INSTALLATION GUIDE

Acorn

INSTALLATION GUIDE

Guidelines for safe operation

The equipment described in this guide is designed and manufactured to comply with international safety standards IEC380 (BS5850), and is intended for use only as a desktop computer. It must not be used for other purposes. It is most important that unpacking and installation is carried out in accordance with the instructions given in this Guide. In the interests of continued safe and reliable operation, observe the following guidelines:

- Keep the machine at a room temperature of +5°C to +35° C (+41° to +95° Fahrenheit) and a relative humidity of 15% to 80% (non-condensing).

- Avoid sudden extremes in temperature, exposure to direct sunlight, heat sources (such as an electric fan heater) or rain.

- Make sure that the equipment is standing on a suitable rigid horizontal flat surface, allowing enough space for air to circulate when it is in use.

- Ensure that wires and cables are routed sensibly so that they cannot be snagged or tripped over. Don't tug or twist any wires or cables, or use them to hang or lift any of the units.

- Make sure you have read and understood any installation instructions supplied with upgrade kits before attempting to fit them. If you have any doubts, contact your supplier.

- Keep the original packaging in case you need to transport the computer, and avoid bumping or jarring it in transit.

- Switch off and unplug the equipment and any accessories before opening any unit, to install an upgrade, for example. The main computer unit must normally be operated with the cover secured, but it can safely be switched on with the cover removed, provided that care is taken not to short circuit any connections or to allow any fingers or objects in the area of the fan or disc drives when these are running. Be especially careful with jewellery.

- DON'T attempt to open any display or monitor unit, whether supplied with the equipment or not.

- DON'T spill liquids on the machine. If liquid does spill, turn the machine off immediately and take it to your supplier for assessment.

- DON'T drop the equipment or subject it to excessive bumping and jarring. This is particularly important if you have a hard disc installed.

- DON'T obstruct or poke objects through the ventilation openings in the computer casing, or cover them with anything.

- DON'T exceed the maximum power consumption of 8 watts from each expansion card slot.
- DON'T balance any objects, or stand equipment weighing more than 15kg (33lbs) on top of this equipment.

Warning: this computer must be earthed.

Important: The wires in the mains lead for the computer are coloured in accordance with the following code:

Green and yellow:	Earth
Blue:	Neutral
Brown:	Live

For United Kingdom users

The moulded plug must be used with the fuse and fuse carrier firmly in place. The fuse carrier is the same basic colour (though not necessarily the same shade of that colour) as the insert in the base of the plug. Different manufacturers' plugs and fuse carriers are not interchangeable. In the event of loss of the fuse carrier, the moulded plug MUST NOT be used. Replace the moulded plug with another conventional plug wired as described above, or obtain a replacement power lead from an authorised dealer. In the event of the fuse blowing, it should be replaced, after clearing any faults, with a 5-amp fuse that is ASTA approved to BS1362.

For all users

If the socket outlet available is not suitable for the plug supplied, first check that the outlet is not of a different mains voltage or frequency from the computer. Provided it' is the same, either a different lead should be obtained or the plug should be cut off and the appropriate plug fitted and wired as noted below. The moulded plug which was cut off must be disposed of as it would be a potential shock hazard if it were to be plugged in with the cut off end of the mains cord exposed.

As the colours of the wires may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured green and yellow must be connected to the terminal in the plug which is marked by one of the following: the letter E, the safety earth symbol, the colour green, or the colours green and yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N, or coloured black.

The wire which is coloured brown must be connected to the terminal which is marked with the letter L, or coloured red.
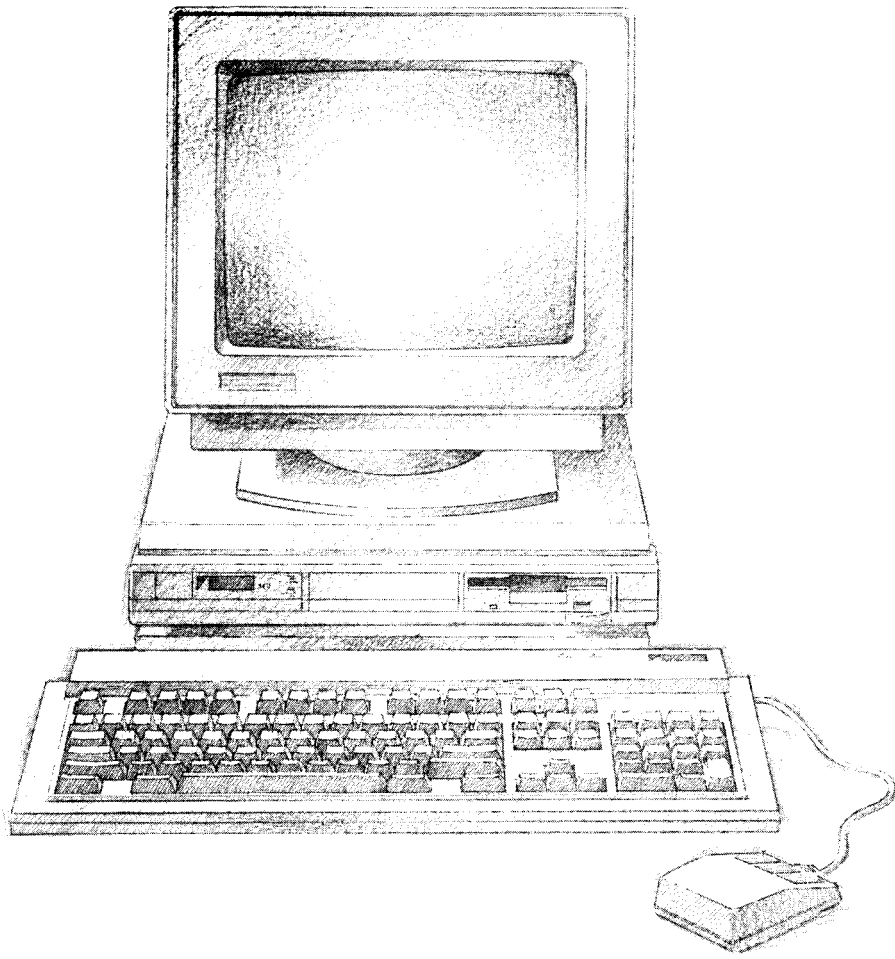
About this guide

This is the first in a series of guides for owners of Archimedes 540 and Acorn R200 series workstations. It takes you through the stages of unpacking and setting up, powering up, and starting to use your workstation.

You need to read this guide *first,* and then you can go to the other books supplied with your workstation to find out more information. To help you decide which books will be of most use to you, there is a diagram on the next page that shows you what the other books contain.

You should be aware that although this is basically a hardware installation guide, the computers described in it use two operating systems: the Archimedes 540 uses RISC OS, and the Acorn R200 series workstations use RISC iX and RISC OS.

Structure of this guide

Part 1 of this guide introduces your new computer; the first three chapters explain how to connect your computer together, and describe what happens when you switch it on. The fourth chapter gives you some advice on what to do if things go wrong.

Part 2 is a tutorial for Archimedes 540 owners, and those owners of Acorn R200 series computers who want to use RISC OS. If you only want to use RISC iX, you can miss out this part, and go straight to Part 3.

Part 3 of the guide gives you some advice about looking after your computer. It also contains some more detailed information about the computer, which you may need to refer to when you want to use equipment such as printers. The pages in this part are marked with a shaded rectangle on the edge.

INSTALLATION

Installation Guide (Parts I+III)

RISC iX

RISC OS

SCSI Expansion card User Guide

Getting started with RISC iX

Getting started with RISC OS

RISC iX User Guide (Part I)

Installation Guide (Part II)

Using RISC iX

| *RISC iX User Guide (Part II)* | *RISC iX System Administrator's Guide* | *X Window System Administrator's Guide* |

Using the RISC iX desktop

Using RISC OS

X.desktop Guide

RISC OS User Guide

Other sources of information

The following list shows some other manuals which you may find useful. They are available from your Acorn supplier.

- *RISC iX Programmer's Reference Manual, Volume 1 — Kernel and Languages*
- *RISC iX Programmer's Reference Manual, Volume 2 — Network File System*
- *RISC OS Programmer's Reference Manual*
- *BBC BASIC User Guide (RISC OS)*
- *Archimedes 540 Technical Reference Manual (also covers Acorn R200 Series) .*

Contents

Part 3 - Hardware reference section

This part contains technical reference information and more detailed installation instructions, along with some advice on looking after your *computer. The pages in this part are marked with a grey block* on *the edge* of *the* paper.

XII

Part 1 - Getting started

Unpacking

This chapter tells you about unpacking your computer, and gives some hints on where to set it up.

Unpacking

Unpack your computer on a flat surface – a large table where there's plenty of room for the box as well as for the computer is best. Take all the items out of the box, making sure you don't break the foam packing material, as you may need this later.

Checklist

When you open the box containing your computer, there will be a packing list and registration form inside. Check that you have received all the items on the packing list. If you don't have all of these parts, or if any of them is damaged, notify your supplier immediately.

If you have bought any other equipment to attach to your computer, such as a monitor or printer, check that your supplier has provided the correct cables (see Appendix B: Monitor *connections* and Appendix C: *Attaching peripheral devices).*

Complete the system registration form and post it back to Acorn Computers. This is very important: without it, we cannot provide proper support. When you do return it, we can inform you of developments and updates to your computer. This will help us to ensure that you get the best from your computer in the future.

Put all the packing back into the box and put it away somewhere safe. If you ever want to transport your computer system, it is best to use the box, even if you only take it a short distance in a car. If you ever have to take it back to your supplier, too, you'll have to pack it back into the original box.

Note: If you do re-pack your computer for any reason, be sure to put any leads back in their protective plastic bags. This is because there may be a reaction between the leads and the polystyrene packing material if they are left in direct contact for a long period of time.

Choosing where to put your computer

Bear the following points in mind when deciding exactly where to situate your computer:

- You'll need a firm, flat surface with enough space at one side to move the mouse around, and space at the other side for manuals and papers you may be working on.

- You'll need space nearby for any peripheral equipment (such as a printer).

- You'll neeed at least one easily-accessible 13 Amp power point within 1.5 metres of the computer, plus extra power points for any peripherals you want to connect to the computer.

- Don't place the computer where it will be exposed to direct sunlight, or any other source of heat, such as a radiator.

  Sunlight or reflections from a window might make the screen difficult to see.

Setting up the computer

This chapter describes how to connect the components of the computer together and set it up ready for use. Before you start connecting it up, please read the Guidelines for safe operation in the front of this guide.

1. Connect mouse to keyboard

Take the mouse and the keyboard out of their plastic bags. The mouse has a straight cable with a plug on the end of it. This goes into the socket at the back of the keyboard.

The plug has an arrow moulded into it: this should be uppermost when you push it in. The plug won't go in any other way, so don't try to force it.
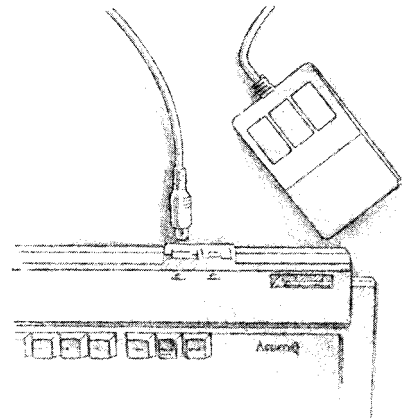
2. Connect keyboard to computer

Insert the plug on the end of the keyboard cable into the socket on the front righthand side of the computer unit. (The socket is just below the disc drive slot, if your computer has one.)

Make sure the arrow on the plug is uppermost. Don't try to force the plug. Place the keyboard in front of the computer.
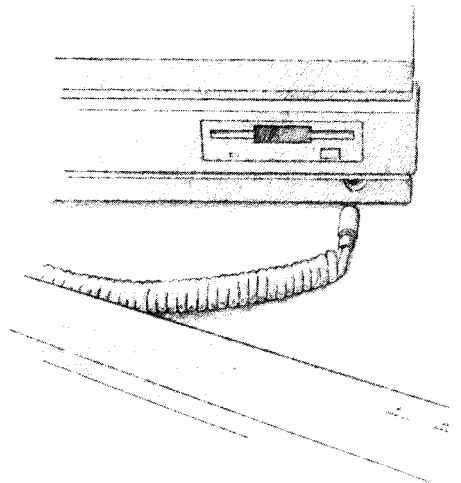
3. Connect monitor to computer

To connect your monitor to your computer, you need to do the following:

- Check in the section entitled *Table I* - Monitor *information* to see what the positions of internal links LK3 and LK6 should be for your particular monitor. Note that the default positions (set in the factory) are between pins 2 and 3 on both links.
- If necessary, change the positions of links LK3 and LK6, as described in the section entitled Changing *the internal* link *settings* on page 88.
- Connect the monitor to your computer using the correct cable. Appendix B: Monitor *connections* gives a list of commonly-used monitors. It assigns to each of them a type number (from 0 to 4) and a cable type (MA, MB, MC and so on).

Put the monitor on top of the computer (unless the monitor weighs 15kg or more, in which case it will have to go alongside the computer unit, or on a strong shelf above it).

The following subsections give examples of how to connect five different monitors. Appendix B: Monitor *connections* gives full details of how the cables are wired and what sort of connectors they use, for these and many other monitors.

Note: Various third party monitors and other peripheral equipment are depicted or described in this Guide. The illustration or description of these or any other third party equipment does not imply any recommendation or endorsement by Acorn Computers Limited, and users must satisfy themselves as to the suitability of any peripheral equipment (including monitors) on advice from the equipment supplier.

Colour monitors

Such as the Acorn medium resolution colour monitor AKF17.

Use cable type MG. This has different connectors at each end. Push the female end into the back of the monitor, and the male end into the socket on the back of the computer marked ANALOGUE RGB.

Multi-frequency colour monitors

Such as the Taxan 770.

Use cable type MB. This has identical connectors at each end. Plug one into the signal input on the back of the monitor, and the other into the socket on the back of the computer marked ANALOGUE RGB.

High resolution monochrome monitors

Such as the Taxan Viking.

Use cable type ME. This has identical connectors at each end. Check whether your monitor uses two or three leads (the Taxan Viking only uses two). If it has two leads, use the sockets marked HI-RES MONO VIDEO and C/V SYNC on the back of the computer. If it has three leads, you will also need to use the socket marked H SYNC.

Standard resolution monochrome monitors	Such as the Philips BM7500 series.
	Use cable type ME. This has identical connectors at each end. You'll also need an adaptor cable to be able to connect this to the computer. Refer to Appendix B: Monitor *connections* for details.
VGA monitors	Such as the Microvitec VGA.
	Use cable type MD. This has identical connectors at each end. You'll also need an adaptor cable to be able to connect this to the computer. Refer to Appendix B: Monitor *connections* for details.

4. Connect printer to computer

Different printers require different connectors and cables. The section entitled *Printers* in Appendix C: *Attaching peripheral devices* gives some guidance for connecting printers. Check with your supplier that you have the correct cable.

Note that you'll need to refer to the RISC iX System *Administrator's Guide* or the RISC OS User *Guide* (depending on which operating system your computer uses) for information on the software configuration of your printer.

5. Connect other peripherals to computer

Other peripherals — if you have any — should also be connected to the computer *before* the power is switched on:

- If you are using an R200 series computer, you can connect an extra terminal to it using the socket marked SERIAL.
- If you want to connect a modem to your computer, connect it to the socket marked SERIAL.
- If you have an Econet network, and your supplier has already installed an Econet module inside the computer, connect your computer to the network using the socket marked ECONET.
- If your computer has a SCSI expansion card installed, you can connect SCSI devices to it, such as hard disc drives or tape streamers.
- If your computer is fitted with an Ethernet expansion card, you can connect your computer to an Ethernet network.

These are described in more detail in Appendix C: *Attaching peripheral devices* later in this guide.

6. Connect mains supply   If your monitor has an IEC-type mains plug (similar to a kettle plug), plug this into the socket marked UNSWITCHED 0/P 220-240V on the back of the computer. If it has a normal mains plug, plug this directly into the mains. Don't switch on the mains supply yet.
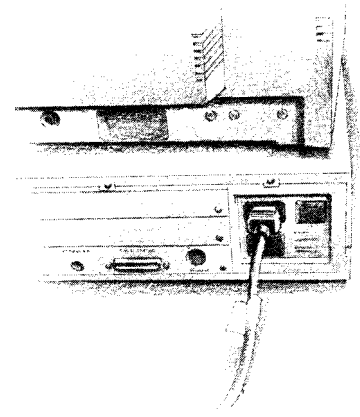
Finally, plug the connector on the computer mains cable into the socket marked I/P 220-240V on the back of the computer unit. Don't switch on the mains supply yet: follow the instructions in the next chapter.

Setting up the computer
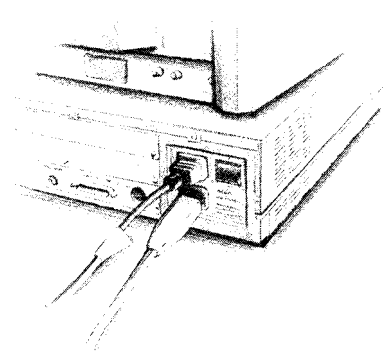
Switching on

This chapter tells you how to power up your computer for the first time, and describes what you see on the screen when you do. It also tells you how to switch off your computer safely.

1. Equipment check

First check that you have connected all parts of the computer together properly, as described in the previous chapter.

2. Before switching on the mains supply

Check the monitor and computer ON/OFF switches are set to OFF. The monitor has a separate switch. The manual for your monitor will explain where it is.

The ON/OFF switch for the computer is the rocker switch on the back:

0 is **OFF**

I is **ON**
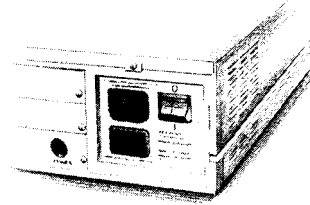
3. Switch on the mains supply

Switch on the mains supply for the computer (at the mains outlet on the wall), and that for the monitor (if it has a separate mains supply).

4. Switch on the monitor

The manual for your monitor will explain how to turn it on and, if necessary, adjust the brightness control.

5. Perform the initial power-up sequence

Follow the instructions in this section carefully.

1   Check *Table 1 -* Monitor *information* in Appendix B: Monitor *connections* to find the monitor type and sync type of your monitor.

2   Switch the computer on whilst holding down the key (0, 1, 2, 3 or 4) on the *numeric keypad* which corresponds to your monitor type. Keep the key held down until the self-test is complete (this is described in the following subsection).

If you have not got a picture on your screen yet, you will need to follow the remaining steps very carefully, as you will probably be typing 'blind'.

3   Press F12 on the keyboard.

4   Set the sync type by typing the following:

```
configure sync x
```

where x is the sync type for your monitor.

5   Press the Return key twice.

Note: This initial power-up sequence uses RISC OS to configure the monitor type and synchronisation. This means that if you have a RISC iX machine, it will not automatically boot straight into RISC iX. (You can alter this after the initial power-up – see the section entitled Starting RISC iX from *the* RISC OS desktop on page 12).

By now, you should have a picture on your screen. The section entitled *The RISC* OS *desktop* on page 11 describes what you see on the screen. If you have any trouble, refer to the chapter entitled If *things go* wrong further on.

Next time you want to switch on the computer, simply turn it on at the ON/OFF switch.

The self-test

The computer performs this self-test every time you switch it on. It should not take longer than 15 seconds (normally contained within the warm-up time of your monitor). Obviously you won't see the colours if you're using a monochrome monitor.

1   The screen goes purple, indicating that the test has started.

2   The screen goes blue after about a second. It stays blue for up to 12 seconds, depending on the memory size of your computer.

