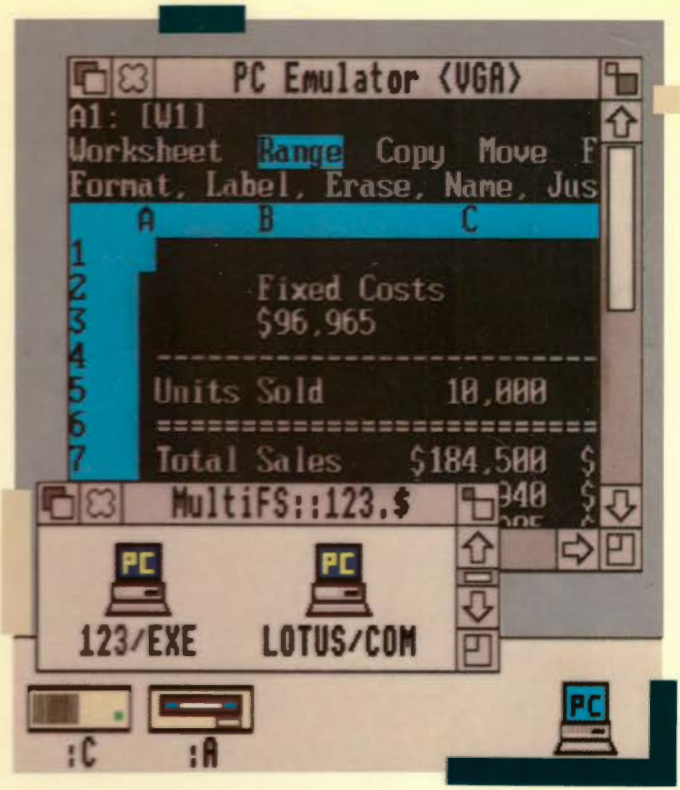
PC EMULATOR



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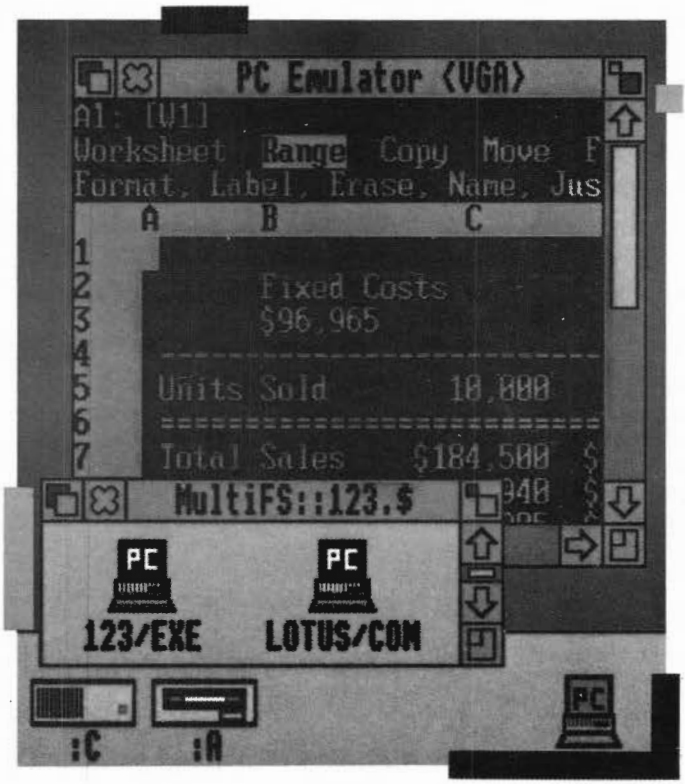
PC EMULATOR



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Published by Acorn Computers Technical Publications Department

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Published by Acorn Computers Limited
Edition 5
Part number 0484,151
Issue 1 February 1992

Contents

About this Guide

Introduction

The PC Emulator allows standard DOS applications to be run on a RISC OS computer. It does this by emulating the hardware of an IBM PC compatible computer and then running a standard copy of DOS on this emulated hardware.

This Guide is not a DOS tutorial. It only describes how to install and run the PC Emulator and explains those DOS utilities that are specific to the PC Emulator. There are many good books available for DOS, and some suggested titles appear at the end of this Guide.

The PC Emulator package

The PC Emulator package contains four discs:

- the multitasking PC emulator disc (called *Multitasking* CGA/EGA/VGA)
- the single-tasking PC emulator disc (called *Single tasking* CGA)
- the MS-DOS 3.30 disc
- the CD–ROM support disc.

  You will only need to use the CD–ROM support disc if you connect a CD–ROM player to your computer. *Appendix C: The CD ROM support disc*, on page 63, shows you how to install and use this disc.

The *Multitasking* (CGA/EGA/VGA) disc contains all the files needed for the multitasking PC Emulator. These are:

- !PCEm – the PC emulator application
- !MultiFS – the desktop filer application that lets you view DOS format discs in a window
- !System – which contains modules needed by the emulator

- !Merge – an application that should be used to update your existing !System.

The *Single tasking* (CGA) disc contains all the files needed for the single-tasking PC Emulator. These are:

- !PCEmS – the small PC emulator application
- !MultiFS – the desktop filer application that lets you view DOS format discs in a window
- !System – which contains modules needed by the emulator
- !Merge – an application that should be used to update your existing !System.

The MS-DOS 3.30 disc contains the MS-DOS operating system, standard DOS utilities and other DOS utilities that are specifically for use with the PC Emulator.

The disc is in DOS format and can only be read with the emulator (or MultiFS).

Viewing MS-DOS files

MultiFS is an application that lets you view your DOS format discs in a RISC OS window. MultiFS allows files to be moved, copied and deleted using normal desktop operations.

RISC OS 3 Users can use the RISC OS 3 Filer to view and manipulate files on DOS format floppy discs and files stored in the DOS hard disc file.

The initials DOS stand for Disc Operating System – the PC Emulator's operating system.

Upgrading your existing PC Emulator

If you are running one of the earlier versions of the PC emulator first turn to the *Appendix* B: *Upgrading*, on page 59 to find out how to upgrade to this version.

Upgrading your current version of DOS

If you are using an earlier version of DOS and want to upgrade it, first follow the instructions on page 59.

Registration card and licence agreements

Please take the time to fill in and return the Owner registration card. The information this provides is used to improve the quality of our products and service.

Please also read, fill in, and return both the MS-DOS licence and the CD ROM licence agreements to Customer Services at Acorn, using the prepaid envelope. If you do not agree to any of the licence conditions, return the complete package to your dealer before you use it and your money will be refunded.

Reporting problems

If you have problems running software on the Acorn PC Emulator which you have used successfully on a PC clone, please let us know. Write to Acorn Customer Services, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, giving details of the software, the PC clone (make, memory, graphics cards, etc), the version of DOS used, and how you have configured the PC Emulator. Please write 'PC Emulator' on the outside of the envelope.

If you have any comments on this manual, please complete the form at the back of the manual, and send it to the address given there.

Installing the PC Emulator

This chapter describes how to install the PC Emulator on your computer. Installation is necessary to tailor the emulator to suit your requirements and the configuration of your system. You can run the PC Emulator from floppy discs, or, if your computer has one, from a hard disc. This chapter tells you how to install the emulator either way.

Before starting

Before you start this chapter you must decide which version of the emulator you are going to use. Which one you use will depend on the memory size of your computer. The multitasking version needs at least 2MB of memory, while the single-tasking version can operate with 1MB.

Multitasking or single tasking

The multitasking PC Emulator runs in a window on the RISC OS desktop simultaneously with other RISC OS applications. It also has a 'Single Task' mode of operation in which the emulator takes over the whole screen. In 'Single Task' mode, the emulator runs faster and the computer appears to be an IBM PC clone running DOS.

Multitasking requires at least 2MB of memory to run. With only 2MB you may not be able to use all the VGA screen modes and still have 640k of PC memory.

The single-tasking PC Emulator is a reduced version of the emulator for use with computers that have only 1MB of memory. This version only operates in full screen (Single Task) mode; it does not operate in a window. Additionally, it only emulates the Colour Graphics Adaptor (CGA) display.

The emulator does not operate in a computer with less than 1MB of memory.

You should choose which of these versions you are going to use before you start the installation. The instructions in this guide refer to the program names for the emulators; PCEm is the multitasking emulator and PCEmS is the single-tasking emulator.

Monitor requirements

If you choose the multitasking emulator, you can configure the emulator to use certain screen modes. However you may be limited by the capabilities of your monitor. If your computer has a medium resolution RGB monitor, we recommend that the emulator be configured to emulate either CGA or EGA CD.

If your computer has a VGA or multiscan monitor we recommend that the emulator be configured to emulate either EGA ECD or VGA. It is not possible to use the single-tasking mode with EGA ECD or VGA emulation on a medium resolution RGB monitor.

You will find out how to configure your monitor type in the section entitled *The configuration dialogue box* on page 21.

Making backups

If you plan to run the emulator from floppy discs, you should make backups of the master discs supplied, and use these backups as your working discs.

The PC Emulator discs should be backed up like any other RISC OS floppy disc. The procedure is described in *your Welcome Guide* and *the* RISC OS *User Guide*. The MS-DOS disc should be backed up using the DOS command DISKCOPY (once you have installed the emulator). For more information on using the DISKCOPY command see the chapter entitled A *brief introduction to* DOS on page 43.

You will therefore need **two** blank discs before you start installing the PC Emulator (one for the emulator disc and one for the DOS disc). The PC Emulator floppy discs are RISC OS format, but the MS DOS disc is DOS format. The two formats are different, and cannot be used for the same purpose.

Saving DOS files on floppy discs

The emulator can only save files on floppy discs that have previously been formatted by DOS. To format a disc, use the DOS FORMAT command. For more information on using the FORMAT command, see the chapter entitled A *brief introduction to* DOS on page 43.

