The CD-ROM Filing System User Guide

Contents

Configuring the computer

The CD-ROM Filing System (CDFS) enables you to access data on a CD-ROM from the RISC OS desktop. It is usually resident in a ROM on your SCSI expansion card, and is loaded automatically when you power on your computer. The CDFS icon bar menu enables you to configure your computer to suit the CD-ROM system attached to it.

This section tells you how to configure your computer so that you can use CD-ROMs; you only need to do so when adding or removing drives.

For details of how to use CDFS once you have configured it, see *Using CD-ROM discs* on page 7.

Configuring your RISC OS computer from the desktop

To ensure the fastest boot up time, the following procedure should be followed:

1 Ensure all the peripherals and cables are connected.

2 Switch on the monitor, then the CD-ROM drive. The CD-ROM drive should always be switched on before the computer.

3 Switch on the computer. CDFS will look to see if a CD-ROM drive is connected.

4 The CDFS CD-ROM icon will be displayed on the Icon Bar. Click on this icon to determine which type of CD-ROM is currently held in the drive drawer – CD-ROM, Photo CD or Audio CD.

5 To configure the number of CD-ROM drives you have attached to your computer, click Menu on the CD-ROM icon. The CDFS icon bar menu will be displayed:
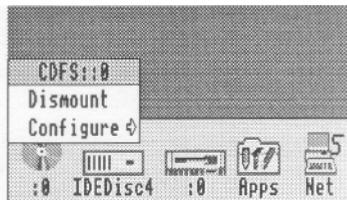
6   Choose Configure, Drives then enter the number of drives connected. If only one drive is connected, this step may be left out, but the boot-up time will be slower:
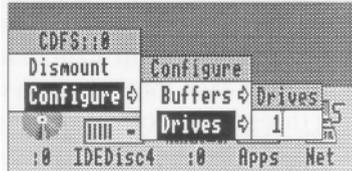
7   To configure the CD-ROM buffers, click Menu on the CD-ROM icon. Choose **Configure, Buffers** then click on the required buffer size — 16K is normally sufficient, unless you are swapping discs a lot, in which case 32K or 64K would be better:
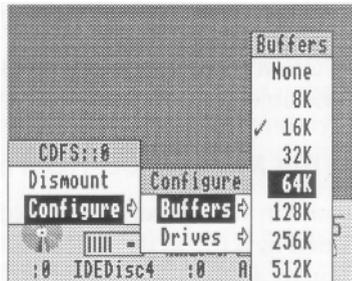
8   Reset the computer to implement the new configuration.

Setting up PC Soft to read CD-ROM discs

Many CD-ROM titles are written in PC format, so to get the best out of these, PC Soft should be used in the computer. (PC Soft used to be known as the Acorn PC Emulator.) The copy of PC Soft you use must be version 1.6 or later.

If you are using MS-DOS, you must have version 3.3 or higher, with CD-ROM extensions.

If you are using DR-DOS, you must have a version with CD-ROM extensions. At the time of going to press, such versions were not yet available — but this is likely to change. You should see your supplier for details of DR-DOS compatibility, availability, and installation.

3

Loading PC Soft

Load PC Soft as instructed in the PC Soft *Guide* accompanying it

Set the configuration of the emulated PC, using the **Configure** option from the PC icon bar menu. Choose EGA and ECD for titles using this screen mode, with 128K of memory for computers with 2MB of RAM, and 256K for those with more RAM. Choose VGA for titles using this screen mode. (Versions 1.6 and 1.7 do not support VGA, but you can choose EGA+ for a partial emulation of VGA mode.)

By default, the CD-ROM drive will be configured as drive F Additional drives will be named G, H and so on. However, if you have four hard disc drives configured (drives C-F) then the CD-ROM drive will install itself as drive G, and additional drives follow on from there.

Now run PC Soft. Switch to **Single task** mode (from the icon bar menu) to be able to display a full screen, and for faster response.

Loading the MS-DOS CD-ROM support software

PC Soft (version 1.6 or later) when sold with MS-DOS is accompanied by a CD-ROM Support disc. The software on this disc enables you to access the CD-ROM drive while you are running DOS.

The software has its own installation program, to make it easy for you to install it on your computer. This program alters your DOS AUTOEXEC.BAT and CONFIG.SYS files and copies Microsoft MS-DOS CD-ROM extensions and the CD-ROM device driver.

If you usually boot DOS from a floppy disc, you first need to format a new system floppy disc on which to install the software. To do this, put a floppy disc in the drive and type:

```
FORMAT A: /S
```

When the format completes, remove this disc from the drive.

To install the software, put the disc labelled CD-ROM Support *disc* into the drive. Type:

```
A:
INSTALL
```

This starts the installation program. Follow the instructions given on the screen.

When prompted for a drive letter on which to install this software:
- If you boot DOS from a floppy disc, type A. When the installation program prompts for your boot disc, insert the newly-formatted system disc, and press Space. When you are prompted to insert the disc containing MSCDEX.EXE, put the CD-ROM *Support disc* back in the drive.
- If you boot DOS from a hard disc, type the hard disc drive letter (typically C).

When the installation program has finished, reboot DOS from your hard disc, if you have one, or else put your newly-created system disc back in the drive and hold down Ctrl and Alt and press Delete to do this.

During the reboot cycle a message should be displayed on the screen similar to the following:

```
MSCDEX Version 2.20
Copyright © Microsoft Corp. 1986
Drive F: = Driver CDFSEM unit 0
```

This indicates that the driver is loaded and the CD-ROM drive has been allocated the letter F: for access purposes from DOS.