3   The screen goes blue again, for about one second.

4   The screen goes black, and a message is displayed indicating the memory size of your computer. This means that the self-test is complete:


```
RISC OS 4096K
Acorn ADFS
Supervisor
```
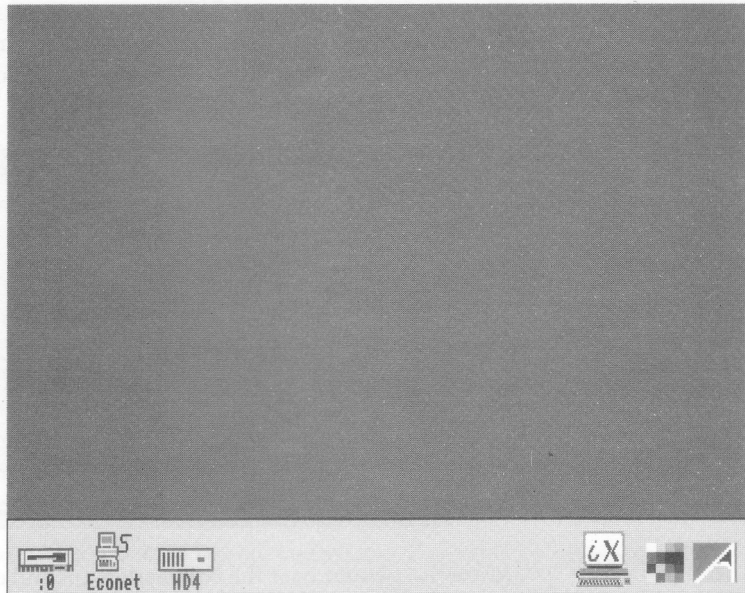
Notes:

- The Econet icon will only be present if your computer has the optional Econet module fitted.

- The RISC iX icon will only appear if you have an Acorn R200 series computer.

- The disc icons on the left will not be present on Acorn R225 computers.

- If the desktop has not appeared after about 15 seconds, or if the display does not look like that shown above, refer to the chapter entitled If *things go* wrong later in this guide.

For more information on how to work with the RISC OS desktop, see Part 2 of this guide. You'll find more detailed information in the RISC OS User Guide.

If you are using an Acorn R200 series machine, and want to boot into RISC iX, follow the instructions in the section entitled *Starting* RISC iX from *the* RISC OS desktop on page 12.

Starting RISC iX from the RISC OS desktop

After the initial power-up, you will have to start up RISC iX through the RISC OS desktop. If you are unfamiliar with desktop environments, and the use of a mouse, then refer to Part 2 of this guide.

To boot into RISC iX, place the pointer over the RISC iX icon on the icon bar. Then click the lefthand mouse button once. You should see a box like this appear:

```
┌──────────────── RISC iX boot ────────────────┐
│                                               │
│          Select "OK" to enter the RISC iX     │
│          operating system (Note: This         │
│          terminates all active RISC OS tasks  │
│          before entering RISC iX)             │
│                                               │
│        ┌────────┐          ┌──────────┐       │
│        │   OK   │          │  Cancel  │       │
│        └────────┘          └──────────┘       │
└───────────────────────────────────────────────┘
```
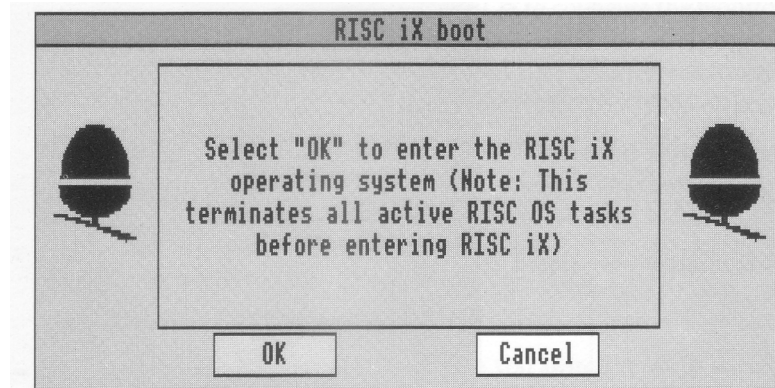
Move the pointer over the box marked OK and click the lefthand mouse button once.

The autoboot procedure starts and the following messages are displayed on the screen. (The screen messages may vary slightly from those shown in this Guide.)

```
RISC OS 4096K
Acorn ADFS
Supervisor
```

After about 10 seconds the screen clears and the RISC iX start-up screen is displayed, starting with messages of the following form:

```
RISC iX Release 1.2
ARM3 processor, cache enabled
real mem = 4194304
avail mem = 3080192
30 buffers (240 Kbytes)
et0: slot 0: iss 1, address 00:00:a4:00:08:5f
scsi 0: slot 1
vminit: swapunit doubles after every 7 then every 5
Swap size = 9.9Mb
root fstype 4.3, name /dev/sd0a
swap fstype spec, name /dev/sd0S
.
.
.
```

More messages will appear after the ones shown above. The complete start-up procedure takes about three minutes for a workstation connected to NFS and Ethernet. It is slightly quicker for a stand-alone system.

When the system has started up, you will see the `login`: prompt:

```
Multi-user system started

Acorn RISC iX Release 1.2
login:
```

This prompt may be within a window if your system has been configured to run a window system. If there is a word before `login` :, then this is the hostname that your System Administrator has chosen to call your system.

To find out more about starting up via the RISC OS desktop, refer to the chapter entitled *Using the RISCiX FS module* in the RISC *iX* System *Administrator's Guide*. This explains, amongst other things, how to force your computer to boot automatically into RISC iX every time you switch on.

For information about what to do next and how to use RISC iX, see the RISC iX *User Guide* and the RISC iX System *Administrator's Guide*.

If you have any problems, first see the chapter entitled If *things go* wrong later in this guide. If you still have trouble, read *Reference Section* A: *Trouble-shooting* in the RISC *iX User Guide*. If the problems persist, contact your supplier for help.

Switching off your computer

Switching off a RISC OS computer

When you have finished using your RISC OS computer, you should first make sure that you save any work you have been doing (see the chapter entitled *Files and directories* on page 53). You can then switch the computer off at the ON/OFF switch on the back.

Switching off a RISC iX computer

When you have finished using your RISC iX computer, you can't just switch it off like you can a RISC OS computer.

First, make sure that you save any work you have been doing. Then refer to the chapter entitled *Starting up and shutting* down *the system* in the *RISC iX System Administrator's Guide*.This explains how to put the computer into a known state, so that you don't accidentally terminate any active processes when you switch off.

Switching off peripherals

When you switch the computer off, you should also switch the monitor off, to avoid wasting electricity. If you have any other peripherals connected to your computer, check in the manuals supplied with them to see whether you need to switch them off every time you switch off the computer. For example, it is sometimes better to leave your printer switched on if you use it every day.

If things go wrong

This chapter offers solutions to some problems you might encounter while you are getting started with your computer. If you try all the solutions suggested and the problem is not solved, consult your supplier.

Problem	Possible solution
No picture	Check that: • the computer is turned on • the monitor is turned on • the mains supplies to computer and monitor are connected • the monitor is connected to the computer • the brightness control on the monitor is not turned down too low.
Flickering or flashing display	Check that: • the connectors between the monitor and the computer are tight. Switch off both the computer and the monitor, and push in the connectors firmly (see the chapter entitled Setting up *the* computer) • you have set the correct monitor type and sync type, as described in the section entitled *The initial* power-up *sequence* on page 10 • the internal links LK3 and LK6 are in the correct positions for your monitor (see the section entitled *Changing the internal link settings* on page 88).
Different screen display	If the computer starts up with a different display, or other unexpected things occur while you are using it, you (or someone else) may have set up the system configuration in a different way. Follow the instructions in the section entitled *Restoring the default configuration settings* on page 16.
No SCSI hard disc icon	Follow the instructions in the section entitled *Restoring the default configuration settings.*

| Pointer won't move, or is not visible on the RISC OS desktop | If moving the mouse does not move the pointer, check the following:
• The mouse is firmly connected to the computer.
• The surface you are moving the mouse across is firm enough to allow the ball in the base of the mouse to move. Move the ball with your fingers to check that the mouse works.

If the pointer is not visible, check whether the command line (with * prompt) is at the bottom of the screen. If it is, you might have pressed F12 by mistake. Press Return to get back to the Desktop. |

| No RISC iX icon | If you have a RISC iX machine that boots into RISC OS, but has no RISC iX icon on the icon bar, then try the following:
1 If the root directory ($) is not on the screen, click on the hard disc icon on the icon bar.
2 Double click on the !RISC iX icon in the root directory.

If the RISC iX icon still does not appear, contact your system administrator. |

| Can't boot into RISC iX | If your machine will not boot into RISC iX when you click on the OK button in the RISC iX boot window, refer to the chapter entitled *Using the* RISCiXFS *module* in the RISC iX System Administrator's Guide. |

| The self-test does not complete properly | If you do not see a message of the following form when the self-test is performed:

```
RISC OS 4096k
Acorn ADFS
```

or if the self-test does not complete properly (the screen may stay red) then contact your supplier. There may be a fault with the computer's memory. |

Restoring the default configuration settings

Take the following steps to restore your computer's configuration to the default (as supplied when new):

1 Save any work you need.

2 Switch off the computer.

3 Switch on the computer again *while holding down* the Delete key (keep it held down until the self-test has completed).

Note: This power-on-Delete sequence is known as a hard reset. Its effect, and the effects of other types of reset, are described in the *RISC OS User Guide*.

4   Switch off the machine again.

5   Follow the instructions in the section entitled 5. *Perform the initial* power-up *sequence* on page 9 (to reset your monitor and sync types). You should now be able to see the RISC OS desktop.

6   Press F12 to get to the command line.

7   At the * prompt type `status` and press Return. This displays the current CMOS RAM settings (you may need to press Shift to see the whole list).

8   Check the configuration settings against the list below:

```
Baud 4                  Boot                   Caps
Data 4                  Delay 32               No Directory
DumpFormat 4            FontSize 24K           Ignore 10
Language 3              Mode 0                 MouseStep 4
Print 1                 Quiet                  RamFsSize OK
Repeat 8                RMASize 64K            ScreenSize 160K
Scroll                  SpriteSize 32K         SystemSize OK
TV 0,1                  FileSystem scsi        ADFSbuffers 16
ADFSDirCache 16K        Drive 0                Floppies 1
HardDiscs 0             Step 3                 File server 254
Library 'ArthurLib'     Printer server 235     Country UK
SoundDefault 1 7 1      WimpFlags 47           WimpMode 12
Cache on                SCSIFSDirCache 16K     SCSIFSdiscs 1
SCSIFSDrive 4           noRISCOS ON            Device sd0
Unit 0                  Partition 0
```

9   Restore any incorrect configuration settings. For instance, if you need to restore the language to 3, and the number of SCSI discs to 1, type the following at the * prompt (remembering to end each line by pressing Return):

```
*configure Language 3
*configure SCSIFSdiscs 1
```

Note: the `*configure noRI S COS` option is for owners of RISC iX machines, who want their machines to boot straight into RISC iX.

10   Press Return at the * prompt to return to the RISC OS desktop.

11   Press Ctrl Break or Ctrl Reset to reset the computer with the new configuration settings.

Your computer should now start up in the state you require. If you are still having problems, then contact your supplier.

If things go wrong

Part 2 - RISC OS tutorial

The RISC OS desktop

The chapters in this part give you an introduction to working with the desktop environment of RISC OS. You will find a more detailed description of the desktop in the RISC OS User Guide.

Introducing icons

The pictures in the lower margin of the screen represent the tools and devices available. They are called icons. The area they occupy is called the icon bar.

Device icons

The icons on the left of the icon bar represent the devices which are available — that is, the discs and other places where you can load information from, and save it to. At least one will appear on the icon bar:
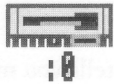
Floppy disc drive (if fitted). The computer uses 3.5 inch floppy discs, which you put into the slot on the front of the computer. Floppy discs are described in the the chapter entitled *Discs and the disc drive.*

Hard disc drive (if fitted). The computer uses a SCSI hard disc drive. For more information on SCSI devices, see the *SCSI Expansion Card User Guide.*

Econet. If your computer is fitted with the hardware for an Econet local area network, there will also be an Econet icon.

Applications icons

On the righthand side are the applications icons. These represent things you can do, such as word-processing and drawing programs. Initially only two or three are loaded:
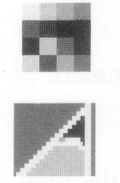
Palette. This enables you to change the colours or grey scales on the screen, depending on your monitor type.

Task manager. This enables you to switch from the desktop to the operating system and other tasks, and to look at and control the allocation of your computer's memory. More information on this is given in the RISC *OS User Guide* in the chapters entitled The *Task Manager* and *The Command Line.* They will be of interest to more experienced users.

Any other applications which you load will normally be represented by icons on the righthand side of the icon bar.

The pointer

The arrow on the screen is the pointer. It is used to indicate items you want to use or move.

The mouse works best on a firm, flat surface. The next chapter tells you more about how to use the mouse.

Using the mouse

This chapter tells you how to *use the mouse with the RISC* OS *desktop.*

You use the mouse to select and move items displayed on the screen. It is your principal means of communicating with the desktop.

Holding the mouse

Hold the mouse with the cable away from you so that your fingers rest easily on the three buttons. If you are right-handed, you should hold it like this:
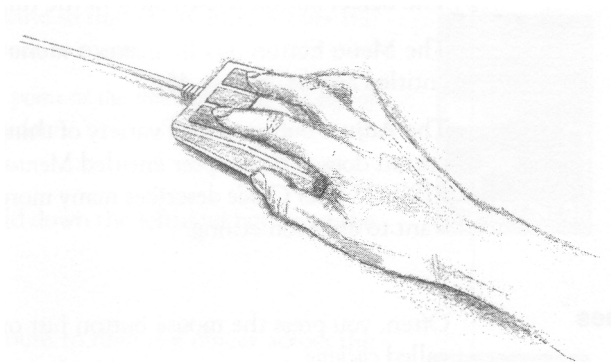
Move the mouse around and watch the pointer move around the screen. If you run out of space to move the mouse, lift it up and put it down again in a more convenient spot. While the mouse is lifted, the pointer will not move, and when you put it down again you can carry on where you left off.

The mouse buttons

The mouse has three buttons, known as **Select, Menu** and **Adjust:**
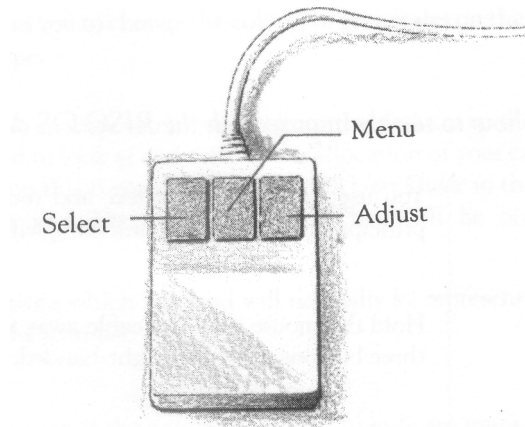
The Select button is used most of the time to select icons displayed on the screen.

The **Menu** button usually makes a menu appear. Menus are described in the chapter entitled Menus on page 45.

The **Adjust** button does a variety of things, mostly useful variants of what the Select button does. The chapter entitled *Menus* on page 45 includes one instance, and the *RISC OS User Guide* describes many more. Try using the Select button first when you want to alter something.

Mouse techniques

Often, you press the mouse button just once and then release it immediately. This is called *clicking.*

Two other mouse techniques are also used:

double-clicking – pressing and releasing twice in quick succession. This is used to initiate an action, or to load an application, for example.

dragging – to move an icon from one place to another.

Clicking and dragging techniques are summarised on the following page.

Using the mouse

Clicking

1. Point at the icon

Move the mouse so that the pointer is over the item you want to select.

For *example, point at the desktop colour palette icon on the icon bar.*

2. Click on the mouse

Click once on the Select (lefthand) button of the mouse.

3. The item will be selected

The palette will appear on the screen.
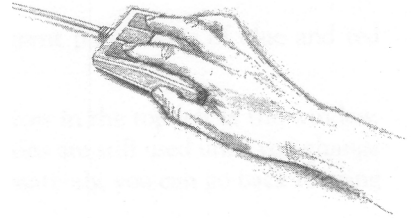
Dragging

1. Point at the icon

Move the mouse so that the pointer is over the object you want to move.

For *example, point at the title bar along the top of the palette window*.
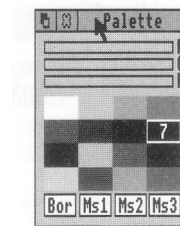
2. Select it with the mouse

Press and hold down the lefthand button of the mouse.

3. Move the mouse and drag the icon

Move the mouse to drag the object across the screen. Release the mouse button when the object is where you want it.

Using the mouse
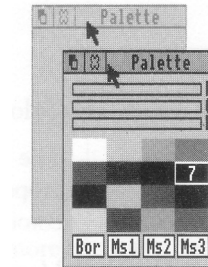
More practice with the mouse

One of the icons on the icon bar is the palette, mentioned on the preceding page. This lets you alter the colours used in the screen display. Click on the palette icon to display the palette on the screen:
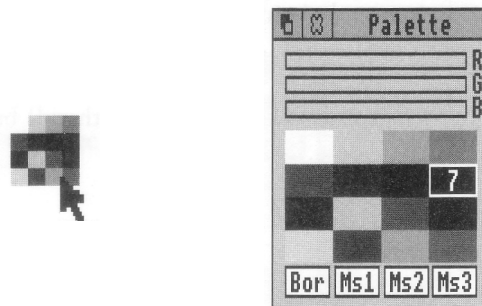
Now click on the third colour block on the top row (which is actually a lightish grey). The colour block is outlined, and the number 2 appears in it (because the colours are numbered 0, 1, 2, ...):
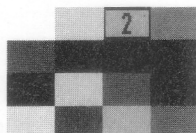
Colour number 2 is used to display the title bar along the top of the window.

The bars at the top of the colour selection panel will have changed to show the proportions of red, green and blue which make up that colour. You can adjust the colour of the title bar by either dragging or clicking anywhere in the colour bars.

Move the pointer somewhere in the middle colour bar, and press the Select (lefthand) mouse button. The bar will snap to the position of the pointer, and the colour will change accordingly. Keep the button down, and drag the bar backwards and forwards.

Notice how the colour at the top of the window changes as you do this — it works rather like a slider volume control on a stereo. By moving the bar, you're adjusting the proportion of green in the colour of the title bar.
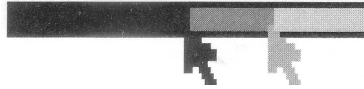
Try dragging the other bars, too, to see how different proportions of blue and red change the colour of the title bar.

When you have practised this a bit, click on the cross in the top left of the window. The palette disappears, but the new colour definitions are still used until you change the colours again or switch off the computer. Alternatively, you can go back to using the default colour definitions as follows:

1   Move the pointer over the Palette icon, and click the Menu (middle) button (the chapter entitled Menus on page 45 describes in more detail how to use the Menu button)

2   Move the pointer over the word Default when the Palette menu appears, and click on it with the Select (lefthand) button.
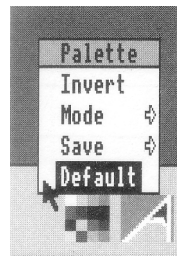
That's clicking and dragging. If you want to know more about the colour palette itself, see the *RISC OS User Guide*.

Using the mouse

Discs and the disc drive

This chapter tells you how to use and take care of your discs and disc drive, and how to make backup copies of discs.

Floppy discs

Information and programs are stored on discs. There are two types of disc: floppy discs and hard discs.

The computer uses 3.5 inch floppy discs. It will only hold one at a time.

A hard disc is much faster and holds a lot more information than a floppy disc, and is built into the computer. If your system has a hard disc, its presence is indicated by an amber light labelled H/DISC on the front panel of the computer.

