The information that follows is intended to supplement the MS-DOS User's Guide supplied with the Graduate under licence from Microsoft Ltd.

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Contents

<u>UNPACKING</u> :

    Please check that you have the following. Keep the original
packing to protect the system in case you have to ship it somewhere.

    <u>Item   check </u>

    Graduate Main Unit ....

    Graduate MS-DOS User's Guide and Technical
    Manual. (this manual) ....

    Graduate MS-DOS 2.11 System disc . . . ..

    Graduate BBC microcomputer compatible disc
         filing system (GDFS) disc . . .

    Mains lead with moulded 13A plug . . . .

    Packing including disc transit cards . .

    Xchange business software (one manual and
    three discs)

    At this stage, check the unit for obvious damage sustained in
transit. Worthy of special attention are :

         Ribbon cable on the main unit

         Corners of main unit

         Diskettes

    If you are unsure about removal of the transit cards, leave
these until you have read on to the relevant section on disc drives.

GETTING STARTED - GRADUATE MS-DOS

     In checking the goods supplied against the checklist earlier
you will have identified which bits are which. There is a minimum
selection of items you will need in front of you to get a working
and usable system:

     Graduate main unit
     Graduate MS-DOS systems disc
     Power lead for the Graduate
     BBC microcomputer model 'B' with or without BBC/Acorn DFS
     Monitor or television for the BBC micro
     Mains supply outlets for all three items

(1) With all units powered off and unplugged from the mains supply,
take the ribbon cable trailing from the Graduate main unit and
carefully plug it into the 1MHz bus expansion socket of the BBC
microcomputer. Note that this is the second socket from the right-
hand side next to the TUBE socket. Make sure the locating notch on
the side of the plug fits into the corresponding slot in the side
of the socket.

(2) Connect the Graduate to the mains supply and switch it on by
using the switch at the rear of the unit.

(3) Connect the BBC microcomputer and the monitor to the mains
supply. Ensure that the monitor is attached to the BBC
microcomputer in the usual way and is switched on.

(4) Insert your Graduate MS-DOS System Disk in the (top) drive,
called drive A, and press the button to lock the disc in. (Refer to
the section on how to insert discs on page 8)

(5) Switch on the BBC micro, or if it was already switched on then
press (Break].

     After a short moment in which the Graduate tests its memory and
other components, the disc drives will start to whirr. The red light
on the top disc drive will come on and the MS-DOS system will be
loaded into the computer's memory from the disc you have inserted
into drive A.

     The following should appear on the screen :
  Torch GRADUATE version XXX
  MSDOS version XXX
  Copyright 1981, 1982 Microsoft Corp.

  Command v. XXX
  Current date is Mon 01-01-1981
  Enter new date:_

Where XXX is the version number of the software you are using.

If this fails to appear, check the following points :

Check that any network feature of the BBC Computer is not being used and is totally unplugged.

Check that the GRADUATE is connected properly to the 1Mhz Bus socket on the underside of the BBC computer.

Check that the correct MS-DOS system disc is in the top drive and is properly inserted and locked in.

Check that the GRADUATE is properly connected to a 240V 50 Hz. AC mains outlet.

Press BREAK to try loading the system from disc again.

If the message 'BBC Computer' appears as usual then there is likely to be one of the following faults with the system :

The Graduate is not connected to the BBC Microcomputer correctly

The Graduate is not connected properly to its power outlet or there may be blown fuses.

There may be a fault in the BBC microcomputer 1MHz bus interface logic. If you have any other peripherals which use this bus check the BBC microcomputer is functioning correctly with them. If all is OK with them there may still be a fault in the interface but it is much less likely. Consult your BBC dealer/supplier if you have such a problem.

If the message 'Data Technologies DFS' appears at the top of the screen, then you have inserted the wrong system disc to run the MS-DOS system.

If the system still fails to 'BOOT', then there may be an internal fault on either the BBC microcomputer or the Graduate unit and you should contact your local dealer/supplier.

When the prompt appears, you can enter the date in the format MM-DD-YY and then press RETURN. If you enter a date that does not exist the system will respond with

Invalid date

and prompt you for a valid date. If you are happy with the date the system currently displays and don't wish to change it then simply hit RETURN at the prompt.

A quick word here about the importance of the time and date. Files stored on disc are all time and date stamped automatically by the system so you can always tell which file is the newest or oldest or whatever. If you neglect the date and time then you are simply making things more difficult for yourself. (See also the DATE and TIME commands, page 16 onwards)

Having got the date out of the way, the system will then prompt you for the time :

    Current time is xx:xx:xx
    Enter new time:_

You can now enter the time in the format HH:MM:SS and then press RETURN. If you enter a bad time, the system will respond with

Invalid time

and prompt you again. If you are happy with the time displayed and don't want to change it then simply hit RETURN at the prompt.

The system will then respond with its standard prompt :
    A>_

The 'A' means that when you enter a command, the system will look on the first drive (the top one) for a file. This is the DEFAULT drive. The angle bracket '>' means that MSDOS is ready to accept a command.

The first thing you should do now is make a copy of the systems disc.

At the 'A>' prompt, type

format b:

then press return. The system will respond :

Insert new diskette in drive B:
Press any key when ready

Insert a blank disc in drive B: and press a key. The system
will respond

  Formatting...
    When finished, the system will prompt :

  Format complete

    362496 bytes total disc space
    362496 bytes free

  Format another (Y/N) ?

    Press 'N' and the 'A>' prompt will appear. Type the following :

  diskcopy a: b:

    Then press RETURN. the system will respond :

  Insert source diskette in drive A:
  Insert formatted target diskette in drive B:
  Press any key when ready...

    As the discs are already in the drives the system requires
just press a key. The system will respond:

  Copying

    When the copy is complete, the system will prompt :

  Copy complete
  Copy another (Y/N) ?

    Press 'N' and the 'A>' prompt will appear.

    Remove the original systems disc and store it in a safe ?lace.
Do not use it for day to day use, but only for creating copies. For
day to day use, use the new disc you have just created.

    For further information on the commands FORMAT and DISKCOPY,
refer to the appropriate section in the MS-DOS USERS GUIDE.

Getting Started - Using BBC Basic with the Graduate DFS.

     To use the GRADUATE as a BBC Microcomputer with Graduate DFS (
GDFS), insert your GDFS SYSTEMS DISK in the (top) drive and press
BREAK. The screen will appear :-

   Data Technologies DFS

   BBC Computer

   BASIC

   >_

     The Graduate DFS may be activated by *GDFS (refer to the DFS
section in this manual)

     Note that on pressing BREAK, the memory inside the BBC is not
corrupted, so pressing BREAK again will not destroy your program
unless it would have done so without the Graduate connected to the
BBC.

Using the BBC without the Graduate
     To use the BBC on its own simply turn off the Graduate or
leave the system on but without a disc in drive A. After a pause
while the Graduate checks for a disc in drive A the BBC Micro will
go through the same startup as it would without the Graduate fitted
which is usually to display the 'BBC Computer' and other messages
on screen.