Your computer will now behave like a PC with a CD-ROM drive attached. There is a summary of common PC commands in the PC *Soft Guide.*

Recommended changes to configuration files

We recommend that you check that the following statements exist in the CONFIG.SYS and AUTOEXEC.BAT files and amend or add them as necessary as some DOS formatted CD-ROM discs require these settings before they can be used.

In the CONFIG.SYS file we recommend you add these lines:

```
FILES=2 0
BUFFERS=2 0
```

In the AUTOEXEC.BAT file your PATH should include the pathnames below, in the order given:

```
PATH=C:\;C:\DOS;F:\           (Hard drive users.)
PATH=A: \ ; A: \ DOS; F       (Floppy drive users.)
```

Of course, your PATH may also include other pathnames you have previously added.

Using CD-ROM discs

You can use CD-ROM drives either with CD-ROM discs formatted for use with RISC OS, or with CD-ROM discs produced to run under MS-DOS. For the latter, you will need a copy of PC Soft to get full benefit.

Using CDFS

CDFS appears to the user very much like ADFS – all the usual RISC OS Filer commands are available, although you cannot of course **save** to a CD-ROM. If a write command is made to the CD-ROM drive, an error message will be displayed.

To open a directory display on a CD-ROM which has been inserted in the drive, click on the CD-ROM drive icon on the icon bar. The contents of the CD-ROM will be displayed by the RISC OS Filer:
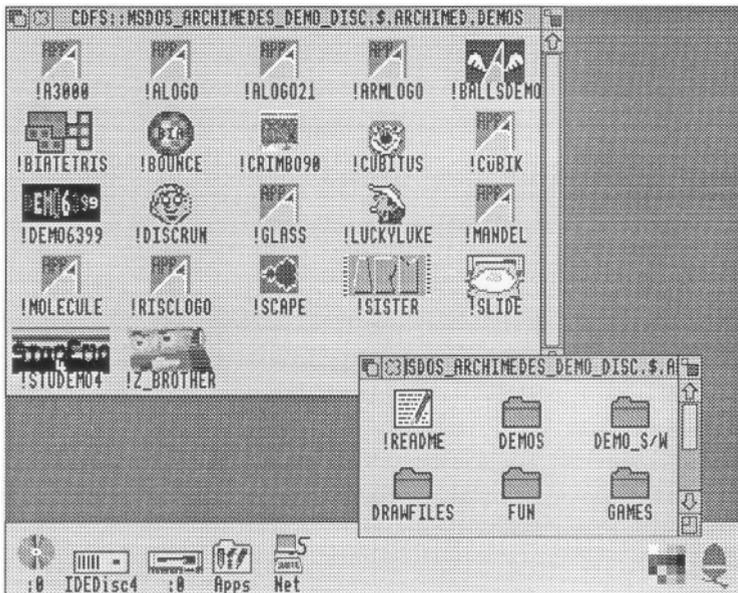
RISC OS directory displays can be opened for PC CD-ROMs. PC file names are translated to a format compatible with the RISC OS environment. You can view text files using Edit in the same way as usual, and use ChangeFSl (see page 15) to convert a wide range of graphics images to RISC OS sprites, which you can then view using Paint. However, to run the programs included on such discs, you will need to use PC Soft (see *Reading PC-format* CD-ROM *discs using* PC Soft below).

If you are not using CDFS

CDFS claims some memory each time you power on your computer. If you are not using CDFS and need this extra memory, you can disable CDFS by typing

```
*Unplug CDFS
*Unplug CDFSDriver
*Unplug CDFSFiler
```

and then resetting your computer. When you need CDFS again, you can reinstall the three modules by using *RMReInit for each one in a similar way, and then rebooting.

Reading PC-format CD-ROM discs using PC Soft

Place a CD-ROM disc in the drive, and type

```
F:
```

(or whatever drive letter your CD-ROM drive is configured as). You can now access PC-format discs in the normal way.

Consult the guide that comes with each title for information on playing CD-ROM discs.

Do not try to access a CD-ROM through RISC OS (including via CDPlayer) and through PC Soft at the same time.

Performance limitations

VGA images

Version 1.6 and 1.7 of the Acorn PC Emulator (the old name for PC Soft) do not fully support the VGA Bios. EGA+ is a partial implementation of VGA, but some VGA images on PC format CD-ROM discs cannot be displayed fully. The title screens of some discs are designed to be displayed in VGA mode, so such discs may not start off very well. This does not, however, necessarily mean that the rest of the disc cannot be read correctly. Often the application will continue of its own accord, or require Space or Return to be pressed. In some cases the lack of VGA support will prevent the disc from running under the emulator at all.

Version 1,8 of PC Soft does support VGA.

Sound

Titles which attempt to play sound through the computer's own sound system can cause program errors, unless you first configure sound in the program to be off. Most titles are able to play CD-quality sound through a CD-ROM drive, so this problem does not often arise.

Titles which attempt to mute one audio channel (left or right), whilst playing the other channel, can cause program errors.

Windows

Certain CD-ROM applications contain their own version of Windows on the CD-ROM itself. These versions have often been modified in some way, and do not always work correctly. We recommend that you do not use a version of Windows supplied on CD-ROM, but an appropriate Windows application available separately from a PC dealer.

Note that Windows 3.1 will **not** run under PC Soft.