On/off indicator light

3.5 inch floppy disc drive

Hard disc drive indicator light

Keyboard connector
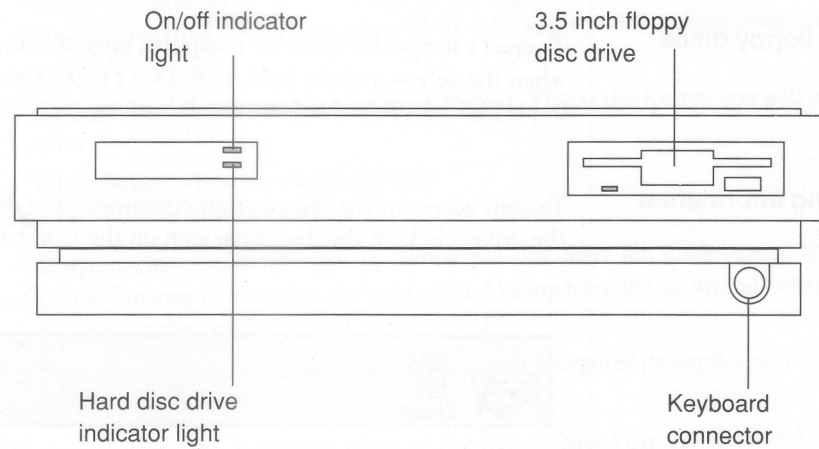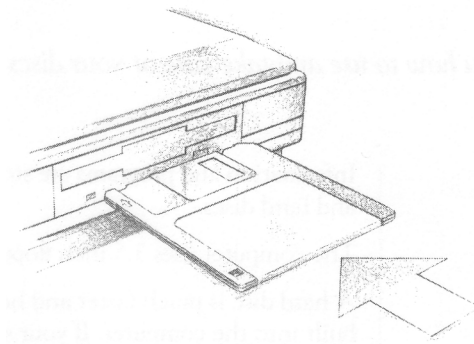
The disc clicks into place when it is fully inserted.

Ejecting floppy discs

To eject a floppy disc from the computer, press the disc eject button below the disc slot when the yellow activity light is off. Don't try to eject a disc when the activity light is on; it indicates that the drive is still running.

Accessing information on discs

To gain access to the information contained on a disc which has been inserted into the drive, click on the disc drive icon on the icon bar:

The contents of the disc will be displayed in a window for you to see. The chapter entitled *Windows* on page 35 tells you more about windows.

Making a backup copy of a floppy disc

It is a good idea to make a backup copy of floppy discs from time to time, in case a disc is damaged or a file is accidentally deleted.

You will need a blank disc (known as the destination disc) on which to make the backup copy. You can either use a brand new disc, or one that has been used before. You will need to format a new disc before you can use it as a backup disc. Formatting a disc prepares it to receive information, rather like wiping a blackboard clean before starting to write on it. The next section tells you how to do this.

Formatting a floppy disc

Warning!: When you format a disc, any data that was previously stored on it is permanently lost.

Take the following steps to format a floppy disc:

1   Insert the disc in the drive.

2   Move the pointer over the floppy disc drive on the icon bar, and click the Menu (middle) button.

3   Move the pointer to highlight the **Format** menu of the icon bar menu for the disc drive.

4   Move the pointer over the arrow to the right of the **Format** menu. (See the chapter entitled *Menus* on page 45 if you want more information on using menus).

5   Choose the disc format: click on the E format. This is the format you will use most often.

6   Click Select when the computer asks:

     `Are you sure (Y/N) ?`

     If you decide you don't want to format the disc after all, click one of the other mouse buttons to abandon the operation. During formatting, an indication of the progress of the operation will be displayed.

7   Press Space or click a mouse button when the computer prompts you. Formatting is now complete.

The initial name the computer gives to the disc is based on the date and time: for example 11_27_Mon. It is worth getting into the habit of renaming the disc to something appropriate to its contents.

See the *RISC OS User Guide* for more information on formatting floppy discs.

Backing up a floppy disc   (Note: Before you make a backup copy of a floppy disc, it is a good idea to write-protect it, to avoid accidentally corrupting it. See the section entitled *Write-protecting floppy discs* on page 33.)

Take the following steps to make a backup copy of a floppy disc:

1   Put the disc you want to make a copy of into the disc drive. (This is the source disc).

2   Move the pointer over the disc drive icon on the icon bar and press the Menu (middle) button.

3   Move the pointer to highlight the **Backup** option, and click on it.

4   Click the Select (lefthand) button when the computer asks

    ```
    Are you sure (Y/N) ?
    ```
    If you decide you don't want to backup the disc after all, click one of the other mouse buttons to abandon the operation.

5   Just press the Space bar when the computer asks:

    ```
    Insert source disk in drive 0 then press SPACE bar
    ```
    (as you've already inserted the source disc).

6   Similarly, when prompted, remove the source disc, insert the destination disc, and press the Space bar.

7   Swap the discs over each time the computer prompts you, until all of the data has been copied.

8   When the computer prompts you, press the Space bar or click a mouse button to conclude the operation.

You have now backed up your disc. Choose an appropriate name for the disc and write it on the disc's label.

For more information on backing up floppy discs, see the *RISC OS User Guide*.

Write-protecting floppy discs

If you write-protect a disc, it means that you cannot change anything on the disc, delete anything by mistake, or save any new files to the disc.

To write-protect a new disc, move the plastic tab towards the outside edge of the disc with your finger nail:
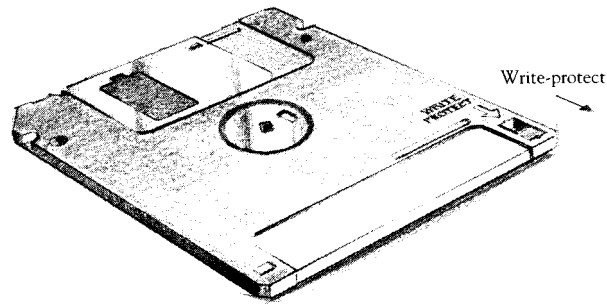
Looking after floppy discs

You will build up a collection of discs as time passes. Label them so that you always know which one holds the information you need. Store them carefully and keep them away from:

• extremes of temperature
• strong magnetic fields
• dust, dirt, drinks, pets etc.

Don't open the metal shutter on the disc, as the disc surface is easily contaminated by dust and small particles. For this reason, it is not a good idea to write on the labels in pencil: small pieces of pencil lead can easily get onto the disc.

Discs and the disc drive

Windows

This chapter describes windows and explains how they can be moved, resized, hidden and closed. It describes how to move through the contents of a document too large to display in one window all at once.

What is a window?

A window is an area of the screen displaying an activity or application. Examples of windows you have seen so far are the colour selection palette and the directory window, displayed when you click on the palette and disc drive icons respectively.

Features of windows

Most windows can be moved around the screen, hidden behind other windows, or closed completely. Icons on the windows allow you to do these things. Some windows also have icons which allow you to change their size.

	Title bar	The **Title bar** displays the title of the window. This may be the name of an application, or the name of a document if you are editing text.
	Back icon	The **Back** icon has the effect of putting the window to the back of the pile of windows on the screen. If you click on this, the window will be hidden behind any windows which overlap the area it occupies.
	Close icon	The **Close** icon closes the window. If you click on this, the window will be removed from the screen.
	Toggle size icon	The **Toggle** size icon switches the window between full size and the last size displayed. (Full size is either large enough to display the complete document, or so that the window fills the screen.) This alternating action is called toggling.
	Adjust size icon	The **Adjust** size icon lets you drag the icon to alter the size and shape of the window.

Displaying some windows

Click on the hard disc icon to display the root directory ($). Then double-click on the App1 directory icon.

The directory display shows the contents of the App1 directory:
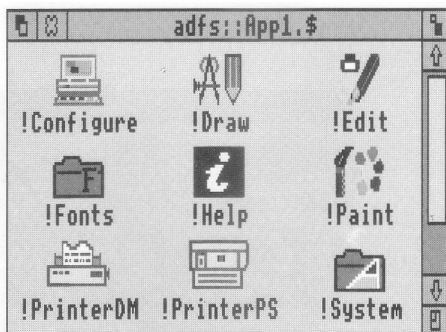
Click on the palette icon to bring the palette window up onto the screen as well.

Practising manipulating windows

Practise using the window icons to do the things described on the following pages.

Moving a window

1. Select the Title bar

Move the pointer onto the Title bar.
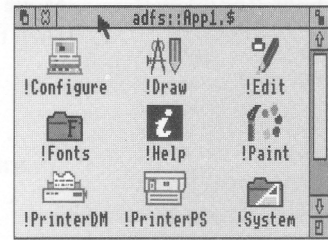
2. Drag the mouse

Press and hold the Select (lefthand) button, and drag the window.
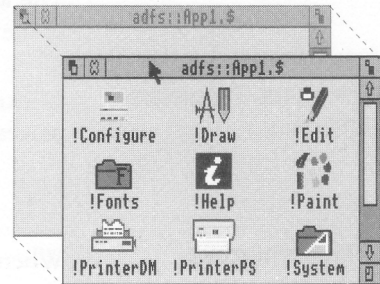
3. Release the mouse button

Release the button when the window is where you want it.

Changing a window's size

1. Select the Adjust size icon

Move the pointer to the Adjust size icon. (*Practise this on the App1 directory* display.)
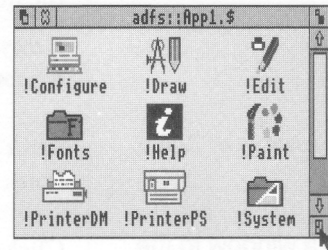
2. Move the mouse

Press and hold the Select (lefthand) button, and drag the icon to change the size of the window.

3. Release the mouse button

Release the button when the window is the size you want it.
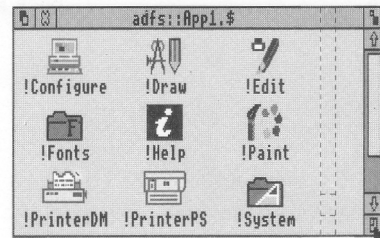
Toggling window size

1. Select the Toggle size icon

Move the pointer over the Toggle size icon and click the Select (lefthand) button.
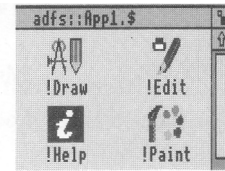
(Practise this on the App1 directory display.)

The window size will snap to nearly the width of the screen.

2. Click on the Toggle size icon again

Clicking on the icon again will reverse the process.
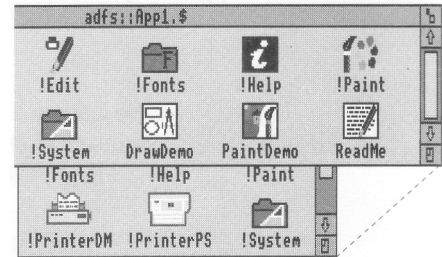
Shuffling windows

When you have a pile of windows on the screen, you can get at the one you want by sending windows to the back or bringing one to the front:

If they are not already overlapping, drag one of the windows on top of the other to practise this.

Bringing a window to the front

Click on the Title bar to bring a window to the front.
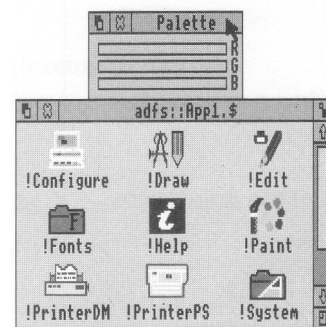
Sending a window to the back

Click on the Back icon to send a window to the back again.
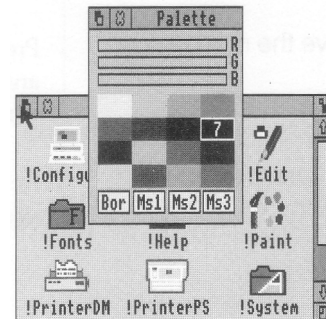
Closing windows

Select the Close icon

Position the pointer on the Close icon and click the Select (lefthand) button.

For example, close the directory window.

The window will disappear from the screen.

If the window has some unsaved work in it (some edits you have made to a document, for example), you will be asked whether you want to save the changes you made since you last saved it. The the chapter entitled *Files and directories* on page 53 tells you how to save files.
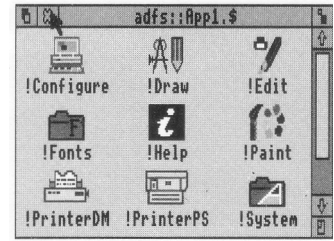
Scrolling

A window is so named because it allows you to see part of a file, directory or picture stored in the computer. The proportion of the file visible depends on the size and shape of the window's frame. The part of the file you can see alters as you move around the file:

A window onto an area of a document
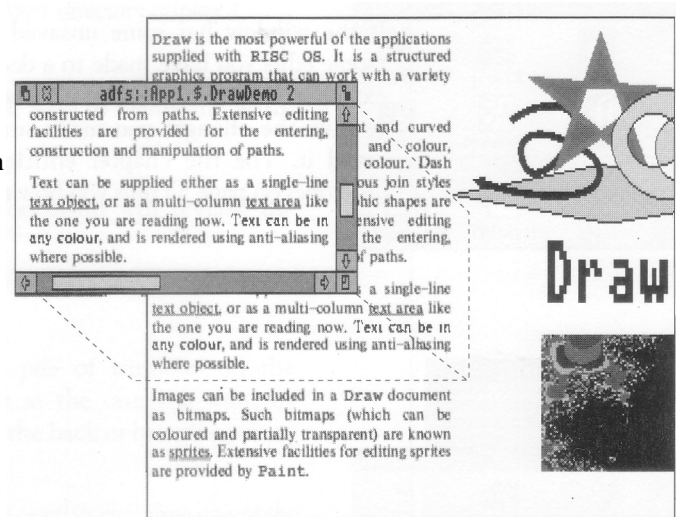
The technique of moving the window around a large file is called scrolling. You move the window frame over the file, but because the window actually stays in the same position on *the screen,* it appears as though the file is scrolling past the window.

This is not as complicated as it sounds. Try out the techniques on the following pages, and you will quickly get used to moving around large files.

Most windows have scroll bars and scroll arrows to enable you to move the window around a file:
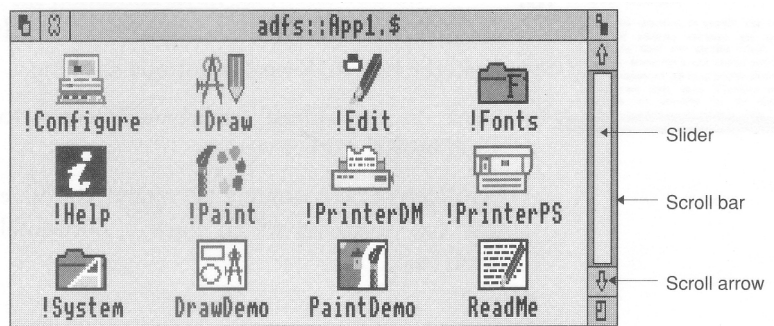
Scroll bars

The **Scroll bars** allow you to scroll the window over the file, directory or picture you are viewing.

Slider

The **Slider** size shows what proportion of the file is visible: if the slider occupies half the length of the scroll bar, half the file is visible. To display a different area of the file, drag the slider along the scroll bar. This technique is useful for moving quickly around a large file.

Scroll arrows

The **Scroll arrows** are at each end of the scroll bar. Click on the arrow showing the direction you want to move the window in — left, right, up or down. This technique allows you a finer control over scrolling than dragging the slider.

Practising scrolling

To load a file on which you can practise scrolling, first click on the hard disc icon to display the root directory. Then double-click on the App1 directory icon. When the directory is displayed, double-click on the DrawDemo icon, and a window with scroll bars will appear, containing some drawings and text.

Practise the scrolling techniques shown on the next two pages:

Scrolling step by step

Select the scroll arrow

Position the pointer on the scroll arrow and click on the Select (lefthand) button to scroll by small steps at a time.

Hold the button down to continue scrolling.

Click on the Adjust (righthand) button to scroll back the other way.

Scroll left or right, column by column, the same way (on windows which have a horizontal scroll bar).
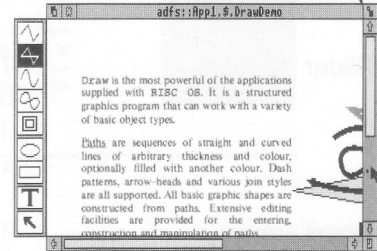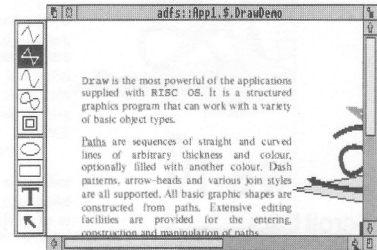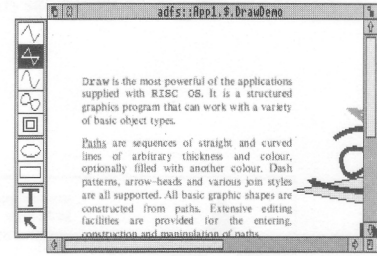
Scrolling screen by screen

Select the shaded part of the scroll bar

Position the pointer on the shaded part of the scroll bar (above the slider to scroll up, below the slider to scroll down), and click on the Select (lefthand) button.

The next screen of the document will appear.

Click on the Adjust (righthand) button to scroll back the other way.
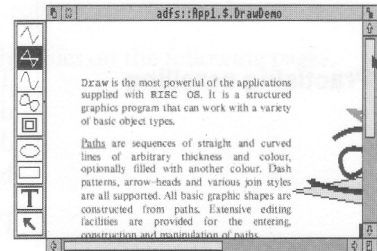
Moving through a file

1. Select the slider

Position the pointer on the slider, press the Select (lefthand) button and *keep it pressed* down.

Windows

2. Drag the slider

Drag the slider to display the part of the file you want to view.

Move from one *side* of a document to the other by using the horizontal scroll bar (if the window has one).
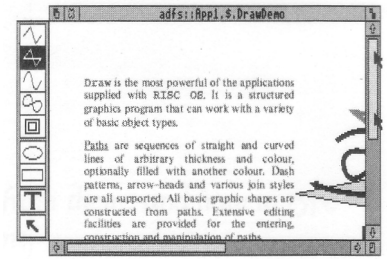
Menus

This chapter tells you what menus are, how to display them and choose things from them, and how to type in answers when the computer asks you to be more specific about what you want.

What is a menu?

A menu in computing gives you a list of commands or actions to choose from. So, instead of having to type in a command using the keyboard, you just point at the command you want on the menu and select it. This is the main way of doing things in the desktop.

```
┌─────────────────────┐
│        Filer        │
├─────────────────────┤
│ Display           ⇨ │
│ File ''           ⇨ │
│ Select all          │
│ Clear selection     │
│ Options           ⇨ │
│ New directory     ⇨ │
│ Open parent         │
└─────────────────────┘
```
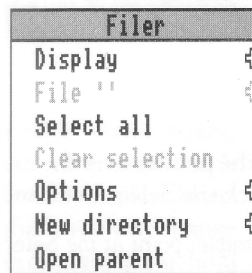
This chapter introduces some of the basics of using menus. For a full description, see the *RISC* OS *User Guide*.

Using menus

To display a menu, click the Menu (middle) mouse button. The menu displayed will depend on where the pointer is on the screen at the' time, whether the icon has been selected, and also on what application you are using at the time. You can usually make a menu disappear again by clicking on a blank area of the desktop.

Practise the menu techniques described on the following pages.

Displaying a menu

1. Point to the relevant icon

Move the pointer over the window or icon you want to work on.

For example, move the pointer over the App1 directory window.
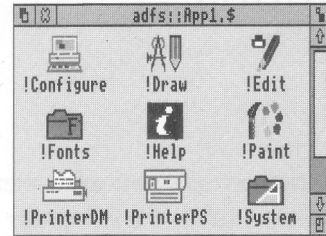
2. Click on the Menu (middle) button

The menu will be displayed.

If the pointer is over a file's icon, or if you have previously selected its icon by clicking on it, the menu will change to apply to an individual file in a directory window.
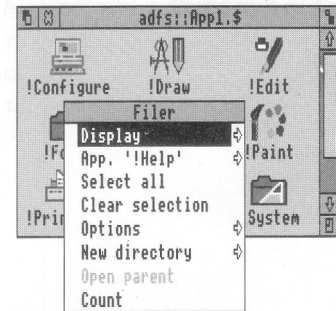
Choosing from a menu

Select the menu item you want

Move the pointer over the menu item you want and click the Select (lefthand) button.

For *example,* point *at the* **Select all** *option on the Filer* menu *and click Select.*

The file icons in the directory window will all be highlighted. Repeat the process, choosing **Clear selection** *to reverse it.*

Use the Adjust (righthand) button instead of the Select button if you want the menu to stay on the screen — otherwise it will disappear when you press the button.
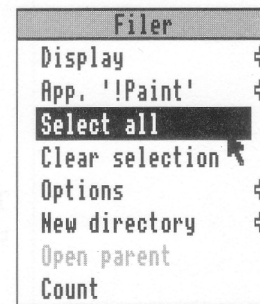
Choosing from a submenu

1. Select the main menu item

Move the pointer onto a main menu item with an arrow. An arrow indicates that a submenu is available.

