inserting Discs into the Disc Drive

3” Microdrives are inserted into the drive with the side marked A uppermost, holding the disc as it is inserted by the label.

5” Floppy discs are inserted into horizontal drives with the label uppermost, and the write protect notch on the left edge of the disc. You will not be able to read or write to any disc that has been incorrectly inserted.

## Making a Copy

Get ready a new blank disc, we will use the utility disc to format it. Insert the utility disc in drive 0, this will be the top drive or left drive in dual systems.

Hold down the shift key and press and release the break key, only then releasing the shift key. The disc drive will turn, and a menu will be displayed on the screen. Select option 1 to format a disc.

You will be asked for the number of tracks, answer either 40 for 3” microdrives and 40 track floppy disc drives, or 80 for 80 track floppy disc drives, and the drive number. For now answer drive 0. The program will now ask you to confirm your selection. Before you do this remove the utility disc and insert your new blank disc.

After you have confirmed your selection, a series of numbers will appear on the screen as the drive turns. The numbers indicate the track which is currently being formatted. All tracks which format correctly are displayed in white, any tracks which cannot be formatted are displayed in colour.

When you have formatted your first disc it is a good idea to make a backup copy of the utility disc. If you have a single disc drive enter the following.

```
*ENABLE
*BACKUP 0 0
```

You will be prompted to insert your source disc, which is the utility disc in this case, and to press a key, followed by your destination disc, which is the new disc you have just formatted. This procedure will be repeated six times until the whole disc is copied. When it has finished take the new disc and label it ‘Opus Utility Disc, copy’ and add the date for future reference.

If you have a dual disc drive enter the following.

```
*ENABLE
*BACKUP 0 1
```

Insert the utility disc in drive 0 and the newly formatted disc in drive 1, and press a key when ready. The disc will now be copied without any further intervention. Label the disc as described above.

Lock your original utility disc away in a safe place, and use the new utility disc you have created as a working master.

You will now need some additional discs for saving your programs and data. As always these must be formatted before use. To format more discs you may call up the formatting program from the menu as before, or for more versatility you can call it directly as described below.

# THE UTILITY DISK PROGRAM

## *FORMAT (<no. tracks>) (<drive no.>) (<title>) (<boot option>)

In order to format a disc the program must know the number of tracks to be formatted and the drive number on which to carry out the formatting. If these are not given the program will ask for them.

The disc title and the boot up option can also be setatthis point, simply follow the format command with the desired title and the boot option. Permitted boot options are LOAD, RUN and EXEC. Seethe *TITLE command for details of permitted titles.

To enter the options, type *FORMAT followed by the number of tracks to be formatted, the drive number, the title, and the boot up option in any order. The first number less than four is assumed to be the disc drive, and the first legal boot up option is assumed to be the boot up option, so to format a 40 track disc in drive 3 with a title fred and an EXEC boot up option, type the following.

* FORMAT 3 40 fred EXEC
or
* FORMAT EXEC fred 40 3

## *VERIFY

*VERIFY allows you to check a disc to see if it has been corrupted. Under normal use this will not occur unless the discs are misused. The command may be followed by a drive number to specify the drive to be verified. To verify the disc in drive 1 type in

*VERIFY 1
or
*VERIFY and answer 1 when asked which drive.

### *PRINT

Print is a utility which allows you to produce the screen image on an Epson compatible matrix printer. It is limited to only working in the graphics modes of the BBC Microcomputer.

To use ensure that a disc holding the utility is in the current drive and include the command *PRINT on a line by itself. If this is typed as a command line it will normally appear on the screen, but from a program it will not be visible.

## *INFORM (<initial letter>)

*INFORM is an on line help system which will produce a summary of the DFS commands. Typing *INFORM will produce a paged listing of the command section of this manual, use the return key to obtain the next page. If *INFORM is followed by a letter all commands which start with that letter will be listed.

## *ACCESS <afsp> (L) *ACC.

Locks the files which match the ambiguous file specification to prevent accidental erasure if the 'L' is included. If the 'L' is omitted the files matching the ambiguous file specification are unlocked allowing them to be erased, written to or overwritten.

EXAMPLE

>*ACCESS ATEST L

locks the file ATEST

>*ACCESS $*

unlocks all files in directory $.

WARNING

Locking a file does not prevent files from being overwritten or erased by formatting a disc or using * BACKUP.