Floppy disc installation

If you intend to run the emulator from your floppy disc drive, follow these instructions (hard disc instructions are on page 6):

There are three main stages in this procedure:

1 Choosing which emulator version to use.

2 Updating your System directory.

3 Loading the emulator.

Choosing the emulator version

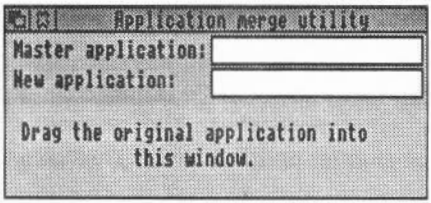
Decide which version of the emulator you are going to use. The multitasking emulator is on the disc named *Multitasking* (CGA/EGA/VGA). The single-tasking emulator is on the disc named *Single tasking* (CGA).

Update your System directory (RISC OS 2 only)

If you are using RISC OS 3 you don't need to update your !System as it already contains the latest versions of the system modules. Ignore this section and turn to the subsection *Loading the emulator* on page 5.

The emulator floppy disc contains updates for your existing System directory. The application **Merge** updates your System directory automatically.

1 Start Merge by double-clicking on it; a dialogue box like this is displayed:



2 Drag your existing master System application to the Merge dialogue box. The upper box (for the master application) changes to show its path name.

3 Now drag the System application from the emulator disc onto the Merge dialogue box. The pathname for this will appear in the lower box.

Your original System will be updated and the message 'Application updated' will appear.

If there are problems, you should read the error message and take the appropriate action. The only common error message you may see is 'disc full'.

When you have finished, quit the application by clicking on the Close icon.

4 Quit any other applications you may have running and save any data you wish to keep.

5 Remove the emulator floppy disc from the disc drive.

6 Reset the computer by holding down Ctrl and pressing the Reset key. Alternatively you can switch the computer off then on again.

You should only have a single !System that you use as your working application. It is recommended that you have a single floppy disc on which you keep your master working copy of !System.

Loading the emulator

1 Insert the disc containing your master copy of !System. Click on the floppy disc icon to display the contents of the disc.

2 Double click on the !System on the floppy disc. Now remove the disc.

3 Insert the disc containing the version of the emulator you wish to install into the floppy drive and click on the floppy disc icon. This displays the contents of the disc.

4 Double-click on the emulator application (!PCEm or !PCEmS) to load it onto the icon bar. You may need to insert the !System master disc if asked.

5 Click on the PC icon on the icon bar.

If the **Erase RISC OS?** option has been set, a warning box will appear to remind you that the desktop will be cleared and you will loose any unsaved work. If you wish to continue, click on the **OK** box.

After a while the following message appears:

```
Acorn PC Emulator, (C) Acorn 1991
Insert DOS boot disk and press any key
```

6 At the `Insert DOS boot disk and press any key` prompt, put the DOS disc into the drive and press the space bar. When DOS has been loaded, the `A:` DOS command line prompt will be displayed, and you can use your computer as a DOS machine.

The floppy disc drive is known as drive A: under DOS. Under RISC OS it is known as :0.

7 You have now successfully completed installing DOS. You can now turn to the chapter entitled *Running the* PC E*mulator* on page 15.

Hard disc installation

This section explains how to install the emulator on a computer with a hard disc. There are four main stages in this procedure:

1 Choosing which emulator version to use.

2 Copying the emulator applications onto the hard disc, and updating your System directory.

3 Creating a DOS partition on your hard disc.

4 Installing DOS on your DOS hard disc.

Choosing the emulator version

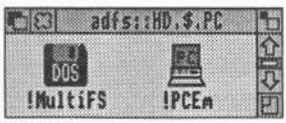
Decide which version of the emulator you are going to use. The multitasking emulator is on the disc named *Multitasking* (CGA/EGA/VGA). The single-tasking emulator is on the disc named *Single tasking* (CGA).

Copying the emulator onto a hard disc

Copy the emulator files to a new directory on your hard disc as follows:

1 Insert the disc containing the version of the emulator you wish to install into the floppy drive and click on the floppy disc icon. This displays the contents of the disc.

2 Make a new directory in the root directory of your hard disc (use the **New directory** option on the Filer menu). It is recommended that you name this directory `PC`. Copy into it the applications MultiFS and PCEm (or PCEmS) from the emulator disc you have chosen.

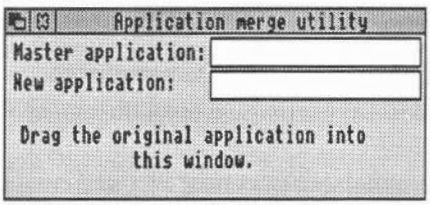


Updating your System directory (RISC OS 2 only)

If you are using RISC OS 3 you don't need to update your !System as it already contains the latest versions of the system modules. Ignore this section and turn to the subsection *Creating a* DOS*-formatted hard disc* on page 8.

The emulator floppy disc also contains updates for your existing System directory. The application **Merge** updates your System directory automatically.

1 Start Merge by double-clicking on it; a dialogue box like this is displayed:



2 Drag your existing System application to anywhere in the Merge dialogue box. The upper box (for the master application) changes to show its path name.

3 Now drag the System application from the emulator disc onto the Merge dialogue box. The pathname for this will appear in the lower box.

Your original System will be updated and the message 'Application updated' will appear.

If there are problems, you should read the error message and take the appropriate action. The only common error message you may see is 'disc full', which is unlikely to occur if you are merging onto a hard disc.

When you have finished, quit the application by clicking on the Close icon.

4 Quit any other applications you may have running and save any data you wish to keep

5 Remove the emulator floppy disc from the disc drive.

6 Reset the computer by holding down Ctrl and pressing the Reset key. Alternatively you can switch the computer off then on again.

You should only have a single !System application on your hard disc.

Creating a DOS-formatted hard disc

The emulator does not have its own hard disc; instead it uses a special RISC OS file as a simulated hard disc. In this section, when we refer to the DOS hard disc, we are really referring to this file. However, in DOS terms, this file looks and behaves like a proper DOS hard disc drive.

There are four stages in creating a DOS hard disc:

1 Create the RISC OS file that the emulator can use as a DOS hard disc file.

2 Partition the simulated DOS hard disc and create a DOS partition on it.

3 Format the simulated disc.

4 Copy the DOS utilities onto the hard disc.

If you already have a DOS hard disc file created with a previous version of the emulator it can still be used. See *Appendix* B: *Upgrading* on page 59.

If you already have a DOS hard disc file and want to create a second DOS hard disc drive file, turn to the section entitled *Creating a second hard disc drive* on page 27.

Create the RISC OS file that the emulator uses as a PC hard disc

1 Load the PCEm (or PCEmS) application and choose the **Configuration** option from the icon bar menu.

2 Click Select over the number next to **Hard disc drive files**; this changes the number to 1. (Clicking Adjust decreases the number). The default file name `adfs::4.$.PC.Drive_C` is displayed. This creates a file named Drive_C in the PC directory.

If you have stored your emulator files in a different directory or wish to create a differently named file, erase this and type in a suitable RISC OS name.

If you have an Acorn SCSI disc drive you should change the file name to one beginning `SCSI::`. For example the default on a computer with an Acorn SCSI disc drive would be

`SCSI::4.$.PC.Drive_C.`

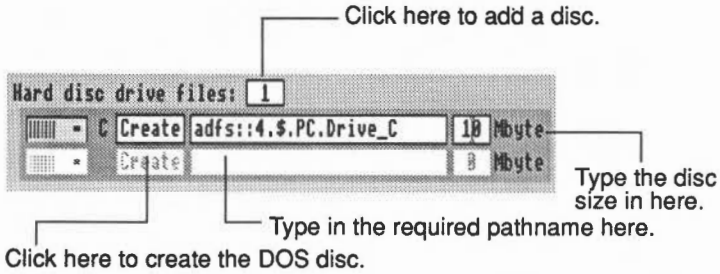
Hard disc expansion cards from third party manufacturers may use different filing systems. Consult the manufacturer's manual for more information.

3 Type in the size (in Megabytes) for the DOS hard disc file. A minimum size of 2MB is recommended.

It is not possible to increase or decrease the size of an existing DOS hard disc file. If you need a different size, you must first delete the old one and re-create one of a different size, using the emulator.

Information about deleting or changing the size of a DOS hard disc is given in the section entitled *Changing the size of a* DOS *hard disc file* on page 29

4 Create the hard disc partition by clicking on the word **Create**. This creates an unformatted DOS hard disc which you will format in the next section.



5 Save the configuration by clicking on **OK** in the **Save as** box.

Installing MS-DOS on a hard disc

1 If you have not already done so, double-click on the emulator application (!PCEm or !PCEmS) to load it onto the icon bar.

2 Click on the PC icon.

If the **Erase RISC OS?** option has been set, a warning box will appear to remind you that the desktop will be cleared and you will loose any unsaved work. If you wish to continue, click on the **OK** box.

After a while the following message appears:

```
Acorn PC Emulator, (C) Acorn 1991
Insert DOS boot disk and press any key
```

3 At the `Insert DOS boot disk and press any key` prompt, put the DOS disc into the drive and press the space bar. When DOS has been loaded, the `A:` DOS command line prompt will be displayed. You can now use the DOS operating system.

The floppy disc drive is known as drive A: under DOS. Under RISC OS it is known as :0.

Partition the hard disc

4 Put the DOS system disc in the disc drive.

5 At the DOS A: prompt type **`FDISK`** and press Return. This will run the DOS utility that partitions hard discs.

6 Choose option 1, Create Primary DOS Partition, and follow the program (by pressing the Return key) to create a bootable Primary DOS partition that occupies the allocated hard disc space. At the end, FDISK will ask you to press any key in order to reboot DOS.

DOS format the disc

7 At the DOS prompt, type **`FORMAT C: /S`** and press Return. This will format drive C, which is usually the first DOS hard disc.

If your computer has more than two floppy discs configured, then the first hard disc will not be C:, and care must be taken to give the correct drive letter to the Format command. For example, if there are four floppy discs, the floppy discs are named A:, B:, C: and D: in sequence and the first hard disc will be E:, so the command to format the first hard disc would be: **`FORMAT E: /S`**

Copy the DOS utilities onto the hard disc

8 At the DOS prompt, type: **`COPY A:\*.* C:\`** and press Return. This will copy all the files on the floppy disc into the root directory on the hard disc. It takes a few minutes. If you want to place the utilities elsewhere on the hard disc don't follow this instruction; read the next section instead.

9 Remove the MS-DOS disc from the floppy drive and Reset DOS by holding down the Ctrl, Alt and Delete keys together.

This restarts the emulator which will now boot from your hard disc. You now have a hard disc partition.

