Get the most out of your Amiga 1993

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Get the Most out of your Amiga 1993

At the Workbench

When you are doing anything except playing games, the Workbench becomes the most important disk in your collection. In case you've never used the Workbench before, or if you find you keep having to check in the manual to try to work out what you're doing, here's a simple guide to what Workbench does and how you get specific jobs done using Workbench. So for everything from formatting disks to copying files, here's how...

1.1 How to use Workbench

The nice thing about Workbench is that it's what's known as a 'graphical user interface' (GUI) or, alternatively, a 'WIMP' system (windows, icons, menus and pointers).

This might sound a little intimidating, but it actually means it's very easy to use because everything you need to do is shown to you on the screen, either as a picture (an icon) or as text. It's all operated with the mouse.

Essentially there are four things you need to know how to do with the mouse, and these four terms will be constantly referred to in anything that talks about using the Workbench:

1. **Click** on something. Move the mouse pointer over an object on the screen and press the left-hand mouse button once. Clicking on the box in the top-left corner of a window, for example, will close that window.

2. **Double-click** on something. Move the mouse pointer over an object on the screen and press the left-hand mouse button twice in rapid succession. Clicking on a drawer or disk icon, for example, will open a window showing the contents of the drawer or disk.

3. **Select** an icon. This involves moving the mouse pointer over an icon and pressing the left-hand mouse button (clicking on the icon). When an icon is selected, it is **highlighted** – its colour changes to show that it is selected. Clicking elsewhere on the screen will 'deselect' the icon and its colour will change back.

4. **Select a menu option**. This is the part that involves the right-hand mouse button. Hold down the right-hand button and you'll see the bar at the top of the screen change. Move the pointer to the top left of the screen and you will see a menu drop down. Pulling the pointer down this menu will highlight each of the menu options in turn. To select a menu option, simply let go of the mouse button when the option you want is highlighted.

1.2 Versions of Workbench

The Workbench disk is updated every so often and a new version brought out – versions of Workbench are identified by a number after the name. There are two really common versions of Workbench at the moment – **Workbench 1.3** (and also 1.3.2) which was available with the A500, 1500 and 2000 between 1988 and 1991, and **Workbench 2.04 (also 2.05)** which was available with the A3000, A500 Plus and A600 from about October 1991 to the present time. The new A1200 and A4000 have Workbench 3.

Quite substantial changes were introduced with Workbench 2 and so many things are done in a different way. We'll be concentrating on Workbench 2 and above, but if there are differences from 1.3 we'll mention them in brackets.

1.3 Loading Workbench

Workbench is a **self-booting** disk. All you have to do is switch your Amiga on and put the Workbench disk in, and Workbench will load. We'll assume Workbench is already loaded for the rest of this article.

1.4 Write-protecting disks

If a disk is **write-protected**, it cannot have any data saved onto it and it cannot be formatted. Write-protect a disk by moving the plastic tab in the corner so that the hole is showing.

If a disk is **write-enabled**, it can have data saved to it and it can be formatted. Write-enable a disk by moving the plastic tab so that the hole is covered. Once they are formatted for use on the Amiga, you should keep disks write-protected until you need to save something onto them.

1.5 Formatting (preparing) a blank disk

Before you can use a new three-and-a-half-inch floppy disk in your Amiga, it has to be prepared as an Amiga disk. This is called **formatting** the disk and

is one of several jobs that it's easiest to do with Workbench.

Simply put your new disk into the disk drive. It will appear on the Workbench screen as an icon with the words **DF0:????** written underneath (or **DF0:BAD** on Workbench 1.3). This shows that Workbench can't recognise the disk because it isn't an Amiga disk (yet).

Select the disk's icon. Select the **Format disk...** option from the **Icons** menu (with Workbench 1.3, select the **Initialize** option from the **Disk** menu). The Amiga will put up messages asking you to put the blank disk into the drive and asking you to confirm that you want to erase the disk: click on **OK** (or **Continue** in Workbench 1.3) and the process will start.

The formatting procedure will now click away quietly, and you will see a count-down on the screen showing how far it has got. Once it has formatted and checked all 80 of the **tracks** from which a disk is composed (numbered 0 to 79) your blank disk will be Amiga format and ready to use.

1.6 Disk swapping and requesters

If you've only got one disk drive, you will often need to swap disks. This is because the Amiga has to read something from one disk before it can do something to the other disk.

When it wants you to insert a disk, the Amiga will put a box with a message in it onto the screen. This is known as a **requester** because it's requesting that you do something.

A disk-swap requester says something like 'Insert volume Workbench in drive df0:' and it refers to the disk as a **volume** because that's what the Amiga calls disks.

Most requesters also have areas called **buttons** on which you are supposed to click to give your response. The disk requester is no exception – it has the options 'Cancel' and 'Retry' for you to click on. However, the 'insert disk' requester is unique in that if you insert the disk it's asking for, you do not need to click on either of the buttons, ever.

1.7 Disks, drawers and files

It's important to know how the structure of files, drawers and disks works. Basically, a file is something created by another program, although programs themselves are generally treated as files when it comes to disk operations because they work exactly the same way.

One basic principle of the Amiga (and, indeed, all computers) is that no two files that are in the same place can have the same name. This is pretty obvious, if you think about it, because how would the Amiga know which one you wanted?

You can, however, have two files with the same name stored on the same disk – provided they are in separate drawers. Drawers are there for you to store files in, to keep them separate. You can also store drawers inside other drawers.

So a disk can contain simply files, or it can contain drawers that contain files. Use drawers to organise your files – keep all your *DPaint* pics in one drawer and all your word processor documents in another, for example.

1.8 Creating a new drawer

You can't create disks, obviously: and you can't create files from Workbench (they have to be created by a program). And strangely enough, owners of Workbench 1.3 can't create a new drawer either: you have to duplicate the **Empty drawer** that's there already (that's what that Empty drawer is lying around for, if you'd ever wondered).

But if you have Workbench 2, you can create new drawers on a disk. All you have to do is make sure that the window (for a disk or another drawer) that you want to create your drawer in is selected ('active', as it's also called) then choose the **New drawer** option from the **Window** menu.

A box will appear asking you to name the drawer: get rid of the name 'Unnamed1' by using the Delete key and then type in whatever name you want to call your drawer. Then click on the OK button.

1.9 Renaming a disk, drawer or file

When you format a blank disk, create a new drawer or copy something, you may find it useful to rename it. To do this, all you have to do is **select** the file, drawer or disk by clicking once on its icon so that it's highlighted. Then select the **Rename** option from the **Icons** menu (**Rename** from the **Workbench** menu on Workbench 1.3). A requester will appear: delete the old name by pressing the Delete key and type in your new name. Then click on **OK** (or just **press Return** on Workbench 1.3).

A note about file names

When you are naming a file, disk or drawer remember a couple of basic 'don'ts'. You cannot put a colon (:) or a back-slash (/) in a file name and it is wise not to use spaces in names, otherwise whenever you use the name, you will have to put it in inverted commas or double quotes (**"file name"**).

1.10 Duplicating files and drawers

If you want to make a copy of a file or a drawer and leave it in the same place, this is generally referred to as duplicating it. All you have to do is select the icon for the drawer or file by clicking on it once, then select the **Copy** option from the **Icons** menu (**Duplicate** from the **Workbench** menu on Workbench 1.3). The duplicate will be called Copy_of_Yourfile and you can rename it, as long as you don't give it the same name as the original.

1.11 Copying files and drawers from one disk to another

This is really very easy. All you have to do is open the first disk, and open the windows for disks and drawers until you find the file or drawer that you want to copy. Then take the disk out of the drive and put in the disk you want to copy the file to. Again, open any windows you want to put the file or drawer into. Now simply drag the file or drawer from where it was on the

first disk to where you want it to be on the new disk. You will probably now have to swap disks a few times.

Notice that the copy, because it is on a completely different disk, is allowed to have the same name as the original file or drawer and so is not renamed with Copy_of_ in front of it.

1.12 Copying whole disks

This is almost exactly the same as copying a file or a drawer from one disk to another, but if anything it's easier. All you have to do is insert the disk you want to copy: then take it out and insert the new disk. The icons for both disks should be visible on the screen. Now drag the icon for the disk you want to copy over the icon for the new disk that you want to copy it to. You'll then have to follow the requesters and probably swap disks a lot, but it's pretty easy really, eh?

Note one very useful thing: when you are copying a disk to a blank disk, you do not have to format the blank disk before you start. The Amiga will format the new disk as it copies the old disk onto it. Easy!

1.13 Deleting files and drawers

Occasionally you'll start running out of space on a disk and decide that there's a couple of old files, or even drawers full of files, that you don't need any more. So you might as well delete them and free up the disk space.

The procedure is the same for both, but note that you are not allowed to delete a drawer while it's got anything in it, so you do have to get rid of the contents first by deleting them the same way.

All you have to do to delete a file or drawer is to drag its icon to the Trashcan, then select **Empty Trash** from the **Icons** menu (**Empty Trash** from the **Disk** menu on Workbench 1.3). With Workbench 2, there's also an alternative way of doing it: you can select the icon for the file or drawer you want to delete, then select the **Delete** option from the **Icons** menu.

1.14 Showing files that don't have icons

The big problem with Workbench 1.3 and the main reason why most people think Workbench 2 is a lot better is that if a file doesn't have an icon (and not all files do) you can't do anything to it with Workbench 1.3. You have to use the CLI or Shell instead. With Workbench 2, though, you can make files or drawers that don't have icons appear on your Workbench screen all the same. All you have to do is select the **Show** option and then the **All files** sub-option from the **Window** menu. Lots of 'pseudo-icons will appear for files that don't actually have icons, and you can now copy, delete, rename and move these files just as you would normally.

1.15 Selecting more than one icon at a time

There's no reason why you shouldn't move or copy a whole bunch of files at the same time, if you can select all their icons – so Workbench gives you the option to do this.

All you have to do is hold down the **Shift** key on the keyboard while you select each of the icons you want, then let go of the Shift key when you've selected all the ions you want. This is called **Shift-selecting**.

Alternatively, you can drag the mouse pointer round the outside of the icons you want, holding down the left mouse button. Providing it's on a blank piece of screen, the pointer will draw a box as you go, and when you let go of the mouse button all the icons that were within the box you drew will be selected.

1.16 Keeping Workbench tidy – resizing, moving and selecting windows

Right, you pretty much know your way around Workbench now, and you know how to do all the practical tasks that you might have to do. Just to put the icing on the cake, here's a quick word in your shell-like about how to keep windows on your Workbench screen organised and tidy.

Obviously, you open a window by double-clicking on a disk or drawer icon. Once the window is open, the **gadgets** around the border of the window enable you to do various things with the window.

Close gadget: this is the small box at the top left corner of the window. Clicking on this will put the window away.

Resize handle: this is the small box with a triangle (two squares corner-to-corner on Workbench 1.3) in the bottom right corner of the window. Dragging this around with the left button held, you can resize and reshape the window.

Title bar: you can move the window around the screen by dragging it by the title bar across the top of the window. On the title bar of a disk's window, you also have the name of the disk and the amount of space that is used up by files and drawers on the disk. (On Workbench 1.3 the 'fuel gauge' down the left-hand side of the window shows how much of the disk is full.)

Scroll bars: along the bottom and right borders of the window, these enable you to bring icons into view that are in the window but aren't visible. Either drag the coloured bar or click on the arrows.

Zoom gadget: at the top right there are two gadgets: the one on the left enables you to 'zoom' the window up to full screen size, then back to its previous size, when you click on it.

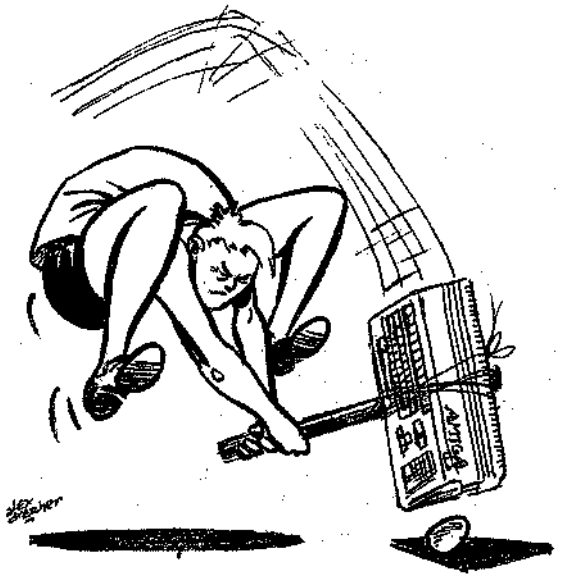
Click to back/front gadget: the other one in the top right corner is there for you to bring windows to the front so that you can see what's in them or make them disappear behind others on the screen. (On Workbench 1.3 there is no Zoom gadget and the click-to-front and click-to-back functions are handled by two separate gadgets.

All you need to know now is how to keep windows tidy. If you've got a small window with a messy heap of icons in it, make the window the size you want and roughly tidy up all the icons. Then use the **Clean Up** option from the **Icons** menu and Workbench will sort your icons out neatly.

Now move the window to where you want it on the screen. Shift-select all the icons in the window, then also Shift-select the disk or drawer icon to which the window belongs. The select the **Snapshot** option and the **All** sub-option from the **Window** menu. Now when you put the window away, it will reappear in the same place and with the icons sorted in the same way as when you put it away.

Note that the disk must be write-enabled because Workbench stores information about how the window looks in a file on the disk.

0



Cracking the Shell

To become a real Amiga expert, you have to know your way around the Shell, aka CLI. This Command Line Interface name basically means it's a way of controlling your Amiga by typing in lines of commands which tell it what to do. It can do all the things that the Workbench screen can do, and many more besides, but it can be tricky because you have to know what to type in... so here's a complete guide to CLI commands.

2.1 How to use the Shell

If you've never explored the Shell before, the first thing you're going to need to know is a few basics about how to use it. The rules are quite simple.

Opening the Shell – simply find its icon hiding in your Workbench disk window and double-click on it to get the Shell running.

Closing the Shell – either click in the close gadget in the top-left corner of the border of the Shell screen, or use the `endcli` command.

Entering commands – all Shell commands are entered by typing in the command and then pressing the Return key to enter the command. Until you press Return, it doesn't matter what you've typed.

Showing disks and drawers – if you are doing something to a file using the Shell, you have to tell the Shell exactly where that file is. This information is known as a **path**. The path includes the name of the disk (or the disk drive the disk is in) as well as any drawers the file is in.

Disks are denoted by a **colon** (**:**) and drawers by a **back-slash** (/) after their names – this is why you can't use those characters in a file name. So typical examples of a path to a file called PictureFile might be...

```
    Mydisk:PictureFile
or  df0:PictureFile
or  df0:Drawer/PictureFile
or  df0:Drawer/OtherDrawer/PictureFile
```

Spaces and spelling – you must spell everything absolutely correctly and you must put spaces in between words only where you are supposed to, otherwise the Shell will not know what you are talking about.

Note that in the examples of paths above, for instance, there are no spaces in the path and file name. Between commands and file names, however, there must be a space.

Capital letters – the Shell ignores whether or not you use capital letters, so if a file is called MyFile and you type myfile it will know what you are talking about. Equally, it does not matter whether you refer to the internal disk drive as df0: or DF0: so long as you put a zero not an o.

2.2 Handy hints for the Shell

There are a couple of tricks built in that make the Shell easier to use. The most useful of these is what's called a **command history**. Basically, this means the Amiga stores in its memory all the command lines you have typed in since you started the Shell running, and will keep them stored until you quit out.

This means that if you want to use again a command that you used five minutes ago, you don't have to type it again. You can flick back to last time you typed it and get it from there.