CDPlayer

The CDPlayer application allows you to play and control audio CDs using your computer and a CD-ROM drive. CDPlayer simulates all the functions of a CD audio player with all the normal functions such as play, stop, track search, cue and review. It also has a very comprehensive programming facility. All the functions, including drive select, are controlled using the mouse.

CDPlayer is supplied on floppy disc. It is already set up to use a CD-ROM drive that has a SCSI ID of 6, and that is connected to the first SCSI expansion card fitted to your computer. If you wish to use a drive with a different SCSI ID, or if you have fitted multiple SCSI expansion cards to your computer, you should first read *The Setup window* on page 14.

To start the application, double-click on the CDPlayer icon; this loads the program and displays its icon on the icon bar. Click on its icon to display the main CD Player window, used to control the CD:
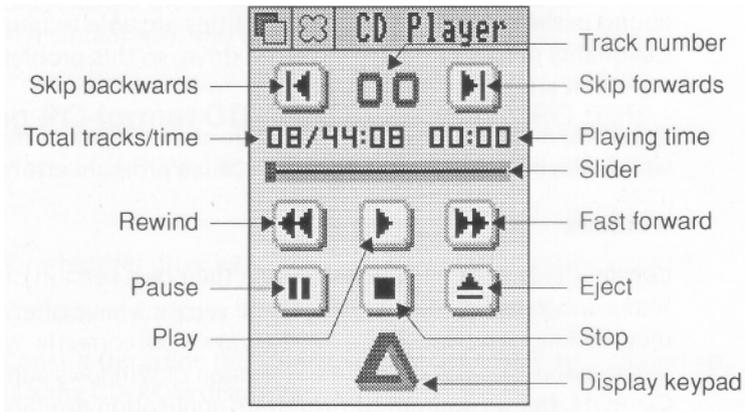
The main CD Player window

The basic set of controls work in the same way as those of a conventional audio CD player.

Play starts the audio CD playing.

Pause stops the CD playing, but holds it in its current position. **Stop** stops the CD playing, and returns to the start of the CD. **Eject** stops the CD and ejects it from the CD player.

Skip backwards and **Skip forwards** move to the previous or next tracks respectively.

Rewind and **Fast forward** move backwards or forwards through the audio track, speeding up as you hold down the button.

Moving the **Slider** takes you quickly to any point on the CD.

Track number shows the number of the track currently playing, or (as above) **00** if nothing is playing.

Playing time gives you three choices of display. It normally shows the time the disc has been playing. Clicking on this number changes the display to show the time the individual track has been playing; clicking again shows the time left on the disc; clicking again returns to the original display.

Total tracks/time gives the total number of tracks on the CD, and its total playing time.

Display keypad displays the keypad, the use of which is described in the next section.

The Keypad window

Clicking on the triangle icon or choosing **Keypad** from the

CD Player menu will open the Keypad window. You can use this window to select which tracks on the CD you wish to hear and in which order you wish to hear them:
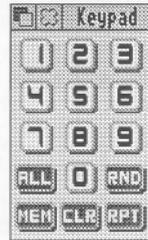
To program the player to play a selection of tracks

I   Click on the first track number you wish to hear, and then on MEM. The **Memory** window automatically appears, showing the tracks in the *program memory:*
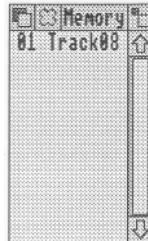
2   Repeat this for any other tracks you wish to add to the program memory.

3   Play the tracks by clicking on Play.

Other program play functions

ALL adds a list of all the audio tracks available on the CD to the program memory.

RND clears the program memory, and creates a randomly ordered list of all the audio tracks to the program memory.

RPT continuously repeats the tracks in the program memory until you click on the Stop key in the CD Player window. If no program has been set, the CD instead repeats continuously from start to finish.

CLR is used to clear the program memory. To clear all tracks from the program memory, click Adjust on the CLR button. To clear individual tracks, highlight the desired tracks and then click Select on the CLR button.

Notes on playing programs

When CDPlayer is set to play a program, the following restrictions apply:

- The slider and slider bar cannot be dragged or clicked on.
- The time display will only show the time the disc has been playing.
- The main CD Player window must be open to allow the programmed tracks to be played.

When playing a mixed mode CD (mixed audio and data tracks), using the ALL button guarantees that all the audio tracks will be played, otherwise the drive will normally stop when it encounters a data track, even if there are subsequent audio tracks.

The Setup window

Each CDPlayer can be used to control a single CD-ROM drive at one time, which is selected using the **Setup** window. CDPlayer is supplied already set up to use a CD-ROM drive that has a SCSI ID of 6, and that is connected to the first SCSI expansion card fitted to your computer. You'll only need to change the Setup if you wish to use a drive with a different SCSI ID, or if you have fitted multiple SCSI expansion cards to your computer.

To open the Setup window, choose **Setup** from CDPlayer's icon bar men u:
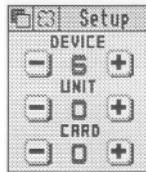
Click on the + and — icons until the correct device, unit and card numbers are shown for the CD-ROM drive you wish to use. If you're not sure what the numbers should be for a particular drive, you can find them out by typing at the command line:

`CDFS:CDDevices`   *(see page* 22).

It is not advisable to keep switching CDPlayer from one drive to another using the Setup window. This operation should only be performed when CDPlayer is first started. If you need to control more than one drive, you should start the CDPlayer application as many times as you require and change each copy's setup individually before use.

Quitting CDPlayer

To quit the CDPlayer application, choose **Quit** from its icon bar menu.