Moving the DOS utilities to another directory

Only read this section if you want to place your DOS utilities into a a subdirectory on the hard disc.

It is possible to place the DOS utilities elsewhere on the hard disc. For example, to move the utilities in a directory called DOS in the C drive

1 change to drive C by typing

  `C:`

2 create the directory DOS by typing

  MKDIR \DOS

3 move the files to \DOS by typing

  COPY A:*.* C:\DOS

If this is done then the AUTOEXEC.BAT file must be created in the root directory and the AUTOEXEC.BAT file updated to tell DOS where to look for the DOS utilities.

1 Add the line `PATH C:\DOS` to the AUTOEXEC.BAT file by typing

  ECHO PATH = C:\;C:\DOS >> C:\AUTOEXEC.BAT

  (If you don't have an AUTOEXEC.BAT file it will create one for you).

2 If you want the DOS prompt to show the name of the current subdirectory. Add the line `ECHO PROMPT=$P$G` to the AUTOEXEC.BAT file by typing

  ECHO PROMPT=PG >> C:\AUTOEXEC.BAT

After the hard disc installation

Once the system is installed, remove the floppy disc from the drive and reboot the PC Emulator by holding down the Ctrl and Alt keys and pressing and releasing the Delete key.

You now have a complete DOS system installed on your hard disc. From now on, you do not need the floppy discs, except as backups in case your hard disc is corrupted at any time.

To run the emulator, load the emulator application (PCEm or PCEmS) onto the icon bar and click on the PC icon. You can now use drive C: (the hard disc) in the same way as drives A: or B: (floppy discs).

Running the PC Emulator

Before you run either version of the emulator, you should first install the program as described in the chapter *Installing the* PC *Emulator*. This sets up the emulators to suit your particular system configuration, and makes working copies of them on either floppy or hard disc (if you have one). You should run the emulators from these working copies.

The following section describes the multitasking emulator. The single-tasking emulator is described on page 17 onwards.

Running the multitasking emulator

To run the PC Emulator:

1. Double-click on the PCEm icon in the directory display. This loads the emulator onto the icon bar.
2. Click on the PCEm icon on the icon bar. This displays the PC screen in a window.
3. If you do not have a DOS hard disc you should insert the DOS system disc and press any key.
4. The emulator will ask you for the date and time. Press Return at each prompt (unless you want to change either of these).
5. When the PC has finished starting up you will see an A> prompt, representing the floppy disc drive.

   If you have a correctly set-up DOS hard disc it will boot DOS automatically as long as the floppy disc drive is empty. When the emulator has finished starting, you will see a C> prompt representing the hard disc drive. If you have more than two floppy drives, your hard disc will be represented by an E> or F> prompt.

The window menu options

Display the emulator menu options by clicking Menu (the middle mouse button) over the PC emulator window. The emulator window menu is only available if you are using the emulator in a window. To move from full screen to windowed mode click Menu.

Save screen

This option allows you to save a screenful of data to a RISC OS sprite file. Sprite files cannot be converted to text files.

Save text

This option allows you to save a screen as a text file, if you are in a text mode.

Connect mouse

This option allows the PC window to use the mouse. You may also have to run AMOUSE.COM; see the section entitled *The mouse driver* on page 39 for details. When the mouse is 'connected' it will drive the PC mouse pointer. Click Menu again to reconnect the mouse to the RISC OS mouse pointer.

Quitting the emulator

To exit the emulator, choose the **Quit** option from the emulator icon bar menu.

Warning: Any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore this option should normally only be used when the PC Emulator is at the DOS prompt.

Running the single-tasking emulator

To run the reduced memory version of the PC Emulator:

1 Double-click on the PCEmS icon in the directory display. This loads the emulator onto the icon bar.

2 Click on the PCEmS icon on the icon bar. This displays the PC screen.

This will cause all RISC OS tasks to be suspended and the emulator to run in single task mode. You can return to RISC OS, without losing your PC data, by clicking the middle mouse button (if the configuration option **Erase RISC OS?** has not been chosen). Click on the emulator icon again to redisplay the PC screen.

3 If you do not have a DOS hard disc you should insert your copy of the DOS floppy disc and press any key.

4 The emulator will ask you for the date and time. Press Return at each prompt (unless you want to change either of these).

5 When the emulator has finished booting you will see an A> prompt, which represents the floppy disc drive.

If you have a correctly set-up PC hard disc it will boot DOS automatically as long as the floppy disc drive is empty. When the PC has finished booting you will see a C> prompt, representing the hard disc drive. If you have more than two floppy drives, your hard disc will be represented by an E> or F> prompt.

Quitting the emulator

If you have not set the Configuration option **Erase RISC OS?**, you can switch to the RISC OS desktop by clicking the Menu button on the mouse. Click on the PC icon bar icon to get back to DOS.

Exit the emulator altogether by choosing the **Quit** option from the emulator icon bar menu.

If you **have** set the Configuration option **Erase RISC OS?**, you must hold down Ctrl and press the Reset button to exit the emulator. This restarts the whole computer.

Warning: When you quit the PC Emulator, any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore you should normally only quit the PC Emulator when the DOS prompt is displayed.

PC Emulator icon bar menu options

The following options appear on the PC emulator icon bar menu. Click Menu over the emulator icon to display them. If you are using the single-tasking emulator, the Freeze and Single task options are not available to you.

Info

This gives the version number of the PC Emulator application.

Single task (multitasking emulator only)

Clicking on this option causes the PC Emulator to use the whole screen, instead of operating in a RISC OS window. To return to window mode, click Menu.

No other RISC OS tasks run while the PC Emulator is in Single task mode. However, the RISC OS desktop will be restored as it was when you return to windowed mode. The RISC OS tasks that were running will now start again.

When running in Single task mode, the emulator will run slightly faster. Screen updates in particular will be faster and mouse movement smoother.

Freeze (multitasking emulator only)

Clicking on this option causes the emulation to freeze. This option can be used to pause the PC Emulator while doing work in other RISC OS windows. Click on this option again to restart the emulator.

The emulator will automatically freeze when the emulator window is closed (by clicking on the close icon). Unfreeze and open the emulator window by clicking on the emulator icon.

Configuration

Clicking on this option displays a dialogue box that allows the details of the emulated PC to be specified. This dialogue box is described in detail in the section entitled *The configuration dialogue box* on page 21.

A suitable configuration must be set up before DOS is run. You cannot reconfigure the emulator while it is running. You must first quit the emulator by choosing **Quit** from the icon bar menu and then reloading it. The Configuration option will then be available on the icon bar menu.

Quit

Clicking on this option causes the emulator to quit.

Warning: Any PC applications which are running will be immediately stopped and any associated data will be lost. Therefore this option should normally only be used when the PC Emulator is at the DOS prompt.

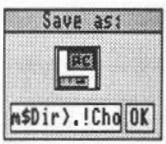
Configuring the PC Emulator

This chapter explains how to configure the emulator further to suit your requirements.

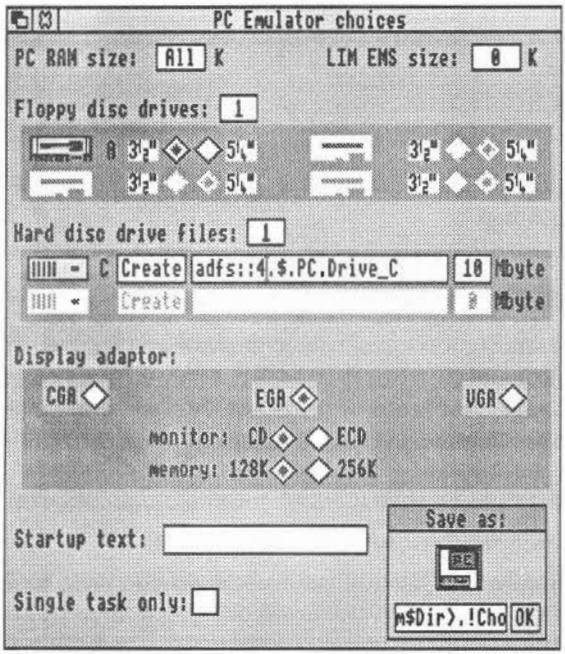
The configuration dialogue box

The configuration dialogue box is displayed by choosing the **Configuration** option from the icon bar menu. This option allows you to change details about the actual PC that is emulated. The configuration menu can only be accessed when the emulator is loaded but not running. Changing the configuration whilst the emulator is running is like trying to remove a graphics card from a PC while it is switched on!

If you change any of the options, the changes do not take effect until you have saved them by clicking on **OK** in the **Save as** box. The configuration options are saved, in plain text, in a file called **!Choices** in the emulator application directory.



The !Choices file is kept within the emulator's application directory. If you want to view this file, open the emulator application directory (hold down the shift key and double-click on the emulator icon) and then drag the !Choices file to the Edit icon (on the icon bar)



PC RAM size

This option specifies the amount of RAM that the emulated PC can use, up to a maximum of 640K. The default setting is **All**, which means that the PC Emulator will emulate a PC with as much memory as possible, up to a maximum of 640K.

If there is insufficient memory available when the PC Emulator is loaded, a warning message is displayed and the emulator icon is removed from the icon bar.

LIM EMS size (multitasking only)

This option specifies the amount of expanded memory (memory above the conventional 640K limit) that can be used by programs and applications. Only programs specifically designed to use expanded memory can make use of this memory area.

To use expanded memory you need to have the file EMS.SYS loaded. To do this add the line `DEVICE=EMS.SYS` to your CONFIG.SYS file by typing:

```
ECHO DEVICE=EMS.SYS >> C:\CONFIG.SYS
```

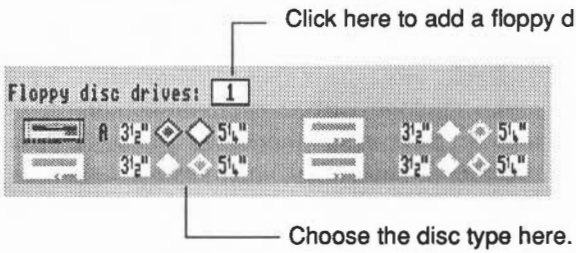
(If you don't have a CONFIG.SYS file it will create one for you). You will also need to have the file EMS.SYS in the root (C:\) directory.