Copying the GDFS Systems Disk
     The Graduate DFS Systems Disk is a double-density single sided
disc and cannot be read by the DFS. To make a copy, use the
following procedure:

     Boot your system into MS-DOS (insert the MS-DOS system disc
or a copy in the top drive and press BREAK).

   With the MS-DOS SYSTEMS DISK in drive A:, type

   format b:/1

     and press RETURN. The system will prompt :

   Insert new disc in drive B:
   Press any key when ready...

     Insert a blank disc in drive B: and press a key.

When finished, the GRADUATE will prompt :

Format complete

  179712 bytes total disc space
  179712 bytes available on disc

Format another (Y/N)?

  Press 'N'. The 'A>' prompt will appear. Type the following

diskcopy a: b:

  and press RETURN. The system will prompt:

Insert source diskette in drive A:
Insert formatted target diskette in drive B:

  Remove the MS-DOS systems disc from the top drive and insert
the DFS SYSTEMS DISK. The new disc is already in drive B: Press a
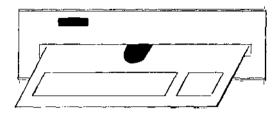key. The system will respond:

  Copying...

  When finished, the system will prompt :

Copy complete

Copy another (Y/N)?

  Reply 'N' and the 'A>' prompt will re-appear.

  Remove the original DFS SYSTEMS disc and store it in a safe
place. Do not use it for day to day use, but only for making
copies in emergencies. Always use the copy you have made. You may
make as many copies as you like.

THE GRADUATE DISK DRIVES

        Drive A: is the top drive, and drive B: the lower one.

    To insert a disc in a drive, hold the disc by the label area,
with the label uppermost, remove it from the protective
jacket and slide into the slot.

    When the disc is flush with the front of the drive, push the
buttn just above the slot in until it clicks. Note that the button
stays in almost flush with the facia.

    When the drive is in use, the small red select light will be
on, and you will not be able to remove the disc.

    When finished, the select light will go out, and you will be
able to remove the disc by pressing the button again. The disc
will eject itself about one inch, allowing you to remove it.

<u>THE KEYBOARD - USAGE IN MS-DOS</u>

     Users who are familiar with the BBC Micro will not find much difficulty in adapting to its new functions, the most striking of which is the lack of split cursor editing. MS-DOS will only accept data written on the current command line, although use of the function keys enables the previous command entered to be manipulated on the new line. This is explained in detail in the MS-DOS user guide. Here is a brief description.

ESCAPE   This key cancels the line you have just typed and lets you start afresh. A backslash is printed where the cursor was, and the cursor is moved to a fresh line.

CONTROL + ESCAPE   This cancels whatever is happening and returns you to the DOS prompt (A>). ^C appears on the screen where the cursor was. This combination is only effective when DOS is either writing to the screen or waiting for a key. It may be enabled at other times by use of the BREAK command (refer to DOS COMMANDS)

DELETE   Pressing this key erases the character to the left of the cursor and moves the cursor back one space.

fl   This moves one character from the last command line nto the current one. Hold this key down and the entire line will be repeated.

f2   This copies all characters of the last line up to the next character typed. e.g. if the last command entered was ABCDEFG and you press f2 then E, ABCD will appear on this line.

f3   This copies the entire line previously entered on to the current line.

COPY   This is the INSERT key. It allows you to type a command without destroying the previous one. e. g. if the last command was ABC, and you press COPY, then EFG, then f3, EFGABC will appear on the command line.

Cursor Left <-   On the command line, this is similar to DELETE.

Cursor Right ->   On the command line, this is similar to f1.

CAPS LOCK   Press this key once, and all alphabetic
                        characters will appear in upper case. Press
                        it again and they will be in lower case.

SHIFT LOCK   Press this key once, and ALL KEYS will be
                        in upper case. Press it again and they will
                        be in lower case.

CONTROL + CURSOR RIGHT Pressing this combination causes the
                        computer to suspend writing to the screen
                        until another key is pressed. This is very
                        useful when listing a long file on the
                        screen.

"KEYPAD ENTRIES"   It is possible with the GRADUATE to enter
                        any ASCII value into the program in the
                        range 0 to 255. To do this, hold SHIFT and
                        CONTROL down, and type a number, for
                        example, 65 . Release SHIFT and CONTROL,
                        and press any key. In the case of 65, a
                        capital A will appear at the current cursor
                        position.

BREAK...................Pressing this key ALWAYS causes the system
                        to reboot itself. Both the processors are
                        reset and any data not saved on disc will
                        be lost. It is equivalent to turning the
                        system off and then on again.

THE KEYBOARD - DIFFERENCES BETWEEN GRADUATE AND IBM PC

     The Graduate requires the use of a BBC Micro for its keyboard,
and while this is quite adequate, there is a complication in that
some keys found on the IBM PC are not on the BBC Micro. All the PC
keys not on the BBC can be made available by the use of a
combination of keys. Most of these involve the use of SHIFT or
CONTROL or both. The following table shows how the extra keys may
be obtained.

PC Key	Graduate key
ill	f0
ALT	Control & Shift
CTRL-BREAK	Control & Escape
CTRL-ALT-DEL	Control & Break
CTRL-NUM LOCK	Control & Cursor right
Backspace	Delete
Delete	Shift & Delete
Insert	Copy
Page up	Shift & Cursor up
Page down	Shift & Cursor down
Home	Shift & Cursor left
End	Shift & Cursor right
Scroll Lock	Control & Copy
Print Screen	Shift & copy
Plus	Control & Cursor Up
Minus	Control & Cursor Down

NOTE: Plus and minus are those found on the right-hand side of an

IBM-PC keyboard.

Extended Character Codes

It is possible to obtain any one of the 256 characters in the character set by use of the keyboard directly. To do this, hold the SHIFT and CONTROL key down, then type the decimal value of the required code on the numeric keys. Press any other key to enter the value. e.g., to get a capital A, hold control and shift down, type 6 then 5 (65 being the ASCII value of capital A), then any other non numeric key.

Caps Lock and Num Lock

The CAPS LOCK and NUM LOCK keys on the BBC Micro work in the same ways as those on the IBM-PC but with the following differences:-

While CAPS LOCK is engaged, lowercase letters cannot be obtained by pressing a shift key. CAPS LOCK must be off to get lowercase characters

NUM LOCK forces all keys to their shifted state and has no effect on the cursor keys.

The effect of these keys within programs will be the same as a PC, except that the GRADUATE only recognises a change in the state of these keys when a normal character key is pressed.

GRAPHICS MODES

The following screen modes may be selected using the MODE command (refer to the MODE command later in the manual)

80 x 25 Text   Green characters on black background

40 x 25 Text   Green, Red, Blue and Black

640 x 200 Graphics Green on black

320 x 200 Graphics Green, red, blue and black

Compatibility with IBM SYSTEM DISKS

The GRADUATE is capable of booting from an IBM SYSTEM DISK of version 2.00 or later. However, if there is an AUTOEXEC.BAT file, it should not contain the command KEYBUK. This would cause the keyboard to be locked out completely. There is no need for KEYBUK because the BBC MICRO has a U.K. standard keyboard.