It works like this. Simply press the 'up arrow' cursor key to flick back, line by line, through the commands you've used, with the most recent coming first. If you go too far, press the 'down arrow' cursor key to run through the lines in the opposite direction.

This feature is also very useful for **correcting** your spelling. If you mistype a line, the Shell will reject it with an error message and leave you having to type it in again. But if you get the line back using the up arrow, you can then move the cursor back through it with the sideways-arrow cursor keys, correct it and then press Return to enter it again.

Note also that you can press Return when the cursor is in the middle of a line – it doesn't have to be right at the end of the command line for it to take any notice and work.

One other little thing that makes the Shell a great deal easier to use is that you can sometimes use **optional extras** in a command line to make it clearer what's going on. For instance, the command to copy a file from disk drive 0 to drive 1 might be...

```
    copy df0:PictureFile df1:PictureFile
or... copy from df0:PictureFile to df1:PictureFile
```

2.3 A note about how Shell commands are loaded

It's worth remembering that CLI commands are actually little programs. These are stored (mostly) in the C directory (a **directory** is another name for a drawer) of your Workbench disk, with the exception of a few that are stored on the Kickstart ROM (though this is not true of Workbench 1.3).

Whenever you want a Shell command to do something, the Amiga must first load the program for that Shell command from the Workbench disk into RAM. This means that very often you will need to have the Workbench disk in the drive. When you are dealing with an operation that involves having another disk in the drive, this can make life a little awkward.

If, for example, you are trying to format the disk in drive df0: you will find that you need to flip the disk out and put the Workbench disk in. The best advice is simply *be careful* – keep your Workbench disk write-protected at all times.

Later in this chapter we also show you how to get round this problem by copying the CLI commands you need into RAM.

2.4 Formatting a disk

To do this you use the command **format**, which must be followed by the word **drive** and then the name of one of the disk drives attached to your system, It must also be accompanied by the word **name** and a name that you want the disk to be called.

So here's two examples of how you would use the format command:

```
format drive df0: name PictureDisk
```

Notice all the spaces, particularly between the word name and the name you want your disk to be called by.

There is also a couple of other options you might like to explore. These are the alternatives noicons which prevents the Workbench from adding a Trashcan to your disk and quick which does a 'fast format' of a disk that's already an Amiga disk. This example:

```
format drive df0: name PictureDisk noicons
```

would give a disk that has no trashcan, which is fine for most Shell users (the Trashcan only takes up extra disk space).

2.5 Moving, copying and duplicating files

This is all done with just the **copy** command when you are using the Shell. If you want to move a file, for example, you would jus make a copy of it in the place you wanted to move it to and then delete the original. If you want to duplicated it, you make a copy but specify the same path (so it ends up where the original is) but obviously you have to give it a new name.

As we have already noted, the copy command is one that allows you to use extra words to make it clearer for yourself. When you're an experienced hand you won't need them, but at first it might help you to remember that the name of the file you are copying comes first and the name of the new file that you are creating comes second. For example:

```
    copy from df0:EaglePicture to df1:EaglePicture
or  copy df0:EaglePicture df1:EaglePicture
```

are actually exactly the same thing. Notice also that in this example, where we do not want the name of the file to change, there is no real need to repeat the file name in the second half of the 'equation' the following will do just the same function:

```
copy df0:EaglePicture df1:
```

But what if we want to duplicate the picture, leaving the copy in the same place? Well, then repeat the path' information but this time change the name of the file we are copying to (this time, we're also pretending our EaglePicture file is in a drawer called Pics, not just floating around on a disk, so remember we have to put the drawer in the path too):

```
copy df0:Pics/EaglePicture df0:Pics/EagleCopy
```

Similarly, we could just as happily have changed the name of the file when copying it from one disk to another in our first example.

Note on drawers and directories

Bear in mind that drawers are also sometimes referred to as directories – they are both exactly the same thing. Notice also that of a file is on a disk but not in a drawer (as in the path df0:EaglePicture) it is usually said to be in the **root directory** of the disk.

2.6 Other options with copy

Copy also has some other useful options and aspects. One of these is that you can copy the contents of a whole disk or a whole directory. To copy the entire contents of a disk, for example, you would use the **all** option:

```
copy from df0: to df1: all
```

The Amiga will copy all the files and all the directories from one disk to another disk (remember that df1: is an external disk drive: these are really useful when you're doing anything with Workbench or the Shell).

Copying a directory is slightly more tricky. If you type, for example:

```
copy from df0:PictureDrawer to df1:
```

then the Shell will copy all the files from the relevant drawer onto the other disk. If, on the other hand, you type:

```
copy from df0:PictureDrawer to df1:PictureDrawer
```

then the Amiga will check to see if there is a directory called PictureDrawer on the other disk and if there is not, it will create that drawer before copying all the files across. Strange, eh? Bear it in mind!

2.7 Wild cards!

If you want to copy a whole bunch of files across the **wild card** can be very useful indeed. Essentially, the wild card is the characters #? used in combination with each other and it means 'anything that matches this'. That's a bit vague and confusing, so put it this way instead.

If you had a disk in df0: with files on it called Pic1, Pic2, Pic3 and Letter1, Letter2 and Letter3 then you might use #? like this.

`Copy df0:#? df1:` would copy all the files on the disk to the other disk.

`Copy df0:Pic#?` in effect means 'any file that begins with Pic' and so would copy all three Pic files across.

`Copy df0:#?2` on the other hand would mean 'any file that ends in a 2' and so Pic2 and Letter2 would be copied.

Beginning to get the idea? Try using #? yourself.

2.8 Copying a disk

This has a special command all to itself, which is **diskcopy**. It's actually the very same diskcopy program that Workbench launches when you copy a disk from the Workbench screen.

All it needs in the way of parameters is the names of the disk drives you want to use and which one comes first. You can also quite happily copy from a disk in the internal drive to a disk in the internal drive as follows:

```
diskcopy from df0: to df0:
```

You will be obliged to follow the same disk-swapping requesters as when copying a disk from the Workbench screen. And, as with Workbench, when you are using diskcopy the disk you are copying to need not already be in Amiga format – the program will format the disk as it goes along.

As ever with disk copying, always make sure you keep your source disk (the disk you are copying from) write protected just in case you muddle them up.

2.9 Creating a drawer

You can create a drawer from the Shell but, unlike the drawers you create from the Workbench screen, it will not have an icon. You do it using the **makedir** command and specifying a path that includes the name of the drawer you want to create, as follows:

```
    makedir df0:NewDrawer
or  makedir MyDisk:NewDrawer
```

It is also possible to make a new sub-directory (in other words, create a new drawer within another drawer) in just the same way, along the lines of:
`makedir df0:OldDrawer/NewDrawer`

2.10 Deleting files and drawers

Once again, this is pretty simple stuff as soon as you know your way around the CLI at all. It's simply a question of using the delete command as follows:

```
        delete df0:Unwantedfile
or      delete df0:UnwantedDrawer
```

You cannot, however, delete a drawer this way unless it is completely empty. If it has files in, you have to use the **all** option, like this:

```
        delete df0:Fulldrawer all
```

2.11 Changing directory

All Shell commands require you to specify the path and the file name very accurately before you can do anything to a file. There is, however, an alternative to stringing huge great path names together all the time.

The alternative is to work in one particular drawer or directory at a time, navigating your way around the drawers on a disk by use of the **CD** command, which gets its name from the words change directory.

Suppose, for example, that you have a disk called Fish with a drawer called Troutdrawer which contains another drawer called Sticklebackdrawer which in turn contains a file called Pikefile. Normally, if you wanted to copy that file from where it is to , say, a disk in the second disk drive you would have to type something like the following:

```
copy df0:Troutdrawer/Sticklebackdrawer/Pikefile df1:
```

which is a little long-winded to say the least. If, instead, you use the simple little command cd to 'navigate' your way through all the drawers, you can make your life an awful lot easier. You might start off by typing:

```
cd df0:
```

which means that the Shell now knows you are working on df0: and so if you don't specify anything else, it assumes that's where you're talking about. So you can now get away with:

```
copy Troutdrawer/Sticklebackdrawer/Pikefile df1:
```

and what's more, you can navigate further through the hierarchy of drawers until you end up right at the bottom. After the following two commands:

```
cd Troutdrawer.
cd Sticklebackdrawer
```

you end up being able to type simply the following:

```
copy Pikefile df1:
```

and the job is done just the same as before!

2.12 Finding out what's in a directory

There are two commands that are used to see what files and drawers a directory contains: these are dir and list. The simpler of the two is dir, which just brings up a list of the names of files and drawers in a drawer or on a disk.

So, for example, you might have a disk that contains directories called Fish, Eggs and Meat and files called Tom, Dick and Harry. If you use the dir command, the Shell will tell you they are there and will also indicate which are drawers by putting (dir) after them. You type in:

```
dir df0:
```

and the Shell will return an answer along the lines of...

```
Dick
Eggs (dir)
Fish (dir)
Harry
Meat (dir)
Tom
```

In this way, you see, you can distinguish the directories from the files when using dir to get a list of what's in a drawer.

You can also use dir with a specified path to get a listing of a directory that you're not CDed to. So, for example, cd df0:Drawer/Otherdrawer will get a directory of that drawer no matter which directory you are actually working in at the time.

There are a couple of options for use with dir, the most useful being **all**, **files** and **dirs**. If you put all after the dir command, the Shell will list not only all the files and drawers that are directly in the drawer you're asking about, but will also list the contents of any sub-directories within your drawer. The files option means it will only tell you about files, while the dirs option means it will only tell you about directories.

2.13 Using list instead of dir

The **list** command is almost exactly the same as dir except that it produces a lot more information as well as the file and directory names. It actually has all kinds of options, most of which are far too techie to even concern us. The information it returns as standard includes the size of the file in **bytes** (1.024 bytes is 1K, a disk can fit 880K) and the time and date of creation. Most normal human beings will generally prefer to use the simpler dir command, but once you get used to working it out the file size information can be useful.

Handy hint: controlling long lists

Particularly if you have a hard drive, you may find that the list of files and directories produced by a dir command or a list command is far too big to fit into the Shell window you have on the screen.

Obviously, you can resize the Shell window just as you can any other window, taking it up to full screen size of need be, but you'll still sometimes find the list of files scrolls rapidly off the screen and the particular file you are trying to look at has long since vanished.

So what do you do? Well, the answer is that you can get the list to pause if you press the space bar, then continue again when you press the back-space key. This can be extremely useful.

Remember, one of the occasions on which a dir is most useful is when you are trying to check the exact spelling of a file that you can't seem to do anything with, even though you know it's there and you've specified the right path. In this case, being able to pause the list and scrutinise your spelling can be really handy.

2.14 Dealing with names that contain spaces

We've already suggested that it's never wise to put spaces in a file name earlier in this book. When you start using the Shell, you soon realise why this is. If you're trying to copy a file called 'Brain strain', for example, you won't get terribly far typing in the following:

```
copy from df0:brain strain df1:
```

Do you see why? The Shell gets as far as the df0:brain part, goes off to look for it and then has absolutely no idea what it's supposed to do with the strain part. Is it a command option? 'Not one I've ever heard of,' thinks the Amiga, and it gives you back a huffy error message saying something like 'Bad args'. (If you ever see that message, incidentally, it means 'bad arguments'

and it's probably because you've spelt something wrong, missed out a space or put a space in when you shouldn't have, or got things in the wrong order.)

Anyway, what do we do about file names with spaces in? The best advice is to avoid them – experienced users will usually use a bar instead of a space, like this: `My_Favourite_File`.

But you'll still find from time to time that you need to handle files with spaces in the name, perhaps created by an inexperienced use saving pictures out of *Deluxe Paint*. The answer is **double quotes**.

As soon as you enclose a name in double quotes, you are saying to the Shell 'everything inside these quote marks is actually a part of the file name'. So going back to our brain drain example above, to copy that file from one disk to the other you would have to stick the whole lot, *including the path*, in quotes. Oh, and why not rename the file to something a bit more sensible and practical while you're about it?

```
copy "df0:brain drain" df1:brain_drain
```

Because the path is also included, you are safe to use the same technique to deal with disks and drawers that some awkward so-and-so has put spaces in the name of.

Incidentally, if you ever have trouble doing something to a file and it's behaving as though you've spelt the file name wrong even though you're sure you've spelt it right, it could well be that the file name has a space or two on the end. Try treating it as if it does, putting a space on the end of the name and enclosing it all, including the space, in quotes and you may well find you can get it to work. Some people even use extra spaces as a security measure to prevent people accessing files they don't want made public!

2.15 Running a program from the Shell

It may well happen at one time or another that you need to run a program

from the Shell. So how do you do it? Well, believe it or not, you know already because you've already been doing it!

Towards the start of this chapter we pointed out that Shell commands are, in actual fact, simply programs. So the answer to the question is that you run programs simply by typing in their names. Simple, eh?

Naturally, you must also specify the correct path if you have not used the cd command to get to the right drawer already. Why not try using the dir and cd commands to find the *Deluxe Paint* program file on your *Deluxe Paint* disk, then loading the program via the Shell?

You may also have noticed from the manual or other reference books that there is a Shell command called **run**. Many beginners try to use this to run programs – don't! Run is actually used to execute programs as a background task under multi-tasking and will do you no good at all for loading up a program. Best leave run alone.

2.16 Stopping a Shell command in its tracks

From time to time, you might decide that you really didn't want to do what you just started doing and wish you could get the Shell to stop. Say, for example, you just started copying fifteen files over to another disk and you've just realised that you only need the first four. Well, the good news is that you don't have to sit there and wait until it's finished.

If you hold down the Control (Ctrl) key and press C a few times, you'll find that the Shell will break off whatever it is doing and will display a message saying `***BREAK`. It will then return control to you again, offering you the Shell prompt so that you can type in a new command. This is known, unsurprisingly, as a break and the Ctrl-C combination is what does it.

2.17 The mysterious Diskdoctor

Amiga Format always advises that if you have a problem with a Coverdisk, the first thing you should try is running the Diskdoctor program. All too

many people, however, are at a loss with this advice because they do not realise that Diskdoctor is actually a Shell command.

Diskdoctor is actually a disk recovery utility, although it's not a very good one – much more effective ones are available both in the public domain and commercially. The idea is that if you have a disk that has read-write errors, one on which the data has become damaged but the disk is not physically harmed, the program will attempt to recover the data and allow you to copy it to a fresh, healthy disk.

In use, it requires you to specify only the disk drive as a parameter:

```
diskdoctor df0:
```

and then you put the disk in the drive and let it go about its business. Diskdoctor will report on its progress as it goes, telling you what files it has recovered and reporting also if it is unable to recover a file and has had to delete it.

Once Diskdoctor has finished, you should then copy all the files it has managed to salvage across onto a fresh disk and throw away the corrupted one – it's not going to be any more use for storing data.

One peculiar aspect of Diskdoctor that we often get queries about is that it will occasionally rename a disk Lazarus if it thinks it has done a particularly good job of bringing a disk back from the dead. This is just a poor joke on the part of the programmers of Diskdoctor and isn't anything to be worried about.

2.18 Renaming disks, files and drawers

This is something we've left till quite near the end for two reasons: one, because it's not actually a particularly convenient thing to do with the CLI – it's easier with the Workbench – and, two, because it doesn't seem to crop up quite so much when using the Shell. But you might as well know how.

There are two different commands for renaming different things. **Relabel** is used to give disks a new name, because disk names are known as labels, simply because you would normally write the name on a label and stick it on the outside. **Rename** is used for files and drawers.

Relabel needs the drive name or the name of the disk, the parameter **name** and the new name you want to give it, as follows:

```
    relabel drive df0: name NewDiskName
or  relabel OldDiskName: NewDiskName
```

Note that in the second example you don't need the extra word name, but you do need to put a colon after the old disk name to tell the Shell which bit of the line is the disk.