EMS.SYS is an expanded memory device driver especially for the PC Emulator. It is supplied on the DOS disc.

Floppy disc drives

Click Select on the number (next to the title) to add disc drives (click Adjust to remove them). If you have a 5 1/4" drive attached make sure you click on the appropriate 5 1/4" button.

You should not configure more floppy drives than there are real physical floppy disc drives. If you want your DOS hard disc drive to be called C:, reduce the number of configured floppy drives to one or two.



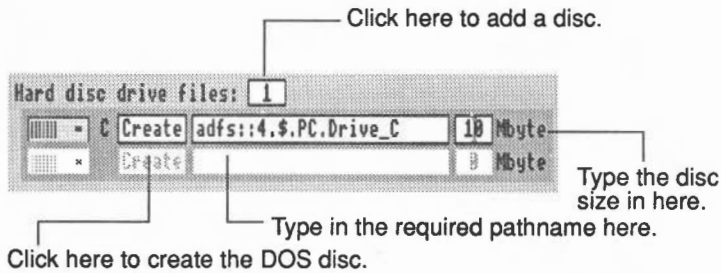
Hard disc drive files

Click Select on the number (next to the title) to add hard disc drives (click Adjust to remove them). Click on the Create box to create the hard disc drive.

The drive still needs to be partitioned and formatted. To set up a new hard disc drive, read the section entitled *Creating a second hard disc drive* on page 27.

If you try to specify a hard disc file that does not exist, a warning is displayed when you start the emulator.

If a file representing a PC hard disc exists, but the emulator has not been configured for it, rather than type the filename into the dialogue box you can drag the file itself into the disc drive filename field in the dialogue box.



Display adaptors (multitasking only)

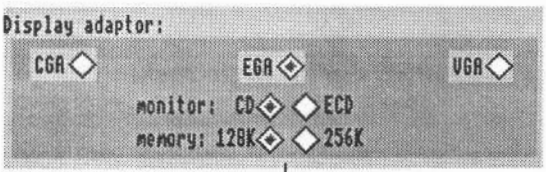
Although there are several different types of display adaptors available, most users should simply choose **EGA**. If you have a multi-frequency or VGA-compatible monitor you can choose EGA monitor **ECD**, in all other cases choose **CD**. You should also choose the least amount of EGA memory needed to run your program; most run with **128K**. However some applications need **256K** to run properly.

Click Select on the adaptor name to select the adaptor required. To disable an adaptor, click Adjust on the highlighted option.

The chosen display should be the simplest that is suitable, as this will use the least RISC OS memory. CGA uses the least memory, followed by EGA and VGA.

EGA Monitor types

With the EGA display you can specify the monitor type it is connected to. The choice is either CD (Colour Display) or ECD (Enhanced Colour Display). CD should be chosen if you have a medium-resolution monitor. If you have a multi-frequency or VGA-compatible monitor you can choose ECD.



Select monitor and memory size here (EGA only)

EGA memory

With the EGA display you can specify the amount of memory to be used in the emulation of the adaptor. You should specify the least amount of memory that will allow the PC program to run. Most programs will run with 128K of memory. Increasing the memory used by the graphics adaptor will increase the amount of RISC OS memory needed to run the emulator.

Startup text

This option will only work correctly if you are booting from a DOS hard disc file.

This option allows you to define an action for the computer to perform after it has booted up correctly. The startup text can be any valid DOS command.

For example, to display the directory you would type in DIR|M. Always use `|M` to end a command (instead of pressing Return).

Don't use this option to type in long lines of commands, it is far better to use this option to start a DOS batch file operation.

Single task only (multitasking only)

This option allows you to start the emulator full screen, without the option of using the emulator in a window. Once in full screen mode you can return to the RISC OS desktop by clicking on Menu (the middle mouse button. You can then click on the Emulator icon again to return to DOS.

The advantage of this option is that substantially less RISC OS memory is used by the emulator.

Erase RISC OS? (single tasking only)

Clicking on this option maximises the memory available to DOS. Using this option gives you approximately 600K of memory on a 1MB computer. If you don't use this option you get about 450K of memory on a 1MB computer.

The option frees up memory by removing all applications you were running under RISC OS and by deleting non-essential RISC OS modules. Make sure you save anything you want to keep **before** you run the emulator using this option.

If you use this option, the only way to return to RISC OS is to restart the computer.

The list of modules that are deleted from memory by this option can be found in the file `!PCEmS.GenBoot.!Modules`. Do not change this file unless you know what you are doing.

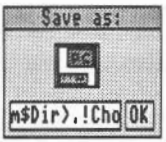
Saving the configuration

Once you have decided which options to use, click on the **Save as** box. This saves your configuration in a file called **!Choices** in the PCEm applications directory. The emulator will now always use these saved options.

Saving different configurations

Although !Choices is the standard file in which to save your configuration, you can save the configuration in any file. Type a new filename into the Save as box and then drag the icon to a directory. The file has a special PC icon.

To use this configuration file, make sure that RISC OS has 'seen' the PC Emulator application, then double-click on the configuration file icon. This starts the emulator with the parameters stored in the configuration file.



You can have multiple configuration files each set up with a different configuration. Double-clicking on the configuration file will start up the emulator with the right configuration.

Creating a second hard disc drive

To create an additional hard disc, load the emulator, but before you start DOS, choose **Configuration** from the icon bar menu, and increase the number of hard disc drive files by one. Check the path name and the desired size of the new hard disc drive file.

Click on the adjacent **Create** button for the **new** drive. There will be a delay while the drive is created.

Save the new configuration by clicking on the **Save as** OK button.

Start the PC Emulator by clicking on the emulator icon, and follow the instructions overleaf to partition and format the new hard disc drive:

Warning: Follow this section carefully, to avoid the risk of formatting your existing drive.

1 Type

`FDISK`

2 You will be asked to enter your desired option from a list of choices. Type

`4`

to choose `Select alternate fixed disk`. This will select the new hard disc drive.

3 You will be asked if you want to `initialize` (format) the new drive. Type

`Y`

to confirm that you do.

4 At the next prompt, type

`1`

to create a DOS partition on the disc, and

`1`

again to make a **primary** DOS partition.

5 You will then be asked if you want to use all the cylinders (space on the new hard disc) for the DOS partition. Type

`Y`

to confirm that you do. The disc partition will then be formatted. When this is complete, you will be prompted for a disc label – a name for the new hard disc – and you can type one in if you do.

Press **Esc** to exit from FDISK.

6 Format the new drive by entering:

```
FORMAT D:
```

Note: If you have three floppy drives the new drive will be E:, not D:. If you have four floppy drives the new drive will be F:.

You may wish to make the drive bootable, in which case type in:

```
FORMAT D: /S
```

Changing the size of a DOS hard disc file

It is not possible to increase or decrease the size of an existing DOS hard disc. If you need a different size, you must first delete the old one (using the RISC OS Filer) and re-create one of a different size, using the emulator. Any important data that you want to keep from the old DOS hard disc should be first copied onto floppy disc, so that it can be transferred back to the new DOS hard disc.

How to delete the DOS hard disc – RISC OS 2 users

In RISC OS 2 the DOS hard disc file is a data file. To delete this file:

1 Display the directory containing the file.

2 Select it.

3 Choose the Delete option from the Filer menu.

As a cautionary note, from the above description, it is easy to see how a DOS hard disc file can quickly be deleted with loss of all data. You should back up the contents of your DOS hard disc on a regular basis, as is good practice with all hard discs.

How to delete the DOS hard disc – RISC OS 3 users

With RISC OS 3, the DOS hard disc is given a file type DOSDisc. This file type cannot be deleted using the Delete option on the Filer; this is to prevent accidental deletion of the DOS disc file.

If you want to delete the DOS hard disc file:

1 Press F12 to enter the command line.

2 Change the file type of the DOS file to Data by typing:

```
SetType adfs::4.$.PC.Drive_C Data
```

If you have used a different pathname, filename or filing system for your hard disc partition you should change this line accordingly.

3 Press the Return key twice.

4 Delete the hard disc file, which now has file type Data, using the Delete option in the Filer.

Creating a new hard disc partition

After deleting your old hard disc partition, create your new hard disc partition. Turn to the section entitled *Hard disc installation* on page 6 or the section entitled *Creating a second hard disc drive* on page 27.

Accessing DOS directories using MultiFS

Introduction

MultiFS gives you DOS disc icons on your icon bar. These display the contents of PC format floppy discs and emulated hard discs in standard RISC OS desktop directory displays.

You can also perform all the standard functions (such as move, copy and delete) in exactly the same way as you would with RISC OS.

MultiFS can be used to transfer files between DOS and RISC OS floppy formats. You can copy RISC OS files onto DOS discs and DOS files onto RISC OS discs. RISC OS files stored on DOS discs can be loaded and run as normal.

It is recommended that RISC OS 3 users use the standard Filer to view the contents of DOS floppy and hard discs. Refer to the RISC OS 3 *User Guide* for more information.

Starting MultiFS

Double-click on the !MultiFS icon. The DOS disc drive icons appear on the icon bar. You won't see the hard drive icon unless you have configured a DOS hard disc drive partition using the PC Emulator.

If you have a DOS hard disc file that is **not** stored using the filename `adfs::4.$.PC.Drive_C` then you should read the next section. If you have used this filename then you can skip to the section entitled *Viewing the* DOS *filing system*.

Configuring MultiFS

If you have a hard disc with a DOS hard disc file and your hard disc file is **not** stored with the filename `adfs::4.$.PC.Drive_C` (`_D`, etc) then you will need to alter the !Run file within !MultiFS.