*** BACKUP <Source drive>**
**<destination drive>** ***BAC**

Makes an exact copy of disc in the source drive onto the disc in the destination drive. The destination disc must have been previously formatted.

If drive 0 is given as both the source and destination drives, the computer will prompt for the insertion of source and destination discs alternately. A forty track disc is copied in five blocks.

The *ENABLE command must be used before the *BACKUP is used.

>*ENABLE

>*BACKUP 01

Copies the disc in drive 0 to the disc in drive 1

>*ENABLE

>*BACKUP 0 0
Prompts the user to alternately insert source and destination discs into drive 0, allowing a copy of the disc to be made in a single drive system.
WARNING

The contents of user memory are overwritten by this command, and the previous contents of the destination disc are lost.

## *BUILD <tsp> *BU.

Creates an ASCII file directly from the keyboard. This command is often used to create EXEC files such as a BOOT file.

The computer prompts for input by issuing line numbers. Input is terminated by typing the ‘ESCAPE’ key in response to the line number prompt.

EXAMPLE

```
>*BUILD !BOOT
1 *KEY 10 CHAIN “MENU’: M
2 CHAIN “MENU"
>
```

Creates a text BOOT file.

## * CAT (<drive>) *.

Displays the catalogue of the specified drive, if no drive is specified then the catalogue of the current drive is displayed.

The following information is displayed:—

the disc title, the number of times the disc has been written to, the drive number, the Boot option set for the disc ( by *OPT ), the current directory, the current library directory, the files in the current directory, and the files in other directories.

EXAMPLE

```
* CAT 0
GAMES 1 (12)
Drive 0                 Option 2 (EXEC) Library :O.$

Directory :0.$

  !BOOT L               BATBALL L
  CHASE

A. MENU L
```

## *COMPACT (<drive>) *COM

Transfers files to occupy contiguous sectors starting at track 0 sector 2

All files on a disc must occupy contiguous sectors, when files are deleted the sectors released appear as gaps between the remaining files. These gaps can only be occupied by files of the same size or smaller. To reclaim the sectors for use by larger files the disc must be compacted.

After compaction the remaining free space on a disc is displayed.

EXAMPLE

```
~>*COMPACT 0
Compacting drive 0
$.!BOOT     L     000000     000000     OQOOlA     002
$.CHASE           001900     FF8023     000370     003
A.MENU      L     001900     FF8023     000130     007
Disk compacted 187 free sectors
```

WARNING

User memory is overwritten. If a disc error occurs during compaction the disc is likely to become unreadable. It is wise to make a backup copy of a disc before compaction.

## * COPY <source drive> <destination drive> <afsp> *COP.

Copies the files which match the ambiguous file specification from the source drive to the destination drive. Attempts to copy files exceeding the size of user memory generate an error message.

EXAMPLE

>*COPY 0 1 A.*

Copies all files in directory A from the disc in drive 0 to the disc in drive 1.

WARNING
User memory is overwritten.

## *DELETE <fsp> *DE.

Removes the specified file's entry from the catalogue, effectively erasing the file from the disc. Locked files and files on a write protected disc cannot be deleted.

EXAMPLE

>*DELETE A.MENU

Deletes the file MENU in directory A from the disc.

## *DESTROY <afsp> *DES.

Removes the files which match the ambiguous file specification on the selected drive, and are unlocked.

The *ENABLE command must be used before the *DESTROY command. A list of all the unlocked files which match the ambiguous file specification is produced, and confirmation of the deletion request is requested.

EXAMPLE

```
>* ENABLE
>*DESTROY A.*
AM ENU
A.F RED
A. BALL

Delete (YIN) ?Y
Deleted
```

## *DIR (<directory>) *DIR

Sets the current directory to that specified, if no directory is specified the current directory is set to $.

All files saved to disc which do not include a directory in the file name are put into the current directory, changing the current directory has no effect on files already on the disc.

EXAMPLE

>*DIR S

Sets the current directory to S.

## *DRIVE <drive> *DR

Sets the current drive to the specified number.

Valid numbers are from 0 to 3, the default drive number isO. All subsequent disc accesses which do not specify a drive number will be made to the current drive.

Single sided drives are numbered 0 and 1; double sided drives have drive 2 on the reverse of drive 0, and drive 3 on the reverse of drive 1.

EXAMPLE

>*DR. 1

Current drive is set to 1.

## *DUMP <fsp> *DU.

Displays **(** Dumps) a file in hexadecimal and ASCII on the screen.