Rename is incredibly simple: the old name of the file or drawer comes first, the new name comes second and, as with copy, you can include **from** and **to** to make it easier if you wish:

```
    rename df0:OldFile df0:NewFile
or  rename from df0:OldDrawer to df0:NewDrawer
```

2.19 Testing your memory

One useful little command is **avail** which is used to check how much RAM you have available at any moment. Simply type the single word `avail` and it will return details of how much chip and fast RAM you have, how much is used and what the largest contiguous block is. It can be of use.

2.20 Fun with prompting (like Butlins?)

One quite amusing thing to play around with can be changing the prompt – the little arrow that appears when the Shell is ready for you to type a command in. You can change the text that this contains to whatever you want.

In a frivolous frame of mind, for example, you might want it to say 'What next, mate?'. All you have to do is change it to this with a bit of judicious use of the **prompt** command.

All you have to do is type prompt, followed by whatever you want it to say; though, as ever, if you want spaces in there you must be sure to use quote marks. As follows...

prompt "What next, mate?"

which would mean that the Shell would immediately ask you 'What next, mate?' and would go on asking you that every time it's ready for a new command – until you quit out of the Shell, that is. It doesn't save the change to disk for next time you load the Shell.

2.21 Other Shell commands

There are actually quite a few other Shell or CLI commands, but we have covered all the important ones. The rest are mainly used for quite involved, techie stuff which most of us Amiga users don't ever touch. Some others are also useful for startup-sequence scripts, and we'll cover those in the relevant chapter ('Ready to run', Page 41).

2.22 Alternative Shell/CLI commands

Because Shell commands are just little programs, there is actually quite a number available in the public domain, written by enthusiasts who are willing to share them. Some of these can be very useful. All you have to do is get a copy of a PD disk with them on, and copy them into the C directory of your Workbench disk.

Good examples are **SysInfo**, which will tell you about the hardware inside your Amiga; **WhereIs**, which searches disks for a file you want; and **Border**, which makes your Shell into a full screen rather than a window.

2.23 Using RAM to store Shell commands

We mentioned earlier that you can avoid a lot of disk-swapping by copying Shell commands into RAM. To do this, you need to use the command **path** to tell the Amiga to look in RAM when it's trying to locate commands.

Imagine, for example, that you have two disk drives and you're trying to copy a file from one disk to another. It should be easy – except that the Shell will insist that you put the Workbench disk in so it can load the copy command, thereby making for lots more disk-swapping than is really necessary. In this kind of situation first copy the copy command into RAM:

```
copy sys/c:copy RAM:
```

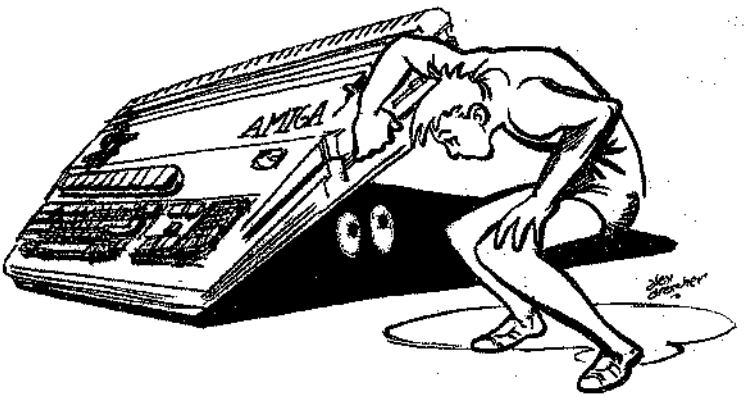
Normally all Shell commands are held in the C directory of the Workbench disk. (Sys simply means 'the disk I booted from' – i.e. Workbench.) Now we tell the Amiga it has to look in RAM when looking for Shell commands.One of the things that is done by your startup-sequence (see Page 41 and on) is that it sets up a 'path' of different directories that the Amiga must check when it wants a Shell command. All we have to do is add RAM to the list:

```
path RAM: add
```

Now we can go ahead and take out the Workbench disk, out our other two disks in and type:

```
copy from df0:Myfile to df1:Myfile
```

and the Amiga uses the copy command that is stored in RAM. Clever, eh? This technique is ideal for avoiding situations where you want to do something to a disk in drive df0: but the Amiga insists you put Workbench in df0: *And that's about everything you could need to know about the Shell!*



What's hiding where

The Workbench and Extras disks are packed full of useful programs, CLI commands and all sorts of other things – but do you know where it all is? Have you ever needed to copy a command from your Workbench disk to another disk, and been unable to remember where it lives? Have you ever wondered what the L directory contains? Here's a complete reference list of what lives where in Workbench...

Workbench 2.04
The disk contents

This is a handy reference which, surprisingly, doesn't seem to be available anywhere else.

The idea is that you can use this to check which directory the files you want live in and what their exact names are.

This can be useful if, foe example, you are copying a set of CLI commands into RAM or, like most of us, you can never quite remember how the startup-sequence file name is spelt!

Items in bold are ones which are visible in the root directory.

Items that are contained inside a sub-directory are offset.

C directory
Addbuffers
Assign
Avail
BindDrivers
Break
ChangeTaskPri
ConClip
Copy
CPU
Date
Delete
DiskChange
DiskDoctor
Ed
Edit
Eval
Execute
FileNote
IconX
Info
Install
IPrefs
Join
List
LoadWB
MagTape
MakeDir
MakeLink
Mount
Protect
Relabel
RemRAD
Rename
Search
Setclock
Setdate
Setfont

Setpatch
Sort
Status
Type
Version
Wait
Which

Devs directory
clipboard.device
Keymaps directory
Mountlist
narrator.device
parallel.device
Printers directory
    generic
printer.device
serial.device
system-configuration

disk.info

Expansion directory

Expansion.info

Fonts directory

L directory
aux-handler
port-handler
queue-handler
speak-handler

Libs directory
asl.library
commodities.library
diskfont.library
iffparse.library
mathieeedoubbas.library
mathieeedoubtrans.library
mathieeesingtrans.library
mathtrans.library
rexxsupport.library
rexxsyslib.library
translator.library
version.library

Monitors directory

Monitors.info

Prefs directory
Env-Archive directory
    sys directory
        keyboard
        wbconfig.prefs
Font
Font.info
Icontrol

Icontrol.info
Input
Input.info
Overscan
Overscan.info
Palette
Palette.info
Pointer
Pointer.info
Presets directory
Presets.info
Printer
Printer.info
PrinterGfx
PrinterGfx.info
Screenmode.info
Serial
Serial.info
Time
Time.info
WBPattern
WBPattern.info

Prefs.info

Rexxc directory
HI
RX
RXC
RXLIB
RXSET
TCC
TCO
TE
TS
WaitForPort

S directory
BRUtab
DPat
Ed-startup
HDBackup.config
PCD
PickMap
Shell-startup
SPat
Startup-sequence
Startup-sequence.HD

Shell.info

System directory
Addmonitor
Addmonitor.info
BindMonitor
BindMonitor.info
CLI
CLI.info
DiskCopy
DiskCopy.info

FixFonts
FixFonts.info
Format
Format.info
NoFastMem
NoFastMem.info
RexxMast
RexxMast.info
Setmap
Setmap.info

System.info

t directory

Trashcan directory

Trashcan.info

Utilities directory
Clock
Clock.info
Display
Display.info
Exchange
Exchange.info
More
More.info
Say
Say.info

Utilities.info

WBStartup directory
Mode_Names.info

WBStartup.info

0

Workbench 2 menu command summary

What follows on the next three or so pages is a complete guide to what the Workbench menus do. It's here as a reference guide just in case you forget how to do a particular thing, or if you're curious about an option.

Workbench menu

BACKDROP – Switches whether the Workbench is shown as a window or as a full screen..

EXECUTE COMMAND – enables you to type in and run just one Shell or CLI command.

REDRAW ALL – Redraws the screen in case there is a 'glitch'.

UPDATE ALL – Makes sure all the icons on screen match up with the correct files or drawers.

LAST MESSAGE – Redisplays the last error message.

ABOUT – Gives a little bit of information about Workbench.

QUIT – Closes Workbench.

Window menu

NEW DRAWER – Creates a new drawer in the currently selected (or 'active') window.

OPEN PARENT – Finds and opens the 'parent' window of the selected icon (the one that you get to when you trace back through all the folders that the current icon is in).

CLOSE – Closes a window.

UPDATE – Checks files and drawers in the current window to ensure they match up with their icons.

SELECT CONTENTS – Selects all icons in a window.

CLEAN UP – Tidies up your icons on an invisible grid pattern.

SNAPSHOT – Stores the currently selected window/icon positions.

SHOW – ALL FILES – Shows pseudo-icons for all those files that don't have real icons.

SHOW – ONLY ICONS – Shows only the files that have proper icons.

VIEW BY – Enables you to choose whether your files and drawers are displayed as icons or text and, if text, sorts them into various orders (by date, by size etc).

Icons menu

OPEN – Opens the window for the disk or drawer icon that you have currently selected.

COPY – Duplicates the disk, drawer or file the icon of which you have currently selected.

RENAME – Enables you to rename the item that is selected.

INFORMATION – Brings up a box that allows you to altre the attributes of an icon so that it launches a program when double-clicked. Treacherous ground for beginners, so best avoided.

SNAPSHOT – Saves the position of the particular icon you have selected (but not windows).

UNSNAPSHOT – Frees up an icon so that Workbench can put it anywhere in the window.

LEAVE OUT – Allows you to leave an icon out on the Workbench screen, outside a window.

PUT AWAY – Puts a left-out icon back where it belongs.

DELETE – Deletes the drawer or file associated with the icon that is currently selected.

FORMAT DISK – Prepares a blank disk for use.

EMPTY TRASH – Deletes any items in the Trashcan.

Tools menu

RESETWB – Resets Workbench just as it is when it first boots up.

0

Ready to run

If you know your way round the CLI (see previous chapter), then you should be ready to start your own programming by writing what are known as 'AmigaDOS scripts'. The ideal first step is to create your own self-booting disks, so in this chapter you should be able to find everything you need to know about startup-sequences, the all-important AmigaDOS script that tells a disk what to do when it boots up...

4.1 Note on techniques for this tutorial

We're going to be using the Shell for the vast majority of this. There are certain things you could probably do using the Workbench instead, but for the sake of learning more about the CLI it's worth doing it this way.

I'm actually going to be using Workbench 1.3, but we've checked it and everything works exactly the same on Workbench 2. Finally, remember that although we often refer to it as the CLI, the Shell is the same thing!

4.2 What a self-booting disk is

Just in case you're not precisely certain what a self-booting disk is, let's take a look at that first. It's simple enough, really.

If you've just switched your Amiga on without a disk in the drive (and assuming you haven't got a hard drive attached), it sits there showing you the screen that says "put a disk in if you expect anything more to happen". For Workbench 2 Amigas, that's the purple screen with the animation of a disk being put into a disk drive.

At this point, if you put a **self-booting** disk into the drive, the Amiga will load up from the disk and start doing something. The Workbench disk and most game disks are self-booting.

Disks that aren't self-booting have to be accessed from the Workbench, so you load up the Workbench first from its disk, then take out the Workbench disk and put the non-self-booting disk in.

While we're on the topic, it's worth mentioning that self-booting disks come in two kinds: **standard** Amiga ones, and **non-standard** ones. The difference is that with a standard Amiga boot disk, you can treat it as if it was not a boot disk: you can load up Workbench first, then put the disk in the drive and Workbench will recognise it. Most games are non-standard disks.

What is it, then, that makes a self-booting disk different from a non-booting disk? Well, basically it has something extra on it called a **bootblock**. A bootblock is simply a small piece of data at the start of a disk which tells

the Amiga that it should start up from this disk. So, one thing we're going to need on our self-booting disk is a bootblock.

4.3 How a disk starts up

When you switch the Amiga on, the **Kickstart** chip inside the Amiga prepares the whole thing for use. Kickstart contains the basics of the Amiga's operating system, so it prepares the Amiga to check the disk drive for something to happen.

When you put a self-booting disk in, the Amiga first checks that the disk has a bootblock. It does, so the Amiga then starts loading data from the disk. The first thing it does is open an **AmigaDOS** screen (remember that AmigaDOS is the Amiga's operating system, the thing that the CLI and Workbench give you control of).

To do this it needs information and so it looks for a directory on the boot disk called **Devs**, which contains a file called **system-configuration.** This reads off basic **Preferences** information about how you want the AmigaDOS window to appear, such as the colour.

After that, it begins to wonder what program the disk is going to load, so it looks for a file called the **startup-sequence**. This is an AmigaDOS program file: essentially, it's like a word processor document in which you have typed a whole bunch of Shell commands. Startup-sequences can be quite simple, as you'll find out. It must also live in a specific directory on your disk, a directory called simply s.

4.4 Step One: Format and name a disk

First thing to do is boot up your Workbench disk, get a blank disk and format it. You van do this using Workbench or using the Shell, whichever you prefer. Then rename it to whatever name you fancy: I'm going to call my disk Fish, simply because it's short and handy. It's probably easiest if you use the same name.

4.5 Step Two: Get rid of unwanted stuff

As with every blank disk, the disk Fish now has a Trashcan on it which we don't really need, so we'll delete it. Remember, when you're using the CLI it's very important to always know which area of a disk you are currently working on. There are certain CLI commands that are very useful for 'navigating' through the different directories of different disks. The first of these is **cd** which simply means change directory. The second is **dir** which gives you a list of what's in the current directory (the one you're working in).

Make sure you've got the Workbench disk in the drive and type

```
cd Fish:
```

which changes the attention of the CLI to work on the disk Fish. The Amiga should put up a prompt asking you to put the disk Fish in the drive, so do so. Now type:

```
dir
```

and you should get a list of what's on the disk Fish. You'll notice there's a Trashcan and a Trashcan.info files for the Trashcan's icon, so delete them both. Notice that because you've changed directory to work in the Fish disk, you don't need to specify the path for the files you're deleting.

```
delete trashcan
delete trashcan.info
```

4.6 Step Three: Make the directories you need

Using the **makedir** command we'll create the drawers or directories we need on the disk. Again, we don't need to specify where because we're already working on the disk Fish.

```
makedir devs
makedir s
```

Finally, to check your progress try the dir command and you should see the directories you've created.

4.7 Step Four: Getting a system-configuration file

Right, we need a **system-configuration** file, but where do we get one from? Well, the best way is simply to pinch one off a disk that exists already, such as your Workbench disk.

Quit out of the Shell, put the Workbench disk back in the drive and restart the Shell again; notice that the prompt is back to the Workbench disk again. Let's find the system-configuration file we want by typing

```
cd devs
dir
```

and there it is, all waiting for you. Now simply copy it to the devs directory of your Fish disk

```
copy system-configuration fish:devs
```

and check it's there by using the dir command in a slightly different way, with a path that tells it where you want to look:

```
dir fish:devs
```

4.8 Step Five: Getting a program to run

For our self-boot disk, we'll make a slideshow disk that displays pictures. First we'll need the pictures, so get three pictures you've created with *Deluxe*

Paint or make some. Copy them across to your Fish disk. If you like, you can rename them as you go to make it simpler later on, like this:

```
copy Pictures:airplane Fish:pic1
copy Pictures:car Fish:pic2
copy Pictures:boat Fish:pic3
```

Because you've got three disks involved – you're copying from the disk with saved pictures on, to your Fish disk, and the Amiga will also need to look at the Workbench disk occasionally – this will involve a heck of a lot of disk-swapping if you've only got one disk drive, so you'll have to be patient!

So now we've got three pictures (mine happened to be of a plane, a car and a boat which I had stored on a disk called Pictures) on our disk. All we need now is the program to display them.