To edit the !Run file:

1. Hold down the Shift key while double-clicking over the !MultiFS application. This displays the files contained inside the application.
2. Start the standard RISC OS application !Edit.
3. Drag the !Run file onto the Edit icon on the icon bar.
4. Find the following lines:

```
*If "<PCe$Drive_C" = "" THEN *Set PCe$Drive_C ADFS::4.$.PC.Drive_C
*If "<PCe$Drive_D" = "" THEN *Set PCe$Drive_D ADFS::4.$.PC.Drive_D
*If "<PCe$Drive_E" = "" THEN *Set PCe$Drive_E ADFS::4.$.PC.Drive_E
*If "<PCe$Drive_F" = "" THEN *Set PCe$Drive_F ADFS::4.$.PC.Drive_F
```

5. Edit the text `ADFS::4.$.PC.Drive_C` to the correct path name for the file you have configured for DOS drive C.

   If your hard disc drives uses a different type of filing system, such as SCSI, you will also have to edit these lines. For example the Acorn SCSI card will require the path name:

   ```
   SCSI::4.$.PC.Drive_C
   ```

6. If you are emulating additional DOS drives, subsequent lines will also need to be modified.
7. If MultiFS has already been run, then the PCe$Drive_X variables will have been set. Therefore before re-running MultiFS, type the * command

   ```
   Unset PCe$Drive_*
   ```

   or reboot your machine.

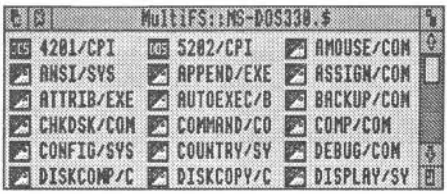
   MultiFS will then use the new PCe$Drive_* variables when it is next run.

The drives specified by <PCe$Drive_D>, <PCe$Drive_E>, and <PCe$Drive_F> will not be accessed if previous drives do not exist (ie C, D, or E).

The !Run file also contains a series of DOSMAP commands. These map RISC OS file types to DOS extension types.

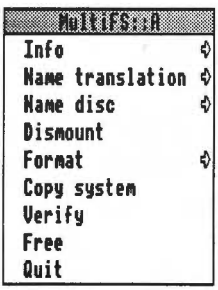
Viewing the DOS filing system

Click on the disc icons to open the directory window for that disc.



The window menu options available for DOS files and directories are exactly the same as those for RISC OS files and directories. Files can be copied and moved between RISC OS and DOS directories in the normal way. However you cannot start a DOS application by double-clicking on its icon.

Icon bar menu options



From the MultiFS icon bar menu you can select:

Info

This gives information about MultiFS, including the software version number and date.

Name translation

ADFS file names are limited to ten characters without an extension, and DOS names are limited to eight characters with a three letter extension. When copying from ADFS to DOS names are truncated to eight characters. The RISC OS filetype of an object is preserved (this works with MS-DOS 3.21 and 3.30, and DR DOS 5.0).

There are three ways in which MultiFS can map DOS names to ADFS:

- **Truncated**: The DOS file separator is replaced with a '/', and if the name, including the separator, is more than 10 characters it will be truncated. For example, README.DOC is translated to README/DOC, whilst AUTOEXEC.BAT is thus translated to AUTOEXEC/B.
- **Full**: As above, but without truncation. However RISC OS will generate an error if an attempt is made to copy a file with a long file name from DOS to RISC OS.

  The error 'not a heap block' is generated if you menu over a long file name (more than 10 characters)
- **Hierarchical**: This converts the DOS extension into a pseudo directory. AUTOEXEC.BAT will thus appear as AUTOEXEC in the directory BAT/

If you are performing DOS to DOS file transfers then use Full name translation. If you are transferring files from DOS to RISC OS, use Truncated name translation. Use Hierarchical when you need to access a DOS file with a long name; for instance, if you wish to use Edit to modify AUTOEXEC.BAT.

Name disc

Name disc lets you give your disc any name up to 10 letters long. Disc names (or volumes) cannot be created which contain spaces (even though some versions of DOS allow this). MultiFS will ignore any text after the first space it finds. A name must be longer than one character.

Dismount

Dismount allows you to close all displayed directories

Format

You can format floppy discs in various formats:

- MS-DOS 720K
- MS-DOS 720K system
- MS-DOS 360K
- MS-DOS 360K system

DOS discs formatted using MultiFS automatically have a volume label. This is of the form "HHMMYYMODD", where:

HH = 00 .. 23 (hours)
MM = 00 .. 59 (minutes)
YY = 00 .. 99 (year in current century)
MO = 01 .. 12 (month)
DD = 01 .. 31 (day)

This provides a unique disc identity for every formatted floppy disc that is similar to that used by the ADFS Filer.

RISC OS 3 users can also use the standard Filer to format floppy discs. If you have an A5000 you can use the Filer to format high density discs (1.44MB and 1.2MB). These densities are not available using MultiFS.

MultiFS does not operate with the high-density discs (1.44MB and 1.2MB) that are available with the A5000; view directories using the RISC OS 3 Filer instead.

Copy system

This is used to make a bootable DOS floppy disc. It takes a copy of the boot block, copyrighted system files, and any user files from a DOS system disc placed in the floppy drive. These files are kept within the MultiFS application (as files called BootBlock and System). The boot block is written onto a disc when it is formatted normally, whilst both the boot block, system files, and user files are written back when a disc is formatted with the system option.

Verify

Verify will verify that a floppy disc does not contain media faults.

Free

Free returns the free space on the disc.

Quit

Choose **Quit** to remove the MultiFS icon(s) from the icon bar.

Translating file attributes between DOS and RISC OS

Since there is not a complete mapping between RISC OS file attributes and those provided by DOS, attributes are set as follows:

From RISC OS to DOS:

- The RISC OS Locked, Public read, and Public write bits are ignored.
- The DOS Archive bit will be set.
- If the RISC OS Write bit is not set then the DOS Read only bit will be set.

From DOS to RISC OS:

- The Archive bit is ignored.
- The RISC OS Public read, and Public write bits are unset.

- If the DOS Read only bit is set then the RISC OS Write bit will be unset and the Locked bit set.

MultiFS command line interface

The following commands are available from the command line (entries marked † also appear on the Filer menu).

DeskTop_MultiFSFiler	Starts the MultiFS RISC OS Desktop filer
MultiFS	Selects MultiFS as the current filing system
DOSMap	Provides MS-DOS extension (.ext) to RISC OS filetype mapping
Format	Format a DOS disc †
Free	Displays free and used byte counts †
NameDisc	Set the DOS volume directory entry †
NameDisk	Set the DOS volume directory entry
Dismount	Forget this disc (close all Filer windows) †
Verify	Verify a formatted DOS disc †
Map	Provide FAT information about the floppy

Using * commands from the command line

Free, **Map**, **Dismount**, **Verify**: Specify the drive with either a drive number (:0 for the first floppy drive, :4 for the first hard disc) or a drive letter (:A, :C, :D, etc). These commands will not accept a drive name.

Cat: The drive can be specified by drive number, drive letter, or drive name. However the case of the drive name must be an exact match.

DOSMap: The DOS extension must be given in upper case.

Running MultiFS and PC Emulator together

Two applications attempting to write to the hard disc at the same time may cause corruption. Therefore it is not generally possible to access the hard disc from MultiFS while the emulator is running.

If the hard disc partition is locked (read only), then both the emulator and MultiFS will be able to read the partition, but not write to it.

Known problems with MultiFS

The intended use of !MultiFS is to transfer files between DOS and RISC OS filer windows in the desktop. It is not recommended that it be used as an alternative general purpose RISC OS filing system.

Clicking menu on a long file name (more than ten characters) with untruncated translation will generate the error 'not a heap block'.

Copying with Hierarchical name translation may attempt to copy the same files many times, so that the copying takes an unacceptably long time. The problem occurs if the source is a DOS directory containing several files of the same extension. The work around is to use Full name translation.

Some characters are valid in DOS filenames but invalid in RISC OS filenames. The characters $, #, *, %, & and ^ are mapped to ?, +, [, ;,] and > respectively. Note that this can cause unexpected behaviour. For example, it is not possible to rename a file whose RISC OS name contains +.

!MultiFS should not be used simultaneously with any other program that offers similar functionality.

Acorn DOS utilities

The mouse driver

AMOUSE.COM is a Microsoft compatible mouse device driver and is supplied as one of the DOS utilities on the DOS system disc.

Load the mouse driver by typing AMOUSE at the DOS prompt. This should be done before starting a program that requires a mouse with a Microsoft compatible mouse driver. Alternatively, add the line AMOUSE.COM to the AUTOEXEC.BAT file. This will load the mouse driver every time you boot the emulator.

If you are working with the emulator in a window and running a program which uses the mouse, you should connect the mouse by using the **Connect mouse** option on the emulator window menu.

Some DOS programs (such as Microsoft Windows 3.0) use the mouse hardware directly and not via the mouse driver. These programs still work correctly as the hardware of a Microsoft bus mouse is also emulated. Therefore AMOUSE.COM need not be run.

The expanded memory device driver

EMM.SYS is an expanded memory device driver and is supplied as one of the DOS utilities on the DOS system disc.

If you wish to use expanded memory, copy EMS.SYS to your disc and put the following line in your CONFIG.SYS file:

```
DEVICE=EMM.SYS
```

When you want to use expanded memory you should fill in the required amount in the **LIM EMS size** box in the Configuration dialogue box.

The PC Emulator supports the LIM EMS 3.2 type of expanded memory.

Transferring files between DOS and RISC OS

The GETFILE and PUTFILE utilities, also supplied on the DOS system disc, are used to transfer files between the DOS and RISC OS filing systems. They are used from within the PC Emulator at the DOS prompt. Normally it is easier to use the MultiFS application for file transfers, but these utilities may be useful in DOS batch files and are included for compatibility with previous versions of the PC Emulator.

The utility GETFILE allows the transfer of files from RISC OS to DOS and has the following syntax:

```
GETFILE <RISC OS source filename> <DOS destination filename>
```

For example:

```
GETFILE ADFS::FD.$.LETTERS.BANK A:\LETTERS\BANK.DOC
```

The utility PUTFILE allows the transfer of files from MS-DOS to RISC OS and has the following syntax:

```
PUTFILE <DOS source filename> <RISC OS destination filename>
```

For example:

```
PUTFILE A:\SHEET\ACCOUNT.SHT ADFS::FD.$.SHEET.ACCOUNT
```

Using GETFILE and PUTFILE on single floppy drive systems

To transfer files between a RISC OS disc and DOS disc with only a single floppy drive, either a RISC OS RAM disc or a DOS RAM disc must be used. If you have sufficient RISC OS memory, use a RISC OS RAM disc, as the procedure is much easier. If you are short of RISC OS memory but have sufficient DOS memory, use a DOS RAM disc.