Incompatibilities with PC-DOS

    Although the Graduate provides a system which will run programs
designed for the IBM Personal Computer, there are some areas in
which compatibility is not possible. This is due to some basic
differences in the design of the machine. The following list
explains these differences and how they would be avoided by
programmers.

1. The Keyboard

    There are two main areas where compatibility may prove a
problem. Firstly there are less keys on the BBC Micro, and the
missing keys are emulated with a combination of keystrokes.
Secondly, the BBC Micro keyboard is not connected to the same
interface device as a IBM-PC's keyboard is. Hence programs which
look directly at the keyboard hardware will not run (KEYBUK is a
good example of this which causes the machine to hang). It is
possible to test whether a program does not run for this reason.
After loading the program, hold the CONTROL key down and press the
"@" key. If the speaker fails to produce a short tone then this is
the most likely reason.

2. Colours

    Users of the BBC Micro will be aware that in 80 column screen
modes, there are only two colours available, normally black and
white. Users of the IBM PC have sixteen colours at their disposal.
This will not normally cause problems as attributes are chosen to
produce displayed characters whatever colour they would be on a PC.
In 40 column modes, there are four colours available.

3. The CRT Controller

    There is no CRT controller inside the GRADUATE. The display is
produced by the 6845 LSI chip inside the BBC Micro. This will not
cause any problems with programs which use the ROM routines to
display text/graphics, but any program which expects to find a 6845
somewhere in memory cannot be handled.

4. The Disk controller

    The IBM PC uses an NEC u765 disc controller. The GRADUATE uses
a Western Digital 1770 disc controller. Most programs use the ROM
routines for reading and writing discs, but some, notably physical
disc copy programs, actually access this chip directly. Such
programs are unlikely to work.

5. The Serial and Parallel Ports

     Since the BBC Micro comes with both serial and a parallel
ports readily available, these have been implemented for use in
MSDOS and will always be the last devices in the IjO list. Thus if
a RS232 expansion card is fitted, it will have the device
designation COM1 and the BBC micro's serial port will become COM2.

     Note that some baud rates are not available to the user (see
page 18) and that some of the control signals associated with the
back of a PC expansion card are not present on the   serial and
parallel ports. You will find that programs using serial IjO work
a lot better if output to the screen is turned off (e.g. use print
rather than TYPE with "P). This is primarily caused by the BBC
microcomputer spending most of its time updating the display when
any screen activity occurs.

     If you are using a program that makes heavy use of the ports
or uses serial lines not available on the BBC then the use of an
IBM expansion card is recommended.

Description of MS-DOS COMMANDS

     Most of the commands are described in detail in the MS-DOS
manual and reference to that should be made to appreciate all the
options available. They are described briefly here to help users
become familiar with the system. The MODE, TREE and ASSIGN commands
are described in detail here as they have been added for extra
compatibility with the IBM PC.

     The syntax of commands is described in the following way :-

Parameters j characters not in brackets are always required

Parameters / characters in square brackets are optional

Parameters j characters separated by the 1 symbol means that at
                        least one of the parameters must be
                        entered.

To set or read the date - DATE
Syntax: date [mm-dd-yy]

Example: date 10-22-84

To set or read the time of day - TIME

Syntax: time [[[hh]:mm]:ss]

Example: time 22:15

To find out what files are on a disc - DIR

Syntax: dir [drive]

                  If the drive is not specified, the files on the
                 disc in the default drive are displayed.

Example: To see what is on the disc in drive B

                  dir b:

                 note that the colon is necessary for reasons which
                 will be obvious when reference is made to the full
                 MS-DOS section.

To format a disc   -   FORMAT

Syntax: format [drive][/1][/8][/s][/v]

                   If DRIVE is not specified, the default drive is used

                   If j1 is used, the disc is formatted as a single
                   sided disc

                   If j8 is used, there will only be 8 sectors on
                   each track as opposed to the usual nine.

                   If jS is used, the system files IO.SYS, MSDOS.SYS
                   and COMMAND.COM are copied onto the new disc, thus
                   making it bootable.

                   If /V is used, FORMAT will prompt you for a name
                   to label the entire disc.

Example: format b:/s/v

                   This will format the disc in drive B:, copy the
                   system files onto it, and ask you for a name to
                   label the entire disc. The name is displayed by the
                   DIR command as the volume name.

To copy a file -   COPY

Syntax: copy [drivel]filenamel [drive2][filename2]

                   If drivel is missing, copy looks for a file on the
                   default drive.

                   If drive2 is missing, copy will make a new copy of
                   the file on the same disc (drivel)

                   If filename2 is missing, copy will give the new
                   file the same name as the old file.

                   Copy does not erase the file you are copying from.

Example: copy a:fred.lst b:jim.prn

                   This command copies the file called FRED.LST on
                   drive A: and copies it to a new file called JIM.PRN
                   on drive B:

To delete a file - ERASE or DEL

  Syntax: erase (drive filename

                 If drive is missing, the file is deleted from the
                 default drive

  Example: erase a:old.fil

                 This command erases the file OLD.FIL from the disc
                 in drive A:

 To clear the screen - CLS

  Syntax: cls

                 The screen is cleared, the cursor returns to the
                 top left

To re-assign drives   - ASSIGN

Syntax: assign (drive1=drive21

                 Drivel is the new drive letter where all accesses
                 will be made when drivel is asked for. If no
                 parameters are entered, all re-assignments are
                 reset to their initial state.

Example: assign a=b

                 This command would cause all accesses to drive A
                 to go to drive B.

To display directory paths - TREE

Syntax: tree [drive:][/F]

                 This command allows all directory paths found on
                 the specified drive to be displayed and optionally
                 allows the files at each sub-directory to be
                 displayed. For each directory found it's full
                 pathname will be displayed with all sub-directories
                 associated with that directory. If the jF option is
                 selected, then the names of all files in a
                 directory will also be displayed. If no drive is
                 specified, the default drive is assumed.

Example: tree b:

                  Displays all directory paths on drive B

                  Refer to commands CHDIR, MKDIR in the MS-DOS
                  manual.

To select RS232 parameters. - MODE

 Syntax: mode device_name:[baud_rate[,parity[,word_length (
                                         ,stopbits[,retry]]]]]

                  This command allows you to select the conditions
                  for serial input and output RS232 device(s).

                  Device name must be specified as COM1: COM2: or
                  COM3:

                  baud_rate may be 96 for 9600 baud, 48 for 4800
                  baud, 24 for 2400 baud, 12 for 1200 baud, 6 for
                  600, 3 for 300

                  parity may be N for no parity, E for even parity,
                  or 0 for odd parity.

                  word_length selects how many bits there are in
                  each byte sent. You may select 8, 7, 6 or 5.

                  Stop bits selects the number of stop bits added
                  after each byte sent/received. Valid numbers are 1
                  or 2

                  Retry selects whether the computer would keep
                  trying to send characters or return an error
                  message when the device receiving data stops
                  listening. This is used for printers and should be
                  P for retry, blank for errors.

Example: mode com1:96,n,8,2,p

                  This sets up COM1 as a serial printer output with
                  9600 baud, no parity, eight bit words and two stop
                  bits.