We're going to use a program called vilbm, which is a simple freely-distributable program we include often on ***Amiga Format*** Coverdisks to display pictures. We'll find it lurking on the SpectraColor Jr Coverdisk (though you can use it from any other disk you happen to have it on) and we'll copy it to our Fish disk, so put the Coverdisk in the drive and type

```
cd SpectraColorJr:
copy vilbm Fish:
```

So, we now have a program ready to display our pictures and some pictures to display.

4.9 Step Six: Getting a startup-sequence file

This is probably the most complicated part of the operation, because we'll need to use a new program to create the AmigaDOS mini-program that we need. This kind of mini-program is called a script.

Your Workbench disk comes with several program-editing programs on it: we're going to use the simplest, a program called *MEmacs* which is on the Extras disk. First we have to find it, using the cd command:

```
cd Extras2.0
cd Tools
```

You are now in the directory where MEmacs lives, so load the MEmacs program by typing the following:

```
memacs Fish:s/startup-sequence
```

This tells the Amiga to load the program *MEmacs*, and to edit the file **startup-sequence** on the s directory of the Fish disk. This file does not exist yet, so the program will create it.

Now we need to write our startup-sequence. This is simple enough: all we will ask it to do is load the *vilbm* program and display the pictures in order. *Vilbm* works by displaying a list of pictures one by one, moving on to the next one when you click the mouse button, so all we need to do is type the following

```
df0:vilbm pic1 pic2 pic3
```

And that's our startup-sequence all ready! What that line tells the Amiga to do is load the *vilbm* program and then display the pictures you've listed. You can put as many or as few pictures on the list as you want, just as long as you leave a space between each one.

All we need to do now is select the **Save-exit** option from the left-most *MEmacs* menu and our startup-sequence will be written to the s directory of our Fish disk for us. Simple, eh?

4.10 Step Seven: Writing the bootblock

Getting the Amiga to write a standard bootblock onto our disk is very easy indeed, but there is one small problem. The way that the command works is that the **install** command has to be followed by the name of the drive. If you've only got one drive, this is a problem.

What would happen is that you would type `install drive df0:` and the Amiga would ask you to put the Workbench disk in the drive so that it can load the install program. It would then try to install a bootblock on the Workbench disk you've put in the drive, which is not too helpful! To get around this, we're going to copy the install command to **RAM** then tell the Amiga that when it's looking for commands, it must look in RAM as well:

```
copy c:install ram:
path ram: add
```

Now take out the Workbench disk, put the Fish disk in drive df0: and type:

```
install drive df0:
```

and it will install a bootblock for us. Done!

4.11 Step Eight: Testing, testing – and maybe success!

Switch the Amiga off then back on and put your Fish disk in the drive. It should boot up with an AmigaDOS screen in whatever Preferences colours you had selected on the Workbench disk you got your system-configuration file from. Then it will load up the first picture and wait for you to click the mouse button. When you do, it will load up the second picture, then click again to make it load the third. And there's your first self-booting disk!

Make like an artist

So we come to software. Naturally, the most popular and best-supported area of Amiga software is graphics, along with all its related bits and bobs – video, animation, digitising, CAD and all the rest. Over the next few pages you can find a complete reference guide to all the tricky techie jargon, as well as advice on which packages to buy and reams of ideas on where to get started if you're keen to dabble...

5.1 Paint programs

The basic type of graphics package is the paint program. There are actually quite a few paint programs for the Amiga, but one of them far and away dominates the whole field of Amiga graphics. It's called *Deluxe Paint,* and don't pretend you haven't heard of it!

Electronic Arts created *Deluxe Paint* at the same time as the Amiga was first made, co-operating closely with Commodore – between them they came up with the IFF file (see below), the standard way of storing bitmap graphics on the Amiga. *Deluxe Paint* has been given away in Amiga packs for three years now, and almost everyone who owns an Amiga has a copy. It's also the standard tool used by games programmers for creating the graphics that are used in games.

5.2 How bitmap paint packages work

Deluxe Paint is a bitmap paint package. Essentially, this means it works by changing the colours of each of the **pixels** on the screen individually. The bitmap is actually a pixel-by-pixel description in the Amiga's memory of what colour each pixel on the screen should be.

If you use the Zoom mode in *Deluxe Paint,* you can zoom in to see and change each individual pixel. Mostly, however, this would make paining a whole screenful of picture a little tricky, so a number of drawing tools are provided that enable you to change whole sets of pixels at a time.

5.3 Drawing and Painting tools in Deluxe Paint

It's worth looking through all the drawing and painting tools in this program, partly because you might find some new ones you want to try, but also because you will find that a lot of other programs use similar features.

The basic drawing tool is a **freehand line** tool. This changes pixels wherever you drag the pointer to the currently-selected palette colour.

The colour you are painting with in *Deluxe Paint* is chosen from the

palette of colours at the bottom right-hand side of the screen. The palette can be edited by choosing the appropriate menu option, which means you can then alter the colours by using sliders to set the amount of **red, green** and **blue** light is used to make up the colour. The colour palette for a picture is saved along with the picture, as is information on what **screen mode** your picture uses (see below).

The colour you are drawing with is selected by clicking the left mouse button on the palette and is known as the **foreground** colour. The colour the screen goes when you clear it is known as the **background** colour and is selected with the right mouse button.

The drawing tools can draw with a line of one pixel or with lines of several pixels: these different sizes are known as **brushes** and are selected by clicking on them at the top of the **toolbox**.

Other drawing tools include the **straight line** tool that enables you to drag out a straight line and the **curve** tool, which helps you get smooth curves by setting a start and end point for the curve and then dragging the curve into whatever shape you want it to be by using a **control point**. This curve-bending technique is also known as **rubber-banding** (for obvious reasons) and is crucial to getting natural-looking shapes in computer graphics.

The **airbrush** drawing tool sprays pixels roughly around in a feasible imitation of a real airbrush, while the various shape-drawing tools (rectangles or squares, ellipses or circles and polygons) enable you to create shapes that are outlines or are solid **(filled)**.

One of the most useful tools is the **flood fill** tool, which 'floods' the currently-selected colour into an area of a single colour, stopping only where it reaches a different colour. The finally there's what is probably the most important tool of all, the **custom brush pick-up**. This enables you to cut out an area of the screen and use it to paint with. If you cut out a brush with the left mouse button it copies it, leaving the original screen intact, and it also makes any areas of the brush that feature the background colour transparent.

5.4 Drawing modes in Deluxe Paint

There is a number of different ways in which what you draw will affect what's on the screen already, and these too are worth knowing your way around not only so you can use them, but also because they are very similar in other graphics packages.

Colour – The standard drawing mode, in which whatever colour you draw with will write over the background.

Matte – This enables you to draw with a custom brush with the background colour acting as transparent wherever it occurs in the brush.

Repic – Short for Replace, this simply means that when you draw with a custom brush the background colour will be included.

Smear – This gives an imitation of what happens when you drag your finger over a charcoal drawing: it shifts the odd pixel here and there sideways. The more you do it, the more of a mess it makes.

Shade – This shifts the colour under the brush along one in the palette. this can be interesting for blending colour in weird ways.

Blend – Averages out the colours under the brush using colours in the same palette **range**. You set a range in the palette editing screen, telling the Amiga that a particular sequence of colours is a range.

Cycle – Draws with the current brush, stepping to a new palette colour each time a blob of colour is drawn. More fun than useful.

Smooth – Looks at the colours under the brush and tries to fins colours in the palette that can be put in between the two to make the boundaries between the colours less obvious.

Tint – This replaces colours on the screen with the nearest shade in the current range. In effect, this means that you can tint a picture with a colour, leaving areas similarly light and dark.

HBrite – This mode can be used when you are using 64 colours and shades colours with their half-as-bright equivalents.

5.5 Screen modes

The Amiga has a number of different screen modes that you can use to paint in. One of these, the HAM mode, allows access to all 4096 palette colours but can not necessarily be used by all programs. Only the latest version of *Deluxe Paint* (*Deluxe Paint IV*) can use HAM.

The following standard screen modes are the same on Amigas that have the original chip set and also on Amigas that have the **Enhanced Chip Set (ECS)**, but there are extra screen modes available on machines with the **AA chip set** (the A1200 and A4000). These new screen modes allow the use of 64 colours (without halfbrite), 128 colours and 256 colours, as well as a new HAM mode that can display 262,000 colours on the screen. These new screen modes are catered for in Electronic Arts' new *Deluxe Paint IV AA*.

The basic way it works is that screen modes can be in various different numbers of colours and various different **resolutions**. The resolution is the number of pixels on the screen: the greater the number of pixels, the higher the resolution and the better the picture looks, because the individual pixels stand out less. The only limitation is that higher-resolution screen modes use more memory and that in the higher resolutions, less colours are available.

The colour modes are as follows: **2, 4, 8, 16** or **32** colours, plus **Extra Half Brite** (EHB) which creates 64 colours by using ean extra set of 32 that are half as bright as the original 32, and **HAM** which uses all 4096 colours.

The screen resolutions are as follows: **low resolution**, which gives 320 pixels across the screen by 256 pixels down the screen; **medium resolution**, which gives 640 across by 256 down; **interlace**, which gives 320 pixels across by 512 down but flickers horribly; and **high resolution**, which gives 620 across by 512 down but also flickers horribly. You are limited to a maximum of 16 colours when using medium resolution or high resolution.

Recommended paint programs

Deluxe Paint IV	Electronic Arts	£89

5.6 Animation

As well as being able to create pictures, *Deluxe Paint* is also capable of producing animations. The technique involved is actually very, very simple indeed. Animation works by flipping very rapidly through a series of pictures, each of which changes slightly, giving the impression of movement. It's exactly the same technique that television and movies use to create the illusion of movement and, of course, the same technique used by animation in Amiga games.

Each different picture in an animation is referred to as a **frame** and the speed at which the frames are flipped through is known as a **frame rate** and is expressed in fractions of a second. Television updates images once every 1/25th of a second but in actual fact you don't need that many frames per second to give a decent illusion of movement. A frame rate of 1/12th of a second is normally enough, unless you want something to move very quickly across the screen, in which case doubling the frame rate makes it an awful lot smoother.

It's quite good fun exploring animation with *Deluxe Paint*, but there are other packages which are aimed specifically at animation and so have some extra facilities. Gold Disk's *MovieSetter*, for example, also allows you to add sound samples to your animation to give it a soundtrack. It's the program used by famous Amiga animator Eric Schwartz to create his own amazing cartoon-like animations, and is a good place for a beginner to start.

5.7 3D graphics

Probably the most exciting area of Amiga graphics – and certainly the one that requires the most extra hardware – is **3D modelling** and **rendering**. This is the technique used to produce all the most attractive, 'computer-like' Amiga images – you know the ones, full of shiny ball bearings, chess-board backgrounds, shiny objects and reflections.

The sharp end of 3D modelling is **ray-tracing**. This is a technique that

makes the Amiga calculate the way rays of light bounce off objects in a picture and so it is very heavy on mathematical calculations, which is why this area of graphics needs a lot of extra hardware. In particular, an accelerator is almost vital if you are going to be serious about ray-tracing.

The way 3D modelling packages work is as follows. First, you have to create objects, which are shown on the screen as the bare bones of the object, which is called a **wireframe**. Objects are generally created by reshaping and cutting up certain 'primitive' shapes, such as spheres and cubes.

Once you've got all the objects created for your picture, you then set up what kind of surfaces you want the objects to have. You decide colours (and you can also have mirrored, for example) and how reflective an object is (shiny or matt).

You then set up light sources wherever you want them in your picture – then you are ready to render. The rendering process works everything out and puts the surfaces and colours on your objects, also calculating stuff like reflections if the method of rendering you are using is ray-tracing.

Recommended 3D programs

Imagine 2	Impulse/Alternative Image	£270
Real 3D v1.4 Professional	Activa international	£280

5.8 Video

The main use of the Amiga in video is for titling. To put titles, captions and so on onto a video tape, all you need is a bit of hardware called a genlock. This will lock' the video signal into any area of flat colour on an Amiga screen, enabling you to record the combined image.

A good genlock is the RocGen, which costs about £99 (from HB Marketing, 0753 686000). Once you've got it, all you need to do is get a video titling program that can create animated, scrolling titles for you to lock on the video image. But you might be best off using *Deluxe Paint* to do it!

5.9 Video digitising

If you have either a mono or a colour video camera, you can use it to grab pictures of anything that's around you or to digitise in photographs, turning them into IFF files. You do this with a piece of hardware called a video digitiser which takes a video signal and stores it in the Amiga's memory.

the simplest and cheapest digitisers work in black and white but can also be used to grab colour images, though they have to do it in three goes. These use a filter (a piece of coloured plastic) to grab a separate image for red, green and blue which the Amiga then combines into a full-colour image.

Flash, clever digitisers can take in a full-colour signal direct and also do it quickly enough to be able to grab an image from a moving video, which means they must grab quicker than 1/25th of a second. These are known as real time and have the advantage that you can grab pictures from videos to use in your own artistic creations!

5.10 CAD and structured drawing

Computer-aided design (CAD) programs, which are used for technical drawing and architecture, and structured drawing programs, which are mostly used for providing illustrations for DTP, use a very different technique from that used by bitmap packages.

They store all the lines you draw on the screen mathematically, which means two things: first, you can load a picture up and edit it long after you've originally created it, and second, they print out at the greatest possible resolution no matter what size you make the image.

These two differences apart, these drawing packages are fairly similar to other types of graphics package. In particular, the rubber-banding method of creating smooth, flowing curves in important with these.

Roll over, Beethoven

After its colourful graphics, the Amiga is most renowned for sound. Because it can use sound samples, slicing up sounds into digital information in pretty much the same way a CD player works, there are all kinds of possibilities for you to create your own samples and use them to compose your own songs. And that's just a start – a little gadget called a MIDI interface can take you into the synthesised world of real musicians...

In 1992, a duo who went by the name Urban Shakedown had a Top Thirty hit with a tune that they created and recorded on their two Amiga 500s. And they were using the simplest of beginners' techniques, yet getting great results. What follows is a brief explanation of how you, too, can have a lot of fun messing around with music on your Amiga.

6.1 Sound sampling

The Amiga's sound capabilities, which may be very familiar from games, also make it easy for you to write music. This is based around the fact that the Amiga's sound chip, Paula, gives the Amiga stereo sound on four channels, meaning that you can use four different instruments in your tunes. The great thing about the Amiga's sound is that it is based on **samples** – small chunks of sound sliced up as digital information and stored as data on disk.

All you need to do to try this out for yourself is a **sound sampler.** This is a piece of hardware with accompanying software that connects up to a sound source (your hi-fi or video, or a microphone). You control it from the software: when you press 'go' the sampler will record sound into the Amiga and when you press 'stop' it will stop doing so. This effectively allows you to record sound on your Amiga, though the amount you can do is limited to only a few seconds because sounds involve a lot of data. You are limited by both memory (RAM) and disk space.

The idea is not simply to record sounds, though. What you do is record tiny little bits of sound – a dog's bark, for example, or a single piano note. What you then do is edit the sample using the software of your sampling package, to make the sound as small as possible in terms of disk space and also to make it sound how you want it to.

You can then use this sound sample as an instrument when you are writing tunes with your sampling software. As you place the notes in your tune, the sample will be played back at different pitches – you could write a whole melody that sounds like lots of very musical dogs barking out a tune,

for example, using just your dog barking sample. If you want to take it a bit more seriously, on the other hand, you can use four different samples as four different instruments and write a tune that uses all four **tracks** (channels) of the Amigas sound. This way, four single samples of a bass note, a synthesiser note, a drum beat and a cymbal crash can be used to build up a whole song in glorious stereo.