For *example, point at the* **Display** *option* on *the Filer menu.*
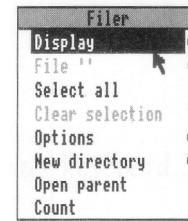
2. Display the submenu

Move the pointer onto the arrow.

The **Display** *submenu will appear on the screen.*
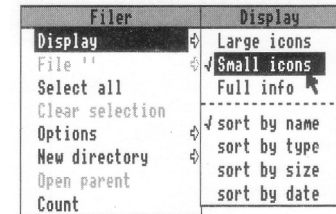
3. Select the submenu item

Writable menu boxes

Highlight and select your submenu choice by clicking on it.

Select **Small icons.** *The file icons* in the *directory will change size.*

1. Display the writable menu box

2. Type in the information requested

Some menus include writable menu boxes. They prompt you to type in information, such as a filename. Some boxes are blank. Others include a default name, which you can change if you want to. To erase the original name, hold down the Ctrl key and press U.
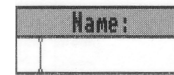
3. Click on the name

Move the pointer onto the arrow to the right of the New directory option in the Filer menu. A writable menu box appears.

In this case you have to type in the name you want to give the new directory. The text will appear to the left of the vertical bar (called the caret).

Use the Delete key to erase mistakes.

When you are happy with your entry, click on the name. The directory will be given the name you typed in.

Menus

Using the keyboard

This chapter describes the keyboard and explains how it differs from a typewriter keyboard. It includes an exercise using the text editor, Edit.

A tour of the keyboard

The figure below shows how the keys are laid out on the keyboard. The following pages describe the main features, and tell you how to use the different types of key.
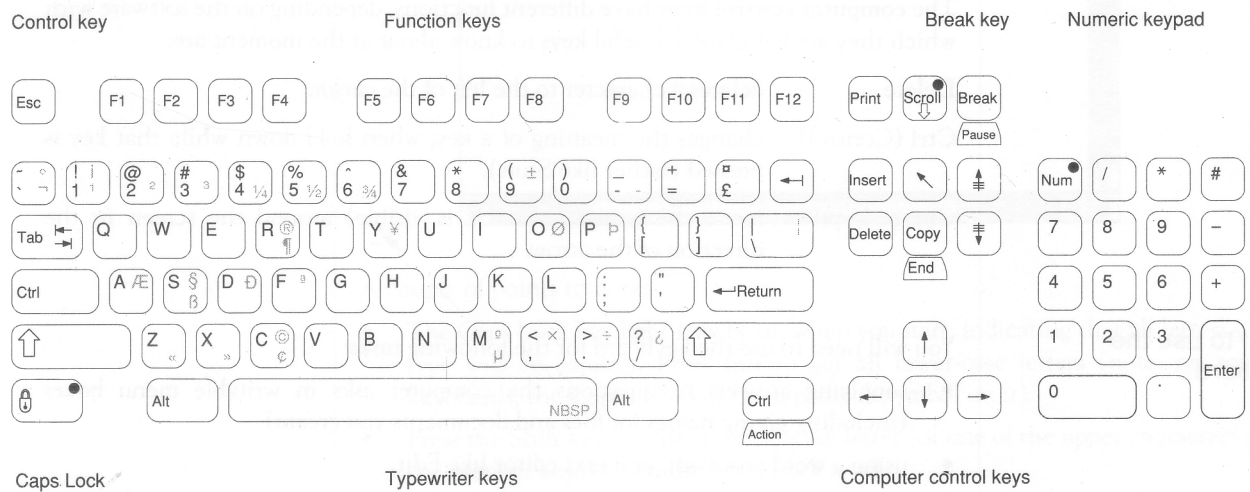
The keys are divided into blocks, as follows:

The typewriter keys are in the main block, and are similar to a typewriter keyboard. The Return key on the right completes a line, either starting a new line of text, or sending a name or instruction to the computer, depending on what you are doing.

Some of the characters on the figure are shown in grey, but do not appear on the keys themselves. You can get the computer to print these by pressing Alt <key> or Shift Alt <key>. For instance, if you want a german double s character (B), press S while holding down the Shift and Alt keys.

The **function** keys (marked Fl to F12) are in a row above the typewriter keys. You can program them to perform special functions, depending on what software you are using at the time.

The function of these keys in a particular piece of software is often marked on a keycard. You don't need to use these keys at the moment.

The numeric keypad is at the far right, laid out like a calculator. These keys can be used either to type numbers or to perform special functions, depending on the program or application you are using.

The computer **control keys** have different functions, depending on the software with which they are being used. Useful keys to know about at the moment are:

Delete   deletes a character to the left of the cursor.

Ctrl (Control) changes the meaning of a key, when held down while that key is pressed (rather like Shift).

Cursor keys move the cursor (when it is visible) around the screen in the direction of the arrow.

When to use the keyboard

You will need to use the keyboard for the following tasks:

• supplying answers to questions the computer asks in writable menu boxes (including giving names for files and documents you create)

• using a word processor, or a text editor like Edit.

Whenever you need to use the keyboard within the desktop, a vertical bar appears (it is red, if you have a colour monitor). This is called a caret. Any characters you type will appear to the left of the caret, which will move to the right.

Practising using the keyboard

Practise using the keyboard with the text editing program called Edit. Its icon is a pen and a bottle of ink:

Loading Edit

To use Edit, double click on the !Edit icon in the App1 directory, then click on the Edit icon when it appears on the icon bar.

Anything you type appears in the window:
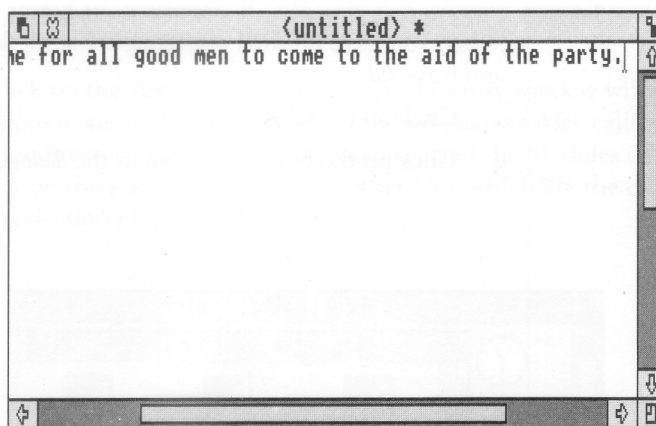
A couple of points to note:

- The Caps Lock key light may be on when you start, indicating that all letters you type will be capitals. Press this to get all lower-case letters (note: on some keyboards, the Caps Lock key has a padlock symbol on it).
- Press the Shift key to type an upper-case letter (or one of the upper characters on the number keys) when the Caps Lock is off.

Press the Return key to force a new line, and press it again to leave a blank line. Experiment with the Shift, Caps Lock, Tab, Delete, Backspace and Return keys.

Moving around your document

Once you have typed a few lines of text, move the caret around the text by moving the pointer with the mouse and clicking the Select (lefthand) button — the caret will jump to the position of the pointer. Some other keys allow you to move around long documents:

	Page up	moves to the previous page
	Home	moves the caret to the start of the document
	Page down	moves to the next page

You can, of course, also use the scroll bars to move around the document.

Leaving Edit

When you have finished practising using the keyboard, you can abandon your work and leave Edit:

1   Click on the Close icon.

2   Click on the box marked No in the *dialogue box* that appears next.

Files and directories

This chapter explains how you can store information in an organised way, copy it, and delete it when you no longer need it.

Organising your files

Everything you create using the computer can be saved as a *file,* whether it consists of text, graphics or a program. Each file has a name – you have to provide one when you save a new file.

Files are stored in *directories.* A directory can contain many files, and also other directories *(subdirectories).*

Double-click on the App2 directory icon. The directory window will be displayed. It shows various icons, including an icon which looks like a folder, called Modules. This represents a directory. Double-click on Modules, and the Modules directory window will appear on the screen. This contains other files, which are the different modules used by application programs.
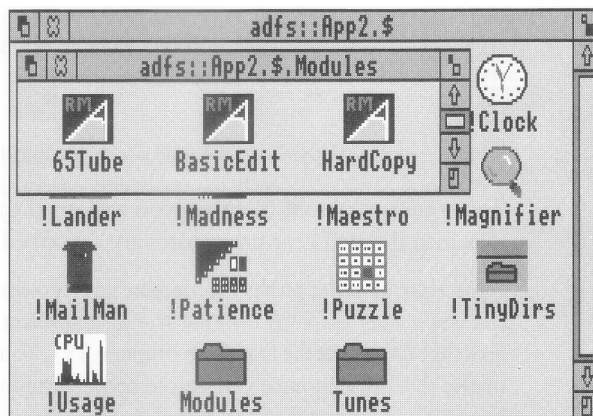
All discs have a root directory, out of which grows the rest of the directory structure on the disc. Its symbol, which you will see on the title bar of the directory display, is $.

Building a file structure   As you create more files, it will become increasingly important to organise them carefully: If you leave all your files in the main directory on the disc, it will soon become large and unwieldy — you will have to scroll through the disc directory window every time you want to find something. Instead, build up a file structure with files of similar types grouped in directories. The file structure should be along these lines:
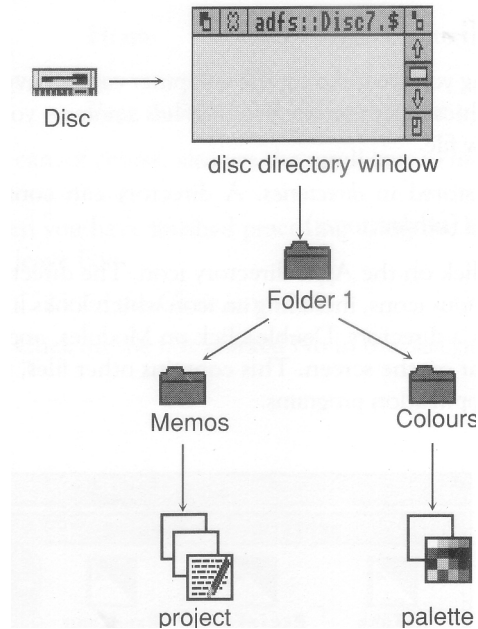
To create a structure like this, you will need to save files, create directories and copy files into them. These procedures are described on the following pages.

Note that in order to save a file you have created (using Edit, for example) to a floppy disc, you may have to remove the *write-protection* from the disc (see the the chapter entitled *Discs and the disc drive* on page 29). You may also want to make a backup copy of the disc, just in case you delete something by mistake. The section *Making backups* in the chapter entitled *Discs and the disc drive* tells you how to make backup copies.

Files and directories

**Saving a file in an
existing directory**

1. Open the directory
   window

Decide which directory you want to save your file in, and double-click on its icon to open a directory window for it.
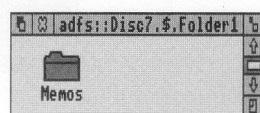
2. Select Save

Go back to the work you want to save, and press the Menu (middle) button to display the top-level menu for the application.

Move the pointer across the arrow to the right of the word **Save:** a dialogue box appears, containing a writable box for you to type in the filename you want.
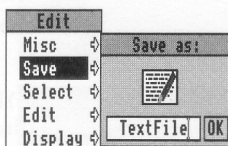
3. Type in the file name

Type in the name you want to give to the file. If there is a name already in the box (like `TextFile` here) which you don't want, erase it by holding down the Ctrl key and pressing U.

4. Drag the file icon into the
   directory window

Select the file icon in the dialogue box, drag it into the directory window, and release the button.

You can load the file again by double-clicking on its icon in the directory window.
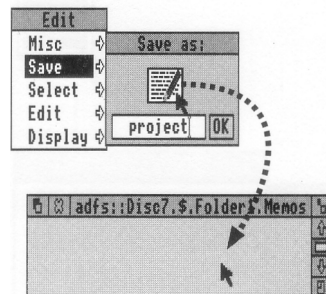
Creating a new directory

1. Display the Filer menu

Open a window for the subdirectory in which you want your new directory to be created. Press the Menu (middle) button, and the Filer menu will appear.

```
┌─────────────────────┐
│      Filer          │
├─────────────────────┤
│ Display           ⇨ │
│ File ''            ⇨ │
│ Select all          │
│ Clear selection     │
│ Options           ⇨ │
│ New directory     ⇨ │
│ Open parent         │
│ Count               │
└─────────────────────┘
```

2. Select New directory

Move the pointer over the arrow to the right of the **New directory** option. A writable menu box will appear.

3. Type in the directory name

Type in the name you want to give the new directory.

Use the Delete key to erase mistakes.

4. Click on the new directory name

Click on the new name (or press the Return key) to create the directory.

An icon for the new directory will appear in the subdirectory window.

```
┌─────────────────────┐
│      Filer          │
├─────────────────────┤
│ Display           ⇨ │
│ File ''            ⇨ │
│ Select all          │        ┌──────────┐
│ Clear selection     │        │  Name:   │
│ Options           ⇨ │        ├──────────┤
│ New directory     ⇨ │        │ newname  │
│ Open parent         │        └──────────┘
│ Count               │
└─────────────────────┘
```

Files and directories
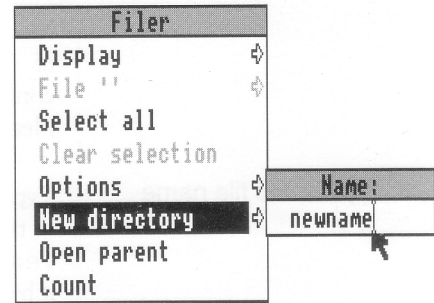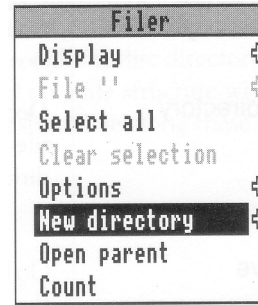
Copying a file to another directory

1. Select the file to be copied

Point at the icon of the file to be copied, and press the Select (lefthand) button to highlight it.

2. Drag the icon to the new directory

Drag the file icon into the new directory window.
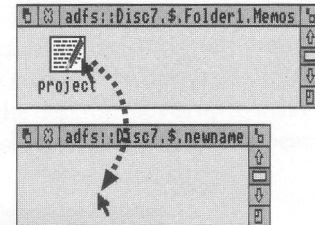
3. Release the mouse button

Release the mouse button and the file will be copied into the new window. A copy of the icon will appear in the window when this has been done.

Note: Holding down the shift key during steps 2 and 3 will delete the icon from the old window.

Deleting files and directories

1. Select the file or directory to be deleted

Point at the icon, and press the Select (lefthand) button. The icon will be highlighted:

2. Select the **File** option in the Filer menu

Click the Menu (middle) button to display the Filer menu, and select the **File** option.

A submenu of options will be displayed, including Delete.
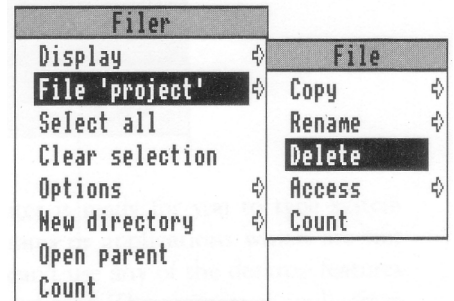
3. Delete the file or directory

Click on **Delete.** The file (or directory) and its icon will be deleted from the directory.

If the file (or directory) has been locked against deletion, it will not, in fact, be deleted.

Select the File option on the Filer menu, and move across to the Access option. Click in the File is locked against deletion box, then click in the Update box. You can now delete the file by repeating steps 2 and 3 above.

Files and directories

Outside the desktop

This chapter describes how you can leave the desktop and address the RISC OS operating system and languages directly.

*Commands

More experienced users will occasionally want to leave the desktop environment, and issue commands direct to the RISC OS operating system — *Commands. To do this, press F12. A line is cleared below the desktop, and the desktop moves up to make room for it. You will not lose any of your work on the desktop. The pointer disappears.
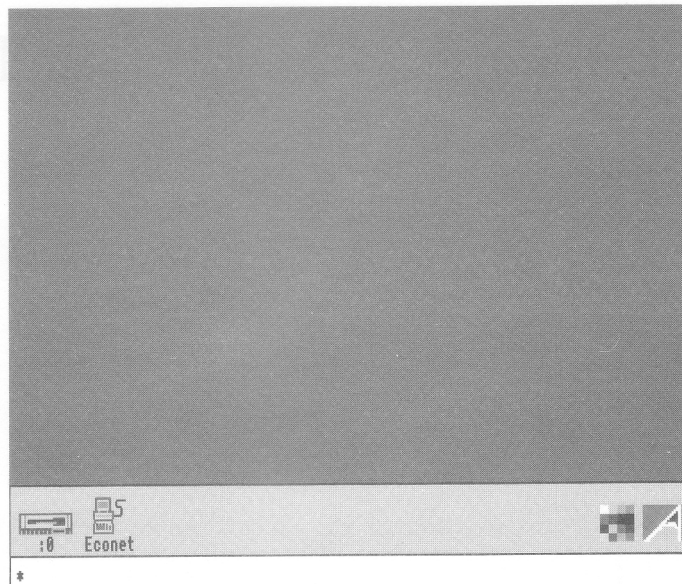
The star is a prompt. It means that the computer is ready for you to type system commands at the keyboard. You can run programs or applications which are not accessible from the desktop from here, but you can't use any of the desktop features while you are using system commands, only the keyboard. The program or application you select, however, may use desktop features.

The *RISC OS* *User Guide* gives a detailed explanation of the things you can do with *Commands. When you have finished, leave any program or application you have been using, and when the star prompt appears, press the Return key on the keyboard. This takes you back to the desktop.

Outside the desktop

Part 3 - Hardware reference section

Appendix A: Hardware components and connectors

This chapter describes the hardware components of the computer, and gives details about the connections of the different sockets.

The front of the computer

The drawing below shows the front of the computer (but note that an R225 is discless, and does not have a floppy drive or a hard disc indicator light).

On/off indicator
light

3.5 inch floppy
disc drive

Hard disc drive
indicator light

Keyboard
connector
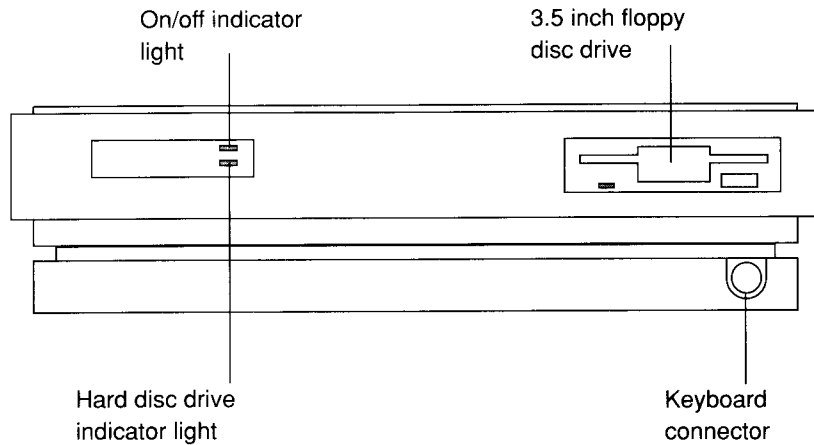
On/off indicator light

This light comes on when you turn the computer on.

Hard disc drive indicator
light

Your computer will have this light only if it has a hard disc installed. The light comes on when the hard disc drive is being accessed by the system.

3.5 inch floppy disc drive

If your computer has a floppy disc drive, it is located on the right. It includes a disc insertion slot, a drive indicator light, and a disc eject button.

Disc insertion slot: This is where you insert floppy discs. The disc enters the machine at a downward slant.

Drive indicator light: The indicator light comes on when the floppy disc drive is being accessed by the system.

WARNING: When the floppy disc drive indicator light is on, the computer is actually reading or writing data. Do not remove the floppy disc or turn off the computer while the light is on.

Disc eject button: The disc eject button releases the floppy disc so that you can remove it from the drive. When you press the button, the disc pops partially out of the slot, allowing you to remove it by hand.