ChangeFSI

ChangeFSl is a useful program for converting and displaying image files of various formats. These images can then be converted into sprites for viewing with RISC OS applications such as Paint.

In case you're wondering, ChangeFSl stands for 'Change Floyd Steinberg Integer' (ChangeFSl performs Floyd Steinberg error diffusion dithering).

You should make sure that your conversion and subsequent use of an image does not infringe on any copyright that the image may be under.

ChangeFSl provides the ability to read, scale the data to improve the picture, change the x and/or y size, sharpen the picture and write the result using error diffusion dithering in one step (so it provides the best possible quality). All operations are carried out with 32-bit fixed point numbers (three per pixel in the case of a colour picture).

Using ChangeFSI

ChangeFSl is supplied on floppy disc. Before using the application, you should copy it either to another floppy disc, or to your computer's hard disc – if one is fitted.

Double click on the application to start ChangeFSl. Its icon will be loaded onto the icon bar. Display the file icon for the image you wish to process, and drag the icon onto the ChangeFSl application on the icon bar. ChangeFSl will attempt to interpret the file to give a RISC OS sprite, displaying the result. You can then save the resultant image as a sprite file.

Picture formats

ChangeFSl will convert many types of images. These include the PC graphics formats TIFF, PCX, PIC and IMG, the Amiga format IFF, the Compusery GIF format and the JPEG JFIF file interchange format.

For a full list of image formats explained in greater detail, you
should read the file FSllnfo provided inside the application (shift
double-click on !ChangeFSl to display the files).

ChangeFSl in more detail

This section describes the ChangeFSl menu trees in detail. Most users
won't need to use these options as ChangeFSl is already set up to give
good results with most types of image files.

If you want to know how ChangeFSl and its options are used in greater
detail you should read the information file, FSIInfo, provided inside the
application (shift double-click on !ChangeFSl to display the files).

Menu options

Once you have loaded ChangeFSl onto the icon bar, click Menu over
the icon to display the main options menu.

```
┌─────────────────┐
│    ChangeFSI     │
├─────────────────┤
│ Info          ⇨ │
│ Scaling       ⇨ │
│ Processing    ⇨ │
│ Output        ⇨ │
│ Reprocess       │
│ Fast            │
│ Save Choices    │
│ Quit            │
└─────────────────┘
```
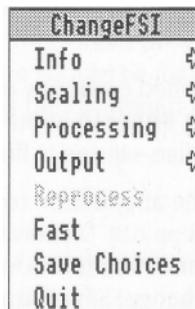
Scaling options

The **Scaling** options allow you to choose which scale you wish for your image. You can also transform, rotate or mirror the image.
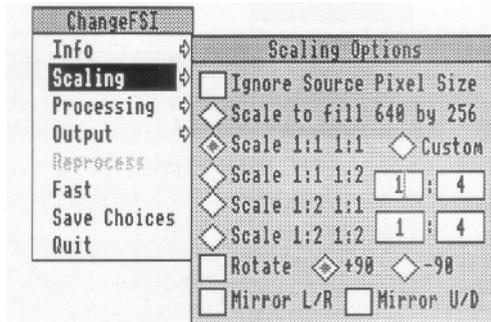
The option **Scale 1:1** 1:1 will give you a full sized image.

Choosing **Custom** allows you to specify your own scaling options. If you wish the image to 'scale to exact pixel size', fill in the left boxes only and leave the right boxes blank. The **Scale to fill** option allows you to scale the image so that it covers the entire screen area; this may distort the aspect ratio of the image.

The **Ignore Source Pixel Size** box allows you to ignore any source information about the pixel size. This can be useful if you have images that use a non-standard pixel size.

The **Rotate** and **Mirror** options perform rotations and mirror operations on the source image.

Processing options

The Processing options allow you to control the image processing used in the conversion and display of the image.

```
  ChangeFSI
  Info          ⇩
  Scaling       ⇩       Processing Options
  Processing    ⇩    ☐ Expand Dynamic Range
  Output        ⇩    ☐ Histogram Equalisation
  Reprocess          ☐ Disable Dithering
  Fast               ☐ Invert Input
  Save Choices       ☐ Brighten Picture
  Quit               ☐ Black Correction    [    ]
                     ☐ Gamma Correction    [2.2 ]
                     ☐ Pre-Sharpening      [ 24 ]
```
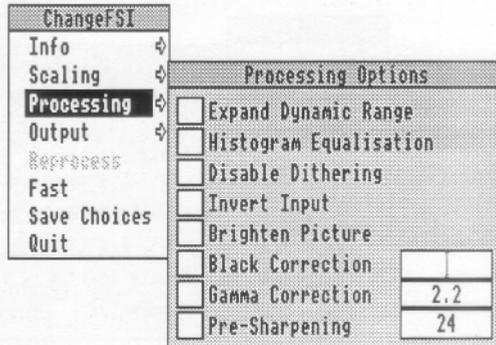
You'll notice that all of these options are 'off' by default; you will not normally need to change these settings.

Expand Dynamic Range will expand the range of colours in the image. This normally brightens the image. It expands the dynamic range of a picture to full scale.

Histogram Equalisation will most often result in a worse picture but it can be used to recover detail from an otherwise useless image. Alternatively you can use it to look at information locked in a small part of the input scale.

Disable Dithering will disable Floyd-Steinberg dithering. This will usually result in an inferior image.

Invert Input will result in your colour images having their colours inverted. Black and white image are also inverted.

Brighten Picture will produce a picture that is slightly brighter than it should be. Useful if you have dark pictures.