This is basically a simple version of the techniques that have made modern dance music styles possible and if you've got even a bit of an ear for music you should find it pretty easy to get good results.

You don't need to be able to read music: most of the song-writing programs included with sampling packages represent notes as blocks and it's the fact that they are higher up or lower down the screen that affects the pitch, so it's very straightforward to learn your way around. Writing tunes on a computer is known as **sequencing,** because you are simply putting together a sequence of notes.

Most sampling packages now include a sequencer (song-writing) part, but you can use the sampler simply to obtain the samples you want. Most of the popular sample sequencing programs that are widely used by Amiga owners are actually from the public domain.

Because there's a lot of competition in this field, sound samplers are now very, very cheap for really quite decent ones. If you get keen, however, you can invest more money on better hardware that will deliver much cleaner, crisper samples or on better software that will enable you to edit your sounds in much more flexible ways. The top-class *AudioMaster IV* software, for instance, can make samples longer or shorter without changing their pitch, which only two years ago required a piece of specialist musician's hardware which costs thousands of pounds. Further advances are being made all the time, the latest being the use of 16-bit rather than 8-bit sampling hardware for better resolution (better quality) samples. Look out for MicroDeal's Clarity 16 sampler, the first of this type.

Recommended sound sampling kit

Beginners: Technosound Turbo	New Dimensions		£35
Cheap, high-quality hardware and software including sequencer program			
High-end: Audio Engineer	HB Marketing	0753 686000	£299
Amazing top-notch hardware with a version of the excellent AudioMaster IV			
Sample sequencing: OctaMED Pro	Amiganuts		£22

6.2 Musical instruments and MIDI

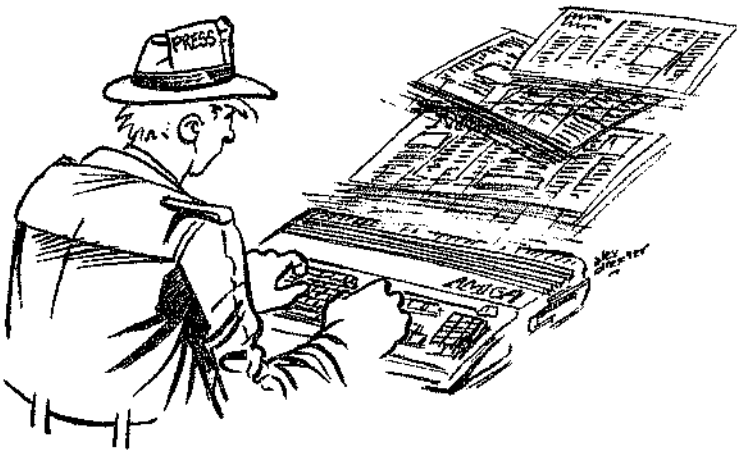
The next step on if you get keen on Amiga music is to control synthesisers and electronic instruments from your Amiga. This is a little like the opposite of recording. First you write your tune with a sequencing program, juts as you would if you were writing a song with samples, then you press 'play' and the Amiga automatically plays the instruments for you! An alternative is for you to play the instrument with the sequencer program set to record: as you play, the program writes the tune as notes on the screen and you can then store it and play it back later.

All this is made possible by something called **MIDI** (Musical Instrument Digital Interface), a standard 'protocol' for letting computers talk to electronic instruments. To use it you have to buy a MIDI interface (Datel Electronics do a decent one for £19.99) which plugs in to your Amiga and then hook up your synth with a couple of leads.

Nowadays, many of the sample sequencers that come with even the budget sampling packages, like Technosound Turbo, have the ability to use MIDI and control instruments, but it's almost worth investing in a professional and complicated top-end piece of software because of all the extra possibilities it opens up.

Recommended MIDI sequencers

Sequencer One Plus	Gajits	061 236 2515	£130
Dr T's KCS 3.5 Level II	Zone Distribution		£279



Getting into print

The typewriter has had its day. The word processor is faster, more flexible and the ideal way to write anything – get used to WP and you'll probably forget how to use a pen! But over and above and beyond, you can now play out your fantasies of becoming a hard-nosed hack or a highly-paid designer with the help of a DTP system. You can create your own newspapers, magazines and books. Here's where to start...

7.1 Basic features of word processors

The word processor is probably the most common kind of software in use all over the world. It's taken over from the typewriter almost completely because it makes life so much easier.

The basic concept of this kind of program is that you type the words into a text file, which you can then alter, edit, change and check for correct spelling before you commit it to paper.

Important features of a word processor include the ability to **cut** or **copy** sections of the text and paste them in in other positions in your document. This means that if you think you've written something in the wrong order, you can cut and paste bit of it until it makes more sense. The only complicated bit of this process is how you **mark** the piece of text you want to cut or copy. More sophisticated and easier-to-use programs will let you drag the mouse cursor down the screen, highlighting the text as you go: while others use a slightly more awkward method by which you have to mark start points and end points of the **block** of text you want to cut.

Another important feature of a word processor is the **spell checker**. Once you've finished your typing and saved it (it's always a good idea to save at regular intervals when typing a long document, just in case the Amiga crashes) you select the spell check option. The program then goes through comparing all the words in the document with words in the program's own built-in dictionary, and if it doesn't find a word that matches it asks you to double-check it yourself.

Other important or useful features include a **thesaurus,** which will help you find alternative words for a word you've used too often; a **mail merge,** which automatically puts different names and addresses from a database onto a form letter for you; and the ability to **load and save** in a variety of different word processor file formats, especially the standard ASCII (American Standard Code for Information Interchange) format which is used by all computers everywhere to store text.

7.2 Word processors with graphics

Some word processors also have the ability to import IFF format pictures and print them out. These are also referred to as **word publishers** and often have a range of different **layout** features included, such as the capacity to arrange text in **columns**.

Word processors that have graphics are often trickier or slower to use for pure word processing, but are much more powerful when it comes to making things look good.

The latest word processors use **scalable fonts**, which were also included with Workbench 2. These are **typefaces** that can be printed out at any size and can appear on the screen at any size, which makes them much more flexible. The latest programs also use a full **WYSIWYG** (What You See Is What You Get) display, which basically means that your page is shown on the screen looking more or less exactly as it will when you print it out on your printer.

Recommended word processors

Entry-level: Scribble!	Free on the cover of *Amiga Format* Issue 41		
Professional: Protext 5.5	Arnor	0733 68909	£152.75
With graphics: Wordworth 2	Digita	0395 270273	£129.99

7.3 DTP explained

Desktop publishing is simply the art of combining pictures and text to create complete pages on the screen. It's a modern method that has replaced all kinds of traditional systems.

The text is usually typed in with a word processor and it is then **imported** onto the page. Most DTP packages use a system of **boxes** on the page, so the basic layout will be done on a text box that has three or four columns. Other boxes, for type that is in a different style like headlines and for the pictures, can be placed on top of the basic grid.

Text can be put into different typefaces (usually known as **fonts**) – such as **Helvetica Black** or Frutiger Roman – and into different type styles such as *italic* and **bold**. Text can also be made different sizes, measured in an old-fashioned printer's measure called **points** – from body text like this, which is 10-point, up to massive headlines in 100-point. The last important measure of text is the spacing between the lines, which is called **leading** and also measured in points – this text is 10-point text on 12-point leading.

As well as styling your text, you'll also want to import pictures. These are effectively placed in other boxes on the screen and their size and shape can be changed at will. Amiga DTP programs will not show colour pictures in colour, but will print them in colour, right up to 24-bit true colour images.

Pictures come in two basic types: **bitmap** images and **structured** images. Structured images are produced with a structured drawing or illustration package (see the Graphics chapter) and are essentially line drawings, though they can be coloured. Their advantage is that like scalable fonts (also called **outline** fonts) they can be made any size and will still print at maximum resolution.

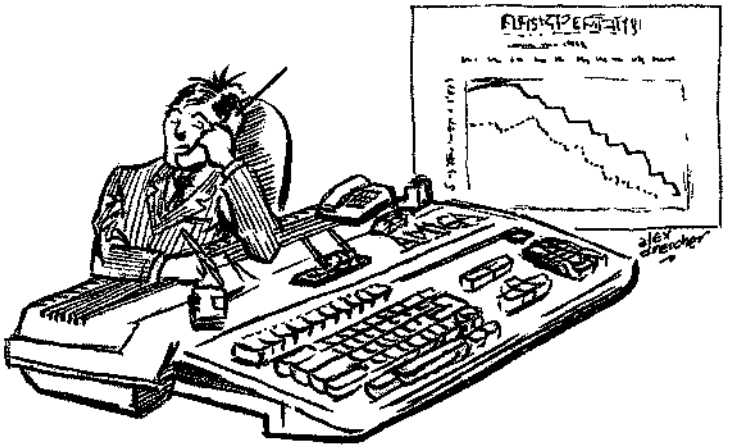
Bitmap images can simply be created by your paint package, but there are more useful ways of getting pictures into your DTP page than painting them yourself. A **hand scanner** can scan in photographs and save them as bitmap IFF files, while a video digitiser can do the same job. If you have lots of money, a flatbed scanner will do you full-colour, full-page-size 24-bit scans for professional-quality full page make-up.

Of all the uses of the Amiga, DTP is probably the one that requires the most extra hardware if you are going to take it seriously, particularly RAM, though you can start off on a very simple system.

Recommended DTP packages

Entry-level: PageSetter 1.2 free with Issue 34 of Amiga Format

Top-end: PageStream 2.2 (Soft Logik) Silica 081 309 1111 £199



Get down to business

As the computer takes over in almost every office all over the country, the names 'spreadsheet' and 'database' become ever more familiar. But what are these mysterious creatures? How do they work? Can they really be of any use to an Amiga owner, even one who runs a small business, let alone one who can barely manage a bank account? The answers to these questions and more besides are revealed over the page…

8.1 Spreadsheets

In the business world, the name Lotus *1-2-3* once ruled supreme. This is the name of the original and most famous spreadsheet package – the one that came up with the concept in the first place.

Essentially, a **spreadsheet** is just a large calculator that allows you to type in descriptions of what you are calculating. It takes the form of a large grid of rows and columns into which you type text, or numbers, or formulae.

Imagine, for example, that you are trying to get together an ideal Amiga set-up as cheaply as possible. In one column you enter the names of the pieces of hardware you require, each in its own 'cel', one on top of the other, forming a column of text entries. In the next column along, you type in where you can get the bits you want and in the following column you type in the price: so reading across the screen on one row you would have the name of the piece of kit, the name of the supplier and the price in consecutive cels. Reading down the screen, you would have first a list of the pieces of kit you want, then a list of suppliers, then a column full of prices.

All you have to do now is select the cel underneath your column of numbers and turn it into a formula rather than a text or number field. You type in a formula that will add up the sum of all the numbers entered in that column and, hey presto, it adds up the total cost of your Amiga system.

But that's not the clever bit: that's just a big calculator, so far. The advantage of a spreadsheet is that you can come back later on – say, in our example, if you find a cheaper RAM expansion – and type a new figure in instead of one of the ones that's already there. Immediately, the whole thing is recalculated.

This is what caused such an impact on businesses. The ability to try out different values for your costs to see how a worst-case and a best-case could come out, for example, has made spreadsheets almost indispensable in business nowadays.

They can also be useful in the home, though, for all kinds of analytical

work involving large amounts of information. We analyse our reader surveys using one, for example, using it to calculate not just the percentage of Amiga owners with a hard drive but also clever things like the percentage of Amiga owners with a hard drive to have had their Amiga longer than a year. It's amazing how useful a spreadsheet can be.

Recommended spreadsheets

Entry-level: Advantage (Gold Disk)	HB Marketing 0753 686000	£102
Top-end: Professional Calc (Gold Disk)	HB Marketing 0753 686000	£160

8.2 Databases

The **database** is also an incredibly useful little item that is best known for its work in businesses but can also be made good use of in the home.

A database is designed simply to store information and help you retrieve it easily – it's a bit like a card index system in a library and simple database programs are actually known as **card index** databases. The idea is that you have **records** that are made up certain **fields** of a defined maximum length (you define this, according to what you need) into which you type the information you want to store. Certain of these fields are **key fields** which the computer can search through for you to find the record you want.

A simple example is an address book, where you would first set up the database so that each record can hold a name field, an address field and a telephone number field. You key field would be the name, so that if you want to find where Joe Bloggs lives you ask it to search through all the names and display the record for Joe Bloggs.

If you were a business, you might want to set up other key fields for, for instance, the various areas of the country on an address book of all your customers. That way you could ask the database to find all the customers who live in the North West so tat you could mail stuff out to them. Most databases can do stuff like print out address labels or **mail marge** the address

information that a search like this produces into a standard form letter, so that the database writes out all the addresses and personalises the letters for you. It's very useful.

In the home, a database is particularly useful for anyone who has a large collection, whether it's stamps or movies on video. ***Amiga Format***'s art editor Marcus, for example, bought his Amiga originally to catalogue his enormous record collection.

One other nice trick of Amiga databases is that they can often store all kinds of Amiga data as well as just text, so you can add pictures of items in your database and even sound samples!

Recommended databases

Superbase Personal 2 (Oxxi-Aegis)	Silica	081 309 1111	£99
Superbase Professional 4 (Oxxi-Aegis)	Silica	081 309 1111	£199

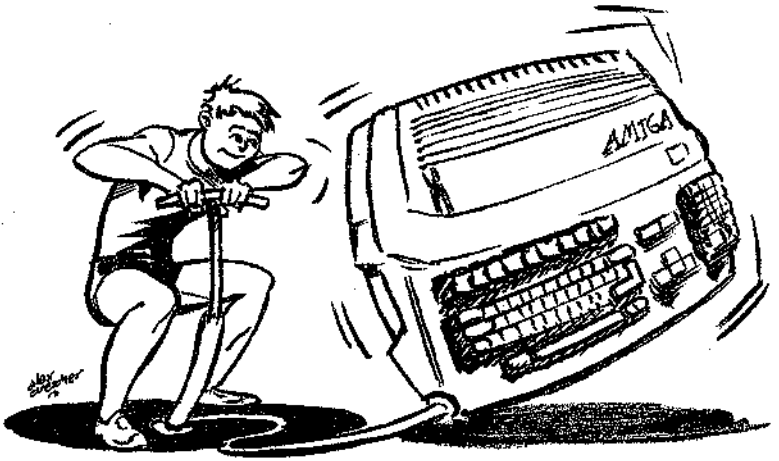
8.3 Accounts software

One thing that in our experience the Amiga lacks is a decent small business accounts package for doing stuff like VAT returns, so if you run your own business don't hold out high hopes. If, on the other hand, you just want to look after your household finances and your bank account, there are a couple of decent packages around.

A home accounts program will enable you to set a budget for yourself, helping you by prompting you for the kinds of expenditure you may have to consider. Provided you are conscientious about keeping it up to date, it can then help you keep track of how money is coming in and going out of your bank account, and even alert you on dates when you are supposed to make regular installment payments and the like.

Recommended home accounts packages

Home Accounts 2	Digita	0395 270273	£54.95



E-x-p-a-n-d-a-b-i-l-i-t-y

There's plugs, sockets, doofers and thingies all over (and even inside) your Amiga, the idea being that you can plug all manner of peripherals and extra hardware in. Just in case you're not completely up on all the different kinds of hardware and what it can do for you, here's an explanation of how more memory, bigger hard drives and all the rest can make a difference – plus a quiet word in your ear about which expansions to choose…

There are all kinds of hardware expansions (also known as peripherals) available for your Amiga. Some of them are designed to make your machine generally more powerful, such as extra RAM memory: others are designed for a particular function, such as printers.

What follows is a brief introduction to all the different kinds of hardware available, along with specific recommendations as to the best of each kind of hardware that is available for your machine.