EXAMPLE

>*DUMP !BOOT

Displays the !BOOT file in hexadecimal and ASCII on the screen.

## * ENABLE *EN

Enables DFS commands which can erase files, this extra step helps to prevent accidental erasure of files.

***** ENABLE must be used before the ***** DESTROY and *BACKUP commands, if it is not used the message

Not enabled

is produced.

***** ENABLE only remains active for the next ***** command.

EXAMPLE

>*EN
>*BACKUP 0 1

Will backup the disc in drive 0 onto the disc in drive 1, destroying any files previously existing on drive 1.

## *EXEC <fsp> *E.

Executes the commands in the specified ASCII file as if they had been typed in from the keyboard.

Short command files are usually produced by use of the ***** BUILD command. Programs may be merged by *SPOOLing one program, oading a second program, and *EXECing the first program back into computer memory.

EXAMPLE

>*EXEC PROGTEXT
Further input is taken from the ASCII file PROGTEXT until the end of the file is reached.

WARNING

Unpredictible, and strange results will occur if a non ASCII file, such as a BASIC program file is EXECed.

## * HELP (<keyword>) *H.

If no keyword is employed a list of sideways ROMs with the keywords on which more help is available is displayed. the two keywords recognised by the DFS are UTILS' and 'DFS'. When the 'DFS' keyword is employed a summary list of the DFS commands is produced, when the UTILS' keyword is employed a summary list of the DFS utilities is produced.

*HELP is a Machine Operating System Command

EXAMPLE

```
>*HELP UTILS
DFS 0.9A
BUILD <fsp>
DISC
DUMP <fsp>
LIST  <fsp>
TYPE  <fsp>

05 1.20
```

NOTE
Not all sideways ROMs.support the *HELP command or recognise their keywords

## *INFO <afsp> *I.

Displays the information on the files which match the ambiguous file specification.

The information displayed in order is as follows:— filename, locked status, load address, execution address, length of file in bytes, and start sector. All numerical values are displayed in hexadecimal.

EXAMPLE

```
>*I BATBALL
$.BATBALL    L       FF1900       FF8023       00023A       QOC
```

The file called BATBALL in directory **$** has a load address of &1900, an execution address of &8023, a length of &23A bytes, and starts at sector &C (12) on the disc. Since there are ten sectors per track on the disc, the starting sector is on track 1 sector 2.

## * LIB (:<drive>) <directory> *LIB

If only the directory is specified, the library is set to the specified directory on the current drive. If the drive is also specified the library is set to the specified directory on the specified drive

When a *command is entered, if the command is not recognised by any of the sideways ROMs, (including DFS), then the library directory is searched for a file of that name; if such a file is present it will be loaded into memory at its load address and executed from its execution address, it should be a machine code program.

EXAMPLE

>*LIB :1.Z

The library is set to directory Z on drive 1.

## *LIST <fsp> *LIST

Displays an ASCII text file with each line numbered.

BASIC programs are stored in a tokenised form, and cannot be sensibly displayed using the * LIST command. An ASCII text file of a BASIC program may be obtained by *SPOOLING a BASIC program.

EXAMPLE

>*LIST !BOOT
1 *KEY 10 CHAIN “MENU” |M
2 CHAIN “MENU”

A text file such as that produced by the *BUILD command is listed.

## * LOAD Kfsp> (<address>) *L.

Loads the specified file into memory. If no address is given, the load address is that in the file information on the disc, usually the address from which it was saved. If an address is given, the file will be loaded into the computer memory starting at that address.

EXAMPLE

```
>*INFO FRED
$.FRED      L      FF1900      FF8023      00023C      002
>*L FRED
```

The file FRED has a load address of &1900, as shown by the *INFO command. The ***** LOAD command will place it in memory starting at this address as no load address has been specified.

```
>L. FRED 2500
```

FRED will now be loaded into memory at &2500.

## *OPT 1 <number> *0.1

If the number is zero, file information is not displayed whenever a file on disc is accessed. This is the default setting. If number is non zero, then all the file information which is produced by the ***** INFO command is displayed whenever a file is acessed.

EXAMPLE

```
>*OPT1 1
```

Enable file information.

```
*OPT 1 0
```

Disable file information.

## *OPT 4 <number> *0.4

Sets the start-up action which will occur for the disc in the currently selected drive.