18

Black Correction is useful if you want to print the image on a laser printer. You should use a number between zero and 128, though values between 32 and 64 usually give the best result; experiment. Images treated in this way will give a poor result when viewed on screen. Only works for 1 bpp (black and white) output.

Gamma Correction is used to correct the image quality as displayed on your monitor. Low values of gamma (0 to 1) make colours darker and high values (above 1) make them lighter. Gamma correction is most often used to correct images that have been scanned in with a scanner. Different monitors may need different Gamma Corrections. A standard value is 2.2 (TV industry standard).

Pre-sharpening is used to sharpen the edges of objects. This is useful if the dithering process has made the image blurred. A value of 24 will counteract the general dither blurring. A value of 20 is noticeably sharp. Values down to nine can be selected.

Output options

The Output options control the screen mode the picture is created for.
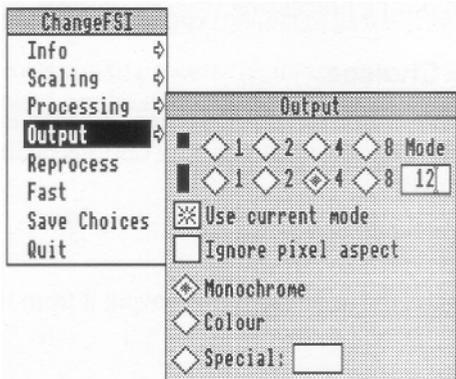
The **1, 2, 4, 8** buttons represent the screen colours that you can use. The numbers represent bits per pixel. 8 bits represent 256 colours, 4 bits represent 16 colours, 2 bits represent 4 colours and I bit

represents 2 colours. The square box represents the square pixel modes and the oblong box represents the non-square modes. The actual output mode chosen is displayed in the mode box.

Use current mode outputs the image for display in the current mode.

Ignore pixel aspect disables all pixel size information and assumes both source and output pixels are square.

Monochrome and **Colour** give an image in black and white or colour.

Special allows the use of special file suffixes. These are explained fully in the on-line documentation file FSlInfo.

Reprocess
This option reads the file in again and processes it according to any new options you have set.

Fast
This option speeds up the processing of the image by blanking the screen during processing.

Save Choices
This option will save any changes you have made to the ChangeFSl options so that you can use the options again next time you run ChangeFSl.

Quit
This quits the application, removing it from the icon bar.

Image menu

Once your image has been produced you can click Menu over the image to display a menu of information about the input and output image.

```
Change FSI
Sprite Info  ⇨
Source Info  ⇨
Range Info   ⇨
Zoom         ⇨
Save Sprite  ⇨
Reprocess
```
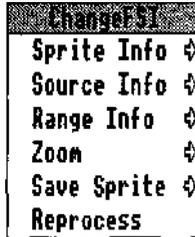
Sprite Info gives the information about the Sprite output file.

Source Info gives the information about the source file.

Range Info gives you information about the dynamic range of the image.

Zoom allows you to change the magnification of the image. This is not the same as scaling the source image.

Save Sprite allows you to save the image as a Sprite file.

Reprocess allows you to process the image again using any options you have changed on the main menu.

Using the command line

CDFS * Commands

CDFS supports all standard RISC OS filing system * Commands that do not try to write to disc; for details of these, see your RISC OS 3 User *Guide.* CDFS also provides some new commands of its own, detailed below. Many of these commands require an optional drive parameter; if you omit this, CDFS defaults to using its current drive (initially drive 0).

*CDDevices

*CDDevices displays all the CD devices connected, their product name, capacity, SCSI ID (displayed as device, LUN, and card) and firmware revision.

```
*CDDevices
```

*CDFS

*CDFS selects the CD-ROM filing system as the current filing system.

```
*CDFS
```

*CDSpeed

*CDSpeed displays or sets the read speed of the given CD-ROM drive.

```
*CDSpeed [drive] [speed]
```

*Configure CDROMBuffers

*Configure CDROMBuffers sets the configured amount of memory reserved for CD-ROM buffering (maximum 512K).

```
*Configure CDROMBuffers sizeK
```

*Configure CDROMDrives

*Configure CDROMDrives sets the configured number of CD-ROM drives recognised at power on.

```
*Configure CDROMDrives n
```

*Eject

*Eject ejects the disc from the given CD-ROM drive.
```
*Eject [drive]
```

*Lock

*Lock locks the disc in the given CD-ROM drive, disabling the Eject button.

```
*Lock [drive]
```

*Play

*Play plays from the specified audio track to the end of the disc in the given CD_ROM drive.

```
*Play track [drive]
```

*PlayList

*PlayList lists the tracks – whether audio or data – on the disc in the given CD-ROM drive, together with their start time and the total CD time.

```
*PlayList [drive]
```

*PlayMSF

*PlayMSF plays a piece of audio from the disc in the given CD-ROM drive. The start and stop times are specified in minutes, seconds and frames from the start of the disc.

```
*PlayMSF mins:secs:frames mins:secs:frames [drive]
```

*Stop

*Stop stops playing the disc in the given CD-ROM drive.
```
*Stop [drive]
```

*Supported

*Supported lists the drive types recognised by CDFS.
```
*Supported
```

*Unlock

*Unlock re-enables the Eject button on the given CD-ROM drive, reversing the effect of any earlier *Lock command.

```
*Unlock [drive]
```

*WhichDisc

*WhichDisc displays the unique ID number for the current CD-ROM drive.

```
*WhichDisc
```

Configuring CD-ROM drives from the command line

To configure the number of CD-ROM drives, type:
```
*Configure CDROMDrives n
```

where n is the number of drives (from 0 to 28). You can set n to 0, which obviously sets the configuration to 0 CD-ROM drives.