Using a DOS RAM disc to transfer files.

1. Start up the PC Emulator and DOS.
2. Make sure that the DOS Startup/Install disc is unprotected.
3. From the A> prompt type:

   ```
   ECHO DEVICE=VDISK.SYS >> \CONFIG.SYS
   ```

4 Re-boot the PC Emulator by holding down the Ctrl and Alt keys and pressing and releasing the Delete key.

5 The screen will clear and you will get a message saying that a RAM disc has been created on drive C.

With the RAM disc created you can now start to copy files between ADFS and DOS. First copy the GETFILE or PUTFILE programs into the RAM disc, using

```
A>C:
C>COPY A:PUTFILE.EXE C:
C>COPY A:GETFILE.EXE C:
```

If you are transferring files from ADFS, you can now put the ADFS disc into the drive and type, for example:

```
C>GETFILE ADFS::FD.$.MYFILE MYFILE.DOC
```

If you are putting files onto an ADFS disc, first copy the files from your DOS disc into the RAM disc and then use PUTFILE to transfer them to the ADFS disc.

Using a RISC OS RAM disc to transfer files

You cannot use this option if you have configured the single tasking emulator to use the Erase RISC OS? option.

1 Create a RAM disc as described in your RISC OS *User Guide*.

2 If you are **transferring a file from ADFS to DOS** put the ADFS disc into the drive, and copy the file from the floppy disc into the RAM filing system (click on the RAM filing system icon on the icon bar to open up a directory display for it).

3 Start up the PC Emulator and DOS.

4 Insert the DOS floppy disc into the drive. This disc must also hold GETFILE.EXE and PUTFILE.EXE.

5 At the DOS prompt type in:

```
GETFILE RAM:$.MYFILE MYFILE.DOC
```

(replacing `MYFILE` with the name of the file to be transferred).

6 If you are **transferring a file from DOS to ADFS**, start up the PC Emulator and DOS.

7 At the DOS prompt type in:

```
PUTFILE MYFILE.DOC RAM:$.MYFILE
```

(replacing `MYFILE` with the name of the file to be transferred).

8 If you are in single task mode or using PCEmS, return to RISC OS by clicking Menu.

9 Insert the ADFS destination disc. Open a directory display for the RAM disc by clicking on its icon on the icon bar. Copy the file from the RAM disc to the floppy disc.

A brief introduction to DOS

Below is a list of some of the most commonly-used commands with a brief description. These commands are common to both MS-DOS 3.30 and DR DOS. See the list of suggested DOS books for more information about DOS.

CD (or CHDIR)

CD (or CHDIR) is used to change the current directory. For example:

```
A>CD A:\LETTERS
```

changes the current directory of drive A to the directory LETTERS in the root directory of drive A. The following example:

```
A>CD B:\BILLS\GAS
```

changes the current directory of drive B to the directory GAS in the directory BILLS on drive B.

To return to the root directory, type

```
CD \
```

To go up a level, type

```
CD..
```

CHKDSK

CHKDSK is used to check that a disc is correctly set up. It displays the total amount of space on the disc, the amount of unused space remaining and the number of files stored. In addition to this, CHKDSK displays the amount of memory the emulator makes available as PC memory and the amount of that which is free for applications. For example:

```
A>CHKDSK /V
```

lists all files and their paths.

```
A>CHKDSK /F
```

allows you to fix any problems that have been identified.

CLS

CLS is used to clear the screen.

COPY

COPY is used to copy files or directories between drives on the system. For example:

```
A>COPY B:TEST.COM
```

copies TEST.COM from drive B to the current directory of drive A, while:

```
A>COPY B:\LETTERS B:\BILLS
```

copies the contents of the directory LETTERS on drive B to the directory BILLS on drive B.

DISKCOPY

DISKCOPY copies the contents of the floppy disc in the source drive to a formatted or unformatted floppy disc in the target drive. For example:

```
A>DISKCOPY A: B:
```

copies the contents of the disc in A to the disc in B. In the case of a system with a single floppy drive, A: and B: are the same physical drive and you are prompted to change discs as necessary.

DATE

DATE returns the system date and prompts for a new date to be entered. Note that the default date format is American, ie MM/DD/YY. If you do not want to change the date, just press Return.

DIR

DIR is used to catalogue the current directory. DIR on its own lists the files one per line. The following example:

```
A>DIR B: /W
```

lists the files on drive B. The /W denotes that they are displayed five per line.

ERASE (or DEL)

ERASE allows you to delete files from a disc (an alternative form is DEL). For example:

```
A>ERASE *.COM
```

erases all files with the .COM extension, while:

```
A>ERASE B:\TEST
```

erases all files in the TEST directory on drive B.

```
A>ERASE *.*
```

erases all files in the current directory.

FORMAT

FORMAT is used to prepare new blank floppy discs to store data and programs on. For example:

```
A>FORMAT B:
```

formats the disc in drive B. You will be prompted to insert the new disc before formatting starts.

```
A>FORMAT A: /S
```

formats the disc in drive A and copies the system files onto the disc, so making it bootable.

MKDIR (or MD)

MKDIR (or MD) is used to create new directories on the disc. For example:

```
A>MKDIR BILLS
```

creates a directory called BILLS from the current directory, while:

```
A>MD B:\TEST
```

creates a directory called TEST from the root on drive B.

RENAME (or REN)

RENAME allows you to change the name of a file. For example:

```
A>REN BILLS OLDBILLS
```

renames the file BILLS to one called OLDBILLS.

RMDIR (or RD)

RMDIR deletes a directory from the disc. The directory must be empty before it can be deleted. For example:

```
A>RMDIR LETTERS
```

deletes the directory called LETTERS on the current drive (A).

TIME

TIME returns the system time and prompts for a new time to be entered. If you do not need to change the time, just press Return.

TYPE

TYPE allows you to display the contents of a text file on the screen. For example:

```
A>TYPE B:MYFILE.DOC
```

displays the contents of MYFILE.DOC on drive B.

XCOPY

XCOPY copies complete directories, subdirectories and files. For example:

```
A>XCOPY ARCHIVE B:
```

copies the file ARCHIVE to the B drive.

```
A>XCOPY APPS B: /S
```

copies the directory APPS and any lower level subdirectories and files onto the B drive. It does not copy empty directories.

Appendix A: The PC Emulator

Compatibility

The compatibility of the emulator is very good. Many well known DOS titles have been tested and operate correctly. These include:

- Database:
  - DBase IV
  - Retrieve
  - Neris
  - Simis
- Spreadsheet:
  - Excel
  - Lotus 123 V2.1
  - SuperCalc 4
  - Symphony
  - MS Works
- Publishing:
  - Timeworks
  - Ventura 2.0
  - DeskPress 1.01
- Word processing:
  - Brief
  - MS Word V5
  - Wordstar Prof V6
  - WordPerfect
- Planning:
  - PC Planner
  - BYL
- Communications:
  - Crosstalk
  - Procomm
  - DR DOS FileLink
- Programming:
  - MS MASM
  - MS C V5
  - Quick C
  - GWBasic
  - Turbo Pascal V5
  - SmallTalk/V
  - ProFORTRAN77
- Graphical user interfaces:
  - Windows 3
  - GEM 3
  - DR DOS ViewMax
- Operating systems:
  - MS-DOS 3.21 (but must use DRIVPARM = /D:0 /F:2)
  - MS-DOS 3.30
  - DR DOS 3.41
  - DR DOS 5.0

However, it is not possible to run all of these on a single-floppy drive or 1MB A3000, as some require VGA (and hence a 2MB or 4MB computer), while others have been designed to be run from a hard disc and will not fit on a 720K or 1.44MB floppy disc. Check with your Acorn supplier as to the suitability of your system for particular DOS titles.

The emulated PC – a technical description

For some DOS applications (particularly during installation), it is necessary to know the exact nature of the PC and what attached devices the PC Emulator emulates.

The emulated PC is basically an IBM PC XT, but in more detail the emulated PC contains the following components:

- Intel 80188 processor chip
- Intel 8087 maths coprocessor chip
- Intel 8259 interrupt controller chip
- Intel 8253 timer chip
- Intel 8237 DMA chip
- Intel 8255 IO chip
- Sound connected via 8255 chip
- Enhanced 101 key US layout keyboard connected via 8255 chip
- Serial interface (Intel 8250 chip)
- Parallel interface (output only)
- 3.5 inch 720K/1.44MB floppy disc (BIOS level only)
- External 5.25 inch 360K floppy disc (BIOS level only)
- Hard disc (BIOS level only)
- Real time clock (BIOS level only)
- CGA
- EGA (not PCEmS)
- VGA (not PCEmS)
- Two-button Microsoft bus mouse

- Conventional memory (max 640KB)
- Expanded memory (max 4MB) using LIM 3.2 (not PCEmS)
- ROM BIOS.

Some PC devices are only emulated at the BIOS level. This means that the hardware of the device is not emulated, only the BIOS interface to the device. DOS programs that attempt to access the hard disc IO ports will fail because they are not emulated, but DOS programs that access the hard disc via the BIOS will work correctly. Other devices are emulated at the hardware level, for example, the graphics adaptors. Programs that access the graphics adaptor hardware directly will work correctly.

Unsupported features

- Programs written for 80286, 80386 and later processors.
- EGA screen blanking not supported.
- EGA smooth scrolling not supported.
- EGA Print screen (screen dump) is not supported.
- EGA does not support plane chaining. The consequence is that in 64K mode certain PC screen modes are unavailable.
- Some limitations in sound emulation.
- DMA chip is not fully implemented.
- Blinking text is not supported.
- Long start-up texts in the configuration file may fail. Use the start-up text to run a .BAT file.
- 3.5" discs formatted under DOS 3.21 will, by default, be formatted to 360KB rather than 720KB. To overcome this, add the following line to your CONFIG.SYS file:

  DRIVPARM = /D:0 /F:2

  If you have a second drive then also add

  DRIVPARM = /D:1 /F:2
- MS-DOS 3.21 and MS-DOS 3.30 can access only two configured hard disc partitions. DR DOS 3.41 and DR DOS 5.0 can access four (although DR DOS FDISK will only recognise two at a time).