The number may take values from O to 3. When a disc is in drive Q and shift break is pressed (releasing the break after the break), the start-up action for the disc is checked. The action set is as follows:

*OPT 4 0 causes no action to be taken on start-up
*OPT 4 1 causes a *LOAD of the file !BOOT
*OPT 4 2 causes a *RUN of the file !BOOT
*OPT 4 3 causes a *EXEC of the file !BOOT
If the !BOOT file is not present on the disc which has a non zero start-up option set, when the disc is auto started it will produce the message File no found

EXAMPLE

> *OPT 4 3

Sets the disc in the current drive to perform an *EXEC of the BOOT file when the disc is placed in drive 0 and shift break is pressed.

## *RENAME <old fsp> <new fsp> *RE.

Changes the name of the file specified by <old fsp> to the name given by <new fsp>.

The file specifications can include the directory, so files can be transferred from one directory to another, but a different drive number must not be given as the command cannot transfer files from one drive to another.

EXAMPLE

>*REN A.FRED B.TOM

Renames the file called FRED in directory A to TOM in directory B.

## * LOAD Kfsp> (<address>) *L.

Loads the specified file into memory. If no address is given, the load address is that in the file information on the disc, usually the address from which it was saved. If an address is given, the file will be loaded into the computer memory starting at that address.

EXAMPLE

```
>*INFO FRED
$.FRED      L      FF1900      FF8023      00023C      002
>*L FRED
```

The file FRED has a load address of &1900, as shown by the *INFO command. The ***** LOAD command will place it in memory starting at this address as no load address has been specified.

```
>L. FRED 2500
```

FRED will now be loaded into memory at &2500.

## *OPT 1 <number> *0.1

If the number is zero, file information is not displayed whenever a file on disc is accessed. This is the default setting. If number is non zero, then all the file information which is produced by the ***** INFO command is displayed whenever a file is acessed.

EXAMPLE

```
>*OPT1 1
```

Enable file information.

```
*OPT 1 0
```

Disable file information.

## *OPT 4 <number> *0.4

Sets the start-up action which will occur for the disc in the currently selected drive.

The number may take values from O to 3. When a disc is in drive Q and shift break is pressed (releasing the break after the break), the start-up action for the disc is checked. The action set is as follows:

*OPT 4 0 causes no action to be taken on start-up
*OPT 4 1 causes a *LOAD of the file !BOOT
*OPT 4 2 causes a *RUN of the file !BOOT
*OPT 4 3 causes a *EXEC of the file !BOOT
If the !BOOT file is not present on the disc which has a non zero start-up option set, when the disc is auto started it will produce the message File no found

EXAMPLE

> *OPT 4 3

Sets the disc in the current drive to perform an *EXEC of the BOOT file when the disc is placed in drive 0 and shift break is pressed.

## *RENAME <old fsp> <new fsp> *RE.

Changes the name of the file specified by <old fsp> to the name given by <new fsp>.

The file specifications can include the directory, so files can be transferred from one directory to another, but a different drive number must not be given as the command cannot transfer files from one drive to another.

EXAMPLE

>*REN A.FRED B.TOM

Renames the file called FRED in directory A to TOM in directory B.

## *RUN <fsp> (<parameters>) *R.

Causes the machine code file specified to be loaded into memory and executed. Parameters following the filename may be accessed by the program using OSWORD with the Accumulator equal to 5. BASIC programs cannot be run using this command.

EXAMPLE

>*RUN VERIFY

This will cause the machine code file called VERIFY to be loaded and run. The same effect could have been obtained by typing *VERIFY.

## *SAVE <fsp> <start addr> <end addr+1> (<exec addr>) (<load addr>)
## *SAVE <fsp> <start addr> <+length> (<exec addr>) (<load addr>) *S.

Saves a block of memory from the start address of length specified by either the end address or the length, to a file of the specified name. If the optional execution address and load address are not given these are set to the same as the start add ress.

EXAMPLE

>*SAVE MCODE 1900 +2000

Saves the contents of memory starting at &1900 of length &2000, (ie. upto &38FF)

to a file called MCODE.

>*SAVE MCODE 1900 3900
This instruction achieves the same result.

## *SPOOL <fsp> *SP.

Opens the file specified, such that all subsequent output to the screen is copied to the file. The file is closed by the command *SPOOL without a filename.

This command is used to produce ASCII text file of BASIC programs and for copying the output of programs to a text file for subsequent analysis or for incorporation into a document using a word processor.

EXAMPLE

>*SPOOL PROGTXT
>LIST
>SPOOL

The program currently in memory will be saved to an ASCII text file called PROGXT.