You may want to configure the size of the CD-ROM buffers, especially if you expect to be using a variety of CDs. Type:

```
*Configure CDROMBuffers sizeK
```

where *size* represents the size of the buffers in KB, a number in the range 0-512.

24

The configuration chosen will be stored in the CMOS RAM; reset the computer to implement it. The computer should boot up into the desktop. A 'CD-ROM' icon should appear in the icon bar, the number of icons representing the number of CD-ROM drives attached.

Important: Incorrectly setting the number of drives causes the boot up procedure to take longer.

Altering the default configuration of your system under PC Soft

The device driver

The DOS device driver CDFS_DRV. SYS is configured by entering a statement such as this in CONFIG.SYS:

```
DEVICE = C:\DRIVERS\CDFS DRV.SYS /D:MSCD001 /N:1
```

Parameter switches are:

Parameter Use

/N: This restricts the number of drives that can be used from PC Soft, for example, if you have 4 CD-ROM drives and you use the switch /N:2, then only the first two drives will be usable from PC Soft. If this switch is not specified then all of the drives will be accessible.

/D: This switch allows the device driver name to be changed. You are advised not to change this switch as it must then also be changed for MSCDEX.EXE.

MS-DOS CD-ROM Extensions

The file containing the MS-DOS CD-ROM extensions is called MSCDEX.EXE. This is configured by entering a statement such as this in AUTOEXEC.BAT:

```
C:\DRIVERS\MSCDEX /D:MSCD001 /L:F
```
Parameter switches are:

Parameter Use

/D:	Specifies the CD-ROM device driver name - for example MSCD001 - which must match that used in CONFIG.SYS
/L:	Specifies the drive letter of the first CD-ROM drive
/M:	Specifies the number of cache buffers for MSCDEX.EXE (8 - 1 5), the default being 8.
N:	Displays verbose message during boot-up, detailing memory usage and diagnostic information.
/S:	Instructs MSCDEX.EXE to patch DOS to allow CD-ROM drive sharing on an MS-NET based network server.
	This parameter is not used by PC Soft
/E:	Instructs MSCDEX.EXE to use extended memory if available.

Interfacing CDs and RISC OS
Introduction

CDFS is made up from three modules: the CDFS module itself, the CDFSDriver module, and the CDFSFiler module. In general, the SWIs provided by these modules are reserved for internal use, and you must not use them in your own code, otherwise unpredictable results may occur. You should access files stored on CD-ROMs using the same * Commands and SWI calls with which you would access any other filing system; see the *FileSwitch* chapter of the RISC OS 3 *Programmer's Reference Manual.*

However, RISC OS itself does not provide any facilities for you to use the audio facilities of a CD-ROM drive; these facilities are instead provided by the CDFS and CDFSDriver SWIs detailed below. You should only use these SWIs for accessing audio, and you must not use any other CDFS or CDFSDriver SWIs.

The SWI calls

All SWIs conform to the RISC OS standard insofar as:

- Any registers not explicitly defined as result parameters are preserved.
- The processor flags N, Z and C are preserved
- Errors are indicated by setting V and returning with R0 pointing at an error block. (If the bit 17 clear version is called, control passes to the error handler instead.)
- The SWI cannot be called from the background unless this is specifically documented.
- All SWIs may be called from interrupt and event routines.

but:

- No CDFSDriver SWIs preserve the interrupt state.
- No CDFSDriver SWIs are re-entrant.

CDFS SWI calls

CDFS_ConvertDriveToDevice (SWI &41 E80)

Converts a logical drive number to a physical drive number.

On entry

RO = logical drive number

On exit

RO preserved

RI = physical drive number

Use

This call converts a logical drive number to a physical drive number. You can then use the physical drive number to produce a CDFS control block, which you have to pass when calling CDFSDriver SWIs. For details of how to construct the block, see below.

This call returns an error if the logical drive is not known.

CDFSDriver SWI calls

CDFS control blocks

Before you can access a CD-ROM drive using any of the CDFSDriver SWIs, you need to set up a CDFS control block, as described below. When you call any of the SWIs, you pass a pointer to the block in R7.

A CDFS control block describes a physical device to the CDFS_Driver module, so that it can use the correct routines. Consequently there must be one block for each CD-ROM drive to be accessed. Once set up, the block remains valid until the next CDFS initialisation. CDFS may alter a block's contents, but you must not do so yourself, nor must you save a block and use it in another session.

Each CDFS control block is five words long. To construct a block for a particular logical drive, you must:

1   Allocate memory for the block.
2   Call CDFS_ConvertDriveToDevice to convert that drive's logical number to a physical drive number.