Keyboard connector

The keyboard connector is located on the front of the computer, on the bottom righthand side. The keyboard has a 6-way plug on the end of its cable, that goes into the 6-way socket on the front of the computer:
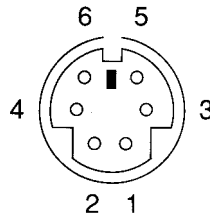
The pins on the socket are wired as follows:

1   Reset
2   Not connected
3   0V
4   5V
5   Serial Data in (from keyboard)
6   Serial Data out (to keyboard)

Appendix A: Hardware components and connectors

The back of the computer   The drawing below shows a typical view of the back of the computer.
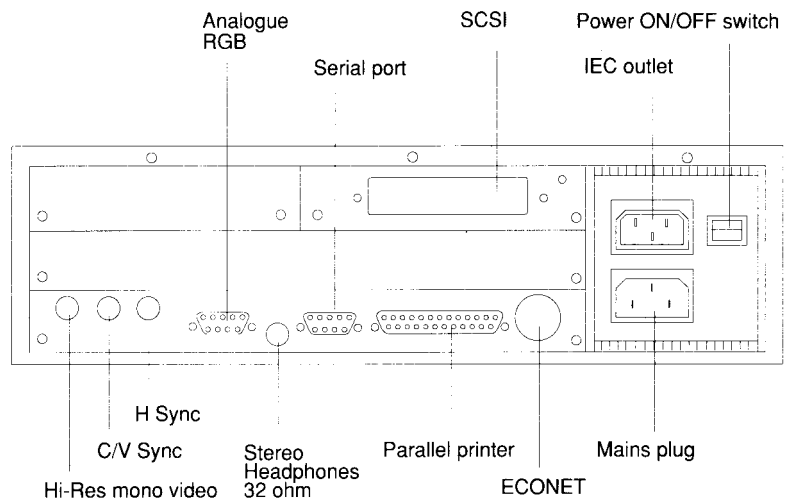
The following subsections describe the connectors on the back of the computer:

Analogue RGB

This socket is used to connect an RGB (colour) monitor to the computer (it is not suitable for TTL RGB monitors).The pins on the socket are numbered as follows:
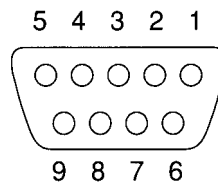
See your supplier for information on the kinds of colour monitors that work with the computer. See the chapter entitled Appendix B: *Monitor connections* for information on other monitors that use this socket.
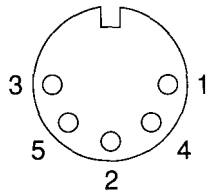
The Econet socket is wired as follows:

1	Data +
2	0V
3	Clock +
4	Data-
5	Clock —

Use this socket to connect the computer with other Acorn computers on a local area network (LAN). A LAN allows you to communicate with several computers within a single geographic location. To use the Econet network, you must install an optional Econet expansion card in the machine. A blanking plug may have been fitted to this socket if the Econet upgrade is not installed. See your supplier for more information on the Econet expansion card.

Ethernet (optional)

This allows you to connect your computer with other computers over a network. R225 computers are factory-configured to use the thick Ethernet socket. If you want to use the thin Ethernet socket, refer to the guide supplied with your Ethernet expansion card.

You can fit an Ethernet card to your computer if it does not have one. See the chapter entitled *Appendix D: Expansion card installation.*

Expansion card backplane panels

The blank panels cover any expansion card slots not in use. Expansion cards allow you to expand the system's capabilities. More information is given in the chapter entitled *Appendix D: Expansion card installation.*

Headphones

The headphones 32Ohm socket allows you to connect stereo headphones or your stereo amplifier system to the computer, through which you can hear sound produced by the computer. The lead must have a 3.5mm stereo jack plug.

Left   Right   Ground
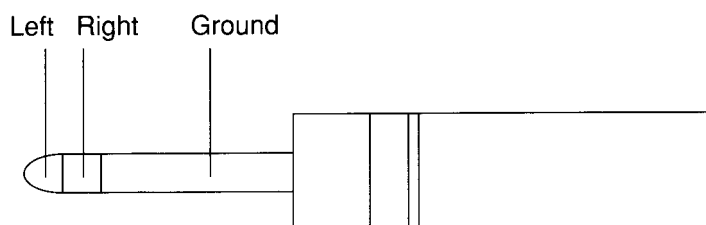
Hi-Res mono video
C/V Sync
H Sync

If you have a high resolution monochrome monitor, it will have two or three leads for connecting it to the computer: one for the display signal and one or two for the synchronisation signal. See the chapter entitled Appendix *B: Monitor connections,* which describes how to connect the leads correctly to the high resolution monitor output sockets.

IEC 320 outlet

You can attach the mains cable of most types of monitor to this outlet. See the instructions accompanying your monitor for information. The maximum continuous rating for this outlet is 3A (240V AC).

Mains plug

Use this three-pin plug, located on the power supply area, to connect the computer's power lead to a standard mains wall outlet.

Parallel printer

A parallel printer needs a 25-way D-type plug to go into the 25-way D-type socket on the back of the computer. Parallel and serial printers are discussed later in this Guide, in the chapter entitled Appendix C: *Attaching peripheral devices*.

```
     13 12 11 10 9  8  7  6  5  4  3  2  1
   ⎛  O  O  O  O  O  O  O  O  O  O  O  O  O  ╱
   ⎝   O  O  O  O  O  O  O  O  O  O  O  O  ╱
     25 24 23 22 21 20 19 18 17 16 15 14
```
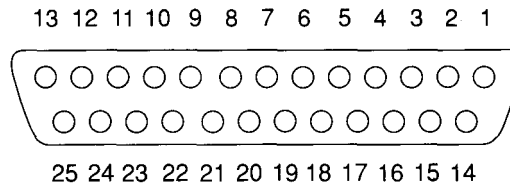
Power on/off switch

The power on/off switch is a rocker switch (I = ON, O = OFF). Press the bottom of the switch to turn the computer on; press the top to turn it off.

SCSI expansion card

This interfaces with the SCSI hard disc drive. The 50-way socket on the back has a terminator into it, but you can remove the terminator and connect other SCSI devices to the computer. **Important note:** The SCSI expansion card itself contains an electrical terminator. If you connect any other SCSI devices to the computer, they must be correctly terminated. See the *SCSI Expansion Card User Guide* for details.

Serial port

The serial port on the back of the computer is a 9-way D-type plug. A serial device to be connected here needs a 9-way D-type socket on the end of its lead. Refer to the documentation accompanying your particular communications package for information on how to wire the lead to be used with the serial port.

The pins on the plug are as follows:

```
      1 2 3 4 5
   ⎛  ● ● ● ● ●  ╲
   ⎝   ● ● ● ●   ╱
      6 7 8 9
```
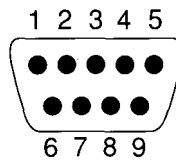
Pin	Name	Meaning
1	DCD	Data Carrier Detect
2	RxD	Received Data
3	TxD	Transmitted Data

Appendix A: Hardware components and connectors

4	DTR	Data Terminal Ready
5	0V	Common Return, Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

Keyboard

The functions of the various keys are described in the chapter entitled *The keyboard* in the *RISC OS User Guide* (for those of you with RISC OS workstations) and the chapter entitled *Configuring and using the terminal* in the *RISC iX User Guide* (for those of you with RISC iX workstations). What follows here is a description of the back of the keyboard and how to connect it, and the mouse, to the computer.

The drawing below shows the back of the keyboard.
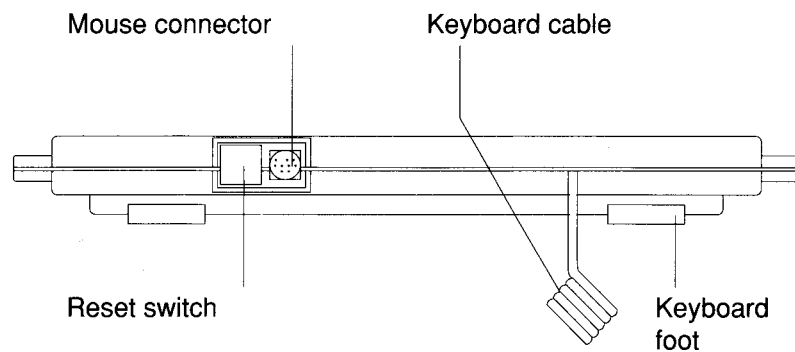
RESET switch

The RESET switch is used to restart the computer without turning it off at the on/off switch. If you have a RISC iX workstation, be sure to read the chapter entitled *Configuring and using the terminal* in the *RISC iX User Guide.* If you have a RISC OS workstation, refer to the *RISC OS User Guide, Appendix A: Resetting and power on.*

Mouse connector

Use this 9-way connector to attach the mouse cable to the keyboard (the other end of the cable is permanently fixed to the mouse).

Keyboard cable	The coiled keyboard cable to the right of the mouse connector is permanently attached to the keyboard. It connects the keyboard to the computer.
Keyboard feet	You can pull these down, making the keyboard slope more steeply. You can choose one of two angles of rake.
Mouse	The mouse has a cable with a connector on the end which you plug into the 9-way connector on the back of the keyboard. The use of the mouse is described in Part 2 of this Guide, in the chapter entitled *Using the Mouse* on page 23.
Mouse connector	The mouse has a 9-way mini-DIN plug that goes into the 9-way mini-DIN socket on the back of the keyboard:

```
      9  ⃝ ⃝ ⃝   7
      6 ⃝ ⃝ ⃝ ⃝  3
           ⃝ ⃝
          2   1
```
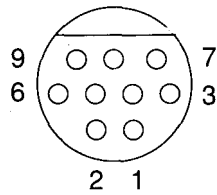
The pins on the socket are wired as follows:

1	X Reference
2	Switch 1
3	Switch 2
4	0V return
6	5V supply
5	X Direction
7	Y Reference
8	Switch 3
9	Y Direction

Rear of main circuit board
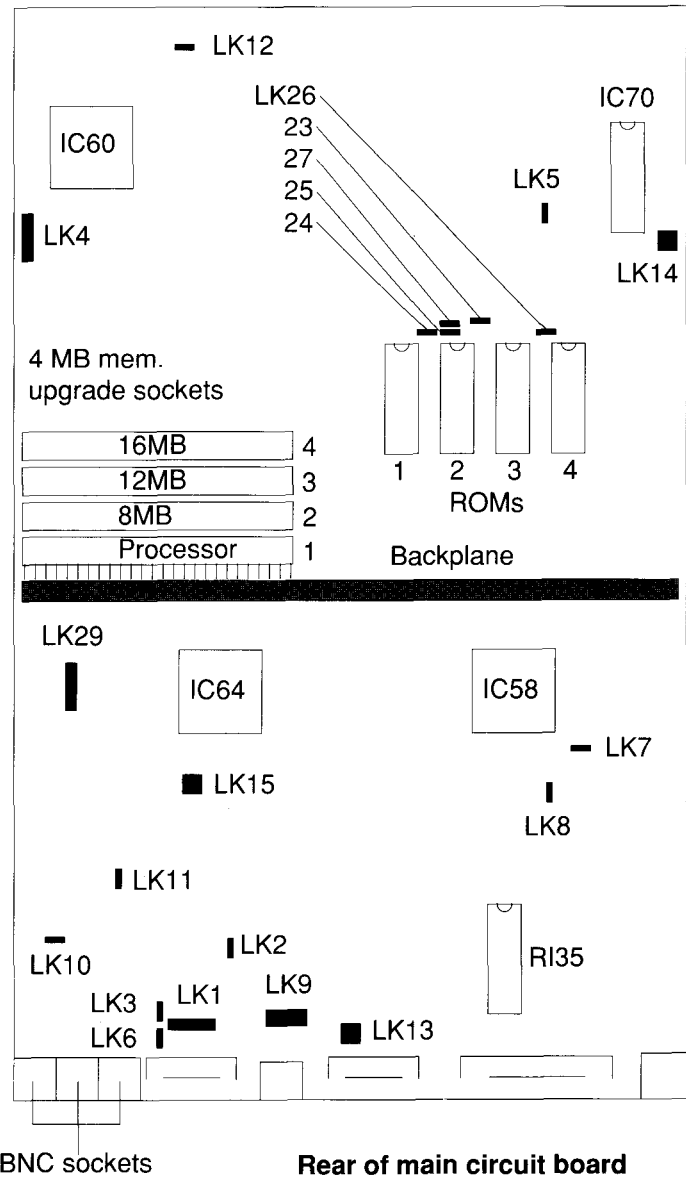
The links shown on the diagram have the following functions:

LK1   Internal auxiliary video connector providing access to the following
       signals:

       P1   Red
       P2   Green
       P3   Blue
       P4   H/CSync
       P5   VSync/Mode
       P6   0V

LK2   Provides option for video CSync to be superimposed on the Green video
       output signal:

       P1   Sync source
       P2   Green
       P3   0V

       Note that for a monitor that uses Sync on Green, move this link to the
       1-2 position, and set the sync type to 1.

LK3   Used to configure the signal on pin 5 of the video socket:

       P1   VSync or $\overline{\text{VSync}}$
       P2   Video socket pin 5
       P3   Mode

       Note: Mode is a control signal used by some monitors with a SCART
       interface.

LK4   Test connector used in conjunction with Acorn designed test
       equipment:

       P1   5V
       P2   D<0>
       P3   La<21>
       P4 $\overline{\text{RomCS}}$
       P5 $\overline{\text{Rst}}$
       P6   0V

LK5   Provides simple oscillator signal.

P1	HSync/$\overline{\text{HSync}}$
P2	Video socket pin 4
P3	CSync

LK7   Test point for non-volatile memory/RTC battery voltage:

P1	0V
P2	1.2V ± 0.2V

LK8   Test point for RTC clock frequency:

P1	0V
P2	32.768 KHz

LK9   Internal auxiliary audio connector providing access to the following signals:

P1	Unfiltered Left
P2	0V
P3	Left Phones
P4	0V
P5	Aux Input
P6	0V
P7	Right Phones
P8	0V
P9	Unfiltered Right
P10	0V

LK10   Internal test link, allowing phase adjustment of Hi-Res dot clock.

LK11   Internal test link, allowing phase adjustment of CK24M.

LK12   Allows the +5V supply to the floppy to be via the data cable or through a separate feed. For supply via data cable, cut track 22-3 and link positions 1-2.

LK13   Connection point for the internal speaker:

P1	0V
P2	Signal

LK14	Connection point for POWER front panel LED.

LK15   Genlock connection point:

P1	Internal clock	P9	Ved2
P2	Clock to VIDC	P10	$\overline{Ved3}$
P3	Sink	P11	$\overline{Supremacy}$
P4	0V	P12	$\overline{Hi}$
P5	NC	P13	$\overline{HSync}$
P6	NC	P14	$\overline{Vs}$
P7	$\overline{Ved0}$	P15	0V
P8	$\overline{Ved1}$	P16	0V

LK23   Used in conjunction with LK24 and LK26 to select ROM SIZE:

SIZE (Bits)	LK24	LK23	LK26
512K	2-3	2-3	2-3
1M	2-3	2-3	2-3
2M	1-2	2-3	2-3
4M	1-2	1-2	2-3
8M	1-2	1-2	1-2

LK24   See LK23.

LK25   Used in conjunction with LK27 to select ROM TYPE:

TYPE	LK25	LK27
Non JEDEC 512K and 1MB ROMs and EPROMs	1-2	1-2
JEDEC 1,2, 4, and 8MB ROMs and EPROMs	1-1 2-2	

LK26   See LK23.

LK27   See LK25.

LK29   Test points for MEMC reference clocks:

    P1   5V
    P2   RefW (Base 4MB MEMC)
    P3   RefX (1st RAM card MEMC)
    P4   RefY (2nd RAM card MEMC)
    P5   RefZ (3rd RAM card MEMC)
    P6   0V

Appendix B: Monitor connections

This appendix tells you how to connect different types of monitor to your workstation.

Overview

Your workstation has been designed so that you can use it with a wide variety of monitors. This means that you must configure the computer to suit your chosen monitor. The steps you need to take are as follows:

* Make the physical connection using the correct cable type for your monitor

* Ensure the two internal shorting links LK3 and LK6 are in the correct positions

* Configure your workstation to the correct monitor type

* Configure your workstation to the correct sync type (not always necessary).

What's involved

Take the following steps to get a picture on your monitor:

1   Use *Table 1 - Monitor information* on page 78 to determine the cable type, link positions and configuration settings that your particular monitor uses.

2   Use *Table 2 - Cable* types on page 80 to determine which Acorn socket your cable uses, and whether you need to make an adaptor to be able to connect the supplied cable to your workstation.

3   Use the information in the section entitled *Cable schematics* on page 81 which tells you whit the pin connections are between the cable and the Acorn socket, and how to make an adaptor (if necessary).

4   Follow the instructions in the section entitled Changing *the internal link settings* on page 88 to ensure the links LK3 and LK6 are in the correct positions.

5   Connect the monitor to your workstation, using the information gained from steps 1, 2 and 3.

6   Follow the instructions in the chapter entitled *Switching on* to configure your workstation and get a picture on your monitor.

Note: Various third party monitors and other peripheral equipment are depicted o described in this Guide. The illustration or description of these or any other thin party equipment does not imply any recommendation or endorsement by Acori Computers Limited, and users must satisfy themselves as to the suitability of an peripheral equipment (including monitors) on advice from the equipment supplier.

Table 1 - Monitor information	Monitor	Family	Cable type	Link settings	Monitor type	Sync type
	Acorn AKF12	medium-res colour	MA	2-3, 2-3	0	1
	Acorn AKF17	medium-res colour	MG	2-3, 2-3	0	1
	Taxan multivision 970	multisync	MC1 or MC2	2-3, 2-3 2-3, 2-3	1 1	1 1
	Taxan 770	multisync	MB	2-3, 2-3	1	1
	Eizo Flexscan 9060S	multisync	MB	2-3, 2-3	1	1
	NEC 3D	multisync	MB	2-3, 2-3	1	1
	Taxan Viking	hi-res mono	ME	don't care	2	1
	Philips M19P114	hi-res mono	ME	don't care	2	1
	Microvitec VGA 14H949GS2	VGA	MD	1-2, 1-2	3	0

Appendix B: Monitor connections

Table 1 - Monitor information (cont)	Monitor	Family	Cable type	Link settings	Monitor type	Sync type
	LiteOn CN1414E	Super VGA	MD	1-2, 1-2	4	0
	Eizo Flexscan 9070S	High line-rate multisync	MB	1-2, 1-2	4	0
	Philips BM7502 BM7542	Std-res mono	MF	2-3, 2-3	0	1

	Monitor	Family	Cable type	Link settings	Monitor type	Sync type
	LiteOn CN1414E	Super VGA	MD	1-2, 1-2	4	0

Table 2 - Cable types

| Cable type | Connectors: | | Acorn socket used | Adaptor required? |
	Workstation	Monitor		
MA	9-pin	SCART	ANALOGUE RGB	no
MB	9-pin	9-pin	ANALOGUE RGB	no
MC1	9-pin	15-pin	ANALOGUE RGB	no
MC2	(15-pin)	15-pin	ANALOGUE RGB	yes
MD	(15-pin)	15-pin	ANALOGUE RGB	yes
ME	BNC BNC	BNC BNC	MONO VIDEO C/V SYNC	no
MF	(phono)	phono	ANALOGUE RGB	yes
MG	9-pin	9-pin	ANALOGUE RGB	no

Cable schematics

The following subsections give details of the pin connections between different cable types and your workstation. Where necessary, they also tell you how to make an adaptor cable, if the plug on the end of your monitor cable will not fit into the appropriate video connector.