## *TITLE <disc name> *TI.

Changes the title of the disc in the current drive to the name specified. A disc title can have twelve characters, and will be truncated if more than twelve characters are specified. Shorter titles are padded out with nulls. Spaces can only be included in a disc title if the title is included in quotes.

When the contents of a disc are catalogued using *CAT the disc name is displayed.

EXAMPLE

> *TITLE “GAMES DISC”
The title of the disc in the current drive is changed to “GAMES DISC”.

## * TYPE <fsp> *TY

Displays an ASCII text file without any line numbers. This command is similar to the * LIST command except that line numbers are not displayed.

EXAMPLE

>*TYPE :l.A.TXT2

Displays the contents of the ASCII text file called TXT2 in directory A of the disc in drive 1.

## * WIPE <afsp> *W.

Deletes files which match the ambiguous file specification from the catalogue. The command asks for confirmation for each file that matches the file specification.

EXAMPLE

>*WIPE #.A*

All files on the current disc in any directory, which start with the character A will be listed individually. The user will be prompted to confirm the deletion of each file. Those files for which deletion is confirmed are removed from the disc catalogue.

# APPENDIX A

## INSTALLATION INSTRUCTIONS

The disk upgrade can only be fitted to a BBC Microcomputer Model B, fitted with the 1.2 or later version of the operating system. If you are not sure which operating system you have fitted type

*****FXO

If the 1.2 operating system is fitted the computer will print out

OS1.2

If you have an earlier version of the operating system contact your dealer to have your machine upgraded.

The disk upgrade kit contains the following items.

| | | |
|---|---|---|
| 1 off | 8271 | (IC78) |
| 2 off | 7438 | (IC79,80) |
| 2 off | 74L5393 | (IC81,86) |
| 1 off | 74L510 | (IC82) |
| 2 off | CD4O13B | (IC83,84) |
| 1 off | CD4O2OB | (IC85) |
| 1 off | 74L5123 | (IC87) |

Do not remove the devices from their packing at this stage. Some of these devices are fabricated using MOS technology and can be damaged by static electricity.

**Installation Procedure**

1 Switch off the computer and remove the power plug from the mains supply.

2 Remove the two screws at the rear of the machine, and the two screws on the bottom of the machine which are nearest the front edge of the machine. In earlier models these screws are marked FIX'. Carefully lift off the cover of the machine.

3 Undo the two or three nuts and bolts which hold the keyboard to the lower part of the case. Disconnect the ribbon cable which connects the keyboard to the motherboard. Disconnect the lead which goes to the loudspeaker. If speech is fitted, disconnect the second ribbon cable.

4 Lift the keyboard clear of the computer, and lay it carefully down.

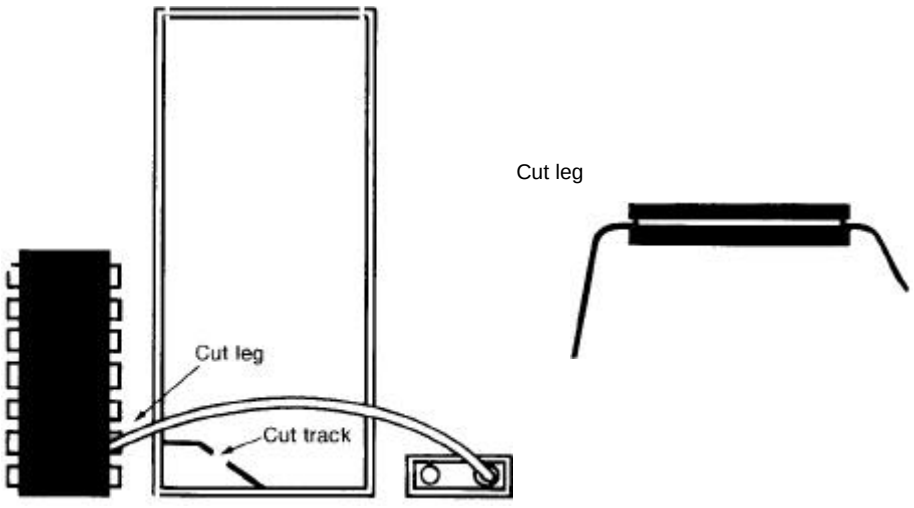
5 Printed on the main circuit board will be the issue numer. If the issue number is 1, 2 or 3 a circuit board modification is required. DO NOT MODIFY ISSUE 4 OR LATER ROARDS~

Modification for Boards of Issue 1, 2 and 3.

a) Identify pin 9 of 1C27. Cut the leg with a fine pair of side cutters as close to the printed circuit board as possible. Bend up the leg.

b) Cut the track between pin 9 of 1C27 and the link S9 using a fine knife, do not cut any other tracks.

c) Solder a fine wire between the leg of pin 9 on 1C27 and the East pad of S9 (as viewed from the front of the computer).