3   Copy the returned physical drive number into the block as follows:

Bits from physical drive number	Place in:	Word	Bits	of CDFS control block
0 - 2		0	0 - 2	
3 - 4		1	0 - 1	
5 - 7		2	0 - 2	
8 - 15		3	0 - 7	
16 - 31		4	0 - 15	
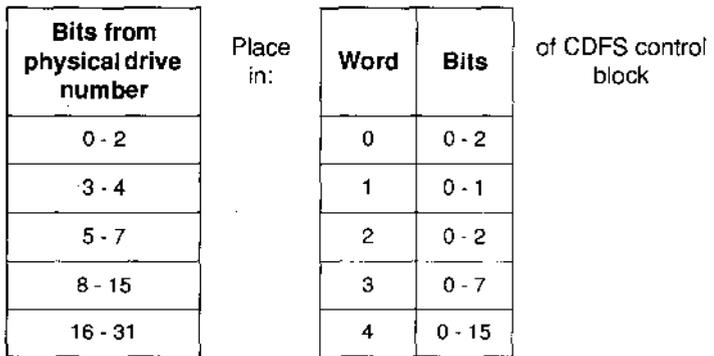
All bits of the control block not mentioned above must be initialised to zero. The whole process can be done as follows:
word 0 = (drive_number AND 8)
word 1 = (drive_number AND &18) » 3
word 2 = (drive_number AND &E0) » 5
word 3 = (drive_number AND &FF00) » 8
word 4 = (drive_number AND &FFFF0000) » 16

Addressing modes
Locations on a CD are specified as one word addresses. You can use three different addressing modes:

Addressing mode	Meaning
0	Logical block addressing
I	Red Book addressing
2	Physical block addressing

Logical block addressing

A logical block address gives an offset in blocks from the start of the CD's data area.

Red Book addressing

A Red Book address gives a time offset from the CD's first frame, made up as follows from the MM:SS:FF location defined in the Red Book:

Byte	Mnemonic	Meaning
0	FF	Frame number (0 - 74)
1	SS	Seconds (0 - 59)
2	MM	Minutes (0 - 99)
3		Undefined

There are 75 frames per second.

Physical Block Addressing

A physical block address gives an offset in blocks from the first block on the CD.

CD_OpenDrawer (SWI &41247)

Stops the CD spinning, opens the drawer and ejects the caddy

On entry

R7 = pointer to CDFS control block

On exit

R7 preserved

Use

This call stops the CD spinning, opens the drawer and ejects the caddy. The call fails and returns an error if the drawer has previously been locked using CD_EjectButton or *Lock.

CD_EjectButton (SWI &41248)

Enables or disables CD ejection

On entry

R0 = 0 (to enable ejection) or I (to disable ejection)
R7 = pointer to CDFS control block

On exit
R0, R7 preserved

Use
This call enables or disables CD ejection. It is used by the *Lock command.

CD_EnquireAddress (SWI &41249)

Returns the current address of the head

On entry

R0 = addressing mode, for returned head location
R7 = pointer to CDFS control block

On exit
R0 = head address
R7 preserved

Use
This call returns the current address of the head. You can use it while playing audio to determine which section of audio is playing.

CD_PlayAudio (SWI &4124B)

Attempts to play a section of a CD as audio, specified by address

On entry
R0 = addressing mode, of parameters RI
= start address of play section R2 = end
address of play section R7 = pointer to
CDFS control block

On exit
R0-R2, R7 preserved

Use
This call attempts to play a section of a CD as audio, specified by
address. If the section contains non-audio information, the results are
drive-dependent; you will not necessarily get an error returned and
some drives may still attempt to play the data. We therefore recommend
you first use calls to CD_EnquireTrack to find if the section you wish to
play consists entirely of audio.

CD_PlayTrack (SWI &4124C)

Attempts to play a section of a CD as audio, specified by track

On entry
R0 = track number at which to start playing (I - 99)
RI = 255 to play to end of CD, or 254 to play to end of track R7
= pointer to CDFS control block

On exit
R0, RI, R7 preserved

Use
This call attempts to play a section of a CD as audio, specified by
track. If the section contains non-audio information, an error is
returned.

CD_AudioPause (SWI &4124D)

Controls pausing of audio playing

On entry

RO = 0 to turn off pausing, if pause was in effect, or I to turn on
pausing, if audio was playing
R7 = pointer to CDFS control block

On exit

RO, R7 preserved

Use

This call controls pausing of audio playing.

CD_EnquireTrack (SWI &4124E)

Returns the track range of a CD, or information on a specified track

On entry

RO = 0 to return track range, or a valid track number
RI = pointer to 5 byte block
R7 = pointer to CDFS control block

On exit

RO, RI, R7 preserved

Use

This call returns the track range of a CD, or information on a specified
track. The information is returned in the block pointed to by RI.

If RO = 0 on entry, the track range is returned in the block as follows:

Byte Contents

0	First track on CD (1-99)
1	Last track on CD (1-99)
2-4	Corrupted

Track numbers do not necessarily start at I.

If RO is a valid track number on entry, then information about that track is returned in the block:

> **Byte Contents**
>
> 0-3   Logical block address of track start (ie Mode 0 address)
>
> 4   Audio control bits specifying the type of information the track holds:
>
> > | Bits | | Meaning |
> > |------|---|---------|
> > | 0 | 0 | audio information, I   data information |
> > | 1 | 0 | 4 channel sound, 1   2 channel sound |
> > | 2-7 | | Reserved |

CD_StopDisc (SWI &41252)

Stops a CD playing

On entry

R7 = pointer to CDFS control block

On exit

R7 preserved

Use

This call stops a CD playing. You can use it to stop prematurely an audio play request.

CD_DiscUsed (SWI &41253)

Returns the size of the CD currently in the drive

On entry

RO = addressing mode, for returned size
RI = pointer to 8 byte block
R7 = pointer to CDFS control block

On exit

RO preserved
RI corrupted
R7 preserved

Use

This call returns the size of the CD currently in the drive. The call
works with audio CDs as well as with CD-ROMs. The size is returned
in the block pointed to by RI on entry:

Bytes	Contents
0-3	Size of CD
4-7	Size of blocks on CD, in bytes (usually 2048)

Note that RI may be corrupted on exit.