Cable type MA

This cable is supplied with the Acorn AKF12 medium-resolution colour monitor, and does not need an adaptor cable. For information, the pin connections are as follows:

Workstation   **Monitor**

9-way D-type (male)   SCART

1 (R)	15
2 (G)	11
3 (B)	7
4 (CSYNC)	20
5 N/C	
6 (0V)	4
7 (0V)	5
8 (0V)	9
9 (0V)	13

Plug body ———— Screen ———— Plug body
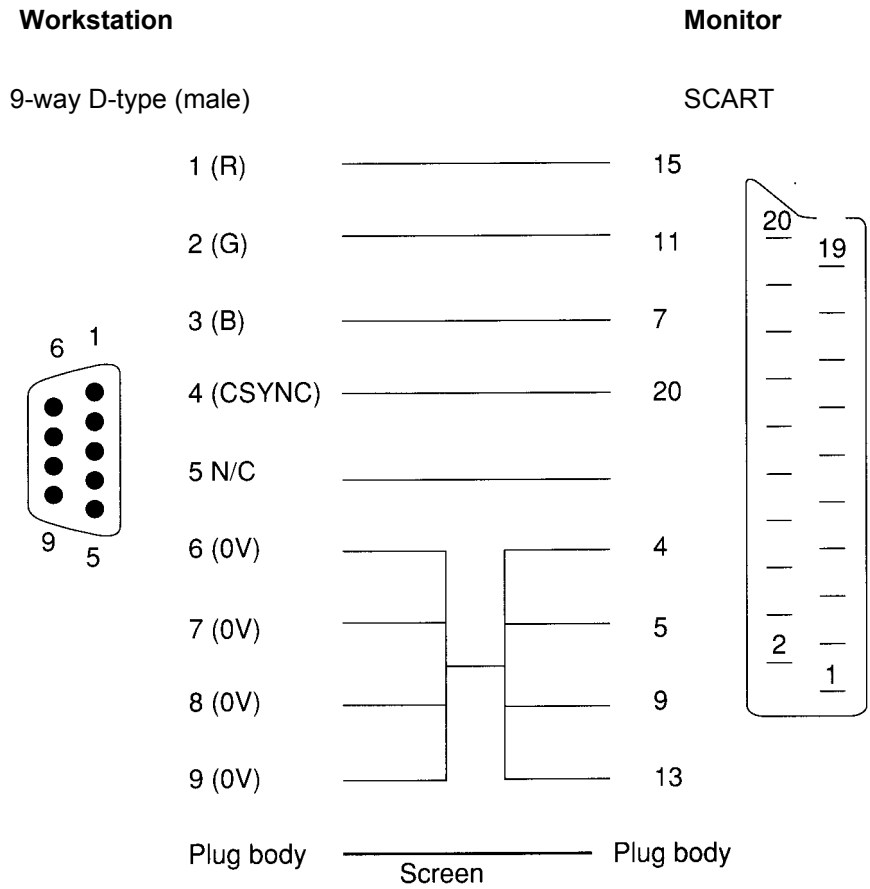
Cable type MB

This is a standard cable and does not need an adaptor. For information, the pin connections are as follows:

Workstation

9-way D-type (male)

Monitor

9-way D-type (male)

Workstation		Monitor
1 (R)	——————	1
2 (G)	——————	2
3 (B)	——————	3
4 (CSYNC)	——————	4
5 (Pulled high)	——————	5
6 (0V)	——————	6
7 (0V)	——————	7
8 (0V)	——————	8
9 (0V)	——————	9
Plug body	———Screen———	Plug body

Cable type MC1

This is a standard cable and does not need an adaptor. For information, the pin connections are as follows:

Workstation   **Monitor**

9-way D-type (male)   15-way mini D-type (male)

1 (R) ——————— 1

2 (G) ——————— 2

3 (B) ——————— 3

4 (CSYNC) ——————— 13

5 (Pulled high) ——————— 14

6 (0V) ——————— 6

7 (0V) ——————— 7

8 (0V) ——————— 8

9 (0V) ——————— 10

Plug body ——————— Plug body
Screen

Appendix B: Monitor connections

Adaptor for cable type MC2
If you want to connect a multi-sync monitor that has been supplied with an MC2-type of cable (instead of an MC1-type) you will need an MC2 cable adaptor. This will connect from the 15-way plug on the computer end of the monitor cable to the ANALOGUE RGB socket on the back of the workstation.

You need to make a short cable that has 15-way mini D-type socket on one end, and a 9-way D-type plug on the other end. The pin connections of this adaptor are as follows:

Workstation   **Monitor cable**

9-way D-type (male)   15-way mini D-type (female)

9-way D-type (male)		15-way mini D-type (female)
1 (R)	———————	1
2 (G)	———————	2
3 (B)	———————	3
4 (CSYNC)	———————	14
5 (Mode)	———————	13
6 (0V)	———————	6
7 (0V)	———————	7
8 (0V)	———————	8
9 (0V)	———————	10
Plug body	———— Screen ————	Plug body
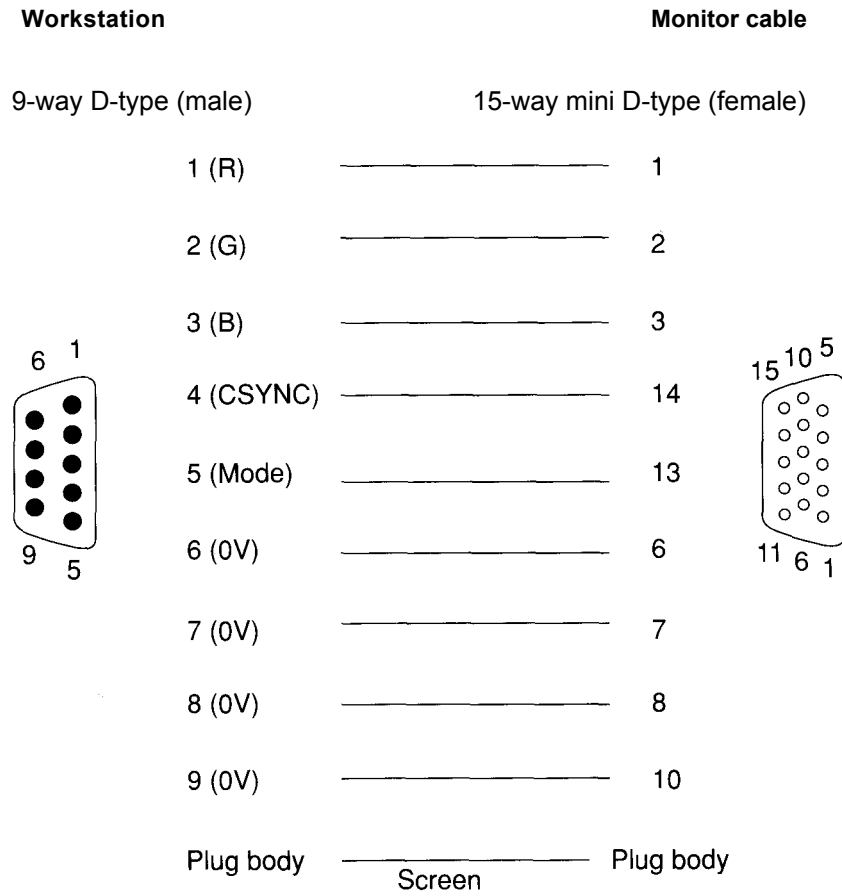
Alternatively, you can make a single cable to connect from the workstation to the monitor without an adaptor.

Adaptor for cable type MD

Some monitors are supplied with a signal cable directly moulded into the monitor (eg the LiteOn CN1414E monitor). They need an adaptor, to connect between the 15-pin plug on the other end of the monitor cable, and the 9-pin ANALOGUE RGB socket on the workstation.

You need to make a short adaptor cable that has a 15-way mini D-type socket on one end, and a 9-way D-type plug on the other end. The pin connections are as follows:

Workstation   **Monitor cable**

9-way D-type (male)   15-way mini D-type (female)

1 (R) ——————————— 1

2 (G) ——————————— 2

3 (B) ——————————— 3

4 (HSYNC) ——————————— 13

5 (VSYNC) ——————————— 14

6 (R GND) ——————————— 6

7 (G GND) ——————————— 7

8 (B GND) ——————————— 8

9 (Digital GND) ——————————— 10

Plug body ——————————— Plug body
Screen
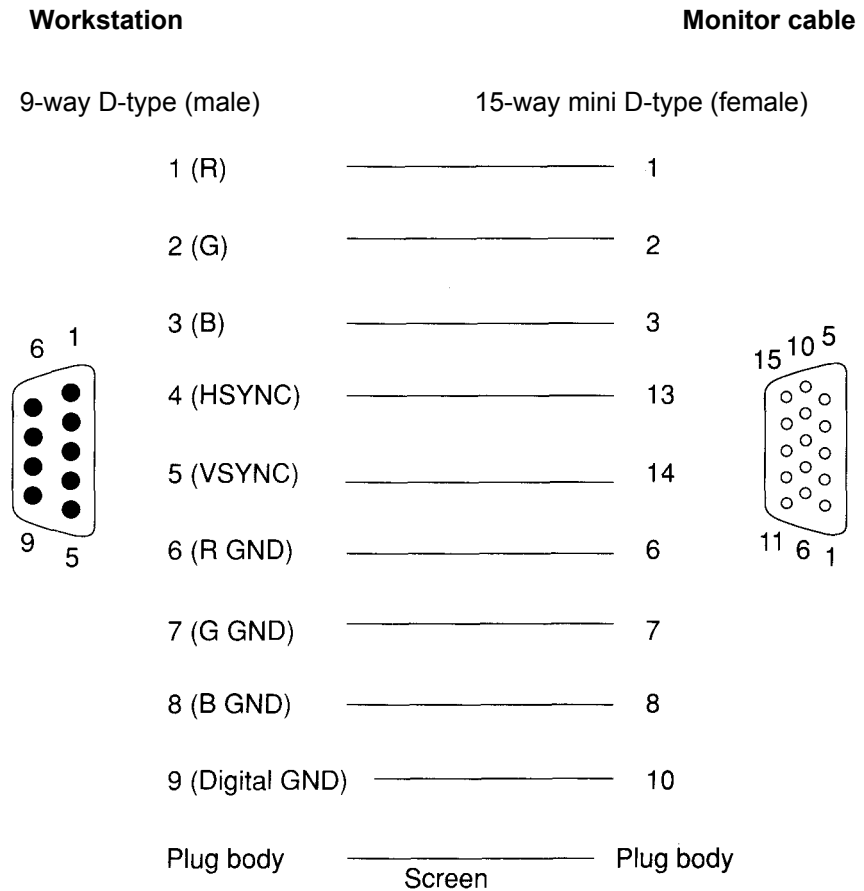
If you are unsure about how to make this adaptor, then contact your supplier.

Appendix B: Monitor connections   85

Cable type ME

This is a standard cable, with a BNC connector on at each end. Most high-resolution monochrome monitors use two of these cables, but some use three. In either case, you do not need an adaptor.

For monitors using two type ME cables, the connections are as follows:

Workstation   **Monitor**

BNC   BNC

HI-RES   ⊖—————————⊖   VIDEO
MONO VIDEO

C/V SYNC   ⊖—————————⊖   SYNC
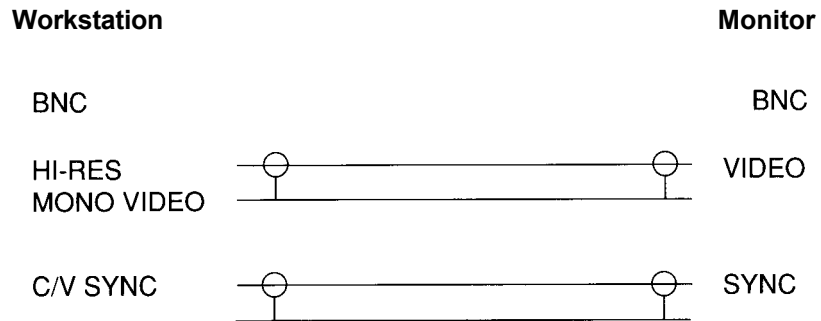
For monitors using three type ME cables, the connections are as follows:

Workstation   **Monitor**

BNC   BNC

HI-RES   ⊖—————————⊖   VIDEO
MONO VIDEO

C/V SYNC   ⊖—————————⊖   V SYNC

H SYNC   ⊖—————————⊖   H SYNC

Appendix B: Monitor connections
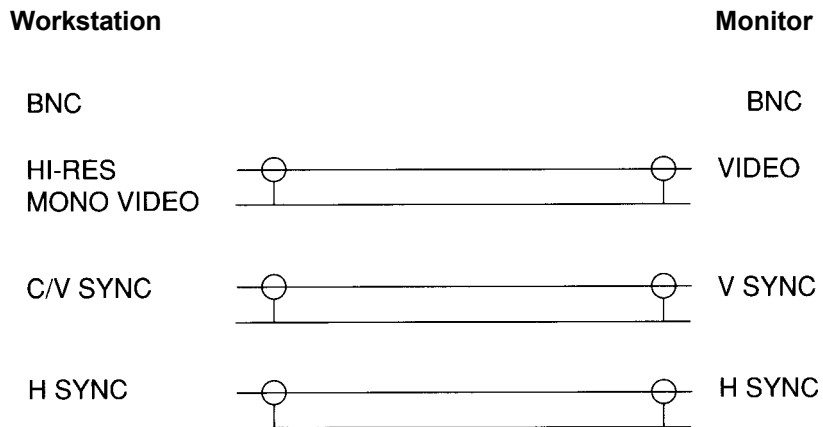
Adaptor for cable type MF

Cable type MF is a standard cable with a phono connector on each end. It needs an adaptor (with resistors, to mix the separate red, green and blue signals into a composite monochrome signal) which connects to the ANALOGUE RGB socket on the back of the workstation.

You need to make an adaptor cable that has a 9-way D-type plug on one end, and a phono socket on the other. The connections you need to make are as follows:

Workstation   **Monitor cable**

9-way D-type (male)   phono socket
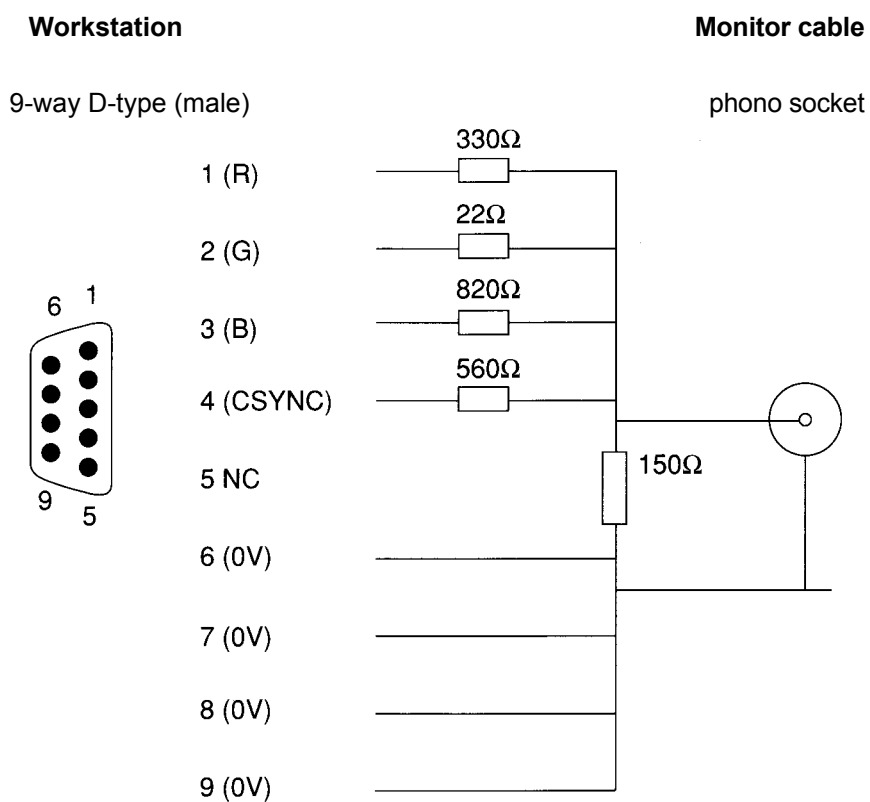
Alternatively, you can make a single cable, which connects directly from the workstation to the monitor. It requires the same mixing resistor network. If you are unsure about how to make either of these, then contact your supplier.

Appendix B: Monitor connections   87
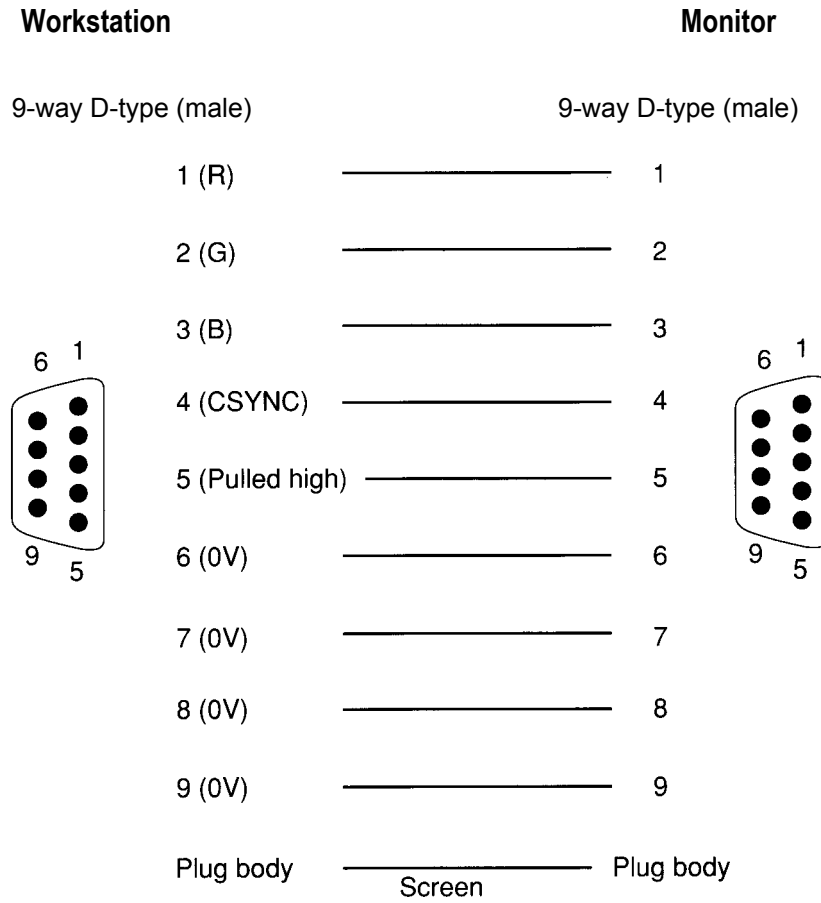
Cable type MG

This cable is supplied with the Acorn AKF17 medium-resolution colour monitor, and does not need an adaptor cable. For information, the pin connections are as follows:
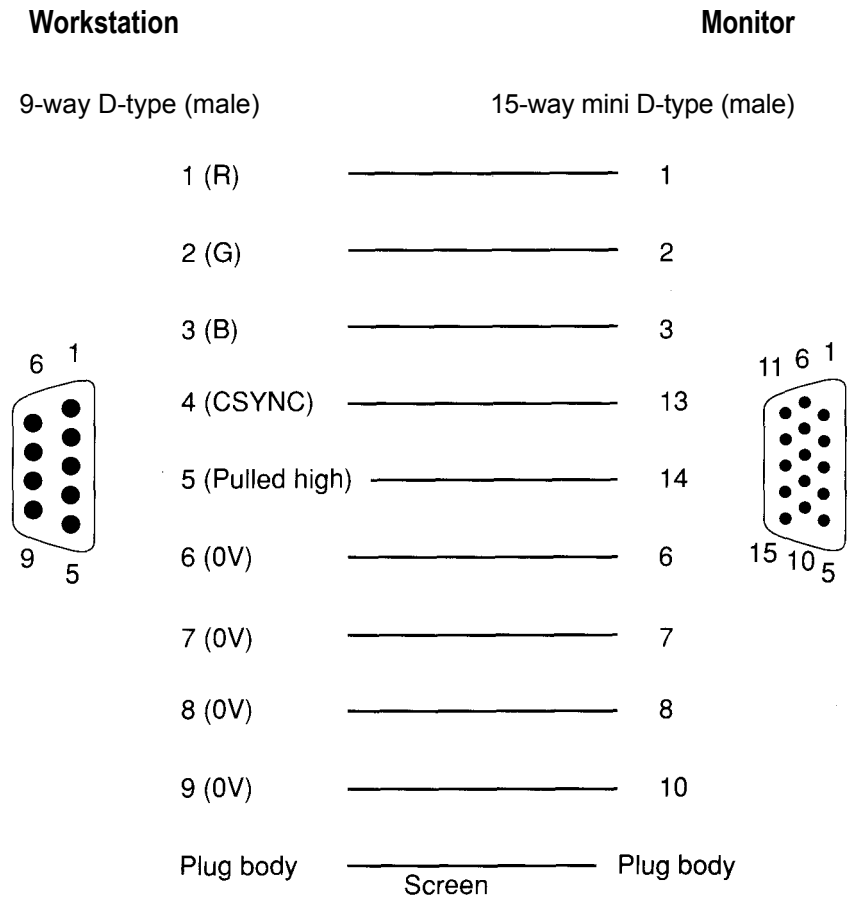
Workstation