Application configuration options

If the PC application you are using allows any configuration options on how to address the screen, typically called Direct and BIOS, then choose BIOS. ProComm is one such application.

If the application offers a choice in performing scrolling, then do not select hardware scrolling. Locoscript is one such application.

Editing the !Choices file directly

This section is for experts only! Most people won't need to edit their Choices file in this way.

The configuration that you chose using the Configuration window is saved in the file !Choices. This is a plain text file and can be altered using !Edit. The only reason you may want to do this is to make an installation that is not directly available from the Configuration window.

The only two options that are not directly available are:

- 64K memory option for EGA memory.
- Options for a third and fourth DOS hard disc file.

DR DOS can support four DOS hard disc files. The drives must firstly be formatted as two sets of two. This is due to the two disc limitation in FDISK. MS-DOS 5 can also support four DOS hard disc files in the same way.

Possible problem areas

CGA Emulation in single-tasking mode

Some monitors (and televisions via the TV modulator) will not operate correctly when run with a CGA display in single-tasking mode (this is the only option with the single tasking emulator). This is due to the field rate being 60Hz.

To cure this problem you should:

1 Load Edit onto the icon bar.

2 Open the application directory by holding down the Shift key and double-clicking over the PCEm (or PCEmS) icon in the directory window.

3 Drag the file !Run onto the Edit icon. This display the contents of the file.

4 Comment out the line in the !Run file that reads:

```
RMEnsure ModesCGA 1.00 RMLoad <Obey$Dir>.ModesCGA
```

To comment out the line, type in the bar character (|) at the start of the line so that the line now reads:

```
|RMEnsure ModesCGA 1.00 RMLoad <Obey$Dir>.ModesCGA
```

5 Press F12 to access the command line. Type in:

```
RMKill ModesCGA
```

6 Press Return twice to display the desktop.

If you don't understand this procedure, contact your dealer for help.

This procedure removes the special 200 line screen mode and the CGA display will now use the standard 256 line screen mode; this results in a slightly smaller screen area.

Screen colours

When working in windowed mode, particularly in a 16-colour RISC OS mode (for example, mode 12), the DOS colours will often not be mapped correctly. This is because the 16 colours used by RISC OS are not the same colours used by DOS. This is less apparent in a 256-colour RISC OS mode (such as mode 15). The colours will be mapped correctly in single-tasking mode. The 256 colour VGA mode 19 will have slight colour errors as RISC OS does not give 256 independent colours, which VGA requires.

EGA and VGA Compatibility

The EGA and VGA graphics adaptors are very complex devices and it is possible to configure them in many ways other than the standard BIOS supported screen modes. It is possible that some PC programs (games) using such non-standard register configurations, may not behave correctly.

Parallel port

The parallel port supports output only.

Copy protection

In general, copy protected software will not run on the emulator.

The restrictions on the parallel port mean that software titles which employ copy-protection via this port may not run.

Similarly, other titles using certain methods of floppy disc protection will not work under the emulator.

Keyboard configuration

Within MS-DOS, the default keyboard configuration is that of a US keyboard, and this is the recommended configuration (the keyboard resembles a US style keyboard more than a UK style keyboard). Computers with keyboards designed for use in other countries should be configured to that country.

To configure your keyboard for another country use the DOS utility program KEYB.COM.

With the default US keyboard layout, the key to the left of the backspace key has no effect. To enter the £ symbol, hold down Alt and type 1 5 6 on the numeric keypad.

Formatting under MS-DOS 3.21

3.5" discs formatted under DOS 3.21 will, by default, be formatted to 360KB rather than 720KB. To overcome this, add the following line to your CONFIG.SYS file:

DRIVPARM = /D:0 /F:2

If you have a second drive then also add

DRIVPARM = /D:1 /F:2

The serial interface

The serial chip in early A305, A310, and A440 machines contained a number of faults which affected hardware handshaking. If you have such a machine and are having problems with the serial port, please contact your dealer.

Always configure any serial communications packages to use hardware handshaking. Do not use XON/XOFF handshaking (this is likely to fail because of the extra layer of buffering provided by RISC OS between the PC application and the serial chip).

When using serial communications the emulator should be in single task mode (in multitasking mode, other RISC OS applications may deny the PC Emulator enough computer power to emulate the serial chip fast enough).

Talking to a serial printer

Use an IBM AT to serial printer cable.

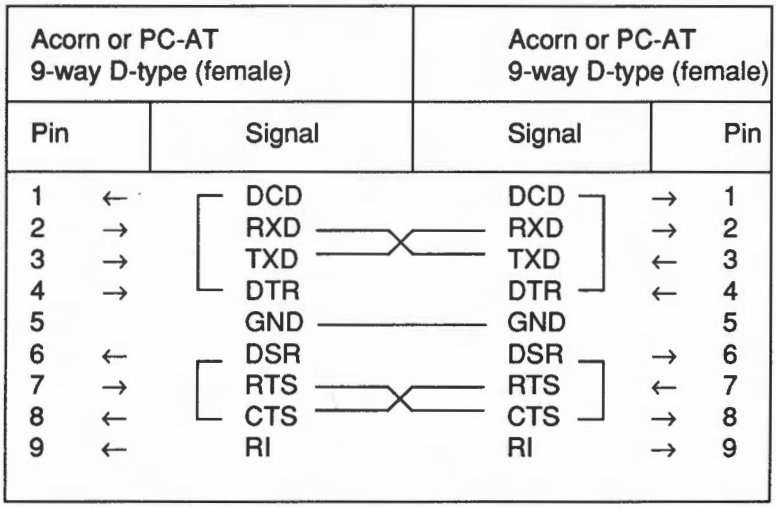
Talking to a modem

With a modem the signals are wired straight through; therefore an IBM AT to modem cable will usually work. This should be wired as follows:

Acorn computer 9-way D-type (female)			Modem 25-way D-type (male)		
Pin		Signal	Signal		Pin
1	←	DCD	DCD	→	1
2	→	RXD	RXD	→	2
3	→	TXD	TXD	←	3
4	→	DTR	DTR	←	4
5		GND	GND		5
6	←	DSR	DSR	→	6
7	→	RTS	RTS	←	7
8	←	CTS	CTS	→	8
9	←	RI	RI	→	9

Talking to another PC

The following cable will allow communication between two Acorn computers, two IBM ATs, or between an Acorn computer and an AT:



Baud rates

With hardware handshaking enabled and operating in single-tasking mode the emulator can operate at up to 9600 baud (although the actual transfer rate will be considerably lower).

Without handshaking the maximum data rate is 300 baud.

Appendix B: Upgrading

Upgrading from your existing PC emulator

Floppy disc users

If you have a floppy disc only machine, use the !Merge application supplied on the emulator disc to merge the new System application with your current versions. Then use the new PC Emulator disc in place of your old one. Your data and applications will continue to work. Turn to page 7 for more information about !Merge.

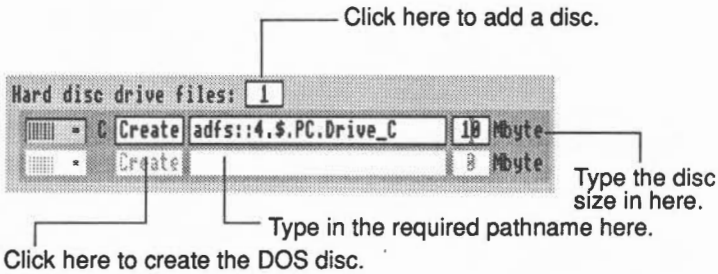
Always reboot your computer after using !Merge.

Hard disc users

The following instructions tell you how to upgrade your PC Emulator:

1. Make a note of the pathname of the RISC OS file used by the emulator as a DOS hard disc.
2. Delete the old PC emulator and its associated files from your hard disc. **Do not delete your existing hard disc file.**
3. Copy the new MultiFS and PCEm (or PCEmS) applications into your PC directory. You do not need to create a DOS hard disc file, as you already have one.
4. Set the Hard disc drive files option in the Configuration dialogue box to One (by clicking on the number box) and type in the pathname of your existing DOS hard disc file.

Alternatively, drag the hard disc file icon onto the appropriate Hard disc drive files box. This changes the pathname to that of your disc drive file. **Do not click on Create**.



5 Save the new configuration and start the new emulator. The emulator will now boot using your existing DOS hard disc.

If you are also going to upgrade your version of DOS, do this by following the instructions in the following section.

Upgrading from your existing version of DOS to MS-DOS 3.30

You should upgrade to the new version of the PC Emulator before upgrading your version of DOS.

Floppy disc users

If you have a floppy disc only machine, you should stop using your old DOS system disc and any copies of the system disc you have made. You should also make sure that you no longer use any of the utilities provided with the old system disc. In place of the old DOS, use the new DOS disc.

Your data and applications discs will continue to work.

Hard disc users

When you upgrade your version of DOS you must:

- Use the SYS command to copy over the hidden DOS system files.

- Delete your old COMMAND.COM file and copy over the new version from the DOS system disc.
- Delete all your old DOS utilities (those that came on the old DOS system disc) and copy over all the new DOS utilities.

Before you start this procedure it is recommended that you make a backup of your PC hard disc files on floppy disc.

The following instructions describe how to update to MS-DOS 3.30 on drive C:

1 Insert the MS-DOS 3.30 system disc into the floppy drive.

Start the emulator (by clicking on the PC Emulator icon). This will boot up MS-DOS 3.30.

2 At the A> prompt, type in:

```
SYS C:
```

This will transfer the DOS 3.30 system files onto drive C, overwriting the earlier system files. If the old system is on a different drive, perhaps D, then type in SYS D:

3 Type in:

```
COPY COMMAND.COM C:
```

(assuming drive C).

4 Replace the old DOS utilities with the new utilities on the MS-DOS 3.30 disc by deleting your existing DOS utilities and then copying the new utilities from the DOS System disc.

The exact way this task is undertaken will depend on where you have placed your DOS utilities. If you have placed your DOS utilities in a subdirectory such as C:\DOS you could type:

```
DEL C:\DOS\*.*
```

This deletes all the files in the DOS directory.

5 Now copy the new utilities from the floppy disc:

```
COPY A:*.* C:\DOS
```

Remember to update any utilities copied to the root directory.