CD_AudioStatus (SWI &41254)

Returns the current audio status of the drive

On entry

R7 = pointer to CDFS control block

On exit

RO = audio status
R7 preserved

Use

This call returns the current audio status of the drive, which may have one of the following values:

Value	Meaning
0	Currently playing audio
I	Currently paused
2	Reserved (has no meaning at present)
3	Audio play successfully completed
4	Error occurred during last audio play
5	Audio play has not been requested

To maintain drive independence, you should always treat values 3 and 5 in the same way.

Soft-loadable Drivers

A soft-loadable driver must register itself with the CDFS_Driver module before it can be used. Once the driver has been registered, CDFS will make a SCSI_Inquiry command to obtain information about a SCSI device at a specific SCSI address (i.e. device id, LUN, card). The results of this Inquiry command are then passed to the soft-loaded driver to check if it recognises the drive. If the soft-loaded driver does recognise the drive, then it must return without an error, in which case CDFS will allocate this soft-loaded driver as the code which is called each time information is required from the device.

For soft-loadable drivers which are not SCSI, the same procedure must be followed. In this case however, CDFS, when passing the Inquiry command, will pass an error block pointed to by R0 instead for any SCSI address which is not occupied by a device. The soft-loaded driver will check for this error block, and when seen will return a non-error as above. CDFS will then allocate the driver as before. Thus the non-SCSI soft-loaded CD-ROM device driver is effectively allocated a SCSI address which is not occupied by any other device. CDFS will then access the driver in the usual manner,

passing the SCSI address in the control block to the specific driver which can handle the command in the most appropriate way for the specific hardware regardless of its type.

SWI handler entry conditions

When the soft-loadable driver registers itself with the CDFSDriver, it passes the address of a handler for SWI calls. CDFSDriver passes 'CD_' SWIs to this handler with the following entry conditions:

On entry

R0 - R6 = Whatever values the various CD_ SWIs use

R7 = pointer to a control block

Offset Meaning

0	SCSI device id (0-7)
4	SCSI card number (0-3, usually 0)
8	Logical Unit Number (0-7, usually 0)
12	Drive type for this module

R1 1= the number of the CD_SWI, i.e. 0 CD _ReadData, 1
                                    CD_SeekTo etc
R12 = pointer to the workspace for this module
R13 = pointer to a full descending stack, approx. 1024 bytes
R14 = address to return to

On exit

R0 - R12 and R14 corrupted

CD_Register (SWI & 41260)

Registers the soft-loadable driver with the CDFSDriver module.

On entry

R0 = pointer to a block

    Offset Meaning

0   Information word for CDFSDriver module:

    Bits   Meaning

    0 - 5   The number of CD commands recognised, currently 31, maximum 63

    6   If set then use the SCSI 1 read data command

    7   If set then use the SCSI I seek command

    9 - 31 Reserved (must be zero)

4   Number of times registered (should be set to zero and will be updated by CDFSDriver)

8   Number of drive types recognised by this driver

12   Unused (must be zero)

16   Unused (must be zero)

RI = pointer to a 1-word special tag (&EE50EE50), followed by handler code

R2 = pointer to workspace for the soft-loadable module (passed in RI 2 to the handler)

On exit

    Offset Meaning

12   A pointer to a routine to convert logical blocks to minutes, seconds, frames

16   A pointer to a routine to convert minutes, seconds, frames to logical blocks

Use

This call registers the soft-loadable driver with the CDFSDriver module. The block pointed to by R0 on entry must be in RAM, whereas anything else, i.e. the code for each CD _SWI, can be in ROM. The block must stay put in the memory so that CDFSDriver can check it when detecting drive types.

CD_Unregister (SWI &41261)

Removes the soft-loadable driver from the CDFSDriver module.

On entry

RO = pointer to a block

Offset Meaning

0   Information word for CDFSDriver module block

Bits	**Meaning**
0-5	The number of CD commands recognised, currently 31, maximum 63
6	If set then use all SCSI 2 commands and ignore bits 7 and 8
7	If set then use the SCSI 2 read data command
8	If set then use the SCSI 2 seek command
9-31	RESERVED (must be zero)

4   Number of times registered (should be sent to 1 to indicate that it has been registered already)

8   UNUSED

RI = pointer to a special tag (&EE5OEE50 = I word) followed by the handler code.

On exit

Use

Removes the soft-loadable driver from the CDFSDriver module. The block pointed to by R0 on entry must be in RAM, whereas anything else, i.e. the code for each CD _ SWI, can be in the ROM.

CD_ByteCopy (SWI &41262)

Fast memory copy routine.

On entry

RI = pointer to the source
R2 = pointer to the destination
R3 = number of bytes to copy

On exit

All registers preserved

Use

Fast memory copy routine which provides an efficient way of copying any number of bytes, word-aligned or not.

CD_Identify (SWI & 41263)

Identifies the drive type of a CD-ROM drive.

On entry

R7 = pointer to control block

Offset	Meaning
0	SCSI device id (0 to 7)
4	SCSI card number (0 to 3)
8	Logical unit number (0 to 7)
12	0

On exit

R0 - RI preserved
R2 = drive type given by CDFS driver, or – I if type not recognised

Use

This call gets the drive type of a CD-ROM drive, so that other CD_SWIs can be made. It can be made by CDFS, the PCEmulator driver or !CDPlayer.