9-way D-type (male)

Monitor

9-way D-type (female)

Workstation		Monitor
1 (R)	———————	3
2 (G)	———————	4
3 (B)	———————	5
4 (CSYNC)	———————	7
5 (Mode)		6
6 (0V)		8
7 (0V)		1
8 (0V)		2
9 (0V)		9

Plug body ——————— Plug body
Screen
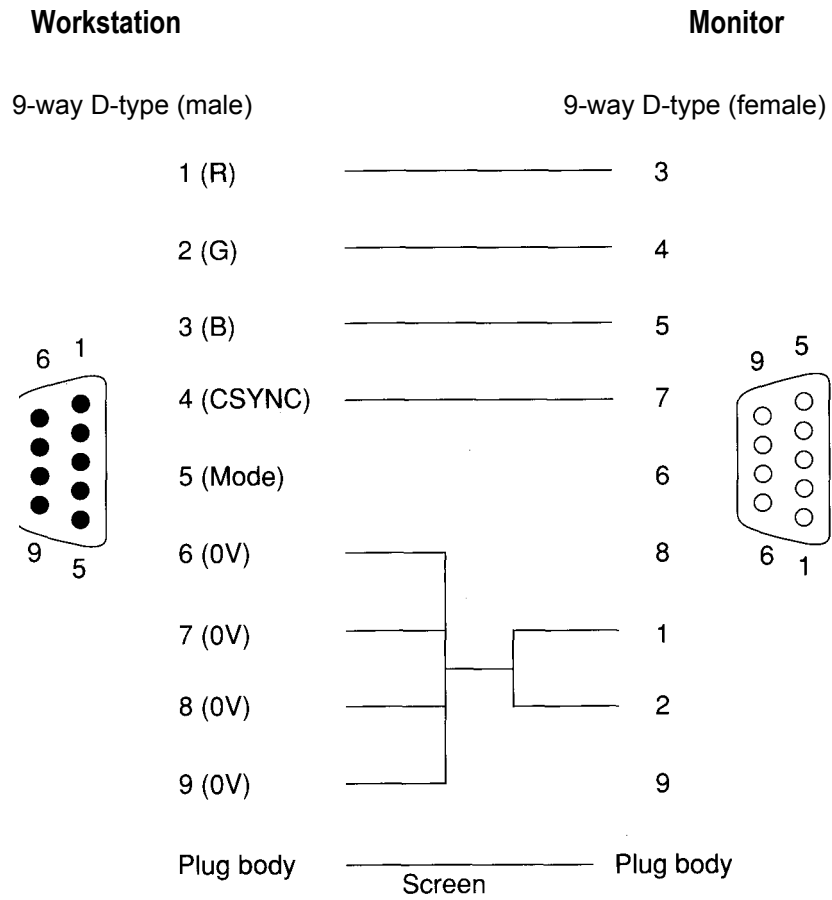
Changing the internal link settings

There are two shorting links (LK3 and LK6) on the circuit board whose positions you may need to move before you can use your monitor.

Note: The default settings are between pins 2 and 3 on both links. If your monitor uses these link positions, you probably won't need to go through the following stages (which involve taking the lid off the computer) so check first.

To change the positions of these links, take the following steps:

1   Switch off the computer and unplug the power supply cable.

2   Locate and remove the three screws at the top of the back panel.

Back screws
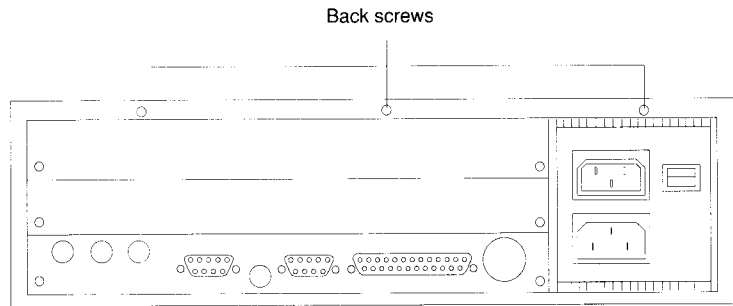
3   Locate and remove the screws on either side of the computer as shown in the drawing below (there is one screw on each side):

Side screw
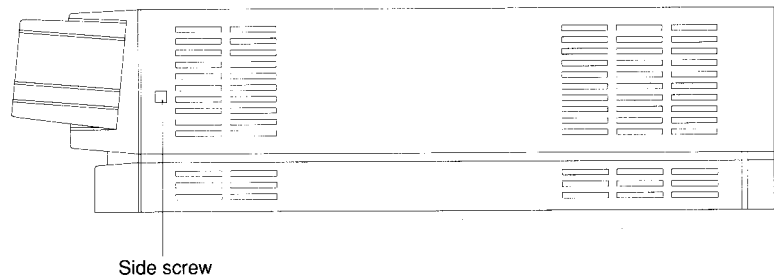
4   Grasp the sides of the computer's top cover and slide it carefully towards the back, until the cover comes right off. If you spring the sides apart slightly, it will be easier to slide off.

5   Referring to the illustration below (plan view, with the **rear** of the computer at the bottom of the page) check to see which positions the two plastic-covered links on LK3 and LK6 are in. If necessary, move them so that they are in the correct positions for your monitor (as given in *Table 1 - Monitor information* on page 78).

LK3 →

LK6 →

RGB socket
(SK2)

BNC Connectors

Back edge of
circuit board
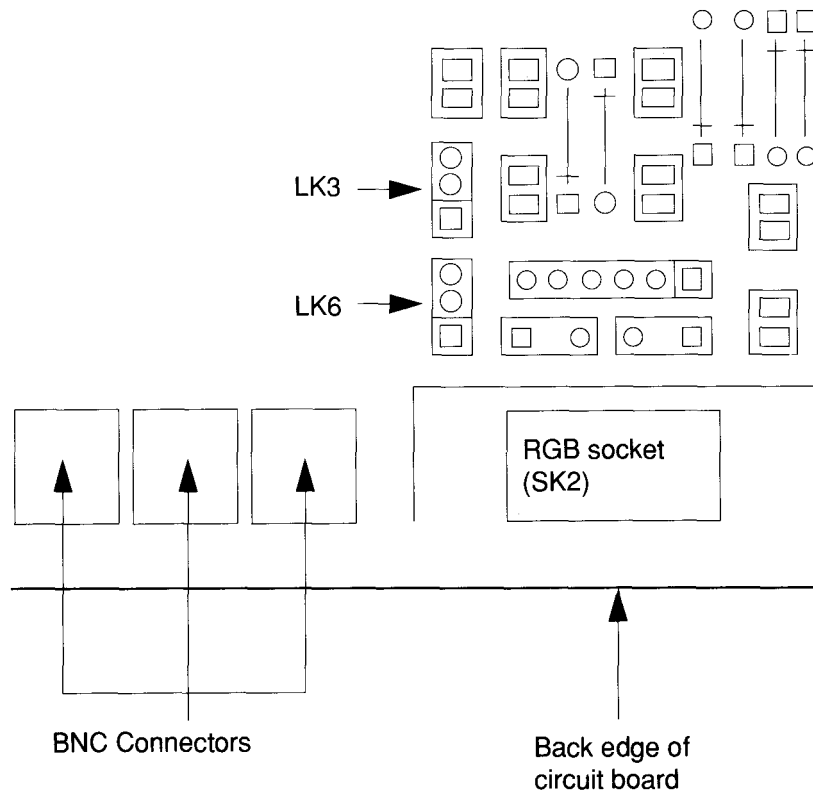
6   Replace the cover and fixing screws.

7   Follow the instructions in the chapter entitled *Switching on* to configure your workstation and get a picture on your monitor.

Appendix C: Attaching peripheral devices

This appendix gives you advice on attaching different peripheral devices to your computer.

Introduction

Depending on the configuration, there are a number of peripheral devices that you can attach to your workstation to expand its capabilities. For example:

- terminals
- printers
- modems
- SCSI peripherals (if you have a SCSI expansion card installed).

This chapter offers some general guidelines for setting up each of the above devices on your system. Where possible, examples are given for attaching specific peripheral devices, but be aware that there will be times when only general explanations can be given and it will be up to you to determine the exact action required. For example, the signal connection diagrams that are given for each hardware connection act as guidelines which will work with most hardware. Some or all of the connections shown with dotted lines may be unnecessary, and you must first check the manual accompanying the peripheral device that you are connecting.

Notes:

1   Some peripheral devices are only compatible with RISC OS, and others are only compatible with RISC iX. You should check with your supplier before you attach any new peripherals to your system.

2   Various third party monitors and other peripheral equipment are depicted or described in this Guide. The illustration or description of these or any other third party equipment does not imply any recommendation or endorsement by Acorn Computers Limited, and users must satisfy themselves as to the suitability of any peripheral equipment (including monitors) on advice from the equipment supplier.

Stages involved in connecting a device

There are two main stages involved in attaching any type of peripheral device to your system:

1 **Hardware connection** — physically connecting the peripheral device to your system by attaching a cable from one of the ports on your system to a port on the peripheral device, and ensuring that the correct signals are being sent through this cable so that data can be transmitted.

2 **Software connection** — altering existing system configuration files and creating new configuration files, or running appropriate device driver software so that your system knows about, and can communicate with, the peripheral device. You will need to consult the appropriate User Guide for your operating system to complete this stage.

Available ports

There are two or (optionally) three ports available on your system that are used to attach peripheral devices:

• Serial port

• Parallel port

• SCSI port (only available if your workstation has a SCSI expansion card installed).

The characteristics of each of the above ports are described in the following sections along with information about the types of devices that can be connected to them.

Serial port

The serial port is by far the most versatile and consequently the most troublesome port to use. The port supports two different types of peripheral or equipment: Data Terminal Equipment (or DTE — for example printers and computers), and Data Communication Equipment (or DCE — for example modems). It follows that you will need different cables, depending upon which type of peripheral (DTE or DCE) you are connecting to your machine.

When you connect peripherals to the serial port:

• Ensure that screened cabling is used to connect up the peripheral.

• Consult the peripheral manufacturer's instructions for pin connections but note that at your workstation end of the cable, connections to the CTS signal should instead be made to the DSR signal. Examples of signal connections to specific peripheral devices are given in the section entitled *Serial port connections* on page 99.

Serial port pin assignment

The following diagram shows the assignment of the pins on the serial port of your workstation, viewed on the rear face of the computer. The pin assignment of 9-pin serial ports on other hardware is often the same as this.

```
         DCD  RXD  TX  DTR  0V

            1 2 3 4 5
          ⌜───────────⌝
          │ ● ● ● ● ● │
          │  ● ● ● ●  │
          ⌞───────────⌟
            6 7 8 9

         DSR  RTS  CTS  RI
```
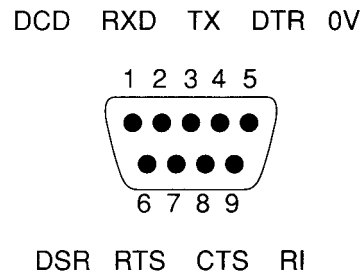
Parallel port

The parallel port is commonly used to connect a printer, or to send data to a device using eight data pins in parallel, making a byte of character data.

Parallel port pin assignment

The following diagram shows the assignment of the pins on the parallel port 25-way D-type socket, viewed on the rear face of the computer:

```
  13 12 11 10 9  8  7  6  5  4  3  2  1
 ⌜─────────────────────────────────────⌝
 │ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ │
 │  ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○  │
 ⌞─────────────────────────────────────⌟
   25 24 23 22 21 20 19 18 17 16 15 14
```

Appendix C: Attaching peripheral devices   93
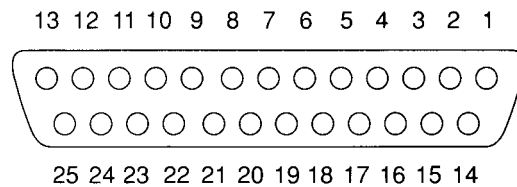
PIN	Name
1	$\overline{\text{STROBE}}$
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	$\overline{\text{ACKNOWLEDGE}}$
11	$\overline{\text{BUSY}}$
12-16	Not connected
17-25	0V

The pin connections are arranged so that a parallel ribbon cable can be used to connect directly to a 36-way Centronics-type Delta 57 connector.

SCSI port

The SCSI card provides an industry standard interface that enables you to connect a variety of SCSI-compatible devices.

The SCSI port is a high-speed interface that conforms to the ANSI Standard X3.131 - 1986, and enables you to connect ANSI-compatible SCSI peripherals, such as tape streamers and hard discs.

For a fuller list of SCSI peripherals that can be attached to your SCSI interface and for more information about the characteristics of the SCSI hardware interface, refer to the *SCSI Expansion Card User Guide.*

The remainder of this chapter describes how to attach various peripheral devices to your system using the serial and parallel ports.

Terminals

Attaching an extra terminal to Acorn R200 series systems can greatly enhance the capability of your machine.

You cannot connect a terminal to a RISC OS workstation.

Hardware connection

You can connect a wide variety of different terminals to your system using the serial line port. To physically connect a terminal to your system, follow the instructions given in the documentation provided with the terminal. Here is a general guide to the signals required on the cable:

Workstation
9-way D-type (female)

Terminal

```
1 (DCD)  ─────────┐              ┌················· DCD
                  │              :
2 (RXD)  ────────┐│      ┌───────┤─────── RXD
                 │└──────┼───┐    :
3 (TXD)  ────────┘       │   └────┤─────── TXD
                         │        :
4 (DTR)  ────────●       ●········: DTR
                 │       :
5 (0V)   ────────┼───────┼──────── 0V
                 │       :
6 (DSR)  ────────┤   ┌───┤·········· DSR
                 │   │
7 (RTS)  ────────┤───┤       ┌───── RTS
                 │   └───────┼┐
8 (CTS)  ────────┘           └┼──── CTS

9 (RI)                        RI
```
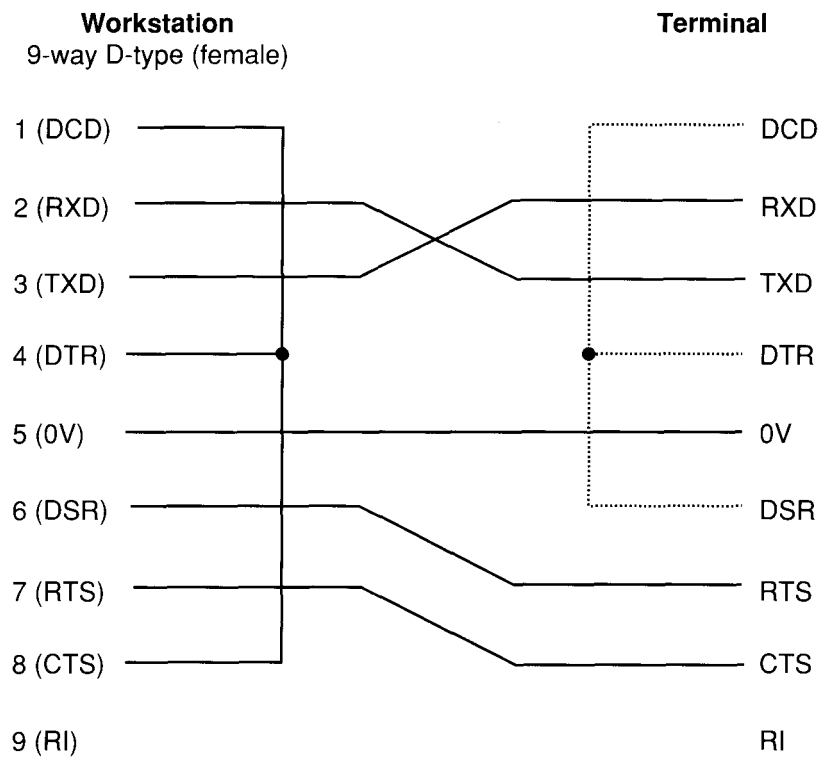
An important point to note is that the terminal monitors the status of the lines DSR (data set ready) and DCD (data carrier detect). It also raises and lowers DTR (data terminal ready) as appropriate. In many cases, where 'modem control' is not required (which is the case with most terminals) it is appropriate to strap all these lines together, and thus only use the three lines of transmitted data, received data and common return.

Both the computer and a terminal are described as DTE (Data Terminal Equipment). This means that in order to connect them, two connections in the cable are transposed: the 'Transmitted Data' line at one end is connected to the 'Received Data' line at the other.

Likewise the line CTS, 'Clear to Send' is paired with RTS 'Ready to Send', and DTR is paired with with DCD. A cable with connections thus paired is often referred to as a *null modem cable,* but the number of connections thus paired varies, and often only the three transmitted data, received data and common return connections are passed through the cable with straps at each end.

For more information about setting up extra terminals for use with RISC iX workstations, refer to the *RISC iX System Administrator's Guide.*

Printers

You can connect printers to your system via:

- the parallel port
- the serial port .

The way to connect printers to each of these two ports is described below.

Hardware connection

Printers on the parallel port

Connecting printers via the parallel port is generally simpler. Check the documentation accompanying your parallel printer for more information.

For more information about setting up printers for use with RISC iX workstations, refer to the *RISC iX System Administrator's Guide.* If you have a RISC OS workstation, see the chapters *PrinterDM* and *PrinterPS* in the **RISC OS** *User Guide,* and the manual supplied with your printer.

Printers on the serial port

You should check carefully what options for flow control your printer uses, and if possible set it to XOFF/XON flow control. Some printers have alternative flow control mechanisms involving ETX/ACK (different control characters from XOFF/XON, transmitted under slightly different circumstances), or RTS/CTS (signals on additional wires on the interface cable). The diagram on the next page is a general guide to the signals required on the cable:

Workstation
9-way D-type (female)
                                                    Printer

1 (DCD)   DCD

2 (RXD)   RXD

3 (TXD)   TXD

4 (DTR)   DTR

5 (0V)   0V

6 (DSR)   DSR

7 (RTS)   RTS

8 (CTS)   CTS

9 (RI)   RI

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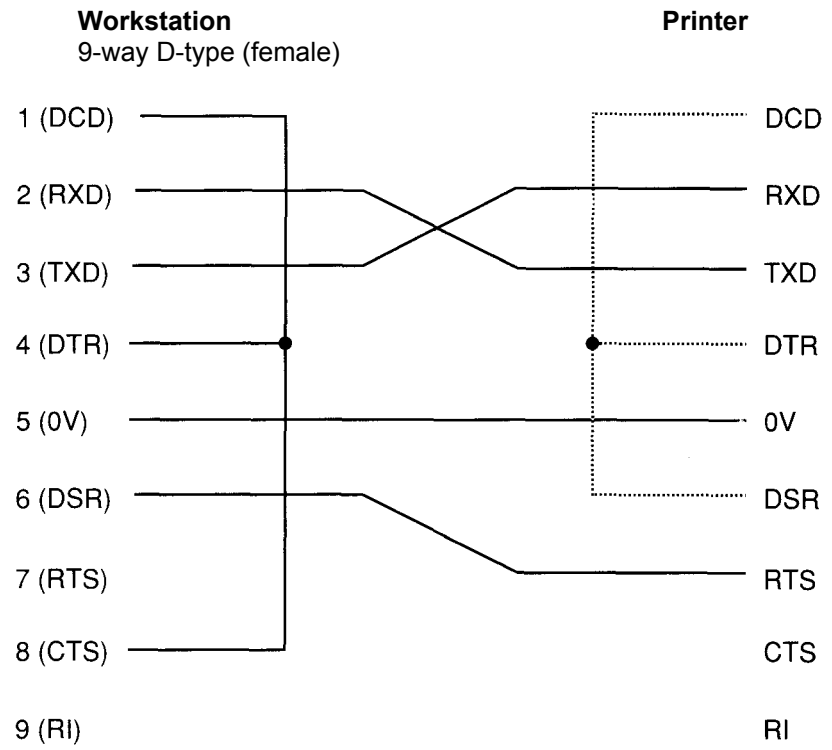
Modems

A modem is usually connected up differently from a terminal. This is because a modem is a DCE (Data Communications Equipment) device, whereas terminals and printers are DTE (Data Terminal Equipment) devices. The main difference is that the connections are 'straight through', in that the modem expects to *receive* data on the ` transmitted data' line, and vice versa, whereas when connecting terminal to computer or computer to computer the connections have to be crossed over.