To re-assign devices - MODE

 Syntax: mode device1:=device2

                  This command allows you to re-direct input or
                  output for one device to/from another. Device 1 is
                  the device where output or input would normally
                  come from/go to, and device 2 is where you want
                  the output/input to come from/go to.

 Example: mode Ipt1:=coml

                  This command re-routes output intended for a
                  parallel printer to the RS232 device COM1. This is
                  useful if you have a serial printer. Note that you
                  must set the RS232 device up using MODE COM1: for
                  the correct baud rates etc.

To change screen width - MODE

 Syntax: mode 40|80

                  This command allows you to change between 40 and
                  80 column screen mode.

 Example: mode 40

                  Changes to 40 column screen mode, useful if you
                  have a television rather than a monitor connected,
                  as 80 column output is not very clear on
                  televisions due to the lack of horizontal
                  resolution.

GRADUATE DFS

OVERVIEW:

    The Graduate Disk Filing System (GDFS) allows you to use the
Graduate disk drives from BBC Basic at the file level. This means
that using a Graduate with a standard model 'B' BBC microcomputer
you can load and save program and data files to and from floppy
disc. Commands are also provided to maintain and backup files on
the disc.

    The GDFS has the advantage that you do not have to spend any
more money on a disc interface and extra ROMs to provide a disc
filing system for your BBC. The hardware of the Graduate provides
all the interfaces and drive(s) necessary without the need to
remove the lid of the BBC microcomputer. Ali that is required is
to plug the disc drives into the 1MHz bus socket.

    There are many other advantages in using the GDFS with your
BBC microcomputer including :

    *   the GDFS takes up a maximum of 3 pages of the BBC micro's
         RAM whereas other disc filing systems take up to 11 pages
         of memory.

    *   a spare ROM socket is available inside the BBC
         microcomputer which would normally have been occupied by
         a disc filing system ROM.

    *   If you wish to run 80 track drives from your BBC micro
         then you can fit a standard disc interface and DFS to do
         this but still have access to the 40 track drives
         provided by the Graduate just by using one command to
         switch between the two.

    *   GDFS is loaded from disc and is mostly resident in the
         Graduate's memory. This leaves as much free memory as
         possible in the BBC microcomputer without sacrificing
         performance.

    *   Disk access is controlled by the Graduate giving best
         performancejflexibility trade off.

    It should be noted at this point that the GDFS is not an exact
reproduction of Acorn DFS. Because of lack of space some commands
and operating system calls which are standard in Acorn DFS had to be
omitted from GDFS.

    GDFS discs are compatible with Acorn DFS 40 track discs so
discs produced using DFS can be directly read by the Graduate and
vice-versa. However, some specially protected programs from
commercial suppliers on 40 track Acorn format discs may not run or
may produce strange errors.

This is because many of the protection systems rely on being able to 'talk' directly to the BBC micro 8271 disc controller chip. As described earlier the Graduate does not require this to be fitted and does not use it to operate GDFS and thus cannot be affected by any software that programs it directly.

START UP:

This section covers the first steps to take when starting to use the GDFS. Another, briefer, introduction to using the GDFS and backing up the GDFS system disc appears earlier in this manual. Please make sure that you also read this section.

To use your BBC micro with the GDFS, first put the GDFS System Disc into drive A of the Graduate (the top drive if you are using a G800) and press <BREAK> on the BBC Micro. When the usual 'BBC Computer' banner appears on the screen you will notice that the top line of the screen now says

Data Technologies DFS

The next thing to do is to type in

*GDFS <RETURN>

This will 'wake up' the GDFS so that it is ready to start using the Graduate discs with the BBC microcomputer. Please note that each time you press <BREAK> on the BBC you must have the GDFS System Disc in drive A and, to ensure that the GDFS is the active filing system after pressing <BREAK>, you must also type

*GDFS <RETURN>

Commands available

The commands that are supported by the GDFS are as far as is possible compatible with the Acorn DFS. Here is a list of commands which are supported by the GDFS.

LOAD and SAVE (from inside BASIC and most other languages)
*LOAD, *SAVE and *RUN
*CAT or *. (the standard abbreviation for this command)
*INFO
*DRIVE and *DIR
*ENABLE and *BACKUP
*FORMAT and *VERIFY
*DELETE
*COMPACT
*TITLE

Commands can be abbreviated in the usual way by giving the first few letters of the command's name followed by a full stop. For example *FORMAT can be abbreviated *FORM.

SYNTAX and FILENAMES

        The general form of a command is <command> <parameters>. The
command is one of your choice from the list available and this is
followed by the necessary parameters. Generally the parameters will
include at least one filename. In GDFS, filenames conform to the
standard Acorn DFS format shown below:

        :<n>.<d>.<name>

        where <n> is a drive number
              <d> is a directory character
              <name> is a sequence of up to seven characters

        If the drive number is specified then it must be preceded by
a colon and followed by a dot. The drives are split into a top and
bottom surface on each disc drive. Drive numbers are allocated in
the standard Acorn DFS manner:

                Top   surface of top   drive is drive 0
                Bottom surface of top   drive is drive 2

                Top   surface of bottom drive is drive 1
                Bottom surface of bottom drive is drive 3

        Any operation which accesses a drive but does not specify
which one will use the 'default drive'. The default drive is
initially set up to be drive 0 but can be changed using the *DRIVE
command (which is described fully later on).

        The next part of a filename is a single character 'directory'
. This can be used to divide files into groups by putting them into
a particular directory or to store two files on the disc with the
same name but in different directories.

        The directory character is optional but if used can be any
printable character except space (in other words any character with
an ASCI1 code between 33 and 126) and must be followed by a dot. As
with the drive number if the directory is not specified then the
default directory is used. This is set up to be '$' initially and
can be changed using the *DIR command (also described later).

        The main part is the name itself. This must be between one
and seven characters long and can contain any 'legal' printable
characters except space. Dots and colons cannot be used as the
first character of the name because of their special meanings when
used with drive numbers and directory letters as described above.

        Filenames less than 7 characters long are filled out
automatically with spaces by GDFS before being stored on disc. If a
filename is longer than 7 characters only the first 7 will be used
when GDFS looks for the file.

It is best to use filenames that either relate to the
contents of the file (so that if you forget what exactly is in a
file the title will give you a clue) or, if several people use one
disc, a filename that relates the program back to the owner or
originator. (This is where different directories come in handy to
store several different programs each marked with your name).

Some examples of valid names (the various DFS commands will
be described in detail later):

```
LOAD"IAN"            (Load Ian's program in the default directory
                     on the default drive)
*DELETE A.PAYDAT     (Delete the payroll data file in directory A
                     on the default drive)
*INFO :3.C.STACEY    (Get information on the program in directory
                     C on drive 3)
```

Some examples of invalid names:

```
*INFO CATHERINE      (Name longer than seven characters - only
                     CATHERI would be used)
SAVE"1.A.SNOOKER"    (No colon in front of the drive number)
*DELETE "J.TAYLOR    (Missing closing quotes. If quotes are used
                     around a filename in a 'star' command they
                     must match)
LOAD":TABLE"         (Only a drive number can follow a colon)
```

If you break any of the rules for naming a file the GDFS will
report an error, usually one of 'Bad filename', 'Bad drive no.' or
'Bad directory'. If this happens check the relevant part of the
filename for mistakes and try again. (There is more information on
GDFS error messages in a section later on in this manual).