It's worth commenting at this stage that the A600 (and the A1200 too, of course) are both recent machines and have a couple of aspects to them that mean they need a quite new type of hardware. Because they are so new, not so much of this type of hardware is currently available, though we should see n increasing amount becoming available over the next couple of months.

Anyway, there should be a lot of information here for you whatever kind of machine you have, from the A500 right up to the 2000 and 3000.

9.1 Extra memory – RAM

RAM (Random Access Memory) is the main workspace of the Amiga – the area into which it loads programs to run them and in which it manipulates all data. While processor speed is the real measure of performance of an Amiga, it's RAM that is the measure of your machine's muscle-power.

Essentially, the more RAM you have, the better, though the only real need to get more is if you want to use a program that requires more RAM in order to work. Graphics programs are particularly find of lots of RAM – the fractal landscape generator *VistaPro*, for instance, needs more than 4Mb to work properly.

How much RAM your computer has is generally measured in Megabytes (Mb), although units of half a Megabyte (512K) are also often used. The standard A500 before the Plus came along had only 512K of RAM built in. An A500 Plus or A600 comes with 1 Megabyte built in. Most Amigas can be expanded to 9Mb total (the A4000 can go much further).

Unless you want to use a particular program that needs more, 2Mb of RAM is usually more than enough and it's a good target to aim for – expansion to this size can easily be achieved on the A500 Plus or A600 by adding a 1Mb RAM expansion card in the **trapdoor slot** inside the Amiga.

The trapdoor slot is designed primarily for use by a RAM expansion card and can take only 1Mb of expansion – an appropriate card will cost round about £50-£60. One feature to look out for in a trapdoor RAM expansion card is the addition of a **battery-backed-up clock**: this means that whenever you boot up your Workbench disk, the clock on the Workbench will automatically be set to the right time. It's handy.

Most games need no more than the 1Mb you have already, and 1.5Mb or 2Mb will be enough to run the vast majority of programs, but if you get seriously into, say, graphics or DTP programs you might find that even 2Mb is not enough. In this case, you have to start adding RAM elsewhere.

A600 and A1200 owners can use the **PCMCIA** credit card slot to add RAM. Cards can be bought which will add 2Mb or 4Mb of extra RAM and these are particularly convenient because they are really very small – just like a thick credit card. It's also reasonably cheap, costing about £160 for a 4Mb card, and should get much cheaper still over the coming months.

While it's also pretty easy for A1500 and above owners to add RAM on internal cards, A500 owners have it slightly more difficult once they go beyond the trapdoor RAM expansion. The only other slot available that can take RAM expansions is the **edge connector** on the left-hand side of the machine, which means that you have to buy some sort of case to house the extra RAM chips as well as the RAM itself. This makes it slightly more expensive, although the fact that the A500 has been around for so long and that so many manufacturers are competing in this market does make it rather cheaper than it might otherwise be.

So what do you slot on the edge connector to get more RAM? Well, you can get a straightforward RAM expansion, which is generally just a

slimline box that slots on and enables you to add more and more RAM chips, usually up to 8Mb in total.

Usually a better option, however, is to get a hard drive of the type that also enables you to add RAM chips inside the case. Similarly, these will usually give you the capacity to add up to 8Mb of RAM chips.

RAM expansions of all kinds can usually be bought **unpopulated**, which means with no chips on so that you can buy your own, or **populated**, which means with chips on already. Larger expansions will usually only be partially populated, with, say, 1Mb on already, leaving you to buy and fit extra chips at a later date.

Different expansions will need different kinds of chip, so do follow the instructions carefully and buy the right type of chip. Some will need four chips to make up 1Mb, for example, while others will do it with just one chip. It's also worth bearing in mind, when buying a RAM expansion, what kind of chip you need to expand it later. The most popular chips and the type which is most likely to remain popular in future are **SIMM** chips (Single In-line Memory Modules).

Recommended RAM expansions

A500 trapdoor, 512K	Phoenix	0532 311932	£29.99
A500 Plus trapdoor, 1Mb	Phoenix	0532 311932	£34.99
A600 trapdoor, 1Mb	Phoenix	0532 311932	£44.99
A600 PCMCIA card, 4Mb	Phoenix	0532 311932	£169.95
A500 edge connector: SupraRAM 500RX 1Mb		0532 311932	£99.99
A500 hard drive plus RAM, 52Mb drive with expansion capacity up to 8Mb but no RAM on board: GVP HD8+	Silica	081 309 1111	£329.99

9.2 Second disk drives

Your Amiga actually has the capacity to recognise and use lots of extra floppy disk drives and can use old-fashioned 5.25-inch drives, but really

you're only ever likely to want just the one extra disk drive and you'll want it to be a 3.5-inch drive, just like the internal one.

Having a second disk drive makes it a darn sight easier to do all sorts of things, but it's particularly useful if you use Workbench a lot. Copying files from one disk to another or copying whole disks is an awful lot easier when you can put one disk in each drive, because you don't have to keep swapping the disks over all the time.

It's easy to attach a second disk drive to an A500 or A600 – all you have to do is plug it in to the socket labelled disk drive on the back of the Amiga. The only slight disadvantage of a second floppy drive is that it uses a bit of RAM memory up keeping it running, which is why we reckon that 2Mb is a good basic amount of RAM to aim for: most programs will need no more than about 1.5Mb.

Simply enough, if you take your Amiga at all seriously you really ought to have a second disk drive. So get one!

Recommended external floppy disk drives

Power Computing PC880B	Power	0234 273000	£69.95
RocTec RocLite drive	HB Marketing	0753 686000	£69.95

9.3 Hard disk drives

It's quite amazing the difference a hard drive makes to an Amiga. They're very expensive, costing roughly the same amount of money as the Amiga itself in the case of drives for the A500 – but when you consider what a hard drive does, it has to be worth it. Effectively, a hard drive turns your Amiga from a good amateur computer into a superb semi-professional machine.

Physically, a hard drive is very like a floppy disk: inside the casing, there's a disk covered with magnetic material, the difference being literally that the disk is rigid rather than floppy. A hard drive stores data exactly the same way a floppy disk does, except that it's much quicker and can store

much more data. Where a floppy disk can store only 880K (it takes 1024K to make e Megabyte, remember) hard drives are available in capacities of anything from 20Mb to 200Mb.

On a hard drive, you store your Workbench so that it boots up automatically to that, and you store all you programs that you ever want to run – Deluxe Paint, a word processor and so on. You can also create directories in which to store all the files you create with your programs. All the programs run much faster from hard drive than from floppies, which makes the Amiga a whole lot easier to use.

The favourite type of A500 hard drive is one that comes in its own case and clips directly on to the edge connector on the side of the Amiga. These hard drives are available in an enormous range of sizes and also have space for you to add extra RAM inside. The only drawback is that they have their own power supply.

Once again, owners of the A600 or the A1200 have the latest in technology for connecting a hard drive. Inside the machine is a small plug called an IDE connector, which enables you to fit a tiny 2.5-inch IDE hard drive actually inside the Amiga.

As with PCMCIA cards, IDE hard drives are becoming more widely available and getting cheaper. They are of a standard type used in IBM PC-compatible computers, so while they are not widely advertised in the Amiga market, you can pick one up pretty easily. Ask for a half-height type and go for at least 40Mb capacity.

Recommended hard drives

A500 GVP Impact Series II HD8+ 52Mb Silica 081 309 1111 £349.99

9.4 Control systems - mice and joysticks

This may seem almost flippant and frivolous, but in actual fact the mouse that comes with the Amiga (except for the A1200 and A400, which have a

nice new one) is an incredibly old design and doesn't really work too well: while you'll find a better joystick can make a world of difference to how much fun a game is. Get a smoother-running mouse and experiment with different joysticks to see which suits your playing style: we prefer the loose but very accurately-switched kind of joystick.

Recommended mice and joysticks

MegaMouse by AlfaData	Local supplier	£12.95
Golden Image Mouse	Local supplier	£14.99
Bug joystick by Cheetah	Local supplier	£14.99

9.5 Processor accelerators

We won't dwell on this topic, but if you want real speed and power from an Amiga you need a **faster processor** or **accelerator**. This is particularly vital if you get into professional-standard graphics or DTP, where lots of calculations are being made by the Amiga to work out how things should look.

The basic idea is that the normal Motorola 68000 **CPU** (Central Processing Unit) can easily be replaced by a compatible but more powerful version. In many ways, the easiest way to do this is by upgrading to a new Amiga – the new A1200 has a 68020 processor making it about five times as fast as an A500, while the A3000 has a 68030 and the A4000 has a 68040.

If you have an A1500 or A2000, you can easily buy an accelerator card, though these are expensive: we recommend the GVP cards. The A500 is mostly left out, though Progressive Peripherals are working on a super-fast 68040 accelerator for the A500 and there is a version of GVP's HD 8+ hard dive that comes with a 68030 processor in – it's an amazing piece of kit!

Recommended accelerators

GVP A530 hard drive with 68030 accelerator, mini-slot for PC emulator and expansion space for up to 8Mb RAM	Silica	081 309 1111	From £750

9.6 Monitors

If you're still using a telly to display your Amiga's picture, you'll find that a monitor gives much better results. Because it takes an RGB (red, green, blue) signal the colours are much closer to what the Amiga intended and because a monitor is especially designed for the job, the picture is sharper and clearer. A monitor will also have built-in stereo speakers for better sound!

If you want to use a **flicker fixer** to get rid of interlace flicker or to use the Productivity and Super High Res screen modes, you;'ll need a multisync or VGA-style monitor. These are much more expensive.

Recommended monitors

Philips CM8833/II	Local Supplier	£289

9.7 Printers

Printers come in all shapes and sizes. The most basic type is the **dot matrix** printer, which uses an arrangement of pins to print the shapes of letters through a typewrite-style ribbon. 9-pin dot matrix models give coarser results, while 24-pin models give much finer letters. Dot matrix printers also come in colour versions, too.

Bubblejet printers work by squeezing fine dots of ink out using little bubbles of air and so are a good deal quieter than dot matrix printers. They are also cheap, and give very good results, nearly as good as a laser printer. They can not print in colour, though.

Laser printers work in a very similar fashion to a photocopier and give very fine lines and quality results, but again only in black and white, not in colour. **Postscript** versions are ideal for professional DTP work.

Recommended printers

Canon BJ-20 bubblejet	Silica	081 309 1111	£299
Citizen Swift 240C colour	Silica	081 309 1111	£420

Playing a part

Tee hee! That's the serious part of the book over – here's the bit where we can have some fun! OK, it may not look terribly glamourous, but what follows over the next few pages is the most complete listing of Amiga games ever printed in one place. Here we've got all the ratings of all the games ever reviewed by ***Amiga Format****, building up into the ideal checklist that will tell you whether a game's worth getting...*

Pre-1989 Top Eleven

*In the first issue of **Amiga Format**, these were the games we picked as the best before 1989:*

Balance of Power 1990 Edition	– Strategy
Denaris	– Shoot-em-up
Dungeon Master	– Adventure
Elite	– Space epic
F-18 Interceptor	– Flight sim
Hybris	– Arcade
Nebulus	– Platform/puzzle
Populous	– God sim
The Sentinel	– 3D arcade/strategy
Super Hang-On	– Driving
Virus	– 3D arcade

Games Listing

Here's every game ever reviewed in AF...

1st Division Manager	Apr '92	66%
4D Sports Boxing	Dec '91	79%
4D Sports Driving	Mar '92	33%
5th Gear	Feb '90	42%
688 Attack Sub	Apr '90	86%
A-10 Tank Killer	Apr '91	75%
Abandoned Places	Jan '92	80%
Aces of the Great War	May '91	65%
Action Stations	May '91	70%
Addams Family	May '92	78%
ADS	Mar '91	68%
Advanced Destroyer	May '92	67%
African Raiders	Jul '89	68%
Afrika Korps	Jun '91	64%
Agony	May '92	60%
Air Bucks	Aug '92	72%
Airbus A320	Jan '92	78%
Alcatraz	May '92	76%
Alien Breed	Nov '91	74%
Alien Legion	Sep '89	52%
Alien Storm	Jan '92	59%
Alpha Waves	May '91	70%
Altered Beast	Nov '89	33%
Altered Destiny	Oct '91	54%
Amazing Spiderman	Nov '90	77%
Amiga Encounter	Jun '91	79%
Amnios	Dec '91	61%
Anarchy	May '92	76%
Ancient Battles	Feb '91	69%
Another World	Jan '92	82%
Antago	Aug '90	65%
Apache Flight	May '92	69%
APB	Nov '89	81%
Apidya	May '92 FG	90%
The Aquatic Games	Oct '92	86%
Aquaventura	Jul '92	73%
Arcade Trivia Quiz	Aug '91	57%
Archer MacLean's Pool	Oct '92	89%
Armada	Jan '90	82%
Armalyte	Aug '91	51%
Armourgeddon	Apr '91	85%

Arnie	Jul '92	44%	Battle Squadron	Jan '90	82%
Arthur	Sep '89	89%	Battlemaster	Nov '90	83%
Ashes of Empire	Jul '92	85%	Battlestorm	Apr '91	83%
Astaroth	Sep '89	41%	Beast Busters	Jul '91	41%
ATF II	Dec '90	74%	Betrayal	Nov '90	84%
Atomic Robokid	Dec '90	75%	Big Run	Mar '92	58%
Atomino	Aug '91	72%	Bill and Ted's		
Atomix	Apr '90	61%	Excellent Adventure	Jul '91	58%
Austerlitz	Feb '90	FG 91%	Billiards II Simulator	Aug '91	58%
Axel's Magic Hammer	Jan '90	67%	Billy Boulder	Oct '90	68%
B.A.T.	Dec '90	88%	Bionic Commando	Jul '91	43%
Baby Jo Going Home	Dec '91	58%	Birds of Prey	Dec '91	88%
Back to the Future III	Mar '91	82%	Black Crypt	Apr '92	78%
Backgammon	Apr '92	67%	Black Tiger	Apr '90	71%
Backgammon Royale	Apr '91	78%	Blade Warrior	Sep '91	74%
Bad Company	Feb '90	71%	Block Out	Aug '90	84%
Badlands	Nov '90	46%	Bloodwych	Nov '89	79%
Ball Game	Jun '91	60%	Blues Brothers	Nov '91	86%
Bane of Cosmic Forge	Jun '92	80%	Bonanza Brothers	Jan '92	70%
Barbarian II	Jan '92	73%	Borobdur	Mar '92	35%
Barbarian	Jul '91	76%	Boston Bomb Club	Oct '91	74%
Bard's Tale III			Botics	Jan '91	41%
– Thief of Fate	May '91	69%	Brat	Apr '91	87%
Basketball	Aug '89	65%	Breach 2	Aug '90	79%
BAT 2	Oct '92	84%	Brides of Dracula	Apr '92	73%
Batman	Nov '89	FG 90%	BSS Jane Seymour	Aug '92	75%
Battle Chess II	Aug '91	76%	Bug Bash	Oct '90	65%
Battle Command	Jan '91	FG 90%	Bug Bomber	Sep '92	83%
Battle Isles	Nov '91	FG 90%	Cabal	Mar '90	71%
Battle Isles Scenarios 1	Jul '92	72%	Cadaver – The Pay Off	Jun '91	85%