Hardware connection

You may need to make an adapter cable to connect a modem or other standard RS232 DCE device. Here is the wiring guide for connecting to a standard RS232 25-way D-type connector:

Workstation		**Modem**
9-way D-type (female)		25-way D-type
1 (DCD)	———————	8 (DCD)
2 (RXD)	———————	3 (RXD)
3 (TXD)	———————	2 (TXD)
4 (DTR)	———————	20 (DTR
5 (0V)	———————	7 (0V)
6 (DSR)	———————	6 (DSR)
7 (RTS)	———————	4 (RTS)
8 (CTS)	———————	5 (CTS)
9 (RI)	———————	22 (RI)

In practice you may leave out RI and DSR as they are not used. If the modem doesn't provide a CTS signal, leave out this wire and instead strap it to RTS at the workstation end.

If you are connecting a different type of modem than the one illustrated, the differences will be in which signals the modem looks at and can supply. More modern or expensive modems can be configured to use or ignore the various control signals, by means of DIP switch settings or by sending commands.

For more information about setting up modems for use with RISC iX workstations, refer to the chapter entitled *Setting up peripheral devices* in the *RISC iX System Administrator's Guide,* and the manual supplied with your modem.
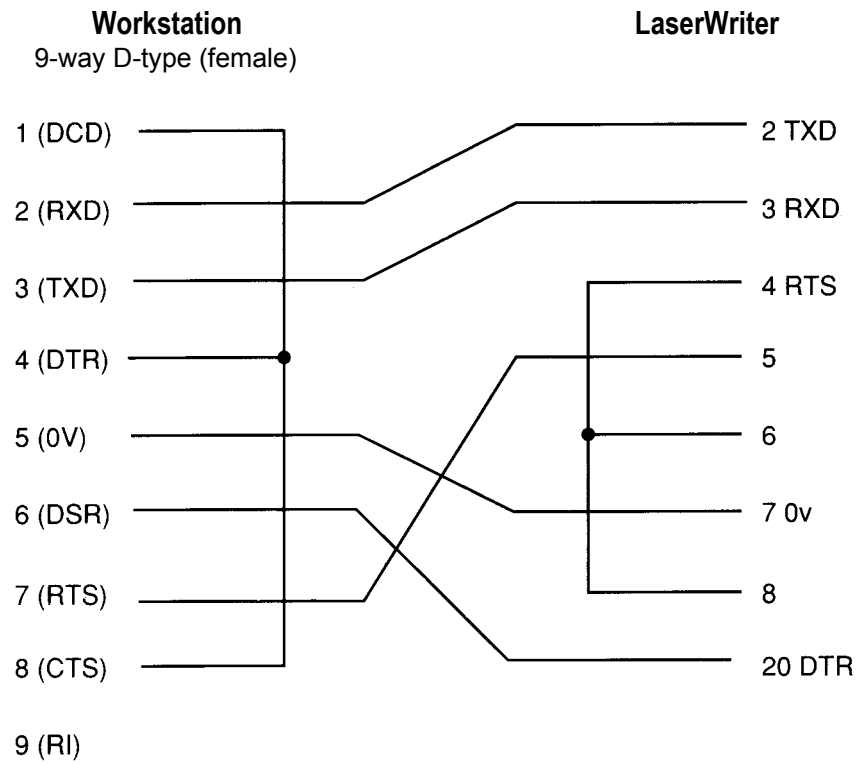
Serial port connections

This section defines the serial port connections for connecting various specific peripheral devices to the serial port of your workstation.

If the device that you wish to connect to the serial port is not included then you should refer to the section entitled *Serial* port on page 92, which contains general guidelines about attaching devices to the serial port.
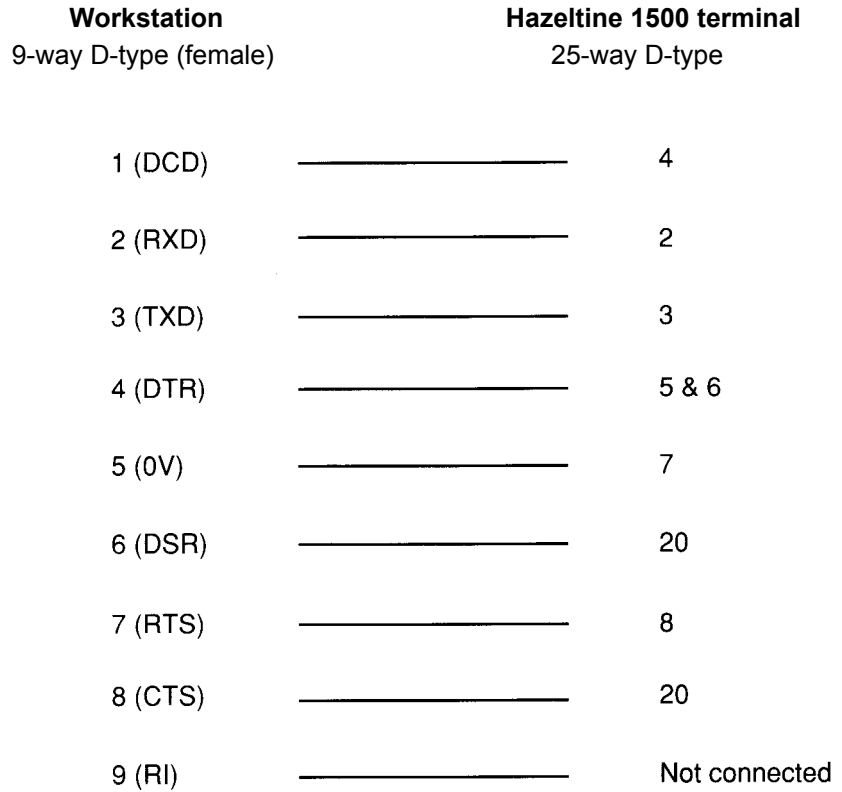
Laser printer signal
connections

The following diagram shows the serial port signals used to connect to an Apple `
LaserWriter' laser printer:

Workstation
9-way D-type (female)   **LaserWriter**

1 (DCD) ———————————————————— 2 TXD

2 (RXD) ———————————————————— 3 RXD

3 (TXD) ———————————————————— 4 RTS

4 (DTR) ————————●———————————— 5

5 (0V) —————————————————————— 6

6 (DSR) ———————————————————— 7 0v

7 (RTS) ———————————————————— 8

8 (CTS) ———————————————————— 20 DTR

9 (RI)

If you are using a RISC iX workstation, refer to the chapter entitled Setting up
peripheral devices in the *RISC iX System Administrator's Guide.* This tells you what
software changes you need to make. If you are using a RISC OS workstation, refer to
the chapter entitled *PrinterPS* and *PrinterDM* in the *RISC OS User Guide.* For more
information about connecting other types of printers, refer to the section entitled
Printers on page 96.

Hazeltine 1500 terminal
signal connections

The following diagram shows the serial port signals used to connect a Hazeltine 1500 terminal to the serial port of your workstation:

Workstation		**Hazeltine 1500 terminal**
9-way D-type (female)		25-way D-type
1 (DCD)	———————	4
2 (RXD)	———————	2
3 (TXD)	———————	3
4 (DTR)	———————	5 & 6
5 (0V)	———————	7
6 (DSR)	———————	20
7 (RTS)	———————	8
8 (CTS)	———————	20
9 (RI)	———————	Not connected

There is more information for RISC iX users in the chapter entitled *Setting up peripheral devices* in the *RISC iX System Administrator's Guide.*

Appendix C: Attaching peripheral devices

Appendix D: Expansion card installation

This chapter explains how to install expansion cards into your computer.

Expansion cards

There are a number of expansion cards available from Acorn to make your computer more versatile. They include:

- Internal 4 MB memory expansion cards
- a MIDI expansion card
- an I/O expansion card
- a SCSI expansion card (generally fitted as standard to Acorn R260 and Archimedes 540 computers)
- an Ethernet expansion card (generally fitted as standard to Acorn R260 and R225 computers)
- an Econet module.

Contact your supplier for an up-to-date list of available expansion cards. He will also inform you which ones are compatible with RISC iX machines, and which are compatible with RISC OS (eg a MIDI expansion card will only work on a RISC OS machine). There are spaces for up to four expansion cards (some of which may already be occupied).

In order to fit an expansion card you will have to remove the cover of the computer unit and one of the blanking plates at the rear of the machine. This is so that you can gain access to the backplane adapter (known simply as the *backplane)*. The only tools you will require for this are No. 1 and No. 2 Pozidriv screwdrivers.

If you do not feel confident about fitting an expansion card, take the expansion card and your computer to your supplier who will fit the card for you. A charge may be levied by the supplier for installing the expansion card; such a charge shall be entirely at the discretion of the supplier concerned.

Disassembly

1   Switch off the computer at the rear and disconnect it from the mains supply by unplugging the power supply cable.

2   Unplug from the mains any peripherals that are attached, such as printers or terminals, and disconnect them from the computer.

3   Remove the top cover of the machine (to do this, follow steps 1 to 4 of the instructions in the section entitled *Changing the internal link settings* on page 88).

4   Find the backplane, which is a small printed circuit board (PCB) mounted vertically on the main PCB.

5   Check that the backplane has an expansion card socket free. If all the sockets are in use, you will have to remove one of the existing expansion cards in order to make room for the new one.

6   The backplane has upper and lower expansion card slots. These correspond to the two full-width blanking plates if no expansion cards are currently installed.

7   Remove a blanking plate (for the rest of this chapter we've illustrated the lower plate). To do this, unscrew the two screws holding the plate in position.

You are now ready to fit the expansion card. The following section tells you how to fit expansion cards such as an ethernet expansion card, or a MIDI expansion card.

The section entitled *Fitting memory expansion cards* on page 106 tells you how to fit the internal 4MB memory expansion cards.

Fitting expansion cards

WARNING: Some components on expansion cards can be damaged by static electricity. Avoid touching chips on the card, or the connectors.

1   Examine the expansion card before fitting it to see whether it is a full-width or a half-width card.

    A full-width expansion card has a plate at the rear which extends the full width of the machine. If you have a full-width card, go straight to step 3.

2   If you have a half-width card, use the short blanking plate, T-piece and two screws supplied to make the expansion card up to the full width of the machine.

3   Support the backplane firmly with one hand, and gently push the connector on the card into your chosen socket on the backplane.

    Make sure that you offer the expansion card up to the backplane at right angles to it, and that you align the connectors; otherwise, you may bend the pins or break or disconnect the backplane itself.

The diagram below shows an expansion card fitting into one of the lower positions in the computer unit:

Appendix D: Expansion card installation   105
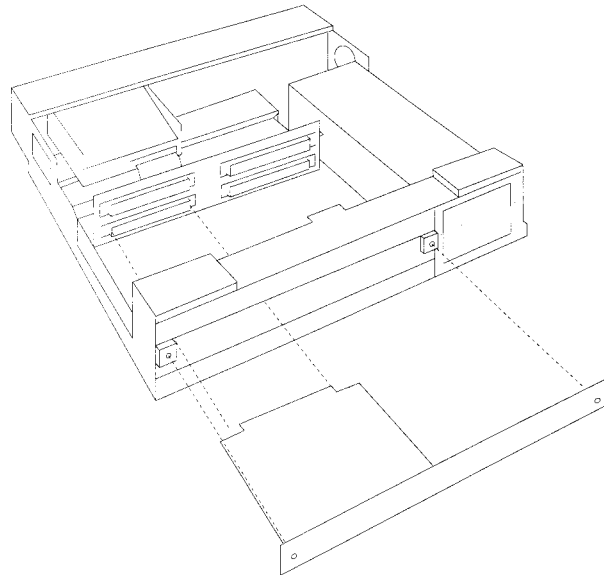
4   Make sure that the connector fits properly: the rear plate of the expansion card should be flush with the rear of the computer case.

It does not require great force to fit the expansion card correctly. If the expansion card will not seat easily, remove it and try again.

5   Screw the rear plate of the expansion card into the rear of the computer case. Use the two screws which held the blanking plate in place.

Fitting memory expansion cards

The 4MB memory expansion cards plug into the main circuit board. To fit an extra card, proceed as follows:

1   Remove the top cover of the computer (as described in steps 1 to 4 of the instructions in the section entitled *Changing the internal link settings* on page 88).

2   Hold the memory expansion card so that the connector is at the bottom, and the components are on the side nearest to you.

3   Working from the rear of the computer, plug the expansion card into the next available memory expansion socket.

The diagram in the section entitled *Internal links* on page 71 snows you where the sockets are in relation to the other main components on the board. **Important:** you must fit extra memory cards into adjacent sockets. To upgrade your computer to 8 MB, use socket 2; for 12 MB, use sockets 2 and 3, and so on.

Reassembly

1   Slide the top case of the computer unit on from the rear (make sure you slide it on the right way around - the three notches for the fixing screws go at the back of the computer).

2   Replace the three screws at the rear of the unit and tighten them up.

3   Finally, replace the two screws, one on each side of the case, and tighten them up.

Appendix E· Maintaining the computer

This chapter tells you more about looking after your computer. It describes how to clean the computer, the mouse and the fan filter.

Cleaning the computer, monitor and keyboard

First, remember to follow the *Guidelines for safe operation* at the very beginning of this guide.

You can clean the computer case by wiping it gently with a soft, slightly damp cloth. For advice on cleaning the monitor, refer to the manual accompanying it.
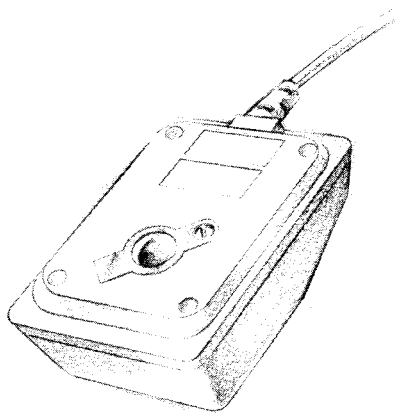
Cleaning the mouse

You should use the mouse on a surface that is as clean and as dust-free as possible. However, dust does sometimes get caught up in the ball on the underside of the mouse.

Clean the mouse occasionally to keep it running smoothly. There are two types of mouse that may be supplied with your computer. One has a screw underneath keeping the ball retainer in place. To clean this type of mouse, you need the following items:

- a cross-head screwdriver
- some tape head cleaner
- a cotton swab
- a lint-free, dry cloth.

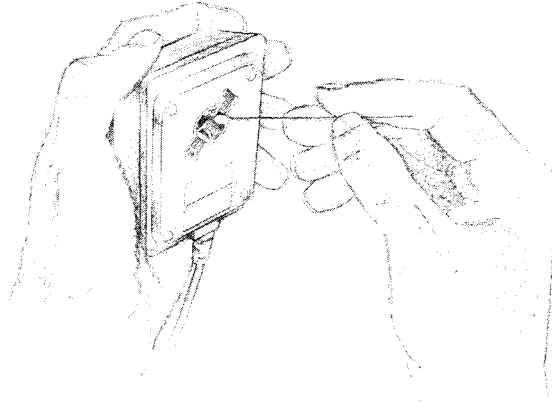To remove the ball and clean the mouse, take the following steps:

1   Unplug the mouse and turn it upside down.

2   Using the cross-head screwdriver, remove the screw holding the ball retainer.

3   Hold one hand over the ball and retainer and turn the mouse right side up,
    allowing the ball, screw and retainer to drop into your hand. Set them aside in a
    safe place.
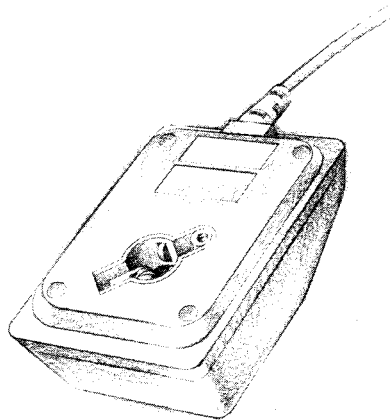
4   Locate the three plastic rollers as shown in the drawing.

5   Lightly moisten the cotton swab with tape head cleaner and apply it gently to the rollers. Rotate the rollers, carefully cleaning off any dust or dirt that may be clinging to them.

6   Make sure the inside of the mouse is free from dust.

7   Wipe the ball with the clean, dry cloth. Do not use a cloth which may leave lint, and do not use cleaning liquid on the ball.
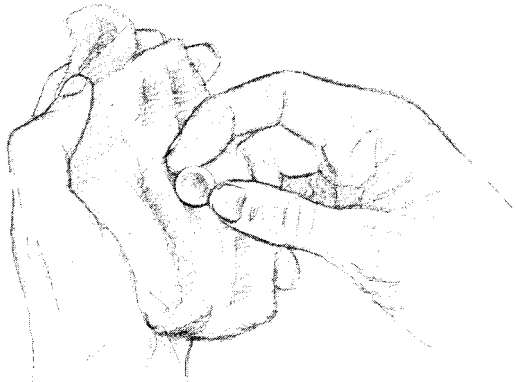
To replace the ball and retainer, take the following steps-

1 Turn the mouse upside down and place the ball back in the case.

2 Return the retainer to its original position, as shown in the diagram at the beginning of this chapter.

3 Replace and tighten the screw.

In the other type of mouse, the ball is retained by a simple bayonet-locked cover. To remove the ball for cleaning, twist the retainer anticlockwise: the retainer and ball will fall out. Clean the ball following steps 5, 6 and 7 in the instructions above. Return the ball to its original position. Replace the retainer and twist it clockwise.

Cleaning the fan filter

The power supply for your workstation has a filter on one side, to filter the air sucked in by the two cooling fans. You should clean this filter periodically (at least annually) to prevent it becoming clogged up. To do this, take the following steps:

1 Remove the top cover of the computer, by following steps 1 to 4 in the section entitled *Changing the* internal link *settings* on page 88.

2 Locate the filter. Its position is shown in the diagram below:
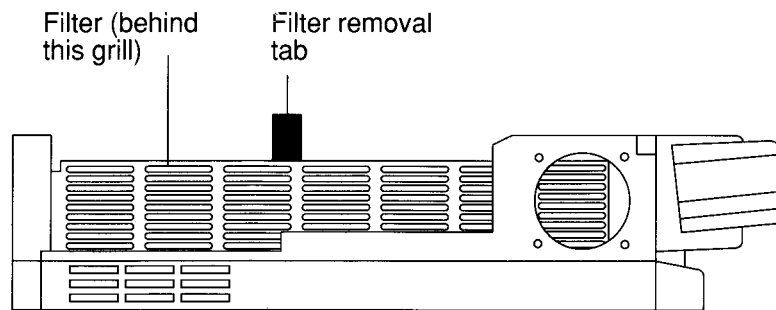
3 Gently run the nozzle of a vacuum cleaner over the outside of the grill on the power supply.

4 Grasp the filter removal tab, and gently remove the filter (taking care not to knock loose dirt into the grill).

Make sure you know which way round the filter goes — the frame should be on the outside.

5   Now run the nozzle of the vacuum cleaner over the outside face of the filter. Tapping the filter frame gently against the edge of a table will also help to dislodge any large dirt particles.

6   Replace the filter, taking care to slot it in the right way around.

7   Replace the top cover of the computer.

Alternatively, you can obtain replacement filters from your Acorn supplier; ask for Acorn part number 0816, 017.

Reader's Comment Form

A540, R260, R225 Installation Guide

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

Did you find the information you wanted?

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