The complete filename, including any default disc and
directory fields is very often called a file specification,
abbreviated to <fsp> in many manuals. Sometimes it is useful to
have an ambiguous file specification (<afsp>) so that more than one
file name may be found on the disc to match the file specification.

For example, if there are 16 files on a disc in drive 1 called:

$.TAGIRQP	$.TAGGUT	&.GRADPAD	G.TAGDFS
A.GAME	A.SNOOKER	$.TABLE	T.TAGON
B.BOGGLE	C.MARK	S.TONY	O.GRAHAM
W.ALAN	T.RICHARD	$.MARTIN	S.MIKE

and you wish to get information on all those files whose name
begins with TAG. This is where 'wildcards' come in. There are two
types of wildcards which can be used. The first type is the hash '
#'; when this is used as a character in a file specification it
behaves as a match for any letter in that position.

The second is the star '*'. The star behaves as if it were any number of hashes so that it matches a variable number of any characters. Thus *.* will match any or all files on the disc. Here is an example of the use of wildcards (the use of the *INFO command is described fully later on):

     1)   *INFO :1.#.TAG####

     2)   *INFO :1.#.TAG*

     3)   *INFO :1.*.TAG*

All three of the above are different variations of wildcard characters which do a similar job. The first one matches the character of the directory with any directory, then compares the first three letters of the filename with TAG and the next four characters, being 'wild', always match.

In the second example the hash also matches any directory character, compares the first three characters of the filename with TAG and then the final star matches any number of any characters. The third example works in exactly the same way. A star has the same effect as a hash directory character and will match any directory.

So any of the above would give information on these files:

$.TAGIRQP $.TAGGUT   G.TAGDFS   T.TAGON

Whereas if you were to simply enter:

*INFO :1.#.TAG##

the only information displayed would be for T.TAGON.

This powerful feature is implemented fully on both the GDFS and the BBCjAcorn DFS. It is something which is very easy to grasp and can make your file management a lot easier.

GDFS COMMANDS

The next section describes each command and tries to give an indication of where errors may occur and how to deal with them.

Each command has a description of its function followed by a description of the syntax of the command (in other words, what you need to type in to make the command work) with any parameters (such as filenames, drive numbers etc) that are needed shown in angle brackets. If a parameter is optional it will have square brackets surrounding it. For example in the statement

*LOAD <afsp> [<address>)

an ambiguous or unambiguous filename (the <afsp> part) must be given but an address to load the file at is optional. Any memory addresses given to any of the 'star' commands must be in hexadecimal numbers.

LOAD

     This command is used from within BASIC to load a BASIC
program and works as it normally would with cassette tape. You
must specify a filename and the GDFS will search for it on the
disc. (A full description of this command is given on page 292 of
the BBC Micro User Guide).

     As described earlier, if only the name is specified then the
default directory and drive are assumed. Alternatively you may
specify extra parts of the filename such as the directory or drive
if required.

Syntax: LOAD"<afsp>"

Example: LOAD"M*" loads the first file it finds with a name
         beginning with M on the default drive in the default
         directory.

     The most likely errors to occur are 'File not found' or the
errors associated with incorrect filenames; 'Bad filename', 'Bad
directory' or 'Bad drive no.'. If this happens check the name and
try again.

SAVE

     This command is used from within BASIC and is used (not
unexpectedly) to save BASIC programs on disc. This command also
works as it would normally and is described in detail on page 344
of the BBC Micro User Guide. An unambiguous file name must be
used. If an ambiguous filename is given the GDFS will report a '
Bad filename' error.

     As with LOAD (and all other commands) only the name can be
given (in which case the usual defaults will be assumed) or the
drive andjor directory can be specified.

Syntax: SAVE"<fsp>"

Example: SAVE"S.TONY" saves a program called TONY in directory S.

     If there is not enough space left on the disc for the program
you are trying to save GDFS will produce a 'Disc full' error
message will to tell you this. You can then try to free some space
on disc using *COMPACT and try again (*COMPACT is fully described
later on in this guide).

     Note that the GDFS (unlike some other disc filing systems)
will not affect memory in the BBC while it is compacting the disc
so you will not lose your program if you do this.

     Saving a program with the same name as one already on the
disc will save that program 'on top' of of the old file. If the new
program is much longer than the old one then you will get a 'Cant
extend file' message.

     This error means that there is not enough space available in
that part of the disc to save the new, larger, copy of the
program. If this happens save the program again using a different
name or delete the original copy and save it again.

*LOAD

     This is used to load a file from disc directly into an area
of memory.

Syntax: *LOAD <afsp> [<address>]

     This is identical to the normal operation of *LOAD when used
with cassette tape as described in the BBC Micro Users Guide on
page 393.

Example: *LOAD SCREEN 7C00 loads a file into MODE 7 screen memory.

     The errors etc that are likely to be produced are the same
as for LOAD in BASIC as described above.

*SAVE

     This saves an area of memory to disc.

Syntax: *SAVE <fsp>,<start address>,<end address or length of
                  block>,[<execution address>],[<reload address>]

     This command also works in the same way as it normally does
when using cassette tape on the BBC Micro. See the BBC Micro Users
Guide page 392 for details.

  Example: *SAVE SCREEN 7C00 7FFF saves a copy of a MODE 7 screen.

     The errors etc that may be produced are the same as for SAVE
above with the addition of the message 'Start address greater than
end address' which will be displayed if you try to save an area of
memory with a negative size. If this happens re-check your figures
and try again.

*CAT

     This command gives a catalogue (or List) of the files on the
disc drive given. If no drive number is given the default drive is
used. For example, if *CAT 0 is entered a display will be shown
like this:

TITLE (42)

Drive: 0   Option: 0 (OFF)

Directory: S   Library: S

     followed by a list of files in the order they were saved on
disc. The drive and directory remind you of the current setting of
*DRIVE and *DIR (these commands are described later).

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The title at the top of the catalogue can be changed using the
*TITLE command (also described later). The number in brackets after
the title is the number of times the contents of the disc have been
changed (e.g. files saved, deleted, etc) and turns back to 00 when
it reaches 99.

Syntax: *CAT [<drive>]

Example: *CAT gives a list of files on the current default drive
         *CAT 1 gives a list of files on drive 1

*INFO

    This lists various details about a single file (or a group of
files if an <afsp> is given). When run a set of headings will be
displayed on the screen showing what the various figures mean. The
meaning of most of the information is obvious. The start sector is
the position on disc at which that file starts.

Syntax: *INFO <afsp>

Example: *INFO S.* gives information on all files in directory S
         thus:

File Name	Load Address	Exec Address	File Length	St Sec
S.TONY	00002000	00002010	28FF	004
S.MIKE	00001900	0000801F	5C9	09A

    If you give a filename or <afsp> which is not on the disc GDFS
will report a 'File not found' error.