PIN 9 of 027 going to right hand block of S9.

d) On issue 1 and 2 boards solder a wire link across link S8.

6 On issue 4 and later boards cut link S9 if it is made.

7 Set the following link positions if they are not already made.

| | |
|---|---|
| 518 | North |
| S19 | East |
| S20 | North |
| S21 | two links, both East/West |
| S22 | North |
| S32 | West |
| S33 | West |

8 Carefully insert ICs 79,80,81,82,83.84,85,86,87 in the marked sockets, ensuring that the notch of each IC is to the North. (The same as the ICs already in the board.) To insert some if the Cs into the socket it will probably be necessary to carefully bend the rows of pins in slightly, this is most easily done against a hard flat surface.

9 Insert the DFS ROM in position ICi 01, to the East of the circuit board, and IC78. This latter device needs care because it is relatively expensive, and has 40 pins making it harder to insert.

10 Check all the Cs for bent legs and correct orientation, if all looks correct refit the speaker wire (the polarity of this does not matter) and the ribbon cable connecting the keyboard to the main circuit board.

11 Plug in the computer, and switch on. If all is well the following message should be displayed.

BBC Computer 32K

Acorn DFS

BASIC

>

If this or a similar message is not obtained switch off the computer, remove the mains plug, and check all the steps you have taken. Also check the position of the ribbon cable which connects the keyboard to the main circuit board.

12 Remove the mains plug, and refit the bolts holding the keyboard in position. Refit the lid of the computer, locating the LEDs in their holes in front of the keyboard. Replace the screws at the back and underneath the computer. Replace the mains plug, and turn on for a final check.

# GUARANTEE

This equipment is guaranteed only against defects in design, materials and workmanship, from the date of purchase for the relevant period and subject to the conditions below.

**Registration**

The guarantee shall only be effective if the whole Guarantee Card is completed and mailed within lO days of delivery to Opus Supplies Ltd., 55 Ormside Way, Holmethorpe Industrial Est., Redhill, Surrey.

Period of Guarantee

The Guarantee is effective calculated from the date of purchase fora period of 2 **years.**

**Conditions**

**1** This Guarantee is personal to the original user, is not transferrable and shall not be valid unless the equipment was purchased or taken on deferred or hire purchase terms from an appointed Opus Dealer, to whom the equipment was sold by the Company or direct from the Company.

2 This Guarantee will be invalidated if the equipment is misused or modified in any way without the written consent of the Company or if any original component or accessory has been replaced by any component or accessory of a type not recommended or approved by the Company, or if operated other than in accordance with the Instruction Manual.

3 Any claims made under this Guarantee must whenever possible be made through the Dealer from whom the equipment ws originally purchased, or taken on deffered or hire purchase terms. If this is not possible a claim may be made to any other Opus Dealer (a list of whom can be supplied on application), the customer's portion of the certified guarantee must be produced when any claim is made. The cost of carriage to and from the Dealer must be paid by the customer.

4 The Company's own transport will collect and return at no charge from an Opus Dealer only any equipment which after agreement by the Company is found necessary to be forwarded to them for repair.

5 In the event of equipment being returned which on test is found to comply with the published specification, the Company reserves the right to charge a reasonable fee for testing the equipment and for return carriage.

6 The liability of the Company under this Guarantee shall be limited to the cost of repair or complete replacement (at the discretion of the Company) of the defective equipment

**Guarantee Registration Opus Supplies Ltd. copy**

Model / Invoice! Ref.No.

Date of Purchase

Dealer……

Address……

……

……

…….. ……

I accept the terms of this guarantee.

Customer's signature…….

This Guarantee is only valid if it is completed and signed above by the customer and mailed to Opus Supplies Ltd., 55 Ormside Way, Holmethorpe Industrial Est., Redhill, Surrey, within ten days of delivery to the original user.

This Guarantee is valid in the U.K. only.

Opus.

Opus Supplies Ltd.,
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London SE5 0EE.
Tel: 01-701 8668