Cadaver	Nov '90	83%
California Games 2	Aug '92	64%
Captain Dynamo	Oct '92	67%
Captain Planet	Dec '91	43%
Captive	Oct '90	FG 91%
Car-Vup	Jan '91	83%
Cardiaxx	Jan '92	37%
Cardinal o/t Kremlin	Aug '91	59%
Carl Lewis Challege	Oct '92	56%
Carthage	Jan '91	82%
Castle Master	May '90	89%
Castle of Dr Brain	Jun '92	81%
Castle Warriór	Oct '89	53%
Castles	May '92	72%
Celtic Legends	Dec '91	85%
Centurion Defender of Rome	Jun '91	79%
Challenge Golf	Aug '91	45%
Champ	Aug '89	48%
Champion of the Raj	Jul '91	57%
Championship Manager	Jul '92	41%
Chaos Strikes Back	Mar '91	89%
Chariots of Wrath	Jun '92	42%
Chase HQ	Jan '90	82%
Chess Champion 2175	Jul '90	77%
Chess Champion	Apr '92	65%
Chip's Challenge	Jan '91	79%
Chuck Rock	Apr '91	80%
Chuck Yeager's Flight Trainer	May '91	71%
Circus Attractions	Jul '89	56%
Cisco Heat	Dec '91	62%
Civilisation	Aug '92	FG 94%
CJ in the USA	Oct '92	79%
Classic Invaders	Jul '89	9%
Cloud Kingdoms	Sep '91	56%
Codename Iceman	Sep '90	64%
Colonel's Bequest	Sep '90	60%
Colony	May '90	51%
Colorado	May '90	62%
Combo Racer	Aug '90	69%
Combo Racer	Mar '92	44%
Commando	Jan '90	71%
Conflict Europe	Oct '89	65%
Conflict: Korea	Jul '92	70%
Conqueror	Mar '90	FG 93%
Continental Circus	Oct '89	71%
Cool Croc Twins	Jul '92	88%
Cover Girl Poker	Jun '92	19%
Covert Action	Jun '92	68%
Crackdown	Apr '90	67%
Crackdown	Jul '92	54%
Crazy Cars III	Aug '92	FG 93%
Crazy Seasons	Aug '92	68%
Cricket	Sep '91	61%
Crime Does Not Pay	Jul '91	54%
Cruise for a Corpse	Sep '91	FG 90%
Cyberball	May '90	71%
Cybercon III	May '91	FG 90%
Cycles	Mar '90	84%
D-Generation	Jul '92	66%

D.R.A.G.O.N. Force	Jun '90	83%
Damocles	Aug '90 FG	92%
Damocles Mission Disk 1	Jan '91	89%
Dan Dare III	Jun '90	67%
Darkman	Oct '91	48%
Das Boot	May '91	79%
Deadline	Sep '91	42%
Death Trap	Dec '90	74%
Deathbringer	Dec '91	71%
Defender II	Dec '90	78%
Defenders of the Earth	Jul '90	58%
Deja Vu II	Sep '89	82%
Deliverance	May '92	80%
Demon's Tomb	Mar '90	80%
Demoniak	Apr '91	70%
Denaris	Apr '92	73%
Deuteros	Mar '91 FG	95%
Devious Designs	Dec '91	83%
Disc	May '92	48%
Discovery	Jul '92	72%
Distant Armies	Oct '90 FG	92%
Dojo Dan	Jul '92	80%
Dominator	Sep '89	28%
Double Dragon 2	Feb '92	73%
Double Dragon II	Dec '89	64%
Dr Plummet's House of Flux	Mar '90	77%
Dragon Breed	Dec '90	75%
Dragon Spirit	Nov '89	67%
Dragonflight	Oct '90	70%
Dragons Breath	Mar '90 FG	94%
Dragons Lair II Timewarp	Feb '91	65%
Dragons of Flame	Feb '90	62%
Drakkhen	Feb '90	73%
Dreadnoughts	Jul '92	45%
Driller	Mar '91	88%
Drivin' Force	Mar '90	81%
Dune	Jun '92	79%
Dylan Dog – The Murderers	Jul '92	42%
Dynablaster	Apr '92	87%
Dynamite Dux	Oct '89	64%
Dynasty Wars	Jul '90	69%
Dyter 07	May '90	47%
Eco Phantoms	Jan '91	84%
Edd the Duck	Jan '91	61%
Edd the Duck	Jun '92	77%
Elf	Oct '91	85%
Elvira 2	Apr '92	81%
Elvira Mistress of the Dark	Jan '91	61%
Emlyn Hughes Arcade Quiz	Mar '91	38%
Emlyn Hughes International Soccer	Aug '92	77%
Epic	Jul '92	34%
Erik	Sep '92	67%
Escape From Colditz	Apr '91	79%
Escape from the Planet of the Robot Monsters	May '90	82%
Espana The Games '92	Sep '92	43%
ESWAT	Jan '91	59%
European Champions	Aug '92	34%

European Superleague	Nov '90	74%
Everton FC Intelligensia	Aug '90	53%
The Executioner	Sep '91	40%
Exile	May '91	68%
Extase	Sep '90	86%
Exterminator	Feb '91	64%
Eye of Horus	Dec '89	61%
Eye of the Beholder 2	May '92	FG 91%
Eye of the Beholder	Jun '91	FG 92%
F-15 Strike Eagle	Jun '91	FG 90%
F-16 Combat Pilot	Apr '92	80%
F-16 Combat Pilot	Sep '89	FG 94%
F-19 Stealth Fighter	Oct '90	FG 91%
F-29 Retaliator	May '90	FG 92%
F1 Tornado	Oct '92	47%
Face Off	Nov '91	83%
Falcon Mission Disk:		
Op Counterstrike	Sep '92	78%
Falcon Mission Disk:		
Op Firefight	Sep '92	80%
Falcon	Sep '92	FG 90%
Falling Jewels	Feb '92	38%
Famous Five		
– Treasure Island	May '91	73%
Fantastic Voyage	Jan '92	49%
Fascination	Sep '92	65%
Fate: Gates of Dawn	Feb '92	77%
Federation of Free Traders	Aug '89	69%
Fiendish Freddy's		
Big Top of Fun	Sep '89	59%

Fighter Bomber	Mar '90	87%
Fighter Bomber Missions	Sep '90	71%
Fighting Soccer	Dec '89	43%
Final Battle	Oct '90	56%
Final Blow	Dec '91	43%
Final Command	Jul '92	53%
Final Fight	Oct '91	60%
Fire and Brimstone	Jul '90	81%
Fire and Ice	Jun '92	89%
Fire Brigade	Aug '89	88%
Fire	Mar '90	43%
Fireteam 2200	Apr '92	78%
First Samurai	Nov '91	FG 91%
Flames of Freedom	Oct '91	87%
Flight of the Intruder	Oct '91	88%
Flight Path 737	Jul '91	10%
Flood	Aug '90	84%
Floor 13	Jul '92	50%
Fools Errand	Nov '90	70%
Football Champ	Jul '92	40%
Formula 1 Grand Prix	Dec '91	FG 92%
Fort Apache	Dec '91	68%
Frenetic	Aug '91	67%
Frostbyte	Jul '91	69%
Full Contact	Jun '91	86%
Full Metal Planet	Feb '90	75%
Future Basketball	Oct '90	43%
Future Wars	Dec '89	84%
Fuzzball	Dec '91	80%
G-LOC R360	Aug '92	44%

Galaxy Force II	Jan '90	47%
Games Summer Edition	Aug '91	51%
Games: Summer Edition	Nov '89	61%
Garfield: Winter's Tail	Oct '89	43%
Gateway/Savage Frontier	Apr '92	45%
Gauntlet 3	Sep '91	63%
Gazza II	Feb '91	51%
Gem-X	Apr '91	88%
Gemini Wing	Sep '89	68%
Genghis Kahn	Mar '91	84%
Germ Crazy	Jul '91	75%
Ghost Battle	Jul '91	69%
Ghost's 'N' Goblins	Jul '90	80%
Ghostbusters II	Dec '89	79%
Ghouls 'n' Ghosts	Jan '90 FG	91%
Ghouls 'n' Ghosts	Feb '92	54%
Global Effect	Jun '92	67%
Go	Apr '91	78%
Go	Apr '92	64%
Gobliiins	Aug '92	81%
The Godfather	Feb '92	46%
Gods	May '91 FG	90%
Gold of the Aztecs	Sep '90	73%
Gold Rush	Sep '89	38%
Golden Axe	Dec '90	80%
Golden Eagle	Feb '92	59%
Graham Taylor's Soccer Challenge	Jul '92	82%
Grand National	Apr '90	30%
Grand Prix Circuit	Aug '89	78%
Gravity	May '90 FG	91%
Great Napoleon Battles	Mar '92	40%
Gremlins 2	Nov '90	79%
Grid Runner	Jul '90	71%
Gunboat	Jul '91	72%
Gunship	Jul '89	87%
Guy Spy and the Crystals of Armageddon	Aug '92	48%
Hagar the Horrible	Dec '91	59%
Halls of Montezuma	Jul '91	43%
Hammerfist	Jun '90	89%
Hard Drivin'	Jan '90	50%
Hard Drivin' II	Mar '91	68%
Hard Nova	Oct '91	42%
Hare Raising Havoc	Mar '92	25%
Harlequin	Mar '92	78%
Harley Davidson	Aug '90	67%
Harpoon Battleset 3	Apr '92	78%
Head over Heels	Oct '91	79%
Heart of China	Feb '92 FG	90%
Heavy Metal	Jun '90	77%
Heimdall	Nov '91	88%
Helter Skelter	Oct '90	87%
Herewith the Clues	Apr '90	80%
Hero Quest	Aug '91	85%
Hero Quest	Jun '91	85%
Hero Quest Return	May '92	60%
Hero's Quest	Jul '90 FG	92%
High Steel	Aug '89	39%
Highway Patrol	Apr '90	48%

Hill Street Blues	May '91	82%
Hillsfar	Nov '89	72%
Hoi	Aug '92	72%
Hollywood Collection	Dec '90	80%
Hook	Aug '92	48%
Horror Zombies from the Crypt	Jul '92	48%
Horror Zombies	Jan '91	71%
Hostile Breed	Jul '92	78%
Hot Rod	May '90	66%
Hound of Shadow	Jan '90	45%
Hoversprint	May '92	67%
Hunter	Feb '91	86%
I Play 3D Soccer	Jun '91	81%
Immortal	Oct '90	78%
Imperium	Jul '90	86%
Impossamole	Jun '90	60%
Impossible Mission 2	Jul '91	72%
Indiana Jones and the Last Crusade	Aug '89	77%
Indiana Jones Adventure	Dec '89	71%
Indianapolis 500	Nov '90 FG	92%
Infection	Oct '89	83%
Infestation	Apr '90	89%
Interceptor	Jul '91	42%
International 3D Tennis	Aug '92	83%
International 3D Tennis	Jul '90	79%
International Athletics	Sep '91	58%
International Championship Wrestling	May '90	24%
International Ice-hockey	May '91	79%
International Soccer Challenge	Dec '90	55%
International Sports Challenge	Jul '92	68%
Interphase	Oct '89	88%
Iron Lord	Jan '90	77%
Ishar – Legend of the Fortress	Jul '92	76%
Ishido	Jan '91	80%
The Island of Lost Hope	May '90	80%
Italia '90	Apr '90	27%
Italy '90	Jun '90	80%
Italy 1990	Jul '92	70%
Ivanhoe	Jun '90	52%
Jack Nicklaus' Golf	Sep '89	78%
Jaguar XJ220	Jul '92	83%
Jahangir Kahn's Squash	May '91	81%
James Pond	Mar '92 FG	90%
James Pond	Nov '90	81%
James Pond, Robocod	Nov '91 FG	91%
The Jetsons	Apr '92	29%
Jim Power in Mutant Planet	Jul '92	85%
Jimmy White's Snooker	Aug '91 FG	91%
Jockey Wilson Darts	Dec '90	77%
John Barnes European Football	Jul '92	42%
John Madden's Football	Mar '92 FG	94%
Journey	Jul '89	82%
Judge Dredd	Feb '91	44%
Jumping Jack Son	Jun '90	81%
Jupiter's Masterdrive	Feb '91	79%
Jupiter's Masterdrive	Feb '92	87%
Keef the Thief	Dec '89	89%

Kenny Dalglish		
Soccer Match	Feb '90	31%
Kick Off 2	Jul '90	FG 94%
Kick Off Extra Time	Jan '90	45%
Kick Off	Jul '89	FG 91%
Kid Gloves 2	Feb '92	79%
Kid Gloves	Apr '90	61%
Kid Gloves	Sep '91	61%
Killing Cloud	Apr '91	80%
Killing Game Show	Nov '90	FG 92%
Klax	Jul '90	88%
Knight Force	Jan '90	33%
Knightmare	Jan '92	85%
Knights of Crystallion	Mar '90	FG 91%
Knights of the Sky	Nov '91	88%
Kult	Aug '89	FG 92%
Kwik Snax	Mar '92	55%
Kwik Snax	Sep '92	80%
Lancaster	Nov '89	61%
Laser Squad	Nov '89	FG 93%
Last Ninja 2	Aug '90	58%
Last Ninja III	Nov '91	81%
Leander	Feb '92	78%
LED Storm	Jul '91	46%
Legend	Jun '92	88%
Legend	Nov '89	52%
Legend of Djel	Nov '89	59%
Leisure Suit Larry 1	May '92	53%
Leisure Suit Larry 5	Mar '92	50%
Lemmings	Feb '91	FG 92%
Licence to Kill	Aug '89	71%
Life and Death	Jul '91	70%
Line of Fire	Dec '90	80%
Links Courses: Bountiful	Aug '92	88%
Links Courses: Firestone	Aug '92	89%
Links	Jun '92	FG 92%
Liverpool	Sep '92	45%
Llamatron 2112	Aug '91	89%
Logical	Jun '91	80%
Loom	Oct '90	85%
Lord of the Rings	Dec '91	72%
Lost Patrol	Aug '90	79%
Lotus Esprit Turbo	May '92	87%
Lotus Turbo Chall 2	Nov '91	89%
Lotus Turbo Challenge III	Oct '92	76%
Lotus Turbo Esprit Challenge	Nov '90	89%
Lure of the Temptress	Jun '92	FG 92%
M1 Tank Platoon	Oct '90	71%
Mad Dog Williams	Mar '92	72%
Magic Fly	Sep '90	88%
Magic Garden	Nov '91	79%
Magic Marble	Dec '89	73%
Magic Pockets	Sep '91	85%
The Manager	May '92	79%
Manchester United	Apr '90	62%
Manchester Utd Europe	Jul '91	80%
Manchester Utd Europe	Jun '92	74%
Manhunter 2	Jul '90	54%
Manic Miner	Apr '90	25%
Manix	Feb '92	63%

Mannix	Nov '90	69%	Moonfall	Apr '91	71%
Masterblazer	Dec '90	89%	Moonshine Racers	Mar '91	79%
Match of the Day	Oct '92	56%	Moonstone	Feb '92	59%
Mayday Squad	Jul '89	67%	Moonwalker	Dec '89	68%
Mean Streets	Nov '90	88%	Mr Heli	Nov '89	52%
Medieval Warriors	Sep '91	63%	MUDS	Jan '91	81%
Mega Twins	Nov '91	60%	Murder	Aug '90	81%
Mega-lo-Mania	Aug '91	FG 91%	Mystical	Dec '90	71%
Megafortress	Aug '92	77%	Mystical	Feb '92	60%
MegaTraveller 2	Aug '92	82%	Myth	Jul '92	58%
Megatraveller	Jun '91	70%	Myth	Oct '89	87%
Mercenary III	Feb '92	87%	Nam	Mar '91	88%
Merchant Colony	May '91	67%	Narc	Feb '91	63%
Mercs	Jul '91	72%	Narco Police	Jan '91	79%
Metal Masters	May '91	52%	Narco Police	Sep '92	63%
MicroProse Golf	Dec '91	FG 90%	Navy Moves	Jul '89	53%
MicroProse Soccer	Jun '92	60%	Nebulus 2	Sep '91	63%
MicroProse Soccer	Jul '89	67%	Necronom	Dec '91	23%
Midnight Resistance	Aug '90	69%	Neighbours	Jul '92	24%
Midwinter	Jun '90	FG 92%	Neuromancer	Aug '90	81%
MiG 29 Fulcrum	Feb '91	FG 90%	New York Warriors	Nov '90	65%
MiG 29M Superfulcrum	Nov '91	89%	New Zealand Story	Jul '89	FG 94%
Might and Magic 3	May '92	82%	Nightshift	Dec '90	81%
Might and Magic	May '90	73%	Nine Lives	Dec '90	64%
Mighty Bomb Jack	Feb '91	60%	Ninja Remix	Jan '91	78%
Mille Miglia	Jul '92	51%	Ninja Spirit	Jun '90	63%
Mindbender	Feb '92	65%	The Ninja Warriors	Dec '89	88%
Monkey Island 2	Jun '92	FG 95%	Nitro	Jan '91	84%
Monster Pack Compilation	May '91	83%	North and South	Dec '89	74%
Monty Python	Sep '90	88%	North and South	Jul '92	84%