*DRIVE

    This command is used to change the default disc drive, in other
words the disc drive that GDFS looks on if no drive number is given
in the filename. This command is very useful for G800 users as it
enables the user to set the defaut drive to 1 and leave the GDFS
System Disc in drive 0.

Syntax: *DRIVE <drive number>

Example: *DRIVE 1 followed by LOAD"GARY" loads the program GARY from
         drive 1. If LOAD":0.GARY" is used GARY will still be loaded
         from drive 0.

    If a drive is given that is not one of the digits 0, 1, 2 or 3
GDFS will produce a 'Bad drive no.' error.

*DIR

     This command is used to change the default directory used.
The directory character can be any 'legal' character except a
space. (The normal default is $).

Syntax: *DIR <character>

Example: *DIR A followed by *SAVE GAME 2000 +28FF 2010 would save
         GAME in directory A as A.GAME on disc. Using SAVE°S.TABLE"
         will still save TABLE in directory $ (the normal default
         directory).

     If a directory character is given that is outside the
allowed range a 'Bad directory' error will be given by GDFS.

*BACKUP

     This command makes a duplicate copy of a disc on to another
disc. The disc you are copying on to must already have been
formatted and BACKUP will overwrite any data present on the disc
being copied to, so use it with care.

     Because there is a danger you might accidentally copy over a
disc that you wanted to keep a special safety switch has been
incorporated with this command. In order to make it work the
command *ENABLE must be used immediately before *BACKUP. If this
is not done the message 'Not enabled' will be displayed to remind
you.

     As mentioned in the other parts of this manual it is a good
idea to take regular BACKUPs of your discs especially if you have
important files on the disc because it is then possible to recover
your data from an old copy of the disc if your files become
corrupted or are lost.

Syntax: *BACKUP <drl> <dr2> (drive 1 must be be different to
         drive 2)

Example: *BACKUP 0 1 copies the whole of the contents of the disc
         in drive 0 on top of the disc in drive 1.

     Apart from the 'Not enabled' message the only other message
likely is 'Bad drive no.' which will be displayed if you enter the
same number for both drives (e.g. *BACKUP 1 1).

*DELETE

     This command is used to erase a single file from a disc and
expects an unambiguous filename. WARNING the computer will not
check with you before deleting the file so ensure that you only
enter the names of files that you are sure you no longer want.
Once a file has been deleted it has gone forever (!).

Syntax: *DELETE <fsp>

Example: *DELETE B.BOGGLE will remove B.BOGGLE forever

*FORMAT

     Before a new disc can be used it must be formatted. *FORMAT
is used for this purpose. WARNING formatting a disc completely
destroys any information already on the disc so, if you are re-
formatting an old disc make sure you do not need any of the files
on it.

     Because of this *FORMAT will check with you by asking 'Are
you sure (YjN)' before formatting the disc. If you answer anything
other than 'Y' GDFS will not format the disc. As each of the 40
tracks on disc is formatted GDFS will display its number.

Syntax: *FORMAT [<drive>]

Example: *FORMAT formats the disc in the current default drive

     If an invalid drive number is given a 'Bad drive no.' error
will be produced by GDFS. If a disc error is discovered during
formatting one of the standard 'Disk fault' messages or the
message 'Error - disk may be unusable' will be displayed. If this
happens try formatting the disc again. If the errors persist you
may have a faulty diskette.

*VERIFY

     This command will read an entire disc and verify that the
information on it is still readable. This can useful after power
failures etc may have damaged the information on disc.

Syntax: *VERIFY [<drive>]

Example: *VERIFY 3 checks the disc in drive 3

     If the message 'Error - disc is unusable' is displayed a data
fault has been found. Recover as much information as possible and
then re-format the disc.

*RUN

     This command works as it normally does on cassette tape and
loads and executes a 6502 machine code program.

Syntax: *RUN <afsp>

Example: *RUN TAGIRQP will load and execute the program $.TAGIRQP (
         assuming the default directory is still set to be $).

*COMPACT

     GDFS will only save a program or file if there is suffcient
space available as one continuous block on disc to do so. If
several files have been deleted and re-saved the space may be still
be available but in areas too small to be re-used. If this is the
case *COMPACT can be used to move all the empty space on disc into
one continuous block.

     When *COMPACT is called up the message 'Compacting...' is
shown. After a short time the following information is displayed:

     xxx sectors freed

     yyy sectors available

     If the number of sectors available is shown as 0 the disc is
full.

Syntax: *COMPACT [<drive>]

Example: *COMPACT will compact the disc in the current default
         drive.

         *COMPACT 1 will compact the disc in drive 1.

     *COMPACT also checks the disc while working and may report '
Error - disc may be unusable'. This means you have either run
*COMPACT on a disc with no files on it or there is an error on the
disc. If this happens recover as much information as possible and
then re-format the disc.

*TITLE

     Each disc you use can be given a title using the *TITLE
command to help remind you what files are contained on the disc.
The title is the first thing displayed at the top of the catalogue
listings from *CAT.

     A title may be a maximum of 12 characters long. Any extra
characters will be ignored by GDFS. If a space is to be included in
a title the text must be inside quotation marks. *TITLE only puts
titles on the current drive so *DRIVE may be needed before using it
if the disc you want to title is in another drive.

Syntax: *TITLE <string of text>

Example: *TITLE MALCOLM gives the disc in the current default
         drive the title MALCOLM.
         *TITLE "DAVID'S DISC" gives the current default disc the
         title DAVID'S DISC.

ERROR MESSAGES

     Disc errors can occur at any time and are of the general
format:

       (Error number 199) Disc fault NN, track tt, sector ss.

     Track tt, sector ss shows exactly where on the disc the error
has occured. The type of error is given by the fault number 'NN'
and will be one of those listed below.

Fault no Probable meaning

80   Time Out. There is probably no disc in the drive. The
         drive may also not be shut correctly or the disc may be
         the wrong format.

40   Bad Seek. The disc has bad address marks - probably not
         formatted or incorrectly formatted.

20   Controller Failed. There is a hardware problem in the
         disc controller.

10   CRC Error. The data on disc has been 'scrambled' in some
         way. The data may not have been written to the disc
         correctly or the disc may have become corrupted. Retreive
         the data from a backup copy of the disc.

08   DMA Controller Failed. Hardware fault.

04   RecordjSector not found. The disk is probably the wrong
         format or has been formatted incorrectly.

03   Write Protected Disk. The notch on the left of the disk
         has a write protect sticker over it or may have
         accidentally had the label stuck over it. If you are sure
         you want to write to the disk remove the sticker.

02   Bad Address Mark. The disc is probably the wrong format (
         most likely a Graduate MS-DOS double density disc).

Summary of Other GDFS Error Messages

     This section describes some of the other error messages you
may get and their meanings. Each message also has a corresponding
error number which is shown in brackets beside the message.

     (198) Disc full:

     There are.no more spaces left on disc which are large enough
to store your programs. Try using *COMPACT which may create enough
space or use another disc.

(190) Catalogue full:

A maximum of 31 files can be stored on one drive. This message will be produced if you try to SAVE more programs or files than this. Delete any files you don't want and try again or save the file on to another disc.