6 Remove the floppy disc and reboot DOS.

The emulator should now boot with DOS 3.30.

Warning. The SYS command may not always work (this is a DOS problem). In which case you should choose one of the following options:

- If you have room on your hard disc, create a new DOS hard disc file and load the new version of the operating system onto this partition, then copy your files and directories from the old DOS hard disc to the new DOS hard disc. Don't copy the old DOS utilities over, use the new ones.
- Back up your existing hard disc partition and then reformat the partition using the new version of the operating system.

Do not use the DOS BACKUP command to backup your hard disc. It does not work consistently between DOS versions. You should use COPY or XCOPY to transfer the files and directories to floppy disc.

Appendix C: The CD ROM support disc

Reading CD ROM discs using the PC Emulator

Many CD ROM titles are written in PC format, so to get the best out of these, the PC Emulator should be used.

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. VGA can be chosen for an 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 the PC Emulator. Switch to **Single task** mode (from the icon bar menu) to be able to display a full screen, and for faster response.

Loading the PC support software

With your Acorn PC Emulator, you will find 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 will need to format a new system floppy disc on which to save the new software before running the installation program. To do this, put a floppy disc in the drive and type:

```
FORMAT A: /S
```

Remove this disc from the drive, and put the disc labelled CD ROM *Support disc* into the drive. Type:

```
A:
```

then

```
INSTALL
```

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

If you boot DOS from a hard disc, type the hard disc drive letter (typically C), when prompted for a drive letter on which to install this software.

If you boot DOS from a floppy disc, type A, and insert the newly-formatted system disc when prompted for your boot disc by the installation program. Press Space.

When you are prompted to insert the disc containing MSCDEX.EXE, put the CD ROM *Support disc* back in the drive.

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.

Your computer will now behave like a PC with a CD ROM drive attached.

Reading PC format CD ROM discs

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 which comes with each title for information on playing CD ROM discs.

Performance limitations

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 the CD ROM drive, so this problem does not often arise.

Microsoft Windows

Certain CD ROM applications contain their own version of Microsoft 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 3 application available separately from a PC dealer.

Improving the performance of 2MB machines

2MB is very much the minimum memory you need for accessing CD ROM drives using the PC Emulator – 4MB is preferable. If you are limited to 2MB, there is a number of things you can do to make best use of your available memory:

- Don't have any other tasks running in the desktop at the same time – it is usually a good idea to reboot the machine prior to loading the PC Emulator to make sure that all memory is available.
- Create a !Deskboot file (which is called from the !Boot file by adding the line `Desktop -f Deskboot` to the end of your !Boot file).

  The file should contain the line

  `run` *`filesystem::drive_num.pathname`*`.!PCEm`

(Substitute the appropriate path name for your PC Emulator.) This will ensure that the PC Emulator is installed on the icon bar when you reboot the machine. You should not load any other application from the boot file when loading the PC Emulator this way.

- If the amount of memory available to user applications while running the PC Emulator is not quite enough to run a certain application, some memory can be made available by reducing the amount of memory set aside for disc buffers. You can do this by typing the commands:

  ```
  Co. ADFSDirCache 16K
  ```

  ```
  Co. ADFSBuffers 16K
  ```

  (or, if you have a SCSI hard disc:

  ```
  Co. SCSIFSBuffers 16K)
  ```

  It is not recommended to reduce the size of disc buffers below 16K as this is likely to have a detrimental effect on performance.

- Certain MS-DOS applications contained on CD ROM discs need to be transferred to the hard disc. This operation sometimes requires a lot of memory. As the installation of an application doesn't require a fancy graphics mode, configure the display under the PC Emulator to CGA prior to running it. When you have installed the application, quit the PC Emulator, reconfigure to the desired screen display and then run the PC Emulator again.

- Every time you add a new device driver to MS-DOS, you reduce the amount of memory available to user programs. Only add device drivers for the devices that you use with your system. Device drivers loaded are shown in the CONFIG.SYS file, where you can edit out drivers you do not require.

- The PC Emulator comes with a new RISC OS screen mode – mode 43. Before you run the PC Emulator it is wise (for memory reasons) to change mode to 43. This can be achieved either from the command line (`Con. wimpmode 43`) or the Mode entry in the Palette menu (type 43 in the bottom line of the

menu and press Return). Mode 43 is loaded with the PC Emulator, so you will only be able to use this mode when the PCEmulator icon is on the icon bar.

- Always use the display mode appropriate to the application running under the PC Emulator. Running an application that only requires CGA mode in EGA 256K or VGA mode doesn't gain you anything and may reduce the amount of memory available for your applications.
- If you are content with using the emulator in full screen mode and don't want to use the emulator in a window, tick the option **Single task only** in the **Configuration** window. This has the effect of running the emulator in full screen mode only. This method of operation uses less memory and makes the emulator perform slightly faster.

Altering the default configuration of your system

The device driver

The DOS device driver CDFS_DRV.SYS can be configured by entering the following statement in CONFIG.SYS:

```
DEVICE=C:\DRIVERS\CDFS_DRV.SYS /D:MSCD001 /N:n
```

where `n` is the maximum number of drives that can be accessed from the PC Emulator. If you have more than `n` drives actually connected, only the first `n` drives will be accessible. The parameter `/D:` is the name of the device driver, and should not be changed unless a corresponding change is made for MSCDEX.EXE.

MS-DOS CD ROM extensions

The file containing the MS-DOS CD ROM extensions is called MSCDEX.EXE. This can be configured by entering a statement into AUTOEXEC.BAT; for example:

```
C:\DRIVERS\MSCDEX /D:MSCD001 /L:F
```

where MSCD001 is the name of the device driver (see above), and F is the drive letter assigned to the CD ROM drive. Other parameters are:

/M: The number of cache buffers for MSCDEX.EXE (8-15), the default being 8.

/V: Display verbose message during boot-up, detailing memory usage and diagnostic information.

/S: Patch the operating system to permit CD ROM drive sharing on an MS-NET based network server (for information only – not implemented under the PC Emulator).

/D: Specifies the CD ROM device driver name, as for CDFS_DRV.SYS.

/L: Assigns the drive letter of the first CD ROM drive.

/E: MSCDEX.EXE makes use of extended memory, if this is available.

Appendix D: Programming details

Access to RISC OS

DOS programs can gain access to RISC OS by using a special (new SVC) 8086 opcode. This is an opcode that is unused on a real 8086 but the PC Emulator traps and uses it to communicate with RISC OS. The utility programs GETFILE.EXE and PUTFILE.EXE use this SVC opcode to transfer files between the RISC OS and MS-DOS filing systems. There is also a PC I/O mapped device that allows RISC OS events to be seen by the PC and can cause the PC program to be interrupted if required.

The SVC Opcode

The new pseudo 8086 SVC opcode has the following format:

```
FF FF nn nn
```

It is four bytes long, the first two bytes being hexadecimal FFFF, the third and fourth bytes being a 16-bit number that indicates to the emulator what service is required. For example, the SVC opcode to translate an 8086 address to an ARM address could be assembled in Microsoft MASM using:

```
dw -1,257
```

Only a few of the possible SVC numbers are actually used. Not all of the numbers that are used are described here, as many are used for internal purposes. Only those SVC numbers described below should be used by a DOS application.

SVC 257

Translate 8086 address to ARM address.

On entry

ES:BX 8086 address

On exit

DX:AX 32 bit ARM address
CY = 1 if error
CY = 0 if okay

SVC 258

General purpose SWI.

On entry

DX:AX = 'safe' (DH='s', AL='e')
ES:BX = pointer to parameter block

Parameter block (must be dword, ie 4 byte, aligned)

dword 0 SWI number
dword 1 R0
dword 2 R1 ...
dword 15 R14
dword 16 R15 *(flags only, does not contain the PC)*

On exit

If the carry (CY) flag is clear, the parameter block is valid. In this case if the V flag in the returned R15 is clear the SWI was executed successfully and the parameter block will be updated with the values in the registers returned by the SWI. If the V flag was set, then the SWI failed.

If the carry flag is set, the parameter block is malformed. The top bit (bit 31) of the SWI number will be set, and the remainder of the SWI number will contain an error code:

0 – general failure
1 – invalid signature
2 – command block not in user RAM
3 – alignment error
4 – SWI number is out of range
5 – SWI number is protected

The RISC OS PC Device

This is a PC I/O mapped device at PC ports 0x700 and 0x701. It allows RISC OS events to be seen by the PC emulator.

An ARM Event 13 will generate a PC IRQ3. These will be queued (up to at least four entries). The RISC OS PC device allows the 8086 to examine the event registers.

Port 700H

Read

bit 0	set if interrupt requested
bit 1	set if overrun (event buffer overflowed)

Write

bits 0 - 1	select byte within word (00 = LSB of word)
bits 2 - 5	latched register contents (r0 to r15) (only registers 0 to 2 can be read)
bit 6	must be zero (reserved)
bit 7	clears interrupt status, enables subsequent events

Port 701H

Read only

Gives the ARM register content at the time of Event 13 being queued. The byte that is read is determined by writing to port 700H (see above).

Appendix E: Further reading

ABCs *of* MS-DOS by A R Miller, published by Sybex.

IBM PC: A*n introduction to the operating system*, BASIC *programming and applications* by L J Goldstein, published by Prentice-Hall.

IBM PC-DOS *handbook* by R A King, published by Sybex.

U*nderstanding* MS-DOS by K O'Day, published by Sams.

M*astering* DOS: T*he complete tutorial and up-to-date user's guide* by Judd Robbins, published by Sybex.

R*unning* MS-DOS F*ourth Edition* by Van Wolverton, published by Microsoft Press. ISBN: 1-55615-186-1.

U*sing* PC-DOS T*hird Edition* by Chris DeVoney, published by Que Corporation. ISBN: 0-88022-419-3.

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Reader's Comment Form

PC E*mulator* MS-DOS (*Version* 1.8)

We would greatly appreciate your comments about this Manual, which will be taken into account for the next issue:

Did you find the information you wanted?

Do you like the way the information is presented?

General comments

If there is not enough room for your comments, please continue overleaf

How would you classify your experience with computers?

☐ **Used computers before** ☐ **Experienced User** ☐ **Programmer**

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