Nuclear War	May '90	51%
Nucleus	Oct '90	54%
Obitus	Feb '91	81%
Oh no! More Lemmings	Jan '92	82%
Oil Imperium	Sep '89	66%
Omar Sharif's Bridge	Aug '92	58%
Omega	Jan '90	87%
Onslaught	Dec '89	78%
Onslaught	Jan '92	81%
Ooops Up!	Dec '90	76%
Operation Combat	Sep '92	79%
Operation Stealth	Sep '90 FG	90%
Operation Thunderbolt	Apr '92	44%
Operation Thunderbolt	Jan '90	88%
Oriental Games	Oct '90	72%
Ork	May '92	72%
Outlands	Feb '90	51%
Outrun Europa	Nov '91	78%
Overlander	Mar '90	81%
P 47	Feb '90	80%
Pacific Islands	May '92 FG	93%
Pang	Nov '90	87%
Panzer Battles	Jul '92	69%
Paperboy 2	Sep '92	44%
Paperboy	Oct '89	41%
Paradroid 90	Nov '90	88%
Parasol Stars	Jun '92	87%
Paris-Dakar	Apr '90	37%
Pegasus	Nov '91	61%
The Perfect General	Jul '92	82%
PGA Tour Golf	Apr '91 FG	90%
PGA Tour Golf courses	Mar '92	72%
Phobia	Aug '89	72%
Photon Storm	Aug '90	62%
Pick 'n' Pile	Dec '90	71%
Pinball Dreams	Mar '92	84%
Pinball Magic	Feb '90	75%
Pipe Mania	Mar '90	81%
Pirates	Mar '90	77%
Pitfighter	Oct '91	60%
Plague	Jul '90	61%
Plan 9 From Outer Space	Sep '92	45%
Player Manager	Apr '90 FG	93%
Plexu	Oct '90	21%
Plotting	Sep '90	81%
Police Quest 2	Aug '90	69%
Pools of Darkness	May '92	53%
Popeye 2	Sep '92	68%
Populous 2	Dec '91 FG	95%
Populous	Dec '91	89%
Populous World Editor	Jan '92	80%
Power	Mar '91	84%
Powerdrift	Nov '89 FG	92%
Powerdrome	Jul '89 FG	92%
Powermonger	Dec '90 FG	94%
PP Hammer	Jun '91	80%
Predator 2	May '91	81%
Predator	Nov '89	22%
Prehistoric Tale	Mar '91	49%
Prehistorik	Jul '91	68%

Premiere	Sep '92	89%	Red Storm Rising	Aug '90	89%
Prince	Jan '90	54%	Red Zone	Oct '92	64%
Prince of Persia	Feb '91	88%	Renegade	Apr '92	71%
Pro Tennis Tour 2	Apr '91	82%	Resolution 101	Feb '92	82%
Pro Tennis Tour	Nov '89	87%	Resolution101	Jun '90	87%
ProFlight	Jul '91	75%	Return of Medusa	Mar '92	85%
Project X	May '92	75%	Revelation	Mar '91	78%
Projectyle	Jul '90	FG 90%	Rick Dangerous	Aug '89	89%
Protector	Jul '91	13%	Rick Dangerous II	Oct '90	FG 92%
Protector	Jun '90	52%	Rick Dangerous	Mar '92	75%
Psyborg	Apr '92	36%	Rise of the Dragon	Sep '91	86%
Pursuit to Earth	Feb '90	19%	Risk	Mar '90	85%
Push-Over	Aug '92	86%	Risky Woods	Jul '92	65%
Putty	Oct '92	FG 95%	Robin Hood	Sep '91	80%
Puzznic	Dec '90	88%	Robin Smith's Cricket	Sep '91	35%
Pyramax	Aug '90	52%	Robocop 2	Dec '90	80%
Quadrel	May '91	63%	Robocop 3	Feb '92	FG 91%
Quartz	Nov '89	68%	Robocop	Apr '92	57%
Quest for the Time Bird	Nov '89	82%	Robocop	Sep '89	73%
R-Type II	Jul '91	88%	Robosport	Oct '92	FG 90%
Race Drivin'	Apr '92	45%	Robozone	Dec '91	52%
Railroad Tycoon	Apr '91	FG 92%	Rock'n'Roll	Dec '89	86%
Rainbow Islands	Apr '90	FG 95%	Rocket Ranger	May '91	89%
Rally Cross Challenge	Dec '89	64%	Rodland	Sep '91	88%
Rampage	Jul '89	72%	Rogue Trooper	Dec '90	85%
Ranx	Dec '90	52%	Rolling Ronny	Oct '91	76%
RBI 2	Jul '91	84%	Rome AD 92	Oct '92	77%
Realms	Feb '92	69%	Rorke's Drift	Jul '90	62%
Red Baron	Feb '92	39%	Rotor	Mar '90	84%
Red Lightning	Oct '89	FG 90%	Rotox	Feb '92	86%

Rotox	Jun '90	84%
Rugby The World Cup	Dec '91	82%
S.T.U.N. Runner	Jan '91	66%
S.W.I.V.	Mar '91	FG 92%
Safari Guns	Dec '89	42%
Saint Dragon	Oct '90	82%
Samurai	May '92	65%
Sarakon	Sep '91	60%
SAS Combat Simulator	May '90	44%
Satan	Oct '90	77%
SCI Chase HQ II	Dec '90	76%
Scooby and Scrappy Doo	Nov '91	69%
Scramble Spirits	Apr '90	54%
Search for the King	Jun '91	68%
Secret of Monkey Island	May '91	FG 92%
Sensible Soccer	Jun '92	FG 91%
Seven Colours	Nov '91	64%
Seven Gates of Jambala	Feb '90	79%
Seymour Goes Hollywood	Aug '92	77%
Shadow of the Beast 2	Sep '90	87%
Shadow of the Beast	Oct '89	78%
Shadow Sorceror	Dec '91	74%
Shadow Warriors	Aug '90	42%
Shadowlands	Mar '92	FG 93%
Sharkey's Moll	Jul '91	69%
Sherman M4	Apr '90	77%
Sherman M4	Jul '92	74%
Shinobi	Oct '89	36%
Shockwave	Dec '90	87%
Shogun	Sep '89	76%
Shoot Em Up Construction Kit	Sep '92	88%
Shufflepuck Cafe	Oct '89	49%
Silent Service II	Oct '91	82%
Silkworm	Mar '91	86%
Sim Ant	Jun '92	73%
Sim City Architecture 1 – Future Cities	Aug '92	78%
Sim City Architecture 2 – Ancient Cities	Aug '92	78%
Sim City	Dec '89	FG 92%
Sim City Terrain Editor	Aug '92	75%
Sim Earth	Sep '92	79%
The Simpsons	Aug '91	82%
Simulcra	Sep '90	80%
Sirius 7	Dec '90	24%
Skate of the Art	Sep '89	38%
Ski or Die	Mar '91	62%
Skidz	Jun '90	86%
Skweek	Jul '89	78%
Slayer	Nov '89	43%
Sleeping Gods Lie	Aug '89	80%
Sleeping Gods Lie	Aug '92	60%
Sliders	Aug '91	60%
Smash TV	Jan '92	61%
Soccer Pinball	Oct '92	46%
Sooty and Sweep	Sep '92	80%
Sorceror	Sep '91	60%
Space 1889	Jan '92	59%
Space Ace	Feb '90	62%

Space Crusade	Apr '92	82%	Strider	Sep '89 FG	91%
Space Gun	Apr '92	57%	Strike Fleet	Dec '91	80%
Space Quest I	Jun '92	58%	Striker	Jun '92 FG	93%
Space Quest IV	May '92	48%	Striker Manager	Aug '91	53%
Space Rogue	May '90	55%	Striker Manager	Sep '92	62%
Special Forces	May '92	79%	Stunt Car Racer	Dec '89 FG	93%
Speedball 2	Feb '91 FG	94%	Stunt Car Racer	Dec '91	89%
Speedball	May '91	79%	Supaplex	Dec '91	73%
Spellbound	May '92	51%	Supaplex	Jun '92	44%
Spherical	Jul '89	64%	Super Monaco Grand Prix	Mar '91	83%
Spindizzy Worlds	Dec '90 FG	94%	Super Monaco Grand Prix	Oct '92	80%
Sporting Gold Compilation	Dec '90	71%	Super Off-Road Racer	Nov '90	80%
Sporting Triangles	Dec '89	65%	Super Puffy's saga	Feb '90	57%
Spy vs Spy	Jun '92	84%	Super Ski 2	May '92	70%
Spy Who Loved Me	Nov '90	80%	Super Skweek	Mar '91	81%
Stack Up	Aug '91	80%	Super Space Invaders	Nov '91	83%
Starblade	Sep '90	67%	Super Tetris	Aug '92	68%
Starbyte Super Soccer	Mar '92	63%	Supercars 2	Apr '91	80%
Starglider 2	Jan '92	88%	Supercars	Feb '90	86%
Starush	Jun '92	52%	Superleague Soccer	Dec '89	48%
Steel Empire	Jul '92	63%	Superski Challenge	Dec '90	69%
Steg the Slug	Jan '92	83%	Supremacy	Sep '90 FG	90%
Steve McQueen	Feb '92	26%	Suspicious Cargo	Nov '91	80%
Storm Across Europe	Jun '90	80%	Swap	Aug '91	59%
Storm Master	Mar '92 FG	91%	Switchblade	Dec '89	85%
Stormball	Jun '91	70%	Switchblade	Jun '91	70%
Stormlord	Dec '89	62%	Sword of Honour	Sep '92	67%
Stratego	Oct '91	81%	Swords of Twilight	Dec '89	68%
Street Hockey	Dec '90	44%	Tangram	Jul '91	60%
Strider II	Dec '90	77%	Team Suzuki	Feb '91	88%

Team Suzuki	Jul '92	87%
Team Yankee	Oct '90	81%
Teenage Mutant Hero Turtles	Jan '91	35%
Tennis Cup 2	Aug '92	80%
Tennis Cup	May '90	83%
Terminator 2	Nov '91	60%
Tetris	May '91	70%
Thai Boxing	Jul '91	16%
Their Finest Hour	May '90 FG	90%
Their Finest Missions	Oct '91	83%
Theme Park Mystery	Jun '90	82%
ThunderBurner	Feb '92	22%
Thunderhawk	Aug '91 FG	90%
Thunderjaws	Oct '91	51%
Thunderstrike	Feb '92	73%
Thunderstrike	Sep '90	77%
Tie Break	Sep '90	84%
Time Machine	Sep '90	85%
Time Soldier	Jul '90	49%
Tintin on the Moon	Nov '89	38%
Tip Off	Jan '92	50%
Titanic Blinky	Dec '91	74%
Titus the Fox	Apr '92	81%
Toki	Jun '91	78%
Toobin'	Dec '89	72%
Torvak the Warrior	Nov '90	69%
Total Recall	Feb '91	77%
Total Recall	Oct '92	79%
Touchdown	Sep '92	65%
Tournament Golf	Feb '91	70%
Tower FRA	Mar '91	74%
Tower of Babel	May '90 FG	95%
Toyota Celica GT Rally	Mar '92	73%
Toyota Celica Rally	Dec '90	70%
Traders	Sep '92	70%
Treasure Trap	Jun '90	68%
Trial By Fire	Jun '91	56%
Turbo Outrun	Dec '89	70%
Turn It	Jul '90	83%
Turrican II	Feb '91	80%
Turrican	Jul '90	88%
Turrican	Nov '91	88%
Turtles Coin-op	Jan '92	60%
Tusker	Aug '90	68%
TV Sports Baseball	Jul '92	67%
TV Sports Basketball	Apr '90	51%
Twin World	Dec '89	81%
Typhoon Thompson	Apr '90	80%
Ugh!	Jul '92	88%
Ultima VI	Apr '92	67%
Ultimate Darts	Jul '91	55%
Ultimate Golf	Feb '92 FG	90%
Ultimate Golf	Jun '90	88%
Ultimate Ride	Dec '90	67%
UMS II	Apr '91	77%
Under Pressure	Dec '91	45%
Unreal	Sep '90	74%
Untouchables	Apr '92	38%
The Untouchables	Feb '90	87%
Utopia	Oct '91	84%

Utopia – New Worlds	Sep '92	74%	Wings	Oct '90	79%
Vaxine	Oct '90	85%	Wings of Death	Dec '90	76%
Vector Championship Run	Jan '91	42%	Wings of Fury	Oct '90	84%
Venus the Fly Trap	Sep '90	79%	Winning Team Comp	May '91	80%
Venus the Flytrap	Mar '92	82%	Winter Supersports	Aug '92	65%
Videokid	Mar '92	60%	Wipe Out	Jun '90	85%
Vikings	Aug '92	62%	Wizkid	Jul '92 FG	93%
Vindicators	Jul '89	81%	WolfChild	Mar '92	76%
Viz the Game	May '91	70%	Wolfpack	Nov '90	83%
Volfied	Nov '91	72%	Wonderland	Jun '91	70%
Voodoo Nightmare	Mar '92	70%	World Championship		
Voodoo Nightmare	Nov '90	75%	Boxing Manager	May '90	76%
Voyager	Jul '89	79%	World Championship Soccer	Feb '91	80%
Vroom	Apr '92 FG	91%	World Class Rugby	Jan '92	68%
Vulcan	Oct '89	83%	World Cup Soccer Italia'90	May '90	74%
Warhead	Apr '90	88%	Wrath of the Demon	Jan '91	85%
Warlock - the Avenger	Mar '91	60%	Wreckers	Apr '91	82%
Warlords	Apr '91	85%	WWF Wrestlemania	Feb '92	72%
Warriors of Releyne	Aug '92	59%	X-Out	Jan '90	78%
Warzone	Jun '91	73%	Xenomorph	May '90	83%
Waterloo	Sep '89 FG	92%	Xenon 2	Sep '89 FG	93%
Wayne Gretzky Hockey	Jul '89	70%	Xenophobe	Nov '89	76%
Wayne Gretzky Hockey 2	Mar '92	78%	Xiphos	Nov '90	80%
WC Rugby Five Nations	May '92	69%	Xybots	Aug '89	77%
Web of Terror	Sep '90	48%	Yolanda	Sep '90	49%
Wheels of Fire Compilation	Dec '90	74%	Zarathrusta	Feb '91	71%
Wild West World	Jan '92	64%	Ziriax	Sep '90	68%
Wild Wheels	Dec '91	41%	Zone Warrior	Oct '91	36%
Wildlife	Aug '90	31%	Zooi	Sep '92 FG	95%
Willy Beamish	Mar '92	44%	Zork Zero	Sep '89 FG	92%

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