(204) Bad filename,(205) Bad drive no.,(206) Bad directory:

One or more parts of the filename have been specified incorrectly. Read the sections on syntax and filenames and ambiguous filenames for more details of exactly what you are allowed to use and recheck your typing of the filename. A 'Bad filename' error may also be given if you try to use SAVE or *SAVE with an ambiguous filename. 'Bad drive no.' can also be caused by using the same drive number twice in the *BACKUP command (e.g. *BACKUP 2 2).

(214) File not found:

The file you are looking for was not on the disc. You could be looking on the wrong drive or have the name of the file or the default directory wrong. This message can also be caused by entering the name of a 'star' command that GDFS does not recognise because it will then try to *RUN a program with that name on disc. If this happens check the spelling of the command you entered and try again.

(201) Disc write protected:

This means exactly the same thing as disc fault 03. See the description of that error given above for more details.

(130) Start address greater than end address:

A *SAVE command has been used with a set of addresses which, if used, would try to save a block of memory of negative length (H. Recheck the addresses and try again.

(189) Not enabled:

You have tried to use *BACKUP without using *ENABLE. If you are sure you want to overwrite the disc you are backing up on to enter *ENABLE and repeat the *BACKUP command.

(253) Bad string, (254) Bad command:

The quotation marks in a filename have been mismatched (e.g. *LOAD "O.GRAHAM (no closing quotes) or some parameters have been omitted from *SAVE or a similar command.

(191) Cant extend file:

GDFS will only save a file if there is enough free space for it. See the explanation in the description of SAVE for details.

(129) Command not implemented:

GDFS does not allow this function to be used. Read the 'implementation details' section for more information.

IMPLEMENTATION DETAILS

As mentioned before, because of lack of space in the Graduate ROMs some features of Acorn DFS have been omitted from the GDFS.

The most notable of these is that no byte access to files is allowed so the BASIC commands OPENIN, OPENOUT and OPENUP will produce a 'Command not implemented' message. *SPOOL and *EXEC will do the same. You will have to replace any files that are normally *EXECed by typing in the corresponding instructions by hand or writing a small BASIC program to do the same thing.

This also means that any applications programs (or paged ROMs) that use byte access to files will not work or may only work in a limited manner. In practice most programs such as extra languages and wordprocessors tend to use *SAVE and *LOAD and so will still work.

Shift and BREAK will not run the !BOOT file. You will have to duplicate this from the command line manually. Many of the 'star' commands normally found in Acorn DFS have not been implemented. The most important of these is *COPY. *LOAD and *SAVE can be used instead.

Because GDFS is not held in a standard BBC Micro 'sideways ROM' it cannot adhere exactly to the correct protocols required for these ROMs. Most notably it will always use three pages of workspace from &E00 to &12FF so ROMs that do not treat this as public workspace may cause problems. As a result the GDFS cannot be guaranteed to work with paged ROMs.

Finally as mentioned before, since the GDFS does not use the BBC Micro's disc controller any program (or ROM) that programs it directly will not work.

Programmers using GDFS from assembler should know that OSFILE has been implemented for A=0 and A=&FF only, OSFSC is complete but calls with A=0, A=1 and A=7 are ignored and OSARGS, OSBGET, OSBPUT, OSGBPB, OSFIND and the DFS OSWORD calls have not been implemented. Apart from the usual workspace areas GDFS also uses the IND3 vector (at 5234 and &235) to chain OSCLI so beware if changing these locations.

MAINTENANCE

        There are no user serviceable parts within the Graduate. The
disc drives, especially, should not be tampered with.

        The cooling fan dust filter should be cleaned occasionally at
intervals of, say, a month, or more often in very severe
environments. This can be done by removal of the two clamp plate
fixing screws which should release the piece of foam filter
material. Clean this by rinsing in warm soapy water several times
Thoroughly dry before reassembly which is done using the reverse of
the procedure above. Ensure that the metal grill is placed next to
the fan.

        It is not a good idea to operate the machine without its dust
filter since damage to the disc drive mechanisms or your discs may
result.

        The single external mains fuse may be found on the back panel
between the onjoff switch and mains input socket and may be levered
out with a coin, or similar implement, when the mains plug has been
removed from the unit. Note that there is a position for a spare
fuse in the fuse holder so take care to replace the fuse correctly.
Should the fuse replacement become necessary, a 20 millimetre
2A/250V quick blow cartridge type should be used.

FITTING EXPANSION CARDS

WARNING - Disconnect mains before removing covers. **********

        To fit IBM compatible expansion cards release the top cover
by removing the four fixing screws. Once the top cover is removed
one, or both, of the rear blanking plates may be removed to
accommodate the expansion board's back panel. Fix the expansion
board with one of the blanking plate screws. (Note that these
screws are not interchangeable with those supplied for a similar
purpose on an IBM-PC). Take care to align the connector fingers
with the edge connector.

        If a memory card is being fitted remember to correctly set
any base address switches to accommodate the existing 128K bytes or
256K bytes already inside the Graduate. Any other expansion board
configuration requirements should be explained in documentation
supplied with the product.

        *** Refit top cover before powering up ***

GLOSSARY

application program
                    - one which carries out a specific user function (
                    e.g. financial planning). Application programs may
                    be specially written for users or provided as a
                    standard software package.

bit   a single piece of binary information which
                    can only be either 1 or 0 (also sometimes referred
                    to by terms such as on/off, true/false, high/low).
                    Bits are grouped into bytes which can also be
                    grouped in words.

boot   derived from phrase "to pull yourself up by your
                    own bootstraps(laces)". Refers to computer's
                    ability to use a few key initial instructions ("
                    triggered" by the keyboard or from power switches)
                    and use them to load the rest of a required
                    routine (such as the operating system) into
                    memory.

byte   a group of 8 bits of information. The capacity of
                    storage media is usually quoted in either
                    thousands of bytes (Kbytes) or millions of bytes (
                    Mbytes). Note that these are not the normal
                    decimal terms but are binary 'round numbers' which
                    are close equivalents.Thus K = 1024, M = 1,048,576
                    (see "character").

character   a single screen-displayed letter, digit or special
                    symbol, represented by a byte of memory within the
                    computer. There can be up to 256 different
                    characters because there are 256 different ways of
                    arranging the 8 bits which make up a byte. The
                    Graduate uses the industry-standard ASCII
                    character set.

command   keyed-in instruction which can be understood and
                    immediately acted upon by the operating system.
                    The precise effect of commands varies between
                    different operating systems but in general their
                    main use is to allow the user to access
                    information stored on disc (e.g. a directory
                    listing of filenames). In addition, a command is
                    always provided to pass control from the operating
                    system to an application program.

command line
                    - a distinctive form of the prompt which indicates
                    that the MS-DOS operating system is ready to receive
                    a typed-in command. The command line prompt will
                    look something like this:
                                        A>.

compiler   a specialised program converts a set of program
                    instructions from form which can be written by a
                    programmer - the source code - into a form which can
                    be read by the processor - the object code.

cursor   the cursor can take the form of a "flashing" line
                    which appears directly beneath the point at which
                    the next character will appear. Anything typed in at
                    the keyboard will appear on the screen at the point
                    marked by the cursor.

data   information which can be processed by a computer
                    program.

disable   when switches or codes are "set" in such a way that a
                    device will not accept interrupt. See enable.

disc(disk)   the primary medium n which information (both data and
                    programs) is stored. The Graduate uses 'floppy'
                    discs which have their surfaces covered with a thin
                    layer of magnetic material which holds the
                    information in a binary form.

disc drive(1)   from a hardware point of view a disc drive is a
                    device that is used to read information from, and
                    write information to, a disc. A read/write head is
                    provided for each physical surface of the disc. The
                    drive rotates the disc at a constant speed and moves
                    the readjwrite heads in and out across the disc
                    surfaces in order to access any part of the disc.
                    The heads store information on the disc by
                    magnetising or demagnetising small pieces of the
                    disc's surface; each piece representing a bit. The
                    bits are read by detecting their magnetic influence
                    as they rotate past the drive heads.

disc drive(2) as defined within the operating system a disc drive
               is 'seen' to be the disc that the disc drive
               contains. The current disc drive is the one being
               referenced via the corresponding drive letter in
               the command line prompt or specified in a command
               or program.

extension   the optional "second half" of a MS-DOS filename
               which follows the "."(dot). This allows files to be
               grouped, or indicates the nature of the contents of
               the file (see command and graphics).

file   a logical 'block' of information that has been
               placed on a storage medium (e.g. disc). Files are
               used to store both programs and data.

filename   a means of referring to a file.

firmware   a term which describes all software held in ROM.

floppy   a flexible disc (q.v.) with its own protective
               jacket which can be moved between drives (q.v.).

hardware   a term used to describe all the physical parts of
               a computer.

interrupt   a temporary halt in executing a program during which
               control is transferred to the operating system.

memory   any solid state device which stores information.
               The processor can access information in its memory
               much faster than information stored in any other
               media.

object code   any program in a form that can be understood by the
               processor.

operating system
               - a 'supervisor' program (MS-DOS on the Graduate)
               which looks after the files on the discs and also
               controls the inputjoutput (Ij0) requests to the
               other peripherals. It contains a command
               interpreter to understand the commands entered by
               the computer user, plus a set of Ij0 routines that
               provide a standard interface with other programs.
               The operating system is initially loaded into
               memory and used by the processor as its initial (
               base) program. It will then wait for commands from
               the user. If requested it will load another program
               (into a different part of memory) and pass control
               to it. However, the operating system will then '
               wait' in the background to carry out the I/0
               requests from the program and to retake control
               when this program finishes.

peripheral   usually refers to a device that is physically
               separate from the basic computer (e.g. a printer).
               However when describing a computer's functionality
               it is often used to cover all devices that are
               linked to the processor, whether inside the same box
               or not. Thus a disc drive can be a peripheral even
               when inside the main processor box.

ports   general term for the interfaces between peripherals
               - such as printers - and the computer.

processor   the solid state device which acts as the 'brains' of
               the computer. It operates on data according to the
               current set of instructions (program).

program   a set of logically ordered instructions which tell
               the processor how to perform a task or series of
               tasks.

prompt   Takes various forms (see command line) but always
               ends in an arrow (">") n the screen. Everything
               typed in at the keyboard will appear immediately
               beneath its point and above the cursor (q.v.).

RAM   Random Access Memory (also known as readjwrite
               memory). This memory is used to hold the programs
               and data. All data is lost when the power is
               switched off.

ROM   Read Only Memory. Information stored in ROM is fixed
               and not lost when power to the computer is switched
               off.

software   a term that encompasses all the various types of
               programs: applications, utilities, compilers, etc.

surface   when referring to a disc its meaning is the same as
               disc drive (q.v.).

source code   program written in an easily understood way but
               needing to be "compiled" into an object code for the
               processor.

text   data that can be read by the user when displayed on
               the screen or printed. A file containing text may be
               indicated by the extension ".TXT".

toggle   switching between two alternative "states" using the
               same device (i.e. first action is "on", second is "
               off", third is "on" - and so on).

utility   a program which performs some kind of general
               purpose "housekeeping" or administrative function
               for the computer user - usually improving the
               efficiency or maintaining the system in some way.
               For example, a utility is provided with your TORCH
               computer which will create and display titles for
               each user number.

word   a group of bytes which can be handled directly by
               the processor. Words are of different lengths for
               different processors and purposes.

Bibliography

[1] BBC Microcomputer System User Guide by John Coll
                                        (BBC Publications)

[2] The Advanced User Guide for the BBC Micro by Andrew Bray,
    Adrian Dickens and Mark Holmes
                            (Cambridge Microcomputer Centre)

[3] Acorn 1MHz bus application ncte by Kim Spence-Jones
                                        (Acorn Computer)

[4] BBC Microcomputer System Disc System User Guide by Brian Ward
                                        (Acorn Computer)

[5] Microsoft MS-DOS 2.11 implementation guide   (Microsoft Ltd.)

[6] IBM PC technical manual   (IBM)

[7] Western Digital Corporatin 1984 Storage Management Products
    Handbook

[8] Intel Microsystem Components Handbook Vol. 1 1984

[9] The IBM PC-DOS Handbook by Richard Allen King   (Sybex)

[10] IBM PC-DOS Disk Operating System manual   (IBM)

Using the Graduate with BBC Micros fitted with TORCH Z80s

    To use your TORCH Z80 processor simply leave the Graduate switched off and MCP or CPN will display their usual startup messages and operate as usual.

    Some versions of TORCH MCP may fail to display a prompt initially. If this happens leave the Graduate turned on but with no disc in drive A until the MCP prompt is displayed then turn it off.

    If using GDFS remember that, as with all BBC Micro programs, a <B> <BREAK> must be done before use. The best order to do this is: turn on BBC Micro, do a <B> + <BREAK>, turn n Graduate and put GDFS Systems Disc in drive A, press <BREAK> to activate GDFS.

    A further <B> + <BREAK> may be needed after some games have been run. If this is the case make sure you hold down <B> until the 'BBC Computer' message appears on the screen. GDFS will not run with the TORCH CPN operating system.

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To re-assign colours - **COLOUR**

```
Syntax: Colour logical-colour, actual colour
        Where in 80 column modes:
                Logical colour 1 is foreground
                Logical colour 0 is background

        and in 40 column nodes:
                Logical colour 3 is foreground
                Logical colour 2 and 1 are intermediate
                Logical colour 0 is background

        Actual colour is given by:
                 0 = Black
                 1 = Red
                 2 = Green
                 3 = Yellow
                 4 = Blue
                 5 = Magenta
                 6 = Cyan
                 7 = White
                 8 = Flashing Black-White
                 9 = Flashing Red-Cyan
                10 = Flashing Green-Magenta
                11 = Flashing Yellow-Blue
                12 = Flashing Blue-Yellow
                13 = Flashing Magenta-Green
                14 = Flashing Cyan-Red
                15 = Flashing White-Black

        Example: Colour 1, 5

        In 80 column node, sets foreground colour to magenta.
```